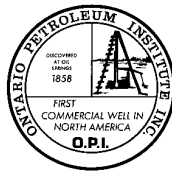




# EPEX 2021

Energy Prospectors Expo

## OPI 58<sup>th</sup> Conference and Trade Show



June 8<sup>th</sup> & September 15<sup>th</sup>,  
Virtual & Oakwood Resort, Grand Bend, Ontario



## WHAT IS EPEX?

EPEX highlights the multifaceted nature of Ontario’s oil, natural gas and salt industries and how they fit into Ontario’s energy landscape. EPEX identifies opportunities to help other energy sectors. After all, we’re all doing the same thing but in different ways -- and that is why the OPI and OGSR Library wanted to bring everyone together.

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## ENERGY PROSPECTORS EXPO

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Each one of you is an important collaborator in this conference and your participation highlights the multidimensionality of our energy sector in Ontario.

The EPEX logo is a tesseract, a four-dimensional shape with 24 faces, chosen to represent the complexities and multiple layers of energy production in Ontario.

EPEX is about more than prospects – it’s about exploring.

*Join us in the plenary session and let’s start generating collaborative energy!*

*Social Media #epex2021*

We’re live online. Follow the conference, post pictures and ask questions on twitter using the hashtag:

# #epex2021



## Schedule of Events

### Day 1 - Tuesday, June 8<sup>th</sup> – Virtual Event

| <b>Length</b> | <b>Time</b> | <b>Event</b>  | <b>Presenters</b>   |
|---------------|-------------|---|---|
| 15 min        | 1:00        | Official Conference Opening   | Welcoming remarks   |
| 30 min        | 1:15        | <b>Plenary</b>  | OPI, OGSRL, and Industry present <b><i>Subsurface Energy Future!</i></b> How to explore and drill in Ontario.<br>MC: Shelie Cascadden, Enbridge |
| 15 min        | 1:45        | Stretch Break   | Trade Show Exhibitor and Sponsor Messages   |
|               |             | <b>BLOCK 1: EXPLORATION AND DEVELOPMENT</b>   | <b>MODERATOR:</b> Shelie Cascadden  |
| 15 min        | 2:00        | <i>Ontario producer natural gas delivery options, pricing and municipal taxation</i>                                      | Scott Lewis, Lagasco Inc.   |
| 15 min        | 2:15        | <i>Bayfield Pool as a CAES Reservoir</i>  | Jim McIntosh and Stephen Sangiuliano  |
| 15 min        | 2:30        | <i>Successful Plugging of a Hazardous Location Well - Without a Drilling Rig</i>  | Jim McIntosh, Jug Manocha, and Mark Stocking  |
| 15 min        | 2:45        | <b><i>Block 1 Panel Discussion</i></b>  |   |
| 15 min        | 3:00        | Stretch Break   | Trade Show Exhibitor and Sponsor Messages   |
|               |             | <b>BLOCK 2: ONTARIO TODAY AND TOMORROW</b>  | <b>MODERATOR -</b> Shelie Cascadden   |
| 15 min        | 3:15        | Porosity-Permeability variation and evolution in the Silurian Lockport Group, southwestern Ontario                        | Shuo Sun, University of Western Ontario & Oil, Gas and Salt Resources Library   |
| 15 min        | 3:30        | <i>A Revised 3-D Bedrock Model for Southern Ontario and Progress on the Development of a 3-D Hydrostratigraphic Model</i> | Terry Carter, Carter Geologic   |
| 15 min        | 3:45        | <i>Ministry's "Supporting Ontario's Safe Employers" program</i>   | Ron Kelusky, Ministry of Labour Training and Skills Development   |
| 15 min        | 4:00        | <b><i>Block 2 Panel Discussion</i></b>  |   |
| 5 min         | 4:15        | Official Conference Closing   | Closing Remarks   |
|               | 4:20        | <b>Conference Closed</b>  |   |

## Conference Chair's Remarks

It is my privilege to welcome you to OPI's 58<sup>th</sup> Conference, EPEX 2021.

For 57 years, the OPI Conference has provided a very necessary opportunity for industry professionals to join together, to share ideas and insights, to learn from one another, to collaborate and consider application of new data and technologies being utilized or developed by our colleagues here and in other regions. It has also provided a venue for Ontario to showcase what it has to offer to those outside of the province – and for over the last decade, as a venue to try and breathe new life into Ontario's energy sector.

It would be difficult to comment on the past year without mentioning the Covid-19 pandemic. Its' impact on business and industry has been dramatic and wide-reaching, and the energy sector has been no exception. With drastic changes to how we live day-to-day, to ever changing restrictions, disruptions in the supply chain, extending all the way to the health of the global economy, it is no surprise that our industry has faced its' share of challenges since the pandemic hit in March of 2020.

It seems clear that now is the time, more than ever, for pivoting and for finding new and creative means to meet the growing demand for energy. This fits nicely with the concept of collaboration between the energy sectors that has been an OPI Conference focus since the launch of EPEX 2018.

Though we would love to gather in person, and certainly hope this will again be possible in 2022, this years' Conference must be held virtually to ensure everyone's safety. I hope you will find it to be informative and encourage you to connect with one another and continue the good work needed to keep this vital industry alive and well in Ontario.

Niki Clarke, Conference Chair

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## Plenary Summary

(Re)-Introducing Ontario! There is a lot of energy potential under your feet in Ontario and some new opportunities are on the horizon.

Ontario Petroleum Institute (OPI); Oil, Gas and Salt Resources Library (OGSRL); and Industry collaborate again to investigate what it takes to explore and develop petroleum resources and other opportunities in Ontario.

2021 Plenary Outline:

1. Finding data for your Ontario exploration efforts.
2. Geology and operator points of view.
3. Economic recap of oil and natural gas development.
4. Canadian Standard Association update.

EPEX – The Energy Prospectors Expo was launched with the vision of inspiring more collaboration within Ontario’s multidimensional energy industry. The core participants in EPEX are the members of Ontario’s oil, natural gas, hydrocarbon storage and salt solution mining industries. The expo seeks to encourage prospects and exploration in existing and new types of ventures.

In the Plenary session we will introduce the play concepts in Ontario. These play concepts come from the poster “Exploring the Oil and Gas Plays of Ontario” written for OPI by Ian Colquhoun, Ed Welychka and Jim McIntosh. Operators of different sizes will also talk about working here in the province and give their ideas on what can be done here in the future. We hope you find this plenary session entertaining and informative.



## Student Poster Competition

In 2019 University and college students were invited to submit posters on themes of Ontario Energy or Geology.

We would like to thank Sara Belontz, Elizabeth Hooper, Chris Lucas, and Philip Teri for all submitting excellent and thoughtful posters.

The OGSR Trust Scholarship winner was Sara Belontz with the poster titled “Are Microplastic Abundances High in Benthic Sediments of Lake Huron?”.

### **Congratulations to our 2019 poster entries:**





## Speaker Biographies and Abstracts

### Block 1 – Exploration and Development

Scott Lewis

Vice President – Operations, Lagasco Inc.

Scott is a third-generation producer in Ontario and a Professional Geologist and Project manager consulting for the Lagasco group with over 10 years of experience in the Ontario patch. Scott has worked as project lead on several federal and provincial government well abandonment projects and is integral in the day to day management of the Lagasco Group of companies. Scott is currently Vice Chair of the Ontario Petroleum Institute. He obtained his professional designation in Petroleum Geology working in the Ontario Oil and Gas sector In addition to an MBA from the Centre for Energy, Petroleum and Mineral Law and Policy at the University of Dundee Scotland, and an honours bachelor of science in Earth Sciences at the University of Western Ontario.

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*Scott Lewis - Abstract*

### **Integrating Large Subsurface Databases in the Michigan Basin for Analyses of Field Redevelopment Strategies**

There are 2 key issues currently affecting the profitability of many Ontario Natural Gas producers. These issues are Ontario producer Natural Gas pricing including Enbridge charges, and Municipal Tax valuations for pipelines, facilities and wells.

Lagasco Inc. and the OPI have been working to address the issue of Natural Gas pricing and Enbridge charges through participation in Ontario Energy Board consultations and directly through discussions with Enbridge Gas Inc. Ontario producers should receive the price for commodity that Enbridge charges its customers in the Southern Rate zone without deductions when selling under the standard Gas Purchase Agreement. This price is OEB approved and a fair price for natural gas commodity delivered downstream of Dawn in direct proximity to customers.

Lagasco with the OPI's support has challenged the fairness of Municipal pipeline, facility and wellhead valuations through MPAC appeals, OEB hearings, court proceedings, and through consultation with the MNRF and MOF. Ontario producers need property assessments that are in line with fair market value which take into consideration depletion and obsolescence.

To date significant progress has been made but more work still needs to be done. Correction of these key issues should lead to longevity in the Ontario natural gas industry and increased exploration and development activity with a stronger contribution to the province with economic, societal and environmental benefits.

## Jim McIntosh and Stephen Sangiuliano

### Jim McIntosh, P. Eng., Petroleum Consultant

Jim McIntosh graduated from Chemical Engineering from the University of Alberta in 1976, then moved to Calgary to work for Calgary-based oil and gas companies for 12 years. He moved to London in 1988, working initially for Ram Petroleums, then Denbridge Gas/Cambright Gas before starting his consulting company in 2001.

Jim has been involved in all aspects of engineering in the upstream oil and gas sector in SW Ontario since 1988. He drilled the first directional and first horizontal wells chasing exploration and production in the province, he designed and built the Innerkip gathering system and compressor station, and he designed and built the upgraded Rodney oil battery. More recently, Jim drilled the initial Injection/Withdrawal wells and designed and supervised the construction of the compressor station associated with the Tipperary Gas Storage pool near Goderich. Jim also writes reserve reports for various public companies as part of their public listing requirements.

Jim has presented numerous times at OPI conferences in the past. He is here today to discuss his experiences designing and supervising the rig-less plugging of an orphan well under the Abandon Works Program. His second talk is about repurposing a depleted Guelph pinnacle reef as an air storage container for a Compressed Air Energy Storage project.

### Stephen J. Sangiuliano, B.E.S., M.E.S., P.M.P.

Stephen has engaged in energy generation, efficiency, and storage projects across North and South America and Europe in the areas of planning, management, and project development. Trained as an energy and environmental planner and project manager, Stephen consults for a wide variety of energy projects ranging from the early research and development phase to commercial implementation. Stephen has produced over a dozen peer-reviewed and government publications in the fields of energy and the environment and has appeared in several media outlets concerning his work to date.

Stephen's currently works as the Director of Project Management for Bedrock Energy Corp., while being an owner thereof. Stephen leads daily operations on early-stage project development of Bedrock's utility-scale Compressed Air Energy Storage project is the corporation's porous rock reservoir assets.

*Jim McIntosh and Stephen Sangiuliano - Abstract*

**The Bayfield Pool as a Compressed Air Energy Storage Container synopsis**

This talk will briefly discuss what Compressed Air Energy Storage (CAES) is and why it is important to the Ontario electrical grid as a means to help balance out the intermittency of wind and solar power. The differences between CAES in salt-solutioned caverns and CAES in reservoir rock will be discussed.

The balance of the talk will discuss the Bayfield and Stanley 4-7-XI pools and why Bedrock believes the pools are suitable as CAES in Reservoir Rock containers. Creation of the reservoir model of the Bayfield pool will be discussed. Using the reservoir model, Bedrock will show how the remaining natural gas in the pool can be swept with nitrogen, then how the pool can be developed using multiple horizontal wells to serve as a CAES container. Finally, next steps will be discussed, including creation of the regulatory framework to allow CAES in Reservoir Rock projects to be approved, and what steps Bedrock is following to develop both the Bayfield and Stanley pool.

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## Jim McIntosh and Jug Manocha

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Jug Manocha, P. Eng., Special Projects Engineer

Jug Manocha is a Special Projects Engineer who has been involved in the Oil, Gas and Hydrocarbon Storage industry both as a regulator and as an operator. He has been recognized for his many presentations and educational initiatives with an Award of Merit from the OPI. He has also been recognized with an Award of Merit from the Canadian Standards Association for his work on the CSA Z341 Storage of hydrocarbons in underground formations and for CSA Z325 Well design. He has been actively involved in plugging many wells under the Abandoned Works Program including a sulphurous water artesian well.

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*Jim McIntosh and Jug Manocha – Abstract***Successful Plugging of a Well on Lake Erie Bluff - Jim McIntosh, P. Eng., Jug Manocha, P.Eng. and Mark Stocking, Driller.**

A well located approximately 100 meters from Lake Erie shoreline, was drilled some 80 years ago and left in an unplugged condition. This well leaked small amounts of crude oil on an intermittent basis and was added to the wells to be considered for plugging under the Abandoned Works Program. With the continued accelerated erosion of the shoreline at this location on Lake Erie, the well was at the edge of the bluff of Lake Erie with a 20-meter drop to the lake in 2016. A decision made to consider plugging the well. Additional safety precautions taken to assess the slope and area stability and to implement specialized training and procedures to work in hazardous locations. Well plugging plans and strategy developed to plug the well without a drilling rig on site using specialized low weight logging and cementing equipment strategies. Well logging results showed casing and tubing intact. The tubing was perforated and cementing conducted through the wellbore, isolating subsurface formations from the overburden and surface. The well was plugged without using onsite drilling rig in 2016. This was the first well in Ontario where drones were used, where workers worked from platforms under professional harnessed situations and where plugging completed by cement circulation without an onsite drilling rig. Subsequent follow-up site visit in 2021 showed that the well had fallen into Lake Erie, and fortunately, as the well had been successfully plugged, there was no release of oil into the Lake.

## Block 2 – Ontario Today and Tomorrow

### Shuo Sun

Postdoctoral Fellow, University of Western Ontario & Oil, Gas and Salt Resources Library

Shuo Sun is an industrial postdoctoral fellow in Oil, Gas and Salt Resources Library and University of Western Ontario. His postdoctoral project (2019 to present), supported by MITACS research funds, is the study of geologic controls on the porosity and permeability of the Silurian Lockport Group, southwestern Ontario. It involves geographic analysis on the variations in porosity and permeability in the Lockport Group at formation level, relating these variations to lateral depositional and diagenetic facies changes, in order to more accurately represent the continuity/discontinuity of bedrock pore systems, relationships to hydrocarbon traps and groundwater flow patterns in southern Ontario.

He has obtained his PhD degree in the Earth Science Department, Western University, in March 2018. His PhD project (2013 to 2018) is on the revised stratigraphy of the upper Silurian-Middle Devonian stratigraphy in southwestern Ontario. His work involves core logging, outcrop section mapping integrated with hundreds of wells with geophysical data and drill cuttings.

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*Shuo Sun - Abstract***Porosity-Permeability variation and evolution in the Silurian Lockport Group, southwestern Ontario****Sun, Shuo** <sup>1, 2</sup>; **Frank R. Brunton**<sup>1, 3</sup>, **Terry Carter**<sup>4</sup>, **Kei Yeung**<sup>3</sup>, **Jisuo Jin**<sup>1</sup>, **Jordan Clark**<sup>2</sup><sup>1</sup>Department of Earth Science, University of Western Ontario, 1151 Richmond St, London, ON N6A 3K7 [ssun224@uwo.ca](mailto:ssun224@uwo.ca)<sup>2</sup>Oil, Gas and Salt Resources Library, 669 Exeter Rd, London, ON N6E 1L3<sup>3</sup>Earth Resources and Geoscience Mapping Section, Ontario Geological Survey, Ministry of Northern Development & Mines, 933 Ramsey Lake Road, Sudbury, ON P3E 6B5<sup>4</sup>Geological consultant, 35 Parks Edge Cres, London, ON N6K 3P4

The Oil, Gas and Salt Resources Library (OGSRL) staff in London, Ontario have compiled a database of porosity and permeability core test results from 485 oil/gas wells, and 155 tests are from parts of the early Silurian Lockport Group. The data comprises 11,543 porosity and vertical and horizontal permeability analyses. This data set, in combination with outcrop sections, newly drilled rock cores, and geophysical well logs, has been integrated into a geospatial and temporal analysis of porosity and permeability at the formational rank.

Regional-scale outcrop/subcrop and deeper subsurface mapping by staff/students at Ontario Geological Survey with staff at the Oil, Gas and Salt Resources library has resulted in the development of a revised stratigraphic nomenclature and paleoenvironmental interpretation for the mature early Silurian petroleum play formerly referred to as the “Guelph” pinnacle play in southwestern Ontario. This predominantly dolostone succession is now referred to as the Lockport Group and comprises, in ascending order: Gasport, Goat Island, Eramosa and Guelph formations.

ArcGIS plots of the data provide a spatial distribution of formation isopachs and regional porosity/permeability variations in the deeper subsurface in order to improve the representation of bedrock permeability zones, relationships to hydrocarbon traps, and isolation of deeper bedrock formations from interaction with meteoric waters.

To improve the data quality, data validation has been conducted by summarizing laboratory protocols and standards from the 12 different laboratories and reconciling data fields with auxiliary data, including geophysics and duplicate cores. Data have been validated on the parameters of Effective Porosity, Grain/Bulk Density and Valid Permeability. Geology QA/QC of the 155 cored wells have been performed to delineate formational tops using geophysical logs and rock core lithofacies, in order to revise the regional lithostratigraphy. A core analysis database has been created with each porosity/permeability parameter plotted and isopach maps of each formation created in ArcGIS.

The core analysis data are derived from the deeper subsurface of southwestern Ontario and represent the Lockport oil/gas plays and intermediate brackish to saline sulphur formational fluid regimes. This newly compiled data reveals that the porosity/permeability values are controlled by variations in the dolostone lithofacies, diagenetic destruction / enhancement, presence of evaporites, and existence/development of paleokarst. The inter-pinnacle facies of the Guelph Formation have high porosity and permeability values due to the paleokarstic nature. The high porosity and permeability of the Guelph Formation within pinnacle structures have enabled entry of oil and natural gas reservoirs and/or saline water-bearing zones and remobilization of salts. From the inferred Algonquin Arch to western Lake Erie, both the karstic top of the Guelph Formation and the overlying A-1 Carbonate have variable and more permeable intervals, and the Gasport Formation also possesses relatively high permeability.



Terry Carter  
Consulting Geologist, Carter Geologic

**Terry R. Carter, MSc, P.Geo.**

Terry is formerly the Chief Geologist, Petroleum Operations, of the Ontario Ministry of Natural Resources and is now a Consulting Geologist in London, Ontario. Terry specializes in mapping, modelling and interpretation of the Paleozoic bedrock geology of southern Ontario, its oil, gas and salt resources, and regional bedrock aquifers.

Terry is co-author of the book Subsurface Paleozoic Stratigraphy of Southern Ontario, published by the Ontario Geological Survey in 2010 and is project coordinator on an ongoing project to produce 3D geological and hydrostratigraphic models of the Paleozoic bedrock of southern Ontario.

Terry Carter, Consulting Geologist

Terry.carter@cartergeologic.com

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*Terry Carter – Abstract*

## **A Revised 3-D Bedrock Model for Southern Ontario and Progress on the Development of a 3-D Hydrostratigraphic Model**

Terry R. Carter<sup>1</sup>, Frank Brunton<sup>2</sup>, Melissa Bunn<sup>3</sup>, Jordan Clark<sup>4</sup>, Charles Logan<sup>3</sup>, Hazen Russell<sup>3</sup>, and Shuo Sun<sup>5</sup>

1 Geological consultant, 35 Parks Edge Cres, London, ON N6K 3P4

2 Ontario Geological Survey, Sudbury, ON

3 Geological Survey of Canada, 601 Booth St, Ottawa, ON K1A 0E8

4 Oil Gas and Salt Resources Library, 669 Exeter Road, London, ON

5 Earth Science Dept, University of Western Ontario, 1151 Richmond Street, London, ON N6A 3K7

A regional three-dimensional (3-D) geologic model of the Paleozoic bedrock of southern Ontario co-released by the Geological Survey of Canada and Ontario Geological Survey (Carter et al 2019: GSC Open File 8618 & OGS Groundwater Resources Study 19) has been revised to reflect data corrections and improved model layer rendering. The model encompasses the entire 1500 metres of Paleozoic bedrock of southern Ontario over an area of 110,000 km<sup>2</sup>. The model comprises 53 Paleozoic bedrock layers, the Precambrian basement and the overlying unconsolidated sediment, modelled at a spatial resolution of 400 m.

Formation top data from a total of 20,836 Ontario petroleum wells, 199 OGS stratigraphic tests, 15 measured sections, 3 Michigan petroleum wells, and 30 control points were utilized, including seven new control points to improve layer extrapolation beneath Lake Huron. Corrections to formation top picks for petroleum wells is the principal control on revisions to model bedrock layers. Resolution of the subcrop surface is improved and there is a more accurate and realistic rendering and correlation of the topography and bedrock geology of the Niagara Escarpment. Anomalous outliers, structural and thickness anomalies, and gaps in model layers are greatly reduced. There was a focus on improving data quality/quantity for formations of the Lockport Group to improve model layers and support hydrostratigraphic modelling. Features added to the model include: 3-D extent of salt mining leases at Ontario's 2 underground salt mines, 3-D solution-mined caverns in salt units utilized for hydrocarbon/petrochemical storage and mining of salt, two-dimensional representations of oil and natural gas reservoirs, regional faults, and lithotectonic boundaries in the Precambrian basement. An uncertainty analysis of individual model layers is underway. Model release will occur in early 2021.

A companion 3-D hydrostratigraphic model is in preparation, with 14 bedrock hydrostratigraphic units and one unit comprising all the surficial sediments. Assignment of lithostratigraphic units as hydrostratigraphic units is based principally on hydrogeologic characteristics in the intermediate to deep groundwater regimes, below the influence of modern meteoric water. Examples from the first model iteration are presented.

## Ron Kelusky

Chief Prevention Officer/Assistant Deputy Minister, Ministry of Labour Training and Skills Development



Ron Kelusky is Ontario's Chief Prevention Officer (CPO). The CPO oversees the Prevention Office within the Ministry of Labour, Training and Skills Development, and has a wide range of responsibilities, including:

- Working with Ontario's health and safety system partners to prevent workplace injuries, illnesses and fatalities.
- Reporting to the Minister of Labour on the performance of Ontario's occupational health and safety system through an Annual Report
- Setting province-wide training and safety programs standards
- The establishment and implementation of a new provincial occupational health and safety strategy

Under the CPO's leadership, the Prevention Office has supported workplaces in Ontario to implement health and safety measures during the COVID-19 pandemic. This has included working on cross government and industry committees and producing over 200 workplace guidance resources which have been viewed over one million times.

Prior to his appointment as CPO, Ron was President and CEO of Public Services Health and Safety Association (PSHSA), a Health and Safety Association of the Ministry of Labour. Before joining PSHSA, Ron held senior positions within the private and not for profit sectors and in municipal government. Ron holds a Master of Business Administration, is a Certified Municipal Manager (CMM III) and is a member of the Institute of Corporate Directors and Canadian Society of Safety Engineers.

*Ron Kelusky – Abstract*

**Supporting Ontario’s Safe Employers**

Ron Kelusky is the Chief Prevention Officer (CPO) at the Ministry of Labour, Training, and Skills Development for the Province of Ontario.

The CPO is appointed by the Minister of Labour, Training, and Skills Development and oversees the ministry's Prevention Division. The CPO has a wide range of responsibilities, including publishing a province-wide Occupational Health and Safety Strategy; creating standards for key occupational health and safety courses; and, working with the province’s OHS system partners to apply an evidence-based approach to interventions that prevent workplace injuries, illnesses and fatalities.

The CPO’s presentation is about a new and exciting program, the first of its kind in Canada, called Supporting Ontario’s Safe Employers (SOSE). The program was developed to promote and recognize excellence in occupational health and safety in Ontario workplaces.

Employers participate voluntarily and receive formal CPO recognition as a safe employer for successfully implementing and maintaining an accredited occupational health and safety management system (OHSMS).

The presentation includes details on the history of the program’s development, how employers get involved, program requirements and criteria, the application process and eligibility details about available incentives.

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## Sponsor Biographies

### Harold Marcus Limited

Harold's introduction to the oil industry came from his father, Andrew Marcus, who hauled oil with a horse drawn 8-barrel wooden tank from the Bothwell oil fields. In 1946, determined to work in the trucking industry, Harold purchased his first oil truck, a 1942 4-wheel drive army truck, and began his tank truck service hauling oil to Bothwell, Oil Springs, Petrolia, and eventually Sarnia. Over the years, with hard work, dedication and determination, his company grew and Harold Marcus Limited was formed.

Today, Harold Marcus Limited remains a family owned and operated corporation with its head office proudly residing in the small community of Bothwell, Ontario. With 95 power units, the company's fleet has expanded to include over 275 specialized trailers comprised of stainless steel, aluminum, carbon, roll-off, vans, trains, dumps, and our unique fleet of fiberglass trailers. All of our trailers are divided into four dedicated divisions to reduce the cleaning requirement and expense, and to also eliminate the risk of contamination.

Website: <https://haroldmarcus.com/>



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**LimeGREEN** is proudly Canadian owned and operated serving Ontario and beyond. Our team is prepared to respond and mobilize to address immediate and emergent situations.

To find out more visit our website at [www.limegreeninc.com](http://www.limegreeninc.com)

Email us at [info@limegreeninc.com](mailto:info@limegreeninc.com)

Or Call us anytime **844-444-2100**

LimeGREEN Equipment Inc., 1183 Barton St E, PO Box 47629, Hamilton, ON, L8H 7S7 1 844 444 2100

## **Stream Flo Industries Ltd.**

Founded in Edmonton, Alberta, Canada in 1962, Stream-Flo Industries Ltd. manufactures wellheads, gate valves, check valves, and surface safety valves for the worldwide oil and gas industry. Our comprehensive services include field maintenance and installation, remanufacturing, customer property management, frac tree rentals, frac ball drop systems and isolation tools.

As a privately-owned and operated company, Stream-Flo has the ability—and commitment—to deliver greater value by developing long-term partnerships with our customers. This can be seen in our responsive engineered solutions to the challenges our customers face today, and in our ongoing research and development to ensure our products meet their increasingly complex requirements in the future. It can also be seen in the comprehensive services we deliver when and where our customers need them. Most importantly, it can be seen in our people. Regardless of role or level, Stream-Flo employees work as a team to ensure the success of our customers.

Our 340,000-square-foot head office in Edmonton, Alberta, Canada, is home to our Administration, Engineering, Research and Development, and Manufacturing. This world-class facility is complemented by Engineering and Service teams in the Stream-Flo USA head office in Houston, Texas, along with service and distribution centers strategically located where our customers operate in Western Canada, the United States, the United Arab Emirates, Indonesia and Kurdistan.

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## **Wellmaster Pipe and Supply Inc.**

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Wellmaster Pipe and Supply is a family-owned manufacturer servicing the global energy and drilling sector with on time delivery of machined, fabricated and wholesale products. Since 1987, our team has built a reputation on setting the highest standards for product quality and service excellence. With an evolving range of products and services, we are innovators committed to helping our customers be more productive and adapt to challenges ahead.



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## EPEX 2021 & OPI Gold Volume Archives

Now in its 58<sup>th</sup> year, an extraordinary amount of valuable technical information has been presented at OPI conferences. All material from previous conferences has been archived and digitized for convenience, please enjoy.

**All digitized volumes can be found online:**

<http://www.ogsrlibrary.com/catalogue>

**Presentations from EPEX 2018 & 2019 are available on the OGSR Library YouTube channel:**

<https://www.youtube.com/user/ogsrlibrary>



## Acknowledgements

### *Conference Chair:*

Niki Clarke

### *OPI Office Manager:*

Lorraine Fillmore

### *Conference Committee:*

Niki Clarke

Jim McIntosh

Jug Manocha

Lorrain Fillmore

Jordan Clark

Matt Dupont

Maryrose D'Arienzo

### *Media:*

Matt Dupont (video)

### *MC & Moderator:*

Shelie Cascadden

### *Welcoming Messages:*

Niki Clarke (Conference Chair)

### *Special Thanks*

Shuo Sun (Glacial geology field trip)

Craig Irwin (Glacial geology field trip)

Matt Dupont (VR field trip edition)

# Glacial Geology VR Field Trip

At our 2019 live event we were please to have Shuo Sun and Craig Irwin lead a glacial geology field trip of London, Ontario.

Although field trip events are not possible with our 2021 event, we are lucky enough to have a virtual edition of this 2019 field trip!

This virtual field trip is a 360-degree video shot and narrated at significant glacial geology field trip locations. It is best experience on a virtual reality headset but will run on any device, like a phone or computer, and best of all you can still pan the video to look in any direction on these devices!

The virtual field trip video is hosted on the OGSR Library YouTube channel and may be accessed at this link:

<https://youtu.be/1CZFD6H5vUk>

The guidebook that follows is from the original 2019 tour and provides some extra details and special maps to help you along the way; please enjoy this virtual reality field trip from wherever you are.



# Glacial Geology Field Trip

Originally Presented by Shuo Sun & Craig Irwin



Medway Creek – Glacial Till (top)

The Coves – Oxbow Lake (bottom left)

Whisperwood Park – Moraine (bottom right)

## Glacial Geology Field Trip in London, Ontario

(Originally) Monday April 29<sup>th</sup>, 2019, from 9am - 1pm

Field Trip Guide(s):

Shuo Sun, PhD – Geological Laboratory Technician, OGSR Library

Shuo Sun is now working as the Geological Laboratory Technician at the Oil, Gas and Salt Resources Library, London, Ontario. He is now working on geologic projects of the Silurian-Devonian carbonate sedimentation in southern Ontario. Shuo obtained his BSc and MSc in at the China University of Geosciences, Beijing and his PhD at University of Western Ontario.

Craig Irwin, MSc – GIS & Database Clerk, OGSR Library

Craig has been with the OGSR Library since 2018, most recently as GIS & Database Clerk. Craig uses geologic data and GIS to complete large scale, long-term projects at the Library by creating, maintaining and interpreting geologic databases. Craig completed a MSc in Physical Geography and BSc Specialization in Environmental Science at Western University. He has a keen interest in studying the Earth's biotic and abiotic processes, specializing in aquatic environments.

### **Trip Itinerary**

Begin - Best Western Plus Lamplight Inn & Conference Centre (696 Wellington Rd)

1<sup>st</sup> Destination – The Coves & Thames River

2<sup>nd</sup> Destination – Medway Creek

3<sup>rd</sup> Destination – Sifton Bog

4<sup>th</sup> Destination – Whisperwood Park

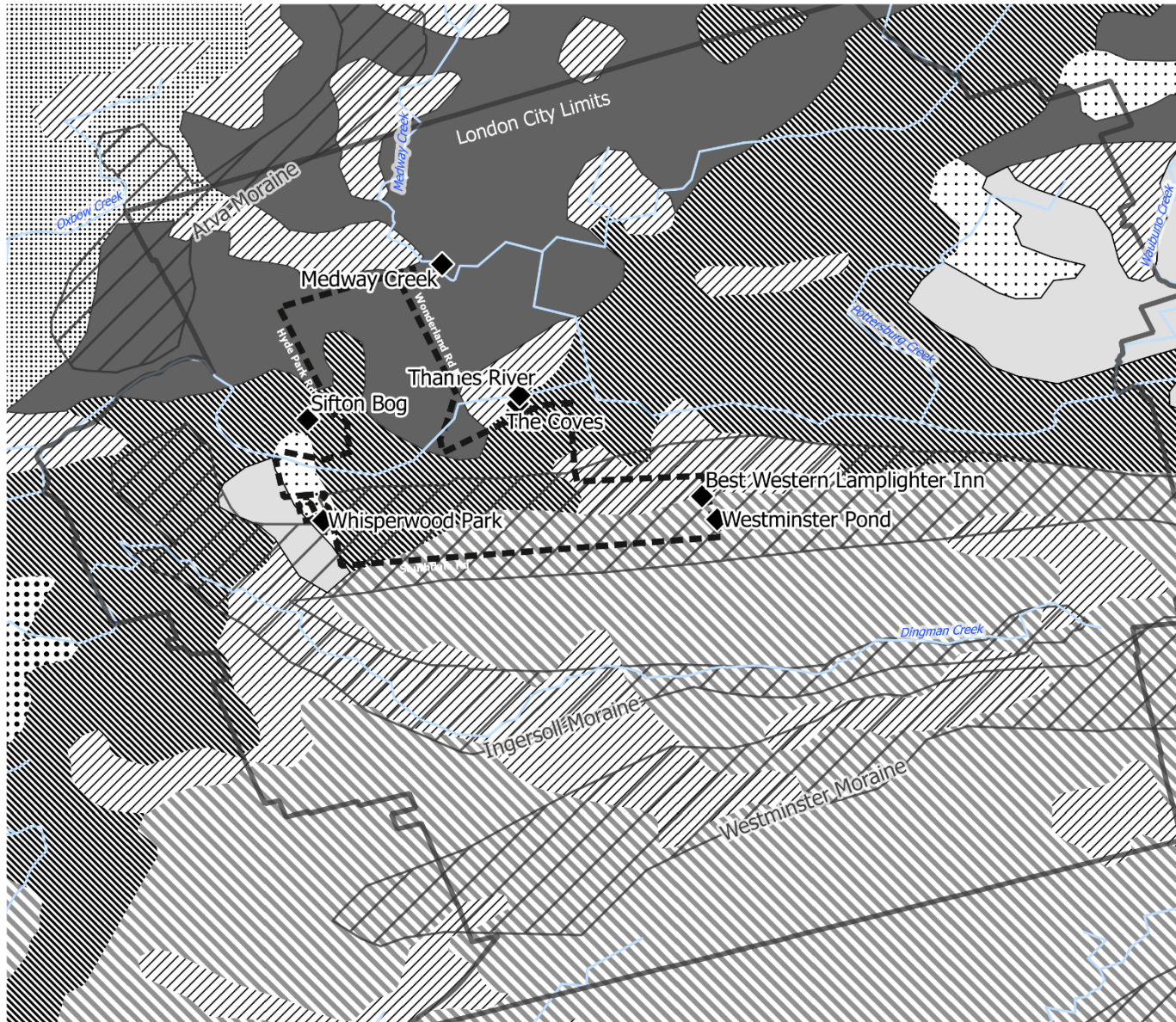
5<sup>th</sup> Destination – Westminster Ponds

End - Best Western Plus Lamplight Inn & Conference Centre

### **Description:**

Explore the features left behind in London, ON from the Wisconsin Glaciation 10,000 – 15,000 years ago. Glacial processes shaped the Thames River watershed's current physiography during the Wisconsin glacier, leaving behind ridges, glacial till and kettle ponds. Material, in the form of stones, gravel, sand and clay, were deposited as the glacier retreated. The accumulation of these materials created moraines. Three major moraines surround London, the Arva moraine in the north, and the Ingersoll and Westminster moraines running through the southern portion of the city. This guided tour presents an exciting opportunity learn about the geology and geomorphology of London!





**Glacial Geology Field Trip  
EPEX 2019**

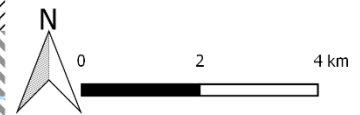
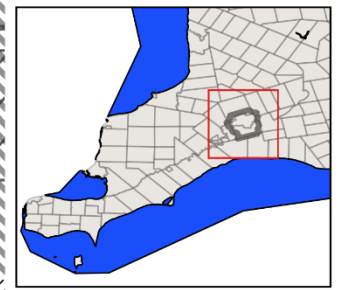
**Legend**

- ◆ Field Trip Stops
- - - Trip Route
- ▭ Moraines

**Geology**

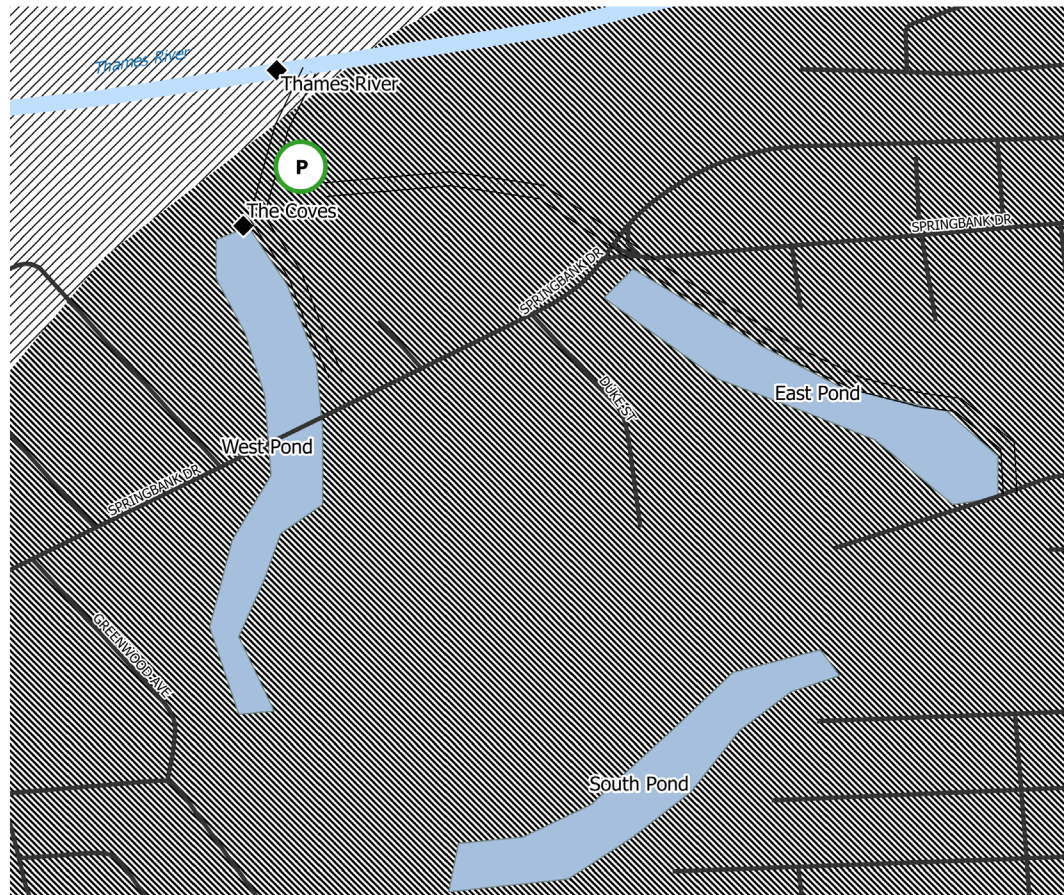
- Catfish Creek Till
- Fluvial deposits
- Glaciofluvial ice-contact deposits
- ▨ Glaciofluvial outwash deposits
- ▧ Glaciolacustrine deposits
- ▩ Organic deposits
- ▨ Port Stanley Till
- Rannoch Till
- Tavistock Till

**Location Map**



### 1<sup>st</sup> Destination: The Coves and Thames River

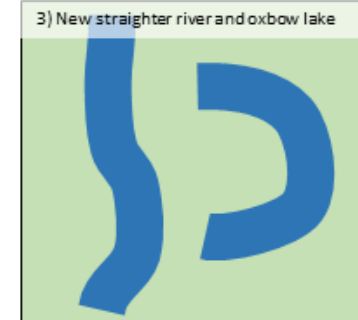
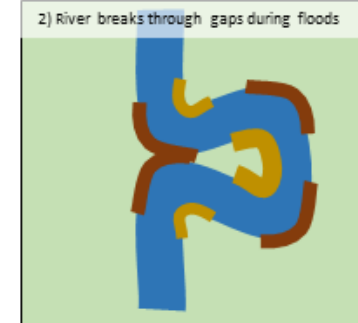
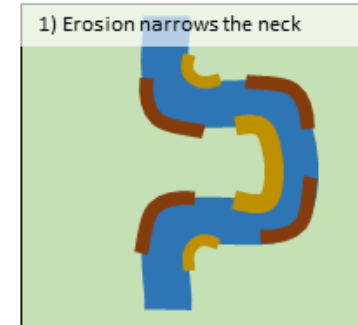
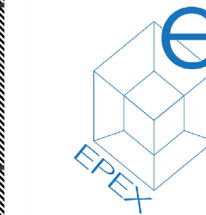
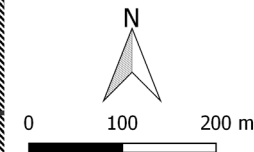
The Coves are a set of three oxbow lakes that used to be connected to the Thames River. As the Thames River meandered and eroded, a new main channel formed because water flow follows the path of least resistance. The abandoned channels gradually became disconnected over time and are now termed West Pond, East Pond and South Pond. The tour will showcase the West Pond and Thames River.



The Coves - London, ON

#### Legend

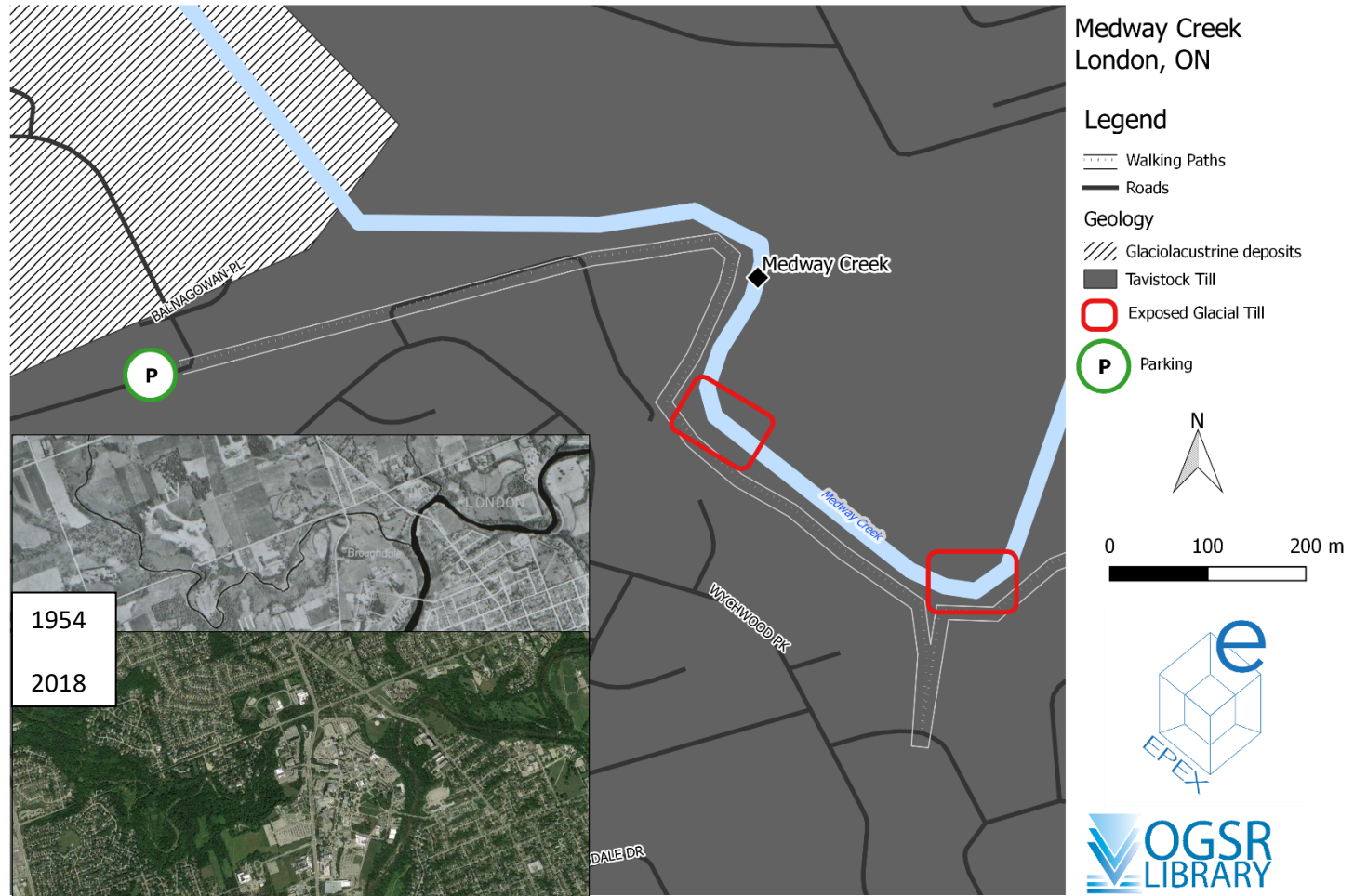
- Walking Paths
- Roads
- Water Features
- Geology**
- Glaciofluvial outwash deposits
- Glaciolacustrine deposits
- Parking



- Erosional area
- Depositional area

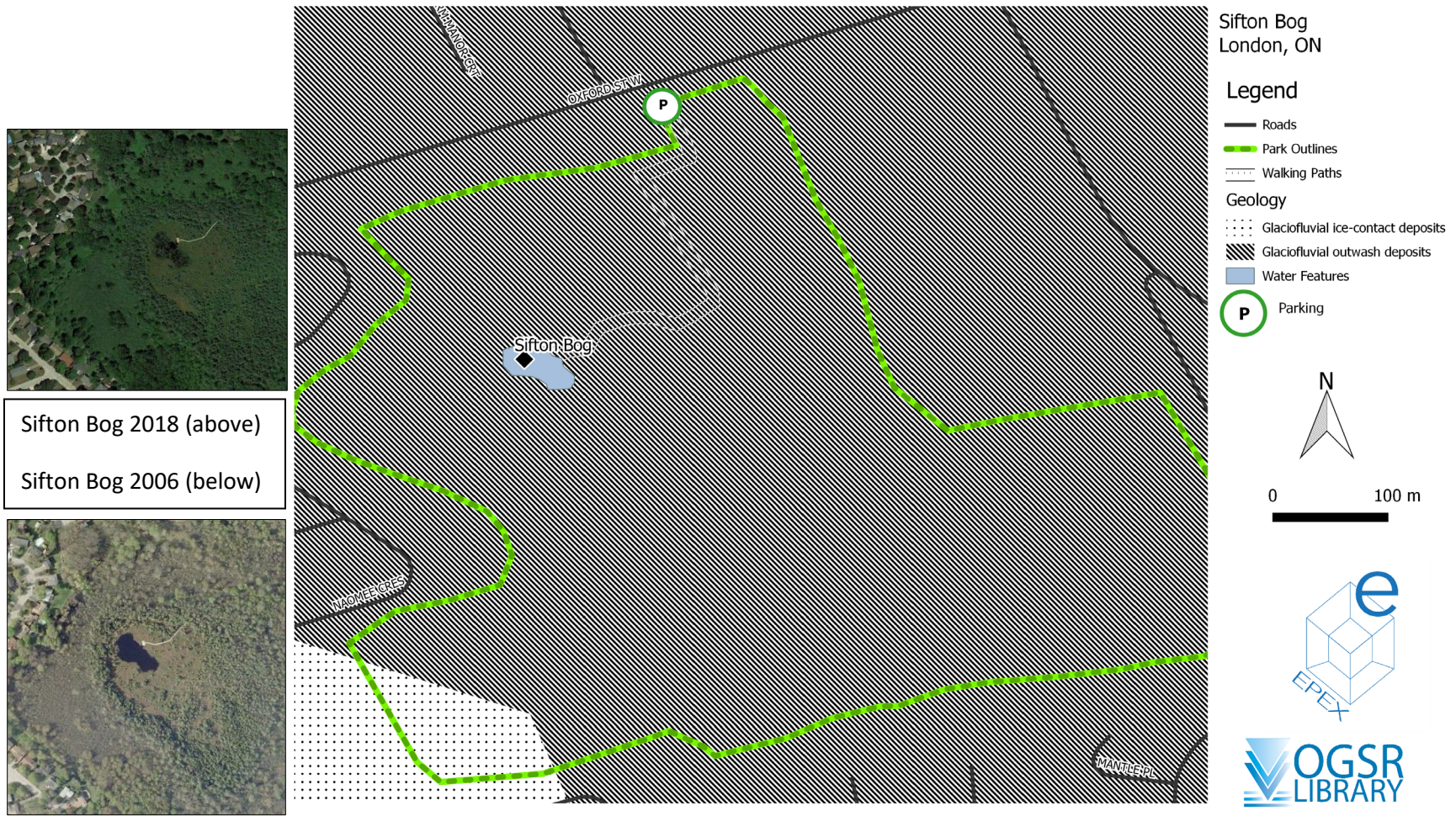
## 2<sup>nd</sup> Destination: Medway Creek

Medway Creek is an alluvial, meandering single channel river with broad well-developed floodplains. Bedrock is composed of glacial till (fine clay with a gravel matrix) which was left behind after the Wisconsin glacier. At its outlet, Medway Creek joins the Thames River which can be seen on the Western University campus. Urbanization in London has influenced the flow regime of the river, with increased high flow events contributing to accelerated erosion.



### 3<sup>rd</sup> Destination: Sifton Bog

Sifton Bog Environmentally Significant Area is a 50 – hectare floating acid peat bog located in northwest London. Redmond’s Pond is located at the end of the boardwalk, which takes you through the floating shrub bog. The forest is a large mixed and deciduous swamp forest with Tamarack and Black Spruce. Sifton Bog is currently classified as a mid-life bog and was formed from a kettle pond (see next page).

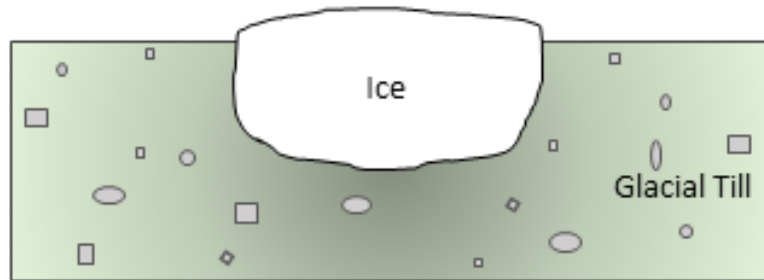


Sifton Bog 2018 (above)  
Sifton Bog 2006 (below)

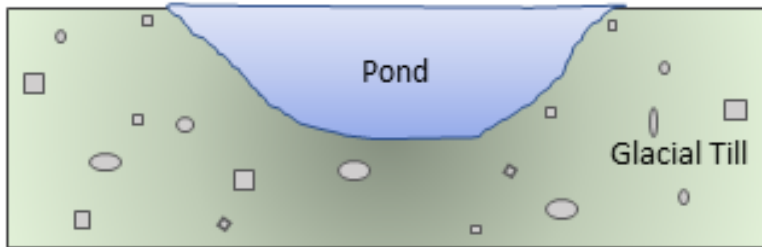


## Formation of Kettle Ponds and Bogs

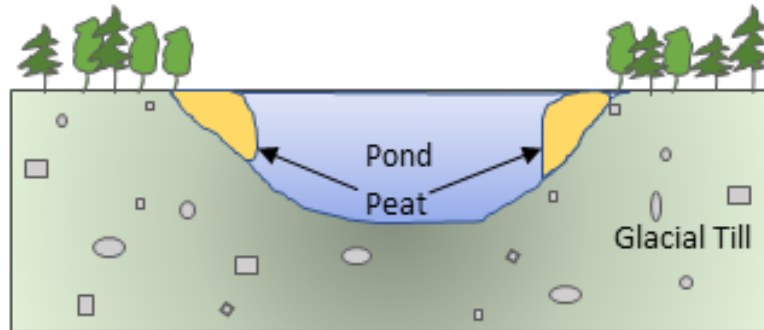
1) Stranded ice block



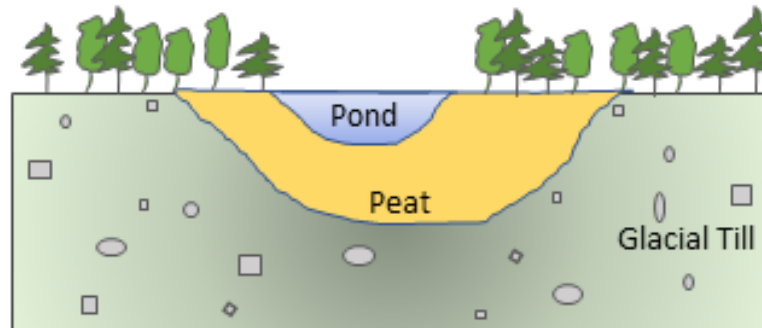
2) Kettle pond  
(Westminster Ponds)



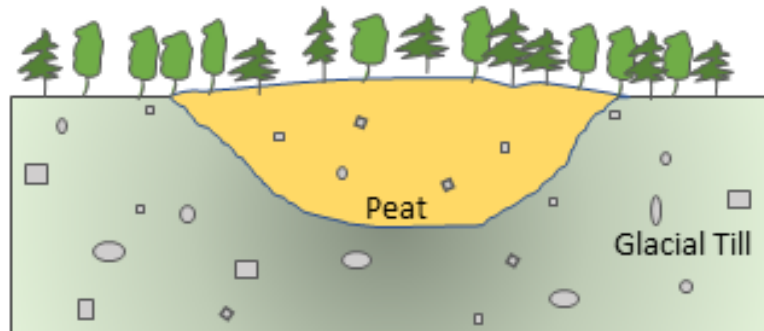
3) Plant colonization begins



4) Mid-life of a bog  
(Sifton Bog)

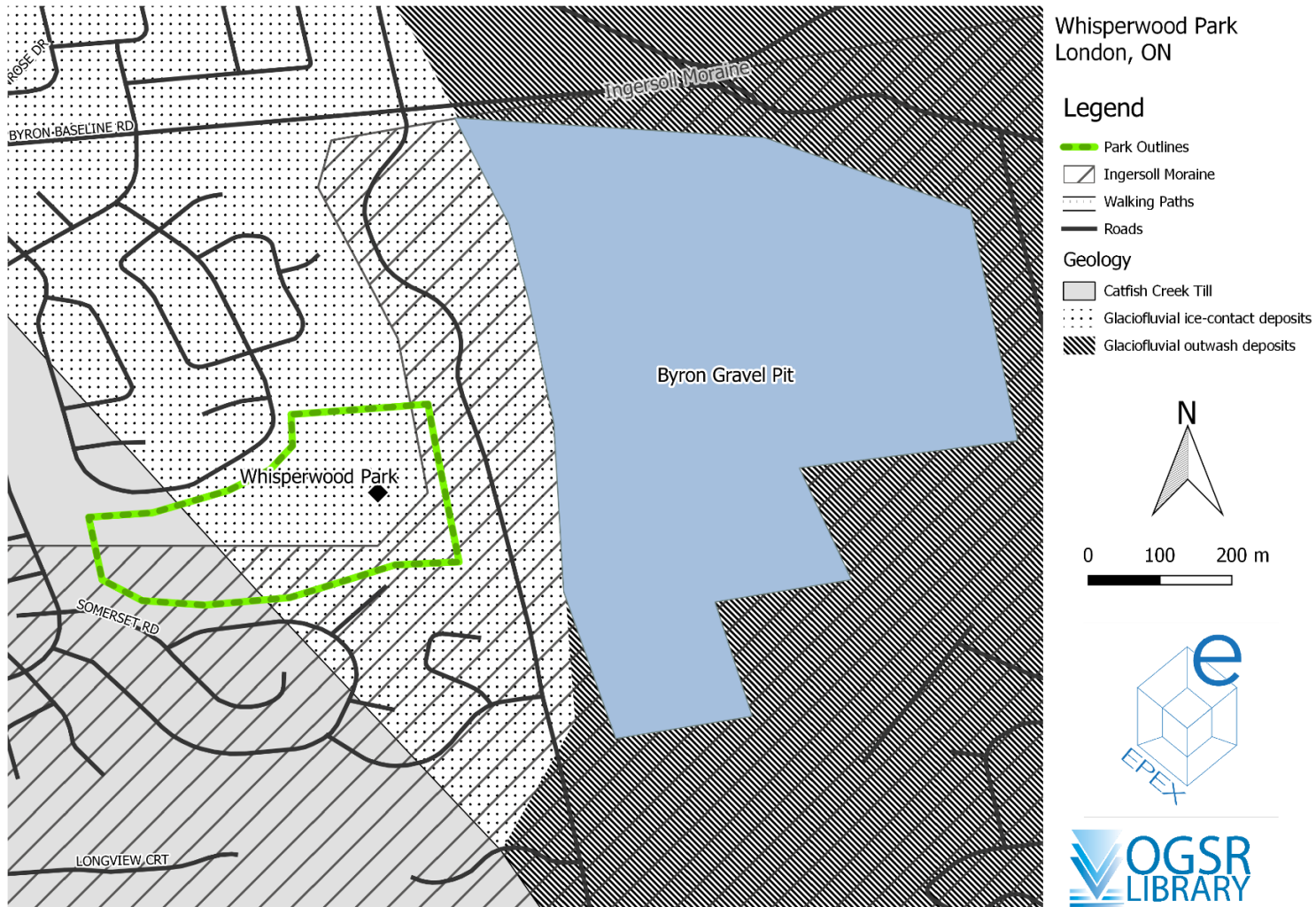


5) Raised bog



**4<sup>th</sup> Destination: Whisperwood Park**

The Ingersoll Moraine runs east-west through London and represents the northern extent of the Lake Erie ice lobe. The Byron Gravel Pit, which is still operational, mines gravel and stone from the moraine for commercial uses. The edge of the Ingersoll moraine can be seen to the east and south from Whisperwood Park.



**5<sup>th</sup> Destination: Westminster Ponds**

The Westminster Ponds are located south of the Ingersoll Moraine and north of the Westminster moraine in southeast London. These kettle ponds are permanent depressions left behind in the glacial sediment from blocks of ice melting during the Wisconsin glaciation period. The ponds are fed by surface runoff and are not naturally connected by a stream, resulting in water slowly draining between them through bog and wetland area.



**NOTES**

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