SPRINGBANK OFF-STREAM RESERVOIR PROJECT

NRCB APPLICATION NO. 1701

WITNESS RESUMES

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Colin Buchanan Ph.D.

Principal
Technical Lead (Indigenous Services)

Colin Buchanan holds a Ph.D. in Anthropology from the University of Calgary and has over 25 years professional and academic experience in ethnographic and historical research pertaining to Aboriginal peoples in Canada, Aboriginal culture and history, Canadian Indian policy, Land Claims, and Aboriginal rights. Colin has served as a discipline lead and senior advisor on traditional knowledge and traditional land use (TK/TLU) programs for several major regulatory applications, responsible for the scoping, planning and execution of TLU studies and the reporting of TK/TLU in environmental assessments. As subject matter expert for TK/TLU within Stantec, Colin provides guidance and technical direction nation-wide on TK/TLU study methodology and data gathering, consideration of TK/TLU in the environmental assessment, and regulatory reporting. Colin routinely conducts senior review of TK/TLU components of environmental assessments submitted to provincial, territorial, and federal regulators and provides advice to clients on regulatory strategy. Colin appeared as an expert witness before the National Energy Board, the Canadian Environmental Assessment Agency, and the Mackenzie Valley Environmental Impact Review Board.

EDUCATION

Ph.D., University of Calgary, Anthropology, Calgary, Alberta, 2008

M.A., Carleton University, Anthropology, Ottawa, Ontario, 1995

B.A., University of Winnipeg, Winnipeg, Manitoba, 1987

PROJECT EXPERIENCE

Dams & Levees

Alberta Transportation Springbank Off-Stream Reservoir Project, Calgary, Alberta (Senior Advisor Traditional Ecological Knowledge and Land Use component) 2015 - Present

Provides senior guidance and technical direction on all aspects of the traditional knowledge and traditional land use study program, including consideration of traditional knowledge in the environmental assessment, and reporting for a regulatory Environmental Impact Assessment prepared for submission to both Alberta Environment and Parks and the Canadian Environmental Assessment Agency. Has developed a traditional land and resource use workshop process to solicit Indigenous groups' feedback on the environmental assessment and help perspective on potential project effects on Aboriginal and Treaty rights. Led the response to information requests on Indigenous issues from the provincial and federal regulators. Led review and responses to traditional use studies and participated in meetings with Indigenous groups to discuss responses.

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Manitoba Infrastructure Lake Manitoba and Lake St. Martin Outlet Channels Project. 2019 – Present
Stantec conducted a CEAA regulated environmental impact statement (EIS) of a proposed permanent flood control management system for the Lake Manitoba and Lake St. Martin region of Manitoba. Provided senior review of the traditional land and resource use assessment and the assessment of impacts to rights of Indigenous peoples. Provided senior review on information requests from federal regulator.

Oil & Gas Midstream, Pipelines

TransCanada PipeLines Ltd., Energy East Pipeline Project, Alberta, Saskatchewan, Manitoba, Ontario, Québec, and New Brunswick (Senior Advisor) 2012-2017
Provided senior guidance and technical direction on all aspects of the traditional knowledge and traditional land use study program, including consideration of traditional knowledge in the environmental assessment, and regulatory reporting. Energy East Pipeline Project has engaged over 100 Aboriginal communities across Canada. Stantec is leading the TK component on this project, scoping and executing TK studies with Aboriginal communities along the entire route of the Project in Alberta, Saskatchewan, Manitoba, Ontario, Quebec, and New Brunswick. This work required thorough working knowledge of regulatory requirements, Aboriginal consultation policies, and use of TK in regulatory applications across provincial and federal jurisdictions.

TransCanada PipeLines Ltd., Prince Rupert Gas Transmission Project, British Columbia (Senior Advisor) 2013-2015
Provided senior guidance and technical direction on all aspects of the traditional environmental knowledge and traditional land use study program, environmental assessment of TK and regulatory reporting. Stantec engaged 20 Aboriginal communities in northern British Columbia on this project and led all aspects of the traditional environmental knowledge and traditional land use component, including, tracking traditional environmental knowledge and traditional land use study progress, coordinating with other disciplines, working with client Aboriginal Relations team to consult on the Aboriginal engagement strategy, providing updates reports other management tasks.

NOVA Gas Transmission Ltd., North Montney Mainline Pipeline Project, British Columbia (Discipline Lead) 2013-2015
Led the traditional knowledge program for this 300-km natural gas line from the North Montney play, to Dawson Creek, BC. Responsible for the review of traditional knowledge studies submitted by Aboriginal groups, consideration and assessment of traditional knowledge in the environmental assessment, and information request responses, regulatory reporting, and hearing support. Coordinated the participation of Aboriginal participants on environmental field studies.

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Enbridge Northern Gateway Pipeline Project, Western Canada (Discipline Lead) 2008 – 2016
Led the Aboriginal Traditional Knowledge study program for the National Energy Board regulated pipeline between Bruderheim, Alberta and Kitimat, British Columbia. Responsible for scoping and execution of Aboriginal traditional knowledge study reports, implementing traditional knowledge study methodology, coordinate study tracking, provide technical support for study leads, and provide support for Northern Gateway Aboriginal Relations team, participating in engagement meetings with Indigenous groups as needed. Responsible for preparing the traditional knowledge section of the environmental assessment and regulatory filing documents. Led the response to information requests on Indigenous issues from the provincial and federal regulators. Contributed to post-fining engagement strategy and oversaw inclusion of traditional knowledge in environmental emergency management plans.

NOVA Gas Transmission Ltd. Grande Prairie Mainline McLeod River Section, Alberta (Senior Advisor) 2013-2014
Provided senior guidance and technical direction on all aspects of the traditional knowledge and traditional land use study program, including consideration of traditional knowledge in the environmental assessment, and regulatory reporting.

Oil & Gas Midstream, Facilities

Swan Hills Synfuels In-situ Coal Gasification Project, Environmental Assessment, Whitecourt, Alberta (Senior Advisor; Traditional Knowledge Lead) 2009-2011
Senior Advisor, Traditional Knowledge and Project Manager for the traditional knowledge and traditional land use study component of an EPEA regulatory Assessment.

Oil & Gas Upstream, Conventional

K'ââlô-Stantec Ltd., ConocoPhillips Harvesting and Land Use Study, Sahtú Region, Northwest Territories (Senior Advisor) 2013
Provided senior guidance and technical direction on a collaborative traditional knowledge study with the Tulít'a Renewable Resources Council on a for a hydraulic-fracturing project in the Sahtú Settlement Area.

Oil & Gas Upstream, Oil Sands In Situ
JACOS Hangingstone Expansion, Environmental Impact Assessment (Senior Advisor; Traditional Knowledge Lead) 2008-2017
Senior Advisor, Traditional Knowledge and Project Manager for the TK/TLU component of a regulatory Environmental Impact Assessment. Following project approval continued to work with participating Aboriginal groups to facilitate an alternative process for identifying Aboriginal concerns and interests related to the JACOS project. A consultative body based in part on Aboriginal protocols for consensus decision-making and alternative dispute resolution procedures, was created and continues to meet to resolve contentious issues, identify solutions for on-going involvement in project planning, and mitigate impact to traditional use.

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Fort McMurray #468 First Nation Traditional Land Use and Occupancy Study for the Imperial Oil Corner Project 2016-2020
In collaboration with Fort McMurray #468 First Nation Industry Relations Corporation, designed and executed a traditional land use and occupancy study program to assess effects of the proposed Imperial Oil Corner Project on Fort McMurray #468 First Nation traditional use activities and practices. The study program involved ethnographic interviews with Elders and knowledge holders; mapping Fort McMurray #468 First Nation traditional use sites, area, and locations; conducting field verification visits; completing regulatory reports and verifying results of the study program with participants.

Nu Nennè-Stantec, Cold Lake, Alberta (Senior Advisor) 2012-2014
Provided technical direction and senior review for traditional knowledge assessments conducted for numerous projects on behalf of Cold Lake First Nations.

Mining

Greenstone Gold Hardrock Mine Project, Ontario (Senior Advisor) 2016-2018
Provided senior guidance and technical direction on all aspects of the traditional knowledge and traditional land use study program, including consideration of traditional knowledge in the environmental assessment, and regulatory reporting.

Alamos Lynn Lake Gold Mine Project (Senior Advisor) 2017-present
Provided senior guidance and technical direction on all aspects of the traditional knowledge and traditional land use study program, including consideration of traditional knowledge in the environmental assessment, and regulatory reporting. Provided senior review of the assessment of impacts to rights of Indigenous peoples. Provided senior review for response to information requests on Indigenous issues from the provincial and federal regulators. Provided support for the proponent's Indigenous consultation and participated in meetings with Indigenous groups and open houses.

Transmission & Distribution

Milner Power Inc. Ash Management Facility, Grande Cache, Alberta (Senior Advisor; Traditional Knowledge Lead) 2011
Senior Advisor, Traditional Knowledge and Project Manager for the traditional knowledge and traditional land use study component of an EPEA regulatory Assessment.

Transportation

Canadian National Railway Company Milton Logistics Hub Project (Senior Advisor) 2015-2019
Provided senior guidance and technical direction on all aspects of the traditional knowledge and traditional land use study program, including consideration of traditional knowledge in the environmental assessment, and reporting for a regulatory Environmental Impact Assessment submitted to the Canadian Environmental Assessment Agency. Provided senior review of responses to information requests submitted to the Agency.

Government of Nunavut and Kitikmeot Inuit Association, Grays Bay Road and Port Project, Nunavut (Senior Advisor), 2017-present
Provided senior guidance and technical direction on all aspects of the traditional knowledge program, including consideration of Inuit Qaujimajatuqangit in reporting for a regulatory Environmental Impact Assessment to be submitted to the Nunavut Impact Review Board.

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Community-based Traditional Knowledge and Land Use Studies

Community-specific Engagement Guidelines (Senior Advisor), 2012-2013

This project was designed to learn how each of the ten existing Aboriginal CEMA-member organizations want to work within CEMA and be meaningfully engaged in CEMA's work. This work involved developing a workshop approach compatible with each member community's varying interests and needs, as well as establishing a good working relationship with CEMA's team and the community focus-group participants. This project reported on the issues and concerns regarding cumulative effects facing each community, each community's desires for enhancing their working relationship with CEMA, as well as each community's suggested best practices for working with TK Holders and improving the meaningful and cohesive treatment of traditional knowledge in the larger context of land and resource management practices and policies.

Traditional Knowledge and Land Use GIS Mapping

Government of Alberta GeoData Mapping Project (Senior Advisor) 2013-2014

Stantec assisted the Ministry of Aboriginal Relations in the collection and review of spatial traditional knowledge data from participating First Nations throughout Alberta. The objective of the project is to create more accurate and relevant areas of consultation interest for each First Nation by dialoguing with First Nation leaders about the data that communities are willing to share to augment or revise what the government currently holds. Stantec worked closely with ministry representatives to create a standardized geospatial template, meet with interested First Nations, analyze and standardize submitted spatial data, and verify the data assessment with each participating First Nation.

Strategic Environmental Assessments

Canada-Newfoundland and Labrador Offshore Petroleum Board Labrador Shelf Off-Shore Area Strategic Environmental Assessment Update (Senior Advisor) 2017-2019

Provided senior guidance and technical direction on Indigenous engagement and the compilation and consideration of traditional knowledge in this update to the 2008 Labrador Shelf Off-Shore Area Strategic Environmental Assessment reviewing potential oil and gas development. Provided senior review of the Indigenous Engagement Plan and related documents.

Nunavut Impact Review Board Baffin Bay and Davis Strait Strategic Environmental Assessment (Senior Advisor) 2017-2018

Provided senior guidance and technical direction on Indigenous engagement and consideration of Inuit Qaujimaningit (IQ) in the Strategic Environmental Assessment reviewing potential oil and gas development. Participated in a workshop with Qikiqtani Inuit Association Elders and knowledge holders to determine assessment process and identify how IQ should be used.

Expert Testimony / Witness

Total E&P Energy Canada Joslyn North Mine Project (Regulatory Support) 2010

Prepared as an Expert Witness for the National Energy Board Joint Review Panel Hearings for this mine application (was not ultimately required to appear as Indigenous groups withdrew objections to project prior to hearing).

Enbridge Northern Gateway Pipeline Project (Regulatory Support) 2012-2103

Appeared as an Expert Witness before the National Energy Board Joint Review Panel Hearings for this pipeline application.

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Canadian National Railway Company Milton Logistics Hub Project (Regulatory Support) 2019
Hearing support at the Canadian Environmental Assessment Agency Review Panel hearing held in July 2019.

Diavik Diamond Mines Inc. Processed Kimberlite to Mine Workings Project (Regulatory Support) 2019
Appeared as an Expert Witness at the regulatory hearing for this Project held by the Mackenzie Valley Environmental Impact Review Board.

PUBLICATIONS

Buchanan, C. Review of 'Enough to Keep them Alive': Indian Welfare in Canada, 1873-1965 by Hugh Shewell. The Canadian Review of Sociology and Anthropology On-Line Book Reviews. Posted at http://www.csaa.ca/CRSA/BookReview/Reviews/200503SHEWELL.htm, 2005.

Buchanan, C. Canada's Indian Problem: Canadian Anthropology and Ideas of Aboriginal Emendation. Historicizing Traditions in Canadian Anthropology. J. Harrison and R. Darnell, eds. Vancouver: UBC Press. Pp. 93-106, 2006.

Presentation. Buchanan, C. 'All the etceteras of a whiteman's election': Band Government and the Regulation of Aboriginal Political Culture in Canada. Canadian Anthropology Society/société canadienne d'anthropologie (CASCA) Meetings, Calgary Alberta, 2000.

Presentation. Buchanan, C. Band Government Legislation, 1869-1895: Establishing the Elective System on Canadian Indian Reserves. Annual meeting of the American Society for Ethnohistory, London Ontario, 2000.

Presentation. Buchanan, C. Canadian Indian Policy and Images of Aboriginal Incapacity. Canadian Anthropology Society/société canadienne d'anthropologie (CASCA) Meetings, Montreal Quebec, 2001.

Dan A. Back PE, PEng, GE, SE, PLS

Senior Geotechnical Engineer · 40 Years of Experience · Lexington, Kentucky

Dan is a Geotechnical and Structural Engineer and Project Manager for various geotechnical, construction and structural projects including design, analysis and management of projects involving concrete gravity dams, earth dams and navigable locks. Supervises the design, analysis and construction of numerous locks and dams (earthen embankments and concrete gravity dams) in accordance with both USACE and FERC requirements. These efforts included data mining and historical research, detailed existing conditions assessments, analysis of structural components, thorough geotechnical exploration programs, analysis and design of appropriate risk reduction measures or replacement structures, development of contract documents (construction drawings and technical specifications), and engineering support during construction services. Also provides lock and dam facility evaluations, development of short-term risk reduction measures and long-term planning for capital improvements.

EDUCATION

M.Eng., Civil Engineering, Cornell University, Ithaca, New York, 1986

BS, Civil Engineering, University of Kentucky, Lexington, Kentucky, 1979

REGISTRATIONS

Professional Engineer WA #54837, MA #52381, TN #117207, AL #34270-E, IN #11100476, NC #27038, CA #36102, MD #24901, KY #13930

Professional Engineer Alberta #234565

Geotechnical Engineer CA #3087

Structural Engineer KY #13930, IL #081-006223

Land Surveyor KY #3413,

PROJECT EXPERIENCE

Design of Springbank Off-Stream Flood Storage Dam, Calgary, Alberta (Senior Geotechnical Engineer) - February 2015 – Present

Senior Geotechnical Engineer responsible for Site Characterization, design, tender and construction support - Following the devastating flooding in Calgary in June 2013, the Province of Alberta retained Stantec to develop a flood control system on the Elbow River above town. The system will consist of a low in-river structure to divert excess flow, a 4.8 km long diversion channel and an off-stream reservoir contained by a 3.2 km long, 30 m tall embankment dam. The geotechnical team is responsible for complete design of channel and embankment flood storage dam as well as providing parameters and loads to the structural designers of appurtenant structures. Work completed to date includes full geotechnical exploration / lab testing and preliminary design of the earthen embankment dam and the river flow diversion channel.

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Anchor Stabilization Design at Fort Loudoun, Tellico and Watts Bar Dams, Meigs, Loudon, and Rhea Counties, Tennessee (Principal Engineer) 2014- 2015

Technical Lead providing technical guidance to the structural team on post tension anchoring analysis at three dams. Developed approach to mitigate stability deficiencies at lift joints and globally within the existing concrete non-overflow blocks and evaluate stability of the lock walls which included post-tensioned bar and strand anchors. Performed active and passive stability analysis of the existing dams after an in-depth review of the historic field and laboratory data followed by a simplistic and finite GTSTRUDL model. Led development of a basis of design report., calculation package, quality control inspection program, permitting, instrumentation monitoring plan and development of construction and bid documents in accordance with TVA standards. Providing engineering support during construction.

Stability Evaluation of Nickajack Hydroelectric Dam, Marion County, Tennessee and Ocoee No. 3 Hydroelectric Dam, Polk County Tennessee (Principal Structural/Geotechnical Engineer) 2013-2014

Lead Structural and Geotechnical Engineer providing a comprehensive review of dam stability for the Nickajack and Ocoee 3 Dams. The detailed studies included an extensive field exploration, laboratory testing, concrete monolith stability analyses, embankment slope stability analyses, seepage modeling, and seismic analyses. Evaluated each structure for normal operating conditions, flood pool loadings, rapid drawdown, and earthquake performance. Oversaw the planning and performance of the field and laboratory programs, as well as execution of the detailed seepage and stability analysis. Assisted with developing conceptual retrofitting schemes and preparing a calculation package that reported the results of the evaluations.

Stability Evaluation of Chatuge Hydroelectric Dam Clay County, North Carolina and Nottely Hydroelectric Dam, Union County, Georgia (Senior Geotechnical Engineer/Project Manager) 2012 - 2013

Project Manager providing a comprehensive review of dam stability for the Chatuge and Nottely Dams and associated saddle dams. The detailed studies included an extensive field exploration, laboratory testing, seepage modeling, slope stability analyses, liquefaction assessments, and seismic analyses. Evaluated each structure for normal operating conditions, flood pool loadings, rapid drawdown, and earthquake performance. Oversaw the planning and performance of the field and laboratory programs, as well as execution of the detailed seepage and stability analysis. Assisted with developing conceptual retrofitting schemes and preparing a calculation package that reported the results of the evaluation.

Salt River Project, Horse Mesa Dam Pump Storage Unit Intake Structure Repairs, Maricopa County, Arizona (Senior Structural Engineer) 2012-2014

Served on the team of senior dam engineers developing a timely and cost-effective solution after the partial collapse of the 40-year old upper intake structure forced the idling of the pump storage unit, a key element of the SRP Phoenix area electric power balance. Technical challenges included inability to lower the lake level due to environmental and political constraints. The repair design was developed to be implemented by "Saturation Divers" working continually, 160 feet below the lake level. The design developed allowed the rapid installation of new hydraulic guide vanes and required structural supports, minimizing the extremely expensive diver bottom time. Work included quick response engineering support throughout the construction period.

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Renovation of the Kentucky River Lock and Dam System, Various Counties, Kentucky (Project Manager) 2000 -2007

Work consists of structural evaluations and alternates development for Kentucky River Lock and Dam Nos. 3, 5, 6, 7 and 10. Manages thorough alternative analysis for upgrade of the existing 100-year-old Lock and Dam No. 10 including repair alternatives, raised dam options, and a replacement dam option; designed concrete lock closure structures for Dam Nos. 5, 6 and 7 and; provides a single-season, temporary abutment repair design for Dam No. 3. Manages continuous, on-site engineering support during project construction.

Greenbo Lake Dam Repair, Greenup County, Kentucky (Project Manager) 1998 -2003

Stantec performed $1.8M worth of work associated with repairs necessary to upgrade the earth dam to meet State of Kentucky Class "C" High Hazard criteria. Repairs included removal of the existing spillway, construction of a new emergency spillway and raising the crest of the embankment dam. Managed the project, which included the following tasks: detailed inspection of existing conditions, evaluation of repair alternatives, topographic survey (including hydrographic survey of the upstream pool and underwater inspection of the drawdown structure), geotechnical exploration, preparation of design plans, hydrologic and hydraulic analyses of the proposed emergency spillway, slope stability and seepage analyses of the raised embankment and construction monitoring/testing services.

McAlpine Lock Repair Station Pier Cofferdam (Project Manager) - 1998

Stantec was retained to perform structural/geotechnical design of three braced sheetpile cofferdams utilized in the construction of foundations for lock mitigate piers 20 feet below the pool level of the Ohio River. Work areas protected by the cofferdams were generally rectangular in shape, up to 60 feet across and were not permitted to contain any cross-excavation braces. Stantec's Project Manager, responsible for selection of the structure configuration and determination of the soil loading conditions, as well as overseeing the detailed design, analysis report and construction documents.

Barbourville River Levee Stabilization, Barbourville, Kentucky (Project Manager) 1998

Served as Project Manager for this USACE project. After being retained to stabilize the river bank, Stantec executed the following scope of work: surveyed, generated topographic maps and critical cross sections, explored the subsurface, identified soil types, performed lab testing on soils and inserted the boring logs onto critical cross sections. Having established the condition of the basin and considered safety factors, generated a remedial design/analysis. Final deliverables consisted of fully QC'd construction plans and specifications for the remedial repair. All analyses, designs, detailing, and specifications were completed in-house in accordance with USACE standards.

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Triplett Creek Dam Repairs, Morehead, Kentucky
(Project Manager) – 1994 - 2004

Project Manager for repairs to Triplett Creek Dam. This aging concrete gravity dam exhibited scour, failing abutments and inadequate drawdown capacity. Design measures included removal of a central island, replacement of sluice gate system with a large tainter gate, design of reinforced concrete training walls for gate chute, concrete overlay for the weir and stable abutments. This project involved hydraulic analyses to determine downstream effects of tainter gate operation

Dan Yoshisaka M.Sc., P.Eng.

Principal, Environmental Services

Dan is a geo-environmental engineer responsible for hydrogeologic assessments, site remediation, environmental risk management, and environmental impact assessments. He is committed to help our clients achieve their goals of improved environmental performance through innovative and cost effective solutions.

Dan has significant regulatory experience in the groundwater component of environmental impact assessments, Environmental Protection and Enhancement Act approvals, Codes of Practice, and contaminated sites management. Dan has also been involved with the development of regional scale groundwater initiatives aimed at characterizing and protecting groundwater resources in the Province.

Dan has substantial experience in the management of groundwater issues at chemical manufacturing facilities, upstream/downstream oil and gas facilities, bitumen production facilities, wood preservation facilities, and municipal facilities. He has also been involved with a variety of contaminated site investigations required to delineate soil and groundwater impacts. He has also conducted dewatering assessments, groundwater supply investigations, and soil, groundwater and surface/pore water sampling programs for various facilities. Dan has managed the development of groundwater database management systems integrating database and GIS technologies.

EDUCATION

M.Sc. in Environmental Engineering, University of Alberta, Edmonton, Alberta, 2003

B.Sc. in Civil Engineering, University of Alberta, Edmonton, Alberta, 1999

S.S. Papadopulos & Associates, Inc./Interpretation of Non-Textbook Pumping Tests, Waterloo, Ontario, 2005

The Groundwater Pollution and Hydrology Course, Princeton Groundwater Inc., San Francisco, California, 2006

MEMBERSHIPS

Member, Association of Professional Engineers and Geoscientists of Alberta, 1999

AWARDS

2005 Premier's Award of Excellence, CNRL Horizon EUB Hearing Team

PROJECT EXPERIENCE

ENVIRONMENTAL IMPACT ASSESSMENTS

Alberta Transportation Springbank Flood Diversion Project | Hydrogeology Lead | 2015 - Present

Energy East Pipeline Environmental Impact Assessment | Cross Canada | 2013-2014 Hydrogeology Lead

Swan Hills Synfuels In-situ Coal Gassification Project Environmental Impact Assessment | Alberta | 2013-2014 | Hydrogeology Lead

Encanto Potash Corp Muskowekwan Project Environmental Impact Statement | Saskatchewan | 2012-2013 | Hydrogeology Lead

Shell Quest Carbon Capture and Storage Project - Environmental Impact Assessment | Edmonton, Alberta | 2010-2012 | Hydrogeology Lead

Shell Scotford Upgrader Expansion 2 Environmental Impact Assessment | 2006-2007 | Hydrogeology Lead

Shell Scotford Upgrader Expansion Environmental Impact Assessment | Fort Saskatchewan, Alberta | Hydrogeology Lead

Alberta Heartland Upgrader Environmental Impact Assessment | Fort Saskatchewan, Alberta | 2004 - 2005 | GeoEnvironmental Engineer

Sahtu Land and Water Board Environmental Effects Report | Hydrogeology Discipline Lead

Husky Energy Tucker Thermal Project, EIA Technical Review Team* | 2000 | Soil/Groundwater Contamination Specialist

** denotes projects completed with other firms*

Canadian Natural Resources Ltd. Primrose/Wolf Lake, EIA Technical Review Team* | 2000 | Soil/Groundwater Contamination Specialist

Conoco Phillips Canada Surmont, EIA Technical Review Team* | 2000 | Soil/Groundwater Contamination Specialist

Canadian Natural Resources Ltd. Horizon, EIA Technical Review Team* | 2000 | Soil/Groundwater Contamination Specialist

Imperial Oil Nabiye/Mahikan North, EIA Technical Review Team* | 2000 | Soil/Groundwater Contamination Specialist

REGIONAL HYDROGEOLOGIC ASSESSMENTS

Beverly Channel Regional Groundwater Quality Study–Phase II | Fort Saskatchewan Area, Alberta |2012-2013| GeoEnvironmental Engineer

Beverly Channel Regional Groundwater Quality Study–Phase I | Fort Saskatchewan Area, Alberta |2011-2012| GeoEnvironmental Engineer

Beaver River Watershed Alliance Groundwater Database System| Bonnyville, Alberta|2012-2013| GeoEnvironmental Engineer

Barbados Water Authority Hydrogeological Investigations and Water Supply| Barbados, WI| 2007-2009|GeoEnvironmental Engineer

Cold Lake - Beaver River Basin Water Management Plan| 2005-2006| GeoEnvironmental Engineer

Sturgeon County Regional Groundwater Monitoring Program | GeoEnvironmental Engineer

Regional Potable Groundwater Assessment | County of Kneehill, Alberta | GeoEnvironmental Engineer

EXPERT TESTIMONY / WITNESS

ERCB Hearing Panel | 2012 | Expert Panel Member Shell Quest

Environmental Appeal Board | 2012 | Expert Witness Anadarko Petroleum

Expert Witness | 2006 | Civil Litigation - Field Law/Riteway Vacuum Service

Expert Witness | 2005 | Civil Litigation - Miller Thomson/Brookfield Residential

EUB Hearing Panel | 2003 | Expert Panel Member CNRL Horizon

GEOCHEMICAL MODELING

Shell Quest CCS Project – Geochemical Modeling | Edmonton, AB | 2010 | Project Manager and Hydrogeology Lead

GROUNDWATER RESOURCE INVENTORY, PLANNING & PROTECTION

Shell Quest CCS Project – Groundwater Evaluation and Monitoring Well Program | Edmonton, AB | 2010 |Project Manager and Hydrogeology Lead

REGULATORY PERMITTING / ENTITLEMENTS / APPROVALS

Alberta Energy – CCS Regulatory Framework Assessment | Edmonton, AB | 2010 | Project Manager

SITE MANAGEMENT AND REMEDIATION

Shell Chemicals Annual Groundwater Monitoring Program | 2004 - Present| Senior Technical Advisor

Agrium Inc. – Fort Saskatchewan Annual Groundwater Monitoring Program | 2004 - Present| Senior Technical Advisor

Agrium Inc. – Redwater Annual Groundwater Monitoring Program | 2004 - Present| Senior Technical Advisor

Suncor Refinery Annual Groundwater Monitoring Program | 2014 - Present| Senior Technical Advisor

Shell Scotford Upgrader Soil Monitoring Program | 2004 - Present| Senior Technical Advisor

Shell Scotford Refinery Soil Monitoring Program | 2004 - Present| Senior Technical Advisor

Gibson Energy Hardisty Terminal Annual Groundwater Monitoring Program | 2016 - Present| Senior Technical Advisor

Shell Chemicals Remediation System Feasibility Study | Project Manager

Enbridge Inc. – Groundwater Dewatering Assessment | Project Manager

Groundwater Investigation | GeoEnvironmental Engineer

Agrium Inc. - Groundwater Interceptor Design |2003 | GeoEnvironmental Engineer

Agrium Inc. - Recovery Well Design|2004| GeoEnvironmental Engineer

Environmental Management Plan | 2003 | GeoEnvironmental Engineer

Landfill Investigation* | 2000 | Environmental Engineer

EPEA Approvals* | 2000 | Soil/Groundwater Contamination Specialist

EPEA Approvals | 2000 | Soil/Groundwater Contamination Specialist

** denotes projects completed with other firms*

GROUNDWATER SUPPLY / WELLS

Town of Canmore Groundwater Supply Well Replacement and Licensing | Senior Technical Advisor

Groundwater Exploration Program | John D'Or Prairie, Alberta | Senior Hydrogeologist and Technical Advisor

SaskPower Groundwater Exploration Program and Supply Wells |Saskatchewan| Senior Hydrogeologist and Technical Advisor

EPCOR Utilities |2012| Mackay River Plant Water Supply Wells| Senior Hydrogeologist and Technical Advisor

HYDROGEOLOGIC ASSESSMENTS

Alpine Ridge Hydrogeologic Assessment | Senior Technical Advisor

Sahtu Land and Water Board/NEB Environmental Effects Report | Hydrogeology Discipline Lead

PUBLICATIONS

Groundwater Investigation of Sunderby Landfill, Lulea, Sweden. *Proceedings from the Cold Regions Engineering and Construction Conference, Co-authored with Kindzierski, W. and Jonasson, C.*, 2004.

Sunderby Landfill Groundwater Investigation. *M.Sc. Thesis*, 2003.

** denotes projects completed with other firms*

Darrell Jobson, M.Sc., P.Biol., R.P.Bio.

Senior Aquatic Biologist

Darrell has over 22 years working as an Aquatic Biologist in Canada and the United States on variously sized aquatic environmental projects for assessment, monitoring and regulatory purposes. He regularly fills different project roles including technical lead, component manager and Qualified Aquatic Environmental Specialist. His technical background includes water quality and fisheries science; his experience includes aquatic effects assessments investigating how changes to water quality and habitat impact aquatic environments (i.e., lakes, rivers, streams and wetlands).

Darrell has worked on more than 20 large and small Environmental Impact Assessments including oil and gas and water resources projects. He has done environmental assessment, mitigation planning and regulatory support for flood protection and mitigation projects, stream and bank restoration work, pipeline and bridge river crossings, land-use planning, water resource and management, and industrial facility approvals. He has also worked on projects assessing the effects to aquatic environments from agriculture and nutrient runoff, industrial emission and acid deposition, industrial runoff, produced water and chloride spills, and effluents.

Darrell has a strong understanding of the relevant provincial and federal regulatory regime as well as water related legislation (e.g., *Water Act*, *Public Lands Act*, *Fisheries Act*, Provincial and federal water quality guidelines, etc.) needed to get projects completed and/or approved. He demonstrates strong technical leadership and actively mentors other staff. He became a member of the Alberta Society of Professional Biologists in 2006 and served as a board director from 2011 to 2015

EDUCATION

Master of Science, Wichita State University, Wichita, Kansas, United States, 1999

Bachelor of Science, University of New Mexico, Albuquerque, New Mexico, United States, 1997

EMPLOYMENT HISTORY

January 2021 to Present	Senior Aquatic Biologist, Matrix Solutions, Inc.: Technical Project Lead for aquatic biology, fisheries and water quality components of various projects including regulatory applications, risk assessments, monitoring, etc.
May 2019 to January 2021	Senior Associate, Aquatic Biologist, Stantec Inc.: Provided technical expertise in aquatic biology, fisheries and water quality and leadership to the water group in Calgary's Environmental Services Team.
April 2016 to May 2019	Professional Aquatic Biologist, Jobson Environmental Consulting Inc.: Providing clients technical environmental and regulatory expertise on projects in and around water including provincial and federal regulatory support.
2011 to 2016	Senior Aquatic Biologist, Matrix Solutions, Inc., Calgary, Alberta: Provided technical and organizational leadership to Matrix's aquatics team. Was accountable for technical quality and management of aquatics projects, providing advisement, oversight and review.

2005 to 2011	Aquatic Biologist, Matrix Solutions, Inc., Calgary, Alberta: Conducted water quality, fisheries, and aquatic ecology studies for environmental impact assessments, ecological risk assemments, instream construction and applications for permitting and approvals.
2002 to 2005	Aquatic Biologist, Golder Associates, Calgary, Alberta: Aquatic biologist working on water quality and aquatic ecology studies to support Oil Sands EIAs, and aquatic effects assessments.
2000 to 2002	Aquatic Biologist, Cheney Lake Watershed, South Hutchinson, Kansas: Lead scientist and Project Manager for the Cheney Lake Biomonitoring Project.
2001	Water Quality Data QA Technician, US E.P.A., Oregon: Contract Position

PROFESSIONAL AFFILIATIONS AND CERTIFICATIONS

Registered Professional Biologist #1265, Alberta Society of Professional Biologists, 2006 to present (Past Director)

Registered Professional Biologist, British Columbia College of Professional Biologists, 2009 to Present

Association of Professional Biologists, British Columbia

American Fisheries Society

Society for Freshwater Science

Rosgen Applied Fluvial Geomorpholgy Level 1

University of Calgary Aboriginal Relations Leadership Training

Erosion and Sediment Control Practitioner

EXAMPLE PROJECT EXPERIENCE/PROFESSIONAL EXPERIENCE

ENVIRONMENTAL IMPACT ASSESSMENTS AND PERMITTING

Springbank Reservoir | Alberta Transportation | Calgary, Alberta, Canada | 2018 to 2021 | Water Quality Discipline Lead

Water Quality discipline lead and hearing witness for a flood mitigation project on Elbow River upstream of Calgary. Responsible for the completion of the Water Quality Assessment and associated regulatory submissions. Contributed to monitoring and mitigation development to address environmental considerations, addressing regulatory and technical information requirements, stakeholder questions, and regulatory submissions to support provincial EIA and federal EIS requirements. Contributed to technical and regulatory components of the Provincial *Water Act* and Federal *Fisheries Act* applications.

Lake Manitoba/Lake St. Martin Outlet Channels Project | Manitoba Infrastructure | Winnipeg, Manitoba | 2020-2021 | Water Quality Discipline Lead

Was the Water quality discipline lead for a proposed flood control management system for the Lake Manitoba and Lake St. Clair region of Manitoba. Was responsible for water quality assessments, considered proposed monitoring and mitigations to water quality, and responding to regulatory and stakeholder information requests.

Suncor Meadow Creek EIA | Suncor | Fort McMurray, Alberta | 2014-2015 | Aquatics Technical Lead

Technical Lead for the aquatic ecology and fisheries component of an in-situ oil sands project EIA; managing budgets, field staff, data, conducting data analysis, mentoring junior and intermediate level staff, technical review and editing.

Hangingstone, Thornbury and MacKay EIA Projects | Athabasca Oil Corp. | Fort McMurray, Alberta | 2008 2015 | Technical Adviser and Component Manager

Oversaw the Aquatics Ecology and Water Quality components of the EIAs submitted for in-situ oil sands projects. Provided technical oversight in all aspects of the field work and reporting for the EPEA submissions and supporting infrastructure (e.g., Water Act and Fisheries Act submissions for stream crossings for the roads to the facilities). Also managed and/or conducted specialized work on fisheries and groundwater-surface water interactions to support EPEA applications.

Kai Kos Dehseh EIA | Statoil Canada Inc. | Fort McMurray, Alberta | 2006-2014 | Technical Adviser and Project Team

Oversaw various regulatory, permitting and monitoring work for a SAGD oil Sands Project. Was responsible for the Water Quality component of the Statoil Canada (North American Oil Sands Corp.) environmental impact assessment. Managed aquatic ecology environmental work to support Statoil's ongoing operations including Federal and Provincial regulatory compliance to work in and around water (Federal Fisheries Act and Navigable Water Protection Act; Provincial Water Act and ERCB Directive 56). Works in and around water included road stream crossings, pipeline crossings, pad and facility placement and monitoring. Conducted specialized aquatic assessments to support Statoil's biomonitoring and population genetics (e.g., Arctic Grayling, slimy sculpin, mussel body burden, water quality).

Surmont, SAGD EIA | MEG Energy | Conklin, Alberta | 2007-2009 |Technical Lead

Technical Lead providing oversight to field program coordination and safety. Also provided oversight to water related disciplines (hydrology, water quality and fish and fish habitat). Was the water quality discipline lead; responsible for the water quality component of the EIA, managing budgets, field staff, data, conducting data analysis, mentoring junior and intermediate level staff, technical review and editing.

OPTI Nexen Long Lake SAGD Project | OPTI Canada Inc. and Nexen Inc. | Anzac, Alberta | 2005-2008 | Discipline Lead for Water Quality and Aquatic Ecology/Fisheries

Was responsible for the water quality and aquatic ecology/fisheries components of the EPEA application for an in-situ oil sands project. Conducted field work and wrote the water quality and aquatic ecology/fisheries sections of the environmental impact assessment.

Taiga and Seleski Projects | Osum Oil Sands Corp. | Northeast Alberta | 2009-2012 | Aquatic Biologist.

Technical Lead and senior review for the Water Quality component of two oil sands EIAs.

Dunkirk Project | Koch Oil Sands Operating ULC | Fort McMurray, Alberta | 2013-2014 | Aquatic Biologist

Technical advisor for water quality and aquatic ecology (fisheries) disciplines of the Environmental Impact Assessment. Provided technical oversight and management review for surface water components (project not approved)

Pouce Coupe Lateral Application | Pembina Pipelines | Pouce Coupe, BC. | 2015 | Aquatic Biologist

Technical Reviewer for Aquatics component of Pembina's Pouce Coupe Lateral Project requiring NEB Section 58 application for pipeline approval. The project included 27 kms of new pipeline in Alberta and BC, and had 27 stream crossings and one wetland.

Mist Mountain Coal Bed Methane Project | BP Canada | Fernie, British Columbia | 2007-2009 | Aquatic Biologist

Technical reviewer for the aquatics component (Fisheries and Water Quality) of a large, multi-year environmental study to assess the environmental feasibility of a coal bed methane project in south eastern British Columbia.

BlackGold Project | Newmont Mining Company | Conklin, Alberta | 2006-2007 | Aquatic Biologist.

Conducted seasonal water quality and fisheries fieldwork and co-wrote the environmental setting report.

Carmon Creek EIA | Shell Canada | Peace River , Alberta | 2006-2008 | Water Quality Lead

Water Quality lead for the Water Quality component of the Environmental Impact Assessment. Responsible for managing the field programs, data analysis, technical writing and review.

Kearl Lake Oil Sands EIA | Imperial Oil | Fort McMurray, Alberta | 2003-2005 | Aquatic Biologist

Responsible for the water quality and benthic invertebrate components. Managed budgets, coordinated with field crews to collect samples, managed data, mentored junior staff on the project, data analysis and authored the baseline report.

WATER QUALITY and AQUATIC EFFECTS MONITORING

Hay Lakes Aquatic Effects Assessment |NuVista Energy Ltd. | Hay Lakes, AB. | 2018 | Aquatic Biologist
Conducted a water quality and benthic invertebrate assessment on wetland and lake habitats associated with oil field facility remediation. Information used to plan remediation and monitoring activies.

Aquatic effects assessment | Tidwater Midstream Ltd. | Whitecourt Alberta | 2018 | Aquatic Biolgist
Water quality and aquatic habitat assessments at oil field remediation sites to determine the potential for effects to aquatic life. Information used to plan remediation and monitoring activies.

Aquatic Effects Monitoring | Apache Corp. |2014-2017| Virginia Hills, Alberta | Aquatic Biologist
Technical advisor/support for various aspects of a multi year aquatic monitoring program to identify the potential level of effect from a produced water spill on an aquatic stream community. Accountable for the benthic invertebrate portion of the project and contributed to field work.

Water Quality and Fisheries Assessment | Confidential Client | Alberta | 2015-2016 | Aquatic Biologist
Conducted a water quality and fisheries assessment on a stream with a known federaly listed fish Species at Risk. Investigated the potential for a nutrient groundwater plume to affect a section of river habitat.

Ecological Risk Assessment | Enerplus | Wainwright Alberta. | 2015-2016 | Aquatic Biologist
Technical lead on a risk assessment assessing potential effects of chloride contaminated groundwater entering the Battle River on multiple trophic levels (including fish and benthic invertebrates).

Wetland Aquatic Assessments | Murphy Oil Corporation | Various locations in eastern Alberta | 2015-2016 | Aquatic biologist
Assessed water quality effects of oil field produced water on wetland aquatic communities. Information used to plan remediation and monitoring activies.

Aquatic Risk Assessment in a Wetland Complex | Zama City, Alberta | 2014-2016 | Technical Lead
Oversaw aquatic risk assessment to assess effects of chlorides on aquatic communities in a wetland complex in northern Alberta. This study included investigations on diatoms, zooplankton, benthic invertebrates and fish communities.

Repsol Energy | Various locations, AB. | 2016 | Aquatic Biologist
Wetland water quality and aquatic life assessments to support remediation and risk management planning for contaminated sites. Information used to plan remediation and monitoring activies.

Statoil, Christina River Mussel Study | Statoil Canada Ltd. | Fort McMurray, Alberta | 2010-2013 | Technical Lead and Project Manager
Investigated relationships between water quality, contaminants (metals, polycyclic aromatic hydrocarbons) and fat mucket mussel tissue concentrations in the Christina River.

FISH HABITAT PROJECTS

Fish Habitat Assessment | Piikani Nation, AB. | 2017 |Fisheries Biologist
Conducted fish habitat assessment to support regulatory applications for a stream realignment and road crossing repair. Authored report and recommendations; advised client on applications.

Pipeline Crossing Repairs | Nova Gas Transmission Ltd. | Alberta | 2013-2015 | Qualified Aquatic Environmental Specialist
Technical Lead for a number of QAES assessments throughout Alberta to support regulatory applications for a number large pipeline river and stream crossing repair projects. Also provided oversight to the environmental monitoring on the construction to remediate each crossing. Projects were situated in southern Alberta (Highwood, Elbow, Red Deer and Little Red Deer rivers and Threepoint, Willow and Langford creeks) and northern Alberta (Smokey and Simonette rivers and Beaver Creek)

Fish Spawning assessment | Okotoks, AB. | 2014 | Fisheries Biologist
Conducted fisheries habitat assessment in the Sheep River to determine potential impacts to resident fish spawning activities from instream construction and flood protection measures.

Flood Mitigation and Bank Protection Works | Calgary Municipal Corp. | Calgary, AB. | 2014-2015 |Aquatic Biologist

Fisheries technical advisor for fish habitat assessments and regulatory support activities to conduct instream bank protection construction and post flood mitigations in the Bow River.

Sheep River Flood Protection, Okotoks, AB. | Town of Okotoks | Okotoks, Alberta | 2014 | Fisheries Biologist

Conducted fisheries environmental work to support Fisheries Act and Water Act approvals to construct flood protection measures in the Sheep River Valley within Okotoks, Alberta after the 2013 floods.

Emergency Flood Response and Flood Repairs | Legacy Oil + Gas | Turner Valley, AB. | 2013 | Fisheries BIologist

On site during 2013 floods to assist client making emergency decisions to protect oil and gas industrial infrastructure in the Sheep River valley while maintaining regulatory compliance with the Federal Fisheries Act and Provincial Water Act. Environmental and regulatory work for river bank restoration/protection and flood mitigation after the 2013 floods. The instream works were around a number of oil and gas infrastructure facilities in the Sheep River valley (i.e., pipelines and wells).

Elbow River Fisheries and Habitat Rehabilitation | Calgary Municipal Corp | Calgary, Alberta | 2011 – 2013 | Techncical Lead and Project Manager

Conducted fish and fish habitat assessment of the Elbow River between the Glenmore Dam and the Bow River (approx. 15 km) to develop offsetting plan to enhance fish habitat. Tasks included spring and fall fish snorkel surveys, redd surveys, habitat mapping and the development of a GIS program for use in future monitoring. Developed habitat rehabilitation plans to restore Brown Trout spawning habitat in the Lower Elbow River.

FISHERIES ASSESSMENTS

Arctic Grayling Population Genetics Study | Various | Fort McMurray, Alberta | Technical Lead and Project Manager

Principle investigator and technical lead assessing population genetics in resident Arctic Grayling populations in a number of watersheds. Information used to assess baseline population dynamics and population viability.

Aquatic Monitoring | Chateau Lake Louse Lake Louise, Alberta | 2010 | Aquatic BIologist.

Benthic invertebrate and fish population monitoring for the Chateau Lake Louise to comply with their operating approvals under the Canadian Environmental Assessment Act.

Christina River Sculpin Study | Statoil Canada Ltd | Fort McMurray, Alberta | 2010-2013| Technical Lead and Project Manager

Investigated relationships between water quality, contaminants (metals, polycyclic aromatic hydrocarbons) and slimy sculpin fish tissue concentrations in the Christina River. Also collected sculpin DNA and assessed population genetics.

FISH PASSAGE DESIGN

Fish Passage on the Beaverlodge River | Mighty Peace Watershed Alliance | Beaverlodge , Alberta | 2015-2016 | Aquatic BIologist

Provided technical and regulatory over-site to construct a natural channel restoring fish passage in the Beaverlodge River. Obtained Fisheries Act and Water Act approvals for the project and provided guidance on fish habitat and passage requirements.

Fish Passage Project on Bearhole Lake | Dawson Creek, B.C. | 2016 | Fisheries Biologist

Fisheries Technical advisor on project to build a fish passage structure to facilitate fish movement past a low-head dam on a river used to maintain lake water levels.

David Brescia B.Sc., M.Sc., P.Biol.

Senior Principal / Regulatory and Environmental Specialist

Dave is a Senior Principal and a regulatory and environmental advisor with Stantec. He has extensive experience with the management and direction of environmental impact assessments, regulatory applications, and environmental monitoring programs for major projects.

Most recently, Dave has been providing technical direction and senior review as the Environment Lead for the Springbank Off-stream Reservoir Project, and as a technical reviewer and advisor for the Manitoba Infrastructure Lake Manitoba and Lake St. Martin Permanent Outlet Channels Project EIA.

Dave has been working on multidisciplinary EIAs for the past 21 years and has experience with all phases of project development from preliminary planning to reclamation and closure and follow-up and monitoring. He is an experienced ecologist and senior reviewer and applies his knowledge to develop robust, technically sound environmental assessments. Dave has been engaged in all phases of the regulatory process from liaison with regulators, application scoping and preparation through to post-approval monitoring.

EDUCATION

Master of Science, Forestry, University of British Columbia, Vancouver, British Columbia, 2000

Bachelor of Science, Biology (Co-op), University of Victoria, Victoria, British Columbia, 1997

REGISTRATIONS

Professional Biologist, Alberta Society of Professional Biologists

MEMBERSHIPS

Member, Canadian Land Reclamation Association

Member, Society for Ecological Restoration, Western Canada Chapter

Member, Alberta Native Plant Council

PROJECT EXPERIENCE

Alberta Transportation, Springbank Off-Stream Reservoir Project, Rockyview County, Alberta (Technical Lead), 2016-present

Dave is the environment lead on the Springbank Project. He works with the EIA team and the proponent to provide strategic direction on environmental assessment approach and methods, on Indigenous engagement matters. Dave liaises with the project engineering design team to provide direction on regulatory requirements and he liaises with regulators on environmental assessment approach and strategy. He is responsible for technical review of EIA deliverables, monitoring plans, information requests, and responses to statements of concern. He is preparing as an expert witness for the forthcoming regulatory hearing for the project.

Manitoba Infrastructure, Lake Manitoba and Lake St. Martin Permanent Outlet Channels Project, Federal and Provincial Environmental Impact Assessment, Winnipeg, Manitoba. 2019-Present

Stantec conducted a CEAA regulated environmental impact statement (EIS) of a proposed permanent flood control management system for the Lake Manitoba and Lake St. Martin region of Manitoba, approximately 200 km northwest of Winnipeg. Dave provided senior review and technical advice on the preparation of the regulatory filings for the project. Dave worked with the environmental team and provided direction on environmental effects, mitigation, Indigenous engagement, and regulatory challenges.

** denotes projects completed with other firms*

David Brescia B.Sc., M.Sc., P.Biol.

Senior Principal / Regulatory and Environmental Specialist

Teck Resources Ltd., Frontier Oil Sands Mine Project, Joint Federal-Provincial Environmental Impact Assessment and Baseline Studies, Fort McMurray, Alberta (Discipline Lead, Senior Technical Advisor, Expert Witness), 2011-2019

Dave prepared the vegetation and wetlands assessment update and the closure, conservation, and reclamation plan for the Project Update. He provided technical direction to the Frontier EIA team, including guidance on the regulatory application, EIA scoping, and assessment methodology. He worked with both the client and the EIA technical team to identify and resolve key regulatory and technical issues. Dave both authored and provided senior review of SIR and SOC responses and worked on post-approval environmental plans. Dave acted as expert witness for the Frontier Project regulatory hearing.

Titanium Corporation, Creating Value from Waste (CVW) Project, Fort McMurray, Alberta (Project Director), 2018

Dave led the preparation of the regulatory application for the CVW Project. He provided both environmental and regulatory direction, including the development of the environmental assessment approach. Dave liaised with the client and the engineering design team for the project, as well as with the regulators and other stakeholders. Dave was responsible for review of environmental and regulatory deliverables.

NOVA Gas Transmission Ltd., Woodenhouse Compressor Station C3 Unit Addition Project, Environmental and Socio-economic Assessment, NEB Section 58 Application, Alberta (Technical Director), 2016-2017

Dave provided technical direction on the ESA, including scoping and assessment methods. Dave worked with the client and regulators to provide clear direction on regulatory and environmental requirements. This included providing guidance on the newly implemented Alberta Wetland Policy. He provided review of all deliverables.

NOVA Gas Transmission Ltd., Peace River Mainline Abandonment Project, Environmental and Socio-economic Assessment, Alberta (Senior Reviewer and Technical Advisor), 2016-2017

The Project consisted of the physical abandonment of 266 km of pipeline, compressor station yard piping, utilities, buildings and other associated facilities and included an application to the National Energy Board (NEB) under section 74(1) (d) of the NEB Act. The Project also transversed the Sturgeon Lake Cree Nation where full removal of the pipeline within the Reserve Lands resulted in a Project Description submission to Indigenous and Northern Affairs Canada (INAC) under Section 67 of CEAA 2012.

Dave provided technical and strategic advice for the environmental assessment and regulator information requests. He worked closely with the project team to provide direction on the methods for assessing Project and Cumulative effects. Dave was a technical reviewer for the assessment sections and regulatory information requests on the Project.

Suncor Energy, Meadow Creek West Project Environmental Impact Assessment, Fort McMurray, Alberta (Technical Reviewer), 2016-2017

Dave worked with the EIA team to provide technical direction on assessment approach and methods. He provided senior review of technical deliverables for the EIA.

Shell Canada Limited, Muskeg River Mine Life of Mine Closure Plan, Fort McMurray, Alberta (Technical Reviewer), 2016

Dave acted as technical reviewer for the Update of the wildlife and fish components of the Life of Mine Closure Plan for the Muskeg River Mine.

Confidential Oil Sands Mine Project, Fort McMurray, Alberta (Technical Reviewer), 2016

Dave acted as technical reviewer for a confidential project in the Fort McMurray area. The project provided an examination of possible reclamation certification criteria and also provided a comparison of wildlife monitoring methods.

TransCanada Corporation, Energy East Pipeline Project, Environmental and Socio-economic Assessment, Canada (Senior Reviewer and Advisor), 2015

Dave provided technical and strategic advice for the environmental assessment. He worked closely with the project team to provide direction on the methods for assessing Project and Cumulative effects across multiple geographic and regulatory jurisdictions. Dave was a technical reviewer for the assessment sections and

** denotes projects completed with other firms*

technical data reports on the Project.

Eco Canada, Navigating Canadian Environmental Law Course, (Content Provider), 2015
Dave worked with Eco Canada to provide content for one of their online courses. Content was designed to introduce people to the basics of environmental assessment, the regulatory framework, and working with clients through the environmental assessment process.

Sasol Canada Holdings Limited, Canada Gas-to Liquids Facility, Environmental Impact Assessment, Alberta (Project Director, Regulatory Advisor), 2011-2015
Dave served as Project Director for the Project and was responsible for scoping the environmental assessment, meeting with regulators, and providing regulatory direction to the client. Dave also provided technical direction to project discipline teams and provided senior review of all deliverables. Dave interfaced regularly with project discipline teams, with the client`s management, technical, and engineering staff to ensure that project deliverables and schedule requirements were met and to ensure that communication and flow of information was maintained. Dave provided senior review of deliverables, including SIR responses.

Value Creation, BA Energy Inc., Heartland Upgrader, Environmental Impact Assessment, Strathcona County, Alberta (Project Manager), 2003-2015
Dave was responsible for coordinating 15 project disciplines and producing the EIA and application for approval. He prepared a regulatory amendment application to the Project. He also provided regulatory direction to the client, dealt with regulators, coordinated hearing preparations, coordinated liaison with the Client and project team and managed subcontractors, work scope, schedule and budget.

Shell Canada, Carmon Creek Project, Peace River, Alberta (Technical Director), 2013-2014
Dave worked with Shell on the development of their Carmon Creek Project. He provided technical and regulatory direction regarding environmental monitoring and regulatory requirements and on development strategy.

TOTAL E&P Canada Ltd., Joslyn North Mine Site-Wide Environmental Monitoring Program, Fort McMurray, Alberta (Technical Director), 2012-2014
Dave provided technical oversight of the Site-Wide Monitoring Program (SWMP) team for the Joslyn North Mine. He worked with TOTAL's environmental, regulatory, and engineering personnel to provide direction on key issues around their surface water, fish, environmental effects, wildlife, vegetation and noise monitoring programs. Dave led a team of environmental specialists in the development and execution of innovative management and monitoring programs which are the subject of intensive review by provincial and federal regulators for early works and construction activities. Dave has been responsible for both content development and senior review.

Japan Canada Oil Sands (JACOS), Hangingstone Expansion Project Environmental Impact Assessment, Fort McMurray, Alberta (Technical Director), 2011-2014
Dave worked with JACOS regulatory, stakeholder and engineering personnel on post-filing regulatory and technical strategy in support of the EIA for the Hangingstone Expansion Project. He provided senior review and content development for responses to Supplemental Information Requests from regulators.

TOTAL E&P Canada Ltd., Joslyn North Mine Environmental Management and Monitoring Plan, Fort McMurray, Alberta (Technical and Regulatory Lead), 2010-2011
Dave was the project manager and the technical and regulatory lead for the environmental management and monitoring plan (EMMP) for the Joslyn North Mine. He worked with TOTAL's environmental, regulatory, and engineering personnel to scope the EMMP and provide direction on key issues. Dave managed a team of environmental and regulatory specialists to develop the mitigation, management and monitoring programs to be incorporated into the project design, construction, operation, and decommissioning. Dave was responsible for both content development and senior review of the EMMP.

BP Canada, Environmental / Regulatory Overview, Calgary, Alberta (Project Manager, Author), 2010
Dave prepared a technical report for BP Canada

** denotes projects completed with other firms*

providing a preliminary review of potential environmental and regulatory issues to be considered for the development of a commercial in-situ oil sands project at one of their Leases.

Imperial Oil Resources, Nabiye Expansion Project Pre-Disturbance Assessment and Conservation & Reclamation Plan, Cold Lake, Alberta (Project Director), 2008-2010
Dave managed a large multidisciplinary team in the production of 37 regulatory submissions in support of Imperial Oil's Nabiye Project approval. Dave acted as senior reviewer and provided technical guidance to the project team. As part of the project, he managed the execution of a comprehensive field program involving more than 35,000 field hours with zero lost time incidents. Dave was responsible for client liaison, management of subcontractors, field safety inspections, and project scope, schedule and budget.

Value Creation Inc., Terre de Grace Pilot Project Regulatory Application, Fort McMurray, Alberta (Project Director, Regulatory Advisor), 2005-2010
Dave managed all disciplines and production of the regulatory application. He served as a senior technical reviewer for the application and was responsible for the preparation of the Water Act application for the Project. Dave served as a regulatory advisor to Value Creation and provided direction on project design requirements, regulatory and stakeholder issues. Dave met with regulators to discuss expectations and assessment scoping Dave met with aboriginal groups to discuss and address statements of concern. Dave was responsible for reviewing draft approvals. for the pilot project. Dave provided direction on scoping for future EIA work and organized field work to meet those requirements.

Shell Canada Inc., Scotford Upgrader Expansions Baseline Study and Environmental Impact Assessment, Strathcona County, Alberta (Senior Technical Reviewer), 2007-2008
Dave was a reviewer for several of the baseline studies and EIA sections of the application.

Petro-Canada Oil Sands Inc., Sturgeon Upgrader Baseline Study and Environmental Impact Assessment, Sturgeon County, Alberta (Project Manager, Technical Reviewer), 2005-2008
Dave was responsible for coordinating all project disciplines and producing the EIA and application for approval. He dealt with regulators and served as a liaison between the client team, engineering team members and environmental team members. Dave also managed the supplemental information request process as well as post-filing support work for Petro-Canada Oil Sands Inc. He was involved in the preparation for and attended the ERCB hearing for the Project. Dave managed subcontractors, work scope, schedule and budget.

Connacher Oil and Gas Ltd., Great Divide Oil Sands Project Regulatory Application, Fort McMurray, Alberta (Project Manager), 2005-2006
Dave was responsible for coordinating preparation of the regulatory application and senior technical review of the biophysical baseline reports and the conservation and reclamation plan prepared in support of the application. His responsibilities also included client liaison and management of work schedule and budget.

Imperial Oil Resources Ventures Ltd., Kearl Oil Sands Project – Mine Development Baseline Report and Joint Federal-Provincial Environmental Impact Assessment, Fort McMurray, Alberta (Project Manager and Discipline Lead), 2003-2006
Dave was the manager for the terrestrial disciplines, and was discipline lead for conservation and reclamation, and resource use. Dave was responsible for preparing and monitoring the work scope and schedule, and for liaison with the client, project team members and subcontractors. Dave prepared the baseline and environmental impact studies for the resource-use section of the EIA, and the terrestrial closure, conservation and reclamation plans for the mine. Dave managed the supplemental information request process for the terrestrial disciplines. He was involved in the hearing preparation process and attended the EUB Hearing for the Project.

Lacombe County, Sylvan Lake Water Quality Assessment and Watershed Management Considerations | Sylvan Lake, Alberta | 2005 | Project Manager
Dave was responsible for preparing the science-based reference document for long-term development planning in the Sylvan Lake watershed. Responsibilities included coordinating report preparation and mapping,

** denotes projects completed with other firms*

scheduling work with the project team, client liaison, managing the budget and editorial and technical review of the final report.

Terasen Pipelines, Heartland Terminal EPEA Application, Strathcona County, Alberta (Project Manager), 2003-2005
Dave was responsible for client liaison and management of work schedule and budget. He was also the coordinating author of the application report, responsible for integrating input from contributing authors.

David Luzi Ph.D., P.Geo. (AB, BC, MB, NU, NWT)

Senior Geomorphologist/Hydrologist

David has over 20 years of professional and research experience in the fields of fluvial geomorphology, hydrology and mine water management in Canada and the United States. He has managed hydrology programs that have included baseline monitoring, flood frequency analysis, hydrological modelling, water balance modelling, watershed modelling, climate change modelling, water management plans and development of sediment and erosion management plans.

David has participated in the development of technically feasible habitat offsetting programs, geomorphic assessments and river restoration projects in British Columbia, Alberta, Northwest Territories, Nunavut, Washington State, Colorado and Wyoming.

David has provided environmental support to various Tribal and First Nation governments, provincial, state, and federal governments, addressing both existing environmental conditions and assessing the potential effects of proposed land use changes. This experience includes: hydrometric network planning, road siting and assessment of water crossing structures, stakeholder engagement with the public, regulatory agencies, and First Nation communities.

EDUCATION

Doctor of Philosophy in Fluvial Geomorphology, University of British Columbia, Vancouver, British Columbia, Canada, 2014

Masters of Science in Fluvial Geomorphology, University of British Columbia, Vancouver, British Columbia, Canada, 2000

Applied Fluvial Geomorphology (Level I), Wildland Hydrology Inc., Asheville, North Carolina, United States, 2015

River Morphology and Applications (Level II), Wildland Hydrology Inc., Bend, Oregon, United States, 2015

Canadian Rivers Institute, Stream Restoration Design Workshop, Bob Newbury, British Columbia, Canada, 2014

PROJECT EXPERIENCE

STREAM/RIVER RESTORATION AND GEOMORPHOLOGY

SR1 Springbank Dam Diversion | Alberta Transportation | Alberta, Canada | 2019-Present | Discipline Lead - Hydrology/Geomorphology

Joined project as hydrology discipline lead during the regulatory review process. Led the hydrology and geomorphic responses to information requests, this included: updated geomorphic impact assessment; updated MIKE-21 TSS model; scenarios for early and late releases of water from the reservoir; and coordination between fisheries and engineering discipline leads to advance mitigations of the project.

Streambank Protection | Township of Langley | Langley City, British Columbia | 2018 | Geomorphologist

Objective of the project was to provide bank protection for an eroding stream bank that was threatening the stability of an adjacent municipal road. David reviewed the stream bank protection designs and provided field supervision during project construction.

Yakoun River | BC Ministry of Forests Lands and Natural Resource Operations | British Columbia, Canada | 2017-2018 | Project Manager, Technical Reviewer

Managed and was senior technical reviewer for a project assessing the hydrological response of active fluvial units. Specifically, the project was to assess the flood flows that inundate the low and medium benches and assess the efficacy of relating Terrestrial Ecosystem Mapping (TEM) data to inundation frequency.

Mill Creek Geomorphic and Channel Stability Assessment | City of Edmonton, AB | Edmonton, Alberta | 2017 | Geomorphologist

Conducted a field geomorphic assessment of Mill Creek to quantify the effects of flow reductions on sediment and erosion in the creek. Conducted channel stability analysis using Shields equation and provided recommendation for restoration.

Bow River Geomorphic Assessment, Alberta | City of Calgary | Calgary, Alberta | 2016 | Geomorphologist

Geomorphic assessment of selected reaches on the Bow River within the City of Calgary. Historic aerial photos and field surveys were used to determine potential locations for habitat offsetting. Additionally, unstable reaches were identified as well as areas of long-term or excessive bank erosion.

Chappelle Outfall Geomorphic and Channel Stability Assessment | Confidential Client | Edmonton, Alberta | 2016 | Geomorphologist

Reviewed proposed outfall location in terms of the potential effects to local sediment transport and geomorphic stability.

Kitimat River Geomorphic Assessment | LNG Canada | Kitimat, British Columbia | 2016 | Geomorphologist

Geomorphic Assessment of the downstream, reaches of the Kitimat River. Historic aerial photos and field surveys were used to identify unstable reaches, bank erosion, and potential avulsion locations.

Fisheries Offsetting Design Program | LNG Canada | British Columbia | 2015-2018 | Design Manager/Geomorphologist

Responsible for management of team of stream restoration design engineers, hydrologists, hydrogeologists, and fisheries biologists to produce designs for DFO authorization and designs for construction. The project requires 20 km of new channel construction, using surface water intakes, infiltration galleries, and groundwater sources in the design. Project includes hydrometric program (6 stations) and groundwater monitoring well installation and monitoring (27 paired wells).

Gibraltar Ditch and Yampa River Bank Stabilization | Colorado | 2015 | Geomorphologist

Assisted with design, review and Hec-Ras modelling for a bank stabilization project.

Glacier Ridge | Calgary, Alberta | 2015 | Geomorphologist

Senior technical reviewer for a geomorphic and channel stability assessment for a residential development.

Porcupine Ridge Ranch Egeria Creek | Colorado | 2015 | Geomorphologist

Assisted in geomorphic and channel stability assessment, 60% design review and layout of stream restoration design.

Yampa River | Colorado | 2015 | Geomorphologist

Reconnaissance geomorphic and channel stability assessment and observation of the Morgan Bottom reach of the Yampa River.

Peryam Reach of the Encampment River | Wyoming | 2015 | Geomorphologist

Reconnaissance geomorphic and channel stability assessment of the Encampment River.

Fisheries Habitat Compensation Program, KSM Project* | Confidential Client | British Columbia | 2011-2014 | Design Manager/Geomorphologist

Following the identification of 27 potential compensation sites, led team of engineers, geomorphologists and biologists to assess the feasibility and constructability of the sites. The multi-year program narrowed the sites to 6, after which detailed geomorphic assessments, groundwater and surface water monitoring was begun in order to progress designs. Engineering designs progressed from conceptual to 60% design phase.

Participated in QA/QC of engineering design, layout of project, and construction monitoring.

Fisheries Habitat Compensation Program, Back River Project* | Sabina Gold & Silver | Nunavut | 2011-2014 | Geomorphologist

Assessed feasibility of Fisheries Compensation Projects. Task required geomorphic and constructability assessment of potential offsetting locations.

Sediment Transport Study* | Department of Fisheries and Oceans | Northwest Territories | 2006 | Contract Geomorphologist

Collected sediment data to characterize surface and subsurface grain size distributions, sediment transport, and suspended sediment concentrations for multiple creek crossings along the proposed Mackenzie Valley Pipeline.

Channel Assessment Stillaguamish River* | Tulalip Tribes | Washington, United States | 2004-2005 | Geomorphologist

Completed field data collection and reporting for the stream channel assessment module of the Washington State Watershed Assessment method.

Channel Assessment Squire Creek* | Tulalip Tribes | Washington, United States | 2003-2004 | Geomorphologist

Conducted 7 km longitudinal profile survey, which included channel cross section and wood loading estimates. The survey was conducted to document the impact of a landslide which delivered an estimate 125 000 m³ of mud, rock, woody debris to the channel.

Channel Migration Board Manual Working Group* | Tulalip Tribes | Washington, United States | 2002-2004 | Geomorphologist

Technical representative for the Tulalip Tribes in state level working group to develop a manual to provide guidelines for delineating channel migration zones for Washington State.

Watershed Road Surface Erosion Assessment and Monitoring* | Tulalip Tribes | Washington, United States | 2001-2004 | Geomorphologist

Field beta-tested and reviewed the Washington Road Surface Erosion Model (WARSEM). Contributing member of the scientific advisory committee that reviewed the applicability and implementation of the model and accompanying field manual for state forest practices.

Channel Assessments of Carnation Creek and Stuart-Takla for the Fish-Forestry Interaction Program* | BC Ministry of Forests | British Columbia | 1999 | Geomorphologist

Completed field surveys of channel morphologic parameters and in-channel wood loading for long-term monitoring program.

HYDROLOGY STUDIES

Lesser Slave River Hydrologic Assessment | West Fraser, Slave Lake Pulp | AB | 2020 | Technical Reviewer

Senior technical reviewer of a hydrological assessment of the Lesser Slave River to determine allocation potential for water use.

Prince Rupert Gas Transmission Project | PRGT | Prince Rupert, British Columbia | 2017-2018 | Technical Reviewer

Completed technical review of the Hydrology Technical Data Report and Hydrology Environmental Assessment for Prince Rupert Gas Transmission Project.

Water Availability Assessment | Confidential Client | British Columbia | 2016 | Hydrologist

Flood frequency analysis and water availability assessment was conducted to estimate ecosystem base flow. Analysis of existing water licenses in the basin was coupled with the result of the estimation of the ecosystem base flow to provide the client with guidance on water availability for their project.

Flood Frequency Analysis | City of Penticton | Penticton, British Columbia | 2016 | Hydrologist

Conducted flood frequency analysis to establish the 1:200 year design flow for the Penticton Creek Stream Restoration Project.

Assessment of Flood Vulnerability | Government of Alberta | Alberta | 2014 -2015 | Hydrologist

Built and calibrated a Hec-HMS model of the Bow River Watershed for use in a climate vulnerability assessment.

MINING

Eagle Gold Mine | Victoria Gold Corp | Yukon | 2020 | Water Resources Quality Reviewer

Quality reviewer for surface water quantity, quality and geochemistry sections of the independent environmental audit, required by the Quartz Mine Licence QML-0011, to assess the implementation of environmental management plans at the mine site.

Michel Coal Project | North Coal Ltd | British Columbia | 2020 | Third Party Reviewer

Provided a third-party scientific review of hydrological baseline report, water balance model, mitigation measures for source control and water quality, water management plan and mine plan included in the application for an environmental assessment certificate.

Nystar Myra Falls Reclamation Research Program | Nystar | British Columbia | 2018-2019 | Discipline Lead Water Resources

Senior technical reviewer for the development of the reclamation research evaluation and monitoring programs with regards to hydrology and stream restoration/reclamation components. Also contributed to channel geomorphic monitoring program.

Coffee Project | Goldcorp | Yukon | 2018 | Hydrologist

Value assurance review on behalf of the client. Reviewed the following reports: hydro-meteorology, water balance and water quality model, heap leach water balance report, and the overall site-wide water management plan. Objective of the review was to identify any potential uncertainty and risk to the client and the Project.

Hermann Mine | Conuma Coal | Tumbler Ridge, British Columbia | 2018 | Senior Hydrologist

Senior technical reviewer for hydrology and water balance/quality model for Environmental Assessment application. Reviewer of clients hydrometric monitoring program. Participation in Working Group meetings on behalf of the client.

Mount Milligan | Centerra Gold | Mount Milligan, British Columbia, Canada | 2017 - | Technical Director, Business Developer, Qualified Professional

Water permitting lead for emergency water sources for mine processing. Tasks included: review of existing water balance model, review existing hydrometric, climatological and hydrogeological data, surface water source identification and investigation, environmental flow needs assessment, 2D Hydraulic modelling for assessing potential effects of water withdrawal, multiple water licence applications, environmental assessment amendment applications, developed new site-wide and regional water balance model for environmental assessment and for operations, and client representative at Working Group and First Nation review meetings. Developed site-wide adaptive management and monitoring plan. Qualified Professional for site's makeup water pumping program.

Lynn Lake Gold Project | Alamos Gold | Lynn Lake, Manitoba | 2016-present | Project Water Lead

Senior technical support and liaison between engineering and environmental components of the project, NI43-101 reviewer, and worked with client engineering team to develop water management plans and appropriate water management infrastructure. Senior technical reviewer for: baseline surface water program, baseline reporting documents, QA/QC of the hydrometric data collection program and rating curve development. Reviewer of the hydrology model and water balance model. Presenter at regulatory meetings and participated in community engagement meetings. Senior lead for water sections of the Environmental Assessment.

Mesa Wolverine | Teck | Tumbler Ridge, British Columbia | 2016 | Hydrologist

Technical lead for water related items for closure and reclamation planning for Teck's Legacy Sites program. Discipline lead for erosion and sedimentation program, culvert assessment and removal program, and water management assessment and planning program. Water management for reclamation and closure planning.

Berg Cu-Mo Project* | Thompson Creek Metals | British Columbia | 2013-2014 | Senior Discipline Reviewer

Reviewed baseline reporting documents and QA/QC of the hydrometric data collection program.

Quintette Coal Project* | Treaty 8 Nations | British Columbia | 2013 | Third Party Review—Hydrology Manager

Managed the third-party technical review for the hydrology portion of the Mines Act Permit Application. This included the technical review of the data collection methodologies of the hydrometric program and the surface water hydrology effects assessment. Provided the proponent and their consultant with comments regarding gaps in the existing baseline instream flow assessment and hydrology reports, water balance model, and effect assessment analysis.

Roman Coal Mine* | Treaty 8 Nations | British Columbia | 2013 | Third Party Review—Hydrology Manager

Managed the third-party technical review for the hydrology portion of the Roman Environmental Assessment. This included the technical review of the data collection methodologies of the hydrometric program and the surface water hydrology effects assessment. Provided the proponent and their consultant with comments regarding gaps in the existing baseline reports, water balance model, and effect assessment analysis.

Hope Bay Gold Project* | Newmont/TMAC Resources | Northwest Territories | 2012-2014 | Project Hydrologist—Hydrology Manager

Managed a hydrometric monitoring network for a compliance monitoring program and water licence renewals. Reviewed baseline reporting documents and QA/QC of the hydrometric data collection program.

Brucejack Au-Cu Project* | Pretivm | British Columbia | 2012-2014 | Hydrology Manager

Managed baseline program, reviewed baseline reporting documents, and QA/QC of the hydrometric data collection program.

Hackett River Au Project and Bathurst Inlet Port and Road Project (BIPR)* | Xstrata | Nunavut | 2012-2014 | Senior Discipline Reviewer

Reviewed engineering water management plans and coordinated fish habitat assessment as it pertained to in-stream flows and fish compensation planning. Reviewed baseline reporting documents and QA/QC of hydrometric data. Discipline review of DEIS submitted for BIPR.

Murray River Coal Project* | HD Mining International | British Columbia | 2012-2014 | Hydrology Manager

Managed a hydrometric monitoring network and QA/QC of the hydrometric data. Reviewed annual baseline reports, a hydrometeorological report and co-developed a site wide water balance model in GoldSim.

Young and Melville Potash Projects* | BHP Billiton | Saskatchewan | 2012-2013 | Senior Discipline Reviewer

Reviewed baseline reporting documents and QA/QC of the hydrometric data collection program.

Back River Au Project* | Sabina Gold | Nunavut | 2011-2014 | Project Hydrologist/Senior Discipline Reviewer

Managed a hydrometric monitoring network that collected hydrometric data for a baseline monitoring program. Reviewed baseline reporting documents and QA/QC of the hydrometric data collection program. Reviewed the hydrology section for the DEIS.

Courageous Lake Au Project* | Seabridge Gold | Northwest Territories | 2011-2014 | Project Hydrologist

Managed a hydrometric monitoring network that collected hydrometric data for a baseline monitoring program. Reviewed baseline reporting documents and QA/QC of the hydrometric data collection program. Reviewed existing fish habitat compensation and diversion options, suggested alternatives and design improvements.

KSM Cu-Au Project* | Seabridge Gold | British Columbia | 2011-2014 | Project Hydrologist/Hydrology Manager

Managed the baseline monitoring program for hydrology, glaciology and fish compensation planning. Selected locations for the hydrometric network in response to Project design changes. Calibrated and extended site water balance model to regional watersheds for water quality modelling in GoldSim. Responsible for providing senior review and direction for the hydrologic assessment chapter in the KSM Environmental Assessment (EA). The assessment included an estimate of expected normal and return period values for a number of key hydrological indices that consider a wide range of hydrologic conditions over a long time period. Prepared and reviewed the following documents submitted along with the EA or Mines Act permit: hydrology baseline report, glacial monitoring baseline report, UBC watershed model report, fish habitat compensation plan, in-stream flow assessment memo, water management plan, and the erosion and sediment control plan. Attended working group meetings directed by BC Environmental Assessment Office (EAO) and prepared responses to stakeholder comments on the EA.

Galore Creek Cu Project* | Galore Creek Mining Corporation | British Columbia | 2011-2014 | Senior Discipline Reviewer

Managed baseline program, reviewed baseline reporting documents, QA/QC of the hydrometric data collection program and glacier monitoring program, and reviewed Hec-Ras model of one of the project creeks.

PUBLICATIONS

Hogan, D.L. and D.S. Luzi. Channel Morphology: Fluvial forms, processes, and forest management. *In Compendium of forest hydrology and geomorphology in British Columbia. Pike, R.G. et al. (editors). B.C. LMH No. 66, pp. 331–371*, 2010.

Hassan, M.A., B.J. Smith, D.L. Hogan, D.S. Luzi, A.E. Zimmermann, B.C. Eaton. Sediment storage and transport in coarse bed streams: Scale considerations. *In Gravel-Bed Rivers VI. From process understanding to river restoration. Eds. Habersack H., Piégay H., and Rinaldi M. pp. 473-496*, 2008.

Presentation. Morphodynamics of a steep gravel bed stream: inferences from a Froude-scaled experimental river. *American Geophysical Union 2009 Fall Meeting, San Francisco, California*, 2009.

Presentation. Abundance, function and evolution of wood in headwater streams of the Northwestern Cascades, Washington. *Riparian Management in Headwater Catchments: Translating Science into Management. Vancouver, British Columbia*, 2007.

Presentation. The influence of log jam development on channel morphology in an intermediate sized coastal stream, Carnation Creek, BC. *American Geophysical Union 2006 Fall Meeting. San Francisco, California*, 2006.

Presentation. A vertical geologic strip map and landslide inventory of the Tulalip Tribes Reservation shoreline, Puget Sound, Washington. *Geological Society of America Annual Meeting 2005, Salt Lake City, Utah*, 2005.

Co-Instructor (with Tim Abbe). *Channel Migration Zone (CMZ) Delineation Workshop. Seattle, Washington*, 2004.

David Sol BA, MA, MPL, RPP, MCIP
Associate - Manager, Planning

Mr. Sol is a resilience planner and mitigation assessment specialist. He has graduate degrees in Communication for Development and Urban Planning and has completed academic research in the areas of multicultural stakeholder engagement, planning for climate change and the effects of information technologies in regional planning. Mr. Sol has a wide range of experience in land use planning, market research, and public participation. He has completed the International Association for Public Participation (IAP2) certificate program.

With IBI Group, Mr. Sol has become a specialist in assessing the risks and impacts of floods and mitigation options. He leads a multidisciplinary team to complete flood risk assessments and mitigation planning across Canada, working with all levels of government to increase community resilience. He also leads the development of methods and tools for risk assessment practice.

Representative Experience

Mr. Sol was the Project Manager and Team Lead for the following Flood Risk Assessment and Mitigation Planning projects:

- Benefit/Cost Analysis of Elbow River Mitigation, Springbank Off-Stream Reservoir – Alberta Transportation. 2017 - 2021.
- Dam Failure Flood Assessment, Barrier, Interlakes, Canyon, Three Sisters and Cascade Dams – TransAlta. August 2020.
- BC's Lower Mainland Flood Risk Assessment – Fraser Basin Council. June 2020.
- CanFlood – Canada's open flood damage toolset – Natural Resources Canada. Phase I, May 2020; Phase 2, ongoing.
- Town of Whitecourt – Flood Mitigation Plan. May 2020.
- Provincial Flood Damage Assessment – Alberta Environment and Parks: Medicine Hat, Red Deer, Wood Buffalo, Canmore, Okotoks, High river, Black Diamond, Sundre, Peace River; April 2020.
- Flood Damage Assessment and Mitigation Benefit/Cost Advisory – Credit Valley Conservation, ON. June 2019.
- Provincial Flood Damage Assessment – Alberta Environment and Parks: Hamlet of Irvine, Hamlet of Walsh, Village of Thorsby, Village of Carbon, Town of Coleman, City of Airdrie, Town of Stettler, City of Lacombe, Town of Millet, Town of Manning; March 2019.
- Flood Risk Assessment and Ranking Project – Toronto Regional Conservation Authority, ON. March 2019.
- Flood Damage and Mitigation Study – Quinte Conservation Authority, ON, March 2019.
- Flood Damage and Mitigation Study – Village of Telkwa, BC, March 2019.
- Flood Mitigation Study – City of Moncton, NB, October 2018.

Education

Master of Planning, Urban Development, Ryerson University, Toronto, ON, 2011

Master of Communication for Development, Malmö University, Malmö, Sweden, 2007

Bachelor of Arts, Communication and Culture, University of Calgary, AB, 2004

Experience

2012–Present
IBI Group, Calgary, AB, Planner

2007-2012
Clear Path Engineering Inc.

Memberships

Alberta Professional Planners Institute (APPI) - 2009

Canadian Institute of Planners (CIP) - 2009

Certifications

International Association for Public Participation (IAP2) - Certificate in Public Participation, 2012

- Analysis of Floodplain Regulations with Future Development: case study – City of Calgary. June 2018.
- Canadian Guidelines and Database of Flood Vulnerability Functions – Natural Resources Canada, March 2017.
- Assessment of Flood Damages: Wetland Retention Study – Intact Centre on Climate Adaptation, University of Waterloo, March 2017.
- Provincial Flood Damage Assessment Study Canmore, Whitecourt, Okotoks: Assessment of Flood Damages – Alberta Environment and Parks, February 2017.
- Provincial Flood Damage Assessment Study Fort McMurray: Benefit/Cost Analysis of Waterways/Ptarmigan Dykes – Government of Alberta, June 2016
- The City of Calgary Flood Mitigation Options Assessment – City of Calgary, 2016
- Provincial Flood Damage Assessment Study, Government of Alberta – ESRD, February 2015
- Provincial Flood Damage Assessment Study - City of Calgary: Assessment of Flood Damages, Government of Alberta – ESRD, February 2015
- Provincial Flood Damage Assessment Study Drumheller: Assessment of Flood Damages, Government of Alberta – ESRD, April 2015
- Provincial Flood Damage Assessment Study Fort McMurray: Assessment of Flood Damages, Government of Alberta – ESRD, April 2015
- Provincial Flood Damage Assessment Study High River: Assessment of Flood Damages, Government of Alberta – ESRD, April 2015
- Feasibility Study – Athabasca River Basins, Government of Alberta – Flood Recovery Task Force, January 2014
- Flood Damage Assessment in Alberta: Best Practices Principles and Guidelines – Publication, Government of Alberta – ESRD, December 2014

Mr. Sol has developed flood damage estimation programs, depth-damage curves, building classification systems and GIS inventory tools. In addition to the direct damage to property, he has experience investigating the following risks and impacts: mortality, injury, disease/infection/exposure, mental health/quality of life, water contamination, habitat loss, business disruption, residential displacement, traffic disruption, waste disposal, emergency response and infrastructure damages. For risk and mitigation assessments, Mr. Sol produces a baseline existing risk profile against which a variety of mitigation options, both structural and non-structural are evaluated with benefit/cost and multi-criteria analysis.

Mitigation plans are assessed with a triple-bottom-line, multi-criteria process that is weighted and scored with input from key stakeholders. Mr. Sol has conducted engagement sessions for flooding issues for residents of communities across Canada. The goals of this engagement were to understand existing knowledge, perceptions, and values in relation to flood risk and to communicate flood risk profiles and mitigation options.

Eliot Terry M.Sc., P. Biol.

Associate, Senior Wildlife Biologist

Eliot Terry is a senior wildlife biologist with over 20 years of professional work experience in the environmental consulting industry. Mr. Terry has held a number of senior level positions as a Group Leader as well as Project Manager/Wildlife Biologist for environmental consulting companies in both Alberta and British Columbia. As a senior wildlife biologist he has provided environmental consulting services to a number of sectors including government (land use planning/risk assessment), mining, forestry, oil and gas, oil sands, hydroelectric, transportation, as well as municipal infrastructure. His area of expertise focuses on wildlife related issues associated with environmental impact assessments including mitigation and monitoring. Mr. Terry has completed a number of technical reports including peer-reviewed scientific papers related to woodland caribou conservation. Mr. Terry also has 8 years of post-secondary teaching experience where he held a full-time faculty position at Lethbridge College, School of Environmental Sciences.

EDUCATION

Master of Science (Animal Science), University of British Columbia, Vancouver, British Columbia, Canada, 1994

Bachelor of Science in Wildlife Biology, University of Guelph, Guelph, Ontario, Canada, 1984

REGISTRATIONS

Professional Biologist, Alberta Society of Professional Biologists (2004 to present)

Registered Professional Biologist (RPBio.), Association of Professional Biologists of BC/College of Applied Biology, British Columbia (1994-2005)

AWARDS

1992 Science Council of Canada–Graduate Scholarship

PROJECT EXPERIENCE

FLOOD IMPACT ASSESSMENTS

Springbank Off-stream Reservoir Project | Alberta Transportation | Calgary, Alberta, Canada | Senior Wildlife Biologist/Technical Advisor | 2016 - Present

Responsible for technical (quality) review of the wildlife component of an environmental assessment prepared to support Alberta Transportation's application to build and operate the Springbank Off-stream Reservoir Project west of Calgary, Alberta. The environmental assessment was prepared to meet both provincial (EPEA) and federal (CEAA) regulatory requirements and included an assessment of potential Project effects on wildlife and biodiversity during construction and dry operations as well as flood and post-flood operations. Participated in Public Open Houses and presented environmental assessment results as well as proposed mitigation and monitoring programs to the Technical Advisory Group as well as Indigenous groups. Prepared responses to provincial and federal Supplemental Information Requests (SIRs) as well as statements of concern from Indigenous groups.

Lake Manitoba and Lake St. Martin Outlet Channels Project | Manitoba Infrastructure | Winnipeg, Manitoba, Canada | Senior Wildlife Biologist/Quality Reviewer | 2019- Present

Stantec conducted a CEAA regulated environmental impact statement (EIS) of a proposed permanent flood control management system for the Lake Manitoba and Lake St. Martin region of Manitoba. Responsible for senior technical review of the wildlife component to meet provincial (Environment Act) and federal (CEAA 2012) regulatory requirements. Report included an assessment of potential Project effects on wildlife and wildlife habitat during construction and operation. The assessment focused on potential effects of the Project on species of conservation concern including species at risk and species of traditional importance.

** denotes projects completed with other firms*

OIL & GAS MIDSTREAM, PIPELINES

Keystone XL Pipeline Project | TransCanada | Calgary, Alberta | 2018 | Discipline Lead - Wildlife

Responsible for coordination of wildlife field surveys and technical data reporting to meet certificate Condition 7 outlined by the National Energy Board (NEB).

Kaybob Duvernay Program, Caribou Protection Plan | Chevron | Calgary, Alberta | 2016 | Senior Wildlife Biologist, Quality Review

Responsible for preparing and updating a Caribou Protection Plan (CPP) to support the Chevron's Kaybob Duvernay Appraisal (KDA) pipeline, which intersected the Little Smoky Caribou Range in west-central Alberta.

TransCanada Energy East Pipeline Project | 2014 | Senior Wildlife Biologist and National Discipline Lead

Responsible for provincial coordination and senior technical review of the wildlife component of the Environmental and Socio-economic Assessment (ESA) as well as Technical Data Reports (TDRs) prepared to support a National Energy Board (NEB) section 52 application to construct and operate a 4600 km pipeline extending from Alberta to New Brunswick.

Nova Gas Transmission Limited (NGTL) Peace River Mainline (PRML) Abandonment Project | Nova Gas Transmission Limited (NGTL) | Alberta | Senior Wildlife Biologist and Quality Review

Responsible for senior technical review of the wildlife component of the Environmental and Socio-economic Assessment (ESA) prepared to support a National Energy Board (NEB) section 74 application to abandon a 266 km section of the PRML.

Enbridge Northern Gateway Pipeline, Critical Work Plan | Enbridge Inc. | Alberta and British Columbia | 2005 | Senior Wildlife Biologist

Completed a preliminary environmental screening (Critical Work Plan) for a 1200 km crude oil pipeline from Alberta to the BC coast. Report focused on identification of priority wildlife species, land use conflicts and potential environmental effects on the terrestrial environment.

OIL & GAS UPSTREAM, OIL SANDS IN SITU

Wildlife use of reclaimed lands in the mineable oil sands | 2016 | Senior Wildlife Biologist

Completed a review and comparison of wildlife survey methods used to assess wildlife use of reclaimed lands in the mineable oil sands.

Teck, Frontier Project | Teck Resources | Alberta | 2014 | Senior Wildlife Biologist

Assisted in the preparation of responses to wildlife Information Requests (IRs) and Statements of Concern (SOCs) related to potential effects of the Frontier Project on wildlife and wildlife habitat.

Shell Carmon Creek Wildlife Monitoring Program | Shell Canada | Peace River, Alberta | 2014 | Wildlife Discipline Lead

Responsible for coordinating wildlife field surveys and quality review for the Peace River In-Situ Wildlife Monitoring Program (Carmon Creek Phase 1 & 2) in-situ oil sands project in Peace River, Alberta. Wildlife monitoring included winter tracking, breeding bird and nocturnal amphibian surveys.

STRATEGIC ENVIRONMENTAL ASSESSMENT

Beaufort Region Strategic Environmental Assessment - Data Synthesis and Assessment Report | Inuvialuit Regional Corporation, Inuvialuit Game Council and Crown-Indigenous Relations and Northern Affairs Canada | Inuvik, NT | 2019 | Senior Wildlife Biologist

Responsible for synthesizing and assessing the potential effects of offshore oil and gas development activities on caribou in the Beaufort Region. The assessment included an analysis of three oil and gas development scenarios that reflected different types and intensities of oil and gas activities that could result in varying effects on coastal habitats and seasonal caribou use.

ENVIRONMENTAL ASSESSMENTS - RISK ASSESSMENTS

Environmental Assessment: Elk Herd Reduction CFB Suffield | Department of National Defence | Medicine Hat, Alberta | 2017| Senior Wildlife Biologist

Responsible for senior technical review of an environmental assessment designed to determine the potential effects of elk hunting activities on species on risk within the Canadian Forces Base (CFB) Suffield, Alberta

LAND USE PLANNING

Ministry of Employment and Investment, Ministry of Sustainable Resource Management, Resource Analysis and Assessment Methods* | Victoria, British Columbia | 2002 | Senior Wildlife Ecologist

Assisted in the development of resource analysis and assessment methods to support provincial Sustainable Resource Management Planning–Biodiversity Chapter.

** denotes projects completed with other firms*

B.C. Ministry of Sustainable Resource Management, Southern Rocky Mountain Management Plan Environmental Risk Assessment* | Victoria and Cranbrook, British Columbia | 2002 | Consultant

Completed an Environmental Risk Assessment (ERA) for the Southern Rocky Mountains Management Plan.

Ministry of Employment and Investment, Environmental Risk Assessments for Land and Resource Management Plans* | British Columbia | 1995-2003 | Project Manager and Senior Wildlife Ecologist

Completed strategic environmental risk assessments for 11 Land and Resource Management Plans (LRMPs) including: Lillooet, Sea to Sky (Squamish Forest District), Robson Valley, Dawson Creek, Fort St. John, Fort Nelson, Mackenzie, Lakes, Cassiar Iskut-Stikine, Kalum, and Central Coast. Using an environmental risk assessment approach, reports focused on identifying wildlife resource values at risk and determining the potential short and long-term implications of implementing proposed land use plans compared to low risk benchmarks and current management practices (Base Case). Also responsible for oral presentations of the Base Case and Resource Analysis components to Round Table members including the public, industry, government agencies, environmental groups and First Nations.

URBAN ENVIRONMENTAL RESOURCE MANAGEMENT

Bird Nest Search Reports | City of Calgary | Calgary, Alberta | 2013-present | Senior Wildlife Biologist, Quality Review

Responsible for quality review of pre-construction bird nest search memos designed to reduce risk of incidental take of breeding birds protected under the Migratory Birds Convention Act (MBCA) and Alberta Wildlife Act.

Biophysical Impact Assessments | BrookCal, bcIMC Holdco, West Creek Developments | Calgary, Alberta | 2018 | Senior Wildlife Biologist

City of Calgary (Parks), South Regional Wetland Open Space Study | The City of Calgary | Calgary, Alberta | 2005-2006 | Project Manager

Managed a one-year (multi-season) biophysical inventory (3,800 ha) focusing on the identification and mapping of vegetation communities, wetlands, wildlife habitats as well as Environmentally Significant Areas in south Calgary. Data collected was used to provide mitigation measures related to urban development activities and provide a basis for the development of a conceptual Open Space Plan including wetland conservation.

ROADWAYS

Saskatchewan Ministry of Highways and Infrastructure (MHI), Hwy 914 All-Weather Road | Saskatoon, Saskatchewan | 2018-2019 | Wildlife Discipline Lead

Responsible for preparing the wildlife component of a provincial environmental assessment prepared to support MHI application to build a 50 km all-weather road between the McArthur River and Cigar Lake Mine Sites in northern Saskatchewan. Client deliverables included regulatory presentations related to potential effects of the project on boreal caribou (SK1 population) as well as proposed mitigation and potential offsets.

Alaska, Kivalina Evacuation and School Site Access Road | Alaska Department of Transportation and Public Facilities, Federal Highway Administration | Kivalina, Alaska | 2017 | Senior Wildlife Biologist

Contributed to an environmental assessment of the proposed Kivalina evacuation road in northwestern Alaska to meet regulatory requirements under the National Environmental Policy Act (NEPA). Responsible for completing the wildlife component, which included a description of existing baseline conditions and potential project effects of route alternatives on large mammals including caribou, muskoxen, and brown bears.

RENEWABLE ENERGY

ATCO, Athabasca River Hydroelectric Project* | ATCO Ltd. | Alberta | 2008 | Sub-consultant

Completed an overview of potential environmental effects of a proposed hydroelectric project along the Athabasca River, Alberta. The assessment and report focused on sensitive environmental issues related to terrestrial resources including vegetation, wetlands and wildlife.

Terrestrial Habitat Assessments* | British Columbia | 2002 | Senior Wildlife Ecologist

Completed terrestrial habitat assessments to determine potential environmental impacts from mini-hydro development projects in the Mackenzie and Prince George Forest Districts.

RENEWABLE ENERGY WIND

Whitla Wind Project | Capital Power | Calgary, Alberta | 2017 | Senior Wildlife Biologist

Responsible for quality review of various technical reports to support an Alberta Utilities Commission (AUC) application (Rule 007) to build and operate a 300 MW wind energy project in southern Alberta. Technical reports included a Wildlife Technical Data Report, Construction and Operation Mitigation Plan and Post-Construction Monitoring Plan as well as the wildlife component of an Environmental Evaluation.

** denotes projects completed with other firms*

GW Power & Nexen Inc, Soderglen Wind Farm | Fort McLeod, Alberta |2004 Senior Environmental Advisor

Responsible for wildlife mitigation planning, client liaison and proponent due diligence related to the federal Species at Risk Act (SARA).

RENEWABLE ENERGY SOLAR

Duchess Solar Project | ENGIE Development Canada LP | 2018 |Senior Wildlife Biologist/Quality Reviewer

Responsible for quality review of wildlife technical reports prepared to support an Alberta Utilities Commission (AUC) application (Rule 007) to build and operate a 90 MW (photovoltaic) solar energy project in southern Alberta. All reports focused on potential effects of the proposed solar project on wildlife and wildlife habitat including species at risk.

HYDROELECTRIC PLANT SYSTEMS

Rio Tinto Alcan Inc., Tahtsa Narrows Dredging Project, Tweedsmuir-Entiako Woodland Caribou Habitat Analysis* | Rio Tinto Alcan Inc. |2002 | Senior Wildlife Ecologist

Using 17 years of woodland caribou radio-telemetry data reviewed and summarized Tweedsmuir-Entiako woodland caribou habitat use and calving patterns near the Nechako Reservoir.

WILDLIFE SURVEYS AND STUDIES

Ministry of Forests, Wildlife Tree Patch Audits* | Prince George and Fort St. John Forest Districts, British Columbia | 2001 | Senior Wildlife Biologist

Completed Wildlife Tree Patch (WTP) audits in the Prince George and Fort St. John Forest Districts. Provincial level audit (Forest Practices Branch) was designed to determine how well standard management prescriptions are meeting provincial wildlife tree policy guidelines (2001).

Morrison IRM Terrestrial Ecosystem Mapping* | Morice Forest District, Houston Forest Products Ltd | 1997 | Senior Wildlife Biologist

As part of the Morrison IRM Terrestrial Ecosystem Mapping (TEM) Project, conducted spring and winter wildlife relative abundance surveys. Field work included ground transect sampling to identify wildlife sign and determine relative use of ecosystem units for 11 focal species (e.g., moose, black bear, furbearers, cavity nesting ducks, songbirds). Also responsible for data analysis and report preparation.

Ministry of Environment, Lands and Parks, British Columbia Provincial Mountain Caribou Management Strategy* | Ministry of Environment | 1997 | Co-author

Assisted in the development of the Provincial Mountain Caribou Management Strategy for British Columbia. Provincial strategy focused on ranking caribou sub-populations according to various biological criteria as well as socio-economic impacts.

Ministry of Forests, Mule Deer Winter Field Assessment* | Ministry of Forests | British Columbia | 1996 | Senior Wildlife Biologist

Completed a winter field assessment and report of 3 mule deer winter ranges in the 100 Mile House Forest District. Recommendations provided further direction to integrate mule deer winter habitat objectives with forest harvesting activities.

Ministry of Environment, Lands, and Parks, Mackenzie Forest Ungulate Mapping* | Ministry of Environment, Lands and Parks | British Columbia | 1995 | Senior Wildlife Biologist

Conducted aerial ungulate inventory in the north Mackenzie Forest District. Winter reconnaissance-level survey focused on distribution of moose, caribou, mountain goat and Stone's sheep in the Finlay River area, MELP.

Ministry of Environment, Lands and Parks, Diversionary Bear Feeding Program* | Ministry of Environment | Prince George, British Columbia | 1994 | Senior Wildlife Biologist

Assisted in the implementation of a diversionary feeding program designed to reduce bear predation of moose calves in the Parsnip River drainage. Organized and monitored the collection of rail-killed and road-killed moose for carcass storage. Conducted aerial moose composition surveys. Prepared research paper on mountain caribou habitat selection for publication.

Madawaska Highlands Recreation Land Development, Environmental Impact Assessment* | Ontario |1984 | Wildlife Biologist

Member of a team responsible for an environmental impact assessment (screening) of a 625-hectare recreation land development project in the Madawaska Highlands, Ontario. Focused on impacts to the forest resource and associated wildlife habitats, and recommended mitigation measures to minimize potential adverse effects.

WILDLIFE HABITAT EVALUATION AND MODELING

Government of the Northwest Territories, Multi-Scale Habitat Selection by Boreal Woodland Caribou in the Sahtu, Gwich'in and Inuvialuit regions of the Northwest Territories | Government of the Northwest Territories | Northwest Territories | 2014| Senior Wildlife Biologist

Responsible for senior technical review of a report designed to identify and map seasonal boreal caribou habitat suitability using a resource selection function (RSF) modelling approach. Deliverable was used to identify high quality caribou habitats within in each region and assist with the development of range plans.

BIOLOGICAL MONITORING

Ministry of Environment, Lands and Parks, Finger-Tatuk Provincial Park Biodiversity Monitoring Plan* | Ministry of Environment | British Columbia | 2003 | Senior Wildlife Ecologist

Designed a Biodiversity Monitoring Plan for Finger-Tatuk Provincial Park (17,000 ha), British Columbia. Recommended a monitoring framework and developed specific indicators to meet park plan long term monitoring objectives.

WETLANDS ASSESSMENTS

Ontario Ministry of Natural Resources, Ontario Wetland Evaluation Program* | Ontario Ministry of Natural Resources | Lake Simco Region, Ontario | 1985 | Wildlife Biologist

Assessed wetlands in the Lake Simcoe Region as part of the Ontario Wetland Evaluation Program mandated to identify and classify wetlands of significant ecological value. Specific tasks included identification of plant species and mapping of vegetation communities. Prepared technical report and compiled data on forest management practices in Canada and Latin America. Provided background material on the ecology of Neo-tropical migrant songbirds, to be included in a Canadian Wildlife Service publication on forest birds.

WILDLIFE CAPTURE AND TELEMETRY

University of Montana, Ministry of Forests, Flathead Valley Black Bear Habitat Inventory* | University of Montana, Ministry of Forests | British Columbia | 1991 | Wildlife Biologist

Assisted in the tracking and trapping of black bears in the Flathead Valley, British Columbia. Duties included operation of the WILDLINK receiver/transmission system for remote control recapture collars and vegetation inventory of black bear habitat.

RESEARCH

High Lake Ecology Research Foundation, Falcon Lake Biophysical Land Classification* | Manitoba | | 1984 | Instructor

Responsible for training small groups of undergraduate students and youth volunteers in forest inventory procedures and vegetation analysis techniques as part of an inter-disciplinary field study for the High Lake Ecology Research Foundation.

EDUCATION POST-SECONDARY EDUCATION

School of Environmental Sciences | Lethbridge College* | Lethbridge, Alberta, Canada | 2006-2013 | Instructor

I held a full-time faculty position in the School of Environmental Sciences at Lethbridge College 2006-2013. Responsible for the preparation and delivery of lectures, labs and field trips for the following courses:

- Principles of Wildlife Biology (Lethbridge College and University of Lethbridge students)
- Environmental Impact Assessment (Lethbridge College and University of Lethbridge students)
- Wildlife Conservation and Field Techniques
- Terrestrial Ecology
- Environmental Quality

I also held a sessional teaching position during 2003-2004 where I was responsible for teaching wildlife biology, terrestrial ecology, and career enhancement.

PUBLICATIONS

Simpson, K. and E. Terry. Captive Breeding of Mountain Caribou—Problem Analysis. *Ministry of Environment Lands and Parks, Victoria, BC*, 2001.

Simpson, K. and E. Terry. Impacts of Backcountry recreation on mountain caribou: management concerns, interim management guidelines and research needs. *Report to Ministry of Environment, Lands and Parks, Victoria, BC.*, 2000.

Terry, E., B. McLellan, and G. Watts. Winter habitat ecology of mountain caribou in relation to forest management. *Journal of Applied Ecology 37: 589-602.*, 2000.

Terry, E., and M. Wood. Seasonal Movements and Habitat use of Woodland Caribou in the Omineca Mountains. *Wolverine Herd. Phase 2. Peace Williston Fish and Wildlife Compensation Program. BC Hydro*, 1999.

Simpson, K., E. Terry, and D. Hamilton. Towards a mountain caribou management strategy for British Columbia - habitat requirements and sub-population status. *Wildlife Working Report No. WR-90. BC Environment, Victoria, BC 27. pp*, 1997.

** denotes projects completed with other firms*

Ivan R. Whitson, Ph.D., P.Ag. - *Senior Soil Scientist and Hydropedologist*

Dr. Whitson is a senior soil scientist with more than three decades of soil survey experience, conducted in both forest, rangeland and agricultural landscapes. His hydropedology specialization allows him to weave a knowledge of soil science with the behavior of water at the site, hillslope and catchment scales. Through good fortune he conducted graduate studies and post-doc within an interdisciplinary science and engineering context, where he was supervised less by soil scientists and more by aquatic scientists, foresters, water engineers, and hydrologists. Dr. Whitson found his strengths in hydropedology very useful in his work with the complex SR1 project. The analysis of soil biological, chemical and physical changes resulting from the imposition of flooding on dry upland soils required an individual with a comfort in evaluating the interactions of soil and water in a stochastic setting.

Education

- Ph.D. (2003) Environmental Biology and Ecology, University of Alberta
- B.Sc. (1990) Agriculture, University of Alberta
- Diploma (1984) Conservation and Reclamation Technology, Lakeland College

Publications, Presentations, and Seminars

- Co-author or author of 11 publications in peer-reviewed scientific journals (list available upon request)
- Ph.D publication: *Phosphorus movement in a Boreal Plain soil (Gray Luvisolic) after forest harvest*
- Oral presentations at Alberta Soil Science Workshop (2000, 2001, 2003, 2012, 2015, 2016, 2018, 2020), Canadian Society of Soil Science, Banff (2002), Canadian Society for Civil Engineering, Saskatoon (2004), North American Lake Management Society, Banff (1998), Crooked Creek Nature Conservancy, Athabasca (2015), Agricultural Services Board Annual Provincial Conference (2019) and Alberta Onsite Wastewater Management Association, Calgary (2014) and Red Deer (2018).
- Seminars presented for Alberta Institute of Agrologists (2010, 2011) and Lakeland College (2011 to 2015)

Employment History

I Whitson Innovations Inc. PO Box 1241 Station Main Edmonton, AB T5J 2M8 Incorporated subcontractor providing professional consulting services since 2016.	Stantec Consulting Ltd. Springbank Dry Reservoir Environmental Assessment. Soil Discipline Lead (2016 to present). Stantec Consulted Ltd. Teck Frontier Oilsands Mine Environmental Assessment. Soil Discipline Lead (2016 to 2018). Ackroyd LLP. Evaluation of soil damages on Fox Creek to Namao pipeline ROW (2017 to present). Ackroyd LLP. Evaluation of subsoil volumes and reclaimed soil quality on a central Alberta coal mine (2020 to present). Canadian Association of Energy and Pipeline Landowner Associations. Evaluation of soil quality on Enbridge pipeline corridor (2019 to present). My Landman Group (Daryl Bennett). Evaluation of soil quality on a reclaimed oil and gas wellsite (2020).

Stantec Consulting Ltd. and Jacques Whitford-Axys Consulting Ltd. Soil Scientist and Hydropedologist 2006 to 2016	**Pedology Focus** Provided technical leadership to a team of environmental scientists engaged in: Soil survey and interpretations supporting regulatory requirements for: • Pipeline ROWs • Oil sand facilities including upgraders, SAGD operations, and a surface mine • Power transmission corridors Provided guidance to team in the use of DEM attributes to model soil distribution Land classification for a rural Manitoba municipality Assurance of staff capability in the use of soil classification, mapping and analysis protocols and standards including wind and water erosion and land capability Development and use of relational databases for spatial data management QA/QC of data, interpretations, and reports **Hydropedology Focus** Led or participated in projects related to soil-water interactions: • Land classification for irrigation • Site suitability for onsite waste disposal • Site suitability for sumps using Directive 50 criteria • Soil mapping in support of nutrient management planning • Loading calculations for sump waste disposal • Site suitability for hydrostatic water release • Food processing wastewater disposal on soil **Soil Reclamation Focus** Contributed to development of conceptual reclamation plan for an oil sands mine including identifying reclamation prescriptions and closure land capability Contributed to the development of Conservation and Reclamation Applications and Environmental Protection Plans for provincially and federally regulated pipeline projects Applied 2013 Borrow Pit pre- and post-disturbance guidelines to assess reclamation success Developed methods for a post-construction pipeline monitoring program

Independent Research Research Scientist 2011 to present	Engaged in hydric soil research at forested watersheds in the Boreal-Parkland transition in the County of Barrhead. Four sub-watersheds were instrumented with wells (15), piezometers (20), temperature probes (8), weather stations (3), moisture probes (9), dataloggers (5), and pressure transducers (6). Work included measures of groundwater chemistry, watershed runoff, and estimates of groundwater contribution to transpiration. Publication citation: *Whitson, I.R 2020. Hydropedology of depression-toe slope interaction across a soil unit boundary at the Boreal-Prairie interface. Catena. 2019.104349.* Adapted the methodology in *Land Suitability Rating System for Agricultural Crops 1. Spring-Seeded Small Grains* to use quantitative inputs. Used synthetic data to evaluate a procedure to determine post reclamation land capability. Publication citation: *Whitson, I.W. 2017. Use of modelled soil data ranges to explore post-reclamation soil suitability ratings for 30 Alberta soil series. Canadian Journal of Soil Science. 97: 278–289.* Collected and analyzed data from field sites at three locations in southern Saskatchewan. Linked field measures of soil with topographic characteristics of site to model soil distribution. Publication citation: *Whitson, I.R. 2015. Equivalent latitude for prediction of soil development in a complex mapunit. Canadian Journal of Soil Science. 95:125-137.*
Millar Western Forest Products Industrial Research Fellow 2004-2006	Conducted soil survey and mapping on 0.5 million ha forest management agreement area in west-central Alberta Investigated use of Digital Elevation Model slope attributes to predict soil distribution
University of Alberta and Lakehead University Research Associate 2002 to 2004	Soils field lead including supervision of up to three summer assistants as part of the Forest, Watershed, and Riparian Disturbance Project (FORWARD) Classified profiles and mapped soils in 12 first-order watersheds (5 to 15 km^2 each) Sampled select profiles for laboratory analyses, bulk density, and hydraulic conductivity Advised modelling group on use of spatial soil data for hydrologic model calibration and operation (Soil&Water Assessment Tool; SWAT) Installed and monitored soil moisture sensors, piezometers, groundwater wells, and soil temperature sensors at representative sites in first-order watersheds for ongoing studies of harvest and fire impacts on forest watershed hydrologic response
LandWise Consultant 2000	Contributed to literature review of best management practices for managing phosphorus on agricultural land

University of Alberta Graduate Student and Ph.D. Candidate 1996 to 2003	Designed and conducted studies related to phosphorus biogeochemistry and hillslope hydrologic processes in Boreal Forest soils before and after logging. Combination of field and laboratory work including: • Dissolved phosphorus sample collection from lysimeters and wells • Lab measures of soil nutrients and solubility-controlling cations • Phosphorus adsorption • Field tracer with bromide • Subsurface flow and soil moisture response to precipitation and snowmelt Soil hydraulic conductivity variability
Sustainable Forest Management Network, University of Alberta Field Technician 1996	Hydrology and biogeochemical studies on forested hillslopes and small catchments at study lakes in NE Alberta: • Provided detailed soil profile and stratigraphy description • Installed groundwater sampling equipment (piezometers and lysimeters) Managed field logistics in remote boreal location including supervision of two summer staff
Land Resources Network Ltd Reclamation Specialist 1994 to 1995	Conducted fieldwork and provided data related to: • Pre-construction assessments of new well sites for soil salvage recommendations • Post-reclamation soil assessments on wellsite's using the 1995 Criteria • Research towards verifying effectiveness of two- and three-lift guidelines for soil handling on pipelines • Mapped 24 townships in eastern Alberta for the AGRASID program
Pamir Consulting Ltd. Independent Consultant 1993-1994	Mapped 75 townships in SE Alberta for the AGRASID program • Gathered soil plot data at rangeland sites in the Cypress Hills
Alberta Research Council and Agriculture Canada Research Branch Soil Mapper Seasonal (1987-1989), Full time (1990 -1993)	Mapped soils in the Counties of St. Paul and Forty Mile Provided technical assistance in soil salinity survey and for other technical duties related to map production

Department of Forestry, Lands and Wildlife Technician 1985 to 1986	Assisted with field and office work in support of Ecological Land Classification and land use analysis on public lands (plant and soil classification)
Western Reclamation Ltd. Field Assistant 1985	Built fences and seeded forages on pipeline ROW and assisted in laboratory
Mira-Kon Consultants Technician 1985	Undertook technical duties for study evaluating potential of two native plants (Reed Canary Grass and Dock) to dewater oil sands tailings
Agriculture Canada, Vegreville, AB Technician 1984	Provided technical assistance for projects related to cereal and forage cropping systems for Solonetzic soils
Alberta Environmental Centre Technician Summers 1983 and 1984	Contributed technical assistance for projects involving reclamation research for saline and sodic soils and mine spoils

Hearing Witness Experience:

- Attended Teck Frontier Hearing (September 2018) as second row witness providing expertise on soil aspects of project

Jennifer Hallson, MA

Jennifer Hallson is an anthropologist with abundant research, technical and academic writing skills. She has experience with short-term and long-term project management. She has over three years of experience undertaking and leading Crown-led and proponent-led consultation within Alberta. Jennifer also performs research and other required work for First Nation land claims and treaty land entitlement cases.

Education

Master of Arts in Anthropology, University of Alberta, 2017

Bachelor of Arts with Honours in Anthropology with First Class Honours, University of Alberta, 2014

Memberships

Canadian Archaeological Association, 2014-2021

Archaeological Society of Alberta – Edmonton Centre, 2014-2021

DEMA Land Services
Team Lead, Indigenous Consultation and Engagement

Jennifer is responsible for facilitating consultation and engagement for the Crown and proponents, including drafting notification packages, communicating with Indigenous groups, and organising meetings and site visits. Jennifer manages records of emails, phone calls, meetings, and site visits for the Record of Consultation. She maintains and reviews Record of Consultation logs, Specific Concerns and Response Tables, and all supporting documents in accordance with Aboriginal Consultation Office guidelines. Jennifer is responsible for supervising and training team members.

Jennifer has helped to complete consultation for Alberta Transportation on multiple projects, receiving consultation adequacy from the Aboriginal Coordinator with Alberta Infrastructure and with the Aboriginal Consultation Office. She has experience with all levels of consultation. On all projects Jennifer works with clients, proponents, and DEMA's consultation team to ensure they achieve consultation adequacy.

Jennifer also undertakes historical research, produces maps and figures, and completes sales research related to First Nations' specific claims and treaty land entitlement cases, including current and historical appraisals and loss of use reports required for adjudication by the Specific Claims Tribunal of Canada.

Jennifer is currently the Consultation Lead for Alberta Transportation's Springbank Off-Stream Reservoir Project (Level 3: Extensive Consultation with EIA). This entails managing the Records of Consultation and Specific Concerns and Response Tables for bimonthly submission to First Nations and the Aboriginal Consultation Office, and corresponding with Indigenous groups to share information, organise meetings, and answer questions. Jennifer facilitates and minutes meetings and tracks action items and concerns to ensure Indigenous groups receive responses to all questions and concerns. Jennifer produces summaries of information for Alberta Transportation and provides consultation and engagement information for regulatory submissions.

Consultation Project Experience

Springbank Off-Stream Reservoir Project, 2017-present
TransAlta Seasonal Haul Road, 2020-2021
Highway 40:38 Emergency Slide Repairs, 2020
Highway 1A/22 Interchange Project, 2018-2019
Highway 3 Functional Planning Study, 2017-2019
Klein Lake Decommissioning Project, 2017-2019
Bridge File 86266 Culvert Replacement, 2018
Bridge Files 13891 and 13892, 2017-2018
Bridge File 74652 Culvert Replacement, 2017-2018
Cold Lake Regional Waterline Expansion, 2017-2018
Highway 740:02 and Highway 684:02 Slide Repairs, 2017-2018

Employment History

DEMA Land Services, St. Albert, Alberta

Indigenous Consultation and Engagement Administrator, 2017-2018
Team Lead, Indigenous Consultation and Engagement, 2018-present

Currently Team Lead of Indigenous Consultation and Engagement, facilitating Crown-led and proponent-led consultation and supervising team members. Completing historical research, sales research, and producing maps and figures for First Nation specific claims and treaty land entitlement cases.

University of Alberta, Edmonton, Alberta

Teaching Assistant

May-June 2017 – University of Alberta Field School

Led and supervised students in archaeological field work, excavation, and camp work. Organized daily meals, activities, and marked field notes, assignments, and final reports.

September-December 2016 – Alberta Archaeology
January-April 2015 – North American Prehistory
September-December 2014 – Alberta Archaeology

Held office hours for students and marked projects and exams.

Research Assistant

Various appointments in 2014-2017

Catalogued artifacts and prepared collections for curation and reporting; managed databases; identified and sampled materials for analysis, performed quantitative analyses, prepared archaeological site report for submission.

Royal Alberta Museum, Edmonton, Alberta

Archaeological Assistant

September 2016

Excavated at UNESCO World Heritage Site Head-Smashed-In Buffalo Jump under the supervision of Assistant Curator of Archaeology. Responsible for organising and excavated artifacts.

May-July 2016

Catalogued, analyzed, photographed, organized, and reshelved artifacts from a variety of archaeological sites according to the curator and assistant curators' requirements; completed data entry and data analysis for multiple archaeological site records.

Select Awards

2014 Social Sciences and Humanities Research Council (SSHRC) Joseph Armand Bombardier Canada Graduate Scholarship-Master's
2014 Walter H. Johns Graduate Fellowship
2015 Queen Elizabeth Graduate Scholarship-Master's
2016 Queen Elizabeth Graduate Scholarship-Master's – one term

Publications

Metcalfe, Jessica Zoe, John W. Ives, Sabrina Shirazi, Kevin Gilmore, Jennifer Hallson, Fiona Brock, Bonnie J. Clark, Beth Shapiro
2021 Isotopic Evidence for Long-Distance Connections of the AD Thirteenth Century Promontory Caves Occupants. *American Antiquity*, in press.

Hallson, Jennifer
2017 Using debitage analysis to investigate an Alberta archaeological site. *Compass: The Student Anthropology Journal of Alberta* 1(1): 25-41.

John Menninger PE, P. ENG.

Civil Engineer

Mr. Menninger is a civil engineer with experience in a variety of civil design and water resources projects. His experience includes water resources planning, hydrologic and hydraulic modeling, stream restoration, site design and layout, river course and canal stabilization, and dam and levee design. Mr. Menninger's dam and hydraulics experience includes hydrologic and hydraulic evaluations, emergency action planning, hydraulic design including erosion protection and spillways and dam embankment design.

EDUCATION

BS, Civil Engineering, University of Dayton, Dayton, Ohio, US, 2004

REGISTRATIONS

Professional Engineer #73601, State of Ohio

License to Practice #234070, Province of Alberta

PROJECT EXPERIENCE

Springbank Off-stream Storage Project | Alberta Transportation | Springbank, Alberta | 2021 | Design Task Manager and Hydrotechnical Lead

The project will protect the City of Calgary from flooding of the Elbow River for events equal to or less than the 1:200 year flood event. The diversion structure and channel will have the capacity to divert up to 600 m^3/s during the design flood event. Mr. Menninger leads the design team for this project and coordinates the delivery of the various disciplines including civil, structural, geotechnical, hydrotechnical, mechanical, electrical and instrumentation.

Mid-Breton Sediment Diversion | New Orleans, LA | 2020 | Civil Design

Mr. Menninger provided independent review for 15-percent design package for this this 75,000 cfs diversion project to rebuild wetlands in Southeast Louisiana as part of a Coastal Restoration Program for hurricane protection. The project includes re-alignment of the Mississippi River Levee and re-construction of local flood protection levees including pump station replacement.

Western Milwaukee Flood Control | Milwaukee, Wisconsin | 2020 | Independent Technical Review

Mr. Menninger provided Independent Technical Review for the hydraulic analyses and design of levee and flood walls along the Menomonee River in Western Milwaukee. The river segment to be protected includes complex hydraulics and geomorphology, historic infrastructure constraints and multiple bridge crossings. The hydraulics program includes incorporation of 2D overbank flows within the regulatory HEC-RAS model to assess the relative benefits of levee alignments including a "hanging" levee scenario. In addition, the design tasks include two-dimensional in-stream modeling using RiverFlow 2D, a finite volume model, to assess the complex channel flows around the bridge structures and a sharp bend within the river. Results of this analysis will inform the regulatory model and design of scour protection.

Sunnyside Flood Barrier | Calgary, Alberta | 2019 | Independent Technical Review

John provided Independent Technical Review for the hydrotechnical elements (hydrology and hydraulics) for the design of a levee along the banks of the Bow River in Calgary, AB. Challenges associated with the project included construction in an urban environment and adjacency to high-bedload, geomorphically complex river system.

Hancock County Flood Risk Reduction Plan | Findlay, OH | 2019 | Hydrology and Hydraulics

Mr. Menninger led the development of the Hydrologic and Hydraulic modeling approach and provided QA/QC services for this flood risk reduction plan for the City of Findlay, Ohio. The plan includes a dry storage reservoir on Eagle Creek, a tributary to the Blanchard River outside of Findlay, OH.

Great Miami River Bank Stabilization | Hamilton County, Ohio | 2019| Project Manager

John served as project manager for the design of more than 1,000 feet of bank stabilization on the Great Miami River. The bank stabilization includes mass excavation, riprap revetment, and bio-engineered soil lifts to prevent continued migration of the river bank and protect the well-field for a large and vital water treatment facility.

Hancock County Flood Risk Reduction Plan | Findlay, OH | 2019 | Hydrology and Hydraulics

Mr. Menninger led the development of the Hydrologic and Hydraulic modeling approach and provided QA/QC services for this flood risk reduction plan for the City of Findlay, Ohio. The plan includes a dry storage reservoir on Eagle Creek, a tributary to the Blanchard River outside of Findlay, OH.

Conservation Ponds No. 1 and No. 2 Dams Decommissioning | Cadiz, Ohio | 2018| Project Manager

Mr. Menninger served as the project manager for the removal of two earthen dams, dewatering of their impoundments, and restoration of about 2,700 linear feet of natural stream channel. The 105-foot and 73-foot-tall dams impounded approximately 443 acre-feet and 106 acre-feet of water, respectively. The design included over 300,000 cubic yards of earthwork to decommission the dams while meeting environmental permitting requirements and minimizing the cost of construction for the client.

Permanent Canal Closures and Pumps Project | New Orleans, LA | 2017 | Civil Design

Mr. Menninger served as the Designer of Record for the Site Civil Components for this $680 Million design-build project for the United States Army Corps of Engineers. As the final component of New Orleans' revamped flood protection system, the Permanent Canal Closures and Pumps (PCCP) project reduced a significant risk and reliability issue of the current system. The project included the construction of levee, flood walls, gate structures and three pump stations with a total pumping capacity of 24,000 cubic feet per second.

Miller-Coors Brewery Outfall Design | Butler County, Ohio | 2016| Project Manager

John served as project manager for the design of a reconfigured outfall and bank stabilization features along the Great Miami River. The design involved relocating the discharge structure 300 feet from the river bank and construction of a bendway weir to alter flow along the river bank. Installation of live branch layering, riprap armoring, and live staking were also included in the design to control erosion and protect the outfall long-term.

Amos Ash Pond Closure and Dam Modification | Scary, WV | 2014 | Project Management and Civil Design

Mr. Menninger led the permitting and detailed design of the closure of the Amos Fly Ash Pond in Scary, West Virginia. This $50-million project included the closure of the 170 acre facility and modifications to the 220 foot tall earthen dam. Key project elements included over 2-million cubic yards of earthwork, modification to an existing pump station, excavation of a 130-foot new spillway and grouting and abandonment of principal outlet works tunnel.

City of Des Moines Levee Accreditation | Des Moines, Iowa | 2014|Independent Technical Review

Mr. Menninger served as an ITR reviewer of the risk analysis modeling for the Section 408 application to the US Army Corps of Engineers. This project involves the accreditation of over 8 miles of levees protecting the City of De Moines, Iowa.

Dam Breach Analysis for TVA Fossil Plant Impoundments | Tennessee| 2010 |Project Manager

Project manager to perform dam breach analysis and inundation mapping at TVA fossil plant impoundments to identify inundation zones for postulated dam breach scenarios. The facilities evaluated included (1) Bull Run Fossil Plant Fly Ash Pond (2) Colbert Fossil Plant Ash Pond Number 4, (3) Cumberland Fossil Plant Ash Pond, (4) Cumberland Fossil Plant Gypsum Stack, (5) Widows Creek Fossil Plant Gypsum Stack. Preliminary breach analyses for these facilities were performed using HEC-HMS to develop breach outflow hydrographs and HEC-RAS to route the hydrographs along the streams. This analysis was used to identify structures within approximate zone of impact and helped defined the scope for subsequent breach analyses.

Englewood Low Dam Removal and Stillwater River Restoration Project | Five Rivers MetroParks | Englewood, Ohio | 2009 |Project Engineer

Mr. Menninger served as a project engineer in the restoration of the Stillwater River through the removal of a low-head dam in Englewood, Ohio. The restoration design included creation of aquatic backwater habitat, dam removal, grade control structures (such as cross vanes) and native plantings. Funding for the design and construction was provided under an Ohio EPA 319 Grant. Part of the design process included the modeling of erosion and sediment in the Stillwater River associated with dam removal.

City of Fairfield Levee Evaluation | Fairfield, Ohio | 2009 |Project Engineer

Mr. Menninger served as the lead project engineer responsible for the engineering study of flood protection levees in the City of Fairfield. Pleasant Run and GM Ditch, located in the City of Fairfield, have levee systems shown as protecting from the 1% annual-chance flood on the Effective Flood Insurance Rate Maps. The City hired Stantec to evaluate the existing flood hazard risk associated with the levees and to review alternatives to reducing the determined risk. Mr. Menninger led a team of engineers that developed hydrologic and hydraulic modeling for over 3 miles of stream along Pleasant Run and GM Ditch. The hydrologic models were developed in HEC-HMS and linked to the hydraulic models. Unsteady flow hydraulic models were developed in HEC-RAS to more accurately model the significant floodplain storage impacts. The resulting models significantly reduced the number of homes impacted by the effective Base Flood Elevations along the streams and will be incorporated in the FEMA Map Modernization updates.

Clifty Creek Dams Emergency Action and Maintenance Plans | Madison, Indiana |2010 |Project Manager

Mr. Menninger served as project manager to develop Emergency Action Plans and Maintenance and Management Manuals for three dams located at the American Electric Power (AEP) Clifty Creek Generating Station. A key component of the project included breach analysis of potential failures along Clifty Creek and the Ohio River.

Pine Hill Lake Dam Emergency Action Plan | Mason, Ohio |2006 |Project Engineer

Mr. Menninger served as project engineer for the development of an Emergency Action Plan for a high hazard dam in Warren County, Ohio. Project tasks included development of an unsteady-flow hydraulic model with dam breach, mapping of inundation limits, and coordinating and conducting meetings with the client and emergency response personnel.

Lacey AuCoin M.Sc., P.Biol.

Fisheries Biologist

Lacey is a Fisheries Biologist that specializes in regulatory planning as it relates to urban infrastructure design and construction on watercourses, lakes, and wetlands. Lacey plays an important role in project planning by working closely with design teams and regulatory agencies to integrate environmental mitigation strategies into projects. Lacey works on a range of projects that include infrastructure development for municipalities, fish habitat offsetting designs, transportation, and pipeline projects. She also conducts and advises on the technical aspects of fish habitat and aquatic assessments, biophysical impact assessments, and regulatory submissions. Lacey has an in-depth understanding of environmental regulatory processes at both the federal and provincial level such that she can facilitate the preparation of quality deliverables to meet project objectives. Her construction supervision experience has also been proven valuable in the planning phases of projects to develop environmental mitigation plans that can be well executed in the field.

EDUCATION

M.Sc., Dalhousie University, Halifax, Nova Scotia, 2011

B.Sc., Dalhousie University, Halifax, Nova Scotia, 2008

CERTIFICATIONS & TRAINING

Stantec Emerging Leaders Program, Calgary, AB, 2016

REGISTRATIONS

Professional Biologist #1902, Alberta Society of Professional Biologists

PROJECT EXPERIENCE

WATER DAMS & RESERVOIRS

Springbank Offstream Reservoir (SR1) | Alberta Transportation | Calgary, AB | 2018-Pres | Lead Fisheries Biologist

The Springbank Offstream Reservoir (SR1) will reduce flood risks by managing downstream river flow rates and volume, and work in tandem with the Glenmore Reservoir. The project design intent is to provide Calgary with the infrastructure needed to accommodate floods that are equal to or greater than the devastating flood that was experienced in 2013 in Calgary. Lacey's role in this project has evolved over time from support for fish habitat field surveys and provincial permitting to facilitate geotechnical investigations, to Lead Fisheries Biologist in the Environmental Impact Assessment process. Lacey has also on matters related to Indigenous engagement, and regulatory efforts for the Alberta Water Act, federal Fisheries Act. Lacey has supported In addition, Lacey has developed draft monitoring plans for project operation to support the regulatory review process. Lacey. . Lacey is preparing as an expert witness for the forthcoming regulatory hearing for the project.

Red Deer River Bank Stabilization | NOVA Chemicals Ltd. | Red Deer, Alberta | 2018-Pres | Regulatory Lead

NOVA Chemicals retained Stantec to provide design and regulatory services for bank stabilization along the Red Deer River to meet Dam Safety Guidelines. Lacey led the fisheries and regulatory components of this project to facilitate construction within the Red Deer River and liaised with the client and contractor regarding regulatory compliance matters throughout the construction program.

FISH HABITAT DESIGN

City of Calgary Quarry Park Fish Compensation | City of Calgary | Calgary, Alberta | 2016-2019 | Fisheries and Regulatory Lead

Federal regulatory triggers resulted in a request from The City of Calgary to have Stantec design a 1-km long side channel along the Bow River. The intent of this novel project within the City was to balance habitat debts incurred under the Fisheries Act as a result of emergency flood repair work within the Bow and Elbow Rivers. Lacey worked with a multidisciplinary design team to develop solutions that exceeded federal requirements and client objectives through regulatory planning and collaborative design efforts to maximize fish habitat.

Alberta Environment and Parks Allison Creek Fish Habitat Enhancements | Alberta Environment and Parks | Blairmore, Alberta | 2016-2018 | Regulatory Lead and Fisheries Biologist

Provided regulatory guidance and fisheries assessments for bioengineered features within flood-affected areas of Allison Creek. Opportunities to enhance existing fish habitat, and prevent further loss of habitat have been incorporated throughout various sites within Allison Creek to maximize benefits of flood restoration funding.

City of Calgary Lawrey Gardens Fish Compensation Project | City of Calgary | Calgary, Alberta | 2016-2018 | Regulatory Specialist

Supported the design and implementation of a fish habitat offsetting project to satisfy conditions of a Fisheries Act Authorization. Baseline conditions were evaluated, and fish habitat potential was integrated into a preliminary design. Preliminary desktop assessments were completed to inform the client of regulatory requirements for working in Lawrey Gardens. Key environmental considerations informed the client of design and construction costs.

Alberta Environment and Parks Lynx Creek Fish Habitat Enhancements | Alberta Environment and Parks | Crowsnest, Alberta | 2016-Present | Regulatory Lead and Fisheries Biologist

Provided regulatory guidance and fisheries assessments for bioengineered features within flood-affected areas of Lynx Creek. Opportunities to enhance existing fish habitat, and prevent further loss of habitat have been incorporated throughout various sites within Lynx Creek to maximize benefits of flood restoration funding.

Capital Power Corporation, Genesee Generating Station Fish Habitat Compensation* | Capital Power Corporation | Genesee, Alberta | 2012-2013 | Fisheries Biologist

Designed a fish habitat compensation plan (under previous DFO HADD regime) to enhance habitat along the North Saskatchewan River for sportfish. Provided fish and fish habitat assessment services for a variety of compensation opportunities, and assisted the proponent in the selection of a habitat enhancement location that would balance habitat quality and costs. Coordinated provincial and federal regulatory approvals, and team logistics for construction monitoring.

URBAN INFRASTRUCTURE DEVELOPMENT

City of Calgary, Green Line North LRT | The City of Calgary | Calgary, Alberta | 2016-Present | Regulatory Specialist and Environmental Planner

The Green Line LRT will provide 46 kilometers and 28 stations within the City of Calgary to improve public transit for Calgarians. Stantec has been working to design enabling works and functional studies for the project, technical performance specifications and planning for construction. Lacey has been leading Stantec's regulatory services for the project, including provincial and federal permitting for enabling works as well as providing strategic guidance to the City for contract preparation. Ongoing support will be provided to the City for regulatory planning, consultations, sustainability practices, contract development, Request for Proposal preparation, bid reviews, and quality assurance for regulatory submissions.

West Bow River Bridge Twinning | Alberta Transportation | Calgary, AB | 2015-Present | Environmental Lead

The West Bow River Bridge Twinning ($89 million) is an integral component of the West Calgary Ring Road, which will provide more than 101 km of free-flow travel around the city. Stantec's role as the Engineering Consultant has evolved to an Owner's Representative role during the construction phase. As Environmental Lead in representation of the Owner, Lacey has facilitated environmental regulatory components for the project since the conceptual design phase, including provincial permitting for geotechnical investigations, and federal approvals to tender the project for construction. Ongoing regulatory guidance and quality reviews are being provided during construction to ensure that the Contractor's mitigation plans align with provincial and federal requirements with consideration being given to the Owner's high-quality environmental standards. Lacey has been overseeing the awarded Contractor's plans, monitoring reports, and mitigation strategies of the Bow River Bridge and the Scenic Acres link on a daily basis, and communicating the regulatory and contractual commitments to the construction team. Construction is ongoing until 2021.

City of Calgary, Bonnybrook Waste Water Treatment Plant D Expansion | The City of Calgary | Calgary, Alberta | 2014-Present | Regulatory Specialist and Fisheries Biologist

Ongoing development of a mitigation strategy for instream work related to an effluent diffuser outfall in the Bow River. Ongoing coordination of regulatory consultations related to the Water Act, Public Lands Act, Fisheries Act, Transport Canada. Strategic advice provided with respect to public comments, construction mitigation, schedule. Technical support provided to First Nations consultation team.

City of Calgary South East Bus Rapid Transit (SE BRT) Phase 2 Extension | Stantec Consulting Ltd. | Calgary , Alberta | 2016-Present | Regulatory Specialist and Biologist

A particularly time-sensitive project; responsible for obtaining regulatory approvals and negotiating mitigation strategies with environmental regulatory agencies on behalf of the client. Offsetting plans, including post-construction monitoring plans, are currently in-progress.

City of Calgary River Access Strategy: West Baker Park | City of Calgary | Calgary, Alberta | 2016-Present | Project Manager and Environmental Planner

The Bow and Elbow rivers are integral to the City of Calgary and provide extensive opportunities to promote social, economic, and environmental well-being in Calgary. Stantec was commissioned by the City of Calgary to design the West Baker Boat Launches as one of the first of the City's efforts to improve river access. Lacey serves as Project Manager for the design and construction of recreational amenities in the northwest area of Calgary to improve rafting opportunities for the public. Coordinated the technical and financial components of a multidisciplinary team of engineers, landscape architects, and biologists that are contributing to this project. Lacey also served as lead biologist for the project.

City of Calgary River Access Strategy: Sunnyside Boat Launch | The City of Calgary | Calgary, AB | 2018-Pre | Project Manager and Environmental Planner

The Bow and Elbow rivers are integral to the City of Calgary and provide extensive opportunities to promote social, economic, and environmental well-being in Calgary. Stantec was commissioned by the City of Calgary to design the Sunnyside Boat Launch to improve river access in the city. Lacey serves as Project Manager for the design and construction of recreational amenities in the northwest area of Calgary to improve rafting opportunities for the public. Coordinated the technical and financial components of a multidisciplinary team of engineers, landscape architects, and biologists that are contributing to this project. Lacey also served as lead biologist for the project.

City of Calgary, Bowness Sanitary Offload Trunk* | The City of Calgary | Calgary, Alberta | 2013-2014 | City of Calgary

Coordinated approvals for the proposed pipeline crossing of the Bow River, including obtaining Water Act approval for in-stream geotechnical investigations, coverage under the Navigable Waters Protection Act, Fisheries and Oceans Canada, and Public Lands Act. Prepared a baseline fish and fish habitat assessment that included substrate analysis using sidescan sonar technology, and designed a water quality monitoring plan for in-stream geotechnical works and microtunnelling pipe construction.

City of Saskatoon, Circle Drive Bridge* | The City of Saskatoon | Saskatoon, Saskatchewan | 2012 | Aquatic Biologist

Conducted water quality monitoring during cofferdam construction and removal, as part of the environmental monitoring efforts for the construction of the Circle Drive Bridge over the South Saskatchewan River.

Alberta Transportation, Highway 2 and Highway 566 Balzac Interchange* | Alberta Transportation | Balzac, Alberta | 2012-2014 | Fisheries Biologist

Responsible for environmental regulatory approvals for the proposed Balzac Interchange and the realignment of 500 m Nose Creek to accommodate the culvert replacement. Provided recommendations for fish passage velocity requirements of the channel and culvert designs, and provided a fish and fish habitat assessment for the environmental assessment.

OIL & GAS MIDSTREAM, PIPELINES

NPS 48 British Columbia Mainline Loop Leach Creek Section Stream Diversion | TransCanada Pipelines Ltd. | Fernie, British Columbia | 2019-Present | Project Manager, Biologist

TCPL retained Stantec to provide environmental regulatory permitting support for a stream diversion along the NPS 48 BC Mainline Loop. Stantec provided a mitigation strategy for construction in the stream and a fish habitat assessment to support a Section 11 application to the British Columbia Oil and Gas Commission (BC OGC). Lacey's role as both Project Manager and Fisheries Biologist on the project offers efficiencies.

TransCanada Energy East Pipeline Project, Planning and Fisheries | TransCanada | Calgary, Alberta | 2014-2017 | Fisheries Biologist

The Energy East Pipeline proposed to deliver diluted bitumen from Western Canada and Northwestern United States to Eastern Canada , and included 3,000 kilometres of pipeline, marine terminals, tank terminals, pump stations, pressure reduction stations. Over 300 river watercourse crossings were included in the project. Lacey formed part of the Fisheries team that contributed to the environmental and socio-economic assessment (ESA) and supplemental reports that were submitted to the National Energy Board for project filing. Lacey served as a key contact for nation-wide fisheries biologists that supported the ESA process to coordinate deliverables and ensured that assessment methodology remained consistent across the numerous biologists that were involved in the ESA efforts.

FLOOD RESTORATION

City of Calgary 2011 Disaster Recovery Program | The City of Calgary | Calgary, Alberta | Fisheries Biologist, Regulatory Lead

Provided regulatory guidance and fisheries assessments for a multi-disciplinary and integrated Stantec design team for the repair of pathway networks and stabilization of slopes and riverbanks for a variety of sites within the City of Calgary. Regulatory input was provided for Weaselhead Natural Area and Douglasdale Flats.

Alberta Parks and Tourism, Kananaskis River Realignment | Alberta Parks and Tourism | Kananaskis, Alberta | Fisheries Biologist

Conducted a fish habitat assessment of the Kananaskis River and prepared a habitat map to provide a visual representation of habitat features in the footprint of the project. The habitat assessment was used to develop a mitigation strategy and support regulatory reviews of the project, including an authorization under the Fisheries Act.

City of Calgary, Fish Creek Park Flood Restoration | The City of Calgary | Calgary, Alberta | Fisheries Biologist, Regulatory Lead

Significant damage within Fish Creek Provincial Park was a result of the 2013 flood event. Our team performed site assessments on damage to existing infrastructure, riverbanks, pathways and pedestrian bridges. QAES recommendations were incorporated into the design of Bridge 8, Bridge 9 and Bebo Grove; and Stantec provided technical support during regulatory reviews. QAES recommendations were provided to meet the conditions of the Code of Practice for Watercourse Crossings at Bridge 9 for construction during the Restricted Activity Period (RAP) of Fish Creek.

City of Calgary, Flood Recovery: South Highfield* | City of Calgary | Calgary, Alberta | 2013-2014 | Regulatory Lead and Fisheries Biologist

Coordinated approvals and prepared a fish and fish habitat assessment for bank stabilization and channel re-shaping works of the Bow River following the 2013 flood event in Calgary.

ROADWAYS

Alberta Transportation, Highway 63:11 Thickwood Boulevard Interchange to Confederation Way* | Alberta Transportation | Fort McMurray, Alberta | 2012-2013 | Environmental Inspector

Conducted monthly environmental inspections during the construction of the culvert at Conn Creek. Monthly reports were submitted to Transport Canada (responsible authority under CEAA).

Alberta Transportation, Highway 63:08 Twinning: North of Mariana Lake to North of Algar Tower* | Alberta Transportation | Fort McMurray, Alberta | 2012-2014 | Environmental Inspector

Conducted bi-weekly environmental inspections to identify potential areas of concern in terms of erosion and sediment control. Provided regulatory support, report reviews, and communicated with regulatory agencies.

SITE MANAGEMENT & REMEDIATION

Public Works and Government Services Canada, Padloping Island Fish Sampling Program* | Public Works and Government Services Canada | Qikiqtarjuaq, Nunavut | 2013-2014 | Lead Fisheries Biologist

Coordinated a fish tissue sampling program and human health risk assessment to address concerns from the local communities that consume fish in the vicinity of Padloping Island, the location of the recently remediated DEW Line military station.

Public Works and Government Services Canada, Colomac Mine Ecological Monitoring Program* | Public Works and Government Services Canada | Northwest Territories | 2013 | Fisheries Biologist

Conducted a fish tissue sampling program for contaminant analysis following the remediation of Colomac Mine. Fish were captured using gill nets and minnow traps. Liver and muscle samples were obtained for metal analysis and otoliths, scales, and pectoral fin rays were collected for ageing. Site reconnaissance and access was achieved by float plane and helicopter.

Public Works and Government Services Canada, FOX-E Dew Line Station Remediation* | Public Works and Government Services Canada | Durban Island, Nunavut | 2013-2014 | Environmental Inspector

Conducted environmental monitoring of remediation activities at the FOX-E DEW Line Station in Nunavut. Helicopter work was required on a daily basis for access to several remote locations at the site. Responsible for soil sampling, reporting, construction supervision and QA/QC of all laboratory results.

Fisheries and Oceans Canada, Phase I Environmental Site Assessments of Knife Edge Mountain and Ashe Inlet* | Fisheries and Oceans Canada | Iqaluit, Nunavut | 2013-2014 | Environmental Scientist

Completed a Phase I and II Environmental Site Assessment at abandoned communication stations along the southern shore of Baffin Island. Provided recommendations for remediation.

BIOPHYSICAL ASSESSMENT

Basic Impact Analysis for the Cave and Basin Boardwalk Replacement | Parks Canada Agency | Banff, AB | 2019 | Environmental Services Technical Lead

Lacey managed a multidisciplinary BIA for the replacement of the upper boardwalk at the Cave and Basin National Historic Site. Lacey oversaw schedule, quality reviews, tender specifications related to environmental mitigation, and attended regular meetings with the landscape design team to ensure consistency between deliverables.

ENVIRONMENTAL ASSESSMENTS – POWER

Nose Hill 14th Street Parking Lot Distribution Line Upgrade | ENMAX Power Corporation | Calgary, Alberta | 2019 - 2020 | Project Manager

Managed a Preliminary Natural Site Assessment for upgrades within the City of Calgary's Nose Hill Park. Provided regulatory guidance for working within wetland and wildlife habitat.

Quarry Park Pole Replacement | ENMAX Power Corporation | Calgary, Alberta | 2019-2020 | Project Manager

Managed a Preliminary Natural Site Assessment for the Quarry Park Pole Replacement and provided regulatory guidance to ENMAX for working within the boundaries of the City of Calgary's constructed fish habitat area. Mitigation measures to avoid causing harm to fish habitat were provided.

PUBLICATIONS

Ecosphere. *Budge, S.M.; AuCoin, L.R.; Ziegler, S; and Lall, S.P. Fractionation of stable carbon isotopes of tissue fatty acids in Atlantic pollock (Pollachius virens)* , 2016, pp. Ecosphere 7(8).

Malcolm Smith, M.Sc., R.P.Bio.

Senior EIA Specialist

Hemmera
An Ausenco Company

EDUCATION

Bachelor of Science (1987) (Biology), University of Victoria

Masters of Science (1992) (Biology), Simon Fraser University

DESIGNATIONS

College of Applied Biology - Registered Professional Biologist (1994)

Malcolm is Vice-President of Hemmera's Environmental Planning and Ecology line of business and responsible for the development of Hemmera's environmental impact assessment (EIA) practice over the past 20 years. In addition to leading Hemmera's EIA practice, Malcolm is a Senior EIA specialist with over 25 years of experience in environmental regulatory processes, a diverse range of technical fields, and multi-stakeholder-based resource planning.

Throughout his career Malcolm has developed a reputation for providing technically robust and strategic environmental and regulatory support for a range of infrastructure and resource development projects. While Malcolm's EIA experience spans a range of sectors, a primary focus of his practice is the planning/approval of infrastructure in the energy and renewables sectors where he has worked on wind, solar, tidal, hydroelectric and waste-to-energy projects for clients including: BC Hydro, Hydro One, TransAlta, Altagas, Capital Power and Blue Earth.

Malcolm's experience in leading environmental permitting and approvals processes includes some of western Canada's largest infrastructure and resource development projects, including: Site C Clean Energy Project, John Hart Generating Station Redevelopment Project, South Fraser Perimeter Road Project, George Massey Tunnel Replacement Project, and Roberts Bank Terminal 2 Project. In addition to his deep knowledge of federal/provincial EIA processes, Malcolm brings technical literacy across EIA disciplines (i.e., air, noise, archaeology, fisheries, health, etc.).

RELEVANT EXPERIENCE

Energy and Renewables

Site C Clean Energy Project, BC Hydro (2018): In response to regulatory non-compliance events, Malcolm was retained to lead a review of the performance of the project's Environmental Management Program that supported the construction phase of the Site C Clean Energy Project. The focus of his review included consideration of: roles and responsibilities and organizational structure; processes and systems supporting implementation of the environmental program; and challenges and opportunities related to ensuring regulatory compliance during the project's construction phase.

Fasken Martineau/BC Hydro, Site C Clean Energy Project (2017): Malcolm led a team to develop a submission to the BCUC as directed by the Provincial Government in an Order-in-Council. The scope of the inquiry included a consideration of the financial impact on BC Hydro ratepayers associated with continuing, suspending, or terminating the Project. The team was responsible for estimating the costs of addressing environmental requirements (i.e., restoration, new and existing permit requirements, long-term monitoring, etc.) associated with either a suspension or termination of the Project.

Metro Vancouver Waste-to-Energy Project, Metro Vancouver (2017): Malcolm led a team of environmental and stakeholder engagement specialists to support Metro Vancouver in the development of a waste-to-energy project. Malcolm provided strategic advice on project siting and design; developed and implemented a regulatory and stakeholder engagement strategy; and provided senior strategic advice on addressing environmental considerations in the facility's procurement and construction processes.

Avian Use Survey, New Dayton Wind Power Project, Acciona Energy Canada (2017): Malcolm acted as Senior Technical Review for techncial studies undertaken in support of Acciona's application to the Alberta Utilities Commission (AUC) for the New Dayton Wind Power Project.

Lone Pine Wind Power Project Bat Surveys, Spirit Pine Energy Corp (2016): Malcolm acted as Senior Technical Reviewer for bat studies undertaken in support of Spirit Pine Energy Corporation's application to the Alberta Utilities Commission (AUC) for the Lone Pine Energy Project. Studies undertaken included spring and fall bat migration studies to assess bat migration activity.

Review and Update of Environmental and Social Attributes, BC Hydro (2011): Malcolm led the review and update of the environmental and social indicators used to evaluate potential impacts and benefits associated with resource options being considered by BC Hydro. Malcolm led the selection of environmental and socio-economic indicators that reflect the types of impacts associated with the construction and operation of energy-generating infrastructure (i.e., run-of-river, wind, biomass, wave, and tidal facilities). He also represented BC Hydro in stakeholder workshops to obtain feedback on indicators.

Socio-economic and Environmental Assessment of Alternatives, BC Hydro (2010): Malcolm led the assessment of the socio-economic and environmental impacts of potential project alternatives being considered for the John Hart Generating Station Replacement Project. The scope of work included identifying regulatory requirements and estimating the costs of required mitigation. The study was used to support BC Hydro's application to the BC Utilities Commission.

Site C Clean Energy Project, BC Hydro (2008): Malcolm provided strategic EA support services to the Site C project team as part of work to determine whether the project should advance to the regulatory approvals phase of project development. In his role, he led work to identify data gaps, developed workplans to address information gaps, and developed a project description to support initiation of the EA process.

John Hart Transmission (JHT) Generating Station Replacement Project, BC Hydro (2008): As Regulatory and Environmental Manager for the JHT Generating Station Replacement Project, Malcolm was responsible for providing strategic advice to BC Hydro on obtaining environmental and regulatory approvals; coordinating BC Hydro's submission to the BCUC; acting as Environmental Lead during project procurement; and managing the project's overall budget, schedule, and deliverables.

NaiKun Wind Energy Group, NaiKun Wind Energy Project (2007): Malcolm provided senior leadership in support of socio-economic and socio-community impact assessment studies required for the EA of the Naikun Wind Energy Project, including studies on socio-economic impacts and benefits such as employment, community services, noise, navigational considerations, viewscapes, and human health issues related to electromagnetic fields. Malcolm also provided support in finalizing environmental compensation programs to support project approval.

Water Management

Confidential Project, Rio Tinto Alcan (2017): Malcolm provided strategic advice during the planning stages of a strategic project being considered to facilitate long-term growth opportunities associated with Rio Tinto's BC operations. Strategic advice included identifying environmental, First Nations, and stakeholder engagement schedule risks, as well as assisting with preparing materials to present to internal decision-making bodies for project/funding approval.

Bioengineering Education and Demonstration Project, Alberta Environment and Parks (2016): Malcolm led a multi-disciplinary technical team to plan and implement the Bioengineering Education and Demonstration Project being advanced by Alberta Environment and Parks and the City of Calgary. The Project involved designing bank reclamation to address 2013 flood damage and using bioengineering approaches and techniques that span the Bow River within the City of Calgary. Project work conducted under Malcolm's direction included Project planning and habitat design; conducting field work in support of planning and approvals; conducting senior review of all key deliverables including regulatory submissions, and providing project management during construction.

Springbank Off-Stream Reservoir Project, Alberta Transportation (2016): Malcolm acted as Project Lead in support of an alternatives assessment for the McLean Creek project which was being considered as one option for mitigating flood risk following the flood of 2013. Malcolm's role included overseeing execution of technical studies (e.g., aquatics, wildlife, air quality, noise, water quality, socio-economics etc.); establishing the methodology for the assessment of effects associated with the alternative; and overseeing development of the Environmental Impact Screening (EIS) report. In addition, Malcolm provided support in addressing intervenor comments, relating to the McLean Creek EIS report, during regulatory processes supporting the Springbank Off-stream Reservoir Project.

Bevan Wells, City of Abbotsford (2010): Malcolm provided strategic EA advice to the City of Abbotsford to comply with federal and provincial EA requirements associated with the development of a groundwater supply project to provide back-up to the domestic water supply for the City of Abbotsford. The project was subject to review under the BC Environmental Assessment Act (BCEAA) and CEAA.

Chemainus Groundwater Project Comprehensive Study, Western Economic Diversification (2009): Malcolm provided regulatory support to Western Economic Diversification in support of the Comprehensive Study review associated with the District of Chemainus's groundwater supply project. Support from Malcolm and his team resulted in approval of the project, which was subject to review under CEAA.

Transportation/Urban Infrastructure

Broadway Skytrain Project, Ministry of Transportation and Infrastructure/TransLink (2018): Malcolm was retained as the Owner's Environmental Director for the Millennium Line Broadway Extension Project. He was responsible for providing leadership on all environmental aspects of the project including managing consultants undertaking the Environmental and Socio-economic Review of the Project and leading engagement with Indigenous groups with an interest in the project.

George Massey Tunnel Replacement Project, Ministry of Transportation and Infrastructure (2015): Malcolm acted as the Owner's Environmental Manager for the GMTRP Project, and led a multi-disciplinary team in undertaking environmental assessment (EA) work and regulatory engagement with federal and provincial regulators, including the British Columbia (BC) Environmental Assessment Office (EAO). Malcolm provided senior leadership with respect to the EA methodology for the assessment as well as planning and implementing environmental, regulatory, and stakeholder consultation processes.

Evergreen Line Project, Ministry of Transportation (2012): Malcolm provided senior environmental leadership and served as Environmental Advisor during construction of the Evergreen Line. Malcolm's scope of work included: liaison with regulatory agencies, strategic advice to the project team, senior review of environmental reports and submission, strategic advice on addressing community and environmental issues during construction, and senior support to the Environmental Manager.

Highways Construction and Maintenance Environmental Support, Ministry of Transportation and Infrastructure (2012): Malcolm led a team in providing environmental support, including undertaking environmental screenings/evaluations for small and medium-sized highway construction and maintenance works in the South Coast and Interior regions. The scope of services that Malcolm provided include: conducting baseline conditions assessments as well as EAs; securing permits, authorizations, and approvals; liaising with environmental regulators; supporting owner-led consultation events; and developing environmental compensation and enhancement plans.

South Fraser Perimeter Road Project, Ministry of Transportation and Infrastructure (2006): As Environmental Manager for the South Fraser Perimeter Road Project, Malcolm was responsible for managing all environmental issues related to project development, coordinating environmental study teams, developing EA documentation, liaising with regulatory agencies, and providing support to the public-private-partnership procurement process. In addition, Malcolm acted as the liaison with engineering and design teams to integrate environmental considerations into project design and represented MOTI in public and First Nations consultation processes.

Port Mann Highway 1 Project, Ministry of Transportation (2006): Malcolm provided EA and environmental management services for the Port Mann Highway 1 (PMH1) Project including: coordinating environmental study teams; developing EA documentation; liaising with regulatory agencies; and representing the Ministry of Transportation in public and First Nations consultation processes.

Canada – BC Infrastructure Program, Western Economic Diversification (2005): Malcolm led the review of more than 300 EAs for the construction and operation of local government infrastructure including water and wastewater infrastructure, roads, and recreational facilities (i.e., pools and ice rinks). His responsibilities included identifying environmental issues associated with the operation of local government infrastructure and ensuring implementation of appropriate management practices.

Monitoring and Follow-up Programs

Site C Clean Energy Project, Wildlife Monitoring Program, BC Hydro (2017): Malcolm provided technical leadership to the development of a seven-year wildlife monitoring program for BC Hydro on the Site C Clean Energy Project. The wildlife monitoring program is a condition of approval of the joint federal-provincial review panel that approved the Project in 2015. The focus of the program is to confirm the effectiveness of wildlife-related mitigation and the conclusions of the environmental impact statement (EIS) with respect to the extent and nature of project-related effects. The scope of efficacy monitoring activities includes: waterfowl and shorebirds, belted kingfisher, garter snake, and western toad.

Elbow River at McLean Creek Project, Habitat Offsetting Planning, Alberta Transportation (2017): Malcolm led a technical team developing habitat restoration and mitigation concepts to address potential effects of a water management project in southern Alberta. The scope of work conducted included working with engineering and design personnel to design habitat offsetting projects required to offset the loss and alteration of fish habitats, development of fish passage infrastructure required for bull trout, and development of a framework for post-construction monitoring of the proposed restoration and offsetting projects.

Bioengineering Project, Long-term Monitoring Program, Alberta Environment and Parks (2016): Malcolm led the development of the long-term monitoring plan to assess the bio-efficacy of bioengineering designs for a habitat restoration project. The plan includes post-construction monitoring at years 1, 2, 3, 5, and 10, with the first year of monitoring commencing in 2018. Each round of monitoring included surveys for fish and fish habitat, riparian health, benthic macroinvertebrates, wildlife, and integrity of bioengineering structures/installments. Surveys were conducted over multiple seasons to capture a range of environmental conditions that may exist.

South Fraser Perimeter Road Project, Ministry of Transportation and Infrastructure (2008): As part of obtaining environmental approvals under BCEAA and CEAA, Malcolm led the development of a monitoring and follow-up program to address potential effects associated with construction and operation of the project, which was situated adjacent to high value and highly sensitive ecological features, including a sensitive wetland ecosystem (Burns Bog Ecological Conservancy Area). The monitoring and follow-up program focused on evaluating the efficacy of mitigation to avoid potential effects on a range of values including: red and blue-listed plant communities, species at risk including avian and reptilian species, and water quality and hydrology adjacent to Burns Bog. The program, completed in 2016, demonstrated that mitigation employed during design and construction of the project was effective in protecting key environmental values.

Ports and Marine Infrastructure

Habitat Enhancement Program (HEP), Port of Vancouver (2015): Malcolm led the Hemmera team advancing the development of specific restoration and offsetting projects associated with port development in the lower Fraser River estuary. Work led by Malcolm included providing technical support in assessing existing fisheries values, planning conceptual and detailed enhancement concepts, developing and implementing efficacy monitoring programs to monitor constructed sites, and developing a productivity model to understand changes in ecological productivity associated with changes in habitat conditions.

Deltaport Road and Rail Improvement Project, Port of Vancouver (2012): Malcolm led a multi-disciplinary team in obtaining environmental approval for the expansion of road and rail infrastructure associated with the Port of Vancouver infrastructure at Roberts Bank. Malcolm and his team were also responsible for associated stakeholder consultation.

Roberts Bank Terminal 2 Project, Port of Vancouver (2010): Malcolm led a multi-disciplinary team in undertaking EA work in support of a federal/provincial panel review associated with expansion of port facilities at Roberts Bank. Malcolm provided senior leadership to identifying environmental, regulatory, and stakeholder requirements; delivered strategic input into project design; developed a regulatory strategy; directed and supported planning and implementing stakeholder engagement strategies; and conducted senior technical review of the EIS submitted to the Canadian Environmental Assessment Agency.

PRESENTATIONS

Integration of HIA and EIA. Transportation Association of Canada Conference, 2018: Malcolm presented to the Environmental Committee of TAC on the implementation of a health impact assessment (HIA) in the context of delivery of a EIA for the George Massey Tunnel Replacement Project and challenges associated with the integration of HIA and federal and provincial EA processes.

International Association for Impact Assessment, International Conference, 2017: Malcolm participated on the Conference Planning Committee and organized and chaired sessions on environmental impact assessment and infrastructure development with a focus on the transportation sector.

Aligning Infrastructure Design and Land Use. Transportation Association of Canada Conference, 2014: Malcolm presented a case study on environmental planning for highway development. Key themes addressed focused on complimentary land use objectives that would ensure that highway design would align with adjacent land uses including: management of contaminated soils, agriculture production, and protection of wildlife habitat and a sensitive ecosystem (Burns Bog Ecological Conservancy).

Undertaking EIA for Design Build Procurement Projects. Transportation Association of Canada Conference, 2009: Malcolm delivered a presentation to the 2009 TAC Conference in Vancouver on addressing EA requirements during development of a public-private partnership project in a sensitive ecosystem.

Linear Infrastructure Development and Management of Contaminated Sites. Land Summit: 2009: Malcolm presented on opportunities for addressing historic land development impacts during linear corridor development at the Land Summit Conference at Whistler. The Land Summit brought together professionals with an interest in land management including planners and professional agrologists.

Considering Climate Change in EA. BC Environmental Assessment Office, 2008: Malcolm presented to the Regional EA Committee, comprised of federal departments with an interest in delivering EAs under CEAA. Specifically, he presented on best practice in integrating climate change into EAs.

International Association for Impact Assessment, International Conference, 2004: Malcolm participated on the Conference Planning Committee, organizing and chairing EIA and infrastructure development sessions.

Education

B. Sc. Environmental Science, University of Lethbridge, Lethbridge, Alberta, 2008

Watershed Management Diploma, Lethbridge College, Lethbridge, Alberta, 2004

Alberta Transportation – Edmonton

Water Management Environmental Specialist

Mark is the Water Management Environmental Specialist for Alberta Transportation with 12 years' experience managing the environmental and regulatory processes of major and complex water and highway infrastructure projects.

Mark is responsible to direct environmental assessments and regulatory permitting for major and complex water infrastructure projects. In this role, Mark is also responsible for leading projects through the complex provincial and federal environmental regulatory processes and leading consultation teams to engage with Indigenous groups and stakeholders. Mark also assists in the development and review of all aspects of environmental assessments for complex water management infrastructure projects for Alberta Transportation.

Mark was the Alberta Transportation Environmental Impact Assessment lead for the Comprehensive Study under the Canadian Environmental Assessment Act for the Little Bow Reservoir Rehabilitation project. He facilitated regulatory discussions, secured regulatory permits and provided technical review and oversight for this multi-year program from planning, design, construction and post construction monitoring.

Mark co-managed the Special Areas Water Supply Project engineering confirmation and Environmental Impact Assessment for Alberta Transportation, Alberta Municipal Affairs and Alberta Agricultural and Forestry. In this role Mark managed environmental consultants in identifying potential impacts, receiving feedback, and addressing concerns.

Mark is also part of the Alberta Transportation team consulting with Alberta Environment and Parks on the Bow River Reservoir options assessment.

Mark is responsible for developing and updating various departmental environmental standards and specifications, and collaborating with Regional Environmental Coordinators and other provincial and federal departments with regards to environmental regulations.

Because of his background, Mark was hired by Alberta Transportation to initiate, develop and manage Alberta Transportation's wetland habitat banking program. This involved collaboration with Regional Environmental Coordinators and Alberta Environment and Parks staff to develop standards, procedures and guidelines for wetland assessment and compensation.

Employment History

Alberta Transportation – Edmonton, Alberta

Water Management Environmental Specialist (2012 - Present)

Currently responsible for directing teams of environmental professionals on major and complex water management infrastructure projects; including environmental assessments to meet provincial and federal regulatory

requirement, regulatory permitting and stakeholder and Indigenous consultation and/or engagement.

Alberta Transportation – Edmonton, Alberta
Environmental Specialist (2008 - 2012)

Evaluated and interpreted the biological significance of project impacts and mitigation recommendations in various environmental assessments. Provided in-house report interpretation, consultation and recommendations to management outlining project environmental impacts and mitigation measures. Provided and evaluated project specific wetland compensation plans. Evaluated and audited the rehabilitation of aquatic environments to ensure existing ecosystem diversity was maintained. Analysed contaminated sites as candidates for bioremediation and phytoremediation.

Alberta Transportation – Edmonton, Alberta
Acting Regional Environmental Coordinator – Southern Region (2011 - 2012)

Provided environmental project delivery support including obtaining federal and provincial environmental permits or authorizations. Managed contaminated sites liability for the Government of Alberta and crown corporations (Southern Region) by interpreting biological significance and advising of potential impacts to adjacent ecosystems and the highway network.

PENSERV Corp. – Calgary, Alberta
Environmental Technician (2004 - 2006)

Supervised and led teams in conducting electromagnetic soil surveys, installing water monitoring wells, soil coring, sampling and analysis of soil throughout Alberta and Saskatchewan. Monitored environmental programs, including remediation of contaminated sites.

PROJECT EXPERIENCE – WATER MANAGEMENT INFRASTRUCTURE

Little Bow Reservoir Rehabilitation / Alberta Environment and Parks
2009 - 2020
Lomond, Alberta, Canada

As the final stage of rehabilitating the Carseland Bow River Headworks System, Alberta Transportation was responsible for the rehabilitation and upgrading of Little Bow Reservoir to bring it into compliance with the updated Canadian Dam Safety standards. This included raising and lengthening the main dam, creation of a saddle dyke, replacement of existing gates, and widening the connecting canal between Little Bow Reservoir and Travers Reservoir. This work included a Comprehensive Study under the Canadian Environmental Assessment Act, provincial and federal regulatory permits and approvals and Indigenous and stakeholder engagement.

Special Areas Water Supply Project / Alberta Municipal Affairs
2013 - 2019
Special Areas, Alberta, Canada

Alberta Transportation was responsible for the engineering confirmation study and environmental assessment that would see water pumped from the Red Deer River to the Special Areas for agricultural and municipal use. This project would include 2 new reservoirs, over 100 km of pipeline, and over 200 km of enhanced stream channels.

Travers Reservoir Rehabilitation / Alberta Environment and Parks
2009 - 2017
Lomond, Alberta, Canada

As one stage of rehabilitating the Carseland Bow River Headworks System, Alberta Transportation was responsible for the rehabilitation of Travers Reservoir to bring it into compliance with updated Canadian Dam Safety standards. This work included raising the dam, adding weight to and flattening the dam face, removing existing control structures, rehabilitating the emergency spillway and upgrading the wing-walls and gates.

PROJECT EXPERIENCE – HIGHWAY TWINNING

Highway 63 Twinning – Hwy63:04
2012 - 2016
Wandering River, Alberta, Canada

Alberta Transportation is responsible to ensure the safety of the traveling public on Alberta's highway network. As part of this mandate, Alberta Transportation twinned approximately 230 km of Highway 63 from Grassland to south of Fort McMurray.

TRAINING

Government of Alberta Leadership Program
2017

PROFESSIONAL AFFILIATIONS

Registered Professional Biologist, Alberta (ASPB)

Matt Wood P.Eng.

Senior Associate, Chief Natural Systems Design Engineer - Water

Matt Wood is a hydrotechnical and civil engineer who provides river engineering assessment and design services in Canada. Matt has led projects for both public and private sectors; and, is experienced in working with a variety of clients, boards, councils, the general public and regulatory agencies to address: river related infrastructure; flood risk mapping and mitigation; in-stream construction; natural systems restoration; regulatory approvals, and environmental planning and policy items. Mr. Wood's technical specialty is the design and construction of river infrastructure such as: water intakes, outfalls, bridges, culverts, and boat launches; dams and weirs, pipelines and other infrastructure crossings; flood protection, diversions, bank armouring, channel restoration and fish habitat. He is experienced with hydrometric monitoring, hydrologic assessment and flood forecasting. Matt has worked in remote environments for the resource development industry and in municipal environments of Alberta, British Columbia, Saskatchewan and the Arctic, including several high profile projects in the parks and other ecologically and recreationally sensitive areas. Matt has been a member of Stantec's SR1 team since 2014 providing technical engineering communications and undertaking select design activities.

EDUCATION

Bachelor of Science, Environmental Science, The University of Western Ontario, London, Ontario, 2004

Bachelor of Engineering Science, Civil Engineering, The University of Western Ontario, London, Ontario, 2004

MEMBERSHIPS

Professional Engineer, Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists

Professional Engineer, Association of Professional Engineers and Geoscientists of Saskatchewan

Member, Engineers and Geoscientists British Columbia

Member, Association of Professional Engineers and Geoscientists of Alberta

PROJECT EXPERIENCE

DAMS & LEVEES

SR1 Springbank Dam Diversion | Alberta | 2015-present | River Engineer/Engineering Engagement Lead

Matt is the river engineering representative on the project's design team providing techcnial and design support to: the debris barrier, fish passage mitigations, river armouring, bank restoration, flow isolation and other hydrotechnical design components. He is also the engineering engagement lead for stakeholder consultation including open houses, landowner meetings, and leading consultative design workshops for a major flood control system planned for the Elbow River Basin.

Medicine Hat Overland Flow Protection | Medicine Hat, Alberta | 2014 | Hydrotechnical Engineer

Matt provided general arrangement and hydrotechnical design of flood protection measures for the City of Medicine Hat, including modeling of the South Saskatchewan River, and its tributaries within the City, and engineering support to regulatory approvals. Protective measures include the 3 kilometers of dikes, including one with a custom opening for a roadway with demountable floodwall, and other site specific mitigative measures.

Bonnybrook WWTP Flood Protection | Calgary, Alberta | 2014-2016 | Hydrotechnical Engineer

Hydrotechnical and river engineering design contribution to a flood protection berm and effluent diffuser for the expansion of the Bonnybrook Wastewater Treatment Plant. The project included an encroachment assessment to quantify impacts of the flood protection berm for the feasibility assessment, in the context of regulatory applications.

** denotes projects completed with other firms*

FLOOD RISK MAPPING

Priddis River Hazard Study | M.D. Foothills No. 31, Alberta, Canada | 2018-2019 | Project Lead

Project Lead for a flood hazard mapping study on Fish Creek and Priddis Creek in the foothills of the Rocky Mountains. The scope includes survey, hydrology, hydraulic modelling, channel assessment, two-zone hazard mapping and flood risk inventory. The project was executed under the provincial standard terms of reference.

FISH HABITAT DESIGN

Quarry Park Fish Habitat Compensation Project | Calgary, Alberta | 2015-present | Project Lead

Project Lead for the design and implementation for the reinstatement of a 1 km long historic side-channel on the Bow River to serve as fish habitat compensation under the Fisheries Act. The channel design includes fixed wood debris jams, riffles and pools, ephemeral channels and backwaters. The channel alignment and geometry was designed in respect of the historic riverine features still present in the landscape. Construction was completed in 2017 and 28 redds were observed within the compensation in its first fall of operation.

Stoney Trail Bridge Over the Bow Twinning Fish Habitat Compensation | Calgary, Alberta | 2018-2019 | Lead Hydrotechcnial Engineer

Design of fish habitat compensation for the permanent and temporary impacts of the highway bridge twinning. The works include a rearing channel made from a historic avulsion channel that was disconnected from the river in the early 1900s. The works also include re-vegetation of existing riprap of the original bridge.

Gregoire Lake Fish Habitat Enhancement Project* | Anzac, Alberta | 2011 | Lead Engineer

Engineer of Record and filed engineering for the re-connection and restoration of a severed section of the Gregoire River at the outlet of Gregoire (Willow) Lake near Anzac, Alberta. The re-connection required a fixed crest control with a rocky ramp fishway that would maintain existing lake levels while allowing passage of adult and young-of-the-year pike and walleye. The project was implemented as Fisheries and Oceans Canada HADD of fish habitat compensation for pipeline installations at watercourses and has been operational since its construction in 2010.

BANK STABILIZATION AND EROSION CONTROL

Woodbine Storm Pond Protection at Bebo Grove | Calgary, Alberta | 2017-2019 | Hydrotechnical Engineer

Engineer of record for the design of a self-launching riprap revetment along a natural terrace feature in Fish Creek Provincial Park. The revetment was designed to be resilient enough to protect the storm pond in accordance with Canadian Dam Safety guidelines; and included undulations in the toe, fish habit boulders and extensive re-vegetation to be both functional, and fit into the park aesthetic.

Kananaskis River Realignment | Kananaskis Village, Alberta | 2015 | Project Manager and Engineering Lead

Project manager and engineering lead for the design of 300 m of realignment of the Kananaskis River to protect the village's water treatment plant. The project included the hydrotechnical assessment, design, regulatory application and construction supervision of 4 river training spurs that incorporated fish habitat compensation measures that resulted in no-net habitat loss and expedited approvals.

RIVER ICE

Russell Woods Pumping Station Generator Ice Protection | Lakeshore, Ontario | 2014 | Hydrotechnical Engineer

Assessment of impacts that river ice could have on the fuel storage tank and generator for the pumping station. The project included quantifying ice load forces and recommendations for the design of mitigative measures.

Poppy Plaza River Ice Mitigation* | Calgary, Alberta | 2012 | Hydrotechnical Engineer

Assessment of river ice generation mechanisms from the Bow River and the effects it has on the Poppy Plaza infrastructure. Mitigation concepts were developed and ice loading forces computed for detailed design.

FLOOD RISK ASSESSMENT, PLANNING AND MITIGATION

Bow River at Crowchild Trail Flood, Erosion and Debris Hazard Mitigation | Calgary, Alberta | 2018-present | Project Manager and Lead Engineer

Project lead for the geomorphic assessment of over 3 km of the Bow River upstream of Crowchild Trail Bridge. The project involved 2D hydrodynamic modelling of past and projected channel changes using Mike 21C and additional geomorphic assessment techniques. The assessment informed recommendations for flood risk, erosion protection, recreation opportunities and public safety.

** denotes projects completed with other firms*

Wolf Willow Developments Flood Risk Assessment and Recommendations | Calgary, Alberta | 2015 | Hydrotechnical Engineer

Flood and geomorphic risk assessment for the Wolf Willow Community alongside the Bow River. The scope included assessment of erosion risk and recommendations for setbacks and mitigations.

Town of Okotoks Water Treatment Plant Flood Protection | Okotoks, Alberta | 2014 | Project Manager and Lead Engineer

Engineer of record and project management for a flood risk assessment, options development, detailed design and construction supervision of flood protection measures at the Town's water treatment facility, located on a floodplain of the Sheep River. The mitigations included armouring of the building foundation, well field protection and modification of a major sub-channel to prevent a channel switch against the WTP.

RIVERINE INFRASTRUCTURE

Bowness Lagoon Inlet Design | Calgary, Alberta, Canada | 2019-present | Lead Engineer

Matt led engineering design of a replacement for the Bowness Lagoon inlet which diverts water from the Bow River into the water features within Bowness Park. The design includes both low and high flow systems to meet different operational and regulatory objectives.

City of Calgary Fire Department Bow River Boat Launches* | Calgary, Alberta | 2013 | Project Engineer

Project manager and engineer of record for 6 jet boat launches for the City of Calgary Fire Department following the 2013 flood. This included emergency repairs during the receding flood and regulatory applications to reinstate the permanent re-designed boat launches prior to construction.

RIVER RECREATION AND ACCESS

Kicking Horse River Whitewater Access | Golden, British Columbia | 2018-2019 | Lead Hydrotechnical Engineer

River Engineering Lead on assessment team investigating alternatives for recreational and commercial whitewater access to the Lower Canyon. Matt put forward a solution that modifies the Class 5 rapids at 'The Split-Rock" and 'the Bridge Drop' to allow commercial (and recreational) entities to navigate through. This to avoid pull-outs and put-ins that conflict with highway and rail stakeholders. The assessment included hydraulic modeling in HEC-RAS and the preliminary design of navigable features.

BRIDGE PLANNING AND DESIGN

SE Bus Rapid Transit Bridges | Calgary, Alberta | 2017-2018 | Lead Hydrotechnical Engineer

Hydrotechnical engineer for bridge design and construction planning for a bus to light rail bridge crossing of the Bow River and the Western Irrigation District Canal. The work on the Bow River bridge included two working pads in the river and required hydrotechnical support to obtain regulatory approvals. Matt also designed the fish habitat compensation for the impact from the bridge and the access berms.

Sue Higgins Pedestrian Bridge | Calgary, Alberta | 2013-2014 | Hydrotechnical Engineer

Engineering design of abutment armour for a perched pedestrian bridge that was damaged in the 2013 flood. The design incorporated vegetative plantings in the riprap; and turf-reinforcement matting for the protection on the backside of the abutments.

STREAM AND RIVER RESTORATION

Bebo Grove Bank Repairs and Restoration | Calgary, Alberta | 2015 | Lead Hydrotechnical Engineer

Engineer of Record for the reinstatement of 230 m of bank using bioengineering techniques to protect a key pathway corridor in the park. The design used riprap and wood for structural support in the bank toe and vegetated soil wraps above the normal high-water mark to obtain a steeper profile for overhanging vegetation.

Upper McDougal Creek Post-Flood Restoration | West Kelowna, British Columbia | 2016-2017 | Lead Hydrotechnical Engineer

Engineer of Record for the restoration of 200 m of channel located on an interim fan in the watershed. Deposition from the 2017 flood event was hindering conveyance and posing a risk to upstream crossings, adjacent infrastructure and property. The scope included stabilization of the channel profile using bioengineered bed controls and bank structures.

** denotes projects completed with other firms*

Education

Executive Masters of Business Administration, Ivey Business School, Western University – 2017

Bachelor of Arts, Political Studies, Augustana University College - 2005

Executive Education, Alberta School of Business, University of Alberta – 2018

Government of Alberta, Alberta Transportation – Edmonton

Executive Director, Transportation Policy, Safety and Policy Division

Matthew is the Executive Director of Transportation Policy and has worked in the Government of Alberta for 14 years.

Matthew is responsible for:

Leading the Transportation Policy Branch, including the supervision of 6 direct reports and oversight of a more than $3 million operating budget.

Leading the Springbank Off-stream Reservoir Project through all aspects of the environmental and regulatory processes to obtain approvals for the construction of the project;

Leading the department's policy development, coordination, and engagement function to support the delivery of the Ministry's policy priorities;

Guiding the department's intergovernmental and transportation market access activities to support Minister and Deputy Minister involvement in key federal/provincial/territorial committees;

Providing direction to the legislative planning activities to ensure legislation and regulation reflect department objectives; and,

Matthew has served the Government of Alberta at the executive level since March 2017 three years and has led a number of strategic initiatives including development of business units, strategic shifts in the Provincial Care Networks program, development of the Nurse Practitioner Support Program, and advancement of the Springbank Off-stream Reservoir.

Matthew started his career in the legislative assembly supporting MLAs and through the course of his career has provided support and guidance to many elected officials. He was an executive assistant to the Minister of Seniors and Community Supports and he was Director of Operations in Office of the Minister of Health. He also worked as the Chief of Staff in the Deputy Minister's Office at Alberta Health.

Employment History

Alberta Transportation - Edmonton, AB

Executive Director, Transportation Policy, Safety and Policy Division (October 2019 - Present)

Leading the Transportation Policy Branch, including the supervision of 6 direct reports and oversight of a $3 million operating budget.

- Executive lead for the Springbank Off-stream Reservoir Project (see below).
- Responsible for Alberta Transportation's policy development, coordination, and engagement function to support the delivery of the Ministry's policy priorities.
- Guides the department's intergovernmental and transportation market access activities to support Minister and Deputy Minister involvement in key federal/provincial/territorial committees.

- Provides direction to the legislative planning activities to ensure legislation and regulation reflect department objectives.

Executive Director, Springbank Reservoir Project, Transportation Services Division (February 2019 – October 2019)

Lead the Springbank Off-stream Reservoir Project through all aspects of the environmental and regulatory processes to obtain approvals for the construction of the project.

- Navigate the project through provincial and federal assessment and regulatory approval process which includes the role of chairing the province's witness panel at the provincial hearing.
- Oversight of the project budget.
- Work with external advisors and legal counsel to coordinate the regulatory strategy for the project.
- Lead external stakeholder and Indigenous engagement primarily through in-person meetings.
- Support the project land acquisition strategy and associated stakeholder management process.
- Develop and provide project briefings for senior elected officials and public service executives.

Alberta Health – Edmonton, AB

Executive Director, Health Workforce Partnerships, Health Workforce Planning and Accountability Division (February 2018 – February 2019)

Led the Health Workforce Partnerships Branch, including the supervision of 3 direct reports and oversight of an over $200 million budget.

- Led staff in the health human resource (HHR) planning and strategy, and Primary Care Network (PCN) operations areas of the Ministry supporting effective program delivery, issues management, financial oversight, and policy development and implementation.
- Supported the implementation of provincial PCN strategic shifts in collaboration with Ministry colleagues and external partners, including participation on the provincial PCN Coordinating Committee and leading the delivery of a priority items on funding and primary care HHR needs.
- Led the development of a new Ministry HHR strategy to guide future activities in workforce deployment and health system strategic shifts.
- Provided executive director sponsorship of Ministry engagement activities (Managers Forum; Senior Managers Forum).
- Represented the Ministry on the Federal/Provincial/Territorial Committee on Health Workforce.

Executive Director, Ministry Integration, Innovation and Strategic Operations (March 2017 – February 2018)

Acting Executive Director, Executive Operations, Innovation and Strategic Operations (September 2017 – February 2018)

Led the Ministry Integration branch, including the supervision of 3 direct reports and oversight of an approximately $1 million budget. Provided temporary leadership of the Executive Operations branch, which included leadership of 4 direct reports and oversight of an approximately $10 million budget.

- Developed a policy integration unit to coordinate policy development in the Ministry. This included the recruitment of a new director and supporting staff, creation of a policy development map, and an internal initiative tracking tool to ensure strategic initiatives were ready for executive and ministerial consideration and delivered consistent with government objectives.
- Developed the Alberta Health Services (AHS) coordination unit to support the relationship of the Deputy Minister's Office with the Chief Executive Officer (CEO) of AHS by establishing processes to address ongoing health system issues coordination between Ministry and AHS officials and ensured AHS is aligned ministry priorities.
- Supported the functions provided by the Executive Operations branch (agency governance and public appointments, strategic engagement and planning, and ministerial correspondence) and ensured the team was delivering work on schedule that met the expectations of senior Ministry officials.

Chief of Staff, Deputy Minister's Office (September 2013 – March 2017)

Managed the operations of the Deputy Minister's Office, including the supervision of 3 direct reports and oversight of approximately $2 million budget.

- Ensured the assignment, review, and completion of requests from the Minister's Office to meet their policy, information, and business requirements through leadership of a team that delivered approximately 350-400 action requests and 10 executive level meeting packages to the Minister's Office per month and approximately 5-10 cabinet reports annually.
- Coordinated the Deputy Minister's priorities and initiatives with the Ministry's 14-member Executive Team and their offices and/or divisions. (e.g. worked with assistant deputy ministers in 2016 to develop a plan for the inclusion of issues managers in their offices and recruited candidates into these new roles that supported the operations of divisions and the delivery of ministry priorities).
- Liaised with officials at the Executive Council office to coordinate policy development and cabinet decision-making for the Ministry. This included bringing awareness and resolving critical Ministry issues that impacted the delivery of the government's agenda (e.g. worked with Executive Council staff in May 2015 to develop broker and finalize Health's transition binder for the newly elected government).
- Liaised with the CEO's Office at AHS to resolve issues in the delivery of health services and ensure AHS initiatives were consistent with government and ministry directions. Provided advice and guidance on the development of annual AHS budget and health plan.

Director, Office of the Official Administrator (June 2013 – September 2013)

Executive support and advice to the Official Administrator (OA) of Alberta's single health delivery authority.

- Established the office for the OA and developed process and procedures to support board-level decision-making under the *Regional Health Authorities Act* and to allow for communications between the OA, the Minister of Health, the CEO, and the public.
- Liaised with the CEO's office and executive offices on operational matters on behalf of the OA ranging from service delivery planning (e.g. northern

Alberta laboratory request for proposal) to workforce management (e.g. planning for bargaining with major health unions).
- Briefed the Office of the Minister of Health and officials in the Ministry of Health on the initiatives led by the OA (e.g. developed briefing materials on the OA's review of homecare procurement, supported the OA in the drafting and finalizing of her report in the review of the executive structure of AHS).
- Coordinated events and activities between the Minister, Ministry, and Alberta Health Services through the planning and development of agendas of periodic meetings of the Minister, Deputy Minister, OA, and CEO. This included maintaining an issues tracking document to follow up on actions arising from the meetings.

Office of the Minister of Health – Edmonton, AB
Director of Operations (September 2012 – June 2013)

Special Advisor (October 2011 – September 2012)

Supported the Minister and Chief of Staff with the daily activities of the Minister's Office and served as principal contact with Members of the Legislative Assembly (MLAs) and their offices for information requests.
- Liaised with the Deputy Minister's Office and executive team member offices in support of the Minister's internal decision-making process, including organization of Minister-Deputy Minister meeting agendas and post-meeting followup to ensure implementation of ministerial direction (e.g. worked with department staff on the development of an electronic tracking tool that streamlined the number of ministry priority initiatives and brought attention to critical timelines in the decision-making process).
- Attended meetings and functions with the Minister and ensured the Minister was effectively prepared for speaking engagements and aware of concerns of stakeholders and elected officials (e.g. organized and supported daylong sessions with stakeholders and member of the public).
- Coordinated the legislative functions of the office, including direct support to the Minister in carrying bills in the Assembly, organizing the written question/motions for return process, and assisting MLAs and their offices with their needs related to Question Period (e.g. coordinated decision-making, stakeholder management, drafting, communications, and legislative speeches for the *Health Quality Council of Alberta Act* in late 2011).
- Supported the policy development process in the office through vetting of decision-making documents prior to Executive Council, and coordinated briefings for the Minister and other elected officials prior to cabinet meetings (e.g. appointments to Ministry agencies and boards; policy decisions related to health governance, pharmaceutical programs, regulatory structure for midwives, long-term care accommodation fees, tobacco reduction, cancer prevention, family care clinics, seniors property tax deferral, and provincial emergency management services).

Minister of Seniors and Community Supports – Edmonton, AB
Executive Assistant to the Minister (February 2011 – October 2011)

Provided advice and support to the Minister and liaised between the Minister's Office and the Office of the Premier, Executive Council, executive assistants to Ministers and MLA offices.
- Managed the relationship between the Minister's Office and the department, including support of the policy development and implementation process,

delivering on Minister's priority items ensuring communication of government goals and objectives and following up as required.
- Ensured the Minister was briefed and prepared to participate in external and internal commitment including internal decision-making groups, meetings with elected officials and stakeholders groups, and public speaking engagements.
- Managed the daily functions of the Minister's Office, including providing direction to 3 support staff, handling Human Resources issues and managing an office budget of $500,000.

Special Assistant to the Minister (July 2007 – February 2011)

Liaised with department to ensure prompt and efficient preparation of correspondence and briefings.
- Prepared agendas and assemble materials for executive meetings with the Minister and briefed the Minister and executive assistant on upcoming and other relevant issues.

Legislative Assembly Office – Edmonton, AB

Research Officer (December 2006 – July 2007)
- Prepared speeches and other communication materials for government MLAs.

Legislative Assistant (March 2005 – December 2006)
- Managed scheduling and correspondence for 2 government MLAs.

Michele Perret M.A. (Econ) Queen's University, B.A. Special (Econ)University of Alberta

Stantec

Michele has 29 years of experience in community engagement and regulatory issues in industry managing large teams of professionals as well as multi-million dollar budgets. Michele has been responsible for the development and execution of engagement and Indigenous Consultation strategies, plans, processes, evaluation tools and frameworks. She has a track record of generating creative, strategic and effective solutions in challenging environments.

Her areas of expertise include: engaging stakeholders, Indigenous relations, government relations, financial acumen, strategic planning, public speaking, regulatory, leadership, and coaching/mentoring.

EDUCATION

University of Alberta / B.A. (Special) Economics, Edmonton, Alberta, 1983

Queen's University / M.A. Economics, Kingston, Ontario, 1988

QUALIFICATIONS

Public Information Officer & Incident Command System 300, Federal Emergency Management Agency, Calgary, Alberta, 2015

MEMBERSHIPS

Member, IAP2

PROJECT EXPERIENCE

For the last 4.5 years, Michele has worked for Stantec Consulting Ltd. with a variety of clients on various issues associated with engagement and Indigenous Consultation. In most cases, she was the Engagement Lead, which required developing and implementing the engagement strategy. She was also the Project Manager with the responsibility of managing the team, schedule and budget for the effective outcomes.

Springbank Reservoir (SR1) | Alberta Transportation | Edmonton/Calgary | 2020 – present | Engagement Lead

Based on significant experience leading engagement on large projects in a regulatory setting, I was asked to join the SR1 project prior to the NRCB hearing. Responsibilities included organizing responses to questions from landowners and stakeholders, as well as overseeing the development of newsletters and project updates for landowners and stakeholders.

Flood Mitigation Environmental Impact Statement | Manitoba Infrastructure | Winnipeg, Manitoba | 2019 - present | Engagement Lead

Coordinated and participated in public meetings and drafted the consultation chapter for the Environmental Impact Statement submitted to the Canadian Environment Assessment Agency. Provided advice on Indigenous Consultation, and summarized issues and questions from Indigenous consultation activities previously undertaken. Drafted easy to understand one page summaries for all valued components of assessment for communication to Indigenous communities.

Capital Region Housing Youngstown and Keheewin | Edmonton, Alberta, Canada | 2017- 2020 | Engagement Lead

Led engagement for two new affordable housing developments in Edmonton including facilitating public meetings, working with Community Advisory Boards and organizing events with existing tenants. Michele also spoke at the Public Hearing at Edmonton City Council for the Keheewin project this past winter.

Urban Forestry | City of Edmonton, Alberta | 2019-2020 | Project Manager, Engagement Lead

Designed and implemented an engagement strategy for updates to Corporate Tree Management Policy and the City's Public Tree Bylaw.

Shaunavon Interconnection | Many Islands Pipeline | Regina, Saskatchewan | 2019 – 2020 | Engagement

Provided engagement advice for a regulatory application for a new meter station and pipeline near Shaunavon, Saskatchewan. Designed and implemented an engagement plan that meets federal regulatory requirements of the Canadian Regulatory Authority and prepared the engagement section of the regulatory application. Edited and updated their Public Awareness Program documentation.

Touch the Water | City of Edmonton, Alberta | 2019 – ongoing | Project Manager, Engagement Lead

Designed and implemented an engagement strategy that encouraged easy participation and feedback. It included public pop up sessions with "graffiti" walls placed outside and in public high traffic venues to allow people to respond to three questions about the project and the space. Created an online survey.

Coal Combustion Residual | Tennessee Valley Authority | Tennessee | 2019 – 2020 | Engagement

Established stakeholder mapping session outlines, edited video scripts, edited infographics to educate the population on Coal Combustion Residuals.

Off-site Levy Committee | City of Edmonton, Alberta | 2018 – 2020 | Facilitator

Facilitated off-site levy committee meetings as a neutral third party. The committee is made up of City of Edmonton administration and representatives of the development industry in Edmonton. The committee was formed by the City to update off-site levy policy and complete a bylaw.

Stakeholder Engagement | Canada Revenue Agency | Ottawa, Ontario | 2019 | Project Manager, Facilitator

Workshops were designed and facilitated in 7 cities across the Country to generate feedback on the perception of service quality Canadians receive form the Canada Revenue Agency. A detailed report that included analysis of a CRA survey was generated.

Waste Strategy | City of Edmonton, Alberta | 2018-2019 | Project Manager, Engagement Lead and Project Manager

Michele led an engagement team to gather opinions from the residents, business owners, corporations, and internal City departments regarding the renewal of the City's Waste Management Strategy. Engagement provided opportunities for education about waste management, presented concise material, focused conversations, and generated helpful feedback for decision makers. In the fall of 2018, more than 20,000 residents, businesses, and city employees participated in public drop-in sessions, workshops, facilitated meetings and online surveys for the Waste Management Strategy. These conversations continued into the spring of 2019 with over 11,000 residents, businesses, and employees validating what was heard.

Centre In the Park | Strathcona County, Alberta | 2018-2019 | Engagement Lead

Designed and implemented engagement with adjacent landowners and the public for a revised Area Redevelopment Plan for Sherwood Park's downtown. This involved identifying tactics to engage (public meetings, engaging youth council, online summary) and reporting on feedback gathered.

Bremner Area Project, Planning and Development Services Department, Engagement, Transportation, Utilities | Strathcona County, Alberta | 2017-2019 | Engagement Lead

Worked with Project Manager from Strathcona County to develop creative opportunities engage and facilitate conversations with internal stakeholders and the public regarding the development of the new community of Bremner. Engagement techniques were required to reflect the unique characteristics of the project and the opposition to this greenfield project.

Alberta's Industrial Heartland Area Structure Plan | Lamont County, Alberta | 2016-2018 | Engagement Lead

Develop and facilitate an engagement plan for the revised Industrial Areas Structure Plan (ASP) that reflects the current challenges in the area. Flexibility was key to meet the client and stakeholders' requirements as we changed public engagement styles to address feedback. Briefing documents and timely engagement summaries were provided.

The Barrier Wall | City of St. Albert, Alberta | 2018-2019 | Engagement Lead

Developed and implemented a respectful engagement strategy on a project for the City of St. Albert that required access and construction within personal property. Work includes developing public engagement strategies, plans and processes collaboratively with the municipality, including notification letters, key messages, and meetings in a

respectful manner that recognizes the sensitivity of those directly affected.

Government of Alberta, Bighorn | Edmonton, Alberta, Canada | 2018-2019 | Engagement Lead

Michele led engagement to facilitate respectful conversations with stakeholders and the public around this high profile, controversial project in central Alberta. Engagement included public meetings and multi-stakeholder workshops.

Fort Edmonton Park Expansion | Edmonton, AB | 2017-2019 | Consultation Team Lead

Designed and led Duty to Consult requirements with 30 Indigenous communities for the park's multi-million dollar expansion. Provided communication and engagement expertise including approach to acquiring Indigenous content for the Indigenous Peoples Experience.

Vision 2050 | Edmonton, Alberta | 2016-2018 | Engagement Lead/Project Manager

As Project Manager and Lead Engagement, worked with team to develop and undertake an innovative and meaningful engagement strategy for the renewal of the City's 10 year strategic plan that incorporates diverse voices. The plan was designed to be collaborative, authentic, strategic and wide ranging to reach, and be relevant, to the diverse demographics and geography of the City.

Jasper Place Wellness Centre | Edmonton, Alberta, Canada | 2018 | Engagement Lead/Project Manager

Michele organized engagement for the new Glenwood Development in west Edmonton that would provide permanent supportive housing. Public meetings, attendance at community league events and communication couching was included in Michele's duties.

Gibson Energy | Calgary, Alberta | 2018 | Consultation Advisor/Project Manager

Provided consultation support and advice for an oil and gas project that wanted to engage Indigenous communities in proximity to the assets. Organized cultural awareness training, prepared engagement plans and briefings for senior Management.

Community Indicators, City of Edmonton | Edmonton, Alberta | 2018 | Engagement Lead/Project Manager

As a follow up to the Vision 2050 project, the City wanted to develop indicators with the community. Michele led the engagement and designed telephone interviews and a workshop with community leaders to generate ideas and potential indicators of success.

Castle, Porcupine Hills and Livingstone New Par | Government of Alberta | 2017 | Engagement Lead/Project Manager

Michele led the Stantec team to provide neutral third-party facilitation of public meetings, including documenting and reporting feedback from the approximate 600 attendees who attended the 3 day meetings. The use of interview style feedback gathering, graffiti boards, documenting conversations, and comment cards provided a calming and approachable atmosphere for an emotionally charged subject.

Natural Areas Inventory and Management Plan Update | Town of Spruce Grove, Alberta | 2017 | Facilitator

Parks, Recreation and Culture Master Plan | Parkland County, Alberta | 2016-2017 | Engagement Lead

Public Awareness Program Review | Red Deer, Alberta | 2017 | Engagement Review

Aboriginal Consultation on Three Regional Plans, Alberta Government (Land use Secretariat) | Edmonton, Alberta | 2016-2018 | Consultation Support

ENBRIDGE 1991 – 2015 | Edmonton, Calgary, Toronto

For 25 years, Michele worked for Enbridge Pipelines Inc. in leadership positions with increasing responsibilities on high profile projects. For many years Michele was in charge of regulatory filings with the National Energy Board in Canada and the Federal Energy Regulatory Commission in the US. Michele worked in public affairs on government relations, community relations, and Indigenous engagement for pipeline projects between BC and Quebec.

Northern Gateway Project* | 2005-2014 | Engagement Lead

Managed a group of professionals responsible for First Nations, Metis and community Engagement in Alberta and B.C., which included: development of engagement plans, process and evaluation tools; and, introduction of innovative engagement techniques to provide meaningful and respectful engagement and extend outreach, which increased the number and quality of conversations with Metis, First Nations, communities and the public.

** denotes projects completed with other firms*

Five Community Advisory Boards were used between Edmonton and Kitimat, BC with over half of the participants being Indigenous. Brought Chiefs and leaders of Indigenous communities that had signed Equity Agreements together for regular meetings with CEO and other Senior Executives. Organized tours of the oilsands and a large oil spill clean up in Michigan for Indigenous communities and stakeholders who were opposed to the project or wanted to learn more about the industry. Negotiated agreements with Indigenous communities across the proposed right of way to identify benefits for Indigenous communities in the project.

Kept stakeholders, Metis and First Nation communities informed of project updates through regular presentations to, and meetings with, Elders, Hereditary Chiefs, Elected Chiefs, Locally Elected Officials, Chambers of Commerce, Community Groups and Rotary Clubs. Identified and presented employment, training and business opportunities for the project to Indigenous communities, municipalities, and other groups and associations interested in participating.

Connected stakeholders with industry experts in various fields including contracting. Developed process to respond promptly to questions received via email, website, telephone and meetings. Organized door knocking in Kitimat, third-party hosted informal coffee chats in west coast communities to answer questions about the project, developed conferences and trade shows, and other events to profile the project and respond to questions.

Alberta Clipper and Southern Lights Pipeline Construction* | 2006-2008 | Engagement Lead

Worked with communities in Alberta, Saskatchewan and Manitoba to provide information regarding a large expansion and construction project and gather feedback on issues of importance to communities and the public: Travelling the right of way to present project information, identify construction opportunities and connect prime contractors with local stakeholders to meet supply requirements. Explained timing of construction and the various activities involved. Worked with Project Manager and Prime Contractors to address questions, issues and find solutions to concerns in communities around safety, codes of contact, employment, training and business opportunities. Organized and participated in local media tours. Managed community investment opportunities.

Nick De Carlo B.Sc., P.Biol.

Senior Vegetation Ecologist

Nick De Carlo is a Senior Vegetation Ecologist and Technical Lead for Vegetation, Wetlands and Soils at Stantec with over 19 years' experience in the consulting industry. Working independently and as part of a team, he has assessed potential effects to vegetation and wetlands from various development sectors, including roads, flood management, rail, oil and gas, wind energy, and urban development. He has participated in Biophysical Inventories and Environmental Impact Assessments (EIAs) in the Northwest Territories, Alberta, Saskatchewan, Manitoba, and British Columbia, including the Low-Arctic, Subarctic, Boreal, Parkland, Foothills and Grassland regions. Nick has also conducted post-construction monitoring and asssisted with reclamation. This experience provides a solid understanding of regional vegetation and wetland conditions, regulatory requirements and potential mitigation options. Together with a team of skilled biologists, Nick helps deliver cost effective, technically sound assessment of vegetation, wetlands and soils, and develop mitigation solutions reducing potential effects.

EDUCATION

Bachelor of Science, Ecology, University of Calgary, Calgary, Alberta, 2000

CERTIFICATIONS & TRAINING

Ecological Restoration Professional Specialization Certification Program, University of Victoria, British Columbia, 2018

Advanced Hydrology for Jurisdictional Determinations, Wetland Training Institute, e-course, Calgary, Alberta, 2013

Wetland Delineation, Wetland Training Institute, Arlington, Washington, 2008

REGISTRATIONS

Professional Biologist #1706, Alberta Society of Professional Biologists | 2009-present |

MEMBERSHIPS

Member, Society of Wetland Scientists

Member, Alberta Native Plant Council

PROJECT EXPERIENCE

FLOOD MANAGEMENT

Springbank Off-Stream Reservoir, Environmental Impact Assessment | Calgary, Alberta | 2018-present | Vegetation Ecologist/Wetland Specialist

Stantec conducted an environmental impact assessment of a proposed off-stream reservoir flood mitigation project west of Calgary. The assessment was conducted to meet requirements of the Alberta Natural Resources Conservation Board Act and Canadian Environmental Assessment Act. This joint provincially and federally regulated assessment included desktop determination of existing vegetation and wetland conditions, identification of mitigation measures, and assessment of potential residual direct and indirect project and cumulative effects. Nick supervised the updated vegetation and wetlands impact assessment, prepared a draft revegetation and monitoring plan, directed and assisted with additional wetland field surveys, directed completion of an Alberta Water Act application and associated wetland assessment and impact report for Project construction, assisted with Indigenous engagement, and authored provincial and federal post-filing supplemental information request responses. ,

Lake St. Martin/Lake Manitoba Outlet Channels, Environmental Impact Statement | Manitoba | 2019-present | Vegetation Ecologist/Wetland Specialist

Stantec conducted a CEAA regulated environmental impact statement (EIS) of a proposed permanent flood control management system for the Lake Manitoba and Lake St. Martin region of Manitoba. The EIS included desktop determination of existing vegetation and wetland conditions, identification of potential mitigation measures, and an assessment of potential project and cumulative effects. Nick was the vegetation and wetlands technical lead, and directed desktop mapping, data analysis and reporting, and is assisting with

addressing provincial and federal supplemental post-filing information request responses.

URBAN ENVIRONMENTAL RESOURCE MANAGEMENT

Nose Creek Area Structure Plan, Biophysical Impact Assessment | Calgary, Alberta | 2020 | Vegetation Ecologist/Wetland Specialist

Stantec completed an environmental impact assessment for a new residential and commercial development in Northeast Calgary. Nick coordinated the environmental assessment and authored the vegetation assessment section. Duties included selecting study area boundaries, data gaps, advising on mitigation options, assessment of effects and team coordination.

Haskayne Park Biophysical Impact Assessment | Calgary, Alberta | 2019 | Vegetation Ecologist

Stantec completed an environmental impact assessment for a new park planned for Northwest Calgary. Nick coordinated the environmental assessment and authored the vegetation assessment section. Duties included selecting study area boundaries, identifying data gaps, advising on mitigation options, assessment of effects and team coordination.

Nose Creek Area Structure Plan, Biophysical Inventory Gap Analysis | Calgary, Alberta | 2015 | Vegetation Ecologist/Wetland Specialist

Stantec conducted a gap analysis of a biophysical inventory completed for proposed residential development in northeast Calgary. The analysis assessed report accuracy and completeness and recommended further studies where needed. The analysis included terrain, soils and surficial geology, vegetation and wetlands, wildlife and wildlife habitat and environmentally significant areas. Duties included analysis of vegetation and wetlands reporting, and team coordination.

Calgary Municipal Land Corporation, St. Patrick's Island Biophysical Impact Assessment | Calgary, Alberta | 2012-2013 | Project Manager and Vegetation Ecologist

Stantec conducted a Biophysical Impact Assessment for a proposed redevelopment and restoration of St Patrick's Island in Calgary, Alberta. The impact assessment focused on wildlife, fish and vegetation, including species of management concern. Nick managed the project and conducted the vegetation assessment. Project management duties included determining assessment scope, scheduling, liaising with client, financial tracking and report review. Vegetation assessment duties included determining potential effects and recommending potential mitigation strategies. Nick authored the vegetation assessment and main report introductory sections.

City of Calgary, Laycock Park Biophysical Inventory | Calgary, Alberta | 2006 | Vegetation Ecologist

Stantec conducted a biophysical inventory of vegetation resources in support a proposed wetland compensation project in northeast Calgary. The inventory focused on vegetation upland and wetland communities and species of management concern. Nick conducted the vegetation biophysical inventory and authored the vegetation section of the report. Vegetation inventory duties included conducting field surveys, wetland mapping and classification and analyses of field data.

ENVIRONMENTAL MANAGEMENT

Green Cemetery Weed Management Plan and Habitat Restoration Plan | Calgary, Alberta | 2018 | Vegetation Ecologist

Stantec prepared a weed management plan and habitat restoration plan for a proposed Green Cemetery in southeast Calgary, Alberta. The work required an inventory of weeds and non-native plant species present at the site, development of a control plan (including chemical and mechanical methods) and native seed mixes appropriate for previously cultivated land. Nick was the technical lead and quality reviewer.

South East Alberta Watershed Alliance, Aerial Assessment of Riparian Areas in the Seven Persons Creek Watershed | Medicine Hat, Alberta | 2018 | Vegetation Ecologist

Stantec completed a desktop assessment of riparian area conditions in the Seven Persons Watershed of Southern Alberta. Seven Persons Creek Watershed provides off-stream storage for irrigation and is an important water source for the City of Medicine Hat and an assessment or riparian condition was needed to identify degraded areas in need of restoration that otherwise could harm water quality. Nick provided project direction and quality review.

Pasqua Street Pipeline Remediation, Weed Inventory and Management Plan | Regina, Saskatchewan | 2017 | Vegetation Ecologist

Stantec conducted a weed inventory and prepared a weed management plan as part of a post-construction pipeline right-of-way assessment in the City of Regina. Listed weed species abundance and distribution were quantified and options for mechanical and chemical control, and re-seeding were developed based on species ecology and available literature. Nick prepared the weed management plan.

Canadian Energy Pipeline Association (CEPA), Vegetation Management Guidance Document | 2015 | Vegetation Ecologist

Stantec prepared a vegetation management guidance report for pipeline rights-of-way and facility sites. The document includes guidance on control options, recommended thresholds, post-treatment evaluation and integrated vegetation management to assist CEPA members with routine operations, maintenance and release emergency response. Nick coordinated team members and was the report lead author.

OIL & GAS

Frontier Oil Sands Mine, Wetland Function Assessment | Fort McMurray, Alberta | 2017 | Wetland Specialist

Stantec conducted a wetland function assessment in support of the Frontier Oils Sands Mine EIA. The work assisted in determining how the Alberta Wetland Policy would relate to the Project, should it be applied, and assist with development of a biodiversity management plan. Nick led the work and authored the report.

Nova Gas Transmission Ltd., Woodenhouse Compressor Station C3 Unit Addition, Environmental and Socio-Economic Assessment Section 58 Application | Wabasca, Alberta | 2016 | Vegetation Ecologist/Wetland Specialist

Stantec conducted a vegetation and wetland assessment in support of an Environmental and Socio-Economic Impact Assessment for a proposed compressor station north of Wabasca, Alberta. Nick directed the vegetation and wetland assessment and provided recommendations for mitigation. Duties included data QA/QC and overseeing vegetation and wetland assessment of potential project effects.

Enbridge, Athabasca Pipeline Twinning Project, Post-Construction Wetland Health and Function Assessment | Wainwright, Alberta | 2016 | Wetland Specialist

Stantec conducted a post-construction wetland health and function assessment of the Athabasca Pipeline Twinning Project north of Wainwright, Alberta. The work was conducted to evaluate effectiveness of construction mitigation and evaluate compliance with Water Act Code of Practice approval requirements. Nick led the wetland assessment. Duties consisted of background scientific literature review, assessment plan design, data analysis and report preparation.

ConocoPhillips, Parsons Lake Sump Evaluation | Northwest Territories | 2013 | Vegetation Ecologist

Stantec assisted with an evaluation of vegetation conditions for a remediated sump in the northern Arctic. The study consisted of a field inventory of plant species cover and diversity and an evaluation of differences to surrounding natural vegetation. Nick designed the sampling approach, conducted field work and authored the report.

Total Upgrader Environmental Impact Assessment | Fort Saskatchewan, Alberta | 2010 | Assistant Project Manager/Vegetation Ecologist

Stantec completed an environmental impact assessment for a proposed oil upgrader near Fort Saskatchewan, Alberta. Nick assisted with project management of the environmental work, conducted baseline vegetation surveys, and authored vegetation supplemental information request responses. Duties included scheduling, inventory team coordination, client liaison, financial tracking and conducting wetland and upland field surveys, rare plant surveys, and wetland mapping and classification.

Mackenzie Gas Project Biophysical Baseline and Environmental Impact Assessment | Northwest Territories | 2002-2007 | Vegetation Ecologist

Stantec conducted detailed vegetation surveys and mapping in support of the vegetation component of the Environmental Impact Statement and Project Permit Applications (PPA). These studies encompassed native vegetation community classification and mapping, data analyses, impact assessment, weed identification and rare plants.

ELECTRICAL TRANSMISSION

AltaLink, Provost Transmission Line Environmental Evaluation and Wetland Assessment | Provost, Alberta | 2018-2019 | Vegetation Ecologist/Wetland Specialist

Stantec conducted an environmental evaluation and wetland assessment in support of a 33 km proposed electrical transmission project near Provost, Alberta. Nick led the vegetation and wetlands environmental evaluation and assisted with wetland assessments for the project, identifying potential effects and advising on mitigation. Duties included vegetation and wetland mapping and advising on wetland avoidance and mitigation.

Manitoba Hydro, Manitoba to Minnesota Transmission Project Environmental Impact Assessment | Manitoba | 2015-2019 | Vegetation Ecologist/Wetland Specialist

Stantec completed an environmental impact assessment for a proposed electrical transmission project from Winnipeg, Manitoba to the Manitoba-Minnesota border. Nick was the technical lead for the vegetation and wetlands assessment. He assisted

with assessment writing, preparing supplemental post-filing information request responses, and provided expert witness evidence at the project provincial hearing.

Foothills Area Transmission Development Project, Pre-construction Wetland Assessment | Langdon/Okotoks, Alberta | 2012-2014 | Wetland Specialist

Stantec conducted an environmental evaluation and wetland assessment in support of the proposed electrical transmission project from Langdon to Okotoks, Alberta. Nick assisted with wetland assessments for the project, identifying potential effects and advising on mitigation. Duties included wetland mapping, wetland surveys and boundary delineation, and advising on wetland avoidance and mitigation.

Castle Rock Ridge to Chapel Rock Transmission Project Environmental Evaluation | Alberta | 2015 | Vegetation Ecologist/Wetland Specialist

Stantec conducted an Environmental Evaluation in support of a proposed electrical transmission project from Castle Rock Ridge substation to Chapel Rock in southwestern Alberta. Nick provided senior technical direction and co-authored the vegetation and wetland assessment section for the project, identifying potential effects and advising on potential mitigation. Duties included assessment guidance to other team members; data, mapping and report review and QA/QC; and advising on wetland avoidance and mitigation as required.

Western Alberta Transmission Line (WATL) Project, Post-construction Wetland Impact Assessment | Calgary / Edmonton, Alberta | 2014 | Wetland Specialist

Stantec conducted a post-construction wetland impact assessment in support of an electrical transmission project from Genesee to Langdon, Alberta. Nick designed and implemented a post-construction wetland assessment for the project, evaluating pre-construction predictions and assessing mitigation effectiveness. Information was used to help revise AEP regulatory requirements for electrical transmission lines. Duties included wetland mapping QA/QC, wetland surveys and boundary delineation, assessment of potential effects and team technical direction and oversight.

North Foothills Transmission Project (NFTP) Pre-construction Wetland Assessment | Calgary/High River, Alberta | 2012-2014 | Vegetation Ecologist/Wetland Specialist

Stantec conducted an environmental evaluation and wetland assessment in support of the proposed electrical transmission project from Calgary to High River, Alberta. Nick assisted with wetland assessments for the project, identifying potential effects and advising on mitigation. Duties included wetland mapping, wetland surveys and boundary delineation, and advising on wetland avoidance and mitigation.

South Foothills Transmission Project (SFTP), Pre-construction Wetland Assessment | High River / Pincher Creek, Alberta | 2010-2014 | Wetland Specialist

Stantec conducted an environmental evaluation and wetland assessment in support of the proposed electrical transmission project from High River to Pincher Creek, Alberta. Nick assisted with wetland assessments for the project, identifying potential effects and advising on mitigation. Duties included wetland mapping, wetland surveys and boundary delineation, and advising on wetland avoidance and mitigation.

Western Alberta Transmission Line Project, Pre-construction Wetland Assessment | Calgary / Edmonton, Alberta | 2011-2012 | Wetland Specialist

Stantec conducted an Environmental Evaluation and Wetland Assessment in support of the proposed electrical transmission project from Genesee to Langdon, Alberta. Nick conducted a wetland assessment for the project, identifying potential effects and advising on mitigation and the need for Water Act applications. Duties included wetland mapping QA/QC, wetland surveys and boundary delineation, advising on wetland avoidance and mitigation, and assessment of potential effects and preparing Water Act applications as required.

RAILROADS

CN Rail, Calgary Logistics Park Environmental Impact Assessment, Wetland Compensation Plan and Post-Construction Monitoring | Conrich, Alberta | 2009-2020 | Vegetation Ecologist/Wetland Specialist

Stantec conducted a vegetation and wetland assessment and prepared a wetland compensation plan for a proposed CEAA regulated railway logistics yard near Calgary, Alberta. Nick led the vegetation and wetlands assessment including survey planning, data QA/QC, and assessment of potential project effects. Nick also provided guidance on provincial and federal wetland regulations and assisted with the development of an on-site wetland compensation plan. Nick has been supervising wetland compensation monitoring since completion of construction and providing recommendations for weed management.

Shell Canada, Scotford Rail Terminal Wetland Assessment | Fort Saskatchewan, Alberta | 2015 | Wetland Specialist

Stantec conducted a wetland assessment in support of a planned rail terminal for the Shell Scotford Refinery. Nick reviewed site conditions and provided regulatory guidance on Alberta Water Act needs. Duties included wetland survey, client and regulator

meetings and assessment of wetland presence and extent.

Kinder Morgan, Rail Terminal Wetland Impact Assessment | Edmonton, Alberta | 2011-2013 | Vegetation Ecologist/Wetland Specialist

Stantec conducted a vegetation and wetland assessment in support of a wetland assessment and Alberta Water Act and Public Lands Act applications for a proposed rail terminal in Edmonton, Alberta. Nick directed wetland mapping and effects assessment. Duties included wetland mapping, wetland and rare plant surveys and wetland boundary delineation, advising on wetland avoidance and mitigation, assessment of potential effects and preparing Water Act applications as required.

ROADS AND HIGHWAYS

Township Road 560 and Rand Road 213 Improvements, Wetland Impact Assessment and Water Act Application | Strathcona County, Alberta | 2016 | Vegetation Ecologist/Wetland Specialist

Stantec conducted a wetland assessment in support of planned road improvements in Strathcona County. Work included pre-construction wetland identification, development of potential mitigation measures and assistance with Water Act compliance and approval. Nick provided senior technical guidance and quality review.

Township Road 522 Improvements, Wetland Impact Assessment and Water Act Application | County of Vermillion River, Alberta | 2016 | Vegetation Ecologist/Wetland Specialist

Stantec conducted a wetland assessment in support of planned road improvements in the County of Vermillion River. Work included pre-construction wetland identification, development of potential mitigation measures and assistance with Water Act compliance and approval. Nick provided senior technical guidance and quality review.

Ewing Road Connector, Wetland Impact Assessment and Water Act Application | Starland County, Alberta | 2014 | Vegetation Ecologist/Wetland Specialist

Stantec conducted a wetland assessment in support of planned road improvements in Starland County. Work included pre-construction wetland identification, development of potential mitigation measures and assistance with Water Act compliance and approval. Nick provided senior technical guidance and quality review.

Boychuk Drive and Highway 16 Interchange Project, Environmental Self-Assessment | Saskatoon, Saskatchewan | 2016 | Vegetation Ecologist/Wetland Specialist

Stantec conducted a vegetation and wetland assessment in support of an environmental self-assessment for a proposed interchange upgrade in southeast Saskatoon, Saskatchewan. Existing vegetation and wetland conditions, including rare species and sensitive communities, were determined, potential harmful effects from the project identified and mitigation measures recommended. Nick provided technical direction and senior review.

WETLAND CLASSIFICATION

Alberta Wetland Classification System | Alberta | 2014 | Wetland Specialist

Stantec assisted with revisions to the Alberta Wetland Classification System used for Water Act applications in Alberta. Nick managed the project and assisted with classification system revisions.

PRESENTATIONS

Wetland Regulatory Triggers. *Alberta Society of Professional Biologists - Annual Wetland Workshop*, 2018.

Reid A. Person M.Eng., B.A.Sc., P.Eng.

Technical Leader for Atmospheric Sciences – Canada, Principal

Reid is a senior air quality engineer, project manager and is a technical leader for Atmospheric Sciences in Canada at Stantec with 20 years of consulting experience. His primary area of technical focus has been on emissions inventories, greenhouse gas emissions, air quality modelling and assessment. He has extensive experience with assessing the effects of air emissions from a wide range of industries including infrastructure, oil and gas, petrochemical, mining, power generation, pipeline utilities, and forest products.

Reid's technical, project management and discipline leadership experience includes developing and advising on assessment methodology, leading multi-disciplinary teams, client liaison, internal and external training, technical analysis, report writing, regulatory advice and providing expert witness testimony regulatory hearings. Reid is responsible for senior review of project work, development of standard operating procedures, training staff, technical quality, and project delivery.

EDUCATION

Master of Engineering, Environmental Engineering, University of Calgary, Calgary, Alberta, 2007

Bachelor of Applied Science, Environmental Systems Engineering, University of Regina, Regina, Saskatchewan, 2000

CALPUFF 3 Day Training Course, San Diego, CA, 2001

CALPUFF 5 Day Introductory and Advanced Training Course, Edmonton, Alberta, 2008

REGISTRATIONS

Professional Engineer, Association of Professional Engineers and Geoscientists of Alberta

Professional Engineer, Association of Professional Engineers and Geoscientists of Saskatchewan

MEMBERSHIPS

Member, Air & Waste Management Association (Canadian Prairie and Northern Section)

Expert Testimony / Witness

Teck Frontier Joint Review Panel Hearing (Expert Witness), 2018

Shell Waterton 68 ERCB Hearing (Expert Witness), 2013

ENMAX Shepard Energy Centre AUC Hearing (Technical Support), 2010

Total E&P Canada and PetroCanada Upgrader Hearings (Technical Support), 2008-2010

PROJECT EXPERIENCE

Infrastructure

Alberta Transportation Springbank Dam (SR1) Project, Air Quality Assessment, Alberta (Discipline Lead), 2018 – current

Stantec was retained to complete a comprehensive air quality assessment in support of the Environmental Impact Assessment for the SR1 Project. Stantec designed and implemented a baseline air quality and meteorological monitoring program, prepared a detailed emission inventory focusing on emissions from regional vehicle traffic (MOVES) and construction specific vehicle and fugitive dust emissions, applied the CALPUFF dispersion model to predict changes in air quality associated with fugitive dust and combustion emissions, supported a detailed human health risk assessment and prepared a comprehensive air quality assessment report. Work continues throughout the regulatory process responding to supplemental information requests from provincial and federal regulators and preparing for a regulatory hearing.

** denotes projects completed with other firms*

Reid A. Person M.Eng., B.A.Sc., P.Eng.

Technical Leader for Atmospheric Sciences – Canada, Principal

Manitoba Infrastructure Lake Manitoba and Lake St. Martin Outlet Channels Project, Air Quality Assessment, Manitoba (Discipline Lead), 2018 – current
Stantec was retained to complete an air quality, light and noise assessment in support of the Environmental Impact Statement. Stantec summarized baseline air quality and meteorological information, developed project and regional emission inventories, estimated air quality, noise and light impacts associated with the Project. Work continues throughout the regulatory process responding to supplemental information requests from provincial and federal regulators and preparing for a regulatory hearing.

Oil & Gas Midstream - Terminals
Nexen Aurora LNG Project, Environmental Assessment, Prince Rupert, British Columbia (Discipline Lead), 2016-2017
Lead air quality assessment of the Aurora LNG export facility including emission calculations, dispersion modeling, effects assessment, reporting, information responses and public presentations. This included a detailed examination of the existing environment (emissions and air quality) plus an analysis of environmental effects of the LNG Terminal.

LNG Canada Project, Environmental Assessment, Kitimat, British Columbia (Technical Advisor, Quality Reviewer), 2014-current
Technical reviewer and quality reviewer associated with emission inventory development, CALPUFF dispersion modelling, EA reporting, post-application dispersion modelling to support design, and health risk assessment associated with the worker accommodation camp (WAC). These tasks included a detailed estimate of project emissions, meteorological modelling and dispersion modelling associated with multiple phases of the proposed LNG Terminal.

Douglas Channel LNG, Environmental Assessment, Kitimat, British Columbia (Senior Technical Advisor, Senior Review), 2012
Provide senior direction on emission calculations and dispersion modeling methodology. Completed senior review of all calculations, modeling and senior review of the air quality component of the environment assessment report. The study included an examination of the existing environment (emissions and air quality) plus an analysis of environmental effects of the proposed LNG Terminal.

Oil & Gas Downstream - Refineries
Federated Co-operators Limited Regina Refinery (Discipline Lead, Quality Review), 2019.
Stantec was retained to complete dispersion modelling for in support of development of an Environmental Protection Plan for the Co-operators Regina Refinery Complex. Stantec developed a comprehensive emission inventory of CAC, VOC, PAH and RS emissions and completed dispersion modelling using the CALPUFF model, and prepared an air quality assessment report.

Husky Energy Lloydminster Asphalt Refinery (Senior Review, Quality Reviewer), 2015 to 2017.
Stantec was retained to complete dispersion modelling for in support of an EPEA renewal application as well as in support of an application to amend the facility EPEA approval. Stantec completed dispersion modelling using the AERMOD and AERFlare models and prepared air quality assessment reports in support of both regulatory applications.

Oil Sands Upgraders
Value Creations Heartland Upgrader, Air Quality Assessment, Fort Saskatchewan (Discipline Lead, Quality Review), 2015

** denotes projects completed with other firms*

Reid A. Person M.Eng., B.A.Sc., P.Eng.

Technical Leader for Atmospheric Sciences – Canada, Principal

Stantec was retained to complete an air quality assessment associated with a proposed amendment to the VCI Heartland Upgrader. The project included updating the facility emission inventory, meteorological and dispersion modelling with CALPUFF, and preparing a detailed air quality assessment report.

Oil Sands Mining

Air Quality and Greenhouse Gas Assessments for Mining Projects (EIAs): Synenco Energy Northern Lights Mine, Petro-Canada Fort Hills Mine Expansion, Teck Resources Frontier Project Mine, Regulatory/Hearing Support for the Total Joslyn Mine, Alberta (Discipline Lead, Quality Reviewer)
Air quality impact assessments of multiple oil sands mine and extraction Projects in Alberta. Work included an emission inventory including combustion and fugitive emissions, meteorological and CALPUFF dispersion modelling, working collaboratively with the human and ecosystem risk assessment team, preparing reports, and QAQC of work. Greenhouse gas emissions were estimated and assessed by comparing to provincial and federal inventories and by comparing GHG emission intensity to other similar oil sands projects.

Frontier Oil Sands Mine Project Energy Mapping Study (GHG Emissions, Report Reviewer), 2018
Stantec Consulting Ltd. (Stantec) was retained by Teck Resources Limited (Teck) to examine energy consumption at the Project located 110 km north of Fort McMurray, Alberta. The energy mapping study focuses on energy use in the context of GHG emissions and contrasts the 2011 Integrated Application with the 2015 Project Update. Possible opportunities to reduce energy consumption during future stages engineering are also identified.

Oil Sands In-Situ

Air Quality and Greenhouse Gas Assessments for SAGD Projects (EIAs): Suncor Meadow Creek East and West Projects, Cenovus Foster Creek and Christina Lake Expansions, Suncor MacKay River Expansion, Devon Jackfish Expansion, JACOS Expansion, OSUM Taiga, Alberta (Discipline Lead)
Air quality impact assessments of new or expansions of in-situ SAGD oil sands facilities in Alberta. Work included an emission inventory focused on the combustion and VOC emissions, meteorological and dispersion modelling, and providing air quality data to be used in the human and ecosystem risk assessments, preparing reports, and QAQC of work. Greenhouse gas emissions were estimated and assessed by comparing to provincial and federal inventories and by comparing GHG emission intensity to other oil sands projects.

Oil and Gas Pipelines

Enbridge Northern Gateway Project, Environmental Assessment, Calgary, Alberta (Emission Calculations, Modeling, Analysis), 2007-2012
Oversaw technical completion of the air quality and climate portions of the environmental assessment for the Enbridge Northern Gateway Project with a focus on establishing methodology, directing completion of emission calculation and dispersion modeling related tasks, and senior review of emission calculations, dispersion modeling and analysis.

** denotes projects completed with other firms*

Reid A. Person M.Eng., B.A.Sc., P.Eng.

Technical Leader for Atmospheric Sciences – Canada, Principal

Midstream Facilities

Pembina Pipeline Redwater Fractionation and Storage Facility Projects, Ft. Saskatchewan, Alberta (2012 to 2017)

Stantec was retained to provide air quality support for multiple regulatory applications associated with adding tanks, rail and truck loading facilities, debottlenecking changes, the RFS 2 expansion, RFS 3 expansion, a cogen expansion and an assessment in support of an application to renew facility EPEA approval. Stantec prepared emission inventories for each expansion as well as for other facilities in the Fort Saskatchewan region, completed dispersion modelling using the AERMOD and CALPUFF models and prepared air quality assessment reports.

Conventional Oil & Gas Facilities

Shell Foothills Region Vapour Tank Flaring Dispersion Modelling Assessment (Project Manager and Technical Lead), 2012

Evaluation and development of flare management plans at Shell's 297 existing well sites located in seven management zones within the Foothills region. The assessment focused on dispersion modeling and developing flare management plans associated with flaring the vapors that evolve from the produced fluids.

Air Quality Assessment of the Ignited Blowout of the ConocoPhillips Chetwynd and Hythe Well Fires (Project Manager), 2008-2010

Quantification of emissions and completion of CALPUFF dispersion modeling for the uncontrolled ignited release and for flaring during each event. Post-event dispersion modeling to support human health risk assessment.

Chemical Facilities

Inter Pipeline Ltd. Polypropylene Manufacturing Project, Ft. Saskatchewan, Alberta (Discipline Lead, Senior Reviewer), 2018

Stantec was retained to complete an air quality assessment in support of regulatory applications to amend the Propane Dehydrogenation Plant EPEA approval to add a polypropylene manufacturing plant. Work included an emission inventory, meteorological and dispersion modelling, and a report.

Combined Heat and Power

Inter Pipeline Central Utilities Block Project (Discipline Lead), 2018

Completed an emission inventory, meteorological and dispersion modelling using the CALMET and CALPUFF models in support of FEED, detailed design and regulatory applications to Alberta Environment and Parks and the Alberta Utilities Commission for 102 MW gas turbined cogeneration plant associated with the IPL Heartland Petrochemical Project.

City of Calgary Bonnybrook WWTP Cogeneration Project, Air Quality Assessment, Alberta (Discipline Lead), 2016-2017

Completed an air quality assessment of the proposed installation of a new gas fired turbine and waste heat recovery system at the City of Calgary Bonnybrook WWTP to burn digester gas. Work included an emission inventory, meteorological and dispersion modelling, and preparing a report for submission to Alberta Environment and Parks and the Alberta Utility Commission.

** denotes projects completed with other firms*

Reid A. Person M.Eng., B.A.Sc., P.Eng.

Technical Leader for Atmospheric Sciences – Canada, Principal

Project Management

Alberta Environment – Uncertainty and Gap Analysis of Area Sources in the Oil Sands Area (Project Manager & Technical Advisor), 2013

Stantec was retained to complete a summary and analysis of existing oil sands fugitive measurements, estimates and calculation methods as well as review of strengths, weaknesses and gaps with existing measurements techniques for fugitive oil sands emission sources.

CEMA - Emission Inventory and CALPUFF Model Protocol Project for the Lower Athabasca Region (Project Manager), 2011-2012

Partnering with ENVIRON, Stantec developed an emission inventory protocol and a model protocol for CEMA that outlines the steps to create an appropriate emission inventory and complete concentration, photochemical and deposition modeling to address the needs of the Acid Deposition Management Framework, Nitrogen Eutrophication Plan and Ozone Management Frameworks for the Lower Athabasca Region. Stantec and ENVIRON recently completed the next phase of this project: development of the actual emission inventory.

Alberta Environment - Preparation of MM5 Meteorological Data, MCIP Output Files and SMOKE Technical Support, Edmonton, Alberta (Project Manager), 2010

Stantec was retained to apply the MM5 meteorological model to generate meteorological data to meet the input requirements of the CMAQ model. Stantec processed the MM5 model output to produce MCIP output files for subsequent SMOKE & CMAQ model runs and provided technical assistance on an as-needed basis to Alberta Environment staff with the preparation of SMOKE input files.

** denotes projects completed with other firms*

PUBLICATIONS

Davies M, Cho S, Spink D, Pauls R, Desilets M, Shen Y, Bajwa K, Person R., An enhanced approach for the use of satellite-derived leaf area index values in dry deposition modeling in the Athabasca oil sands region. Journal of Environmental Management. December 2016.

Davies, M., K. Bajwa, R. Person. 2015. Predicted spatial variations of sulphur and nitrogen compound concentrations and deposition in the AOSR. Chapter 4 in Assessing Forest Health in the Athabasca Oil Sands Region. WBEA Report 2015-05-25, pp 51 to 63.

Vijayaraghavan, K., J. Jung, R. Morris, M.J.E. Davies, R. Person. Impact of Emissions from Oil Sands and Other Sources on Ozone and Acid Deposition in Northeast Alberta. Presented at North American Oil and Gas Conference (October 2014), Calgary, Alberta.

Davies, M.J.E. and R. Person. Air Quality Model Data Needs – A Modeller's Perspective. Presented at the WBEA/TEEM workshop (November 2013), Calgary, Alberta.

Presentation. Davies, M.J.E, and R. Person. Modelling PAH and Metal Deposition in the Oil Sands Region. COSIA meeting: Aerial Deposition and Snowpack Runoff to Streams and Lakes in the Oil Sands Area, Calgary, Alberta, October, 2013.

Davies, M., Person, R., Bajwa, K., Vijayaraghavan, K. A comparison of two independent applications of the CALMET/CALPUFF model system to the Athabasca Oil Sands Area. (April 2012). 2012 CPANS AWMA Spring Conference. Calgary, Alberta, 2012.

Person, R., Davies, M., Shen, Y. A comparison of CALMET and MMIF Meteorological Pre-processors. (April 2012). 2012 CPANS AWMA Spring Conference. Calgary, Alberta, 2012.

Tania Noble M.Eng., P. Eng.

Senior Risk Assessment Specialist

As Stantec's Geographic Technical Lead for Site Assessment, Remediation, and Emergency Response in Canada, Tania is responsible for the technical quality of over 250 environmental site assessors, risk assessors, remediation specialists and support staff, including development of internal standards and tools, and overseeing training programs. Since joining the company in 1997, her professional experience has been primarily in the fields of human health and ecological risk assessment and water resources, with expertise in assessment and management of contaminated sites and multi-media fate and transport modelling. Her experience spans a wide range of contaminants at sites from Newfoundland and Labrador to British Columbia and Northern Canada, as well as the United States. In recent years, Tania has developed particular expertise in the assessment of potential health effects associated with air emissions and releases from planned projects as part of various provincial and federal environmental assessment regulations. She has led, and continues to lead, these complex multidisciplinary environmental health assessments and facilitate community consultation and risk communication through open houses, workshops, and formal public meetings.

EDUCATION

B.Sc.E., Engineering, University of New Brunswick, Fredericton, New Brunswick, Canada, 1994

M.Eng., Engineering, University of New Brunswick, Fredericton, New Brunswick, Canada, 2004

Mid-America Toxicology Course, Kansas City,Missouri, Dr. Curtis Klaassen, 2010

Health Impact Assessment, step by step (online course), National Collaborating Centre of Health Public Policy, 2020

MEMBERSHIPS

Member, Engineers & Geoscientists New Brunswick

PROJECT EXPERIENCE

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT FOR ENVIRONMENTAL IMPACT ASSESSMENT

Alberta Transportation Springbank Dam (SR1) Project, Human Health Risk Assessment, Alberta | Discipline Lead | 2014 – current

Ms. Noble is the discipline lead for the assessment of potential health effects the SR1 Project, an off-stream reservoir to provide flood protection. The assessment evaluated the potential effects of changes in air quality, water quality, and country foods on human health. Ms. Noble provided detailed oversight of the human health risk assessment and incorporated the findings in the Public Health assessment. Work continues throughout the regulatory process.

Lake Manitoba and Lake St. Martin Outlet Channels Project | Manitoba Infrastructure | Winnipeg, Manitoba, Canada | Quality Reviewer | 2019- Present

Stantec conducted a CEAA regulated environmental impact statement (EIS) of a proposed permanent flood control management system for the Lake Manitoba and Lake St. Martin region of Manitoba. Ms. Noble provided senior technical support and quality review of the health chapter.

Human Health Risk Assessment, CN Milton Logistics Hub, Canadian National Railway Company | 2018-2019 | Senior Risk Assessor

Stantec Consulting Ltd. (Stantec) was retained by the Canadian National Railway Company (CN) to conduct Human Health Risk Assessment (HHRA) for the proposed Milton Logistics Hub (the Project) within the Town of Milton in the Regional Municipality of Halton, Ontario. The scope of the HHRA included the assessment of potential health risks from inhalation of chemicals of potential concern released during the construction and operation phases of the Project. Ms. Noble provided senior technical support, including attendance at the regulatory hearing.

Enbridge Line 3 Replacement Project | 2016-2017 | Senior Risk Assessor

Stantec, in collaboration with RPS-ASA, conducted an assessment of expected environmental effects from hypothetical oil releases at seven sites in Minnesota. These sites were selected as representative of most of the predominant ecological units, major hydrological features, watercourse widths, and watercourse features along the preferred and alternative routes. The assessment of each site included a description of the environmental setting at and downstream of the hypothetical release location, and a detailed discussion of the expected environmental effects of an oil release on the physical, biological and human environments; namely: terrestrial receptors (i.e., soil, groundwater, terrestrial, vegetation); aquatic receptors (i.e., rivers, lakes, sediment, shorelines and riparian areas, wetlands, aquatic plants, benthic invertebrates, fish); semi-aquatic wildlife receptors (i.e., amphibians and reptiles, birds, semi-aquatic mammals); and human and socio-economic receptors (i.e., air quality, human receptors, public use of natural resources). Tania co-authored a paper describing the novel approach her team used in the assessment and presented the findings at AMOP in October 2018

Human Health and Ecological Risk Assessment Supporting an Environmental Assessment for LNG Canada's Facility in Kitimat, British Columbia | 2014-2019 | Quality Reviewer

Quality reviewer of the human health risk assessment component of the environmental assessment for permitting a liquefied natural gas facility and port in Kitimat British Columbia. The work included completion of baseline and post-closure assessments of potential human health effects for local residents and First Nations communities and worker accommodation camp.

Energy East Pipeline Project: Ecological and Human Health Risk Assessment for Marine Crude Oil Spills in the Bay of Fundy | Energy East Pipeline Ltd., TransCanada Inc. | Saint John, New Brunswick | 2014-2016 | Discipline Lead

As part of the environmental assessment for the Energy East Pipeline Project, Tania was the discipline lead and senior human health risk assessor for the ecological and human health risk assessment (EHHRA) for hypothetical crude oil spills related to marine shipping in the Bay of Fundy. The assessment relied on stochastic and deterministic oil spill modeling results for three types of crude oil: a light Bakken type, a medium synthetic crude, and a heavy diluted bitumen crude. The stochastic EHHRA used an Area Risk Assessment approach, compiling the results of approximately 10,000 individual model simulations at over 30 potential spill locations.

The findings of the stochastic EHHRA were used to inform the selection of spill locations for the deterministic assessment, which evaluated the environmental effects of three hypothetical credible worst case crude oil spill scenarios, ranging in volume from 67,000 barrels to 78,000 barrels. As a result of high resolution afforded by the detailed fate and transport modeling, detailed risk characterization was conducted, including an assessment of potential health risks associated with short-term inhalation of vapours, direct contact with sediment, and ingestion of marine foods.

Sisson Project Human Health and Ecological Risk Assessment | Sisson Project Limited Partnership | Napadogan, New Brunswick | 2010-2014 | Discipline Lead – Human Health Risk Assessment

Ms. Noble was the discipline lead for a human health risk assessment to evaluate potential risks to human receptors at baseline, during peak mining operations, and during post-closure, for the proposed Sisson Mine (molybdenum/tungsten) project. The risk assessment included spatially explicit regional baseline sampling of soil, soil invertebrates, vegetation and small mammals. When combined with baseline data for water, sediment and fish, and meteorological data forecasting dustfall from mine operations, supported a spatially-explicit landscape-scale risk assessment for the proposed mine.

Human Health and Ecological Risk Assessment, Quintette Restart Project | TECK | Tumbler Ridge, British Columbia | 2011-2014 | Senior Risk Assessor

Ms. Noble was the senior human health risk assessor for the assessment of the potential health effects associated with a coal mine. The assessment is being completed as part of an environmental review under Mines Act Permit Amendment Application. Consideration of potential health effects to human and ecological receptors was identified as a key issue due to the importance of the area for First Nations, subsistence, and recreational land use, as well as for wildlife habitat.

Human Health and Ecological Risk Assessment, Proposed Steam Assisted Gravity Drainage (SAGD) Expansion Project | Alberta | 2009-2011 Discipline Lead

Ms. Noble was the discipline lead for the assessment of the potential effects expanding an existing SAGD facility by up to 35,000 bbl per day of bitumen on human and ecological health. Facilities associated with the project include new well pads, seven steam boilers, two medium heaters, electrical generators, storage tanks, a high pressure flare, and a low pressure flare. As the discipline lead and senior reviewer, Ms. Noble prepared the initial scoping document to address the terms of reference, and provided detailed oversight of the human health and ecological risk assessment. Unique features of the assessment included consultation with representatives of local First Nations, a baseline sampling program of traditional foods, and the incorporation of a human receptor that would rely exclusively on fruit, produce, and wild game from the local study area for all dietary needs.

Human Health and Ecological Risk Assessment, Milner Expansion Project | Alberta | 2008-2010 | Senior Reviewer

Ms. Noble was the senior reviewer for the HHERA completed to assess the potential health effects of air emissions from a proposed 500 MW coal-fired power plant. The assessment was being completed as part of a provincial Environmental Impact Assessment (EIA) and a federal Environmental Assessment (EA), and included an assessment of the potential health risks to First Nations receptors in the area, including potential health risks associated with inhalation exposures.

Human and Ecological Risk Assessment in support of the Environmental Assessment for Ajurak Exploration Drilling Program | Imperial Oil Resources Ventures Limited | 2009-2010 | Senior Reviewer

Senior reviewer for the human and ecological risk assessment to be submitted to the National Energy Board in support of the Ajurak Exploration Drilling Program that is subject to an environmental review under the Western Arctic (Inuvialuit) Land Claims Settlement Act Bill C-49, 1983-84 and the Canadian Environmental Assessment Act (CEA Act).

Project Eider Rock: Public Health Assessment, Proposed Petroleum Refinery and Marine Terminal | Irving Oil Limited | Saint John, New Brunswick | 2007-2009 | Discipline Lead

Ms. Noble was the discipline lead for the assessment of the potential effects of a proposed 250,000 bbl per day petroleum refinery and marine terminal in Saint John, NB on Public Health. In response to identified concerns, technical studies completed as part of the assessment included a detailed baseline environmental sampling program, a baseline health status report, a human health and ecological risk assessment (HHERA) and marine ecological risk assessment. As the discipline lead, Ms. Noble was responsible for coordinating the efforts of the team of epidemiologists, toxicologists, biologists, engineers, and geoscientists. Ms. Noble designed the baseline sampling program and provided detailed oversight of the HHERA. Ms. Noble incorporated the findings of the environmental baseline sampling, HHERA and baseline health status report in the Public Health assessment and presented the findings to the public following acceptance of the EIA report by the provincial Technical Review Committee.

Human Health and Ecological Risk Assessment, Proposed Municipal Waste Thermal Treatment Plant (Energy from Waste) | Durham-York Region, Ontario | 2008-2009 | Senior Technical Support

Ms. Noble provided senior technical support for the human health and ecological risk assessment for a proposed EFW facility for the Durham-York Region. Her specific contributions included senior guidance on the baseline sampling program, evaluation of potential human exposure scenarios, and guidance on the fate and transport modeling being undertaken to evaluate concentrations of chemicals in various environmental media. The purpose of the assessment was to understand potential risk to the environment to ensure appropriate mitigation (where warranted) and monitoring programs are in place.

Risk Assessment Training, Environmental Management Authority (EMA) | Port of Spain, Trinidad and Tobago | 2008 | Technical Lead

Ms. Noble delivered training on the practice of human health risk assessment for proposed projects under environmental impact legislation to officers of the Environmental Management Authority of Trinidad and Tobago, who are responsible for scoping and reviewing environmental assessment submissions. As part of her contract, Ms. Noble also led group discussions with the officers and assisted them in the development of internal guidance documents for identification, scoping, and review of human health risk assessments.

Human Health Risk Assessment for New Ajax Mine BC | Kamloops, British Columbia | 2015-2016 | Senior Review

Senior reviewer of the human health risk assessment component of the environmental assessment for permitting an open pit gold mine in northern British Columbia. The risk assessment includes completion of baseline and post-closure assessments of potential human health effects for local residents and First Nations communities.

Human Health Risk Assessment for a Proposed Thermal Oxidizer Facility, Belledune, New Brunswick | 2003 | Risk Assessor

Ms. Noble was the risk assessor for a human health risk assessment to predict the potential risk to residents of Belledune, NB from stack emissions associated with a proposed thermal oxidizer soil treatment facility. Twenty-six contaminants of potential concern were identified and carried through a comprehensive human health risk assessment, which included the assessment of acute and chronic exposures to concentrations of chemicals in air, as well as fate and transport modeling of chemical depositions from air to other environmental media. The human health risk assessment was a requirement identified in the Minister's Determination.

Golder Associates Ltd. – Calgary

Education

Project Management Extension Certificate, Mount Royal University, Calgary, Alberta, 2011

M. Eng. Environmental Engineering, University of Guelph, Guelph, Ontario, 1998

B. Sc. Environmental Engineering, University of Guelph, Guelph, Ontario, 1996

Principal, Senior Regulatory & Impact Assessment Specialist

Wayne is a Project Director at Golder and an environmental engineer with 22 years' environmental consulting experience. He is a registered professional engineer in Alberta and a certified Project Management Professional.

Wayne is responsible for directing EIAs and regulatory permitting projects with a focus on infrastructure and energy projects in Alberta. In this role, Wayne is responsible for strategic direction and management for environmental and regulatory issues for projects, and leading technical consultation discussions with regulators, Indigenous communities and other stakeholders. He has led or participated in over 30 Federal and/or Provincial environmental assessments in Canada.

Wayne is currently the Regulatory Lead for the Alberta Transportation Springbank Off-Stream Reservoir Project, a flood management project proceeding through both Federal and Provincial impact assessments. He was the EIA technical director for the Teck Frontier Oil Sands Mine Project and the Shell Jackpine Mine Expansion & Pierre River Mine Projects. He was the air quality component lead for the EIAs supporting the Albian Sands Muskeg River Mine Expansion Project, the Suncor Voyageur Project, the Shell Jackpine Mine - Phase 1 Project and the Suncor South Tailings Pond Project. Wayne has also managed and provided technical and strategic support on numerous other regulatory approval applications for developers in the Oil Sands Region.

Wayne was the lead environmental witness for the Teck Frontier Oil Sands Mine Project Joint Review Panel hearing and the Shell Jackpine Mine Expansion Joint Review Panel hearing. He also provided expert testimony for the Suncor Voyageur Project EUB hearing and the Albian Sands Muskeg River Mine Expansion Joint Review Panel hearing. He supported the project applications through regulatory hearings for the Shell Jackpine Mine - Phase 1 Project, the DeBeers Snap Lake Diamond Project and the Leigh-Inland Cement Fuel Conversion Project.

Wayne started his career in air quality assessment specializing in air compliance, EIAs, air emissions inventories, and air dispersion modelling.

Employment History

Golder Associates – Calgary, Alberta
Principal, Project Director (2010 to Present)

Associate, Project Manager (2006 to 2009)
Air Quality Engineer (2001 to 2005)
Currently Project Director for energy projects. Responsibilities include leading multi-disciplinary teams for environmental impact assessments and permitting projects for the energy industry including strategic direction on environmental and regulatory issues, leading technical consultation discussions with regulators, Indigenous communities and other stakeholders, communication between Golder and the client, and senior review of deliverables.

Golder Associates – Mississauga, Ontario
Environmental Engineer (1999 to 2001)

Project Engineer on air compliance and environmental impact assessment projects. Involved in air emissions inventories, air pollution characterization and control, dust impact studies, odour impact studies, noise impact studies, air dispersion modelling, indoor air quality assessments, preparation of source testing pre-test plans and industrial hygiene studies.

University of Guelph – Guelph, Ontario
Master of Engineering Candidate and Teaching Assistant, School of Engineering (1996 to 1998)

Master of Engineering degree project consisted of developing systems for increasing efficiency and productivity of Gaussian air dispersion models.

F. H. Theakston Environmental Ltd. – Fergus, Ontario
Engineer-in-Training (1995 to 1996)

Assisted in air dispersion studies using scale models in a water flume. Modelled physical effects of wind and snow on proposed building construction and dust concentrations for regulatory compliance (Ontario Regulation 346), computer modelling and report preparation.

PROJECT EXPERIENCE

Springbank Off-Stream Reservoir Project Calgary, Alberta, Canada	Regulatory Lead for the Springbank Off-Stream Reservoir Project beginning in 2019. Responsibilities include planning and implementation of processes to obtain regulatory approvals for the project, lead contact with Federal and Provincial regulatory authorities, strategic advice and technical review on regulatory filings, strategic advice for Indigenous consultation and stakeholder engagement.
Teck Resources Frontier Oil Sands Mine Project Fort McMurray, Alberta, Canada	Golder was responsible for the technical leadership and project management of the regulatory process for the Frontier Oil Sands Mine Environmental Impact Assessment (EIA). Responsibilities included EIA technical director, project direction, strategic advice, Federal and Provincial regulatory liaison, report preparation, assistance on supplemental responses to review agencies and stakeholders and lead witness for the Joint Review Panel Hearing representing environmental aspects of the project.
Canadian Natural Horizon North Pit Extension Fort McMurray, Alberta, Canada	Golder is responsible for the technical leadership of the regulatory process for the Horizon North Pit Extension Environmental Impact Assessment (EIA). Responsibilities include EIA technical director, project director, strategic advice, regulatory liaison, report preparation, assistance on supplemental responses to review agencies and stakeholders.
Shell Canada Limited Muskeg River Mine Project Fort McMurray, Alberta, Canada	Golder was responsible for supporting the preparation of the EPEA Renewal Application for the Muskeg River Mine. Responsibilities included senior review and strategic advice for the EPEA Renewal Application and provincial supplemental information requests (SIRs) and the statements of concern (SOCs) from regional stakeholders and direction on the environmental summary and air quality assessment.
Imperial Oil Resources Ventures Limited, Kearl Oil Sands Project Fort McMurray, Alberta, Canada	Golder provided regulatory permitting strategic support for the preparation of the EPEA Renewal Application for the Kearl Oil Sands Project. Responsibilities included providing a regulatory road map and strategic advice for the EPEA Renewal Application.
Canadian Natural Horizon Mine Fort McMurray, Alberta, Canada	Golder was responsible for the preparation of the EPEA Renewal Application for the Canadian Natural Horizon Oil Sands Mine. Responsibilities included senior review and strategic advice for the EPEA Renewal Application, provincial SIRs and the statements of concern (SOCs) from regional stakeholders.
Shell Canada Limited, Jackpine Mine Expansion & Pierre River Mine Project Fort McMurray, Alberta, Canada	Golder was responsible for the preparation of the Environmental Impact Assessment (EIA) for the Jackpine Mine Expansion & Pierre River Mine Project EIA. Project manager for the EIA and later transitioned into the project director role. Responsibilities included project direction, strategic advice, regulatory liaison, regulatory application preparation support, technical support, report preparation, assistance on supplemental responses to review agencies and providing expert testimony at the Joint Panel hearing.

Canadian Natural Resources Limited, Kirby Expansion Project Conklin, Alberta, Canada	Golder led the multi-disciplinary team supporting the Kirby In Situ Oil Sands Expansion Project EIA. Responsibilities included strategic support, review of EIA methodology and regulatory applications, and senior review of EIA documentation.
Total E&P Canada, Joslyn North Mine Fort McMurray, Alberta, Canada	Golder participated in the multi-disciplinary team supporting the application and regulatory hearing for the Joslyn North Mine. Participation included supporting the project director in EIA strategy discussions, senior review of EIA sections, and provincial and federal information response strategy discussions. Also supported the project management team during Joint Panel hearing preparation.
Shell Canada Limited, AOSP Environmental Baseline Study Fort McMurray, Alberta, Canada	Member of the multi-disciplinary team for one of the largest environmental baseline study undertaken by the Golder Calgary office. Responsibilities included senior direction on air quality and noise monitoring discussions, review of baseline reports for air quality, noise and aquatic resources.
Shell Canada Limited, Sharkbite Dewatering Program Fort McMurray, Alberta, Canada	Golder prepared regulatory documents to dewater the Shell Sharkbite area in the Muskeg River mine Expansion area for mining activities. Responsibilities included strategic support on regulatory application process, senior review of deliverables and client liaison.
Shell Canada Limited, Khahago Creek Engineering Design Fort McMurray, Alberta, Canada	Golder prepared Preliminary and Detailed Engineering including field investigations of a diversion channel for several creeks around an oil sands mine. Responsibilities included strategic support on environmental and regulatory discussions, senior review of deliverables and client liaison.
Shell Canada Limited Muskeg River Mine Expansion Project Fort McMurray, Alberta, Canada	Golder prepared the EIA for the Muskeg River Mine Expansion Project. Responsibilities included air quality component management, regulatory liaison, regulatory application preparation support, technical support, report preparation, assistance on supplemental responses to review agencies and providing expert testimony at the Joint Panel hearing.
Suncor Energy Inc., Oil Sands Voyageur Project Fort McMurray, Alberta, Canada	Golder was retained by Suncor Energy Inc. to aid in the preparation of the environmental impact assessment for the Voyageur Project EIA, which included the North Steepbank Expansion and the Voyager Upgrader. Responsibilities included air quality component management, regulatory liaison, regulatory application preparation support, technical support, report preparation, assistance on supplemental responses to review agencies and providing expert testimony at the EUB hearing.
Suncor Energy Inc., Firebag Project Expansion Work Fort McMurray, Alberta, Canada	Golder was retained by Suncor Energy Inc. to provide environmental services to obtain regulatory approvals for the on-going expansion of the Firebag In-Situ Oil Sands Project. Responsibilities include project management, regulatory application preparation support and review of air quality work.

Canadian Natural Resources Limited, Primrose East Expansion Project Cold Lake, Alberta, Canada	Golder was retained Canadian Natural to aid in the preparation of the environmental impact assessment for the Primrose East Expansion Project EIA. Responsibilities included senior strategic support, regulatory application preparation support and review for air quality component.
Imperial Oil Resources Ventures Limited, Kearl Oil Sands Project – Mine Development Fort McMurray, Alberta, Canada	Golder was retained by Imperial Oil to aid in the preparation of the environmental impact assessment for the Kearl Oil Sands Project. Responsibilities included technical support and report review for the air quality component and participation in regulatory hearing preparation sessions.
Shell Canada Limited, Jackpine Mine – Phase 1 EIA Fort McMurray, Alberta, Canada	Golder was responsible for the completion of the EIA of the Jackpine Mine - Phase 1 Oil Sands mine for Shell Canada Limited. Responsibilities included air quality component management, regulatory liaison, regulatory application preparation support, technical support, report preparation, assistance on supplemental responses to review agencies and support during Joint Panel hearing.
Suncor Energy Inc., Firebag SAGD Compliance Fort McMurray, Alberta, Canada	Golder provided an ambient air quality monitoring plan for the Firebag Steam Assisted Gravity Drainage (SAGD) Project. The monitoring plan involved evaluating potential sites passive monitoring stations based on maximum ground level concentrations predicted by dispersion modelling. Responsibilities included air quality component management, regulatory application preparation support, technical support and report preparation.
Suncor Energy Inc., Millennium Coker Unit Assessment Fort McMurray, Alberta, Canada	Golder aided in the preparation of the application for construction and operation of the Millennium Coker Unit Project. Responsibilities included air quality component management, technical support, report preparation and assistance on supplemental responses to review agencies.
Suncor Energy Inc., Suncor South Tailings Ponds EIA Fort McMurray, Alberta, Canada	Golder was responsible for the completion of the EIA of the Suncor South Tailings Pond Project for Suncor Energy Inc. Responsibilities included air quality component management, regulatory application preparation support, technical support, report preparation and assistance on supplemental responses to review agencies.
Canadian Natural Resources Limited, Horizon Project Fort McMurray, Alberta, Canada	Golder was responsible for the completion of the EIA for the Canadian Natural Resources Limited (CNRL) Horizon integrated oil sands mine and upgrading project. Responsibilities included technical support, report preparation and assistance on supplemental responses to review agencies related to the air quality assessment.
OPTI Canada/Nexen Canada, Air Quality Modelling Course Calgary, Alberta, Canada	Golder prepared a comprehensive 2-day course designed to introduce the concepts of dispersion modelling and air quality assessment in the Oil Sands Region. The course comprised 8 modules ranging in topic from oil sands history to hands on modelling exercises using SCREEN3 and CALPUFF. Responsibilities included course development and instruction.

Suncor Energy Inc., Firebag In-Situ Project
Fort McMurray, Alberta, Canada

Golder was responsible for the completion of the environmental impact assessment (EIA) and project application for the development of this Steam-Assisted Gravity Drainage (SAGD) project on the northern edge of the Cold Lake Air Weapons Range. Responsibilities included air quality component management, regulatory liaison, technical support and report preparation and assistance on supplemental responses to review agencies.

Petro-Canada Oil and Gas, Meadow Creek Project EIA
Fort McMurray, Alberta, Canada

Golder was responsible for the completion of the environmental impact assessment (EIA) and application to develop a Steam-Assisted Gravity Drainage (SAGD) project in the Athabasca Oil Sands Region. Responsibilities included technical support, report preparation and assistance on supplemental responses to review agencies for the air quality assessment.

Rio Alto Exploration Ltd., Kirby Project Compliance Monitoring
Cold Lake, Alberta, Canada

A review of compliance monitoring results was completed to assess whether steam generator emissions complied with approval emissions limits. Graphical comparisons of NOX emissions, power output and emission limits were provided. Responsibilities included technical support.

OPTI Canada Inc./Nexen Canada, Long Lake Project EIA and Project Update
Fort McMurray, Alberta, Canada

Golder was responsible for the preparation of the environmental impact assessment (EIA) and subsequent project update for the Long Lake Project, which includes an integrated steam assisted gravity drainage (SAGD) facility and upgrading complex. Responsibilities included assistance on the air quality assessment supplemental responses for the original EIA as well as technical support and report preparation on the project update.

Suncor Energy Inc., Firebag In-Situ Project
Fort McMurray, Alberta, Canada

Golder was responsible for the completion of the environmental impact assessment (EIA) and application to develop a Steam-Assisted Gravity Drainage (SAGD) project in the Athabasca Oil Sands Region. The Firebag Project EIA represented the first application to use the CALPUFF 3-D dispersion model for simulating concentrations and acid deposition patterns. Responsibilities included development of quality assurance protocols.

NOX-SOX Management Working Group
Northeastern Alberta, Canada

Golder retained as part of an ongoing series of projects for the NOX-SOX Management Working Group (NSMWG) of the Cumulative Effects Environmental Management Association (CEMA) reviewing possible air quality options for the Athabasca Oil Sands Region. Responsibilities included emission profile development support and report preparation.

CEMA/TMAC Fort McKay Estimated Contributions Assessment
Fort McKay, Alberta, Canada

Golder was retained by the Trace Metal and Air Contaminant (TMAC) Working Group of CEMA to perform a review of a previous air dispersion modelling assessment. The review included further assessment of the modelling and monitoring data to estimate contributions to ambient concentrations in the community of Fort McKay. Responsibilities included project management, technical approach development and report preparation.

Confidential Client, Fuel Conversion Project
Confidential

Golder prepared the regulatory road map for a proposed coal-to-gas fuel conversion project for a power plant. Responsibilities included preparing the regulatory road map and participating in discussions with the regulators regarding the proposed regulatory process.

Husky Canada Ltd. Noise Assessment Southern Saskatchewan, Canada	Golder was retained by Husky Canada Ltd. to perform noise monitoring and prepare a noise assessment for a proposed natural gas compressor located in a farming community in southern Saskatchewan. Field monitoring was conducted, which included frequency analysis and SLM logging. Responsibilities included project management, technical support and report preparation.
TransCanada Energy Saddlebrook Power Station Aldersyde, Alberta, Canada	Participated in the environmental permitting for a 350 MW natural-gas-fired power generating facility near High River Alberta. Senior reviewer for air quality assessment.
TransCanada Turbines Ltd. Facility Expansion and Peaking Plant Calgary, Alberta, Canada	Participated in a multi-disciplinary team to prepare permit applications for the expansion of a turbine testing facility at the Calgary Airport. Senior reviewer for air quality assessment.
Paramount Resources Ltd. Cameron Hills Extension Project Fort Liard, Northwest Territories, Canada	The Cameron Hills project is an oil and gas development that straddles the Alberta/NWT border. Golder Associates was retained to complete the Developer Assessment Report (DAR) for the project. Responsibilities included technical support and report review.
Northwest Territories Power Corporation Air Quality Assessment Various, Northwest Territories, Canada	Golder completed an air quality assessment of 21 power generating stations in the Northwest Territories for NTPC. Responsibilities included project management, technical support and report preparation.
Northwest Territories Power Corporation Stack Height Assessment Deline, Northwest Territories, Canada	Golder conducted a stack height assessment for the Northwest Territories Power Corporation (NTPC) Deline power generating station. Responsibilities included project management, technical support and report preparation.
Upside Engineering Ltd. BP Glen Ewen Gas Plant Glen Ewen, Saskatchewan, Canada	An air quality assessment was completed for the development of a gas plant near Estevan, Saskatchewan. The project included the estimation of facility emissions, development of a meteorological data set, evaluation and selection of dispersion models and refined modelling using CALPUFF (2D). Responsibilities included project management, technical support and report preparation.
Paramount Resources Ltd. Review of the Draft NT Code of Practice Northwest Territories, Canada	Golder was retained by Paramount Resources Ltd. to provide a review of the Draft Air Quality Code of Practice, Upstream Oil and Gas Operations. Additionally, a summary of the review of the draft code of practice was prepared for the Canadian Association of Petroleum Producers (CAPP). Responsibilities included technical review and report preparation.

Ontario Power Generation Comprehensive Certificates of Approval (Air) Preparation
Various Sites, Ontario, Canada

Performed comprehensive emissions inventory and dispersion modelling of various power generation facilities throughout Ontario in support of permits in accordance with requirements of Ontario Ministry of Environment (MOE). Responsibilities included project management, regulatory liaison, calculating emission estimates, performing dispersion modelling and application preparation.

Confidential Client, Coal Mine Project
Confidential

Golder prepared a regulatory overview of the permitting process for coal mines in Western Canada. Responsibilities included input and review on the Alberta regulatory process related to environmental and land use regulations.

Teck Coal Limited, Baldy Ridge Extension
British Columbia, Canada

Golder led a multi-disciplinary team preparing an EIA for a proposed coal mine expansion. Participation included strategic support, review of EIA methodology and senior review of air quality and noise baseline studies and assessment.

Miramar Mining Corporation Doris North Gold Project EIS
Bathurst Inlet, Nunavut, Canada

Golder prepared an air quality and noise assessment for the Miramar Doris North Gold Project located near Bathurst Inlet, Nunavut. Responsibilities included component management, technical support, report preparation, development of supplemental responses to review agencies and hearing preparation.

De Beers Canada Mining Inc. Diamond Mine EIA
Snap Lake, Northwest Territories, Canada

Golder conducted an air quality assessment as part of a comprehensive EIA for a proposed diamond mine northeast of Yellowknife, NWT. Additional support was provided to the client in response to stakeholder's questions and the Mackenzie Valley Environmental Review Board hearing. Responsibilities included regulatory liaison, technical support, report preparation and hearing participation.

Miramar Mining Corporation Ambient Air Quality Monitoring
Bathurst Inlet, Nunavut, Canada

Golder was retained to provide background air quality and meteorological monitoring services in support of Miramar Mining Corporation's permit application process for a gold mine near Cambridge Bay on Victoria Island in Nunavut. A Hi-Volume particulate sampling and meteorological monitoring program was implemented during the summer months. Responsibilities included technical support.

Barrick Gold Corporation
Lima, Peru

Golder conducted an air quality assessment in support of an EIA to estimate the ambient air concentrations of criteria air compounds resulting from the operation of the Alto Chicama Gold Project in Peru. Responsibilities included component management, technical support and report preparation.

Pangea Minerals Tuluwaka Gold Mine
Tanzania

Golder conducted an air quality assessment in support of an EIA to estimate the ambient air concentrations of criteria air compounds resulting from the operation of the Tuluwaka Gold Project in Tanzania, Africa. Responsibilities included component management, technical support and report preparation.

Cogema Resources Inc. Monitoring Data Review and Analysis
Saskatchewan, Canada

Golder was retained to conduct a review and analysis of the ambient air quality data collected near the Cogema McLean uranium mine. Responsibilities included component management, technical support and report preparation.

Calgary-Banff Rail Strategic Impact Assessment Calgary, Alberta, Canada	Golder is preparing a Strategic Impact Assessment and Regulatory Roadmap on behalf of Canada Infrastructure Bank for a proposed passenger rail project connecting Calgary to Banff. Responsibilities include strategic regulatory advice, authoring regulatory roadmap and liaising with Federal and Provincial regulatory authorities.
Confidential Client, Confidential Project Confidential	Golder provided third-party review of an EIA on behalf of the proponent. Responsibilities included senior direction, regulatory permitting advice and senior review of EIA sections.
Lehigh Inland Cement Limited Substitution Fuel Project Edmonton, Alberta, Canada	Golder were retained to prepare the EPEA application for the proposed conversion of the Lehigh Inland Cement facility in Edmonton to allow the use of coal as a primary fuel. Responsibilities included project management, regulatory liaison, technical support and report preparation.
Lehigh Inland Cement Limited Substitution Fuel Project, Appeal Board Hearings Edmonton, Alberta, Canada	Golder was retained by the proponent to provide expert witness testimony in the Environmental Appeals Board hearing of the Lehigh Inland Cement substitution fuel project approval. Responsibilities included project management, regulatory liaison, technical support and support to the Environmental Appeal Board hearing.
Confidential Client Rooftop Air Quality Assessment Calgary, Alberta, Canada	Golder prepared an air quality assessment to investigate the effect of exhaust stack emissions on adjacent air intakes on the same rooftop of a commercial building in Calgary, Alberta Responsibilities included project management, dispersion modelling and report preparation.
Domtar Canada Ltd. Particulate Monitoring Cochrane, Alberta, Canada	Conducted short-term particulate monitoring services to Domtar Canada Ltd. using hi-volume sampling devices. The objective of the work was to obtain estimates of airborne total suspended particulate (TSP) levels in the vicinity of an excavation site. Responsibilities included project management, and technical support.
Hi Temp Products Odour Management Project Fort McLeod, Alberta, Canada	An odour management plan was completed for the Hi Temp Products fireproof fibreglass mat manufacturing facility, located in Fort Mcleod, Alberta. Responsibilities included project management, regulatory liaison, technical support and report preparation.
Lafarge Construction Material Limited Ambient Air Quality Monitoring Calgary, Alberta, Canada	Provided consulting services to Lafarge regarding a proposed gravel pit east of Calgary, Alberta. Work included the preparation of a monitoring plan and guidance to Lafarge on placement options for a particulate and meteorological monitoring system in the vicinity of the proposed operation. Responsibilities included technical support.

Saputo Dairy Environmental Workplan and Remedial Action Plan Calgary, Alberta, Canada	Performed an air quality assessment of atmospheric emissions from a soil remediation project at a dairy processing facility in Calgary, Alberta. Responsibilities included technical support and report preparation.
Shield Source Environmental Monitoring Program Peterborough, Ontario, Canada	An air quality assessment was completed to determine derived release limits (DRLs) for tritium at a facility that makes tritium-illuminated signs. Air dispersion models were used to derive concentrations and aerial deposition rates for tritium from the site, and an environmental pathway model was used to translate these concentrations and deposition rates into dose rates to critical receptors. Responsibilities included project management, technical support and report preparation.
Noel Covey and Associates Palmview Sanctuary Queensland, Australia	Worked with the Golder office in Brisbane to complete a traffic noise assessment in Queensland, Australia. The project consisted of a proposed land development area being constructed along-side an existing, high-volume traffic, highway. A model was developed and barrier attenuation was calculated. Responsibilities included technical support.
Bombardier Inc. Comprehensive Certificate of Approval (Air) Preparation Downsview, Ontario, Canada	Performed comprehensive emissions inventory and dispersion modelling of aerospace manufacturing facility in Downsview, Ontario in support of permit in accordance with requirements of Ontario Ministry of Environment (MOE). Responsibilities included project management, regulatory liaison, calculating emission estimates, performing dispersion modelling and application preparation.
Cargill Ltd. National Pollutant Release Inventory High River, Alberta, Canada	Completed National Pollutant Release Inventory reporting for a rendering plant in High River, Alberta.
Riverside Forest Products Ltd. National Pollutant Release Inventory British Columbia, Canada	Completed National Pollutant Release Inventory reporting for five wood processing facilities throughout British Columbia for 2002 and 2003.
Erco Worldwide Monitoring Data Review and Analysis Saskatoon, Saskatchewan, Canada	Golder was retained to conduct a review and analysis of the ambient air quality data collected in the vicinity of the ERCO Worldwide chemical production facility located in Saskatoon, Saskatchewan. This review and analysis was completed as part of a comprehensive State of the Environment report. Responsibilities included project management, technical support and report preparation.
Greater Vancouver Regional District Ashcroft Ranch Landfill EIA Ashcroft Ranch, British Columbia, Canada	Golder was retained by the Greater Vancouver Regional District to provide technical support for the development of the proposed Ashcroft Ranch Landfill. Responsibilities included technical support and report review for the air quality assessment.

Saputo Inc. Air Quality Assessment of the Armstrong Facility
Glenwood, Alberta, Canada

Golder was retained by Saputo Inc. to conduct an air quality assessment of the Armstrong Cheese Facility. This assessment was completed to support the Alberta Environment (AENV) Industrial Approval Application for the facility. Responsibilities included component management, participation in an on-site emission inventory, technical support and report preparation.

TRAINING

Ontario Ministry of Environment Environmental Noise Assessment in Land Use Planning Course
1999

An Introduction to Advanced Air Quality Modelling in Canada
2003

Project Management Extension Certificate
2011

Introduction to Gender-based Analysis+
2018

PROFESSIONAL AFFILIATIONS

Registered Licensed Professional Engineer, Alberta (APEGGA)

Project Management Professional, Project Management Institute

Education

Master of Engineering, Water Resources Engineering, University of Alberta - 1998

Bachelor of Science, Civil Engineering, University of Alberta - 1997

Alberta Transportation – Edmonton

Director, Water Management

Yvonne is the Director of the Water Management Section within the Major Capital Projects Branch and has worked for Alberta Transportation for 12 years.

Yvonne is responsible for providing leadership to a team of engineers and technologists that annually deliver approximately $30 million of water management infrastructure projects and coordinate and implement approximately $4 million of maintenance on all water management infrastructure owned and operated by Alberta Environment and Parks. Her responsibilities also include direct oversight for the engineering and construction activities for the proposed Springbank Off-stream Reservoir Project, including the pipeline and utility relocations required for the project.

Yvonne is part of the Alberta Transportation team providing support to Alberta Environment and Parks for assessment of the Bow River Reservoir options to provide flood protection to the City of Calgary.

Yvonne was the Team Lead and Hydrotechnical Specialist at Alberta Transportation providing engineering advice to regional Alberta Transportation offices, engineering consultants, and other branches of government in support of design and construction of bridge and water management projects. As part of her role she facilitated acquisition of regulatory approvals for the bridge construction for NE Anthony Henday Drive. In this role she also managed consultants and contractors designing and constructing water management infrastructure projects.

Yvonne has broad water management engineering experience. She has experience with hydropower operations, including dam safety monitoring and emergency preparedness; design and construction in the fields of water resources and bridge planning; and regulatory oversight, under the *Fisheries Act,* assessing impacts to fish and fish habitat and working with project proponents to mitigate project impacts.

Employment History

Alberta Transportation – Edmonton, AB

Director, Water Management (February 2016 – present)

Manage a program in excess of $30 million and lead the Water Management team in the engineering, construction, and maintenance activities of water management infrastructure. The work is coordinated with and performed on behalf of Alberta Environment and Parks.

Direct oversight of all aspects of the engineering and construction of the Springbank Off-stream Reservoir. These responsibilities include engineering review, strategic approaches to contracting, and negotiation of pipeline and utility relocations to meet the project schedule.

Liaise and coordinate with engineering consultants, contractors, government ministries, and other agencies to ensure appropriate development and delivery of the water management construction and maintenance program.

Alberta Transportation – Edmonton, AB
Hydrotechnical Specialist/Team Lead, Project Delivery North (December 2011 – February 2016)

Managed water management capital construction projects through all project phases; engineering through construction and warranty.

Provided project guidance and expertise as part of the project team for water management and bridge construction projects for the life of the project, including engineering review of designs.

Provided oversight and led development of standards, guidelines, and specifications for bridge and water management projects. This included environmental practice development for Alberta Transportation with provincial and federal environmental agencies including co-leading the creation of an Environmental Risk Management Framework to facilitate acquisition of regulatory approvals for construction of the north east component of Anthony Henday Drive.

Provided engineering support for a public private partnership construction of the north east component of Anthony Henday Drive, including specification development and engineering review and feedback to proponents during procurement, design, and construction.

Alberta Transportation – Edmonton, AB
Acting Director, Professional Services (February 2014 – August 2014)

Managed the procurement services team responsible for selection, negotiation, and engagement of engineering consultants and approval of all tenders for advertisement, as well as related consultant contract changes. The annual fee commitment for consulting was over $30 million per year and for construction was over $300 million per year.

Worked with external stakeholders to address issues related to procurement of services and consultant performance, as well as improvement and development of department specifications, standards, and guidelines.

Coordinated with other government departments and industry associations to progress the electronic tendering project (ebidding) as part of the Government of Alberta procurement modernization.

Alberta Transportation – Edmonton, AB
Bridge Planning Standards Engineer (January 2009 – November 2011)

Provided bridge planning and hydrotechnical engineering reviews and advice to regional Alberta Transportation offices, consultants, and other branches of government to support design and construction of bridge and water management projects including both NE and SE Stoney Trail components of the Calgary Ring Road.

Led the re-development of fish passage provisions in Alberta Transportation's Fish Habitat Manual and provided additional recommendations for revision to the manual. Provided project specific advice via the Alberta Fish Passage Technical Review Committee with respect to fish protection and passage.

Fisheries and Oceans Canada – Calgary, AB and Edmonton, AB
Habitat Protection Engineer (September 2001 – January 2009)

Responsible for the assessment of potential impacts to fish and fish habitat under the *Fisheries Act* on proposed projects including watercourse crossings, oil sands development, water intakes, and fish passage. Worked with project proponents to reach project solutions that balanced the environment, economics, safety, and social impacts.

Coordinated and participated in technical working groups to support a balanced and inclusive approach to address issues related to project development. Working groups included the Alberta Fish Passage Technical Working Group, Central and Arctic Region Fish Passage Working Group, Isolation of Construction Works Task Group, and the Alberta Road Builders and Heavy Construction Association Environmental Committee.

PROJECT EXPERIENCE – WATER MANAGEMENT INFRASTRUCTURE

St. Mary Dam Low Level Outlet Valve Replacement Spring Coulee, Alberta, Canada	Replacement of two large diameter valves, 1.8 m and 1.4 m, in the low level outlet of St. Mary Dam under 53 m of head. The project required specialized work and coordination of dam operations and contractors to isolate the low level outlet and install the valves while maintaining irrigation supply and flow in St. Mary River.
Harvie Passage Calgary, Alberta, Canada	Harvie Passage enables river passage for boaters and fish while maintaining irrigation water diversions from the Bow River. In 2013 the infrastructure was severely damaged by flooding. Implementing lessons learned from the original design and construction created a more robust and sustainable facility with creation of terrestrial and aquatic habitats that integrate with the surrounding area creating a unique park and recreational amenity for the City of Calgary.
Bullhorn Wasteway Replacement Cardston, Alberta, Canada	A new baffled chute concrete wasteway was designed and constructed to replace the existing creosote treated timber structure. The baffles effectively dissipate the increased flood capacity of the structure. Due to the increased design flow, three culverts downstream of the structure also required upgrades. As the culvert structures are located on the Blood Reserve the culvert upgrade work was tendered and awarded to local indigenous contractors.
Dickson Dam Spillway Gate Replacement Innisfail, Alberta, Canada	Description The five welded box style spillway gates on the Dickson Dam spillway required rehabilitation. The coatings were failing and the gate design presented significant safety concerns for workers performing inspection and maintenance activities. A lifecycle cost analysis indicated that it would be more economical to replace the gates than rehabilitate them. A detour route of approximately 50 km required special consideration and handling of road closures for construction.
South Chain Lakes Flood Capacity Enhancements Nanton, Alberta, Canada	Flood capacity enhancements were required at the south Chain Lakes Dam. Work included raising the existing dam over one metre, raising the existing gatewell and replacing the gates in the low level outlet, and construction of a new concrete spillway with increased flow capacity.

PROJECT EXPERIENCE – RING ROADS

North East Anthony Henday Drive Edmonton, Alberta, Canada	Design and construction of part of the ring road around Edmonton utilizing the design, build, finance, operate model including 27 kilometres of a new six- and eight- lane divided freeway, with nine interchanges, 10 flyovers, two river crossings and pre-grading for future work. Specific work included development of an environmental risk framework to facilitate acquisition of regulatory approvals for the stream crossings.
South East Stoney Trail Calgary, Alberta, Canada	Design and construction of part of the ring road around Calgary consisting of approximately 25 kilometres of a new six lane divided freeway, including nine interchanges, three flyovers, and additional pre-grading for future interchanges using the design, build, finance, operate model.

PROFESSIONAL AFFILIATIONS

Professional Engineer, Association of Professional Engineers and Geoscientists of Alberta