

Sheldon Smith is a Senior Hydrologist who has worked extensively with clients throughout North America and overseas in hydrological, hydrogeological and engineered and created wetland projects. His hydrological expertise lies in open channel and pulse flow monitoring, modeling and water quality analysis, modeling and interpretation, particularly in the fields of water supply assessment, stormwater management, floodplain assessment, instream flow needs assessment, stream monitoring, natural channel design and erosion analysis. Sheldon's hydrogeological experience is in the design, instrumentation and analysis of groundwater monitoring networks, groundwater : surface water linkages, aquifer assessment and capacity, and contaminant fate and transport. His experience with engineered and created wetlands has focused on their use, sizing, configuration, design and modeling as effective urban stormwater, mine effluent and aircraft deicing treatment end-of-pipe technologies, in either free-water surface or sub-surface flow regimes. Created wetland projects have focused on the creation of new functional wetlands as habitat compensation features, and the enhancement, restoration and sustainability of existing wetlands which have often been threatened by development encroachment or degraded due to watershed urbanization and land use change.

## EDUCATION

B.Sc. (Hon), Physical Geography, Memorial University of Newfoundland, St. John's, Newfoundland, 1994

MES, Master of Environmental Studies (Environmental Planning and Hydrology), University of Waterloo, Waterloo, Ontario, 1998

## MEMBERSHIPS

Mine Water Working Group, Ontario Mining Association

Environmental Geoscience Chair - Fluvial Geomorphology sub-committee, Association of Professional Geoscientists of Ontario

Environmental Geoscience Committee Member, Association of Professional Geoscientists of Ontario

Environment Committee Member, Ontario Mining Association

Practicing Member, Association of Professional Geoscientists of Ontario

## PROJECT EXPERIENCE

### Environmental Assessments

Alderon Iron Ore Corp. – Kami Iron ore Mine Federal EA and Provincial Environmental Impact Statement, Wabush, Newfoundland and Labrador

*Environmental assessment satisfying the requirements of the Federal and Provincial processes. Water Resources task lead including:*

- *planning, collection, analyses and assessment of site area water quality and hydrological monitoring data;*
- *assessment of project water supply requirements;*
- *determination of project-integrated water balance;*
- *determination of water taking effects on water availability and environmental flows;*
- *development of site wide water management plan;*
- *determination of mine site and major component area effluent flows;*
- *characterization of mine effluent water quality including TSS, Acid Rock Drainage/Metal Leaching potential, ammonia modeling and Red Water assessment;*
- *completion of mine effluent assimilative capacity and mixing zone analyses;*
- *assessment of potential effects and development of mitigation alternatives to minimize and/or eliminate effects;*
- *open pitgroundwater surface water modeling lead;*
- *consultation with regulators;*
- *response to regulatory, aboriginal and public comment;*

Century Iron Ore Corp. – Joyce Lake Iron Ore Mine Federal EA and Provincial Environmental Impact Statement, Newfoundland and Labrador near Schefferville, QC

*Currently ongoing environmental assessment satisfying the requirements of the Federal and Provincial processes. Water Resources task lead including:*

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- *planning, collection, analyses and assessment of site area water quality and hydrological monitoring data;*
- *assessment of project water supply requirements;*
- *determination of project-integrated water balance;*
- *determination of water taking effects on water availability and environmental flows;*
- *development of site wide water management plan;*
- *determination of mine site and major component area effluent flows;*
- *characterization of mine effluent water quality including TSS, Acid Rock Drainage/Metal Leaching potential, ammonia modeling and Red Water assessment;*
- *completion of mine effluent assimilative capacity and mixing zone analyses;*
- *assessment of potential effects and development of mitigation alternatives to minimize and/or eliminate effects;*
- *development of conceptual Joyce Lake dewatering plan;*

Durham – York Energy Center Individual Environmental Assessment, Regions of Durham and York, Ontario

*Environmental Assessment for residual waste from Durham and York Regions through an energy from waste process. Discipline lead for surface water, groundwater and stormwater management assessment at the Courtice, ON site. Tasks included background information review, field work, analysis and assessment, Public Information Center presentation, regulatory discussions and negotiations and permit application review. Also included development of surface water and groundwater monitoring plans in collaboration with the Project Public Liaison Committee and the Ministry of Environment.*

Landfill Expansion Environmental Assessment, Capital Power, Calstock, Ontario

*Environmental Assessment for expansion of the existing ash landfill to include an additional landfill cell. Discipline lead for surface water and stormwater management assessment. Tasks included background information review, field work, analysis and assessment.*

Bonar Creek Stormwater and Legion Road Extension Environmental Assessment, Toronto, Ontario

*Individual EA for stormwater management planning and design alternatives at Bonar Creek confluence with Mimico Creek and extension of Legion Road from Lakeshore Blvd to Gardiner Expressway.*

Banff Highway Twinning Environmental Assessment, Phases I & II

*Banff Highway twinning assessment and review, provided to Banff National Park.*

Construction and Post-construction Environmental Monitoring, Various Sites

*Construction and post-construction environmental monitoring for numerous infrastructure, residential, commercial and industrial projects.*

Environmental Impact Assessments (EIA), Various Sites

*Numerous full and partial Environment Impact Assessments (EIA) including a full NB EIA for Ocean Spray's new 9300 ac cranberry growing operation in Blackville, ON.*

Epcor Utilities Environmental Assessment, Stormwater Harvesting Plan, Milton, Ontario

*Environmental Assessment for a gas-fired power generation facility, including stormwater harvesting plan to fully supply plant water demand.*

Don Valley Parkway Class Environmental Assessment, Stormwater Management Alternatives\*, Toronto, Ontario

*Class Environmental Assessment for stormwater management planning and design alternatives for 13 sites along the Don Valley Parkway, in association with TSH.*

Class Environmental Assessments (EA), Various Sites

- *King – Lincoln Stormwater Retrofit Class EA, Uxbridge, ON*
- *Aurora C2/C3 Stormwater Retrofit Class EA- amendment, Aurora, ON*
- *Mary Lake Dam, Port Sydney, ON*
- *Kawagama Lake Dam, Dorset, ON*
- *Large Shell Refinery, Sarnia, ON*
- *SkyPower's Byron Wind Power Project, Prince Edward County, ON*
- *Capital Power proposed Gas fired power generation facility, Cambridge, ON*
- *New Ethanol Production Facility, Oshawa, ON*
- *Enbridge Pipeline Reversal and Expansion, Southern ON*
- *TransCanada Pipelines Ltd – Parkway Loop, Southern ON*
- *LNG Processing facility, Grand River, NB*
- *Biofuel Generation facility, Grand Falls, NB*
- *Peer Review – Don Mouth Naturalization, Toronto, ON*
- *EIA Coal Mine, Glace Bay, NS*

\* denotes projects completed with other firms

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- CEAA Screening Assessment, VIA Rail capacity expansion, ON

## Hydrogeologic Studies

### Groundwater Permits to Take Water

Groundwater investigations, regulatory consultation and preparation of more than 100 Category 1, 2 and 3 PTTW reports and application packages associated with pipeline integrity digs for Enbridge Pipelines Inc., pipeline installations for Enbridge Gas, linear corridor excavation for waterline and road construction for the Region of York, open pit and trench dewatering for Ontario Graphite, Ferromin Inc. and other clients.

### Groundwater and Surface Water Instrumentation for Golf Courses\*

Development of groundwater and surface water instrumentation for the golf course market including products adaptation, marketing materials and promotion through the Golf Course Superintendents of America Association and Ontario Golf Course Superintendents Association Annual conferences and trade publications- Solinst Canada.

### Saltwater Intrusion, Australia\*

Saltwater Intrusion on a Polynesian Island with a mixed semi-diurnal tidal regime – EcoWise Consultants, Australia.

### Groundwater Monitoring and Slope Stability, California, USA

The use and effectiveness of groundwater level monitoring as a predictor of slope stability – CALTRANS District 5.

### Geotechnical Installations for Mining, Various Sites

A wide variety of geotechnical installations in the mining sector for clients such as Inco, Falconbridge, GoldCorp, Newmont and DeBeers Canada.

### Aquifer Production and Water Quality, California, USA

Water banking effects on aquifer production and water quality – West Kern Water District, Kern Water Bank.

### Groundwater Monitoring Network

Regions of York, Durham, Halton, Peel, and Waterloo Groundwater monitoring and watershed management networks

- NS DOE&L's Provincial Groundwater Monitoring Network  
- PE DOE's Provincial Groundwater Monitoring Network

### Ontario Provincial Groundwater Monitoring Network

Equipment use, site selection criteria, installation and monitoring techniques and data interpretation for the Ontario Provincial Groundwater Monitoring Network.

### Hydrogeological Investigations, Various Sites

Hydrogeological investigation for new subdivision development, Sharon, ON; and Hydrogeological review and construction phase monitoring plan and implementation for Lionhead HDD Sanitary Sewer, Region of Peel.

### Golf Course Groundwater Investigations, Various Sites

Groundwater investigations associated with three Ontario golf course developments located in Markham, Ballantrae and Innisfil.

### Tailings Dam Seepage Groundwater Investigation

Development of study design, drilling program, hydraulic testing and monitoring associated with seepage remediation assessment for three tailings dams – Newmont Canada Golden Giant Mine

## Hydrologic / Hydraulic Assessments

### Low Flow, Fish Passage and Environmental Flow

#### Hydraulic Assessment, East River, Nova Scotia

Hydraulic modeling of the lower reach of the East River, N.S. to assess low flow water levels, fish passage and headpond weir redesign in association with water takings at Louisiana Pacific East River Mill.

### Hydraulic Assessment - Mining

Hydraulic assessment of several sub-watersheds of Napadoggan Brook potentially affected by water management plans associated with the proposed Hunter-Douglas Sisson Molybdenum mine in central, NB. The assessment used the Wetted perimeter hydraulic assessment method in a HEC-RAS model to estimate the amount of potential aquatic habitat alteration arising from the proposed mining project and support a Habitat Alteration, Disruption and Destruction (HADD) application to DFO.

\* denotes projects completed with other firms

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## Surface Water Permits to Take Water

*Surface water investigations, regulatory consultation and preparation of more than 100 Category 1, 2 and 3 PTTW reports and application packages associated with surface water crossing pipeline integrity digs and hydrostatic testing for Enbridge Pipelines Inc., and pipeline installations for Enbridge Gas, linear corridor excavation for waterline and road construction over water crossings for the Region of York, water takings associated with pulp and paper and mine process water demand, stormwater harvesting, hydroelectrical waterpower and industrial and municipal water supply takings from watercourses and lakes.*

## Bathymetric Geotechnical Installation, Tacoma, Washington

*Bathymetric geotechnical installation design and implementation for the Hybelos Channel.*

## Interactive Weather Station Network\*

*Instrumentation requirements for a distributed interactive weather station network in Ontario Secondary Schools – Ministry of Environment.*

## Tailings Pond Discharge Monitoring\*

*Tailings pond discharge monitoring using a paschal flume at Cabello Coal mine – Peabody Energy.*

## Tailings Pond Discharge Assessment

*Tailings pond hydraulic assessments and spillway design for multiple mine sites tailings pond and dams including hydrotechnical and flooding risk assessments.*

## Hydraulic Control Devices\*

*Design, monitoring and flow calculation of hydraulic control devices including weirs, flumes, pipes and orifice structures.*

## Seaworld Florida

*Tank level, evaporation losses and leakage assessment for large marine mammal tanks.*

## Online Hydrologic Monitoring Networks, Various Sites

*Online, telemetered (CDMA) hydrologic monitoring networks for City of Laval, QC, Castlemoor Hydroelectric generating station, and Osler Glen Golf Club, ON.*

## Environmental Monitoring and Inspection for York Region Stouffville Road Upgrades, Whitchurch-Stouffville, Ontario

*Environmental monitoring and inspection of in-water works and erosion and sedimentation controls.*

## Environmental Monitoring and Inspection for York Region 19th Avenue Upgrades, Richmond Hill, Ontario

*Environmental monitoring and inspection of in-water works and erosion and sedimentation controls.*

## Surface Water Assessment, Saint John, New Brunswick

*Surface water assessment associated with Irving Oil's proposed Canaport Eider Rock refinery.*

## Water Taking Assessment, East River,, Nova Scotia

*Water Taking hydrological assessment and permitting for Louisiana Pacific East River Mill.*

## Natural Wetland Monitoring Plan, Vaughan, Ontario

*A Natural wetland monitoring plan was developed for Thornhill Estates.*

## Wetland Water Supply Assessment, Brampton, Ontario

*Created wetland water supply assessment and detailed design.*

## Hydrological Sensitive Feature Assessment, York Region, Ontario

*A Hydrologically Sensitive Feature assessment was completed for nine (9) watercourse crossings on the Oak Ridges Moraine associated with the Pristine York Energy Center gas supply pipeline.*

## Hydraulics Design Assessment, Ontario

*Completion of a hydraulics design assessment for major marine docking facilities along the St. Clair River.*

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## Region of York Trunk Sewer Project, Markham, Ontario

*A surface water monitoring and data telemetry was completed in support of Region of York's 16th Avenue Trunk Sewer project.*

## Hydrotechnical Assessment, Cavan-Monaghan, Ontario

*A hydrotechnical assessment was completed for an exposed gas pipeline relocation, including design and specification of surface water diversion, open trench dewatering and erosion and sedimentation control planning for Enbridge Gas Distribution.*

## Dams Review and Future Works Assessments, Uxbridge, Ontario

*Dams review and future works assessments for the Elgin Pond Dam, Electric Light Pond Dam and the Preserve Dam for the Town of Uxbridge.*

## Hydrotechnical Assessment of Kawagama Lake Dam, Dorset, Ontario

*A hydrotechnical assessment of Kawagama Lake dam was completed leading to detailed design of a new dam wingwall spillway.*

## Dam Break Hazard Assessments, Various Sites

*Dam break hazard assessments were conducted for the Meadow Lake Dam, Isaacs Harbour, NS, the Brant Mill Dam, Oakland, ON, Pinkerton Dam, Pinkerton, ON. Tailings and Polishing Pond dams for Ontario Graphite, Kearney, ON, Wesdome Eagle River Gold Mine, Wawa, ON. Tailings dams at abandoned mine sites in Newfoundland. In addition, repair and rehabilitation works permitting and approval process was completed for many of the above assessed dams.*

## Detailed Dam Safety Review, Tailings dams at the former Consolidated Rambler, Whalesback and Gullsbridge mines near Springdale, NL.

*Hydrotechnical assessment for five tailings dams as part of DDSR and Repair Assessment in accordance with the Canadian Dam Association Dam Safety Guidelines. The project included hydrotechnical assessments according to CDA criteria, followed by recommendations to improve hydraulic capacity and preliminary design of tailings sediment traps, beaver exclusion devices, erosion protection, new culvert installations, emergency spillways and repair of failed rockfill dam sections.*

## Mining Open Pit Dewatering

*Bathymetric investigation and volume estimation for a large-water-filled open pit, followed by a dewatering plan that sized pumps and discharge lines and the timing of dewater release in light of background flows in local watercourse.*

## Keltic Petrochemical LNG facility, Goldboro, Nova Scotia

*Water supply, reservoir sizing, environmental flow determination and Hazard Potential assessment for water supply reservoir dam.*

## Enbridge Don River Utility Bridge, Toronto, Ontario

*Flooding and hydraulics assessment, determination of hydraulic and ice loading factors.*

## Evapotranspiration and Runoff Method Evaluation

*Assessment of evapotranspiration and runoff methods applicable in an Ontario climate change environment for the Ontario Ministry of Natural Resources.*

## Canadian National-VIA Rail Link Improvements, Various Sites

*Environmental hydrology and hydraulics assessments of more than 80 watercourses affected by the proposed Canadian National – VIA Rail Link Improvements from Toronto to Montreal for flooding, erosion and sediment control and fish passage.*

## Canadian National MP 263 Brook Creek Channel Realignment

*Design of Brook Creek channel realignment at CN MP 263 in Cobourg, ON*

## Canadian National Newcastle Fish Passage Culvert Replacement

*Hydrological study and hydraulic design of a new culvert for fish passage on LeBlanc Brook, Newcastle, NB. Included design of in-culvert fish passage baffle design, inlet and outlet staging pool design and environmental permitting with NB Environment and the Department of Fisheries and Oceans.*

## Canadian National Bedford Culvert Replacement

*Hydrological investigation and hydraulic design of new CSP culvert draining Second Pond near Bedford, NS to replace an existing collapsed stone arch culvert.*

\* denotes projects completed with other firms

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## Natural Channel Design, Various Sites

*Natural channel design for SV7 connecting channel in Springbrook Creek, and restoration sections of Bronte, 16 Mile, Marigold, Soper Creeks and the Welland, Wye, Credit, Don and Rouge Rivers and tributaries.*

## Fluvial Geomorphic, Erosion Assessment and Remedial Design, Various Sites

*Fluvial geomorphic, erosion assessment and remedial design for the Don, East Don, Rouge, Muskoka, Isaacs Harbour and St. Clair Rivers. Newtonbrook, West Etobicoke, Springbrook, Marigold, Soper, Talfourd, Clay, Bowens, Sinister, Baby, 16 Mile, 12 Mile and Brook Creeks, ON, Beaver Brook, NS, and Kelly Creek, NB.*

## Instream Flow Needs Assessments, Various Sites

*Instream flow needs assessment for more than 30 Ontario, Quebec and Atlantic Canada watercourses.*

## Floodplain Analysis and Mapping, Various Sites

*Newtonbrook, Soper, Sinister, Talfourd, Clay and Bowens Creeks, Don and East Holland River, ON; Isaacs Harbour River, NS; Kelly Creek, NB; Saint John River at Fredericton, NB; and several other flooding assessments associated with specific events and unnamed watercourses.*

## Hydrological Assessments in support of mining projects

*Hydrological baseline studies, flow prediction and modeling including, water balance modeling of more than 20 watersheds in support of mine development and expansion projects.*

## Hydrological Assessments

*Hydrological assessments for more than 150 Ontario watercourses including analysis of existing flow data, hydrological modeling and analysis.*

## Hydrology Studies

### Baseline Hydrology Investigation - Mining, Newfoundland

*Development of study design, instrumentation, monitoring, data collection, analysis, modeling and reporting for 3 watersheds potentially affected by proposed gold mine in west-central Newfoundland – Marathon Gold, Alderon Iron Ore's Kami Project and Century Iron Ore's Joyce Lake Project*

### Baseline Hydrology Investigation - Mining, Ontario

*Development of study design, instrumentation, monitoring, data collection, analysis, modeling and reporting for 3 watersheds potentially affected by proposed new Tailings Management Area west of Wawa, ON for Wesdome Eagle River Gold mine, Ontario Graphite's Kearney Mine, Premier Gold's Hardrock Project in Geraldton, ON.*

### Cold Climate Hydrology\*

*Monitoring precautions and considerations in cold climate hydrology – Solinst.*

### Groundwater Monitoring and Surface Water Gauging

*Instrumentation renewal for USGS groundwater monitoring and surface water gauging stations including specification, supply and support for over 5000 surface water dataloggers.*

### Attenuation and Stream Response, California, USA

*Attenuation and stream response timing of precipitation in the American River watershed, CA – NOAA.*

### Scripps Institute Alpine Spring Runoff Study

*Study design and monitoring considerations in alpine spring runoff.*

### Alaskan Wetlands - US Fish & Wildlife Service\*

*Annual round hydrologic conditions in Alaskan wetlands*

### Surface Water Monitoring and Design, Various Sites

*Large surface water monitoring, design, equipment installation and data analysis for St. John's River watershed, FL, Miami Conservancy district, OH, and The Nature Conservancy, AL.*

### Water Management Plan, Blackville, New Brunswick

*Water management planning, design and scheduling to provide all irrigation and flooding demand for Ocean Spray's 9300 ac cranberry growing operation in Blackville, NB entirely from precipitation and runoff harvesting.*

### Development of Site Specific Emergency Response Plans, Various Sites

*Hydrodynamic modeling (2D) and oil spill propagation of the Ottawa, Mille Ile and Des Prairies Rivers near Montreal and Niagara River near Niagara Falls in association with development of Site Specific Emergency Response Plans for Enbridge Pipelines river crossings.*

\* denotes projects completed with other firms

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## Golf Course Surface Water Investigations, Various Sites

*Surface water investigations associated with three Ontario golf course developments located in Markham, Ballantrae and Innisfil.*

## Vale Eastern Range Baseline Hydrology Investigation

*Development of study design, instrumentation, multi-year monitoring, data collection, analysis, both event and continuous modeling and reporting for 5 watersheds potentially affected by proposed copper mine – Sudbury, ON. Tasks included surface water supply potential, water quality analyses and modeling and effluent assimilative capacity assessments.*

## Hydrology/Hydraulics Assessment

*Mine effluent and mine site flooding assessment for Xstrata Coal's mine site project in Glace Bay, NS*

## Naturalized Wetlands / Channels

### Carruthers Creek Bank Stabilization, Ajax, ON

*Field investigation, hydrological and fluvial geomorphological assessment Carruthers Creek associated with a section of outer meander bend bank instability and private property loss. Development of remedial design using minor channel realignment and a hybrid brush layering - live cribwall, and regulatory permitting.*

### St. John's International Airport Feasibility Assessment and Preliminary Design, St. John's, Newfoundland

*Feasibility assessment and subsequent preliminary design of using engineered wetlands to treat spent aircraft deicing fluid at the St. John's International Airport.*

### King Lincoln Stormwater Sewershed Class Environmental Assessment, Uxbridge, Ontario

*Assessment of retrofit alternatives to an existing stormwater management pond for enhanced phosphorus removal. Alternatives evaluated include sub-surface flow engineered stormwater wetland. Additionally, the EA evaluated end-of-pipe treatment alternatives for the King Street sewershed which currently receives no stormwater treatment.*

### CN Salmon River Bridge Habitat Compensation Plan, Milltown, Ontario

*Riparian wetland enhancement. Revegetation design of riparian emergent macrophyte monoculture wetland with more diverse, locally indigenous wetland vegetation to enhance Large and Smallmouth Bass and Yellow Perch spring forage and redd/nest construction habitat using boulder cluster and gravel/sand bed design. Design and supervision of Large Woody Debris rootwads as a bank erosion remediation approach to redirect the hydraulic flowline and create refuge habitat for fish.*

### Engineered Wetland, Buffalo-Niagara International Airport

*Stormwater design review and assessment in association with design of an engineered wetland system to treat glycol-contaminated runoff.*

### Engineered Stormwater Wetland, Aurora, Ontario

*As part of a retrofit of an existing dry pond stormwater management facility, a sequential subsurface engineered wetland cell and free water surface wetland cell were integrated into retrofit design. The free water surface cell incorporated open water marsh design elements, with both emergent macrophytic and floating vegetation to limit the growth of algae, while acting as a final stormwater polishing cell. The retrofit included a four cell design of an oil/grit separator, sediment forebay, engineered subsurface wetland cell and free water surface wetland cell. The design objective was demonstration of enhanced phosphorus removal from urban catchments within the Lake Simcoe Basin.*

### Thornhill Ravines Wetland Complex, Richmond Hill, Ontario

*Two wetlands within the Thornhill Ravines residential development area were affected by reduction of wetland runoff catchment area. A wetland water supply and water balance was completed and a water supply augmentation plan was proposed and designed, bringing in clean water from local residential rooftops via a clean water collector system. In addition an extensive wetland hydrologic and hydraulic monitoring program was developed to assess potential water balance effects prior to, during and post-construction of the residential development.*

\* denotes projects completed with other firms

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## Countryside Villages, Brampton, Ontario

*Created forested wetland; employment lands. A forested wetland connection block was proposed and designed for the Employment Land Block of the Countryside Villages Development in Brampton. The created forested wetland block provided compensation for partial loss of a wetland and provided hydraulic and land area connection between a residual wetland parcel and a downstream provincially significant wetland. Water supply to the residual and created wetland parcels was to be sourced from clean industrial complex building rooftop runoff through a clean water collector system.*

## Credit Manor Estates, Brampton, Ontario

*Created wetland design. The proposed location of stormwater management facility at Credit Manor Estates in Brampton included the footprint of an existing riparian wetland area. To compensate for this loss of wetland area, a created wetland was proposed adjacent to the SWM facility. The wetland was designed to be compatible with the characteristics of local riparian wetlands in the watershed, incorporate periodic inundation from an adjacent watercourse and provide quality amphibian habitat. The wetland water supply was sourced from clean rooftop runoff from the adjacent subdivision, through a clean water collector system.*

## Cheltenham Quarry Rehabilitation, Caledon, Ontario

*Design of multiple vernal pools and a constructed wetland complex as well as more than 600 m of new natural channel in two watercourses in association with the rehabilitation of a Brampton Brick Ltd quarry site.*

## Channel Restoration – Pipeline Crossings

*Completed over 20 pipeline depth-of-cover assessments for watercourses in Ontario and subsequently developed remedial design addressing the depth of cover concerns without requiring line lowering at 15 locations for Enbridge Pipelines, Enbridge Gas Distribution, TransNorthern Pipelines, Imperial Oil and TransCanada Pipelines. Each remedial design included a hydrologic, hydraulic and fluvial geomorphic assessment and channel alteration using natural channel design principles.*

## Stormwater Management

### Stormwater Runoff and Porous Pavements, Denver, Colorado

*Effectiveness of porous pavements in attenuating peak stormwater runoff from parking facilities.*

## Hydraulics Monitoring, Toronto, Ontario

*Hydraulics monitoring of a large stormwater flow balancing system.*

## Stormwater Management in Cold Climates, Aurora, Ontario

*Use and effectiveness of constructed wetlands for stormwater management in cold climates.*

## Road Salting and Water Quality Improvement, Toronto, Ontario

*Road salting and water quality improvement in a wet pond facility accepting stormwater from a major highway/overpass complex.*

## Stormwater Monitoring and Performance Assessment, Various Sites

*Monitoring and performance assessment at:*

- Forebay/wet pond stormwater management facilities in Richmond Hill and Markham, ON
- Roadside swale infiltration and underlying exfiltration trench in Toronto, ON
- Oil/grit separator technology in commercial parking lots in Markham and Toronto, ON

## Stormwater Constructed Wetland

*Feasibility and cost-benefit analysis of extending stormwater constructed wetland active growing season by the use of an emplaced greenhouse structure.*

## Construction Stormwater Planning, Sarnia, Ontario

*Construction phase stormwater, drainage and erosion management planning for a large, 650 ha industrial site.*

## Water Management Planning, Various Sites

*Water management plan for large proposed Ontario Power Generation peaker facility, new and existing petroleum refinery, ethanol production facility, pipeline terminal facilities, wind farms and solar energy parks; and water management operational and closure planning for a number of mine sites.*

## Sediment Quality Assessment, Various Sites

*Sediment quality assessment for excavation, removal and deposit permitting from more than ten stormwater management ponds and facilities.*

\* denotes projects completed with other firms



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Stormwater Control Study, Graftech Canada, Welland, Ontario

*Stormwater Control Study and detailed design, approval and construction tendering of stormwater conveyance, pumping, storage and discharge for a large decommissioned industrial site adjacent to the Old Welland Canal including on-site industrial landfill and re-direction of numerous existing, uncontrolled stormwater outfalls to a centralized stormwater management pond and treatment facility and subsequently to Humberstone drainage and the BrownTap Canal to the Welland River.*

Functional Servicing Studies, Various Sites

*Functional Servicing Reports and Stormwater Management planning for numerous residential, commercial, industrial and mixed used developments, including: Employment Land 48.1 Countryside Villages, Metrus Developments, Brampton, ON; and Countrywide Developments, Block 12, Vaughan, ON.*

Stormwater Management Planning

*Stormwater management planning, design and approvals for numerous new and redevelopment residential, commercial and industrial applications including:*

- Refinery Expansion in Sarnia, ON
- Asphalt Loading Facility in Sarnia, ON
- Bonar Creek Stormwater management facility, Toronto, ON
- Don Valley Parkway, Creation/Upgrade/ Retrofit of 13 stormwater management facilities, Toronto, ON
- Stormwater design for gas/oil pumping battery, St. Clair Township ON
- Stormwater management design for EPCOR GTA West and Cambridge Energy Centre, ON
- Proposed Durham-York Residual Waste Facility, ON
- Stormwater management retrofit for an 80 ha industrial site in Welland, ON
- Buffalo Niagara International Airport, USA
- Elmsdale Quarry Expansion, NS
- Waste Composting Facility, Orangeville, ON
- Stormwater Retrofit – Wet pond to Engineered wetland, Uxbridge, ON
- Trenton Airport, Trenton, NS

Engineered Stormwater Wetland, Aurora, Ontario

*Stormwater management planning, detailed design and construction tendering of an engineered stormwater wetland to retrofit an existing stormwater dry pond.*

TTC Birchmont Facility, Toronto, Ontario

*Technical review and advise for Stormceptor™ monitoring and performance assessment at the TTC Birchmont facility.*

**Water Quality Assessment**

Thermo-hydraulic Assessment - Mining

*Thermo-hydraulic assessment of several sub-watersheds of Napadoggan Brook potentially affected by water management plans associated with the proposed Hunter-Douglas Sisson Molybdenum mine in central, NB. The assessment used a HEC-RAS model to estimate the amount of potential aquatic habitat thermal regime disruption arising from the proposed mining project and support a Habitat Alteration, Disruption and Destruction (HADD) application to DFO.*

Closure Plan Amendment - Mining

*Compilation, review, analysis and reporting closure plan amendment for the Ontario Graphite Kearney Mine, Kearney, ON, Ferromin Tomclid Iron Magnetite open pit mine near Ompah, ON Wesdome Eagle River mine and mill closure planning including development of new groundwater and surface water monitoring plans and innovativetailings and waste rock rehabilitation approach.*

Baseline Water Quality Investigation - Mining

*Development of study design, monitoring, data collection, analysis and reporting for 2 watersheds potentially affected by an existing iron magnetite mine – Ompah, ON – Ferromin Inc.*

Baseline Water Quality Investigation - Mining

*Development of study design, instrumentation, monitoring, data collection, analysis, modeling and reporting for 3 watersheds potentially affected by proposed a proposed new Tailings Management Area west of Wawa, ON – Wesdome – Eagle River gold mine.*

Baseline Water Quality Investigation - Mining

*Development of study design, instrumentation, monitoring, data collection, analysis, modeling and reporting for 10 watersheds potentially affected by proposed iron ore mine in western Labrador near Schefferville, QC – Labec Century Joyce Lake Iron Ore Corporation through aboriginal joint venture Stannisu-Stantec.*

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## Waste Rock Storage Area Water Quality Assessments

*Assessment of water quality runoff for waste rock areas including acid generating potential, receiving water quality and planning of waste rock storage zones to minimize environmental effects.*

## Tailings Facility Surface Water and Groundwater Quality Assessment

*Source and receiving water quality assessment associated with seepage Remediation from dams at a large Tailing facility including water quality modeling and concentration plume delineation – Newmont Canada Golden Giant Mine.*

## Mine Surface Water and Groundwater Quality Assessment

*Baseline surface water quality investigations, groundwater quality assessment and ongoing receiving water quality assessments and reporting – Ontario Graphite Kearney Graphite Mine*

## Mine Surface Water Assimilative Capacity Assessment

*Water quality and quantity planning, monitoring and assessment of existing polishing effluent on a receiving water body, including a water quality assessment of a reference watercourse and waterbody – Ontario Graphite Kearney Graphite Mine.*

## Closure Plan Historic Surface Water and Groundwater Quality Assessment - Mining

*Compilation, review, analysis and reporting of 17 years of historic water quality associated with the mine during the period of Temporary Suspension in the filed 2012 Closure Plan – Ontario Graphite Kearney Graphite Mine.*

## Water Quality Sensor and Sonde Product Development\*

*Water quality sensor and sonde product development, alpha and beta testing - Solinst Canada.*

## Water Quality Management Planning - Mining

*Development of water quality management plan for 100 locations in the including the assessment of potential contaminant sources, location prioritization and short and long term strategic remedial planning.*

## Water Quality Baseline Studies - Mining

*Baseline water quality studies in more than 30 watersheds in support of mining developments and expansions in Canada, U.S. and South America.*

## Baseline Water Quality Investigation, Sudbury, Ontario

*Development of study design, instrumentation, monitoring, data collection, analysis, modeling and reporting for 5 watersheds potentially affected by proposed copper mine – Sudbury, ON*

## Baseline Water Quality Investigation - Mining

*Development of study design, instrumentation, monitoring, data collection, analysis, modeling and reporting for 3 watersheds potentially affected by proposed iron ore mine – Labrador City, NL – Alderon Iron Ore Corporation through aboriginal joint venture Stannisu-Stantec*

## Baseline Water Quality Investigation - Mining

*Development of water quality study design, monitoring, analytical results review, data interpretation and reporting for 16 water quality monitoring locations associated with the Aurora Energy uranium develop project in central coastal Labrador – Palladin Resources through aboriginal joint venture Aivek-Stantec.*

## Surface Water Remedial Planning and Design - Mining

*Remedial planning and design to address surface water quality concerns at more than 70 locations through source control, source removal, monitored natural attenuation, in situ water quality treatment and riparian enhancement*

## Tailings Pond Water Quality Assessments

*Water quality assessments in association existing and proposed tailings management areas including tailings geochemistry and acid generating potential, local soils and groundwater quality and existing and/or expect runoff quality and required water quality treatment.*

## Polishing Pond Design and Retrofit

*Bathymetric investigation and subsequent redesign of Polishing pond at a graphite mine in central ON. Project included development of lime addition treatment protocol for metals precipitation and sizing the pond volume, residence time and depth for very fine particle size settling.*

\* denotes projects completed with other firms

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## Mine Effluent Receiving Water Quality and Assimilative Capacity Assessment

*Mine effluent receiving water assessment for Ship Cove associated with coal mine development at Xstrata Coal's mine site project in Glace Bay, NS.*

## Source Investigations – Water quality

*Water quality exceedance source investigations and commercial and industrial facilities, source identification and remedial planning and design. Source investigations for plume breakout during construction dewatering operations*

## Monitoring Program Design and Implementation

*Water quality monitoring program design and implementation for industrial, wastewater effluents as well as several receiving water bodies.*

## Water Quality Assessment, Monitoring and Technical Studies, Various Sites

*Completion of water quality assessments associated with numerous Ontario lakes and streams, water quality technical studies associated with new and amended Certificates of Approval; and detailed improvement investigations for more than ten southern Ontario stormwater management facilities.*

## Sediment Quality, Dredging and Disposal

*Sediment quality, dredging and disposal assessments, dredging plans and permitting for lakes, streams stormwater management ponds.*

## Pacific Salmon Migration

*Dissolved oxygen and water level influences on Pacific salmon migration, spawning and smelt survival – CA Dept of Water Resources*

## Sanitary and Storm Sewer Water Quality Program

*Sanitary and storm sewer water quality program investigations for industrial/commercial clients as well as surface water quality investigations for industrial, commercial and residential developments.*

## Assimilative Capacity Studies, Various Sites

*Numerous assimilative capacity studies associated with new and upgraded wastewater treatment plants, such as: Plato and Talfourd Creeks and the St. Clair River and numerous other unnamed watercourses and lakes.*

\* denotes projects completed with other firms

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SWAMP (StormWater Assessment Monitoring and Performance) Program Report, Toronto Region Conservation Authority, Toronto, ON. *Performance Assessment of a Pond-Wetland Stormwater Management Facility - Markham, Ontario, 2002.*

SWAMP (StormWater Assessment Monitoring and Performance) Program Report, Toronto Region Conservation Authority, Toronto, ON. *Performance Assessment of a Swale/Perforated Pipe Stormwater Infiltration System - Toronto, Ontario, 2002.*

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Smith, S., Constructed Wetlands for Stormwater treatment. *Proceedings of the SWAMP Stormwater/CSO Technology Transfer Conference, Ryerson University, Toronto, Ontario, February 23-24, 1998.*

Smith, S., Temperature Performance and climatic Influences on Constructed Wetland performance. *1st Annual International Ecological Engineering Conference sponsored by The Thai-Canadian Centre for Environmental and Agro-industrial Development at King Mongkut's Institute of Technology, North Bangkok, 1997.*

Smith, S., Assessing constructed wetland performance. *1st Annual International Ecological Engineering Conference sponsored by The Thai-Canadian Centre for Environmental and Agro-industrial Development at King Mongkut's Institute of Technology, North Bangkok, 1977.*