BIOSOLIDS MANAGEMENT FACILITY, CITY OF GREATER SUDBURY, ONTARIO

STATE-OF-THE-ART MUNICIPAL BIOSOLIDS MANAGEMENT

THE CANADIAN COUNCIL FOR PUBLIC-PRIVATE PARTNERSHIPS

2013 NATIONAL AWARD CASE STUDY

The Canadian Council for Public-Private Partnerships

Le Conseil Canadien pour les Partenariats Public-Privé


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NATIONAL
AWARDS
FOR
INNOVATION &
EXCELLENCE

The Canadian Council For Public-Private Partnerships
2013 National Award Case Studies

Chuck Wills Award:
Biosolids Management Facility
City of Greater Sudbury, Ontario

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Introduction

Faced with both infrastructure deficits and fiscal constraints, governments are increasingly using public-private partnerships, or P3s, to deliver much-needed public infrastructure and services. There are currently over 200 P3s in procurement, under construction and in operation across the country.[1]

Compared to traditional public infrastructure procurement, P3s extend the expertise of the private sector beyond design and construction into the financing, maintenance and, in some cases, operations of a project, under a long-term contract. Public-private partnerships capitalize on the respective strengths of government and the private sector. Recent research by the Conference Board of Canada,[2] the Fraser Institute[3] and MNP[4] indicate that Canada has a strong track record of on-time, on-budget delivery and P3s are delivering significant value for money to Canadian taxpayers. Canada is now considered a global P3 leader.

A recent independent report commissioned by The Canadian Council for Public-Private Partnerships (CCPPP) showed that P3s have made major contributions to Canada's economy.[5] Based on a review of P3 projects in operation or under construction from 2003 to 2012, the report highlights the following cumulative economic impacts over those 10 years:

- 290,680 direct full-time equivalent (FTE) jobs;
- $19 billion in direct income/wages and benefits;
- $25.1 billion in direct gross domestic product (GDP);
- $51.2 billion in direct economic output;
- $9.9 billion in cost savings; and
- $7.5 billion in tax revenue to government.

Canada's P3 success is backed by Canadian public opinion. National and community-based surveys conducted by Nanos Research for CCPPP show that 62 per cent of Canadians are open to P3s and a majority support the use of P3s across key sectors of the economy, notably transit systems, roads, social housing and hospitals. In each of three communities surveyed (Winnipeg, Sault Ste. Marie, Moncton), a strong majority indicated support for P3s and recognized their benefit to taxpayers. They also agreed that these projects might not have been possible without the private sector as a partner in their design, construction, financing and maintenance.[6]

CCPPP established the National Awards for Innovation and Excellence to honour each year's outstanding Canadian P3 projects, and the awards are recognized as a "who's who" of both governments and the private sector involved in Canadian P3s. Gold, Silver and Awards of Merit are given for achievements in project financing, infrastructure, service delivery or other notable attributes to projects from across the country and at all levels of government.

Winning projects are chosen on the basis of the following criteria:

- innovative features;
- relevance or significance as a model nationally and/or abroad;
- economic benefit (job creation, enhanced economic value, export potential, etc.);
- measurable enhancement of quality and excellence of service or project;
- appropriate allocation of risks, responsibilities and returns between partners; and
- effective use of financing and/or use of non-traditional sources of revenue.

CCPPP has published 59 case studies of selected Award winners since 1998. The case studies are intended to be learning tools for both P3 practitioners and those new to the sector. Each one highlights the essentials of a project's deliverables, its procurement process, contracts, financing and risk allocation, benefits and lessons learned, helping to continuously improve Canada's P3 project delivery. A complete list of case studies is included in the Appendix, and all are available from the CCPPP bookstore: www.pppcouncil.ca/bookstore.

2013 National Award Case Studies

The three projects selected as case study subjects from the pool of six 2013 award-winners exemplify the diversity of Canada's current P3 market, and deliver infrastructure relating to law enforcement, social housing and wastewater biosolids treatment.

The Ontario Provincial Police Modernization project used an innovative integration of four mid-size regional contractors under the leadership of a large design-build contractor to deliver 18 facilities in 16 communities distributed widely across Ontario.

The Single Room Occupancy Renewal Initiative renovated 13 historic buildings in Vancouver's Downtown Eastside to provide safe housing for some of Canada's most vulnerable people. It was the first social housing project to obtain funding through PPP Canada, $29.1 million, and it achieved value for money of $5.2 million compared to the traditional procurement method.

Using a P3 to procure its Biosolids Management Facility, the City of Greater Sudbury achieved its financial and environmental objectives, balancing the risks and rewards of building and operating a community asset in partnership with the private sector. It also established a P3 procurement model that can be used by other small to mid-sized municipalities.

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[1] CCPPP Project Database: http://projects.pppcouncil.ca.

[2] Conference Board of Canada, *Delivering Value through Public-Private Partnerships at Home and Abroad*, August 2013. The study found 83% of recent Canadian P3s were delivered on time or early (p. 17).

[3] Fraser Institute, *Using Public-Private Partnerships to Improve Transportation Infrastructure in Canada*, May 2013. The report noted that 89% of P3s finished ahead of or on schedule; in the delayed projects, costs were borne by the private sector (p. 17).

[4] MNP, "Alternative Financing and Procurement Project Track Record Review" for Infrastructure Ontario, August 2013. Of the 30 projects studied, 29 were completed below budget and 22 were completed ahead of schedule or on time (pp. 3, 18).

[5] InterVISTAS, *10-Year Economic Impact Assessment of Public-Private Partnerships in Canada (2003-2012)*, December 2013.

[6] CCPPP, *The P3 Pulse: National and Community Opinions on Public-Private Partnerships in Canada*, April 2014.

2013 Award Winners

Gold Award for Transportation Innovation: Confederation Line

As the first phase of Ottawa's new light rail transit system, the Confederation Line P3 project combines the widening of Highway 417 with a 12.5-kilometre, 13-station LRT line. The performance-based contract with Rideau Transit Group will generate $3.2 billion in economic activity and 20,000 person-years of employment during construction. Once in operation, it will generate approximately $16 million in annual savings, reduce the City's annual diesel fuel consumption by 10 million litres, reduce traffic congestion in the downtown core and improve accessibility and ridership.

Gold Award for Infrastructure: Route 1 Gateway Project

The Route 1 Gateway Project linking New Brunswick's south to other Atlantic provinces and the USA attracted first-time support for a domestic P3 from Export Development Canada and the Business Development Bank of Canada. The project included the design, construction and financing of 55 kilometres of new four-lane highway, twinned sections and selected upgrades along the existing 235-kilometre stretch between St. Stephen and River Glade, as well as bridges and wildlife crossings. Seventy-five per cent of the design-build was completed by New Brunswick workers, suppliers and contractors, and the project was delivered under budget and ahead of schedule.

Silver Award for Project Financing: Northeast Anthony Henday Drive

Alberta's Northeast Anthony Henday Drive Project is the third section of Edmonton's ring road to be developed as a P3. It will complete a vital transportation corridor around Edmonton, including 27 kilometres of new divided freeway, nine interchanges, 10 flyovers, two bridges and 46 bridge structures. The project's P3 bond offering, the first since the 2008 financial crisis, achieved a spread of less than 200 basis points compared to equivalent Canadian government bonds. The $1.81 billion contract between Alberta Transportation and Capital City Link General Partnership provides value for money of $370 million compared to the Province's estimate for traditional procurement.

Silver Award for Infrastructure: OPP Modernization Project

Ontario's first Alternative Financing and Procurement project to be financed by a long-term fully amortizing bank loan since the 2008 financial crisis, the OPP Modernization Project bundled 18 facilities across Ontario into one project, enabling it to attract national and global developers and investors. Early prototyping, then transferring learning to subsequent projects, ensured consistent quality and timely delivery for the entire portfolio. Four mid-size regional contractors led by a large design-build contractor harnessed the skills and knowledge of local contractors, employed local workforces and stimulated regional economies. The $292.7 million project provided value for money of $51.3 million compared to traditional delivery.

Silver Award for Social Housing Innovation: Single Room Occupancy (SRO) Renewal Initiative Project, Downtown Eastside

Thirteen single-room occupancy (SRO) hotels owned by BC Housing in Vancouver's Downtown Eastside, century old buildings housing approximately 900 of some of Canada's most vulnerable residents, were in urgent need of renovation. Procuring interim accommodation for displaced tenants, providing ongoing access to medical and social programs during renovations, and staging the construction completion payments are among this P3's innovations. The project achieved value for money of $5.2 million compared to traditional procurement. By providing more stability, autonomy and dignity for residents, it will also reduce the human and economic costs of homelessness.

Chuck Wills Award for Innovation and Excellence in Public-Private Partnerships: Sudbury Biosolids Management Facility

After 30 years of disposing of its sewage sludge in nearby mining tailing ponds, the City of Greater Sudbury partnered with N-Viro Systems Canada LP to find a more environmentally sustainable solution; the Biosolids Management Facility will also generate a value-added product to be used in agriculture and mining reclamation. Sudbury's first P3 and the first P3 biosolids project in Canada using the PPP Canada funding structure. Lessons learned from its integration of small and medium-sized local design and construction partners can be applied to similar P3 municipal projects across the country.

P3 Champion

John M. Beck, chair and CEO of Aecon Group Inc., has led heavy civil, commercial and industrial projects during more than 50 years in the Canadian and global construction industry, and has deep knowledge of and expertise in P3s. A Fellow of the Canadian Academy of Engineering, he is former chair of the Ontario Power Authority board and has served on the boards of the Macdonald-Laurier Institute for Public Policy, the Ontario Financing Authority, the Canadian Council of Chief Executives and CCPPP.

Acknowledgements

CCPPP has a dedicated Awards selection panel made up of volunteers who review an increasingly high calibre of submissions, choose the winners each year and review the case studies to ensure they capture the essence of the projects. The following panelists comprised the 2013 selection committee:

- Jack Davis, Chair, CEO.Mobile Inc.
- Peter Hepburn, Head & Managing Director Infrastructure Finance Group, National Bank Financial
- Cliff Inskip, Managing Director, Head of Infrastructure & Project Finance, CIBC World Markets
- Alain Massicotte, Partner, Blake, Cassels & Graydon LLP
- Larry McCabe, Clerk-Administrator, Town of Goderich
- Johanne Mullen, Partner, PricewaterhouseCoopers LLP
- Cynthia Robertson, Principal, Parkridge Consulting (Chair, CCPPP National Awards Committee)
- Alan Russell, Professor & Chair, Computer Integrated Design & Construction, Department of Civil Engineering, University of British Columbia

We would like to acknowledge the contributions of Cynthia Robertson, who chaired the Awards Committee for seven years and helped to raise the profile of the CCPPP National Awards program.

The Awards are made possible by the generous support of the following 2013 sponsors:

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DAVIES

FASKEN MARTINEAU

STONEBRIDGE

The case studies are developed with significant input and review from the project partners and procurement agencies as well as the diligent work of the researchers. CCPPP would like to thank them for their contributions as well as PPP Canada for its research support for the case studies.

PPP Canada

About CCPPP

Established in 1993, CCPPP is a national not-for-profit, non-partisan, member-based organization with broad representation from across the public and private sectors. Its mission is to promote innovative approaches to infrastructure development and service delivery through public-private partnerships with all levels of government. The Council is a proponent of evidence-based public policy in support of P3s, facilitates the adoption of international best practices, and educates stakeholders and the community on the economic and social benefits of public-private partnerships. The Council organizes an annual conference, which is recognized internationally as the premier gathering for P3 practitioners, and where Canada's leading P3s are celebrated through the National Awards for Innovation and Excellence.

CCPPP conducts research on topical P3 issues and sectors to help further the understanding and best practices of Canada's P3 market. Our reports, case studies, guides and surveys are available in the CCPPP bookstore at: www.pppcouncil.ca/bookstore.

Quick Facts – Greater Sudbury Biosolids Management Facility[7]

Project type

Design-Build-Finance-Operate-Maintain (DBFOM)

Asset/Service

22-year agreement to design, build, finance, operate and maintain a biosolids management facility to convert sewage sludge into a beneficial end product:

- 2-year design and construction period
- 20-year operating period

Status

Construction commenced June 17, 2013

Partners

City of Greater Sudbury
N-Viro Sudbury LP[8]

Other Participants

Public Sector

- KPMG LLP – Transaction and Financial Advisor
- Blake, Cassels & Graydon LLP – Legal Advisor
- RV Anderson Associates Ltd. – Technical Advisor
- Knowles Consultancy Services Inc. – Fairness Advisor

Private Sector

- PMX Inc. – Project Management
- Tribury Matheson Group and W.S. Nichols – Construction Joint Venture
- Cole Engineering Group – Engineering
- RWDI Air Inc. – Air & Noise Consultant
- Corpfinance International Ltd. – Transaction and Financial Advisor
- Gowlings LLP – Legal Advisor

Financing

Total project cost

- $63.1 million – construction price
- $149.2 million net present value (NPV)[9] – total cost over the 22-year life of the project

Project development & financing

- $13 million equity: N-Viro Systems Canada LP[10]
- $54 million debt financing facilities: 2-year construction and 10-year long-term financing

Completion payment:

- $36.3 million from Greater Sudbury
- $11 million from PPP Canada

Service payments:

- during the operating period with capital and operating components

Value for Money

- $11.1 millinn NPV

Other features & benefits

- first P3 for Greater Sudbury
- first P3 biosolids project in Canada using PPP Canada funding structure
- four-phase procurement process including negotiations protocol phase not requiring committed financing
- multi-faceted risk analysis incorporating risk transfer for operating proprietary technology and producing a beneficial end product for use in agriculture and mine reclamation
- sustainable solution to manage sewage sludge

Project website

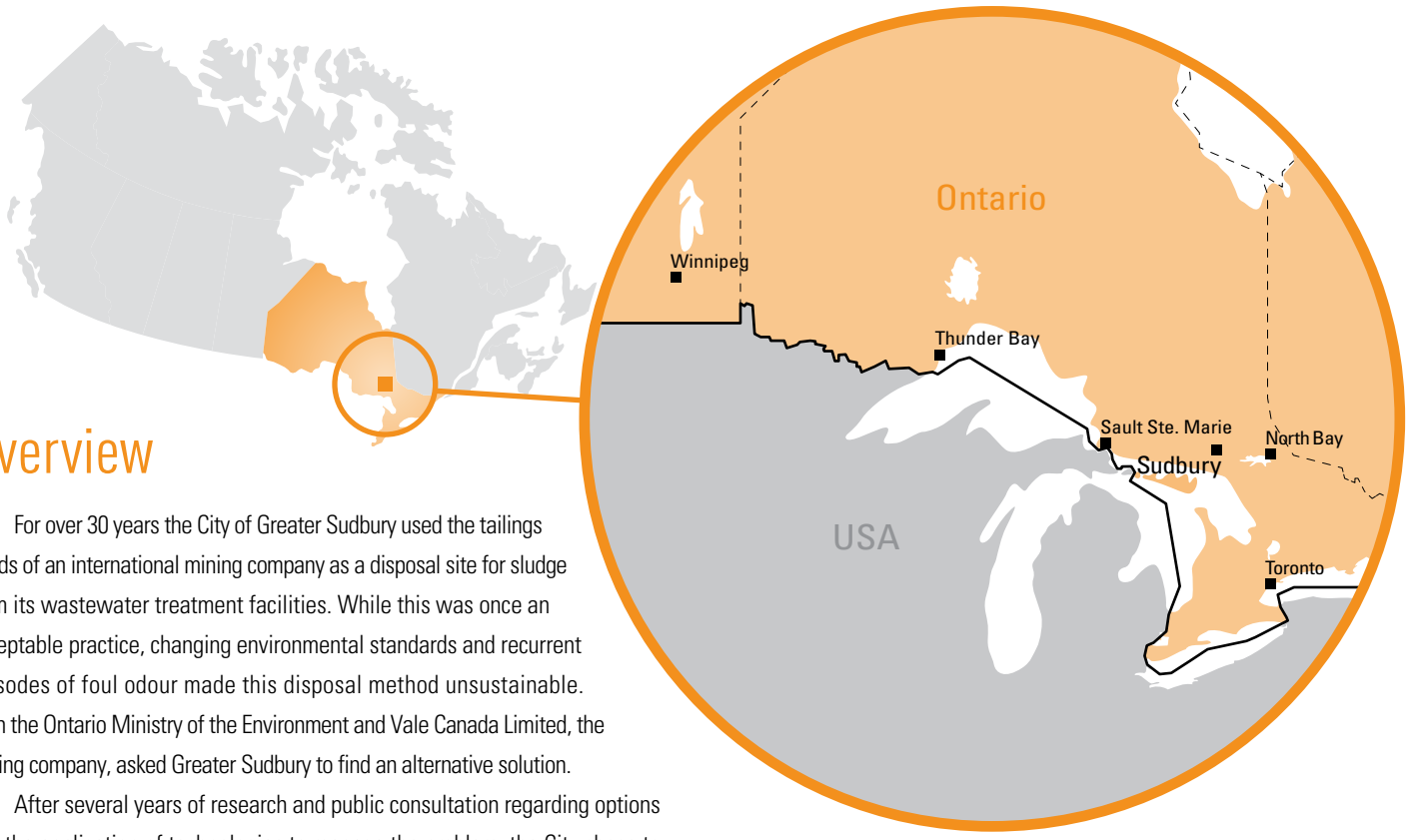
www.greatersudbury.ca/living/sewer-and-water/biosolids-management/

[7] Background and facts in this case study rely on the information contained in the award application submitted jointly by the project partners in September, 2013, to the Canadian Council for Public-Private Partnerships. Information from the submission has been supplemented and updated with information from the procurement documents, the project agreement, the value-for-money and project report, municipal council minutes and website, and personal interviews with project partner representatives.

[8] N-Viro Sudbury LP is now part of the Walker Environmental Group, a division of Walker Industries Group of Companies.

[9] Net Present Values are calculated as at the financial close date (June 13, 2013) using a discount rate of 4.5% which represents the long-term average borrowing cost of the City of Greater Sudbury.

[10] N-Viro Systems Canada LP is now part of the Walker Environmental Group, a division of Walker Industries Group of Companies.



Overview

For over 30 years the City of Greater Sudbury used the tailings ponds of an international mining company as a disposal site for sludge from its wastewater treatment facilities. While this was once an acceptable practice, changing environmental standards and recurrent episodes of foul odour made this disposal method unsustainable. Both the Ontario Ministry of the Environment and Vale Canada Limited, the mining company, asked Greater Sudbury to find an alternative solution.

After several years of research and public consultation regarding options and the application of technologies to manage the problem, the City chose to use a design-build-finance-operate-maintain (DBFOM) public-private partnership (P3) procurement model to build a new biosolids management facility. The new facility will convert the sewage sludge into a stable and beneficial end product that can be used in agriculture and mining reclamation applications and will provide economic and environmental benefits to the community.

Under the terms of the P3 agreement the private partner, N-Viro Sudbury LP, will design, build, finance, operate and maintain the Greater Sudbury Biosolids Management Facility (the project).

Construction will take approximately two years, followed by an operations and maintenance period of 20 years. The facility will be owned by the City throughout the duration of the project with operations being transferred to Greater Sudbury at the expiration of the O&M period. Construction began immediately after the project reached financial and commercial close on June 13, 2013.

This is the first P3 for the City and the first P3 biosolids project in Canada using the PPP Canada funding structure. The project agreement is performance-based, with a guaranteed completion date. It was a steep learning curve for City staff as they adapted the P3 procurement process to the needs of a mid-sized municipality and learned about transferring certain risks to the private sector while maintaining public-sector accountability.

The project will allow the City to meet its future wastewater disposal needs using a method that is both environmentally responsible and sustainable. It is expected to provide $11.1 million NPV in cost savings to taxpayers and will improve residents' living conditions.

The CCPPP Awards Committee selected this project for the Chuck Wills Award, which is given periodically to municipalities for outstanding P3 projects. By choosing a P3 approach, Greater Sudbury learned how to balance the risks and rewards of building and operating a community asset in partnership with the private sector and achieved its financial and environmental objectives. The City also created a modified P3 procurement model for small to mid-sized municipalities.

The project received funding support from the Government of Canada through PPP Canada and the P3 Canada Fund in the amount of $11 million.

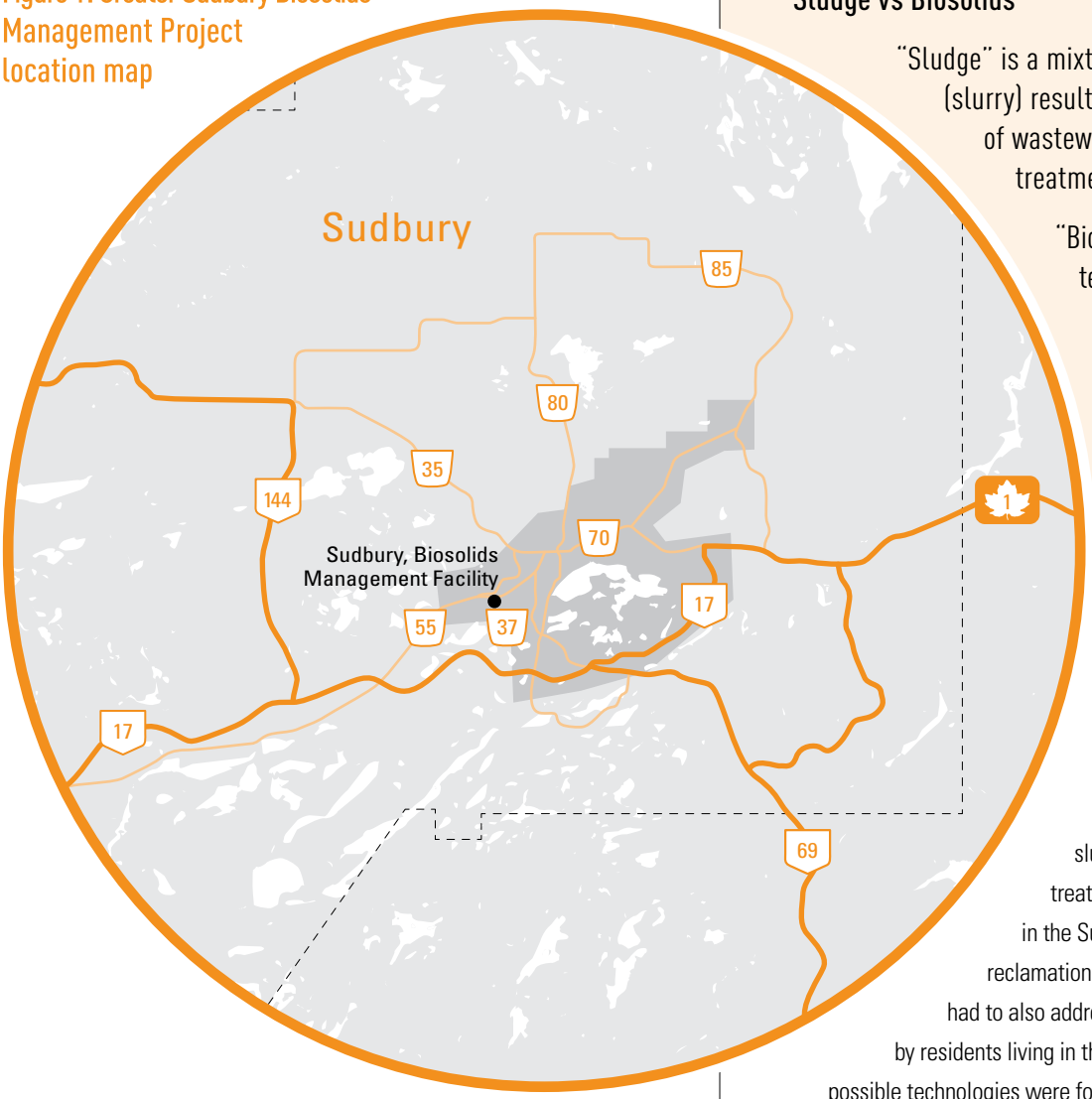
This case study will highlight some of the key initiatives and decision-making strategies that contributed to the project's success. It will help to inform municipal officials across Canada considering how to revitalize municipal infrastructure with limited budgets.

Background and rationale

Greater Sudbury is located in Northeastern Ontario about 400 kilometres north of Toronto. It has a population of approximately 160,000 and is 3,238[11] square kilometres in area. Greater Sudbury is the largest municipality in the province by area and the sixth largest in Canada.[12] It is a world-renowned mining centre supporting a 300-company mining supply and service sector and employing 16,000 people.[13] Figure 1 shows the location of the facility.

[11] http://www12.statcan.gc.ca/census-recensement/index-eng.cfm
[12] http://en.wikipedia.org/wiki/List_of_the_100_largest_cities_and_towns_in_Canada_by_area
[13] City of Greater Sudbury: www.greatersudbury.ca

Figure 1: Greater Sudbury Biosolids Management Project location map



The City currently operates nine secondary wastewater treatment plants.[14] Sludge is collected from these plants by truck and hauled to the City's sludge transfer station located in Lively, 27 kilometres west of the Sudbury Waste Water Treatment Plant (SWWTP), where it is pumped to the tailings ponds of Vale Canada Limited. This practice was in place for the past 30 years; however, in the late 2000s, the Ontario Ministry of the Environment and Vale Canada told the City it would soon no longer be able to use the tailings ponds for this purpose.

As a result, in 2008, Greater Sudbury initiated the development of a biosolids master plan through Ontario's Class Environmental Assessment (EA) process. After extensive research and public consultation, the plan was reported to City Council in February 2009. It recommended the construction of a new biosolids management facility that would use technology to convert the sewage sludge into a beneficial end product such as a soil amendment or fertilizer. Council members adopted the recommendations in the Sudbury Biosolids Master Plan EA, and decided that the new facility would be located on the site of the existing SWWTP.

Sludge vs Biosolids[15]

"Sludge" is a mixture of solids and liquid (slurry) resulting from the treatment of wastewater at wastewater treatment plants.

"Biosolids" is a generic term referring to sewage residuals containing nutrients and organic matter resulting from the treatment of municipal wastewater.

The new facility would deliver several benefits to the City and its residents including that of meeting the City's future wastewater disposal needs with an environmentally sustainable system. Rather than disposing of the sludge in the tailings ponds, it would be treated and the end product could be used in the Sudbury area for agriculture and land reclamation. Whatever technology was selected had to also address complaints about odour made by residents living in the vicinity of the SWWTP. Several possible technologies were found during the development of the biosolids master plan.

City Council members anticipated that additional benefits could be realized by implementing the project under a P3 model as they could leverage the experience of the private sector to operate the facility and find markets for and distribute the resulting product. This was especially important to them since the City had no in-house experience in treating biosolids or in marketing or distributing a value-added product. Council members recognized that it would be costly to train and retain individuals with the required skills and that the operating and marketing skills and distribution networks brought to the table by a private-sector partner would be invaluable.

[14] A municipal wastewater treatment plant produces two components: a liquid portion, which is cleaned and typically released under environmental permit back into an appropriate waterway, and a residual solid portion known as "sludge." This project is concerned with the processes related to the second component – the sludge.

[15] Ontario Ministry of the Environment webpage: *Subject Matter, Biosolids* http://www.ene.gov.on.ca/environment/en/subject/biosolids/index.htm

Municipal objectives

City Council identified several important objectives for the project, including

- to meet the City's future wastewater disposal needs based on an environmentally responsible system (i.e., cease disposing sludge in the tailings ponds, stabilize sludge and produce a beneficial end product);
- to provide services to residents that are environmentally sustainable and in keeping with industry best practices;
- to ensure the biosolids management facility and improvements to the existing infrastructure provide value for money for City taxpayers;
- to transfer appropriate risks to the private partner;
- to ensure the continual provision of quality waste disposal services during redevelopment of the SWWTP;
- to ensure that safe construction and operation practices are followed during the redevelopment of the SWWTP; and
- to meet the City's requirements to reduce odour complaints.

Description of the Project

The project involves the design and construction of a new biosolids management facility and upgrades to existing infrastructure at the SWWTP. Once the construction is completed, the City will take ownership of the facility and the private partner will operate and maintain it for a 20-year period. The private partner is also responsible for the repair and lifecycle replacement of the equipment and facilities during the O&M period.

The project also includes the retrofit of existing tanks to accept wastewater from rural areas which cannot be brought to the SWWTP via the municipal sewer system. This wastewater, also known as "septage," will be delivered to the site by specialized trucks to the septage receiving station and then pumped to the SWWTP for full treatment.

The project agreement requires that the equipment provided by the private partner be designed so that in the event of failure or process interruptions a second backup system is available to provide continuous treatment of inputs from the sewage treatment plants operated by the City.

The main components of the construction phase of the project:

- design and construction of a new biosolids management facility including thickened-sludge pumping station and sludge dewatering, sludge stabilization/conversion and storage facility;
- design and construction of a new sludge/septage receiving facility;
- design and construction of a new sludge thickening facility; and
- general site works such as upgrades to electrical substation, utility services, site access and parking, and fire detection and suppression systems.

Figure 2 shows the project site plan.

Procurement Process

Selecting the P3 model

The City of Greater Sudbury typically uses a traditional design-bid-build (DBB) approach for service and infrastructure delivery while taking on full responsibilities and risks for the design, construction, financing, maintenance and operations of a facility. An important element in P3 delivery approaches is the transfer of some or all of these key risks to the private sector. The general principle in risk allocation is that risks should be assigned to the party best able to manage them.

As part of the planning stage for the Greater Sudbury biosolids project, a risk matrix was developed through review of precedent industry documents and discussions among project team members. The objective of the risk matrix was to identify project risks that could occur during the design, construction, operations and maintenance phases and to facilitate the quantification of these risks.

On October 28, 2010, a risk workshop was conducted with representatives from the project team including City staff, RV Anderson Associates Ltd. (technical advisor to the City), KPMG LLP (transaction and financial advisor to the City) and officials from PPP Canada. The purpose of the workshop was to come to consensus on the contents of the risk matrix to be used in the value-for-money (VFM) analysis. The risk matrix was finalized in December 2010 prior to the release of the Request for Proposals (RFP).

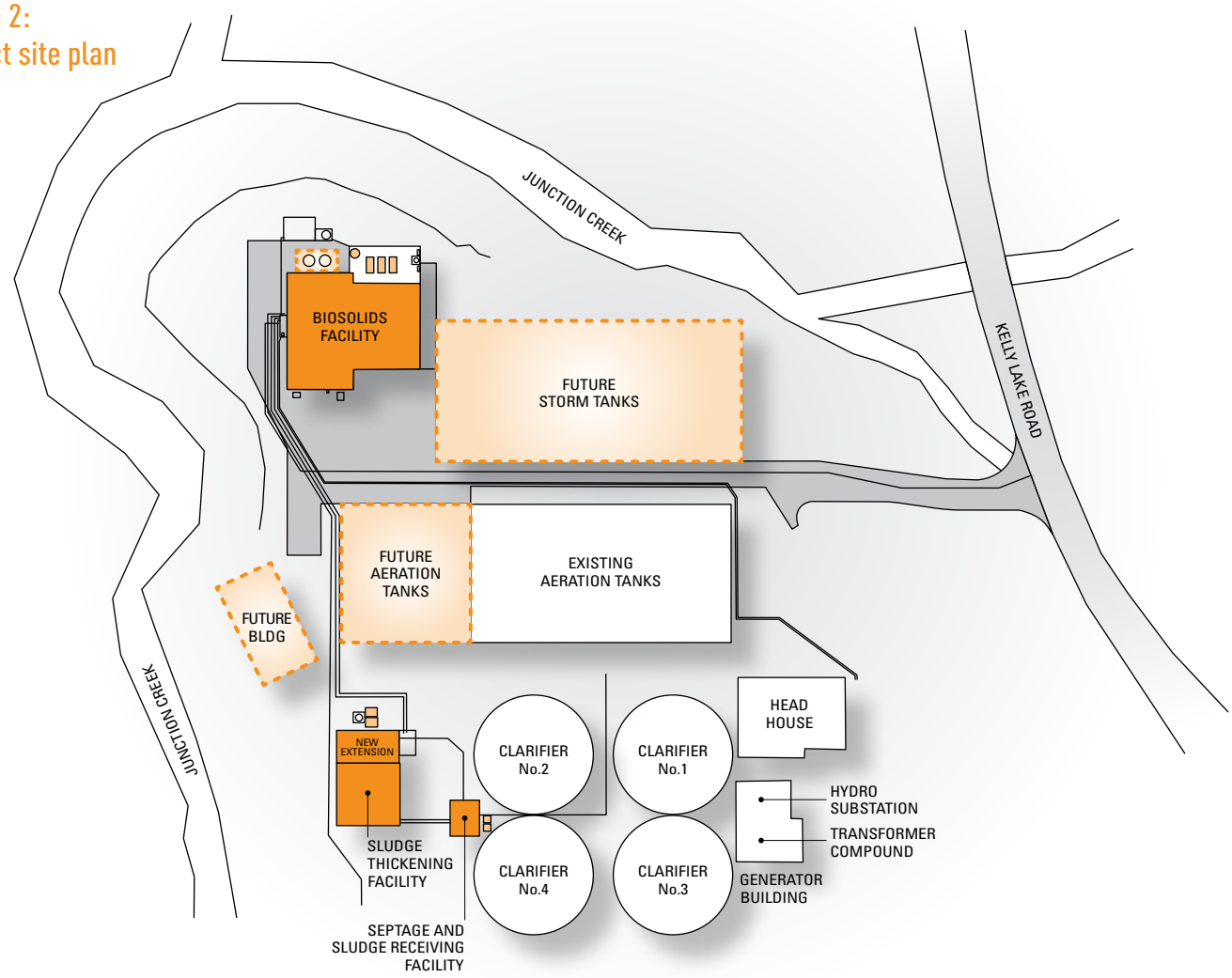
The following risks were identified and considered for each stage of the project:

- planning and procurement stage – risks involving availability of funding from the City, market and capacity risk, risks involving land acquisition, and financial risk related to changes in capital markets prior to start of the project;
- design stage – risks related to design errors and specifications;
- construction stage – risks related to geotechnical and environment risks, construction delays, permitting approval risks, cost overruns, latent defects and scope changes, and contractor failure or default;
- operations stage – risks related to building operations and maintenance, building rehabilitation, coordination among parties (facility operators, maintenance contractors and City staff), and operator performance.

For each identified risk, the probability and cost impact of risk occurrence were assessed for both the traditional DBB delivery model and the P3 DBFOM model. Aggregate values of risks retained by the City were estimated under both models.

Preliminary analysis showed the project, if delivered using a DBFOM P3 delivery model, would provide value for money for Greater Sudbury taxpayers. On this basis, the City applied for funding support through the P3 Canada Fund. As a prerequisite for this funding, the City was required to demonstrate to PPP Canada that the project would generate value for money.

Figure 2:
Project site plan



In January 2011 City Council adopted a DBFOM project delivery model and authorized city staff to proceed with the project. The selected consortium would finance the entire project cost during construction and provide a portion of the long-term (20-year) project financing.

Selecting a partner

Competitive process

Greater Sudbury chose a three-phase procurement process, which was modified following the RFP phase to include a fourth phase.

Phase 1: Statement of Interest (SOI)

In January 2010, the City issued a request for statements of interest (SOI) to solicit the marketplace for technology and service providers, which in the City's opinion presented the best opportunity for developing a successful biosolids management program. Through the SOI process, the City selected the following technologies as eligible for the project:

- BioCon, supplied by Veolia Water Solutions & Technologies Canada Inc;
- Bioset, supplied by Schwing Bioset Inc;
- Lystek, supplied by Lystek International Inc; and
- N-Viro, supplied by N-Viro Systems Canada LP.

Phase 2: Expressions of Interest (EOI)

The EOI process ran in June and July 2010. Based on pre-established evaluation criteria the City identified the following shortlist of four proponents, each of whom would supply one of four eligible technologies selected through the SOI process:

- Graham Design Builders – Lystek Process
- Kenaidan Contracting Ltd/CH2M Hill – Bioset Process
- Maple Reinders/Veolia Water Solutions and Technologies – BioCon Process
- N-Viro Systems Canada LP – N-Viro Process

Phase 3: Request for Proposals (RFP)

During the RFP phase, the four pre-qualified proponents were invited to submit proposals to design, build, finance, operate and maintain the new biosolids management facility. The RFP was issued on March 14, 2011, and included a draft project agreement. Proposals were received on January 27, 2012, from two of the four proponents, N-Viro Canada and Veolia Water Solutions and Technologies with Plenary Group (Veolia/Plenary Group).

Proposals were evaluated based on compliance, technical elements and financial elements. Both proponents submitted strong technical proposals; however, due to submission compliance issues, the City decided to continue the process using a negotiations protocol agreed to by all parties.[16]

Phase 4: Negotiations Protocol

Council directed staff to enter into negotiations with both private-sector parties to arrive at the best solution for the City. The objectives were to

- review the scope of the project;
- resolve contract terms and conditions; and
- reduce the capital and operating costs for the project.

Submission requirements and evaluation criteria were also developed to assess and evaluate the final submissions under the negotiations protocol. The criteria were divided into three categories: technical, financial and risk allocation. Each category was further broken down into detailed evaluation criteria. The criteria were heavily weighted towards price because both parties had demonstrated strong technical abilities to meet the City's requirements for the project.

Table 1 summarizes the evaluation criteria and total points allocated. The successful bidder would have the lowest-cost technically compliant submission.

Table 1: Negotiations protocol evaluation criteria

Criteria	Maximum Points
Technical solution and adherence to output specifications and operating & maintenance requirements	800
Acceptance of risk sharing as specified in the project agreement	300
Financial plan	400
Financial offer (based on net present value)	2,500
Total Score	**4,000**

During the negotiation period, some minor scope adjustments were made to the project requirements and the project agreement to achieve reductions in both the capital and operating costs from the original RFP and to optimize risk sharing. The two private-sector bidders were asked to respond to the same project requirements and draft DBFOM contract.

On October 9, 2012, final submissions were received from N-Viro Canada and Veolia/Plenary Group. The submissions included the proposed full technical solution, an updated financing plan and a revised financial offer to reflect the amended draft DBFOM contract.

Based on the evaluation criteria N-Viro Canada was the highest-scoring consortium, having submitted a strong technical proposal that effectively met the City's requirements and was also priced the lowest; however, it did not provide fully committed financing and was scored accordingly. Although in its submission requirements the City indicated its preference for fully committed financing, it was not a mandatory requirement of the negotiations protocol. This work still needed to be completed by the lenders, who were not yet committed to N-Viro Canada.

On November 20, 2012, Council passed the following resolution:

That the City of Greater Sudbury authorize the General Manager of Infrastructure Services to enter into an agreement with N-VIRO SYSTEMS CANADA LP ("N-Viro") or a corporate entity owned or controlled by N-Viro for the Design, Build, Finance, Operation and Maintenance ("DBFOM") for the Biosolids Management Facility; such authority being subject to the following conditions which are to be met to the satisfaction of the City and within appropriate timelines as set by the City:

1. *N-Viro providing evidence of fully committed financing and an updated financing plan for the project; and,*
2. *N-Viro executing the Project Agreement in substantially the same form as currently finalized and for the amounts submitted.*

Financial and commercial close

N-Viro Canada subsequently satisfied the conditions of City Council's resolution and on June 13, 2013, financial close for all financing was achieved with lenders and the project agreement was executed between the City of Greater Sudbury and N-Viro Sudbury LP, a special purpose vehicle (SPV) incorporated to execute the project.

Table 2 summarizes the overall project timeline.

[16] In interviews with Greater Sudbury officials on February 5, 2014, it was explained that there were compliance issues with both proposals relating to a City purchasing by-law. Given its investment in time and other resources to that point, the City felt it was prudent to find a way to move forward with the two proponents. After consultation with advisors and proponents the City decided to continue the process using a negotiations protocol.

Table 2: Timeline

2008–2009

Preparation of Biosolids Master Plan & Environmental Assessment with public consultation components

2009 February 18

Biosolids Master Plan recommendations adopted by City Council

2010 January 13

Statement of Interest issued

2010 February

Statement of Interest closed

2010 June 8

Expression of Interest issued

2010 July

Expression of Interest closed

2011 January

City Council authorized proceeding with DBFOM project delivery model

cont.

2011 March 14

RFP issued

2012 January 27

RFP closed

2012 March 6

City Council decision to continue process using a negotiations protocol

2012 October 9

Final submissions received from proponents

2012 November 20

City Council resolution selecting preferred proponent

2013 June 13

Financial and commercial close

2013 June 17

Construction started

2015 May 15

Guaranteed construction completion date as per project agreement

Fairness of the process

Knowles Consultancy Services Inc. was engaged as fairness monitor to review the City's procurement process from the release of the RFP to the selection of the preferred proponent to ensure the processes used were fair and followed the provisions of the RFP document. The fairness monitor used first-hand observations of the process by attending procurement meetings and reviewed all procurement documents and information.

A confidential report[17] prepared by Knowles for the City stated that

- *The procurement process was consistent with that outlined in the RFP;*
- *The evaluation criteria were applied in accordance with the stipulations of the RFP document;*
- *All bidders were treated consistently and in accordance with the stipulations of the RFP;*
- *City staff and external advisors adhered to conflict-of-interest and confidentiality requirements.*

The negotiation process was also overseen by a fairness monitor from Knowles Consultancy Services Inc., who issued a fairness opinion:

It is our view that that the negotiations and selection process that we monitored in respect of the Biosolids Management was conducted in a fair manner, and specifically, was conducted in accordance with the guidelines of the negotiations and selection process as set out in the Negotiations Protocol.

Role of the fairness monitor[18]

The task is to offer an assessment about the procedures established by the RFP and the carrying out of those procedures by the public sector.

The subject of judgment is whether the recommended selection process by the evaluation committee has been carried out in a fair and reasonable manner.

The review is of procedure, not of substantial decisions.

It is not the role of the fairness monitor to establish the selection procedures, nor to make or suggest the selection, nor to offer legal opinions about the duties of anybody in the process.

Overall Structure of the Agreement

N-Viro Sudbury executed the following drop-down contracts with members of the N-Viro Canada consortium for the design, construction, financing, maintenance and operations of the project:

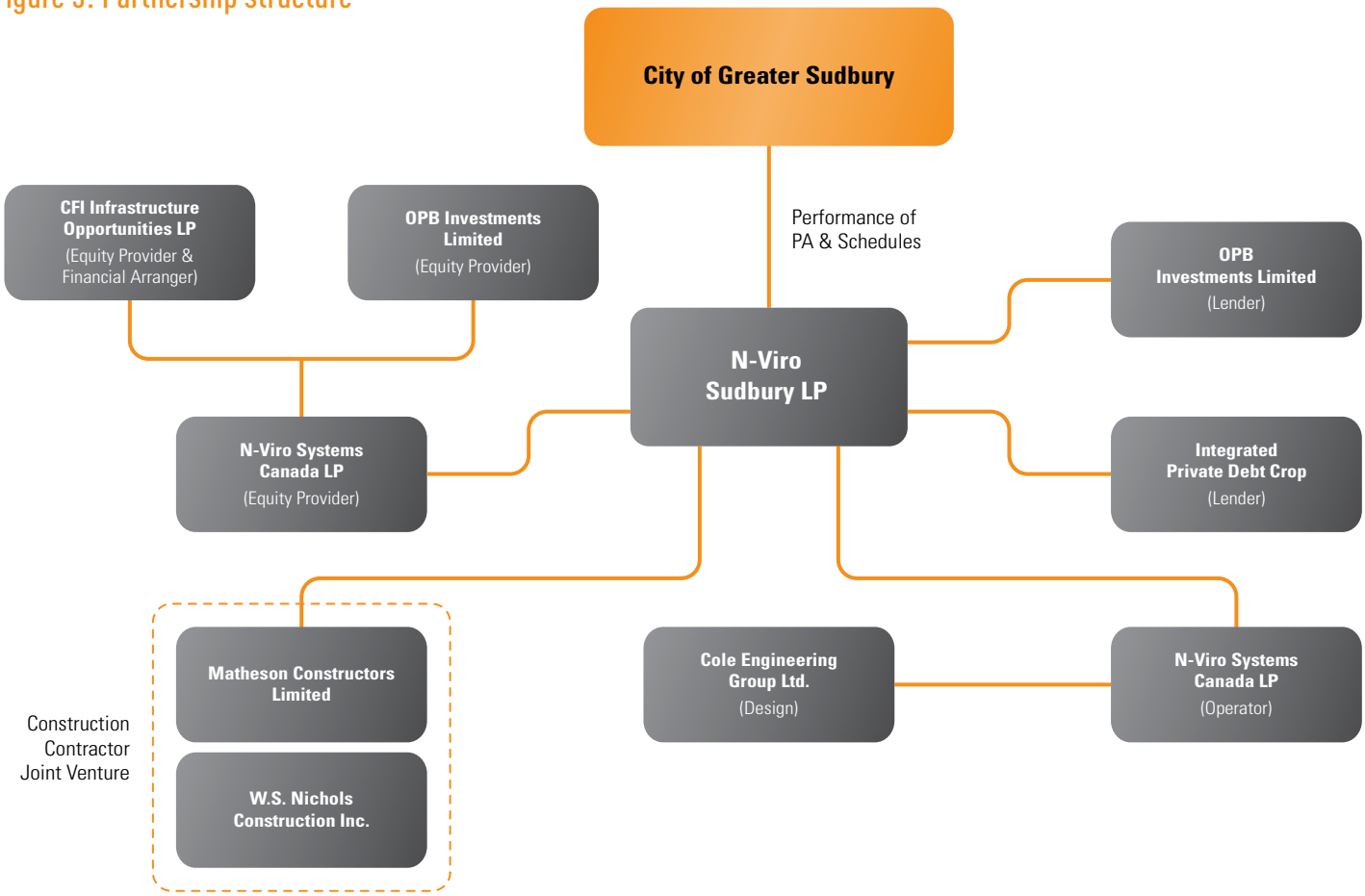
- N-Viro Systems Canada LP (the parent company of N-Viro Sudbury) – technology provider and operator;
- PMX Inc. – project management;
- Tribury Matheson Group and W.S. Nichols – joint venture constructor;
- Cole Engineering Group – design; and
- RWDI Air Inc. – air and noise consultant.

Figure 3 illustrates the agreement partnership and financing structure.

[17] Knowles, City of Greater Sudbury Biosolids Project RFP: Fairness Monitor's Report (Confidential).

[18] The Canadian Council for Public Private Partnerships, *2009 National Award Case Studies, Silver Award for Project Financing, Royal Jubilee Hospital Patient Care Centre*, p. 102.

Figure 3: Partnership structure



Left to right: Doug Nadorozny, Chief Administrative Officer; Lorella Hayes, Chief Financial Officer/Treasurer; Tony Cecutti, General Manager Infrastructure Services; Greg Clausen, former GM Infrastructure Services; Councillor Ron Dupuis; Councillor Dave Kilgour; Mayor Marianne Matichuk; Rob Sampson, President, N-Viro, during the official ground breaking ceremony.

Financial Arrangements

The Greater Sudbury project is the first P3 biosolids management project using the PPP Canada structure for P3 deals in Canada.[19] Its construction price of $63.1 million is relatively small in the Canadian P3 market; often this project size is considered unattractive among the large financial and construction firms. Corpfinance International Ltd. (the CFI Group) acted as financial advisor and placement agent for N-Viro Sudbury and was able to secure financing involving medium-sized Canadian financial firms.

There were four unique features to the financial and project group structuring for this project that stood apart from typical P3 transactions in the Canadian marketplace:

- **Deal and participant size:** Because of its relatively small size, the project did not attract participation from large financial and construction firms, which typically look for significant transaction costs to compensate for bidding efforts and bidding risks. This issue was resolved by the use of medium-sized project partners in the project consortium. In typical Canadian P3s, medium-sized entities accept similar project bidding risks and costs even though they participate at more junior levels in the consortium. Medium-sized Canadian companies were invited to participate in the N-Viro Sudbury consortium to reduce the transaction costs associated with the bid and hence offer the City a competitive bid. However, the financing risk associated with the use of medium-sized consortium partners had to be mitigated by higher than normal performance guarantees and security.
- **Proponent size:** N-Viro Canada is a medium-sized Canadian limited partnership. In typical Canadian P3 transactions, large, often multinational, firms are the main project proponents. The proposal was led by the proposed technology supplier and project operator (N-Viro Canada), thereby removing a layer of involvement and cost to the overall project. However, the financial risk of a medium-sized Canadian entity acting as main proponent had to be mitigated for the lenders.
- **Engineering, procurement and construction (EPC) vs. E and PC drop-down agreements:** The final deal structure had two separate agreements – one for facility design and another for facility procurement and construction. Typical P3 transactions have these roles combined into one agreement; however, due to the size of the project consortium members and the need to ensure that design met both short-term (construction) and long-term (operations) needs, it was decided that the drop-down agreements would be split into two separate components, with two separate counterparties performing those services. The financial risk associated with this split had to be mitigated.
- **Long-term loan financing:** As part of the financing structure, the City required the proponent to finance 25 per cent of the total project cost over 20 years. N-Viro Sudbury funded that obligation using a term loan with a maturity of less than 20 years. The refinancing risk associated with this maturity mismatch had to be mitigated.

Financing

To support the $63.1 million construction cost, the CFI Group arranged $54 million of debt financing consisting of a combination of two-year construction and 10-year long-term financing provided by Canadian institutional investors.

The project was funded using

- $13 million in equity, raised by N-Viro Systems Canada and injected into N-Viro Sudbury, made up of contributions from
  - CFI Infrastructure Opportunities LP (the private equity fund that owns N-Viro Canada) ($3 million); and
  - the Ontario Pension Board ($10 million).
- a two-year construction-only financing with a two-year tenor raised by N-Viro Sudbury and provided by
  - The Ontario Pension Board – $16 million; and
  - Integrated Private Debt – $13 million.
- a $12 million two-year construction loan converting to an eight-year term loan raised by N-Viro Sudbury and provided by Integrated Private Debt.

Payments

Completion payment

Upon substantial completion of the project, the city will make a payment to N-Viro Sudbury for 75 per cent of the construction price ($47.3 million). The balance of $15.8 million will be financed over the 20-year operating term, with N-Viro Sudbury receiving annual capital payments from the city to cover long-term financing costs.

Of the $47.3 million to be paid by the City at substantial completion, $11 million will come from PPP Canada and the City will incur debt to make the remainder.

[19] *The Canadian Council for Public Private Partnerships Project Database:* http://projects.pppcouncil.ca

Service payment

Following facility commissioning, the City will make monthly performance-based service payments to N-Viro Sudbury with a capital component and an operating component:

- Capital payments amounting to $1,374,000 annually will cover repayment of the 25 per cent balance of the completion payment and related long-term financing.
- Operating payments are projected to be $2,802,000 in the first year of the contract. They will be adjusted annually for inflation and the quantity of sludge processed, and will be subject to deductions for non-performance.

Revenue sharing

N-Viro Sudbury is also responsible for the marketing and distribution of the final product, known as N-Rich. The project agreement specifies that the City is entitled to five per cent of gross revenue from the sale of N-Rich to be paid semi-annually on an ongoing basis. If N-Viro Sudbury fails to submit the appropriate revenue share there is a provision in the project agreement for the amount to be deducted from the operating payment. The operator has full control and responsibility for end-product sales and is free to develop new and innovative markets for N-Rich in the Greater Sudbury area.

Other

Refinancing risk

While the operating period is 20 years and the amortization of the long-term debt is also 20 years, the financing is only in place for a total of 10 years; therefore, there is refinancing risk in the project. The project agreement assigns 100 per cent of the refinancing risk to N-Viro Sudbury. However, if there is any refinancing gain the City shares in it as calculated by a pre-set formula.

Letters of credit

Other financial items that anchor the risk transfer include a $5 million letter of credit provided by N-Viro Sudbury to the City on financial close and to be held until $4 million of infrastructure is in the ground. There are also handover provisions for either a letter of credit or a reduction in payments in the event of life cycle costs within four years of handover. During construction, the performances of the contractor and N-Viro Sudbury are secured by over $4 million in cash or letters of credit and sizeable contingencies.

Risk Allocation

While the City maintains full ownership of the facility, it has transferred a number of key risks to the private partner, including the potential for construction cost overruns and operating cost escalations. As the City lacks experience with biosolids management technology the latter is particularly important. Some of the key risks transferred to N-Viro Sudbury:

- **Construction cost overruns** – N-Viro Sudbury bears the risk of any construction costs above the price agreed to in the contract.
- **Project financing** – N-Viro Sudbury is responsible for 100 per cent of construction financing and receives no payments until construction has been completed and commissioning is achieved. Should N-Viro Sudbury default during the operating period the City retains 25 per cent of the net present value of the outstanding capital. Hence, capital is at risk for N-Viro Sudbury throughout the term of the agreement.
- **Project schedule** – N-Viro Sudbury must have the biosolids management facility and related improvements to the existing infrastructure available within 24 months of execution of the agreement. Should N-Viro Sudbury fail to meet this requirement, it will then be responsible for the disposal of sludge from that date and will receive reduced payments. N-Viro Sudbury must manage the construction schedule to meet this date.
- **Permitting and approvals** – N-Viro Sudbury is responsible for obtaining and complying with the Ontario Ministry of Environment's *Environmental Compliance Approval* for *Sewage/Air & Noise*.
- **Operating cost overruns** – N-Viro Sudbury will receive a monthly payment for the operation of the biosolids management facility based on a predefined payment rate for the quantity of sludge processed. Any increased operating and maintenance costs above the contract price are the responsibility of N-Viro Sudbury.
- **Biosolids production** – N-Viro Sudbury is responsible for producing Class A biosolids and will receive reduced payments if this is not achieved as a result of their processes.
- **Odour limits** – N-Viro Sudbury is responsible for maintaining pre-defined odour limits from the biosolids management facility and will receive reduced payments if these limits are not achieved.
- **Long-term asset maintenance** – N-Viro Sudbury is responsible during the term of the contract for maintaining the facility and equipment in accordance with industry standards. The private partner is required to submit an annual maintenance and asset management plan to the City as well as monthly and annual operations and maintenance reports. The agreement has provisions for the City to withhold payments if N-Viro Sudbury

What are Class A Biosolids?[20]

The U.S. Environmental Protection Agency (EPA) categorizes biosolids as Class A or B, depending on the level of pathogenic organisms in the material.

- Class A biosolids contain no detectible levels of pathogens.
- Class B biosolids are treated but still contain detectible levels of pathogens.

These standards are set out in the EPA's 40 CFR Part 503 Rule. The Canadian Food Inspection Agency, which administers the Canadian *Fertilizers Act*, has adopted the EPA limits for pathogen destruction in biosolids.

does not maintain the facility and building in accordance with these plans and industry standards.

- **Handback requirements** – The agreement stipulates that N-Viro Sudbury must provide a handover holdback to the City four years prior to the end of the contract. The handover holdback will provide any funds that might be necessary to bring the facility and equipment to the expected standard when the City takes it over at the end of the 20-year operating period.

For its part, the City is responsible for providing dewatered biosolids in specific quantities, quality and density and within certain time periods. The City must also maintain and calibrate the flow meter and density probe for measuring the quantity of biosolids flowing into the facility.

Biosolids facility under construction

Benefits

Cost savings/value for money

The City retained KPMG LLP to prepare the value-for-money (VFM) analyses throughout the procurement process. As noted earlier, the analysis was based on a comparison of the total risk-adjusted cost to the City under two different delivery models – a P3 delivery approach using a design-build-finance-operate-maintain (DBFOM) model and a traditional delivery approach using the design-bid-build (DBB) model.

The risk matrix and risk quantification were refreshed at key points during the procurement process and at financial close to reflect the risk allocation of the project agreement and the final financial proposal.

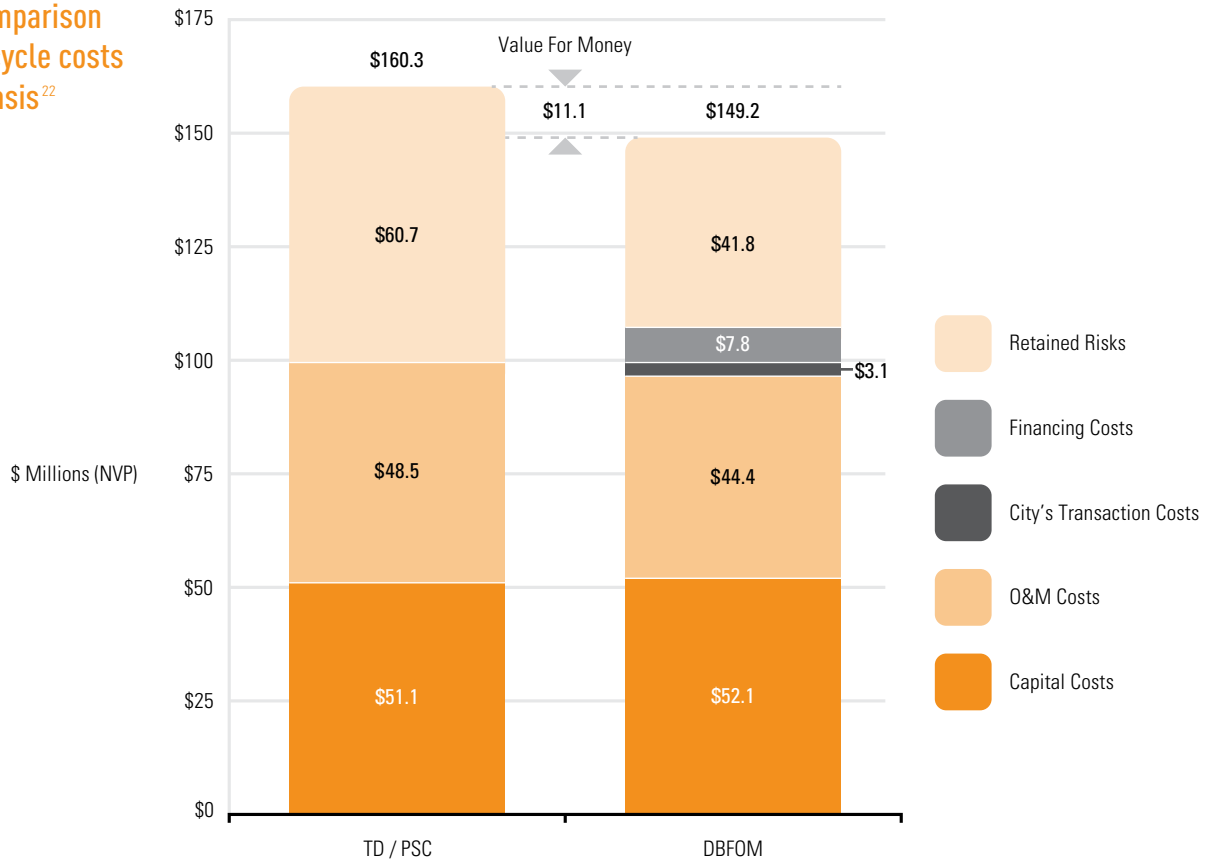
The VFM analysis demonstrated that the total cost to the City over the 22-year life of the project under the DBFOM approach will be $149.2 million net present value[21] (NPV) compared to $160.3 million NPV under the traditional delivery approach. The project is expected to achieve VFM of $11.1 million NPV, or 6.9% of total costs.

Figure 4 illustrates total life cycle costs of the project to the City under the two delivery models.

[20] N-Viro Canada LP: http://www.n-viro.ca/nviro/regulations; US Environmental Protection Agency: http://water.epa.gov/scitech/wastetech/biosolids/503pe_index.cfm

[21] Net Present Values are calculated as at the financial close date (June 13, 2013) using a discount rate of 4.5%, which represents the long-term average borrowing cost of the City.

Figure 4: Comparison of total life cycle costs on an NPV basis[22]



Traditional Delivery/Public Service Comparator (TD/PSC)

- Capital costs – estimated costs for construction, equipment, and other costs such as design fees and contract management for delivery of the biosolids management facility and upgrade to existing infrastructure under a traditional design-bid-build approach
- Operating and maintenance (O&M) costs – estimated total operating costs (e.g., labour, chemicals) and maintenance costs (e.g., equipment and building repairs and maintenance) for the biosolids management facility over the 20-year operating period
- Retained risks – estimated value of project risks retained by the City under a traditional delivery approach. Project risks arise from adverse events that may increase a project's costs. Key project risks retained by the City under the traditional approach include construction delays, deficiencies in works, commissioning delays, change orders, unscheduled maintenance, unanticipated operating costs, and asset condition in 20 years.

DBFOM Delivery

- Capital costs and O&M costs – have the same meaning as in the traditional delivery model
- City's transaction costs – incremental costs incurred by the City related to the transaction process
- Financing costs – incremental costs of private-sector financing over public-sector financing in NPV terms
- Retained risks – estimated value of project risks retained by the City under the DBFOM delivery approach. Retained risks are lower than under traditional delivery as risks have been transferred to the private sector.

Community socio-economic benefits

The project will also deliver several non-financial benefits to Greater Sudbury and its residents. Most importantly, it will meet the City's future wastewater disposal needs based on an environmentally responsible and sustainable system and will end the disposal of sludge in the Vale Canada tailings ponds. It will also address odour issues that have been raised over the years by residents.

The City of Greater Sudbury is a geographically large municipality and there are many properties that rely on holding tanks and septic fields to process sanitary waste. The septage from these systems is currently taken to waste lagoons in various parts of the City. Once the new biosolids management facility is operational this waste will be delivered and processed at the new facility and the lagoons will be rehabilitated. This is another significant environmental improvement for the City.

Further, by implementing the project under a P3 model, the City is able to realize additional benefits such as leveraging the experience

[22] City of Greater Sudbury, *Value for Money and Project Report: Biosolids Project*, June 2013.

of the private sector in operating a biosolids management facility and distributing the beneficial end product. The immediate use of the end product will be in mining land reclamation, which will also have positive environmental benefits for the region.

During the construction phase, the project is benefiting the local economy by using local firms and labour. It is estimated that local participation in the construction of this project accounts for 40 per cent of the $63.1 million cost of construction.

Communications

With the public

Prior to the project

City officials noted that it was important for the City to communicate regularly with residents at all stages of the process to ensure they were aware of the need to find the best possible approach to the community's biosolids management and to end the use of the tailings ponds.

Community consultations began in 2005 and occurred at several intervals throughout the process. As noted earlier, the City prepared a biosolids master plan which was part of a larger municipal class environmental assessment process requiring opportunities for public input.

Public information sessions were held in April and July 2008. The purpose of the first was to inform residents, regulatory agencies and interested groups about the project and to seek input on creating a biosolids master plan for the City. It was also used to update residents on the status of the City's odour abatement program and to introduce treatment technologies and related end products being considered.

The second public information session was held to update and inform the public on the proposed technologies and odour abatement strategies for the SWWTP. A display presented information from the first meeting and expanded on the tasks that had been carried out since then, which included prescreening of the various options and an evaluation of the planning and technical alternatives. Display materials also included estimates of capital and operating costs over a 50-year life cycle, and the presentation of a preferred location and technical alternatives for a biosolids management facility.

On February 14, 2008, a progress report to City Council was made by city staff on the odour abatement program and the environmental assessment/biosolid master planning process. Regular reports to City Council were also provided during the procurement process. All reports are available to the public through the City's web site.

During the project

The City and N-Viro Sudbury will work together to communicate project progress to the public. In July 2013, a groundbreaking event was held, attended by the Mayor, city councillors and staff, and N-Viro representatives. This gave local media an opportunity to see the project site and ask questions about the impact of the project on the community.

A communication plan ensures that the public benefit of the project is regularly highlighted. For example, regular news releases will be issued at each milestone of the facility's construction and operating life. As a further example, a December 2013 issue of a City newsletter delivered to every household in Greater Sudbury included a feature article on the biosolids project. Numerous communication activities are planned over the project's lifetime to emphasize its financial and environmental benefits to the community.

During construction N-Viro Sudbury is providing the City with access to "work in progress" photos that will be shared with the public.

N-Viro Sudbury intends to partner with Laurentian University to research innovative ways to expand the use of N-Rich as a land reclamation product. The company also intends to produce a version of N-Rich that can be used by the residents of the City. N-Viro Sudbury will work with Laurentian University and the City respectively to communicate these components of the project to the public.

Between the partners

The City and N-Viro Sudbury have set up a committee to jointly oversee the administration of the project agreement and to promote communication throughout the design and construction period and the O&M period. The committee includes four representatives from the City and four from N-Viro Sudbury.

Dispute resolution mechanism

The project agreement establishes two clearly defined formal processes to resolve disputes, one during the design and construction stage and a separate process for the O&M period. As of the time of preparation of this case study, there had been no need to engage the dispute resolution process.

Project Design Features

Innovative project design features and benefits

N-Viro Sudbury was able to offer the City innovative ideas for cost reduction and process optimization, before and after the contract was awarded, while satisfying the stringent requirements of the project agreement. This was done through equipment and building design innovation, strong relationships with vendors and suppliers, and a specialized team of industry professionals who provided their knowledge, experience and expertise.

Some of the project design innovations are highlighted here with a discussion of their benefits. Structural innovations included post-disaster design features that are beyond those typically required for commercial and industrial buildings but are necessary for WWTP facilities.

Biosolids management facility

Direct injection of thickened sludge to high-capacity centrifuges

A major innovation developed by the N-Viro Sudbury team was the addition of special pumps to pump thickened sludge directly from the sludge thickening facility to high-capacity centrifuges. This approach reduced capital and operating costs because customary intermediate equipment and infrastructure (pumps, valves, tanks, instruments, piping, etc.) were unnecessary. This innovation, coupled with the greater capability and processing flexibility of the high-capacity centrifuges, will accommodate the range of material that N-Viro Sudbury will be required to process during the 20-year operating term.

Civil and structural engineering innovations for improved constructability

A number of innovations were developed and implemented for the biosolids management facility to overcome civil and structural engineering challenges while ensuring a durable, cost-effective solution in accordance with the requirements of the City.

The boundary designated by the City for construction of the biosolids management facility presented several geotechnical challenges. The poor soil-bearing capacity in this area precluded the use of traditional construction foundations.

Geotechnical reports recommended that construction be done at least 16 metres away from the top of the bank of Junction Creek. As the bank formed a boundary along two sides, the building envelope of the site was greatly reduced. Structures and traffic, for instance, could not encroach on the 16-metre setback unless the bank was properly supported.

During the bid stages it was necessary to undertake detailed evaluations to ensure appropriate funds and resources were allocated to support the design and construction challenges related to these specific site conditions. The N-Viro Sudbury team addressed them in the following ways:

- Soil depth and poor bearing capacity –Rather than using traditional construction foundations, the design used a "raft slab" or slab-on-grade foundation supported by H-piles. H-piles are vertical supports which had to be driven into the ground by specialized rigs until they seated on bedrock which, in certain areas, was more than 25 metres below the surface. This approach gave rise to two main advantages: cost savings and risk mitigation.
- 16-metre setback – Several cost-effective design innovations were developed to mitigate costs related to the 16-metre setback requirement, including
  - adoption of alternative processing equipment with the same general function as previously intended but with a reduced overall footprint;
  - strategic positioning of the biosolids management building and equipment to areas that provided the most construction advantage and the least encroachment onto the top of the bank;
  - use of a pre-packaged, above-grade odour control system of equivalent or better efficacy to the in-ground, field-erected system that was contemplated before the building footprint was reduced and air-handling requirements altered.

Where encroachment on the top of the bank within the 16-metre setback could not be avoided, the N-Viro Sudbury team worked closely across multiple disciplines to develop the best possible solution.

Alternative design of electrical duct banks

Another significant component of the project was the requirement for a duct bank to provide secondary power cables and conduits for incoming power to the biosolids management facility. In collaboration with the City, N-Viro Sudbury presented and the City accepted an innovation that involved relocation of a pad-mount[23] transformer outside of the biosolids management facility. This greatly reduced the required linear footage of conduits and multiple secondary power cables.

[23] A padmount or pad-mounted transformer is a ground-mounted electric power distribution transformer in a locked steel cabinet mounted on a concrete pad.

Septage and sludge receiving facility

Use of existing tanks and outdoor delivery vs. construction of new, enclosed delivery bay

During the bid process, N-Viro Canada provided the City with insight into the cost implications and operational challenges of having an enclosed septage and sludge receiving area for delivery trucks to enter and unload material. Such an enclosed facility would be required to meet the National Fire Protection Association (NFPA) 820 standard and the Electrical Safety Authority (ESA) regulations.

During final negotiations, the City modified the requirements for the septage and sludge receiving facility to use existing, abandoned tanks rather than build a new facility and to allow connections for delivery trucks to be located outdoors. These changes significantly reduced the cost of the project for this component of the work.

Monitoring

The project agreement is performance-based and establishes output specifications for all stages of the project – design, construction, operations, maintenance and handback.

N-Viro Sudbury is required to submit monthly progress reports during the design and construction period and during the O&M period. Financial statements and other financial reports must be provided on an ongoing basis to the lenders. The project agreement also sets out a series of other reports required on a periodic basis.

The City has full access to the site for compliance inspections. It also has prescribed certain testing programs for the end product, which will be tested by third-party laboratories accredited through the Standards Council of Canada. In addition, surprise testing will be conducted by the Canadian Food Inspection Agency (CFIA) Fertilizer Division. If the end product does not pass the CFIA testing, it cannot be sold and must be re-processed to meet CFIA requirements. All results are to be posted on the N-Viro Canada website: www.n-viro.ca.

Environmental Sustainability

The N-Viro process provides Greater Sudbury with an environmentally sustainable solution to its biosolids management needs. The process converts the biosolids into a nutrient-rich product using a closed system designed to protect both indoor and outdoor environments by preventing the escape of air, dust and odours.

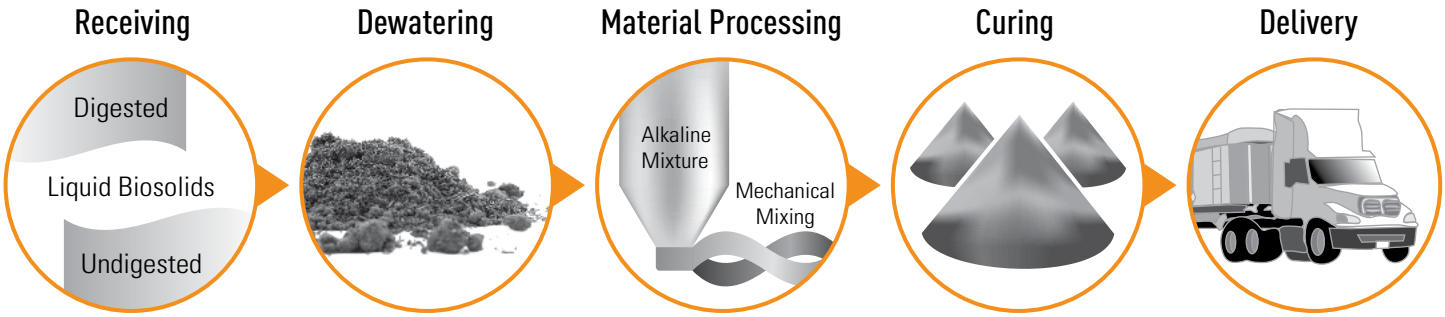
The process will recover essential nutrients from Greater Sudbury's dewatered biosolids and will convert them into a Class A product suitable for use as a soil amendment in agriculture or mine reclamation applications. Biosolids are blended with inert alkaline material such as lime kiln dust (LKD) and cement kiln dust (CKD). These admixtures are industrial by-products from the local aggregate industries and have at times been sent to landfill. Their use in the Greater Sudbury project will prevent them from consuming landfill space in the future.

The final product, N-Rich, is different than compost because of its enhanced nutrient components. It is virtually free of pathogens, and contains nutrients, organic matter and liming agents essential for plant growth and normally provided by non-renewable commercial fertilizer. N-Viro Canada provides minimum guaranteed limits for the nitrogen (N), phosphorous (P) and potassium (K) content levels of N-Rich.

The majority of the N-Rich to be produced at the Greater Sudbury facility has been pre-sold for the next 10 years for use in mining reclamation projects in the Greater Sudbury area, thus providing an additional environmental benefit.

The process also reduces noise, odour and greenhouse gas emissions, benefiting the local community. The facility will operate throughout the year, producing approximately 30,000 tonnes of N-Rich annually. Figure 5 illustrates the process.

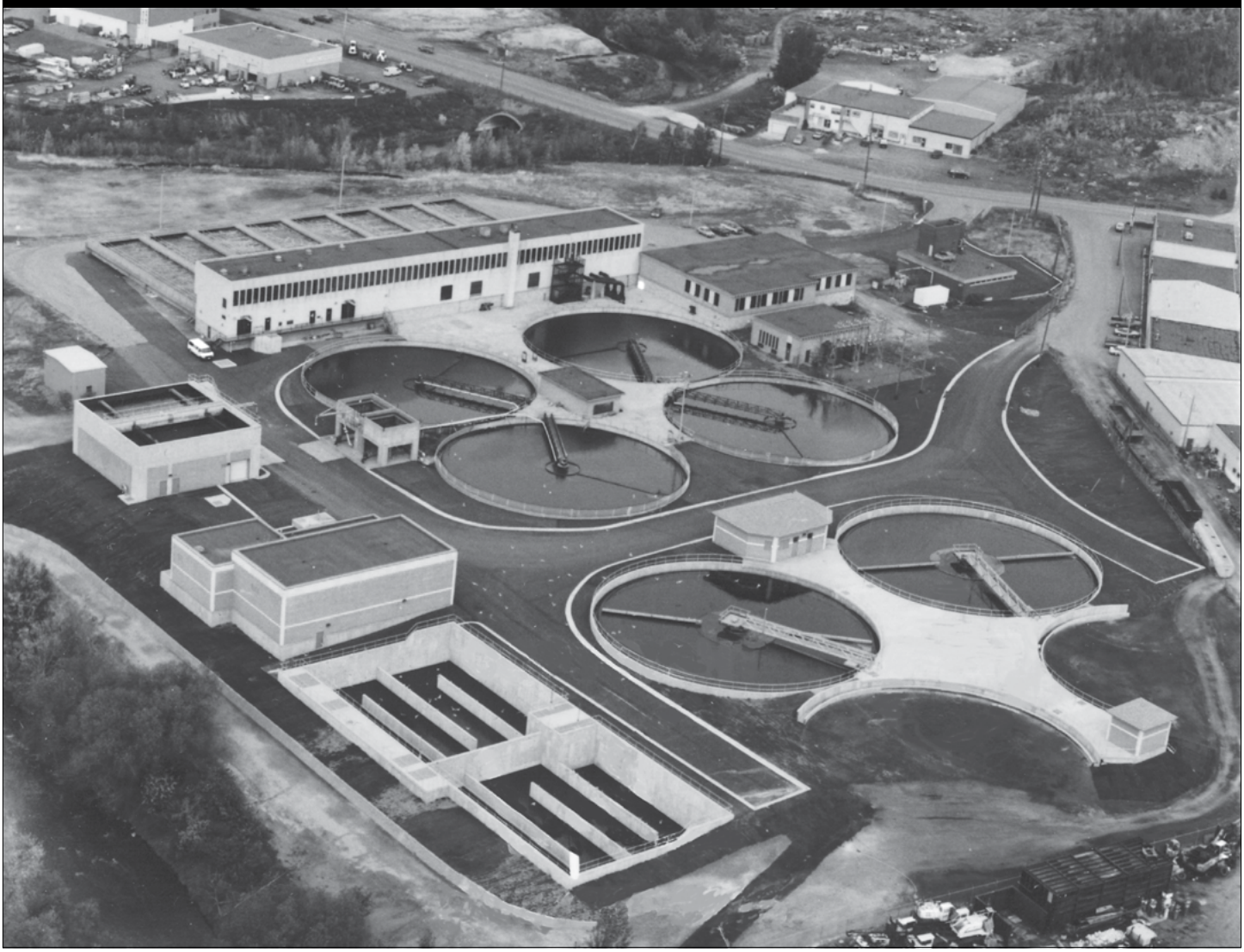
Figure 5: N-Viro process



N-VIRO

- agriculture
- soil for land reclamation
- silviculture
- topsoil maufacturing
- yard waste co-composting
- sod production

Aerial view of the wastewater treatment plant



Lessons Learned

Aspects that made the project a success

There were two significant aspects of this project that made it stand out. First, it was small in relation to most Canadian P3 projects. Second, it involved transferring the risk to the private sector of operating a new type of municipal infrastructure using proprietary technology. As a result, there were challenges in evaluating the risks and in attracting potential proponents and lenders.

According to Doug Nadorozny, Greater Sudbury's Chief Administrative Officer, all parties had to be flexible. He said that one of the biggest lessons for City staff was learning the theory of risk transfer in a P3 project. He noted that traditionally the public sector does not do such in-depth risk analyses as those required for P3 projects. In addition, the required due diligence in analyzing the risks associated with each technology added a layer to the traditional risk profile of other public infrastructure projects such as arenas or hospitals. Mr. Nadorozny said that he found the process "fascinating," and that he was convinced that P3s "are good models for the public sector to move large or complex infrastructure projects forward and give value to the taxpayer."[24]

He also noted that because P3 financing markets have traditionally focused on larger projects, the relatively smaller size of this project was a factor in attracting proponents and lenders. To overcome the challenges, he added, high levels of innovation and flexibility in both the procurement process and the commercial terms were needed.

Rob Sampson, President of N-Viro Canada, agreed that flexibility was required.[25]

Both partners viewed the following aspects of the project as contributing to its success:

- Confidential bidders' meetings – These were critical to establishing the commercial terms of the deal and modifying the traditional Canadian P3 structure to fit the size of this transaction. Compromise was required in order to attract medium and small Canadian service providers and financial firms in this market. An example of this was in the nature of the drop-down agreements, especially the splitting of the engineering and construction components of the project and the participation and involvement of medium-sized Canadian companies.
- Negotiations protocol – While the City received two technically strong proposals to its RFP, both were non-compliant bids. Given the resources that had been invested in the process to that point, City Council decided to establish a negotiations protocol and negotiate with both proponents, receiving two new submissions at the conclusion of the negotiations phase. This gave the City and both proponents the ability to consider the detail work needed to reach a commercially viable transaction while maintaining a competitive procurement environment and mitigating further transaction or bidding costs of all parties involved.
- Committed financing not mandatory – The City had indicated it would prefer committed financing but did not make it mandatory. The preferred proponent did not have committed financing, which was taken into consideration when both proposals were evaluated. Council accepted the proposal with conditions that had to be fulfilled before entering into a contract. Although this delayed the project, the preferred proponent successfully fulfilled the conditions.

Aspects that could be improved

Both partners agreed that being a small or mid-sized P3 municipal project in Canada was not easy. They provided suggestions to assist future municipal P3 projects reach successful outcomes.

From the public-sector perspective

Doug Nadorozny provided the following comments and suggestions:

- Templates – The costs associated with implementing a P3 project are significant. It would have been helpful to have templates to provide guidance on the steps to be taken and documentation that did not have to be drafted from scratch. Templates for procurement documents and a project agreement could provide a streamlined approach for small and mid-sized municipal P3s, could help reduce costs and would likely motivate more projects.
- Education for lenders – Where it makes economic sense, the ability to pass on certain risks to the private sector is a big advantage to small and mid-sized municipalities. If municipal P3s are going to become more prevalent, it would be helpful to undertake education directed at financial markets.
- Internal resources – Due diligence and other requirements of undertaking a P3 could overwhelm a small or mid-sized municipality. Greater Sudbury staff had to be very engaged. Sufficient and correct internal resources must be committed to the project to ensure success.

[24] Interview with Doug Nadorozny, Chief Administrative Officer, City of Greater Sudbury, February 5, 2014.

[25] E-mail correspondence with Rob Sampson, President, N-Viro, February 2014.

From the private-sector perspective

Rob Sampson, President of N-Viro Canada, made these comments and suggestions:

- Communication – Open communication between the municipality and bidders is essential to allow for innovations to be discussed as part of the process. In this regard, it would be helpful to have a process for innovations to be discussed without being obligated to disclose such to other bidders. This ensures that the public-sector project sponsor can benefit from private-sector innovations while protecting the bidder from the release of proprietary information to competing bidders.
- Affordability – Municipal financing commitment levels need to be well established and provide a reasonable time for lender due diligence to occur. This is especially true where, for cost control and final project cost-mitigation purposes, less than 100 per cent-financed bids are allowed.
- Outcome-based objectives – Public-sector objectives need to be clearly outlined at the beginning of a procurement process. These should be outcome objectives and not necessarily process objectives, so that the process does not become an outcome but is a means to the desired outcome. The process should never be an obstacle to allowing the consideration of private-sector project cost mitigation innovations.
- P3 funding formats/expectations in Canada – Canadian lenders must begin to understand and allow for innovations in P3 financing structures to allow for smaller-sized P3s, and, with that, the participation of smaller and medium-sized Canadian entities at the highest level of bidding consortiums.

Applicability to other municipalities

The City of Greater Sudbury is the first municipality in Canada to take advantage of the P3 Canada funding model for municipal biosolids infrastructure. Appendix A shows a list of all municipal P3 projects in Canada undertaken or in procurement to date.

The procurement approach and lessons learned by Greater Sudbury in undertaking this project have broad application for other municipal infrastructure projects within and outside of Canada. The process was well received by city staff and Greater Sudbury residents. Having a strong political commitment from City Council was one key to the success of this project.

Few municipalities in Canada have had experience with a P3 procurement model; it was therefore challenging for Greater Sudbury to find best practices from other municipalities. However, the City's experience can now be drawn upon and customized to the needs of other municipalities so they can also benefit from the cost savings and innovation brought to the public sector by partnering with the private sector.

Concluding Comments

The Greater Sudbury Biosolids Management Facility is on the leading edge for municipalities wanting a sustainable solution to management and disposal of sludge while at the same time providing effective use of taxpayer dollars. Partnering with N-Viro Sudbury has given the City access to proprietary technology that meets its sustainability goals. By undertaking this project using a P3 model, the City will also achieve value for money with an estimated cost savings of $11.1 million NPV (or 6.9%) compared to a traditional delivery approach.

Traditionally, P3 projects in Canada have been large-scale infrastructure investments using large partners. In the Greater Sudbury Biosolids Management Project, the traditional P3 procurement model was modified so that it could apply to a smaller-scale infrastructure investment and involve small- and medium-sized partners.

In addition, N-Viro Canada separated the design component from the build and equipment procurement component in order to deal with possible operating/design conflicts associated with traditional design, bid, build contracts. This is atypical in Canadian P3s, but it allows for the design and build components to consider the true costs over the life of the project and not just the construction period.

As N-Viro is the operator during the operations period of the project agreement, the design and construction of the facility required that both design and construction properly balance the typical tradeoff between up-front capital costs and operating and maintenance costs during operations. In the end, the separate design and construction contracts allowed for a much better management of operations risk for the long-term lender.

The P3 approach provided Greater Sudbury the advantage of single-point accountability for construction, operations and maintenance and long-term financial stability related to construction and operating costs – all important factors for a mid-sized municipality with limited access to capital and limited ability to train and retain staff with the requisite skills to operate a biosolids management facility.

In principle, a DBFOM model will leverage efficiencies by combining the design and construction phases of the project and bringing in the strong project due diligence and discipline associated with private-sector financing. In this mid-sized P3, Greater Sudbury has done that. It has also successfully transferred the responsibilities and risks associated with the biosolids management facility design, construction, operations and maintenance to the private sector while at the same time benefiting the taxpayer and the environment.

Testimonials

Public sector

On June 13, 2013, the City of Greater Sudbury executed the contract documents entering into its first public-private partnership to build a biosolids management facility. The following highlights the benefits to the City of procuring this facility through a public-private partnership:

- The City does not have any experience with biosolids management and the current technologies for sludge processing are proprietary. The City has been able to capitalize on the private sector's expertise to develop a biosolids management facility that will allow the City to process its deactivated sludge over the long term in an environmentally sustainable manner;
- The ability to allocate construction and operating risks appropriately to the private-sector partner should ensure a project that is on time and on budget;
- The public-private partnership transaction has generated value for money for the taxpayers of $11.1 million in net present value terms;
- The public-private partnership has enabled the City to leverage federal funding, through PPP Canada, of 25 per cent of eligible costs, to a maximum of $11 million;
- Through participation in the City's first public-private partnership City officials and staff acquired knowledge that they will be able to apply more generally to the City's other procurement activities.

The City is proud to have developed a groundbreaking public-private partnership. After 30 years of disposing of activated sludge in Vale's tailings ponds, the City is proud to embark on a state-of-the-art biosolids management facility that leads the way in sustainability.

Doug Nadorozny
Chief Administrative Officer
City of Greater Sudbury

Private sector

In the fall of 2012 we were selected by the City of Greater Sudbury as the preferred proponent under a call for a DBFOM structured biosolids management project. In June of 2013 we began construction.

Due to the project's relatively small size and the transaction expenses related to P3 projects of this nature, there were challenges in attracting potential project partners. The P3 financing markets have traditionally focused on large P3 projects, and given the uniqueness of this particular transaction, bid costs were a significant component of the overall project costs. N-Viro Canada worked hard to mitigate the size of the bid transaction costs and formed a bid team and bid strategy early on so that the bid team could have some level of confidence of success and recovery of bid soft costs.

Because of its size and the size of the bid team partners, this project is groundbreaking. As the need for more medium-sized infrastructure grows, so too will the need for the involvement of Canadian-based small- and medium-sized companies in providing infrastructure solutions.

We believe that, in conjunction with the City, we have worked to modify the traditional P3 process to form the basis of what could be a new model for public- and private-sector partnering.

To help develop the mid-sized P3 market in the future, innovation is required to overcome the challenges in both the procurement process and the commercial term. Examples of these innovations and lessons learned were included in the submission and we'd like to highlight two:

- A negotiations-protocol type of process is extremely helpful in the latter phase of the bid process. This allows both the public sector and the proponents to consider the detail work needed to reach a commercially viable transaction.
- The public-sector entity should consider proposals that have a high degree of funding certainty but not fully committed financing. This allows the proponent to develop bid details that are based on some level of funding certainty but to defer the high costs of funding certainty until bid award.

N-Viro Sudbury looks forward to working in partnership with the City of Greater Sudbury.

Rob Sampson
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Appendix A: Canadian Municipal P3 Projects in Procurement, Under Construction or Operational

Project Name	Municipality	Current Stage
Emergency Services		
Ottawa Paramedic Service Headquarters	City of Ottawa, Ontario	Operational
Landfill & Recycling		
Britannia Landfill Gas to Electricity Project	Regional Municipality of Peel, Ontario	Operational
Vancouver Landfill Gas Cogeneration Project	City of Vancouver, B.C.	Operational
Waterloo Landfill Gas Power Project	Regional Municipality of Waterloo, Ontario	Operational
Public Transit		
Barrie P3 Transit Service Project	City of Barrie, Ontario	In Procurement
Confederation Line	City of Ottawa, Ontario	Under Construction
Edmonton LRT	City of Edmonton	In Procurement
Eglinton Crosstown LRT and Scarborough LRT Lines	City of Toronto, Ontario	In Procurement
ION Stage 1 LRT Project	Region of Waterloo, Ontario	In Procurement
Pointe-Saint-Charles Commuter Train Maintenance Centre	City of Montréal, Québec	In Procurement
Saskatoon Civic Operations Center Phase One	City of Saskatoon, Saskatchewan	In Procurement
Viva	Regional Municipality of York, Ontario	Operational
Recreation & Culture		
Bell Sensplex	City of Ottawa, Ontario	Operational
Budweiser Gardens	City of London, Ontario	Operational
Mohawk 4-Ice Centre	City of Hamilton, Ontario	Operational
Pan Am Athletes' Village	City of Toronto, Ontario	Under Construction
Pan Am Games Aquatics Centre, Field House & CSIO Project	City of Toronto, Ontario	Under Construction
Powerade Centre	City of Brampton, Ontario	Operational
Prospera Place	City of Kelowna, B.C.	Operational
Red Ball Internet Centre	City of Moncton, New Brunswick	Operational
Regina Stadium	City of Regina, Saskatchewan	In Procurement
Richcraft Sensplex	City of Ottawa, Ontario	Under Construction
Shenkman Arts Centre & Orleans Town Centre	City of Ottawa, Ontario	Operational
SHOAL Centre	Town of Sidney, B.C.	Operational

Appendix A: Canadian Municipal P3 Projects in Procurement, Under Construction or Operational – continued

Project Name	Municipality	Current Stage
Roads & Bridges		
Charleswood Bridge	City of Winnipeg, Manitoba	Operational
Chief Peguis Trail Extension	City of Winnipeg, Manitoba	Operational
Disraeli Bridges & Freeway	City of Winnipeg, Manitoba	Operational
Water & Wastewater		
Biosolids Energy Centre	Capital Regional District, B.C.	In Procurement
Brockton Water & Wastewater System	Municipality of Brockton, Ontario	Operational
Canmore Water & Wastewater System	Town of Canmore, Alberta	Operational
Goderich Water & Wastewater System	Town of Goderich, Ontario	Operational
Hamilton Biosolids Project	City of Hamilton, Ontario	In Procurement
Lac La Biche Wastewater Treatment Facility	County of Lac La Biche, Alberta	Under Construction
McLoughlin Point Wastewater Treatment Plant	Capital Regional District, B.C.	In Procurement
Moncton Water Treatment Facility	City of Moncton, New Brunswick	Operational
Okotoks Water & Wastewater System	Town of Okotoks, Alberta	Operational
Port Hardy Water & Wastewater Treatment System	District of Port Hardy, B.C.	Operational
Regina Wastewater Treatment Plant	City of Regina, Saskatchewan	In Procurement
Sooke Wastewater System	District of Sooke, B.C.	Operational
Sudbury Biosolids Management Facilities	City of Greater Sudbury, Ontario	Under Construction
Surrey Biofuel Processing Facility Project	City of Surrey, B.C.	In Procurement
Winnipeg Wastewater System	City of Winnipeg, Manitoba	Operational

Appendix B: CCPPP's National Award Case Studies 1998 - 2013

Defence

Communications Security Establishment Canada Long-Term Accommodation Project (2011)

Education

Alberta School Alternative Procurement – Phase 1 (ASAP I), Alberta (2010)
O'Connell Drive Elementary School, Nova Scotia (1998)

Energy

Britannia Landfill Gas to Electricity Project, Ontario (2005)
Vancouver Landfill Gas Cogeneration Project, B.C. (2003)
Bruce Nuclear Power Facility, Ontario (2000)
Waterloo Landfill Gas Power Project, Ontario (2000)

Government Services

Archives of Ontario – Offsite Archival Storage (2006)
Cook Chill Food Production Centre, Ontario (2005)
DriveTest: Ontario Driver Examination Services (2004)
Transforming the Delivery of Ontario's Social Assistance System (2003)
Emergency Service Mobile Communications in Ontario (2000)
Electronic Child Health Network, Toronto, Ontario (1999)
Teranet, Ontario (1998)

Health

BC Cancer Agency Centre for the North and Fort St. John Hospital & Residential Care Project, B.C. (2012)
Centre Hospitalier de l'Université de Montréal Project (2012)
Glen Campus – McGill University Health Centre, Quebec (2010)
Women's College Hospital Redevelopment Project, Ontario (2010)
Royal Jubilee Hospital Patient Care Centre, B.C. (2009)
VIHA Residential Care and Assisted Living Capacity Initiative, B.C. (2007)
Abbotsford Regional Hospital and Cancer Centre, B.C. (2008, 2005)
Facility Management for the Royal Ottawa Health Care Group, Ontario (2000)
Devonshire Care Centre, Alberta (2000)
Shaikh Khalifa Medical Centre, United Arab Emirates (2000)

IT Infrastructure

Connecting Small Schools in Newfoundland (2003)

Justice & Corrections

Ontario Provincial Police Modernization Project (2013)
Surrey Pretrial Services Centre Expansion, B.C. (2011)
Durham Consolidated Courthouse, Ontario (2007)
Central North Correctional Centre, Ontario (2002)
Five Corners Project, B.C. (2002)

Real Estate

Aurora College Family Student Housing, Northwest Territories (1999)
Legislative Chamber, Offices and Housing, Nunavut (1999)

Recreation & Culture

L'Adresse symphonique, Quebec (2011)
SHOAL Centre: Seniors Recreation Centre, B.C. (2004)
John Labatt Centre, London, Ontario (2002)
Skyreach Place, B.C. (2000)

Social Housing

Single Room Occupancy Renewal Initiative Project, B.C. (2013)

Transportation

Disraeli Freeway and Bridges Project, Winnipeg, Manitoba (2012)
Canada Line, B.C. (2009)
Confederation Bridge, PEI (2009)
Highway 407 ETR, Ontario (2008 & 1999)
Autoroute 30, Montreal, Quebec (2008)
Northwest Anthony Henday Drive, Alberta (2008)
William R. Bennett Bridge, B.C. (2008)
Autoroute 25, Montreal, Quebec (2007)
Kicking Horse Canyon Project –Phase 2, B.C. (2007)
Golden Ears Bridge, B.C. (2006)
Anthony Henday Drive Southeast Leg Ring Road, Alberta (2005)
Sea-to-Sky Highway Improvement Project, B.C. (2005)
Sierra Yoyo Desan Resource Road , B.C. (2004)
Fredericton-Moncton Highway Project, New Brunswick (2003)
Belledune Port Authority, New Brunswick (2000)
Retendering Alberta's Highway Maintenance Contracts (2000)
Cobequid Pass Toll Highway, Nova Scotia (1998)

Water, Wastewater & Biosolids

Biosolids Management Facility, Sudbury, Ontario (2013)
Britannia Mine Water Treatment Plant, B.C. (2006)
Goderich Water and Sewer Services, Ontario (2000)
Port Hardy Treatment Project, B.C. (2000)

These case studies can be obtained through CCPPP's online bookstore at: www.pppcouncil.ca/bookstore

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