



Wednesday, April 27, 2016
Stream 3A - Sustainable Brownfield Redevelopment
Location: Level 3, Salons 6&7

9:00 am – 9:20 am

Why Do We Need an International Standard on Sustainable Remediation When We Could Go SuRFing Instead?

Paul Nathanail, University of Nottingham and Land Quality Management Ltd., Chair of ISO TC190/SC7/WG12

The objective of this presentation is to describe the structure and main principles of the draft international standard on sustainable remediation and how it will be used to ensure remediation is demonstrably sustainable.

Abstract

A draft international standard on sustainable remediation received unanimous approval during the voting that closed in February 2016 and the final standard is due for publication by the end of this year. The standard will bring visibility to the principles of sustainable remediation to many countries, thereby helping to bring into mainstream practice ideas that have been implemented successfully elsewhere in the world.

This presentation will describe the structure and main principles of the standard and how it will be used to ensure remediation is demonstrably sustainable.

9:30 am – 9:50 am

Embedding Sustainability in a Remediation Scheme: A Former Tar Distillery, United Kingdom

Richard Lewis and Richard Clayton
WSP Parsons Brinckerhoff

The objective of the presentation is to summarise how, by applying key design principles and established methods, sustainability can inform the design, implementation and closure of a remediation scheme.

Abstract

Following 120 years of tar distillation, a legacy of tar and creosote contamination required the design of a remediation scheme that would achieve the reduction in residual risk and allow the divestment of site ownership. Complex alluvial geology and discrete hydrogeological features existed beneath the site with connectivity between groundwater and surface water. Mobile contamination, in the form of free tars and creosote liquids were impacting a river and a conceptual remediation scheme had been proposed but stalled during regulatory engagement.

At the point that WSP|Parsons Brinckerhoff was engaged, the client outlined a number of key objectives for the delivery of the project:

1. The scheme needed to facilitate site exit whilst addressing key environmental risks;
2. The programme needed to be robust, with no long-term maintenance requirement (beyond monitoring);
3. The technical approach needed to be agreed with regulators and project stakeholders; and,
4. The approach had to be cost effective and sustainable.

We developed a characterisation and evidence based remediation approach – built upon robust understanding of the conceptual site model (CSM) and definition of stakeholder objectives and drivers. A sequence of pilot and field trials were carried out to establish practicable remediation techniques and enhancements to recover contaminants with the primary aim of defining a suitable technique to overcome recalcitrant contaminants in a low-permeability aquifer.

Following these pilot trials, the scheme needed to be scaled to assess site viability. We completed a detailed cost benefit and sustainability assessment developed in consultation with project stakeholders and regulators. This built upon the six key principals of the SuRF-UK framework and a holistic assessment adopting the fundamental structure of the Network for Industrially Contaminated Land in Europe (NICOLE) sustainable remediation roadmap. Environmental intensity metrics were established and quantified against which the impact of the scheme could be accurately assessed. A robust comparison of various potential technologies (including cost/benefit) was completed using multi-criteria analysis.



Following assessment, it was possible to establish a regime that promoted protection of the receptor rather than elimination of all risks. The principals of the design approach and the remediation objectives were agreed with the Environment Agency within a Joint Position Statement (JPS), adopted by both client and regulator.

With the principals and objectives agreed, we developed a remedial action plan (RAP) that established the implementation approach together with a series of performance and intensity metrics by which the progress of remediation would be assessed, measured and ultimately, closed.

To deliver the scheme, WSP | Parsons Brinckerhoff installed and commissioned site wide NAPL recovery from a network of groundwater treatment wells established within individual treatment cells. This structure enabled assessment on a cell-by-cell basis in line with the principals agreed within the RAP. Sustainability and environmental impact were incorporated in to the performance metrics for the operation of the remediation systems and the closure process.

The implementation demonstrated that gathering information to assess the impact of intervention and the sustainability of the scheme itself benefited from safe operation, robust data gathering, verification monitoring and validation of the remediation objectives.

By following industry best practice and applying the six SuRF-UK sustainable remediation principles, we have delivered a technically sound and cost effective remediation design supported by a robust audit trail and decision making process. The project was recently awarded 'Best Conceptual Design' at the Brownfield Briefing Awards, October 2015.

10:30 am – 10:50 am

A Critical Review of Completed and Emerging Best Management Practices in Sustainable Brownfield Redevelopment

Christopher De Sousa, Ryerson University

The objective of the presentation is to explore the sustainability features of two-dozen "best practice" sustainable brownfield redevelopment projects in the United States, as well as examine the barriers to sustainable redevelopment and the lessons learned.

Abstract

Even after almost three decades, efforts to remediate and redevelop contaminated lands in the US continue to evolve in scope and character. Initial actions in the late 1970s were spurred by pollution disasters such as Love Canal and the Valley of the Drums, which forced government to better understand the human and environmental risks posed by contaminants, develop suitable methods for efficient site remediation, and begin to tackle high risk sites. In the 1990s, the focus shifted to developing, testing, and implementing tools to promote the economic redevelopment of "brownfields" in an effort to bring jobs, investment, and taxes back to ailing cities. More recently, there has been an emerging shift in attention to redeveloping brownfields in a manner that brings about more sustainable development, while continuing to address contamination and economic development issues.

This presentation synthesizes the lessons learned from two-dozen brownfield projects planned and developed throughout the United States that incorporate "sustainability". These projects include nine completed best management case studies and 15 brownfield sustainability pilots funded by the US EPA in 2008/2009. Specifically, the presentation:

- Explores the sustainability features that were implemented, including those related to remediation and redevelopment activities;
- Examines the barriers to both brownfield reuse and the implementation of sustainability features; and,
- Derives a series of lessons learned, including innovative policies, programs, and/or funding mechanisms that helped make projects work.

The research is based on structured interviews with multiple stakeholders involved in the nine best management projects and coordinators from each brownfield sustainability pilots along with a comprehensive review of relevant project plans and reports. The research benefits from examining both projects "in the making," where the trials and tribulations associated with moving projects from visioning, to planning, and then to development are fresh in the minds of coordinators, and completed projects that have already started to bear fruit in terms of outcomes.

The research is useful to developers, planners, consultants and community representatives interested in such redevelopment by highlighting emerging best practices and revealing common components or lessons learned from the group of projects in relation to what factors (e.g., stakeholder capacity, community involvement, regulatory influences, financing) moved them forward.



11:00 am – 11:20 am

Setting a New Standard for Corporate Conservation: Turning Remediation Sites into Assets

Ashley Ossher, Wildlife Habitat Council

The objective of the presentation is to share approaches for turning corporate legacy sites into assets through conservation. Insights and case studies will be shared that showcase how companies are integrating meaningful conservation projects into site clean-up and reuse, and how these successes are being tracked and leveraged to enhance corporate sustainability reporting.

Abstract

Remediation sites present unique and important opportunities for companies to integrate biodiversity conservation projects that restore ecological value and engage communities. For many companies, biodiversity conservation is becoming a key component of the sustainable remediation approaches applied across the company's portfolio. Through integration of meaningful conservation actions into site clean-up and reuse, remediation sites can become valuable assets for companies, communities and ecosystems.

Based on over 25 years of experience working with corporate landowners to build conservation programs on industry lands, Wildlife Habitat Council (WHC) will discuss conservation approaches that are compatible with the site remediation context, and explore opportunities for integrating conservation into the project life cycle that can help to address different business challenges. WHC will share case studies that highlight the best practices of corporate programs on remediation sites that restore or enhance wildlife habitat, engage employees, build community partnerships and create opportunities for conservation education.

WHC presenters will also discuss how continued monitoring and evaluation of these efforts allows corporate programs to generate data and results that document their value and impacts. WHC will share examples of companies using various benchmarking frameworks such as ISO, GRI and Conservation Certification, to translate corporate sustainability goals into on-the-ground actions, as well as to measure and report their conservation achievements.

The presentation will provide attendees with valuable insights into how many innovative companies are leveraging biodiversity conservation as a strategy to transform their legacy sites into assets, and are utilizing various frameworks to benchmark and share the positive impacts of these programs within and beyond the fence line.

11:30 am – 11:50 am

Co-composting: A Sustainable Solution to Soil Impacted by Hydrocarbons

Éric Bergeron, Golder Associates Ltd.

The objective of the presentation is to discuss the assessment of the best remedial approaches and methodologies to be used at a former petroleum site and present the results and lessons learned from the selected option.

Abstract

Golder Associated Ltd. (Golder) was retained to assess the best remedial approach and methodology to be used at a former petroleum site (the "site"). The soil is impacted by heavy petroleum hydrocarbons and recalcitrant PAHs. Based on the site conceptual model, in-situ technologies were discarded due to the fact that contamination in soils was mainly located in shallow and unsaturated soils for most of the contaminated areas. Based on those site constraints, the excavation and combining of the affected soils into biopiles for aerobic biodegradation was selected as the remedial alternative for the soil affected by only petroleum hydrocarbons. The objective of the remediation was to meet the Québec industrial limit criteria.

In order to assess the feasibility of biotreatment, laboratory testing and pilot testing were performed in 2010-2012. A co-composting process was designed by Golder. The process consisted of mixing impacted soil with organic amendments such as chicken manure to promote contaminant degradation by microorganisms at elevated temperatures (40-65°C) under aerobic conditions. Co-composting promotes thermophilic and mesophilic growth as well as increases nutrients and contaminant bioavailability. A sustainability evaluation was also conducted in 2012 to assess the performance of the biotreatment option as it related to the client's sustainability objectives, as compared to other potentially applicable technologies.



Based on the laboratory and pilot tests, as well as the sustainability evaluation, the full-scale design of the co-composting system was performed in 2012. 54 piles of 700 m³ volume were constructed. The piles were connected to six extraction systems consisting of 36 regenerative blowers. Air treatment was performed using activated carbon filters and biofilters. The treatment of 120,000 m³ of impacted soil began in 2013 and is scheduled to be completed in seven years.

Pseudo first-order degradation rate constants were estimated and the nutrients, as well as the air requirement and composting amendments mixture, were determined in laboratory and during the pilot tests were used to design the full-scale treatment system.

The full-scale results revealed that the biodegradation of the COCs was performed in less than the predicted 24-month timeframe. The mass effect of the piles was beneficial to composting as the heat period is significantly longer in comparison with lab and pilot-scale tests. The co-composting was also efficient in breaking the cohesion of the clay material which resulted in high removal efficiency and fast degradation kinetic for TPH and PAH. The co-composting piles generate significant VOCs emissions (up to 1,000 ppm) and the minimal target temperature of 55°C within the pile was achieved and maintained for at least a month.

The biggest challenge of co-composting is the management of the water generated and controlling the nutrient level within the piles. Key sustainability indicators were monitored and compared against predicted performance.

1:30 pm – 1:50 pm

Sustainable Solutions: Practical Approaches for Conducting Site Investigation, Managing Risk and Achieving Closure for Large Portfolio of Contaminated Sites

Andrew H. Thalheimer, Dillon Consulting

The objective of the presentation will be to demonstrate practical sustainable solutions that can be achieved for small-scale sites and environmental, social, and economical metrics that can be effectively achieved through proactive and practical approaches focused on obviating the need for remediation, while still achieving closure.

Abstract

Traditionally, in nascent ethos of sustainable remediation, the concepts of sustainable remediation, green remediation, green and sustainable remediation, and, most recently, gentle remediation have promoted the use of sustainable practices in addressing and remediating contaminated sites. During this evolution, many case studies have focused on large-scale, long-term mega-projects where the viability of renewable energy or carbon-reduction metrics communicated success. In other cases, sustainable metrics were developed and applied to demonstrate that the remediation was sustainable. Limited profile of practical approaches being proactively applied to limit the need to remediate and achieve closure exists, especially for small-scale sites.

This presentation demonstrates that sustainable solutions can be practical and effectively applied to small-scale sites, while satisfying the environmental, economical and social metrics used to evaluate what success means in the world of sustainable remediation. Moreover, the presentation will show how these practical approaches were proactively applied to a portfolio of over 250 contaminated sites across four jurisdictions (i.e., Canadian provinces) involving incident responses, environmental site assessment, underground storage tank removals and brownfield redevelopment to manage unacceptable risks.

Specifically, for example, we will demonstrate how effective scheduling and resource management were routinely applied to reduce the carbon footprint of site assessment activities; soil vapour assessment was innovatively applied to achieve closure; impacted soil management obviated the need to expensive remediation; acknowledgement of pre-existing conditions facilitated regulatory closure; application of administrative controls facilitated closure while eliminated the need for remediation; and, how environmental considerations were integrated into redevelopment projects.



2:00 pm – 2:20 pm

Brantford, Ontario's Greenwich Mohawk Site – Green Remediation of a 20-Hectare Site

Ed Taves¹ and Tara Tran²

¹*CH2M HILL Canada Limited*

²*City of Brantford*

The objective of the presentation is to discuss the green remediation technical approaches used to remediate the Greenwich-Mohawk brownfield site, highlight the benefits (in terms of greenhouse gas emissions) and present the lessons learned.

Abstract

As part of the City of Brantford's brownfield initiative, the remediation and redevelopment of the Greenwich-Mohawk brownfield site was identified as a priority for municipal investment to initiate interest in redeveloping the site for a mix of commercial, residential, institutional and parkland uses. In addition to the funding committed by City Council for the demolition and remediation, the City received funding from Industry Canada, Federation of Canadian Municipalities, and the Ontario government with the premise that remediation had to be completed by the end of 2016. A total budget of \$42 million was available to complete the work. The City also looked for alternative cost-effective ways to minimize negative impacts to the surrounding residences that could result from hauling off-site large amounts of soil and importing new soil backfill.

A combination of risk assessment (RA) with green remediation using on-site soil screening, biotreatment and washing to maximum on-site soil reuse was selected by the City's consultant, CH2M HILL Canada Limited. The approach brings the following value:

- Retaining existing buildings through alternative protective strategies. This allows the City to preserve heritage structures and maintain operation of the Canadian Military Heritage Museum.
- Treat on-site over 105,000 m³ of LNAPL-impacted soil for reuse onsite. With only 12 months available for soil remediation, an aggressive ex-situ soil screening, washing and green remediation technique (biopiles) was selected. Over 80,000 m³ of soil has been treated to date for reuse on-site.
- Manage in place over 1 million m³ of soil on site through risk assessment and risk management.
- Potential opportunities to reuse excess soil from external City sites for on-site use in soil caps and covers.
- Collecting LNAPL and recycling (over 90,000 litres of oil has been sent for recycling).
- Crushing the old building foundations for on-site reuse as backfill instead of off-site disposal; over 24,000 m³ of concrete have been recycled for use as on-site backfill; 1,800 m³ of crushed asphalt has been sent off-site for reuse.

The alternate approach of a dig and dump was estimated to cost approximately \$208 M. Using the green remediation approach described above a cost savings of over \$165M was identified. Remediation commenced in March and Milestone Environmental Contracting Inc. was hired by the City as the remediation contractor; work is to be completed in 2016. Some challenges have been encountered and through the involvement of all parties, the City, CH2M, the Ministry of Environment and Climate Change, and Milestone, resolutions are being identified real-time to achieve the target clean-up requirements on schedule.

The presentation will focus on green remediation technical approaches, assessing benefits (in terms of greenhouse gas emissions), and the lessons learned.

2:30 pm – 2:50 pm

Municipal Innovation in Brownfield Remediation

Guillaume Couillard, Federation of Canadian Municipalities / Green Municipal Fund

The objective of the presentation will be to showcase innovative remediation projects undertaken at the municipal level. It will also highlight the pioneering knowledge brokering work delivered by the Federation of Canadian Municipalities to catalyzed municipal brownfield redevelopment.

Abstract

The Green Municipal Fund (GMF) provides funding and knowledge resources to support brownfield redevelopment in communities across Canada. Both municipalities and their partners can access GMF grants to perform site characterizations and test innovative remediation approaches. They can also access competitive GMF loans to finance the remediation and redevelopment of their brownfield sites. A suite of GMF resources and activities, such as guidebooks, roadmaps, and webinars, are available to support their progress through each step of the redevelopment process. In a manner similar to the FCSAP program and the FCSAP expert support,



the GMF aims to provide funding and knowledge services to municipalities and their partners for their brownfield projects.

This presentation will highlight useful GMF resources, such as our sustainable remediation web portal and our provincial/territorial brownfield roadmaps, and will outline the innovative knowledge brokering work delivered through the Federation of Canadian Municipalities' (FCM) Leadership in Brownfield Renewal Program (LiBRé). This unique program connects municipal brownfield practitioners from across Canada and helps them develop the skills and knowledge they need to become better facilitators of brownfield redevelopment. The program is structured around a seven-step framework based on best practices observed in municipalities that have successfully catalyzed brownfield redevelopment.

This presentation will also focus on one innovative and sustainable pilot project that employed sustainable approaches and was completed with support from the GMF: the Greenwich-Mohawk remediation field test in Brantford, Ontario.

The Greenwich-Mohawk site in Brantford has an area of 20.6 hectares, 5.4 of which were contaminated with petroleum hydrocarbons and volatile organic compounds in concentrations exceeding allowable limits. Three separate pilot projects were undertaken to determine which approach could be successfully implemented to remediate the site. The technologies used in the pilots were steam enhanced remediation, air sparging/soil vapour extraction and biopiles. The results from the test pilots proved very promising and allowed to test the effectiveness, implementability, cost, timeframe and community considerations for each of the remediation techniques. Leading remedial approaches for each contaminant found on the site were developed through the pilot projects and are currently in-use at the full remediation stage of this project.

Lastly, this presentation will provide a quick overview of other innovative contaminated site projects demonstrating the ranges of initiatives that can be undertaken through the GMF to address contaminated site issues.
