PROPERTY MANAGEMENT PROTOCOL FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT

The Government of Canada has given Canada Lands Company the mandate to prepare for sale or development, an extensive portfolio of properties declared surplus by the government. Often located in the centre of cities and of former industrial, defence or rail use, development of these lands provides the challenge of needing to be environmentally rehabilitated, while also deriving a reasonable economic return. Mis-application of the current guidelines — especially the "dig and truck" response to any soils that exceed criteria — has often resulted in an adverse economic climate for property management. Proposed CCME criteria and guidelines for managing soil quality have presented an opportunity for Canada Lands to implement a new management procedure, based on the four principles of sustainable development: sound economics, environmental accounting, environmental assessment and effective use of operational guidelines. Canada Lands Company has recognized and accepted this challenge by implementation of the new management approach to re-development of the former CN Rail Car Shops property, Moncton, New Brunswick.

INTRODUCTION

In 1995, with privatization of CN Rail, the Government of Canada retained ownership of lands ancillary to rail use. As with other government lands being declared surplus, many of these properties are located within urban centres and therefore pose a challenge to property and development managers of returning the lands to the urban fabric. The Government has given Canada Lands Company (CLC) the task of preparing these properties for sale, while operating within three broad objectives to ensure:

- A reasonable economic rate of return on their value;
- A re-integration into their urban communities, recognizing the changes that have occurred in adjacent property use over the last 50 years; and,
- A rehabilitation of the properties to address concerns about potential property contamination arising from former uses.

Re-use of former industrial lands has been governed since the late 1980's by an Environment Canada policy that focused on identification of the degree of soil and groundwater contamination and containment of such materials. This policy resulted in the 1991 Interim Soil Quality Criteria for the Remediation of Contaminated Sites (CCME, 1991). Further evolution to address the broader issues of human health and environmental risk led to:

(a) A Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines (CCME, 1996) (describing general protocols for the derivation of revised guidelines);

(b) A Guidance Manual for Develoning Site-Specific Soil Quality Remediation Obiectives for Contaminated Sites in Canada (CCME, 1 996a) (describing how to apply the new guidelines); and, which provide the scientific substantiation to: Canadian Soil Quality Guidelines, 1996 (CCME, 1996)

The new guidelines are based on stated management goals, using generic risk assessment equations and providing explicit explanation of all assumptions, including those based on science policy and other management considerations. This provides a clear picture of the rationale and intent behind each guideline.

Implementation of these science-based guidelines presents an opportunity to Canada Lands to develop a new management approach to property development, based on the principles of sustainable development, not previously possible using the 1991 Interim Criteria. To develop this new approach, three key guiding principles are merged and focussed on property management and development.

DISCUSSION OF GUIDING PRINCIPLES

Principle 1: Soil Quality Criteria

Beginning in the mid-1980's, in response to proposed re-development of numerous former industrial properties within urban communities, Environment Canada and the provincial Departments of Environment developed a set of guidelines. These guidelines focused on the assessment of the concentrations of contaminants and containment of any problems. In 1991, CCME issued interim soil quality criteria covering 54 substances and three general parameters in 1991. These criteria were adapted from both provincial (Alberta, Quebec, and Ontario) and international (The Netherlands) sources. As the rationale for many of these criteria were unknown or based on political considerations (Denning and Vigerstad, 1997), their operational application has been largely *ad hoc.* For example, soils with concentrations of contaminants exceeding criteria were excavated and disposed (often in a special landfill at great expense), while in other cases, based on site-specific considerations, similar contaminated soils were allowed to remain in place. In addition, because the scientific rationale for these guidelines was unknown, there was inevitably the concern the guidelines and resultant implementation were not truly protective of human health or the environment.

CCME has attempted to remedy this situation, at least in part, by proposing new soil quality guidelines. Based on risk assessment and management considerations, the general rationale appears to be as follows.

- Groundwater shall be protected to maintain drinking water standards wherever possible. It is recognized that some groundwater resources may be previously contaminated and cannot be completely restored.

- Exposure of people to a substance (contaminant) in soils shall not result in a dose that is one tenth of the margin between their current estimated background exposure to that substance and the level considered to require management intervention to protect human health (i.e., one tenth of the margin between background and the Acceptable Daily Intake set by Health Canada). Thus, for the intended uses of all properties, the guidelines define concentrations of substances that are well below what would be considered a "*no-adverse-effect"* level for human health.

- Exposure conditions for residential and commercial properties are considered to include both adults and children; for industrial properties, only adults need be considered.

- Soils shall be capable of supporting some degree of plant and animal productivity, with the level dependent on the intended uses of the property, but cannot be incapable of supporting plant and animal productivity. For residential properties, the criteria define a "no-adverse effect" level for all types of environmental receptors.

- Soils on a property cannot pose a significant risk to surrounding properties. For example, if a site is heavily contaminated and is not being used, it must be remediated to a level where transport of soils through wind or runoff does not pose the potential for contamination of adjoining properties.

Within the guidelines, provision has been made for altering the quantitative value of the criteria within an explicit set of defined conditions and factors (CCME, 1 996a). While the option of completing a site-specific risk assessment has been left to the discretion of local regulatory authorities, an extensive and detailed assessment process is anticipated to modify criteria beyond the guideline approach.

Since the proposed soil quality criteria are values based upon defined protocols that are designed to support explicitly stated management objectives; the regulatory intention of the values of each criterion is now readily understandable. It is now possible to develop a procedure, with clearly defined goals, for the management of properties.

The new more stringent criteria (see Table 1) raise a paradox for site managers. If soils exceeding the new criteria are found on a property, this is not necessarily an indication that there is a danger to human life or health or the environment. The Guidelines indicate the desired objectives of preferred quality of soils and guidance as to the level of soil contamination requiring some level of management.

Using the 1991 Interim Criteria and present mode of implementation, soil contamination would lead to “dig and truck” as a solution. Isolation of soils is extremely expensive. Currently operators of permitted landfills charge $250-500 per tonne for contaminated soils, with contamination by a trace organic substance, such as PCB, resulting in costs of up to $1000 dollars per tonne. It is unlikely the Canadian economy, corporate or public, can afford to pay for isolation of soils that are not dangerous.

From the perspective of managing environmental quality, use of a *guidelines approach* defines what concentration of substances in soils pose negligible risk to the environment or to human health. The new soil quality guidelines represent a level of preferred management, in the same way that the Canadian Drinking Water Guidelines define the objectives for preferred drinking water quality.

What is still not stated is a practical approach to the application of soil quality guidelines to property management and to the development of “brownfield” properties. According to Whitman (1997), the method by which a contaminated site should be remediated is dependent largely upon the future use of that property, types of contaminants that exist, factors that pertain to land use in the surrounding area and community objectives. The challenge is to accomplish land use development and economic needs, protect health and environment, meet regulatory requirements and satisfy community and public concerns.

Principle 2: Assimilative Capacity

The concept of *assimilative capacity was* initially applied to an aquatic system and defined by Cairns (1977) as:

“..the ability of an aquatic ecosystem to assimilate a substance without degrading or damaging its ability to maintain the structural and functional characteristics of a locale.”

The functional characteristics include nutrient transfer, energy dissipation and various rate processes and the structural characteristics are its biological and physical components. The concept of assimilative capacity has since been recognized as a characteristic of all ecosystems (not only aquatic) and as the basis upon which to define how to manage for sustainable development (Goodland et al., 1993) which has been defined as:

"..... keeping both the throughput of raw materials and energy within the regenerative and assimilative capacities of environmental sources and sinks."

Glasoe et al. (1990) further extended the concept to land development, defining land suitability as:

". .the capacity of a site to assimilate the impacts associated with development limited by an allowable level of change in environmental quality. The various types and intensities of land uses, which stay within these environmental limits in turn, may be viewed as defining a site's 'assimilative capacity'."

Principle 3: Sustainable Development

Successful *sustainable* development should include four tools (Goodland et al., 1993):

- *Sound Economics.* Real estate development of contaminated sites must address the economics of site development and investments; cleaning up contamination for its own sake is difficult to justify (Begley, 1997). A procedure should motivate current owners of properties to include the cost of remediation efforts needed in the future into their current environmental management plans. Further, the procedure should recognize that if a soil does not contain a level of contamination that poses a threat to human health or the environment, "dig and truck" or other forms of separation make little economic sense.

- *Environmental Accounting.* Previously, the management of a property was based on the premise that as long as regulatory authorities gave their permission, a site could be used. In such cases, the information associated with title transfer was the use of the property was "permitted". Financial institutions have been taking a more active approach to financial risk by insisting, before title transfer, that properties contain a minimum amount of "environmental liability". While based on the CCME 1991 soil quality criteria, the only information associated with title transfer was the site meets criteria." Information on the overall condition is not provided nor is there a method for determining whether or how new uses will affect the site condition for subsequent users. The proposed management procedure provides a system for environmental accounting by requiring more detailed and on-going site assessment and by establishing both an initial assimilative capacity and subsequent assimilative capacity remainder.

- *Site Assessment* Current site assessment activities are heavily oriented to the goal of meeting criteria. Unless a site-specific risk assessment is undertaken, almost no information is required apart from the quantity of a contaminant in a sample. Questions such as "Will this contaminant be immobilized by this soil?", "Is this soil capable of supporting plant life, even if the contaminant is removed, or will further conditioning be required?" Is the groundwater beneath this site receiving contamination from the soils on this site, or is it contaminated before it enters the site?" need to be considered. Using the new guidelines, the proposed management procedure will provide for a full assessment of

the environmental implications of soil quality and go beyond counting molecules of contaminants. According to the National Roundtable on the Environment and the Economy (1997), better site-specific data on the environmental condition of land would: (1) encourage the preferred uses of various categories of land, consistent with municipal plans; (2) enhance public protection and confidence, especially if landowners were required to disclose conditions that might pose a threat to public health; and, (3) encourage the prevention of contamination of land in the future.

- *Operational Guidelines.* There is currently no working definition of what it means for a site to "meet criteria." Are concentrations of contaminants within the soil on a property required to be, on average at or below criteria, or is every cubic centimetre of soil required to be at or below criteria? What statistical certainty is required to determine such conditions? If a contaminant in a defined soil area exceeds its criterion, what are the guidelines for determining whether this soil should be removed from the site? Does the soil require disposal in an engineered landfill? What level of control should this landfill have? Does the presence of this soil pose an immediate threat to human health or the environment, or is the nature of the threat dependent upon long-term exposure? The proposed management procedure addresses these issues through the provision of interpretation and operational guidelines.

PROPOSED PROCEDURE FOR PROPERTY MANAGEMENT

It is our premise that the new CCME guidelines define the level of assimilative capacity for a soil. Any property, subsequent to a sufficiently detailed environmental site assessment, can be classified as one of three types:

- Scenario 1: Soils on a property are characterized and are maintained in such a way that all contaminant concentrations in the soils meet or are below the guidelines levels, without further site preparation. Because there are risk assessments associated with these guidelines, these properties could also be considered to have been assessed for contamination by Health Canada and Environment Canada.

- Scenario 2: Limited contamination can be managed, and any risk reduced, through mixing with other soils on the property so that the average concentrations meet or are below the guidelines. While meeting criteria (the old approach), the new concentrations also mean there has been a reduction in the remaining assimilative capacity of the site, by a fixed and measurable amount. The remaining potential of the soil to absorb contaminants should be estimated and reported as the "assimilative capacity remainder". This remainder can be assigned a financial value and form part of the appraised value of a property. These properties also could be considered to have been assessed for contamination by Health Canada and Environment Canada.

- Scenario 3: Significant contamination has occurred, such that soils which are considered to pose a danger to health or safety would be removed. The remaining soils that exceed the assimilative capacity but do not exceed the criteria for removal will require risk management. The selection of uses of the site would be constrained by the need to reduce and minimize risk. The requirement for risk management would form part of the property environmental record. There would also be a management responsibility imposed on future users. By exceeding the assimilative capacity and imposing a management responsibility,

the net financial value of the property would be reduced and some form of agreement with future owners would be required.

The key both during initial property evaluation and subsequent property ownership is to maintain an adequate property environmental record or account as described and defined by the environmental site assessment (ESA). To adequately characterize the property, the current Phase 2 ESA has to be modified to determine not only the concentrations of substances in soils, but also the distributions of the contaminants in relation to the volumes of soils which are assimilating those concentrations. Phase 3 ESA tasks would address what actions are required to meet management goals, such as the need to remove soils to reduce endangerment, determine the requirements for soil mixing as part of the assimilative capacity remainder and to demonstrate that the surface soils can support plant and animal life.

Thus, the traditional concept of site assessment as a means for concentration documentation would be enhanced. For example, assessment might indicate that the soils may not contain levels of substances on the guidelines list that are harmful to plants and animals, but the soil may be deficient in other important factors, such as nutrients and organic matter. Site clean up would be re-defined to site rehabilitation, addressing not only contaminants, but also the potential requirements of addition of organic matter and nutrients. This approach is consistent with the goals of the CCME guidelines, which is to preserve the productivity of the soils.

In a case such as scenario 3, the purpose of risk assessment would shift from an exercise intended to supersede criteria to one verifying the effectiveness of proposed risk management. Site assessment would move from a “molecule counting” approach to an activity in support of sustainable development.

With completion of site rehabilitation, a report (property environmental account or record) would be prepared documenting the condition of the property in terms of concentrations of substances of concern and the ability of the soil to support plant and animal life. The report would also document the “assimilative capacity remainder”. This report would allow financial institutions and regulatory officials to assess proposals for future site development, whether a development can be managed to protect the remaining assimilative capacity or whether a property requires long-term risk management.

The property environmental account would also be a way to determine any financial penalties for mis-managing a site. For example, loss of assimilative capacity would reduce the value of the site for future development; definition of a property as a “risk managed area” would place additional demands for environmental management on future users. Some types of uses might not be compatible with properties that were defined as “risk managed areas” at the time of site transfer. Property value appraisals would be forced to continuously reevaluate the value of a property to account for contamination from routine activities or accidental events. In this way, the tool of *environmental accounting* would be applied to help financial institutions determine the cost of environmental mis-management and the value of diligent management.

CONCLUSIONS

The 1991 CCME soil quality guidelines initiated an approach to property that forced property owners, managers and financial institutions to address soil and groundwater contamination within the valuation of ownership and liability. Further implementation of this policy has often resulted in a “dig and truck” approach which has not always resulted in the desired end-point of

risk reduction and protection of the environment. Rather, in many cities, it has labeled properties as “brownfields” and effectively led to the abandonment of such lands.

Application of the new CCME guidelines approach to the evaluation and management of contaminants offers property owners and manager with an opportunity to rehabilitate these lands, based on the four principles of sustainable development: sound economics, environmental accounting, environmental assessment and effective use of operational guidelines. As a major property manager of former industrial lands, Canada Lands Company has recognized and accepted this challenge by implementation of the new management approach to brownfield re-development of the former CN Rail Car Shops property, Moncton, New Brunswick.

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TABLE 1: CCME 1991 and 1997 Soil Quality Guidelines for Residential Property Use (all values in mg/kg)

Contaminant	**1991**	**1997**
Arsenic	30	12
Cadmium	5	10
Chromium +6	8	0.4
Copper	100	62
Cyanide	10	0.9
Lead	500	140
Mercury	2	7
Tetrachloroethylene	5	0.2
Zinc	500	200