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Environmental Site Assessments in Support of Brownfield Redevelopment

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Introduction



- Welcome & Opening Remarks
 - Webinar Logistics
- Stantec Speaker Introductions
 - François Lauzon, C.D., M. Eng., P. Eng., ing., LEED AP

Objective of the Workshop

*This workshop will focus on presenting **general concepts in the process** of brownfield redevelopment, with an emphasis on the following topics:*

- 1. Where Brownfield redevelopment fits in the Municipal context*
- 2. Typical Expertise that should be sought*
- 3. The Environmental Site Assessment (ESA) Process*
- 4. Factors influencing Site Remediation*

Definition

The National Roundtable on the Environment & Economy (NRTEE) defines brownfields as:

“abandoned, idle or underutilized, commercial or industrial properties where past actions have caused known or suspected environmental contamination, but where there is an active potential for redevelopment”.

NRTEE, 2008

What is a “Contaminant”?

The Environmental Protection Act (Ontario) defines a contaminant as follows:

“Contaminant” means any solid, liquid, gas, odour, heat, sound, vibration, radiation or combination of any of them resulting directly or indirectly from human activities that causes or may cause an adverse effect.

Brownfield Impacts

- Left Undeveloped
 - Health & Safety Concerns
 - Environmental Contaminants Fate & Transport
 - Visual Nuisance
 - Loss of Revenues
- Redevelopment Impacts
 - Carbon footprint of Assessment and Construction
 - Financial Impacts of Uncertainties
 - Carbon footprint of new development
 - New Life for the site



Impacts – Human Health

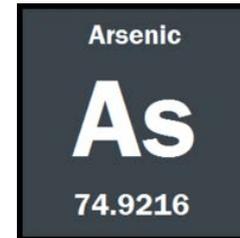
Receptor

- Toddler
- 16.5 kg



Contaminant

- Arsenic in soil
- 100 mg/kg



Pathway

- Soil ingestion
- 80 mg/d



Risk

- Cancer risk = Dose x Slope Factor
> 1 in 100,000
- Hazard quotient = Dose / TRV > 1

Consider Effects

- Bladder, lung, liver cancers
- Oral sf: $1.8 \text{ (mg/kg-d)}^{-1}$

Impacts – Ecological



Source: US EPA

Impacts – Social & Financial

Social

- Loss of trust
- Anger
- Fear
- Cultural Concerns
- Employment opportunities
- Community Conflicts



Financial

- Loss of revenues (tax base)
- Liabilities that may transfer to the municipality
- Property values

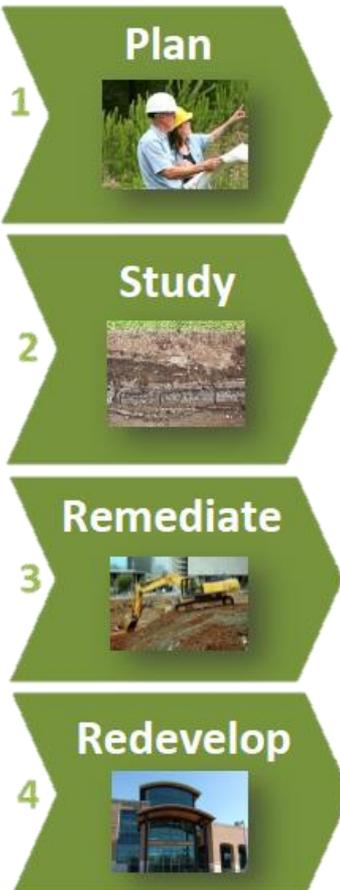


FCM Brownfield Roadmap

Generic Brownfield
Redevelopment
Process

Provincial
Requirements

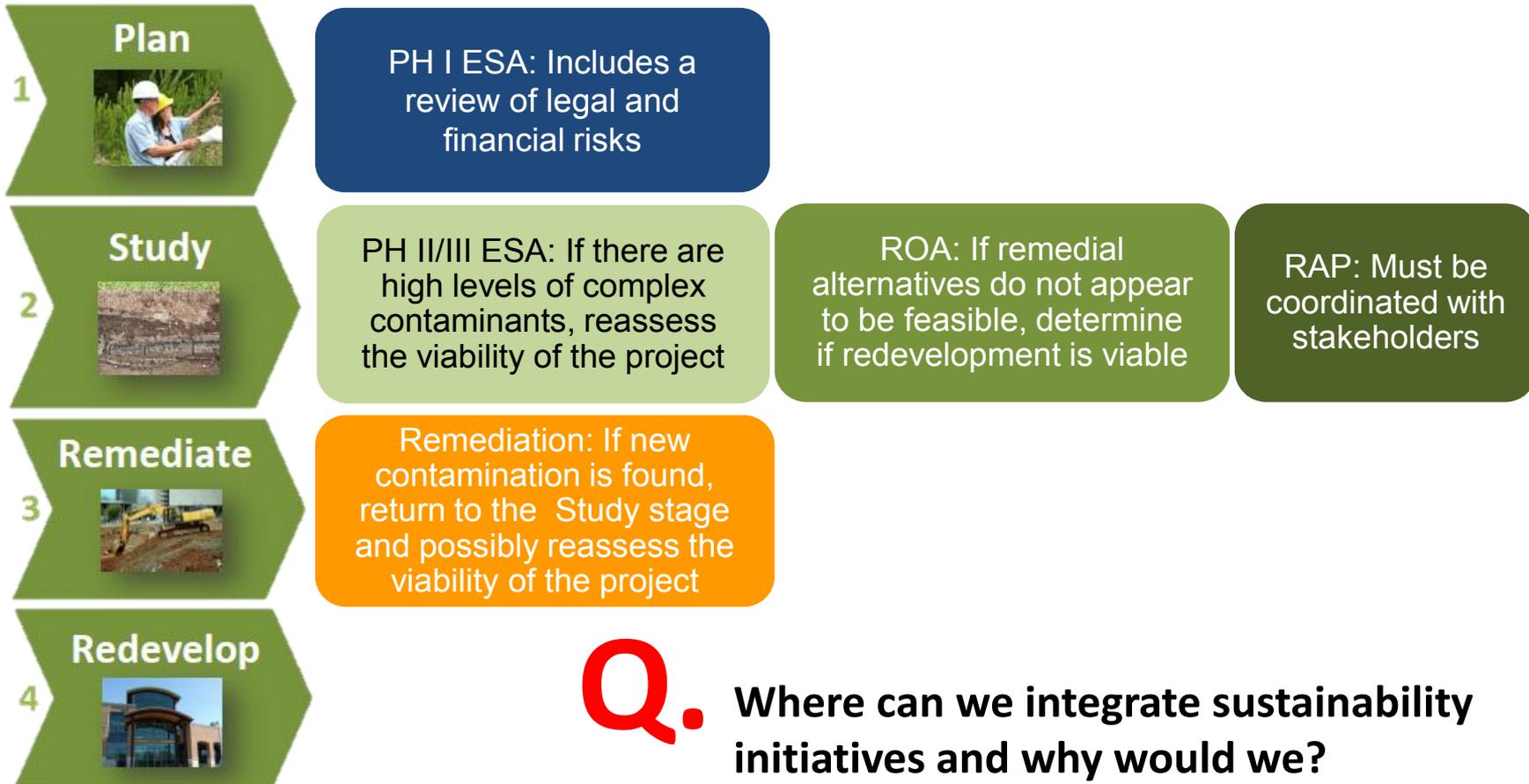
Funding and
Incentive
Programs



GMF (and other) funding at every step...



Industry Context



MODULE 1: Plan

- Create a Supportive Policy Environment & Define Objective
- Inventory your Redevelopment Sites
- Develop a Redevelopment Strategy

- Take Leadership, Catalyze Change
- Identify your Development Model & Team
- Identify the Development Opportunities and Constraints
- Develop a Site Concept

Community

Site-Specific

Municipal Liabilities



- Montreal, 2016
 - *Property owners in Montreal are suing the City after discovering that their properties were built on the site of a former garbage dump. The land contains biogas contamination generated by the former landfill. The property owners are claiming that Montreal failed to inform them about the contamination and the historic use.*

2015ONCA819

Midwest properties v. Thordarson

- Migration of contamination from Thorco's land to Midwest's land
- Thorco was the "source"
- P.Eng. called to testify for remedial costs and context of health risk
- Damages awarded even in the absence of hard data establishing property conditions at time of purchase
- **The Court of Appeal held that in contaminated land cases involving migration to a neighbouring property, the measure of damages could be remediation costs (\$1.3M in this case) – even if those costs exceed the property value**

Municipal Dilemma

- Municipal obligation to protect their residents.
- When the polluter or developer is not available or is impecunious there will be great pressure on the municipality to resolve the problems.
- Municipalities should avoid issuing planning approvals and permits where contamination in excess of applicable standards.
- The conundrum for municipalities is that if the municipality raises the issue of suspected contamination publically, property value may be affected, giving rise to the municipality liability.

Inventory your Sites



Should include:

- known public and potential brownfield sites
- known or potential private lands

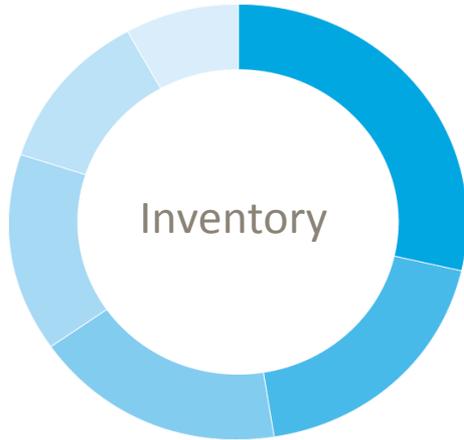


Proactive planning is key to minimize future potential 'orphaned' sites and/or other liabilities and litigation

Public Service Accounting Board - 3260 Bulletin (PSAB3260)

- New accounting requirements
- Reporting Environmental Liabilities
- For fiscal years starting on/after April 1, 2014
- Non-productive/Inactive sites at this time; may evolve into Productive/Active sites

PSAB3260 - What is Required?



Inventory

A comprehensive inventory and disclosure of properties

What, where & why for each site



Estimation

Demonstrated experience in liability estimation

Defendable and auditable estimates requires professional judgement based on experience



Disclosure

Proper disclosure in financial statements

Due diligence and options analysis based on risk

Potential Municipal Sites Included in PS3260

- Schools
- Bus Garages
- Maintenance Garages
- Former Industrial sites
- Refueling Stations
- Fire Stations
- Underground Tanks
- Salt domes
- Police stations
- Old dumping sites
- Old wharfs
- Redundant infrastructure
- Redundant old buildings with past fuel storage, etc.



‘Stumbling Blocks’

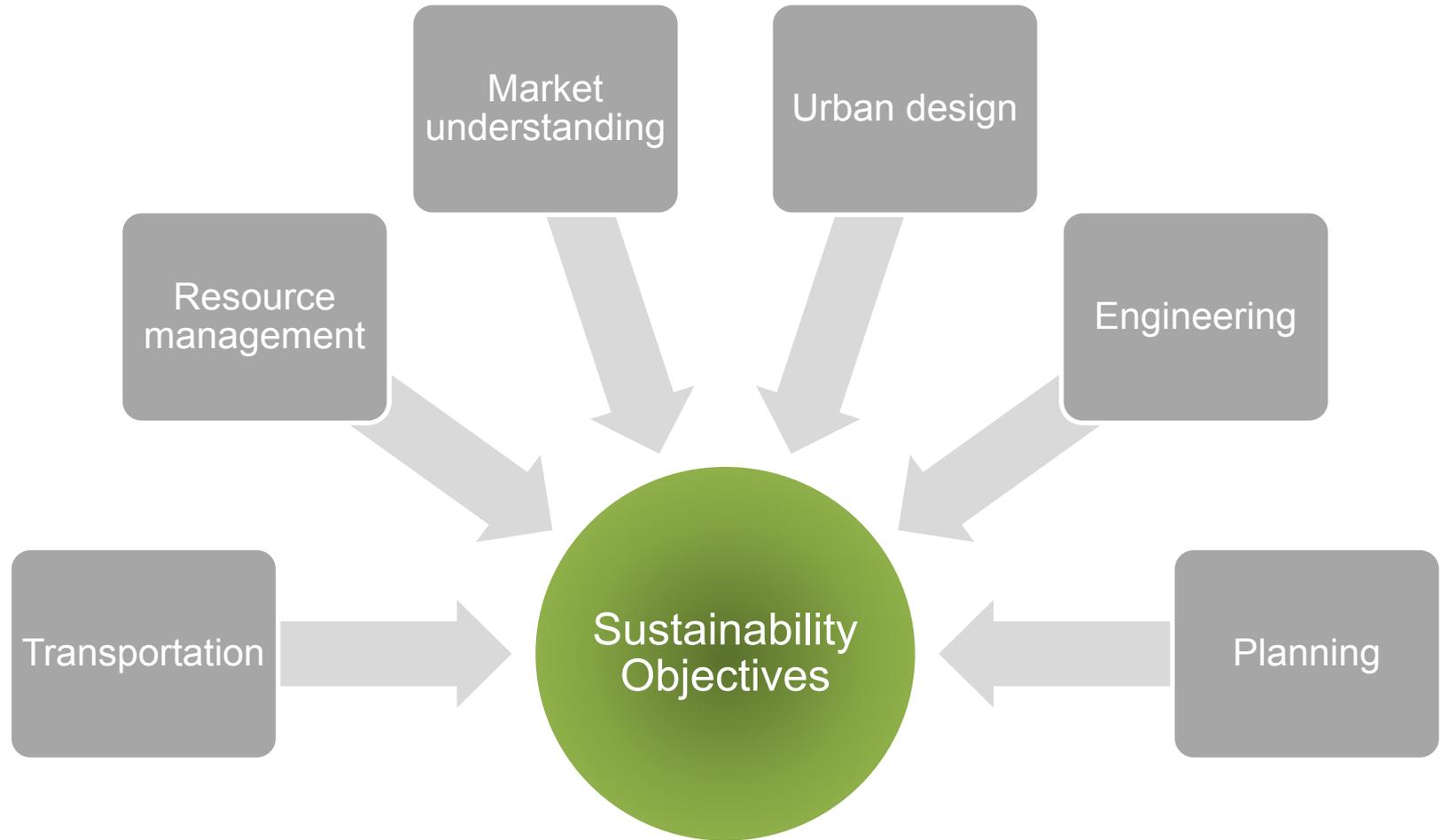
- Many financing tools are property tax based, not at the front end; traditional lenders may be reluctant to finance remediation phase
- In small communities, a lack of market drivers for new development, including brownfield redevelopment, is a significant barrier
- Regulatory process is perceived by some to be slow and too restrictive

Consider :

What are the biggest barriers to brownfield redevelopment in your municipality?



Fundamentals of Planning – Planning Integration



Create Supportive Policy Environment Around Brownfields

Supporting Policies/Strategies

- Official Community Plan
- Energy / Climate Action Plan
- Sustainable Community Plans
- Watershed Management Plans
- Asset Management Strategy
- Brownfield Redevelopment Strategy

Build the Case for...

- Infill
- Densification
- Re-Use
- Remediation

FCM Funding Opportunities



- Renewed offer in effect April 1, 2015
- Intent is to assist for planning, feasibility studies, pilot projects, and capital projects
- Eligible projects: brownfields, energy, transportation, waste, water...common sustainability theme
- Plans & Feasibility Studies: 50% (max grant \$175K)
- Pilot projects: 50% (max grant \$350K)
- For brownfields, loans for up to 80% of eligible costs

Financial Incentives

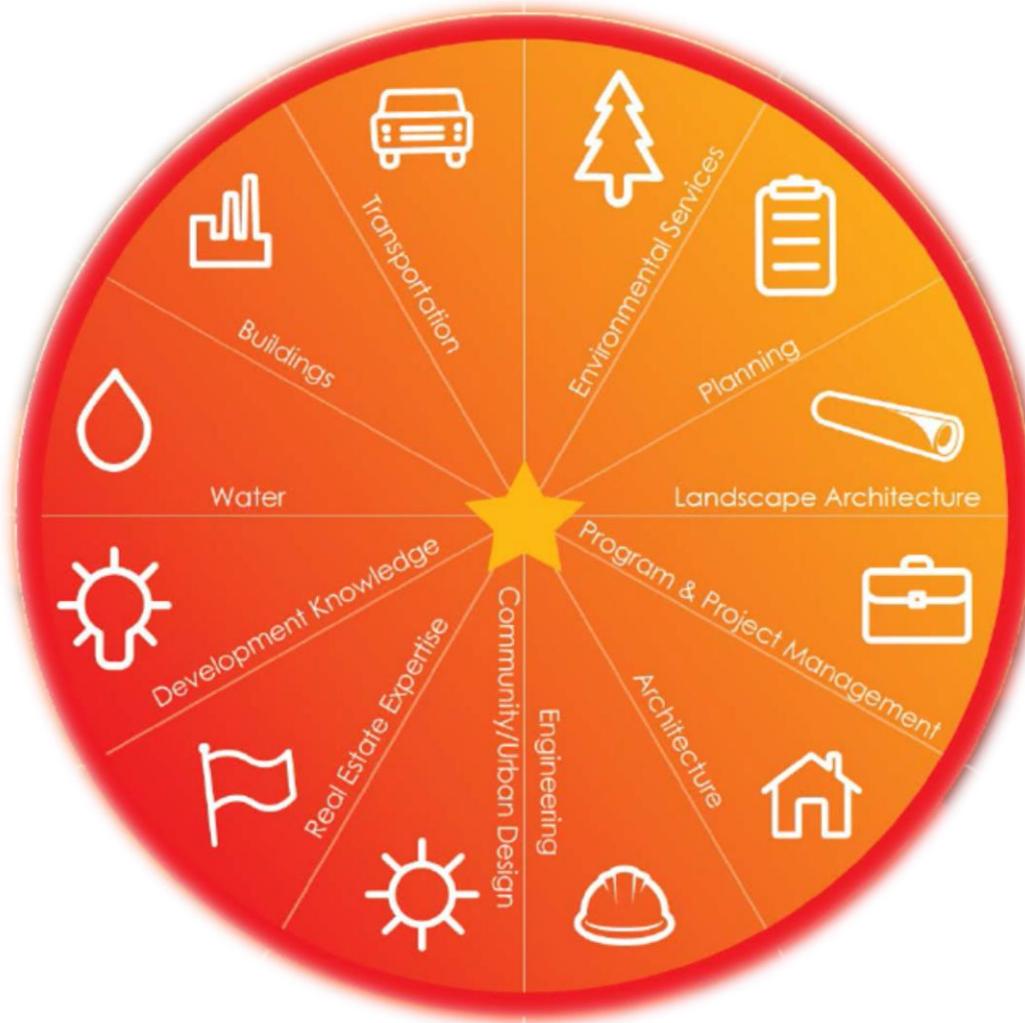


- Help meet convergent planning policy objectives
 - Intensification (transit, sustainability)
 - Use of existing infrastructure (fiscal capacity)
- Provide opportunities for tax partnering
 - Brownfields Financial Tax Incentive Program (BFTIP) is a provincial (Ontario) funding program that provides matching education property tax assistance for the rehabilitation of brownfield properties

Financial Incentives

- Quebec program: ClimatSol
 - Created in 2007, will be ending March 31st 2017
 - Program intended to help municipalities rehabilitate brownfield sites under their responsibility
- New program: ClimatSol-Plus
 - Program in the continuity of ClimatSol, with measures added to fight against climate change, and simplify administrative management
 - Component 1
 - 10 M\$/year allowed for the next 3 years in the 2016-2017 provincial budget
 - Component 2
 - 25 M\$ allowed to rehabilitate brownfields with important potential for economic development (over 5 years)

Brownfield Redevelopment Team



- Multidisciplinary team
- Sustainability lens
- Procurement
- Stakeholder Engagement

Questions



MODULE 2: Study

- The Regulatory Context
- Complete Environmental Site Assessments – A Phased Approach
- Identify Remediation Options
- Align Remediation Plan with Site Vision/Evaluate Development Feasibility
- Develop Remedial/Risk Management Action Plan

Canadian Council of Ministers of the Environment (CCME)

- The Council consists of Ministers of the Environment of the federal, provincial, and territorial governments;
- Members of the CCME propose the adoption of uniform guidelines, criteria and objectives at the national level;
- Responsibility rests with each government to decide the extent to which it will adopt the recommendations of the CCME.

CCME

Canadian Council
of Ministers
of the Environment Le Conseil canadien
des ministres
de l'environnement

The Regulatory Context - Maritimes

- Prince Edward Island- Regulation supported directly by PIRI/RBCA tools
- Nova Scotia developed regulation in 2013
 - Adopted RBCA tools, supported by Partnership
 - Specifically incorporated regulatory Liability closure provisions for brownfield type sites
- New Brunswick - Comprehensive Brownfield redevelopment policy
 - Now focusing on standalone brownfield regulation
 - Supported directly by Atlantic RBCA tools and Partnership Forum
- Newfoundland & Labrador supported directly by PIRI/RBCA tools

The Regulatory Context – Québec

- ***Environment Quality Act (EQA)***
 - If contaminants are present in a land above regulatory concentration limits, the person or municipality has to put a notice of contamination in the land register (31.58)
 - A notice of decontamination may also be registered if remediation has been carried out and a subsequent characterization study has shown that no contaminants are present above regulatory concentration limits (31.59)
- Soil protection and land remediation Policy (1998)
 - Sets the basic principles in terms of land remediation in Québec
- New Developments
 - Favor soil treatment rather than soil burial
 - Favor the development of green treatment technologies (in situ)
 - Favor brownfield remediation in cities for an increase of territorial densification, which will contribute to less transportation, and less greenhouse gas emissions

The Regulatory Context – Ontario

O.Reg. 153/04 Record of Site Condition. Ontario's brownfield regulation designed to increase certainty in the MOECC's RSC process (the Registry), as well as improve the quality of the work completed. The regs include:

- Revised **standards** for 120 chemicals that reflect advances in science and strengthen protection of human health and the environment.
- A new streamlined risk assessment process (modified generic RA)
- Clearer and more flexible requirements for environmental site assessments.
- Details Qualified Person
- Lists Potentially Contaminating Activities (59)

Manitoba Legislation and Guidance

- *Contaminated Sites Remediation Act*
- *Contaminated Sites Remediation Regulation*
- *Guide to the Contaminated Sites Remediation Act*
- Manitoba Sustainable Development guidance documents

Saskatchewan Legislation and Guidance

- ***Environmental Management and Protection Act, 2010***
- Saskatchewan Environmental Code
 - Contains a collection of legally-binding requirements
 - References standards for the management of environmentally impacted sites
 - Outlines the site assessment activities that require involvement of a “qualified person”
- Saskatchewan Ministry of Environment Guidance Document: Impacted Sites
 - Describes the process for managing impacted sites

Alberta

Legislation and Guidance

- ***Alberta Environmental Protection and Enhancement Act, 2000, Chapter E-12***
 - Part 5 of the Act, on Release of Substances, contains provisions related to brownfield redevelopment activities
- Legislative guidance - Alberta Soil and Groundwater Remediation Guidelines
- Environmental Site Assessment Repository
 - Online, searchable database - scientific / technical information about assessed and reclaimed sites throughout Alberta
- Alberta Environmental Site Assessment Standard (Mar 1, 2016)
 - Follows Canadian Standards Association, Phase I & Phase II Environmental Site Assessment Standards
 - Record of Site Condition
 - Assessments and Record of Site Condition must be completed by the licensed professional

B.C. Legislation and Guidance

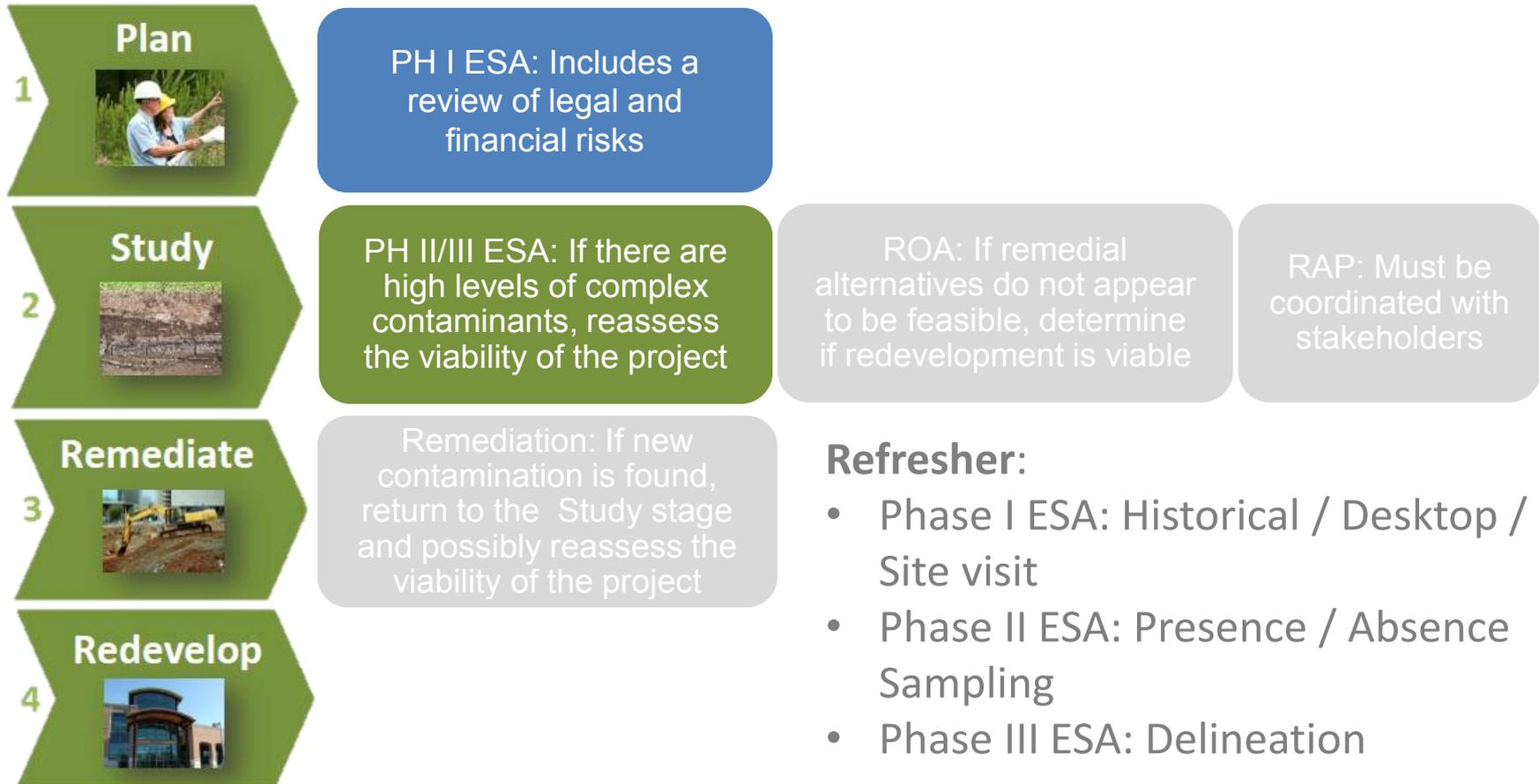
Environmental Management Act

- comprehensive provisions regulating contaminated sites. Brought into force in July 2004
- establishes a framework for site identification, assessment, and cleanup (“remediation”) as well as liability allocation.
- Associated details are set out in the *Contaminated Sites Regulation* (B.C. Reg. 375/96) and accompanying protocols, procedures and guidance
- Updating of Remediation Standards:
 - Universal updating of existing standards, and derivation of new standards for emerging contaminants.
 - Add purpose-derived new standards for new Wildlands and High Density Residential land uses.

Consider :
How might brownfield
redevelopment benefit your
municipality?



Complete Environmental Site Assessments

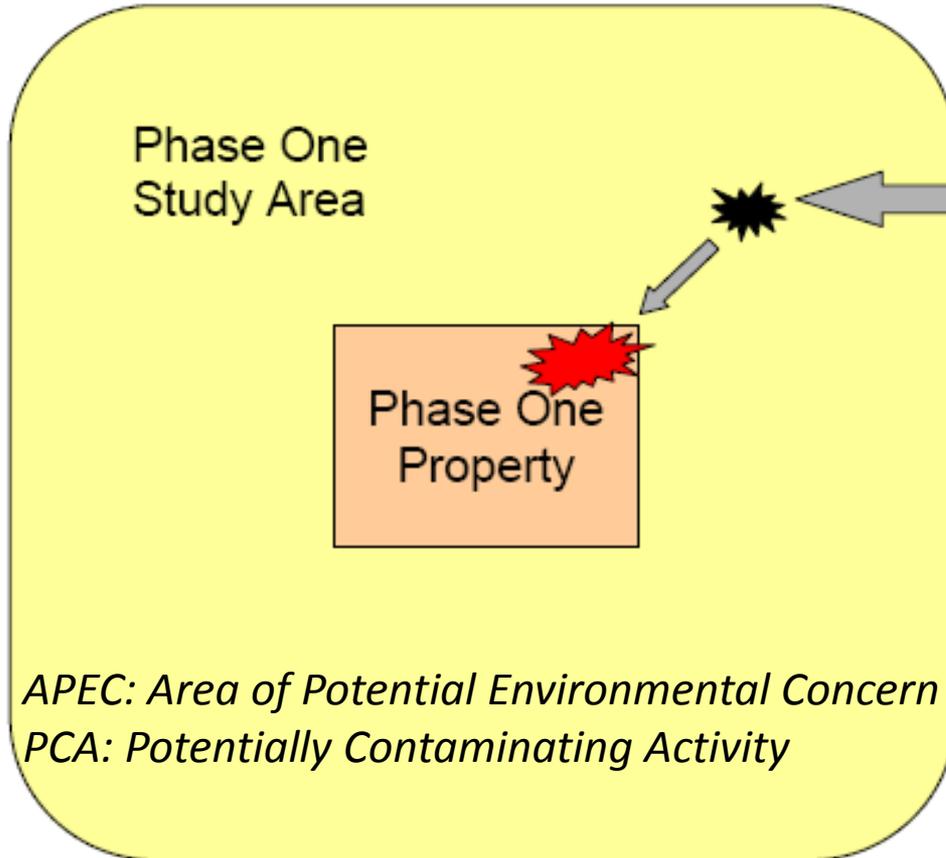


Phase I ESA – Environmental Site Assessment

- Standardized; recognized by Canadian Standards Association - CAN/CSA Z768-01 (R2006)
- Evaluate the current state and environmental liabilities of a residential, commercial, or industrial property
- Assess the environmental risks associated with a site; a necessary decision-making tool prior to any transaction
- Unobtrusive, no sampling is completed



APECs and PCAs



If there is a PCA in the study area, QP must determine if PCA might result in an APEC on the property.

APEC: Area of Potential Environmental Concern
PCA: Potentially Contaminating Activity

-  APEC
-  PCA

Phase II ESA – Preliminary Characterization

- Standardized; recognized by Canadian Standards Association - CAN/CSA-Z769-00 (R2008)
- Carry out for sites where indications of potential contamination have been identified or for sites where there are known environmental concerns and also to document baseline conditions
- Confirm the presence or absence of contaminants, determine the type of pollutant, and identify the contaminated areas and media
- Includes conducting surveys and taking samples



Phase III / Supplemental Phase II ESA – Detailed Characterization

- Exhaustive characterization
- Determine the nature and extent of contamination (concentrations, extent, and variations) for each medium
- Determine the volumes of contaminated materials to be managed in light of the appropriate criteria and standards
- Assess the impacts of contamination on the environment and determine the potential risks to human health, wildlife, and flora, comparing them to existing standards and criteria

Traditional ESAs

- Drilling
- Test Pitting
- Soil Sampling
- Groundwater Sampling
- Laboratory Analyses
- Multiple Phases



Contamination – Characteristics

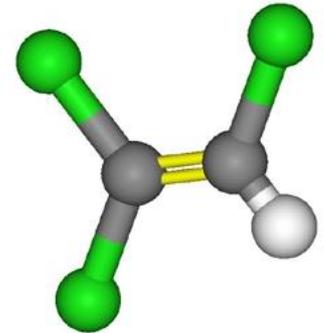
Contaminants generally can be divided into four groups:

- Organic
- Biological
- Inorganic
- Radioactive
- The behaviour of contaminants and contaminant mixtures in the environment is influenced by physiochemical properties.
- These properties govern the partitioning, transport, and fate of the contaminants either individually or in bulk mixtures.



Contaminated Sites Liabilities

- Key Cost Drivers
 - Contaminant Type/Behaviour
 - Biodegradable vs Persistent
 - Mobility
 - Density (LNAPL vs DNAPL)
 - Geological Setting
 - Bedrock vs Fine-grained vs Coarse-grained
 - Hydrogeology



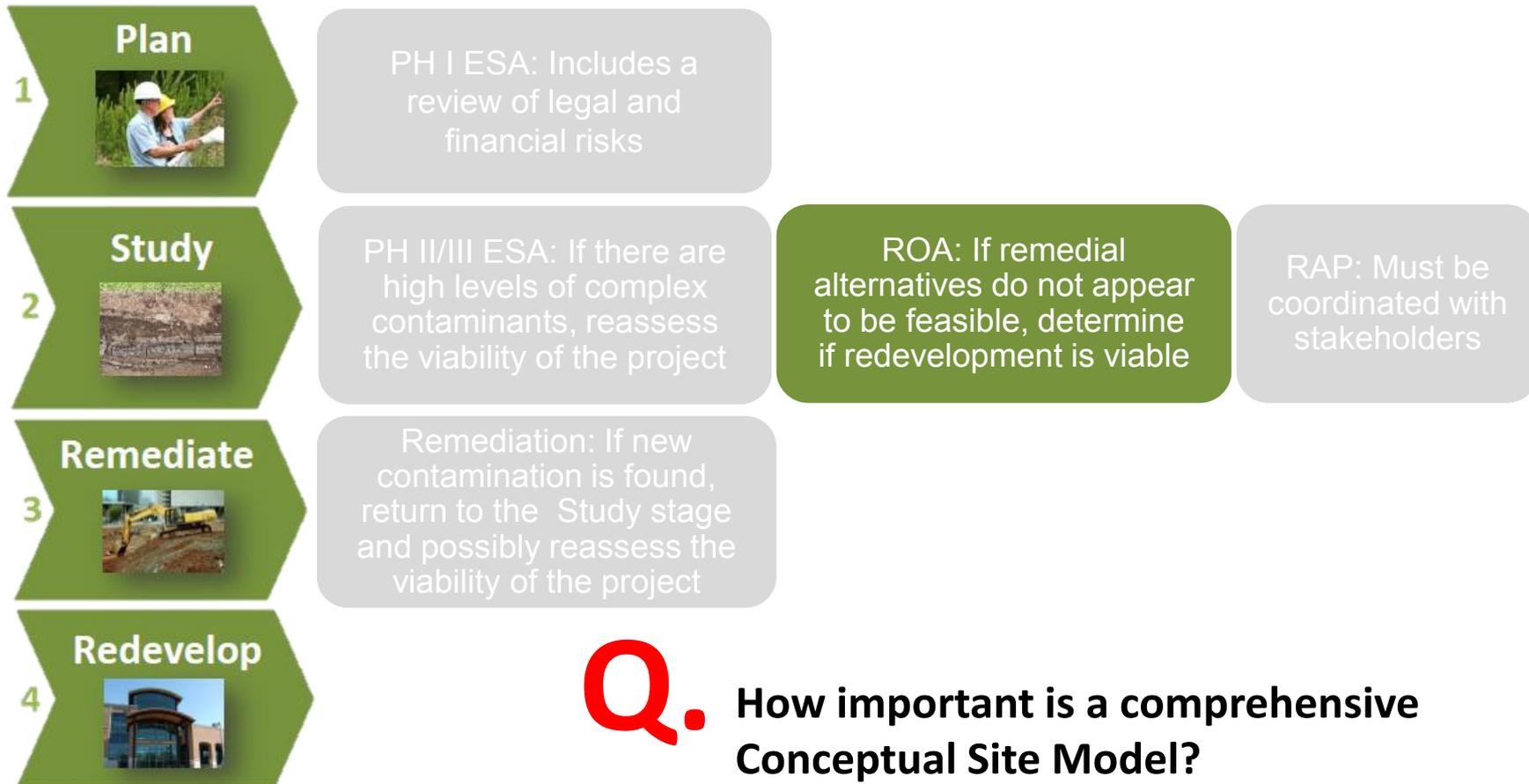
Having a robust Conceptual Site Model will help reduce uncertainties and costs

Average ESA Cost (range) per Phase...?

- Phase I ESA
- Phase II ESA
- Phase III ESA



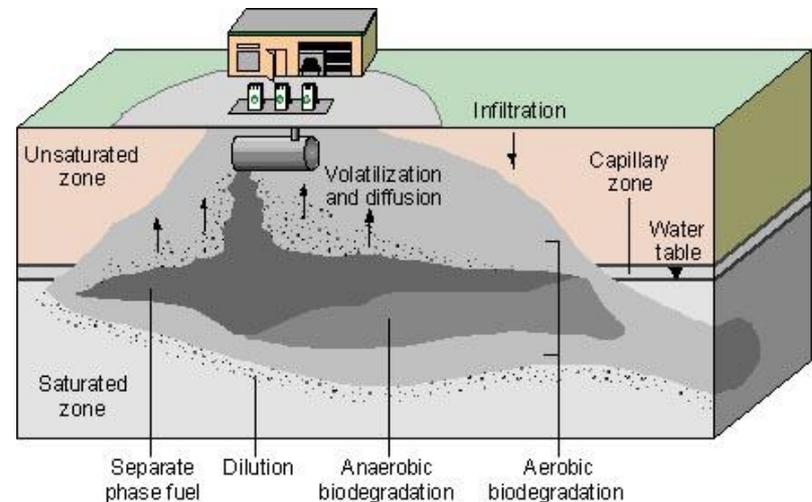
Identify Remediation Options



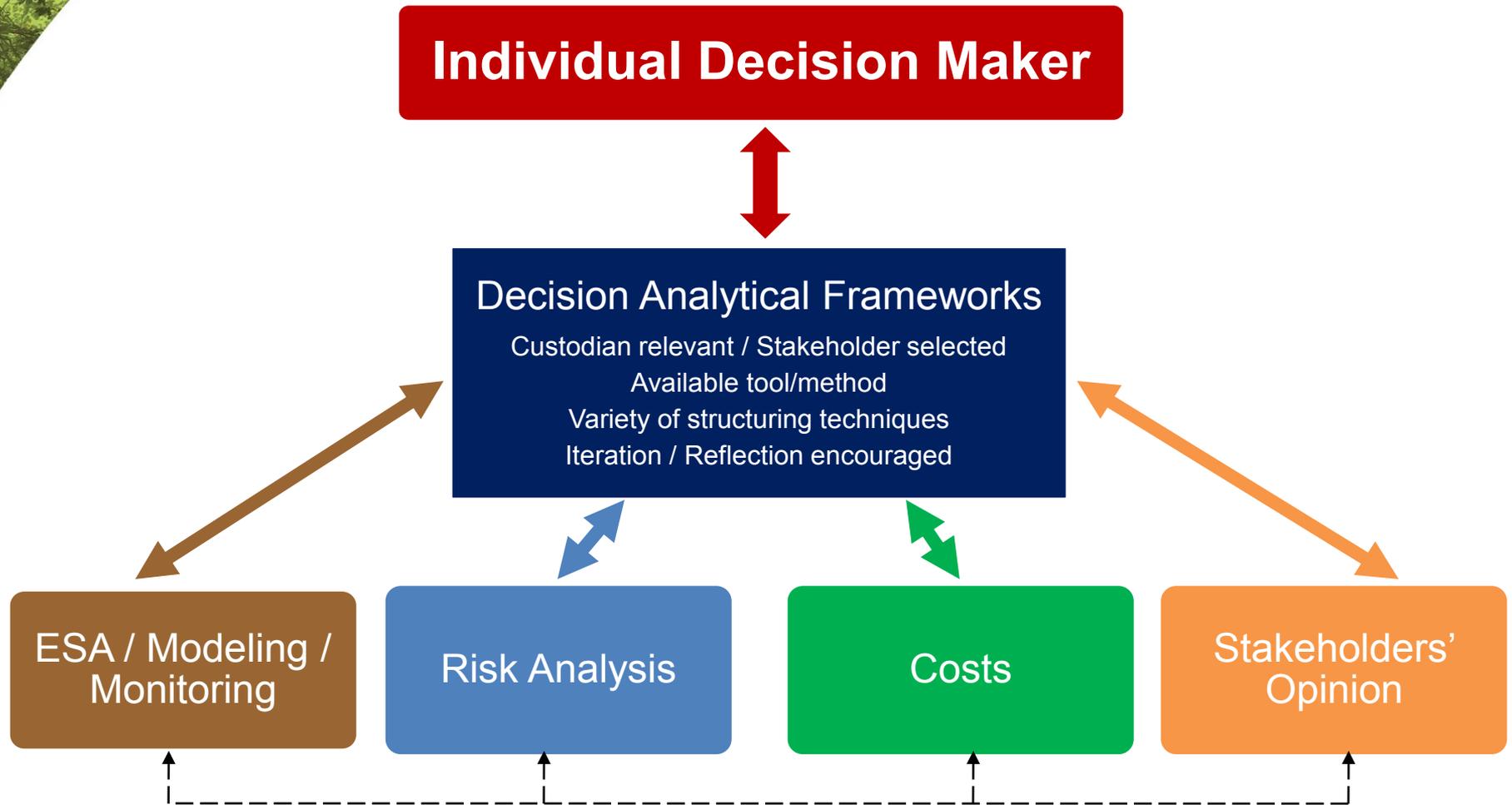
Conceptual Site Model

Key design parameters for use in Remedial Options Analysis (ROA) and Remedial Action Plan (RAP):

- Nature and Extent of Contaminants in the Subsurface
- Contaminant Fate and Transport
- Spatial (e.g. hot spot, mean test)
- Temporal
- Chemical and physical



Remedial Options Analysis (ROA)



What is Risk Assessment?

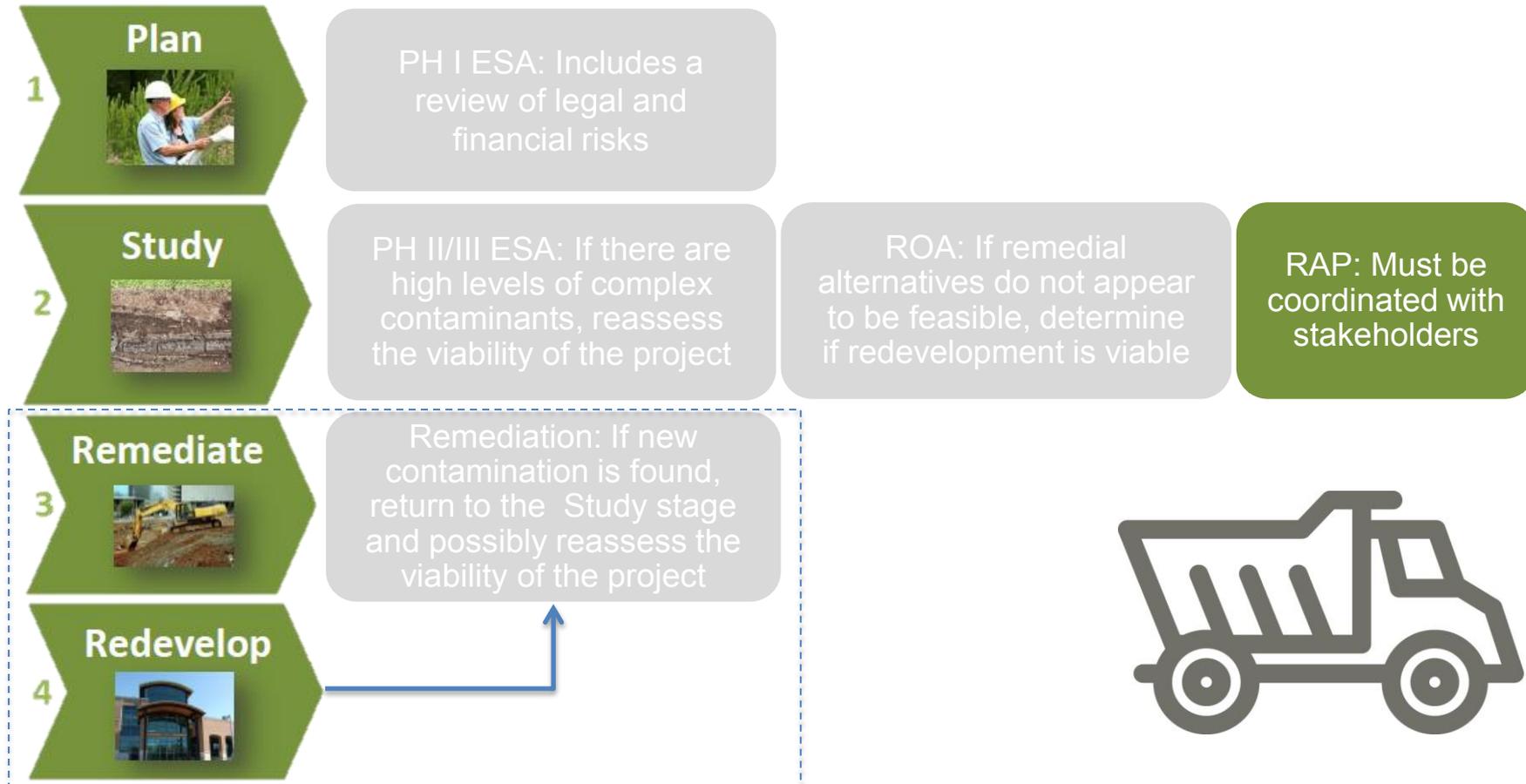
The **process** of estimating the probability of occurrence of **adverse effects** on **human and/or ecological health** resulting from chemical **exposure**

Exposure



Effect

Develop Remediation/ Redevelopment Plan



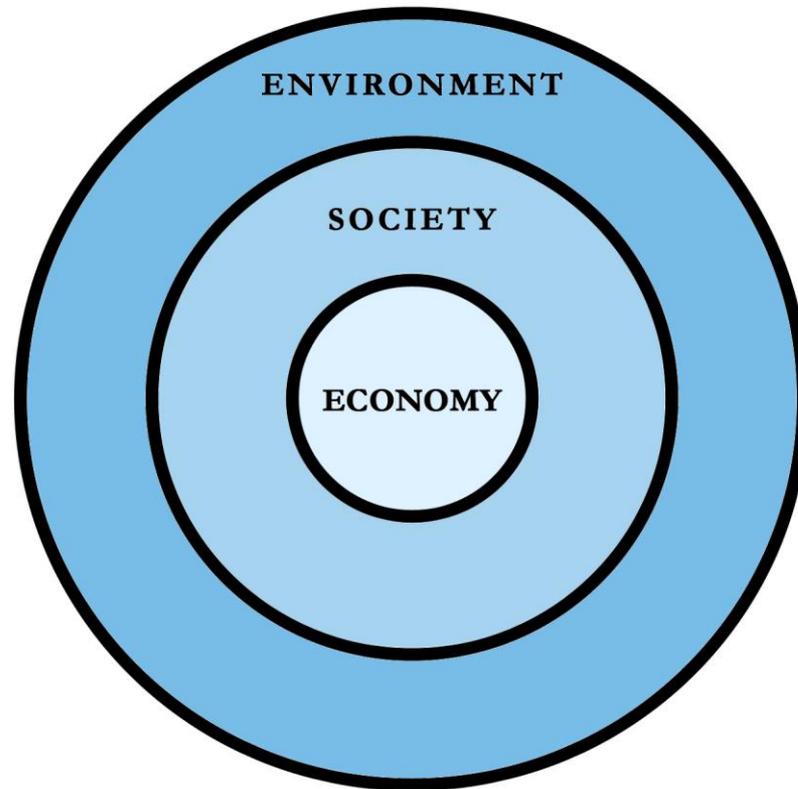
Questions



MODULE 3: Remediate

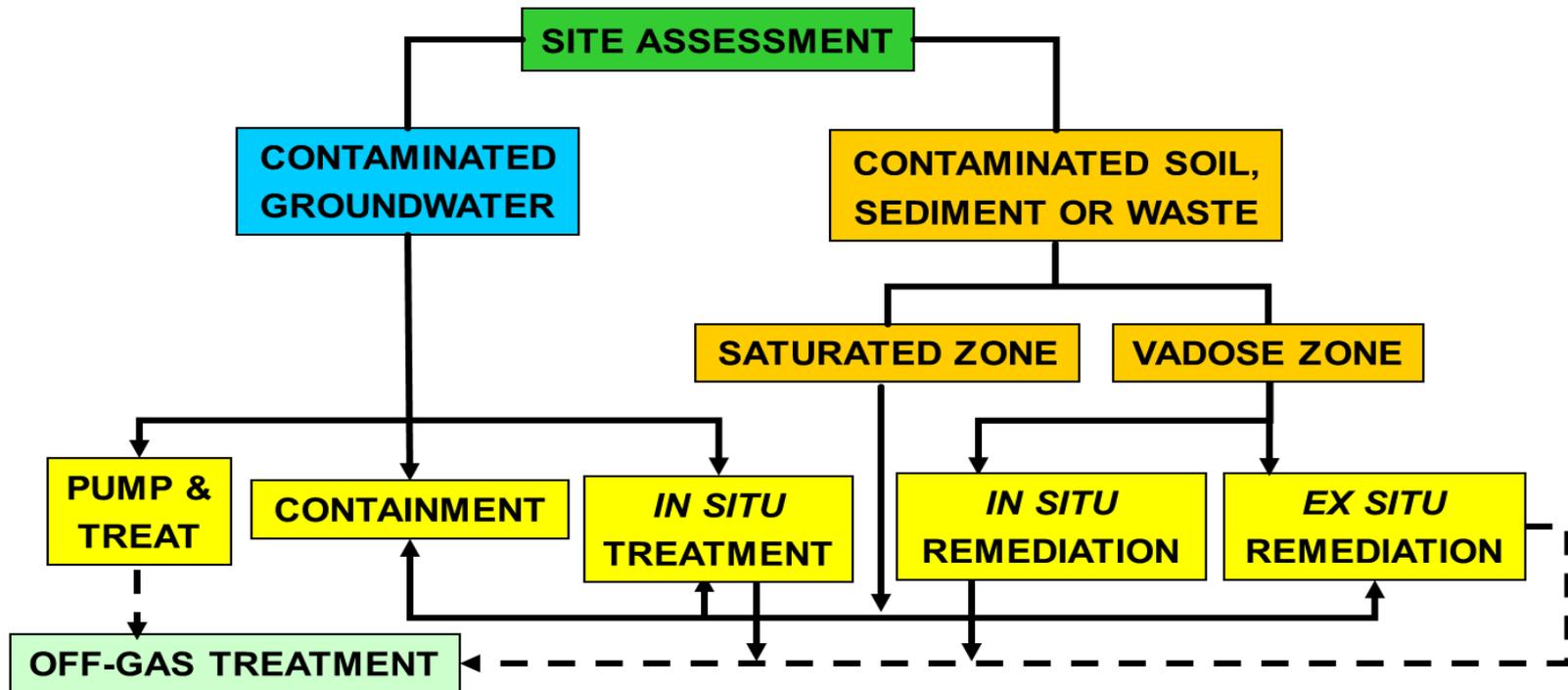
- Complete Site Decommissioning and Site Remediation, Focus on Sustainable Approaches
- Receive Confirmation of Compliance/Site Closure

Reminder: All Three Spheres



Source: umaine.edu

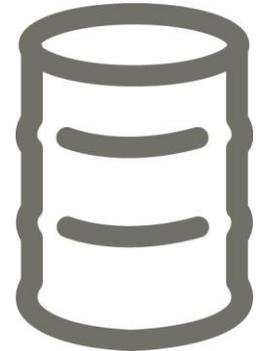
Remediation – Options Selection



Remediation – Options Selection

Petroleum hydrocarbons contaminated sites:

- Excavation and disposal at a landfill or licensed treatment facility
- In situ bioremediation
- Biopile / landfarm
- Monitored natural attenuation
- Pump and treat
- In situ chemical oxidation



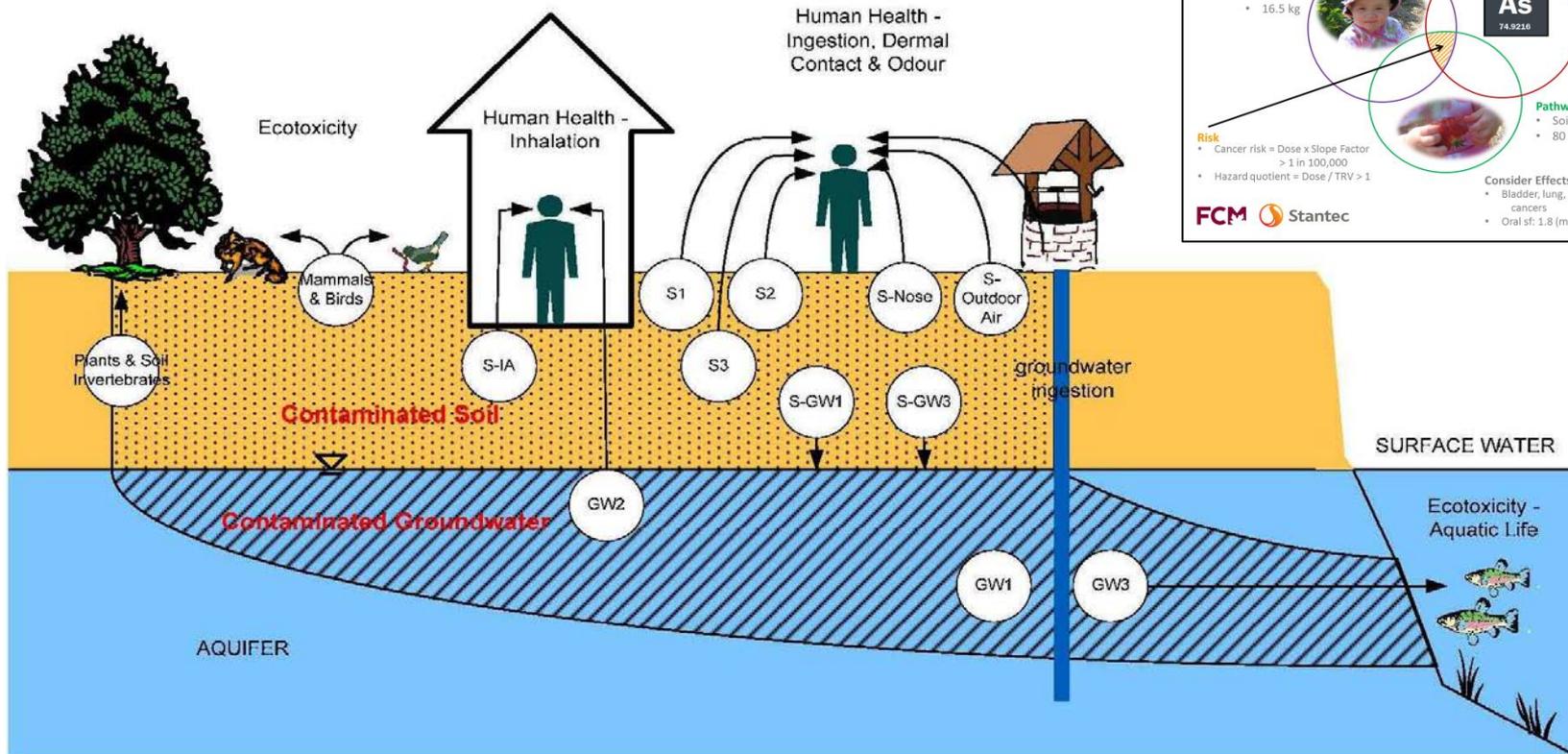
Excavation



Monitored Natural Attenuation

- Risk-based management of contaminated land and groundwater using the combined effects of biological, chemical and physical processes that occur in environment.
- Increasingly important environmentally sustainable strategy for remediation/management of contaminated sites where engineered restoration is impractical, technically unfeasible, or too costly.

Risk Assessments



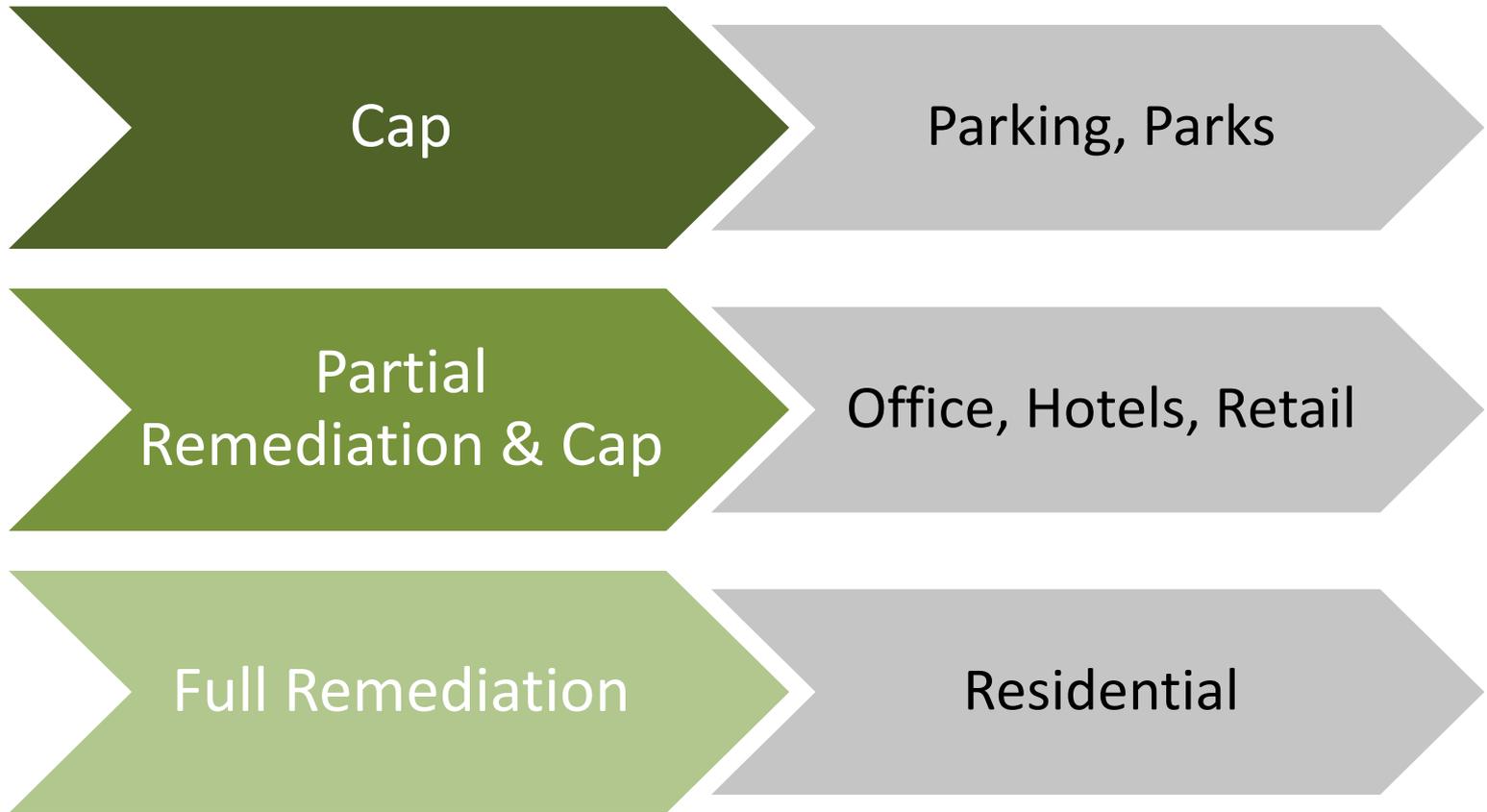
Source: Figure 1.1, Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario, Standards Development Branch, Ontario Ministry of the Environment.

Confirmation of Compliance/ Closure

- Important step to limit liability
- Process depends on jurisdiction
- Ready for redevelopment



Match Remediation with End Use



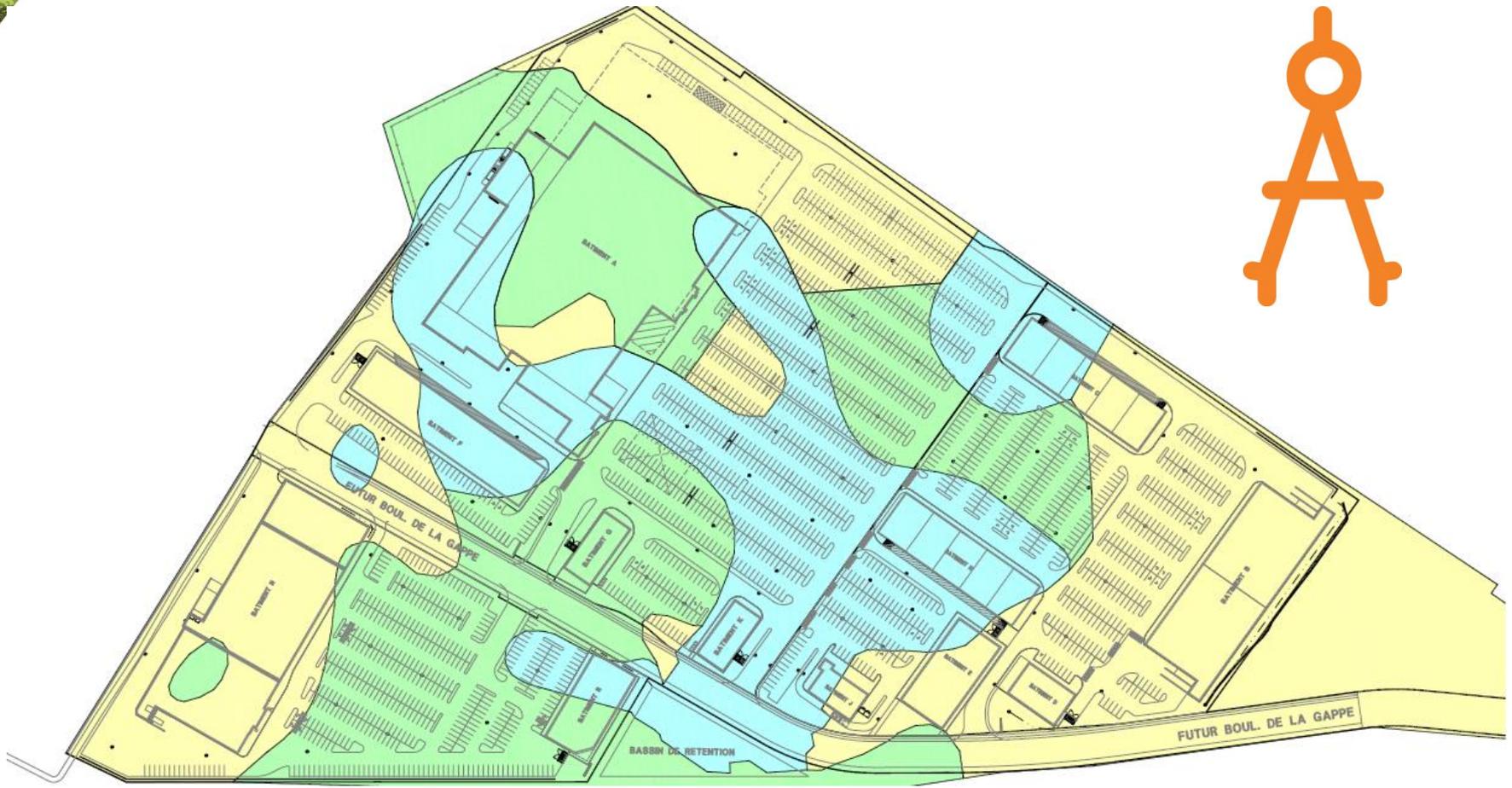
Questions



MODULE 4: Redevelop

- Rezone to allow Flexibility yet Establish Clear Intent
- Collaborate & Adapt

Fail to plan, plan to fail...



Risk Management Measures

- Surface Caps
 - Soils
 - Hard
- Parking Garages
- Ground Level Non-Residential



Is it all worth the hassle?

- Capitalize on existing infrastructure
- Revitalize existing areas
- Improve quality of life
- Reduce ecological impacts

“The price of greatness is responsibility.”
— Winston S. Churchill

Consider :

Which brownfield development solutions discussed today will you commit to promoting to your work team or city council?



Questions

