

# Atlantic RBCA V.3

## General Stakeholder Information Sessions

October 2, 2012 – Moncton, NB

October 3, 2012 – Halifax, NS

October 16, 2012 – St. John's, NL

# Welcome



# Regulatory Overview



# Who is Atlantic PIRI?

- Partnership In RBCA Implementation (PIRI)
- Public - Private Sector Committee
  - Atlantic Provincial Environment Regulators and Environment Canada
  - Regional and National Oil Industry
  - Regional Environmental Consultants
- Established in 1997 (15<sup>th</sup> year)
- PIRI has established Atlantic RBCA



# How does Atlantic PIRI work?

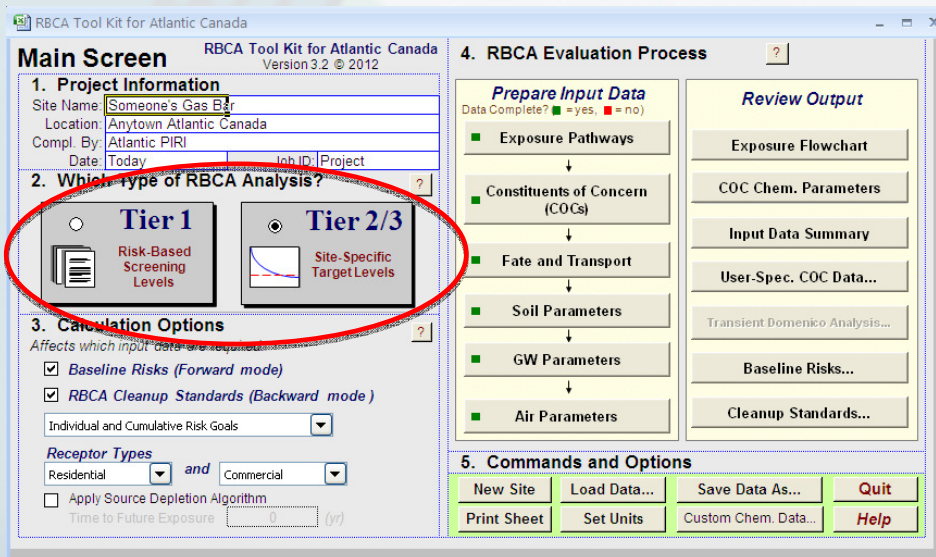
- **Operation:**
  - Memorandum of Understanding (3<sup>rd</sup> mandate)
  - Terms of Reference
- **Objectives:**
  - Consistency, Harmonization and Continuous Improvement
- **Structure:**
  - Working Groups: Technical, Harmonization and Stakeholder
  - Task Groups: Project specific
  - Corresponding Members: Input





# What is Atlantic RBCA?

- Risk Based Corrective Action (Rebecca)
- Adapted from ASTM RBCA standard originating in the U.S. in the mid 90's.
- Atlantic Canada customized RBCA to produce *Atlantic RBCA* through PIRI.



# Why use Atlantic RBCA?

- Provides a standardized scientific basis for decision making – site professionals and regulators.
- Tailored for petroleum hydrocarbon impacts representing the majority of sites in Atlantic
- Cost effective approach enables more sites to be addressed and repurposed by effectively managing health and environmental concerns
- Atlantic RBCA process gives confidence all around that meaningful standards are applied and that the clean up is carried out properly by qualified persons.



# Why Version 3?

- Commitment to meet or exceed Canada's national Canada-Wide Standards.
- Commitment to continuous improvement to the Atlantic RBCA software and associated tools.
- Opportunity to expand scope to include ecological receptors and additional impacts beyond petroleum hydrocarbons.





# Why does Atlantic RBCA matter?

- Repurposing previously used land has significant benefits to society as documented in the NRTEE study. (\$1 in \$3.8 out).
- An efficient approach to re purposing land that addresses risks on a site specific end use basis enables more properties to be addressed and more efficiently.
- Widely accepted approach in Atlantic Canada and since 1999, over 6,000 sites have been brought to regulatory file closure.





# What's Tiered Risk Assessment?

- Three tiers of increasing technical complexity are available for the management of impacted sites.
- All three Tiers achieve the same result of environmental protection at file closure.
  - **Tier 1** – Easy to use look up tables for screening or cleanup levels.
  - **Tier 2** – Computer generated site-specific screening or cleanup levels and easy to use pathway specific tables.
  - **Tier 3** – More detailed and advanced methods and measurements for determining site-specific screening or cleanup levels (ie. Human Health Risk Assessment).



# How does Atlantic RBCA affect stakeholders?

- Allows for efficient use of human and financial resources while protecting the environment and the public.
- Provides risk assessment options for site specific remedial actions.
- Gives confidence site assessments and clean ups were carried out properly.
- Facilitates regulatory file closure processes.



# Atlantic RBCA and Spills

- Spills require immediate emergency actions to mitigate adverse effects.
- Atlantic RBCA look up tables or site-specific levels assist in determining if spill remediation was successful or require further assessment.
- Limited Remedial Actions (or equivalent) streamlines the use of Atlantic RBCA when spills are limited to soil contamination.





# Nova Scotia

- V.3 does not change existing interim procedures related to report submissions and checklist usage
- Business as usual with Atlantic RBCA V.3
- Domestic Fuel oil spill policy criteria automatically change with transition to V.3  
See footnote in Domestic policy table(s)

# New Brunswick

- Work with regulator who can exercise discretion with some RBCA requirements on a site-specific basis (ie. number of monitoring wells, acceptable level of residual impacts).
- Consult with regulator early and as often as necessary especially when site assessments or remediation options are complex or limited.
- Some Guideline documents require minor updates to reflect changes in V3.

# Prince Edward Island \*

- Regulatory amendments that reflect V3 numbers are in progress.
- Upon approval, the *Environmental Protection Act Petroleum Hydrocarbon Remediation Regulations* will contain V3 lookup tables.



# Newfoundland and Labrador

- Currently, the NL Regulatory process has remained the same with the changes in RBCA.
- It should be ensured that the site is assessed/remediated in accordance with our guidance document
- Efforts should be made to meet all Atlantic RBCA requirements. If requirements cannot be met, regulators are open for discussion, as long as sufficient justification is provided.



# Questions?



# General Overview - Human Health Protection in the Atlantic RBCA model

Stakeholder Information Session

October 2-3 and 16, 2012





# Updated Atlantic RBCA Toolkit

- The general RBCA process has remained unchanged.
- Updates to the toolkit completed to harmonize with Canada Wide Standards, and to meet PIRI's commitment to continuous improvement
- Changes to toolkit result in changes to the Tier I Risk Based Screening Levels and Tier II Pathway Specific Screening Levels.



# Updated Atlantic RBCA Toolkit

- Same equations used in toolkit as in past version, with some slight modifications (more up to date science)
- Some defaults were changed as follows:
  - Some defaults were changed to harmonize with Canada Wide Standards
  - Some Toxicity Reference Values and physical/chemical properties were changed to harmonize with Health Canada



# Exposure Pathways

- Remain unchanged from previous version
  - Direct Contact/Ingestion
  - Inhalation of Vapours in Indoor Air
  - Inhalation of Vapours in Outdoor Air
  - Soil Leaching to Groundwater/Groundwater Ingestion



# Receptor Groups

- Previous version only assessed residential and commercial receptors
- New version includes agricultural and industrial uses.
  - Toddler/Age-Adjusted: Agricultural and Residential
  - Toddler/Adult: Commercial
  - Adult: Industrial

# Default Site Characteristics

- In derivation of the Tier I RBSLs/Tier II PSSLs, several default parameters are used as outlined Appendix 5.
- Prior to use of the Tier I RBSLs/PSSLs, it should be confirmed that the site conditions are compatible with the default site characteristics in the Tier I/II Table Checklist (Appendix 6).
- If the Tier I RBSLs or Tier II PSSLs are not applicable, site specific target levels can either be calculated with the RBCA Toolkit or a Tier III approach can be used.



**TABLE 4a - TIER I RISK BASED SCREENING LEVELS FOR SOIL (mg/kg)**

Land Use	Groundwater Use	Soil Type	Compound of Concern						
			Benzene	Toluene	Ethyl-benzene	Xylene	Modified TPH (TPH-BTEX)		
							Gasoline	Diesel/ No. 2 Fuel Oil	No. 6 Oil/ Lube Oil
Agricultural	Potable	Coarse Grained	0.042	0.35	0.065	8.8	74	270	1,100
		Fine Grained	0.094	0.74	0.13	22	1,900	4,700	10,000
	Non-Potable	Coarse Grained	0.099	77	30	8.8	74	270	1,100
		Fine Grained	2.3	10,000	9,300	210	2,100	8,600	10,000
Residential	Potable	Coarse Grained	0.042	0.35	0.065	8.8	74	270	1,100
		Fine Grained	0.094	0.74	0.13	22	1,900	4,700	10,000
	Non-Potable	Coarse Grained	0.099	77	30	8.8	74	270	1,100
		Fine Grained	2.3	10,000	9,300	210	2,100	8,600	10,000
Commercial	Potable	Coarse Grained	0.042	0.35	0.065	11	870	1,800	10,000
		Fine Grained	0.094	0.74	0.13	22	1900	4,700	10,000
	Non-Potable	Coarse Grained	2.5	10,000	10,000	110	870	4,000	10,000
		Fine Grained	33	10,000	10,000	10,000	10,000	10,000	10,000
Industrial	Potable	Coarse Grained	0.042	0.35	0.065	11	870	1,800	10,000
		Fine Grained	0.094	0.74	0.13	22	1,900	4,700	10,000
	Non-Potable	Coarse Grained	2.5	10,000	10,000	110	870	4,000	10,000
		Fine Grained	33	10,000	10,000	10,000	10,000	10,000	10,000
Residual Saturation (RES)		Coarse Grained	890	450	240	340	TBD	TBD	TBD
		Fine Grained	1000	480	250	360	TBD	TBD	TBD

**Notes:**

1. Upper Concentration Limit (UCL) of 10,000 mg/kg is applied to any calculated soil concentration that is >RES or exceeds 10,000 mg/kg.
2. RES values for TPH to be determined (TBD).
3. The numbers in this table are based on the protection of human health. While these concentrations may not be physically realistic in the environment, it remains that the models indicate that chemicals present in the soil at concentrations below these values do not present a potential concern for human health if exposure occurs through the specified pathway.
4. Concentrations >RES are considered an indicator of the potential presence of free product. If site concentrations are >RES, the presence of free product must be specifically addressed by the Site Professional.

**To apply the RBSL values in the Tier I Soil and Groundwater Tables, the following mandatory criteria must be satisfied.**

- a. Non-aqueous phase liquids must not be present in groundwater.
- b. Potable water must be free of objectionable taste and odour.
- c. Soils must not contain liquid and/or free petroleum product.
- d. Residual hydrocarbons must not create objectionable odours or explosive conditions in indoor or outdoor air.
- e. Surface soils must not be stained.
- f. The site characteristics and exposure scenarios must be compatible with the Atlantic RBCA default values.



**TABLE 4b - TIER I RISK BASED SCREENING LEVELS FOR GROUNDWATER (mg/L)**

Receptor	Groundwater Use	Soil Type	Compound of Concern						
			Benzene	Toluene	Ethyl-benzene	Xylene	Modified TPH (TPH-BTEX)		
							Gasoline	Diesel/ No. 2 Fuel Oil	No. 6 Oil/ Lube Oil
Agricultural	Potable	Coarse Grained	0.005	0.024	0.0024	0.3	4.4	3.2	7.8
		Fine Grained	0.005	0.024	0.0024	0.3	4.4	3.2	7.8
	Non-Potable	Coarse Grained	2.6	20	20	20	20	20	20
		Fine Grained	13	20	20	20	20	20	20
Residential	Potable	Coarse Grained	0.005	0.024	0.0024	0.3	4.4	3.2	7.8
		Fine Grained	0.005	0.024	0.0024	0.3	4.4	3.2	7.8
	Non-Potable	Coarse Grained	2.6	20	20	20	20	20	20
		Fine Grained	13	20	20	20	20	20	20
Commercial	Potable	Coarse Grained	0.005	0.024	0.0024	0.3	4.4	3.2	7.8
		Fine Grained	0.005	0.024	0.0024	0.3	4.4	3.2	7.8
	Non-Potable	Coarse Grained	20	20	20	20	20	20	20
		Fine Grained	20	20	20	20	20	20	20
Industrial	Potable	Coarse Grained	0.005	0.024	0.0024	0.3	4.4	3.2	7.8
		Fine Grained	0.005	0.024	0.0024	0.3	4.4	3.2	8
	Non-Potable	Coarse Grained	20	20	20	20	20	20	20
		Fine Grained	20	20	20	20	20	20	20
<b>Solubility (SOL)</b>			1,780	515	150	160	<b>TBD</b>	<b>TBD</b>	<b>TBD</b>

Notes:

1. Upper Concentration Limit (UCL) of 20 mg/L is applied to any calculated concentration that is >SOL or exceeds 20 mg/L.
2. SOL values for TPH to be determined (TBD).
3. The numbers in this table are based on the protection of human health. While these concentrations may not be physically realistic in the environment, it remains that the models indicate that chemicals present in the groundwater at concentrations below these values do not present a potential concern for human health if exposure occurs through the specified pathway.
4. Concentrations >SOL are considered an indicator of the potential presence of free product. If site concentrations are >SOL, the presence of free product must be specifically addressed by the Site Professional.

**To apply the RBSL values in the Tier I Soil and Groundwater Tables, the following mandatory criteria must be satisfied.**

- a. Non-aqueous phase liquids must not be present in groundwater.
- b. Potable water must be free of objectionable taste and odour.
- c. Soils must not contain liquid and/or free petroleum product.
- d. Residual hydrocarbons must not create objectionable odours or explosive conditions in indoor or outdoor air.
- e. Surface soils must not be stained.
- f. The site characteristics and exposure scenarios must be compatible with the Atlantic RBCA default values.

# Mandatory Conditions

- Mandatory conditions for applying the RBCA Toolkit (as well as RBSLs/PSSLs) have remained unchanged.
- Mandatory Conditions are as follows:
  - No measureable free product in soil or water.
  - Drinking water can have no adverse taste or odour.
  - No offensive odours or explosive conditions
  - No surface staining
  - No dirt basement floors, sumps with dirt bottoms, etc
  - Confirmed that correct TPH type used
  - Confirmed that correct soil type used



# Minimum Site Assessment Requirements

- Minimum site assessment requirements outlined in the Tier I/II Checklist (Appendix 6) have remained unchanged.
- If any minimum site assessment requirement is not met, it is recommended to discuss with the regulator in advance. Full justification must be provided in the closure report.



# Best Management Practices

- Best Management Practices for assessment of impacted site has remained relatively unchanged (new name).
- Appendix 1 of the User Guidance document outlines best management practices for reporting and site assessment.
  - Document presents guidance for conducting environmental site assessments
  - Document provides guidance for data required to generate Tier I RBSLs, Tier II PSSLs or Tier II SSTLs



# Soil Vapour Guidance

- As part of PIRIs commitment to continuous improvement, a complete review/update of this document planned for upcoming year.
- An errata sheet has been released, outlining changes that have occurred as a result of RBCA Toolkit updates.
- This is now a stand alone document and can be found on PIRI Website.

# Soil Vapour Guidance Cont'd

- Some of the current changes outlined in the Errata sheet include:
  - Removal of pathway operability tables (assessment still required within 30 m).
  - Soil Gas to Indoor Air Dilution factor
  - Revised Reference Concentration for Toluene
  - Hazard Quotient Changed to 0.5 for Toluene, Ethylbenzene and Xylenes
    - Recognizes a difference between predicted and measured indoor air concentrations.



# Questions

# Ecological Screening Protocol

## Appendix 2, Atlantic RBCA Ver 3 User Guidance

Stakeholder Information Session  
October 2-3 and 16, 2012



# History of Ecological Screening in Atlantic RBCA

- RBCA Toolkit provides for human health based criteria
- Identification of potential ecological concerns addressed via a one page screening form
- Questions focused on habitat presence/absence
- Limited guidance for what to do if habitat present (eg. “additional ERA required”)
- Not substantively updated since 1998





# Canada Wide Standard for Petroleum Hydrocarbons in Soil

- CCME CWS for PHC issued in 2000 and updated in 2008
- Provides screening criteria for both human health and ecological based receptors
- 4 Atlantic provinces are signatories to CWS and must ensure their approaches are “equal to or better than” the protection provided by CWS
- PIRI decision made to examine the eco-screening of RBCA process to ensure this commitment was being fulfilled



# EcoTask Group

- Formed in 2006
- Members:
  - Ken Doe, Environment Canada
  - Ulysses Klee, Stantec (formerly Dillon)
  - Peter Miasek, Imperial Oil
  - Rita Mroz, Environment Canada
  - Malcolm Stephenson, Stantec
  - Rob Willis, Dillon (formerly Intrinsik)
- Affiliate members: Chris Allaway, EC (Ottawa), Thomas Parkerton, and Aaron Redman, Exxon Mobil (New Jersey)



# Objectives

- Update/revise eco-screening checklist
  - Bring Atlantic Canada “in-line” with similar practices across Canada
  - Promote consistent screening of potential risks to the natural environment
  - Provide a robust and defensible process
  - Provide guidance

# Result

Tier One Check List for  
Ecological Receptor Assessment in Atlantic  
Canada (since 1996)



Ecological Screening Protocol  
For Petroleum Hydrocarbon Impacted Sites  
in Atlantic Canada (2012)



# Guiding Principles

**Principle 1** – Both human health and ecological health are important considerations in the overall health and sustainability of our environment (including natural ecosystems and built environments).

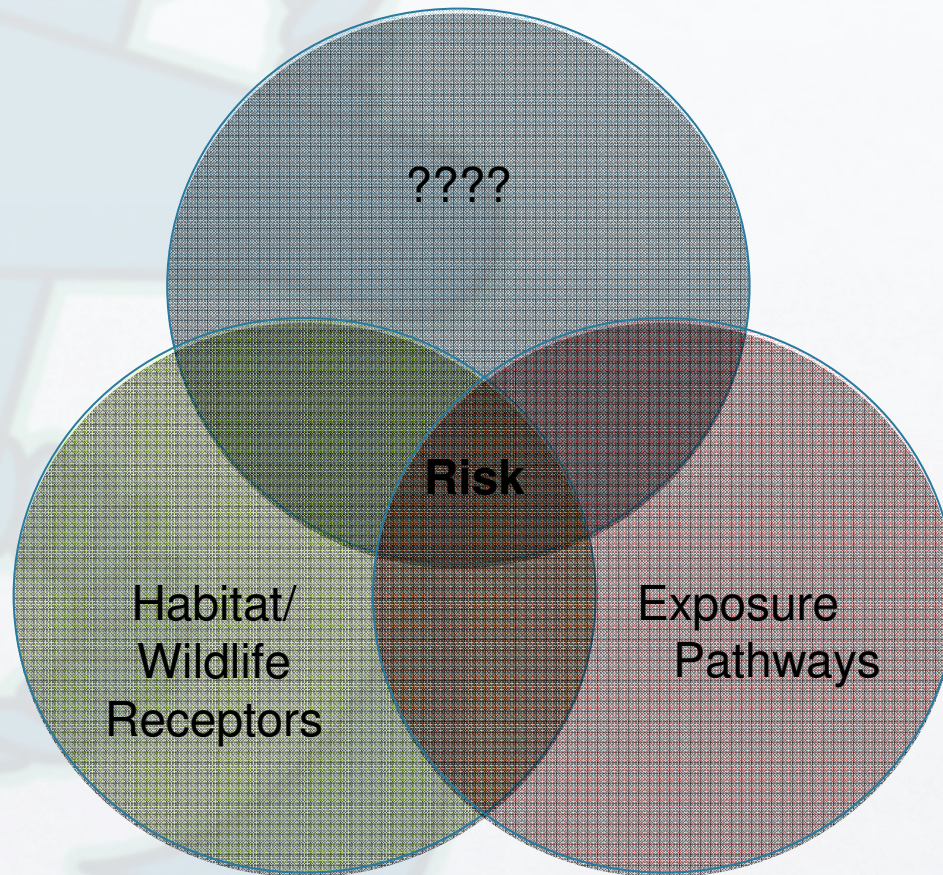
**Principle 2** – Society recognizes and accepts differences between natural ecosystems and built/urban environments (areas which result from the development and expectations of society).

**Principle 3** – Ecological values should be maintained in those areas where they are determined to be important to the health and sustainability of the environment, particularly where this is of value to society.

**Principle 4** – It follows that for some land uses or situations, ecologically driven remediation may be of varying value or importance. Environmental standards for the protection of ecological receptors should be applied where the maintenance of their abundance and diversity is considered to be a priority, reflecting appropriate choices relative to land use. The application of ecological standards should also consider long term integrity and sustainability planning of our environment.

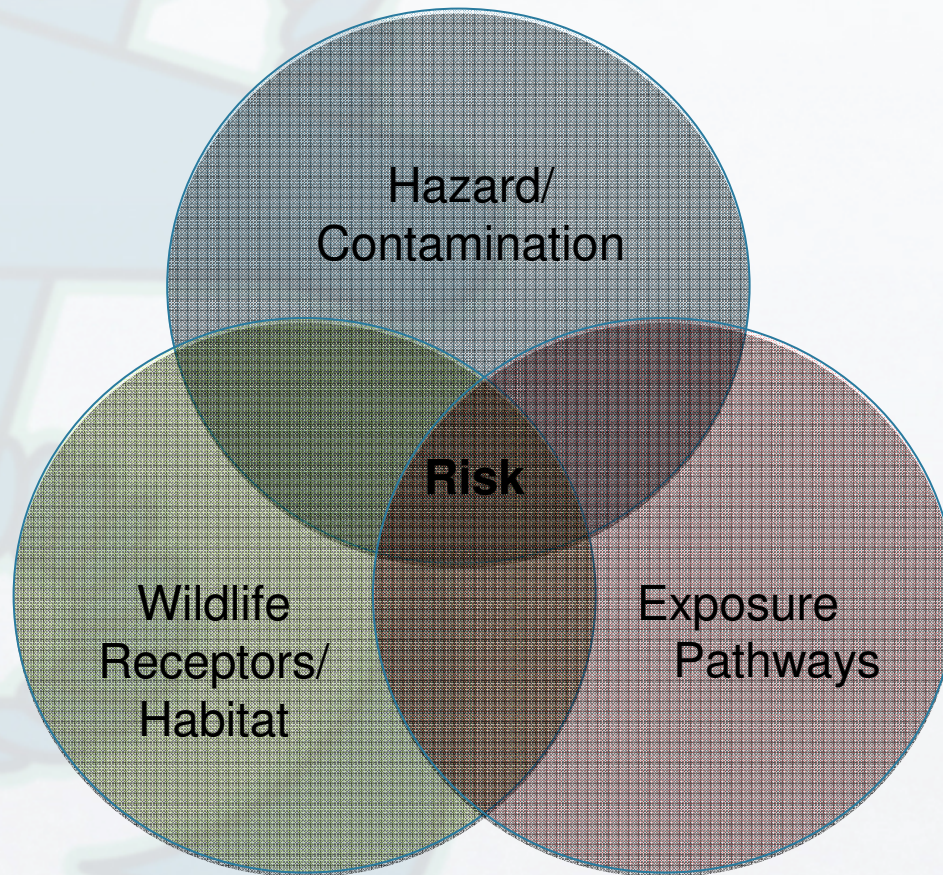


# Risk Assessment Triad

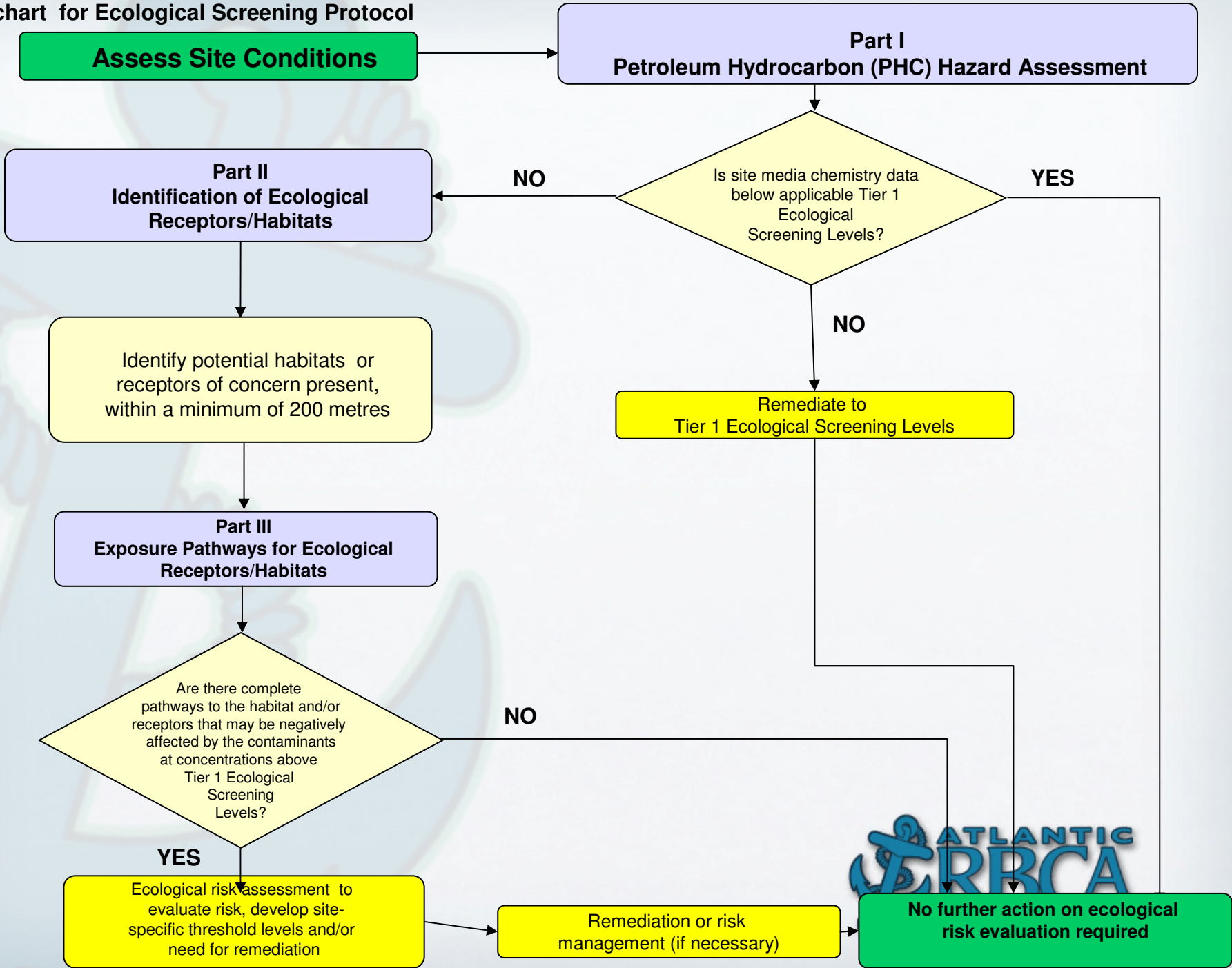




# Risk Assessment Triad



# Flowchart for Ecological Screening Protocol





# Part I

# Part I: PHC Hazard Assessment

- Identification of potential PHCs of concern
- Use of ecological risk-based screening criteria = Tier 1 Ecological Screening levels (ESLs)
- ESLs have been assembled
  - Soil (CWS)
  - Surface water (PETROTOX)
  - Groundwater (Alberta Environment and surface water ESLs)
  - Sediments (surface water ESLs and Equilibrium Partitioning)
    - No other jurisdiction has sediment criteria

# Part I

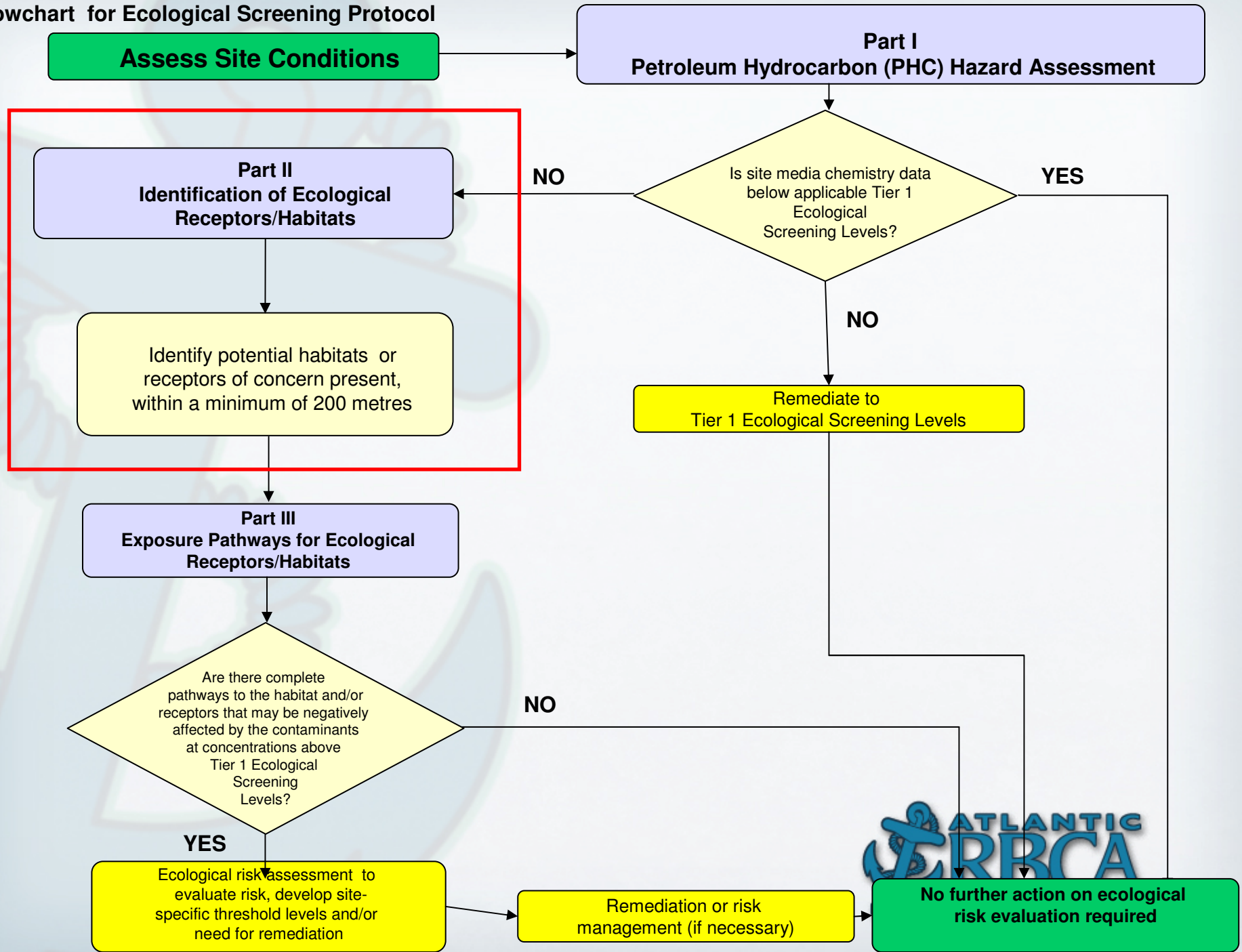
- If site media chemistry data meets the applicable Tier 1 screening levels, then no further action on ecological risk evaluation is required
- If site media chemistry exceeds applicable Tier 1 screening levels: remediate to Tier 1 or complete Parts II and III.



# Part II



# Flowchart for Ecological Screening Protocol



# Part II: Identification of Ecological Receptors

- Essentially, Part II is the “old” RBCA checklist
  - Question 1 is identical (habitat)
  - 4 more questions added (receptors)
- Ecological Habitat Assessment
  - Conducted by wildlife biologist
  - Provides a “picture” of the natural environment on the site and in surrounding areas
- Habitat assessment is used to identify ecological receptors
  - Plants, invertebrates, birds, mammals, fish, etc.





## Examples of Habitat (6 slides)

# Part III

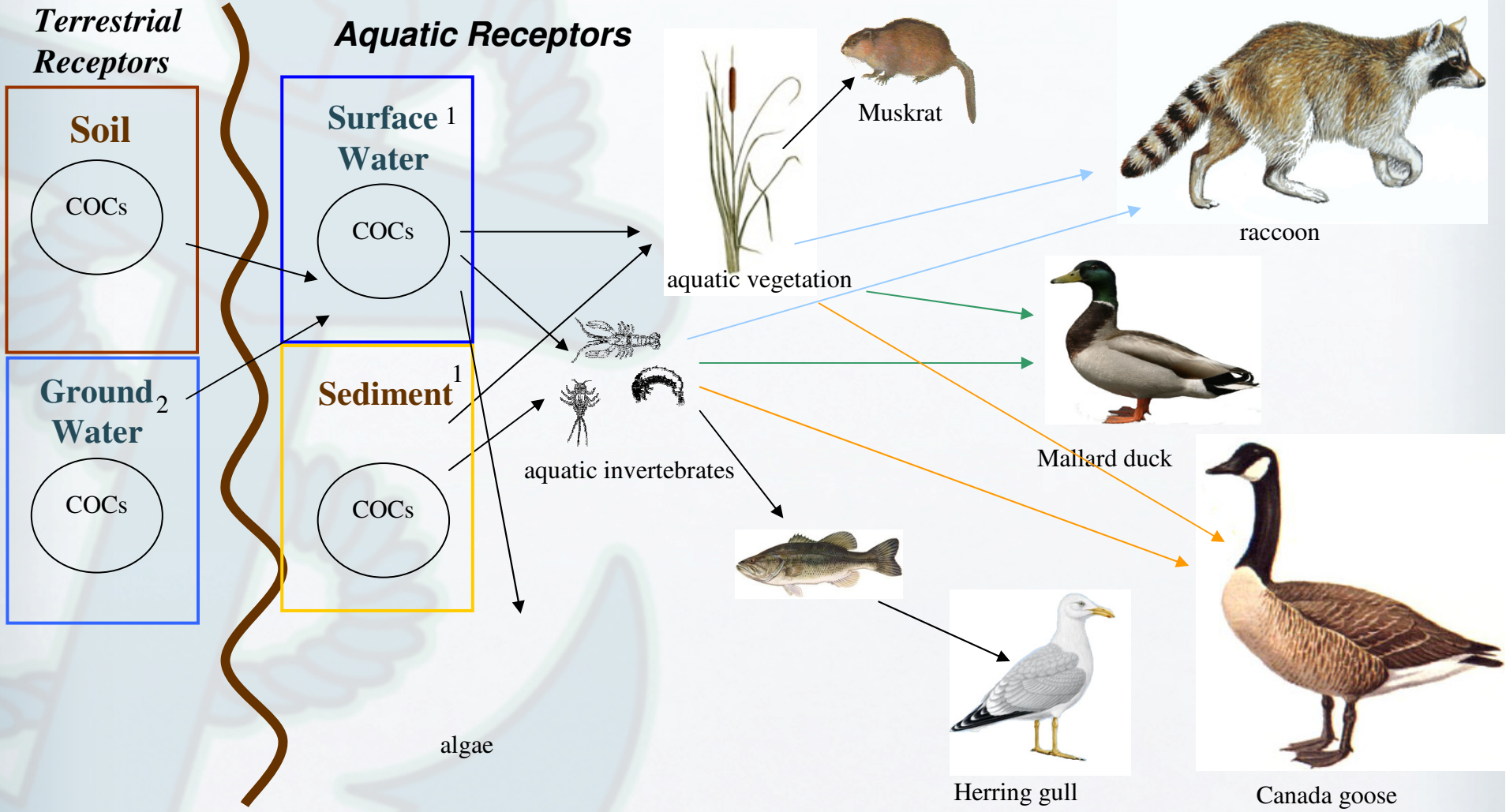


# Part III: Exposure Pathways for Ecological Receptors/Habitats

- Focus on identifying exposure pathways by which receptors could come into contact with site PHCs
- Goal: determine if potential operable exposure pathways exist between PHC present above screening levels (Part I) and identified receptors/habitat (Part II)
- Information/data gathered in Part II will assist in answering questions in Part III Integration of the contaminant identification and the habitat assessment

# Ecological Exposure Pathways

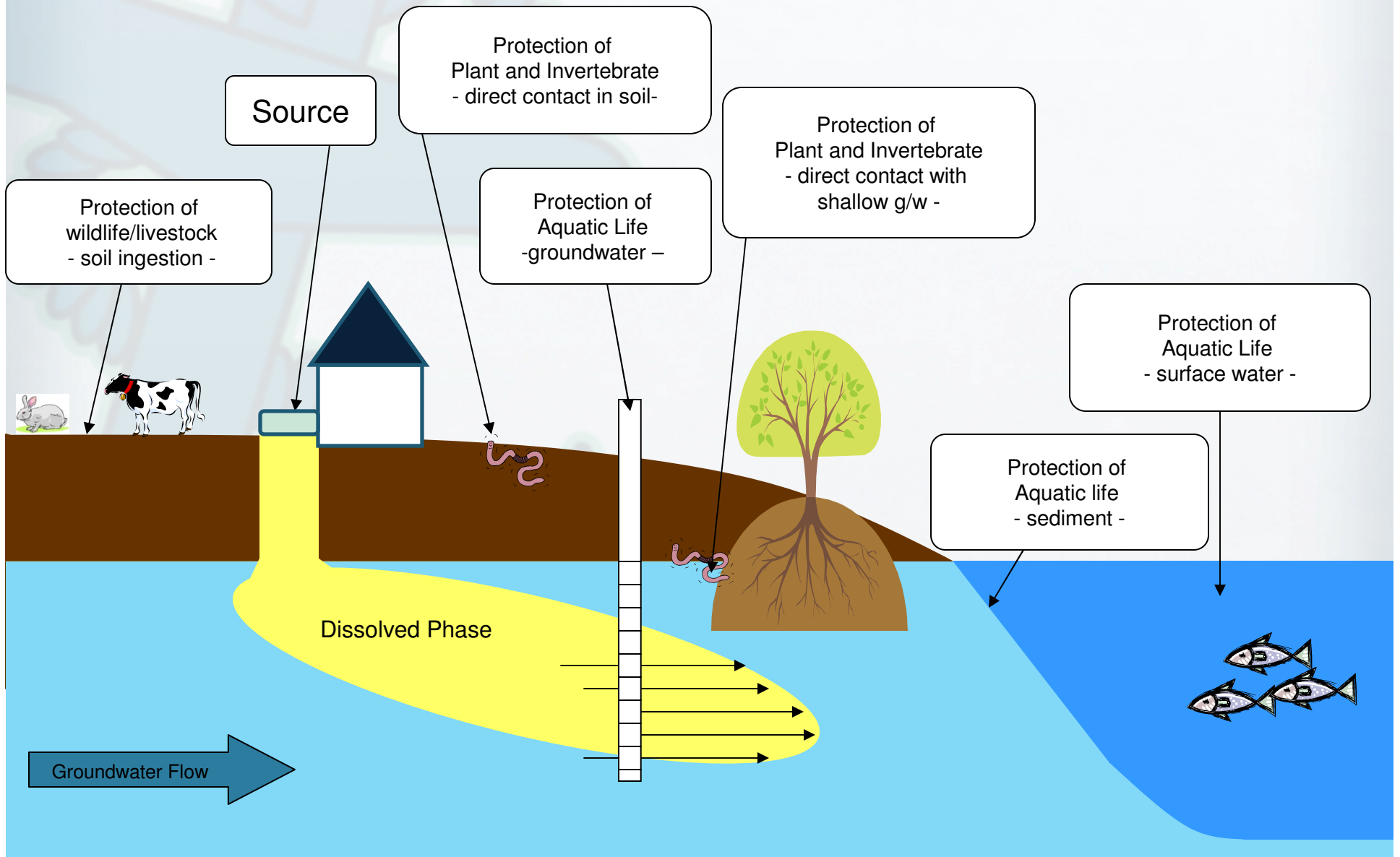
- Potential ecological exposure pathways
  - Contact with soil (plants, invertebrates, birds and mammals)
  - Soil to groundwater (deep rooted plants)
  - Groundwater to surface water (aquatic plants, invertebrates, fish, aquatic birds and mammals)
  - Surface water to sediment (aquatic plants, invertebrates, fish, aquatic birds and mammals)



1 All semi aquatic receptors are also exposed to sediment and surface water through ingestion



# Conceptual Site Model- Eco RBCA





# Summary

- Protocol is an enhancement on the old checklist.
- Promotes consistent screening of potential ecological risks
- Provides guidance
- Robust and defensible process
- In line with similar practices across Canada
- On-line training

# Questions?

