

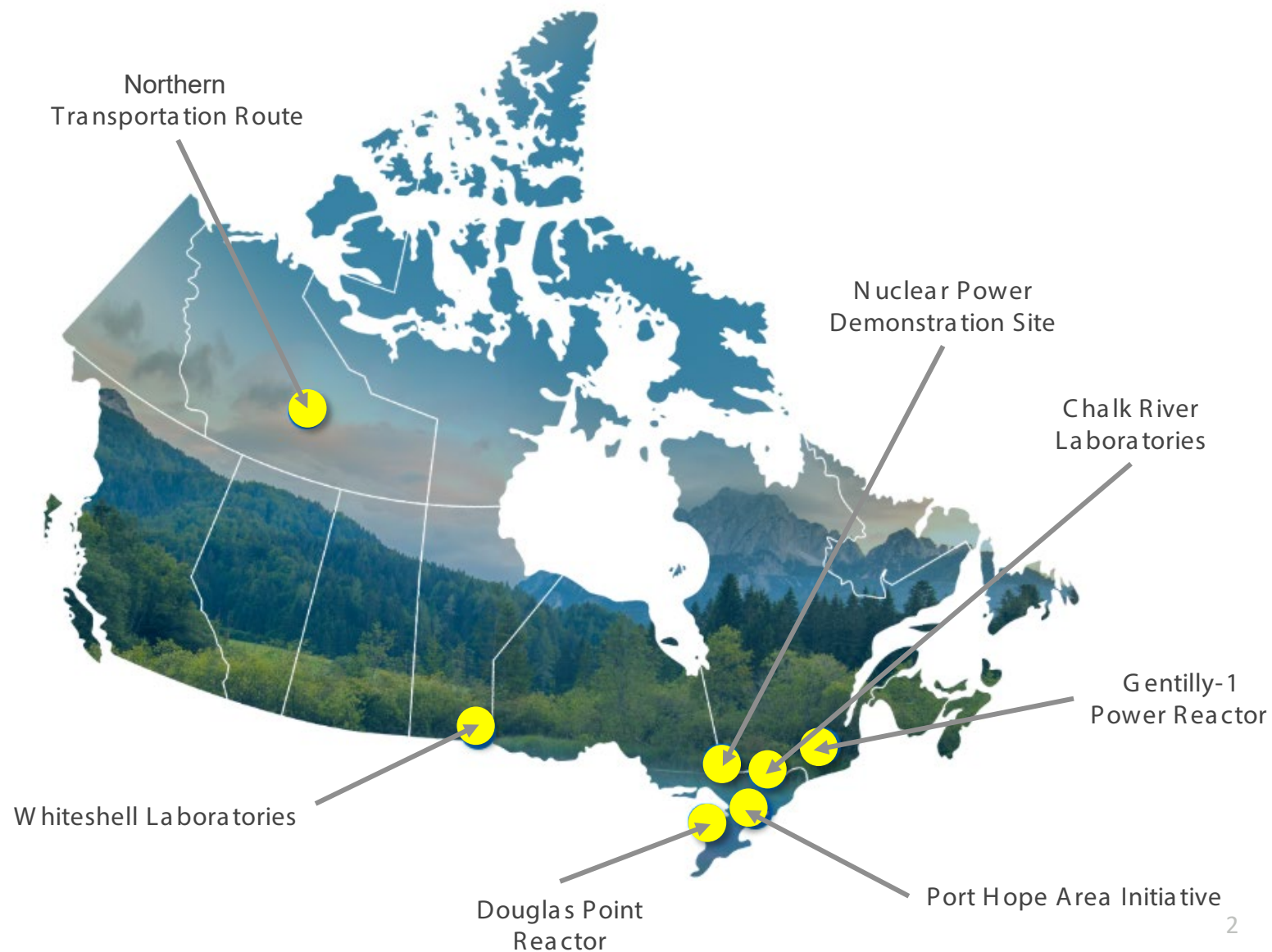
Embedding Sustainability, Resilience, and Circularity into Environmental Site Assessment and Remediation at Canadian Nuclear Laboratories

Jo-Anne Wakem
Environmental Specialist, Cleanup Function



CNL's Mission to Restore and Protect Canada's Environment

- One of CNL's core missions
- Reduce and manage nuclear liabilities
- Extensive environmental site assessment and remediation across Canada



CNL's Environmental Site Assessment and Remediation (ESAR) Standard

Guiding Regulations, Standards, and Best Practices

- Applies to all CNL-managed sites
- Provides requirements and guidance for planning, decision-making, and implementation of ESAR work
- Integrates nuclear regulations, standards, and industry best practices



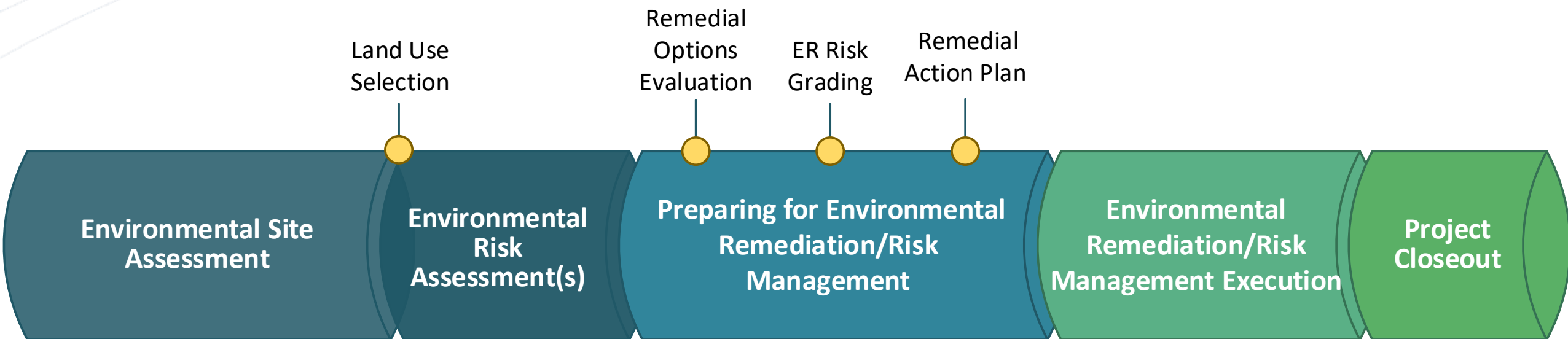
Alignment with Federal Contaminated Sites Action Plan (FCSAP)

National Decision-Making Framework

- ESAR standard incorporates the FCSAP decision-making framework
- Ensures consistency with the national approach to managing contaminated sites
- Supports effective risk reduction to human health and the environment



Key Sections of the ESAR Standard



Embedded Principles in the ESAR Standard

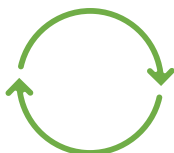
Sustainability, Resilience, and Circularity



SUSTAINABILITY: Uses resources efficiently while balancing environmental, social, and economic outcomes.



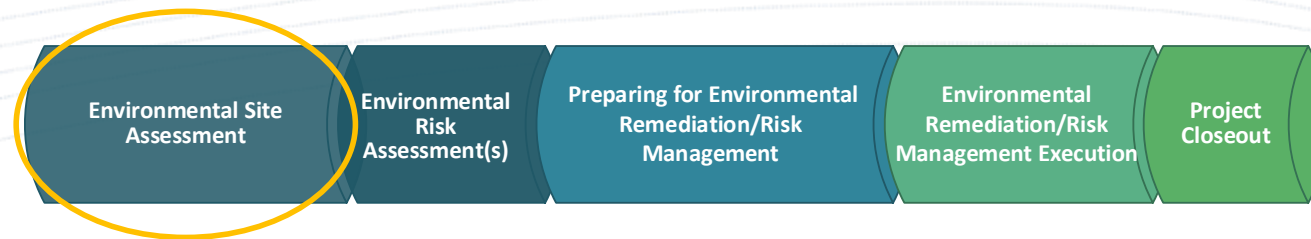
RESILIENCE: Ensures approach can adapt to regulatory changes, evolving best practices or unexpected site conditions.



CIRCULARITY: Minimizes waste and maximizes reuse of resources.



Environmental Site Assessment



- Gather information and characterize the site
- Determines the degree, nature, and extent of contamination (or confirms none is present)
- Uses risk-based screening criteria to focus on areas of potential risk



SUSTAINABILITY: Ensures resources are used efficiently and focused on areas that need attention.



RESILIENCE: Allows the project to adapt if site findings change or more information is needed.



Chalk River Laboratories Site

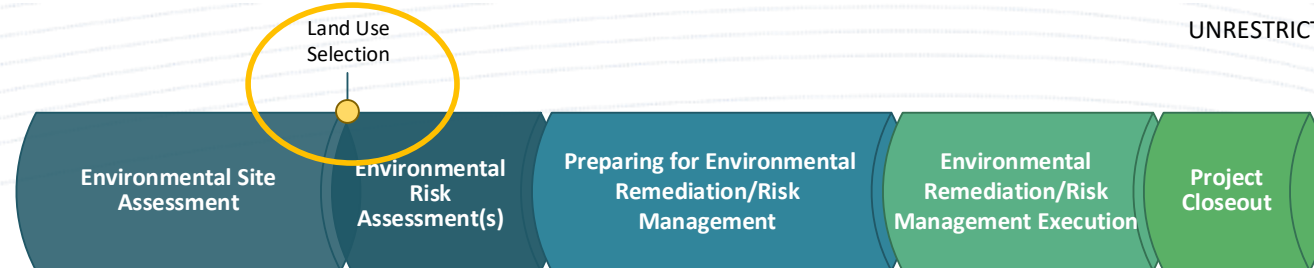
Site Boundary (Purple)

Waste Management Areas (orange areas)

Historical Landfills (yellow areas)



Next Land Use Selection



- Identify potential land uses from the site's overview cleanup plan
- Facilitate discussions with internal stakeholders and external audiences to select the preferred land use
- Selecting preferred land use early:
 - Streamlines planning and execution of environmental site assessment activities
 - Enables environmental data to be compared directly to relevant screening criteria, saving time and resources



SUSTAINABILITY: Focuses effort where needed, conserves resources, and promotes efficient planning.



RESILIENCE: Informs early decisions and supports adaptable, well-supported land use outcomes.



Canadian Nuclear Laboratories' Community Advisory Panel



Environmental Risk Assessment



- Evaluate whether areas exceeding screening criteria pose unacceptable risk
- Determine if remediation and risk management are needed based on the preferred land use and the level of risk
- Focus remediation where it is truly needed, avoiding unnecessary effort or impact



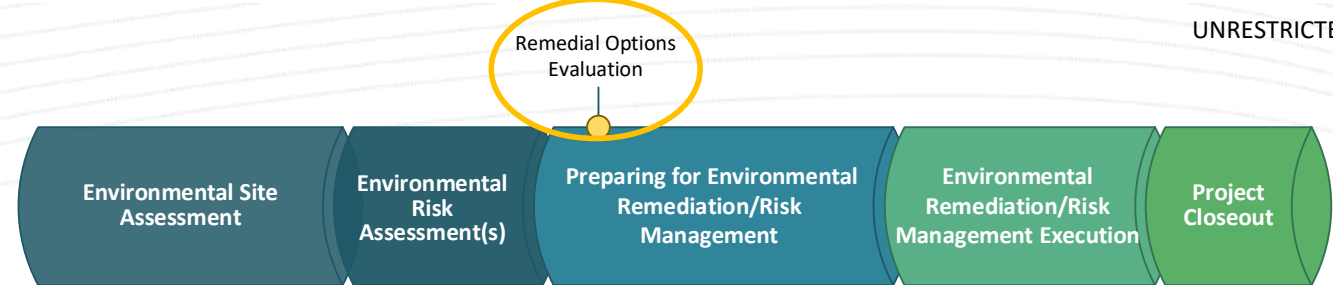
SUSTAINABILITY: Targets remediation where truly needed, conserving resources.



RESILIENCE: Decisions based on actual risk, protecting people and the environment over time.



Remedial Options Evaluation



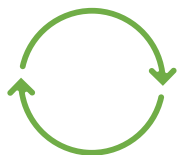
- Identify and select the optimal remedial or risk management option
- Engage with internal stakeholders and, when appropriate, external audiences to define the preferred option and end-state
- Ensure options comply with regulations, best practices, and CNL strategies



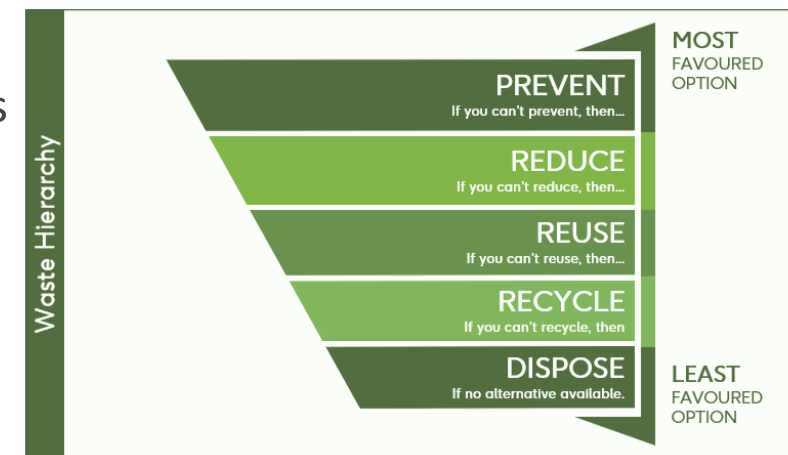
SUSTAINABILITY: Balances environmental, social, and business considerations in selecting the best option.



RESILIENCE: Early, informed engagement ensures the best option is selected and a clear end-state is defined.

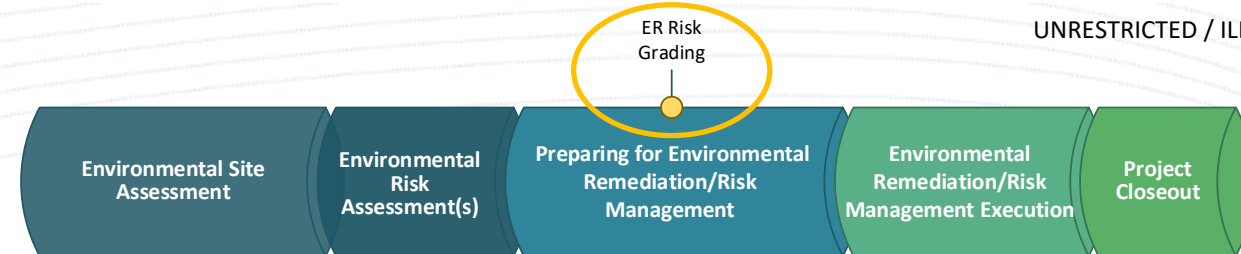


CIRCULARITY: Selects options that promote material reuse and minimize waste.



**Canadian Nuclear Laboratories'
Integrated Waste Strategy**

Environmental Remediation Risk Grading



- Assign risk level based on site complexity, hazards, and potential impacts
- Scale safeguards for health, safety, security and environment according to the risk level
- Directs resources where they are most effective
- High-risk sites → require stronger oversight and protections
- Low-risk sites → require fewer controls, efficient management



SUSTAINABILITY: Aligns effort with actual risk, ensuring resources are used efficiently.



RESILIENCE: Applies stronger safeguards at high-risk sites to protect people, ecosystems, and communities over time.



**Chalk River Laboratories Site -
Remediation of Historic Landfill**



Remedial Action Plan



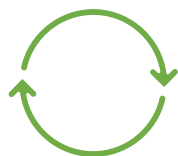
- Develop a detailed plan based on the selected remedial/risk management option
- Includes risk-based cleanup criteria as remediation targets
- Demonstrates how organizational priorities are applied on site
- Standard template ensures consistency across all sites



SUSTAINABILITY: Demonstrates how CNL's Sustainability Strategy is applied on site.



RESILIENCE: Clearly defines actions while allowing flexibility to adapt to changing conditions.



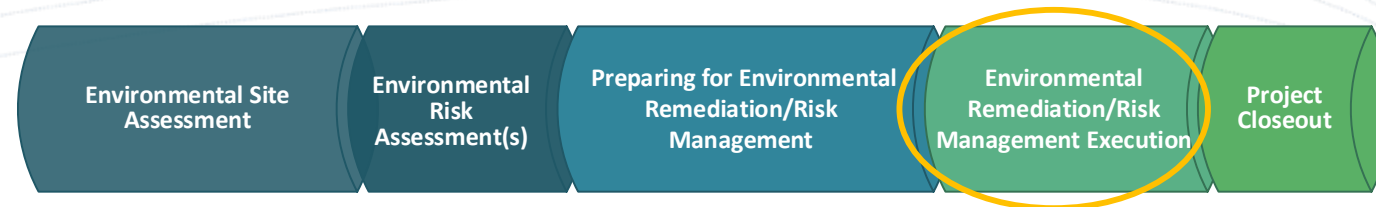
CIRCULARITY: Integrates waste and soil management strategies to support reuse and minimize waste.



**Chalk River Laboratories Site -
Remediation of Pipeline**



Environmental Remediation and Risk Management Execution



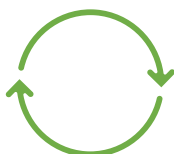
- Execute remediation and risk management plans
- Confirm the site meets the planned end-state (including cleanup criteria)



SUSTAINABILITY: Uses resources efficiently while minimizing environmental impacts.



RESILIENCE: Stays flexible during remediation, implements long-term risk management, and restores the site to support wildlife and local conditions.



CIRCULARITY: Promotes reuse of materials and reduces waste.



Port Hope Area Initiative – Remediation and Restoration of Local Properties

Project Closeout



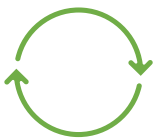
- Document results of environmental remediation and risk management activities
- End-state reporting aligned with the site's environmental remediation risk grading
- Low-risk sites require less oversight; high-risk sites receive detailed reporting



SUSTAINABILITY: Uses resources efficiently.



RESILIENCE: Captures lessons learned and applies them to future projects.



CIRCULARITY: Completes waste and soil records to ensure materials are responsibly managed.



Environmental Site Assessment and Remediation Standard Summary

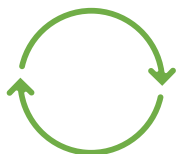
Sustainability, Resilience, and Circularity



SUSTAINABILITY: Efficient use of resources; considers environmental, social, and business outcomes.



RESILIENCE: Strengthened through early engagement, long-term risk management, and thoughtful site restoration.



CIRCULARITY: Minimize disposal and maximize reuse through waste and soil management.



**Community Advisory Panel Tour –
Concrete Crushing Machine**

Thank you!

