



FOSTERING RESILIENCE: FCSAP EFFORTS TO ADDRESS CLIMATE CHANGE IMPACTS

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13th Science Advisory Board for Contaminated
Sites in BC Workshop and Conference



Canada 

OVERVIEW

- Federal Contaminated Sites Action Plan (FCSAP)
- Climate Change – A Priority
- Contaminated Sites Resiliency to Climate Change Examples
- Program Commitments & Reporting
- FCSAP Climate Change Resources
- Challenges
- Moving Forward
- Contact Information & Questions
- Annex: Additional Resources

ABOUT THE FEDERAL CONTAMINATED ACTION PLAN

- The Federal Contaminated Sites Action Plan (FCSAP), established in 2005, aims to reduce environmental and human health risks from federal contaminated sites.
- It is a horizontal program involving 17 federal departments and agencies (known as custodians) that work together to manage contaminated sites, and closely with consultants and contractors in the assessment, remediation, and risk management of contaminated sites.
- Four Expert Support Departments (ESD) provide guidance, promoting the effective and consistent management of federal contaminated sites and ensuring that funding is directed to the sites of highest priority:
 - Environment and Climate Change Canada
 - Health Canada
 - Fisheries and Oceans Canada
 - Public Services and Procurement Canada

FCSAP PHASE IV (2020-2025)

To better align with GoC priorities, changes were introduced in Phase IV. These changes include:

- Eligibility criteria were expanded to accelerate the clean-up of federal contaminated sites located on Indigenous reserves and in the North.
- Guidance developed to consider impacts of climate change on contaminated sites and 5 new program commitment related to climate changes created, with the goals of:
 - Promoting resiliency; and
 - Preventing increased environmental liability and mitigating risks to human health and the environment at sites where climate change impacts have occurred / are predicted to occur.

CLIMATE CHANGE – A PRIORITY

Climate change continues to be a priority for the federal government

- [Pan-Canadian Framework on Clean Growth and Climate Change](#) (ECCC, 2016)
- [Canada's Strengthened Climate Plan: A Healthy Environment and a Healthy Economy](#) (ECCC, 2020)
- [Greening Government Strategy](#) (Treasury Board of Canada Secretariat, 2020)
- [Federal Sustainable Development Strategy](#) (ECCC, 2022)
- [Canada's 2030 Emissions Reduction Plan](#) (ECCC, 2022)
- [Canada's National Adaptation Strategy](#) (ECCC, 2023)

CLIMATE CHANGE – A PRIORITY...

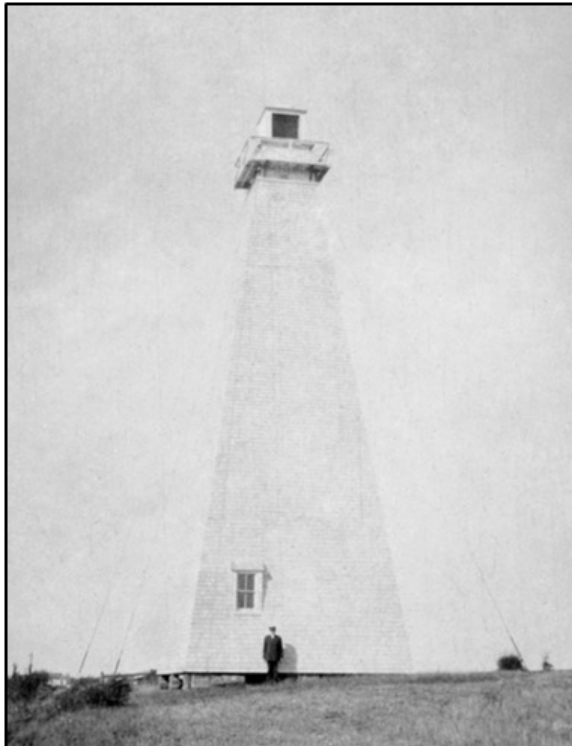
...and a commitment for FCSAP

- FCSAP 2020 renewal included commitments across all aspects of the program related to climate change.
 - Materials have been developed by FCSAP Secretariat to propose a path forward on addressing these program commitments.
 - Climate change considerations in FCSAP Phase IV have been focused on adaptation.
- GoC adaptation and mitigation strategies can benefit federal contaminated site management.
- Integrating climate change considerations through the planning and design stages of site assessment and remediation/risk management (R/RM) can help mitigate potential climate risks.
- Updating technical standards and decision-making processes to include climate change considerations can ensure contaminated sites are resilient to climate change impacts.

CONTAMINATED SITES RESILIENCY TO CLIMATE CHANGE: EXAMPLE #1

Annandale Rear Range Light, PEI

The climate impacts to this site increased the risk of contaminant mobility due to erosion and damage to the lighthouse



(Lighthouse Friends, 2023)



(GHD, 2019)

Structure moved 30m inland to protect it from future riverbank erosion in March 2020.



([Annandale Lighthouse Inc.](#), 2023)

CONTAMINATED SITES RESILIENCY TO CLIMATE CHANGE: EXAMPLE #2

Northside Landfill B, Argentia, NL

Coastal erosion had repercussions on the integrity of the cap.



Shoreline protection completed in March 2020. Long-term monitoring in place to ensure integrity of armour stone wall.



PSPC Northside Landfill B, Argentia, NL

REPORTING TEMPLATES QUESTIONS

The climate change reporting template requires departments to work on the following elements:

Determining climate change hazards relevant to the site, compiling data on those hazards

Incorporating climate hazards impacts into the Conceptual Site Model

Designing remediation/risk management projects to be resilient against climate change hazards

Characterizing risks of failure without adaptation measures

Implementing a monitoring strategy for early detection of re-contamination for sites at high risk

PROGRAM COMMITMENTS

PHASE IV (2020-2025) COMMITMENTS FOR FCSAP-FUNDED SITES:

- Custodians are responsible for taking into account and addressing the impacts of climate change at their sites.
- Custodians should keep the site's life cycle in mind while reporting. Evaluating the potential impacts and determining how much risk is acceptable may require conversations with diverse partners and stakeholder groups.
- Custodians have the flexibility to seek external help, such as consultants and climate experts, to make their sites resilient and implement strategies. The FCSAP Secretariat and Expert Support Departments (ESD) can assist custodians in answering questions.
- Ultimately, it is up to the custodians to determine the best course of action. They can defer to external help when necessary and make decisions based on what is applicable to their specific situation.

SELECTING REMEDIAL TECHNOLOGIES TO MITIGATE CLIMATE IMPACTS

Guidance and Orientation for the Selection of Technologies ([GOST](#)) Tool

- Online since 2008 and used worldwide;
- Assisting environmental practitioners in making informed decisions about the best remediation technologies applicable on their contaminated sites;
- Included a list of 70 remediation technologies factsheets and 65+ environmental contaminants factsheets.

Step 2 – Soil and altered bedrock: Contamination zone
(Question 1 of 1)

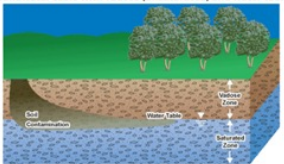
* In which zone is the contamination located? Select one or more items. (required)

Note
There are two separate sets of questions: one for the vadose (unsaturated) zone and other for saturated zone.

Vadose zone
▶ Additional content

Saturated zone
▶ Additional content

Example of the contamination zone of a site
Cross-section of groundwater table with vadose (unsaturated) and water table (saturated) zones

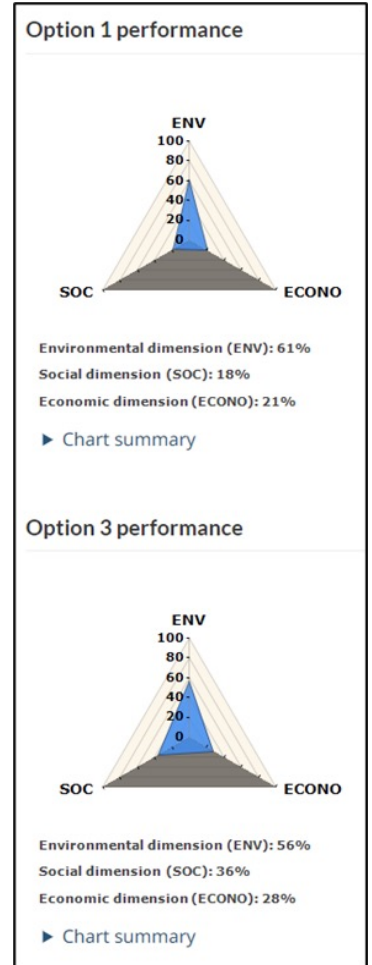


▶ Cross-section of groundwater table with vadose (unsaturated) and water table (saturated) zones — Text version

Previous Next Exit

Sustainable Development ([SD](#)) Analysis Tool

- Online since 2016;
- Comparing remediation technologies applicable to a contaminated site while enhancing the beneficial aspects and mitigating the adverse impacts;
- Helps to support communications with stakeholders, decision-makers, etc.



FCSAP CLIMATE CHANGE GUIDANCE & TRAINING

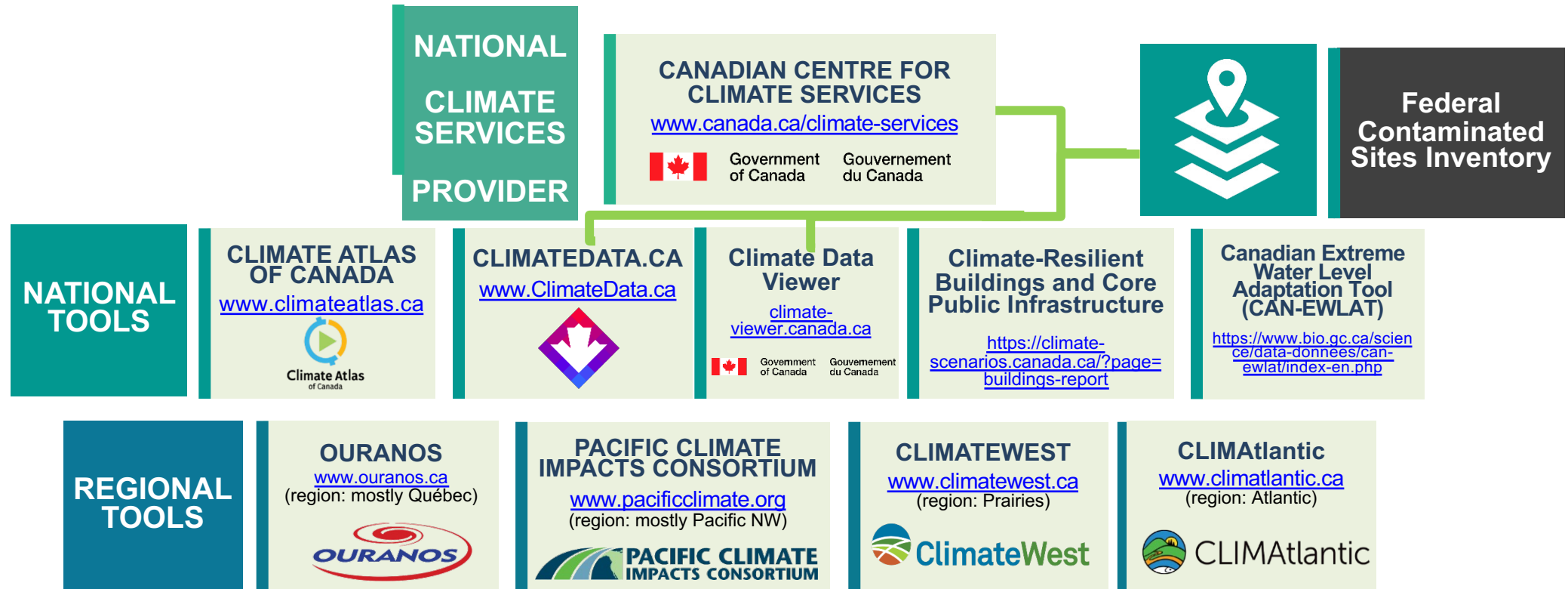
MITIGATION

- **Appendix A of the FCSAP Decision Making Framework (DMF): “Incorporating Sustainability in Contaminated Sites Management”**

ADAPTATION

- **Guidance document**
 - [*Incorporating Climate Change Adaptation Considerations Into Federal Contaminated Sites Management*](#) – led by the FCSAP Secretariat
- **Reporting Template and Factsheets**
 - *FCSAP Phase IV: Climate Change Program Commitments* - led by the FCSAP Secretariat
- **Introductory training** on integrating climate change adaptation considerations in the management of federal contaminated sites and reporting procedures (Recorded)
- **Intermediate training** on Public Infrastructure Engineering Vulnerability Committee (PIEVC) climate change risk assessment protocol (Recorded)

CLIMATE INFORMATION SOURCES (CCCS, 2022)



FCSAP CLIMATE DATASET (MARCH 2022)

Note: Given the range of natural climate variability and uncertainties regarding future greenhouse gas emission pathways and climate response, changes projected by one climate model should not be used in isolation. Rather, it is good practice to consider a range of projections from multiple climate models (ensembles) and emission scenarios. The 50th percentile has been selected in this dataset. However, when incorporating climate projections into decision-making, it is important to use a set of climate model results to ensure you are prepared for the range of possible future climates. If you wish to have more information regarding the values, please contact the Candian Centre for Climate Services or the dataset source listed in the Information tab of this workbook. Please note also that the numbers have been rounded to tenths.

FCSI Number	Site name	Status	Class Type	Highest step completed (as of March 31, 2021)	Department	Contaminated Media	Latitude	Longitude	Historical Total Precipitation (mm)	Projected Total Precipitation (mm)	Historical Mean Temperature (°C)	Projected Mean Temperature (°C)	Historical Number of Days with Maximum Temperature > 37°C	Projected Number of Days with Maximum Temperature > 37°C	Historical Minimum Mean Temperature (°C)	Projected Minimum Mean Temperature (°C)	Historical Coldest Day (°C)	Projected Coldest Day (°C)	Historical Number of Days with Minimum Temperature < -25°C	Projected Number of Days with Minimum Temperature < -25°C
2	Stanley Park	Active	2	9	NCC	Soil	45.43952	-75.68897	909.2	1027.6	6.4	11.9	0.0	9.7	1.2	6.9	-30.3	-19.2	7.0	0.1
6	LeBreton Flats	Active	2	6	NCC	Groundwater, Soil	45.41487	-75.70938	895.2	1014.1	6.5	12.1	0.0	10.1	1.5	7.2	-29.3	-18.3	5.7	0.0
7	LeBreton Flats	Active	2	6	NCC	Groundwater, Soil	45.41435	-75.71077	895.2	1014.1	6.5	12.1	0.0	10.1	1.5	7.2	-29.3	-18.3	5.7	0.0
9	LeBreton Flats	Active	2	6	NCC	Groundwater, Soil	45.41405	-75.71106	895.2	1014.1	6.5	12.1	0.0	10.1	1.5	7.2	-29.3	-18.3	5.7	0.0
10	LeBreton Flats	Active	2	6	NCC	Groundwater, Soil	45.41388	-75.71278	895.2	1014.1	6.5	12.1	0.0	10.1	1.5	7.2	-29.3	-18.3	5.7	0.0
11	LeBreton Flats	Active	2	6	NCC	Groundwater, Soil	45.41367	-75.71183	895.2	1014.1	6.5	12.1	0.0	10.1	1.5	7.2	-29.3	-18.3	5.7	0.0
12	LeBreton Flats	Active	2	6	NCC	Groundwater, Soil	45.41307	-75.71423	895.2	1014.1	6.5	12.1	0.0	10.1	1.5	7.2	-29.3	-18.3	5.7	0.0
13	LeBreton Flats	Active	2	6	NCC	Groundwater, Soil	45.413	-75.713	895.2	1014.1	6.5	12.1	0.0	10.1	1.5	7.2	-29.3	-18.3	5.7	0.0
15	LeBreton Flats - Nepean Bay	Active	2	6	NCC	Groundwater, Soil	45.41153	-75.71988	895.2	1014.1	6.5	12.1	0.0	10.1	1.5	7.2	-29.3	-18.3	5.7	0.0
16	Riverfront Park	Active	2	9	NCC	Groundwater, Soil	45.41574	-75.717	895.2	1014.1	6.5	12.1	0.0	10.1	1.5	7.2	-29.3	-18.3	5.7	0.0
17	THOMPSON-LUNDMARK MINE (W/	Active	1	4	CIRNAC	Sediment, Soil, Surface water	62.606667	-113.4656	295.1	362.6	-5.5	1.3	0.0	0.1	-10.0	-2.9	-43.6	-33.3	85.2	28.4
68	BULLMOOSE LAKE MINE (FORMER	Active	1	8	CIRNAC	Other medium, Sediment, Soil	62.340556	-112.7464	285.8	349.5	-5.3	1.5	0.0	0.1	-9.7	-2.6	-43.2	-32.9	82.1	25.8
69	INDIAN LAKE/DIVERSIFIED (ARSENC	Active	1	7	CIRNAC	Surface soil	64.273611	-115.2047	256.2	324.6	-7.1	-0.1	0.0	0.1	-11.7	-4.3	-44.8	-34.5	98.3	36.1
76	EL BONANZA MINE (BONANZA EAS	Active	1	6	CIRNAC	Soil, Surface water	66.004137	-118.0733	229.8	297.6	-7.5	-0.3	0.0	0.1	-11.6	-3.9	-41.8	-31.4	94.1	22.3
154	CANTUNG MINE (CANADA TUNGS	Active	1	4	CIRNAC	Groundwater, Sediment, Soil, Surface water	61.962778	-128.2161	564.7	699.9	-7.1	-1.3	0.0	0.0	-12.2	-6.0	-49.1	-38.5	76.6	32.6
162	CAMLAREN MINE (HUMP VEIN)	Active	1	9	CIRNAC	Groundwater, Sediment, Soil, Surface water	62.984722	-113.2042	289.0	359.3	-6.1	0.8	0.0	0.1	-10.6	-3.4	-43.9	-33.8	88.9	31.7
177	SPIDER LAKE (TREASURE ISLAND	Active	2	7	CIRNAC	Soil	64.493056	-115.1292	261.8	333.2	-7.6	-0.6	0.0	0.0	-12.1	-4.7	-45.1	-34.7	101.3	37.8
202	WIJINNEDI LAKE (EAST WIJINNEDI	Active	2	4	CIRNAC	Groundwater, Other medium, Soil, Surface water	63.945633	-115.2259	260.7	328.2	-6.7	0.3	0.0	0.1	-11.3	-4.0	-44.5	-34.4	95.3	34.9
230	THOR ISLAND / PANARCTIC OILS/I	Active	1	7	CIRNAC	Soil	78.123678	-103.1771	133.3	210.1	-17.8	-8.5	0.0	0.0	-20.8	-11.2	-47.0	-34.3	170.8	62.9
231	REA POINT (1)/MELVILLE ISLAND	Active	1	7	CIRNAC	Groundwater, Soil, Surface water	75.360989	-105.7274	127.4	192.0	-16.4	-7.2	0.0	0.0	-19.4	-9.6	-45.1	-32.6	160.2	47.8
244	DRAKE POINT - SABINE PENINSUL	Active	1	7	CIRNAC	Soil	67.205278	-118.5917	223.6	298.1	-9.3	-1.7	0.0	0.0	-13.1	-5.2	-41.5	-30.9	105.1	20.0
249	VICTORIA IS. AREA # 16	Active	2	4	CIRNAC	Other medium	69.406003	-106.3123	172.4	235.1	-13.8	-5.5	0.0	0.0	-17.1	-8.5	-44.5	-34.0	146.7	49.3
258	PIONEER IS. - DEVON IS.	Active	2	4	CIRNAC	Soil	76.966521	-96.97258	143.0	225.2	-17.0	-8.0	0.0	0.0	-19.9	-10.5	-45.7	-34.7	165.0	59.4
266	Bathurst Island - Young Inlet (East of	Active	1	7	CIRNAC	Soil, Surface water	76.338411	-98.69446	145.4	226.1	-17.2	-8.2	0.0	0.0	-20.1	-10.6	-45.6	-33.9	165.3	57.0
270	BATHURST ISLAND - PLAYFAIR PC	Active	3	4	CIRNAC	Soil	75.349722	-100.7183	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
282	Bathurst Island - Ile Vanier	Active	1	7	CIRNAC	Soil	76.133333	-104.0333	136.6	214.2	-17.3	-8.0	0.0	0.0	-20.2	-10.3	-45.7	-33.0	166.3	53.9
286	LINCOLN BAY	Active	2	4	CIRNAC	Soil	82.083333	-62	193.3	320.5	-17.7	-9.5	0.0	0.0	-20.9	-12.3	-44.7	-35.6	171.8	79.0
288	Loughheed Island (L1)	Active	1	7	CIRNAC	Soil, Surface water	77.34953	-105.307	128.6	204.3	-17.5	-8.0	0.0	0.0	-20.5	-10.6	-46.4	-33.8	168.7	57.3
289	LOUGHEED ISLAND - CAPE AHNIG	Active	2	4	CIRNAC	Soil	77.728759	-106.0666	127.7	199.0	-17.7	-8.1	0.0	0.0	-20.7	-10.7	-46.7	-34.1	170.2	59.1
296	SOUTH SOMERSET IS. (FORT RO	Active	2	4	CIRNAC	Soil, Surface soil	72.009853	-94.23697	157.0	225.0	-14.8	-6.6	0.0	0.0	-18.1	-9.5	-44.5	-33.1	148.8	50.9
298	STUPART ISLAND	Active	2	4	CIRNAC	Soil	77.131585	-104.4423	126.3	201.4	-17.3	-7.8	0.0	0.0	-20.3	-10.2	-46.1	-33.3	167.0	54.8
303	LITTLE POINT	Active	3	4	CIRNAC	Soil	75.021699	-106.3707	128.7	192.4	-16.4	-7.2	0.0	0.0	-19.4	-9.8	-45.0	-33.0	160.1	48.4
304	CAPE ISACHSEN, ELLEF RINGNES	Active	2	5	CIRNAC	Soil	79.2779	-105.2772	132.0	203.0	-18.6	-9.5	0.0	0.0	-21.6	-12.3	-47.9	-35.7	176.6	71.3
333	MITCHELL LAKE MINE (RIBB CHIC	Active	2	4	CIRNAC	Groundwater, Sediment, Soil, Surface water	62.77332	-113.4306	295.9	365.5	-5.8	1.0	0.0	0.1	-10.3	-3.2	-43.9	-33.7	87.3	30.7
341	ASIAK RIVER	Active	2	4	CIRNAC	Not Available, Soil	67.617222	-114.465	248.1	328.6	-11.2	-3.4	0.0	0.0	-14.8	-6.7	-43.1	-33.0	122.9	32.2
343	COPPERMINE/KENDALL RIVER	Active	2	4	CIRNAC	Not Available	67.116944	-116.1231	245.6	325.5	-9.9	-2.3	0.0	0.1	-13.7	-5.8	-42.4	-31.9	113.5	26.3

FCSAP GUIDANCE DOCUMENT

POTENTIAL IMPACTS OF CLIMATE CHANGE ON R/RM METHODS

Remediation/ Risk Management Method*	Timeframe (See Note 6)	Climate Change Hazard **								
		Air Temperature Change	Changing permafrost conditions	Sea-level Change	Precipitation Changes/Storm Events	Snow Cover Change	Arctic Sea Ice Change	Flora Shifts	Fauna Shifts	Forest Fires
Excavation (soil) ***	<10 years	No	No	No	No	No	No	No	No	No
Groundwater, Surface Water and Leachate										
In-Situ Biological Treatment										
Enhanced bioremediation	<10 years to 50 years	Yes	See Note 1	See Note 3	Yes	Yes +	No	No	No	Yes +
Monitored natural attenuation	10 to 50 years	Yes	See Note 1	See Note 3	Yes	Yes +	No	No	No	Yes
Phytoremediation	<10 years to >50 years	Yes	See Note 1	See Note 3	Yes	Yes +	No	Yes	Yes	Yes
In-Situ Physical / Chemical Treatment										
Air sparging	<10 years	Yes +	See Note 1	See Note 3	No	No	No	No	No	No
Bioslurping	<10 years	Yes +	See Note 1	See Note 3	Yes +	No	No	No	No	No
Chemical oxidation	<10 years	No	See Note 1	See Note 3	No	No	No	No	No	No
Directional wells	<10 years	No	See Note 1	See Note 3	Yes	No	No	No	No	No
Dual phase extraction	<10 years	No	See Note 1	See Note 3	No	No	No	No	No	No
Thermal treatment	<10 years	No	See Note 1	See Note 3	No	No	No	No	No	No
Hydrofracturing enhancements	<10 years	No	See Note 1	See Note 3	No	No	No	No	No	No
In-well air sparging	<10 years	No	See Note 1	See Note 3	No	No	No	No	No	No
Passive/reactive treatment	10 to 50 years	No	See Note 1	See Note 3	Yes	No	No	No	No	No

Federal Contaminated Sites Action Plan (FCSAP)

Integrating Climate Change Adaptation
Considerations into Federal Contaminated
Sites Management
Version 1.0

CHALLENGES

Dataset Limitations

- Understanding methods used for assessing climate change impacts and site vulnerabilities
- Communicating climate change data
- Incorporating uncertainty associated with climate change
- Determining an optimized approach to prioritize sites

Reporting Challenges

- Guidance published and training provided on short timelines
- Ensuring consistency in data collection and program commitment interpretation

CHALLENGES (CON'T)

The FCSAP program is learning to apply climate change lens effectively and consistently. More effort has been put into identifying potential climate change hazards/impacts than incorporating adaptations into site management.

Expert Support Departments found that:

- Limitations in conducting meaningful climate change considerations due to scattered tools available.
- Bringing in climate change experts is necessary for effective management of contaminated sites.

Custodians have asked for:

- Detailed guidance on when climate change considerations need to be carried out by professionals.
- A detailed list of possible relevant climate hazards for their sites.
- Climate prediction maps visualizing the possible range of climate change hazards, with their sites added on as a layer.

MOVING FORWARD

- Build general knowledge about climate hazards in Canada
- Improve scientific knowledge about impacts of climate-driven shifts on contaminants
- Provide simplified and relevant information to custodians to:
 - Support consistent and efficient annual reporting
 - Started this year with the provision of a decision support tool to facilitate the reporting process
 - Improve dataset usability and reduce the data analysis burden
- Learning process: adjustments made through regular consultations with custodians to improve the integration of climate change considerations in federal contaminated sites management.
- Moving forward the program will be looking into climate change mitigation through the reduction of greenhouse gas emissions during remediation/risk management activities.

CONTACT INFORMATION

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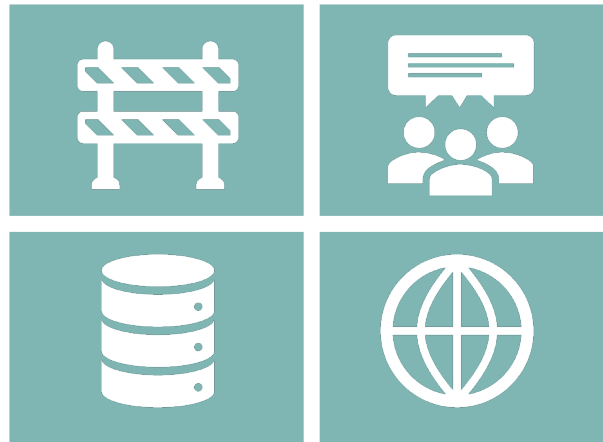
Environmental Specialist, Contaminated Sites

Green and Sustainable Government Directorate

Public Services and Procurement Canada

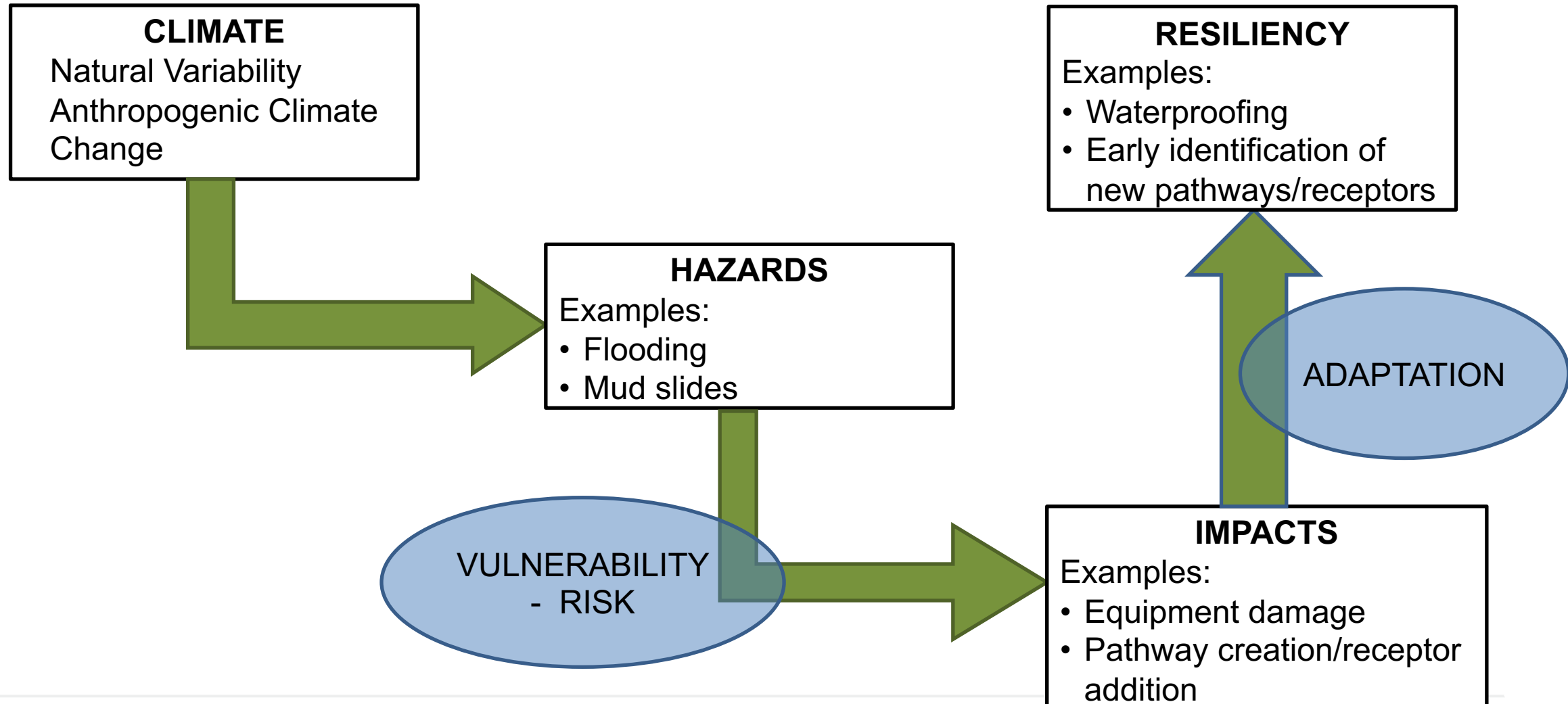
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QUESTIONS?



ANNEX – ADDITIONAL RESOURCES

IMPORTANT TERMS: CLIMATE CHANGE HAZARDS VS IMPACTS



ADDITIONAL CLIMATE CHANGE GUIDANCE & TRAINING

- Climate Change Adaptation Policy Division in the Adaptation Directorate, Climate Change Branch, ECCC (adaptation@ec.gc.ca)
 - [*Climate Lens - General Guidance*](#) (Infrastructure Canada, 2019)
 - NRCan Changing Climate [Regional Perspectives Report](#) (changingclimate.ca) (NRCan, 2022)
 - [*Guidance on Good Practices in Climate Change Risk Assessment*](#) (CCME, 2021)
 - Upcoming [2023 RPIC Federal Contaminated Sites National Workshop](#) (Toronto (ON), November) -> Several presentations on contaminated sites and climate change, including a panel discussion.
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