



Ministry of
Environment and
Climate Change Strategy

Preparing Recovery Plans

August 2018

Context

This guidance document is intended to assist Responsible Persons in understanding and complying with Recovery Plan requirements as outlined in the Spill Preparedness, Response and Recovery Regulation (SPRRR) and provide a basic template for a Recovery Plan including a description of all information that must be included to satisfy the requirements.

Division 2.1 Spill Preparedness, Response and Recovery of the *Environmental Management Act 2003* (EMA) came into force on October 30, 2017. Sections 91.2, 91.21, and 91.3 of EMA set out the ability for a director to order Responsible Persons to develop and implement a Recovery Plan to mitigate and restore the impacts of a spill on the environment. Section 6 of the SPRRR outlines the required content of a Recovery Plan and section 7 outlines the content of the report that is required at the conclusion of the recovery process. This document also provides additional recommendations regarding Recovery Plan development.

This guidance document is solely for the convenience of the reader and is intended to clarify the requirements of EMA and the associated regulations as they relate to the management of environmental emergencies. It is the responsibility of regulated persons, Responsible Persons, and the owners of regulated substances to understand and comply with EMA and the associated regulations. This guidance document is not a legal document and the information contained within it does not constitute legal advice or impose any legally binding requirements. This guidance document does not replace EMA, the associated regulations, or any other applicable law. Amendments to EMA, its regulations, or other legislation referred to in this guidance document may impact the provisions contained within it; in the event of an inconsistency, EMA or other applicable legislation will prevail. Failure to comply with EMA and/or the regulations may result in fines and/or convictions.

Acronyms

EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Mitigation Procedure
EVC	Environmental Valued Components
NEBA	Net Environmental Benefit Analysis
SIA	Spill Impact Assessment
SPRRR	Spill Preparedness Response and Recovery Regulation

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1. Introduction

Environmental recovery focuses on actions to assist in the recovery of an environment/ecosystem that has been degraded, damaged or destroyed by a spill. It includes any or all actions taken to return the site and any impacted resources to their pre-spill conditions. Recovery also addresses materials that could not be cleaned up, impacts on the environment caused by response actions (e.g. digging scars, tire ruts, eroded work areas), and habitat restoration. For the purposes of this policy, “recovery” is an umbrella term that includes restoration and remediation.

As per section 91.2 (4) of EMA, the Responsible Person can be ordered by a director to prepare a Recovery Plan if a director believes that there are steps that must be taken to eliminate, mitigate, and/or compensate for the damage caused by a spill incident. Examples of when a Recovery Plan would be ordered include large volume spills, a significant release of a hazardous substance to a waterbody, a spill that has impacted a public drinking water source, or other significant impacts to the environment.

A Recovery Plan is a documented process that outlines how a Responsible Person intends to resolve or mitigate the entirety of impacts caused by a spill incident, including quantifiable recovery targets, the actions planned to be taken to achieve the targets, and a summary of engagement and consultation with impacted stakeholders. A Recovery Plan is prepared and submitted as a highly detailed report and must contain specific information that is outlined in the SPRRR. The Responsible Person is accountable for developing and implementing the Recovery Plan, including the use of qualified professionals to draft and implement it. Remediation action required by the Contaminated Sites Regulation may occur concurrently.

2. Definitions

Abiotic environment – non-living physical and chemical parts of the environment.

Adverse effect – a change to the environment, environmental component, environmental value, or resource that is serious, of consequence, injurious, or damaging.

Area of influence – the extent of the direct and indirect impact(s) to environmental value(s) and associated components beyond the footprint of the spill incident and response actions; may be defined within each of the local, sub-regional, or regional scales depending on the ecological scale for the processes affecting the environmental value(s).

Biotic environment – living organisms within an ecosystem.

Cumulative impacts – changes to the environment that are caused by an action in combination with other past, present, and future human actions.

Direct effect – impacts caused by the spilled substance and/or response action that occur at the same time and place; direct effects are typically well understood and predictable.

Ecosystem functionality – refers to all natural ecological processes that occur within a complete system composed of human beings, other animals, and plants in a defined area with the soil and climate comprising their habitat in that area.

Ecological restoration – the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. It is an intentional human activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity, and sustainability. Restoration involves returning the impacted ecosystem to a sustainable ecological trajectory or pathway; determined by the restoration target and reference conditions.

Effect pathway – refers to the cause-effect linkage between a spill or spill response action(s) and an environmental value and its associated components.

Environmental component – attributes of the natural resource system (including the air, water, soil, terrain, flora and fauna, and land use) that must be measured, managed, and maintained to ensure the integrity and well-being of the environmental value with which the component is associated.

Environmental value – any part of the environment that is considered important by the proponent, public, scientists, or government involved in the recovery process. Importance may be determined based on cultural values or scientific concern.

Ephemeral sampling – environmental sampling conducted during the response phase of a spill incident.

First Nation Government – means (a) the governing body of a band, as defined in the *Indian Act 1985*; (b) a treaty First Nation; (c) a Nisga'a Government, and (d) the council of the Sechelt Indian Band.

Indicator – the metrics used to measure and report on the condition and trend of an environmental component and/or the process(es) impacting an environmental component.

Indirect effects – effects which are caused by an action and occur later or are farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate and related effects on air and water and other natural systems including ecosystems.

In-lieu payment – a payment made by the Responsible Person to fund offsetting measures (conservation offsetting mechanisms) when recovery is not achievable.

Minimize – to partially avoid or reduce the level of impact on one or more environmental components resulting from a spill incident.

Mitigation measure – a tangible conservation action to avoid, minimize, restore on-site, or offset impacts on environmental values and associated components resulting from a spill incident.

Offset – to counteract or make up for an impact on an environmental component that cannot be adequately addressed through other mitigation measures.

Off-site – outside the area impacted by the spill incident.

On-site – within the area impacted by the spill incident.

Recovery – the process of assisting in the recovery of an environment that has been degraded, damaged, or destroyed by a spill incident. It includes any or all actions taken to return the site and any impacted resources to their pre-spill conditions; umbrella term that includes restoration and remediation.

Recovery target – an established endpoint of advancement along the ecological trajectory intended for restoration.

Remediation – refers to the process to remove residual contamination from soil, water, vapour, and other media.

Residual effects – adverse effects directly related to the spilled material remaining after the implementation of the recovery actions; residual effects are usually described using standard residual effects criteria: context, magnitude, extent, duration, reversibility, and frequency.

Responsible Person – a person who has possession, charge, or control of a substance or thing when a spill of the substance or thing occurs or is at imminent risk of occurring.

Restoration – the action of returning the environment to its former condition. Includes the restoration of physical habitat such as flora and fauna, species (e.g. rebuilding a population of fish impacted by a spill), and infrastructure such as drinking water intakes.

Spill incident – refers to both the spilled substance(s) and the spill response actions.

Temporal impacts – the length of time the impacts from a spill incident persist.

3. Expectations

A Recovery Plan, as outlined in this guidance document, is designed to protect the environment, human health, and infrastructure in the area and the receiving environments impacted by a spill incident. It is expected that a Recovery Plan will:

- Be well organized to ensure quick access to critical information
- Identify qualified professionals who will be conducting Spill Impact Assessments (SIA) and recovery actions
- Ensure that the SIA, Recovery Plan actions, and targets are robust and scientifically defensible and
- Ensure communication and engagement with all parties impacted by the spill incident

For the purposes of this document, “spill incident” refers to both the spilled substance(s) and the response actions that must be considered in the Recovery Plan.

The Recovery Plan Table of Contents and section content recommended in this guidance document can be used to facilitate the development of the Recovery Plan to comply with the mandatory requirements as outlined in the SPRRR; it is not a prescribed template.

4. Recovery Plan approval

Responsible Persons will be required to submit a completed Recovery Plan to the director in the manner specified in the Recovery Plan order. The director will review the Recovery Plan and either approve it or direct that the Recovery Plan be amended. Once a Recovery Plan has been approved by the director, the Responsible Person must carry out the Recovery Plan actions by the date specified by the director.

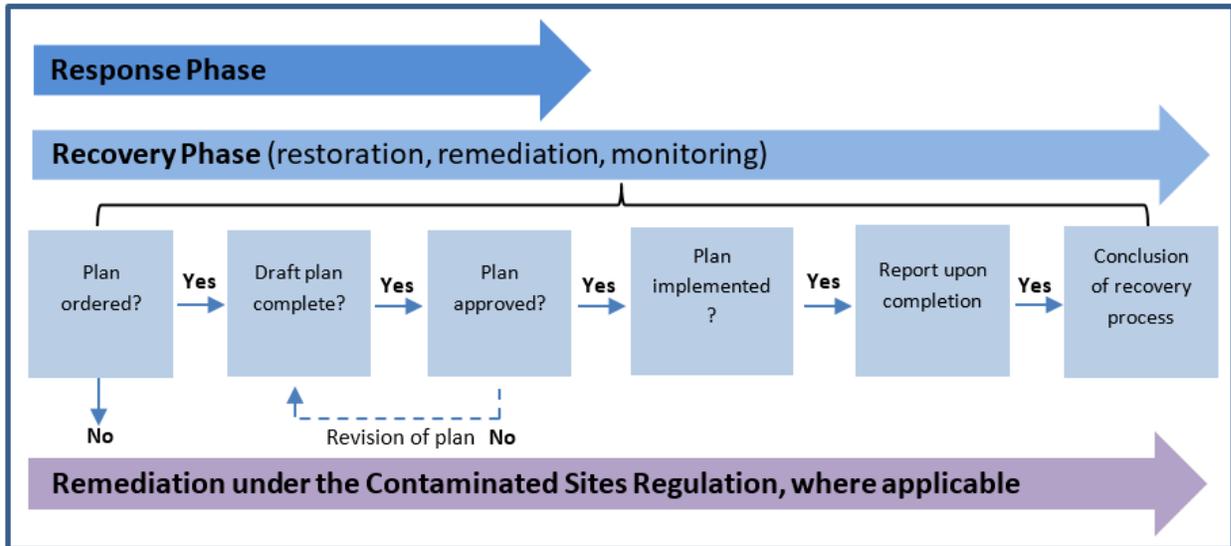


Figure 1 Process flow map for a Recovery Plan. This figure depicts the steps and processes that will occur when a Recovery Plan is ordered. A completed recovery plan is reviewed by recovery section staff at the Ministry and will either be approved or amendments will be directed. Once the plan is approved the Responsible Person will implement the recovery actions outlined in the plan. Upon completion of the plan, the Responsible Person must produce a report outlining how the implemented recovery actions resulted in achievement of the proposed recovery targets. The Ministry will then assess the report and if environmental recovery is deemed to have been successful, the Ministry will conclude the recovery process for that specific spill incident.

5. Recovery Plan contents

The required content of a Recovery Plan is outlined in part 4, section 6 of the SPRRR. Guidance to explain what must be included in each section of the Recovery Plan is provided below. A Recovery Plan should be submitted in a report-style format. It is recommended that the Table of Contents for a Recovery Plan include the following sections:

1. Introduction
2. Spilled substance(s) description
3. Spill Impact Assessment (SIA)
 - 3.1 Selection of environmental values, components, and indicators
 - 3.2 Potential impacts of the spill incident
 - 3.3 Actual impacts of the spill incident
4. Description of the environment pre-spill incident
5. Description of the impacted environment post Recovery Plan implementation
 - 5.1 Description of the affected environment post Recovery Plan implementation
 - 5.2 Targets for recovery
6. Recovery actions
7. Summary of stakeholder engagement and consultation
8. Recovery Plan schedule: implementation and monitoring timeline

It is recommended that a summary table is provided within the Recovery Plan, which summarizes:

- Impacted environmental values
- Components associated with each environmental value
- Cause of impact (e.g. spilled substance or response action)
- Measured impact
- Quantifiable recovery target
- Recovery target achievability
- Proposed recovery action or offset action when the recovery target is not considered achievable
- Indicator to be measured to ensure that the recovery target is achieved
- Estimated time to recovery
- Need for long-term monitoring

Table 1 (below) outlines an approach to present the impacted environmental values, recovery targets, recovery actions, and follow-up monitoring that is required in the Recovery Plan. It is important to include relevant impacted species names, quantifiable targets, units of measurement, and realistic estimates for recovery times. Avoid the use of abbreviations unless they are clearly defined.

Table 1 Example Recovery Plan summary table

Environmental value	Environmental component	Cause of impact	Impact	Recovery target	Target indicator	Estimated time to recovery (years)	Target considered achievable? (Y/N)	Recovery action or offset when target is not achievable	Long-term monitoring required? (Y/N)
Functional habitat condition and structural function	Native trees Red alder (<i>Alnus rubra</i>)	Response action	10 red alders were cut down during response phase	Restore 10 red alder to the forest	Tree survival and growth	5-10	Y	Plant 10+ red alder in the area where trees were cut	Y
	Riverbank vegetation	Response action	Mortality of 20 m ² of vegetation along the riverbank	Restore 20 m ² of lost vegetation	Vegetation growth	1	Y	Plant seedlings of the representative species along the degraded bank area	Y
	Soil quality	Spilled substance	Elevated hydrocarbon (e.g. phenanthrene, average measured value = 0.8 µg/L)	Reduce phenanthrene levels to at or below guideline levels (guideline level = 0.3 µg/L)	Level of soil contamination	3	Y	Natural attenuation	Y
Healthy population size	Coho salmon (<i>Oncorhynchus kisutch</i>)	Deposition of sediments onto fish eggs	Mortality of fish eggs	Restore fish stocks to pre-spill levels	Number of juvenile fish	2	N	Provide funding to support a fish breeding program	Y
	Painted turtle – identified as species at risk (<i>Chrysemys picta</i>)	Response actions	Direct mortality and habitat destruction	Restore populations to pre-incident levels	Number of turtles	3	N	Establish breeding program off-site	Y

Note: A column for potential impacts can also be included and common names and species names of flora and fauna should be included where applicable

The following sections provide guidance on the information to be included in each section of a Recovery Plan.

1. Introduction

Provide background information on the spill incident, including the following:

- General description of the spill incident
- Location of the spill, including Global Positioning System co-ordinates (latitude and longitude as decimal degrees). A map should accompany this section
- Geographical extent of the spill
- Receiving environment
- Emergency response phase actions taken (e.g. source control, protection measures, cleanup)
 - Environmental damage caused by response actions
- If an initial or ephemeral assessment was conducted (as per Section 91.2 (2) of the *Environmental Management Act*) during the emergency response phase, a description of the impacts on the environment and/or any initial sampling/tests results can be provided here
 - The data should be presented clearly using graphs and tables as appropriate (guidance on data reporting is available in section 3.4 below)
 - This section can include assessments on environmental components such as soil, water, aquatic sediment, flora, and fauna
 - The preliminary assessment provided in this section will inform the development of the SIA as outlined in section 3 below

2. Spilled substance(s) description

Section 6 (1) (a), (b) and (c) of the SPRRR outlines that detailed information of the spilled substance(s) and their potential to adversely impact the environment must be included in the Recovery Plan. This section of the Recovery Plan provides critical information for assessing the risk and magnitude of the spill to the receiving environment, providing context for the SIA and Recovery Plan review process. The Recovery Plan must address all spilled substances.

Section 6 (1) (a), (b), and (c) of the SPRRR:

- (1) A responsible person who is ordered under section 91.2 (4) [*responsible persons — spill response*] of the Act to prepare a recovery plan in relation to a spill must include all of the following information in the plan:
- (a) the substance spilled;
 - (b) the amount of the substance spilled;
 - (c) a description of the properties of the substance spilled that are relevant to its potential to cause adverse effects to the environment, human health or infrastructure;

The description of the spilled substance(s) must include the following:

- Name(s) of the spilled substance(s)

- Provide the common name, classification number (United Nations and/or Chemical Abstract Service number) if applicable, product or brand name, and synonyms
- The amount of substance spilled
 - Report the volume of the spilled substance in metric measurements (e.g. litres, kg)
 - If the amount is unknown provide an estimate or range, however ensure that a justification for the estimated value is provided
- Describe the properties of the spilled substance that are relevant to its potential to cause adverse effects to the environment, human health, and/or infrastructure. Properties should be listed in sufficient detail to guide the selection of appropriate recovery actions
 - If a substance is described using a generic or trade description that comprises multiple substances, the product description should include all constituents (e.g. diluents used to dilute bitumen)
 - Additional considerations and resources to aid in the description of the spilled substance(s) are listed in section 1 and 3.1 of the Appendix

3. Spill Impact Assessment (SIA)

An assessment as described in section 6 (1) (d) and (e) of the SPRRR must be conducted on the nature, degree, and extent of impacts to the environment caused by a spill. The assessment must include both the impact of the spilled substance(s) and any additional impact that the spill response actions may have caused. To satisfy the requirements of the SPRRR, it is expected that a SIA is conducted by using an environmental impact assessment (EIA) approach. Links to additional resources are provided in Appendix 3.2.

A SIA is a critical component of spill recovery planning as it provides qualitative and quantitative information on the environmental values and component(s) that were impacted by the spill incident and, are therefore, in need of recovery. The SIA must include an assessment of both the potential and actual impacts of the spilled substance(s) and/or response action(s) on the environment. Disturbance sources and biological impact pathways and receptors (i.e. a description and analysis of where the substance(s) may end up and the organisms that may be impacted) must be identified; see Figure 2 below. The results of the SIA should guide the development of measurable recovery targets (guidance provided in section 5.2 below), recovery actions (guidance provided in section 6 below), and whether and to what degree offsets may be required to compensate for potential or real damages to the environment when recovery is not reasonably achievable or cannot fully counteract the impacts of the spill. It is expected that a qualified professional will develop and conduct the SIA.

The typical methodological steps for developing a SIA include:

1. Identification of environmental values and associated components impacted by the spill incident
2. Selection of appropriate indicators that are measurable and sensitive
3. Determination of the potential impacts of the spill incident on the environment
4. Determination of the actual impacts of the spill incident on the environment

Figure 2 (below) provides an example of the disturbance sources, pathways, and receptors by which a spilled substance could move through the environment and cause adverse impacts to the abiotic (e.g. soil, water) and biotic (e.g. flora, fauna, and human populations) environment. A robust assessment should consider the direct, indirect, temporal and cumulative impacts, and relationships between the valued components listed.

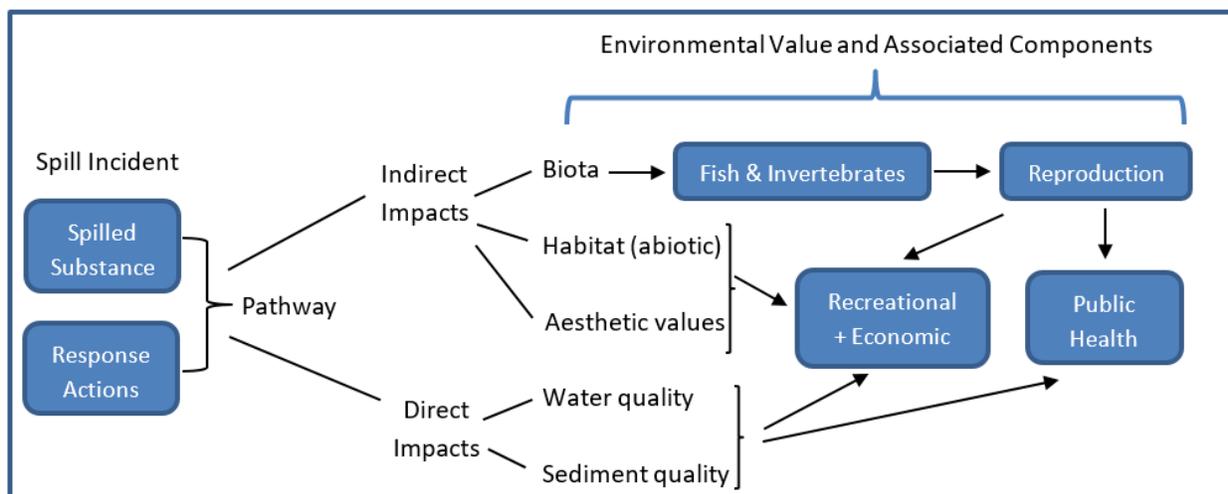


Figure 2 Example of environmental pathways that a spilled substance(s) could move through and potential receptors that could be adversely impacted¹. When conducting the Spill Impact Assessment, it is critical to consider the impacts caused by both the spilled substance and the response actions, as well as direct and indirect impacts to both biotic and abiotic components.

Note: This diagram can also be applied to guide the assessment of actual impacts on the environment.

3.1 Selection of environmental values, components, and indicators

Environmental values provide the foundation for the SIA including the assessment of the potential and actual impacts of a spill incident. Sensitive and/or vulnerable environmental values and associated components impacted by the spill incident must be identified in the SIA. It is also necessary to describe indicators that will be assessed and monitored in the SIA. Indicators should be reliably measurable and reflect the pathways and mechanisms of impact on the environmental values and components in the impacted area. Indicators of environmental health may include measures of:

- Water quality
- Habitat structure and quality
- Species diversity and abundance
- Species health (e.g. contaminant body burden, tissue and organ condition contaminant concentrations in soil, aquatic sediment, and water quality)

Considerations for the selection of environmental values and associated components are provided in Appendix 2.

¹ Adapted from *Guideline for the selection of valued components and assessment of potential effects* produced by the Environmental Assessment Office (EAO), available at <http://www.eao.gov.bc.ca/files/EAO-Guidance-Selection-of-Valued-Components.pdf>

3.2 Potential impacts on the environment

Section 6 (1) (d) of the SPRRR:

- (d) an assessment, prepared in accordance with subsection (2), of the potential impacts on the environment of the spill and the spill response actions carried out in relation to the spill;

Section 6 (2) of the SPRRR:

- (2) An assessment under subsection (1) (d) or (e) must
- (a) describe and quantify the severity and geographical extent of the impacts on the environment of the spill and the spill response actions carried out in relation to the spill, and
 - (b) identify all of the following:
 - (i) the contaminants introduced into or created in the environment by the spill or the spill response actions carried out in relation to the spill;
 - (ii) the flora, fauna and human populations that could be adversely affected by those contaminants;
 - (iii) the pathways by which those contaminants could move through the environment to cause adverse effects to those flora, fauna and human populations.

A critical step in the SIA process is identifying the potential impacts of the spill on the environment which may not be measurable at the time of the spill. This can include follow-on effects and cumulative impacts. For example, a spill into a fish bearing stream may affect a fish population, however this data may not be available until the spawning season following the spill incident. Such information is essential for the development of appropriate targets for recovery, recovery actions, and follow-up monitoring plans. It is expected that scientific and grey literature (e.g. theses and technical reports) will be used to inform the development of scientifically sound assessments.

The following information must be included in the assessment of the potential impacts of the spill incident on the environment:

- Description and quantification of the severity of the potential impacts
- Description and quantification of the geographical extent of the potential impacts
- Description of all contaminants introduced into the environment
- Description of all flora and fauna that could be adversely impacted by the spill incident
- Description of human populations that could be adversely impacted by the spill incident
- Identification of the pathways and receptors by which the spilled substance(s) could move through the environment and cause adverse impacts to flora, fauna, and human populations

When assessing potential impacts, it is critical to include an evaluation of:

- The conservation status in the impacted area
 - Include whether the species, habitat components, and/or ecological communities are of special management concern
- Direct impacts
- Indirect impacts
- Temporal impacts
- Cumulative impacts

The potential impacts to both the abiotic (e.g. soil, water) and biotic components (e.g. flora, fauna, and human populations) should be considered.

Quantification of the potential impacts of the spill incident may be difficult; in such circumstances, it is recommended that a semi-quantitative assessment approach is taken. The development of a simple interaction matrix will help to achieve this, see Table 2 below.

Table 2 Interaction matrix to identify potential effects of the spilled substance(s) and response actions on environmental valued components (EVCs)²

Spill Incident		Environmental Valued Components				
		EVC 1	EVC 2	EVC 3	Etc.	
Spilled Substance	Considerations					
	Name	Abiotic environment				
		Direct impacts		●	●	●
		Indirect impacts	●	●	●	
		Temporal impacts				
		Cumulative impacts	●			
Name	Biotic environment					
	Direct impacts	●	●	●	●	
	Indirect impacts		●			
	Temporal impacts	●	●	●	●	
	Cumulative impacts					
Response Actions						
	Action 1	Abiotic environment				
		Direct impacts	●			●
		Indirect impacts		●		●
		Temporal impacts	●	●	●	
		Cumulative impacts	●			●
Action 1	Biotic Environment					
	Direct Impacts	●		●	●	
	Indirect Impacts	●		●		
	Temporal Impacts		●		●	
	Cumulative Impacts	●	●	●	●	
Etc.	Etc.					

● = No or negligible adverse effect expected; no further consideration warranted.
 ● = Low risk of potential adverse effect requiring additional mitigation; warrants further consideration.
 ● = Medium risk of potential adverse effect requiring additional mitigation; warrants further consideration.
 ● = High risk of resulting in potential significant adverse effect or significant concern; warrants further detailed consideration.

Note: This interaction matrix can also be used to develop a Net Environment Benefit Analysis which should be used to guide restoration and recovery actions (section 6 below).

² Adapted from *Guideline for the selection of valued components and assessment of potential effects* produced by the Environmental Assessment Office, available at <http://www.eao.gov.bc.ca/files/EAO-Guidance-Selection-of-Valued-Components.pdf>

3.3 Actual impacts on the environment

Section 6 (1) (e) SPRRR:

- (e) an assessment, prepared in accordance with subsection (2), of the actual impacts on the environment of the spill and the spill response actions carried out in relation to the spill;

Section 6 (2) of the SPRRR:

- (2) An assessment under subsection (1) (d) or (e) must
 - (a) describe and quantify the severity and geographical extent of the impacts on the environment of the spill and the spill response actions carried out in relation to the spill, and
 - (b) identify all of the following:
 - (i) the contaminants introduced into or created in the environment by the spill or the spill response actions carried out in relation to the spill;
 - (ii) the flora, fauna and human populations that could be adversely affected by those contaminants;
 - (iii) the pathways by which those contaminants could move through the environment to cause adverse effects to those flora, fauna and human populations.

An assessment of the actual impacts on the environment is critical for quantifying the magnitude of the impacts of the spilled substance(s) and response actions and should be included within the SIA. This information is essential for developing appropriate targets for recovery, recovery actions, follow-up monitoring plans, and offsets, if applicable.

The following information must be included in the assessment of the actual impacts of the spill incident on the environment:

- Description and quantification of the severity of the actual impacts
- Description and quantification of the geographical extent of the actual impacts
- Description of all contaminants introduced into the environment from the spill incident
- Description of all flora and fauna that were adversely impacted by the spill incident
- Description of human populations that were adversely impacted by the spill incident
- Identification of the pathways and receptors by which the spilled substance(s) could move through the environment and cause adverse impacts to those flora, fauna, and human populations

The assessment of the actual impacts of the spilled substance(s) and response actions on the environment should include an evaluation of:

- The conservation status of the impacted area
 - Include whether species, habitat components, and/or ecological communities that are of management concern have been impacted and identify the level of impact to them
- Direct impacts
- Indirect impacts
- Temporal impacts
- Cumulative impacts

Actual impacts to both the abiotic (e.g. soil, water) and biotic components (e.g. plant and animal tissue) should be considered. Additionally, any prevention or delay of planned environmental works (e.g. planned release from a hatchery or bank stabilization work) should be considered an environmental impact from the spill incident.

3.4 Assessment monitoring and reporting

To accurately describe and quantify the severity of the actual impacts associated with a spill incident on the environment, *in situ* sampling and monitoring of environmental components and indicators is required. It is expected that environmental monitoring is conducted during the SIA and follow-up monitoring is conducted after the implementation of recovery actions. The purpose of follow-up monitoring is to ensure that recovery actions are implemented as planned and that they effectively meet the intended recovery targets and trajectories. Follow-up monitoring will also identify potential residual impacts from the spill incident. Monitoring and reporting should be considered a best practice of recovery.

Principles

- The Responsible Person is accountable for ensuring relevant monitoring is conducted by a qualified professional
- Planning for follow-up monitoring should be conducted early, ideally during the recovery actions plan phase, and revised as needed as the Recovery Plan is developed
- Monitoring objectives and commitments should be established before finalization of the Recovery Plan
- The type and scope of monitoring will be commensurate with the uncertainty of the proposed recovery actions and the resulting risk to environmental values (i.e. the greater the uncertainty associated with a recovery action, the greater the need to monitor the implementation and/or effectiveness of the measure)
- Monitoring data should be reported and shared with the Ministry of Environment & Climate Change Strategy (the ministry) and stakeholders
- Monitoring results should be used to improve recovery actions related to the spill (i.e. adaptive management) and reduce uncertainty associated with specific mitigation measures

Impact monitoring and assessment tools may include, but are not limited to:

- Toxicity testing
- Water quality monitoring
- Habitat parameter surveys

- Population inventories

Reporting of the assessment sampling and monitoring methodologies and results should include, but is not limited to, the following information:

- A detailed description of the methods used for sampling and monitoring, including:
 - A description of the sampling sites (a map to scale depicting sampling sites should be included)
 - The number of replicates taken for each measured parameter
 - For water and soil samples, provide the depth at which samples were collected and for soil, include the particle size range analyzed for chemical concentrations (e.g. < 2mm, <65 µm)
 - Sampling techniques and processes (e.g. grab sample, probe)
 - Sampling frequency
 - Quality assurance and quality control measures
 - Analytical techniques used/proposed
- A detailed description of the results; it is expected that the Responsible Person and/or qualified person will:
 - Present the data on the impact/contamination levels for each environmental value and/or component that was analyzed/assessed/tested
 - Include concentrations of chemicals and pollutants in environmental media, this must include all previous sampling efforts, not only the most recent data collection survey
 - For all sampled media (soil, groundwater, surface water, vegetation, etc.), the minimum, maximum, and arithmetic average concentrations (\pm standard deviation) should be reported, along with the number of samples analyzed, the detection limits, and the total number or proportion of non-detected measurements
 - Use graphs to illustrate trends and changes in the measured parameters
 - For each table, include a title, units of measurement, and a description of any abbreviations used
 - Provide both qualitative and quantitative descriptions of the results
- A summary of the key findings; the following should be incorporated into the summary section:
 - Synthesis of the data and a description of the environmental values and components (e.g. flora, fauna, water body, soil) that were adversely impacted by the spill incident
 - Discussion of the impacts posing the greatest risk to the environment
 - Contamination levels that are of greatest concern, in relation to established guideline levels and scientific literature whenever possible
 - Pathways by which contaminants could move through the environment to cause adverse impacts to flora, fauna, and human populations
 - Potential residual and cumulative effects
 - Description of the next steps in the SIA or ongoing monitoring for recovery

- Data gaps and information needs and how they will be addressed
- Potential future decisions to be made that may rely on additional monitoring and impact assessment

4. Description of the environment pre-spill incident

Section 6 (1) (f) of the SPRRR:

(f) a description of the environment in the area affected by the spill, as that environment was before the spill;

A characterisation of the baseline pre-spill condition of the environment in the area of the spill is required in the Recovery Plan. This information may be based on a reference ecosystem and the historic range of flora and fauna. This description is required to set targets for spill recovery actions.

Describe the condition of the environment prior to the spill incident including the following:

- Geographical location and context
- Land ownership (e.g. private, crown) including existing permits in place (e.g. trapping, water withdrawal, road-use)
- Interest by Indigenous communities
- Nearby water bodies and water withdrawal locations
- Abundance of typical flora and fauna species in the spill area; red or blue listed ecological communities identified by the British Columbia (B.C.) Conservation Data Center; species that have been assessed as being 'critically imperilled', 'imperilled', or of 'special concern' – vulnerable to extirpation or extinction and, species designation as endangered or threatened under section 6 of the *Wildlife Act 1996*
- Soil/water/sediment characteristics
- Dominant current and wind direction
- Pre-existing contamination
- Socio-economic considerations
- Past, present, and future land-uses (e.g. commercial, agriculture, industry)
- Infrastructure

5. Description of the impacted environment post Recovery Plan implementation

Section 6 (1) (g) of the SPRRR:

(g) a description of the environment in the area affected by the spill, as that environment will be after the recovery plan is implemented, that identifies, in accordance with subsection (3), quantifiable targets for recovery;

Section 6 (3) of the SPRRR:

- (3) The identification of quantifiable targets for recovery referred to in subsection (1) (g) and the proposal of recovery actions and analysis of alternatives referred to in subsection (1) (h) must be based on the principle that the impacts of a spill on the environment are to be restored to the greatest extent that is consistent with the limits set out in section 91.21 (1) (a) (i), (ii) and (iii) [*when restoration not reasonably achievable*] of the Act.

5.1 Description of the environment post Recovery Plan implementation

A description of the environmental condition in the area of the spill as it is expected to be post Recovery Plan implementation is required in the Recovery Plan. The goal of the recovery actions is to restore the environment to its pre-spill condition or better; therefore, any identified residual impacts should be discussed. General descriptions of the restored landscape and ecosystem should be supplemented by specific and measurable targets. Readers of this section of the Recovery Plan should be able to clearly understand what the Recovery Plan intends to achieve when complete including the identification of recovery targets that are not expected to be fully achievable. For ecosystems where recovery will establish conditions for natural community succession to progress, succession should be described from the restored ecosystem to the anticipated end stage community.

This section of the Recovery Plan should describe the expected condition of the environment once recovery actions have been implemented including:

- Expected recovery outcomes for each identified environmental value and its associated component(s) in the impacted environment over time in relation to their recovery target
- Environmental values and components that are not considered to have achievable recovery and that may require offsets
- A description of impacted areas where short or long-term environmental monitoring may be required (e.g. areas of the impacted environment that are recovered using natural attenuation may require more time to achieve recovery)

5.2 Targets for recovery

Recovery targets represent an established quantifiable endpoint intended to set restoration goals and assess goal achievement. Targets must consider recovery from the spilled substance that was introduced to the environment and the spill response actions carried out in relation to the spill.

The recovery targets must be identified in the Recovery Plan. The expectation is that the post spill environmental condition is the same or better than the pre-spill condition. If there is doubt as to the pre-spill condition, consider environmental quality guidelines that post-spill results can be compared to (e.g. B.C. water quality guidelines). In the Recovery Plan, one quantifiable recovery target should be identified for each environmental value and its associated component listed as impacted in the SIA. Recovery targets can be separated into three components: chemical, physical, and biological. Examples of recovery targets can be found in Table 1 (above).

- Chemical targets – refer to pollution concentrations present in soil, surface water, sediment, and groundwater in areas impacted by the spill incident
- Physical targets – refers to the site's topography, hydrology, and physical soil properties in general
- Biological targets – aim for the re-establishment of flora and fauna communities that have been impacted by spilled material or damaged during response and clean-up activities

6. Recovery actions

Section 6 (1) (h) of the SPRRR:

- (h) a description of the recovery actions proposed to meet the targets referred to in paragraph (g) and an analysis, prepared in accordance with subsection (3), in support of those recovery actions that identifies and weighs alternatives;

Spill recovery actions include actions (responsive or proactive) taken to identify and evaluate immediate and/or long-term impacts and steps taken to mitigate and/or remedy those impacts with the overall aim of protecting, recovering and restoring the environment. The proposed recovery actions should address the recovery targets outlined in the recovery targets section of the plan and aim to achieve environmental recovery to the pre-spill condition or better. Actions to remedy impacts to environmental values and associated components range from measures that immediately stabilize the impacted site to measures that bring a site back to full ecosystem structure and function as they existed before the spill incident. Consideration of temporal loss of biodiversity and risks that the desired ecological condition may not be achieved over time are important with respect to any impacted species and ecosystems and to habitats that are critical to species survival. Qualified persons developing recovery actions should be trained and experienced in environmental restoration and remediation and should have support from individuals with local knowledge. Please note, remediation as prescribed in the Contaminated Sites Regulation can take place concurrently.

Describe the actions and measures proposed to remedy impacts to environmental values and associated components that were outlined in the SIA as being impacted by the spill incident. Summary Table 1 (provided above) will help to organize and present this information.

It is expected that the proposed recovery actions will:

- Ensure that all impacted environmental values and components addressed in the SIA are fully addressed in the recovery actions description
- Ensure that the recovery actions described are intended to result in the achievement of recovery targets listed in the recovery targets section of the Recovery Plan
- Ensure that the recovery actions are guided by a Net Environmental Benefit Analysis (NEBA)
 - NEBA weighs the advantages and disadvantages of different recovery actions with each other and with natural clean-up (i.e. natural attenuation) to determine the best course of action to minimize the impacts of the spill incident on both people and the environment
- Consider direct, indirect, temporal, and cumulative impacts, where applicable

- Include transparency as to what residual impacts may remain following recovery actions to inform decisions on follow-up monitoring and/or offsetting and to ensure that all parties understand the resulting situation related to environmental values and associated components

When completing a description of the recovery actions, the ministry encourages the responsible and/or qualified person(s) to comply with the following principles:

- An ecosystem is considered “recovered” when the recovery targets have been achieved and the ecosystem contains adequate biotic and abiotic resources to continue to develop without further assistance, sustaining itself structurally and functionally as it would have pre-spill; the features of restored ecosystems are context-dependent
- Recovery can be conducted at a wide variety of scales; however, interactions and exchanges with contiguous ecosystems should be considered
- The order of preference for recovery measures to rectify adverse impacts on components is as follows:
 - Remediate – eliminate, limit, correct, or counteract any contamination and/or associated adverse effects of a contaminant on environmental components
 - Restore – return environmental components to original pre-existing structure, composition, pattern, ecosystem processes, productivity, and services
 - Reclaim – ensures stabilization of the terrain and restoration of the functional utility of the ecosystem regarding the environmental components
- Recovery actions must be planned, implemented, and monitored for effectiveness using scientific approaches
- Appropriate timelines should be proposed for recovery actions
- Follow up monitoring and evaluation of the recovery project is expected and considered as an integral step to determine whether the recovery actions are achieving the set targets
 - Follow-up monitoring also identifies residual impacts; the size of the residual impact, in relation to the targeted end-point for recovery, will inform whether to propose offset measures and the size of the offset
- The Responsible Person is accountable for the costs of planning, implementing, and monitoring recovery actions

The following attributes of recovered ecosystems should be considered when developing recovery actions. Each attribute should demonstrate the appropriate trajectory of ecosystem development towards the recovery target(s) as identified in the Recovery Plan. It is important to have readily measurable indicators of the attributes. Metrics to assess the trajectory toward the following ecosystem attributes should be included in the Recovery Plan:

- Assemblage of species – the ecosystem contains a characteristic representation of species and the degree of community structure that occurs in the restoration target
- Indigenous species – the ecosystem contains native species to the greatest practicable extent
- Functional groups – the ecosystem contains the functional groups necessary for the continued development and/or stability of the system
- This can include the potential for functional groups to colonize naturally
- Sustainable populations – the ecosystem is capable of sustaining reproducing populations of the species necessary for its continued development and/or stability along the desired trajectory

- Function – the ecosystem functions normally for its stage of development and signs of dysfunction are no longer present
- Integration – the ecosystem is integrated into the larger ecological landscape, interacting biotic and abiotic flows and exchanges
- Ecological integrity – threats to ecosystem health and integrity have been eliminated or reduced as much as possible
- Resiliency – the ecosystem is sufficiently resilient
 - The system can endure appropriate levels of stress in the local environment and maintain health and integrity
- Self-sustaining – the ecosystem is self-sustaining and can persist indefinitely under existing environmental conditions
 - Recovery focuses on re-establishing the successional trajectory that will sustain the ecosystem into the future

As per EMA and the Environmental Mitigation Policy (EMP), the preference is always to recover an impacted site to its pre-spill/contaminated condition. However, on-site recovery of a spill and spill response impacts may not be achievable for many reasons. In this case, the director may decide that in addition to on-site mitigation and restoration, an off-site or financial offset may be used to counteract the impacts from the spill. Examples of potential reasons and scenarios for the director to order offset measures are provided in Appendix section 4.

7. Summary of engagement and consultation

Section 6 (1) (i) and (j) of the SPRRR:

- (1) A responsible person who is ordered under section 91.2 (4) [*responsible persons – spill response*] of the Act to prepare a recovery plan in relation to a spill must include all of the following information in the plan:
- (i) a summary of engagement and consultation with any of the following that might be directly affected by the proposed recovery actions or have knowledge about that area:
 - (i) a local government;
 - (ii) a first nation government;
 - (iii) a resident;
 - (iv) a business;
 - (v) a recreational organization;
 - (j) a description of the process for communicating with the persons referred to in paragraph (i) during the implementation of the plan;

Section 6 (4) of the SPRRR:

- (4) For the purposes of subsection (1) (i) and without limiting that subsection,
- (a) a first nation government must be considered to be directly affected if the proposed recovery actions are likely to affect a culturally sensitive site or a site used for food gathering,
 - (b) a resident must be considered to be directly affected if the proposed recovery actions are likely to affect the health or livelihood or require the relocation of the resident, and
 - (c) a business must be considered to be directly affected if the proposed recovery actions are likely to affect the profitability or require the relocation of the business.

Multiple groups may be directly impacted by a spill incident and/or have knowledge of the spill area. It is critical that all impacted groups are informed throughout the Recovery Plan development, implementation, and follow-up monitoring phases (if applicable). Such engagement and consultation ensure that there is transparency throughout the recovery phase, and that concerns from stakeholders and First Nations are considered in the planning and implementation stages of recovery.

Engagement and consultation are expected to allow for two-way communication; the Responsible Person must communicate information to the impacted stakeholders and First Nations and there must also be methods for stakeholders and First Nations to communicate with the Responsible Person. At a minimum, key elements of public participation that should be addressed include³:

- Accessible information – information about the proposed recovery activities should be in a format that is accessible and understandable by all stakeholders and First Nations
 - Long reports should contain a summary section and information should be readily available
 - Technical language should be avoided
- Reasonable timing – while some aspects of recovery may need to be carried out quickly, to the fullest extent practical, the Responsible Person must allow sufficient time for stakeholders and First Nations to read, understand, and respond to the proposed Recovery Plan
 - Engagement should be started early in the process to avoid delays due to conflicts or litigation
- Sensitivity to community values – consider the variety of values of stakeholders and First Nations and strive to accommodate the cultures, customs, and requirements of all impacted parties
 - Be aware that stakeholders and First Nations in the same region or community may have varying values and/or perspectives on recovery
- Adaptive processes – this refers to both engagement and to the Recovery Plan; the Responsible Person should be able to modify engagement methods when initial attempts at engagement prove ineffective
 - The Responsible Person should have a mechanism to review and incorporate stakeholder feedback, where appropriate and feasible

Provide a summary of the engagement process that has occurred to date during each of the phases of the spill response and Recovery Plan development including the following:

- **Who** – names and contact information for the stakeholders and First Nations the Responsible Person communicates with, subject to privacy concerns

³ Adapted from *Public Participation Guide* produced by the Canadian Environmental Assessment Agency (CEAA), available at <https://www.ceaa.gc.ca/default.asp?lang=En&n=46425CAF-1>.

- **What** – what is communicated to each stakeholder and First Nation and what responses were received
- **Where** – where meetings occur and/or information is made available
 - This could include public meetings, websites, etc.
- **When** – when meetings occur, when information is posted, updates are sent, etc.
 - A schedule for updates for Recovery Plan implementation should be provided
- **Why** – for what reason(s) each stakeholder and First Nation is contacted, including how they were impacted or likely to be impacted
- **How** – how the engagement results are dealt with; a summary of all concerns from each stakeholder and First Nation group should be presented in a table that includes how each concern has been addressed
 - Include how stakeholders and First Nations will be communicated with during the Recovery Plan implementation
 - Provide rationale for concerns that are not addressed

A template for summarizing the information above is provided in Table 3 in the Appendix section 5. For incidents that require monitoring of long-term impacts, or if any targets will not be met until significantly later following the completion of the Recovery Plan, the Recovery Plan should identify how stakeholders and First Nations will be updated. Long-term engagement strategies should also illustrate communication with the ministry.

The magnitude of the spill and the associated Recovery Plan will be incident-dependent, and engagement should be appropriate for the Recovery Plan. Links to additional resources related to engagement and consultation can be found in Appendix section 3.3.

8. Recovery Plan schedule: implementation and monitoring timeline

Section (6) (1) (k) of the SPRRR:

(k) a schedule for the implementation of the plan.

An implementation schedule for the Recovery Plan must be provided within the Recovery Plan which identifies key activities or events throughout the duration of the proposed recovery process and follow-up monitoring events.

Key activities or events could include:

- The start date of the recovery process
- Progress to date
- The expected completion date of the recovery process
- Sampling and monitoring events
- Timeline for analytical analyses (if applicable)
- Rehabilitation or reclamation events
- Key engagement or consultation events
- Submission date for the recovery process conclusion report

9. Recovery process conclusion report

Section 7 of the SPRRR:

A responsible person who is required by section 91.2 (6) (c) [*responsible persons — spill response*] of the Act to submit a report at the conclusion of a recovery process must include all of the following information in the report:

- (a) a declaration that the recovery plan has been carried out;
- (b) the date on which carrying out of the recovery plan was completed;
- (c) a description of the recovery actions carried out;
- (d) a description of the environment at the conclusion of the recovery process;
- (e) a record of sampling, testing, monitoring and assessing carried out, the data generated that demonstrates that the recovery plan has been carried out and a summary of that data.

Upon completion of the recovery actions, a conclusion report is required that provides the results and a summary of the Recovery Plan. A table of contents for the conclusion report could include:

- Introduction – briefly outline the spill incident date, important incident details, and reference to the Recovery Plan file number
- Declaration – include a signed declaration by the Responsible Person(s) that the Recovery Plan has been carried out
- Date – include the dates that the Recovery Plan was approved, recovery actions started, and recovery processes were completed
- Impacts and targets – describe the impacts and corresponding recovery targets
- Recovery actions – provide a detailed description of the recovery actions carried out, including offset measures that addressed each recovery target outlined in the Recovery Plan
- Recovery actions record – provide a detailed record of all sampling, testing, monitoring, and evaluation that was carried out as part of both the SIA and recovery actions
 - Data demonstrating that the recovery targets were achieved and/or the impacted species or ecosystem is on a sure trajectory to the target must be provided and summarized
 - It is highly recommended that graphs are used to demonstrate how the measured/recovered environmental values, components, and contamination levels improved over time to reach recovery targets; when more than one replicate was taken, report data as arithmetic average concentrations (\pm standard deviation) along with the number of samples analyzed
 - It is also recommended that pictures are used to compare the recovered environment with post-spill conditions, pictures should be taken in the same location over time for accurate comparisons
- Recovered environment – with reference to the data provided above, describe the environment at the completion of the recovery process in relation to the pre- and post-spill environmental conditions and recovery targets; if recovery targets were not met, explain why and how these targets were offset

10. Amendments to the Recovery Plan

Completed Recovery Plans are submitted to the director for review. Pursuant to section 91.2 (4) of EMA, the amended Recovery Plan must be resubmitted in the time and manner specified by the director.

Appendix – Considerations and additional information

Considerations and additional information for specific sections of the Recovery Plan are outlined below.

1. Description of the spilled substance(s)

In addition to the requirements outlined in section 6 (1) (c) of the SPRRR, the following sections provide additional considerations that can be used to complete the description of the spilled substances section of the Recovery Plan.

1.1 Properties that may cause adverse impacts to the environment

- Classification of environmental hazards by group based on by the Globally Harmonized System of Classification and Labelling of Chemicals
- Physical state and appearance (e.g. liquid, solid, particulate, colour)
- Solubility
- Persistence and degradability
- Bioaccumulative potential
- Mobility in soil
- Ecotoxicity (i.e. acute and/or chronic impacts)
- Floater/sinker in water (e.g. dense non-aqueous phase liquid in ground water well)

1.2 Properties that may cause adverse impacts to human health

- Toxicological information outlined in Safety Data Sheets (e.g. toxic if inhaled or absorbed through skin)
- Physical characteristics of the substance (e.g. liquid, solid, particulate) and exposure pathways (e.g. inhalation of particulates/volatiles, ingestion, dermal contact)
- Persistence in the environment and potential for a spilled substance(s) to contaminate drinking water and consumptive resources (i.e. solubility, ability to bioaccumulate and biomagnify in tissue, degradation time)
- Adsorptive properties (i.e. will components of the spilled substance bind to sediments, e.g. heavy metals) which could provide pathways leading to human exposure
- Potential receptors (e.g. persons inhabiting or visiting the impacted site, persons occupying neighbouring properties, potential food sources)

1.3 Properties that may result in damage to infrastructure

- Corrosiveness, including the ability to damage pipe coatings, wire insulation, etc.
- Flammability
- Lower and upper flammable/explosive limits
- Reactivity including the possibility of reactions with incompatible materials
- Auto-ignition temperature
- Density of liquids (e.g. floats on water) and of vapours (e.g. vapours collect in underground spaces and pipes)

2. Assessment of potential and actual impacts on the environment

In addition to the requirements outlined in section 6 (1) (d) and (e) of the SPRRR, the following sections provide additional considerations that can be used to complete the assessment of potential and actual impacts on the environment section of the Recovery Plan.

2.1 Components for environmental values

In determining the associated components for environmental values to be assessed, consider the following criteria:

- Compressive – as a set, the components associated with environmental values will fully describe the important aspects of the environmental values that were impacted
- Concise – all environmental components are captured as succinctly as possible
- Relevant – the environmental components accurately capture the things that matter to people and stakeholders
- Measurable – the condition of the environmental component and its sensitivity to the spill incident can be measured directly or indirectly by indicators
- Responsive – the environmental components are sensitive to the spilled substance(s)

2.2 Indicators for associated components of environmental values

In determining the indicators to be assessed, consider the following criteria:

- Relevant – the relationship between an indicator and its associated environmental component is based on recognizable scientific principles and knowledge
 - Ensure that selected indicators are relevant for impact assessment of the spilled substance and response actions (e.g. that the scale of the indicator is appropriate for the impact)
- Measurable – changes in the metrics of an indicator specifically, reliably, and clearly reflect measured changes in the environmental component in relation to the spill impact assessment
- Predictable – indicators provide consistent and comparable assessments when reporting over time
- Understandable – indicators accurately describe environmental components and they are communicated using terminology that is accessible
- Responsive – indicators are likely to change in response to the spill incident and recovery actions
- Practical – data is readily available and/or assessment methods are timely and cost-effective
- Appropriate to the scale – indicators are geographically and temporally relevant to the scale of the spill incident
- Definable in relation to a targeted condition – a specific value of the indicator can be established a priori that will set the context for the predicted condition after recovery actions are implemented
- Aligned with other provincial initiatives – where possible, indicators and associated monitoring protocols should align with indicators developed and used for other provincial

initiatives (e.g. Cumulative Effects Assessment Framework, Forest and Range Evaluation Program)

3. Additional websites

Websites that provide further guidance for the Recovery Plan development are provided below.

3.1 Description of spilled substance properties

WorkSafe BC – Workplace Hazardous Materials Information System (WHMIS)
<https://www.worksafebc.com/en/health-safety/hazards-exposures/whmis/whmis-2015>

Globally Harmonized System of Classification and Labelling of Chemicals (GHS), Canadian Centre for Occupational Health and Safety
https://ccohs.ca/oshanswers/chemicals/whmis_ghs/sds.html

Health Canada – human health risk assessment
<https://www.canada.ca/en/health-canada/services/environmental-workplace-health/contaminated-sites/guidance-documents.html>

3.2 Potential and actual impacts of the spill incident

Environmental Mitigation Policy (EMP)
https://www2.gov.bc.ca/assets/gov/environment/natural-resource-policy-legislation/environmental-mitigation-policy/em_procedures_may27_2014.pdf

Environmental Assessment Office (EAO)
<http://www.eao.gov.bc.ca/guidance.html>

B.C. Approved Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture
https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/wqgs-wqos/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf

Contaminated sites guidance and resources
<https://www2.gov.bc.ca/gov/content/environment/air-land-water/site-remediation/guidance-resources>

B.C. Ministry of Environment's No. 3 Technical Guidance on Contaminated Sites
<https://www2.gov.bc.ca/gov/content/environment/air-land-water/site-remediation/guidance-resources/technical-guidance>

3.3 Summary of stakeholder engagement and consultation

Environmental Assessment Agency (CEAA) Public Participation Guide
<https://www.canada.ca/en/environmental-assessment-agency/services/public-participation.html>

Aboriginal Consultation Guide

4. When restoration is not reasonably achievable

An offset and/or a financial in-lieu payment to counteract the impacts of a spill may be ordered by the director if recovery of the environment through on-site recovery actions is not reasonably achievable as outlined in section 91.21 of EMA. Reasons and scenarios of when and why offsets and/or financial in-lieu payments may be requested in addition to, or instead of, on-site recovery actions are provided below. Offsets may be implemented at the spill site and/or off-site.

4.1 Awareness of destructive recovery actions

In some cases, recovery actions may cause greater environmental impacts than allowing the spilled materials to naturally attenuate over time. Following a spill, recovery actions are typically guided by a NEBA. More information on the NEBA process and additional examples like the scenarios outlined below can be found at:

International Oil Spill Conference Proceedings website

<http://ioscproceedings.org/doi/pdf/10.7901/2169-3358-006-33>

Scenario 1:

A pipeline rupture occurs resulting in the release of crude oil into a nearby lake.

Prior to reaching the lake, the crude oil travelled on land and through wetlands where it picked up a significant amount of sediment. Upon reaching the lake, the crude oil mixed with sediment sinks. The average and maximum water depths of the lake are 150 metres and 500 metres respectively.

Due to the depth of the lake, recovery actions are limited. Most equipment for the recovery of oil is not effective at depths beyond 30 metres, except for bottom trawls. Bottom trawls disturb the bottom sediment which can result in the removal of or damage to sessile (i.e. non-moving) organisms. The width and weight of a bottom trawl can destroy large areas of the sea floor or lake bottom. Such habitat destruction can result in significant damage to the ecosystem. Depending on the length of time for the crude oil to naturally dissipate, the recovery of oil using the bottom trawl may cause more damage to the ecosystem over the longer term. In this case, a decision may be made to approve offsetting and/or a financial payment that could be used to counteract the impact.

Scenario 2:

In August 1992, the tanker *Era* released an estimated 296 tonnes (974,000 gallons) of heavy bunker oil at a jetty near the head of Spencer Gulf, South Australia. In the days following the spill, roughly 20 tonnes of heavy bunker oil stranded along more than 10 kilometres of mangrove forest. Responders were advised that cleanup within the mangrove forest was not feasible and would likely increase damage to adjacent, non-impacted areas. Consequently, all subsequent response activity in the mangrove forest was restricted to detailed and long-term monitoring.

The decision to not pursue cleanup or recovery activities in the impacted area of mangrove forest was based on the determination that recovery actions may cause more damage to the environment. In such a case, a decision may be made to approve offsetting and/or a financial payment that could be used to counteract the impact.

4.2 Complete recovery to pre-spill condition is not possible

In some cases, it may be impossible or not operationally feasible (e.g. not safe) to completely restore a site to its pre-spill condition.

Scenario 1:

The dam of a tailings pond collapses and spilled materials impact an old growth forest which includes stands of mature trees that are roughly 300 years old – the soil is saturated, vegetation is destroyed, and stands of trees are felled. Due to the age of the impacted stand, complete recovery to pre-spill conditions will take several centuries. Given the large temporal scale for recovery, a financial payment could be considered for offsetting measures at a separate site (e.g. enhancing development of old-growth forest characteristics) which would result in tangible results over a shorter period. That is, because recovery actions may not be possible in an appropriate timeframe, a decision may be made to approve offsetting and/or a financial payment that could be used to counteract the impact.

Scenario 2:

A rupture occurs along a crude oil pipeline crossing a stream in the remote northern wilderness of B.C. in winter. While valves are closed on the pipeline as soon as possible, a significant amount of crude oil is released into the stream.

The stream connects to a river which flows into a box canyon with walls over 100 metres in height. The remoteness and geographic features of the area make recovering the crude oil difficult. The high canyon walls do not allow for helicopter access and there are no active access roads to the canyon. There is an access road further upstream to the pipeline, but it is inaccessible in the winter conditions. Further, sections of the river are frozen which would make placing boom or applying response tactics difficult even if the site were accessible.

Given the danger to responders, it is determined that response is not operationally feasible, and therefore recovery is not possible.

Scenario 3:

Information on recovery is unknown, and therefore not possible. An example of this may be a spill where a new contaminant is introduced into a habitat where recovery methods have not been tested.

4.3 Other reasons

Additional reasons restoration may not be reasonably achievable could include:

- It may not be possible to quantify recovery actions at a reasonable cost
- Assessing recovery actions may create an administrative burden
- Recovery actions may not lead to the best conservation outcome

Assessing the extent of damages following a spill can be administratively expensive, sometimes exceeding the extent of damages themselves. In other words, it may cost more to undertake studies to determine the impacts of a spill than it does to restore the site to pre-spill conditions. For example, in the 1985 Acro Anchorage crude oil spill, the State of Washington spent \$230,000 assessing damages which were ultimately valued at approximately \$33,000.

Scenario 1:

A spill impacts a population of painted turtles in southwestern B.C. Painted turtles are the only freshwater turtle in B.C. and populations in southwestern B.C. have been designated as endangered by the Committee on the Status of Endangered Wildlife in Canada. Given the vulnerability of the painted turtle population, it is likely to be very costly to return the population to its pre-spill population size. Further, there is a high level of uncertainty that it will be possible for the painted turtle population to return to pre-spill population numbers. Any growth in the painted turtle population following the spill is anticipated to take many years.

In this case, it may be more viable for a restoration project to be undertaken to enhance another painted turtle population. For example, a breeding program on a separate painted turtle population may result in more overall growth in the number of painted turtles than through restoration to the original population impacted by the spill. However, this addresses individual turtle mortality alone and not the loss of habitat.

In this case, because recovery actions are uncertain and may not achieve the best conservation outcome, a decision may be made to approve offsetting and/or a financial payment that could be used to counteract the impact.

5. Example of stakeholder engagement and consultation

Table 3 Example summary of stakeholder engagement

Stakeholder engaged	Date of engagement	Method of engagement	Reason for engagement	Description of engagement content	Response received (date, description)	Actions taken
Local First Nation government	July 20, 2019	Letter	Possible contamination of soil	Description of spill incident, contaminant type, potential containment actions	July 22, 2019: email received requesting more details and a meeting	Arranged meeting, prepared detailed summary of lab testing, and proposed recovery actions
Local First Nation government	July 27, 2019	Meeting at HQ	Requested to follow regarding the success of the containment actions	Discussion of possible soil contamination, containment and recovery work related to spill	Meeting notes taken and circulated for confirmation August 5, 2019; Stakeholder requests additional information	Environmental consultant to present to stakeholders at town hall meeting on August 15, 2019
Local government	July 20, 2019	Letter	Possible contamination of soil	Description of spill incident, contaminant type, potential containment actions	July 27, 2019: letter received requesting more details	Prepared detailed summary of lab testing, and proposed recovery actions