

## **6 ENVIRONMENTAL COMPLIANCE AND EFFECTS MONITORING PLAN**

### **6.1 Introduction**

The purpose of the Environmental Compliance and Effects Monitoring Plan (ECEMP) is to describe the procedures and policies that will be implemented during construction and drilling and during the first few years of the Operations Phase, after which the frequency and level of monitoring activities for the remainder of the Operations Phase will be reassessed. The plan will ensure that project activities are conducted according to applicable legislation and the conditions of all project approvals.

The environmental compliance component of the ECEMP will:

- be based on the social and environmental protection and mitigation measures:
  - described in the Environmental Impact Statement
  - identified in supplementary studies or by regulatory authorities
- provide direction and promote awareness for all relevant personnel, to ensure effective implementation of social and environmental protection measures
- include the following activities:
  - environmental inspection
  - cultural and environmental training
  - construction environmental audits and post-construction monitoring
  - environmental reporting
  - operations monitoring

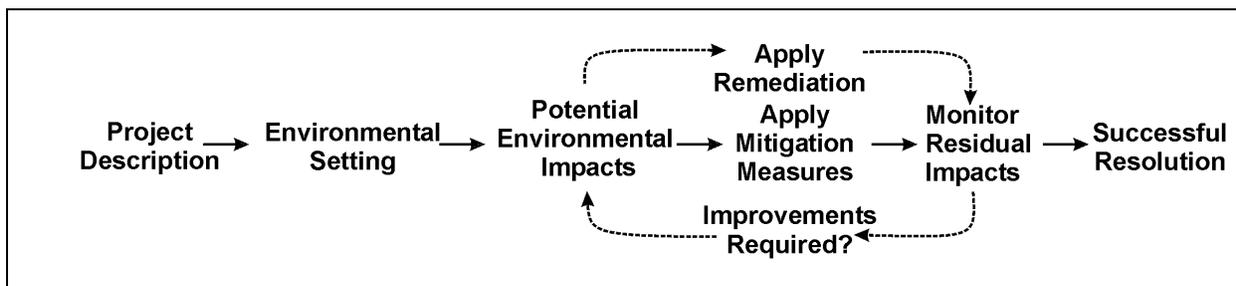
The purpose of the environmental monitoring component of the ECEMP is to:

- evaluate the effects of the project on physical environments, particularly the long-term effects
- monitor the success of mitigation
- respond to community concerns
- ensure regulatory compliance
- continuously improve environmental protection throughout all project phases

Environmental effects monitoring will be based on the results of the impact assessments.

Community members will usually be aware of any problem areas that have developed on their lands. Therefore, the proponents will maintain a relationship with the communities throughout the Operations Phase, so that concerns can be identified and addressed as appropriate.

Figure 6-1 shows a model of the impact assessment process and its link to the ECEMP. Potential environmental impacts are derived after considering the description of the project components and the environmental setting. If, through the efforts described in the ECEMP, the protection measures are applied correctly and prove to be effective, the result will be a successful resolution to the environmental impact. However, if the protection measures are not applied correctly or are not suitable for the situation, improvements will be required to reduce project impacts. Potential impacts are evaluated to plan remediation techniques effectively. The effectiveness of the remediation will then be monitored.



**Figure 6-1: Linkage Between Impact Assessment and Project Monitoring**

## **6.2 Environmental Compliance**

### **6.2.1 Environmental Inspection**

The objectives of environmental inspection are to ensure that:

- all environmental mitigation is implemented, as outlined in the following documents, which will become part of the contract documents:
  - the Environmental Protection Plan (see Section 4, Environmental Protection Plan)
  - the environmental alignment sheets (see Volume 8)
- work proceeds in compliance with environmental regulations and the individual operators' environmental policy statements

The proponents will assign to each pipeline construction spread or construction site a sufficient number of environmental inspectors to inspect activities that have a higher likelihood of causing environmental impacts, e.g.:

- clearing
- grading sites or rights-of-way
- constructing watercourse crossings

At least one full-time environmental inspector will be assigned to each pipeline construction spread and construction site. Additional environmental inspectors will be added as required. One of the environmental inspectors on each of the pipeline construction spreads or construction sites will be designated senior environmental inspector.

The senior environmental inspector will be responsible for coordinating all environmental inspections on the construction spread or site, and will report to the construction supervisor for that component of the project.

#### **6.2.1.1 Qualifications of Environmental Inspectors**

Environmental inspectors will be required to have experience in environmental inspection. Each senior environmental inspector will have at least five years' experience in the pipeline or upstream oil and gas industry. Additional experience in environmental planning, a university degree in the natural sciences or applicable technical diploma, and other pertinent training, e.g., petroleum industry training service courses, and northern experience would also be valuable. Each environmental inspector will be expected to identify workable solutions to problems and establish a good rapport with other inspection and construction personnel, community members and government representatives.

#### **6.2.1.2 Responsibilities of Environmental Inspectors**

The general responsibilities of the environmental inspector will be to:

- ensure that environmental mitigation measures contained in the contract documents are implemented
- ensure that the conditions of permits and approvals, and all of the proponents' environmental policies and commitments, are met
- cooperate with other activity inspectors to assist in interpreting and implementing of environmental mitigation measures
- maintain regular liaison with the relevant government agencies and compile a record of contacts, e.g., records of telephone conversations

- maintain regular liaison with environmental monitors
- advise environmental resource specialists about the timing of critical activities requiring monitoring, such as trenching activities by archaeologists
- ensure that mitigation measures are properly implemented and are effective during watercourse crossing construction
- obtain input, advice and guidance from environmental resource specialists, when required
- prepare daily reports and the final environmental as-built report (see Section 6.2.3)
- provide recommendations on major decisions, e.g., shutdown in wet or warm conditions
- assess the effectiveness of mitigation measures and provide suggestions on alternative measures, where necessary
- advise the chief inspector after consultation with the proponents' environmental staff, about a course of action if an unforeseen environmental issue occurs
- participate in any required liaison with community members or other potentially affected parties during the Design and Construction Phase, as deemed necessary by the proponents' environmental staff
- identify areas requiring erosion control measures that were not previously identified, and recommend measures to be implemented
- suspend work, in consultation with the chief inspector

### **6.2.2 Cultural and Environmental Training**

The proponents' inspection staff will be required to complete cultural and environmental training. All contractor inspection and supervisory personnel will be required to complete a cultural and environmental information course. In addition, all other contractor personnel and regulatory representatives and visitors to anchor fields rights-of-way or facility construction sites and to infrastructure sites, camps, borrow sites, and access roads will be required to complete a cultural and environmental orientation before accessing the work area. An outline of the proposed content of the cultural and environmental training is provided in Sections 6.2.2.1 to 6.2.2.5.

### 6.2.2.1 Environmental Inspectors

All environmental inspectors will complete the cultural and environmental training course before the start of construction. The primary objective of this training is to ensure that each environmental inspector understands:

- the various operators' environmental policy statements
- all regulatory commitments associated with the project
- the role of the environmental inspector in ensuring that these commitments are met
- cultural sensitivities in and around the communities located within the project area

Each environmental inspector will be on the job early enough to:

- complete the cultural and environmental training
- review and become familiar with all project-related material
- conduct a field reconnaissance of their areas of responsibility before construction starts

Each environmental inspector might also be required to conduct the cultural and environmental information course for contractor inspection and supervisory personnel, as determined by the proponents' environmental staff.

The cultural and environmental training for environmental inspectors will address the following:

- the role of the environmental inspector
- the operators' environmental policy statements and environmental management systems
- the operators' compliance assurance programs
- cultural awareness and information on culturally sensitive locations and practices that are to be respected while working on the project
- the chain-of-command and decision-making procedures
- the environmental documentation related to the project, including the supporting socio-economic and biophysical studies

- cultural and environmental issues identified and the mitigation measures, as outlined in the Environmental Protection Plan (see Section 4) and the environmental alignment sheets (see Volume 8)
- conditions of the regulatory permits and approvals
- reporting and government liaison requirements
- unique and less frequently encountered environmental issues, e.g., ice-rich soils, and associated mitigation or construction methods that will be employed
- contents of the contingency plans and the role of the environmental inspector with regard to incidents, such as spills

### **6.2.2.2 Environmental Monitors**

The environmental monitors will complete environmental training before construction start-up. The objective of this training will be to ensure that each monitor understands the operators' environmental policy statements and all regulatory commitments.

The environmental training for the proponents' environmental monitors will include:

- the role of the environmental monitor
- a presentation of the operators' environmental policy statements, environmental management systems and compliance assurance programs
- a discussion of chain-of-command and decision-making procedures related to environmental issues and mitigation
- a presentation of environmental issues associated with the project and an explanation of mitigation measures
- reporting back to applicable communities and government liaison requirements
- a review of contingency plans, including a review of the chain-of-command with regard to any environmental emergency, such as a spill

### **6.2.2.3 Chief and Activity Inspectors**

The proponents' chief and activity inspectors will complete cultural and environmental training before construction start-up. The objective of this training

is to ensure that each inspector understands the operators' environmental policy statements and all regulatory commitments.

The cultural and environmental training for the proponents' chief and activity inspectors will include:

- a presentation of the operators' environmental policy statements, environmental management plans and compliance assurance programs
- cultural awareness and information on culturally sensitive locations and practices that are to be respected while working on the project
- a discussion of chain-of-command and decision-making procedures related to cultural and environmental issues and mitigation
- a presentation of cultural and environmental issues associated with the project and an explanation of mitigation measures
- a review of contingency plans, including a review of the chain-of-command related to any environmental emergency, such as a spill
- a discussion of the decision-making procedures and the roles of the environmental inspectors and monitors, chief inspectors and activity inspectors and the contractor inspection and supervisory personnel, if an unforeseen environmental event occurs

#### **6.2.2.4 Contractor Inspection and Supervisory Personnel**

All contractor inspection and supervisory personnel will be required to complete cultural and environmental training, which will include:

- a presentation of the operators' environmental policy statements, environmental management systems and compliance assurance programs
- cultural awareness and information on culturally sensitive locations and practices that are to be respected while working on the project
- an overview of cultural and environmental issues associated with the project and an explanation of mitigation measures
- an overview of contingency plans, including a review of the chain-of-command related to any environmental emergency, such as a spill
- a discussion of construction management organization, roles and responsibilities

- a discussion of the decision-making procedures and the roles of the environmental inspectors, the proponents' other inspection personnel and the contractor inspection and supervisory personnel, if an unforeseen environmental event occurred

### **6.2.2.5 Non-inspection Contractor Personnel and Visitors**

The proponents will prepare an environmental handbook that will outline the various environmental policy statements, the general cultural and environmental issues and mitigation associated with the project, and the roles and responsibilities of all project personnel and visitors, regarding environmental protection. The environmental handbook will also provide an overview of environmental management plans and pertinent contingency plans. All non-inspection contractor personnel and visitors will be required to complete a sign-off page stating that they have read, understood and will comply with, the contents of the handbook before entering the following:

- anchor fields
- pipeline rights-of-way
- facility infrastructure construction sites
- other areas under construction or development

All individuals who have completed the cultural and environmental orientation will be given a sticker that must be displayed on their hard hat.

### **6.2.3 Environmental As-Built Report**

Following completion of construction and drilling, the project proponents will prepare an environmental as-built report for each major component of the project, e.g. anchor fields and pipeline construction spreads. The environmental as-built report will be developed by making use of daily reports, photographs, and records of government and community liaison from all environmental inspectors on the pipeline spreads, anchor fields and other sites. The environmental as-built reports from each component will be submitted to the proponents' environmental staff and will form part of the environmental as-built report that will be submitted to the applicable regulatory authorities.

The environmental as-built report for each spread or site will contain:

- a project description, including:
  - the spread or site where the work was conducted
  - the construction start-up and completion dates
  - the names of the activity inspectors and other key construction supervisory personnel with whom the environmental inspector had regular dealings

- the general procedures, equipment used and mitigation measures implemented for each activity for which environmental inspection was required
- the procedures that were implemented in the case of any unforeseen environmental issue that occurred, and a description of the decision-making process involved in arriving at those procedures
- a record of any discussions and decisions made regarding conflicting permit requirements or requests from government agencies
- a description of problems encountered, e.g., inclement weather, or equipment breakdown, that might have been detrimental to efforts to implement mitigation measures, and a discussion of any measures taken to alleviate or counteract those problems
- a record of any cases where recommendations, e.g., shutdown in wet or warm conditions, could not be implemented, the circumstances and location of the event and the decision-making rationale
- a record of government, community and third-party liaison
- a photograph, video record, or both, of the events
- selected environmental alignment sheets with hand-written notes pertaining to the as-built report, such as:
  - areas where extra temporary workspace was required
  - location of heritage resources, rare and endangered wildlife, or where rare plants were discovered during the Design and Construction Phase
- a list of environmental issues and the status of each issue, i.e., resolved or unresolved, and actions that were taken in the field

Any relevant paperwork, such as memos and permit revisions, will appear as an appendix to the environmental as-built report.

#### **6.2.4 Construction Environmental Audits**

The objective of construction environmental audits is to ensure that all of the standards for environmental compliance are met or are exceeded for the construction, testing and commissioning of the:

- production wells and facilities
- pipelines and pipeline facilities
- infrastructure sites
- borrow sites

An environmental auditor, with a thorough knowledge of audit principles and the environmental protection techniques used during construction, will complete each audit. Environmental auditors will be independent of the site staff responsible for environmental compliance and will report directly to the project manager.

The responsibilities of environmental auditors will be to:

- review the construction environmental protection programs for all applicable construction activities
- evaluate chain-of-command procedures related to environmental issues
- ensure the adequacy of the cultural and environmental training program
- audit contractor compliance with the environmental protection measures to be used during construction and drilling
- ensure the construction waste management program is adequate to handle and dispose of all waste associated with construction
- audit the inspection program that addresses environmental issues related to construction

One environmental audit will be conducted for the following areas during each year of construction:

- each pipeline spread and facility construction site
- each of the anchor fields
- each infrastructure site and accompanying access roads
- representative borrow sites and accompanying access roads

### **6.2.5 Issue Resolution**

If an unforeseen environmental event occurs, for which no mitigation measures have been approved, the following personnel will formulate a plan of action:

- the chief inspector
- representatives of the proponents, e.g., engineering and construction contractor
- the environmental inspector on that particular construction spread or site

The plan of action will include measures to assess and reduce the environmental impact and will be communicated to all applicable parties. If necessary, regulatory approvals will be obtained and recorded accordingly in the ECEMP.

No substantial changes to the mitigation measures, as they appear in the Environmental Protection Plan and on the environmental alignment sheets, will be made without consulting with the relevant community and obtaining approval from government authorities.

If the requirements of permits and the direction given by regulators are conflicting, the proponents will attempt to resolve the discrepancy or disagreement by meeting with representatives of all the government agencies involved. The chief inspector will participate in the discussions and record the outcome in the environmental as-built report.

### **6.3 Environmental Monitoring**

#### **6.3.1 Objectives**

The proponents are committed to achieving compliance with the applicable laws, and permit and approval conditions. The proponents will also respond to the concerns identified by individual communities. The environmental compliance program (see Section 6.2) will meet most requirements and address many of the community concerns. Environmental monitors will monitor identified concerns related to construction and drilling (see Section 6.3.2, Environmental Monitors).

Certain social and environmental issues will require long-term monitoring to determine the success of protection measures that were applied during construction and drilling.

#### **6.3.2 Environmental Monitors**

##### **6.3.2.1 Qualifications**

As agreed to by the proponents and the communities located within the project area, environmental monitors will be assigned to:

- monitor all project-related construction activities that could potentially affect social, cultural and physical attributes of concern to the communities
- report their observations to the community and the designated project contact, e.g., environmental inspector

The communities will determine the qualifications needed by their environmental monitors.

All project environmental monitors will take environmental training (see Section 6.2.2.2, Environmental Monitors).

### 6.3.2.2 Responsibilities

Daily duties of the environmental monitor will include:

- monitoring project-related activities, e.g., drilling, or watercourse crossings, near social, cultural and physical features that are of particular interest to the community that they represent
- ensuring that the trench is inspected for trapped animals each morning and before lowering in and backfilling
- monitoring trench dewatering activities to ensure that there is no risk of siltation of nearby watercourses
- checking weather reports regularly and ensuring that if warm weather is in the forecast, erosion control measures are adequate to handle any snowmelt runoff
- confirming that the boundaries of exclusion zones, e.g., rare plant or archaeological sites, and limits of approved work and travel areas are clearly staked, flagged or fenced, and are being respected
- taking water and soil samples, as required
- acting as a liaison with the local communities during construction and drilling to disseminate environmental information and to relay community environmental concerns to the senior environmental inspector on the spread or construction site

### 6.3.3 Post-Construction Monitoring Program

The proponents will commission post-construction monitoring programs that will commence during the first growing season following construction of any pipeline spread or other site. The proponents will assess the need for further monitoring in subsequent years, with input from communities and applicable regulators.

#### 6.3.3.1 Objectives

The purpose of the post-construction monitoring program will be to:

- evaluate the recovery of vegetation in the areas disturbed during construction
- assess and report on the status of outstanding environmental issues identified in the environmental as-built report
- identify any new environmental issues that might have arisen during construction

- monitor impacts to rare and endangered plants and associated vegetation communities
- monitor impacts to wildlife and wildlife habitat
- monitor impacts to fish and fish habitat
- determine greenhouse gas emissions
- monitor the impacts to traditional and culturally important features

A revised list of outstanding social and environmental issues that require further action or monitoring will be compiled at the end of the first year of post-construction monitoring.

The post-construction monitoring program will make use of information gathered from:

- line patrols
- the input of directly affected communities
- resource harvesters
- site inspection procedures

### **6.3.3.2 Monitoring Procedures**

The anchor fields, pipeline rights-of-way and all other disturbed areas will be inspected during the first growing season after construction or drilling are completed, and thereafter as required. Revegetation success will be assessed and, if required, reseeded or other remedial measures will be planned and conducted as promptly as possible during the same growing season. In addition, the effectiveness of drainage and erosion-control measures on slopes and the integrity of watercourse crossings will be monitored and remedial measures, if required, will be promptly implemented.

A qualified reclamation specialist will conduct site inspections. If necessary, the proponents will seek geotechnical expertise to assess problem areas and to assist in developing and implementing remedial measures. Site inspections will include a qualitative and quantitative appraisal of initial revegetation success using a standard, statistically valid method. A detailed inspection of sensitive areas, such as steep slopes, will be conducted. Information will be recorded during the site inspections and described in the post-construction monitoring reports, which will include:

- a ground cover description
- species composition, including weeds
- a list of rare plants

- an appraisal of soil erosion and slope stability
- a description of frost heave and thaw settlement
- soil sample analyses
- comparison with an adjacent undisturbed control area
- a qualitative description of any outstanding problems
- recommended remedial measures

Qualified personnel will conduct post-construction monitoring related to environmental issues, such as those pertaining to wildlife and fisheries. Site inspection procedures to monitor the status of these environmental issues will be developed on a site-specific basis and any remedial suitable measures implemented.

Post-construction monitoring reports will be submitted to all relevant communities and regulatory agencies.

#### **6.3.4 Environmental Effects Monitoring**

##### **6.3.4.1 Objectives**

An environmental effects monitoring program will be designed to meet the following objectives:

- complying with the conditions in permits, authorizations and approvals, which are related to environmental effects
- confirming the effectiveness of approved mitigation measures
- verifying the accuracy of impact predictions made in the Environmental Impact Statement
- identifying any effects not predicted in the Environmental Impact Statement

Some level of ecological investigation during construction, drilling, operations, decommissioning and abandonment is required to predict impacts accurately while conducting future assessments. Monitoring environmental effects allows for the testing of impact predictions and hypotheses, which can be used when conducting future assessments and developing environmental protection plans.

##### **6.3.4.2 Approach**

The environmental effects monitoring program will use knowledge gained through the environmental assessment process. This knowledge is based on traditional knowledge and baseline information collected from the project area.

The environmental effects monitoring program will be based on those issues identified in the Environmental Impact Statement for which a valid linkage between the project and an environmental effect has been identified. The locations and types of monitoring will be based on the predictions made in the Environmental Impact Statement.

Valued components and key indicators have been selected and will be used in the design of the effects monitoring program. The results of the impact assessment will be used to:

- identify environmental effects that have the potential to be significant
- identify effects for which there is a high degree of uncertainty

Environmental effects monitoring will also identify effects that may not have been predicted in the Environmental Impact Statement.

### **6.3.5 Reporting**

#### **6.3.5.1 Issue Tracking**

The proponents will use a master list or database to track the status of issues addressed during post-construction monitoring. This list or database will be updated on an ongoing basis. The list will form the basis of a post-construction monitoring report, which will be prepared at the end of the first year and as required after construction. Issues that are resolved will be removed from the list for the following calendar year.

#### **6.3.5.2 Environmental Effects Monitoring Reports**

The proponents will collaborate with other industry and government-sponsored monitoring programs occurring in the Mackenzie Delta and Mackenzie Valley during the Operations Phase of the project. Information collected during the environmental effects monitoring program for this project will be available to the public.

The proponents will meet regulatory reporting requirements. Because of the long-term nature of any environmental effects of the project, a five-year reporting cycle might be suitable, unless an issue needs immediate attention.

