

A Practical Guide for Environmental Inspectors

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1 INTRODUCTION

This guide provides the details related to the role and duties of the Owner Company's Environmental Inspector (EI), in terms of monitoring and inspection requirements throughout the lifecycle of both pipeline and facilities construction process. Other areas of specialty inspection are beyond the scope of this document.

This document represents best practices for environmental construction inspection beyond those captured in regulation and current certification. These practices are based on the accumulated experience and consensus amongst the majority of CEPA Foundation member companies.

2 PURPOSE

The purpose of this document is to provide Environmental Inspectors with guidelines for best practices in the industry, as well as some background and context, beyond the existing regulations. As such, this document is not intended to replace formal training, regulation, or Company specific practices (which may vary based on individual circumstances); rather, it is intended as a complementary guide to information from those sources.

3 SCOPE

The scope of this document is limited to gas and liquid facilities and pipelines construction phases. Specifically, content is focused on those items that are relevant to the role of an Environmental Inspector as it relates to best practices within the industry.

For the purposes of this document, pipelines are defined as the pipe, usually located underground, intended to move gas or liquid products over long distances (including isolation valve assemblies). This document includes inspection items for the construction phases for transmission pipes; however, it may be appropriately applied to accommodate inspection of the construction of distribution pipe. This document also includes inspection items for the Right-of-Way (ROW).

Facilities are defined as all of those systems, equipment, and pipe physically located within the confines of a compression, pumping, or meter station – usually delineated by fencing. Facilities are sites intended to move, store, measure, or otherwise transform the products moving within the site (i.e., a fenced isolation valve along a section of pipe would not be considered a facility under this scope). This document also includes inspection items for access roads to the facility site, as well as any areas that are deemed a designated worksite for the purposes of a facility construction project (e.g., lay down areas).

This document includes inspection items for the construction of greenfield facilities (i.e., new construction); however, it may be appropriately applied to accommodate inspection of the construction of brownfield facilities (i.e., expanding an existing site or working next to an existing site). Note that additional safety requirements and specific environmental considerations may apply to the construction of brownfield facilities.

Commissioning activities are outside of the scope of this document; however, inspection activities and reporting are a key aspect of transitioning to commissioning staff.

4 REVISIONS TO THIS DOCUMENT

This document will be reviewed periodically (as per existing CEPA Foundation practices) to ensure the content within remains relevant and accurate. However, it remains the responsibility of the user to ensure that the most current revision of documents (e.g., codes and standards) are referenced, where appropriate.

5 HOW TO USE THIS DOCUMENT

With an eye to practicality and ease of use, this document is organized to reflect the typical construction process for facility and pipeline sites and adjacent affected areas for Environmental Inspectors, which is loosely based on a typical drawing package. There are three main sections: Foundational Information, Planning and Constructing Pipelines, and Planning and Constructing Facilities (Figure 1). Each section is divided into chapters that detail the many phases of pipeline or facility construction. Within each chapter, five headings are used consistently:

- Overview – a brief description of the specific activities in the facilities or pipeline construction phase
- Inputs – detailed information regarding typical document types, specifications and other information the Environmental Inspector will require in that phase of facility or pipeline construction
- Execution – detailed information regarding items the Environmental Inspector(s) should typically watch for in that facility or pipeline construction phase. For ease of use, items are typically formulated as actions using verbs such as: ensure, monitor, confirm, check, etc.
- Outputs – detailed information listing typical information that the Environmental Inspector will be required to produce or report on for the Owner Company
- References – a list of key relevant reference documents for those seeking additional information for each phase of facilities or pipeline construction

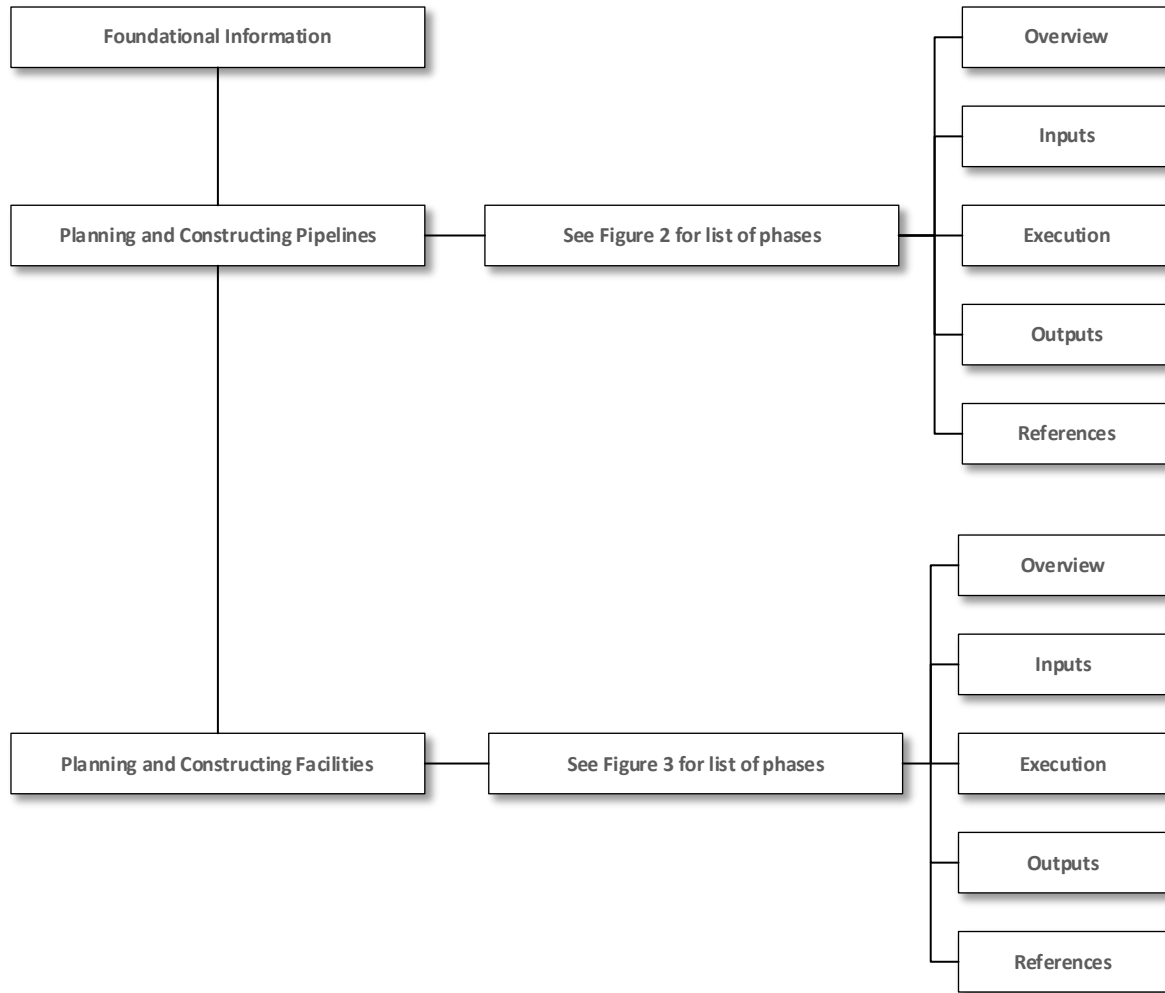


Figure 1: Document Structure

The use of the word “ensure” throughout this document is intended to convey that Environmental Inspectors “ensure” that the contractor has performed the inspected work properly through observing, monitoring, assessing, evaluating, verifying, deciding, resolving, reporting, and documenting to ensure that the project requirements are met. Inspection items in checklists throughout the document use wording such as “Ensure {item} is properly installed” – proper installation means compliance with governing Issued for Construction (IFC) drawings, Owner Company or project specifications, Manufacturer specifications, etc.

6 ENVIRONMENTAL INSPECTOR – FOUNDATIONAL INFORMATION

The items covered in this section are those that are relevant through all phases of the Pipeline construction process (see Figure 2) or the facilities construction process (see Figure 3). As such, any specific content in other sections of this publication is intended to be used in conjunction with the information provided within this section.

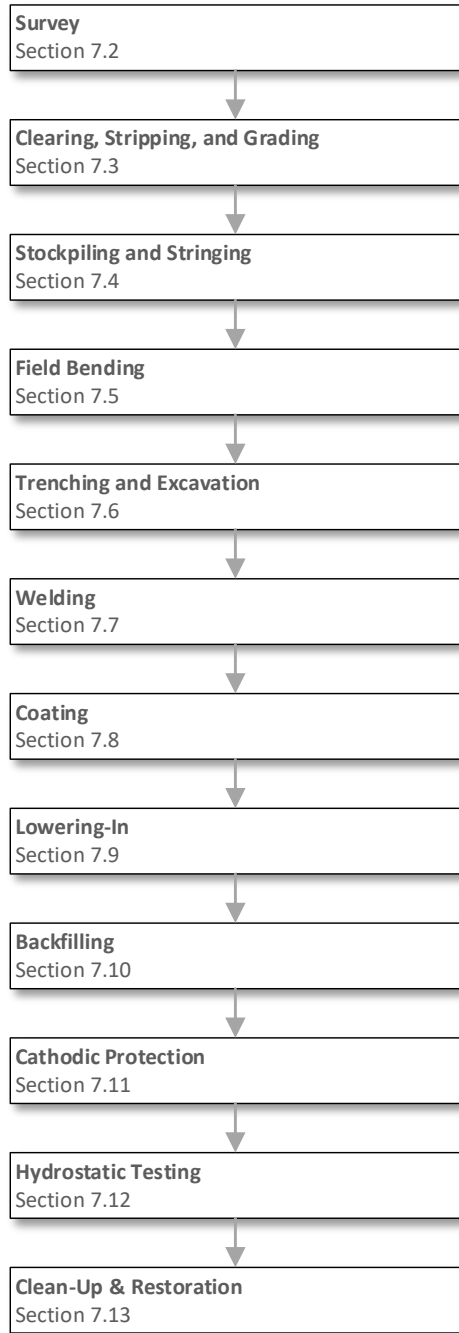


Figure 2: Typical Pipeline Construction Phases

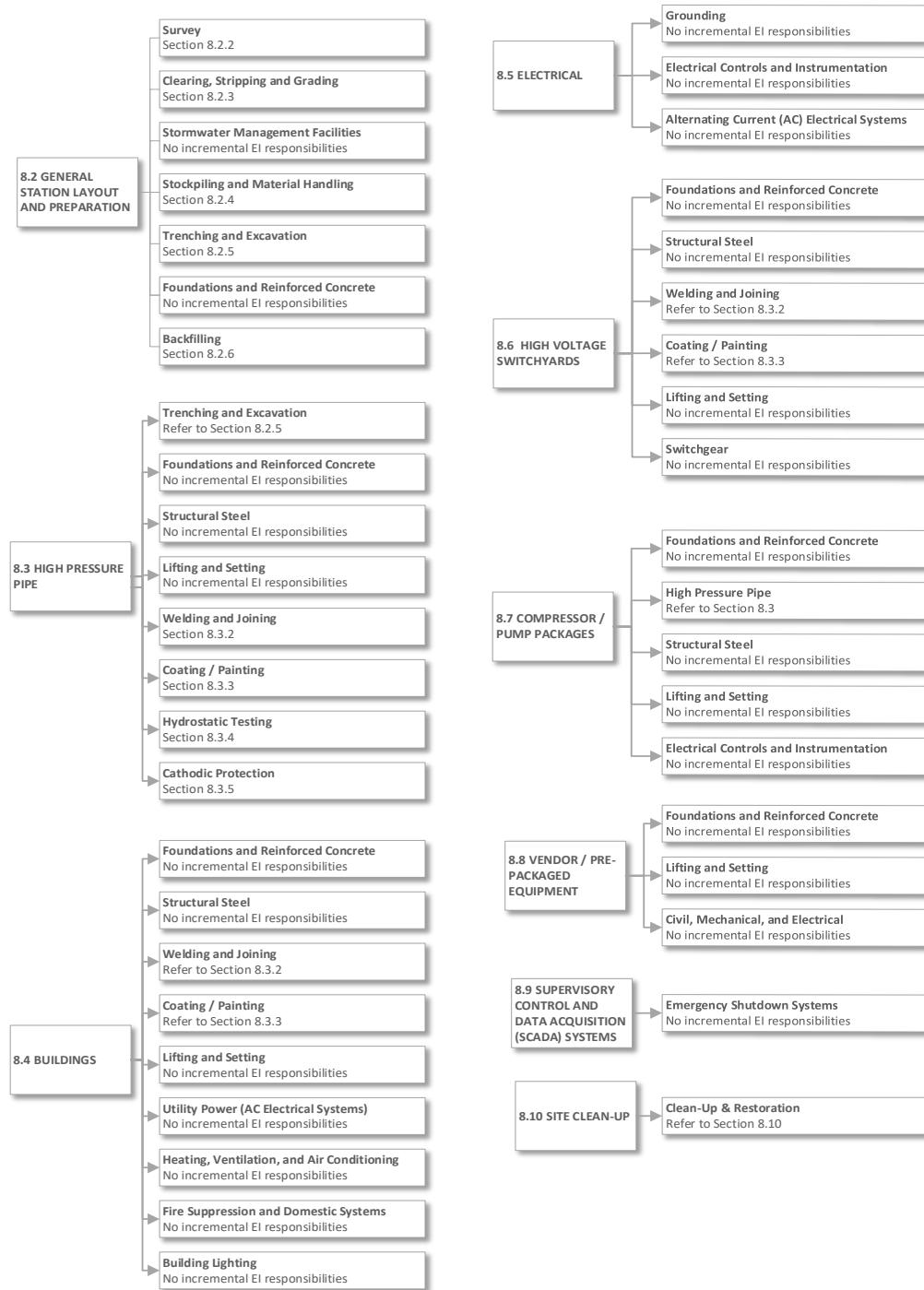


Figure 3: Typical Facilities Construction Phases

The Environmental Inspector acts as the Owner Company’s authorized representative for non-financial matters relating to the environment, continuously observes the Contractor’s activities to ensure they are in accordance with environmental codes and standards; environmental regulatory permits and requirements; Owner Company safety and environmental requirements, drawings, plans, and specifications; as well as the terms of the construction contract or agreement. The Environmental Inspector supports other

specialized Inspectors (e.g., General Inspector), to ensure construction activities do not have an adverse affect on the environment.

In addition to executing specific responsibilities in the following sections, the Environmental Inspector has key responsibilities in the main areas identified in Table 1 with additional detail provided in the corresponding section.

Table 1: Main Areas of Environmental Inspector Roles and Responsibilities

Topic Area	Section Number
Authority	Section 6.1
Code of Conduct	Section 6.2
Worker, Site, and Construction Safety	Section 6.3
Quality, Deficiencies, and Non-conformance Procedures	Section 6.4
Environmental Considerations	Section 6.5
Execution of Work	Section 6.6
Administration of Contractual Obligations	Section 6.7
Records Management	Section 6.8
Personnel Qualifications and Certifications	Section 6.9
Equipment Calibration	Section 6.10
Incident Reporting	Section 6.11
Post-Construction Considerations	Section 6.12

6.1 Authority

The Environmental Inspector on-site is part of a larger Project Team; as such, the Inspector should understand their role within the established chain of command and recognize situations that may need to be escalated in the best interests of the Owner Company. This is important not only for day-to-day operations, but becomes particularly important in the handling of deficiencies / non-conformances discussed later in this section. In particular:

- Roles of the Contractor and Environmental Inspector will be established before performing the inspections or audits to determine whether the work or an item complies with environmental specifications and permit requirements
- Specialized inspectors are responsible for ensuring crews follow appropriate methods during each stage of the facility and pipeline construction lifecycle. The environmental inspector supports the specialized inspectors by ensuring that operations do not have an adverse affect on the environment.
- If the Contractor performs inspections or audits unassisted (e.g., documenting volumes of water withdrawn from a waterbody, or equipment cleaning procedures utilized prior to arriving on site), the Environmental Inspector should be clear about the level of witnessing required, and make sure that the equipment and instruments used by the Contractor are correct and properly calibrated
- The Contractor should be aware of the Environmental Inspector’s duties and authority (as defined in Section 6.4) outlining quality, deficiencies, and non-conformance procedures

- The Environmental Inspector, along with all other inspectors onsite, have “stop work” authority when there is imminent danger to people or the environment

6.2 Code of Conduct

As the Environmental Inspector represents the Owner Company, they should always act ethically, professionally, objectively, consistently, and honestly when performing the required roles and responsibilities.

More specifically, the actual ethical conduct required from Environmental Inspectors is governed by the Owner Company’s Code of Conduct, which typically includes (but is not limited to) the items identified in Table 2.

Table 2: Typical Code of Conduct Considerations

✓	Description
Behaving in an Ethical Manner	
	Abide by confidentiality agreements
	Do not accept gratuities of any kind that may be perceived to affect judgment in the work being performed as an Environmental Inspector; if gratuities are offered, this information should be reported to the Owner Company
	Endeavor to be fair, reasonable, and objective towards performing work requirements at all times
	Do not make assumptions; consult with the Construction Manager / Chief Inspector (or designate) if there are uncertainties in the requirements
	Accept or reject the work performed by the Contractor based on the quality of the work
	Comply with all relevant codes, standards, systems, permits, contracts, agreements, specifications, procedures, approved drawings, and line lists
	Document all deviations and when required, escalate in an appropriate manner for approval
Professional Approach to Work	
	Be knowledgeable of and understand the relevant parts of the construction process
	Be knowledgeable of and understand Owner Company’s standards and specifications
	Be knowledgeable of and understand relevant industry and government standards
	Ensure all applicable permits required to execute the work are in place and on-site prior to commencing the work
	Uphold Owner Company’s industry practices to ensure safety, minimize risk, and avoid hazards in the workplace
	Be knowledgeable of Owner Company’s construction timelines and understand Owner Company’s construction schedule, costs, and components of the work
	Understand their role relative to other Stakeholders in the construction process and engage other expertise accordingly
	Make accurate decisions by being well informed and familiar with all contract documents and design requirements
	Arrive on site before the Contractor’s crew and remain until after the crew leaves the site for the day
	Take breaks when the Contractor’s crew takes breaks and remain on site during construction activities that require inspection
	Obtain all applicable documents before the start of inspection
	If questions arise that cannot be answered, seek those that have the authority to resolve
	Be proactive in problem solving and raise issues / concerns to the attention of the Construction Manager / Chief Inspector (or designate)

✓	Description
Positive Image in Representation of Owner Company	
	Behave in a courteous and respectable manner at all times
	Show respect through good driving habits at the facility, on the ROW, and on access or public roads
	Check the work area for good housekeeping and tidiness (e.g., equipment should be correctly stored, maintained, and unused materials discarded)

6.3 Worker, Site, and Construction Safety

One of the key roles of the Environmental Inspector is to assist the Owner Company in ensuring a safe work environment both for its workers as well as the public. As such, all on site Environmental Inspectors have “stop work” authority should a safety situation arise. Additionally, the Environmental Inspector should actively communicate with other inspectors to ensure that relevant safety requirements are identified and understood.

In addition to safety items detailed in the following sections, the Environmental Inspector should keep in mind the items identified in Table 3.

Table 3: Typical Safety Considerations

✓	Description
	Ensure each member of the activity crew understands their role and responsibility with respect to safety in the execution of the work
	Be aware of changes in work activities or site conditions that were not identified in the daily tailgate meeting along with any changes to precautions that need to be taken as a result of these changes
	Proactively participate in morning Contractor safety meetings
	Promote a safe working environment of continuous improvement through communications of project issues and solutions
	Continuously inspect and monitor activities for compliance to regulations, policies and procedures, and ensure conformance to Owner Company’s Health and Safety specifications and Site-Specific Safety Plans
	Ensure emergency / after-hours contact information is posted in site offices and provided to active Contractors
	Continuously monitor for compliance to personal protective equipment (PPE) requirements
	Ensure “safety zones” are in place and maintained (e.g., powerline locations, nesting sites)
	Participate in weekly Project Site Specific Safety Audits and provide a constructive Corrective Action Plan to communicate safety issues to the Contractor

In support of a safe work environment, the Owner Company’s safety policies typically include (but are not limited to) those identified in Table 4.

Table 4: List of Typical Owner Company Safety Policies / Practices / Procedures

✓	Description
	H2S Safety
	Working Alone Policy

✓	Description
	Fall Protection Practice
	Restricted Work Areas Policy
	Confined Space Entry Practice
	Hearing Conservation Practice
	Manual Lifting and Carrying Practice
	Lock-out / Tag-out Procedure
	Vehicle and Equipment Safety Practice
	Drug and Alcohol Policy
	Job Safety Analysis (JSA)
	Stop Work Protocols
	Other Owner Company or project specific requirements, as applicable

6.4 Quality, Deficiencies, and Non-Conformance Procedures

The Environmental Inspector plays a critical role in managing the quality of work performed during facilities and pipeline construction. As such, the Environmental Inspector should recognize that inspection requires monitoring to regulation as well as the critical elements of the Owner Company's quality management system (QMS). Those items that are specifically relevant to the Environmental Inspector typically include the items listed in Table 5. As the Environmental Inspector identifies any deviations, Owner Company specific escalation processes will need to be followed.

Table 5: List of Typical Owner Company Quality Documentation

✓	Description
	QMS Manual
	Quality Plan
	Inspection and Test Plan (ITP)
	Orientation with approved and current Owner Company specific requirements, processes, procedures, contact documents, and drawings relevant to their role
	All issued permit requirements
	Federal and Provincial issued guidelines for environmental standards (e.g., reclamation standards, habitat preservation standards, or air and water quality standards)

6.4.1 Escalation Processes

Since the Environmental Inspector monitors all facilities and pipeline construction activities and operations for safety, stewardship of the environment, as well as compliance to project specifications and pertinent regulations, the Owner Company will have an escalation process in place to deal with any identified deficiencies that may require elevation to a non-conformance. Any identified non-conformance(s) need to be addressed through corrective action(s).

Specific processes vary from Company to Company and Environmental Inspectors will familiarize themselves accordingly; however, all escalation processes will typically be structured as follows:

1. Verbal discussion with Third Party Representative
2. Verbal warning with notification
3. Written warning including signed documentation
4. Stop work that can potentially impact the health, safety, and environment of people working on the worksites, the community, and the land where the work is being conducted

6.4.2 Personal Violations

The Environmental Inspector should continuously observe and report individuals for personal violations. The typical examples of personal violations are included in (but not limited to) the items identified in Table 6.

Table 6: Examples of Personal Site Violations

Type	Description	Potential Consequence / Outcome
Conduct	Not wearing proper personal protective equipment (PPE)	Removal of worker from worksite
	Wearing incorrect attire (e.g., sleeveless shirts, shorts, or clothes made of synthetic fibres)	
	Using headphones while on duty	
	Roughhousing on the worksite	
	Not wearing seatbelts	
	Not respecting environment or historical resources	
	Being under the influence of drugs or alcohol	Permanent removal of worker from worksite
	Harassment in the workplace	
	Disregard for health, safety and environmental procedures	
	Insubordination	
Behaving in a manner that can cause serious harm or injury		
Worksite	Not having proper guards or shrouds	Stopping use of or removing the vehicle or equipment from the worksite
	Not having nor maintaining safety zones in required places (e.g., at powerline and nesting site locations)	
	Non-functional backup alarms on tracked equipment and rubber-tired vehicles	
	Not having canopies for clear Operator vision on machinery	
	Not having fire extinguishers or if required absorbent on welding units, vehicles and heavy equipment	
	Using defective tools	
	Not addressing equipment leaking fluids	
	Engaging in any unsafe conditions or practices, as determined by Owner Company Construction Manager / Chief Inspector (or designate) or Inspection Resources	Construction Shutdown

Type	Description	Potential Consequence / Outcome
	Engaging in construction activities that are not compliant with applicable safety, contract, and regulatory requirements	

6.5 Environmental Considerations

The Owner Company views compliance with applicable environmental regulations as a priority, and is committed to constructing project facilities in compliance with environmental permit requirements. Environmental compliance is a shared responsibility, and all members of the Project Team are responsible for ensuring that construction activities are conducted in compliance with environmental permits and requirements at all times. In general, environmental considerations are included in this document for the facility or pipeline construction site and potential access roads; however, additional environmental considerations may be required based on the specific situation.

As part of the construction contract, the project specific Environmental Protection Plan (EPP), or equivalent, outlines specific environmental mitigations and procedures for each construction phase of the project that the Contractor must adhere to, including, but not limited to, the following:

- Watercourses
- Wetlands, Muskeg, and Swamp Areas
- Wildlife Habitats
- Migratory Routes
- Stormwater Management
- Erosion and Sediment Control
- Trench Dewatering
- Fuel Containment
- Hydrostatic Test Water Withdrawal and Disposal
- Disposal of Surplus Construction Materials and Debris

Environmental stewardship is a shared responsibility between all Inspectors as detailed in Table 7.

Table 7: List of Typical Environmental Activities

✓	Description
General	
	Inform and instruct all Employees / Contractors of environmental concerns, special conditions, regulations, and specific permit conditions applicable to the construction area and the work itself
	Liaise with regulatory personnel regarding environmental issues, if applicable
	Ensure all Inspectors responsible for onsite activities are engaged to identify additional environmental requirements
	Ensure that disturbance or damage to the environment is minimized, especially the following: <ul style="list-style-type: none"> • Uncontrolled fires • Soil and water erosion

✓	Description
	<ul style="list-style-type: none"> • Habitat damage or loss • Air, noise, and water pollution
	Ensure construction entrances are maintained to prevent tracking mud and debris onto public roadways
	Monitor for spills and ensure clean-up of any spills is completed
	Ensure all specified vehicles have a minimum specified amount of commercial sorbent material to address spills on both water and land
	In case of unanticipated disturbance or damage caused by construction activities, stop work and mitigate as soon as possible to restore affected areas to their original condition (to the extent possible) in a manner satisfactory to the Owner Company, Land Owners, Land Holder, and regulatory authorities
	Observe for firearm possession while on or off the facility site or ROW (e.g., at camp); if observed, report incident immediately to the appropriate authority
	Ensure Fire Prevention and Firefighting Plans are updated, including details of monitoring, prevention, and response concerning: <ul style="list-style-type: none"> • Facility site or ROW preparation • Manpower and equipment • Training of personnel • Emergency procedures
	Ensure that all construction debris (e.g., rags, oil cans) and garbage is collected and disposed of to an approved facility
	Ensure all environmentally sensitive material is properly disposed
Soil, Vegetation and Terrestrial Life	
	Observe for persons feeding or harassing livestock or wildlife; if observed, report incident immediately to the Construction Manager / Chief Inspector (or designate)
	Observe for possession of pets while on or off the facility site or ROW (e.g., at camp); if observed, report incident immediately to the Construction Manager / Chief Inspector (or designate)
	Ensure temporary or permanent erosion and/or sediment control structures (e.g., silt fences, sediment traps, hay bales, drainage ditches) have been constructed in alignment with the EPP, and any damage has been repaired prior to commencing construction activities
Watercourses, Wetlands and Aquatic Life	
	Ensure equipment is not fueled, serviced, or staged within specified distances of water bodies
	Ensure that hazardous materials are stored away from specified distances of water bodies
Air and Noise Pollution	
	Ensure appropriate measures for dust management are implemented (e.g., minimizing soil erosion, dust suppression through the use of water trucks or chemical trucks)

6.6 Execution of Work

Monitoring the work for conformance to the governing revision of the Owner Company Issued for Construction (IFC) drawings and specifications is critical for not only meeting site safety and environmental expectations, but also for ensuring quality of construction, which is necessary for long term safety, environmental, and cost effectiveness of the facilities or pipeline asset.

Best practices relevant for each phase of facilities and pipeline construction are identified in the following sections in significant detail; however, additional activities that the Environmental Inspector will undertake include:

- Ensuring all construction personnel have been made aware of relevant environmental regulations, policies, and approvals
- Disseminating and explaining Owner Company specifications and project specific documentation to other Inspectors and Contractors (where required); it is key that the latest construction drawings and specifications are utilized
- Advance planning and organization of construction activities, such as: surveying environmentally sensitive features, coordinating third party environmental resource specialists and ensuring all relevant approvals have been obtained prior to commencement of construction
- Maintaining lines of communication with key Stakeholders as appropriate (including but not limited to):
 - Construction Manager / Chief Inspector (or designate)
 - Specialized Inspector(s) (e.g., general inspector, welding inspector)
 - Land Agents
 - Project Manager / Engineer
 - Pipeline System Operations Personnel
 - Owner Company community relations and/or indigenous relations representatives
 - Contractors and Subcontractors
 - Third Party Representative (where applicable)
 - Government agencies representatives
- Following site-specific communications protocol as defined in the project

6.7 Administration of Contractual Obligations

It is part of the Environmental Inspector’s role to understand contractual obligations and ensure that the Contractor is carrying out construction activities / operations accordingly. The Environmental Inspector’s role in the administration of contractual obligations is summarized in Table 8. The EI may need to understand the types of agreements and contracts issued to, or applied for, by the Owner Company as detailed in Table 9.

Table 8: Environmental Inspector Role in Administration of Contractual Agreements

✓	Description
	Maintain, coordinate, and communicate progress and schedule updates per Owner Company requirements as related to environmental work
	Ensure Owner Company agreements (such as permits) are adhered to and up to date
	Ensure approval is received from the Construction Manager / Chief Inspector (or designate) prior to commencing any extra work activities that have an environmental impact
	Ensure only most current revision of Issued for Construction (IFC) drawings, approved contract documents, and specifications are referenced for construction
	Ensure that any applicable proposed deviations from specifications, design changes, or material substitutions are discussed and approved by the Construction Manager / Chief Inspector (or designate) prior to proceeding with the work

✓	Description
	Communicate lessons learned and foster an environment of continuous improvement, including participating in post-job review meetings

Table 9: Typical Approvals / Contracts Issued or Applied for by Owner Company

Type	Description
Agreements	Watercourse Crossing Agreements – needed to cross active watercourses within the facility site limits or to access the facility, or that are along the proposed pipeline route
	Wetland Crossing Agreements – needed to cross any wetlands within the facility site limits or to access the facility, or that are along the proposed pipeline route
	Sensitive Land Use Agreements – Required to build on sensitive land. They may include provisions for: <ul style="list-style-type: none"> • Vegetation • Sensitive habitats • Specific landowner requirements
Permits	Regulatory and jurisdictional permits (in some cases some of these would be obtained by the Contractor), which may include: <ul style="list-style-type: none"> • Crown or Public Land Work Permit • Private Land Work Permit • Fenced Enclosure Permits • Encroachment Permits • Environmental Permits (including Air Quality) • Road Use Permits • Road Transport Permits • Dangerous Goods Permits • Safe Work Permits • Burning Permits • Blasting Permits • Third Party Crossing Permits • Water Withdrawal and Discharge Permits for Hydrostatic Test • Building Permits (both temporary and permanent construction) • Stormwater Permits • Damage Control Licenses • Water Crossing Permits • Wetlands Permits
Contracts (May only apply if containing sections regarding the environment)	Materials Storage
	Construction Survey
	Emergency Medical Service (EMS)
	Clearing / Grading
	Pipeline, Facility, or Integrity construction activities
	Non-destructive Examination (NDE)
	Fabrication
Compaction Testing	

Type	Description
	Contracts associated with (small) miscellaneous reclamation activities
	Heavy Lift (Facilities only)
	Hydrovac Excavating
	As-built Documentation
	Security
	Pigging (Pipelines only)
	Trenchless Crossings (Pipelines only)

6.8 Records Management

A critical element of the Environmental Inspector's role is to support Owner Company record keeping, which is critical to compliance with regulations and audits as well as the long-term management of the facility or pipeline. For example, details captured during the construction phase can be one of the critical pieces of information when maintaining the structural integrity of the facility or pipeline in the future. While specific record keeping requirements are identified within each section, general requirements are listed in Table 10. Where record keeping is incomplete, poorly worded, or lacking entirely, Environmental Inspector duties are deemed to be incomplete.

Table 10: Typical Activities Associated with Supporting Records Management

✓	Description
	General
	Ensure the timely completion and submission of all required documentation
	Complete relevant documentation for any interactions with Stakeholders, Regulators and Indigenous Communities
	Ensure all forms, reports, and submitted data are as complete and accurate as possible
	Verify all environmental as-built information pertaining to the construction progress has been recorded
	Provide information on an ongoing basis that will assist in closing Contractor claims
	Continually gather data to support a post-construction evaluation and lessons learned document
	Continually review base estimates and schedules to actual environmental work performed and provide feedback
	Complete environment progress-related information on inspection forms and reports, and note: <ul style="list-style-type: none"> • Equipment and consumables used by the Contractor • Contractor personnel and equipment present on-site
	Confirm that Near Miss Reports are completed and submitted to the Construction Manager / Chief Inspector (or designate)
	Confirm that Incident Reports are completed and submitted to the Construction Manager / Chief Inspector (or designate)
	Obtain approval from the Construction Manager / Chief Inspector (or designate) prior to commencing any extra work activities
	Ensure Environmental reports are completed and forwarded to the Construction Manager and/or Chief Inspector, when necessary, these reports include (but are not limited to): <ul style="list-style-type: none"> • Agency Report • Non-Compliance Report • Serious Violation Report • Rare Plant Report

✓	Description
Daily	
	Complete Inspection reports (e.g., materials, workmanship, areas inspected, pictures)
	If applicable, complete Construction Progress reports (e.g., materials, workmanship, areas inspected)
	Record lengths, locations, and units of work completed on a daily basis
e.g., Weekly	
	Confirm that Weekly Progress reports include identification of potential cost and schedule issues as well as safety, environmental, progress, and quality control issues
	Maintain, coordinate, and communicate weekly progress to Construction Manager / Chief Inspector (or designate)
e.g., Project End	
	Prepare an end of project report (if required by Owner Company)
	Prepare a project summary (if required by Owner Company)
	Identify lessons learned and / or participate in sessions in support of lessons learned

6.9 Personnel Qualifications and Certifications

Confirming the qualifications of individuals allowed on site is an important element of ensuring a quality product is constructed. For example, fisheries assessments have very specific requirements for the qualification of biologists and the work they undertake (e.g., Qualified Aquatic Environmental Specialist [QAES]). These personnel qualifications / certifications are identified, where relevant, and reviewed and accepted prior to construction. Qualifications and certifications should also comply with applicable regulatory requirements (e.g., Owner Company Operator Qualification (OQ) Plans).

6.10 Equipment Calibration

Often activities during pipeline and facilities construction require specialized equipment for environmental testing. For example, turbidity monitors (used to measure water clarity) may be used in watercourse crossing projects. In these situations, the Environmental Inspector will ensure that only properly calibrated test equipment is used on-site and supporting calibration records are available.

6.11 Incident Reporting

Should an incident occur, the Environmental Inspector is expected to assist the Owner Company (and where necessary, the local authorities) in conducting a formal and objective Incident Report. In particular, the Environmental Inspector should keep in mind the items identified in Table 11.

Table 11: Typical Incident Considerations

✓	Description
	Take immediate action to ensure injuries are attended to and emergency services are contacted
	Freeze the work site if required, based on Construction Manager / Chief Inspector (or designate) authority (see Section 6.1)

✓	Description
	Immediately report all injuries, vehicle incidents, near misses, and any unsafe conditions to the Construction Manager / Chief Inspector (or designate)
	Ensure that site evidence is preserved, pictures are taken, and documentation and witness statements are gathered and retained as soon as practical
	Participate in incident investigations (as required)
	If site has been shut down, obtain authorization from Owner Company when site can be returned to services

6.12 Post-Construction Considerations

After the facilities or pipeline construction project is completed (i.e., after cleanup and restoration of the pipeline or facility site), the company will determine what involvement the Environmental Inspector will be responsible for during the Post-Construction Monitoring; typical items are identified in Table 12.

Table 12: Typical Post-Construction Considerations

✓	Description
	Reclamation inspection along the site or ROW (handled by a Reclamation Specialist)
	Soils Assessment (to be performed following the first growing season)
	Assess topsoil and subsoil compaction, texture, and degree of admixing
	Measure topsoil depth
	Assess stoniness, counter restoration, and erosion potential
	Vegetation monitoring
	Monitor for issues with: <ul style="list-style-type: none"> • Inadequate vegetation or crop regrowth • Excessive increase in weed growth
	Site or ROW Monitoring
	Monitor for issues, including: <ul style="list-style-type: none"> • Subsidence (i.e., areas of sunken trench) • Soil erosion
	Wetland Monitoring
	Monitor for issues with: <ul style="list-style-type: none"> • Habitat • Water quality • Hydrological functions
	Water Crossing Monitoring
	Monitor for issues with: <ul style="list-style-type: none"> • Erosion • Revegetation • Functioning • Flow impediment • Sedimentation
	Communication

✓	Description
	Communicate with the landowner during the first and second growing seasons to discuss: <ul style="list-style-type: none"> • Reclamation progress • Any issues with reclamation that need to be addressed
Reporting	
	Maintain Environmental Issues Tracking List, including: <ul style="list-style-type: none"> • Record of identified issues • Status of identified issues (i.e., resolved, or unresolved) • Mitigative measures undertaken
	Prepare Post-Construction Monitoring Report based on the Environmental Issues Tracking List

6.13 References – Foundational Information

Note to user: The reference information provided in Table 13 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 13: List of References – Foundational

Document No.	Type	Title
American Petroleum Institute (API)		
API RP 1169	Recommended Practice	Recommended Practice for Basic Inspection Requirements – New Pipeline Construction
API RP 1184	Recommended Practice	Pipeline Facility Construction Inspection
API Specification Q1	Specification	Specification for Quality Management System Requirements for Manufacturing Organizations for the Petroleum and Natural Gas Industry
Canadian Federal Regulations		
N/A	Regulation	Canadian Environmental Protection Act
N/A	Regulation	Fisheries and Oceans – Land Development Guidelines for the Protection of Aquatic Habitat
N/A	Regulation	Canada Water Act
N/A	Regulation	Migratory Bird Convention Act
N/A	Regulation	Canadian Occupational Health and Safety Regulations (COHS)
N/A	Regulation	Transport Canada – Transportation of Dangerous Goods Regulations
N/A	Regulation	Navigation Protection Act
N/A	Regulation	Species at Risk Act
Canadian Standards Association (CSA)		
CSA Z662	Standard	Oil and Gas Pipeline Systems
CEPA		

Document No.	Type	Title
N/A	Recommended Practice	Facilities Integrity Management Program
International Organization for Standardization (ISO)		
ISO 9000	Standard	Quality Management Systems – Fundamentals and Vocabulary
Canada Energy Regulator (CER)		
OPR-99	Regulation	Canadian Onshore Pipeline Regulations

7 PLANNING AND CONSTRUCTING PIPELINES

7.1 Overview

Planning and Constructing Pipelines consists of the following major activities:

1. Survey
2. Clearing, Stripping and Grading
3. Stockpiling and Stringing
4. Field Bending
5. Ditching and Excavation
6. Welding
7. Coating
8. Lowering-In
9. Backfilling
10. Cathodic Protection
11. Hydrostatic Testing
12. Clean-Up and Restoration

The relevant EI inspection requirements are described within this section, roughly in sequence of construction.



7.2 Survey

7.2.1 Overview

Surveying is an integral part of pipeline construction and refers to the installation of visual reference points and markers (e.g., stakes, pins, lath, and hubs) that will define the right of way (ROW) limits and guide the construction of the pipeline and necessary appurtenances according to the Issued for Construction (IFC) drawings. The references also mark the safe limits of ROW work areas as well as sensitive environmental features outlined in the environmental protection plan (EPP).

A general inspector is the technical liaison for survey information between the Construction Manager / Chief Inspector (or designate), Survey Contractor, and other on-site Contractors. The Environmental Inspector supports the general inspector by ensuring surveying activities do not have an adverse affect on the environment, as well as ensuring environmental features are adequately marked.

Environmental Inspector's (EI) responsibilities during surveying include, but are not limited to:

- Providing clear instructions for surveying activities conducted in the vicinity of environmentally or culturally sensitive areas as defined in the EPP, to reduce disturbance of site-specific environmental or cultural resources; and
- Identifying areas associated with special permit conditions (e.g., riparian areas, and designated wetlands).

7.2.2 Inputs

As part of preparing for environmental inspection during the surveying process, the EI will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner Company technical specifications as identified in Table 15.

7.2.3 Execution

While the work is being executed, the EI is required to monitor workmanship and the construction's progress. Typical items that the EI will monitor for during the surveying process are identified in a series of checklists as detailed in Table 14.

Table 14: Monitoring Requirements for Survey Inspection

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> • On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 16
Safety	<ul style="list-style-type: none"> • Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 17
General	<ul style="list-style-type: none"> • Identifies general items that should be monitored throughout the construction surveying process 	Table 18
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> • Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 19



Item	Description	Reference
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and are particularly sensitive to construction activity 	Table 20
Air and Noise Pollution	<ul style="list-style-type: none"> Specific consideration relating to the atmosphere and that is particularly sensitive to construction activity 	Table 21

7.2.4 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for survey inspection appear in Table 22.

Detailed Checklists – Survey

7.2.5 Typical Input Requirements during Surveying Process

Table 15: Information Requirements for Survey Inspection

✓	Description
	<p>All designs, drawings, and specifications developed by the Owner Company and Contractors related to surveying, such as:</p> <ul style="list-style-type: none"> Alignment Drawings Access Road Drawings Line List (e.g., special concerns for each Land Owner) Issued for Construction (IFC) Drawings Environmental studies
	<p>Contracts and agreements related to:</p> <ul style="list-style-type: none"> Road Use Crossing for Buried Facilities Construction Survey Land Owner and/or Regulatory Requirements Land Owner and/or Regulatory Approvals Third Party Crossing Agreements Jurisdictional Agencies Temporary Workspace Agreements
	<p>Permits related to:</p> <ul style="list-style-type: none"> Environmental conditions and/or commitments Road Use Third Party Crossing Permits Federal, Provincial and Municipal
	<p>Owner Company specific Safety Plan, including (but not limited to):</p> <ul style="list-style-type: none"> Traffic Control Plan Requirements for Personal Protective Equipment (PPE) Emergency Medical Services (EMS)
	Project specific Environmental Protection Plan (EPP), detailing surveying requirements
	Other project specific Plans, which may include:



✓	Description
	<ul style="list-style-type: none"> • Fire Prevention / Firefighting Plan • Survey Plans • Alignment Sheets • Environmental Impact Surveys (EIS) or Environmental Assessments Reports • Environmental Measures, Policies and Plans
	<p>Owner Company specific Pre-Construction Consideration related to:</p> <ul style="list-style-type: none"> • Weather Conditions • Environmental Resources (soils, vegetation) • Wildlife and Aquatic Resources • Agricultural Activities • Historic sites, culturally significant sites and sensitive landscapes

7.2.6 Best Practice Items for Inspecting Typical Surveying Operations

Table 16: Prior to Commencing Work

✓	Description
	<p>Participate in daily meetings to address:</p> <ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Pipeline Contractor's tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	Locate and flag environmentally sensitive sites
	Assist pioneer crews (i.e., first crews at site), if necessary, at commencement of any onsite work including hydrovacing and signage installation for access

Table 17: Safety Concerns during Surveying Process

✓	Description
	Ensure all personnel are trained in hand tree-felling activities, including chainsaw usage
	Ensure that damage or obliteration of any survey references are reported per Owner Company processes and treated as a safety concern

Table 18: Typical Monitoring Requirements – General

✓	Description
	Monitor daily activities for compliance with all environmental requirements
	Ensure construction activities are contained inside the ROW, designated access roads, and ancillary sites
	Assist surveyors in staking any pre-determined environmentally sensitive or archaeological sites
	Ensure a photographic record is made of all sensitive features to be protected or restored
	Adhere to Owner and project-specific requirement for storage and disposal of hydrovac slurry



✓	Description
	Verify that stakes, marks, and flags are maintained throughout construction, if feasible, and communicate with Surveying Contractor when any need to be re-established

Table 19: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Ensure setback requirements for rare vegetative crops and/or species are adhered to
	Confirm the accuracy of flagged environmentally sensitive areas, including ornamental trees, windbreaks, or specialty shrubs, in consultation with survey crews
	Ensure that any locations with crop disease or weed infestations are flagged, staked, and clearly marked with signage
	Ensure nest surveys have been completed along the ROW
	Ensure any burrows or dens are appropriately flagged
	Ensure there are flags, stakes and clearly marked signage at any locations requiring special soil handling techniques (e.g., three-lift soils handling)
	Ensure that topsoil recovered from exposing any underground foreign line is salvaged
	Ensure that taller stakes are installed in high crop areas or snow to ensure visibility, and hub staking is used in livestock pastures
	Ensure that flagging is placed more frequently in heavier vegetated and treed areas to provide better visibility for Clearing Equipment Operators

Table 20: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
	Ensure that the riparian buffer zone is staked and flagged close to watercourses and wetlands
	Ensure that temporary work spaces (TWS) do not encroach within the vegetated buffers of watercourses and wetlands
	Ensure extra workspace at watercourse crossings are sufficiently marked
	Ensure vehicles do not ford watercourses, unless permitted
	Re-establish final alignment of watercourse after construction of the crossing, as specified in the EPP or equivalent
	Ensure drainages are staked and flagged in the fall prior to heavy snowfall to avoid flooding or erosion problems during spring break-up

Table 21: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

7.2.7 Typical Outputs for Survey Inspection

Table 22: Typical Reporting Requirements

✓	Description
	General



	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
Daily	<p>Complete surveying daily Environmental Inspection Progress reports, including (but not limited to):</p> <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions, which includes: <ul style="list-style-type: none"> ○ Updating the company specific environmental commitment tracking system <p>All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required</p>

7.2.8 References – Survey

Note to user: The reference information provided in Table 23 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 23: List of References – Survey

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Pipeline Construction Inspectors
The INGAA Foundation Inc.		
N/A	Best Practices	Environmental Inspector Guidance Recommended Qualifications



7.3 Clearing, Stripping and Grading

7.3.1 Overview

Clearing, stripping and grading is the next phase of pipeline construction after surveying, where the pipeline right of way (ROW) is prepared for the upcoming pipeline installation activities. Key steps of the clearing, stripping and grading process typically include:

- Clearing, which involves the cutting of trees and brush from the pipeline ROW and access roads
- Grubbing, which involves the removal of tree stumps and large roots from specific areas of the ROW
- Timber salvage, which involves the recovery and temporary storage of useful, merchantable timber from the ROW
- Unsalvageable timber and brush disposal, which involves the removal or elimination of on-site non-merchantable timber and brush by chipping, mulching, or burning
- Stripping, which involves the removal and storage of topsoil and/or the organic layer for later redistribution after the pipe has been backfilled
- Erosion control and soil erosion contingency measures
- Cut and fill activities, which are sometimes required for preliminary grading of the ROW
- Temporary fencing
- In some cases, grade rock blasting, excavation, and removal may be required

An Earthworks Inspector, sometimes referred to as a general or craft inspector, is responsible for ensuring crews follow appropriate methods during clearing, stripping, and grading operations. The Environmental Inspector supports the Earthworks Inspector by ensuring clearing, stripping, and grading operations do not have an adverse affect on the environment.

Environmental Inspector's (EI) responsibilities during clearing, stripping, and grading include, but are not limited to:

- Ensure proper handling, salvage, and disposal of merchantable and non-merchantable timber as per project requirements; and
- Ensure soil productivity is maintained by implementing proper soil handling techniques (e.g., prevent mixing of topsoil with subsoil).

7.3.2 Inputs

As part of preparing for Environmental inspection during the surveying process, the EI will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 25.



7.3.3 Execution

While the work is being executed, the EI is required to monitor workmanship and on the construction's progress on a periodic basis. Typical items that the EI will monitor for during the clearing, stripping, and grading process are identified in a series of checklists as detailed in Table 24.

Table 24: Monitoring Requirements for Clearing, Stripping and Grading

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 26
Safety	<ul style="list-style-type: none"> Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 27
General	<ul style="list-style-type: none"> Identifies general items that should be monitored throughout the construction clearing, stripping and grading process 	Table 28
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 29
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 30
Air and Noise Pollution	<ul style="list-style-type: none"> Specific consideration relating to the atmosphere and that is particularly sensitive to construction activity 	Table 31

7.3.4 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for clearing, stripping and grading appear in Table 32.

Detailed Checklists – Clearing, Stripping, and Grading

7.3.5 Typical Input Requirements for Clearing, Stripping, and Grading Environmental Inspection

Table 25: Information Requirements for Clearing, Stripping, and Grading

✓	Description
	<p>All designs, drawings, and specifications developed by the Owner Company and Contractors related to clearing, stripping, and grading, such as:</p> <ul style="list-style-type: none"> Alignment Drawings Access Road Drawings or Route Sheets Grading Drawings Line List (e.g., special concerns for each Land Owner) Environmental studies Commissioned reports



✓	Description
	<p>Contracts and agreements related to:</p> <ul style="list-style-type: none"> • Clearing • Grading (if required) • Road Use • Crossing for Buried Facilities • Timber salvaging; contracts/agreements may be with the Landowner, a public land holder, or forestry management • Timber sales • Construction Survey • Fencing
	<p>Permits related to:</p> <ul style="list-style-type: none"> • Environmental conditions and/or commitments • Road Use • Burning • Blasting • Water Withdrawal • Watercourse crossings including wetlands
	<p>Owner Company specific Safety Plan, including (but not limited to):</p> <ul style="list-style-type: none"> • Requirements for Personal Protective Equipment (PPE) • Emergency Medical Services (EMS) • Blasting Safety
	<p>Project specific Environmental Protection Plan (EPP), detailing clearing, stripping, and grading requirements</p>
	<p>Other project specific Plans, which may include:</p> <ul style="list-style-type: none"> • Access Road Plans • Blasting Plan • Pre-Construction Grade Plan • Burn Plan • Timber Salvage Plan • Fire Prevention / Firefighting Plan • Heritage Sites • Soil Surveys • Environmental Impact Surveys (EIS) or Environmental Assessments Reports • Environmental Measures, Policies and Plans • Compliance Documents • Stormwater Management • Erosion and Sediment Control • Environmental Alignment Sheets • Spill prevention, control and clean up plan
	<p>Owner Company specific Pre-Construction Consideration related to:</p> <ul style="list-style-type: none"> • Weather Conditions • Wildlife and Aquatic Resources • Wetlands • Agricultural Activities



✓	Description
	<ul style="list-style-type: none"> Historic sites, culturally significant sites and sensitive landscapes

7.3.6 Best Practices for Typical Clearing, Stripping, and Grading Operations

Table 26: Prior to Commencing Work

✓	Description
	Participate in daily meetings to address: <ul style="list-style-type: none"> Job safety and/or hazard identification issues Environmental concerns Duties of Inspector(s) Pipeline Contractor's tailgate meetings (as required) Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	Identify environmental issues for consideration in the development of the preconstruction Grade Plan
	Ensure swamp mats, geotextiles, or corduroy are used if ground conditions are unstable and low-ground pressure equipment can not be used
	Ensure that specimen trees and shrubs identified in the Environmental Protection Plan (EPP) are marked and protected both along and marginally off the ROW or work spaces by an approved method
	Ensure well water monitoring plan is adhered to, when required
	Ensure stormwater management plans are in place

Table 27: Safety Concerns for Clearing, Stripping and Grading

✓	Description
	There are no incremental specific Safety Concerns beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

Table 28: Typical Monitoring Requirements – General

✓	Description
	Ensure clearing, stripping, and grading operations are limited to the approved ROW, access roads, and approved work areas
	Monitor for adherence to conditions noted in all environmental approvals and permits issued
	Ensure mitigative measures for permafrost are adhered to (e.g., minimizing grading activities)
	Ensure appropriate measures are implemented when artefacts are unearthed
	Provide input on environmental considerations when additional clearing, stripping, and grading may be required
	Ensure push outs along the outer edge of the pipeline ROW are constructed in approved areas only
	Ensure any temporary work space (TWS) for storage of excavated material, grubbing, or salvageable timber has been constructed as per the EPP
	Verify that the Contractor picks up and properly disposes of any fly-rock from blasting activities
	Monitor temporary fencing requirements
	Ensure a watchperson is present at open gates to control livestock (if required)



Table 29: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
Clearing Trees and Brush	
	Ensure any vegetation (e.g., trees, shrubs) which need to be transplanted are stored properly to prevent drying out before replanting
	Ensure trees, shrubs and tall grasses are cleared prior to onset of migratory bird or species specific activity period
	Ensure adherence to operator or project specific measures for any trees containing burrow, den or an active nests
	Ensure proper equipment is used to minimize terrain disturbance during non frozen conditions when clearing non merchantable timber
	Ensure that on land with a significant slope (per criteria defined by Owner Company in contract documents) in any direction, removal of brush and trees is minimized and root systems are left intact to prevent slope erosion
	Ensure cuts are treated per contract requirements where branches are removed from a standing tree outside the ROW (if required)
	Confirm the contractor brings the cut trees back within the ROW for processing for trees felled outside the ROW
	Ensure contractor refrains from skidding timber through partially thawed and/or muddy ground
	Monitor for proper placement of all removed trees and brush from and adjacent to the ROW
	Ensure the contractor clears wetland, muskeg, and riparian vegetation areas using approved Owner Company procedures as per the EPP
	Ensure methods are used to minimize clearing debris from falling into a watercourse and if it occurs, ensure debris is removed immediately
Snow Berms	
	Ensure snow berms are built to Owner Company specifications over the ditch line immediately after clearing to prevent frost penetration into the pipeline trench
	Ensure that gaps are left in snow berms at specified intervals to allow for passage of livestock and wildlife
Grubbing	
	Ensure appropriate surface erosion control measures are installed prior to commencing grubbing
	Ensure natural surface-drainage can be re-established or installed where appropriate
	Ensure proper equipment (e.g., brush rake attachment) is used for grubbing to preserve topsoil
	On erosion prone slopes, restrict root grubbing to minimize potential for erosion and soil disturbance
	Restrict grubbing near the ROW boundary, as specified by the Owner Company, where possible
	Suspend grubbing when weather conditions promote sedimentation
	Ensure adherence to specific requirements for grubbing near watercourse and/or wetlands
	Ensure grubbing in wet areas is minimized to prevent bog holes
Timber Salvage and Storage	
	Ensure timber is salvaged in accordance with Timber Salvage Plan
	Consult the Timber Salvage Plan regarding any merchantable timber that appears to not meet specifications, then notify the Construction Manager / Chief Inspector (or designate) and Clearing Contractor for a decision on how to proceed
	Ensure stacked timber is not located in reforested areas or grade areas, unless otherwise approved



✓	Description
	Ensure that only approved timber removed from the construction ROW is used for corduroy
	Ensure materials retained for corduroy, chip and/or mulch material and the location of use is in accordance with the regulatory requirements
	Ensure adherence to any specific requirements associated with cutting and removal near watercourses
	Ensure Contractor refrains from skidding timber through watercourses, water bodies, or wetlands
	Ensure timber stockpile sites are located away from watercourses
Timber and Brush Disposal	
	Ensure proper burn permits are in place
	Ensure burning activities comply with the Burn Plan, permit stipulations, Land Owner requirements, and EPP
	Ensure burn locations are only on top of mineral soils and not in peat, muskeg, or wetland areas (Contractor may have to strip surface organics and replace after burning)
	Ensure burn piles are located on the ditch and away from an existing aboveground facility to allow for sufficient space for stacking and working
	During winter, ensure burn piles are placed on the ditch line to avoid thawing the frost-packed traffic lane on the work side of the ROW
	Ensure the location of burn piles are identified, if required
	Ensure continuous (24/7) monitoring during any controlled burn
	Ensure fires are completely extinguished once burn pile is consumed
	Ensure that all residual materials from burning are disposed as per contract documents and/or Owner Company or project specifications
	If burning is not permitted, confirm chipping or mulching is conducted as per contract specifications
	Ensure chips, woody debris or mulch are not piled in a wetland, unless approved by regulatory authority
	Ensure appropriate regulatory approval and waivers are in place before disposing merchantable timber
	Ensure Clearing Contractor hauls away all timber and brush from the ROW that cannot be processed by the above means
Topsoil Stripping and Storage	
	Ensure topsoil is stripped from the following areas in accordance with environmental specifications: <ul style="list-style-type: none"> • Agricultural Lands with weed infestations • Cultivated lands and lands with agricultural potential that are prone to soil mixing and compaction • Areas to be filled or graded • Any special areas, if warranted, that allow for a wider or deeper trench, storage of larger volumes of spoil, grading, and heavy equipment traffic
	Ensure adherence to project specifications for topsoil stripping (e.g., width and depth of topsoil stripped) unless appropriate approval is received
	Ensure topsoil is stored within the construction ROW, and is stored in a manner that prevents mixing of topsoil with subsoil
	Ensure adherence to landowner or regulatory authority requirements for windrow gaps
	Ensure project-specific soil surveys are used to identify soil characteristics and contingency measures are adhered to
	Ensure adherence to Operator or Project specific Mitigative measures for procedures relating to clubroot disease, weeds infestation and other crop diseases
	Suspend topsoil stripping during high winds unless a tackifier is applied to the topsoil pile
Topsoil Stripping – Three-Lift Soils Handling	



✓	Description
	Ensure this technique is only implemented for salvaging topsoil during dry and non frozen conditions and areas where lower subsoils are poorer in quality than upper subsoil
	Ensure that the salvaged upper subsoil is twice the width of the trench, and the depth is as listed in the Environmental Alignment Sheet
	Ensure this technique is implemented to maintain groundwater flow on areas characterized by sands overlying clays at shallow depths
	Ensure there is separation between the topsoil and subsoil pile, and that the upper subsoil is stored separately from the lower subsoil
Topsoil Stripping – Frozen Soil Conditions	
	Ensure there is a snow cover present over the soil stripping area and remove snow immediately prior to stripping activities
	Ensure mulching of frozen topsoil when necessary
	Ensure adherence to project specification for storing stripped topsoil on frozen grounds
Erosion Control and Soil Erosion Contingency Measures	
	Ensure temporary and/or permanent erosion and/or sediment control structures (e.g., silt fences, sediment traps, hay bales, drainage ditches) have been constructed in alignment with the EPP
	Ensure construction activities are suspended during wet weather to avoid negative impacts on the ROW
	Ensure all necessary equipment and personnel are available for installation and maintenance of erosion control
	Ensure topsoil stripping and salvage occurs just prior to trenching for areas prone to wind erosion
Tackification	
	Ensure permits are in place prior to application of a tackifier and applied in alignment with the EPP
	Ensure all ground preparations (e.g., reclamation) activities are completed before applying a tackifier
	Ensure any revegetation (e.g., seed application) takes place prior to tackification
	Ensure application of tackifier adhere to site specification and manufacturer requirements
	Ensure all products applied are biodegradable and have been approved by the Owner Company
Grading	
	Ensure appropriate erosion control measures are in place prior to grading
	Monitor and reduce disturbance to natural drainage channels and avoid blocking any existing channels during grading
	Ensure graded materials, or material displaced to accommodate grading is stored according to Owner or project specific requirements
	Implement appropriate mitigative measures for wet and/or thawed soils, when needed

Table 30: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
General	
	Ensure timely notice is given to all agreed-to parties before starting work near a creek, river, or watercourse
Equipment Crossing Watercourses	
	Ensure contractor plans and prepares in advance for moving equipment across watercourses
	Ensure temporary crossings over watercourses are installed according to approved permits if no bridge exists. Approved temporary crossing types may include:



✓	Description
	<ul style="list-style-type: none"> • Clear span bridge • Ice bridge • Flumes • Rock fill
Grading Near Watercourses	
	Ensure grading in the vicinity of watercourses is per Owner Company specifications and Environmental Protection Plan (EPP) requirements
	Ensure project or operator specific mitigative measures are implemented for grading in riparian areas and buffer zones (e.g., leave an organic mat on the working side of ROW to limit sediments from entering the watercourse or wetland)
	Ensure grading close to watercourses and wetlands occurs just prior to construction of crossing
	Ensure vehicle crossings are in place to prevent grading equipment from operating directly in watercourses

Table 31: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	Ensure burning activities adhere to the ventilation index where required

7.3.7 Typical Outputs for Clearing, Stripping, and Grading Environmental Inspection

Table 32: Typical Reporting Requirements

✓	Description
General	
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
Daily	
	<p>Complete clearing, stripping, and grading Environmental Inspection progress reports, including (but not limited to):</p> <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions <ul style="list-style-type: none"> ○ Updating the company specific environmental commitment tracking <p>All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required</p>

7.3.8 References – Clearing, Stripping, and Grading

Note to user: The reference information provided in Table 33 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.



Table 33: List of References – Clearing, Stripping, and Grading

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Pipeline Construction Inspectors
The INGAA Foundation Inc.		
N/A	Best Practices	Environmental Inspector Guidance Recommended Qualifications



7.4 Stockpiling and Stringing

7.4.1 Overview

For projects of significant size, Owner Company-provided materials are received at a marshalling yard or stockpiling site, typically located away from the right of way (ROW), for temporary storage. Stringing involves placing pipe joints end to end along the pipeline ROW, including:

- Strategically placing pipe section supports (e.g., wooden skids or plastic tubs) next to the proposed pipeline ditch (in some cases trench may already be dug)
- Transporting the coated pipe from stockpile sites and placing the pipe on top of the skids; this includes laying out material for specific crossings (e.g., water, road, railroad, HDD), sidebends, etc.

A Stockpiling and Stringing Inspector, sometimes referred to as a general or craft inspector, is responsible for ensuring crews follow appropriate methods during stockpiling and stringing operations. The Environmental Inspector supports the Stockpiling and Stringing inspector by ensuring stockpiling and stringing operations do not have an adverse affect on the environment.

Environmental Inspector's (EI) responsibilities during stockpiling and stringing include, but are not limited to:

- Monitoring the general set up of the pipe yard to ensure drainage ditches are in place for stormwater management;
- Ensuring access roads are clear for use when needed and no damage is done to the ROW due to heavy equipment passing; and
- Ensuring the working area is maintained and cleaned up regularly.

7.4.2 Inputs

As part of preparing for Environmental inspection during Stockpiling and Stringing, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 35.

7.4.3 Execution

While the work is being executed, the EI is required to monitor workmanship and the constructor's progress. Typical items that the EI will monitor for during the stockpiling and stringing process are identified in a series of checklists as detailed in Table 34.



Table 34: Typical Monitoring Requirements for Executing Stockpiling and Stringing Operations

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 36
Safety	<ul style="list-style-type: none"> Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 37
General	<ul style="list-style-type: none"> Identifies general items that should be monitored throughout the construction stockpiling and stringing process 	Table 38
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 39
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 40
Air and Noise Pollution	<ul style="list-style-type: none"> Specific consideration relating to the atmosphere and that is particularly sensitive to construction activity 	Table 41

7.4.4 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for stockpiling and stringing appear in Table 42.

Detailed Checklists – Stockpiling and Stringing

7.4.5 Typical Input Requirements for Stockpiling and Stringing Environmental Inspection

Table 35: Information Requirements for Stockpiling and Stringing

✓	Description
	All designs, drawings, and specifications developed by the Owner Company and Contractors related to stockpiling and stringing, such as: <ul style="list-style-type: none"> Alignment Drawings
	Contracts and agreements related to: <ul style="list-style-type: none"> Materials Storage
	Permits related to: <ul style="list-style-type: none"> Environmental conditions and/or commitments Road Transport
	Owner Company specific Safety Plan, including (but not limited to): <ul style="list-style-type: none"> Pipe Transport Pipe Loading / Unloading Pipe Storage Handling of Materials



✓	Description
	Project specific Environmental Protection Plan (EPP), detailing stockpiling and stringing requirements
	Other project specific Plans, which may include <ul style="list-style-type: none"> • Traffic Control Plan • Stormwater Management

7.4.6 Best Practice for Typical Stockpiling and Stringing Operations

Table 36: Prior to Commencing Work

✓	Description
	Participate in daily meetings to address: <ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Pipeline Contractor’s tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	Ensure swamp mats, geotextiles, or corduroy are used if ground conditions are unstable and low-ground pressure equipment can not be used
	Ensure stormwater management plans are in place

Table 37: Safety Concerns for Stringing and Stockpiling

✓	Description
	Monitor for individuals standing between a suspended load and equipment or pipe
	Ensure that workers are not standing under or near a suspended load
	Ensure individuals stand clear when metal banding is cut loose or other tie down means are loosened from the load
	Ensure individuals stand clear of lifting slings or vacuum lifters while the Equipment Operator is lifting and placing pipe joints
	Monitor and be aware of other vehicles moving in the stockpile yard or right of way (ROW)

Table 38: Typical Monitoring Requirements – General

✓	Description
	Ensure banding from carriers and any other refused items are hauled away to acceptable disposal sites. Burial at railway sidings or stockpile sites is not permitted.
	Ensure appropriate material is used to stabilize construction ROW for vehicle traffic
	Ensure work area is cleaned up in accordance owner/operator project specifications

Table 39: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Prevent heavy trucks from accessing the construction ROW where topsoil has not been salvaged



✓	Description
	Ensure pipe is stored with end caps (as required by Owner Company specifications) to prevent wildlife from entering
	Ensure Land Owner access and livestock and wildlife crossings are maintained in accordance with Owner Company specifications

Table 40: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
	Ensure location of the stockpile yard is a sufficient distance away from water bodies

Table 41: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

7.4.7 Typical Outputs for Stockpiling and Stringing

Table 42: Typical Reporting Requirements

✓	Description
General	
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
Daily	
	Complete stockpiling and stringing Environmental Inspection progress reports, including (but not limited to): <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions, which includes: <ul style="list-style-type: none"> ○ Updating the company specific environmental commitment tracking system All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required

7.4.8 References – Stockpiling and Stringing

Note to user: The reference information provided in Table 43 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently, and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 43: List of References – Stockpiling and Stringing

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Pipeline Construction Inspectors



Document No.	Type	Title
The INGAA Foundation Inc.		
N/A	Best Practices	Environmental Inspector Guidance Recommended Qualifications



7.5 Field Bending

7.5.1 Overview

Field bending is an integral part of pipeline construction and refers to the set of activities associated with bending the pipe in the field so that it fits the shape of the ROW and trench.

A Field Bending inspector, sometimes referred to as a general or craft inspector, is responsible for ensuring crews follow appropriate methods during field bending operations. The Environmental Inspector supports the Field Bending inspector by ensuring field bending operations do not have an adverse affect on the environment.

Environmental Inspector’s (EI) responsibilities during field bending include:

- Ensuring the work area is maintained and cleaned up regularly.

7.5.2 Inputs

As part of preparing for Environmental inspection during Field Bending, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 45.

7.5.3 Execution

While the work is being executed, the EI is required to monitor workmanship and on the construction’s progress. Typical items that the EI will monitor for during the field bending process are identified in a series of checklists as detailed in Table 44.

Table 44: Monitoring Requirements for Field Bending

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> • On a daily basis, ensure key issues that have been identified are detailed and addressed. 	Table 46
Safety	<ul style="list-style-type: none"> • Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 47
General	<ul style="list-style-type: none"> • Identifies general items that should be monitored throughout the construction field bending process 	Table 48
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> • Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 49
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> • Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 50
Air and Noise Pollution	<ul style="list-style-type: none"> • Specific consideration relating to the atmosphere and that is particularly sensitive to construction activity 	Table 51



7.5.4 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for field bending appear in Table 52.

Detailed Checklists – Field Bending

7.5.5 Typical Input Requirements for Field Bending Environmental Inspection

Table 45: Information Requirements for Field Bending

✓	Description
	All designs, drawings, and specifications developed by the Owner Company and Contractors related to field bending, such as: <ul style="list-style-type: none"> • Alignment Drawings
	Contracts and agreements related to: <ul style="list-style-type: none"> • Transport and Handling of Materials • Materials Storage
	Permits related to: <ul style="list-style-type: none"> • Road Transport • Storage Locations
	Owner Company specific Safety Plan, including (but not limited to): <ul style="list-style-type: none"> • Site preparations
	Project specific Environmental Protection Plan (EPP)
	Other project specific Plans, which may include: <ul style="list-style-type: none"> • Traffic Control Plan • Stormwater Management Plan

7.5.6 Best Practice for Typical Field Bending Operations

Table 46: Prior to Commencing Work

✓	Description
	Ensure swamp mats, geotextiles, or corduroy are used if ground conditions are unstable and low-ground pressure equipment can not be used
	Ensure stormwater management plans are in place

Table 47: Safety Concerns for Field Bending

✓	Description
	There are no incremental specific Safety Concerns beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information



Table 48: Typical Monitoring Requirements – General

✓	Description
	Verify that stakes, marks, and flags are maintained throughout construction, if feasible, and communicate with Contractor when any need to be re-established

Table 49: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Recommend the use of end caps to prevent wildlife from becoming confined or trapped in the pipe

Table 50: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
	There are no incremental specific monitoring requirements for watercourses, wetlands and aquatic life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

Table 51: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

7.5.7 Typical Outputs for Field Bending

Table 52: Typical Reporting Requirements

✓	Description
	General
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
	Daily
	Complete field bending Environmental Inspection progress reports, including (but not limited to): <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions, which includes: <ul style="list-style-type: none"> ○ Updating the company specific environmental commitment tracking system <p>All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required</p>

7.5.8 References – Field Bending

Note to user: The reference information provided in Table 53 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently



and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 53: List of References – Field Bending

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Pipeline Construction Inspectors
The INGAA Foundation Inc.		
N/A	Best Practices	Environmental Inspector Guidance Recommended Qualifications



7.6 Ditching and Excavation

7.6.1 Overview

Ditching and excavation is the next activity of pipeline construction, and typically involves excavation of a trench in the right of way (ROW) for pipe installation. Typically, the ditching operations are after stringing, bending, welding, non-destructive examination (NDE), and coating due to the risk of having an open trench; however, there are a number of exceptions, including:

- Where rock is encountered, the trench may be blasted and excavated prior to stringing
- In urban areas or other areas where numerous underground utilities and obstructions may exist

It should be noted that ditching and excavation is required to create entry and exit pits for trenchless crossings.

There may be a need to remove accumulations of water from the partially or fully excavated trench as outlined in the Stormwater Management Plan, or equivalent.

An Earthworks Inspector, sometimes referred to as a general or craft inspector, is responsible for ensuring crews follow appropriate methods during ditching and excavation. The Environmental Inspector supports the Earthworks Inspector by ensuring ditching and excavation operations do not have an adverse affect on the environment.

Environmental Inspector's responsibilities during ditching and excavation include, but are not limited to:

- Ensuring appropriate measures (e.g., hauling equipment and material on the ROW) are taken to prevent mixing of soil and soil compaction;
- Ensuring fencing is placed to prevent livestock from entering;
- Ensuring proper procedures are followed for areas of concern (e.g., high water table); and
- Ensuring measures (e.g., discharging water to approved sites) are taken to prevent erosion, sedimentation, or contamination of adjacent lands, wetland, and watercourses during trench dewatering.

7.6.2 Inputs

As part of preparing for Environmental inspection during Ditching and Excavation, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 55.



7.6.3 Execution

While the work is being executed, the EI is required to monitor workmanship and on the constructor's progress. Typical items that the EI will monitor for during the ditching and Excavation process are identified in a series of checklists as detailed in Table 54.

Table 54: Monitoring Requirements for Ditching and Excavation

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 56
Safety	<ul style="list-style-type: none"> Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 57
General	<ul style="list-style-type: none"> Identifies general items that should be monitored throughout the construction ditching and excavation process 	Table 58
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 59
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 60
Air and Noise Pollution	<ul style="list-style-type: none"> Specific consideration relating to the atmosphere and that is particularly sensitive to construction activity 	Table 61

7.6.4 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for ditching and excavation appear in Table 62.

Detailed Checklists – Ditching and Excavation

7.6.5 Typical Input Requirements for Ditching and Excavation Environmental Inspection

Table 55: Information Requirements for Ditching and Excavation

✓	Description
	<p>All designs, drawings, and specifications developed by the Owner Company and Contractors related to ditching and excavation, such as:</p> <ul style="list-style-type: none"> Alignment Drawings Access Road Drawings Line List (e.g., special concerns for each Land Owner) Trenching Specifications and Procedures Topsoil Segregation Requirements



✓	Description
	Contracts and agreements related to: <ul style="list-style-type: none"> • Road Use • Land Owner and/or Regulatory Requirements • Land Owner and/or Regulatory Approvals • Workspace Agreements
	Permits related to: <ul style="list-style-type: none"> • Environmental • Road Use • Drilling Fluid Disposal
	Owner Company specific Safety Plan, including (but not limited to): <ul style="list-style-type: none"> • Excavation Plan • Traffic Control Plan • Requirements for Personal Protective Equipment (PPE) • Emergency Medical Services (EMS)
	Project specific Environmental Protection Plan (EPP), detailing ditching and excavation requirements
	Other project specific Plans, which may include: <ul style="list-style-type: none"> • Fire Prevention / Firefighting Plan • Heritage Sites • Engineered Shoring and Dewatering plans (as required) • Environmental Alignment Sheets • Stormwater Management Plan • Erosion and Sediment Control Plan
	Owner Company specific Pre-Construction Consideration related to: <ul style="list-style-type: none"> • Weather Conditions • Environmental Resources (soils, vegetation) • Agricultural Activities • Historic sites, culturally significant sites and sensitive landscapes

7.6.6 Best Practice for Typical Ditching and Excavation Operations

Table 56: Prior to Commencing Work

✓	Description
	Participate in daily meetings to address: <ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Pipeline Contractor's tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	Ensure swamp mats, geotextiles, or corduroy are used if ground conditions are unstable and low-ground pressure equipment can not be used



✓	Description
	Ensure stormwater management plans are in place
	Inspect temporary erosion control structures, and ensure damage is repaired prior to commencing ditching and excavation operations
	Verify exclusion zones are established
	Work area: <ul style="list-style-type: none"> • Check that warning signs and temporary fencing is installed on open excavations close to public accesses • Inspect the open trench for trapped animals before commencing work
	Ensure an approved plan is in place to manage disposal of hydrovac slurry

Table 57: Safety Concerns for Ditching and Excavation

✓	Description
	There are no incremental specific Safety Concerns beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

Table 58: Typical Monitoring Requirements – General

✓	Description
	Ensure that if a machine strikes, contacts, is bogged down, slides into, or rests on top of a pipeline facility, work is stopped immediately and the Construction Manager / Chief Inspector (or designate) is notified; the machine is not to be moved or extricated without Owner Company approval
	Immediately suspend ditching activity and notify the Construction Manager / Chief Inspector (or designate) if any historic sites or resources are discovered
	Verify that the Contractor picks up and properly disposes of any fly-rock from blasting activities

Table 59: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Trench Excavation
	Recommend minimizing the length of time the trench is left open to minimize trench sloughing and interference with wildlife, livestock and landowners
	Ensure trenching activities are suspended in areas where non-salvaged topsoil are sloughing into the trench
	Monitor and record trenching and spoil pile segregation for subsoils with variable horizons
	Ensure appropriate operator or project specification are followed for trenching when using the Three-Soils-Handling technique
	Ensure separation between topsoil and any subsoil is maintained when special soil handling techniques (e.g., Three-Lift Soils Handling) is being used
	Confirm that the trench will be excavated to the specified clearance at all crossings (i.e., road, ditch, culvert, cable, water main, and sewer) or any other obstruction as directed by Owner Company specifications
	Monitor for locations where available work space is insufficient to allow compliance with safety and environmental requirements; escalate to Construction Manager / Chief Inspector (or designate) when identified
	In cultivated fields or where livestock is present, ensure that safe, temporary bridges or backfilled sections along the trench are provided for livestock and farm machinery to cross as specified in construction drawings
	Seasonal (Winter) Conditions



✓	Description
	Ensure Contractor blades (using the blade on a grader) a berm of loose material or snow (e.g., snow roach) to Owner Company specification over the centerline of the trench immediately after excavating the trench to prevent trench sloughing, frost penetration, and livestock interference. Note: A berm may not be required in muskeg areas or if ditching commences by end of the following day of grading
	Ensure frozen lumps resulting from ripping the ditch line are removed by the Contractor and stored separately from the trench subsoil pile

Table 60: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
Trench Excavation	
	Ensure appropriate operator or project specification are followed when trenching occurs near watercourses and wetlands
	Ensure that the Contractor will not leave a trench open for extended periods; in particular, monitor for: <ul style="list-style-type: none"> • Large accumulations of water • Snow and ice accumulation
Trench Dewatering	
	Check or test the trench water for contamination (e.g., hydrocarbon sheen, high salinity) before dewatering trench and ensure mitigative measures are implemented, if necessary, to avoid contamination of adjacent lands, wetlands and/or watercourses.
	Ensure equipment (e.g., pumps, generators) have suitable containment to prevent spills and are appropriately located (e.g., above the normal high water mark of watercourses and wetlands) when working within 100 m of a watercourse or wetland
	Ensure trench water is pumped to an approved site and/or into an appropriate sediment filtering device to avoid erosion or sedimentation of adjacent lands, wetlands or watercourses.
	Ensure the pump flow rate is managed to avoid erosion or sedimentation of adjacent lands, wetlands or watercourses. Mitigative measures (e.g., flow dissipaters on outlets) may be required to minimize ground erosion at discharge location.
	Ensure appropriate disposal of waste products (e.g., used geotextile bags) from trench dewatering activities
Ditch Plugs and Sub-drains / Drain Tiles	
	Ditch plugs and sub-drains may be constructed based on construction drawings; however, in some cases the quantity and their location are best determined in the field after the trench is excavated. Monitor for: <ul style="list-style-type: none"> • Specific terrain features / drainage patterns <ul style="list-style-type: none"> ○ Groundwater flowing or seeping from the bottom or sides of the trench, then a sub-drain (drain tile) may be required immediately downhill of the discharge point to collect the water and divert it off the ROW ○ Locations where water can enter the trench and flow downhill through the backfill • Ditch water encountered on slopes and hills
	Ensure Owner Company specifications are met or exceeded for erosion control (e.g., a sack breaker may be installed as an alternative to ditch plugs if a ditch plug is difficult to install)
	Confirm silt fence and straw bale sediment control measures are installed
	On slopes, confirm that Contractor has installed and keyed in trench breakers and sub-drains in the trench per Owner Company drawings and specifications or as required
	If drain tiles are cut: <ul style="list-style-type: none"> • Ensure location is marked • Confirm ends are capped to prevent clogging from dirt or debris • Ensure temporary flumes are installed to maintain drainage



Table 61: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

7.6.7 Typical Outputs for Ditching and Excavation

Table 62: Typical Reporting Requirements

✓	Description
	General
	Ensure Environmental reports are completed and forwarded to the Construction Manager and/or Chief Inspector, when necessary, these reports include (but not limited to): <ul style="list-style-type: none"> • Laboratory sample analysis • Hazardous goods report Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
	Daily
	Complete ditching and excavation Environmental Inspection progress reports, including (but not limited to): <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Record soil horizons ○ Locations of all drain tiles, irrigation pipes, etc., not on drawings, but crossed by the trench line ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions <ul style="list-style-type: none"> ○ Updating the company specific environmental commitment tracking system All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required

7.6.8 References – Ditching and Excavation

Note to user: The reference information provided in Table 63 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 63: List of References – Ditching and Excavation

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Pipeline Construction Inspectors
The INGAA Foundation Inc.		
N/A	Best Practices	Environmental Inspector Guidance Recommended Qualifications



7.7 Welding

7.7.1 Overview

Welding during pipeline construction is performed to join lengths of pipe together as the Construction crew moves along the pipeline right of way (ROW). Welding is a process that uses fusion to join two or more materials together to become a manufactured or fabricated item. In the pipeline industry, the arc welding process is used to join pipe to pipe, and pipe to components together to form a pipeline.

A Welding Inspector is responsible for ensuring crews follow appropriate methods during welding operations. Welding requires specialized expertise, not just for the execution of the work but also inspection of the work, therefore, welding inspection should only be performed by a Welding Inspector who has been qualified (e.g., CWB Level 2 with CSA or ASME code endorsement) and has been specifically assigned this task. The Environmental Inspector supports the Welding Inspector by ensuring welding operations do not have an adverse affect on the environment.

The Environmental Inspector’s responsibilities during welding include, but are not limited to:

- Monitor for adherence to requests for specified gaps in welded pipe sections to allow passage of wildlife, livestock or movement of farm equipment; and
- Maintaining the ROW by ensuring appropriate disposal of welding waste.

7.7.2 Inputs

As part of preparing for Environmental inspection during welding, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 65.

7.7.3 Execution

While the work is being executed, the EI is required to monitor workmanship and the construction’s progress. Typical items that the EI will monitor for during the welding process are identified in a series of checklists as detailed in Table 64.

Table 64: Monitoring Requirements for Welding

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> • On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 66
Safety	<ul style="list-style-type: none"> • Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 67



Item	Description	Reference
General	<ul style="list-style-type: none"> Identifies general items that should be monitored throughout the welding process 	Table 68
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 69
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 70
Air and Noise Pollution	<ul style="list-style-type: none"> Specific considerations relating to the atmosphere and that is particularly sensitive to construction activity 	Table 71

7.7.4 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for welding appear in Table 72.

Detailed Checklists – Welding

7.7.5 Typical Input Requirements for Welding Environmental Inspection

Table 65: Information Requirements for Welding

✓	Description
	All designs, drawings, and specifications developed by the Owner Company and Contractors related to welding, such as: <ul style="list-style-type: none"> Alignment Drawings
	Permits related to: <ul style="list-style-type: none"> Environmental conditions and/or commitments Road Use
	Owner Company specific Safety Plan, including (but not limited to): <ul style="list-style-type: none"> Requirements for Personal Protective Equipment (PPE) Emergency Medical Services (EMS)
	Project specific Environmental Protection Plan (EPP), detailing welding requirements
	Other project specific Plans, which may include: <ul style="list-style-type: none"> Worksite Welding Plan

7.7.6 Best Practice for Typical Welding Operations

Table 66: Prior to Commencing Work

✓	Description
	Participate in daily meetings to address:



✓	Description
	<ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Pipeline Contractor’s tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	Ensure swamp mats, geotextiles, or corduroy are used if ground conditions are unstable and low-ground pressure equipment can not be used
	Inspect the open trench and pipe for debris or trapped animals and ensure removal before commencing work

Table 67: Safety Concerns for Welding

✓	Description
	During periods of high fire hazards, ensure welding crews have sufficient fire suppression capability during welding activities

Table 68: Typical Monitoring Requirements – General

✓	Description
	There are no incremental monitoring requirements for general environmental inspection beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

Table 69: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Ensure welding is done prior to trenching at locations prone to sloughing, when feasible
	Recommend minimizing the length of time the trench is left open during welding to minimize trench sloughing and interference with wildlife, livestock and landowners
	Ensure the continued use of end caps to prevent wildlife from becoming confined or trapped in the pipe
	Monitor for adherence to requests for specified gaps in welded pipe sections to allow passage of wildlife, livestock or movement of farm equipment
	Ensure proper disposal of welding related debris (e.g., bevel shavings, weld rod ends)

Table 70: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
	There are no incremental specific monitoring requirements for watercourses, wetlands and aquatic life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

Table 71: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information



7.7.7 Typical Outputs for Welding

Table 72: Typical Reporting Requirements

✓	Description
General	
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
Daily	
	<p>Complete welding Environmental Inspection progress reports, including (but not limited to):</p> <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions, which includes: <ul style="list-style-type: none"> ○ Updated Environmental Commitment Tracking Tool <p>All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required</p>

7.7.8 References – Welding

Note to user: The reference information provided in Table 73 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 73: List of References – Welding

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Pipeline Construction Inspectors
The INGAA Foundation Inc.		
N/A	Best Practices	Environmental Inspector Guidance Recommended Qualifications



7.8 Coating

7.8.1 Overview

Coating of the pipeline provides a protective barrier against damage to the pipe (e.g., corrosion, scrapes). The majority of the coating operation occurs in a centralized plant; however, since individual pipe joints are welded together during the construction process, the (girth) weld area requires coating in the field.

A Coating Inspector is responsible for ensuring crews follow appropriate methods during coating operations. Coating requires specialized expertise, not just for the execution of the work but also inspection of the work, therefore, coating inspection should only be performed by a Coating Inspector who has been qualified (e.g., NACE CIP Level 2) and has been specifically assigned this task. The Environmental Inspector supports the Coating Inspector by ensuring coating operations do not have an adverse affect on the environment.

The Environmental Inspector's responsibilities during coating include, but are not limited to:

- Ensure drips and spills from coating operations are captured and cleaned up properly; and
- Maintain the ROW by ensuring that debris from grit blasting operations is contained and disposed of properly (if non-environmentally friendly blast media is used) and waste from coating operations is cleaned up and disposed of properly.

7.8.2 Inputs

As part of preparing for Environmental inspection during Coating, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 75.

7.8.3 Execution

While the work is being executed, the EI is required to monitor workmanship and the construction's progress. Typical items that the EI will monitor for during the coating process are identified in a series of checklists as detailed in Table 74.

Table 74: Monitoring Requirements for Coating

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none">• On a daily basis, ensure key issues that have been identified are detailed and addressed	Table 76
Safety	<ul style="list-style-type: none">• Monitor the operations for adherence to relevant Owner Company and project specific safety requirements	Table 77



Item	Description	Reference
General	<ul style="list-style-type: none"> Identifies general items that should be monitored throughout the coating process 	Table 78
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 79
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 80
Air and Noise Pollution	<ul style="list-style-type: none"> Specific considerations relating to the atmosphere and that is particularly sensitive to construction activity 	Table 81

7.8.4 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for coating appear in Table 82.

Detailed Checklists – Coating

7.8.5 Typical Input Requirements for Coating Environmental Inspection

Table 75: Information Requirements for Coating

✓	Description
	All designs, drawings, and specifications developed by the Owner Company and Contractors related to coating, such as: <ul style="list-style-type: none"> Alignment Drawings Manufacturer supplied information (e.g., storage and handling requirements) Material Safety Data Sheet (MSDS) for coating material
	Permits related to: <ul style="list-style-type: none"> Environmental conditions and/or commitments Road Use Safe Work
	Owner Company specific Safety Plan, including (but not limited to): <ul style="list-style-type: none"> Requirements for Personal Protective Equipment (PPE) Emergency Medical Services (EMS)
	Project specific Environmental Protection Plan (EPP), detailing coating requirements
	Other project specific Plans, which may include: <ul style="list-style-type: none"> Worksite Coating Plan



7.8.6 Best Practice for Typical Coating Operations

Table 76: Prior to Commencing Work

✓	Description
	Participate in daily meetings to address: Job safety and/or hazard identification issues Environmental concerns Duties of Inspector(s) Pipeline Contractor's tailgate meetings (as required) Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	Ensure swamp mats, geotextiles, or corduroy are used if ground conditions are unstable and low-ground pressure equipment can not be used

Table 77: Safety Concerns for Coating

✓	Description
	Verify protection is in place to prevent blast media from entering valves, pipe, fittings and appurtenances

Table 78: Typical Monitoring Requirements – General

✓	Description
	Monitor for spills associated with coating materials and ensure clean-up of any spills is completed

Table 79: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Recommend minimizing the length of time the trench is left open during coating to minimize trench sloughing and interference with wildlife, livestock and landowners
	Review site specific requirements for blast media including method of containing, collecting, and disposing of debris from grit blasting operations (if non-environmentally friendly blast media is used)
	Ensure a tarp of sufficient size is used to block overspray when using spray or paint-on coatings.
	General housekeeping of coating related debris (e.g., gloves, brushes, rollers, containers, overspray) including proper disposal of waste products

Table 80: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
	There are no incremental specific monitoring requirements for watercourses, wetlands and aquatic life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

Table 81: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information



7.8.7 Typical Outputs for Coating

Table 82: Typical Reporting Requirements

✓	Description
General	
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
Daily	
	<p>Complete coating Environmental Inspection progress reports, including (but not limited to):</p> <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions, which includes: <ul style="list-style-type: none"> ○ Updated Environmental Commitment Tracking Tool <p>All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required</p>

7.8.8 References – Coating

Note to user: The reference information provided in Table 83 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 83: List of References – Coating

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Pipeline Construction Inspectors
The INGAA Foundation Inc.		
N/A	Best Practices	Environmental Inspector Guidance Recommended Qualifications



7.9 Lowering-In

7.9.1 Overview

Lowering-in refers to preparing the trench base (if required, due to presence of rock or stones, construction debris, or water in the trench), picking the pipe up from its temporary supports off the right of way (ROW) and placing it into an excavated trench after welding, non-destructive examination (NDE) coating of pipe joints, and completing any associated coating repairs.

A Lowering-in Inspector, sometimes referred to as a general or craft inspector, is responsible for ensuring crews follow appropriate methods during lowering-in operations. The Environmental Inspector supports the Lowering-in inspector by ensuring lowering-in operations do not have an adverse affect on the environment.

The Environmental Inspector's responsibilities during lowering-in include, but are not limited to:

- Assisting in planning for any activities to occur in sequence in a timely manner to limit the duration of an open trench;
- Ensuring topsoil is not used to pad the pipe; and
- Ensuring measures are taken to prevent erosion and contamination of adjacent lands, wetland, and watercourses during lowering-in activities.

7.9.2 Inputs

As part of preparing for Environmental inspection during Lowering-In, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 85.

7.9.3 Execution

While the work is being executed, the EI is required to monitor workmanship and the construction's progress. Typical items that the EI will monitor for during the lowering-in process are identified in a series of checklists as detailed in Table 84.

Table 84: Monitoring Requirements for Lowering-in

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> • On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 86
Safety	<ul style="list-style-type: none"> • Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 87
General	<ul style="list-style-type: none"> • Identifies general items that should be monitored throughout the lowering-in process 	Table 88



Item	Description	Reference
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 89
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 90
Air and Noise Pollution	<ul style="list-style-type: none"> Specific considerations relating to the atmosphere and that is particularly sensitive to construction activity 	Table 91

7.9.4 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for lowering-in appear in Table 92.

Detailed Checklists – Lowering-In

7.9.5 Typical Input Requirements for Lowering-In Environmental Inspection

Table 85: Information Requirements for Lowering-In

✓	Description
	All designs, drawings, and specifications developed by the Owner Company and Contractors related to lowering-in, such as: <ul style="list-style-type: none"> Alignment Drawings Access Road Drawings or Route Sheets Line List (e.g., special concerns for each Land Owner) Typical drawings (e.g., trench configurations, trench breaker design)
	Contracts and agreements related to: <ul style="list-style-type: none"> Road Use
	Permits related to: <ul style="list-style-type: none"> Environmental conditions and/or commitments (e.g., discharge permits for trench dewatering activities) Road Use
	Owner Company specific Safety Plan, including (but not limited to): <ul style="list-style-type: none"> Requirements for Personal Protective Equipment (PPE) Emergency Medical Services (EMS)
	Project specific Environmental Protection Plan (EPP), detailing lowering-in requirements
	Other project specific Plans, which may include: <ul style="list-style-type: none"> Relevant Contingency Plans (e.g., frac out during HDD operations) Stormwater Management Plan Erosion and Sediment Control Plan



7.9.6 Best Practice for Typical Lowering-In Operations

Table 86: Prior to Commencing Work

✓	Description
	Participate in daily meetings to address: <ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Pipeline Contractor's tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	Inspect the open trench and pipe for trapped animals and ensure removal before commencing work
	Ensure swamp mats, geotextiles, or corduroy are used if ground conditions are unstable and low-ground pressure equipment can not be used
	Ensure stormwater management plans are in place
	Seasonal (Winter) Conditions
	Ensure that snow and ice in ditch is removed before lowering-in commences

Table 87: Safety Concerns for Lowering-in

✓	Description
	There are no incremental specific Safety Concerns beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

Table 88: Typical Monitoring Requirements – General

✓	Description
	Ensure removal and proper disposal of construction related debris

Table 89: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Recommend minimizing the length of time the trench is left open to minimize trench sloughing and interference with wildlife, livestock and landowners
	Recommend the use of end caps to prevent wildlife from becoming confined or trapped in the pipe
	Ensure topsoil is not used as a padding material

Table 90: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
	Trench Dewatering
	Please refer to section 7.6.6 Best Practice for Typical Ditching and Excavation Operations, Table 60, for inspection requirements for Trench Dewatering
	Trench Drainage
	Ensure drain tiles are pre-located per alignment drawings



✓	Description
	Ensure drain tiles are not damaged during lowering-in operations

Table 91: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

7.9.7 Typical Outputs for Lowering-in

Table 92: Typical Reporting Requirements

✓	Description
General	
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here
Daily	
	Complete lowering-in Environmental Inspection progress reports, including (but not limited to): <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions, which includes: <ul style="list-style-type: none"> ○ Updated Environmental Commitment Tracking Tool All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required

7.9.8 References – Lowering-in

Note to user: The reference information provided in Table 93 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 93: List of References – Lowering-in

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Pipeline Construction Inspectors
The INGAA Foundation Inc.		
N/A	Best Practices	Environmental Inspector Guidance Recommended Qualifications



7.10 Backfilling

7.10.1 Overview

Backfilling refers to refilling the trench with the previously excavated or new fill subsoil once the pipe section has been lowered into the trench. As backfilling operations begin, the soil is returned to the trench in reverse order, with the subsoil put back first, followed by the topsoil. This ensures that the topsoil is returned to its original position.

An Earthworks Inspector, sometimes referred to as a general or craft inspector, is responsible for ensuring crews follow appropriate methods during backfilling operations. The Environmental Inspector supports the Earthworks Inspector by ensuring backfilling operations do not have an adverse affect on the environment.

The Environmental Inspector’s responsibilities during backfilling include, but are not limited to:

- Ensuring soil productivity is maintained by preventing excessive soil mixing or compaction;
- Ensuring backfill material is suitable and placed in an environmentally responsible manner; and
- Ensuring adequate erosion protection, both in the trench and on the surface.

7.10.2 Inputs

As part of preparing for Environmental inspection during Backfilling, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 95.

7.10.3 Execution

While the work is being executed, the EI is required to monitor workmanship and the construction’s progress. Typical items that the EI will monitor for during the backfilling process are identified in a series of checklists as detailed in Table 94.

Table 94: Monitoring Requirements for Backfilling

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> • On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 96
Safety	<ul style="list-style-type: none"> • Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 97
General	<ul style="list-style-type: none"> • Identifies general items that should be monitored throughout the backfilling process 	Table 98



Item	Description	Reference
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 99
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 100
Air and Noise Pollution	<ul style="list-style-type: none"> Specific considerations relating to the atmosphere and that is particularly sensitive to construction activity 	Table 101

7.10.4 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for backfilling appear in Table 102.

Detailed Checklists – Backfilling

7.10.5 Typical Input Requirements for Backfilling Environmental Inspection

Table 95: Information Requirements for Backfilling

✓	Description
	<p>All designs, drawings, and specifications developed by the Owner Company and Contractors related to backfilling, such as:</p> <ul style="list-style-type: none"> Alignment Drawings Access Road Drawings or Route Sheets Line List (e.g., special concerns for each Land Owner) Backfill Specifications
	<p>Contracts and agreements related to:</p> <ul style="list-style-type: none"> Road Use Regulatory Approvals
	<p>Permits related to:</p> <ul style="list-style-type: none"> Environmental conditions and/or commitments Road Use Safe Work Third Party Crossing Agreements
	<p>Owner Company specific Safety Plan, including (but not limited to):</p> <ul style="list-style-type: none"> Requirements for Personal Protective Equipment (PPE) Emergency Medical Services (EMS)
	<p>Project specific Environmental Protection Plan (EPP), detailing backfilling requirements</p>
	<p>Other project specific Plans, which may include:</p> <ul style="list-style-type: none"> Refer to project documentation for incremental specific requirements Grading Plans



✓	Description
	<ul style="list-style-type: none"> • Stormwater Management Plan • Erosion and Sediment Control Plan

7.10.6 Best Practice for Typical Backfilling Operations

Table 96: Prior to Commencing Work

✓	Description
	Participate in daily meetings to address: <ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Pipeline Contractor’s tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	Ensure swamp mats, geotextiles, or corduroy are used if ground conditions are unstable and low-ground pressure equipment can not be used
	Ensure stormwater management plans are in place
	Prior to backfilling, ensure the trench has been inspected to make sure it is free of debris and wildlife

Table 97: Safety Concerns for Backfilling

✓	Description
	There are no incremental specific Safety Concerns beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

Table 98: Typical Monitoring Requirements – General

✓	Description
	Recommend minimizing the length of time the trench is left open to minimize trench sloughing and interference with wildlife, livestock and landowners
	Ensure all backfilling activities are confined to the construction ROW
	Ensure that the right of way (ROW) is left in as close to original condition as possible

Table 99: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Backfill Material and Process
	Ensure that the back fill material is soft and free from large rocks, stumps, or any other foreign material that can dent the pipe or scratch the external coating as per Owner Company specifications
	Confirm that the Contractor uses only Owner Company approved select / imported backfill
	Ensure any additional backfill required is obtained from appropriate land authority
	Follow project or owner company specific requirements in instances where the preconstruction grade can not be restored



✓	Description
	Ensure that topsoil is never used as padding material or fill
	Check that contaminated backfill material is not placed in the trench and is disposed of properly
	Ensure larger rocks with sizes too large for backfill are hauled away or stacked neatly along the ROW as specified in Owner Company specifications and drawings
	Ensure no machinery passes over the topsoil pile while backfilling spoil and prevent mixing of spoil with the topsoil pile
	Confirm that Contractor is using auger equipment for backfill where coarse fragments are encountered in trench materials
	Ensure proper equipment (i.e., with fine depth control) is used for final pass of backfilling to reduce the risk of scalping
Final Backfilled Surface / Compaction	
	Confirm that the top-most specified depth of the backfilled trench and crown for cultivated land are similar to pre-existing conditions
	Ensure project or owner specification are followed for feathering out excess spoil over salvaged area
	Ensure that the Contractor compacts the spoil in the trench so that the trench crown (berm) is no higher than specified by Owner Company
	If possible, backfill and compact the trench in lifts in areas where no trench crown will be permitted (e.g., road shoulders, bar ditches, agricultural lands)
	Ensure soil compacting or decompacting of agricultural (cultivated, pasture, and native range) land is carried out if specified in Owner Company or project specifications, drawings, and line lists
	Continually observe for sinkholes along the ditch line
	Confirm that the Contractor will conduct final clean-up when soils are dry and unfrozen for freehold and crown white lands. Final clean-up should be delayed until spring when spoil can be adequately compacted in the trench and spoil and topsoil can be removed from the sod surface more accurately
Winter Construction	
	Ensure backfilling is completed prior to spring break-up
	If feasible, postpone compaction of frozen trench spoil till late spring or early summer
	If feasible, postpone feathering-out of excess spoil until after spring break-up
	Ensure solidified or frozen backfill is broken up with a screw auger, power dozer, or other approved equipment
	Ensure that any snow or ice is removed from the compacted layer prior to placement of subsequent layers
	Ensure that during winter construction, the Contractor leaves a trench crown (berm) over the trench to compensate for settlement upon thawing of frozen soils as indicated in Owner Company specifications, construction drawings, and agreements
	Ensure appropriate erosion control measures are in place for trench spoil and any recontoured slopes, when working with frozen soils during winter conditions

Table 100: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
Trench Water Considerations During Backfill	
	Ensure drain tiles are installed per Owner Company specifications in areas where there is potential for seepage into the trench
	Check that trench breakers are installed at the locations defined by the terrain and project specifications
	Confirm that Contractor has installed and keyed in (embedded in the side of the ditch) trench breakers
	Ensure topsoil is not used as a trench breaker



✓	Description
	Ensure appropriate material (e.g., mix of bentonite and sand, or foam) is used for constructing trench breakers
Surface Water Drainage	
	Confirm that the Contractor has provided adequate water erosion protection (e.g., installing suitable geotextiles, earth filled sacks, or rock riprap) where surface drainage crosses the trench line to prevent surface drainage from flowing down trench line
	Ensure that overall drainage control measures are undertaken as advised by the line list
	Confirm that the Contractor re-contours graded portions of the ROW to match the surrounding landforms and drainage patterns
	Ensure that Contractor leaves openings in the trench crown (berm) as required to allow for natural drainage of surface water

Table 101: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

7.10.7 Typical Outputs for Backfilling

Table 102: Typical Reporting Requirements

✓	Description
General	
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
Daily	
	<p>Complete backfilling Environmental Inspection progress reports, including (but not limited to):</p> <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Locations of damaged drain tiles for repair ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions, which includes: <ul style="list-style-type: none"> ○ Updated Environmental Commitment Tracking Tool <p>All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required</p>

7.10.8 References – Backfilling

Note to user: The reference information provided in Table 103 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.



Table 103: List of References – Backfilling

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Pipeline Construction Inspectors
The INGAA Foundation Inc.		
N/A	Best Practices	Environmental Inspector Guidance Recommended Qualifications



7.11 Cathodic Protection

7.11.1 Overview

Cathodic protection (CP) is a technique used to control corrosion of a pipeline's metal surface by making the pipeline the cathode of an electrochemical cell. In other words, CP is a simple method of protection where the pipeline is connected to a more easily corroded (sacrificial) metal (e.g., magnesium) which acts as the anode. The sacrificial metal then corrodes instead of the pipeline. However, for long pipelines, this passive galvanic cathodic protection is not adequate, and an external direct current (DC) electrical power source (rectifier) can be used to provide additional electrical current to protect the pipe.

A Maintenance (i.e., Integrity) Inspector, sometimes referred to as a general or craft inspector, is responsible for ensuring crews follow appropriate methods for installing cathodic protection on the pipeline. The Environmental Inspector supports the Maintenance Inspector by ensuring operations do not have an adverse affect on the environment.

The Environmental Inspector's responsibilities during cathodic protection activities include, but are not limited to:

- Ensuring cathodic protection installation has no adverse effects on the surrounding environment.

7.11.2 Inputs

As part of preparing for Environmental inspection during Cathodic Protection (CP) installation, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 105.

7.11.3 Execution

While the work is being executed, the EI is required to monitor workmanship and the construction's progress. Typical items that the EI will monitor for during the cathodic protection installation process are identified in a series of checklists as detailed in Table 104.

Table 104: Monitoring Requirements for Cathodic Protection

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> • On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 106
Safety	<ul style="list-style-type: none"> • Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 107
General	<ul style="list-style-type: none"> • Identifies general items that should be monitored throughout the cathodic protection installation process 	Table 108



Item	Description	Reference
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 109
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 110
Air and Noise Pollution	<ul style="list-style-type: none"> Specific considerations relating to the atmosphere and that is particularly sensitive to construction activity 	Table 111

7.11.4 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for cathodic protection installation appear in Table 112.

Detailed Checklists – CP

7.11.5 Typical Input Requirements for Cathodic Protection Environmental Inspection

Table 105: Information Requirements for Cathodic Protection

✓	Description
	All designs, drawings, and specifications developed by the Owner Company and Contractors related to cathodic protection installation, such as: <ul style="list-style-type: none"> Alignment Drawings Access Road Drawings or Route Sheets Line List (e.g., special concerns for each Land Owner) Locations and Types of Ground Beds and Anodes
	Contracts and agreements related to: <ul style="list-style-type: none"> Road Use
	Permits related to: <ul style="list-style-type: none"> Environmental conditions and/or commitments Road Use
	Owner Company specific Safety Plan, including (but not limited to): <ul style="list-style-type: none"> Requirements for Personal Protective Equipment (PPE) Emergency Medical Services (EMS)
	Project specific Environmental Protection Plan (EPP)
	Other project specific Plans, which may include: <ul style="list-style-type: none"> Cathodic Protection and Installation Fire Prevention / Fire Fighting



7.11.6 Best Practice for Typical CP Operations

Table 106: Prior to Commencing Work

✓	Description
	Participate in daily meetings to address: <ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Pipeline Contractor's tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work

Table 107: Safety Concerns for Cathodic Protection

✓	Description
	During periods of high fire hazards, ensure crews have sufficient fire suppression capability during cathodic protection installation

Table 108: Typical Monitoring Requirements – General

✓	Description
	Ensure all cathodic protection installation activities are confined to the ROW or ground bed locations
	Ensure removal and proper disposal of cathodic protection installation related debris from the ROW
	Ensure that the right of way (ROW) is left in as close to original condition as possible

Table 109: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Ensure the location of ground beds have no adverse effect on the soil, vegetation, and terrestrial life
	Ensure the ground bed materials have no anticipated adverse effect on the surrounding soil, vegetation, and terrestrial life
	Confirm that the Contractor re-contours graded portions of the ROW or ground bed locations to match the surrounding landforms and drainage patterns

Table 110: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
	There are no incremental specific monitoring requirements for watercourses, wetlands, and terrestrial life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

Table 111: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information



7.11.7 Typical Outputs for CP

Table 112: Typical Reporting Requirements

✓	Description
General	
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
Daily	
	<p>Complete cathodic protection Environmental Inspection progress reports, including (but not limited to):</p> <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions, which includes: <ul style="list-style-type: none"> ○ Updated Environmental Commitment Tracking Tool <p>All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required</p>

7.11.8 References – Cathodic Protection

Note to user: The reference information provided in Table 113 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 113: List of References – Cathodic Protection

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Pipeline Construction Inspectors
The INGAA Foundation Inc.		
N/A	Best Practices	Environmental Inspector Guidance Recommended Qualifications



7.12 Hydrostatic Testing

7.12.1 Overview

A hydrostatic test is a form of pressure testing used to confirm that the pipeline has acceptable strength and will not leak under operating conditions. Hydrostatic testing uses water (as opposed to air) to perform the test.

A Pressure Testing inspector, sometimes referred to as a general or craft inspector, is responsible for ensuring crews follow appropriate methods during hydrostatic testing. The Environmental Inspector supports the Pressure Testing inspector by ensuring hydrostatic testing operations do not have an adverse affect on the environment.

Environmental Inspector's responsibilities during hydrostatic testing include, but are not limited to:

- Permitting for test water withdrawal and discharge;
- Monitoring test water withdrawal and discharge to ensure the activities adhere to the permit requirements and minimize impact on surrounding environments (i.e., prevent contamination, erosion, or sediment accumulation in sensitive areas); and
- Reporting for test water withdrawal and discharge.

7.12.2 Inputs

As part of preparing for Environmental inspection during hydrostatic testing, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 115.

7.12.3 Execution

While the work is being executed, the EI is required to monitor workmanship and the construction's progress. Typical items that the EI will monitor for during the hydrostatic testing process are identified in a series of checklists as detailed in Table 114.

Table 114: Monitoring Requirements for Hydrostatic Testing

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> • On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 116
Safety	<ul style="list-style-type: none"> • Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 117
General	<ul style="list-style-type: none"> • Identifies general items that should be monitored throughout the hydrostatic testing process 	Table 118
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> • Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 119



Item	Description	Reference
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 120
Air and Noise Pollution	<ul style="list-style-type: none"> Specific considerations relating to the atmosphere and that is particularly sensitive to construction activity 	Table 121

7.12.4 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for hydrostatic testing appear in Table 122.

Detailed Checklists – Hydrostatic Testing

7.12.5 Typical Input Requirements for Hydrostatic Testing Environmental Inspection

Table 115: Information Requirements for Hydrostatic Testing

✓	Description
	<p>All designs, drawings, and specifications developed by the Owner Company and Contractors related to hydrostatic testing, such as:</p> <ul style="list-style-type: none"> Alignment Drawings Access Road Drawings or Route Sheets Line List (e.g., special concerns for each Land Owner) Drawings specific to hydrostatic test (including but not limited to): <ul style="list-style-type: none"> Temporary Launchers and Receivers Elevation Profiles
	<p>Contracts and agreements related to:</p> <ul style="list-style-type: none"> Environmental Assessments Heritage Surveys
	Regulatory requirements for water withdrawal and discharge
	<p>Permits related to:</p> <ul style="list-style-type: none"> Environmental conditions and/or commitments Water Withdrawal and Discharge Commitments
	<p>Owner Company specific Safety Plan, including (but not limited to):</p> <ul style="list-style-type: none"> Traffic Control Plan Specified Minimum Setback Distance for Personnel and Testing Equipment Requirements for Personal Protective Equipment (PPE) Emergency Medical Services (EMS) Emergency Contact List
	Project specific Environmental Protection Plan (EPP), detailing hydrostatic testing requirements
	Other project specific Plans, which may include:



✓	Description
	<ul style="list-style-type: none"> • Hydrostatic Test Plan addressing (but not limited to) the following items: <ul style="list-style-type: none"> ○ Site specific safety and/or hazards and appropriate analysis ○ Emergency Response Plan in the event of a rupture during the test ○ Test water sourcing, filling, pressurizing, depressurizing, and dewatering ○ Hydrostatic testing warning signage ○ Provision of protective berms around fuel storage used to supply fuel-driven line fill pumps (as required) • Stormwater Management Plan • Erosion and Sediment Control Plan

7.12.6 Best Practice for Typical Hydrostatic Testing Operations

Table 116: Prior to Commencing Work

✓	Description
	Participate in daily meetings to address: <ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Pipeline Contractor's tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	Check the signage and contact information at public access points to the right of way (ROW), and if required, temporarily restrict access points
	Ensure stormwater management plans are in place
	Ensure that test water withdrawal and disposal notifications, registrations, approvals and/or permits are in place
	Ensure that the required water source volumes and flow rates meet regulatory conditions
	Prior to and upon completion of a hydrostatic test, ensure that the local authorities are alerted, if required

Table 117: Safety Concerns for Pressure Testing

✓	Description
	Familiarize yourself with safety zones around test heads / pigging launchers and receivers and ensure they are maintained throughout the operation

Table 118: Typical Monitoring Requirements – General

✓	Description
	Ensure all hydrostatic testing activities are confined to the ROW
	Ensure removal and proper disposal of hydrostatic testing related debris from the ROW
	Ensure that the right of way (ROW) is left in as close to original condition as possible following hydrostatic testing operations
	Ensure specialized Pressure Testing (i.e., general) Inspector is engaged to identify additional environmental requirements



Table 119: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Ensure all stationary equipment (e.g., pumps, generators, fuel containers) have measures in place to prevent spills onto soils (e.g., secondary containment, polyethylene sheeting)

Table 120: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
	Ensure all stationary equipment (e.g., pumps, generators, fuel containers) within 100 m of a watercourse or water body are in secondary containment
	Ensure all equipment to be used within specified distances from a watercourse or water body is clean and free of leaks and are equipped with approved spill kits
	Ensure that appropriate containment is installed for receipt of any cleaning / drying pigs
Withdrawing Test Water	
	Ensure that the Contractor withdraws test water from locations approved in the water permit or the Environmental Protection Plan (EPP) and not from environmentally sensitive areas (e.g., steep slopes)
	Ensure water withdrawal sources have sufficient quantity and quality of water (e.g., avoid high saline sources) for the pressure test
	Ensure proper use of screens to prevent entrapment of fish or wildlife and any debris during water withdrawal
	When withdrawing water from a fish-bearing waterbody, ensure applicable approval is in place and instream restricted activity period are adhered to
	Confirm that the test water is collected and sent to the laboratory for testing so that results are available in a timely manner
	Confirm that a portable laboratory for testing the water quality is available (if required)
	Ensure water tanks are thoroughly clean inside, when used for transporting test water
	Ensure the withdrawal rate adhere to the limits in the permit and project or owner company specifications; do not exceed those withdrawal rates without regulatory approval
	Ensure project or company specification are adhered to when using additives (e.g., methanol) in the test water; if possible, minimize the use of additives
	Ensure all conditions outlined in applicable permits for water withdrawal are adhered to
Pressure Testing	
	Ensure contingency measures are adhered to when spills or leaks occur
Dewatering the Pipe	
	Ensure that the Contractor dewater to locations approved in the water permit or the Environmental Protection Plan (EPP) and avoid dewatering to environmentally sensitive areas (e.g., steep slopes, muskeg)
	Ensure all conditions outlined in applicable permits for water discharge are adhered to
	Ensure test water withdrawn from one basin is not discharged into another drainage basin to prevent transfer of aquatic organisms
	Ensure that the Contractor does not dewater until proper sampling is completed and filtration unit is in place (if required)
	Ensure water with chemical additive is sampled and treated prior to discharging at approved location and/or sites
	Ensure that the Contractor installs an energy absorbing diffuser at the discharge end of the dewatering line to prevent erosion, bottom scour, or damage to vegetation
Drying the Pipe	
	Ensure drying agents (e.g., methanol) is appropriately captured and disposed of at approved sites



Table 121: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

7.12.7 Typical Outputs for Hydrostatic Testing

Table 122: Typical Reporting Requirements

✓	Description
General	
	Submit reporting for test water withdrawal and discharge, if necessary
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
Daily	
	Complete hydrostatic testing Environmental Inspection progress reports, including (but not limited to): <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions, which includes: <ul style="list-style-type: none"> ○ Updated Environmental Commitment Tracking Tool All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required

7.12.8 References – Hydrostatic Testing

Note to user: The reference information provided in Table 123 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 123: List of References – Hydrostatic Testing

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Pipeline Construction Inspectors
The INGAA Foundation Inc.		
N/A	Best Practices	Environmental Inspector Guidance Recommended Qualifications



7.13 Clean-up and Restoration

7.13.1 Overview

Construction site clean-up is the final cleaning and removal of construction materials left over from the pipeline right of way (ROW) and surrounding area. All materials not native to the site are removed. Construction site clean-up is important to the Owner Company because it:

- Provides tangible examples of Owner Company's attention to detail during construction
- Helps to ensure regulatory agencies and Land Owners are satisfied
- Sets the stage for Land Owner acquiescence, agreement, and support when approached for future projects

Clean-up work can be performed in phases depending on the location and season of construction. For example, during winter construction, the Contractor will perform the machine or initial clean-up immediately after the end of construction and before the spring breakup, then return to the site the following winter to do the final clean-up.

However, during summer construction, the Contractor will do both machine and final clean-up immediately after the end of construction and return to the site at a later date for additional restoration work (e.g., repairing a sunken ditch).

An Earthworks Inspector, sometimes referred to as a general or craft inspector, is responsible for ensuring crews follow appropriate methods during clean-up and restoration activities. The Environmental Inspector supports the Earthworks Inspector by ensuring clean-up and restoration operations do not have an adverse affect on the environment.

The Environmental Inspector's responsibilities during clean-up and restoration activities include, but are not limited to:

- Check that soil compaction contingency measures have been implemented;
- Check that erosion and sedimentation control measures have been implemented correctly;
- Ensure replanting of appropriate vegetation has occurred; and
- Ensure appropriate disposal of construction related debris.

7.13.2 Inputs

As part of preparing for Environmental inspection during clean-up and restoration, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 125.



7.13.3 Execution

While the work is being executed, the EI is required to monitor workmanship and report on progress on a periodic basis. Typical items that the EI will monitor for during the clean-up and restoration process are identified in a series of checklists as detailed in Table 124.

Table 124: Monitoring Requirements for Clean-up and Restoration

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 126
Safety	<ul style="list-style-type: none"> Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 127
General	<ul style="list-style-type: none"> Identifies general items that should be monitored throughout the clean-up and restoration process 	Table 128
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 129
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 130
Air and Noise Pollution	<ul style="list-style-type: none"> Specific considerations relating to the atmosphere and that is particularly sensitive to construction activity 	Table 131

7.13.4 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for clean-up and restoration appear in Table 132.

Detailed Checklists – Clean-up and Restoration

7.13.5 Typical Input Requirements for Clean-Up and Restoration Environmental Inspection

Table 125: Information Requirements for Clean-Up and Restoration

✓	Description
	All designs, drawings, and specifications developed by the Owner Company and Contractors related to clean-up and restoration, such as: <ul style="list-style-type: none"> Alignment Drawings Access Road Drawings or Route Sheets Grading Drawings Line List (e.g., special concerns for each Land Owner)
	Contracts and agreements related to: <ul style="list-style-type: none"> Road Use



✓	Description
	<ul style="list-style-type: none"> • Crossing for Buried Facilities
	Permits related to: <ul style="list-style-type: none"> • Environmental conditions and/or commitments • Road Use • Watercourse crossings including wetlands
	Owner Company specific Safety Plan, including (but not limited to): <ul style="list-style-type: none"> • Requirements for Personal Protective Equipment (PPE) • Procedures for working around overhead powerlines • Emergency Medical Services (EMS)
	Project specific Environmental Protection Plan (EPP), detailing clean-up and restoration requirements
	Other project specific Plans, which may include: <ul style="list-style-type: none"> • Grading Plan • Clean-up and ROW Restoration Plan • Heritage Sites • Stormwater Management Plan • Erosion and Sediment Control Plan

7.13.6 Best Practice for Typical Clean-Up and Restoration Operations

Table 126: Prior to Commencing Work

✓	Description
	Participate in daily meetings to address: <ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Pipeline Contractor's tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	Ensure swamp mats, geotextiles, or corduroy are used if ground conditions are unstable and low-ground pressure equipment can not be used
	Ensure stormwater management plans are in place

Table 127: Safety Concerns for Clean-up and Restoration

✓	Description
	There are no incremental specific Safety Concerns beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information



Table 128: Typical Monitoring Requirements – General

✓	Description
	Ensure no surplus construction or pipeline materials are left on the ROW (refer to contract documents to determine which materials will be stored and which will be scrapped)
	Ensure rock material from construction or excavation that was not reused is removed from the ROW and hauled to an Owner Company approved dump site or distributed within a specific portion of the ROW
	Confirm that clean-up equipment heavier than allowed in the construction specifications do not operate over top the pipeline
	Ensure special restoration requirements of Land Owners are adhered to
	Confirm the backfill roach is not blocking any drainage, access roads, recreational trails, or wildlife/livestock trails across the ROW and that sufficient gaps have been included to allow cross-drainage
	Ensure that for winter construction, the ROW is stabilized after construction and during machine clean-up to prevent erosion during the spring thaw. Final clean-up may be completed during the following construction season, either fall or winter, depending on ground conditions
	Confirm that the Contractor will conduct final clean-up when soils are dry and unfrozen
Road Crossing	
	Confirm that all temporary access roads built during construction are removed and reclaimed per contract requirements
	Ensure road surfaces, fences and gates, signs, etc. are replaced or restored per contract requirements
	Ensure road system drainage is repaired, modified and/or replaced per contract requirements
Fencing	
	Ensure all temporary fences and barricades have been removed per Owner Company specifications
	Ensure that all fencing at compressor, sales / receipt meter stations, and valve locations has been restored or replaced

Table 129: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
Soil Compaction Contingency Measures	
	Ensure ROW locations occupied during construction are de-compacted to loosen subsoil before replacing topsoil, if required
	Locate areas where soil compaction contingency measures apply, in consultation with Construction Manager
	Ensure appropriate contingency measures are implemented (e.g., provide alternate access to construction ROW, reduce traffic along construction ROW) where compaction is occurring and topsoil was not salvaged on the ROW
	Ensure appropriate contingency measures are implemented (e.g., harrow the area to prepare a seed bed, straw crimp on erosion prone soils) during clean-up and reclamation where soil and/or sod compaction occurred
	Ensure that appropriate equipment is used to remove compaction
Topsoil Replacement	
	Ensure stones are removed from the topsoil and subsoil, if applicable
	Ensure the subsoil surface is smooth, uniform, and level for topsoil replacement
	Ensure topsoil is only handled when weather conditions permit (e.g., heavy rain may disrupt operations) and in accordance with Owner Company specifications / procedures and Land Owner agreements
	Ensure all holes, ruts, and depressions are filled with subsoil
	Ensure topsoil has been replaced evenly throughout work area to a depth comparable to pre-construction and off-ROW conditions



✓	Description
Erosion Control	
	Confirm all erosion prone slopes are re-vegetated by seeding with approved mixes, erosion control matting, hydro-seeding and/or hydro-mulching as per Owner Company specifications and Land Owner agreements
	Ensure that previously existing contours in landscape are recreated
	Check placement of erosion control measures for compliance with Owner Company specifications
	Ensure water quality is maintained while applying erosion control at a watercourse
Replanting and Reseeding	
	Ensure that ROW preparation is suitable for the application of fertilizers and seeds per Owner Company specifications as well as Land Owner agreements
	Confirm that the final soil surface is prepared adequately for seeding, taking into consideration soil conditions, weather conditions, ROW requirements, and surrounding land use
	Confirm all seed mixes, fertilizers, rates, equipment and techniques of application have been approved by Owner Company and Land Owner agreements
	Ensure areas where soil stabilization is required (e.g., slopes, stream banks) have been seeded, fertilized, hydro-seeded, or sprayed with a tackifier (a soil adhesive) / mulch mixture
	Ensure trees and shrubs have been replanted or transplanted to meet Owner Company specifications and Land Owner agreements
	Ensure all original vegetation, including seeds, sod, grass, shrubs, and trees are restored or replaced, including fertilizing per Owner Company specifications and Land Owner agreements, if required

Table 130: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
Terraces, Drainage, Diversion Berms, and Slope Protection	
	Check that the construction of terraces, berms or cross ditches on the ROW divert surface runoff to adjacent vegetated areas or existing drainage systems have been completed
	Check cross-drainage or watercourses for operability
Watercourses and Crossings	
	Ensure water crossings are restored to pre-construction conditions and erosion and sediment control measures are installed per Owner Company specifications, Land Owner agreements, or as required
	Ensure riparian zones at creek and river crossings are stabilized by installing site specific reclamation features

Table 131: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

7.13.7 Typical Outputs for Clean-Up and Restoration

Table 132: Typical Reporting Requirements

✓	Description



General	
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
Daily	
	<p>Complete clean-up and restoration Environmental Inspection progress reports, including (but not limited to):</p> <ul style="list-style-type: none"> • Daily progress of the Contractor's clean-up activities with starts and end chainages / station numbers of daily progress, including sections not cleaned up yet and why • Depth of replaced topsoil • Compaction depths • Start / stops on any specialized compaction removal • Drain tile station locations • Location and type of sediment control measures retained • Work completed to date, including: <ul style="list-style-type: none"> ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions, which includes: <ul style="list-style-type: none"> ○ Updated Environmental Commitment Tracking Tool <p>All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required</p>

7.13.8 References – Clean-Up and Restoration

Note to user: The reference information provided in Table 133 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 133: List of References – Clean-Up and Restoration

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Pipeline Construction Inspectors
The INGAA Foundation Inc.		
N/A	Best Practices	Environmental Inspector Guidance Recommended Qualifications



8 PLANNING AND CONSTRUCTING FACILITIES

8.1 Overview

Planning and Constructing Facilities consists of the following major components and associated activities:

1. General Station Layout and Preparation
 - Survey
 - Clearing and Grading
 - Stormwater Management Facilities
 - Stockpiling and Material Handling
 - Trenching and Excavation
 - Foundations and Reinforced Concrete
 - Backfilling
2. High Pressure Pipe
 - Trenching and Excavation
 - Foundations and Reinforced Concrete
 - Structural Steel
 - Lifting and Setting
 - Welding and Joining
 - Coating / Painting
 - Hydrostatic Testing
 - Cathodic Protection
3. Buildings
 - Foundations and Reinforced Concrete
 - Structural Steel
 - Welding and Joining
 - Coating / Painting
 - Lifting and Setting
 - Utility Power (AC Electrical Systems)
 - Heating, Ventilation, and Air Conditioning (HVAC)
 - Fire Suppression and Domestic Systems
 - Building Lighting
4. Electrical
 - Alternating Current (AC) Electrical Systems
 - Electrical Controls and Instrumentation
 - Grounding
5. High Voltage Switchyards
 - Foundations and Reinforced Concrete
 - Structural Steel
 - Welding and Joining
 - Coating / Painting



- Lifting and Setting
- Switchgear
- 6. Compressor / Pump Packages
 - Foundations and Reinforced Concrete
 - High Pressure Pipe
 - Structural Steel
 - Lifting and Setting
 - Electrical Controls and Instrumentation
- 7. Vendor / Pre-packaged Equipment
 - Foundations and Reinforced Concrete
 - Lifting and Setting
- 8. Supervisory Control and Data Acquisition (SCADA) Systems
- 9. Site Clean-up

The relevant environmental inspection requirements are described in this section.



8.2 General Station Layout and Preparation

8.2.1 Overview

General station layout and preparation consists of the following major items during the construction of a facility:

- Survey
- Clearing and Grading
- Stormwater Management Facilities
- Stockpiling and Material Handling
- Trenching and Excavation
- Foundations and Reinforced Concrete
- Backfilling

These items are presented within this section, roughly in sequence of construction.

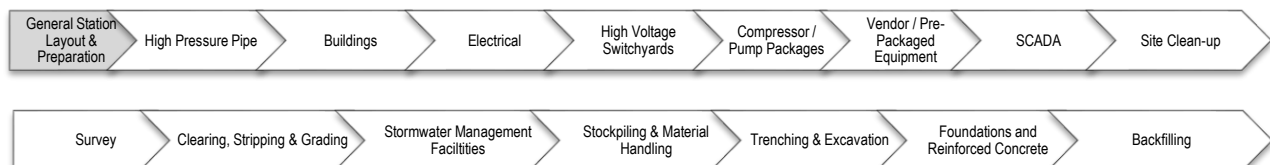
Survey

Surveying is an integral part of facilities construction, and refers to the installation of visual reference points and markers (e.g., stakes, pins, lath, and hubs) that will define the facility site limits and guide the construction of the facility according to the Issued for Construction (IFC) drawings. The references also mark the safe limits of facility work areas as well as sensitive environmental features outlined in the environmental protection plan (EPP) or equivalent. If the area for the approved facility is forested, Construction Surveyors are commonly the first to arrive to flag trees so Clearing Contractors can cut them down for facility construction.

The general inspector is the technical liaison for survey information between the Construction Manager / Chief Inspector (or designate), Survey Contractor, and other on-site Contractors. The Environmental Inspector supports the general inspector by ensuring surveying activities do not have an adverse affect on the environment, as well as ensuring environmental features are adequately marked.

Environmental Inspector's (EI) responsibilities during surveying include, but are not limited to:

- Providing clear instructions for surveying activities conducted in the vicinity of environmentally sensitive areas to reduce disturbance of site-specific environmental resources; and
- Identifying areas associated with special permit conditions (e.g., riparian areas, and designated wetlands).



Clearing and Grading

Clearing and grading is the next phase of facilities construction after surveying, where the facility site is prepared for the upcoming installation activities. Key steps of the clearing and grading process typically include:

- Clearing, which involves the cutting of trees and brush from the facility site limits and access roads
- Grubbing, which involves the removal of tree stumps and large roots from specific areas of the facility site limits
- Timber salvage, which involves the recovery and temporary storage of useful, merchantable timber from the facility site limits
- Unsalvageable timber and brush disposal, which involves the removal or elimination on-site non-merchantable timber and brush by chipping, mulching, or burning
- Stripping, which involves the removal and storage of topsoil for later redistribution
- Erosion control and soil erosion contingency measures
- Cut and fill activities for preliminary grading
- Fencing
- Preparation and maintenance of facility site access
- Line location of buried utilities (both Owner Company and foreign)
- In some cases, grade rock blasting, excavation, and removal may be required

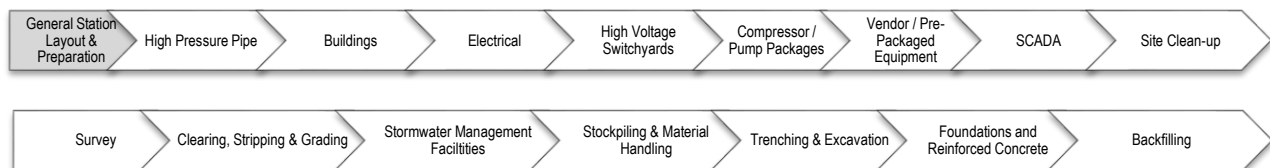
An Earthworks Inspector, sometimes referred to as a general or craft inspector, is responsible for ensuring crews follow appropriate methods during clearing, stripping, and grading operations. The Environmental Inspector supports the Earthworks Inspector by ensuring clearing, stripping, and grading operations do not have an adverse affect on the environment.

Environmental Inspector's (EI) responsibilities during clearing, stripping, and grading include, but are not limited to:

- Ensure proper handling, salvage, and disposal of merchantable and non-merchantable timber as per project requirements; and
- Ensure soil productivity is maintained by implementing proper soil handling techniques (e.g., prevent mixing of topsoil with subsoil).

Stormwater Management Facilities

Stormwater management facilities, including site sewer systems, are typically installed after clearing and grading of the facility site. They essentially manage the surface flow of water within the facility site in order to:



- Contain excess rain and ground water from impervious surfaces (e.g., sidewalks)
- Manage and control snow melt
- Contain sedimentation on site
- Minimize erosion
- Minimize flooding on adjacent property

The bulk of the inspection requirements are focused on the Civil discipline. There are no Environmental Inspector's (EI) responsibilities for the civil components of stormwater management. However, an EI is responsible for stormwater management during construction activities. Those inspection requirements can be found in the A Practical Guide for Environmental Construction Inspectors – Foundational Information.

Stockpiling and Material Handling

As materials are received at the facility site, the Stockpiling and Material Handling Inspector is typically responsible for:

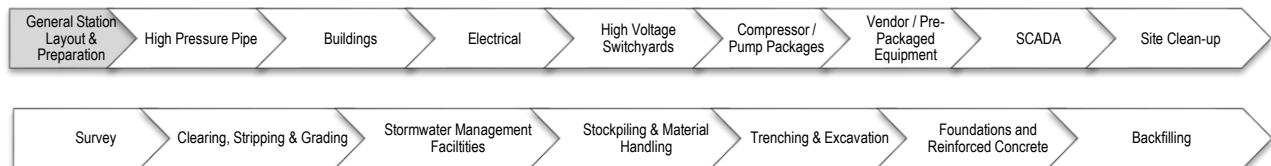
- Inspection of all received materials and log into Material Receiving Reports (MRRs) as required by Owner Company
- Quarantine and return of any materials that are damaged or do not meet specifications according to the Owner Company's processes
- Storage of materials in accordance with the Manufacturer's recommended practices, standards, and / or specifications

A Stockpiling and Material Handling Inspector, sometimes referred to as a general or craft inspector, is responsible for ensuring crews follow appropriate methods during stockpiling and material handling operations. The Environmental Inspector supports the Stockpiling and Material Handling inspector by ensuring stockpiling and material handling operations do not have an adverse affect on the environment.

Environmental Inspector's (EI) responsibilities during stockpiling and material handling include, but are not limited to:

- Monitoring the general set up of the stockpiling yard to ensure drainage ditches are in place for stormwater management;
- Ensuring access roads are clear for use when needed and no damage is done to the facility site due to heavy equipment passing; and
- Ensuring the working area is maintained and cleaned up regularly.

Trenching and Excavation



Trenching and excavation is the next phase of facilities construction, and typically involves excavation of a trench within the facility for pipe, conduit / cable, ground wire installation, and foundations or pipe supports. Subsurface facilities must first be located and exposed prior to any mechanical excavation taking place. Generally, this is done with hydrovac equipment and special conditions must be addressed concerning the disposal of the hydrovac slurry, especially in contaminated soils.

There may be a need to remove accumulations of water from the partially or fully excavated trench as outlined in the Stormwater Management Plan.

An Earthworks Inspector, sometimes referred to as a general or craft inspector, is responsible for ensuring crews follow appropriate methods during trenching and excavation. The Environmental Inspector supports the Earthworks Inspector by ensuring trenching and excavation operations do not have an adverse affect on the environment.

Environmental Inspector’s responsibilities during trenching and excavation include, but are not limited to:

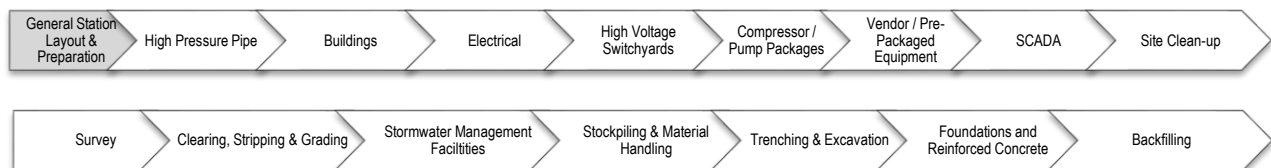
- Ensuring appropriate measures (e.g., hauling equipment and material on the facility site) are taken to prevent mixing of soil and soil compaction;
- Ensuring fencing is placed to prevent livestock and wildlife from entering;
- Ensuring proper procedures are followed for areas of concern (e.g., high water table); and
- Ensuring measures (e.g., discharging water to approved sites) are taken to prevent erosion, sedimentation, or contamination of adjacent lands, wetland, and watercourses during trench dewatering.

Foundations and Reinforced Concrete

Foundations and reinforced concrete are typically installed as part of the construction stage after trenching and excavation activities are completed. At this point, the general Inspector should continuously monitor that the following items are properly performed:

- Pile installation
- Formwork erection
- Reinforcing steel placement
- Concrete pouring and testing

There are no incremental specific EI responsibilities for Foundations and Reinforced Concrete beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.



Backfilling

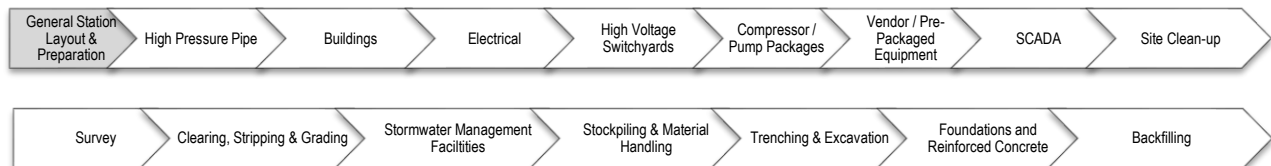
Backfilling refers to refilling the trench with the previously excavated or new fill subsoil once the foundations have cured, and the pipe sections or assemblies are in place. The Inspector should continuously monitor for the following:

- Backfill material is suitable and placed in the trench in such a way that ensures the pipe and coating are not damaged
- Coating damage is repaired per Owner Company specifications prior to backfilling
- Compaction requirements are met

An Earthworks Inspector, sometimes referred to as a general or craft inspector, is responsible for ensuring crews follow appropriate methods during backfilling operations. The Environmental Inspector supports the Earthworks Inspector by ensuring backfilling operations do not have an adverse affect on the environment.

The Environmental Inspector's responsibilities during backfilling include, but are not limited to:

- Ensuring soil productivity is maintained by preventing excessive soil mixing or compaction;
- Ensuring backfill material is suitable and placed in an environmentally responsible manner; and
- Ensuring adequate erosion protection, both in the trench and on the surface.



8.2.2 Survey

8.2.2.1 Inputs

As part of preparing for environmental inspection during surveying, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 135.

8.2.2.2 Execution

While the work is being executed, the EI is required to monitor workmanship and the construction's progress. Typical items that the EI will monitor for during the surveying are identified in a series of checklists as detailed in Table 134.

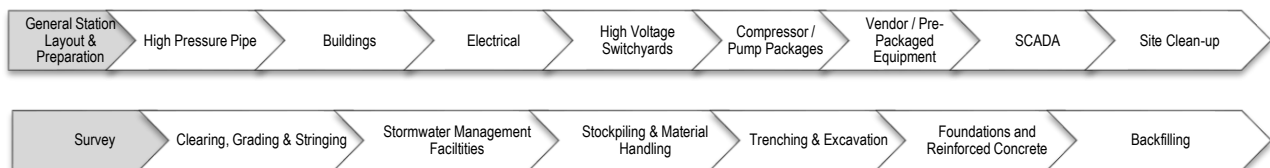
Table 134: Monitoring Requirements for Surveying

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 136
Safety	<ul style="list-style-type: none"> Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 137
General	<ul style="list-style-type: none"> Identifies general items that should be monitored throughout the surveying process 	Table 138
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 139
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 140
Air and Noise Pollution	<ul style="list-style-type: none"> Specific considerations relating to the atmosphere and that is particularly sensitive to construction activity 	Table 141

8.2.2.3 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for survey inspection appear in Table 142.

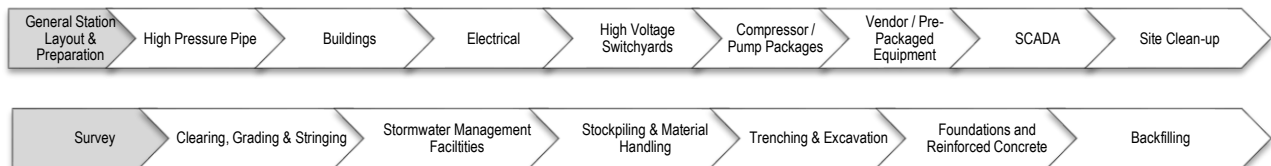
Detailed Checklists – Surveying



8.2.2.4 Typical Input Requirements for Survey Environmental Inspection

Table 135: Information Requirements for Surveying

✓	Description
	<p>All designs, drawings, and specifications developed by the Owner Company and Contractors related to surveying, such as:</p> <ul style="list-style-type: none"> • Issued for Construction (IFC) Drawings, including <ul style="list-style-type: none"> ○ Access Road Drawings ○ Line List (e.g., special concerns for each Land Owner) • GPS or other datum coordinates and elevations for construction control points and benchmark • Site and Appurtenance Surveys • Boundary Surveys • Building Permit Surveys • Construction Surveys • Environmental studies
	<p>Contracts and agreements related to:</p> <ul style="list-style-type: none"> • Road Use • Crossing for Buried Facilities • Construction Survey • Land Owner Agreements • Third Party Crossing Agreements
	<p>Owner Company specific Safety Plan, including (but not limited to):</p> <ul style="list-style-type: none"> • Traffic Control Plan • Requirements for Personal Protective Equipment (PPE) • Emergency Medical Services (EMS)
	<p>Project specific Environmental Protection Plan (EPP) or equivalent, detailing surveying requirements</p>
	<p>Other project specific Plans, which may include:</p> <ul style="list-style-type: none"> • Fire Prevention / Firefighting Plan • Survey Plans • Environmental Impact Surveys (EIS) or Environmental Assessments Reports • Environmental Measures, Policies and Plans • Compliance Documents
	<p>Owner Company specific Pre-Construction Consideration related to:</p> <ul style="list-style-type: none"> • Weather Conditions • Environmental Resources (soils, vegetation) • Wildlife and Aquatic Resources • Agricultural Activities • Historic sites, culturally significant sites and sensitive landscapes



8.2.2.5 Best Practice for Typical Surveying Operations

Table 136: Prior to Commencing Work

✓	Description
	Participate in daily meetings to address: <ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Contractor's tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	Locate and flag environmentally sensitive sites
	Assist pioneer crews (i.e., first crews at site), if necessary, at commencement of any onsite work including hydrovac and signage installation for access

Table 137: Safety Concerns for Surveying

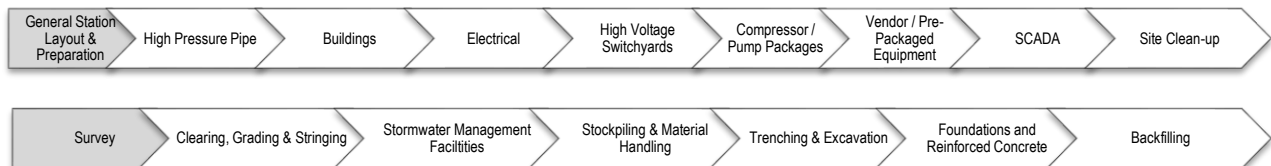
✓	Description
	Ensure all personnel are trained in hand tree-felling activities, including chainsaw usage
	Ensure that damage or obliteration of any survey references are reported per Owner Company processes and treated as a safety concern

Table 138: Typical Monitoring Requirements – General

✓	Description
	Monitor daily activities for compliance with all environmental requirements
	Ensure construction activities are contained inside the ROW, designated access roads, and ancillary sites
	Assist surveyors in staking any pre-determined environmentally sensitive or archaeological sites
	Ensure a photographic record is made of all sensitive features to be protected or restored
	Adhere to Owner and project-specific requirement for storage and disposal of hydrovac slurry
	Verify that stakes, marks, and flags are maintained throughout construction, if feasible, and communicate with Surveying Contractor when any need to be re-established
	Ensure a topographical survey is properly performed to obtain-sufficient data to completely define any drainage areas

Table 139: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Ensure setback requirements for rare vegetative crops and/or species are adhered to
	Confirm the accuracy of flagged environmentally sensitive areas, including ornamental trees, windbreaks, or specialty shrubs, in consultation with survey crews
	Ensure that any locations with crop disease or weed infestations are flagged, staked, and clearly marked with signage



✓	Description
	Ensure nest surveys have been completed within the facility site limits, temporary work spaces (TWS), and access roads
	Ensure any burrows or dens are appropriately flagged
	Ensure there are flags, stakes and clearly marked signage at any locations requiring special soil handling techniques (e.g., three-lift soils handling)
	Ensure that topsoil recovered from exposing any underground foreign line is salvaged
	Ensure that taller stakes are installed in high crop areas or snow to ensure visibility, and hub staking is used in livestock pastures
	Ensure that flagging is placed more frequently in heavier vegetated and treed areas to provide better visibility for Clearing Equipment Operators

Table 140: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
	Ensure that the riparian buffer zone is staked and flagged close to watercourses and wetlands
	Ensure that temporary work spaces (TWS) do not encroach within the vegetated buffers of watercourses and wetlands
	Ensure vehicles do not ford watercourses, unless permitted
	Ensure drainages are staked and flagged in the fall prior to heavy snowfall to avoid flooding or erosion problems during spring break-up

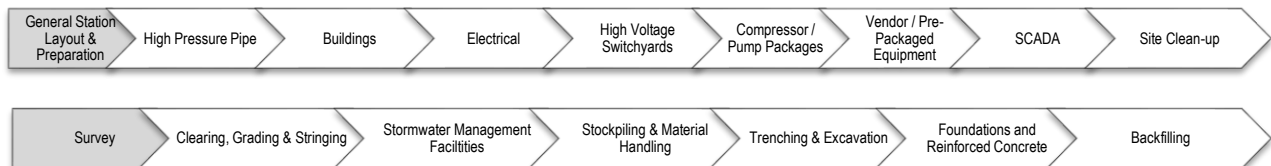
Table 141: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

8.2.2.6 Typical Outputs for Surveying

Table 142: Typical Reporting Requirements

✓	Description
	General
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
	Daily
	Complete surveying daily Environmental Inspection Progress reports, including (but not limited to): <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters. ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions, which includes: <ul style="list-style-type: none"> ○ Updating the company specific environmental commitment tracking system



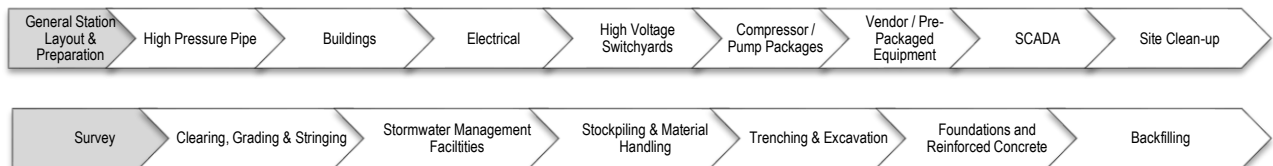
All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required

8.2.2.7 References – Surveying

Note to user: The reference information provided in Table 143 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 143: List of References – Surveying

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Facilities Construction Inspectors



8.2.3 Clearing, Stripping, and Grading

8.2.3.1 Inputs

As part of preparing for Environmental inspection during Clearing, Stripping, and Grading, the Environmental Inspector (EI) will continually familiarize themselves with 8.2.4.2 relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 145.

8.2.3.2 Execution

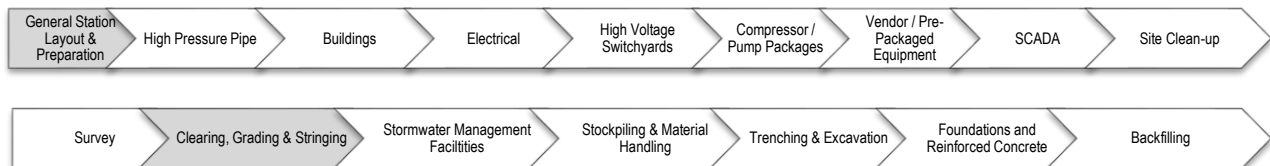
While the work is being executed, the EI is required to monitor workmanship and the construction's progress. Typical items that the EI will monitor for during the clearing, stripping, and grading activities are identified in a series of checklists as detailed in Table 144.

Table 144: Monitoring Requirements for Clearing, Stripping, and Grading

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 146
Safety	<ul style="list-style-type: none"> Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 147
General	<ul style="list-style-type: none"> Identifies general items that should be monitored throughout the clearing, stripping, and grading process 	Table 148
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 149
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 150
Air and Noise Pollution	<ul style="list-style-type: none"> Specific considerations relating to the atmosphere and that is particularly sensitive to construction activity 	Table 151

8.2.3.3 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for clearing, stripping, and grading appear in Table 152.

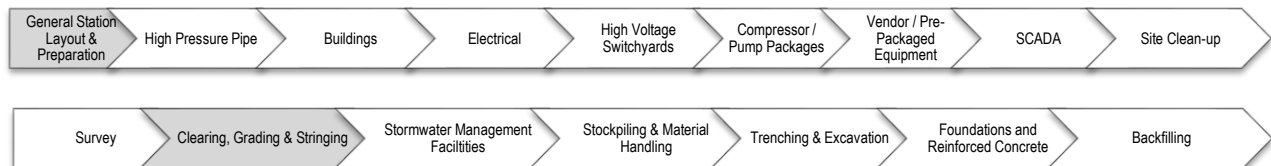


Detailed Checklists – Clearing, Stripping, and Grading

8.2.3.4 Typical Input Requirements for Clearing, Stripping, and Grading Environmental Inspection

Table 145: Information Requirements for Clearing, Stripping, and Grading

✓	Description
	<p>All designs, drawings, and specifications developed by the Owner Company and Contractors related to clearing, stripping, and grading, such as:</p> <ul style="list-style-type: none"> • Issued for Construction (IFC) Drawings, including <ul style="list-style-type: none"> ○ Access Road Drawings ○ Grading Drawings • Line List (e.g., special concerns for each Land Owner) • Drawings related to Facility Site Limits (both permanent and temporary) • Commissioned filed and environmental studies
	<p>Contracts and agreements related to:</p> <ul style="list-style-type: none"> • Clearing • Grading (if required) • Road Use • Crossing for Buried Facilities • Timber Salvage (Land Owner, Forestry Management, Public Land Holder) • Construction Survey • Fencing
	<p>Permits related to:</p> <ul style="list-style-type: none"> • Safe Work • Third Party Crossing Agreements
	<p>Owner Company specific Safety Plan, including (but not limited to):</p> <ul style="list-style-type: none"> • Requirements for Personal Protective Equipment (PPE) • Emergency Medical Services (EMS) • Blasting Safety
	<p>Project specific Environmental Protection Plan (EPP) or equivalent, detailing clearing, stripping, and grading requirements</p>
	<p>Other project specific Plans, which may include:</p> <ul style="list-style-type: none"> • Access Road Plans • Blasting Plan • Pre-Construction Grade Plan • Burn Plan • Timber Salvage Plan • Fire Prevention / Firefighting Plan • Heritage Sites • Soil Surveys • Environmental Impact Surveys (EIS) or Environmental Assessments Reports • Environmental Measures, Policies and Plans



✓	Description
	<ul style="list-style-type: none"> • Compliance Documents • Stormwater Management • Erosion and Sediment Control • Spill prevention, control and clean up plan
	<p>Owner Company specific Pre-Construction Consideration related to:</p> <ul style="list-style-type: none"> • Weather Conditions • Wildlife and Aquatic Resources • Wetlands • Agricultural Activities • Historic sites, culturally significant sites and sensitive landscapes

8.2.3.5 Best Practice for Typical Clearing, Stripping, and Grading Operations

Table 146: Prior to Commencing Work

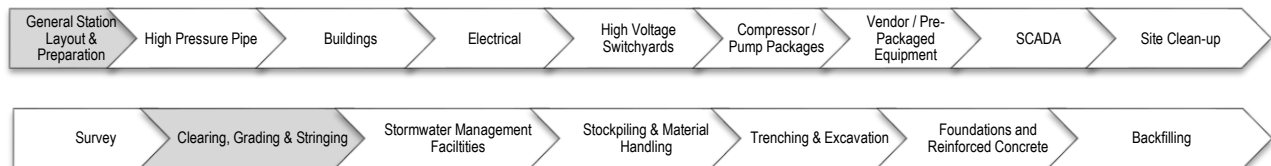
✓	Description
	<p>Participate in daily meetings to address:</p> <ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Contractor's tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	Identify environmental issues for consideration in the development of the preconstruction Grade Plan
	Ensure swamp mats or geotextiles are used if ground conditions are unstable and low-ground pressure equipment can not be used
	Ensure that specimen trees and shrubs identified in the Environmental Protection Plan (EPP) or equivalent are marked and protected within the facility site limits, temporary work spaces (TWS), and access roads by an approved method
	Ensure well water monitoring plan is adhered to, when required
	Ensure stormwater management plans are in place

Table 147: Safety Concerns for Clearing, Stripping, and Grading

✓	Description
	There are no incremental specific Safety Concerns beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

Table 148: Typical Monitoring Requirements – General

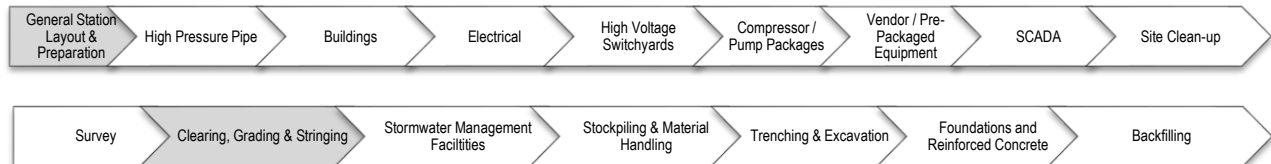
✓	Description
	Ensure clearing, stripping, and grading operations are limited to the approved facility site limits and approved work areas



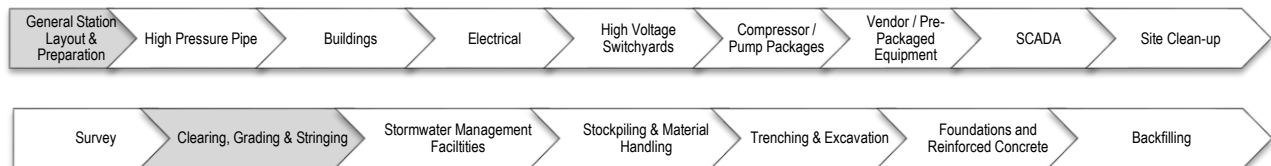
✓	Description
	Monitor for adherence to conditions noted in all environmental approvals and permits issued
	Ensure mitigative measures for permafrost are adhered to (e.g., minimizing grading activities)
	Ensure appropriate measures are implemented when artefacts are unearthed
	Provide input on environmental considerations when additional clearing, stripping, and grading may be required
	Ensure any temporary work space (TWS) for storage of excavated material, grubbing, or salvageable timber has been constructed as per the EPP or equivalent
	Verify that the Contractor picks up and properly disposes of any fly-rock from blasting activities
	Monitor temporary fencing requirements
	Ensure a watchperson is present at open gates to control livestock (if required)

Table 149: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Clearing Trees and Brush
	Ensure any marked trees or shrubs which need to be salvaged are stored properly to prevent drying out before replanting
	Ensure trees, shrubs and tall grasses are cleared prior to onset of migratory bird or species specific activity period
	Ensure adherence to operator or project specific measures for any tress containing burrow, den or an active nests
	Ensure proper equipment is used to minimize terrain disturbance during non frozen conditions when clearing non merchantable timber
	Ensure that on land with a significant slope (per criteria defined by Owner Company in contract documents) in any direction, removal of brush and trees is minimized and root systems are left intact to prevent slope erosion
	Ensure cuts are treated per contract requirements where branches are removed from a standing tree outside the ROW (if required)
	Ensure contractor refrains from skidding timber through partially thawed and/or muddy ground
	Monitor for proper placement of all removed trees and brush from and adjacent to the facility site limits
	Ensure the contractor clears wetland, muskeg, and riparian vegetation areas using approved Owner Company procedures as per the Environmental Protection Plan (EPP) or equivalent
	Ensure methods are used to minimize clearing debris from falling into a watercourse and if it occurs, ensure debris is removed immediately
	Snow Berms
	Ensure snow berms are built to Owner Company specifications over the areas of excavation immediately after clearing to prevent frost penetration
	Grubbing
	Ensure appropriate surface erosion control measures are installed prior to commencing grubbing
	Ensure natural surface-drainage can be re-established or installed where appropriate
	Ensure proper equipment (e.g., brush rake attachment) is used for grubbing to preserve topsoil



✓	Description
	Restrict grubbing near the facility site limits, as specified by the Owner Company, where possible
	Suspend grubbing when weather conditions promote sedimentation
	Ensure adherence to specific requirements for grubbing near watercourse and/or wetlands
	Ensure grubbing in wet areas is minimized to prevent bog holes
Timber Salvage and Storage	
	Ensure timber is salvaged in accordance with Timber Salvage Plan
	Consult the Timber Salvage Plan regarding any merchantable timber that appears to not meet specifications, then notify the Construction Manager / Chief Inspector (or designate) and Clearing Contractor for a decision on how to proceed
	Ensure stacked timber is not located in reforested areas or grade areas
	Ensure materials retained for corduroy, chip and/or mulch material and the location of use is in accordance with the regulatory requirements
	Ensure adherence to any specific requirements associated with cutting and removal near watercourses
	Ensure Contractor refrains from skidding timber through watercourses, water bodies, or wetlands
	Ensure timber stockpile sites are located away from watercourses
Timber and Brush Disposal	
	Ensure proper burn permits are in place
	Ensure burning activities comply with the Burn Plan, permit stipulations, Land Owner requirements, and Environmental Protection Plan (EPP) or equivalent
	Ensure burn locations are only on top of mineral soils and not in peat, muskeg, or wetland areas (Contractor may have to strip surface organics and replace after burning)
	Ensure burn piles are located away from an existing aboveground facility to allow for sufficient space for stacking and working
	During winter, ensure burn piles are not located on frost-packed work areas
	Ensure every burn pile is marked using a global positioning system (GPS) and relevant inspectors know the locations of all burn piles
	Ensure continuous (24/7) monitoring during any controlled burn
	Ensure fires are completely extinguished once burn pile is consumed
	Ensure that all residual materials from burning are disposed as per contract documents and/or Owner Company or project specifications
	Ensure no unburned timber or brush, which can mix with spoil materials, is in the disposal residue
	If burning is not permitted, confirm chipping or mulching is conducted as per contract specifications
	Ensure chips, woody debris or mulch are not piled in a mineral wetland, unless approved by regulatory authority
	Ensure appropriate regulatory approval and waivers are in place before disposing merchantable timber
	Ensure Clearing Contractor hauls away all timber and brush from the facility site that cannot be processed by the above means
Topsoil Stripping and Storage	
	Ensure topsoil is stripped from Areas to be filled or graded in accordance with environmental specifications



✓	Description
	Ensure adherence to project specifications for topsoil stripping (e.g., depth of topsoil stripped) unless appropriate approval is received
	Ensure topsoil is stored within the facility site limits, and is stored in a manner that prevents mixing of topsoil with subsoil
	Ensure project-specific soil surveys are used to identify soil characteristics and contingency measures are adhered to
	Ensure adherence to Operator or Project specific Mitigative measures for procedures relating to clubroot disease, weeds infestation and other crop diseases
	Suspend topsoil stripping during high winds unless a tackifier is applied to the topsoil pile
Topsoil Stripping – Three-Lift Soils Handling	
	Ensure this technique is only implemented for salvaging topsoil during dry and non frozen conditions and areas where lower subsoils are poorer in quality than upper subsoil
	Ensure that the salvaged upper subsoil is twice the width of the proposed trench
	Ensure this technique is implemented to maintain groundwater flow on areas characterized by sands overlying clays at shallow depths
	Ensure there is separation between the topsoil and subsoil pile, and that the upper subsoil is stored separately from the lower subsoil
Topsoil Stripping – Frozen Soil Conditions	
	Ensure there is a snow cover present over the soil stripping area and remove snow immediately prior to stripping activities
	Ensure mulching of frozen topsoil when necessary
	Ensure adherence to project specification for storing stripped topsoil on frozen grounds
Erosion Control and Soil Erosion Contingency Measures	
	Ensure temporary and/or permanent erosion and/or sediment control structures (e.g., silt fences, sediment traps, hay bales, drainage ditches) have been constructed in alignment with the EPP or equivalent
	Ensure construction activities are suspended during wet weather to avoid negative impacts on the facility site
	Ensure all necessary equipment and personnel are available for installation and maintenance of erosion control
	Ensure topsoil stripping and salvage occurs just prior to trenching for areas prone to wind erosion
Tackification	
	Ensure permits are in place prior to application of a tackifier and applied in alignment with the EPP or equivalent
	Ensure all ground preparations (e.g., reclamation) activities are completed before applying a tackifier
	Ensure any revegetation (e.g., seed application) takes place prior to tackification
	Ensure application of tackifier adhere to site specification and manufacturer requirements
	Ensure all products applied are biodegradable and have been approved by the Owner Company
Grading	
	Ensure appropriate erosion control measures are in place prior to grading
	Monitor and reduce disturbance to natural drainage channels and avoid blocking any existing channels during grading
	Ensure graded materials, or material displaced to accommodate grading is stored according to Owner or project specific requirements
	Implement appropriate mitigative measures for wet and/or thawed soils, when needed

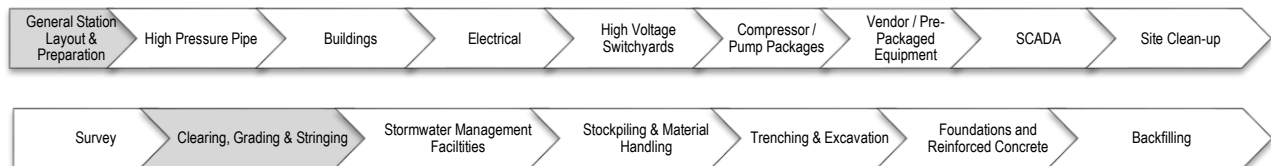


Table 150: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
General	
	Ensure timely notice is given to all agreed-to parties before starting work near a creek, river, or watercourse
Grading Near Watercourses	
	Ensure grading in the vicinity of watercourses is per Owner Company specifications and Environmental Protection Plan (EPP) requirements or equivalent
	Ensure project or operator specific mitigative measures are implemented for grading in riparian areas and buffer zones
	Ensure grading close to watercourses and wetlands occurs just prior to construction
	Ensure vehicle crossings are in place to prevent grading equipment from operating directly in watercourses

Table 151: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	Ensure burning activities adhere to the ventilation index where required

8.2.3.6 Typical Outputs for Clearing, Stripping, and Grading

Table 152: Typical Reporting Requirements

✓	Description
General	
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
Daily	
	Complete clearing, stripping, and grading Environmental Inspection progress reports, including (but not limited to): <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters. ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions <ul style="list-style-type: none"> ○ Updating the company specific environmental commitment tracking All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required

8.2.3.7 References – Clearing, Stripping, and Grading

Note to user: The reference information provided in Table 153 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

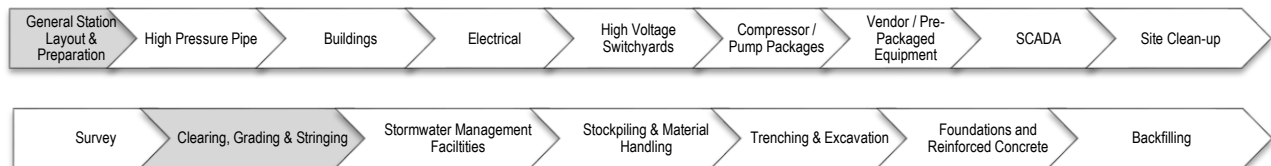
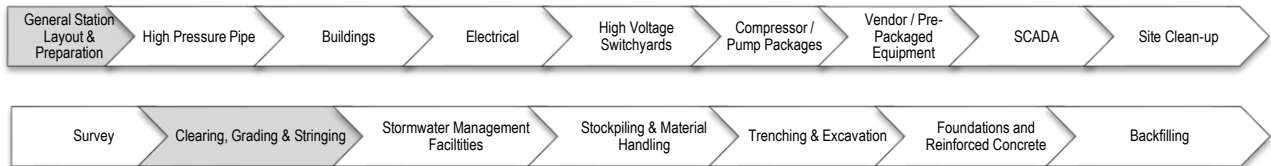


Table 153: List of References – Clearing, Stripping, and Grading

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Facilities Construction Inspectors



8.2.4 Stockpiling and Material Handling

8.2.4.1 Inputs

As part of preparing for Environmental inspection during Stockpiling and Material Handling, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 155.

8.2.4.2 Execution

While the work is being executed, the EI is required to monitor workmanship and the construction's progress. Typical items that the EI will monitor for during the Stockpiling and Material Handling are identified in a series of checklists as detailed in Table 154.

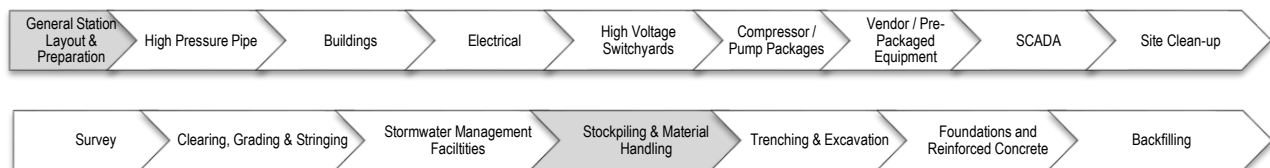
Table 154: Monitoring Requirements for Stockpiling and Material Handling

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 156
Safety	<ul style="list-style-type: none"> Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 157
General	<ul style="list-style-type: none"> Identifies general items that should be monitored throughout the Stockpiling and Material Handling process 	Table 158
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 159
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 160
Air and Noise Pollution	<ul style="list-style-type: none"> Specific considerations relating to the atmosphere and that is particularly sensitive to construction activity 	Table 161

8.2.4.3 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for Stockpiling and Material Handling appear in Table 162.

Detailed Checklists – Stockpiling and Material Handling



8.2.4.4 Typical Input Requirements for Stockpiling and Material Handling Inspection

Table 155: Information Requirements for Stockpiling and Material Handling

✓	Description
	All designs, drawings, and specifications developed by the Owner Company and Contractors related to stockpiling and material handling, such as: <ul style="list-style-type: none"> • Issued for Construction (IFC) Drawings
	Contracts and agreements related to: <ul style="list-style-type: none"> • Materials Storage and Preservation
	Owner Company specific Safety Plan, including (but not limited to): <ul style="list-style-type: none"> • Equipment Transport • Equipment Loading / Unloading • Equipment and Materials Storage • Handling of Materials
	Project specific Environmental Protection Plan (EPP) or equivalent, detailing stockpiling and material handling requirements
	Other project specific Plans, which may include <ul style="list-style-type: none"> • Traffic Control Plan • Stormwater Management

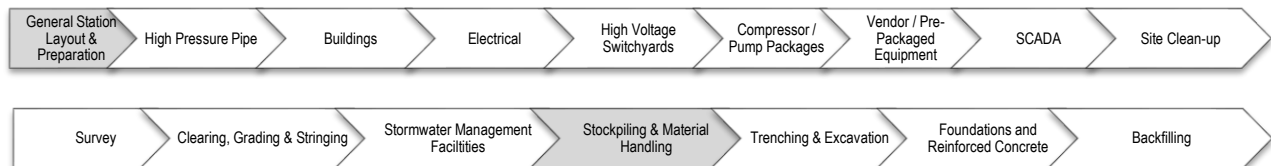
8.2.4.5 Best Practice for Typical Stockpiling and Material Handling Operations

Table 156: Prior to Commencing Work

✓	Description
	Participate in daily meetings to address: <ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Contractor's tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	Ensure swamp mats or geotextiles are used if ground conditions are unstable and low-ground pressure equipment can not be used
	Ensure stormwater management plans are in place

Table 157: Safety Concerns for Stockpiling and Material Handling

✓	Description
	Monitor for individuals standing between a suspended load and equipment or pipe



✓	Description
	Ensure that workers are not standing under or near a suspended load
	Ensure individuals stand clear, the load is level, and materials are prevented from movement when metal banding is cut loose or other tie down means are loosened from the load
	Ensure individuals stand clear of lifting slings or vacuum lifters while the Equipment Operator is lifting and placing pipe joints
	Monitor and be aware of other vehicles moving in the lay down or warehousing area

Table 158: Typical Monitoring Requirements – General

✓	Description
	Ensure banding from carriers and any other refused items are hauled away to acceptable disposal sites. Burial at railway sidings or stockpile sites is not permitted.
	Ensure appropriate material is used to stabilize construction site for vehicle traffic
	Ensure work area is cleaned up in accordance owner/operator project specifications

Table 159: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

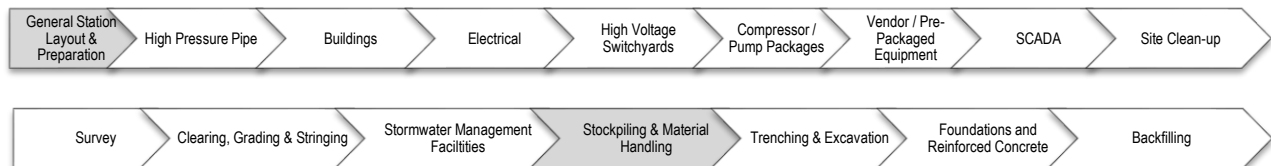
✓	Description
	Prevent heavy trucks from accessing the construction site where topsoil has not been salvaged
	Check that all the pipe joints have end caps (as required by Owner Company specifications)

Table 160: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
	Ensure location of the stockpile yard is a sufficient distance away from water bodies

Table 161: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information



8.2.4.6 Typical Outputs for Stockpiling and Material Handling

Table 162: Typical Reporting Requirements

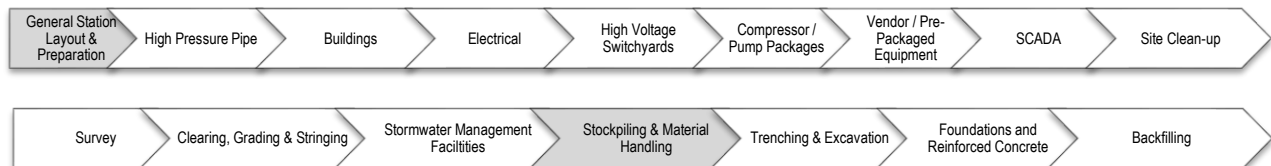
✓	Description
General	
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
Daily	
	<p>Complete stockpiling and stringing Environmental Inspection progress reports, including (but not limited to):</p> <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions, which includes: <ul style="list-style-type: none"> ○ Updating the company specific environmental commitment tracking system <p>All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required</p>

8.2.4.7 References – Stockpiling and Material Handling

Note to user: The reference information provided in Table 163 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 163: List of References – Stockpiling and Material Handling

Document No.	Type	Title
		CEPA Foundation Inc. and The INGAA Foundation Inc.
N/A	Practical Guide	A Practical Guide for Facilities Construction Inspectors



8.2.5 Trenching and Excavation

8.2.5.1 Inputs

As part of preparing for Environmental inspection during Trenching and Excavation, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 165.

8.2.5.2 Execution

While the work is being executed, the EI is required to monitor workmanship and the construction's progress. Typical items that the EI will monitor for during the Trenching and Excavation process are identified in a series of checklists as detailed in Table 164.

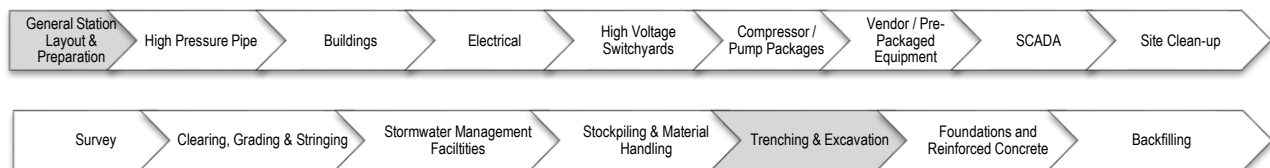
Table 164: Monitoring Requirements for Trenching and Excavation

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 166
Safety	<ul style="list-style-type: none"> Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 167
General	<ul style="list-style-type: none"> Identifies general items that should be monitored throughout the Trenching and Excavation process 	Table 168
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 169
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 170
Air and Noise Pollution	<ul style="list-style-type: none"> Specific considerations relating to the atmosphere and that is particularly sensitive to construction activity 	Table 171

8.2.5.3 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for Trenching and Excavation appear in Table 172.

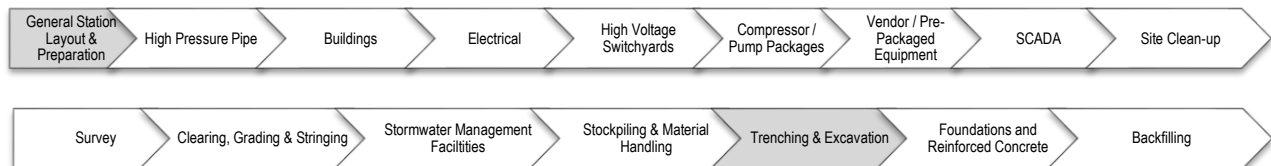
Detailed Checklists – Trenching and Excavation



8.2.5.4 Typical Input Requirements for Trenching and Excavation Inspection

Table 165: Information Requirements for Trenching and Excavation

✓	Description
	<p>All designs, drawings, and specifications developed by the Owner Company and Contractors related to trenching and excavation, such as:</p> <ul style="list-style-type: none"> • Issued for Construction (IFC) Drawings, including <ul style="list-style-type: none"> ○ Access Road Drawings ○ Line List (e.g., special concerns for each Land Owner) ○ Underground Conduit / Cable Routing Plan ○ Grounding Plan • Trenching Specifications and Procedures • Topsoil Segregation Requirements • Blasting Specification (if required) • Ground Disturbance Documentation
	<p>Contracts and agreements related to:</p> <ul style="list-style-type: none"> • Road Use • Construction Survey
	<p>Permits related to:</p> <ul style="list-style-type: none"> • Safe Work • Third Party Crossing Agreements • Confined Space Entry
	<p>Owner Company specific Safety Plan, including (but not limited to):</p> <ul style="list-style-type: none"> • Excavation Plan • Traffic Control Plan • Requirements for Personal Protective Equipment (PPE) • Emergency Medical Services (EMS)
	<p>Project specific Environmental Protection Plan (EPP), detailing trenching and excavation requirements</p>
	<p>Other project specific Plans, which may include:</p> <ul style="list-style-type: none"> • Blasting Plan • Fire Prevention / Firefighting Plan • Heritage Sites • Engineered Shoring and Dewatering Plans (as required) • Environmental Impact Surveys (EIS) or Environmental Assessments Reports • Environmental Measures, Policies and Plans • Compliance Documents • Stormwater Management Plan • Erosion and Sediment Control Plan
	<p>Owner Company specific Pre-Construction Consideration related to:</p> <ul style="list-style-type: none"> • Weather Conditions



✓	Description
	<ul style="list-style-type: none"> • Agricultural Activities • Historic sites, culturally significant sites and sensitive landscapes

8.2.5.5 Best Practice for Typical Trenching and Excavation Operations

Table 166: Prior to Commencing Work

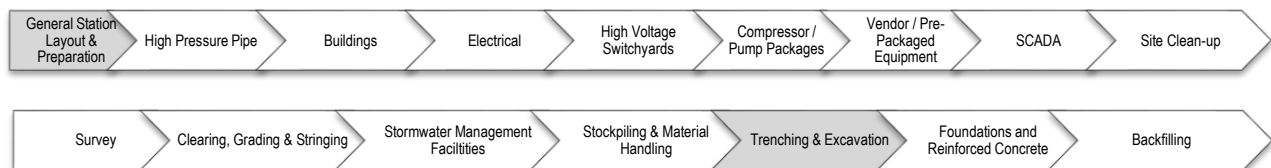
✓	Description
	Participate in daily meetings to address: <ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Contractor’s tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	Ensure swamp mats or geotextiles are used if ground conditions are unstable and low-ground pressure equipment can not be used
	Ensure stormwater management plans are in place
	Inspect temporary erosion control structures, and ensure damage is repaired prior to commencing trenching and excavation operations
	Verify exclusion zones are established
	Work area: <ul style="list-style-type: none"> • Check that warning signs and temporary fencing is installed on open excavations close to public accesses • Inspect the open trench for trapped animals before commencing work
	Ensure an approved plan is in place to manage disposal of hydrovac slurry

Table 167: Safety Concerns for Trenching and Excavation

✓	Description
	There are no incremental specific Safety Concerns beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

Table 168: Typical Monitoring Requirements – General

✓	Description
	Ensure that if a machine strikes, contacts, is bogged down, slides into, or rests on top of a pipeline facility, work is stopped immediately and the Construction Manager / Chief Inspector (or designate) is notified; the machine is not to be moved or extricated without Owner Company approval
	Immediately suspend trenching activity and notify the Construction Manager / Chief Inspector (or designate) if any historic sites or resources are discovered



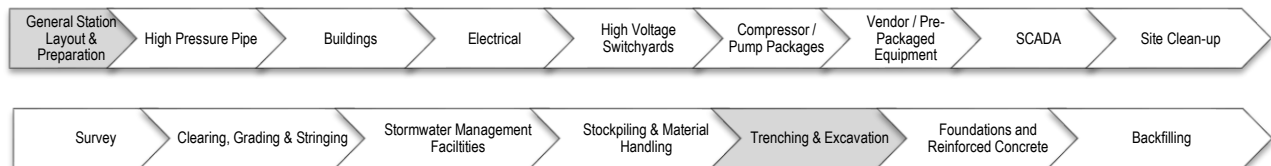
✓	Description
	Verify that the Contractor picks up and properly disposes of any fly-rock from blasting activities

Table 169: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
Trench Excavation	
	Recommend minimizing the length of time the trench is left open to minimize trench sloughing
	Ensure trenching activities are suspended in areas where non-salvaged topsoil are sloughing into the trench
	Monitor and record trenching and spoil pile segregation for subsoils with variable horizons
	Ensure appropriate operator or project specification are followed for trenching when using the Three-Soils-Handling technique
	Ensure separation between topsoil and subsoil is maintained when special soil handling techniques (e.g., Three-Lift Soils Handling) is being used
	Confirm that the trench will be excavated to the specified clearance at all crossings (i.e., road, ditch, culvert, cable, water main, and sewer) or any other obstruction as directed by Owner Company specifications
	Monitor for locations where available work space is insufficient to allow compliance with safety and environmental requirements; escalate to Construction Manager / Chief Inspector (or designate) when identified

Table 170: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
Trench Excavation	
	Ensure appropriate operator or project specification are followed when trenching occurs near watercourses and wetlands
	Ensure that the Contractor will not leave a trench open for extended periods; in particular, monitor for: <ul style="list-style-type: none"> • Large accumulations of water • Snow and ice accumulation
Trench Dewatering	
	Check or test the trench water for contamination (e.g., hydrocarbon sheen, high salinity) before dewatering trench and ensure mitigative measures are implemented, if necessary, to avoid contamination of adjacent lands, wetlands and/or watercourses.
	Ensure equipment (e.g., pumps, generators) have suitable containment to prevent spills and are appropriately located (e.g., above the normal high water mark of watercourses and wetlands)
	Ensure trench water is pumped to an approved site and/or into an appropriate sediment filtering device to avoid erosion or sedimentation of adjacent lands, wetlands or watercourses.
	Ensure the pump flow rate is managed to avoid erosion or sedimentation of adjacent lands, wetlands or watercourses. Mitigative measures (e.g., flow dissipaters on outlets) may be required to minimize ground erosion at discharge location.
	Ensure appropriate disposal of waste products (e.g., used geotextile bags) from trench dewatering activities
Ditch Plugs and Sub-drains / Drain Tiles	



✓	Description
	Ditch plugs and sub-drains may be constructed based on construction drawings; however, in some cases the quantity and their location are best determined in the field after the trench is excavated. Monitor for: <ul style="list-style-type: none"> • Specific terrain features / drainage patterns <ul style="list-style-type: none"> ○ Groundwater flowing or seeping from the bottom or sides of the trench, then a sub-drain (drain tile) may be required immediately downhill of the discharge point to collect the water and divert it off the facility site ○ Locations where water can enter the trench and flow downhill through the backfill
	Ensure Owner Company specifications are met or exceeded for erosion control (e.g., a sack breaker may be installed as an alternative to ditch plugs if a ditch plug is difficult to install)
	On slopes, confirm that Contractor has installed and keyed in trench breakers and sub-drains in the trench per Owner Company drawings and specifications or as required
	If drain tiles are cut: <ul style="list-style-type: none"> • Ensure location is marked • Confirm ends are capped to prevent clogging from dirt or debris Ensure temporary flumes are installed to maintain drainage

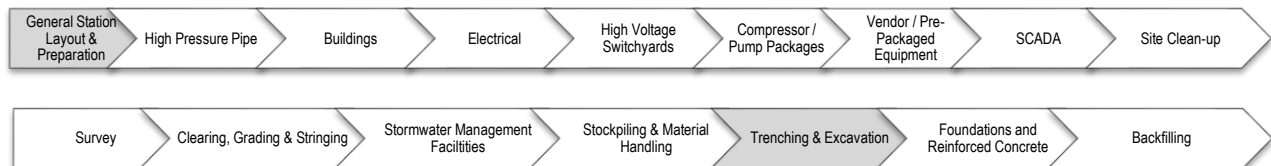
Table 171: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

8.2.5.6 Typical Outputs for Trenching and Excavation

Table 172: Typical Reporting Requirements

✓	Description
	General
	Ensure Environmental reports are completed and forwarded to the Construction Manager and/or Chief Inspector, when necessary, these reports include (but not limited to): <ul style="list-style-type: none"> • Laboratory sample analysis • Hazardous goods report Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
	Daily
	Complete trenching and excavation Environmental Inspection progress reports, including (but not limited to): <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Record soil horizons ○ Locations of all drain tiles, irrigation pipes, etc., not on drawings, but crossed by the trench line ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters. ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions



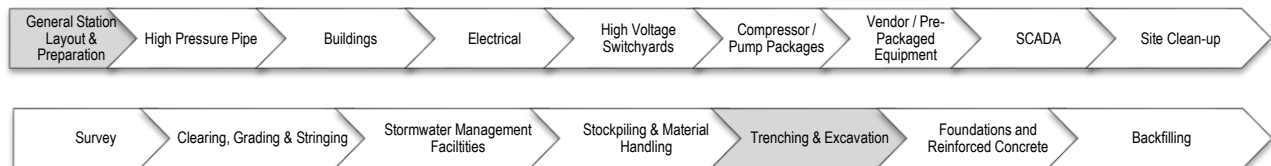
- Updating the company specific environmental commitment tracking system
- All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required

8.2.5.7 References – Trenching and Excavation

Note to user: The reference information provided in Table 173 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 173: List of References – Trenching and Excavation

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Facilities Construction Inspectors



8.2.6 Backfilling

8.2.6.1 Inputs

As part of preparing for Environmental inspection during Backfilling, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 175.

8.2.6.2 Execution

While the work is being executed, the EI is required to monitor workmanship and the construction's progress. Typical items that the EI will monitor for during the Backfilling process are identified in a series of checklists as detailed in Table 174.

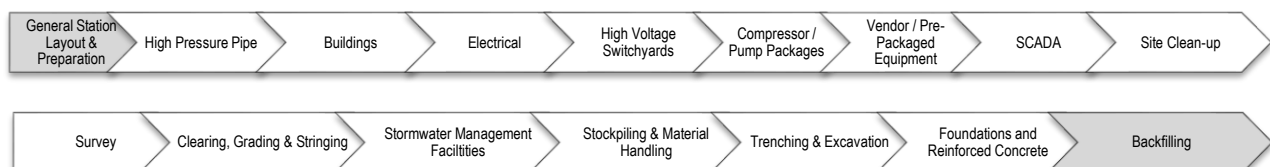
Table 174: Monitoring Requirements for Backfilling

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 176
Safety	<ul style="list-style-type: none"> Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 177
General	<ul style="list-style-type: none"> Identifies general items that should be monitored throughout the Backfilling process 	Table 178
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 179
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 180
Air and Noise Pollution	<ul style="list-style-type: none"> Specific considerations relating to the atmosphere and that is particularly sensitive to construction activity 	Table 181

8.2.6.3 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for Backfilling appear in Table 182.

Detailed Checklists – Backfilling



8.2.6.4 Typical Input Requirements for Backfilling Inspection

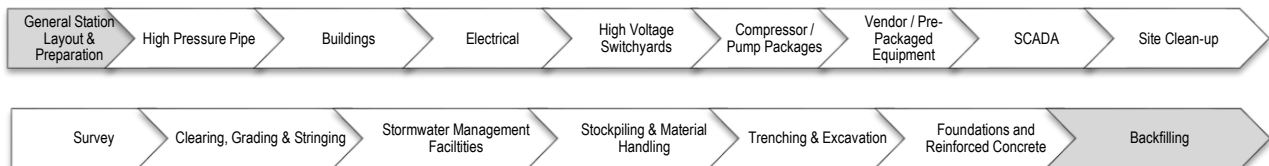
Table 175: Information Requirements for Backfilling

✓	Description
	<p>All designs, drawings, and specifications developed by the Owner Company and Contractors related to backfilling, such as:</p> <ul style="list-style-type: none"> • Issued for Construction (IFC) Drawings, including <ul style="list-style-type: none"> ○ Access Road Drawings ○ Line List (e.g., special concerns for each Land Owner) • Backfill Specifications
	<p>Contracts and agreements related to:</p> <ul style="list-style-type: none"> • Road Use • Regulatory Approvals
	<p>Permits related to:</p> <ul style="list-style-type: none"> • Safe Work • Third Party Crossing Agreements • Confined Space Entry
	<p>Owner Company specific Safety Plan, including (but not limited to):</p> <ul style="list-style-type: none"> • Requirements for Personal Protective Equipment (PPE) • Emergency Medical Services (EMS)
	<p>Project specific Environmental Protection Plan (EPP) or equivalent, detailing backfilling requirements</p>
	<p>Other project specific Plans, which may include:</p> <ul style="list-style-type: none"> • Refer to project documentation for incremental specific requirements • Grading Plans • Stormwater Management Plan • Erosion and Sediment Control Plan

8.2.6.5 Best Practice for Typical Backfilling Operations

Table 176: Prior to Commencing Work

✓	Description
	<p>Participate in daily meetings to address:</p> <ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Contractor's tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work



✓	Description
	Ensure swamp mats or geotextiles are used if ground conditions are unstable and low-ground pressure equipment can not be used
	Ensure stormwater management plans are in place
	Prior to backfilling, ensure the trench has been inspected to make sure it is free of debris and wildlife

Table 177: Safety Concerns for Backfilling

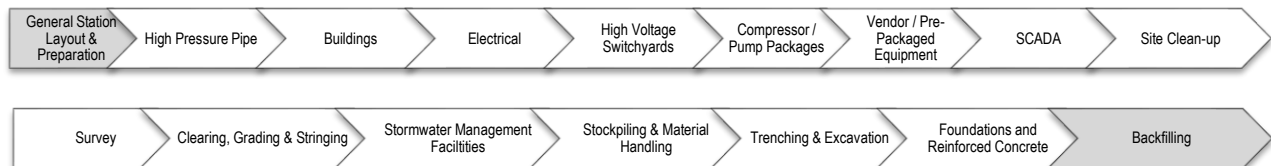
✓	Description
	There are no incremental specific Safety Concerns beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

Table 178: Typical Monitoring Requirements – General

✓	Description
	Recommend minimizing the length of time the trench is left open to minimize trench sloughing
	Ensure all backfilling activities are confined to the facility site limits
	Ensure the facility site is left in as close to original condition as possible

Table 179: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Backfill Material and Process
	Ensure that the back fill material is soft, free from large rocks, stumps, frozen material, or any other foreign material that can dent the pipe or scratch the external coating
	Confirm that the Contractor uses only Owner Company approved select / imported backfill
	Ensure any additional backfill required is obtained from appropriate land authority
	Follow project or owner company specific requirements in instances where the preconstruction grade can not be restored
	Ensure that top soil is never used as padding material or fill
	Check that contaminated backfill material is not placed in the trench and is disposed of properly
	Ensure larger rocks with sizes too large for backfill are hauled away or stacked neatly along the facility site limits as specified in Owner Company specifications and drawings
	Ensure no machinery passes over the topsoil pile while backfilling spoil and prevent mixing of spoil with the topsoil pile
	Confirm that Contractor is using auger equipment for backfill where coarse fragments are encountered in trench materials
	Final Backfilled Surface / Compaction
	Ensure project or owner specification are followed for feathering out excess spoil over salvaged area



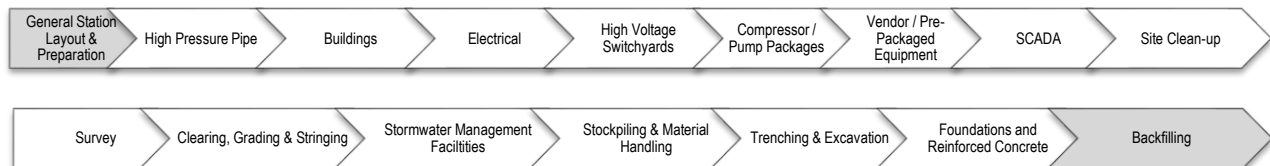
✓	Description
	Ensure that the Contractor compacts the spoil in the trench so that the trench crown (berm) is no higher than specified by Owner Company
	If possible, backfill and compact the trench in lifts in areas where no trench crown will be permitted
	Continually observe for sinkholes along the trench line
	Confirm that the Contractor will conduct final clean-up when soils are dry and unfrozen. Final clean-up should be delayed until spring when spoil can be adequately compacted in the trench and spoil and topsoil can be removed from the sod surface more accurately
Winter Construction	
	Ensure backfilling is completed prior to spring break-up
	If feasible, postpone compaction of frozen trench spoil till late spring or early summer
	If feasible, postpone feathering-out of excess spoil until after spring break-up
	Ensure solidified or frozen backfill is broken up with a screw auger, power dozer, or other approved equipment
	Ensure that any snow or ice is removed from the compacted layer prior to placement of subsequent layers
	Ensure appropriate erosion control measures are in place for trench spoil and any recontoured slopes, when working with frozen soils during winter conditions

Table 180: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
Trench Water Considerations During Backfill	
	Ensure drain tiles are installed per Owner Company specifications in areas where there is potential for seepage into the trench
	Check that trench breakers are installed at the locations defined by the terrain and project specifications
	Confirm that Contractor has installed and keyed in (embedded in the side of the ditch) trench breakers
	Ensure topsoil is not used as a trench breaker
	Ensure appropriate material (e.g., mix of bentonite and sand, or foam) is used for constructing trench breakers
Surface Water Drainage	
	Confirm that the Contractor has provided adequate water erosion protection (e.g., installing suitable geotextiles, earth filled sacks, or rock riprap) where surface drainage crosses the trench line to prevent surface drainage from flowing down trench line
	Ensure that overall drainage control measures are undertaken as advised by the line list
	Confirm that the Contractor re-contours graded portions of the facility as per IFC Drawings

Table 181: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information



8.2.6.6 Typical Outputs for Backfilling

Table 182: Typical Reporting Requirements

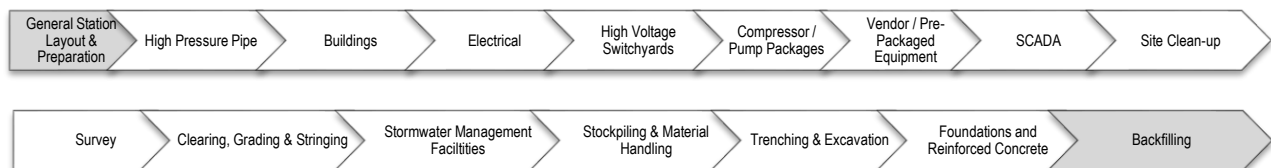
✓	Description
General	
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
Daily	
	<p>Complete backfilling Environmental Inspection progress reports, including (but not limited to):</p> <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Locations of damaged drain tiles for repair ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters. ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions, which includes: <ul style="list-style-type: none"> ○ Updated Environmental Commitment Tracking Tool <p>All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required</p>

8.2.6.7 References – Backfilling

Note to user: The reference information provided in Table 183 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 183: List of References – Backfilling

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Facilities Construction Inspectors



8.3 High Pressure Pipe

8.3.1 Overview

High pressure pipe and piping components are used for the transportation of hydrocarbons in gaseous or liquid form within a facility. High pressure pipe may also be used for power gas systems (e.g., gas-powered valve actuators) and supply feed to utility gas or fuel gas systems for gas turbines (if present). Components of these systems include, but are not limited to, inlet gas filter separators, blowdown, condensate, inlet piping, flow meters, pressure regulating devices, and scraper traps.

Construction of high pressure pipe consists of the following major items during the construction of a facility:

- Trenching and Excavation (refer to Section 1.1.1)
- Foundations and Reinforced Concrete
- Structural Steel
- Lifting and Setting
- Welding and Joining
- Coating / Painting
- Hydrostatic Testing
- Cathodic Protection

These items are presented within this section, roughly in sequence of construction.

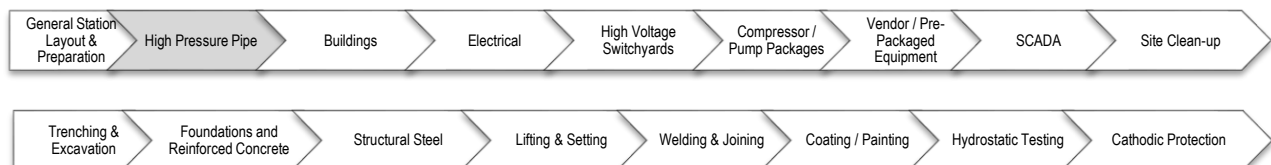
Foundations and Reinforced Concrete

Foundations and reinforced concrete are typically installed as part of the construction stage after trenching and excavation activities are completed. At this point, the general Inspector should continuously monitor that the following items are properly performed:

- Pile installation
- Formwork erection
- Reinforcing steel placement
- Concrete pouring and testing

There are no incremental specific EI responsibilities for Foundations and Reinforced Concrete beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.

Structural Steel



Pipe racks are considered to be structural steel and need to be installed prior to lifting and setting of high pressure pipe. At this point, associated joints and connections of structural steel are also inspected.

There are no incremental specific EI responsibilities for Structural Steel beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.

Lifting and Setting

Lifting and setting involves the placement of pipe sections, assemblies, and other large components onto foundations, pipe supports, pipe racks, or into excavations. This activity requires specialized lifting equipment, trained Operators, and pre-planning.

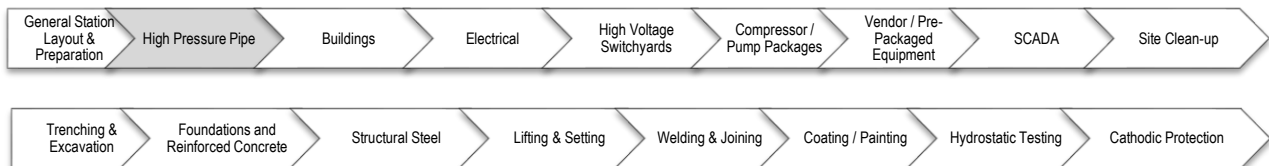
There may be a need to remove accumulations of water from the partially or fully excavated trench as outlined in the Stormwater Management Plan. Please refer to A Practical Guide for Environmental Construction Inspectors – Ditching and Excavation, for EI responsibilities for trench dewatering. There are no incremental EI responsibilities for this construction activity, beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.

Welding and Joining

Welding is a process that uses fusion to join two or more materials together to become a manufactured or fabricated item. Welding during facilities construction is performed to join pipe, fittings, and valves together along with structural steel. In some cases, flanges are used to join lengths of pipe (e.g., need for electrical isolation). These bolted joints require particular attention to ensure additional stresses are not imposed on the pipe.

A Welding Inspector is responsible for ensuring crews follow appropriate methods during welding operations. Welding requires specialized expertise, not just for the execution of the work but also inspection of the work, therefore, welding inspection should only be performed by a Welding Inspector who has been qualified (e.g., CWB Level 2 with CSA or ASME code endorsement) and has been specifically assigned this task. The welding inspector is typically responsible for joining activities as well. The Environmental Inspector supports the Welding inspector by ensuring welding and joining operations do not have an adverse affect on the environment.

The Environmental Inspector's responsibilities during welding and joining include, but are not limited to:



- Maintaining the facility site by ensuring appropriate disposal of welding waste.

Coating / Painting

Coating of the pipe sections and equipment assemblies provides a protective barrier against damage (e.g., corrosion). The majority of the coating operations will occur near to where the pipe was fabricated.

A Coating Inspector is responsible for ensuring crews follow appropriate methods during coating / painting operations. Coating requires specialized expertise, not just for the execution of the work but also inspection of the work, therefore, coating inspection should only be performed by a Coating Inspector who has been qualified (e.g., NACE CIP Level 2) and has been specifically assigned this task. The Environmental Inspector supports the Coating Inspector by ensuring coating / painting operations do not have an adverse affect on the environment.

The Environmental Inspector’s responsibilities during coating include, but are not limited to:

- Ensure drips and spills from coating operations are captured and cleaned up properly; and
- Maintain the ROW by ensuring that debris from grit blasting operations is contained and disposed of properly (if non-environmentally friendly blast media is used) and waste from coating operations is cleaned up and disposed of properly.

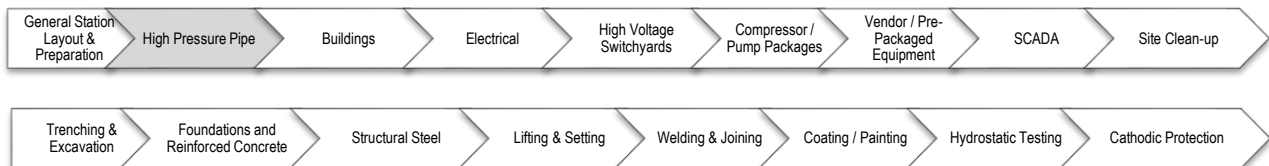
Hydrostatic Testing

A hydrostatic test is a form of pressure testing used to confirm that the pipe has acceptable strength and will not leak under operating conditions. Hydrostatic testing uses water (as opposed to air) to perform the test.

A Pressure Testing inspector, sometimes referred to as a general or craft inspector, is responsible for ensuring crews follow appropriate methods during hydrostatic testing. The Environmental Inspector supports the Pressure Testing inspector by ensuring hydrostatic testing operations do not have an adverse affect on the environment.

Environmental Inspector’s responsibilities during hydrostatic testing include, but are not limited to:

- Permitting for test water withdrawal and discharge;
- Monitoring test water withdrawal and discharge to ensure the activities adhere to the permit requirements and minimize impact on surrounding



- environments (i.e., prevent contamination, erosion, or sediment accumulation in sensitive areas); and
- Reporting for test water withdrawal and discharge.

Cathodic Protection

Cathodic protection (CP) is a technique used, in conjunction with anti-corrosion coatings, to control the external corrosion of a buried pipe's metal surface by making the pipe the cathode of an electrochemical cell. In other words, CP is a simple method of protection where the pipe is connected to a more easily corroded (sacrificial) metal (e.g., magnesium) which acts as the anode. The sacrificial metal then corrodes instead of the pipe. There are two basic methods of CP – galvanic and induced current. The selection of the method depends on many factors, including the amount of pipe to protect, soil conditions, and availability of commercial power. Galvanic systems are passive and do not require any outside power source, whereas induced current systems require an electrical power source (rectifier) to provide the protective current.

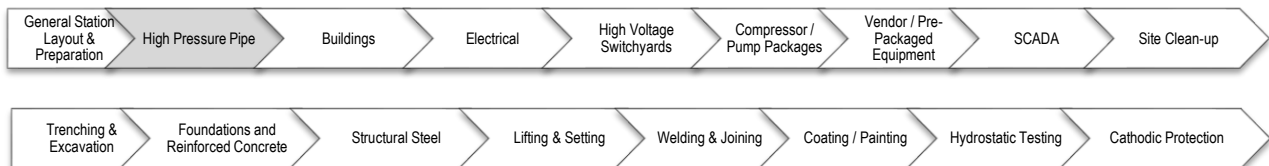
The style and selection of anode material also varies by design. Galvanic systems tend to use several discrete anodes spaced near the pipe and buried at the same depth as the pipe. Induced current systems place the anodes away from the pipe to prevent “over protection” (i.e., high voltages that could cause coating damage). These anodes can be shallow (about the same burial depth of the pipe) or deep wells (typically 200 to 300 feet or 75 to 100 meters deep).

As part of the CP system, test stations are required to take readings on a periodic basis. These can be stand alone posts like those found on pipeline rights-of-way or dedicated connection points at above ground pipe connections. Cathodic test leads, isolation flange kits, anodes, negative drain leads, junction boxes, decoupling devices, lighting protection, and ground bed cables are some of the major components that are installed to complete a CP system.

While connection of test lead (wire) to buried pipe and isolation flange kits are commonly installed by the general pipeline Contractor, the other components are more likely to be installed by a dedicated CP specialty Contractor or Electrician. A Maintenance (i.e., Integrity) Inspector, sometimes referred to as a general or craft inspector, is responsible for ensuring crews follow appropriate methods for installing cathodic protection on the pipeline. The Environmental Inspector supports the Maintenance Inspector by ensuring operations do not have an adverse affect on the environment.

The Environmental Inspector's responsibilities during cathodic protection activities include, but are not limited to:

- Ensuring cathodic protection installation has no adverse effects on the surrounding environment



8.3.2 Welding and Joining

8.3.2.1 Inputs

As part of preparing for Environmental inspection during welding and joining, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 185.

8.3.2.2 Execution

While the work is being executed, the EI is required to monitor workmanship and the construction's progress. Typical items that the EI will monitor for during the welding and joining process are identified in a series of checklists as detailed in Table 184.

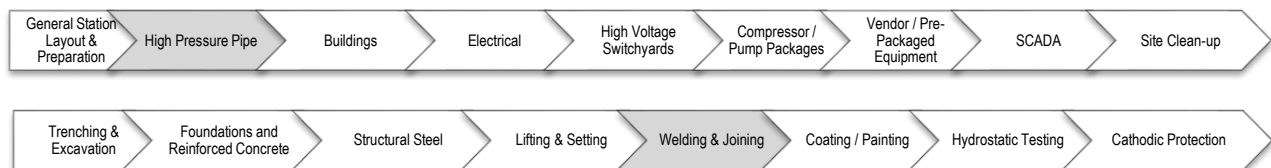
Table 184: Monitoring Requirements for Welding and Joining

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 186
Safety	<ul style="list-style-type: none"> Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 187
General	<ul style="list-style-type: none"> Identifies general items that should be monitored throughout the welding and joining process 	Table 188
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 189
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 190
Air and Noise Pollution	<ul style="list-style-type: none"> Specific considerations relating to the atmosphere and that is particularly sensitive to construction activity 	Table 191

8.3.2.3 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for welding and joining appear in Table 192.

Detailed Checklists – Welding and Joining



8.3.2.4 Typical Input Requirements for Welding and Joining Environmental Inspection

Table 185: Information Requirements for Welding and Joining

✓	Description
	All designs, drawings, and specifications developed by the Owner Company and Contractors related to welding and joining, such as: <ul style="list-style-type: none"> • Issued for Construction (IFC) Drawings, including <ul style="list-style-type: none"> ○ Piping and Instrumentation Diagrams (P&IDs)
	Owner Company specific Safety Plan, including (but not limited to): <ul style="list-style-type: none"> • Requirements for Personal Protective Equipment (PPE) • Emergency Medical Services (EMS)
	Project specific Environmental Protection Plan (EPP) or equivalent, detailing welding and joining requirements
	Other project specific Plans, which may include: <ul style="list-style-type: none"> • Worksite Welding and Joining Plan

8.3.2.5 Best Practice for Typical Welding and Joining Operations

Table 186: Prior to Commencing Work

✓	Description
	Participate in daily meetings to address: <ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Contractor's tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	Ensure swamp mats or geotextiles are used if ground conditions are unstable and low-ground pressure equipment can not be used
	Inspect the open trench and pipe for debris or trapped animals and ensure removal before commencing work

Table 187: Safety Concerns for Welding

✓	Description
	During periods of high fire hazards, ensure welding crews have sufficient fire suppression capability during welding activities

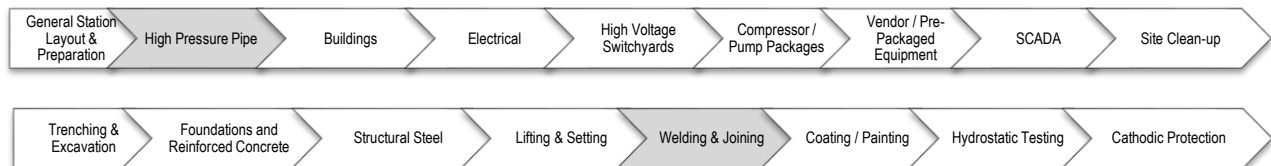


Table 188: Typical Monitoring Requirements – General

✓	Description
	There are no incremental monitoring requirements for general environmental inspection beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

Table 189: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Ensure welding and joining is done prior to trenching at locations prone to sloughing, when feasible
	Recommend minimizing the length of time the trench is left open during welding and joining to minimize trench sloughing
	Ensure the continued use of end caps to prevent wildlife from becoming confined or trapped in the pipe
	Ensure proper disposal of welding and joining related debris (e.g., bevel shavings, weld rod ends)

Table 190: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
	There are no incremental specific monitoring requirements for watercourses, wetlands and aquatic life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

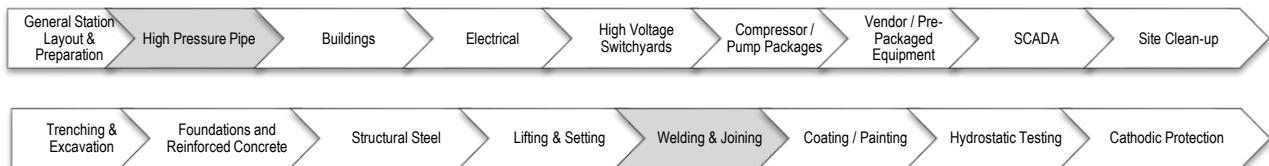
Table 191: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

8.3.2.6 Typical Outputs for Welding and Joining

Table 192: Typical Reporting Requirements

✓	Description
	General
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
	Daily
	Complete welding and joining Environmental Inspection progress reports, including (but not limited to): <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters. ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions, which includes: <ul style="list-style-type: none"> ○ Updated Environmental Commitment Tracking Tool All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required

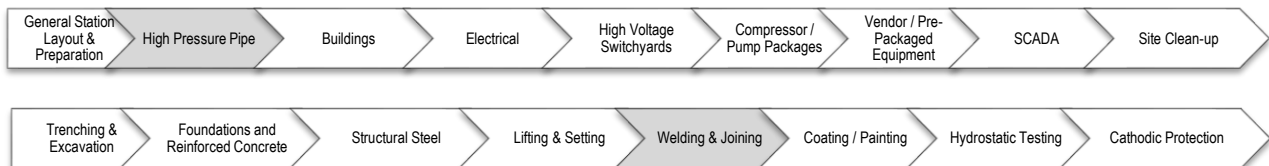


8.3.2.7 References – Welding and Joining

Note to user: The reference information provided in Table 193 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 193: List of References – Welding and Joining

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Facilities Construction Inspectors



8.3.3 Coating / Painting

8.3.3.1 Inputs

As part of preparing for Environmental inspection during coating / painting, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 195.

8.3.3.2 Execution

While the work is being executed, the EI is required to monitor workmanship and the construction's progress. Typical items that the EI will monitor for during the coating / painting process are identified in a series of checklists as detailed in Table 194.

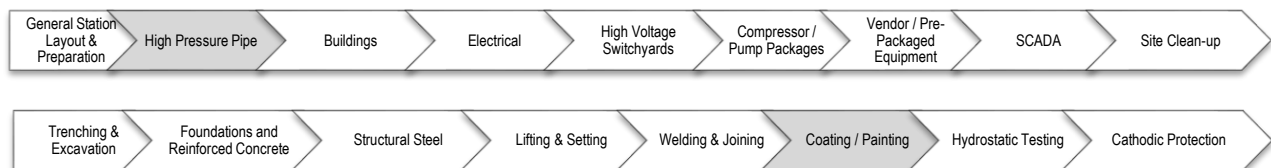
Table 194: Monitoring Requirements for Coating / Painting

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 196
Safety	<ul style="list-style-type: none"> Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 197
General	<ul style="list-style-type: none"> Identifies general items that should be monitored throughout the coating / painting process 	Table 198
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 199
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 200
Air and Noise Pollution	<ul style="list-style-type: none"> Specific considerations relating to the atmosphere and that is particularly sensitive to construction activity 	Table 201

8.3.3.3 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for coating / painting appear in Table 202.

Detailed Checklists – Coating / Painting



8.3.3.4 Typical Input Requirements for Coating / Painting Environmental Inspection

Table 195: Information Requirements for Coating / Painting

✓	Description
	<p>All designs, drawings, and specifications developed by the Owner Company and Contractors related to coating / painting, such as:</p> <ul style="list-style-type: none"> • Coating / Painting Procedures • Coating / Painting Specifications • Manufacturer supplied information (e.g., storage and handling requirements) • Safety Data Sheet (SDS) for Coating / Painting material
	<p>Contracts and agreements related to:</p> <ul style="list-style-type: none"> • Coating / Painting Application • Handling and Disposal of Waste
	<p>Owner Company specific Safety Plan, including (but not limited to):</p> <ul style="list-style-type: none"> • Requirements for Personal Protective Equipment (PPE) • Emergency Medical Services (EMS)
	<p>Project specific Environmental Protection Plan (EPP) or equivalent, detailing coating / painting requirements</p>
	<p>Other project specific Plans, which may include:</p> <ul style="list-style-type: none"> • Worksite Coating / Painting Plan

8.3.3.5 Best Practice for Typical Coating / Painting Operations

Table 196: Prior to Commencing Work

✓	Description
	<p>Participate in daily meetings to address:</p> <ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Contractor's tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	<p>Ensure swamp mats or geotextiles are used if ground conditions are unstable and low-ground pressure equipment can not be used</p>

Table 197: Safety Concerns for Coating / Painting

✓	Description
	<p>Verify protection is in place to prevent blast media from entering valves, pipe, fittings and appurtenances</p>

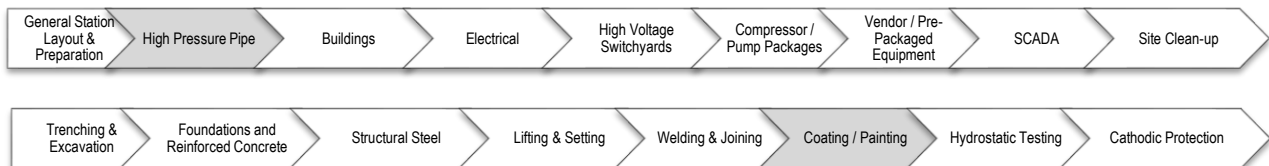


Table 198: Typical Monitoring Requirements – General

✓	Description
	Monitor for spills associated with coating / painting materials and ensure clean-up of any spills is completed

Table 199: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Recommend minimizing the length of time the trench is left open during coating / painting to minimize trench sloughing
	Review site specific requirements for blast media including method of containing, collecting, and disposing of debris from grit blasting operations (if non-environmentally friendly blast media is used)
	Ensure a tarp of sufficient size is used to block overspray when using spray or paint-on coatings.
	General housekeeping of coating / painting related debris (e.g., gloves, brushes, rollers, containers, overspray) including proper disposal of waste products

Table 200: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
	There are no incremental specific monitoring requirements for watercourses, wetlands and aquatic life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

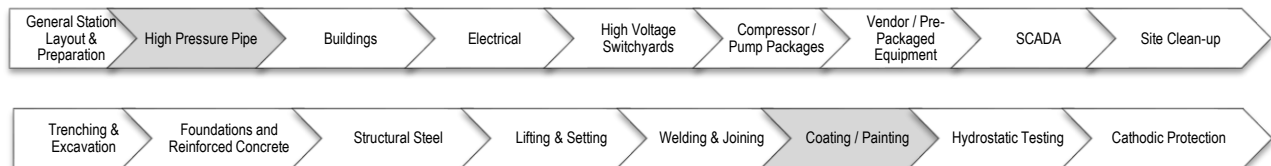
Table 201: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

8.3.3.6 Typical Outputs for Coating / Painting

Table 202: Typical Reporting Requirements

✓	Description
	General
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
	Daily
	Complete coating / painting Environmental Inspection progress reports, including (but not limited to): <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters. ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions, which includes: <ul style="list-style-type: none"> ○ Updated Environmental Commitment Tracking Tool All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required

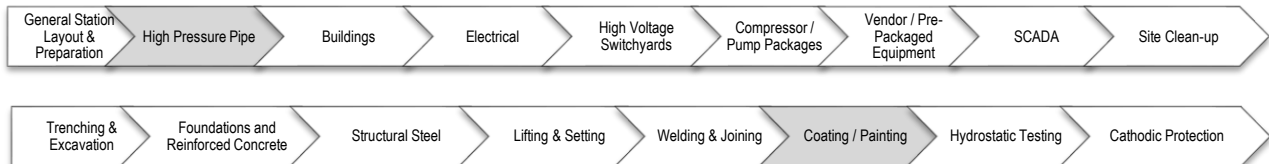


8.3.3.7 References – Coating / Painting

Note to user: The reference information provided in Table 203 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 203: List of References – Coating / Painting

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Facilities Construction Inspectors



8.3.4 Hydrostatic Testing

8.3.4.1 Inputs

As part of preparing for Environmental inspection during hydrostatic testing, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 205.

8.3.4.2 Execution

While the work is being executed, the EI is required to monitor workmanship and the construction's progress. Typical items that the EI will monitor for during the hydrostatic testing process are identified in a series of checklists as detailed in Table 204.

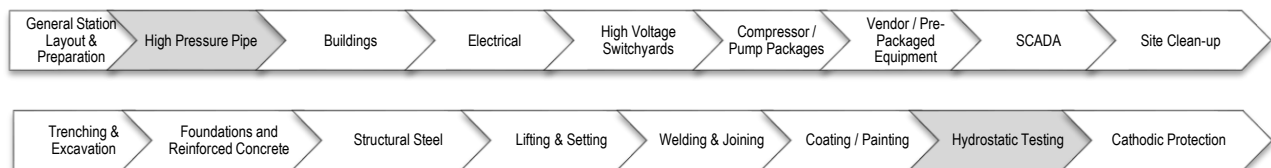
Table 204: Monitoring Requirements for Hydrostatic Testing

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 206
Safety	<ul style="list-style-type: none"> Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 207
General	<ul style="list-style-type: none"> Identifies general items that should be monitored throughout the hydrostatic testing process 	Table 208
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 209
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 210
Air and Noise Pollution	<ul style="list-style-type: none"> Specific considerations relating to the atmosphere and that is particularly sensitive to construction activity 	Table 211

8.3.4.3 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for hydrostatic testing appear in Table 212.

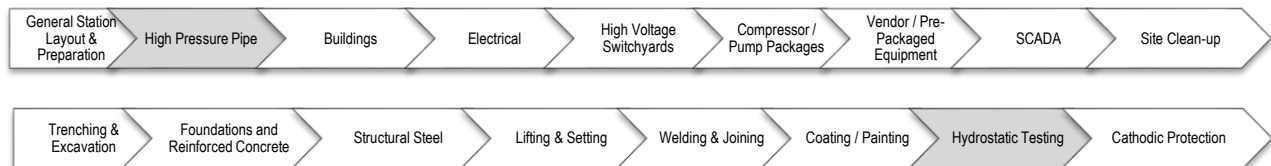
Detailed Checklists – Hydrostatic Testing



8.3.4.4 Typical Input Requirements for Hydrostatic Testing Environmental Inspection

Table 205: Information Requirements for Hydrostatic Testing

✓	Description
	<p>All designs, drawings, and specifications developed by the Owner Company and Contractors related to hydrostatic testing, such as:</p> <ul style="list-style-type: none"> • Issued for Construction (IFC) Drawings, including <ul style="list-style-type: none"> ○ Piping and Instrumentation Diagrams (P&IDs) ○ Isometric Drawings ○ Line List (e.g., special concerns for each Land Owner); for Facility Piping, should include tabulated test pressures, duration, and radiography requirements • Pipeline Facility Drawings • Drawings specific to hydrostatic test
	<p>Contracts and agreements related to:</p> <ul style="list-style-type: none"> • Road Use • Construction Survey • Environmental Reports • Heritage Surveys
	Regulatory requirements for water withdrawal and discharge
	<p>Permits related to:</p> <ul style="list-style-type: none"> • Environmental conditions and/or commitments • Water Withdrawal and Discharge Commitments
	<p>Owner Company specific Safety Plan, including (but not limited to):</p> <ul style="list-style-type: none"> • Traffic Control Plan • Specified Minimum Setback Distance for Personnel and Testing Equipment • Requirements for Personal Protective Equipment (PPE) • Emergency Medical Services (EMS) • Emergency Contact List
	Project specific Environmental Protection Plan (EPP) or equivalent, detailing hydrostatic testing requirements
	<p>Other project specific Plans, which may include:</p> <ul style="list-style-type: none"> • Hydrostatic Test Plan addressing (but not limited to) the following items: <ul style="list-style-type: none"> ○ Site specific safety and/or hazards and appropriate analysis ○ Emergency Response Plan in the event of a rupture during the test ○ Test water sourcing, filling, pressurizing, depressurizing, and dewatering ○ Hydrostatic testing warning signage ○ Provision of protective berms around fuel storage used to supply fuel-driven line fill pumps (as required) • Stormwater Management Plan • Erosion and Sediment Control Plan



8.3.4.5 Best Practice for Typical Hydrostatic Testing Operations

Table 206: Prior to Commencing Work

✓	Description
	Participate in daily meetings to address: <ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Contractor's tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	Check the signage and contact information at public access points to the facility site, and if required, temporarily restrict access points
	Ensure stormwater management plans are in place
	Ensure that test water withdrawal and disposal notifications, registrations, approvals and/or permits are in place
	Ensure that the required water source volumes and flow rates meet regulatory conditions
	Prior to and upon completion of a hydrostatic test, ensure that the local authorities are alerted, if required

Table 207: Safety Concerns for Pressure Testing

✓	Description
	Familiarize yourself with safety zones around test heads / pigging launchers and receivers and ensure they are maintained throughout the operation

Table 208: Typical Monitoring Requirements – General

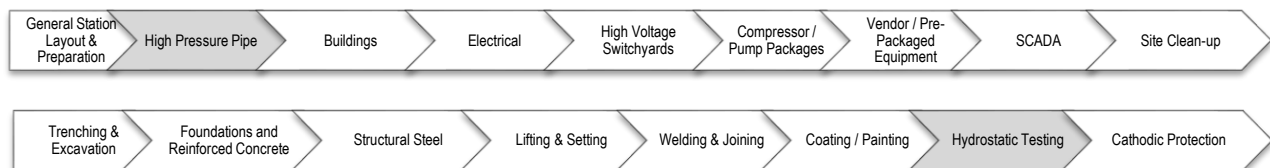
✓	Description
	Ensure all hydrostatic testing activities are confined to the facility site
	Ensure removal and proper disposal of hydrostatic testing related debris from the facility site
	Ensure that the facility site is left in as close to original condition as possible following hydrostatic testing operations

Table 209: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Ensure all stationary equipment (e.g., pumps, generators, fuel containers) have measures in place to prevent spills onto soils (e.g., secondary containment, polyethylene sheeting)

Table 210: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
	Ensure all stationary equipment (e.g., pumps, generators, fuel containers) within specified distances from a watercourse or water body are in secondary containment



✓	Description
	Ensure all equipment to be used within specified distances from a watercourse or water body is clean and free of leaks and are equipped with approved spill kits
	Ensure that appropriate containment is installed for receipt of any cleaning / drying pigs
Withdrawing Test Water	
	Ensure that the Contractor withdraws test water from locations approved in the water permit or the Environmental Protection Plan (EPP) or equivalent and not from environmentally sensitive areas (e.g., steep slopes)
	Ensure water withdrawal sources have sufficient quantity and quality of water (e.g., avoid high saline sources) for the pressure test
	Ensure proper use of screens to prevent entrapment of fish or wildlife and any debris during water withdrawal
	When withdrawing water from a fish-bearing waterbody, ensure applicable approval is in place and instream restricted activity period are adhered to
	Confirm that the test water is collected and sent to the laboratory for testing so that results are available in a timely manner
	Confirm that a portable laboratory for testing the water quality is available (if required)
	Ensure water tanks are thoroughly clean inside, when used for transporting test water
	Ensure the withdrawal rate adhere to the limits in the permit and project or owner company specifications; do not exceed those withdrawal rates without regulatory approval
	Ensure project or company specification are adhered to when using additives (e.g., methanol) in the test water; if possible, minimize the use of additives
	Ensure all conditions outlined in applicable permits for water withdrawal are adhered to
Pressure Testing	
	Ensure contingency measures are adhered to when spills or leaks occur
Dewatering the Pipe	
	Ensure that the Contractor dewater to locations approved in the water permit or the Environmental Protection Plan (EPP) or equivalent and avoid dewatering to environmentally sensitive areas (e.g., steep slopes, muskeg)
	Ensure all conditions outlined in applicable permits for water discharge are adhered to
	Ensure test water withdrawn from one basin is not discharged into another drainage basin to prevent transfer of aquatic organisms
	Ensure that the Contractor does not dewater until proper sampling is completed and filtration unit is in place (if required)
	Ensure water with chemical additive is sampled and treated prior to discharging at approved location and/or sites
	Ensure that the Contractor installs an energy absorbing diffuser at the discharge end of the dewatering line to prevent erosion, bottom scour, or damage to vegetation
Drying the Pipe	
	Ensure drying agents (e.g., methanol) is appropriately captured and disposed of at approved sites

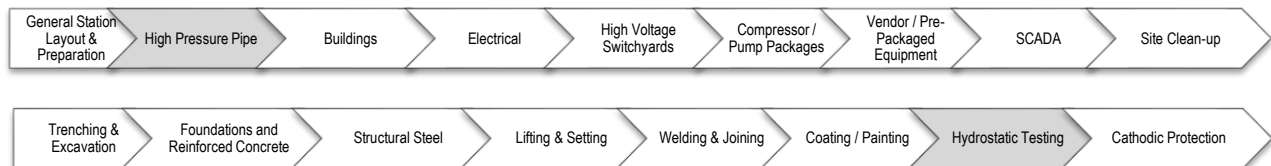


Table 211: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

8.3.4.6 Typical Outputs for Hydrostatic Testing

Table 212: Typical Reporting Requirements

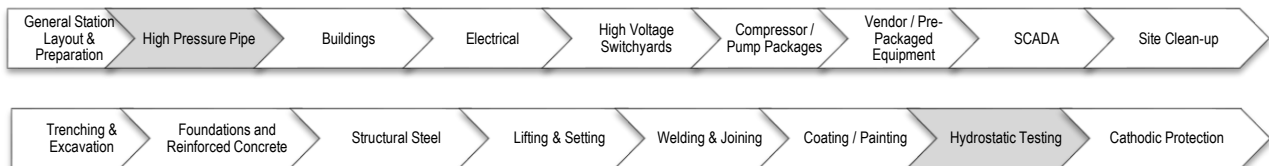
✓	Description
General	
	Submit reporting for test water withdrawal and discharge, if necessary
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
Daily	
	Complete hydrostatic testing Environmental Inspection progress reports, including (but not limited to): <ul style="list-style-type: none"> • Work completed to date, including: <ul style="list-style-type: none"> ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters. ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions, which includes: <ul style="list-style-type: none"> ○ Updated Environmental Commitment Tracking Tool All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required

8.3.4.7 References – Hydrostatic Testing

Note to user: The reference information provided in Table 213 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 213: List of References – Hydrostatic Testing

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Pipeline Construction Inspectors



8.3.5 Cathodic Protection

8.3.5.1 Inputs

As part of preparing for Environmental inspection during Cathodic Protection (CP) installation, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 215.

8.3.5.2 Execution

While the work is being executed, the EI is required to monitor workmanship and the construction's progress. Typical items that the EI will monitor for during the cathodic protection installation process are identified in a series of checklists as detailed in Table 214.

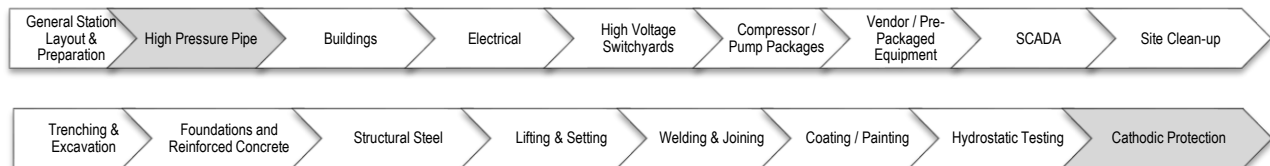
Table 214: Monitoring Requirements for Cathodic Protection

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 216
Safety	<ul style="list-style-type: none"> Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 217
General	<ul style="list-style-type: none"> Identifies general items that should be monitored throughout the cathodic protection installation process 	Table 218
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 219
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 220
Air and Noise Pollution	<ul style="list-style-type: none"> Specific considerations relating to the atmosphere and that is particularly sensitive to construction activity 	Table 221

8.3.5.3 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for cathodic protection installation appear in Table 222.

Detailed Checklists – CP



8.3.5.4 Typical Input Requirements for Cathodic Protection Environmental Inspection

Table 215: Information Requirements for Cathodic Protection

✓	Description
	<p>All designs, drawings, and specifications developed by the Owner Company and Contractors related to cathodic protection installation, such as:</p> <ul style="list-style-type: none"> • Issued for Construction (IFC) Drawings, including <ul style="list-style-type: none"> ○ Access Road Drawings ○ Line List (e.g., special concerns for each Land Owner) ○ Ground Bed Installation Details ○ Rectifier Installation Details ○ Isolation Kit Installation Details • Locations and Types of Ground Beds and Anodes
	<p>Contracts and agreements related to:</p> <ul style="list-style-type: none"> • Road Use
	<p>Permits related to:</p> <ul style="list-style-type: none"> • Environmental conditions and/or commitments • Road Use
	<p>Owner Company specific Safety Plan, including (but not limited to):</p> <ul style="list-style-type: none"> • Traffic Control Plan • Requirements for Personal Protective Equipment (PPE) • Emergency Medical Services (EMS)
	<p>Project specific Environmental Protection Plan (EPP) or equivalent</p>
	<p>Other project specific Plans, which may include:</p> <ul style="list-style-type: none"> • Cathodic Protection and Installation • Fire Prevention / Fire Fighting

8.3.5.5 Best Practice for Typical CP Operations

Table 216: Prior to Commencing Work

✓	Description
	<p>Participate in daily meetings to address:</p> <ul style="list-style-type: none"> • Job safety and/or hazard identification issues • Environmental concerns • Duties of Inspector(s) • Contractor's tailgate meetings (as required) • Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work

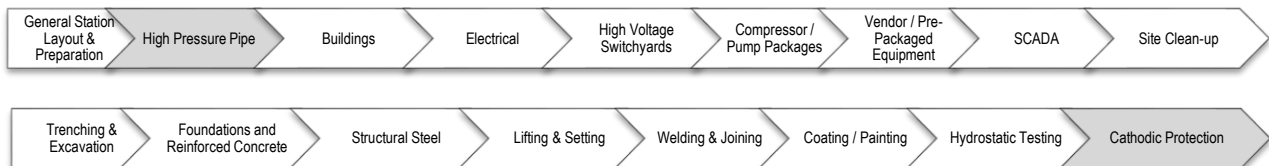


Table 217: Safety Concerns for Cathodic Protection

✓	Description
	During periods of high fire hazards, ensure crews have sufficient fire suppression capability during cathodic protection installation

Table 218: Typical Monitoring Requirements – General

✓	Description
	Ensure all cathodic protection installation activities are confined to the facility site or ground bed locations
	Ensure removal and proper disposal of cathodic protection installation related debris from the facility site
	Ensure that the facility site is left in as close to original condition as possible

Table 219: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Ensure the location of ground beds have no adverse effect on the soil, vegetation, and terrestrial life
	Ensure the ground bed materials have no anticipated adverse effect on the surrounding soil, vegetation, and terrestrial life
	Confirm that the Contractor re-contours graded portions of the facility site or ground bed locations to match the surrounding landforms and drainage patterns, if required

Table 220: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
	There are no incremental specific monitoring requirements for watercourses, wetlands, and terrestrial life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

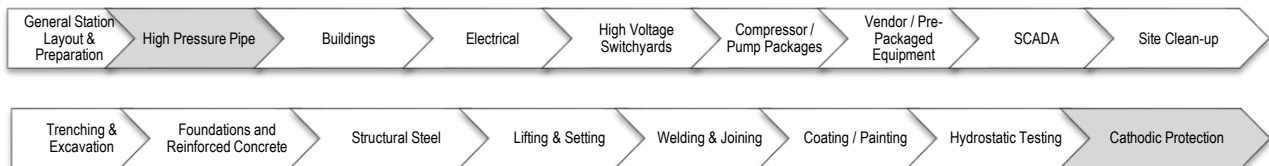
Table 221: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

8.3.5.6 Typical Outputs for CP

Table 222: Typical Reporting Requirements

✓	Description
	General
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
	Daily



Complete cathodic protection Environmental Inspection progress reports, including (but not limited to):

- Work completed to date, including:
 - Information regarding milepost and/or stationing, weather, and any agency or landowner encounters.
 - Recording of any observations, event and violations using a daily log, camera, and other technology
- Documenting compliance with Project permit conditions, which includes:
 - Updated Environmental Commitment Tracking Tool

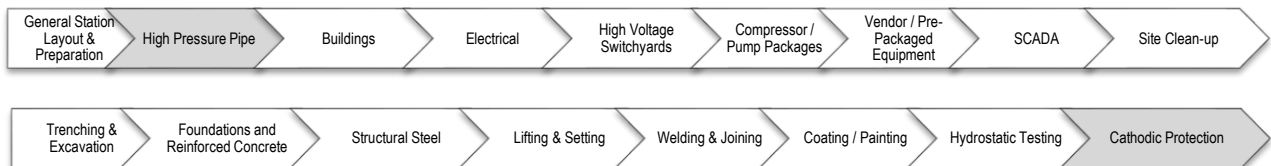
All reports along with any punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required

8.3.5.7 References – Cathodic Protection

Note to user: The reference information provided in Table 223 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 223: List of References – Cathodic Protection

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Pipeline Construction Inspectors



8.4 Buildings

8.4.1 Overview

Buildings, in the context of a facility, include all of the structures on the site regardless of whether they are used to house equipment or personnel.

Construction of buildings consists of the following major items during the construction of a facility:

- Foundations and Reinforced Concrete
- Structural Steel
- Welding and Joining (refer to Section 8.3.2)
- Coating / Painting (refer to Section 1.1.1)
- Lifting and Setting
- Utility Power (AC Electrical Systems)
- Heating, Ventilation, and Air Conditioning (HVAC)
- Fire Suppression and Domestic Systems
- Building Lighting

These items are presented within this section, roughly in sequence of construction.

Foundations and Reinforced Concrete

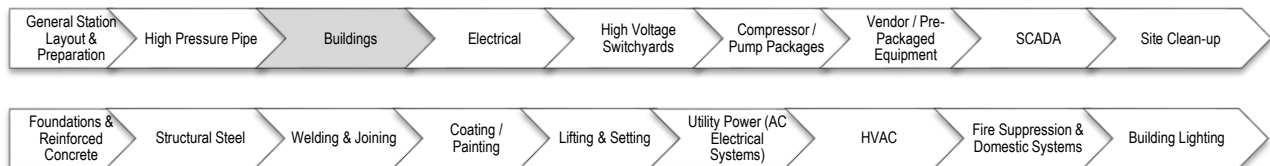
Foundations and reinforced concrete are typically installed as part of the construction stage after trenching and excavation activities are completed. At this point, the general Inspector should continuously monitor that the following items are properly performed:

- Pile installation
- Formwork erection
- Reinforcing steel placement
- Concrete pouring and testing

There are no incremental specific EI responsibilities for Foundations and Reinforced Concrete beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.

Structural Steel

All buildings within a facility have a structural component that is typically steel, regardless of their function (i.e., housing equipment versus offices). At this point,



the steel structure is erected along with the building envelope (i.e., external cladding). Vent bracing is considered to be structural steel. At this point, associated joints and connections of structural steel are also inspected.

There are no incremental specific EI responsibilities for Structural Steel beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.

Lifting and Setting

Lifting and setting involves the placement of pre-fabricated buildings and structural steel onto foundations or into excavations. This activity requires specialized lifting equipment, trained Operators, and pre-planning.

There are no incremental specific EI responsibilities for Lifting and Setting beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.

Alternating Current (AC) Electrical Systems

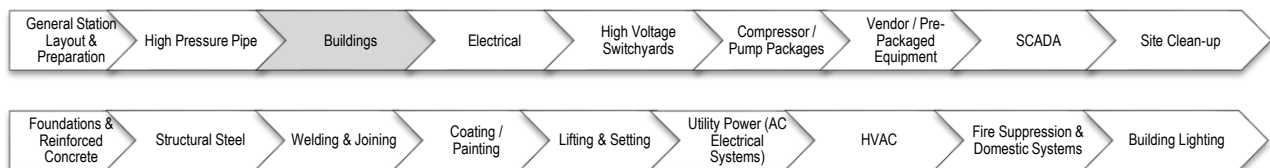
AC electrical systems (e.g., utility power) include but are not limited to the following main components:

- Distribution Panels
- Transformers
- Motor Control Centers (MCCs)
- Automatic Transfer Switches
- Uninterruptible Power Supply (UPS)
- Motors
- Standby Generators
- Lighting

There are no incremental specific EI responsibilities for Alternating Current (AC) Electrical Systems beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.

Heating, Ventilation, and Air Conditioning (HVAC)

HVAC systems are installed to provide an appropriate environment (e.g., temperature, air quality) for both workers and equipment within a facility. The bulk of the inspection activity is focused on the Mechanical discipline.



There are no incremental specific EI responsibilities for Heating, Ventilation, and Air Conditioning (HVAC) beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.

Fire Suppression and Domestic Systems

Fire suppression and domestic systems are typically some of the last items installed during building construction. Fire suppression systems are installed in order to extinguish or prevent the spread of potential fires in buildings, with the bulk of the inspection activity focused on the Electrical discipline.

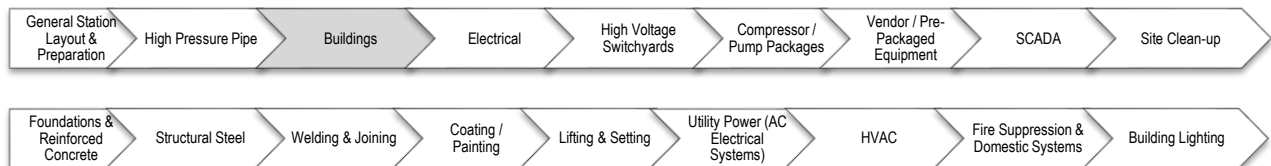
Domestic systems include domestic water and sanitary sewer systems within buildings, with the bulk of the inspection activity focused on the Mechanical discipline. Domestic water is water supplied to buildings for indoor and outdoor use. Sanitary sewer systems essentially contain the building sanitary drain line, holding and processing tanks, and field percolation system (if required).

There are no incremental specific EI responsibilities for Fire Suppression and Domestic Systems beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.

Building Lighting

Building and yard lighting provide adequate illumination to perform tasks safely in hazardous and non-hazardous environments. In the event that failure of normal lighting can pose a hazard to personnel or interfere with plant operations, emergency lighting is provided. The bulk of the inspection activity is focused on the Electrical discipline.

There are no incremental specific EI responsibilities for Building Lighting beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.



8.5 Electrical

8.5.1 Overview

Low voltage electrical systems and controls are typically installed as part of the construction stage after the erection of buildings and their components.

Electrical installation consists of the following major items during the construction of a facility:

- Alternating Current (AC) Electrical Systems
- Electrical Controls and Instrumentation
- Grounding

Alternating Current (AC) Electrical Systems

AC electrical systems (e.g., utility power) include but are not limited to the following main components:

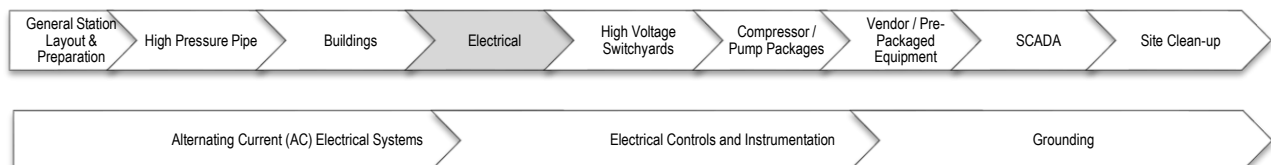
- Distribution Panels
- Transformers
- Motor Control Centers (MCCs)
- Automatic Transfer Switches
- Uninterruptible Power Supply (UPS)
- Motors
- Standby Generators
- Lighting

There are no incremental specific EI responsibilities for Alternating Current (AC) Electrical Systems beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.

Electrical Controls and Instrumentation

All facilities have varying levels of electrical controls and instrumentation. Most controls are electrical in nature, both AC and DC, and may also include pneumatics such as compressed air or natural gas. Electrical controls and instrumentation are vital components used in Supervisory Control and Data Acquisition (SCADA) and / or Human-Machine Interface (HMI) systems.

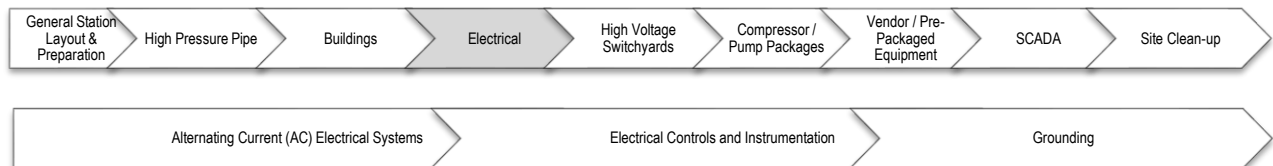
There are no incremental specific EI responsibilities for Electrical Controls and Instrumentation beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.



Grounding

Grounding is a safety measure where electrically operated equipment is connected to the earth as a means of reducing electrical hazards to workers due to potentially dangerous conditions (e.g., short circuits). The station grounding system consists of the existing station grounding and any additional grounding loops.

There are no incremental specific EI responsibilities for Grounding beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.



8.6 High Voltage Switchyards

8.6.1 Overview

High voltage switchyards are used to step down high voltage power to an appropriate voltage for use within the facility.

Construction of high voltage switchyards consists of the following major items during the construction of a facility:

- Foundations and Reinforced Concrete
- Structural Steel
- Welding and Joining (refer to Section 8.3.2)
- Coating / Painting (refer to Section 1.1.1)
- Lifting and Setting
- Switchgear

These items are presented within this section, roughly in sequence of construction.

Foundations and Reinforced Concrete

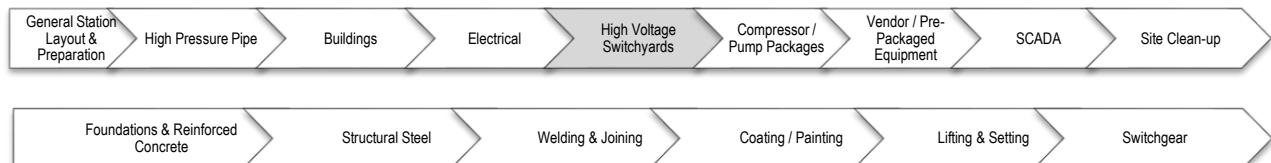
Foundations and reinforced concrete are typically installed as part of the construction stage after trenching and excavation activities are completed. At this point, the general Inspector should continuously monitor that the following items are properly performed:

- Pile installation
- Formwork erection
- Reinforcing steel placement
- Concrete pouring and testing

There are no incremental specific EI responsibilities for Foundations and Reinforced Concrete beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.

Structural Steel

Depending on the nature of the facility, high voltage switchyards may use equipment that requires structural support. Structural steel is typically installed as part of the construction stage prior to lifting and setting of equipment. At this point, associated joints and connections of structural steel are also inspected.



There are no incremental specific EI responsibilities for Structural Steel beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.

Lifting and Setting

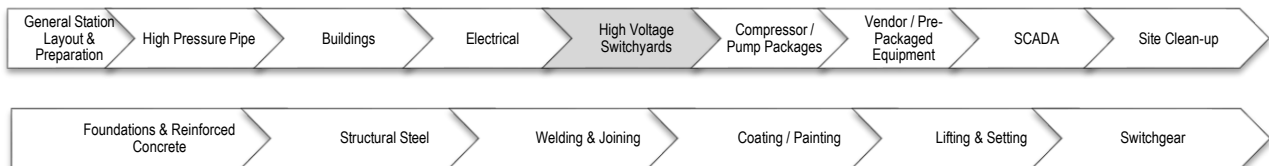
Lifting and setting involves the placement of equipment onto foundations or into excavations. This activity requires specialized lifting equipment, trained Operators, and pre-planning.

There are no incremental specific EI responsibilities for Lifting and Setting beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.

Switchgear

Switchgear is a generic term for the combination of electrical components (e.g., fuses, circuit breakers, switches, control panels, relays, transformers) that are used to control, protect, and isolate electrical equipment.

There are no incremental specific EI responsibilities for Switchgear beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.



8.7 Compressor / Pump Packages

8.7.1 Overview

Compressors (for gaseous products) and pumps (for liquid products) are devices that are used to increase the pressure of the product so that it flows down the pipe.

Installation of compressor and pump packages consists of the following major items during the construction of a facility:

- Foundations and Reinforced Concrete
- High Pressure Pipe (refer to Section 1.1)
- Structural Steel
- Lifting and Setting
- Electrical Controls and Instrumentation

Note that connections to compressor / pump packages are within the scope of this document; however, connections for components within these packages are typically inspected by the Vendor and therefore outside the scope of this document.

Foundations and Reinforced Concrete

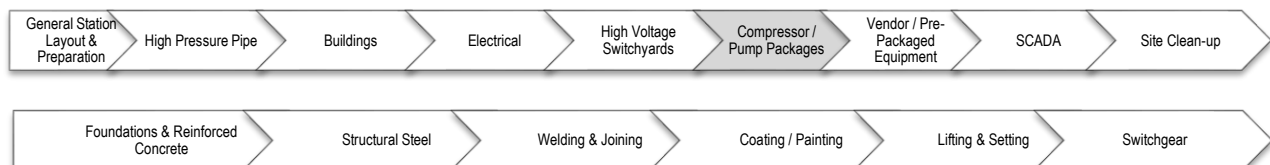
Foundations and reinforced concrete are typically installed as part of the construction stage after trenching and excavation activities are completed. At this point, the general Inspector should continuously monitor that the following items are properly performed:

- Pile installation
- Formwork erection
- Reinforcing steel placement
- Concrete pouring and testing

There are no incremental specific EI responsibilities for Foundations and Reinforced Concrete beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.

Structural Steel

All buildings within a facility have a structural component that is typically steel, regardless of their function (i.e., housing equipment versus offices). At this point, the steel structure is erected along with the building envelope (i.e., external cladding). Vent bracing is considered to be structural steel. At this point, associated joints and connections of structural steel are also inspected.



There are no incremental specific EI responsibilities for Structural Steel beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.

Lifting and Setting

Lifting and setting involves the placement of compressor / pump packages onto foundations and leveling equipment, including all package connections. This activity requires specialized lifting equipment, trained Operators, and pre-planning.

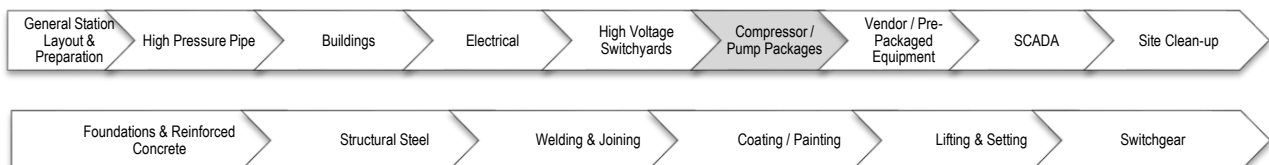
Compressor and pump packages are specialized items with long lead times. Proper attention and care must be given during the lifting and setting phase to ensure that the equipment is not damaged, which may cause delays to the project.

There are no incremental specific EI responsibilities for Lifting and Setting beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.

Electrical Controls and Instrumentation

All facilities have varying levels of electrical controls and instrumentation. Most controls are electrical in nature, both AC and DC, and may also include pneumatics such as compressed air or natural gas. Electrical controls and instrumentation are vital components used in Supervisory Control and Data Acquisition (SCADA) and / or Human-Machine Interface (HMI) systems.

There are no incremental specific EI responsibilities for Electrical Controls and Instrumentation beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.



8.8 Vendor / Pre-Packaged Equipment

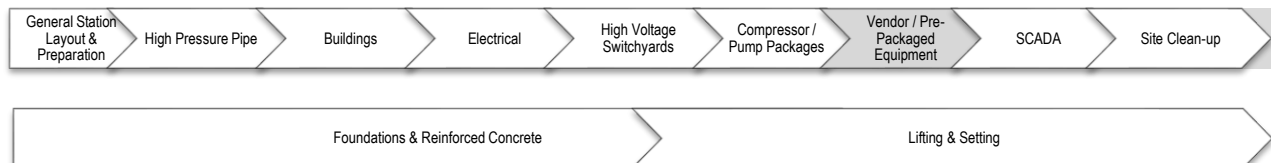
8.8.1 Overview

Vendor / pre-packaged equipment is installed to support the primary compressor or pump package. Installation of vendor / pre-packaged equipment consists of the following major items during the construction of a facility:

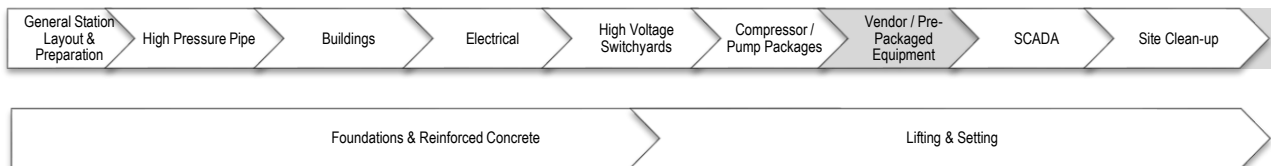
- Foundations and Reinforced Concrete
- Lifting and Setting

These packages may include the following: air filter, exhaust, air cooling, compressed air, lubricating oil, fire water pumps, auxiliary power units (APU), and control piping systems.

- **Air Filter Systems:** These systems pre-treat the air used in combustion in the primary driver (e.g., gas turbine or reciprocating engine) to remove particulate matter and / or liquids.
- **Exhaust Systems:** These systems are used to silence the exhaust on compression equipment and may also be used to treat (e.g., removal of carbon dioxide) or monitor the exhaust gases for composition (Continuous Emission Monitoring System, or CEMS).
- **Air Cooling Systems:** Air coolers are used to reduce the temperature of natural gas that has been heated in the compression process.
- **Compressed Air Systems:** Compressed air systems are used for instrumentation control systems or cooling. These systems include but are not limited to the air compressors, air dryer, and compressed air treatment, including associated equipment and piping.
- **Lubricating Oil Systems:** These systems are used for lubrication and cooling of rotating equipment and commonly used in gas turbine and compressor applications.
- **Fire Water Pumps:** Fire water pumps are required at industrial locations, in accordance with the relevant code requirements. Tankage may be required to store fire water and fuel to be able to operate without utility power.
- **Auxiliary Power Units (APU):** These systems are automated power systems that will automatically start to provide power to critical systems for a specified amount of time in the event of the loss of utility power.
- **Valves and Actuators:** Valves are used to assist with the isolation of pipe sections or to control product flow in a pipe or within a facility. Actuators are used to control the position of these valves (typically required for large diameter valves). The focus of this document is on the large diameter valves and associated actuators used to manage product flow.
- **Control Piping:** These systems are usually a specialized form of a compressed air system or a natural gas system that are used to operate valve actuators remotely.



There are no incremental specific EI responsibilities for vendor and pre-packaged systems beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.



8.9 Supervisory Control and Data Acquisition (SCADA) Systems

8.9.1 Overview

SCADA systems include emergency shutdown systems, security systems, station controls, Human-Machine Interface (HMI) systems, and all related components, including the Programmable Logic Controller (PLC) System, associated panels, networking, communication, and interface to other systems, as applicable. In most cases, this may also involve a backup control center.

Note that oversight of the installation of SCADA systems is typically undertaken by Operations personnel and is therefore outside of the scope of this document; however, emergency shutdown systems are within the scope of this document.

Emergency shutdown systems include emergency shutdown piping and all of the associated equipment such as panels.

There are no incremental specific EI responsibilities for SCADA systems beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information.



8.10 Site Clean-up

8.10.1 Overview

Construction site clean-up is the final cleaning and removal of construction materials and equipment from the facility site. This also involves establishing the final grade, detailing of the surface (e.g., yard gravel, curbs, sidewalks), and completion of any outstanding construction deficiencies.

Clean-up work can be performed in phases depending on the location and season of construction. For example, during winter construction, the Contractor will perform the machine or initial clean-up immediately after the end of construction and before the spring break-up, then return to the site the following winter to do the final clean-up.

However, during summer construction, the Contractor will do both machine and final clean-up immediately after the end of construction and return to the site at a later date for additional restoration work (e.g., repairing a sunken trench).

An Earthworks Inspector, sometimes referred to as a general or craft inspector, is responsible for ensuring crews follow appropriate methods during site clean-up. The Environmental Inspector supports the Earthworks Inspector by ensuring site clean-up activities do not have an adverse affect on the environment.

The Environmental Inspector's responsibilities during site clean-up include, but are not limited to:

- Ensuring appropriate disposal of construction related debris

8.10.1.1 Inputs

As part of preparing for Environmental inspection during site clean-up, the Environmental Inspector (EI) will continually familiarize themselves with relevant aspects of key documents, drawings, and Owner/Operator Company technical specifications as identified in Table 225.

8.10.1.2 Execution

While the work is being executed, the EI is required to monitor workmanship and report on progress on a periodic basis. Typical items that the EI will monitor for during the site clean-up process are identified in a series of checklists as detailed in Table 224.

Table 224: Monitoring Requirements for Site Clean-up

Item	Description	Reference
Prior to Commencing Work	<ul style="list-style-type: none"> • On a daily basis, ensure key issues that have been identified are detailed and addressed 	Table 226



Item	Description	Reference
Safety	<ul style="list-style-type: none"> Monitor the operations for adherence to relevant Owner Company and project specific safety requirements 	Table 227
General	<ul style="list-style-type: none"> Identifies general items that should be monitored throughout the site clean-up process 	Table 228
Soil, Vegetation and Terrestrial Life	<ul style="list-style-type: none"> Specific considerations relating to land and terrestrial life that are incremental and are particularly sensitive to construction activity 	Table 229
Watercourses, Wetlands and Aquatic Life	<ul style="list-style-type: none"> Specific considerations relating to bodies of water and aquatic life that are incremental and particularly sensitive to construction activity 	Table 230
Air and Noise Pollution	<ul style="list-style-type: none"> Specific considerations relating to the atmosphere and that is particularly sensitive to construction activity 	Table 231

8.10.1.3 Outputs

The EI is required to report on workmanship and progress on a periodic basis (e.g., daily or weekly) by completing various reports on each workday and end of week. Report requirements and reporting processes are Owner Company and project specific; however, best practices for reporting requirements for site clean-up appear in Table 232.

Detailed Checklists – Site Clean-up

8.10.1.4 Typical Input Requirements for Site Clean-Up Environmental Inspection

Table 225: Information Requirements for Site Clean-Up

✓	Description
	<p>All designs, drawings, and specifications developed by the Owner Company and Contractors related to site clean-up, such as:</p> <ul style="list-style-type: none"> Issued for Construction (IFC) Drawings, including <ul style="list-style-type: none"> Access Road Drawings Grading Drawings Line List (e.g., special concerns for each Land Owner) Surface Treatment Drawings (e.g., surface gravel placement) Fencing Drawings
	<p>Contracts and agreements related to:</p> <ul style="list-style-type: none"> Road Use Crossing for Buried Facilities
	<p>Owner Company specific Safety Plan, including (but not limited to):</p> <ul style="list-style-type: none"> Traffic Control Plan Requirements for Personal Protective Equipment (PPE) Procedures for working around overhead powerlines



✓	Description
	<ul style="list-style-type: none"> Emergency Medical Services (EMS)
	Project specific Environmental Protection Plan (EPP) or equivalent, detailing site clean-up requirements
	Other project specific Plans, which may include: <ul style="list-style-type: none"> Grading Plan Stormwater Management Plan Erosion and Sediment Control Plan

8.10.1.5 Best Practice for Typical Site Clean-Up Operations

Table 226: Prior to Commencing Work

✓	Description
	Participate in daily meetings to address: <ul style="list-style-type: none"> Job safety and/or hazard identification issues Environmental concerns Duties of Inspector(s) Contractor's tailgate meetings (as required) Ad-hoc meetings with Contractors to discuss and clarify questions or concerns regarding potential environmental impacts from planned daily work
	Ensure swamp mats or geotextiles are used if ground conditions are unstable and low-ground pressure equipment can not be used
	Ensure stormwater management plans are in place

Table 227: Safety Concerns for Site Clean-up

✓	Description
	There are no incremental specific Safety Concerns beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

Table 228: Typical Monitoring Requirements – General

✓	Description
	Ensure no surplus construction materials are left on the facility site (refer to contract documents to determine which materials will be stored and which will be scrapped)
	Ensure rock material from construction or excavation that was not reused is removed from the facility site and hauled to an Owner Company approved dump site or distributed within a specific portion of the facility site
	Confirm that clean-up equipment heavier than allowed in the construction specifications do not operate over top of underground infrastructure
	Ensure that for winter construction, the facility site is stabilized after construction and during machine clean-up to prevent erosion during the spring thaw. Final clean-up may be completed during the following construction season, either fall or winter, depending on ground conditions
	Confirm that the Contractor will conduct final clean-up when soils are dry and unfrozen
Road Access	



✓	Description
	Confirm that all temporary access roads built during construction are removed and reclaimed per contract requirements
	Ensure road surfaces, fences and gates, signs, etc. are replaced or restored per contract requirements
	Ensure road system drainage is repaired, modified and/or replaced per contract requirements
	Fencing
	Ensure all temporary fences and barricades have been removed
	Ensure that all fencing at compressor, sales / receipt meter stations, and valve locations has been restored or replaced

Table 229: Typical Monitoring Requirements for Soil, Vegetation and Terrestrial Life

✓	Description
	Erosion Control
	Confirm all erosion prone slopes are re-vegetated by seeding with approved mixes, erosion control matting, hydro-seeding and/or hydro-mulching as per Owner Company specifications and Land Owner agreements
	Check placement of erosion control measures for compliance with Owner Company specifications
	Verify final grade and drainage requirements as per the IFC
	Replanting and Reseeding
	Confirm that the final soil surface is prepared adequately for seeding, taking into consideration soil conditions, weather conditions, facility requirements, and surrounding land use
	Confirm all seed mixes, fertilizers, rates, equipment and techniques of application have been approved by Owner Company and Land Owner agreements

Table 230: Typical Monitoring Requirements for Watercourses, Wetlands and Aquatic Life

✓	Description
	There are no incremental specific monitoring requirements for watercourses, wetlands and aquatic life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

Table 231: Typical Monitoring Requirements for Air and Noise Pollution

✓	Description
	There are no incremental specific monitoring requirements for air and noise pollution life beyond those identified in A Practical Guide for Environmental Construction Inspectors – Foundational Information

8.10.1.6 Typical Outputs for Site Clean-Up

Table 232: Typical Reporting Requirements

✓	Description
	General
	Please refer to A Practical Guide for Environmental Construction Inspector – Foundational Information for additional reporting requirements beyond those identified here.
	Daily



<p>Complete site clean-up and restoration Environmental Inspection progress reports, including (but not limited to):</p> <ul style="list-style-type: none"> • Daily progress of the Contractor’s clean-up activities • Drain tile locations, if applicable • Work completed to date, including: <ul style="list-style-type: none"> ○ Information regarding milepost and/or stationing, weather, and any agency or landowner encounters. ○ Recording of any observations, event and violations using a daily log, camera, and other technology • Documenting compliance with Project permit conditions, which includes: <ul style="list-style-type: none"> ○ Updated Environmental Commitment Tracking Tool <p>All reports along with punch list items are forwarded to the Construction Manager and/or Chief Inspector, as required</p>
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8.10.1.7 References – Site Clean-Up

Note to user: The reference information provided in Table 233 is intended as a guide only (i.e., the list is not exhaustive); documents of this nature are updated frequently and it remains the responsibility of the user to ensure that the correct, and most current, documents are referenced as appropriate.

Table 233: List of References – Site Clean-Up

Document No.	Type	Title
CEPA Foundation Inc. and The INGAA Foundation Inc.		
N/A	Practical Guide	A Practical Guide for Pipeline Construction Inspectors



9 APPENDIX

9.1 Glossary

Item No.	Term	Definition
1	Agency Report	A report that includes regular updates on authorizations, construction status, planned work, schedule changes, problem areas, non-compliances, landowner complaints, and correspondence received from federal, provincial, or local agencies.
2	Alignment sheet	Sheets showing the location and route of the pipeline and associated facilities.
3	Banding	Rope bands used during pipe transportation to protect the pipe coating.
4	Boot leg hole	A blast hole that contains partially detonated materials.
5	Deficiency	An isolated deviation from requirements that does not impact safety, environment, structural integrity, cost, or schedule.
6	Diversion berms	Drainage systems that divert water away from the trench bottom.
7	Drain tiles	Perforated tubing that allows water to enter and be drained away from the pipeline or facility.
8	Environmental studies	Studies that provide information on an environmental project's setting and potential issues. This knowledge can be used to develop project-specific mitigations and address environmental concerns, thus limiting the potential adverse effects of pipeline construction.
9	Flumes	Ditches that run next to existing pipe trench.
10	Fly-rock	Debris scattered following a blasting activity.
11	Geotextiles	Permeable fabrics used in erosion control to stabilize soil and secure slopes.
12	Hydrocarbon sheen	An iridescent film of hydrocarbon on the surface of a water body.
13	Hydromulch	A combination of water, fiber mulch, and tackifier.
14	Hydro-seeding	A planting method that uses a mixture of seed and hydromulch.
15	Line list	A table containing information (e.g., lot designation, owner name) related to specific parcels of land.
16	Milepost	A marker on the ROW that indicates distance from the upstream mainline valve. Also known as a kilometer post.
17	Non-compliance report	A document outlining non-compliance occurrences.
18	Non-conformance	A recurring deficiency or major deviation from regulation or Owner Company specification such that safety, environment, structural integrity, cost, or schedule could be impacted.
19	Non-destructive examination	A group of analysis techniques used in industry to evaluate the properties of a weld without causing damage.
20	Padding	Support material used to shore up the underside and sides of pipe to properly distribute loading, typically sand and/or foam pillows.
21	Pioneer crew	The crew that sets up access to the ROW for the Clearing and Grading crew.
22	Problem area report	A report created when someone observes an activity that does not meet the definition of acceptable but is not yet non-compliant.
23	Riparian zone	Interface between land and a river or stream.

Item No.	Term	Definition
24	Riprap	Rock or other support material used to armor drainage trenches and trench walls.
25	Roach	A small berm over the centerline of a buried pipeline.
26	Rock gabion	A wire cage filled with rocks used for erosion control and slope stability.
27	Scalping	Disrupting the pre-existing layer of vegetation.
28	Serious violation report	A Serious Violation Report may be written when an activity that is not in compliance with project specifications causes substantial harm or a serious threat to resources.
29	Staking	Marking of proposed pipelines, equipment, or features required for construction operations in a consistent manner.
30	Stockpiling	Storing bulk construction materials, such as pipe or soil.
31	Straw crimp	A crimped layer of straw used to protect seeded areas from erosion.
32	Sub-drains	Drainage systems that divert water away from trench bottoms and/or facilities.
33	Swamp mats	A portable wooden platform used to protect subsoils and support equipment. Also known as a rig or access mat.
34	Tackifier	A soil adhesive.
35	Temporary work space	Area usually adjacent to the permanent facility site limits and/or permanent Right-Of-Way to be used for construction purposes.
36	Trench breaker	Physical dams built across the inside of a trench around the pipeline to prevent backfill migration and/or erosion.
37	Trenchless crossings	A pipeline crossing created without disturbing the ground surface. Methods include boring, jacking, and horizontal directional drilling.
38	Vent bracing	Used to prevent movement of the vent under blowdown conditions.

ENDNOTE

This Guide was developed by the CEPA Foundation for the use of Environmental Inspectors in Canada. This is the original version and is subject to future revision.

If you have any suggestions on additional content or revision to the material included in this Guide, please contact:

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