NATURAL RESOURCES

EROSION AND SEDIMENT CONTROL

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ENGINEERS & GEOSCIENTISTS BRITISH COLUMBIA

BCIA BC INSTITUTE OF AGROLOGISTS
Cultivating Natural Resource Professionals

COLLEGE OF APPLIED BIOLOGISTS
Professional Accountability

JOINTLY DEVELOPED BY:

THE COLLEGE OF APPLIED BIOLOGISTS

THE BC INSTITUTE OF AGROLOGISTS

ENGINEERS AND GEOSCIENTISTS BC

ENDORSED BY:

APPLIED SCIENCE TECHNOLOGISTS AND TECHNICIANS OF BC

FOREST PROFESSIONALS BC

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PREFACE

These *Professional Practice Guidelines—Erosion and Sediment Control* were developed by the College of Applied Biologists, the BC Institute of Agrologists, and Engineers and Geoscientists BC to guide professional practice related to developing and monitoring Erosion and Sediment Control (ESC) Plans in British Columbia (BC). As work related to ESC is a shared area of practice between Registrants of multiple regulators in BC, these guidelines have been jointly drafted by the College of Applied Biologists, the BC Institute of Agrologists, and Engineers and Geoscientists BC and these guidelines are therefore applicable to Registrants of these regulatory bodies. The Applied Science Technologists and Technicians of BC and Forest Professionals of BC have also endorsed the content of these guidelines as general guidance for practitioners or members of the related organizations.

These guidelines are intended to provide an understanding of the considerations and level of effort required from ESC Professionals when planning, implementing, maintaining, or monitoring ESC on projects with surficial Soil stabilization and Sediment retention objectives. These guidelines describe the expectations and obligations of professional practice in relation to the specific professional activity of ESC to be followed at the time they were prepared. However, this is a living document that is to be revised and updated as required in the future, to reflect the developing state of practice.

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ABBREVIATIONS

ABBREVIATION	TERM
BC	British Columbia
BMP	Best Management Practices
CPESC	Certified Professional in Erosion and Sediment Control
DFO	Fisheries and Oceans Canada
ESC	Erosion and Sediment Control
MMCDA	Master Municipal Construction Document Association
NTU	nephelometric turbidity units
PLA	permit(s), license(s), and/or authorization(s)
RUSLE	revised universal Soil loss equation
TSS	total suspended solids

DEFINED TERMS

The following definitions are specific to these guidelines. These words and terms are capitalized throughout the document.

TERM	DEFINITION
Agrology Professional	Registrants of the British Columbia Institute of Agrologists, including Professional Agrologists (PAg), Limited License Agrologists (LLAg), and Technical Agrologists (TAg).
Applied Biology Professional	Registrants of the College of Applied Biologists, including Registered Professional Biologists (RPBio), Registered Biology Technologists (RBTech), and Applied Biology Technicians (ABT).
The British Columbia Institute of Agrologists	The regulatory body for Agrology Professionals in BC.
Best Management Practices (BMP)	Methods that have been determined to be the most effective and practical means of managing Runoff, preventing or reducing Soil Erosion, and managing subsequent Sediment deposition.
The College of Applied Biologists	The regulatory body for Applied Biology Professionals in BC.
Contractor	A party contracted to carry out the construction or implementation of a project, typically the General Contractor on a development project.
Engineering/Geoscience Professional(s)	Professional engineers, professional geoscientists, professional licensees engineering, professional licensees geoscience, and any other individuals registered or licensed by Engineers and Geoscientists BC as a "professional Registrant" as defined in Part 1 of the Bylaws.
Engineers and Geoscientists BC	The Association of Professional Engineers and Geoscientists of the Province of British Columbia, also operating as Engineers and Geoscientists BC; the regulatory body for Engineering/Geoscience Professionals in BC.
Erosion	The process by which Soil particles are detached and transported by natural forces such as water flow or wind.
Erosion and Sediment Control (ESC)	The implementation of temporary or permanent measures to prevent or control Soil Erosion, and the transport and deposition of Sediment by wind or water from a site under development, a disturbed site, or a site undergoing a permitted activity.
Erosion and Sediment Control Auditor (ESC Auditor)	A third-party auditor, typically retained by the Proponent/Client to audit the ESC effectiveness of a project.

TERM	DEFINITION
Erosion and Sediment Control Professional (ESC Professional)	The qualified Applied Biology Professional, Agrology Professional, or Engineering/Geoscience Professional who is responsible for the Erosion and Sediment Control Plan (as defined within this document), including preparation, submission, and ongoing operation of Erosion and Sediment Control measures until project closeout.
Erosion and Sediment Control Monitor (ESC Monitor)	An individual (or individuals) responsible for ongoing monitoring of the implementation of the Erosion and Sediment Control Plan. This individual typically works directly under and/or reports to the Erosion and Sediment Control Professional.
Erosion and Sediment Control Plan (ESC Plan)	A documented plan, often including site layouts and/or drawings, that describes the potential for Erosion and sedimentation of a project and prescribes specific measures (temporary or permanent) to reduce the risk of onsite Soil Erosion and onsite and offsite Sediment introduction adversely affecting identified receptors.
Erosion Control	The implementation of temporary and/or permanent measures to prevent or reduce the potential for Soil Erosion by managing the source or potential source of Erosion.
Field Reviews	For Registrants of Engineers and Geoscientists BC, as defined in the *Guide to the Standard for Documented Field Reviews During Implementation or Construction* (Engineers and Geoscientists BC 2023a). For Registrants of other regulatory bodies, reviews conducted by or under the direct supervision of the professional who completed the design or plan, at the site of implementation of the design or plan, as necessary to ascertain substantial compliance in all material respects with concepts in the documents/drawings prepared.
Proponent/Client	A person and/or organization that owns or has tenure over the land or site in which the project is taking place. The Proponent/Client may be an individual, a private company or group of companies, a public entity (e.g., municipality or government ministry), or a society (non-profit or for-profit).
Professional Governance Act	*Professional Governance Act* [SBC 2018], Chapter 47*.*
Registrant	Means the same as defined in: • Schedule 1, section 2 of the *Professional Governance Act* (for Agrology Professionals). • Schedule 1, section 4 of the *Professional Governance Act* (for Applied Biology Professionals). • Schedule 1, section 5 of the *Professional Governance Act* (for Engineering/Geoscience Professionals).
Regulatory Authority	The governmental body charged by statutes or regulations applicable in British Columbia with administering or enforcing Erosion and Sediment Control related regulatory requirements which may involve the practice of a Registrant. The Regulatory Authority may be an Authority Having Jurisdiction (as defined in the BC Building Code), a provincial ministry, or another governmental body.

TERM	DEFINITION
Runoff	The flow of water over the ground surface, or contained within constructed water conveyance structures (e.g., stormwater services or ditches), resulting from excess rainwater, snowmelt, stormwater, and/or other sources that cannot be absorbed by Soil.
Sediment	Fragmented material that originates from weathering and Erosion of rocks or unconsolidated deposits, and is transported by, suspended in, or deposited by water or wind.
Sediment Control	The implementation of temporary and/or permanent measures to prevent Sediment from reaching sensitive receptors and/or being transported off site.
Soil	The top layer of the Earth's surface consisting of a mixture of organic matter, minerals (divided into silt, clay, and sand), and liquids that provides a medium for plant growth. For the practice of Erosion and Sediment Control, efforts are generally focused on managing the mineral layer of Soil.
Stream	As defined by the *Water Sustainability Act*, "(a) a natural watercourse, including a natural glacier course, or a natural body of water, whether or not the Stream channel of the Stream has been modified, or (b) a natural source of water supply, including without limitation, a lake, pond, river, creek, spring, ravine, gulch, wetland or glacier, whether or not usually containing water, including ice, but does not include an aquifer."

VERSION HISTORY

VERSION NUMBER	PUBLISHED DATE	DESCRIPTION OF CHANGES
1.0	February 5, 2024	Initial version.

1.0 INTRODUCTION

These *Joint Professional Practice Guidelines—Erosion and Sediment Control* provide guidance on professional practice for Applied Biology Professionals, Agrology Professionals, and Engineering/Geoscience Professionals who develop, monitor, implement, or audit Erosion and Sediment Control (ESC) Plans. These guidelines describe the expectations and obligations of professional practice that ESC Professionals who undertake these activities are expected to have regard for.

Having regard for professional practice guidelines means that ESC Professionals must follow established and documented procedures to stay informed of, be knowledgeable about, and meet the intent of any professional practice guidelines related to their area of practice. By carefully considering the objectives and intent of a professional practice guideline, ESC Professionals can then use their professional judgment when applying the guidance to a specific situation. For Registrants of Engineers and Geoscientists BC and Registrants of the College of Applied Biologists, deviation from guidelines must be documented, retained, and a rationale provided. Where the guidelines refer to professional obligations specified under the *Professional Governance Act,* the bylaws of the participating regulators, and other regulations/legislation, ESC Professionals must understand that such obligations are mandatory.

ESC is defined within this guideline as the implementation of temporary or permanent measures to prevent or control Soil Erosion, and the transport and deposition of Sediment by wind or water from a site under development, a disturbed site, or a site undergoing a permitted activity. Sediment transportation from disturbed sites can negatively affect fish and fish habitat when deposited in or near water and can negatively impact other aspects of sensitive ecosystems. Increased sedimentation also contributes to infrastructure damage, increased maintenance costs, and flooding within the built environment. Effective management of Sediment in water directly contributes to the protection of water resources for all water users.

ESC Plans are typically required in response to regulatory or legislative requirements, and/or local bylaw requirements. ESC work includes the development of site-specific plans to reduce the potential for Soil Erosion and suspended Sediment transport, application of operational practices or site-specific physical mitigation measures, implementation of the planned practices and mitigation measures, and monitoring and/or auditing the implementation of the ESC Plan. For additional details on the applicability of these guidelines, refer to Section 1.2.

1.1 PURPOSE OF THESE GUIDELINES

Registrants of the BC Institute of Agrologists, the College of Applied Biologists, and Engineers and Geoscientists BC have professional obligations under their respective organizations' Code of Ethics to hold paramount the safety, health, and welfare of the public, including protection of the environment and the promotion of health and safety in the workplace. These guidelines are meant to assist in fulfilling those obligations by providing guidance on professional practice to professionals who develop, monitor, implement, or audit ESC Plans.

Following are the specific objectives of these guidelines:

1. Describe the expectations and obligations of professional practice that Applied Biology Professionals, Agrology Professionals, and Engineering/Geoscience Professionals are expected to have regard for in relation to the specific professional activities outlined in these guidelines by:
   - specifying tasks and/or services that ESC Professionals are expected to complete;
   - referring to professional obligations under the *Professional Governance Act*, the bylaws of the participating regulators, and other regulations/legislation, including the primary obligation to protect the safety, health, and welfare of the public and the environment; and
   - describing the established norms of practice with respect to ESC in BC.
2. Describe the roles and responsibilities of the various participants involved in planning, implementing, monitoring, or regulating the practice of ESC in BC. These guidelines should assist in delineating the roles and responsibilities of the various participants, which may include the ESC Professional, ESC Monitor, Proponent/Clients, Contractors, Regulatory Authorities, and ESC Auditors.
3. Define the skill sets that are consistent with the training and experience required to carry out professional activities related to ESC.
4. Provide guidance on the use of assurance documents, so the appropriate considerations have been addressed (both regulatory and technical) for the specific professional ESC activities that are carried out.
5. Provide guidance on how to meet the quality management requirements under the *Professional Governance Act* and the Bylaws of the participating regulators when carrying out the professional ESC activities identified herein.
   a) For Engineers and Geoscientists BC, to provide guidance on how Engineering/Geoscience Professionals should meet the quality management requirements under the *Professional Governance Act* and Engineers and Geoscientists BC's Bylaws when carrying out the professional ESC activities identified herein.
   b) For the British Columbia Institute of Agrologists, to establish guidelines which Agrology Professionals must stay informed of, remain knowledgeable about, and meet the intent of, pursuant to Sections 92 and 93 of the British Columbia Institute of Agrologists' Bylaws;
      i) including that the standard of professional practice for Agrology Professionals carrying out professional ESC activities includes carrying out Field Reviews as described in these guidelines.
   c) For the College of Applied Biologists, to establish guidelines which Applied Biology Professionals must comply with, and possess or maintain competence in, pursuant to Section 7-1 of the College of Applied Biologists' Bylaws:
      i) including that the standard of professional practice for Applied Biology Professionals carrying out professional ESC activities includes carrying out Field Reviews as described in these guidelines.

1.2 SCOPE AND APPLICABILITY OF THESE GUIDELINES

This document provides guidance on professional practice for Applied Biology Professionals, Agrology Professionals, and Engineering/Geoscience Professionals who develop, contribute to, monitor the implementation of, or implement ESC Plans. These guidelines are not intended to provide technical or systematic instructions for how to carry out these activities; rather, these guidelines describe professional obligations and outline considerations to be aware of when carrying out these activities. These professionals must exercise professional and ethical judgement when providing professional services; as such, application of these guidelines will vary depending on the circumstances.

ESC work is not the exclusive reserved practice of any profession in BC, and local legislation often dictates the designations required to undertake ESC work within that jurisdiction. However, ESC Professionals must be aware of the limits of their own qualifications and competence and understand when to engage with other professionals or specialists. Additional details on subject matter expertise can be found in Section 3.2.6.

ESC work is site-specific and requires experience and training in this area of practice; typically, ESC Professionals are required to contribute to, or complete this work, when required in response to regulatory requirements.

Although these guidelines may provide thresholds above which professional involvement is required, ESC Professionals must always use their professional and ethical knowledge, experience, and judgment to provide the appropriate level of service that is commensurate with the risk of their professional activities to public safety and the environment.

An ESC Professional's decision not to follow one or more aspects of these guidelines does not necessarily represent a failure to meet professional obligations.

An ESC Professional may depart from these guidelines if it is appropriate to do so for an identified reason. In such circumstances, the ESC Professional must document the reason for departing from any relevant portion of these guidelines, in accordance with the requirements of their regulatory body. The ESC Professional should consider supporting this decision through a documented risk assessment. The rationale must be consistent with the professional's obligations under the *Professional Governance Act*, relevant regulations, and the bylaws and relevant Code of Ethics of their professional organization. Given the potential risks to the public and the environment that such departures from these guidelines can pose, the ESC Professional should evaluate whether to have the departure reviewed by an independent ESC Professional with relevant expertise who was not involved with the design or plan before implementation.

For information on how Engineering/Geoscience Professionals may appropriately depart from the practice guidance within these guidelines, refer to the *Quality Management Guides—Guide to the Standard for the Use of Professional Practice Guidelines* (Engineers and Geoscientists BC 2023b), Section 3.4.2.

1.3 ACKNOWLEDGEMENTS

This document was prepared and reviewed by a group of technical experts and other relevant parties. Authorship and review of these guidelines does not necessarily indicate the individuals and/or their employers endorse everything in these guidelines.

The Applied Science Technologists and Technicians of BC and Forest Professionals BC reviewed these guidelines and provided their official endorsement.

Engineers and Geoscientists BC would like to thank the Erosion and Sediment Control Association of BC for their input on these guidelines.

2.0 ROLES AND RESPONSIBILITIES

2.1 REGULATORY CONTEXT

Erosion and Sediment Control (ESC), and more specifically, the impacts of Sediment reaching environmental receptors—such as Streams—is regulated by federal and provincial acts and regulations, as well as by local government bylaws in some jurisdictions. Uncontrolled release or deposits of Sediment from a project site (onto land owned by another party, or onto or into public or private infrastructure) can cause damage and losses beyond the project site, which could prompt litigation by the owner of the damaged property.

Before starting a project, it is important for the ESC Professional to determine the applicable governing regulations and when permit(s), license(s), and/or authorization(s) (PLAs) may be required. Timelines to obtain the PLAs can vary greatly and must be factored into the project planning phase (and communicated to Proponent/Clients and/or Contractors) to ensure they are in place prior to the start of construction.

Section 6.1 includes a non-exhaustive list of other legislation that may be applicable to projects where ESC and the prevention of negative impacts from Sediment reaching Streams, other sensitive receptors, and outside project boundaries is regulated.

2.1.1 FEDERAL CONTEXT

The *Fisheries Act* is the primary piece of federal legislation that applies to ESC planning and implementation. Under the *Fisheries Act*, Sediment is considered a “deleterious substance” and the deposit of deleterious substances into water frequented by fish (as defined in the *Fisheries Act*) is prohibited. It is important to note that the *Fisheries Act* defines fish habitat as all water frequented by fish and any other areas upon which fish depend on directly or indirectly to carry out their life processes; ESC Professionals must be aware of (and understand the nuances of) applicable federal legislation, including how the federal *Fisheries Act* defines "fish" and "fish habitat". Projects near water may require a review from Fisheries and Oceans Canada (DFO). Projects that will cause the death of fish and/or harmful alteration, disruption, or destruction of fish habitat (as defined in the *Fisheries Act*) may require an authorization. It is recommended that DFO be contacted early in the planning phases for projects located near water to determine what, if any, PLAs from DFO will be required.

Large-scale projects including those crossing provincial boundaries, in regulated industries, or projects located on federal lands, may trigger review under the *Impact Assessment Act* or the *Canadian Energy Regulator Act*, and ESC Plans are generally required for projects near Streams and other environmentally sensitive areas. Approval of the ESC Plans and ongoing monitoring and implementation are typically included as a condition of project approval.

2.1.2 PROVINCIAL CONTEXT

The *Water Sustainability Act* is the primary provincial legislation that regulates projects near Streams that may be impacted by Sediment. It is important to note that the definition of a Stream under the *Water Sustainability Act* is broad and includes a lake, pond, Stream, creek, spring, ravine, gulch, wetland, and glacier, whether or not it usually contains water.

Projects "in and about a Stream" often require a notification of authorized change or a change approval to the province, and ESC measures are an important consideration during the project review stage. Examples include the construction of a stormwater outfall that discharges into a Stream, or the construction of a new Stream crossing.

There are three resource-based industries that have their own applicable provincial legislation in which ESC and the prevention of Sediment reaching sensitive receptors is included. These industries and the applicable legislation[1] include:

- Forestry—*Forest and Range Practices Act*
- Oil and Gas (extraction through to distribution) —*Oil and Gas Activities Act*
- Mining—*Mines Act* and the *Health, Safety and Reclamation Code for Mines in British Columbia*

Agricultural land applications may have additional requirements to follow under the *Agricultural Land Commission Act*.

Large-scale projects may require review under the BC *Environmental Assessment Act.* ESC Plans are generally required for projects near Streams and other environmentally sensitive areas. Approval of the ESC Plans and ongoing monitoring and implementation are generally included as a condition of an environmental assessment certificate.

2.1.3 REGIONAL, MUNICIPAL, AND LOCAL CONTEXT

Many municipal governments and regional districts have implemented ESC bylaws or may have provisions within other bylaws such as stormwater, streamside protection, and/or subdivision and development bylaws that need to be considered as part of the project planning. Master Municipal Construction Document Association (MMCDA) design guidelines and construction specifications also have ESC requirements. Some developments require the application of program- or certification-specific requirements in addition to regulatory requirements (e.g., Leadership in Energy and Environmental Design Certification [LEED], Salmon-Safe Certification). In many cases, ESC Plans and regular monitoring are required to meet the requirements of bylaws.

2.2 COMMON FORMS OF PROJECT ORGANIZATION

Projects can have a range in organizational structures, depending on the project size and complexity, but generally have similar roles. These are further described in Section 2.3. The typical roles in a project are as follows:

- Proponent/Client—the person and/or organization that owns or has tenure over the land or site in which the project is taking place. The Proponent/Client may delegate all or a portion of the project to a third-party consultant or project management firm. The Proponent/Client may be an individual, a private company or group of companies, a public entity (e.g., municipality, government ministry) or a society (non-profit or for-profit). The Proponent/Client, as the holder of the project PLAs, is primarily responsible for ensuring the overall project ESC program results in conformity with conditions of the project PLAs. The delegation of project responsibilities does not absolve the Proponent/Client of their legal responsibility to meet the requirements of the PLAs, and therefore the Proponent/Client maintains the responsibility for the implementation of defensible ESC designs and practices. The Proponent/Client holds responsibility over work that occurs on the land under their ownership or tenure.

[1] Note: The *Water Sustainability Act* differs to the legislation governing these industries; however, the requirement for *Water Sustainability Act* change approvals or authorizations may still be triggered in certain circumstances.

- Erosion and Sediment Control Professional(s)—a person or persons responsible for the preparation and submission of the ESC Plan associated with the project. The ESC Professional is also responsible for overseeing the implementation, maintenance, and monitoring of the ESC Plan.
  - Note that "professional(s) of record" may be used to refer to a person or persons responsible for the overall project design (e.g., a road, bridge, building etc.); this is often a Registrant with Engineers and Geoscientists BC and/or the Architectural Institute of BC. Within this guideline, the term ESC Professional is used to refer to the professional responsible for the ESC design aspects of the project. The ESC Professional(s) may be different from the "professional(s) of record" and includes other qualified individuals who may not be a Registrant with Engineers and Geoscientists BC and/or the Architectural Institute of BC (see Section 2.3.2 for a description of who qualifies as an ESC Professional).
- Erosion and Sediment Control Monitor—a person or persons responsible for the ongoing monitoring of the work captured in the ESC Plan. They report to the ESC Professional and in some instances, the Contractor.
- Regulatory Authority—the governmental body or agency responsible for regulating the project through the issuance of PLAs and monitoring compliance of their conditions. This role may exist at one or more levels of government. As a permit condition or through enforcement action, the Regulatory Authority may require auditing by a third-party professional to observe and report adherence to the project permit conditions related to ESC.
- Contractor—one or more companies responsible for the construction or implementation of the project.
- Erosion and Sediment Control Auditor—a third party ESC Professional, generally retained by the Proponent/Client, to audit ESC Plan implementation and its effectiveness on a project.

2.2.1 COMMUNICATION AND COORDINATION

Communication and coordination between all parties is essential for the successful completion of a project; the professionals and technical specialists involved in a project must communicate and coordinate with each other effectively to ensure project needs, regulatory requirements, and appropriate professional practice requirements are met.

Typically, the Proponent/Client of a project will retain a consultant to act as the professional of record and complete the various professional design aspects of the project. The ESC Professional and ESC Monitor may be subcontractors or subconsultants to the Proponent/Client, or to the consultant acting as the Proponent/Client's representative. The Contractor implementing the work on site may retain an ESC Professional and/or ESC Monitor of their own in addition to the Proponent/Client's ESC representation.

It is important that the ESC Professional and ESC Monitor communicate effectively with the Proponent/Client and Contractor so that the roles and responsibilities assigned on the project are clear and understood. The ESC Professional should be engaged and communicate with the project team early during the design phase to ensure that the ESC Plan is reflective of the construction methods that will be used by the Contractor. Similarly, the ESC Professional should ensure that the operational aspects of the ESC Plan are understood and implemented appropriately; an established communications flow path may be helpful for some project teams during implementation.

If the Contractor is not available during the planning phase of the project, the ESC Professional should prepare a high-level ESC Plan, specifying the need for later modification to suit the final construction methods and the issuance of a revised Plan prior to construction starting.

ESC Professionals should consider the knowledge and needs of their audience when choosing the appropriate approach, structure, and content for communication. ESC Plan drawings and documents must clearly and effectively communicate the intent of the Plan, and the requirements for implementation, monitoring, and closeout. ESC Professionals must be able to effectively explain technical concepts in a way that is both professional and understandable to the audience, whether that is the Proponent/Client, Contractor, Regulatory Authority, or (in many cases) multiple parties. ESC Professionals must clearly describe ESC objectives, recommendations, decisions, judgements, opinions, and facts in writing, while also effectively communicating the possible consequences if professional judgments are disregarded.

The ESC Professional and ESC Monitor are expected to communicate with whomever they have a contract with, be that the Proponent/Client or Contractor, regarding the effective or ineffective ESC implementation during the project construction phase. Documentation of successful ESC implementation, as well as field level adjustments or ESC maintenance to address instances of non-conformance or failure of planned ESC measures, will provide a written record of due diligence by the ESC Professional and help ensure the project is completed as per the ESC Plan.

Regulatory Authorities that have issued PLAs may require project updates and/or a final submission at project completion. Depending on the project and PLA requirements, this may be communicated to the regulatory bodies through the ESC Professional if required.

2.3 RESPONSIBILITIES

2.3.1 PROPONENT/CLIENT

The Proponent/Client is expected to:

- retain appropriate professionals, including the ESC Professional(s) and ESC Monitor(s), to prepare the ESC Plan and monitor as required by the Plan and applicable regulations;
- obtain required PLAs from all Regulatory Authorities with jurisdiction over the project, retaining appropriate professionals to secure these permits as needed;
- establish which party is responsible (Proponent/Client and/or Contractor) for implementing the ESC Plan on site (e.g., supplying materials and labour related to ongoing operations), monitoring the Plan, and reporting on the effectiveness of the Plan where required;
- recognize that ESC Plans are site-specific and prepared for a specific project and therefore should not be used or copied for another project without the consent of the ESC Professional(s) that prepared the Plan; and
- understand that they are ultimately responsible for ESC, and any resulting consequences if Sediment reaches a sensitive feature or off their project site.

Until the project is complete and the site is fully stabilized as defined by the project PLAs, the Proponent/Client should ensure that periodic inspections are completed, especially after precipitation events, to assess whether the interim ESC measures are effective. Regular monitoring and maintenance of temporary ESC measures is required until the site is fully stabilized, to control and mitigate the risk of Sediment discharging into Streams, other sensitive areas, or off site and to ensure PLA requirements (typically linked to water quality standards) are achieved.

If ESC maintenance is required, the Proponent/Client is responsible for undertaking or delegating the maintenance of remedial measures identified through inspection or monitoring, as advised by the ESC Professional.

2.3.2 EROSION AND SEDIMENT CONTROL PROFESSIONAL

The ESC Professional takes overall responsibility of preparing a site-specific ESC Plan or design and conducting any associated Field Reviews during and post construction. In some instances, the Proponent/Client may retain another ESC Professional to oversee the construction phase of the project; this transfer of professional responsibility must be clearly communicated between the two ESC Professionals and documented in writing. ESC Professionals generally work with one or more ESC Monitors to conduct ongoing inspections of ESC measures during construction but can also take on this role on their own.

It is important that the ESC Professional have the appropriate qualifications for the work in question. The type of professional(s) that prepares the ESC Plan will depend on the project specifics (e.g., type of project, Erosion Controls, installation methods, terrain, or site features, etc.) as well as any regulatory requirements. The ESC Professional must be familiar with the PLAs applicable to the project site, as some regulatory requirements may specify that a plan must be prepared by a professional registered with a specific regulatory body (e.g., the College of Applied Biologists), or one holding an external certification (e.g., Certified Professional in Erosion and Sediment Control [CPESC]). The ESC Professional must determine whether they have the appropriate education, training, and experience to complete, and take professional responsibility for, all aspects of the ESC design and associated Field Reviews.

The ESC Professional is expected to complete and authenticate the *Erosion and Sediment Control Assurance Statement* included in this document as 7.0.

2.3.2.1 Multi-Professional or Multi-Disciplinary Teams

More complex projects may require a team of professionals (potentially Registrants of different regulatory bodies) to prepare an ESC Plan. It is important for all ESC Professionals to understand their own qualifications and limits to their scope of work so they understand when a professional or specialist with a different background, different expertise, or from a specific regulatory body must be involved in a project. As an example, a Registrant with Engineers and Geoscientists BC may be required to design a large settling pond, while a Registrant with the College of Applied Biologists may be required to provide recommendations on water quality requirements of the settling pond discharge to a fish-bearing Stream.

The lead ESC Professional is responsible for:

- coordinating and integrating the work of the other professionals into the design;
- communicating with the Regulatory Authority and/or Proponent/Client (as appropriate);
- authenticating relevant site plans and design documents (as required by the applicable regulatory body), including the ESC Assurance Statement; and
- completing associated Field Reviews (unless Field Reviews are being conducted by a different ESC Professional, see Section 3.4).

2.3.3 EROSION AND SEDIMENT CONTROL MONITOR

The ESC Monitor is responsible for monitoring the ongoing operation and implementation of the ESC Plan. The ESC Monitor is responsible for conducting the monitoring at the frequency described in the ESC Plan or PLAs and must coordinate with the ESC Professional should revisions to the Plan be required. Additional information on ESC Monitoring is included in Section 3.4.

Ongoing monitoring provides a key opportunity to provide technical feedback on the implementation of the ESC Plan, especially as site conditions and construction considerations change. The ESC Monitor is responsible for identifying site changes or deviations from the ESC Plan, and reporting to the ESC Professional if the changes require a revision to the ESC Plan. Any revisions to the Plan (including changes to the ESC design documents, instructions provided to the Contractor, or communications with the Regulatory Authority) must be completed by or under the direct supervision of the ESC Professional. It is important that reports produced by the ESC Monitor are shared with the Proponent/Client, Contractor, and ESC Professional in a timely manner to ensure deficiencies are addressed.

It is important to note the difference between ongoing ESC monitoring and Field Reviews. Field Reviews are the professional responsibility of the ESC Professional to determine whether the ESC measures installed or in operation on site substantially comply with the intent reflected in the ESC Plan. Monitoring is the responsibility of the ESC Monitor and is conducted throughout the project and may be conducted independently of Field Reviews to provide confidence that the ESC Plan is properly implemented and is functioning as intended. An ESC Monitor may conduct Field Reviews under the supervision of the ESC Professional if that person has the appropriate training and experience. For more information on Field Reviews and monitoring, refer to Section 3.4.

The ESC Monitor should communicate clearly regarding the boundaries of ESC monitoring. ESC monitoring is not synonymous with environmental monitoring; ESC monitoring typically does not include tasks such as the monitoring of PLA requirements pertaining to hydrocarbons, wildlife monitoring, vehicle inspections, and spill reporting. Water quality monitoring beyond measuring Sediment levels in water is discussed further in Section 3.4. While the ESC Monitor may also be retained to act as the environmental monitor for the site or project, the environmental aspects would be a separate role from ESC and reported separately.

2.3.4 CONTRACTOR

The Contractor is generally responsible for implementing the ESC Plan and maintaining the ESC measures throughout construction; on most development projects, this role is assigned to the general Contractor. The Contractor typically supplies the ESC measures and ensures the installations follow the ESC Plan and/or manufacturer requirements.

It is important for the Contractor to communicate regularly with the ESC Professional, and vice versa, as construction phasing and methodology can have a significant impact on the management of Erosion and Sediment on and off site, and construction changes may require a change in ESC planning. Communication with the ESC Monitor is also important to ensure the ESC Monitor is on site as required by the ESC Plan. Any proposed changes to the ESC Plan must be approved by the ESC Professional and documented.

2.3.5 REGULATORY AUTHORITY

The Regulatory Authorities for a particular project will depend on the applicable PLAs received for the project, as discussed in Section 1.1. Examples of individuals acting on behalf of a Regulatory Authority include:

- Federal: Fisheries Officers and/or Inspectors from DFO or Environment Canada; Inspectors from Impact Assessment Agency of Canada and Canada Energy Regulator.
- Provincial: Conservation Officers, Natural Resource Officers, Oil and Gas Inspectors, Mine Inspectors, and Environmental Assessment Office Compliance and Enforcement Officers.
- Local government: Environment or Engineering Department Staff, Bylaw Enforcement Officers, and Building Inspectors.

The Regulatory Authorities act independently under their applicable laws but may coordinate efforts when investigating a concern with a project.

2.3.6 EROSION AND SEDIMENT CONTROL AUDITOR

ESC Auditors may be assigned on large-scale projects such as mine sites or pipeline installations, where a third party is retained by the Proponent/Client to independently audit the ESC implementation and its effectiveness on a project as a requirement under a PLA. The ESC Auditor documents the implementation of the ESC Plans through field evaluation and documents the effectiveness of the installed measures (in addition to any Field Reviews and ESC monitoring conducted by other parties). The ESC Auditor generally reports directly to the Regulatory Authority and/or the Proponent/Client, particularly in the event of a Sediment release to a Stream and/or environmental receptor.

ESC auditing is not intended to replace ESC monitoring or Field Reviews; neither the ESC Monitor nor the ESC Professional should rely on the ESC Auditors to fulfill these tasks.

3.0 GUIDELINES FOR PROFESSIONAL PRACTICE

3.1 OVERVIEW

Erosion and Sediment Control (ESC) is defined within this guideline as the implementation of temporary or permanent measures to prevent or control Soil Erosion, and the transport and deposition of Sediment by wind or water from a site under development, a disturbed site, or a site undergoing a permitted activity. Although Soil Erosion is a natural process, when intensified by human activity, it can have adverse environmental, societal, and/or economic impacts.

A project's duration spans from the onset of vegetation removal or ground disturbance until project closeout and site stabilization, and includes the removal of any temporary non-biodegradable ESC measures. The design, implementation, monitoring, operations, and project completion stages of the ESC work define the full scope of a project for which the designated ESC Professional(s) accept responsibility and accountability. ESC Professionals should be aware of their obligations in confirming that appropriate measures are taken to protect the integrity of the natural receiving environment, or municipal, regional, or provincial infrastructure, and private property. This section outlines the expectations and obligations of professional practice regarding the design, implementation, monitoring, and project closeout of ESC work in British Columbia (BC).

3.1.1 OBJECTIVES

The overall objectives of the ESC planning process, and resulting ESC Plan are to:

- acknowledge and understand the project site's topographic, geologic, and hydrologic setting, including consideration of the climate, Soil, vegetation, receiving environment, and any sensitive receptors;
- recognize the development project's impacts and potential risks to the natural environment and/or adjacent sites or infrastructure (primarily aquatic ecosystems, water resource values, or infrastructure) at each phase of the permitted activity or development project. This includes recognizing that erosional forces to be considered are not limited to water, with wind Erosion requiring consideration for some projects;
- reference the applicable regulatory requirements and specific discharge/performance criteria;
- provide recommendations for site-specific structural, operational, or conditional Best Management Practices (BMPs) to prevent or mitigate Erosion and/or Sediment transport and meet the applicable regulatory requirements and/or specific discharge/performance criteria;
- set out expectations for maintenance, inspection, and decommissioning of the BMPs by project parties, including the Contractor, ESC Monitor, etc.; and
- demonstrate the ESC Professional's due diligence in meeting their professional obligations.

The ESC Professional must prepare an ESC Plan (including any drawings, site plans, specifications, installation details, or instructions as necessary) that considers a project's natural and existing conditions and recognition of the changed conditions that will result from the project's impacts to site grades, and hydrologic dynamics that will influence a site's Erosion potential.

3.1.2 ASSURANCE STATEMENT

The ESC Professional is responsible for the ESC Plan (and any associated drawings, site plans, specifications, installation details, or instructions as necessary) and managing the risks of Erosion and Sediment transfer from the project's boundaries to achieve the applicable regulatory standards, or to avoid or mitigate the risks to the receiving environment. To clarify the professional responsibility of this role (including active involvement through all project phases to review monitoring, reporting, and implement adaptive management as required), these guidelines include an *Erosion and Sediment Control Assurance Statement* in Section 7.0, that the professional should complete and retain in conjunction with their ESC Plan and submittals.

As noted previously, the implementation of the ESC Plan may be overseen by a different ESC Professional. Different ESC Professionals will have different accountabilities and responsibilities through the implementation of an ESC Plan and the roles and responsibilities must be clearly documented.

The *Erosion and Sediment Control Assurance Statement* in Section 7.0 provides an overview of the expectations of good professional practice as related to ESC work. Regulatory Authorities may or may not request this assurance statement as part of the requested submittals to support project approval or permitting.

3.2 EROSION AND SEDIMENT CONTROL PLAN – DESIGN

The design of an ESC Plan requires the collection of site-specific information, an understanding of the project's development objectives, and consideration of the scope and timing of ground disturbing activities that will expose erodible materials. The following is presented as the standard for professional practice in the design of ESC Plans.

Note that for some small and/or short-duration low-risk projects, an appropriate ESC Plan may not include all of these components. The ESC Professional must apply their professional judgement to determine the scope of the ESC Plan based on the following guidance for each ESC project.

3.2.1 EROSION AND SEDIMENT CONTROL PLAN COMPONENTS

ESC Plans should include the following key components:

1. Project phasing
2. ESC measures, practices, and facilities (applicable to each phase or catchment area)
3. ESC specifications (including locations, relevant product information, installation criteria, and applicable maintenance criteria)
4. ESC monitoring requirements
5. ESC team members and contact information
6. Applicable timing restrictions (including wet-weather operating restrictions)
7. Reference to relevant regulatory criteria

The professional standard is for an ESC Plan to address each of these core components. The components are described in further detail throughout Section 1.0.

3.2.2 DESKTOP INFORMATION GATHERING

The ESC Professional is responsible for gathering the required data and information related to the development of the ESC Plan. As the ESC Plan must be informed by considerations specific to the community, site, or regional context, the ESC Professional should be aware of any historic concerns, such as whether the site is located within a floodplain, contains highly erodible surficial Soils, has experienced infrastructure flooding in the past, or has steep terrain, etc. Review of these considerations forms a critical part of the desktop information gathering task.

Key information considerations may include the following:

- Site conditions:
  - Topography and Soils (e.g., surficial Soils, particle-size curves, geology/parent materials, vegetation, topography and terrain, hillslope hydrologic pathways including overland flows and interflow)
    - Determination of Runoff coefficients applicable to anticipated stages of construction or development and/or project infrastructure (e.g., topsoil vs. stripped and graded surfaces)
  - Drainage conditions (e.g., natural Streams, ephemeral flow-paths, constructed ditches, drainage outlets)
  - Receiving environments (e.g., Streams, lakes, wetlands, reservoirs, ditches, drainage systems, storm drains, environmentally sensitive areas, neighbouring properties)
- Climatic conditions (e.g., average rainfall, rainfall predictions with climate change considerations applied, typical seasonal patterns, applicable design storm events)
- Project scope of work and schedule (e.g., road alignments, excavation plans, cut and fill limits, stockpile/laydown areas, project duration and seasons)
  - Additional project-specific considerations (e.g., project schedule and timeline, construction means and methods)
  - Project phasing (e.g., clearing, grubbing, stripping, access routes, drainage measures, earthworks, servicing, final grading, building construction, landscaping and revegetation)
  - Project-specific detention/retention requirements (e.g., establish design storm criteria and onsite storage capacity or treatment rates)

Refer to Section 3.2.6 for additional information on areas of work where additional professionals may be required.

3.2.3 DESIGN CRITERIA

The ESC Professional must develop an ESC Plan that defines the selected criteria that are used to inform the design, BMP selection, conveyance measures, and detention/retention facilities. These design criteria must be clearly communicated within the ESC Plan and any associated submittals. The ESC Professional must consider the nature of the erodible materials and Sediment characteristics, and the project schedule and frequency of monitoring/inspection in the specification of ESC measures, treatments, or facilities.

Design criteria may be provided by the applicable regulatory framework as a minimum standard and this may be augmented/supplemented by the ESC Professional. ESC Professionals must be aware of the requirements of the jurisdiction in which the work is being implemented (i.e., some jurisdictions have adopted performance targets and design standards for capturing and treating rainfall on public and private property) and incorporate these requirements into their design. As with all design projects, public safety, as well as the safety of those implementing and monitoring the ESC Plan, must be considered.

The ESC Professional must consider, at minimum, the following items in preparing an ESC Plan:

1. Specifying the return period and duration of the selected storm event used in the design, or in components of the design.
   - Provide background or rationale for selection of storm event using current/updated rainfall information and time of year project will take place (e.g., considering rain-on-snow events, or whether a project will extend through several seasons).
     - For some projects, it may be appropriate to evaluate the merits of selecting design storm events based on project duration/schedule.
   - Include the application of climate change considerations; see Section 3.7 for more information.
2. Specifying Soil conditions and target Soil particles for the design, and a rationale for the selection.
3. Specifying the design criteria used on design drawings or within documentation.
   - Including the Runoff coefficient appropriate for stage of construction, and any other relevant inputs.
   - Including estimated Runoff conveyance rates, where appropriate.
4. Specifying treatment sizing considerations and estimated flow rates.
   - Active treatment: Design flow for any filtration unit(s) or mechanical or physical treatment systems (and potentially other relevant design features required for active treatment, such as dosing rates, chemical application, toxicity of reagents, etc.).
   - Passive treatment: Design parameters for designed detention facility (e.g., design retention time, design particle size given site specific Soil analysis and Sediment characteristics).

In addition to this, the ESC Professional must consider potential impacts when a design storm event/return period is exceeded. If there is indication of significant, critical, or unacceptable impacts resulting from a design storm event being exceeded, the ESC Professional must incorporate design redundancies, specify contingencies, or amend the ESC design and/or mitigation measures.

If stormwater conveyances and retention designs are based on return periods below typical applicable design criteria for a project (e.g., ponds or treatment systems designed to a 1:2 year period, whereas applicable municipal criteria may require drainage infrastructure to 1:10 year period), contingencies or other mitigative measures must be provided and clearly indicated by the ESC Professional.

Considerations of contingencies or redundancies to convey site discharges must prevent adverse impacts to ecosystem values, private property, or public safety to a designated point of discharge or receiving environment.

3.2.4 DESIGN AND SELECTION OF BEST MANAGEMENT PRACTICES

ESC Professionals must develop a design for each stage, as applicable, for a given project or development. The ESC Professional must consider and prescribe BMPs, techniques, or facilities specific to key project stages.

Typical project stages may include all or some of the following:

1. vegetation clearing activities (includes grubbing and stripping, tree felling, and removal of ground cover vegetation, root structures, and organics);
2. bulk earthworks and servicing (includes excavations, trenches, placement of preload, construction of roads and equipment access, management of material laydown areas and temporary stockpiles, and dewatering requirements);

3. grading (includes stabilization of exposed surfaces and ongoing water management and water treatment requirements);
4. building/infrastructure construction (includes material laydown areas, vehicle/equipment access restrictions, stockpile management, and water management); and,
5. landscaping, revegetation, or transition to permanent stormwater feature development (includes final stormwater management or Runoff implementation, stabilization of disturbed areas, removal of temporary non-biodegradable ESC measures, and establishment of vegetation).

Table 1 below highlights professional practice considerations for various types of BMPs. ESC Plans are expected to be phased appropriately for the project requirements, and BMPs from the following categories can be selected at each phase of the project to address specific ESC needs. Given the site-specific nature of ESC Plans, other factors may require consideration in the development of BMPs. Selected BMPs must include specifications, locations, and/or details needed to be effectively implemented.

Table 1: Professional Practice Considerations for Various Types of Best Management Practices

TYPE OF BEST MANAGEMENT PRACTICES	DESCRIPTION	PROFESSIONAL PRACTICE CONSIDERATIONS
Project Planning, Site Management, and Reporting	ESC project planning considers key project phases and adapts or evolves phase-specific BMPs to mitigate Erosion and Sediment risks as the project changes over time. This includes high-level strategies such as adjusting construction schedules where possible to maximize dry weather work and considering strategies for preparing the site in advance of significant storm events, freeze, thaw, and freshet. Different BMPs may be more or less suited to the various project phases.	The standard of practice for an ESC Professional is to: • Consider project phasing/staging to limit exposed disturbed surface areas and selection of effective BMPs to address Runoff processes and conveyances at a given phase/stage. • Consider changes in exposure of underlying materials during various project phasing, and the resulting varying Erosion potential, Runoff characteristics, or seepage at a given phase/stage. • Review the project requirements and develop phase specific ESC Plans with appropriate BMPs. • Establish roles and responsibilities of the ESC team, frequency of inspections, frequency of reporting. • Lead/participate in/delegate attendance at site orientation and tailgate meetings. • Communicate any input/testing requirements including testing locations (e.g., water quality monitoring locations). • Explain water quality requirements and regulations to ESC Monitors or Contractors as needed. • Clarify expectations and timelines around any non-conformance or ESC site instructions. • Establish or coordinate the establishment of protection measures and setbacks/clearance zones for existing vegetation/features. • Assess the role of existing natural conditions or hybrid systems in providing ESC benefits through various processes and mechanisms. • Complete required signoff of ESC works or facilities upon installation.

TYPE OF BEST MANAGEMENT PRACTICES	DESCRIPTION	PROFESSIONAL PRACTICE CONSIDERATIONS
Operational BMPs	Operational BMPs are measures that are applicable to the implementation of specific works or suspension of activities to mitigate ESC risk; these may not necessarily be design features but are considered good practice. This involves coordinated evaluation with the Contractor and ESC team to identify the order of operations, schedule, and project needs, to ensure ESC measures are in place in advance of their need. This also encompasses a commitment to site housekeeping, maintenance, and ESC management.	The standard of practice for an ESC Professional is to: • Consider the application of operational BMPs, such as road sweeping, clearing catch basins, vehicle, or equipment access restrictions, etc. • Consider whether the project requires specific wet-weather operational measures such as shutdowns or restrictions (e.g., specifying applicable criteria that would dictate grounds for suspension of earthworks or hauling operations).
Overall Water Management Strategy and Runoff Control	Runoff control measures protect the project area from water sources conveyed through natural overland hydrologic processes, which may adversely affect Sediment transfers within the project areas. These include measures to capture and manage incipient precipitation and Runoff within the project areas such as, but not limited to: • Interceptor/diversion ditches • Drainage ditches • Piped conveyances • Armoured berms/dykes • Inlet or outlet structures • Retention ponds • Sumps	The standard of practice for an ESC Professional is to: • Determine sources of contact water and non-contact water (upslope Runoff, stormwater, groundwater, etc.), and potential flow rates, if applicable. • Consider use of upland Runoff or groundwater contributions, and where possible, intercept and divert to keep clean surface water from entering the project. • Identify management measures for each source of water entering or leaving the site, within the boundaries of the ESC scope of work. • Identify the receiving environment and any required regulatory considerations (e.g., whether temporary drainage connections meet regulatory requirements of the *Water Sustainability Act* and *Fisheries Act*). • Utilize appropriate Runoff coefficients for the prevailing surface cover and consider compaction for a given project stage or phase when evaluating Runoff conditions and associated design. • Consider and evaluate effectiveness of water management BMPs including, but not limited to: diversions, bypasses, check dams, and channel stabilization in ESC Plans.

TYPE OF BEST MANAGEMENT PRACTICES	DESCRIPTION	PROFESSIONAL PRACTICE CONSIDERATIONS
Erosion Control BMPs	Erosion Control BMPs protect exposed surfaces from the erosive forces of moving water and/or wind. These include measures to cover and protect Soils from raindrops, overland flow, and wind, and/or measures to reduce the velocity and volume of overland flow to mitigate the risk of initiation of Erosion or further entrainment and transport of Sediment. Note that Erosion Control BMPs can functionally address the cover factor (C) of the revised universal Soil loss equation (RUSLE).	The standard of practice for an ESC Professional is to: • Evaluate and document existing and disturbed Soils characteristics, infiltration assumptions, stability concerns, etc. • Specify the name, materials, or product codes for prescribed BMPs. • Specify related practice factors required for successful implementation of a prescribed BMP (e.g., surface roughening). • Specify the minimum C-factor to be achieved by a prescribed Erosion Control treatment, if applicable. • Consider and evaluate effectiveness of standard or typical BMPs including but not limited to: slope texturing, seeding, topsoiling, mulching (organic and/or inorganic materials), hydraulic Erosion Control products, rolled Erosion Control products, turf reinforcement mats, wattles /organic fiber rolls, and impermeable sheeting Soil covers in ESC Plans.
Sediment Control BMPs	Sediment Control BMPs interrupt the transport of detached Soil particles. They capture and retain Sediment being transported by moving water and wind, and function by decreasing the velocity of moving water and wind and promoting sedimentation. Note that Sediment Control BMPs can functionally address the practice factor (P) or slope length (LS) of the revised universal Soil loss equation (RUSLE).	The standard of practice for an ESC Professional is to: • Evaluate and document existing Soils characteristics. • Specify location(s) and extent of a selected BMP. • Provide materials specifications or manufacturers name/code applicable to BMPs. • Include a typical installation detail applicable to all specified BMPs and/or clarify that BMPs must be installed per manufacturers specification. • Evaluate and document each location of Runoff release from the site and anticipate and design for the need for Sediment Controls. • Consider and evaluate effectiveness of standard or typical BMPs including but not limited to: construction entrance stabilization, perimeter controls, drainage system surrounds/inserts, curtains, bags, and/or sumps, in the ESC Plans.

TYPE OF BEST MANAGEMENT PRACTICES	DESCRIPTION	PROFESSIONAL PRACTICE CONSIDERATIONS
Detention/Settling BMPs	Detention and/or settling facilities are designed to capture and detain/retain Runoff from a specified catchment area to achieve low energy environments conducive to the deposition of suspended Sediment.	The standard of practice for an ESC Professional is to: • Consider particle size (accurately reflecting project phases, and anticipated particle sizes given the local surficial geology or Soils). • Specify the design retention time objectives for influent water. • Consider features such as flow path, lining, baffles, weirs, skimmers, outlets, and/or flocculants. • Be aware of the impacts of sumps, ponds, and dams and mitigate overflow, bypass, and/or failure impacts. • Design for maintenance, repairs, and monitoring access.
Water Treatment or Filtration BMPs	Water treatment or filtration facilities are designed to capture and treat Sediment-laden water and remove suspended Sediments prior to discharge from the project area.	The standard of practice for an ESC Professional is to: • Document particle size and performance expectations and establish treatment rates. • Specify detention/retention volume requirements to achieve design treatment rates based on site catchment area and design storm events. • Clarify maximum pumping rates to maintain efficacy of treatment system. • Consider regional water quality related restrictions regarding allowable chemistry when using flocculants. • Design for bypass, service, and maintenance. • Specify outlet/discharge characteristics. • Specify sampling/monitoring locations. • Specify treatment sludge disposal requirements, if applicable.

For long-term plans, the ESC Professional should consider the relative value of prescribed ESC BMPs to demonstrably mitigate the risk of Erosion and Sediment transfer through consideration of the revised universal Soil loss equation (RUSLE) variables. RUSLE is an empirical model used to estimate Soil loss from a Soil surface under specified conditions. RUSLE may be applied as an equation wherein variables of slope angle and slope length (LS), cover factors (C), and practice factors (P) influence calculated Sediment yield. At a minimum, consideration of the percentage reduction of Soil loss from a given area should be evaluated to support the selection of a prescribed BMP.

Considerations related to the RUSLE method have been included in Table 1 above for reference.

3.2.5 MONITORING SPECIFICATIONS

ESC monitoring requirements must be clearly defined by the ESC Professional within ESC Plans and any supporting information (e.g., ESC Plan notes and specifications, ESC memos, and/or reports). For additional details around monitoring requirements, refer to Section 3.4.

ESC monitoring requirements to be addressed within the ESC Plan must include the following:

- Minimum ESC Monitor Qualifications (e.g., experience level, educational background, certification level). For more information on ESC Monitor Qualifications, refer to Section 5.0.
  - Note: Qualifications may be specified by the Regulatory Authority.
- Monitoring Scope and Location(s)—must include project-specific standards and sampling locations to evaluate compliance or conformance against applicable criteria, including:
  - Administrative monitoring (e.g., confirming that permits are secured and available on site with contact information displayed, if required by regulatory framework).
  - Observational monitoring (e.g., noting and communicating substantial changes from the ESC Plan, noting instances of non-compliance or non-conformance, noting changes from previous monitoring inspection[s]).
  - Sampling requirements (e.g., sampling location(s), parameters, frequency, whether laboratory analysis or field analysis is required).
  - Sampling methods (e.g., in-situ turbidity measurements or discrete sampling and laboratory testing, in-situ equipment calibration frequency).
  - Water Quality Criteria (e.g., total suspended solids [TSS, expressed in mg/L]) or turbidity [expressed in nephelometric turbidity units, NTU]).
    - Guidelines or specified criteria—typically municipal bylaw criteria, provincial water quality standards, or requirements of applicable permit conditions.
    - If the ESC Professional prescribes chemical or mechanical treatment, a specific water quality monitoring plan must be developed to ensure that water leaving the treatment system meets the applicable water quality guidelines, including testing for the presence of residual flocculant or coagulant chemicals used for treatment.
      - Note: pH monitoring, while not directly related to suspended Sediment, may result from project activities and high pH levels can adversely affect the efficacy of some flocculants or treatments. Monitoring of pH is generally recommended when concrete works are carried out, or treatment chemicals are applied, but pH levels are not always ESC-related and may instead fall under

environmental monitoring requirements (see Section 2.3.3).

  - Location of monitoring – Specify monitoring prior to point of discharge. Background levels may be collected but are not relevant to the ESC Plan design or specifications.
- Frequency of monitoring – the ESC Plan must specify inspection periods applicable to project phase/stage/seasons.
  - Regular monitoring frequency (weekly, biweekly, or as specified by a Regulatory Authority).
  - Monitoring requirements after an identified storm event (typically based on an amount of precipitation over a specified time period, such as greater than 25 mm in 24 hours).
  - Monitoring frequencies may be seasonally driven (i.e., frequency may be reduced during dry season) or driven by the risk associated with the work occurring (e.g., frequency may increase when high risk work, such as in-Stream construction, is occurring).
- Frequency of Reporting – the ESC Plan should clarify the monitoring reporting frequencies to appropriate receiving parties. Projects may have daily, weekly, monthly, or annual reporting requirements for different purposes.
- Reporting requirements – specific requirements to be included in the ESC monitoring report to support the interpretation of site conditions, ESC Plan compliance, and ESC Plan performance.
  - Requirements typically include the weather, a summary of site activities, a list of ESC measures installed or missing, ESC maintenance requirements, water quality sampling results, and photo documentation.
  - Summary of compliance records, and non-conformance corrections.
  - A list of who receives these reports and any applicable corrective actions (by whom and by when) should also be identified.

3.2.6 SUBJECT MATTER EXPERTISE

ESC Plans are sometimes required to accommodate environmental protection objectives beyond Soil Erosion prevention, aquatic ecosystem protection, or water quality protection. Likewise, construction activities may be subject to constraints identified or specified by other professionals or specialists involved on the project.

If an ESC Professional is undertaking ESC work, it is their professional responsibility to have the necessary qualifications required for the complexity of the project; however, the ESC Professional must also understand the limitations of their knowledge, expertise, scope of practice, and when to engage a specialist with subject matter expertise in a particular area to support the ESC objectives. This delineation is typically carried out at the outset of a project during the planning stage.

ESC Plans must clearly delineate situations or conditions where supporting professionals or specialists are required, including but not limited to:

- Environmentally-sensitive areas:
  - Aquatic ecosystems, riparian ecosystems, ravines, floodplains, and wetlands
  - Streamside Protection and Enhancement Areas
  - Designated buffer zones
  - Designated wildlife habitat areas (federal and provincial)
  - Mapped species at risk occurrences
- Tree management considerations:
  - Windfirm tree retention areas
  - Critical Root Zones
  - Root Protection Zones
  - Machine-free zones

- Geotechnical and geological considerations:
  - Slope stability setbacks
  - Hydrogeological considerations and groundwater management
  - Alluvial fans
  - Banks, berms, dams, and instabilities
- Civil engineering considerations:
  - Large Sediment pond design(s) and operation
  - Permanent site servicing and utility design, associated municipal connection(s)
- Archaeological considerations:
  - Cultural or archeological sites
  - Culturally modified trees or archaeological artifacts
- Local contamination or pollution:
  - Presence of hazardous or deleterious materials in Soil, water, or vapour
  - Potential for mobilization of contaminated groundwater or surface water

The ESC Professional is responsible for identifying additional considerations which may not be captured in this list specifically and engaging the advice of external qualified professionals, as needed.

3.3 EROSION AND SEDIMENT CONTROL PLAN – IMPLEMENTATION

ESC Plan implementation begins with the specific project activities and associated BMPs applicable to a given project phase or stage. Prior to the start of each stage, it is expected that the ESC Plans are reviewed with the Contractor and field crews to reiterate the ESC Plan objectives and obtain feedback with respect to conflicts with project logistics. Given the nature of the work involved in ESC design and implementation, ESC Professionals in many cases must work closely with Contractors or Proponent/Clients in a collaborative manner to ensure that the ESC Plan is implemented appropriately.

Prior to commencing works, it is the responsibility of the ESC Professional to ensure that all ESC materials and equipment required to implement the ESC Plan have been made available to the Contractor or Proponent/Client for implementation, and that any changes or substitutions are clearly communicated and are accepted as suitable to achieve the design intent.

At the ESC Plan implementation stage, monitoring of ESC Plan compliance, adherence to specified water quality standards, and verification of protection of the receiving environments must include regular communication between the ESC Professional and field staff (e.g., ESC Monitors). During implementation, it is incumbent on the ESC Professional to receive monitoring reports, review deficiencies, and approve adaptive recommendations provided through monitoring reporting or issue site instructions to achieve the ESC Plan objectives.

Key stages and responsibilities of ESC Plan implementation are summarized below:

1. Pre-construction site assessment and kickoff meeting: ESC Professional to attend and ensure that Regulatory Authorities are contacted to attend (if applicable).
   - Review the requirements of any permit(s), license(s), and/or authorization(s) (PLAs), etc. and ensure copies are available on site throughout the duration of the project.
   - Review and confirm location and configuration of the receiving environment(s).
   - Identify critical areas of concern/sensitivity (e.g., aquatic habitats, riparian boundaries, sensitive wildlife features) with Contractor and ESC Monitor, and consider physically demarcating these areas.
   - Identify monitoring and sampling locations with ESC Monitor.

- Receive feedback on logistical constraints/adaptations from Contractor and ESC Monitor, where appropriate.
- Verify with Contractor that ESC BMP materials, supplies, and associated equipment are readily available for deployment.
- Discuss contingency planning with Contractor and ESC Monitor, discuss when it's appropriate to make changes based on-site conditions, and discuss ongoing communication requirements.

2. Construction phase inspections:
   - ESC Professional to conduct Field Reviews at appropriate stages (e.g., project kickoff, key phases or milestones, and project closure).
   - ESC Professional to conduct inspection to respond to unforeseen events and prescribe adaptations.
   - ESC Monitor to conduct monitoring events as stipulated in the ESC Plan: weekly/bi-weekly/monthly and in response to significant storm events, as applicable.
3. ESC monitoring report reviews:
   - ESC Professional to review ESC monitoring reports.
   - ESC Professional must be available to receive feedback from on-site staff or ESC Monitor, to remain accountable and meet their professional obligations. Field team may provide adaptive recommendations, but any decisions must be approved by the ESC Professional responsible for the ESC Plan design.
   - ESC Professional or ESC Monitor to record deficiencies and evolving site conditions requiring adaptive management.
   - ESC Professional to issue site instructions for ESC Plan amendments.

3.3.1 FIELD REVIEWS VERSUS MONITORING EVENTS

ESC Professionals have an obligation to conduct Field Reviews to ascertain whether the implementation or construction of the ESC Plan substantially complies in all material respects with the ESC Plan drawings or documents.

ESC Plans must include considerations for Field Reviews (which are generally a one-time visit to confirm conformance with a particular stage of the ESC Plan drawings or documents) and monitoring events (which provide frequent, ongoing, regular feedback on the performance of the ESC Plan implementation).

Monitoring events can be, and often are, delegated to other individuals (see Section 2.3.3 on the role of the ESC Monitor) but Field Reviews must be completed by the ESC Professional or under their direct supervision.

The number of Field Reviews required is to be determined by the ESC Professional.

3.3.2 COMMUNICATION AND REPORTING

ESC Professionals should strive to communicate their intended design in a clear, concise manner. This is generally achieved through site plans, drawings, and specifications. Some ESC Plans require clearly phased site plans, specific installation specifications, manufacturer details, and other additional details.

It is good professional practice to append a memorandum or report to provide clear indication of the design criteria applied (including flow rates, Runoff coefficients, and storm events, as discussed in Section 3.2.3) as well as monitoring requirements (as discussed in Section 3.2.5) and redundancy measures (as discussed in Section 3.2.3).

ESC Professionals are professionally responsible for the design and implementation of their work, and are expected to be accountable to Contractors, Proponent/Clients, and Regulatory Authorities unless a transfer of professional responsibility is communicated in writing.

If the professional responsibility for the ESC work is transferred from the ESC Professional to a different ESC Professional, the original ESC Professional, as the outgoing professional should:

1. obtain written confirmation from the Proponent/Client, that future ESC work required by the ESC Plan will be carried out by a qualified professional (see Section 0 for information on qualifications);
2. advise the Proponent/Client and the incoming ESC Professional of the outgoing ESC Professional's availability to answer questions regarding the work during implementation;
3. provide notice of the change to the Regulatory Authority; and
4. retain a record of any communication confirming the steps above and any related responses.

3.4 EROSION AND SEDIMENT CONTROL PLAN – MONITORING

The frequency of ESC-related monitoring will depend on the phase of the project, weather conditions, project risk, and Regulatory Authority requirements. Additional monitoring events should be conducted in anticipation of forecasted storm events, during storm events, and other weather events that have the potential to cause Erosion and/or where the risk of Erosion and Sediment transfer is significantly increased.

The ESC Plan must clarify the regulatory context and clearly articulate on Plan drawings or documents the project monitoring frequency and reporting requirements. Project-specific thresholds for termination of monitoring and reporting requirements must also be provided (e.g., substantial completion, or percentage of vegetation cover established).

Example monitoring frequencies include the following:

- Weekly monitoring during fall/winter/early-spring
- Bi-weekly monitoring during late-spring/summer period
- Event-specific monitoring

Additional considerations for remote site monitoring and reporting frequency may be included in ESC Plan specifications, if applicable (i.e., where site access constraints or ability to obtain laboratory analytical results prohibit typical monitoring and reporting frequencies).

ESC Plans should also clearly outline the recipient list for regular monitoring reports. Typically, a distribution list with email addresses or phone number contacts should be provided for key participants or Regulatory Authorities.

In carrying out their role, it is important for the ESC Monitor to document, at a minimum, the following during each monitoring event:

- Date/time of field inspection
- Weather conditions at the time of field monitoring
- The ESC measures that are in place, their effectiveness, and any maintenance requirements
- Any applicable non-conformance with ESC Plan requirements or specifications
- Key site deficiencies with respect to BMPs or imminent risks of potential adverse effects
- Current state of the receiving environment (e.g., Stream(s) and/or environmentally sensitive receptors) and if there have been any impacts adversely affecting those features
- Record incidences of discharge and water quality samples collected
- Record most recent equipment calibration (for in-situ sampling)

- Representative sites photos during each site inspection
- Records of any communication on site with the Contractor and/or Proponent/Client

3.5 EROSION AND SEDIMENT CONTROL PLAN – PROJECT CLOSEOUT

At or shortly prior to project closeout, the ESC Professional must complete a final site inspection to review site conditions and to verify the removal of temporary ESC BMPs, materials, or facilities (e.g., catch basin insert removal, Sediment fence removal) as well as those measures that may be left in place.

The ESC Professional is expected to complete a Field Review in support of substantial completion and in relation to the assurance statement requirements. The ESC Professional is required to verify that the project related Erosion risks have been suitably addressed and provide confirmation that erodible surfaces have been appropriately stabilized per the ESC Plan (or associated restoration or reinstatement plan), or document ESC risks and recommendations to the Proponent/Client, Contractor, and/or Regulatory Authority. Generally, project closeout will require the verification of permanent vegetation establishment, or an opinion rendered that the ESC measures implemented sufficiently mitigate the risks of naturally occurring surface Erosion to levels typical of undisturbed conditions reflected in the surrounding natural landscape or as prescribed in the ESC Plan.

Photographic documentation of site conditions at project completion must be obtained to accurately reflect the status of landscaping, hardscaping, municipal infrastructure (e.g., streets, sidewalks, boulevards), and buildings and ancillary areas (e.g., residential yards, parking areas).

A letter or document can be provided by the ESC Professional that supports the determination of substantial completion for submittal and record-keeping by the Regulatory Authority.

3.5.1 RECORD-KEEPING AND DOCUMENT RETENTION

Documentation includes any document that is evidence of ESC design work, related calculations, activities, monitoring events, design decisions, or is evidence that an ESC Professional has met their professional and contractual obligations. In practice, this includes field notes, photographs, monitoring event records, monitoring equipment calibration records, documented decisions, drawings, reports, specifications, and revisions.

Engineering/Geoscience Professionals are expected to retain project documentation for a minimum of 10 years; regulatory requirements or contractual obligations may require document retention for longer than 10 years.

3.6 ETHICAL CONSIDERATIONS

Act in the public interest: The Codes of Ethics applicable to Registrants of the BC Institute of Agrologists, the College of Applied Biologists, and Engineers and Geoscientists BC include the requirement to hold paramount the safety, health, and welfare of the public, and the protection of the environment. While ESC work is unlikely to directly impact the safety health and welfare of the public, ESC work can have significant implications for the local receiving environment. ESC Professionals are required to consider the effect of their practice on the environment, while also taking into consideration regulatory requirements, such as acceptable risk thresholds. ESC Professionals are responsible for having adequate knowledge of the possible environmental effects of their projects in order to properly follow the industry standard of practice and regulatory requirements.

Halting ESC Work: In some cases, the ESC Professional is empowered (i.e., by permit or approval conditions) with "stop work authority" (or similar) and may need to implement a "stop work order" (or similar) to remediate a situation involving damage to the environment, or potential damage to the environment. ESC Professionals should include provisions for (or considerations of) this type of stop work authority into ESC Plans where appropriate. If the ESC Professional does not have stop work authority, they still have an obligation to notify any perceived project non-compliance or significant risk to the environment or public to the Proponent/Client and Regulatory Authority. ESC Professionals should also include provisions for (or considerations of) notification of project non-compliance to Regulatory Authorities as required by applicable permit conditions outside of regular reporting requirements, if needed. These reporting pathways are best determined at the outset of a project.

Duty to Report: ESC Professionals have a duty to report under their Codes of Ethics—this involves the obligation to report situations where the regulated practice by another Registrant or other person may pose a risk of significant harm to the environment or to the health or safety of the public, or (as applicable to Registrants of Engineers and Geoscientists BC) where another person is engaged in practices or has made decisions that are illegal or unethical. Registrants must discern who to inform and must promptly tell the appropriate authority about the problem, its consequences, and recommendations for remedial action, where applicable. In practice, this may mean reporting to the appropriate regulatory body (i.e., the BC Institute of Agrologists, the College of Applied Biologists, or Engineers and Geoscientists BC) and/or Regulatory Authority (e.g. WorkSafe BC, Local Government Bylaw Officer) if an ESC Professional is in contravention of their professional obligations.

3.7 CONSIDERATION OF CLIMATE CHANGE IMPLICATIONS

The ESC Professional has a professional responsibility to uphold the principles outlined in their practice's relevant Code(s) of Ethics, including protection of public safety and the environment. As such, the ESC Professional must use a documented approach to identify, assess, and mitigate risks that may impact public safety or the environment when providing professional services.

One of the risk factors that must be considered for longer term ESC projects is climate change implications. ESC Professionals have a responsibility to notify their Proponent/Client of future climate-related risks, reasonable adaptations to lessen the impact of those risks, and the potential impacts should a Proponent/Client refuse to implement the recommended adaptations. ESC Professionals are themselves responsible for being aware of and meeting the intent of any climate change requirements imposed by a Proponent/Client or Regulatory Authority.

Climate change impacts, such as frequent and more intense rain events, extreme wind, and wildfires can increase Erosion potential and result in greater quantities of Sediment passing into receiving environments, with potential impacts to water quality, availability of potable water, agricultural practices, and overall ecosystem health.

ESC Professionals are required to consider climate change in the development, implementation, and monitoring of ESC Plans, if applicable to the project schedule or duration. Application of climate change considerations (including upsizing conveyance, retention, detention, and treatment structures) is on the basis of risk and will vary dependent on project specifics like sensitivity and capacity of receiving environments, geotechnical/geologic considerations, and regulatory or development requirements (e.g., green infrastructure).

Some examples include:

- Utilizing current/updated IDF curves that factor in recent climate change observations or impacts.
- Accounting for recent changes in land cover or vegetation (and therefore Erosion potential) due to wildfire, debris slides, or dry conditions.
- Applying an appropriate factor of safety for drainage conveyance and retention structures to factor in variance related to climate change.
- Designing systems for variable conditions, particularly including mitigation and management of storm events exceeding the design event.
- Including contingencies for extreme weather events.

More information on climate change impacts and adaptation can be accessed via Engineers and Geoscientists BC's Climate Change Information Portal.

4.0 QUALITY MANAGEMENT IN PROFESSIONAL PRACTICE

4.1 INTRODUCTION

Quality management is the duty of the practitioner performing the work associated with this guideline. All regulated practitioners must follow their regulatory body's Bylaws, Code of Ethics, and professional conduct standards, policies, and guidelines.

Erosion and Sediment Control (ESC) Professionals are required to follow quality management processes and standards applicable to the professional work they complete, depending on the regulatory body they are licensed with.

The purpose of quality management is to check that the completed work is technically correct and complies with applicable codes, standards, and regulatory requirements. Quality management requires the implementation of suitable protocols to ensure that appropriate quality assurance and quality control reviews are completed.

4.2 ENGINEERING/GEOSCIENCE QUALITY MANAGEMENT REQUIREMENTS

Engineering/Geoscience Professionals must adhere to applicable quality management requirements during all phases of the work, in accordance with the Engineers and Geoscientists BC Bylaws and quality management standards.

To meet the intent of the quality management requirements, Engineering/Geoscience Professionals should review opportunities for improvements to help inform future projects and must establish, maintain, and follow documented quality management policies and procedures for the following activities:

- Use of relevant professional practice guidelines.
- Authentication of professional documents by application of the Engineers and Geoscientists BC seal.
- Direct supervision of delegated professional engineering or professional geoscience activities.
- Retention of complete project documentation.
- Regular, documented checks using a written quality control process.
- Documented Field Reviews of engineering or geoscience designs and/or recommendations during implementation or construction.
- Where applicable, documented independent review of high-risk professional activities or work prior to implementation or construction.

Similar professional practice principles apply to professionals from the College of Applied Biologists and the BC Institute of Agrologists; ESC Professionals should refer to their applicable Code of Ethics. Many multidisciplinary firms have quality management policies and procedures that apply to all individuals employed by that firm.

Engineering/Geoscience Professionals employed by a Registrant firm (as defined in the Bylaws of Engineers and Geoscientists BC) are required to follow the quality management policies and procedures implemented by the Registrant firm as per Engineers and Geoscientists BC's permit to practice program. Failure to appropriately authenticate and apply the permit to practice number to documents is a breach of the Engineers and Geoscientists BC Bylaws.

These requirements are addressed further in the quality management guides listed in Section 6.2.

4.3 OTHER QUALITY MANAGEMENT REQUIREMENTS

ESC Professionals must also be aware of any additional quality management requirements from other sources that are relevant to their work, which may include but are not limited to:

- legislation and regulations at the local, regional, provincial, federal, and First Nations levels;
- policies of Regulatory Authorities at the local, regional, provincial, federal, and First Nations levels; and/or
- agreements and service contracts between clients and professionals or their firms.

ESC Professionals should assess any areas of overlap between the BC Institute of Agrologists', the College of Applied Biologists', and the Engineers and Geoscientists BC's quality management requirements and the requirements of other applicable sources. If the requirements of different sources overlap, ESC Professionals should attempt to meet the complete intent of all requirements.

Where there are conflicts between requirements, ESC Professionals should negotiate changes or waivers to any contractual or organizational requirements which may conflict with requirements of legislation, regulation, or their respective organization's Code of Ethics.

Generally, there is no contractual obligation or organizational policy that will provide justification or excuse for breach of any of the BC Institute of Agrologists', the College of Applied Biologists', or an Engineering/Geoscience Professional's obligations under any legislation, regulation, or their respective organization's Code of Ethics. Where such conflicts arise and cannot be resolved, ESC Professionals should consider seeking legal advice from their own legal advisers on their legal rights and obligations in the circumstances of the conflict, and they may also seek practice advice from their respective regulatory body on any related ethical dilemma that they may face in the circumstances.

4.4 PRACTICE ADVICE

For professional practice advice regarding the intent of this guideline, please contact the individual listed below for the appropriate regulatory body:

- To contact an Engineers and Geoscientists BC practice advisor: practiceadvisor@egbc.ca.
- To contact the College of Applied Biologists Director of Practice: director_practice@cab-bc.org.
- To contact a BC Institute of Agrologists representative: p.ag@bcia.com.

5.0 PROFESSIONAL REGISTRATION & EDUCATION, TRAINING, AND EXPERIENCE

5.1 PROFESSIONAL REGISTRATION

Registrants of the participating regulatory bodies have met minimum education, experience, and character requirements for admission to their professions. However, the educational and experience requirements for professional registration do not necessarily constitute an appropriate combination of education and experience for work related to Erosion and Sediment Control (ESC). Professional registration alone does not automatically qualify a Registrant of a participating regulatory body to take professional responsibility for all types and levels of professional services in this professional activity.

It is the responsibility of ESC Professionals to determine whether they are qualified by training and/or experience to undertake and accept responsibility for carrying out work related to ESC (as defined in Engineers and Geoscientists BC Code of Ethics Principle 2, the College of Applied Biologists Code of Ethics and Professional Conduct Principle 2, and the BC Institute of Agrologists Code of Ethics Principle 2).

The following sections provide some guidance on education, training, and experience indicators that would qualify an ESC Professional to undertake ESC work.

5.2 EDUCATION, TRAINING, AND EXPERIENCE

ESC work, as described in these guidelines, requires minimum levels of education, training, and experience in many intersecting areas.

ESC Professionals must adhere to the principles of the Code of Ethics applicable to their regulatory body, to "practice only in those fields where training and ability make the Registrant professionally competent" and, therefore, must evaluate their own qualifications and must possess the appropriate education, training, and experience to provide the services.

The level of education, training, and experience required of ESC Professionals should be adequate for the complexity of the project. This section describes indicators that Professionals can use to determine whether they have an appropriate combination of education and experience.

Note that these indicators are not an exhaustive list of education and experience types that are relevant to ESC work. Satisfying one or more of these indicators does not automatically imply competence in ESC work.

A combination of educational and experience indicators is most appropriate for both the ESC Professional and ESC Monitor. For example, five years of industry working experience may be equivalent to three years of industry experience in combination with an applicable certification, or two years of industry experience in combination with an applicable industry training course.

Experience should be commensurate with the project type, site size, and/or risk consequence of the project overall. For example, an individual with ESC industry experience exclusively related to single family developments may not be qualified to undertake ESC work related to large scale developments, mine sites, or pipeline installations.

5.2.1 EDUCATIONAL INDICATORS

Certain indicators show that ESC Professionals have received education that might qualify them to participate professionally in ESC work. Educational indicators are subdivided into formal education (such as university or technical school) and informal education (such as continuing education).

Formal educational indicators include having obtained or completed one or more of the following:

- An undergraduate-level degree in environmental engineering, civil engineering, geological engineering, forest engineering, natural resource management, biology, environmental science, or a related field from an accredited program.
- Specific courses relevant to ESC including surface hydrology, open channel flow, hydraulics, water treatment (i.e., physical or chemical treatment processes), fisheries biology, environmental impacts, water quality, Sediment transport, water pollution control, ESC site management, inspection, monitoring training, etc.

Informal educational indicators include having participated in, or undertaken one or more of the following:

- Certifications that focus specifically on ESC design or monitoring—BC Certified Erosion Sediment Control Lead (BC-CECSL), Canadian Certified Inspector of Sediment and Erosion Control (CAN-CISEC), or Certified Professional in Erosion and Sediment Control (CPESC).
- Training courses facilitated by the professional's employer, industry organizations, or suppliers that focus on ESC work.
- Continuing education courses or sessions offered by professional organizations or reputable educational institutions that focus on ESC work.
- Conferences or industry events that focus on ESC work.
- Conferences or continuing education focussed on climate change impacts and adaptation.
- A rigorous and documented self-study program involving a structured approach that contains materials from textbooks and technical papers on ESC work.

5.2.2 EXPERIENCE INDICATORS

Certain indicators show that ESC Professionals have an appropriate combination of experience that qualifies them to participate professionally in ESC work.

Experience indicators include having completed one or more of the following:

- For an extended duration (greater than one year) as a trainee, participated in ESC work under the direct supervision of a professional with an appropriate combination of education and experience.
- Participated in past projects working on ESC projects and developed a sufficient knowledge of ESC principles.
- Participated in academic, policy, regulatory, or industry working groups that focus on ESC work.

6.0 REFERENCES AND RELATED DOCUMENTS

Documents and legislation cited in the main guidelines appear in **Section 6.1: Legislation** and **Section 6.2: References.**

Related documents that may be of interest to users of these guidelines but are not formally cited elsewhere in this document appear in **Section 6.3: Related Documents**.

6.1 LEGISLATION

Agricultural Land Commission Act (sections related to removal and placement of Soil and fill)

Canadian Emergency Regulator Act

Environmental Management Act

Environmental Assessment Act

Federal Fisheries Act

Forest and Range Practices Act (sections specific to roads and Stream crossings)

Heritage Conservation Act

Impact Assessment Act

Mines Act and the *Health, Safety and Reclamation Code for Mines in British Columbia*

Oil and Gas Activities Act

Professional Governance Act [SBC 2018], Chapter 47.

Water Sustainability Act

Local government bylaws: The applicable local government bylaws will depend on the location of the project, and are too numerous to cite here.

6.2 REFERENCES

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6.3 RELATED DOCUMENTS

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7.0 APPENDICES

Appendix A: Erosion and Sediment Control Assurance Statement

Note: This assurance statement is to be read and completed in conjunction with the current *Joint Professional Practice Guidelines-Erosion and Sediment Control,* (jointly published by the College of Applied Biologists, the BC Institute of Agrologists, and Engineers and Geoscientists BC) and is to be provided for Erosion and Sediment Control (ESC) Plans for the purposes of communicating to appropriate Regulatory Authorities the considerations that informed the ESC Plan, and the commitment on behalf of the professional to conduct Field Reviews. Capitalized terms are defined in the *Joint Professional Practice Guidelines-Erosion and Sediment Control.*

Date: _____

To: _____

(Proponent/Client or Regulatory Authority, as appropriate)

Contact Name: _____

Businessaddress: _____

Contact information (email and/or phone number): _____

Information on the site or project:

Name of site/project and/or description: _____

_____

Located at (address, coordinates, or description): _____

_____

Owned by: _____

I have signed, sealed, and dated the attached ESC Plan (including any specifications or instructions) in accordance with the *Joint Professional Practice Guidelines-Erosion and Sediment Control,* and have included a statement of qualifications as an individual or multidiscipline team lead in Appendix __ of the ESC Plan.

The above-referenced ESC Plan must be read in conjunction with this Statement.

In preparing the above-referenced ESC Plan, I have (check to the left of applicable items):

- ☐ Considered the design objectives and regulatory framework applicable to the site and receiving environment (see Section 1.1).
- ☐ Collected and reviewed available and relevant site information, documentation, and data related to topography, Soil types, hydrology, project schedule, construction methods and sequencing, receiving environment, and environmentally sensitive areas (see Section 3.2).

- ☐ Acknowledged and addressed the variability in Erosion potential and hydrologic changes that may be reasonably expected to occur under various project phases.
- ☐ Confirmed that the site, construction, and design information contained in these drawings reasonably reflects the physical conditions of the site.
- ☐ Provided and appropriately described a selection of Best Management Practices (BMPs), specified actions, and field directions to address the erodible surface exposure and changes to site Runoff characteristics reasonably expected in relation to the proposed development with consideration of extreme weather events (see Section 3.2.4).
- ☐ Confirmed that these BMPs can reasonably achieve the design objectives with respect to the protection of the receiving environment and water quality.

I acknowledge and understand my professional responsibility to (check to the left of each):

- ☐ Authenticate and take professional responsibility for the above-referenced ESC Plan and its implementation on site.
- ☐ Address climate change variability and risk(s) associated with extreme events during the ESC Plan design.
- ☐ Conduct Field Reviews to identify potential deficiencies and prescribe specific remedial measures to address residual project impacts for each phase of the ESC design that is included in the above-referenced ESC Plan; I acknowledge that Field Reviews can be conducted by me, under my direct supervision, or can be assigned to another qualified professional with written confirmation that they are being carried out by a qualified professional.
- ☐ Remain responsible for material design changes made during construction that are brought to my attention during Field Reviews, monitoring, or auditing until project closeout. Should I cease to be involved on this project, I will notify the Proponent/Client and the Regulatory Authority in writing of the date of my departure.
- ☐ Review monitoring reports and recommendations from the project team and issue change orders or addenda to ensure that ESC-related risks are managed through to substantial completion of the project or activity.
- ☐ Provide feedback and support adaptive management to mitigate Erosion and Sediment transfer potential to the receiving environment or water quality impairment, where applicable.
- ☐ Confirm upon project closeout that substantial completion of the project is achieved and that areas have been stabilized to minimize the risk of adverse Erosion, Sediment transfer, or water quality degradation from natural Erosion processes.

I hereby give my assurance that the attached ESC Plan has been prepared and delivered in my professional capacity or under my direct supervision, and that it is complete for intended use.

Name: _____

Date: _____

Contact Information (email and/or telephone): _____

Name of Firm: _____

Permit to Practice number (if applicable): _____

(Affix Professional Seal to the right)

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