

CERTIFIED EROSION, SEDIMENT, AND STORMWATER INSPECTOR (CESSWI) KNOWLEDGE, SKILLS, AND ABILITIES

A CESSWI should be able to understand, describe and implement (as appropriate) the following concepts:

Section 1: Soil Mechanics and Soil Science Principles

- 1.1 Soil Formation Factors
- 1.2 Soil Formation Processes
- 1.3 Soil Properties Impacting Erosion Potential
 - 1.3.a Soil Classification
 - 1.3.b Soil Erodibility
 - 1.3.c Rainfall Runoff Erosivity Factor “R”
- 1.4 Topography
- 1.5 Geomorphology
- 1.6 Splash, sheet, and rill erosion
 - 1.6.a Detachment
 - 1.6.b Transport Mechanisms
- 1.7 Gully erosion
 - 1.7.a Headcutting
 - 1.7.b Downcutting
 - 1.7.c Widening
- 1.8 Slope movement
- 1.9 Channel erosion
 - 1.9.a Channel Stability
- 1.10 Wind erosion
 - 1.10.a Creep

- 1.10.b Saltation
- 1.10.c Suspension
- 1.11 Sediment transport
 - 1.11.a Soil type assessment
- 1.12 Impacts of erosion on soil resources
- 1.13 Impacts on water resources
- 1.14 Impacts on air and fugitive dust

Section 2: Site Climatic Conditions and Rainfall Amounts

- 2.1 Climatic Conditions
 - 2.1.a Isohyetal Maps and Determinations
 - 2.1.b Snow and Snow Runoff Impacts
 - 2.1.c Rainfall Runoff Erosivity Factor "R"

Section 3: Introduction into Hydrology and Drainage Principles

- 3.1 Planning considerations for runoff management
 - 3.1.a Drainage patterns
 - 3.1.b Pre-developed conditions
 - 3.1.c Construction/Project phase conditions
 - 3.1.d Post-construction conditions
 - 3.1.e Internal site conditions
 - 3.1.f Perimeter site conditions
 - 3.1.g Run on water
 - 3.1.h Discharge points
- 3.2 Components of the Hydrologic Cycle
- 3.3 Factors affecting runoff
 - 3.3.a Precipitation

- 3.3.b Time parameters
- 3.3.c Watershed area
- 3.3.d Ground cover
- 3.3.e Antecedent moisture condition
- 3.3.f Storage in the watershed
- 3.3.g Soil permeability
- 3.4 Components of precipitation
 - 3.4.a Return period
 - 3.4.b Rainfall distribution, rainfall depth, rainfall intensity
 - 3.4.c Isohyetal map
 - 3.4.d Storm types
 - 3.4.e Risk analysis
- 3.5 Time parameters
 - 3.5.a Time of concentration
 - 3.5.b Travel time
 - 3.5.c Sheet flow
 - 3.5.d Shallow concentrated flow
 - 3.5.e Channel flow
 - 3.5.f Initial abstraction
- 3.6 Soil permeability categories
 - 3.5.a Hydrologic soil groups
 - 3.6.b Disturbed soil profiles
- 3.7 Runoff curve number components
 - 3.7.a Composite curve number or weighted curve number
 - 3.7.b Average runoff condition
 - 3.7.c Cover description
 - 3.7.d Cover type

- 3.7.e Hydrologic condition
- 3.7.f Cropping treatment
- 3.7.g Impervious areas
- 3.8 Runoff characteristics of the hydrograph
 - 3.8.a Runoff volume
 - 3.8.b Peak discharge
 - 3.8.c Discharge
 - 3.8.d Antecedent flow rate
 - 3.8.e Rising limb
 - 3.8.f Falling limb
 - 3.8.g Runoff depth
- 3.9 Runoff estimation methods
 - 3.9.a Rational Method
 - 3.9.b Modified Rational Method
 - 3.9.c Unit Hydrograph
 - 3.9.d Soil cover complex method (SCS/NRCS Method, TR 55)

Section 4: General Permits

4.1 General Stormwater Permitting

Affiliates and other countries will insert their own permitting criteria. Within the United States these will refer to Federal permits only.

4.2 Permits

- 4.2.a Types of permits
- 4.2.b Permitting authority

- 4.2.c Permit Application process
- 4.2.d Permit application requirements
 - 4.2.d.1 Construction
 - 4.2.d.2 Industrial/Multi-Sector
 - 4.2.d.3 Municipal
- 4.2.e Permit enforcement and penalties

Section 5: Inspection Fundamentals / Duties

- 5.1 Compliance
- 5.2 Inspection Note Taking
- 5.3 Photos and Videos
- 5.4 Inspector Support Equipment
- 5.5 Preconstruction Meetings
- 5.6 Documentation Inspection
- 5.7 Field Inspections
- 5.8 Post Inspection Meeting
- 5.9 Reporting

Section 6: Inspection Elements for Construction

- 6.1 Pre-Construction Meeting
- 6.2 Documentation Inspection Elements
 - 6.2a Permits
 - 6.2b Plans
 - 6.2.c Reports
- 6.3 Erosion and Sediment Control Plan Review
- 6.4 Construction Entrance Posting
- 6.5 Field Inspection Elements

- 6.5.a Tracking Controls
- 6.5.b Site Perimeter Controls
- 6.5.c Erosion Controls
- 6.5.d Sediment Controls
- 6.5.e Runoff and Drainage Controls
- 6.5.f Good Housekeeping and Material Management Controls
- 6.5.g Outfall Inspections
- 6.5.h Final Stabilization Inspections
- 6.5.i Final Inspections

Section 7: Stormwater Monitoring and Sampling

- 7.1 Requirements
- 7.2 Advanced Planning
- 7.3 Sampling Constituents
- 7.4 Sample Collection and Monitoring Details
- 7.5 Sampling
 - 7.5.a Types
 - 7.5.b Who must sample
 - 7.5.c When to sample
 - 7.5.d Where to sample
 - 7.5.e Supplies
 - 7.5.f Methods
 - 7.5.g Data Collection and Recording
 - 7.5.h Reporting procedures
 - 7.5.i Sample shipping and Chain of Custody

Section 8: Documentation, Communication, and Safety

8.1 Documentation

8.1.a Proper methods and procedures

8.1.b Proper reporting techniques

8.2 Communication

8.2.a Pre-construction meetings

8.2.b Post-construction meetings

8.2.c How to deal with difficult people

8.2.d How to deal with problematic sites

8.2.e How to deliver unpleasant findings to appropriate individuals

8.3 Safety

8.3.a Risks involved with inspections

8.3.b Personal Protection Equipment (PPE)

8.3.c Ability to recognize toxic and hazardous substances, proper storage of the same, Material Safety Data Sheets, and response requirements

Section 9: Plan and Site Management

9.1 Types of Plans

9.1.a Stormwater Pollution Prevention Plan (SWPPP)

9.1.b Erosion and Sediment Control (ESCP)

9.1.c Stormwater Management Plan / Program (SWMP)

9.2 Certifications

9.3 Notifications

9.4 Components of the Plan

9.4.a Drawings and Maps

9.4.b Legends

9.4.c North Arrow

9.4.d Vicinity maps

9.4.e Management practices

- 9.4.f Specifications and details
- 9.4.g Sequencing of construction
- 9.4.h Topography
 - 9.4.h.1 Slope calculation methods
- 9.4.i Amendments and updates

Section 10: Management Practices

- 10.1 Categories of Management Practices
 - 10.1.a Site Planning and Management
 - 10.1.b Erosion Controls
 - 10.1.c Sediment Controls
 - 10.1.d Run-Off Controls
 - 10.1.e Good Housekeeping/Materials Management
 - 10.1.f Post-Construction Management
- 10.2 Description and Purpose for each management practice
- 10.2 Objectives and Targeted Pollutants for each management practice
- 10.4 Applications and limitations for each management practice
- 10.5 Implementation considerations for each management practice
- 10.6 Inspection criteria for each management practice
- 10.7 Maintenance criteria for each management practice
- 10.8 Potentially associated management practices for each management practice

Section 11: Rules, Regulations, and Ordinances*

**All United States candidates are tested in a separate take-home exam that must be passed prior to taking the certification exam. Affiliates and other countries may provide a separate exam to test applicants on their country's national rules, regulations, and ordinances that must be passed prior to taking the certification exam.*

- 11.1 United States Federal Regulations
 - 11.1.a Clean Water Act

- 11.1.a.1 Purpose
- 11.1.a.2 Regulating Authority
- 11.1.a.3 Section 401 (Water Quality)
- 11.1.a.4 Section 402 (NPDES)
- 11.1.a.5 Section 404 (US Army Corp)
- 11.1.a.6 CZARA
- 11.1.a.7 Water Quality Standards
- 11.1.a.8 Enforcement and Penalties
- 11.1.a.9 Waters of the US (Surface Waters)

11.b Surface Mining Reclamation Act

11.c USDA Conservation Programs

11.2 State and local regulations

11.3 MS4 programs

11.4 Administrative requirements

11.4.a Permit filing procedures and fees

11.4.b Approval

11.4.c Inspections

11.4.d Enforcement and penalties

11.4.e Project termination

Rules and Regulations	0%
This portion of the exam is a common section for all who do not hold a current and valid ECI professional certification and is administered as a separate exam	
Soils Mechanics and Soil Science Principles	0%
Demonstrate the knowledge of soil formation factors and processes	
Demonstrate the knowledge of soil classification methods and an understanding of soil erodibility	
Demonstrate the knowledge of geomorphology and how it effects the surface conditions of land	
Demonstrate the knowledge of the causes and results of different types of erosion	
Demonstrate the knowledge of the methods of sediment transport	
Demonstrate the knowledge of the impacts of erosion on soil and water resources	
Demonstrate the knowledge of the impacts on air of fugitive dust	
Site Climatic Conditions and Rainfall Amounts	0%
Demonstrate the knowledge of the effects of climatic conditions and rainfall on soil	
Demonstrate the knowledge of Isohyetal maps and the rainfall erosivity factor "R"	
Hydrology and Drainage Principles	1–2%
Demonstrate the knowledge of the planning considerations for runoff management	
Demonstrate the knowledge of the components of the hydrologic cycle	
Demonstrate the knowledge of the factors affecting runoff	
Demonstrate the knowledge and understanding of how to read results from runoff estimation equations	
General Permits	4–6%
Demonstrate the knowledge of permit types, who is the permitting authority, the typical requirements for permit applications, and the methods of enforcement and penalties	
Inspection Fundamentals and Duties	12–15%
Demonstrate the knowledge inspection fundamentals and duties of the inspector	
Demonstrate the knowledge and ability to conduct an inspection using proper inspection techniques	
Inspection Elements for Construction	7–9%
Demonstrate the knowledge of the responsibilities of the inspector at preconstruction meetings	

Demonstrate the knowledge and ability to perform complete documentation inspections
Demonstrate the knowledge and ability to perform complete erosion and sediment control plan inspections
Demonstrate the knowledge of construction entrance posting requirements
Demonstrate the knowledge of the elements of the site that require erosion and sediment control inspections and the ability to perform those inspections
Demonstrate the knowledge and ability to perform final inspections

Stormwater Monitoring and Sampling	1–3%
Demonstrate the knowledge of how to read the documents to determine the sampling and monitoring requirements for the site	
Demonstrate the knowledge of constituents that require sampling and monitoring the knowledge of the advanced planning required to properly perform sampling and monitoring for those constituents	
Demonstrate the knowledge of details required for sampling collections and monitoring	

Documentation, Communication, and Safety	22–27%
Demonstrate the knowledge of the proper methods and procedures to document inspections	
Demonstrate the knowledge and ability to properly record results of the site inspections in a clear and understandable manner	
Demonstrate the knowledge of the communication role of the inspector during preconstruction, post inspection, and post construction meetings	
Demonstrate the knowledge of communication techniques with difficult people, with difficult sites, and communication techniques to deliver unpleasant findings	
Demonstrate the knowledge and ability to read the plans and communicate with the contractors to determine risk areas on the site	
Demonstrate the knowledge of the proper use and types of Personal Protection Equipment	

Plan and Site Management	9–11%
Demonstrate the knowledge different plan types, the required notifications, and the components of the plan(s)	

Management Practices	32–39%
Demonstrate the knowledge of different categories of management practices	
Demonstrate knowledge of management practices	

Chapter #	Subject Matter	General Knowledge/ Concept	Detailed Concept & Application	Calculations	Practical Application	Comments
Chapter 3	Soil Formation Classification					
	Introduction to Soils	X				
	Soil Formation Factors	X				
	Soil Formation Process	X				
	Soil Classification	X	X			
Chapter 4	Properties of Soils					
	Soil Physics and Engineering Properties	X				
	Soil Erodibility	X				
	Soil Chemistry	X				
	Soil Biology	X				
Chapter 5	Soil Erosional and Depositional Environments					
	Soil Detachment	X	X			
	Sediment Transport	X	X			
	Soil Erosion	X	X			
	Estimating Soil Erosion by Water	X				
	Sediment Deposition	X	X			
	Summary of Site Features Impacting Soil Erosion and Deposition	X				
Chapter 6	Site Geomorphology and Planning					
	Geomorphic Processes	X				
	Geomorphic Environments and Landforms	X				
	Site Planning Around Site Geomorphology	X				

Chapter 7	Site Hydrology and Hydraulics					
	Site Hydrology	X				
	Hydrologic Cycle	X				
	Hydrology Analysis and Design Considerations	X				
	Slope	X	X	X		
	Overview of Site Hydraulics	X				
Chapter 8	Safety					
	Insects	X	X			
	Animals and Plants	X	X			
	Exposure to Elements	X	X			
	Physical Hazards	X	X			
	Hazardous Materials	X	X			
	Personal Protective Equipment	X	X			
	Communication	X	X			
	Federal and Provincial Safety Regulatory information	X				
Chapter 9	Communication					
	Arrival Introduction	X	X			
	Communications Issues	X	X			
	Meetings	X	X			
	Working with Site Personnel	X	X			
	Dealing with Difficult People	X	X			
Chapter 10	Documentation					
	Objectives	X	X			
	Note Taking	X	X			
	Photos and Videos	X	X			
	Reporting	X	X			

	Corrective Actions	X	X			
	Site Drawing (Map) Management	X	X			
	Inspector Support Equipment	X	X			
	Compliance Resolution	X	X			
	Enforcement Action	X	X			
Chapter 11	Inspection Duties					
	The Role of the Inspector	X				
	Good Inspector Skills	X	X			
	Pre-construction Process	X	X			
	Inspection Objective	X	X			
	The Inspection Process	X	X			
Chapter 12	Plan Management					
	Erosion and Sediment Control Plans for Construction or Industrial/Multi-Sector Permits or MS4 Program	X	X			
	Certification	X				
	Notice of Intent for Construction, Industrial/Multi-Sector or MS4 Permits	X				
	Summary of Construction, Industrial, Post-Construction Plans	X				
	Project/Site Information for Construction or Industrial/Multi-Sector Permits	X				
	Narrative	X				
	Maps and Plans	X	X		X	need to create photo questions
	Drawings and Maps	X	X		X	need to create photo questions
	Legend	X	X		X	need to create photo questions

	North Arrow	X				
	Vicinity Map	X				
	Specifications and Details	X	X		X	need to create photo questions
	Existing Conditions for Construction Permit	X				
	Scheduling of Construction Activities for Construction	X	X			
	Areas of the Project to Be Disturbed for Construction ` Permits or other NPDES Permits	X	X			
	Soils for Construction Permits	X				
	Topography	X	X			
	Elevation and Slope	X	X			
	Slope Measurements	X	X	X	X	need to create photo questions
	Direction of Sheet Flow	X	X			
	Receiving waters for Construction, Industrial/Multi-Sector, and Ms4 Permits I	X	X			
	Environmental Assessment for Construction Permit Endangered Species	X	X			
	Pollutants of Concern for Construction, Industrial, or Post Construction MS4 Permits	X				
	Management Practices for Construction, Industrial/Multi-Sector, Post-Construction, or MS4 Permits	X	X		X	develop written scenerio
	Amendments	X				
	Inspections for Construction, Industrial, or Post-Construction MS4 Permits	X	X		X	develop written scenerio
	Monitoring/Sampling and Analysis for Construction or Industrial/Multi-Sector Permits or MS4 Inspections	X	X		X	develop written scenerio

	Spill Prevention, Controls and Cleanup (Construction, Industrial, Post-Construction and MS4 Permits)	X	X		X	develop written scenerio
	Termination of Coverage (Construction, Industrial/Multi-Sector Permits)	X				
	Total Site Area	X	X			
	Other Plan Features	X	X			
	Drainage Channels and Swales	X	X		X	develop written scenerio
	Detention/Retention Facilities and Associated Stormwater Structures and Conveyance	X	X		X	develop written scenerio
	Building Pads and Other Foundations	X	X			
	Roads	X	X			
Chapter 13	Management Practices					
	Site Planning and Management	X	X		X	need to create photo questions or written scenerio
	Erosion Controls	X	X		X	need to create photo questions or written scenerio
	Sediment Controls	X	X		X	need to create photo questions or written scenerio
	Runoff Controls	X	X		X	need to create photo questions or written scenerio
	Good Housekeeping/Materials Management	X	X		X	need to create photo questions or written scenerio
	Post-Construction Management	X	X		X	need to create photo questions or written scenerio

Chapter 14	Rules and Regulations - PART A EXAM					
	Federal Regulations	X				
Appendix A	Glossary of Terms	X				
Appendix B	Sample Inspection Report	X				
Appendix C	Erosion and Sedimentation	X	X			
Appendix E	Code of Ethics and Professional Conduct - PART A EXAM					
	Professional Standards Policy 6013 – Code of Ethics and Professional Conduct (including actual COEPC)	X				