



## Maple Ridge Erosion & Sediment Control Plan Checklist

Development applications will require an Erosion and Sediment Control (ESC) Plan as per the requirements of the Watercourse Protection Bylaw 6410 – 2006. See Attached Checklists for Consultants on municipal standards and guidelines. Developers and their consultants must sign off and submit the following documents to the Planning and Engineering Departments.

An ESC plan must include the following information:

1. Erosion and Sediment Control (ESC) Plans that indicate the method to be used to prevent the release of sediment into any ravine, watercourse or storm sewer. (See Attached Example Map) Plans must include the location and description of the following:
  - Existing contours (1 metre) and watercourses, wetlands, or pond features.
  - Proposed post development drainage flows.
  - Sediment control ponds and stormwater detention facilities
  - Outfalls and proposed infiltration areas
  - Gravel pads and wheel wash facilities at access points,
  - Placement and location of silt fences,
  - Soil stockpile areas (to be away from roads, sediment controls, and infiltration areas),
  - Perimeter and infiltration ditches,
  - Watercourse setback area boundary and natural feature or tree retention setback areas.
  - Temporary protective fencing around infiltration areas and protected features.
  
2. Developers and their consultants must sign off and submit the following documents as part of the engineering design drawings to the Planning and Engineering Departments:
  - a. Schedules A, D and E of the Watercourse Protection Bylaw 6410-2006 signed off by both the environmental monitor and developer for Erosion and Sediment Control Plans.
  - b. ESC plan signed off by both the Engineer of record as well as the Environmental monitor
  - c. Stormwater Management Plan signed by engineer of record which includes a letter of assurance for the following:
    - The site incorporates site source controls for infiltration and exfiltration where possible in accordance with current Provincial and GVRD stormwater management standards; and
    - The final Erosion Sediment Control Plan will meet DFO stormwater management standards for water quality, quantity, and velocity.
  
3. A performance security for environmental protection will need to be submitted to the District in the amount specified under the Watercourse Protection Bylaw 6410 – 2006 or as part of the letter of credit under the Servicing Agreement. In addition, an application fee of \$500.00 is required.
  
4. A preliminary and final inspection of the site by the environmental monitor with a letter of assurance that the developer has met the requirements of the Watercourse Protection Bylaw and ESC Plan must be submitted to the Planning and Engineering Dept. before clearing begins on site and at the end of the development construction before the security deposit is released.

The following items are required by the District and must be submitted to Planning & Engineering:

1. Calculations for sizing of erosion and sediment control facilities or stormwater management facilities such as detention or bio-filtration ponds. The District encourages designs that blend in well with the natural environment. Where possible slopes should be less than 4:1. See current DFO guidelines and Best Management Practices on urban stormwater design guidelines. Maximize site source controls using infiltration or exfiltration techniques where appropriate and attempt to minimize impervious surfaces.
2. Calculations demonstrating compliance with the Provincial three tier stormwater management. (See Attachment C) A stormwater management plan that utilizes Provincial and GVRD site source control standards must be used where possible as per the requirements of the Watercourse Protection Bylaw 6410-2006.
3. For large scale or multi phase developments, the District may require the Developer and the consultants of record to carry out Post Construction Environmental Monitoring Duties during the Development Maintenance Period. This is to help determine the adequacy of the proposed facilities.

## **Attachment A. Site Preparation Checklist For Environmental Monitors**

- Provide temporary protective fencing during construction around conservation areas, proposed infiltration areas, and root zones of trees or vegetation that is to be retained.
- Ensure effective erosion control practices are in place before and during the construction period. If erosion or sedimentation issues become a concern, adapt appropriate mitigation measures and inform the District if problems persist.
- Do not expect to use existing municipal facilities or designated park areas for placement of facilities.
- Do not compact soil layers in proposed infiltration areas. Ensure heavy machinery and outfall waters bypass the proposed infiltration areas during construction where possible.
- Do not place erosion control sediment traps in infiltration areas unless absolutely necessary. Build erosion control sediment traps above or around infiltration areas.
- Protect exposed soils, stockpile areas or exposed slopes with temporary cover of plastic or other mechanisms that will mitigate erosion or runoff especially in rain periods or shutdown periods.
- consider staging infiltration area excavation and import organic soils after all adjacent construction is complete. Building trades will likely disturb and compact the native surface soils, but when these soils are removed for the final infiltration facility construction, the compaction will also be removed.
- No large scale clearing. Ensure phasing of development activity includes minimizing disturbance to vegetation and soils. Clear only road and utility corridors during early stages of subdivision, leaving the development parcels vegetated for as long as possible.
- Unvegetated areas on slopes > 15% must be covered up or stabilized at all times during the rainy periods. Where a surface crust has occurred from heavy rainfall, the area must be scarified prior to adding additional layers or opening for infiltration use.
- Consider the import and cultivation of fill and organic matter for establishing infiltration and exfiltration areas where possible. For slopes > 15%, a geotechnical assessment is required to determine appropriate drainage mitigation measures.
- Regular maintenance and monitoring of site source controls and sedimentation facilities is required. Ensure temporary protective fencing, site cleanup, and regular street sweeping of roads as a part of the environmental monitoring requirements.

## Attachment B. Checklist For Developers and Professional Consultants

### 1. Phasing and Scheduling

The Watercourse Protection Bylaw 6410-2006 requires developers and large scale builders to comply with the following standards, guidelines, and practices:

- **Timing of development activity and inventories during suitable periods.** Encourage development activity between June and September. Bio-physical inventories need to be carried out at an appropriate time of year.
- **Leave existing vegetation in place during the planning and approvals stages.** Pre-clearing vegetation results in increased costs for temporary revegetation and erosion control, at the same time as increasing runoff and sedimentation unnecessarily.
- **Clear the site in stages as development proceeds.** For instance, for larger developments, clear only road and utility corridors during each phase of subdivision, leaving the development parcels vegetated for as long as possible.
- **Identify areas where vegetation can permanently remain in the development.** These may be areas of steep slope, stream riparian or wetland areas, wildlife or greenway corridors, specimen trees or other site areas with site constraints.
- **Protect tree retention areas, root zones, and infiltration areas during construction.** It is critical to their stormwater performance that these areas not be disturbed or compacted by equipment or storage during construction. Temporary fencing is likely required.
- **Phased construction schedule and grading plan** should be prepared for each of the following development phases that demonstrate maximum retention of vegetation:
  - Clearing and grubbing;
  - Servicing works;
  - Construction of buildings.
- **Slopes and soils must be stabilized and re-planting of all bare or sparsely vegetated areas within a watercourse protection or natural features development permit area.** The slope stabilization and re-vegetation plan must be prepared by a qualified environmental consultant. Soil stabilization and re-planting is also required for the following:
  - Interim periods where development is not active for longer than 30 days;
  - Where construction activity has destroyed vegetation outside the developable area on slopes > 15%;
  - Encroachment into conservation or riparian protected areas.
- **Coordination of professional consultants and their recommendations.** This includes coordination of assessments and recommendations from the following:
  - Environmental consultants and professional engineers;
  - Developers, architects, and landscape architects;
  - Specialized professionals that are required i.e.geotechnical professionals, hydrologists, arborists, etc.

## Attachment C: Checklist for Professional Engineer

The 3 Tier Approach is found in the Ministry of Water, Land and Air Protection's Stormwater Planning Guidebook for British Columbia.

These three rainfall Tiers correspond to three components of the integrated strategy for managing the sites complete spectrum of rainfall events; rainfall capture (**source control**), runoff control (**detention**), and flood risk management (**contain and convey**).

Tier One (A) Events are first flush events that are typically less than 50% of the mean annual rainfall. These represent about 90% of all rainfall. These events should be captured at source to reduce runoff volume and provide rainfall capture. Tier Two (B) Events are larger rainfall events that are greater than half the size of the mean annual rainfall. These represent about 10% of the rainfall. Typically these events are to be managed through detention in concert with infiltration and exfiltration. Tier Three (C) Events are the extreme rainfall events that may or may not occur in any given year. These are the traditional subsurface pipe approaches. These type three events need to meet municipal requirements and typically need to meet the 100 year storm criteria in order to prevent threats to public safety or property.

### Calculations for Three Tier Approach

**TIER A (50% of Mean Annual Rainfall (MAR) Event = . mm**

- i.e: Permeable pavers: rainfall capture in parking areas etc....
- i.e.: Community gardens: lower road runoff capture in community gardens soils
- i.e.: Surface soil recharge: any release from any buildings? Drainage sumps etc.

**TIER B (infiltration/exfiltration for heavier events & 50% MAR) = mm**

- i.e:Detention fields: detention in drainage rock detention fields? Low flow outlet sized to post development runoff to predevelopment levels?
- i.e: detention fields / ponds?

**TIER C (10yr / 100yr storm event)**

- Connection to municipal storm system? All discharged to \_\_\_\_\_ Creek?  
MAR Measured at AES Station.....\_\_\_\_\_?

### TIER A

**State Facility (sediment pond, biofiltration field etc. )**

Total Catchment Area:.....

**Objective: Capture 50% of the MAR (non storm events)**

50% of MAR = .....

Runoff Area for Infiltration = .....

Total Rainfall from Impermeable Area = .....

Total Rainfall to Infiltrated = .....

**Storage in Sand Field:**

Surface Area = .....  
Average Depth = .....  
Average Porosity = .....  
Sand Storage = .....  
Infiltration from lawns etc = .....  
Infiltration required = .....  
Excess rainfall conveyed to stream = .....

**TIER B (Infiltration and Exfiltration)**

**State Facility (sediment pond, sandcells, biofiltration field etc.)**

Total Lot Area ..... m2  
Total Impervious Areas ..... m2  
Total Pervious Areas ..... m2

**Predevelopment**

Catchment Area ..... m2  
Predevelopment runoff coefficient (c).....  
Rainfall intensity (I)  
Predevelopment toc ..... min  
From Maple Ridge IDF Curve...  
    2yr rainfall intensity ..... mm/hr

Predevelopment peak flow (Q=CIA)..... l/s

**Post development**

Catchment Area ..... m2  
Weighted average from impervious and pervious areas  
Impervious runoff coefficient..... for X m2

Pervious runoff coefficient..... for X m2  
Post development runoff coefficient (c) = ..... for X m2

Rainfall Intensity (I)  
Postdevelopment toc..... min  
From Maple Ridge IDF Curve...  
    2yr intensity..... mm/hr  
Postdevelopment peak flow (Q=CIA)..... l/s

**Objective: Capture 50% of the MAR storm events and heavier rainfalls**

50% of MAR = .....  
Runoff Area for Infiltration = .....  
Total Rainfall from Impermeable Area = .....  
  
Total Rainfall to be Infiltrated = .....

**Storage in Sand Field:**

Surface Area = .....  
 Average Depth = .....  
 Average Porosity = .....  
 Sand Storage = .....  
 Infiltration from lawns etc = .....  
 Infiltration required = .....  
 Excess rainfall conveyed to stream = .....

Table 1. Required Storage to limit 10yr predevelopment level  
 Modified rational method”

Rainfall duration (min)	Intensity (mm/hr)	Peak flow (l/s)	Max release rate	Required Storage (m3)
20				
30				
60				
120				
240				
480				

Peak Storage Req. = ..... m3

Peak Detention Outflow = ..... l/s

**TIER C (Storm Events)**

**Tier 3**

Main Trunk line needs to be size to municipal standards.

No exfiltration generally required.

Transfer water offsite to municipal drainage facilities.

Energy dissipation requirements?

## PRELIMINARY LETTER OF INSPECTION

### Basic Requirements for Environmental Consultant of Record

1. **Contact Information and Coordination of Monitors.** It is a requirement of the Watercourse Protection Bylaw to have contact information readily available on site for the environmental monitor(s) for developers and builders. Failure to do so can result in tickets, fines, or stop work orders. If builders hire an independent environmental monitor for their lots, they should still be working in coordination with the existing ESC plans and monitor that is working for the developer's site. <sup>1</sup>
  2. **ESC plans require Site Source Controls.** These controls are required up front before construction begins and will be implemented in a phased approach where possible to maximize retention of vegetation on site. It is cheaper and more effective to focus on site source controls rather than end of the pipe solutions for developers and builders.  
  
Site source controls and ESCP plans should demonstrate due diligence or else full requirements associated with monitoring by the QEP will be required.<sup>2</sup>
  3. **Monitoring inspections and reports** need to be submitted twice a month during rainy season of October 15 to May 15 by email to the Municipal environmental technicians unless performance targets are not being met in which case more frequent reports are required. Recommendations and mitigation required to encourage work during dry seasons, or additional site stabilization efforts and monitoring are required during rainy periods.
  4. **Communications** with Municipal environmental technicians through both phone message and email with details after infraction(s) still occurring after 24 hours. Communication is also required with site supervisors and contracts on what their responsibilities are since everyone on site is accountable and can be ticketed, fined, or charged by Federal Fisheries and Oceans for infractions related to release or contribution of deleterious substances as well as by municipal employees.
  5. **Letters of assurance** by monitors that must be submitted to the District's Environmental technicians for pre-development and post development inspection of a site. Consultants must ensure adequate design and implementation of controls on site before construction activity commences. A final inspection and letter of acceptance to ensure proper cleanup and decommissioning supervised by the Monitor at the end of the site servicing and building phases to get ESC security deposits back.
- 
1. **Monitors have a responsibility to remind the developer that any new builders or contractors on site need to respect the existing ESC plans and monitoring of the developer as infractions still fall under the responsibility of the developer until final letter of acceptance has been issued by the Engineering Dept. In some cases, a security bond is held by the developer to ensure all builders are going to be cooperative.**
  2. **Failure to demonstrate adequate site source controls will require daily monitoring by QEP's in accordance with the Bylaw. Failure to comply with these requirements may result in ticketing, stop work orders, use of the security deposit by the District, and potential removal of the professional consultants name from the District's list of acceptable qualified ESC monitors.**



## Preliminary Letter of Inspection and Approval For WPDP/NFDP Works

Submit this Letter To: District of Maple Ridge

Environmental Monitor of Record: \_\_\_\_\_  
(insert name and company of QEP monitor)

RE: **Inspection For Development or Building Premises located at**

\_\_\_\_\_  
(insert address)

The environmental professional of record signing this form is the designated environmental monitor of record for this site.

The QEP or their official designate has completed an inspection of the Premises on the following date of \_\_\_\_\_ (provide date of inspection)

In accordance with the Watercourse Protection Bylaw, a preliminary letter of inspection and assurance from the Qualified Environmental Professional is required to be submitted to the District's Engineering Department and to the District's Environmental Section before any clearing or disturbance takes place in accordance with the District's Watercourse Protection Bylaw.

This letter of assurance provides confirmation that the qualified environmental professional has carried out the following duties to ensure the required protection and mitigation measures are in place and operational:

### **General Site Protection and Landscape Management Standards**

- Carefully surveyed the site prior to any disturbance to ensure accurate location for protection mitigation around protected areas and significant vegetation or natural features that need to be protected including watercourses, wetlands, ponds, root protection zones for protected tree stands, bluffs, geotechnical setback areas, active floodplain areas, steep slopes > 25%, and municipal trails. Temporary snow fencing should be installed and in place to ensure features are protected.
- Appropriate site source mitigation measures are in place for Erosion control and they are operational before any disturbance or construction takes place.
- The timing of construction and disturbance does not conflict with critical bird nesting periods, and the proposed works will cease during heavy rain periods. If not, please provide justification and approvals.
- Phasing of works to ensure minimal disturbance and clearing where possible to building lots, soils and vegetation on steep slopes > 15%, especially on larger development sites.
- Ensure hazard mitigation and drainage mitigation is in place and operational before disturbance occurs. Ensure there is no conflict with neighbouring properties, other applicable legislation, municipal regulations, or building code.

**Environmental Consultant of Record**

The undersigned professional may be contacted at: \_\_\_\_\_ (insert business telephone number or best contact number).

CERTIFIED AS OF \_\_\_\_\_(date)

(Print name of environmental monitor and company)

\_\_\_\_\_  
Authorized Environmental Monitor Signature

## Basic Requirements for Environmental Consultant of Record

- 1. Contact Information and Coordination of Monitors.** It is a requirement of the Watercourse Protection Bylaw to have contact information readily available on site for the environmental monitor(s) for developers and builders. Failure to do so can result in tickets, fines, or stop work orders. If builders hire an independent environmental monitor for their lots, they should still be working in coordination with the existing ESC plans and monitor that is working for the developer's site. <sup>1</sup>
  - 2. ESC plans require Site Source Controls.** These controls are required up front before construction begins and will be implemented in a phased approach where possible to maximize retention of vegetation on site. It is cheaper and more effective to focus on site source controls rather than end of the pipe solutions for developers and builders.  
  
Site source controls and ESCP plans should demonstrate due diligence or else full requirements associated with monitoring by the QEP will be required.<sup>2</sup>
  - 3. Monitoring inspections and reports** need to be submitted twice a month during rainy season of October 15 to May 15 by email to the Municipal environmental technicians unless performance targets are not being met in which case more frequent reports are required. Recommendations and mitigation required to encourage work during dry seasons, or additional site stabilization efforts and monitoring are required during rainy periods.
  - 4. Communications** with Municipal environmental technicians through both phone message and email with details after infraction(s) still occurring after 24 hours. Communication is also required with site supervisors and contracts on what their responsibilities are since everyone on site is accountable and can be ticketed, fined, or charged by Federal Fisheries and Oceans for infractions related to release or contribution of deleterious substances as well as by municipal employees.
  - 5. Letters of assurance** by monitors that must be submitted to the District's Environmental technicians for pre-development and post development inspection of a site. Consultants must ensure adequate design and implementation of controls on site before construction activity commences. A final inspection and letter of acceptance to ensure proper cleanup and decommissioning supervised by the Monitor at the end of the site servicing and building phases to get ESC security deposits back.
- 
- 1. Monitors have a responsibility to remind the developer that any new builders or contractors on site need to respect the existing ESC plans and monitoring of the developer as infractions still fall under the responsibility of the developer until final letter of acceptance has been issued by the Engineering Dept. In some cases, a security bond is held by the developer to ensure all builders are going to be cooperative.**
  - 2. Failure to demonstrate adequate site source controls will require daily monitoring by QEP's in accordance with the Bylaw. Failure to comply with these requirements may result in ticketing, stop work orders, use of the security deposit by the District, and potential removal of the professional consultants name from the District's list of acceptable qualified ESC monitors.**

## Letter of Final Inspection and Approval For ESC Plans

Submit this Letter To: District of Maple Ridge

Environmental Monitor of Record: \_\_\_\_\_  
(insert name and company of QEP monitor)

RE: **Final Inspection For Development or Building Premises located at**

\_\_\_\_\_  
(insert address)

This is to certify that in accordance with the requirements of the Watercourse Protection Bylaw 6410-2006, listed under

- Schedule "A" ESC Plan for developments and large scale BP applications; or
- Schedule "C" for small scale BP applications (section 15),

The qualified environmental professional (QEP) identified of record has inspected the site and provides the following assurances to the District of Maple Ridge:

1. The environmental professional of record signing this form has been the designated environmental monitor of record for this site.
2. The QEP or their official designate has completed an inspection of the Premises on the following date of \_\_\_\_\_  
(provide date of inspection)
3. The QEP has remediated the premises in accordance with the applicable Watercourse Protection Bylaw (Schedule A, B, or Schedule C). This includes:
  - Clean up, grading, and stabilization of all disturbed or exposed soil areas on site that still belong to the developer and within adjacent park conservation areas in accordance with District standards;
  - Removal of all temporary ESC control devices, garbage, or construction debris on site that belongs to developer or within adjacent park or watercourse setback areas unless specified otherwise by the District of Maple Ridge;
  - Decommissioning of any temporary erosion and sediment control facilities should include final water quality report on outfalls, bypass of drainage that meets water quality standards from pond into storm system where required, pumping of sediment and sediment laden water into pumper truck, appropriate infill of ponds to specifications of geotechnical engineer and cleanup of area.
  - For builders, completion of all required surface treatments and landscaping requirements as outlined in the attached District of Maple Ridge site treatment and landscape management standards.
  - The stormwater and rainwater facilities and controls are operational & comply with DFO and municipal standards. The signature of the Engineer of Record is required for this.

**Environmental Consultant of Record**

The undersigned professional may be contacted at: \_\_\_\_\_ (insert business telephone number or best contact number).

CERTIFIED AS OF \_\_\_\_\_(date)

(Print name of environmental monitor and company)

\_\_\_\_\_

Authorized Environmental Monitor Signature

**Engineer of Record**

The undersigned professional may be contacted at: \_\_\_\_\_ (insert business telephone number or best contact number).

CERTIFIED AS OF \_\_\_\_\_(date)

(Print name of engineering professional and company)

\_\_\_\_\_

Authorized Engineer's Signature

## **ATTACHMENT ONE FINAL SITE TREATMENT FOR BUILDERS AND THEIR QEP's.**

As per requirements of the Watercourse Protection Bylaw, contractors and their environmental monitors are responsible for providing assurances that landscaping, site stabilization, and cleanup has been completed.

For construction of single family dwellings and large scale building applications, a final inspection of the lot and a signed letter is required by the designated Environmental Monitor to ensure the developer or builder has successfully completed the ESC plan requirements including the proper disposal of any construction or waste materials and stabilization of any exposed or disturbed soils.

The signed letter must be provided to the District prior to inspectors conducting their final building inspection and prior to the return of the environmental security deposit.

### **Objectives**

- To protect the ecology and natural features of the site – including topography, watercourses, soils, vegetation – from damage during the construction process.
- To control erosion and particulate matter and reduce negative impacts on water and air quality.
- Create a low maintenance, resource efficient and effective landscape strategy.

### **General Site Protection and Landscape Management Standards**

- Carefully survey the site prior to building and identify protected areas and significant vegetation or natural features to be retained where required by the District. Identify protection specifications (i.e. fencing type, signage) and implement before any construction takes place. The survey is to be provided by the environmental monitor of record for the site.
- Where possible, retain and protect all significant trees, vegetation, and natural features on the site such as wetlands or rock bluffs. Preserve natural slopes and the existing direction of water flow across the site. Ensure there is no conflict with neighbouring properties, other applicable by-laws, or building code.
- Work with qualified landscapers, certified landscape architects, or qualified environmental professionals to provide adequate surface treatments for re-planting and select native plant species for site restoration and landscaping. The soil stabilization and replanting plans should be included as part of the ESC plans to be submitted as part of the building permit application.
- Work and comply with the District of Maple Ridge Soil Surface Treatment standards handout (see attached standards).

## Soil Surface Treatments Standards and Guidelines

- All materials, labour and plant installation shall be conducted in accordance with the BC Landscape Standard jointly produced by the BC Society of Landscape Architects and the BC Nursery Trades Association.
- All debris and / or excess materials from landscape operations shall be collected and disposed of in accordance with all regulatory requirements.
- All soils to be used as part of the riparian landscaping shall comply with the BC Nursery Association landscape standards.
- Depth and types of soils and topsoils to be used will be dependant on the condition of native soils on site, geotechnical considerations, slopes and professional considerations.

To restore soil conditions on a site back to a respectable condition, basic surface treatments have to be carried out by the builder before sod or final planting is carried out. To prepare front yards and back yards for final building inspection, landscaping requirements must meet District minimal landscape and surface treatment requirements.

### District of Maple Ridge Landscape and Surface Treatment Requirements

1. **Grading.** Water must flow away from footings and foundations. The slopes on site and surrounding the structure should be designed and graded so drainage flows are away from the house structure and must respect neighboring properties as well as other applicable bylaws.
2. **Drainage.** For drainage purposes, a minimum of three to six (3-6) inches of coarse sand or sandy loam soils are to be placed on exposed, disturbed, or compacted areas to allow for adequate drainage, especially where existing soils on site are compacted or consist mostly of clays. The soil surface should be relatively dry when the sand or sandy loam layer is placed.
3. **Topsoil.** A minimum of six to eight inches of appropriate topsoil should be placed above the sand or sandy loam layer to support re-planting and slope stabilization. This should be completed for both back yards as well as front yard areas. The topsoil depth will depend on soil quality. The better the soil, the less depth required. Topsoil should be seeded or sodded where soils are exposed. For disturbed areas that require re-planting of trees or riparian areas that are to be enhanced and replanted, additional top soil may be required as determined by the Environmental Professional of record for the site.
4. **Site stability.** For sites that require geotechnical assistance, the professional engineer of record must be consulted by the landscaper or environmental professional to ensure surface treatments will not compromise the integrity of the slopes.

### Additional Resources

- *BC Landscape Standards* 6<sup>th</sup> edition. BC Landscape Nursery Association
- Native Plant Society of British Columbia <http://www.npsbc.org/index.htm>
- *Natural Lawn Care*. Greater Vancouver Regional District 2000