CITY OF SURREY

Engineering Department

Erosion and Sediment Control
(ESC) By-law No: 16138

SURREY
CITY OF PARKS

Monitoring and Reporting Requirements

For ESC Permitted Sites

April 2007

This document is an addendum to the City of Surrey Erosion and Sediment Control (ESC) By-law No 16138, March 2007. The requirements presented hereafter specify the inspecting, monitoring and reporting standards for use by ESC Supervisors on permitted construction sites located within the City.

These monitoring and reporting requirements will be revised and updated as new information warrants change.

Please forward inquiries concerning these requirements to:

City of Surrey
Engineering Department
Drainage and Environment Section
14245 – 56th Avenue
Surrey, V3X 3A2

Or:

escbylaw@surrey.ca

CONTENTS

1.0 INTRODUCTION

The use of best management practices (BMP's) to control sediment and erosion on construction sites is intended to reduce, and if possible, eliminate the export of sediment-laden water into the City's stormwater system. In order for sediment and erosion controls to be effective they need to be appropriately designed, implemented, inspected and maintained.

Poor BMP performance or failure not only stems from design considerations, but is more frequently a result of poor installation, inspection, and maintenance practices.

As part of the ESC By-law, sites that require an ESC permit are obligated to implement an inspection and maintenance program to ensure that planned ESC facilities can meet the design and treatment performance requirements. In addition, ESC monitoring and reporting on all sites will ensure equal standards are applied and that problems can be identified and addressed within appropriate timeframes to limit damage to the City's drainage network.

The requirements outlined in this document are intended to assist ESC Supervisors with site assessment activities to ensure the requirements of the By-law are achieved.

It is the ultimate responsibility of the developer/property owner to ensure that the site is in compliance with the By-law. The ESC Supervisor must immediately notify the City of any infraction against the By-law and the provisions of the sites ESC Permit.

2.0 BY-LAW REQUIREMENTS

The following document specifies the monitoring and reporting requirements for ESC Permitted sites under the ESC By-law. The requirements specified herein are pertinent to sections 18 & 19 under Part V, *"Monitoring and Reporting"*; and Schedule *"C"*.

Section 18. *"The ESC Supervisor is responsible for inspecting and monitoring the ESC Facilities including reporting requirements as set out hereto in Schedule "C" and the approved ESC Plan"*.

Section 19 *"The ESC Supervisor is responsible for immediately notifying the City of termination or when an infraction occurs pursuant to this By-law or ESC Permit."*

Schedule "C" Details of the Inspection, Monitoring, and Reporting Requirements of the ESC Supervisor.

These requirements contained in this document are considered a minimum for all ESC permitted construction sites within the City of Surrey.

2.1 ESC SUPERVISOR

In accordance with the sections mentioned above, the ESC Supervisor specified in Schedule "A" and "D" as part of the issuance of an ESC permit is defined by the Bylaw as:

> *" An engineer, biologist, geoscientist, applied scientist, or technologist who is registered and in good standing in British Columbia with a professional organization constituted under an Act, acting under the association's code of ethics and subject to disciplinary action by that association…*"

While the ESC Supervisor is the primary person responsible for site inspections, monitoring and reporting, a **suitably qualified individual** under the direction of the ESC Supervisor can act on their behalf conducting the site monitoring and inspection. The ESC Supervisor must, however, signoff on all correspondence with the City of Surrey and be ultimately responsible to identify and address ESC issues as they arise.

2.2 SITE DISCHARGE REQUIREMENTS

Part 2 Section 1 of the By-law specifies that there is to be no discharge of sediment-laden water from construction sites greater than 75mg/L of Total Suspended Solids (TSS).

In-situ field sampling of site discharge is to be conducted using turbidity readings in Nephelometric Turbidity Units (NTU's). NTU results can be obtained in the field using hand held meters and are to be used for initial reporting and as a trigger for the collection of samples for the analysis of discharge TSS loading (refer to section 4.2).

3.0 DELINEATION OF RESPONSIBILITY

3.1 ESC SUPERVISOR'S RESPONSIBILITY ON ESC PERMITTED SITES

The ESC Supervisor is retained by the Developer/Owner to monitor, advise, and report on the sites ESC performance as identified in Section 2.0 above.

The primary duties of the ESC Supervisor are:

- Review the proposed ESC Plan, signing off on the validity of the proposed ESC concept to adequately address expected issues on-site,
- Monitor to ensure ESC facilities are implemented according to the ESC Plan; particularly at the commencement of clearing and grubbing,
- Liaise with the clearing and grubbing contractor to sign off on ESC measures prior to leaving the site,
- Conduct site inspections as needed in accordance with this document and on-site construction scheduling to ensure measures are implemented and maintained appropriately;
- Submit site reports to the City in accordance with section 5.0 of this document
- Advise the Engineer of Record/Owner of any ESC deficiencies or actions required to be implemented to adapt to changing site conditions or unforeseen problems that arise regarding erosion and sediment control,
- Co-ordinate the removal of ESC measures with site operations,
- Monitor the parameters identified in section 4.0 of this document, and
- Immediately notify the City of termination or when an infraction occurs pursuant to the By-law or ESC Permit.

It is the sole responsibility of the Owner/Developer under *Section 17* of the By-law to ensure that all ESC Facilities are implemented and maintained appropriately, and that site discharge limits are in accordance with the limits specified in *Section 1* of the By-law.

3.2 SUBSTANTIAL COMPLETION OF RESIDENTIAL SUBDIVISIONS & ESC PERMIT'S

The ESC Supervisor's responsibility is clear on larger lot developments where the onus of responsibility over the contractors is on the ESC Permit holder. On multi lot sub-divisions (generally the creation of residential zonings RF, RC, and RH) where lot ownership is transferred to the homebuilder, the ESC Supervisors responsibilities are not immediately clear.

Under the By-law, owners/homebuilders on sites under 2000m^2 are responsible to implement appropriate measures in accordance with Schedule "B" to control sediment-laden water from discharging into the drainage system during construction.

The ESC Permit remains effective until substantial completion[1] of all construction within the original extent of the permit at the time of issuance. The permit holder will be held accountable for overall site discharge, common property (i.e. roadways, catch basins, park boundaries, drainage measures etc), and remaining undeveloped lots until substantial completion.

As with existing damage bonds held as part of the sales agreement between the developer and builders, a similar bond for erosion and sediment control should be held by the developer to address incidences where due diligence is not exercised by the builder. For example these bonds could be used in cases where builders have not cleaned the streets, CB's are not maintained or fines have been issued in association with a breach of discharge.

The ESC supervisor's responsibility extends to the interests of the developer as specified above. They should continue to monitor any ESC facilities that remain in place. Any decommissioning of ESC facilities is required to be done in a manner that does not result in the discharge of sediment-laden water to the City's drainage network. The ESC Supervisor should monitor facility decommissioning and sign off on removal indicating that it's no longer required.

The ESC Supervisor must notify the City if the activity of builders results in a detrimental impact on areas under their responsibility or results in the site's discharge exceeding the specified allowable limit. The developer should take action using the bonds to implement appropriate works to mitigate potential impacts as required.

[1] "Substantial Completion" means the stage of construction at which a minimum of 90% of construction (including landscaping) is complete and the land is ready, or is being used for the purpose intended.

4.0 MONITORING AND INSPECTION

As outlined in Section 2.0, the ESC By-law requires permitted sites to undertake regular site inspections and monitoring. The installation of erosion and sediment control BMP facilities alone isn't sufficient to meet the requirements of the permit. To ensure that prescribed BMP's remain effective, regular inspections and maintenance must be conducted during construction, post construction maintenance periods, and through to substantial completion. Substantial completion is defined as the point at which a minimum of 90% of the land use is ready (including landscaping) or being used for the purpose intended.

Ideally, site monitoring should incorporate daily visual checks by the Site Supervisor or Engineer of Record. Site inspections should target critical areas on and off the site and should include:

- All disturbed areas,
- Soil stockpiles,
- Vehicle entry/exit points,
- All erosion and sediment control facilities,
- Storm water conveyance measures,
- Points of storm water discharge from the site (overland and piped flows), and
- Receiving waters within 50m of the site.

Between the specified monitoring periods, it is the responsibility of contractors on site to avoid interfering with ESC devices and facilities, repairing them as required. The Site Supervisor/Engineer of Record should conduct routine visual checks to ensure that the specified facilities outlined in the ESC plan are installed as specified and functioning accordingly. BMP's must be in good working condition until the up-stream area they manage is sufficiently stabilized so that the control measures are no longer required to protect the downstream drainage system.

Although the By-law requires post event monitoring after significant rainfall, ideally spot checks would be conducted during these events to evaluate BMP performance under storm flow conditions when the likely hood of deficiencies are more prevalent.

This section specifies the frequency and parameters required by the ESC Supervisor in fulfilling the monitoring and inspection requirements of the ESC Permit.

4.1 INSPECTION FREQUENCY

The minimum inspection and reporting requirements for ESC Supervisor for active sites is at least once every 7 days and within 24hrs following significant rainfall events[2]. This inspection frequency can be modified upon agreement in writing between the ESC supervisor and the City of Surrey Drainage and Environment Section dependant on prevailing weather conditions, the level of activity/staging on site, and site performance; as outlined below.

4.1.1 Seasonal variation

During extended dry periods over the summer, generally between late June to early September, inspection frequencies can be reduced to bi-weekly intervals to monitor BMP placement/condition and following significant rainfall events.

4.1.2 Construction status

Inactive sites

Site inspections and reporting can be reduced to bi-weekly intervals or longer upon agreement should the period of inactivity on site be greater than 14 days, adequate treatment measures are in-place, and considering previous site performance.

Any reduction in inspection frequencies as a result of inactivity onsite will require that all BMP's specified under the sites ESC plan are appropriately installed, adequately maintained, and sufficient to render the site protected. Prior to the reduction in monitoring frequency the ESC Supervisor is required to undertake a detailed inspection and signoff on the sites ESC protection level. Site monitoring after significant rainfall events is still required.

Residential staging

Inspection frequencies of permitted sites where lots under 2000m^2 are created can be reduced following the on-maintenance ESC inspection and signoff. At the signoff inspection the ESC supervisor shall advise the City of their intended scheduling. Inspection frequencies should take into consideration weather conditions and remaining ESC measures, site conditions and the Permit holder's duty of care. Monitoring during or after significant rainfall events is still required.

[2] Defined under the ESC By-law as a *"Precipitation event which meets or exceeds the intensity of 25mm of total rainfall depth in a 24 hour period"*

4.1.3 Site condition and performance record

Sites that have a track record for satisfactorily implementing and maintaining ESC measures, as well as remaining in compliance with discharge limits may upon agreement with the City switch to a bi-weekly inspection schedule. Monitoring after significant rainfall events is still required.

4.2 MONITORING PARAMETERS

Schedule "C" of the By-law specifies that the ESC Supervisor be required to monitor the following parameters:

Environmental

- Water Turbidity Levels
- TSS Concentrations
- Receiving waters within 50M of the site (Visual inspection)

ESC Facilities

- ESC Facilities Installation and Condition
- Maintenance and Performance

4.2.1 Environmental Parameters

Turbidity (NTU's)

Water turbidity will be primarily used as an in-situ indicator for the level of sediment concentration within site storm water discharge. Although the correlation between NTUs and TSS is generally strong and well documented, it is also site-specific dependant on the particular characteristics of the catchments being monitored (geology, slope, aspect, soils, vegetation and land use).

Initial site monitoring studies examining the correlation between TSS and NTU within the City of Surrey identified an average relation of 1:1.2 NTU/TSS units. Based on these findings, the trigger value for requiring site discharge to be analyzed for TSS is 65 NTU's. Should continual site monitoring identify on a particular site an alternate NTU value that more accurately reflects a comparative value for 75 mg/L TSS; an agreement in writing with the City maybe possible to set an alternate trigger value.

TSS (mg/L)

As specified above, TSS analysis is required as part of the monitoring process should the in-situ turbidity reach or exceed the trigger point of 65 NTU.

Receiving Waters

Under the By-law any receiving waters within 50 meters of the project site should be visually monitored for signs of impact from storm water discharge from the construction site. Changes in the streambed or any accumulations of sediment deltas or banks should be noted and reported.

For ease of reference and record, photographs should be taken for comparison that reflect the prior stream condition and at intervals that reflect change in construction activities and substantial completion. The photographs should be taken at the same focal point, scale and angle to assist comparison.

4.2.2 BMP Facilities

ESC Facilities Installation and Condition

The ESC Supervisor is required to conduct visual inspections to ensure that all ESC measures are installed in accordance with the approved ESC Plan in a timely manner. The inspections should identify any installation deficiencies that could impair the BMP's performance and notify the Site Supervisor to remedy the deficiency.

Maintenance and Performance

It is the responsibility of the ESC Supervisor to identify any maintenance issues that need addressing where by the efficiency of the BMP is likely to be compromised during the next rain event. Likewise it is up to the discretion of the ESC Supervisor to evaluate whether or not the installed BMP facilities are capable of meeting the ESC requirements of the Permit and see to it that measures are undertaken to mitigate any potential deficiencies in the ESC Plan.

4.2.3 Additional requirements

In addition to the parameters specified within the ESC By-law the following parameters should be monitored under certain conditions. The inclusion of these parameters is to identify and evaluate weather or not there are any undue risks posed to downstream aquatic receiving environments from particular ESC Facilities and treatment measures.

- **PH**

  The PH of site discharge is to be included in the monitoring schedule when either flocculants are used as part of the ESC treatment train or when any de-watering/discharge from site (as either surface or piped flow) has been in contact with raw or curing concrete.

  Acceptable range of PH discharge = 6.5 to 9.03[3]

[3] PH values deemed acceptable for the protection of freshwater aquatic ecosystems as specified within the Canadian Environmental Quality Guidelines, Canadian Council of Ministers of the Environment (CCME), 2002.

- **Water Temperature**

  Between the months of June through to September, water temperature discharge is to be added to the monitoring from open sediment facilities that maintain large volumes of standing water.

  Acceptable limits for temperature discharge = <15°C.

  Temperature avoidance has been document at 15°C with temperatures >24-25°C considered lethal for salmon[4].

The continued inclusion of these parameters will be review following field results and site performance.

4.3 MONITORING EQUIPMENT

Scientific equipment utilized for the monitoring of in-situ turbidity to be conducted using meters that generate a digital read out. The testing of discharge turbidity is to be undertaken using a meter capable of testing NTU either using ISO or USEPA testing standards. The use of a Triton Turbidity Wedge or Secchi Disk is not sufficient to meet the monitoring requirements specified under the By-law.

TSS measurements are to be analyzed by a registered laboratory and all samples are to be accompanied by a chain of custody form that can be made available if required.

Discharge pH monitoring should be conducted using a suitable analytical probe capable of a digital readout. Litmus paper and indicator solutions that require subjective interpretation are not sufficient for monitoring.

4.4 DISCHARGE SAMPLING LOCATIONS

Appropriate sampling locations for assessing site performance should be stipulated in the approved ESC Plan. Monitoring points should appropriately reflect site discharge at the down stream boundary of the site and be independent of drainage ditches that convey off site storm water flows.

Should this not be possible, upstream water quality conditions should be included in the monitoring process as a point of reference and every effort taken to limit the influence of dilution of site discharge leading to biasing of the sites performance.

Should the primary point of discharge be piped flow or there is a potential for storm water flows conveyed off-site as piped flow, then efforts should be undertaken to sample and monitor flows as they leave the site. Should the piped flows be influenced from up-stream catchments then a reference point where the pipe flow enters the site should also be sample to identify background levels.

[4] Fisheries and Oceans Canada Land Development Guidelines for the Protection of Aquatic Habitat (1993).

Should flocculants be used on site as part of the ESC treatment train then a suitable site immediately down stream should be available to monitor the effectiveness of the treatment measure and chemical loading. Flocculant treated stormwater must undergo appropriate filtration prior to discharging from the site and must be monitored.

4.5 ESC REMEDIATION AND PROBLEM RESOLUTION

Any damage or deficiencies identified through site inspections and monitoring are to be mitigated as soon as practical after the inspection but in no case later than 7 days after the inspection. Should the identified deficiency result in significant risk or damage to the receiving drainage system then immediate action should be instigated to rectify the deficiency to an acceptable level until the issue can be safely addressed and the site brought back into compliance.

5.0 REPORTING

The ESC Supervisor is responsible for keeping up to date records of all site inspections, maintenance/installation deficiencies, and remedial recommendations made to the Site Supervisor or Engineer of Record. As part of their obligations under the By-law they are required to immediately notify the City of any infraction against the By-law and the provisions of the ESC Permit.

5.1 REPORT REQUIREMENTS

Reports are required to include the following detail:

- Date and time of inspection
- Project location and ESC permit number
- ESC Supervisor/ contact details
- Details on who conducted the inspection if different from the ESC Supervisor
- Weather Conditions at time of inspection, rainfall totals last 7 days and 24hrs
- Stage of Construction (i.e. bulk earthworks, utility installation, building construction etc)
- General site conditions (refer to Appendix A)
- Inspection details pertaining to ESC facilities addressing installation, maintenance, condition, performance
- Remedial actions required including time frames for the completion of specified works
- Site discharge monitoring parameters including the model of turbidimeter used
- Map of problem areas, areas undergoing active erosion, monitoring locations
- Site personnel/Supervisor details who receive the report
- Sign off by the ESC Supervisor.

Refer to Appendix A for an example of a typical inspection report.

5.2 REPORT SUBMISSION

Following all site inspections the ESC Supervisor is required to submit a copy of the site inspection report to the City of Surrey Engineering Department via either fax or e-mail within 24hrs of the inspection.

Fax:

Report submitted via fax to 604 591 8693

Addressed to: Engineering – Drainage and Environment Section

Titled: ESC Permitted Site Report

Or

E-mail:

Report submitted to escbylaw@surrey.ca

Titled: ESC permit report for ……

Reports submitted via e-mail are required to be in PDF format.

Initial reports are to be submitted with the available NTU data, TSS data, should it be required, must be submitted as soon as it is available with a copy of the lab report. Chain of Custody documents are not required to be submitted as part of the reporting process; however, they must be retained encase they are required at a later date.

6.0 SITE INVESTIGATIONS AND BY-LAW ENFORCEMENT

Designated staff from the City of Surrey's Engineering and By-laws Departments may enter a site in order to carry out random site inspections and collect field samples to validate reports submitted to the City and compliance with the By-law.

Any course of action pertaining to the enforcement of violations committed under the ESC By-law will take into consideration the responsible parties that contributed to the breach and will result in stop work notices or ticketing.

The holder of an ESC permit is ultimately held accountable for the conformance of the site under the By-law while the Permit is active. It is their responsibility to ensure that due diligence is employed to prevent the release of sediment-laden water into the City's drainage network.

Appendix A: Sample Inspection Report

Erosion and Sediment Control Site Inspection Report

SURREY
CITY OF PARKS

Date: _____ (dd/mm/yy)

Time:_____

ESC Permit #: _____

Project Location:_____

ESC Supervisor:_____ Contact #:_____

Company: _____

Inspected by:_____ Position Title:_____

(if different to ECS Supervisor)

Weather Conditions: During Inspection:

Rainfall total (mm) Last 7 days:_____mm Last 24hrs:_____mm

Stage of Construction:

Bulk earthworks ☐ Final grading ☐

Utility Installation ☐ Building const. ☐

Period of Construction Inactivity ☐

	As per ESC Plan (Y/N)	Maintained properly (Y/N)	Problem Occurrence (**I**nitial/**R**epeat)	Description of problem	Remedial Action Required (Specify time period)
Are perimeter controls in place and functioning adequately?					
Are off-site/down stream properties/waterways affected by any site runoff?	N/A	N/A			
Vegetation disturbance limited to necessary areas?					
Has all sediment-laden storm water originating on site been treated prior to discharge?					

Erosion Control Measures – Stockpile protection, vehicle restriction, disturbed area surface protection					
Specify:-					

	As per ESC Plan (Y/N)	Maintained properly (Y/N)	Problem Occurrence (**I**nitial/**R**epeat)	Comments	Remedial Action Required (Specify time period)
Storm Water Conveyance Measures – Swales, Check dams					
Specify:-					

Sediment Control Measures – Sediment/filter fences, CB protection, Site access facility (gravel pad, wheel wash etc)					
Specify:-					
Sediment basins/ ponds - Inlet/outlet structures - Baffles - Exterior fence - Side wall stability - Flocculent application					

	Monitoring location as per ESC Plan	Turbidity In-Situ (ntu)	TSS** (mg/l)	PH	Temp* (^{o}C)
Site Discharge	MP 1 (Basin Discharge)				
	MP 2 (Piped Discharge)				N/A
	MP 3 (Upstream) If applicable		N/A	N/A	N/A
	MP 4 (other) If applicable				

* June through to September only.

** Required if Turbidity ≥ 65 NTU's

NTU meter used:

Attach Site Map showing ESC measures, devices requiring maintenance, Critical areas without protection, areas undergoing rill and gully erosion, monitoring locations.

Inspectors Signature: _____

Copies Forwarded to: