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Erosion and Sediment Control

Inspection Guide

Prepared by:



Prepared for:

The Greater Golden Horseshoe Area
Conservation Authorities
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Preface

This guide is intended for use as a quick reference to aid environmental inspectors in their day-to-day work. It should be used in conjunction with the most recent version of the ***Greater Golden Horseshoe Area Conservation Authorities Erosion and Sediment Control Guideline for Urban Construction***, which must be consulted in determining the appropriate use of erosion and sediment control (ESC) mitigation practices. Guidance in this document is superseded by specific direction from governing agency representatives.

While this document provides guidance on proper installation and inspection of ESC measures commonly used in the industry, practitioners are not limited to the use of these measures alone. The use of other innovative solutions, that have been demonstrated to be effective and approved by the relevant regulatory bodies prior to use, is also encouraged.

Information contained in this guide is applicable to all jurisdictions of the Greater Golden Horseshoe Area (GGHA) conservation authorities. These include:

- Central Lake Ontario Conservation Authority
- Credit Valley Conservation Authority
- Grand River Conservation Authority
- Halton Region Conservation Authority
- Hamilton Conservation Authority
- Lake Simcoe Region Conservation Authority
- Niagara Peninsula Conservation Authority
- Nottawasaga Valley Conservation Authority
- Toronto and Region Conservation Authority

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- Fisheries and Oceans Canada
- City of Vaughan
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**Funding does not constitute endorsement.*



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1.0 Introduction

Your Job as Environmental Inspector

The Greater Golden Horseshoe Area Conservation Authorities Erosion and Sediment Control Guideline for Urban Construction (December 2006) directs you as an Environmental Inspector to:

- understand the erosion and sediment control (hereafter ESC) plan and construction methods;
- inform the ESC plan designer about any changes to the construction phases and schedules;
- recognize the effective application of ESC measures and communicate recommendations with the contractor and appropriate governing agency staff;
- inspect all ESC measures every seven days at a minimum, and before and after all rainfall events and significant snowmelts;
- be aware of the contingency plan and direct use if necessary;
- provide feedback to the contractor;
- keep track of construction phase modifications;
- document site inspections and corrective actions; and
- maintain log books of weekly/event-based inspections.

You are also expected to maintain a good understanding of the site and sensitive features, including pre-construction conditions and expected conditions through all project phases. Attendance at scheduled construction progress meetings is recommended to ensure that you remain up-to-date on construction progress and scheduling changes.

Over and above the inspection of individual ESC measures, you must consider the combined effect of all controls installed on-site, and ensure that there is some redundancy in place to provide backup protection of natural features, even during extreme weather events. The most effective means of achieving this is to apply a multi-barrier approach, which involves the use of a variety of controls in series from source to stream, beginning with erosion prevention. During each inspection, it is important that you evaluate the extent to which a multi-barrier approach is in place and assess the overall impact of construction activities on the natural environment. If you determine that measures in place are

not providing adequate protection, or are likely to be inadequate in the near future (it is your job to recommend a more appropriate substitute and/or installation of additional barriers as needed).

Communication

As inspections are completed, you are responsible for ensuring that the appropriate project team members are updated on inspection outcomes. Notification of inspection outcomes should be provided to the project team and/or governing agencies according to the following four scenarios:

- 1. Inspection completed with no problems found:** Document and notify the contract administrator and the contractor.
- 2. Inspection reveals that maintenance and/or repairs are required:** Document and notify the contract administrator and the contractor, specifying your recommended course of action. The contract administrator may also wish to communicate this information to the developer/landowner.
- 3. Inspection reveals that ESC measures in place are not providing adequate protection:** Document and notify the contract administrator that the ESC plan should be modified, specifying your recommended course of action. Once the ESC plan designer has revised the plan accordingly, the new plan should be sent to governing agencies (e.g., conservation authority and municipality) that granted approvals on the original plan. Approvals on the new plan are not required. The contractor must be notified to implement changes specified in the new plan.
- 4. You discover a spill, or a spill is brought to your attention:** Immediately notify the supervising engineer, contractor and contract administrator. The contract administrator must then notify the Ministry of Environment (MOE) spills action centre, the conservation authority enforcement officer for that geographic area, municipal staff and the landowner/developer. Document the details of the spill and the actions taken. See section 3.0 for more detailed information on spills response.





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Pro-active Audit

Familiarize yourself with the ESC plan and the construction schedule. Understand the staging of the controls at various phases of the project and identify any natural features that will require protection for the project duration.

Where possible, visit the site before there is any activity to see the natural landscape, drainage and sensitive features. Take notes and photographs to document the pre-construction site condition and establish an environmental baseline for future reference.

Permits and Approvals

Ensure that all approvals and permits for construction, including the ESC plan, are in place prior to the start of any on-site works.

Obtain a copy of any relevant permits, approvals or information from the local and regional municipalities, the conservation authority, Fisheries and Oceans Canada, or any other governing agency. Understand the conditions of the permit and approvals, as they may dictate monitoring frequency and other related conditions.

Understand and establish a protocol for your on-site contacts, reporting submission, agency communication and roles and responsibilities of all parties involved.

On-site Reference Tools

Post the ESC plan construction drawings in the site construction trailer for easy reference and to communicate any modifications that are made over the duration of the project.

All permits and approvals (local and regional municipality, conservation authority, Fisheries and Oceans Canada, etc.) should also be posted in the trailer for easy reference by on-site workers, agency inspectors and officers.

Prepare a location in the trailer for storage of hardcopies of completed inspection reports, which will allow for easy access by the project team or governing agency representatives.

Documentation and Reporting

The maintenance of up-to-date documentation on inspection activities is an essential component of effective ESC and the demonstration of due diligence. Documentation and reporting methods may be electronic, paper-based or a combination of both. Regardless of the method used, logbooks including completed inspection sheets, notes on maintenance and repairs, and date-stamped photographs are expected as a minimum and form the basis of a thorough documentation system.

Electronic web-based reporting methods are currently being piloted within the Greater Golden Horseshoe Area. This type of reporting allows the inspector to complete an electronic inspection report on-site and then save it, or upload it to a designated Internet site for immediate distribution. Moving toward electronic reporting is encouraged, as it facilitates communication of inspection outcomes to the appropriate project team members and governing agencies. An example electronic inspection sheet is available for download at **www.sustainabletechnologies.ca**

The GGHA Conservation Authorities ESC Guideline for Urban Construction recommends that documentation of all inspections should be kept on-site (or with the supervising engineer or landowner) for a minimum of one year after the development is substantially completed. Paper documentation should be kept on-site, in addition to electronic storage.

the 1990s, the number of people in the UK who are employed in the public sector has increased from 10.5 million to 12.5 million, and the number of people in the public sector who are employed in health care has increased from 1.5 million to 2.5 million (Department of Health 2000).

There are a number of reasons for the increase in the number of people employed in the public sector. One of the main reasons is the increase in the number of people who are employed in the public sector who are employed in health care. This is due to the fact that the number of people who are employed in the public sector who are employed in health care has increased from 1.5 million to 2.5 million (Department of Health 2000).

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A 'walk-through' inspection of the construction site should be undertaken in anticipation of rain, extended wet-weather periods, snowmelt events, or any conditions that could potentially yield significant runoff volumes. It is important to be aware of the predicted forecast for the week and plan your inspections accordingly.

Regular inspections should occur during all construction stages and, at a minimum, should be based on the requirements identified in your permits and approvals. The minimum frequency of inspection normally expected is:

- On a weekly basis;
- Before and after every rainfall event;
- After significant snowmelt events;
- Monthly during inactive periods (> 30 days); and
- Daily during extended rain or snowmelt periods.

More frequent inspections may be specified in permits or approvals, thus project-specific requirements should always be confirmed.

The following checklist provides a guide for the most common ESC measures, however special conditions on your site may require additional areas or installed measures to be checked.

Erosion Prevention Practices

Temporary stabilization

- Check condition of temporary stabilization measures (e.g., hydroseeding, mulch, growth media mats and blankets, compost, netting, plastic sheets or vegetation) to ensure they have been properly implemented and are working effectively. Ask yourself the following questions:
 - If adequate time has passed (maximum 30 days, depending on seed variety), is seed well-established, with good coverage (>80%)?
 - Are there any areas where wash-out has occurred?

- Have growth media blankets/mats been installed properly?
 - Has erosion control netting and plastic sheeting been installed properly?
 - Is there evidence of erosion on previously stabilized areas?
- Check the health of vegetation in vegetative filter strips. Ensure construction vehicles have not exposed soils or removed vegetation.
- Ensure stockpiles are located as specified in the ESC plan.
- Ensure that stabilization measures implemented at critical areas, such as steep slopes and stockpiles, are thoroughly inspected.
- Ensure stabilization of disturbed areas is completed as soon as possible.
- Ensure stabilization of inactive disturbed areas within 30 days of the date the area became inactive.
- Check for any disturbed areas that are acting as a source of dust blown by wind. Ensure that appropriate measures have been applied to control dust as needed.

Permanent stabilization

- **Must occur on all areas at final grade within 30 days.** Stabilization of smaller parcels of the site is encouraged where stabilization of the entire site cannot be completed within 30 days.
- Ensure accepted methods are used. These include:
 - Seeding by broadcast, hydroseeding, mechanical or blower truck application of media and seed methods
 - Planting
 - Sodding
 - Riprap (or riverstone in watercourses, wetlands and natural areas)





Erosion blankets on sediment basin embankments

- Check condition of stabilization measures to ensure they have been properly implemented and are working effectively. Ask yourself the following questions:
 - If adequate time has passed, is seed well-established, with good coverage (>80%)?
 - Have seeded areas received adequate amounts of water?
 - Are there any areas where wash-out of seed, mulch or riprap has occurred?
 - Is there evidence of erosion on stabilized areas?
 - Is planted vegetation (e.g., trees or shrubs) in good health?
 - Have all stormwater outfall pipes been stabilized with river stone or another acceptable measure? Is there evidence of any scouring under the outfall?
 - If permanent stabilization measures are working effectively, have temporary measures been removed (e.g., silt devices)?

Erosion and Sedimentation Control Practices

Slopes and stockpiles

- **Ensure stabilization within 30 days.**
- Ensure proper installation and functioning of:
 - Rolled erosion control products
 - Erosion control netting
 - Slope drains
 - Silt devices at the toe of stockpiles or slopes
 - Permeable barriers at the toe or upslope on sloped areas, or installed around stockpiles

- Check that diversion dikes used on slopes are properly stabilized.
- Check sediment accumulation behind permeable barriers (e.g., biofilter socks, filter berms, straw logs, straw bales, etc.). Sediment must be removed before accumulation reaches 50% of the height of the barrier.

Storm drain inlets

- Check all storm drain inlets to ensure that sediment control measures (e.g., geotextile fabric filter, inorganic berms, biofilter socks, etc.) have been installed and are functioning properly.
- Geotextile fabric installed beneath inlet grates should be inspected for excessive sediment accumulation that may impede drainage. Clogged fabric must be carefully removed to ensure sediment does not fall in the inlet.
- Sediment must be cleaned out and properly disposed of before accumulation reaches 50% of the height of biofilter socks installed around an inlet perimeter.
- Ensure biofilter socks are properly positioned and not on top of the storm drain inlet.
- Ensure drainage is not being impeded at all storm drain inlets.

Swales and channels

- Ensure conveyance swales and channels are stabilized.
- Interceptor swales/diversion dikes in use for >30 days must be stabilized.
- Check that flow interruption devices are properly installed.
- Determine whether maintenance is required; sediment must be removed before accumulation reaches 50% of the height of filter berms, biofilter socks, straw logs, straw bales or check dams.
- Slope drain outlets should be free of debris and sediment build-up.





Sediment basin

Sediment traps/basins

Traps (< two hectares disturbed area)

- Confirm trap is constructed as specified in ESC plan.
- Check that embankments have been properly stabilized with no rill formation.
- Sediment must be cleaned out and properly disposed of before accumulation reaches 50% of trap height.
- Ensure that check dams installed with the trap are properly installed.

Ponds/basins (> two hectares disturbed area)

- Ensure pond/basin has been constructed prior to any construction activities except for activities associated with the construction of the pond, such as topsoil stripping and grading operations.
- Check that embankments have been properly stabilized with no rill formation.
- Ensure pumping protocol specified in ESC plan is being followed.
- Check pond/basin inlet, outlet, and emergency spillway to ensure proper installation and function. Ensure that accumulation of large debris or sediment is not impeding flow into, through and out of the pond.
- Sediment accumulation in the pond/basin must be measured at least once every six months. Sediment must be cleaned out and properly disposed of before accumulation in the forebay reaches 50% of its design capacity.

Perimeter devices

- Ensure perimeter devices, including construction vehicle access points, are in place **before** any construction works begin.
- Check all permeable barriers installed at the site perimeter to ensure proper installation and condition.
- Sediment must be cleaned out and properly disposed of before accumulation reaches 50% of silt fence, filter berm or biofilter sock height.
- Ensure straw bales are not used as a stand-alone perimeter control. These can only be used as a perimeter control in conjunction with other sediment controls such as silt fences, biofilter socks or vegetative buffer/filter strips.
- Check sediment accumulation on mud mats to monitor when granular material requires replenishment or replacement due to excessive sediment accumulation.
- Inspect public roads near construction site vehicle exits for sediment deposition. Sediment and construction debris on public roads outside the construction site must be swept or shovelled and disposed of.
- Ensure vehicle wheel washers are in working order and being utilized for all vehicles leaving the site. Consult manufacturer's product information for wheel washer maintenance requirements and timing.

In-stream Control Practices

Cofferdams

- Ensure that the cofferdam is effectively isolating the work area.
- Ensure that an impermeable liner has been used in the construction of the cofferdam.
- Check for any leaks, particularly at the bottom and sides (stream banks) of the dam.
- Construction practices should prevent tearing of sand bags and ensure that their material is not released into the stream.

- Leaks should be addressed by constructing a second cofferdam around the outside of the leaking dam.

Temporary stream diversions

- Ensure that diversion has been stabilized (with riverstone or established seed) **prior** to receiving flows. Slope failures and erosion control failures must be **repaired within 48 hours or sooner where critical environmental receptors are at imminent and foreseeable risk of adverse impact.**
- Ensure that soil displaced during the construction of the diversion has been properly located away from the stream and that erosion and sediment control measures have been applied.
- Check for leaks in both the upstream and downstream dams.

Water diversion and sump-pumping of water from excavated area

- Ensure filter fabric and screening covering the inlet pump head is well attached.
- Ensure pump head is not exposed so as to allow aquatic organisms to become entrained in or impinged on the pump intake. Where there is potential for entrainment or impingement for pumping rates of 125 L/s or less, screens should be installed over the pump intake according to *Fisheries and Oceans Canada Freshwater Intake End-of-Pipe Fish Screen Guideline, 1995.*
- Ensure that pump hose is properly anchored at the inlet and outlet to prevent shifting.
- Check for erosion of stream bank and bed at the location of the outlet.

For by-pass pumping:

- Clean water should be pumped back into the creek with a splash pad on the bed.

For sumping of an excavated area:

- Ensure sediment-laden waters are treated and released at least 15 m from the watercourse.
- Ensure that the path to the watercourse is adequately stabilized.

- Inspect discharge from the outlet pump head for excessive turbidity that may indicate the malfunctioning of sediment control practices.

Where sediment bag is used for discharge:

- Ensure that bag has no tears, and is installed and functioning properly.
- Ensure that joined inlet hose is firmly attached with no leaks.
- Ensure discharge is to a vegetated area or flow dissipating structure.
- Check manufacturer guidelines for maintenance requirements.

Where sediment trap or basin is used for discharge:

- Sediment control devices should be installed around the perimeter—ensure proper installation and functioning of the sediment devices.
- Ensure the trap or basin is properly installed and functioning.
- Ensure that the discharge path is properly filtering and has the capacity to do so, which may require the use of a dissipation sleeve.

Turbidity curtains

- Ensure curtain is positioned at least five metres outside of the perimeter of the area of disturbance and positioned parallel to any flow present.
- Floatation device should provide greater than 50 mm of freeboard.
- Check that curtains overlap at least 75 mm at the ends and are sewn or threaded together to form a continuous barrier.
- Ensure that the curtain is free of tears, anchored firmly at the bottom and held up properly by a flotation device at the water surface.
- Check for excessive sediment accumulation behind the curtain that is inhibiting flow-through.
- Check for evidence of sediment passing through the curtain or a sediment plume due to improper installation.

Temporary culvert crossings

- Complete a bed elevation survey prior to construction.
- Gravel such as crushed limestone or clear stone should be used to construct the culvert crossing.
- Check for debris accumulation in front of the culvert and arrange for removal if needed.
- Check for localized slope and/or erosion control failures and ensure **repair within 48 hours or sooner, where critical environmental receptors are at imminent and foreseeable risk of adverse impact.**
- Ensure stability of the culvert crossing.
- Check for road washout or tracking of mud over the crossing, and arrange for cleaning or maintenance as needed to ensure sediment does not enter the watercourse from the crossing.
- Ensure careful removal of the culvert crossing and restoration of the watercourse to its pre-construction condition (including bed elevations) once no longer in use.



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- All damaged ESC measures should be repaired and/or replaced within 48 hours of the inspection, or sooner if directed by authorities, or if critical environmental receptors are at imminent and foreseeable risk of adverse impact.
- In situations where ESC measures are properly installed and in good condition, but are not providing adequate protection, you must immediately inform the supervising engineer of the inadequacy of the ESC measure. The engineer must then investigate alternatives and modify the ESC plan accordingly. The revised plan should be sent to attending agencies, but does not require new approvals.
- To the extent possible, new measures must be installed within 48 hours after the supervising engineer was notified of the situation. Interim protection measures should be installed in the time between the detection of the problem and the installation of the measures specified in the new plan.

Spill response

- All minor spills should be immediately contained, cleaned up and removed from site.
- Significant spills must be reported immediately to the environmental inspector and supervising engineer.
- The environmental inspector must notify the contract administrator who must then notify the Spills Action Centre (1-800-268-6060), the conservation authority enforcement officer for that area, municipal staff and the landowner/developer.
- Documented details of the incident, as well as updates on site conditions and containment/clean-up efforts to be provided to the attending agency.
- For large spills, it is advisable that monitoring and documentation of conditions in affected areas be initiated by qualified personnel as soon as possible.

- Enforcement contact numbers for conservation authorities in the Greater Golden Horseshoe Area:

Toronto and Region Conservation Authority (416) 661-6600

Call extension for enforcement officer assigned to your municipality:

| Officer | Municipalities | Phone extension |
|-------------|--|-----------------|
| Pat Doody | Markham, Whitchurch-Stouffville, Scarborough, Durham Region | 5294 |
| Paul Nowak | North York, Toronto, East York, Etobicoke, York, Mississauga | 5626 |
| Brian Moyle | Vaughan, Aurora, Richmond Hill | 5229 |
| Cam Kennedy | Peel Region, Mono/Adjala, King | 5310 |

Credit Valley Conservation Authority

(905) 670-1615
1-800-668-5557 (toll-free)

Halton Region Conservation Authority

(905) 336-1158
(905) 847-7430 (Toronto line)

Hamilton Conservation Authority

(905) 525-2181

Grand River Conservation Authority

(519) 621-2761
1-866-900-4722 (toll-free)

Niagara Peninsula Conservation Authority

(905) 788-3135

Nottawasaga Valley Conservation Authority

(705) 424-1479

Lake Simcoe Region Conservation Authority

(905) 895-1281
1-800-465-0437
(toll-free for 705 area)

Central Lake Ontario Conservation Authority

(905) 579-0411

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Refer to the *Greater Golden Horseshoe Area Conservation Authorities Erosion and Sediment Control Guideline for Urban Construction* (December 2006) for more detailed and complete guidance on proper installation of ESC measures.

Seeding

- Options: Blower truck application of media/seed/mulch mix, hydroseeding, mechanical or broadcast
- Species approved by local conservation authority (see GGHA CAs ESC Guideline for Urban Construction, Appendix D)
- Ideally, installed between April 15 and May 30 or August 15 and September 30. Seeding between May 30 and August 15 may require watering if conditions are dry. Seed may need to be reapplied if not well established. After September 30, additional ESC measures may be required.
- Bare soil properly scarified to prepare for planting if soil has been crusted over or compacted
- Minimum 15 cm of top soil applied to all areas subject to permanent landscaping
- Appropriate seeding method used for steeper slopes (>3:1) to create tread-track depressions for catching and holding seed
- Application rates according to manufacturer specifications and season of application
- If mechanical seeding is used, seed drilled 1 cm in depth
- Seed covered with erosion control mats/blankets/netting as needed for slopes >2:1

- Provisions for watering during dry periods
- Re-seeding of areas that do not show growth within 14 days
- Mulch applied after or with seed

Sodding

- Installed with full coverage
- Laid in straight lines, across a slope rather than up/down a slope
- Pieces tightly butted together but without overlapping or stretching
- Installed in a brickwork-type pattern with staggering of joints in adjacent rows
- Notched into existing grass
- Sod anchored in place if installed on slopes >3:1
- Adequately irrigated, especially right after installation
- Installed during appropriate weather conditions

Riprap

- Consisting of natural stone, solid precast concrete blocks or sound pieces of concrete
- Free of soil and rebar
- Geotextile fabric liner installed under riprap
- Riverstone (without geotextile fabric beneath) used instead in natural areas, watercourses and wetlands

Rolled erosion control products

- Strips installed parallel to flow in swales or conveyance channels
- Strips installed up and down a hill (vertically) for long slopes (does not include watercourse banks)
- Blankets overlapping 20 cm on sides, tops and bottoms
- Blankets not stretched
- Maximum slope on which product is used based on manufacturer's specifications
- Continuous contact with soil surface and no tenting
- Anchored with sufficient quantity of wooden or biodegradable stakes or metal staples, spaced as specified in manufacturer recommendations
- Firmly anchored at top and bottom, with anchor trench at the bottom

Growth media erosion control blankets

- Applied at a depth of 25 mm–100 mm
- > 50 mm thickness applied for slopes >2:1
- 75 mm-100 mm applied for slopes 1:1 or greater
- Overlapped 1-3 m at the top of the slope to which the blanket is applied
- Only used in runoff channels or other areas of concentrated flows if vegetation is well-established

Plastic sheeting or netting

- Firmly anchored at ends
- Free of rips or tears
- Full coverage of exposed area
- Pulled taut and thoroughly staked
- Netting installed according to manufacturer's instructions
- Netting used during establishment of vegetation on slopes must remain in place and in good condition until 70% vegetative cover is established.
- Not to be used near watercourses or wetlands

Vegetative buffer strips (watercourse)

- >30 m wide if adjacent to watercourses
- Must be used in conjunction with silt device

Vegetative filter strips

- Planting surface horizontally roughened prior to planting
- Not utilized on steep slopes
- Perennial/native grasses with deep root base or nurse crops preferred
- >30 m wide adjacent to watercourses

Seeding





Compost biofilter socks around storm drain inlets



Plastic netting



Compost biofilter socks

For flow interruption in conveyance channels

- Staked into soil at ends and centre
- At least 1.2 m additional length upslope of the design capacity of the swale on both sides
- Continuous contact with the bottom of the swale
- Diameter of socks, distance between socks in the channel and number of socks used should be appropriate for the slope and expected flows in the channel. Appropriate sizing should prevent flows from overtopping the sock.
- Free of rips and tears

Around storm drain inlets

- > 30 cm overlap on either side of the opening being protected
- Anchored to the soil behind the curb using staples, stakes or other appropriate device
- Positioned to provide a complete physical barrier to the drain and allow sediment to collect on the outside of the sock
- Spacer (2 x 4 bracing or standard concrete block) used to keep sock out of inlets without grates
- Diameter size selected appropriately to minimize overtopping
- Free of rips and tears

At site perimeter

- Placed on level contours for use in dissipating flows
- Placed >1.5 m from the toe of a slope
- Ends pointed upslope to prevent flow-around
- Sock diameter selected according to slope steepness and based

on manufacturer specifications (larger diameter socks for steeper slopes)

- Sock diameter sufficient to ensure that flows do not overtop the sock
- Free of rips and tears

Interceptor swale and diversion dike

- Swale minimum 30 cm deep and 60 cm wide
- Both swale and dike side slopes constructed to be <2:1
- Stabilized by seeding or rip rap, especially at inlet and outlet
- Stabilization mandatory for swales/dikes in use for longer than 30 days
- Flow velocities in the swale reduced with flow interruption devices

Slope drain

- Drain pipe firmly secured to slope to prevent movement
- Water tight inlet
- Stabilized outlet

Check dams

- Centre height <1 m
- Centre notched approximately 15 cm
- Includes spillway
- Rock piled with a maximum upstream slope of 2:1 and maximum downstream slope of 4:1
- Sides of dam piled up the ditch slope at least 0.5 m higher than the centre of the dam
- For dams used in series in a swale or channel, height of subsequent check dams must be equal to the elevation of the base of the previous dam.
- Constructed with three layers; bottom layer consisting of 45 cm of 5-cm-diameter stone, middle layer non-woven geotextile fabric, and top layer consisting of 10 cm of 15-cm-diameter stone.
- Constructed based on specifications provided in the GGHA Conservation Authorities ESC Guideline for Urban Construction
- Check dam spillway width approximately the same width as the ditch bottom
- Stones placed up the sides of the ditch above the elevation on the spillway to prevent washouts
- Stone size of 5-10 cm for ditch grades less than two per cent and 7-30 cm for ditch grades two per cent and greater
- Installed downstream of sediment traps

Silt fences

- Trenched in at least 15 cm
- Stakes installed on downslope side
- Maximum 2.0 m between posts for heavy-duty fences and 2.3 m for light-duty
- Ends turned up slope where possible
- Fabric is a non-woven synthetic fabric material (with a weave density of 270R or equivalent) stretched across and attached to supporting post and wire fence.
- Fabric taught between posts
- Structural fencing used to back the silt fence
- Positioned on a level contour rather than up or down slopes
- No gaps, 2.0 m minimum overlap of new cloth sections
- Positioned to receive only moderate sheets flows, not concentrated flows
- Toe compacted as much as possible to avoid use of stone placement

Inorganic filter berms

- Filter media derived from composted materials
- Berm constructed perpendicular to sheet flow
- Placed >1.5 m from toe of slope
- Berm ends pointed upslope
- Berm size: height 0.3 m, width 0.6 m
- Larger berms used for steeper slopes
- Berm not positioned so as to concentrate or channel runoff but rather to disperse it



Slope stabilization



Coir matting close-up



Straw bales

Check dams



Organic filter berms

- Same design and installation methods as inorganic filter berms
- Seed applied directly on, in front of, and behind berm to a distance of 1.5 m

Straw logs

- Site must be free of roots, rocks and other debris prior to installation
- Not installed on steep slopes
- 7-15 cm-trench dug at installation site, depending on log diameter
- Log placed in firm contact with ground surface
- Seams offset to ensure continuous filtration
- Staked into soil with wooden stakes or T-bars
- Stake minimum dimensions of 2.5 cm x 2.5 cm x 60 cm

Straw bales

- Straw bales must be used in combination with other controls, e.g., silt fence, compost biofilters, etc.
- Not installed on steep slopes
- Bales should be firmly butted together and staked with either wooden stakes or T-bars.
- In ditches and swales, a second row of bales should be placed behind the first to overlap at the joints.
- Bales should extend up the channel slopes a minimum of 1 m above high-flow depth.
- Once removed, bales can be broken apart and used as mulch.

Sediment traps

- 125 m³ storage per hectare of drainage area
- Sediment traps can be used to treat up to 2 hectares of disturbed area.
- Stabilized embankments
- Located in a flat land area, away from watercourses and wetlands

Sediment basins

- To be implemented on sites with disturbed drainage areas >2 hectares in size
- Minimum 125 m³ active storage per hectare contributing drainage area
- Minimum 48-hour drawdown time, 72-hour drawdown time preferred where practical
- Minimum 75 mm diameter orifice as part of the outlet structure
- Minimum 4:1 L:W ratio of the basin
- **Permanent Pool Volume:**
 - i. Minimum 125 m³ storage volume per hectare drainage; or
 - ii. Minimum 185 m³ storage volume per hectare drainage area if L:W ratio is less than 4:1 or the drawdown time for active storage is less than 48 hours.
- Forebay construction as specified in the *OMOE Stormwater Management Planning and Design Manual*, 2003.
- Berm or turbidity curtain installed in basin halfway between inlet forebay and outlet structure
- Hickenbottom riser outlet or approved equivalent used to release detained flows

- Riser pipe covered with a layer of smaller clear stone (25-50 mm diameter) over a layer of larger size (150-200 mm diameter) clear stones
- Proper compaction in the construction of embankment to ensure stability
- Banks stabilized within 30 days of completing basin excavation
- Minimum 10 m vegetative filter strip at outlet

Sediment bags

- Installed as per manufacturer's specifications on capacity, sizing and proper installation (e.g., clamping procedure)
- Located on a grassed area a minimum of 30 m away from the receiving water body
- If a suitable grassed location is not available/possible, the filter bag must be placed on top of a rock pad or geotextile fabric and surrounded with sediment fencing or approved equivalent.
- Effectiveness will depend on turbidity of water entering the bag. For extremely turbid water, additional measures are required (e.g., water passed through a weir tank prior to discharge to the sediment bag).

Mud mat/gravel vehicle access

- Stone pad >20 m in length and the full width of the entrance
- Stone pad >30 cm thickness (45 cm thickness recommended)
- Pad consisting of 50-mm-diameter clear stone for the first 10 m (extending from the street) and 150-mm-diameter clear stone for the remainder of the length
- Pad underlain with a geotextile (or graded aggregate filter)

Coffer dams

- Constructed with pea-gravel bags, pre-cast concrete jersey barriers, sheet piling or other suitable waterproof alternatives
- Dams consisting of pea-gravel bags or jersey barriers require a waterproof membrane to be placed over the dam and keyed in under to minimize leakage.
- Dams constructed with pea-gravel bags should consist of a double line wall, with a layer of impermeable liner secured between.
- Dam height sufficient to prevent overtopping at minimum five-year storm
- Stranded fish and any aquatic life must be rescued from work area and transferred to upstream areas by a qualified biologist.
- Dewatering performed in the work area to be filtered through approved sediment controls prior to discharge to the environment
- Dams removed carefully to minimize disturbance of bottom sediment
- Disturbed area stabilized immediately after completion of work

Turbidity curtain

- Installed in slow-moving water or water bodies rather than in small streams
- Suspended with floatation/buoy devices with tie downs staked into banks
- Affixed to the base of the water body with anchors and physically secured in location with cable or rope mooring
- Floatation devices providing greater than 50 mm of freeboard
- Curtain overlap of at least 75 mm, with ends being sewn to form a continuous curtain
- Careful removal of curtain to limit disruption of sediment in water column

