

# Construction

Exposed ground and piled-up materials like gravel are vulnerable to erosion by both water and wind. Sediment is a harmful pollutant in its own right. Learn to manage your construction site to minimize impacts to our waterways.



## 10 Great Construction Practices

1. The area of disturbance is minimized.
2. Areas to be protected are clearly marked.
3. Soil is managed to protect its integrity.
4. Compaction is avoided and minimized.
5. An ECO Plan is in place.
6. There is a specific Erosion and Sediment Control (ESC) Plan.
7. Everyone working on the site understands the Plan and how important it is to not pollute stormwater.
8. ESC controls are installed before work is started and they are inspected weekly and after every rainstorm.
9. Work is phased to reduce exposed areas.
10. Plans created for the site are followed and adapted as work progresses.

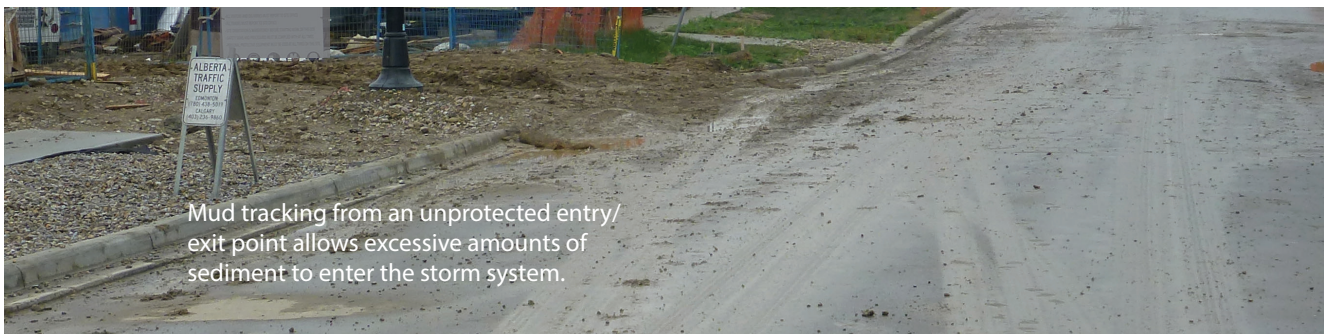
**So you're planning to build, congratulations! So many details; so much to consider. Your site needs attention too.**

Exposed soils and sediment are vulnerable to erosion. Fine particles are liberated, sending nutrients into both air and water. **Sediment disrupts the ecology of water bodies** in a variety of ways. An Erosion and Sediment Control (ESC) Plan addresses this challenge.

In addition, an even more invisible disruption happens when you dig and move soil around. Natural processes in the soil and plant system that work to break down and use nutrients and contaminants are disrupted or destroyed. **Stockpile management** and minimized stripping and grading help retain the functionality of this system. Stripping areas of soil and vegetation and then planting trees and turf afterwards doesn't compensate. It's important to **tread lightly** by **minimizing your footprint** and managing soil carefully.

Actually, it's important to *literally* tread lightly, as a third challenge is **compaction** from mechanized equipment, and even from foot traffic if soil is wet. Soil and subsoil under it can become so dense that plants in your new landscape will struggle or die and rainfall will have a hard time soaking in. Time doesn't heal this compaction wound — you can still see the ruts on the Oregon Trail more than a century later because vegetation won't grow in them. Paying attention to minimizing compaction will result in healthier, larger, faster-growing plants in your new landscape that are more drought-resilient. Plus there will be the bonus of improved runoff-absorption capacity and healthier waterways as a result.

Finally, an Environmental Construction Operations Plan (**ECO Plan**) should be put in place. It identifies how waste will be managed, what chemicals will be used, what you will do if there is an emergency, and so on. The ECO Plan is also your opportunity to record special site characteristics like wildlife corridors, drainage pathways, habitat for sensitive species, any archeological or contamination history and what you plan to do to account for them.



Mud tracking from an unprotected entry/exit point allows excessive amounts of sediment to enter the storm system.

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LANDSCAPING

RAINWATER HARVESTING

RAIN GARDENS

TRENCHES/ SOAKAWAYS

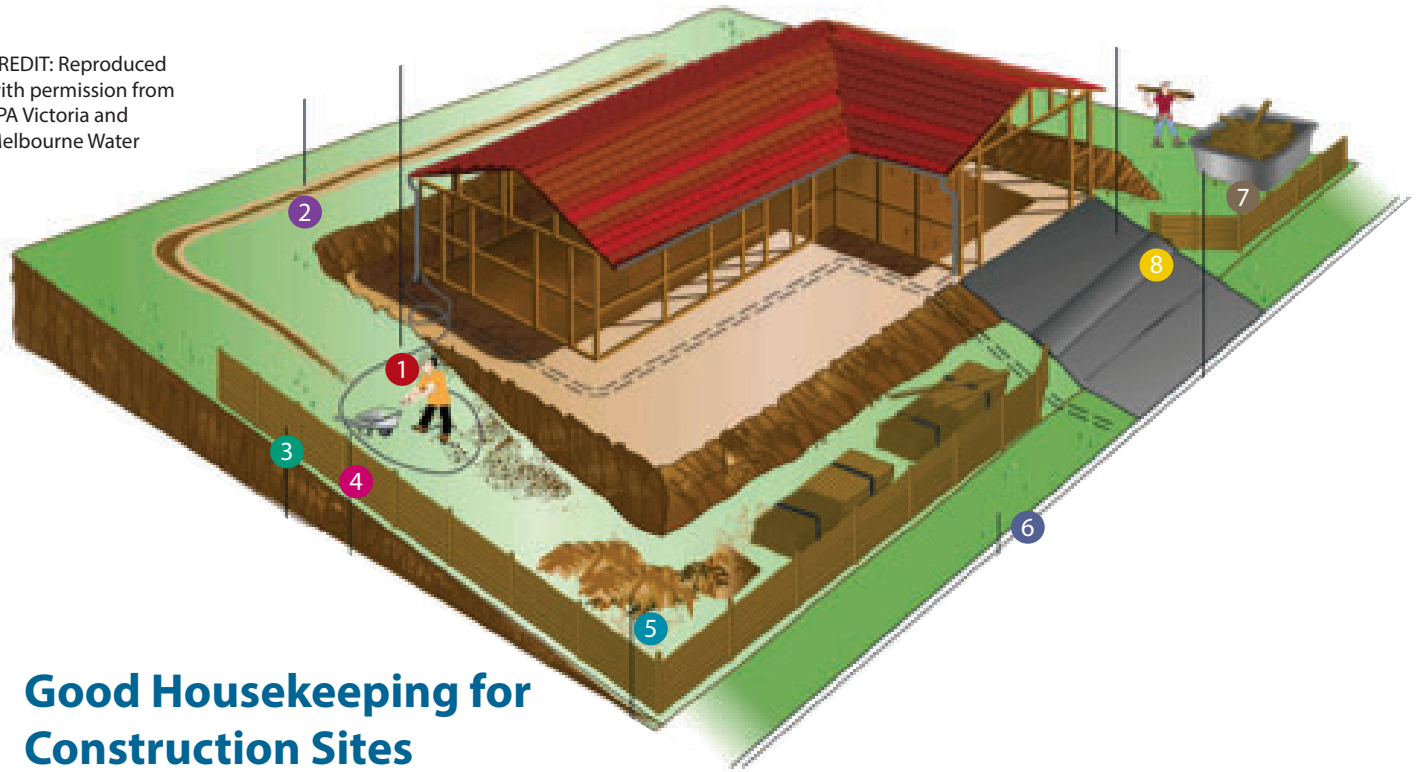
PERMEABLE PAVEMENT

GREEN ROOFS

EVALUATE YOUR SITE

CONSTRUCTION

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## Good Housekeeping for Construction Sites

### 1 Limit Disturbance When Excavating

Preserve as much of the vegetated area as possible. Vegetation improves the appearance of the site and reduces the risk of erosion. The erosion hazard of well-vegetated lands is often less than 1% of those that have been cleared.

### 2 Divert Run-On

Where possible to do so, divert upslope stormwater around all lands that do not have a protective vegetative cover. Water sheeting over the ground is one of the most significant causes of soil erosion and should be minimized.

### 3 Install Perimeter Controls

Install downslope perimeter controls (silt fences, filter logs) for disturbed areas where runoff may occur in order to prevent sediment from getting into the drainage system and waterways.

### 4 Wash Equipment in a Designated Area

Wash all equipment, including equipment with concrete waste, in a designated area that does not drain to the storm drainage system. Do not discharge concrete wash water off site.

### 5 Contain and Protect Stockpiles

Place all stockpiles completely on the site, well away from drainage paths. Stockpiles of erodible materials such as sand and soil should be placed behind a sediment barrier. If stockpiles are in place more than 30 days, they should be covered and protected from erosion. Ensure soil and cement bags are covered at the end of each day if rain or heavy winds are likely.

### 6 Keep Sediments Off the Sidewalk

Keep sidewalks clean of sediments and other construction debris. Do not construct dirt ramps over sidewalks to facilitate construction. By the end of each workday, remove any material tracked onto adjacent streets and sidewalks.

### 7 Store All Waste and Litter in a Designated Area

Store all waste and litter on the site in a way that will prevent it being blown onto neighbouring lands or washed into the storm drainage system.

### 8 Restrict Vehicle Movements to a Stabilized Access

Restrict all vehicle movements onto the site to a stabilized access. This allows all-weather entry and exit, reduces how much soil is carried to the street, and may provide a permanent base for the future driveway.

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## A sequence for setting up ESC controls

1. Before work starts, ensure that all workers understand their individual responsibilities to prevent pollution.
2. Establish a single stabilized entry/exit point to the site.
3. Put up a barrier fence around areas where vegetation is not to be disturbed. Protect trees to the dripline at least.
4. Install onsite waste bins and receptacles.
5. Install perimeter controls.
6. Divert clean run-on around the site and, if necessary, stabilize any drainage channels and outlets.
7. Clear only the lands that must be disturbed. Stabilize exposed soils immediately. Loam is particularly vulnerable to erosion.
8. Ensure that any stockpiles are on your land and have ESC controls, such as perimeter controls and cover.
9. Ensure that all planned erosion and sediment controls are installed.
10. Stabilize any inactive areas.

**RIGHT:** Coarse washed gravel with filter fabric underneath is used on this site to stabilize the construction driveway and entry/exit point. When construction is complete, the gravel can be lifted with the filter fabric and re-used. Alternatives include plywood or coarse woody slash.



**TOP:** Perimeter control: Filter log with stakes.

**MIDDLE:** Covered soil stockpile with filter log at edge of stockpile to prevent sediment migration.

**BOTTOM:** Depressed area: *Sediment trap* to prevent runoff from exiting a future construction area.



**TOP:** Silt fences are made from geotextiles that are tied to stakes and keyed into the soil, holding back runoff so sediment has time to settle out. They should not be used where runoff may have velocity or on slopes. They should be placed some distance away from the toe of slopes rather than tight to the bottom of hills so that runoff has a place to pond.

**BOTTOM:** Drywall and lumber collection and recycling may be available in your area.



## Watch Your Waste

Builders/developers are responsible to manage pollution from a number of sources:

- air pollution, including dust
- noise that might interfere with neighbouring properties
- waste discharges including erosion leakage or spills of construction materials, soil, sand, gravel, slurries and concrete
- trade and domestic waste, including litter packaging, off-cuts and spoiled materials
- toxic chemicals, including fuels, paints, solvents, sealants, adhesives, lubricants and pesticides

**As sediment can bond with and act as a carrier for a variety of contaminants, a solid ESC Plan will contribute to the effective management of many sources of pollution.**

## BE KIND TO YOUR SOIL

**Buildings.** Minimize excavations. Step foundations with the natural grade. Consider minimal excavation foundations (pins or piles).

**Compaction.** Use equipment with the least *ground pressure* to accomplish tasks. This will limit shallow compaction. Use the lowest *total axle weight* to minimize deep compaction.

**Soil management.** Don't mix different soil layers or soil layers with subsoil. Keep stockpiles lower than 4 feet to maintain some aerobic activity that preserves the living elements in the soil. Put soil horizons back in order.

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**ABOVE:** Erosion Control Blanket protects a slope that is being re-vegetated. A filter log runs along the contour to intercept sediment.

## Planning

Prepare an ESC Plan for your site before work starts and consult it regularly during construction. The Plan should show how you will prevent stormwater pollution and protect critical areas throughout construction and until the site landscaping and final surface improvements have been completed. Complexity of the plan will increase primarily as a function of the amount of land disturbed.

Different controls might be necessary at different stages of construction as the nature of the site changes — for example, changing drainage patterns or moving stockpiles to different places. If such changes are likely, these must be shown on the Plan.

## Slope Treatments

Roughen slopes so grooves are parallel with the *contour* (imaginary line of equal elevation) and stabilize with a cover as soon as possible. *Tracking* can be used for slopes up to 3H:1V (33%). Steeper slopes should be *stepped* or *grooved*. Consider *hydroseeding*. Stabilize with *Erosion Control Blankets* (ECBs) for short, steep slopes or other *Rolled Erosion Control Products*. These are made of straw, shaved wood, coir, hemp or similar with a net or backing. Choose biodegradable net or backing.

*Turf Reinforcement Mats* (TRMs) are permanent controls typically made out of plastic.

## ESC Inspection and Maintenance

On a daily basis, sweep or scrape any material tracked onto adjacent streets. Do not wash material onto or down a street or adjoining driveway. Do not use blowers as these merely send particles into the air.

All controls should be checked at least every week and within 24 hours after a rainfall event to ensure they are working properly. Maintenance might include:

- Removing sediment captured in silt fences, sediment traps or other areas.
- Topping up the gravel on the stabilized access.
- Repairing any erosion of drainage channels.

- Protecting exposed soils (especially stockpiles and haul roads) during extended dry weather so as to minimize wind erosion (dust problems).
- Scheduling and completing necessary repairs and upgrades to controls immediately. Remember that the controls might need to change as the slope and drainage paths change during the development phase. Anticipate the likely risks and prepare for unusual circumstances, for example, have spare sediment fence material on site.

## Permits Along the Way

**Dewatering.** If a part of the site collects water and needs to be pumped out, such as a basement excavation that is exposed to rain, do not discharge this sediment-bearing water without checking if a permit is needed. Filtration or coagulants to settle fine particles may be required, depending on the *turbidity* (cloudiness from sediment in the water).

**Placing materials offsite.** Materials are to be stored onsite. Offsite storage typically requires a permit.

## Finalization of Works

Ensure that the site is stabilized and no exposed soil remains before removing temporary erosion and sediment controls. If landscaping is not complete before handing over the site to the owners, ensure that they are aware of their responsibilities to prevent pollution. A common oversight is downspouts causing erosion on unfinished landscaped areas.

## Complying with Regulations

Developing and following an ESC Plan demonstrates your intention to comply with legislation designed to protect our environment and waterways. The deposition of deleterious substances into water frequented by fish is governed under the federal Fisheries Act. As sediment is harmful to fish, it qualifies as a deleterious substance and its deposition into waterways is cause for concern and can result in fines as high as \$1,000,000.

In the province of Alberta the Environmental Protection and Enhancement Act outlines that no one may release a substance into the environment in an amount, concentration or level or at a rate of release that causes or may cause a significant adverse effect. Like federal legislation, this act allows for fines up to \$1,000,000.

In areas where there is access to the storm drainage system it is also important to comply with the Wastewater and Storm Drainage Regulation, which outlines that no substance may be discharged into the system if it could impair the quality of stormwater or the integrity of the system. Fines associated with the deposition of sediment into the storm drainage system can be as high as \$500,000.

Note that different cities and municipalities may have their own bylaws related to ESC and pollution prevention. Be sure to research what is relevant in your area.

Keep in mind that larger-scale developments may require a more detailed Erosion and Sediment Control plan; check with your local planning office.



**ABOVE:** Heavy equipment, lumber, and gravel are too close to these spruce trees that were to be protected. A fence should have been erected around the trees prior to work. Injury to the shallow tree roots is invisible at the time of construction.

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## Products and Suppliers

### **Brock White**

<https://www.brockwhite.com/catalog/materials-and-accessories/geosynthetics/erosion-control>

### **Layfield Group**

<https://www.layfieldgroup.com/Geosynthetics/Erosion-Control-Products.aspx>

### **Nilex**

<https://nilex.com/products/all>

### **Armtec**

<https://armtec.com/products/>

## More Information

Alberta Low Impact Development Partnership  
**alidp.org**

Pigeon Lake Watershed Association  
**plwa.ca**

Why is sediment harmful?  
**[https://cfpub.epa.gov/npstbx/files/ksmo\\_sediment.pdf](https://cfpub.epa.gov/npstbx/files/ksmo_sediment.pdf)**

Alberta Transportation ESC Manual - Section 7 and Appendix C have extensive information on ESC methods as well as installation drawings  
**<http://www.transportation.alberta.ca/Content/docType372/Production/Erosion-ControlManual.pdf>**

City of Calgary Erosion and Sediment Control Guidelines 2017. Design considerations for small sites p. 29. Glossary in Appendix C.  
**<https://www.calgary.ca/content/dam/www/uep/water/documents/water-documents/esc-2017-guidelines.pdf>**

City of Edmonton Erosion and Sedimentation Control Field Guide  
**[https://www.edmonton.ca/city\\_government/documents/PDF/FieldManual.pdf](https://www.edmonton.ca/city_government/documents/PDF/FieldManual.pdf)**

Construction Practices for Environmental Stewardship by AASHTO - Earthwork and Soil Management  
**[https://environment.transportation.org/environmental\\_issues/construct\\_maint\\_prac/compendium/manual/4\\_11.aspx](https://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/4_11.aspx)**

City of St. Albert Environmental Construction Operations (ECO) Plan Framework  
**[https://stalbert.ca/site/assets/files/7525/environmental\\_construction\\_operations\\_eco\\_plan\\_framework.pdf](https://stalbert.ca/site/assets/files/7525/environmental_construction_operations_eco_plan_framework.pdf)**



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