6.0 GENERAL REQUIREMENTS FOR ALL WATERCOURSE ALTERATIONS

6.1 WATER CONTROL MEASURES WHEN WORKING IN A WATERCOURSE

All work in a watercourse must be completed in isolation of the stream flow to avoid sedimentation of the watercourse. Keeping the work area isolated from the stream flow also creates a work area where excavation and construction can be completed properly.

Construction activities within and immediately adjacent to the channel of a watercourse must be isolated from the stream flow to reduce the impact of silt and fines on water quality affecting aquatic life and other users. Water control measures are to be temporary to allow the work to proceed while minimizing impacts to the aquatic environment. This can be accomplished using cofferdams, temporary diversions, and/or dam and pump around techniques.

6.1.1 Sizing Requirement

Cofferdams must be of sufficient height and strength to hold back the bankfull flow and velocity.

The design and construction of temporary diversions and dam and pump methods should also withstand the full bankfull flow and velocity.

Additional equipment (*i.e.* pumps) and materials should be kept on-site in the even of high flows in the watercourse occurring after rainfall. Weather forecasts should be monitored, and instream work should be avoided during times of peak flows when possible.

6.1.2 Cofferdams

Cofferdams are temporary water barriers used to isolate the work area from flowing water. The following guidelines must be followed when using cofferdams:

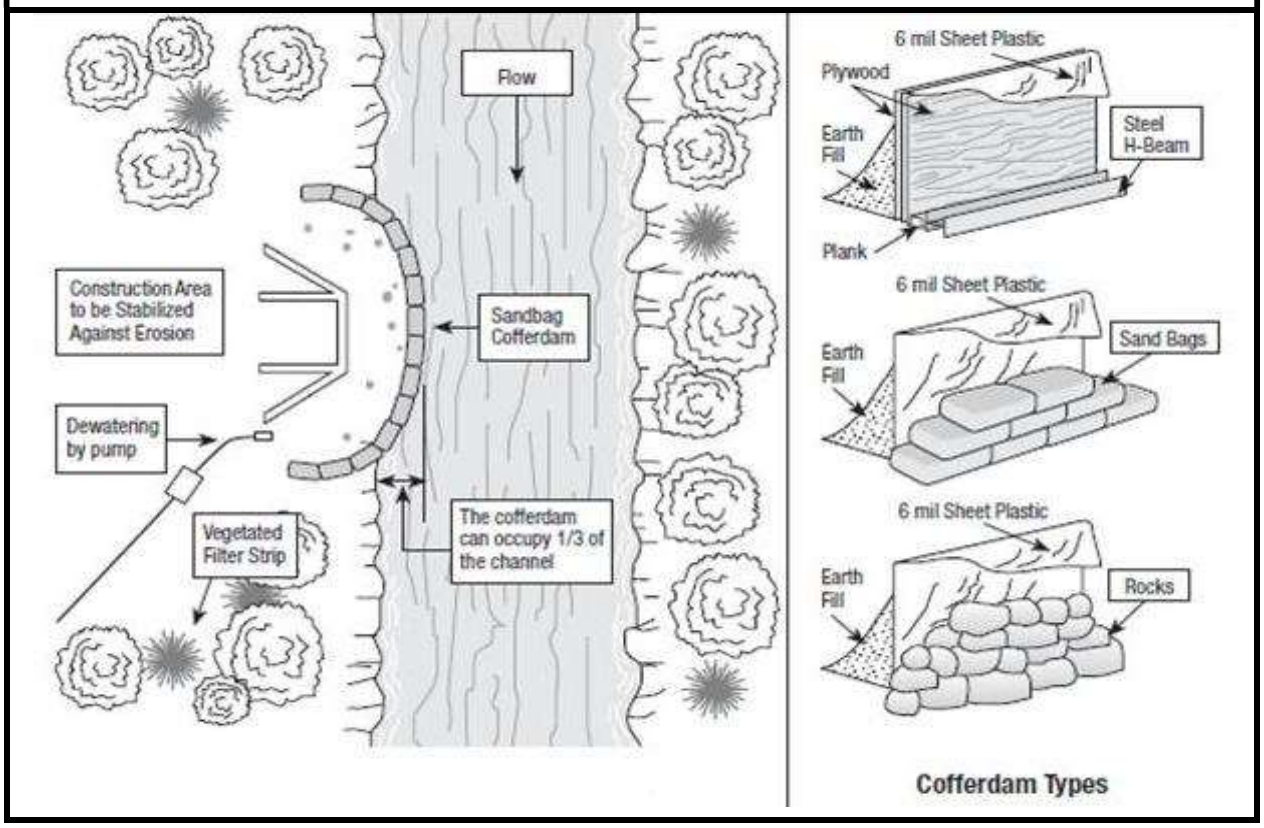
- Cofferdams should be constructed of non-erodible material to prevent washout of the structure, which may result in downstream deposition and siltation
- Cofferdams should be of sufficient height and strength to prevent overtopping or collapse as a result of sudden increases in water levels
- Cofferdams must be constructed tightly to prevent or reduce the amount of seepage into the work area
- Cofferdams should consist of sheet piling or a layer of 6 millimetre plastic sandwiched between an inner wall of *in-situ* earth fill and an outer wall of either rocks, sandbags, or a steel H-beam attached to the bottom of a sheet of plywood. See Figure 6-1. Sheet metal or wood panel cofferdams are preferred over the

construction of dams with till or pit run material as they can provide a tighter structure and do not create siltation and erosion problems. Sandbags filled with pea stone or clean granular material (free of fines) are also preferred as they can be removed easily. Several commercial engineered products are available for use.

- Excavation must not be carried out inside the cofferdam or sediment filtering device until the cofferdam curtain is completely closed
- Turbid water pumped from inside the cofferdam (construction space) must be pumped either into a settling pond, a filter bag, or onto existing vegetation of sufficient expanse to ensure there is no visible suspended sediment in the runoff returning to a watercourse/wetland
- The cofferdam material must be completely removed immediately upon completion of all work in the wetted portion of the watercourse, and the watercourse substrate must be restored to resemble pre-installation grades and profiles closely

Note: In small streams, a dam and pump or a temporary diversion will be required. In larger streams, as much of the channel as possible should remain open to allow unrestricted water flow and fish passage. A good practice is to leave at least two-thirds of the channel unobstructed at all times. See Figure 6-1.

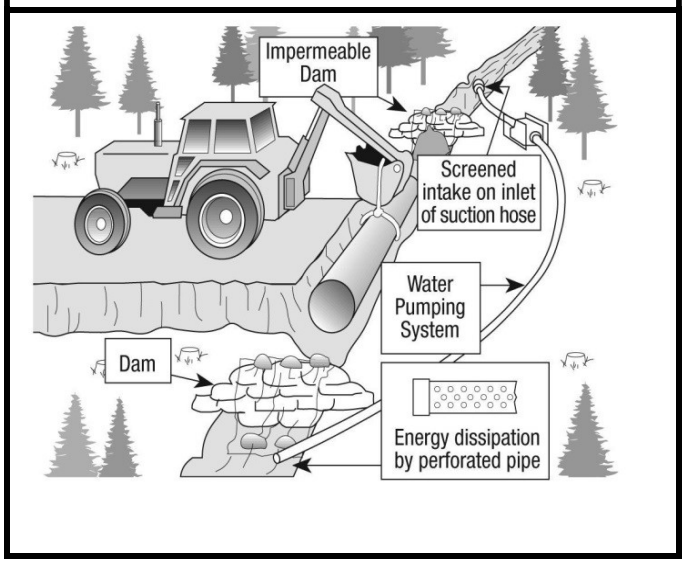
Figure 6-1 A view of a functional cofferdam isolating the construction area and the different types of cofferdams and their components



6.1.3 Dam and Pump Method

Dam and pump method refers to stopping the flow upstream of the instream work area and pumping the flow around the site to a point immediately downstream of the work area. See Figure 6-2. This technique works best on smaller watercourses. The following guidelines should be followed:

Figure 6-2 Pump-around system



- Construct an impermeable cofferdam to block the flow upstream. On the downstream side of the worksite, construct a second cofferdam above the discharge area. The cofferdam is intended to prevent the movement of sediment from the worksite into the watercourse, while also preventing backwater into the construction site.
- Fill used in the construction of a cofferdam must consist of only clean, sediment-free materials.
- Cofferdams should be of sufficient height and strength to prevent overtopping or collapse as a result of sudden increases in water levels.
- Establish a water pumping system to transfer the natural stream flow directly downstream of the worksite. The water pumping system must be continuous whenever there is sufficient water to facilitate pumping until the installation is complete. Use one or more pumps capable of pumping all the stream flow past the worksite. The water pumping system must be monitored to ensure it operates in a functional conditions continuously throughout the entire period of use, including evenings and weekends.
- A complete back-up system should be kept on-site at all times to accommodate any increases in water flow and as a precautionary measure in case of breakdowns.
- Upstream of the installation site, locate the intake pipe where stream elevation is lowest. Movement of substrate material in the stream bed to accommodate the placement of the intake pipe must be done by hand.
- The water withdrawal must not cause any fish or other aquatic organisms to be removed from their habitat. The intake must be screened to prevent these organisms from entering the structure. For more information, please refer to the Fisheries and Oceans Canada's Code of Practice for End-of-Pipe fish protection screens for small water intakes in fresh water: https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html.

Note: The installation of a fish net above and below the work site will prevent any fish from migrating in or near the pump area.

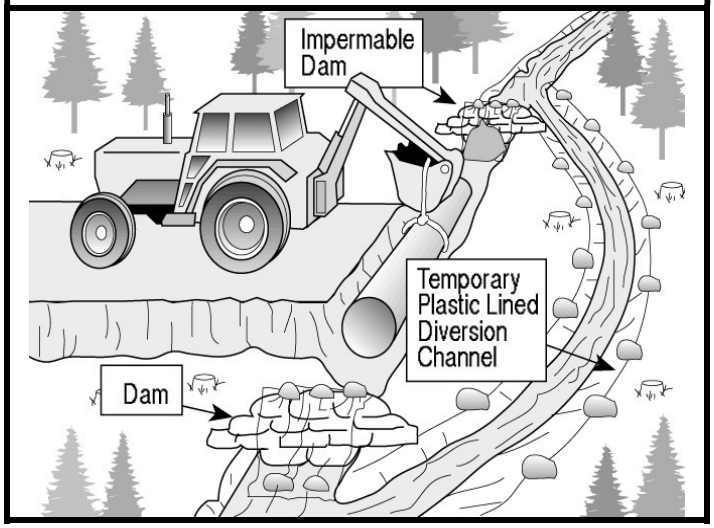
- Any time the existing channel is isolated from stream flow, a fish rescue is required. This will require the removal of any fish trapped in the isolated reach of the natural channel. Capture and relocate them immediately downstream of the temporary diversion. A license to collect and move fish may be obtained from Fisheries and Oceans Canada (DFO) prior to the fish rescue. Please contact DFO through the National Online Licensing System at http://www.dfo-mpo.gc.ca/index-eng.htm.
- The discharge hose should be located in areas with stable stream bed conditions. Use material such as 6 millimetre polyplastic, sandbags, or rock to stabilize the area where stable stream bed conditions are not available. Stabilization of the discharge area will prevent unnecessary scouring and erosion problems as a result of increased water volume and velocity.
- Turbid water from dewatering operations must be routed through a settling pond, filter bag, or into existing vegetation of sufficient expanse to ensure that there is no visible suspended sediment in the runoff returning to a watercourse/wetland.
- Upon completion of the construction project, remove first the downstream, then the upstream cofferdam from the watercourse. Restore/stabilize any soil disturbance along the stream banks or within the work area.
- After completion of the instream work, all materials must be removed from the watercourse.

6.1.4 Temporary Diversions

Use the following guidelines when constructing a temporary plastic or rock-lined diversion:

- Design the opening of the channel to accommodate the peak seasonal flows for the time period the diversion will be in place.
- The diversion channel must not be any longer than necessary to accomplish the project efficiently and must be excavated from the downstream end in isolation of the stream flow. See Figure 6-3.
- Excavate a temporary channel parallel to, and as close as possible, the existing stream channel. Leave a plug on both ends to ensure that stream flow does not enter the diversion channel.

Figure 6-3 Temporary diversion channel



- Line the temporary channel with plastic and secure with rock. Stake the plastic into place at the top of the channel side slopes and weigh the plastic down with rocks.
- Before the diversion channel plugs can be removed, ensure the area is isolated from flowing water (cofferdams/dam and pump).
- Any time the existing channel is isolated from stream flow, a fish rescue is required. This will require the removal of any fish trapped in the isolated reach of the natural channel. Capture and relocate them immediately downstream of the temporary diversion. A license to collect and move fish may be obtained from Fisheries and Oceans Canada (DFO) prior to the fish rescue. Please contact DFO through the National Online Licensing System at http://www.dfo-mpo.gc.ca/index-eng.htm.
- Once in control of water, first, remove the plug at the downstream end of the diversion and stabilize the exit point. Second, remove the upstream plug and stabilize the entrance (plastic should be embedded below the thalweg to prevent flowing water from seeping underneath the plastic lining).
- Construct a cofferdam across the natural channel immediately below the entrance to the temporary diversion.
- To prevent backwater into the construction site in areas with little to no slope, construct a second cofferdam across the natural channel above its confluence with the temporary diversion.
- Turbid water from dewatering operations shall be routed through a settling pond, filter bag, or into existing vegetation of sufficient expanse to ensure that there is no visible suspended sediment in the runoff returning to a watercourse/wetland.
- Inspect the diversion channel daily and carry out repairs as required.
- Upon completion of the project, ensure the diversion channel is restored as closely as possible to the pre-project conditions.

6.2 EROSION PREVENTION AND SEDIMENTATION MANAGEMENT

Any soil exposure/disturbance, big or small, and especially near water can cause significant environmental issues.

BE SMART, BE PREPARED

In the event that something goes wrong before, during, or after construction, have a back-up plan and remediation material/devices on site. Remediation material/devices should include sandbags, rip-rap, filter bags, silt fencing, pumps, hoses, etc.

6.2.1 Environmental Considerations

Defined in basic terms, erosion is the wearing away of an exposed surface and sedimentation is the deposition of eroded particles. When erosion is minimized, the amount of sediment generated is reduced.

Sedimentation in watercourses is destructive to the aquatic habitat, whether the sediment remains suspended in the water or settles out. Environmental impacts, related to erosion and sedimentation, can be found in Module 3 *Impacts of Watercourse Alterations*.

Planning is critical to minimize erosion and sedimentation issues.

6.2.2 All Projects: Preventing Problems

If basic principles for the prevention of surface erosion and sedimentation are considered at the design stages of the project, potential problems can be minimized. These principles are as follows:

- Limit the size of the disturbed area. Retain existing vegetation wherever feasible. Erosion is minimal on a surface covered with natural vegetation.
- Limit the time the disturbed area is exposed.
- Establish permanent vegetation and surface cover. At a minimum, all exposed soils must be covered with grass seed and mulch (such as straw, wood chips, etc.) or with permanent surface cover such as gravel. For larger projects, keep the soil covered as much as possible with temporary or permanent vegetation or with various mulch materials.
- Ditches and swales may need to be lined with gravel, rock, or rip-rap to prevent erosion and scour of the soil. The size of material is dependent on the volume and velocity of the water flow during storm events.
- Exposed soil next to watercourses must be replanted with native perennial non-invasive species to establish natural habitat following project completion. The species and density of woody vegetation must be similar to that which existed in the area before the project took place.
- Keep clean water clean by diverting upland surface runoff away from exposed areas.
- Dykes and constructed swales may be used to divert runoff.
- Keep the velocity of surface runoff low. This can be accomplished by limiting the slope and gradient of disturbed areas and constructing check dams or similar devices in constructed swales and ditches.
- Plan construction to coincide with the low flow period from June 1st to September 30th of any given year.
- All stockpiled soil should either be covered with polyethylene or contained with a sediment control fence or mulch the stockpile as a temporary solution.
- Exposed soils must be managed until all erodible soils are permanently re-vegetated or stabilized with geotextile or rock.
- Turbid water must not be pumped directly into a watercourse. It must be routed through a settling pond, filter bag, or into existing vegetation of sufficient expanse to ensure that there is no visible suspended sediment in the runoff returning to a watercourse/wetland.
- Monitor weather forecasts and ensure the erosion and sedimentation control devices are maintained and ready for any rainfall events. Keep additional materials, machinery, and equipment on site in order to troubleshoot any issues that may arise.

6.2.3 Large Projects: Erosion and Sedimentation Prevention Plans

Before construction begins, erosion and sediment prevention plans need to be developed, especially for large or more complex projects. Complex projects may involve sites with difficult terrain or sites with soils particularly prone to erosion, such as clay soils.

The plan should be guided by the following approach: site evaluation, erosion control planning incorporated into the work schedule, and sediment prevention and site management.

It is essential to plan and place sediment prevention devices before the construction phase of a watercourse alteration to intercept and trap sediment before it reaches a watercourse/wetland. These devices must remain in place until permanent vegetation has been established or the site is otherwise stabilized.

PREVENTING PROBLEMS

Expose the smallest amount of soil possible for the shortest amount of time.
Retain existing vegetation wherever possible.
Smooth grade any disturbed soil to a uniform slope.
Re-vegetate and/or cover soil where possible.
Divert surface water away from exposed soil.
Maintain low runoff velocities.
Trap sediment before it can cause any damage.
Maintain the onsite erosion and sediment prevention devices.

6.2.4 Planning Considerations

One of the mandates of the New Brunswick Department of Environment and Local Government (DELG) is to avoid sedimentation of watercourses. This requires preventative measures to be taken during the planning and construction phases of the project.

Even small projects that expose soil to rain (and ice/snow melt) can cause erosion and sedimentation to watercourses. For example, soil disturbance from a landscaping project or the tracks from machinery can be enough to cause sedimentation to a watercourse during the next rain storm. Regardless of the project size, be aware that sedimentation from a project can potentially travel to a neighbouring watercourse.

Construction activities and large earth-moving projects accelerate erosion dramatically, mainly by exposing large areas of soil to rain and running water. If erosion is not prevented and runoff is not properly treated, the result is often severe siltation of nearby watercourses. General design principles must be used for any project.

Runoff is defined as the portion of precipitation on a drainage area that runs along the surface of the ground and is discharged into streams and waterways. Runoff transports suspended sediment and has to be directed away from areas of exposed soil.

The following sections (6.2.5 to 6.2.14) provide techniques on runoff diversion in relation to road building. In most cases, these techniques are installed in conjunction with road construction, not after.

6.2.5 Road Crowning

Road crowning is done by making the center of the road higher than the outer edges. Crowning is used to encourage water to drain into roadside ditches to reduce rutting and the need for road maintenance. The average slope of the crown should be 3%.

6.2.6 Roadside Ditches

Roadside ditches are used to intercept and carry runoff to locations where the concentrated water flow can be safely carried downslope using drainage control structures such as off-take ditches or cross-drainage culverts.

- Where property ownership allows, roadside ditches must end at least 30 metres (100 ft) from watercourses/wetlands and water directed through an off-take ditch. Ditches must never discharge directly into a watercourse/wetland.
- Roadways located on reasonably level ground (low gradient) should have ditches constructed on both sides.
- Roadways located on steep terrains or hillsides should have ditches constructed on only the uphill side to intercept seepage and runoff
- Design roadside ditches to promote proper water flow management as follows:
  - Design the ditch to adequately handle the expected peak flow runoff
  - Maintain a minimum ditch gradient of 2%. Where possible, ditches should maintain the same slope as the roadway.
  - Ditch gradients less than 2% can be effective; however, a more frequent inspection and maintenance regime should be undertaken. Slopes at this level have the potential to pond water, which may saturate the subgrade.
  - Avoid sharp or abrupt changes in the gradient to minimize scouring of the invert of the ditch
  - Extend the ditch beyond areas deemed unsuitable for water dispersal such as sensitive soils, wetlands, or cuts
- Construct roadside ditches in the following manner:
  - Ditches should be constructed in an uphill direction to prevent trapping of surface runoff
  - Excavate ditches to a minimum depth of 30 centimetres (12 in)
  - Ditches should have a curved or flat bottom with fore and backslopes no steeper than a 1.5:1 slope
  - Areas that are prone to erosion should be stabilized immediately after excavation. Minimize ditch erosion using the following techniques:

- Line the ditch with non-erodible material such as rock or gravel
- Construct check dams or sediment barriers within the ditch to control water velocity and reduce sedimentation. See Section 6.2.7 *Check Dams* and Section 6.2.8 *Straw/Hay Bale Barriers*. This is a temporary measure until construction is complete, and all exposed areas are stabilized.
- Construct settling ponds (or traps) at the end of the ditch to check the water velocity. The larger particles of sediment suspended in the runoff settle out in the pond/trap. See Section 6.2.10 *Settling Pond (or Sediment Trap)*.
- Vegetate the ditch cross-section to reduce erosion.
- In areas of highly erodible soils, postpone construction activities until such time as the ground is frozen or weather conditions are dry.

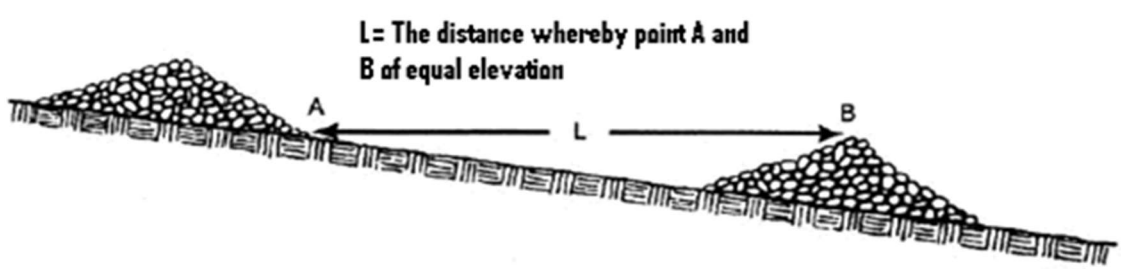
6.2.7 Check Dams

Check dams are temporary structures made from stones, hay/straw bales, sandbags, or logs constructed across ditches. Check dams are used to reduce the velocity of the concentrated flow and thereby, the potential for erosion until permanent stabilization of the disturbed area has been established.

Construct a check dam using the following procedure:

- Embed check dams in the bottom and the bank of the ditch by digging a trench at least 25 centimetres (10 in) deep across the width of the ditch. This will help prevent undercutting and runaround.
- Place dam material over the trench area until a height of 20 centimetres (8 in) below the roadbed is reached
- Construct check dams with the center at least 15 centimetres (6 in) lower than the ends of the dam. This notch in the center enables accumulated water to flow over the dam rather than around the ends, while sediment settles out on the upstream side of the dam.
- Stabilize by backfilling and compacting the soil against the dam
- Place check dams between 15 to 200 metres (50 to 670 ft) apart depending on the slope of the ditch. See Figure 6-4.

Figure 6-4 Measuring the placement of check dam distance



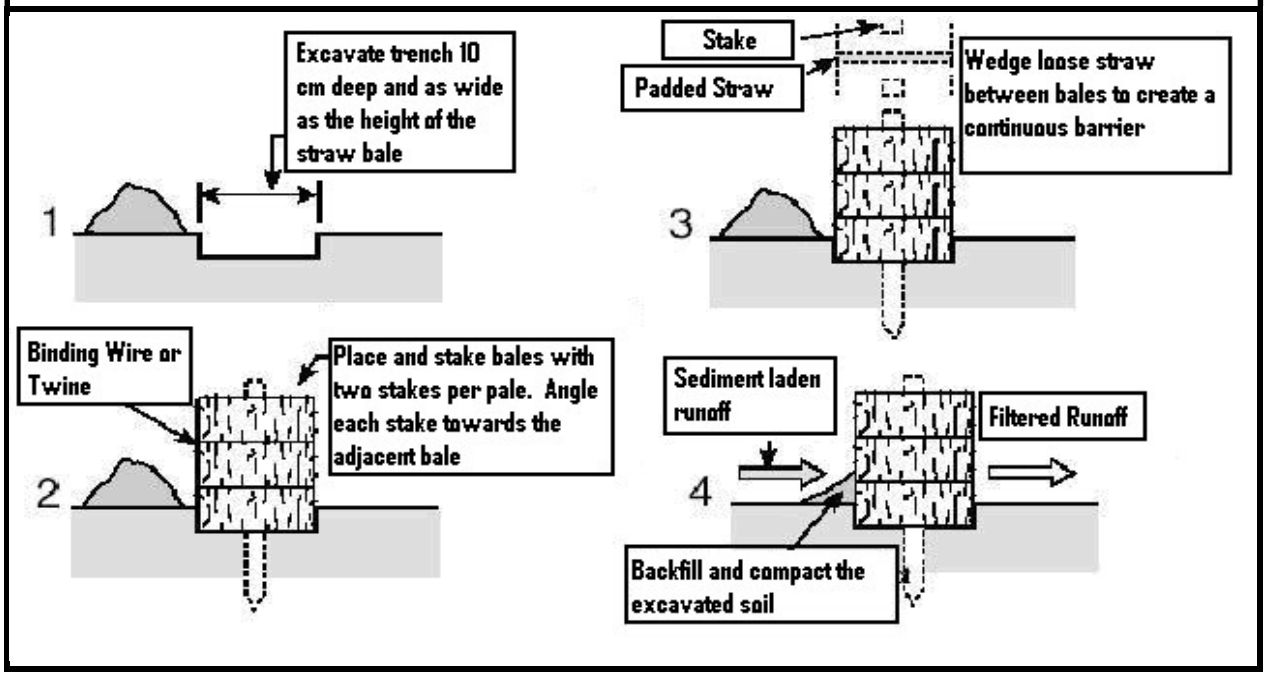
Inspect check dams regularly and after each runoff event to ensure that sediment does not accumulate to an elevation of more than half of the height of the dam. If this is the case, remove all accumulated sediment and dispose of it in an area where it will not re-enter a watercourse/wetland.

6.2.8 Straw/Hay Bale Barriers

Straw/hay bales and silt fences are temporary structures which function as sediment barriers. These sediment barriers are placed around the downslope perimeter of a disturbed area or along the top of the bank of a watercourse, in order to intercept runoff and trap sediment before it reaches the watercourse. See Figure 6-5.

- Sediment barriers must be erected prior to any soil disturbance of the upland area
- The gradient of the upslope of the barrier should be no steeper than 2:1 (horizontal to vertical)
- Sediment barriers should be checked regularly and immediately after each rainfall event for repair or replacement
- On the downhill side, backfill should be built level to the ground
- On the uphill side, build the backfill up approximately 10 centimetres (4 in) above the ground
- Remove the straw/hay bale barrier once the site is stable
- For placement distance, see Figure 6-4

Figure 6-5 Procedure for constructing a straw bale barrier

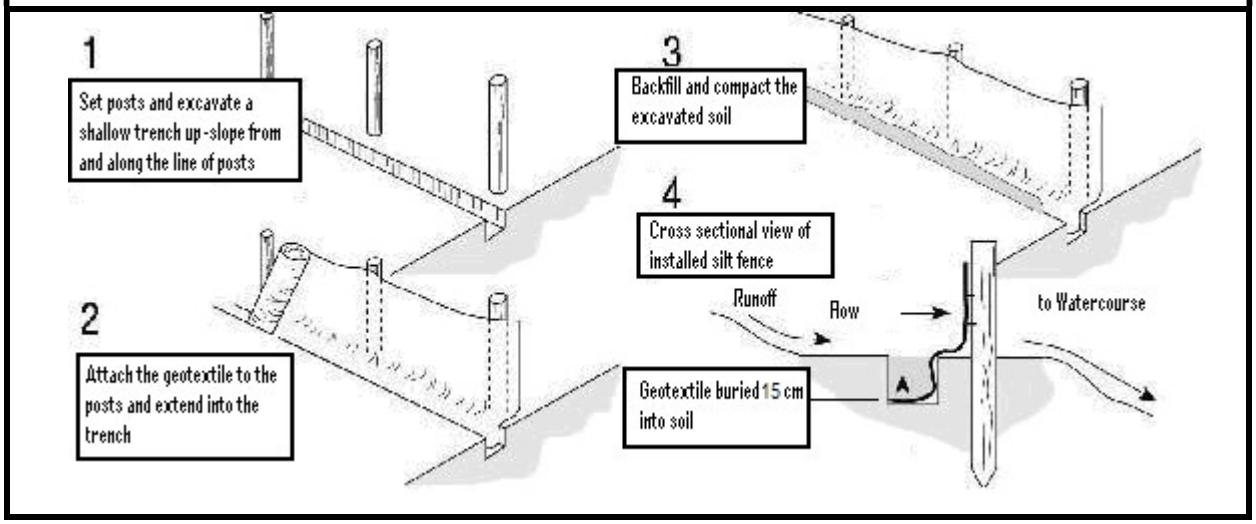


6.2.9 Silt Fence Construction

Construct a silt fence using the following procedure. See Figure 6-6:

- Silt fences should be limited to situations in which only sheet flow or overland flows are expected, not concentrated flow
- Set wooden or steel posts a minimum of 3 metres (10 ft) apart and drive into the ground a minimum of 30 centimetres (12 in). Wooden posts should be 150 centimetre (60 in) in length and at least 10 centimetres (4 in) in diameter.
- Excavate a trench, approximately 15 centimetres (6 in) deep up-slope from and along the line of the post
- Attach filter fabric to the posts on the uphill side and extend into the trench approximately 15 to 20 centimetres (6 to 8 in
- Fence height should not exceed 90 centimetres (36 in)
- Backfill the trench over the fabric and compact the excavated soil
- Silt fences are designed to remain in place until vegetation has re-established. Once the site is stabilized, they must be removed and properly disposed of.

Figure 6-6 Procedure for installing a silt fence



6.2.10 Settling Pond (or Sediment Trap)

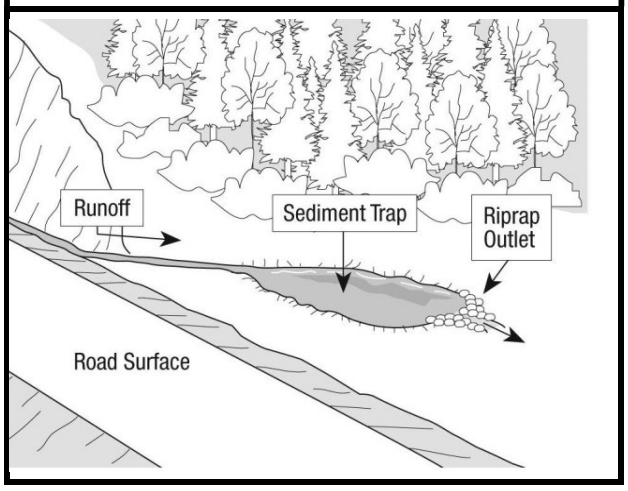
Settling ponds or sediment traps are used to intercept and retain sediment-laden runoff. See Figure 6-7. These ponds are usually located at the end of the ditch.

Sediment ponds are most often used when space is limited, or the road gradient is steep.

- Locate settling ponds at least 30 metres (100 ft) from watercourses/wetlands
- Settling ponds must have a volume of at least 190 cubic metres for every hectare (100 yds/acre) of a road under construction

- Construct a settling pond using the following procedure. See Figure 6-7.
  - Excavate the designated area to a minimum depth of 1.2 metre (4 ft) with the average length at least twice the average width
  - Construct the inner sides of the pond at a slope of 4:1
  - Line the outlet of the settling pond with rip-rap to prevent scouring and re-introduction of suspended sediment into the runoff. The area below the outlet should be stable and well-vegetated.
  - Maintain the area to ensure that the elevation of the sediment in the pond is 30 centimetres (12 in) below the lip of the outlet. When sediment accumulates to the lip of the outlet, remove sediment from the pond and dispose to an area where it cannot be washed into a watercourse/wetland by floodwaters or surface runoff

Figure 6-7 Layout of a settling pond (sediment trap)



6.2.11 Off-Take Ditches

Off-take ditches are used to transport concentrated runoff into well-vegetated areas in an effort to filter out sediment before runoff enters a watercourse/wetland. When constructing off-take ditches, practice the following:

- Locate off-take ditches at least 30 metres (100 ft) from watercourses/wetlands. If the topography permits, construct an off-take ditch on both sides of the road.
- Space off-take-ditches to accommodate the ditch gradient. See Example 6-1. Use the following formula:

$$\textbf{Spacing (m)} = \frac{\textbf{500 m}}{\textbf{\% ditch grade}}$$

$$\textbf{Spacing (ft)} = \frac{\textbf{1640 ft}}{\textbf{\% ditch grade}}$$

- Spacing may be disrupted in areas of unsuitable conditions such as bedrock substrate. Where this occurs, use the closest location available and resume construction.
- Extend off-take ditches into well-vegetated areas beyond the treed buffer. A suggested distance is 7.6 metres (25 ft) into the vegetated or wooded area.

6.2.12 Cross-Drainage Culverts

Cross-drainage culverts are used to transport runoff from one side of the road to the other at a road junction or under and away from a roadway. Diverting concentrated runoff to the low side of the road should prevent excessive runoff in ditches, thus reducing erosion of the roadbed and the potential for siltation. Install a cross-drainage culvert using the following procedure:

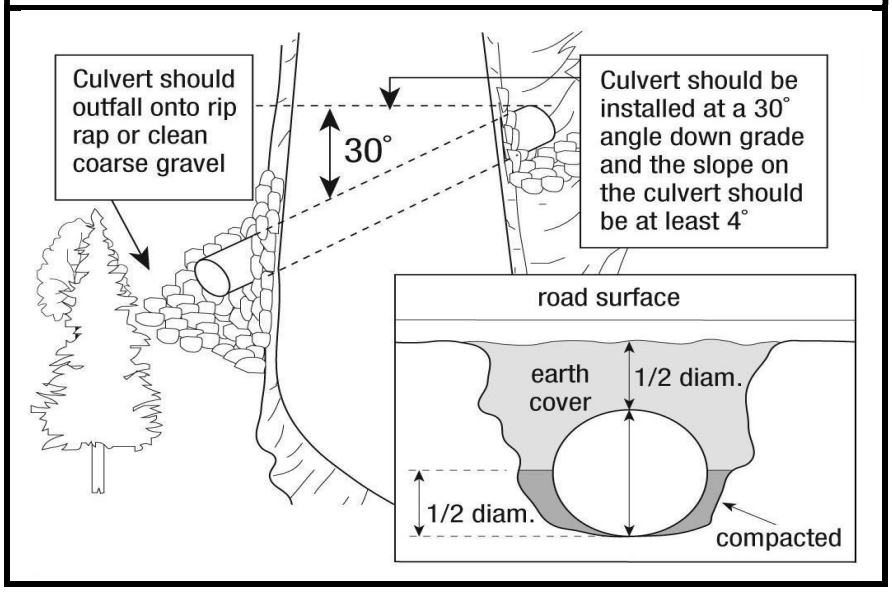
- Locate cross-drainage culverts at least 30 metres (100 ft) from watercourses/wetlands
- The minimum accepted opening of a cross-drainage culvert is 30 centimetres (12 in)
- If the road is located on a sidehill, ensure a cross-drainage culvert drains runoff to the downhill side of the road
- Space cross-drainage culverts to accommodate the ditch gradient. Use the following formula. This is the same formula as off-take ditches. See Example 6-1.

$$\textbf{Spacing (m)} = \frac{\textbf{500 m}}{\textbf{\% ditch grade}}$$

$$\textbf{Spacing (ft)} = \frac{\textbf{1640 ft}}{\textbf{\% ditch grade}}$$

- Spacing may be disrupted in areas of unsuitable conditions such as bedrock substrate. Where this occurs, use the closest location available and resume installation of culverts.
- Install cross-drainage culverts at a 30° angle downslope from a line perpendicular to the centerline of the road. See Figure 6-8. This allows water to flow easily through the culvert. Also, install a ditch block or groin to direct water from the ditch into the cross-drainage culvert.

Figure 6-8 Installation of a cross-drainage culvert



EXAMPLE 6-1
CALCULATING OFF-TAKE DITCH SPACING

How far apart should off-take ditches be placed with a ditch gradient of 15%?

$$\text{Spacing (m)} = \frac{500\text{ m}}{15\ \%} \quad \text{or} \quad \frac{1640\text{ ft}}{15\%}$$

$$= 33\text{ m} \qquad 109\text{ ft}$$

The off-take ditches should be spaced 33 metres (109 ft) apart.

6.2.13 Temporary Mulching

Daily maintenance of exposed soil must be practiced when construction lasts more than one day. To stabilize exposed soil at the end of each day:

- Spread mulch evenly over exposed erodible areas. Types of mulch to use include hay, straw, bark, natural vegetation, or mulch from waste-resource material.
- Hay or straw mulch is typically applied at a rate of one bale per 25 square metres (270 sq ft)
- Or place temporary matting such as erosion control blankets over the disturbed area

6.2.14 Permanent Re-Vegetation

Re-vegetation is a long-term surface water control method. Permanent re-vegetation of disturbed areas in and around the worksite should be done immediately following project completion.

- Prepare the site by:
  - Using effective erosion and sediment control techniques where needed
  - Grading the disturbed area at a uniform slope
  - Removing stones or debris
  - Loosening the soil by hand raking
  - Fertilizing where necessary
- Plant during suitable temperature and moisture conditions to promote plant growth. If planting after September 1st, soils will require a dense layer of mulch.
- Use mulch to improve the odds of successful re-vegetation as it conserves moisture, modifies soil temperatures, and prevents soil compaction.
- Choose a low maintenance seed mixture that is adapted to the local climate and soil conditions. Choose fast-growing and easy-to-plant mixtures. Vegetation must be native perennial non-invasive species.

- If possible, spray hydroseed over the disturbed soil area. This mixture is comprised of a slurry of seed, fertilizer, wood fibre mulch, and water that take hold quickly and effectively.
- Maintain the area by watering and fertilizing (where necessary).

6.3 MAINTENANCE OF MACHINERY AND PETROLEUM MANAGEMENT

Accidental release of pollutants can have detrimental consequences on the aquatic environment. Vehicle and machinery maintenance, in addition to proper storage, handling and transfer of fuels/lubricants, may reduce the potential for accidental spills or discharges into the environment. As a precautionary measure, action plans must always be in effect.

6.3.1 Machinery and Equipment

Machinery and equipment should be regularly maintained to prevent leaks of hydraulic fluids, cooling system liquids, and other fluids. Machinery and equipment should be inspected for leaks regularly.

Fuel in a secure area away from watercourses/wetlands or anywhere that surface water could become contaminated.

A fire extinguisher suited for extinguishing fires ignited by fuels should be on site at all times.

Machinery and equipment must never be cleaned in or near a watercourse/wetland. This is not limited to the alteration site, but anywhere that surface water could become contaminated and seep into a watercourse, wetland, or groundwater. Machinery should be washed in a designated maintenance area.

6.3.2 Fuel Handling and Transfer

All fuelling, maintenance, or repair of machinery and equipment should be performed at least 30 metres (100 ft) from watercourses/wetlands.

When servicing machinery and equipment, dispose of all containers, cartridges, filters, used oil and other refuse at a recognized disposal site in accordance with DELG.

6.3.3 Clean-up Material

Keep spill clean-up kits on site at all times. These kits are designed specifically for the various types of hazardous products that may be used. Each kit often designates a limit for the maximum quantity of spilled product that the kit can absorb/contain. Certified individuals must ensure that all machinery on site is equipped with its own spill kit and that each spill kit is sized appropriately in order to accommodate an incidental release.

Keep sorbent materials, suited to contain and/or absorb spilled products, on site at all times.

Acceptable sorbent materials include soil, sand, and commercially available spill control products.

6.3.4 Storage

All petroleum storage tank systems must be in compliance with the ***Petroleum Product Storage and Handling Regulation – Clean Environment Act*** (New Brunswick Regulation 87-97). Storage tank systems with a total capacity of greater than 2000 litres must be registered.

Store all petroleum products/lubricants and other hazardous materials at least 30 metres (100 ft) from watercourses/wetlands. The storage area must also be outside the floodplain.

Ensure that fuel storage containers, drums, and tanks are in good condition and clearly marked. Storage tanks must be inspected regularly as per Section 65 of the ***Petroleum Product Storage and Handling Regulation***.

Locate storage tanks on impervious mats and surround them by an impervious dyke/container.

The dyke area should be sized to accommodate a spill quantity of at least 110% of the storage tank capacity, with an additional 150 millimetres (6 in) freeboard.

6.3.5 Reporting Procedures

Any spill, regardless of quantity, must be reported by contacting DELG during business hours or the National Environmental Emergencies Center (1-800-565-1633) after hours.

The reporting procedure must contain the following information, as stated in the ***Water Quality Regulation*** (82-126, Section 11(2)), under the authority of New Brunswick's ***Clean Environment Act***, C-6.

- The spilled product(s) type and amount
- The area affected including potential watercourse(s)/wetland(s)
- The cause of the spill
- The remedial action taken or to be taken

6.3.6 Containment

If safe to do so, to the greatest extent possible, stop the leak/spill immediately, secure the area where the spill occurred and contain the spilled product.

6.3.7 Clean-up Procedures

It is the responsibility of the certified individual to ensure the area affected by the spill is cleaned up to the satisfaction of DELG.

- When clean-up poses a safety threat, wait for expert help to arrive.
- If clean-up can be done safely, apply the following techniques.
  - When a small spill occurs on level land, use spill clean-up kits and sorbent material to clean up/absorb the spill. Excavate all affected soil and place it in a temporary container.
  - When possible, pool spill product and pump it into a temporary container. Excavate all affected soil and place in a temporary container.
  - When a spill occurs on a side hill or slope, construct a berm of impermeable soil downhill from the spill area to intercept the spilled product(s). Excavate all affected soil and temporarily place it in a container.
  - Dispose of sorbent material and contaminated soil at a recognized disposal site. A list of disposal sites may be obtained from DELG.
- If spill product(s) reaches a watercourse, or the open water of a wetland, attempt to prevent the material from migrating by using the following:
  - On small watercourses, use a weir made of plywood, sheets, logs, or any other available material. Place the weir across the watercourse, allowing water to flow underneath while stemming the movement of the floating oil/contaminant.
  - On larger watercourses (1 metre (3ft) deep or greater), a fence-type structure may be used. Stake and brace snow fencing in the watercourse. Line the upstream side of the fence with commercially available floating booms (adsorbent pads).
  - Sorbent booms may be used alone to intercept spill products by installing the boom across the full width of the watercourse. These booms may be either commercially purchased or fabricated on-site.

6.4 MATERIALS USED IN AND NEAR WATERCOURSES AND WETLANDS

Only materials that will not negatively impact water quality may be used in watercourses/wetlands or in close proximity to watercourses/wetlands.

6.4.1 Fresh Concrete

Fresh, wet, and uncured concrete must not come into contact with stream flow in the watercourse or in contact with water that will flow into a watercourse as it can be toxic to aquatic life.

- Concrete blocks must be cured for at least one week before they are used in or near a watercourse/wetland.
- Concrete used in a watercourse that has been isolated from stream flow must be permitted to cure long enough prior to releasing stream flow so that it does not

contaminate the water after the flow is released. Concrete must be cured for at least one week before coming into contact with stream flow.
- Excess, unused concrete must not be permitted to enter a watercourse/wetland.
- Wash water contaminated with concrete must not enter a watercourse/wetland.

6.4.2 Treated Wood

Care should be taken when choosing treated wood (wood containing preservatives) for use near watercourses/wetlands.

- The use of wood treated with creosote is not permitted for use in any part of the structure, nor repair of any existing structures. This includes decking and stringers of a bridge.
- The following wood materials can be used below the ordinary high water mark of a watercourse and in a wetland:
  - untreated rot-resistant timber, such as hemlock, tamarack, juniper, or cedar;
  - pressure-treated Alkaline Copper Quaternary (ACQ), or Chromated Copper Arsenate (CCA) treated wood if treated in accordance with CAN/CSA-O80 SERIES-08 (R2012) and as described in the Wood Preservation Specification Guide (Ottawa, ON. Wood Preservation Canada, 2014) as updated from time to time. For more information, visit: http://www.woodpreservation.ca/index.php/en/specifiers-guide

Note: It is recommended to avoid the use of wood pressure-treated with chromated copper arsenate (CCA) (*i.e.* wolmanized) below the ordinary high water mark of watercourses and in a wetland.

WHY RISK IT

Follow the requirements for drying and curing time of pressure-treated wood and concrete to reduce the potential for serious water quality problems.

Remember, a rainfall event can happen at any time. Runoff over or interfacing with construction materials can carry toxic substances into the watercourse/wetland.

6.4.3 Rock Material

Rock material imported to a work site that is used in or within 30 metres of a watercourse/wetland must be clean coarse granular aggregate material, durable, non-ore-bearing, non-watercourse/wetland derived and non-toxic to aquatic life.

In some cases, there may be a requirement for a mixture of rock with a percentage of fines (20% with no clay) when constructing an energy dissipation pool for culvert

installations or a new watercourse channel. The rock mixture is to be washed thoroughly prior to releasing the stream flow into the energy dissipation pool or channel.

Rock must not be sulphide bearing aggregate. Some rock, commonly referred to as slate or shale, can be sulphide bearing and can generate acid if disturbed and exposed to air/water. Slate and shale rock can be tested to determine its acid-producing potential.

6.5 SITE CLEAN-UP

Remove all material from the site upon completion of the project. Excavated materials must be disposed of where they cannot be washed into a watercourse/wetland by floodwaters or surface runoff. Other materials, which may include excavated soil, wood debris, excess rip-rap, etc., must be entirely collected and disposed of outside a regulated area, in a manner acceptable to DELG. A good clean-up results in the site being returned as close as possible to its original condition.