Table 9 – Linear Control Measures

Type	Description	Variations	Installation	Advantages	Disadvantages
Fiber roll	A monofilament polypropylene net or natural-fiber fabric tube sock that is filled with straw. Typically, it is 8" in diameter and comes in 25-foot lengths.	The tube sock can be made of natural fibers or synthetic materials. Fiber rolls can be filled with ordinary straw, certified-weed free straw, coir, flax, rice hulls, or synthetic materials.	Typically, fiber roll is installed in a 2-3" deep trench and staked down every 4 feet. Ends should overlap at least 1 foot and be firmly secured. Fiber roll may also be lashed down with a rope or steel cable. In some cases, such as on a slope covered with other erosion controls, trenching in the linear control measure may not be desirable. Because it needs no trench, the tie-down method can be placed on top of a proper blanket installation helping to prevent rill development under the blanket.	✓ Readily available ✓ Comes in biodegradable versions ✓ Light weight makes slope installations easier than other linear control options.	× Other than the fully synthetic varieties, they tend to have a maximum life expectancy of one storm season. × Need to be trenched in or otherwise firmly secured to the underlying surface. × Not suitable for use on hardened or paved surfaces or in soils that are not able to be trenched down 2–3 inches. × Cannot be ran over by vehicles. × Monofilament encased fiber roll must be removed at the completion of construction (prior to terminating permit coverage).

Type	Description	Variations	Installation	Advantages	Disadvantages
Silt fence	An approximate 3-foot high woven or processed mesh fabric that is attached to wooden stakes.	Stakes can be preattached to the fabric or attached upon installation. Fabric comes in different weights and durabilities. For high wind applications, wire backed fabric is available. High visibility orange fabric is available where needed to also provide a visible barrier.	Silt fence must be trenched in a minimum of 6” deep and held up by supporting stakes. Stakes should be spaced 5 to 6 feet apart and placed on the downgradient side of the fence so that they support the fabric holding the anticipated storm water/sediment load. The fabric is typically secured to the stakes with staples, zip ties, etc.	✓ Will accommodate higher sediment loads. ✓ Can double as a barrier for an environmentally sensitive area or the work zone boundary. ✓ Can double as wildlife exclusion fencing. ✓ Maintaining a perfectly level installation is a little less crucial, especially if cross-barriers are used. ✓ Can be machine installed.	× Tend to be more susceptible to wind damage. × Life expectancy is typically less than one year. × Is not biodegradable and needs to be removed.

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Compost socks	A woven sock that contains "2-inch minus" composted wood mulch.	Compost socks come in a variety of sock materials (synthetic and naturally biodegradable), diameters, and lengths.	In places where there is not any concentrated flow, compost socks may be placed directly on the pervious or impervious surface. They are self-weighting and do not need to be trenched in. Where runoff may be more concentrated, compost socks should be secured with staking per the manufacturer's recommendations.	✓ They filter water, and sediment is captured within the sock. ✓ They remove, to varying degrees, other pollutants, such as oils, metals, nutrients, and organic compounds. ✓ They do not always need to be trenched in and staked down, which allows them to be placed on impervious surfaces and easily moved out of and back into position. ✓ They tend to be more durable than fiber roll, often lasting up to two storm seasons. ✓ They can tolerate—to a certain degree—being run over by vehicles. ✓ When done, the fabric can be sliced open and discarded and the compost can usually be utilized on-site.	× They are heavy and more difficult to handle than fiber roll. × Even when within USEPA and state limits, detritus such as plastic or metal, etc. may be present and unacceptable near waterbodies unless, after the intended use of the sock when the fabric covering is removed and discarded, the detritus is picked from the spread-out compost being left on-site.

Type	Description	Variations	Installation	Advantages	Disadvantages
Curb cutbacks	When there is a hardscape/soil interface and water is flowing from the area of soil disturbance to the hardscape, the soil can be graded down 4–6 inches at the edge of the hardscape so that water will stop at the interface.	Different depths, widths, and tapering of the excavation.	Using a piece of equipment, grade 4–6 inches down a 3–5 foot wide area immediately adjacent to the hardscape. The graded strip can be tapered so that it slopes downward toward the hardscape border.	✓ No materials need to be purchased. ✓ Relatively easy to install and maintain in most instances. ✓ Can be run over by vehicles and equipment. ✓ No undercutting of the control measure by the runoff.	× Does not appear to be a BMP; therefore, construction crews and inspectors must be trained to recognize and maintain it. × Not recommended for places where hardscape could be compromised by the runoff. × Not recommended for concentrated flow.
Gravel bags / sandbags	A row of gravel or sand-filled bags that cause water flow to slow before proceeding beyond it.	Different bag materials, some water can pass through and others are impenetrable to water. Different bag sizes ranging in capacity from 30–40 lb. typical sacks to 1-ton supersacks. Different bag filling materials. Gravel tends to allow water to pass through while sand tends to not allow it to penetrate.	Place a row of gravel or sand filled bags to act as a “speed bump” for the water flow. The row can be built up with multiple layers of filled bags.	✓ Can be placed on impervious surfaces. ✓ Can be used in locations with concentrated or channelized flow. ✓ Readily available.	× Bags are heavy and hard to handle and place. × Bags can be torn by equipment and vehicles or degraded by sunlight and can become themselves a source of sediment. × Sandbags should not be used by discharge points, especially where subject to being damaged. × Bags must be removed at the completion of construction (prior to filing for permit termination.)

Type	Description	Variations	Installation	Advantages	Disadvantages
Water bars	A 4 to 6 inch high "speed bump" made of soil, aggregate, or asphalt, placed across an erodible sloped road/path. The water bar, while not a true linear sediment control measure but more of a concentrated flow BMP, redirects sheet flow on the roadway to one or both of the sides of the road, which is stabilized with vegetation or has a stabilized swale equipped with check dams and velocity dissipation.	The water bar can be constructed of a variety of materials. A rolling swale, which is a depression that extends across the roadway/path, can also be used to intercept and redirect sheet flow.	Water bars or rolling swales are typically installed with a piece of grading equipment or by hand. As with other linear control measures, they should be spaced 10 to 50 feet apart depending upon the slope ratio of the roadway/path. Make sure to provide a stabilized path for the redirected flow to travel after the water bar and provide velocity dissipation at the end of the conveyance.	✓ Native materials are typically used to construct them. ✓ Can be easily removed when not needed. ✓ Can be run over by vehicles and equipment.	× Earthen water bars or swales are also susceptible to erosion. × Can result in concentrated flow (i.e., directing water to a roadside swale) and must be accompanied with channel stabilization and velocity dissipation control measures.
Terracing and grade breaks	Engineered ridges and channels constructed across the slope (parallel with the slope contours) to intercept downslope sheet flow and to redirect the runoff to a place where it can be discharged off the slope in a controlled manner (e.g., stabilized swale or downslope pipe).	The terrace benches can be of varying widths and the channels or swales can be earthen or stabilized with aggregate, geotextiles, or concrete.	Must be engineered and part of the approved grading plans. Terrace benches should typically slope back into the hill and they should be spaced 10 to 50 feet apart depending upon the slope ratio. A mechanism for controlled downslope drainage with velocity dissipation at the outlet should be included in the design.	✓ Native materials are typically used to construct them. ✓ They are usually a permanent control measure.	× Linear control measures may still be needed until terraces and slopes have been completed and stabilized. × Terraces will typically result in concentrated flow (i.e., directing water into a pipe or swale) that will need energy and velocity dissipation.

Type	Description	Variations	Installation	Advantages	Disadvantages
Log erosion barriers[1]	In a natural setting, utilizing downed or intentionally felled trees to intercept and slow downslope runoff.	Burnt or other dead timber from wildfires can be utilized. Felled trees from fire prevention / forest management practices can be used.	A contour line is marked on the slope to identify the approximate cross slope alignment. Trees along this line are felled on the upstream side of the contour line as much as possible. Stumps are left about 12" high to brace the tree. The logs are cut to a length that permits safe handling and placement for the crew, generally 10 to 30 feet, but longer logs can be difficult to manage and therefore can be broken up into 4-foot segments. Tree limbs are removed to the extent necessary for the log to lie flat on the ground. A shallow trench (about 2 to 6 inches deep) is dug along the contour. The log is placed in the trench and seated with tamped backfill such that water flowing down the slope will not run under it. For this practice to be effective, the gaps between the logs must be blocked by a "joining" log above or below the gap to impede passage of water.	✓ Ideal for erosion control after wildfires, for forest thinning / management activities, and for restoration projects. ✓ Utilizes native materials that do not need to be later removed and can remain in place permanently. ✓ Minimizes concerns regarding solid waste of used BMPs and potential for wildlife entrapment.	✗ Need to have a good supply of logs. Hot burn areas may not have enough remaining logs. ✗ Water can flow under logs that do not have good conformance to the ground. ✗ Labor intensive work.

[1] U.S. Department of Agriculture Natural Resources Conservation Service, After the Fire – Log Erosion Barriers, https://www.nrcs.usda.gov/resources/guides-and-instructions/after-the-fire-log-erosion-barriers.

Type	Description	Variations	Installation	Advantages	Disadvantages
Boulders, riprap, and earthen berms.	Often with some creativity, natural materials or features already present at the site can be used effectively as linear sediment control measures.	Natural materials can include boulders or broken-up rock (riprap), logs (as described above), and berms that are either existing or have been created with rock or salvaged organic material.	Use what you have on hand, making sure the material will 1) adequately impede storm water surface flow, and 2) not itself be a source of sediment or pollutants.	✓ Lessens the need for purchased BMPs. ✓ Utilizes (and recycles) materials already present. ✓ May reduce the need for off-hauling of materials from the site. ✓ May be able to become a permanent sediment control feature.	× Sometimes it is hard to achieve good conformance to the ground so that flows don't undercut the BMP. × May not have enough supply of natural materials to provide linear control for the entire project. × Earthen berms need to be stabilized or vegetated.
Vegetative buffers and hedgerows.	A linear stretch of vegetation between the construction area and the project boundary or receiving water.	This can take many different forms, such as preserving 50 feet or more of existing vegetation; planting or preserving a hedgerow of trees, bushes, or vines; or engineering and designing a landscaped area that storm water runoff must pass through.	Installation may be as simple as installing ESA fencing to protect an existing area of vegetation. Or it may involve landscape design and engineering and installation to create a vegetative buffer.	✓ Lessens the need for purchased BMPs. ✓ Vegetative buffers are very effective in improving water quality. ✓ Certain species of plants can uptake pollutants and provide phytoremediation. ✓ Vegetative buffers reduce runoff by facilitating infiltration and transpiration. ✓ They can also provide some wind protection to help control wind soil loss. ✓ It provides habitat for birds and other animals.	× Can already have paths of preferential flow, channeling, and erosion issues. × Need maintenance to manage vegetative growth and disease. × Can restrict flows too much.