

General Information

A. Purpose

In an effort to protect the nation's waters from pollution, the Environmental Protection Agency (EPA) has developed a system of regulations, under the Clean Water Act, entitled the National Pollutant Discharge Elimination System (NPDES). These regulations require the owner of a site to obtain a permit prior to construction, and ensure that proper steps are taken during construction to help prevent erosion and prevent sediment from leaving construction sites.

The purpose of this chapter is to explain the erosion and sedimentation process, and describe methods that may be used to protect natural resources by reducing both. In addition, the steps required to comply with the EPA's NPDES regulatory requirements will be explained. The regulatory information in this section is included as a convenience to the designer. The actual regulations of the Iowa Department of Natural Resources (DNR) govern if there are any discrepancies.

B. Background

Approximately 40% of the nation's waterways have been identified as impaired, meaning that they do not meet the water quality standards for their intended use. In Iowa, the most common reason for a waterway to be designated as impaired is due to high levels of suspended sediment. One of the main sources of suspended sediment found in waterways is construction site stormwater runoff.

Sediment in runoff from construction sites is a direct result of the erosion created when the site is stripped of its stabilizing vegetation. According to the U.S. Environmental Protection Agency (EPA), sediment rates in stormwater runoff from construction sites are typically 10 to 20 times greater than for agricultural lands. In urban areas, stormwater runoff is quickly intercepted by the storm sewer and does not have a chance to travel over vegetated areas where suspended sediment can be removed. The sediment in this runoff eventually reaches streams, ponds, lakes, and rivers. High levels of suspended sediment can quickly form large silt deposits, filling in these waterways.

Silt deposits can cause damage to public and private property. Silt deposits often flow onto adjacent property, causing damage; flow onto public streets, creating mud and dust; and clog storm sewers and ditches. The financial impact caused by this sediment is substantial. Waterways must be dredged to remove the deposits, streets swept, ditches and storm sewers cleaned, and property damaged by sediment must be repaired or replaced. While the financial impacts are significant, the loss of natural resources is just as important.

High levels of sediment in storm runoff can impact an ecosystem. Sediment is often contaminated with other pollutants such as phosphorous, nitrates, pesticides, and heavy metals. In high enough concentrations, these pollutants become poisonous. In addition, the suspended sediment filters out sunlight, killing off aquatic vegetation. Many species of animals depend on this vegetation for habitat and nourishment. If enough vegetation is destroyed, the levels of dissolved oxygen in the water can drop to levels where aquatic wildlife cannot survive. Waterfowl and other animals, dependent on the fish and vegetation for sustenance, may die or leave the area.

C. Definitions

Aggregate: Crushed rock or gravel screened to different sizes for various uses in construction projects.

Annual Plant: A plant that completes its life cycle and dies in one year or less.

Apron: A floor or lining to protect a surface from erosion. Normally at the inlet or outlet of a storm conduit.

Berm: A raised area that breaks the continuity of a slope.

Best Management Practices: Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Channel: A stream that conveys continuous or intermittent water; a ditch or channel excavated for the flow of water.

Channel Stabilization: Erosion prevention and stabilization of velocity distribution in a channel using jetties, drops, revetments, vegetation, and other measures.

Clay (Soils): (1) A mineral soil separate consisting of particles less than 6.6×10^{-6} feet (0.002 mm) in equivalent diameter. (2) A soil textural class. (3) A fine-grained soil that has a high plasticity index in relation to the liquid limits.

Clean Water Act (CWA): The Federal Water Pollution Control Act.

Clod: A compact, coherent mass of soil 2 inches or larger, produced artificially, usually by digging, etc., especially when these operations are performed on soils that are either too wet or too dry for normal soil movement.

Code of Federal Regulations (CFR): A codification of the final rules published daily in the Federal Register. Title 40 of the CFR contains the environmental regulations.

Compaction: The process by which the soil grains are rearranged to decrease void space and bring the grains into closer contact with one another and thereby increase the weight of solid material per cubic foot.

Construction Site: A site or common plan of development or sale on which construction activity, including clearing, grading, and excavating, results in soil disturbance. A construction site is considered one site if all areas of the site are contiguous with one another and one entity owns all areas of the site.

Contour: An imaginary line on the surface of the ground connecting points of the same elevation.

Cover: (1) Vegetation or other material providing protection. (2) Ground and soils: any vegetation producing a protective mat on or just above the soil surface. (3) Stream: generally trees, large shrubs, grasses, and forbs that shade and otherwise protect the stream from erosion, temperature elevation, or sloughing of banks. (4) Vegetation: all plants of all sizes and species found on an area, regardless of whether they have forage or other value. (5) Artificial: any material (natural or synthetic) that is spread or rolled out over the ground to protect the surface from erosion.

Detention Basin (Pond): A structure barrier built to divert part or all of the runoff water from a land area and to release the water under a controlled condition.

Drainage: The removal of excess surface water or groundwater from a land area.

Erosion: (1) The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep. (2) Detachment and movement of soil or rock fragments by water, wind, ice, or gravity.

Filter Strip: Strip of vegetation above ponds, diversion structures, or other elements to retard flow of runoff water and thereby reduce sediment flow.

Final Stabilization: Period when all soil-disturbing activities at the site have been completed and a uniform perennial vegetative cover with a density of 70%, sufficient to preclude erosion, for the entire disturbed area of the permitted project has been established, or equivalent stabilization measures have been employed, or which has been returned to agricultural production.

Gabion: A rectangular or cylindrical wire mesh cage filled with rock and used as a protecting apron, revetment, retaining wall, etc., against erosion.

General Permit: An NPDES permit issued under 40 CFR 122.28 that authorizes a category of discharges under the CWA within a geographical area. A general permit is not specifically tailored for an individual discharger.

Grade: (1) The slope of a road, channel, or natural ground, or any surface prepared for the support of construction such as paving. (2) To finish the surface of a roadbed, top of embankment, or bottom of excavation.

Grass: A member of the botanical family Gramineae characterized by blade-like leaves arranged on the culm or stem in two ranks.

Grassed Channel (Waterway): A natural or constructed waterway, usually broad and shallow, covered with erosion-resistant grasses, used to conduct surface water from land.

Ground Cover: Grasses or other plants grown to keep soil from being blown or washed away.

Gully: A channel or miniature valley cut by concentrated runoff, through which water commonly flows only during and immediately after heavy rains, or during the melting of snow. The gullies may be branching or linear, rather long, narrow, and of uniform width. The difference between a gully and rill is the depth. A gully is sufficiently deep that it would not be obliterated by tillage operations. A rill of lesser depth can be smoothed by regular tillage equipment.

Infeasible: Not technologically possible or not economically practicable and achievable in light of best industry practices.

Infiltration: The gradual downward flow of water from the surface through soil to ground water and water table reservoirs.

Large Construction Activity: As defined in 40 CFR 122.26(b)(14)(x), a large construction activity includes clearing, grading, and excavating, resulting in a land disturbance that will disturb five acres or more of land, or will disturb fewer than five acres of total land area, but is part of a larger common plan of development or sale that will ultimately disturb five acres or more. Large construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site.

Legume: A member of the Leguminosae family, one of the most important and widely distributed plant families. Leaves are alternate, have stipples, and are usually compound. Most legumes are nitrogen-fixing plants.

Loess: Soil material transported and deposited by wind and consisting predominantly of silt-sized particles.

Mulch: A natural or artificial layer of plant residue, or other materials such as straw, leaves, bark, sand, or gravel on the soil surface, to protect the soil and plant roots from the effects of raindrops, soil crusting, freezing, evaporation, etc.

Municipal Separate Storm Sewer System (MS4): A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) meeting the following criteria:

- a. Owned and operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act (CWA) that discharges to waters of the United States.
- b. Designed or used for collecting or conveying stormwater
- c. Which is not a combined sewer
- d. Which is not part of a publicly owned treatment works (POTW)

National Pollutant Discharge Elimination System (NPDES): National program under Section 402 of the Clean Water Act for regulation of discharges of pollutants from point sources to waters of the United States. Discharges are illegal unless authorized by an NPDES permit.

Nurse Crop: Seeding of a short-life crop with a permanent species to aid in erosion control until the permanent species are established.

Organic Matter: Decomposition products of plant and animal materials, such as litter, leaves, and manure.

Perennial Plant: A plant that normally lives three years or longer.

Permeability, Soil: The quality of a soil horizon that enables water or air to move through it. The permeability of a soil may be limited by the presence of one nearly impermeable horizon even though the others are permeable.

Permitting Authority: The United States EPA, a Regional Administrator of the EPA, or an authorized representative. Under the Clean Water Act, most states are authorized to implement the NPDES permit program.

pH: A measure of hydrogen ion concentration. Values range from 0 to 14; a pH of 7.0 is neutral. All pH values below 7.0 are acidic, and all above 7.0 are alkaline.

Planting Season: The period of the year when planting or transplanting is considered advisable from the standpoint of successful establishment.

Point Source: Any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock concentrated animal feeding operation (CAFO), landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.

Pollutant: Dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water.

Qualified Personnel: Those individuals capable enough and knowledgeable enough to perform the required functions adequately well to ensure compliance with the relevant permit conditions and requirements of the Iowa Administrative Code.

Receiving Water: The "Water of the United States" as defined in 40 CFR 122.2 into which the regulated stormwater discharges.

Revetment: Facing of rip rap, or other material, either permanent or temporary, placed along the edge of a stream to stabilize the bank and protect it from the erosive action of the stream.

Rip Rap: Broken rock, cobbles, or boulders placed as revetment on earth surfaces such as the face of a dam or the bank of a stream, for the protection against the action of water or waves.

Runoff: That portion of the precipitation on a drainage area that is discharged from the area. Includes surface runoff and groundwater runoff.

Section 401 Certification: A requirement of Section 401(a) of the Clean Water Act that all federally issued permits be certified by the state in which the discharge occurs. The state certifies that the proposed permit will comply with state water quality standards and other state requirements.

Sediment: Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice.

Seed: The fertilized and ripened ovule of a seed plant that is capable, under suitable conditions, of independently developing into a plant similar to the one that produced it.

Seedbed: The soil prepared by natural or artificial means to promote the germination of seed and the growth of seedlings.

Small Construction Activity: Clearing, grading, and excavating resulting in a land disturbance that will disturb one acre or more and fewer than five acres of total land area, but is part of a larger common plan of development or sale that will ultimately disturb five or fewer acres. Small construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site.

Sod: A closely knit ground cover growth, primarily of grasses, held together by its roots.

Soil Amendment: Any material, such as compost, lime, gypsum, sawdust, or synthetic conditioner that is worked into the soil to make it more productive. This term is used most commonly for added materials other than fertilizer.

Soil Horizon: A layer of soil, approximately parallel to the soil surface, with distinct characteristics produced by soil-forming processes.

Soil Stabilization: The prevention of soil particles from being dislodged and moving, therefore preventing erosion from initiating or continuing.

Soil Structure: The combination or arrangement of primary soil particles into secondary particles or units. The secondary particles are characterized by size, shape, and degree of distinctness into classes, types, and grades.

Stormwater: Storm runoff, snow melt runoff, and surface runoff and drainage.

Stormwater Discharge Related Activities: Activities that cause, contribute to, or result in stormwater point source pollutant discharges, including excavation, site development, grading, and other surface disturbance activities; and measures to control stormwater, including the siting, construction, and operation of BMPs to control, reduce, or prevent stormwater pollution.

Stubble: The base portion of plants remaining after the top portion has been harvested.

Tacking: The process of binding mulch fibers together by adding a sprayed chemical compound.

Topsoil: The unconsolidated earthy material that exists in its natural state and is or can be made favorable to the growth of desirable vegetation. Usually the A-horizon of soils with developed profiles.

Uncontaminated Groundwater: Water that is potable for humans, meets the narrative water quality standards in subrule 567-61.3(2) of the Iowa Administrative Code, contains no more than half the listed concentration of any pollutants in subrule 567-61.3(3) of the IAC, has a pH of 6.5-9.0, and is located in soil or rock strata.

Vegetation: Plants in general or all plant life in the area.

Water(s) of the State: Any stream, lake, pond, marsh, watercourse, waterway, well, spring, reservoir, aquifer, irrigation system, drainage system, and any other body or accumulation of water, surface or underground, natural or artificial, public or private, which are contained within, flow through, or border upon the State of Iowa or any portion thereof.

Waters of the United States: All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters subject to the ebb and flow of the tide. Waters of the United States include all interstate waters and intrastate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds.

Weed: An undesired uncultivated plant.

Wetlands: Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.