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SECTION 12.0 STORMWATER QUALITY ENHANCEMENT

12.1 REGULATORY BACKGROUND

Since the National Environmental Policy Act of 1969 (NEPA), much attention has been given to the control of erosion and sedimentation by Federal, State and local governments. Numerous laws and regulations governing land-disturbing activities have been developed and published. Some important legislation that affect construction activities in regard to erosion and sediment control are:

1. The Clean Water Act (sections 401,402 and 404)
2. Senate Bill 40 (SB40) Wildlife Certification (Title33, article 5, CRS)
3. The Colorado Water Quality Control Act (Title 25, article 8, CRS)
4. City of Greeley Ordinance #33,1994 (Chapter 14.15) (Established Stormwater Management Program)
5. City of Greeley Ordinance #15, 1996 (Chapter 09.18) (Grading & Soil Erosion Control)
6. City of Greeley Ordinance #32,1999 (Chapter 14.16) (Prohibits Illegal Dumping into City's Stormwater Drainage System)

Of particular importance are the National Pollutant Discharge Elimination System (NPDES) Phase II stormwater regulations issued by the Environmental Protection Agency (EPA). In 1999, the regulation was extended to include smaller municipalities as well. The Phase II Stormwater Permit Regulation required small municipalities (<100,000 population) to obtain NPDES MS4 Permit coverage. **The phase II regulation also reduced the minimum size of construction projects requiring NPDES permits from 5 acres of disturbed area to just 1 acre.**

Colorado is an NPDES state, which means the EPA's authority to issue NPDES permits is delegated to the state regulatory agency, the Colorado Department of Public Health & Environment (CDPHE). CDPHE implements and enforces the NPDES Programs through the Colorado Discharge Permit System (CDPS) program.

12.2 INTRODUCTION

The character of the urban landscape affects both the quantity and the quality of stormwater discharged to receiving waters during and after each runoff event. The quality of stormwater runoff from developed lands and urbanized areas can be impacted by some or all of the sources and contaminants shown below. The increase in impermeable areas such as rooftops, parking lots and paved surfaces acts directly to impact stormwater quality by decreasing the opportunity for stormwater to infiltrate and percolate into the ground, and the absence of natural surfaces and vegetation allows for increased runoff velocity and pollutant carrying forces.

TABLE 12.2 POSSIBLE SOURCES OF POLLUTANTS IN STORMWATER

POSSIBLE SOURCES OF POLLUTANTS IN STORMWATER	
Source	Contaminant
Vehicles, Machinery and Industry	Metals, Lubricants, Solvents, Paints
Lawn Care, Gardening	Pesticides, Herbicides, Fertilizers

Household Chemicals Cleaners, Chlorine	Paints, Solvents, Detergents, Disinfectants,
Pets and Animals	Fecal Material, Organic Wastes
Parking Lots	Oil, Grease, Automotive Fluids, Sediments

The intent of this section of these Criteria is to present minimum requirements for the implementation and use of Best Management Practices (BMP's) for stormwater quality control within the City of Greeley. Compliance with this section does not require water quality monitoring, or quantitative descriptions of pollutant load removal. Instead, a performance-based approach is described, whereby the existing principles and objectives of pollutant transport control are addressed in a general manner. Individual methods must be selected and implemented to best fit the conditions and requirements of each site.

These Criteria are developed from information and design guidelines presented in the Urban Storm Drainage Criteria Manual (USDCM), Volume 3, "Best Management Practices." The reader is referred to the USDCM for an extensive discussion of the development of stormwater quality controls and regionally acceptable BMP's.

Section 13 of these Criteria discusses the City's requirements for stormwater quality control due to erosion and sedimentation during the construction period.

12.3 REGULATION CONTROLLING DISCHARGES TO STORM DRAINS

The following regulations shall apply to discharges to storm drains:

No person shall discharge non-stormwater wastewater, which contains pollutants from industrial, commercial or sanitary point sources to a storm drain unless a Colorado Discharge Permit System (CDPS) permit has been obtained for the discharge.

No person shall connect a system for drainage of industrial, commercial or sanitary wastewater, which contains pollutants, other than to convey stormwater runoff to a storm drain unless a CDPS permit has been obtained.

All connections between industrial, commercial, or sanitary non-stormwater wastewater sewers or other drainage conveyances and storm drains which are not the subject of a CDPS permit shall be disconnected even though the connection is unused.

Compliance with the City of Greeley Ordinance No. 32, 1999 is also required. This is an ordinance-amending chapter 14.16 of the Greeley Municipal Code of Ordinances to Prohibit Illegal Discharges into the City of Greeley's Stormwater Drainage System and Specifying Penalties for such Violations.

12.4 OBJECTIVES FOR STORMWATER QUALITY CONTROL

The following principles and objectives for stormwater quality control shall be used by the City to determine if adequate Best Management Practices have been proposed for a site during the design and development process:

1. Minimize, to the maximum extent practicable, impacts of stormwater on receiving waters. An effective level of urban pollutant removal should be accomplished by the selected BMP's.
2. Consider the sites physical constraints. The City realizes that each site presents different topography, area limitations, and land use requirements. Select and design BMP's to work within the conditions on the site.

3. Evaluate the economic impacts of the selected BMP's. Controls must be evaluated for installation (construction) costs and for future operation and/or maintenance costs.
4. Recognize and incorporate multi-use benefits within stormwater quality features whenever possible. Land intensive BMP's such as detention/retention ponds and vegetative strips should be designed to incorporate recreational and aesthetic features such as open space and landscape values whenever possible.

12.5 PERFORMANCE AND DESIGN CRITERIA

The City of Greeley shall require that all land undergoing development incorporate BMP's to achieve, to the maximum extent practicable, the objectives of stormwater quality control. Due to the variability of factors such as land use, extent of development, existing improvements, and the physical characteristics of the site (including soils, slope, and runoff) it is expected that the BMP's designed for each site may vary considerably.

The City of Greeley requires the use of the following BMP's or equivalent, as presented in the USDCM, Volume 3, "Best Management Practices":

- Minimization of Directly Connected Impervious Areas (DCIA)
- Irrigated grass buffer strips
- Grass lined swales
- Extended detention basins (dry basins)
- Retention ponds (w/permanent pool)
- Constructed wetlands
- Modular block porous pavement (as defined in the USDCM, Volume 3)

The design of these structural BMP's shall be incorporated within the provision for flood control facilities.

The City shall evaluate the adequacy and appropriateness of the proposed BMP's based on their fulfillment of the previously stated objectives, as well as the satisfaction of the following minimum design criteria:

A site specific Stormwater Quality Control Plan describing the type of BMP's selected, a construction and implementation schedule, and a description of long-term maintenance requirements is approved by the City.

The site is designed to minimize the extent of Directly Connected Impervious Areas (DCIA's) to at least 50% of Level 1 as described in the USDCM, Volume 3, "Structural Best Management Practices".

The maximum allowable slope for developed land surfaces utilizing Level 1 minimization of DCIA is 4%. Terracing and retaining wall construction may be required to maintain allowable slopes.

The design of developing sites shall incorporate one or more BMP's designed to capture and treat the calculated runoff equal to the 80th percentile rainfall event (see USDCM, Volume 3, "Best Management Practices, Section 5 - Stormwater Quality Hydrology). A variance may be allowed for development of small sites, such as the construction of small parking lot type detention ponds. Alternatives for stormwater quality treatment include extended detention basins (dry), retention ponds, or constructed wetlands.

The evaluation and design for permanent erosion protection and stabilization measures shall be provided for all detention pond outlets, conveyance, outfall and channel facilities constructed on the site.

Detailed information on the development, application, design, and construction details for the BMP's required by the City of Greeley can be found in the USDCM, Volume 3, "Best Management Practices". All updates and revisions to the USDCM shall be included in these Criteria.

The City of Greeley encourages the innovative use and application of measures to insure storm-water quality control. The methods and applications of BMP's designed to meet the objectives of stormwater quality control are expected to increase and improve as the industry's experience and technology evolve. Applicants are encouraged to utilize the newest technology available, and incorporate the design data for these new methods in the Stormwater Management Plan.

12.5.1 STORMWATER CONSTRUCTION SITE QUALITY BMPS

Operation of a construction site may produce pollutants that are transported by runoff and cause adverse impacts to receiving waters. Other potential pollutants, not associated with erosion, are chemicals that are used and stored at construction sites. Table 12.5.1 lists pollutants that may be present during construction activities.

TABLE 12.5.1 CONSTRUCTION SITE POLLUTANTS

Source	Pollutants
Adhesives	Phenols, Formaldehydes, Asbestos, Benzene, Naphthalene
Cleaners	Metals, Acidity, Alkalinity, Chromium
Plumbing	Lead, copper, Zinc, Tin
Painting	VOCs, Metals, Phenolics, Mineral Spirits
Woods	BOD, Formaldehyde, Copper, Creosote, Arsenic
Masonry/Concrete	Acidity, Sediments, Metals, Asbestos
Demolition	Asbestos, Aluminum, Zinc, Dust
Yard O&M	Oils, greases, coolants, Metals, etc
Landscaping & Earthmoving	Pesticides, Herbicides, Fertilizers, Nutrients, Acidity, Alkalinity, Metals, Sulfur, Aluminum Sulfate
Materials Storage	Spills, Leaks, Dust, Sediments, Litter and Trash

The water quality BMPs for a site are usually comprised of five major elements:

1. Erosion Control – see Section 13
2. Sediment Control – see Section 13
3. Materials Handling and Spill Prevention – see Section 12.
4. Waste Management –see Section 12.
5. General Pollution Prevention Measures –see Section 12.

Materials Handling and Spill Prevention are measures implemented to minimize or prevent contamination of the natural resources present from materials stored on construction sites.

General Pollution Prevention BMPs are implemented to minimize or prevent general contamination of the construction site and natural resources present.

12.5.1.A POST-CONSTRUCTION STORMWATER MANAGEMENT

The following terms are defined by the MS4 General Permit:

“Applicable development sites” are sites that result in land disturbance of greater than or equal to one acre, including sites less than one acre that are part of a larger common plan of development or sale.

“Base design standard” is the minimum design standard for new development and redevelopment.

“Constrained Redevelopment Site” is a redevelopment site that has greater than 75% of existing impervious area and cannot practically meet MS4 permit standards for unconstrained sites.

“New development” means land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision for a site that does not meet the definition of redevelopment.

“Redevelopment” includes a site that is already substantially developed with 35% or more of existing imperviousness; with the creation or addition of impervious area (including removal and/or replacement), to include the expansion of a building footprint or addition or replacement of a structure; structural development including construction, replacement of impervious area that is not part of a routine maintenance activity; and land disturbing activities.

Applicable development sites, which are new development and redevelopment sites that are an acre or greater, or are less than an acre but are part of a larger common of development, must implement control measures that adhere to CDPHE’s base design standards.

Applicable development sites must meet one of the following base design standards:

1. WQCV Standard: The control measure(s) is designed to provide treatment and/or infiltration of the WQCV.
2. Pollutant Removal Standard: The control measure(s) is designed to treat at a minimum the 80th percentile storm event. The control measure(s) shall be designed to treat stormwater runoff in a manner expected to reduce the event mean concentration of total suspended solids (TSS) to a median value of 30 mg/L or less.
3. Runoff Reduction Standard: The control measure(s) is designed to infiltrate into the ground where site geology permits, evaporate, or evapotranspire a quantity of water equal to 60% of what the calculated WQCV would be if all impervious area for the applicable development site discharged without infiltration. Note: This Manual refers to “runoff reduction” in general terms, which means site design to avoid unnecessary or excessive impervious areas and infiltration of stormwater to reduce the total amount of runoff. The Manual also refers to the “runoff reduction standard,” which is one of the MS4 permit options for addressing post-construction water quality treatment by using runoff reduction methods to infiltrate, evaporate or evapotranspire 60% of the calculated WQCV.
4. Site draining to a Regional WQCV Control Measure: The regional WQCV control measure must be designed to accept the drainage from the applicable development site. Stormwater from the site must not discharge to a water of the state before being discharged to the regional WQCV control measure.
5. Site draining to a Regional WQCV Facility: The regional WQCV facility is designed to accept drainage from the applicable development site. Stormwater from the site may discharge to a water of the state before being discharged to the regional WQCV facility. Before discharging to a water of the state, 20 percent of the total impervious surface of the applicable development site must first drain to a control measure covering an area equal to 10 percent of the total impervious

surface of the applicable development site.

Exclusions or alternative methods of compliance have been established for sites that meet certain conditions, for example: constrained redevelopment sites, large lot single family sites, oil and gas exploration, sites with land disturbance to undeveloped land that will remain undeveloped, stream stabilization sites, and non-residential/non-commercial infiltration conditions. For a complete list and more guidance on these special conditions, please refer to the General MS4 Permit: <https://www.colorado.gov/pacific/cdphe/wq-municipal-ms4-general-permits>.

12.5.2 MATERIALS HANDLING AND SPILL PREVENTION

Material management is important because the optimal approach to reduce pollution potential is to prevent it at the source. Material storage areas are a major source of risk due to possible mishandling of materials and accidental spills. Developing protocols for materials storage and handling, and response procedures for handling spills, are necessary measures to minimize the contamination impact to stormwater runoff. Developing and incorporating these measures will increase awareness and minimize the opportunities for mishandling and spills.

Material Handling and Spill Prevention BMP's need to address the following:

- A. Stockpile Management
- B. Material Management
- C. Material Use
- D. Spill Prevention and Control

12.5.2.A STOCKPILE MANAGEMENT

These practices are implemented to reduce associated stormwater pollutants from entering storm drains and watercourses from typical soil, concrete, asphalt, or aggregate stockpiles found at construction sites.

This shall include both areas where active and non-active stockpiles of construction materials are stored.

1. Standards and Specifications

- a. Stockpiles must be protected continuously and located away from areas where concentrated stormwater flow is anticipated, major drainage ways, and stormwater inlets. Stockpiles shall be covered and/or protected with a temporary perimeter sediment barrier. Stockpiles of "cold mix" asphalt shall be placed on and covered with durable plastic or comparable material at all times when not in use.
- b. Temporary perimeter sediment barrier such as berms, dikes, silt fences, or sandbags must be constructed to protect stockpiles from runoff.
- c. Implement wind erosion control practices as appropriate on all stockpiles
- d. Waste stockpiles of concrete, solid, sanitary/septic materials, liquids, hazardous materials, and contaminated soils, shall be in accordance to Waste Management BMPs.
- e. Stock piles shall not exceed ten (10) feet in height.

12.5.2.B MATERIAL MANAGEMENT

These practices are to be implemented for proper handling and storage of materials in order to prevent spills or leaks into the storm drains or watercourses.

These practices are implemented at all construction sites where delivery and storage of materials may be detrimental to the environment. Materials of concern include but are not limited to soil, pesticides, herbicides, fertilizers, petroleum products, asphalt and concrete components, and hazardous chemicals such as acids, paints, solvents, adhesives, and curing compounds.

1. Standards and Specifications

- a. Storage and Material Handling Areas
 - a.1. Designated storage sheds must meet City and State building and fire code regulations.
 - a.2. Material safety data sheets (MSDS) shall be made available for all materials.
 - a.3. Training for proper material handling and storage techniques shall be required.

- a.4. Provide sufficient separation between storage containers to allow cleanup and emergency response.
- a.5. Provide storage for materials indoor away from rainfall and offsite flows.
- a.6. Chemically incompatible materials should not be stored together or in the same storage facility.
- a.7. Label all materials properly and maintain current legible labels; also maintain a current inventory of all material delivered and stored.
- a.8. Hazardous materials must comply with federal, state, and local HazMat requirements.
- a.9. Provide above ground secondary containment for all hazardous chemical materials.
- a.10. Immediately contain and cleanup any spills.
- b. Loading and Unloading Areas
 - b.1. Cover loading and unloading areas to reduce exposure of materials to rainfall.
 - b.2. Routinely check vehicles and equipment such as valves, pumps, flanges, and connections for leaks.
 - b.3. Direct offsite stormwater flows away by grading, berming, or curbing the area around the loading/unloading area.

12.5.2.C MATERIAL USE

These practices are implemented to ensure minimal water quality impacts from the use of construction materials.

These practices shall be implemented at all construction sites. The contractor is responsible for identifying proper material use measures for all materials used at construction site projects. The following represent some of the materials of concern where this BMP will be implemented:

- Pesticides, herbicides, and fertilizers
- Detergents and cleaners
- Petroleum products such as fuel, oil, and grease
- Asphalt and concrete compounds
- Hazardous chemicals
- Other materials that may have negative impacts if released into the environment

1. Design Guidelines

- a. MSDS shall be made available for all materials.
- b. Do not remove original labels; re-label all materials properly and maintain current legible labels with proper safety and disposal information.
- c. Use less hazardous, recycled, or non-toxic materials when possible.
- d. Leftover materials should be recycled and properly disposed of.
- e. Use materials only where and when necessary to complete the construction activity; avoid excess application of materials.
- f. Never clean paintbrushes or paint containers into a street, gutter, storm drain, or watercourse. Dispose of used materials properly.

- g. Herbicides shall be applied by a licensed applicator; fertilizers and herbicides shall not be over-applied. Only the amounts needed should be prepared.

12.5.2.D SPILL PREVENTION AND CONTROL

These practices are implemented to prevent and control spills to ensure that spills and leaks do not result in water quality impacts.

This BMP applies to all construction activities. Spill prevention and control measures shall be implemented any time chemicals or hazardous substances are used, stored, or handled.

1. Design Guidelines

The following general design guidelines can be implemented for spill prevention and control measures for various activities and areas:

- a. Identify materials delivered, handled, stored, and used at a project site.
- b. Identify project areas and activities potentially susceptible to spills. Areas and activities that are most vulnerable to spills include: transportation facilities, loading and unloading areas, fuel and chemical storage areas, process activities, dust or particulate generating processes, and waste disposal activities.
- c. Develop spill response procedures.

2. Limitations

This BMP only applies to spills caused by the contractor. The measures described in the BMP are general. The contractor is responsible for identifying practices for specific materials used, stored, or handled on a project site.

3. Standards and Specifications

- a. Spills shall be contained and cleaned up as soon as possible.
- b. If complete cleanup is not immediately possible, then spills shall be fully covered and not exposed to rainfall.
- c. Spills shall not be washed down into the storm drain or buried.
- d. Residuals left over from the cleanup activity such as absorbent pads or containers of spill material shall be disposed of properly.
- e. Proper spill and illicit discharge reporting procedures shall be followed for both hazardous and non-hazardous materials.
- f. An area where a spill has occurred shall be inspected to verify that spill residuals are not present after the initial cleaning and that the area does not need to be re-cleaned.

12.5.3 WASTE MANAGEMENT

Stormwater runoff from areas where construction wastes are stored or disposed of can be polluted. Wastes leached or spilled from management areas may build up in soils or on other surfaces and be carried by stormwater runoff. There is also the potential for liquid wastes from lagoons or surface impoundments to overflow, soak the surrounding area, or be washed to receiving waters. Solid wastes improperly stored can contaminate stormwater runoff and contribute pollutants. Possible contaminants include toxic compounds, oil and grease, oxygen-demanding organics, paints and solvents, heavy metals, and high levels of suspended solids.

The optimal approach to reduce the potential for stormwater contamination from wastes is to reduce the amount generated and, consequently, the amount stored onsite. Waste Management BMPs are considered for: concrete wash out, solid wastes, Sanitary and septic wastes, liquid waste, hazardous waste and contaminated waste.

12.5.3.A CONCRETE WASTE MANAGEMENT

Practices to be used in order to minimize and prevent concrete waste associated with construction activities from entering storm drains and watercourses.

Facilities or designated construction work areas where Concrete waste is generated from demolition activities; where concrete is used as a construction material; where concrete trucks or concrete-coated equipment are washed on site as permitted by the City; where slurries containing Portland cement concrete (PCC) or asphalt concrete are generated; and where mortar-mixing areas exist.

1. Standards and Specifications
 - a. Collection, Storage, and Disposal Guidelines
 - b. Waste generated from concrete activities shall not be allowed to flow into drainage ways, inlets, receiving waters, or in the City Of Greeley right-of way. Concrete waste shall be placed in a temporary concrete washout facility.
 - c. Concrete washout facilities will be comprised of an excavation with erosion bales and construction fences along the perimeter. The bottom of the excavation must be proven to be at least 5 vertical feet above groundwater or, alternatively, the excavation must be lined with either a clay or synthetic liner that is designed to control seepage to a maximum rate defined in CDOT Standard Specifications for Road and Bridge, Section 208. The facilities shall be maintained in good condition to contain all liquid and concrete waste generated by operations at a project site.
 - d. Proper signage such as “Concrete Washout” or “Concrete Sawcutting Water Disposal” shall be placed near concrete washout facilities to inform construction personnel of the location of designated concrete washout facilities.
 - e. Temporary concrete washout facilities shall be located 100 horizontal feet from drainage ways, inlets, and receiving waters unless otherwise approved by the City.
 - f. Adding solvents, flocculents, or acid to wash water is prohibited.
 - g. Hardened concrete waste shall be properly disposed of following solid waste management procedures.
 - h. Removal of temporary facilities, including the solid concrete waste and the material used to construct the facilities, shall be the responsibility of the contractor, who shall remove the waste from the project site and dispose of it properly following guidelines outlined in solid, liquid waste management and any applicable regulations.

12.5.3.B SOLID WASTE MANAGEMENT

Practices to be used in order to minimize and prevent solid waste associated with construction activities from entering storm drains and watercourses.

Facilities or designated construction work areas where solid waste is generated. Solid waste can be classified as non-hazardous solid material including: concrete, rock, debris, soil, wood, plastic, fabrics, mortar, metal scraps, Styrofoam, and general litter created by the public, such as but not limited to beverage containers and plastic wrappers.

1. Limitations

During the non-rainy season or in arid portions of the state, temporary stockpiling of non-hazardous solid waste may not require stringent drainage control measures. The City shall determine if drainage control measures are warranted for a specific construction site where nonhazardous solid waste is being stockpiled.

2. Standards and Specifications

a. Collection, Storage, and Disposal Guidelines

Litter shall be minimized at all construction sites and collected on a weekly basis into water-tight dumpsters. Trash receptacles shall be provided in various locations within the construction site boundaries. Collected trash shall not be placed near drainage inlets or watercourses. A trash hauling contractor shall be used to properly dispose of the collected waste in a timely manner.

a.1. Dumpster washout at the construction site is not permissible.

a.2. Priority shall be given to remove waste and debris from drainage inlets, trash racks, and ditches in order to prevent clogging of the stormwater system.

a.3. Waste storage areas shall be pre-approved by the City.

a.4. Storage areas for solid waste shall be located at least 100 feet from drainage ways and watercourses, and shall not be located in areas susceptible to frequent flooding. Sediment barriers such as berms, dikes, or other temporary diversion structures shall be used to prevent stormwater runoff from contacting stored solid waste at the project site.

a.5. Solid waste shall be segregated properly into various categories for recycling or disposal. Proper disposal is required for each waste category. The contractor shall make every attempt to recycle useful vegetation, packaging material, and surplus construction materials when practical. Most construction materials can be recycled at recycling facilities.

a.6. Additional disposal guidelines for hazardous materials and liquid waste.

12.5.3.C SANITARY AND SEPTIC WASTE MANAGEMENT

Practices to be used in order to minimize and prevent sanitary and septic waste associated with construction activities from entering storm drains and watercourses.

Facilities or designated construction work areas that use temporary or portable sanitary and septic waste systems.

1. Standards and Specifications

a. Temporary sanitary facilities shall be located away from drainage ways, inlets, receiving waters, areas of high traffic, and areas susceptible to flooding or damage by construction equipment.

b. Temporary sanitary facilities shall be properly connected into a sanitary sewer system where permissible to prevent illicit discharges. Authorized sanitary sewer system connections shall comply with local health agency, county, and sanitary sewer district requirements.

c. Wastewater generated from sanitary facilities shall not be allowed to flow into drainage ways, inlets, receiving waters, or into the City of Greeley right-of-way.

- d. Only licensed sanitary/septic waste haulers shall be used to properly dispose of waste from temporary sanitary facilities.
- e. Temporary sanitary facilities shall be secured to prevent overturning.

12.5.3.D LIQUID WASTE MANAGEMENT

Practices to be used in order to minimize and prevent liquid waste associated with construction activities from entering storm drains and watercourses.

Facilities or designated construction work areas where liquid waste is generated.

1. Limitations

Does not apply to solid waste management, hazardous wastes, concrete slurries/wastes, dewatering operations, and sanitary/septic wastes.

Does not apply to non-stormwater discharges permitted by the CDPS permit held by City of Greeley.

The following group of non-stormwater discharges are not considered to be illicit or illegal unless the discharges are identified by City of Greeley as sources of pollutants to State waters:

- landscape irrigation
- diverted stream flows,
- rising groundwater,
- uncontaminated groundwater infiltration to separate storm systems,
- uncontaminated pumped groundwater,
- discharges from potable water sources,
- foundation drains,
- air conditioning condensation,
- irrigation water,
- springs,
- water from crawl space pumps,
- footing drains,
- lawn watering,
- individual residential car washing,
- and flows from riparian habitats and wetlands.

Disposal of some liquid wastes may be subject to regulations or requirements of other CDPS permits secured for the construction site.

2. Standards and Specifications

The contractor shall oversee and enforce all liquid waste measures and will instruct all employees and subcontractors on the identification of hazardous and non-hazardous liquid waste, and non-hazardous handling, storage, and proper disposal.

The contractor shall hold regular safety meetings to ensure proper liquid waste measures are adhered to and efforts are made to minimize the amount of liquid waste produced.

The contractor shall ensure compliance with all liquid waste management procedures and practices.

12.5.3.E HAZARDOUS WASTE MANAGEMENT

Practices to be used in order to prevent hazardous waste associated with construction activities from entering storm drains and watercourses.

Facilities or designated construction work areas where hazardous waste is discovered or generated by lead paint removal operations, and other operations encountering waste that are designated as hazardous by the Code of Federal Regulations or Colorado state laws.

Contact Union Colony Fire Department for additional information.

12.5.3.F CONTAMINATED WASTE MANAGEMENT

Practices used to minimize and prevent pollutants from contaminated soils from leaching into watercourses or drainage systems.

Facilities or designated construction work areas where contaminated soils have been identified to be present.

Contact Union Colony Fire Department for additional information.

12.5.4 GENERAL POLLUTION PREVENTION

This section describes specific common BMPs that minimize stormwater runoff pollution. The objective of General Pollution Prevention BMPs is to reduce the discharge of materials other than stormwater to drainage systems or receiving waters.

The BMPs to consider are included in the following sections.

- A Dewatering Operations
- B Wind erosion control
- C Paving Operations
- D Street Sweeping & Vacuuming
- E Vehicle & Equipment Management

12.5.4.A DEWATERING OPERATIONS

This involves practices to remove and discharge excess water from construction sites. These practices manage the discharge of groundwater and accumulated precipitation in order to prevent potential pollutants from entering storm drains and watercourses.

These dewatering practices are implemented to remove accumulated water and sediments from sediment traps, basins, and excavated areas. Sediment control from dewatering operations is required on all projects where excess water containing sediment-laden water is planned to be discharged.

1. Limitations

These practices are limited to providing sediment control only, allowing for minimal settling time for sediment particles. Other sediment control methods shall be used for better sediment removal when site conditions allow.

2. Standards and Specifications

The contractor shall notify the City of all planned discharges. All dewatering operations must comply with applicable CDPS permits as well as regional and watershed-specific discharge requirements.

The following are guidelines for water quality control:

- a. Water from dewatering operations shall not be directly discharged into any State waters including wetlands, irrigation ditches, canals, or storm drains, unless allowed by the permit.
- b. Discharge into sanitary drains will not be allowed unless written permission is obtained from the owner or controlling authority and a copy of this approval submitted to the City.
- c. Unless prohibited by law or otherwise specified in the contract, water from dewatering operations shall be contained in basins for dissipation by infiltration or evaporation; hauled away from the project for disposal in accordance with applicable laws and regulations; or shall be land applied to approved non-wetland vegetation areas and allowed to soak into the soil. Depending upon the quality of the water, land application of water to vegetated areas may require a written concurrence of permit from the CDPHE. The contractor shall determine the quality of water based on the CDPHE guidelines, obtain applicable concurrences or permits, and furnish copies of the concurrences or permits to the City.

12.5.4.B NON-STORMWATER DISCHARGE MANAGEMENT

This involves practices implemented to prevent discharges of potential pollutants from irrigation systems, discharges from potable water sources, water line, hydrant flushing and other similar activities from entering storm drains and watercourses.

These practices are implemented where irrigation and water flushing practices exist at a construction site.

1. Standards and Specifications

- a. Offsite flows shall be routed around construction sites to prevent runoff from scouring the construction site and carrying sediment loads downstream.
- b. Broken irrigation and waterlines shall be shut off at the source to prevent excess water flow and repaired immediately.
- c. Irrigation systems shall be scheduled to water construction areas without over-watering and causing runoff. Considerations should be made for site-specific conditions such as soil type, slopes, season, and vegetation type when developing watering schedules.
- d. Inlets and watercourses shall be protected with bales or other suitable BMPs from potentially polluted discharges at construction sites. In addition, when possible, non-polluted water resulting from waterline or hydrant flushing shall be reused for irrigation purposes.

12.5.4.C WIND EROSION CONTROL

This involves practices implemented during construction operations, such as applying water or dust palliatives, to prevent wind erosion from exposed soil surfaces.

These practices are limited to exposed soil where wind erosion is expected.

1. Limitations

The effectiveness of this application can be limited by soil, temperature, and wind velocity.

2. Standards and Specifications

- a. Irrigation practices can be applied to a project site until the soil is moist and can be repeated as necessary. However, the soil shall not be over saturated causing runoff

to flow from the project site. The distribution system shall be equipped with a proper spray system to ensure even water distribution. When a distribution system is unavailable, at least one mobile unit shall be available at all times to apply water or a dust palliative to the project site. All non-potable tanks, pipes, and other conveyances shall be marked "non-potable water-do not drink."

- b. Other temporary methods to prevent wind erosion include seeding, mulching, soil binder, and grading techniques.

12.5.4.D PAVING OPERATIONS

Practices implemented during paving and grinding operations to prevent associated stormwater pollutants from entering storm drains and watercourses.

These practices are implemented where paving and grinding operations such as surfacing, resurfacing, or saw cutting may cause pollutants to enter stormwater runoff.

1. Limitations

These practices are limited to dry weather conditions.

2. Standards and Specifications

- a. Protect drainage inlet structures and manholes with filter fabric during paving applications.
- b. Do not conduct paving operations when rainfall is predicted.
- c. Use drip pans or absorbent materials under equipment not in use to catch and contain leaks.
- d. Use only non-foaming and non-toxic coating materials for asphalt trucks and spreading equipment. Follow vehicle cleaning and maintenance guidelines to properly clean asphalt-coated equipment offsite. Dispose of hardened asphalt debris and aggregate debris by following guidelines for concrete waste management.
- e. Apply temporary perimeter controls when asphalt material is used in embankments or shoulder backing to prevent materials from entering the storm drains or watercourses. Examples of perimeter controls are silt fences, berms, and drainage swales.
- f. Do not wash waste sweepings from exposed aggregate concrete into storm drain inlets. Sweepings shall be placed back into the aggregate base stockpile.
- g. Residuals from grinding operations shall not be allowed to remain on the pavement surface or flow across the pavement surface into a watercourse. Residuals shall be cleaned up or contained.
- h. Recycle excavated material and excess asphalt when possible during pavement grinding and removal. If material cannot be reused, store or dispose of properly.
- i. When using thermoplastic striping techniques or performing pavement application/removal inspect equipment for leaks, do not overfill tanks, and do not transfer material near stormwater inlets, storm drain systems, or watercourses.
- j. During raised or recessed pavement marker application, make sure to transfer or load bituminous material away from storm drains and watercourses. Do not overfill melting tanks so as to prevent splashing. Release all pressure from melting tanks before removing lids while filling or servicing. Follow proper disposal methods for col

lecting excess bituminous material from the roadway after removal of pavement markers.

12.5.4.E STREET SWEEPING AND VACUUMING

Practices to remove sediment transported onto streets to prevent the sediment from entering a storm drain or watercourse.

These practices are implemented anywhere sediment is tracked from the project site onto public or private roads, typically at points of egress.

1. Limitations

Sweeping and vacuuming may not be effective when soil is wet or muddy.

2. Design Guidelines

- a. Visible sediment tracking shall be swept and vacuumed on a daily basis.
- b. If not mixed with debris or trash, consider incorporating the removed sediment back into the project.

12.5.4.F VEHICLE AND EQUIPMENT MANAGEMENT

Practices used during vehicle and equipment fueling, cleaning, and maintenance to prevent associated stormwater pollutants from entering storm drains and watercourses.

Facilities or designated construction work areas where vehicles and equipment are fueled, cleaned, or maintained.

1. Standards and Specifications

- a. Perform cleaning, washing, and maintenance in a centralized station offsite. Onsite activities are highly discouraged.
- b. Designated onsite stations should preferably be located indoors on impervious surfaces 50 feet away from watercourses, configured with a sump, and bermed to collect the wastewater.
- c. Wastewater shall not be discharged into the City Of Greeley right-of-way. Wastewater shall be contained for percolation and evaporation.
- d. Constructed berms shall be durable and leak proof.
- e. Eliminate or reduce the amount of toxic or hazardous solvent used.
- f. Use proper waste or recycling drums for used or spilled fluids. Separate and recycle materials when possible.
- g. Use drip pans or absorbent materials under equipment to catch and contain leaks.
- h. Do not pour liquid waste into floor drains, sinks, or storm drain inlets.
- i. Avoid hosing down work stations.
- j. Routinely check vehicles and equipment for leaking oil or fluids.
- k. Proper spill and illicit discharge reporting and cleanup procedures shall be followed for both hazardous and non-hazardous materials.

12.6 **THE EROSION CONTROL AND STORMWATER MANAGEMENT PLAN (SWMP)**

A site specific Erosion Control Plan shall be submitted to the City for review and approval. The Erosion Control Plan should be consistent with the site's drainage report and shall be included within the required drainage report for the project.

Sites that result in land disturbance of an acre or greater, or sites that are less than one acre but are part of a larger common plan of development or sale, must prepare a SWMP and submit it to the Director of Public Works or designee for review and approval.

The SWMP must be prepared in accordance with the standards set forth by the Colorado Department of Public Health and Environment, Water Quality Control Division's General Permit for Stormwater Discharges Associated with Construction Activity.

Guidance for SWMP preparation can be found at the following link:

<https://www.colorado.gov/pacific/cdphe/wq-construction-general-permits>

12.6.1 PRELIMINARY EROSION CONTROL PLAN

The following information shall be included within the Preliminary Erosion Control Plan which shall be submitted along with the Preliminary Drainage Report (refer to Section 2.3 of these Criteria) for the site:

1. Name, address and telephone number of the applicant and the Professional Engineer preparing the report.
2. Project description; briefly describing the nature and purpose of the development, the total area of the site, the area of disturbance involved, and the project location, including township, section and range.
3. Existing site conditions should be described, including existing topography, vegetation, and drainage. If wetlands are present on the site they must be described: location, aerial extent, and type. It is the applicant's responsibility to determine and comply with all other federal or state regulations regarding the impact of development on wetlands.
4. A vicinity map indicating the general area and property lines for the site should be included. Acceptable scales range from 1" = 1000' to 1" = 2000'.
5. An exhibit or map of existing and proposed drainage features or facilities, and basin boundaries (existing and proposed) for the site. Complete basin boundaries shall be shown for all basins extending off of the site.
6. Neighboring areas must be described as to land use and existing features, such as adjacent streams, lakes, structures, roads, etc.
7. A description of the stormwater quality management-planning concept for the site.
8. Preliminary sizing and location of the selected BMP's.
9. A discussion of the maintenance requirements for all proposed BMP's, including suggested schedules, costs and designation of responsible party.

12.6.2 EROSION CONTROL PLAN

In addition to items numbered 1 through 9 as required in the Preliminary Erosion Control Plan, the following information must be included within the Final Erosion Control Plan, which shall be submitted along with the Final Drainage Report (refer to Section 2.4 of these Criteria):

1. A discussion of the final design, sizing and location of the selected BMP's.
2. Hydrologic, hydraulic and all other calculations used to size and design the selected BMP's.
3. A final site and grading plan indicating the path of all stormwater flow and the location of stormwater control and stormwater quality facilities.

4. Final construction drawings of the proposed stormwater quality improvements, if appropriate.

12.7 EXTERIOR TRASH COMPACTORS

This new requirement applies to all commercial stores as detailed below.

1. The area of the exterior trash compactor shall be provided with curb all around except the entry to prevent surface water from entering the trash compactor area drain. The entry side must be ramped in a manner to channel surface water away from the entry edge. The trash compactor curbed area shall slope to a low point where an area drain, like a catch basin, shall be provided.
2. For exterior trash compactors the area drain shall be connected to the storm water drainage system via a double compartment grease/sand interceptor to intercept sediment and any oil and grease fluid leakage from the compactor.
3. For interior trash compactors the area drain shall be connected to the sanitary sewage system.
4. The interceptor shall be a minimum of 750 gallon capacity per UPC definition for Grocery stores, Hardware stores, and Lumber yards.
5. The interceptor for all other type stores shall be a minimum of 350 gallon grease and sand trap.
6. A 4 inch drain connection will be adequate for the area involved.
7. The area drain need not be trapped and vented. The grease/sand interceptor shall serve as the trap and shall be properly vented per the City of Greeley's current Plumbing Code.
8. The access manhole covers over the interceptor compartments shall be accessible while the trash compactor is attached to the building and functioning, to allow cleaning and inspections to occur without moving the trash compactor.

12.8 SWIMMING POOLS, SPAS, JACUZZIS, FISHPONDS AND FOUNTAINS

This is a new section discussing the regulatory issues regarding the discharge of water from swimming pools, spas, Jacuzzis, fishponds and fountains. These facilities often contain chemicals used for sanitizing or cleaning purposes. These chemicals (such as chlorine or copper-based algaecides) may be damaging to the environment if the wastewater is allowed to flow to the Cache la Poudre River by way of storm drains. It is illegal to discharge filter backwash and chlorinated water into the storm drains.

Filter backwash shall be discharged into the sanitary sewer system and not into the street. Backwash water has a heavy concentration of chlorine and other chemicals that are good for treating sewage water, but are damaging to natural aquatic environments. Additionally, backwash leaves a residue of contaminated diatomaceous earth (DE) along the gutter and street. If filter backwash cannot be discharged to the sanitary sewer, a catch basin should be installed to remove the DE prior to draining it into a landscaped area.

Federal law allows **dechlorinated pool water** to be released to the environment, if the following criteria are met:

1. The residual chlorine does not exceed 0.1 mg/l (parts per million)
2. The pH is between 6.5 and 8.5
3. The water is free of any unusual coloration

4. There is no discharge of contaminated filter media.
5. There is no discharge of acid cleaning wastes.

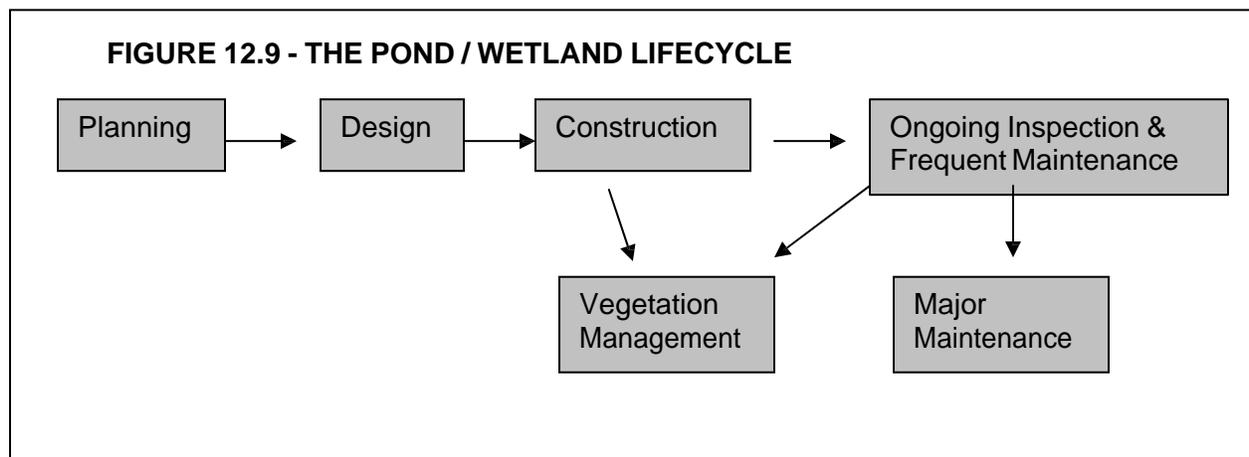
12.9 POST CONSTRUCTION: LONG TERM OPERATION & MAINTENANCE OF STRUCTURAL CONTROL BMP'S

In accordance with the National Pollution Detection and Elimination System (NPDES) Phase II, structural BMP's like detention and retention ponds are to be actively maintained to ensure the long term operation and maintenance.

Stormwater ponds and wetlands are popular stormwater structural BMP's for a number of reasons including aesthetics, pollutant removal capability, habitat value and relatively low maintenance burden. Stormwater wetlands can provide diverse habitat for aquatic and terrestrial species. The large permanent pool volume of ponds and wetlands enhances pollutant removal because of relatively long residence times, reduced flow velocities and their ability to retain settled sediments and pollutants. Stormwater wetlands also provide biological uptake of pollutants through contact between wetland plants and stormwater runoff.

Stormwater pond maintenance is related to the entire pond lifecycle, depicted in Figure 12.9 and needs to be considered in the design phase.

FIGURE 12.9 – THE POND / WETLAND LIFESCYLE



Maintenance is necessary for a stormwater pond or wetland to operate as designed on a long-term basis. The pollutant removal, channel protection, and flood control capabilities of ponds and wetlands will decrease if:

1. Sediment accumulates in the pond, reducing the storage volume
2. Debris blocks the outlet structure
3. Pipes or the riser are damaged
4. Invasive plants out compete the wetland plants
5. Slope stabilizing vegetation is lost
6. The structural integrity of the embankment, weir, or riser is compromised.

Pond and wetland maintenance activities range in terms of the level of effort and expertise required to perform them. Routine pond and wetland maintenance, such as mowing and removing debris or trash, is needed multiple times each year, but can be performed by property owners. This could include Home Owner's Associations and Business Owners. More significant maintenance such as removing accumulated sediment is needed less frequently, but requires more skilled labor and special equipment. Inspection and repair of critical structural features such as embankments and concrete structures, needs to be performed by a qualified professional (e.g., professional engineer) that has experience in the construction, inspection and repair of these features.

Property owners and responsible parties need to recognize and understand that neglecting routine maintenance and inspection can lead to more serious problems that threaten public safety, impact water quality, and require more expensive corrective actions.

A typical inspection/maintenance frequency for Ponds and Wetlands is presented below in Table 12.9(1).

TABLE 12.9(1) - TYPICAL INSPECTION / MAINTENANCE FOR PONDS AND WETLANDS

Frequency	Inspection Item	Skill Level	Maintenance Items
Monthly to Quarterly or After A Storm Event (>1 ")	Inspect low flow orifices and other pipes for clogging Check the permanent pool or dry pond area for floating debris and undesirable vegetation Check banks for erosion	0	Mowing – minimum Spring & Fall Remove debris in and around trash racks, water quality boxes and trickle pans.
One time – After First Year	Ensure that at least 85% of vegetation survive Check for invasive plants and noxious weeds	1-2	Replace vegetation as needed
Every 1 to 3 years	All routine inspection items listed above Inspect riser, barrel and embankment for damage Inspect all pipes Monitor sediment deposition in facility and forebay	3	Repair pipe and riser as needed Forebay maintenance and sediment removal when needed.
2-7 years	Monitor sediment deposition in facility and forebay	3	Forebay maintenance and sediment removal when needed
10 -25 years	Remote television inspection of reverse slope pipes, under drains, and other non-accessible piping.	3-4	Sediment removal from main pond/wetland Pipe replacement if needed

The skills level needed to diagnose a problem during inspection is listed below and referenced in the above table.

Skill Level	Description
0	No special skills or prior experience required.

- 1 Maintenance crew member or citizen with prior experience with ponds and wet lands
- 2 Agronomist with experience with plants within ponds and wetlands
- 3 Contractor or Inspector with extensive pond and wetland maintenance issues.
- 4 Professional Engineer