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Implementation, management, and cost of the clean water act and storm water pollution prevention plan

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Abstract

This research is a retrospective case study designed to document the implementation, and management decisions made about a Storm Water Pollution Prevention Plan (SWPPP) for a wastewater project in California. For this study, the project manager and qualified storm water pollution prevention practitioner (QSP) agreed to extensive interviews about the decisions made and associated costs. Through laws and regulations, constructors are required to take precautionary measures to ensure pollutants stay on jobsites as opposed to running into the storm water system. Moreover, from a practical standpoint, such research might be particularly useful for addressing the challenges constructors are having with the more stringent sustainability regulations. This study used a retrospective case study as part of an exploratory qualitative research strategy for examining the costs associated with storm water pollution prevention on a twenty acre, $48,000,000 wastewater project that had a construction schedule of two years. Cost analysis was taken from historical data and was applied in a quantity takeoff. This study was aimed at documenting some practical features of the actual implementation, management, and cost in this particular case. Results indicate the primary roles of the QSP for this project and the SWPPP cost for this project was 0.46% of the total project cost.

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Keywords: Construction Management; Costing; Storm Water Pollution Prevention Plan (SWPPP); Clean Water Act (CWA); Qualified SWPPP Practitioner (QSP)

1. Introduction

Urbanization has caused the natural environment to be uprooted all around the world. When soil is disturbed, rain and snow melt events pick up pollutants and distribute them into our waters. The flowing water from these occasions

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are known as stormwater. Flowing stormwater can pick up trash, sediment, oil, and toxins such as pesticides. Once larger bodies of water are polluted, serious effects can take place on aquatic life, habitats, and even human health. Today, one of the leading causes of pollution to our nation's waters is because of stormwater [1].

Construction disturbs soil due to the clearing of natural vegetation, and once an area is developed, impervious pavements are created, such as parking lots and sidewalks. Due to this, the natural hydrology of the land is affected. In the natural environment, rain and snowmelt are filtered and absorbed by soil, as well as vegetation such as grasses, brush, and trees. As runoff flows, pollutants are captured by vegetation, and erosive processes are mitigated to an extent. Vegetated areas also provide a buffer against extreme inflow to bodies of water, slowing down and dissipating incoming water. When a naturally vegetated site is stripped for construction, soils are disturbed, stripped of their top soil, and left bare. Therefore, when it rains, there is no longer any vegetation to slow and filter the runoff, as it rushes down the bare landscape [2].

Sediment is the main pollutant of construction. According to the American Society of Civil Engineers (ASCE) and Water Environment Federation (WEF), stormwater runoff from an unstabilized construction site can cause anywhere from 35-45 tons of loss sediment per acre per year, an amount that doesn't occur naturally. The excess sediment blocks the sunlight, reducing the amount of dissolved oxygen in the water, which the aquatic environment depends on to thrive. In addition, fish gills can become clogged, aquatic habitats can be buried, and spawning areas can be ruined [3]. Along with sediment, grease, oil, and any other toxins from trucks and various types of equipment can also be picked up by stormwater. As a result, water quality and aquatic life can be affected, along with the potential of groundwater becoming contaminated.

1.1. History of Clean Water Act

In 1972, the Clean Water Act (CWA) was implemented by the Environmental Protection Agency (EPA) in order to regulate stormwater. However, this act did not focus on construction but instead large industries and wastewater treatment plants. According to Susan M. Franzetti of the Franzetti Law Firm, "…the Clean Water Act generally prohibited the discharge of any pollutant to navigable waters from a point source unless the discharge was authorized by a National Pollution Discharge Elimination System ("NPDES") permit." As a result, the majority of pollution entering U.S. waterways was not being regulated.

However in 1987, the EPA decided to amend the Clean Water Act and focus on construction activities that disturbed more than five acres of land. This was also known as Phase I of the National Pollution Discharge Elimination System (NPDES) and any construction site larger than five acres had to obtain a permit. A few years later, in 1999, the EPA established a Phase II to NPDES. This required construction activities that affect one acre or more of land, along with smaller sites in a larger common plan of development of sale, to obtain a permit along with an approved Storm Water Pollution Prevention Plan (SWPPP) [1]. As a result under the current Clean Water Act, builders are required to apply for coverage under a Construction General Permit (CGP) and to submit and comply with a SWPPP to prevent stormwater pollution.

A SWPPP plan is designed and submitted prior to development, and is implemented at the start of construction until final stabilization is complete. It is a plan that describes the measures a builder will take on the jobsite to control stormwater pollution. SWPPP should include a site map showing the perimeter of the project site, stormwater collection and discharge points, stormwater flow direction, current and proposed topography of the construction area, along with any existing buildings, lots and/or roadways. It also has to describe in writing and in drawing how the project team plans to control polluted stormwater from exiting the site. This is known as Best Management Practices (BMP) [4].

Once construction starts, the builder is required to document any maintenance work, along with reports on how well the in place SWPPP performed during a rain event. If changes are required to the implemented SWPPP because of performance issues, then these changes must also be documented. All of these documents must be up to date and accurate because compliance inspectors visit construction sites to make sure the project follows the Clean Water Act. As a result, many constructors designate a member of their staff to become a Qualified SWPPP Practitioner (QSP) rather than hiring a consultant for the role. The QSP certification allows this designated person to be the lead team member, ensuring that the construction site adheres to SWPPP policies and regulations.