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Storm Water Program

excellence in conservation

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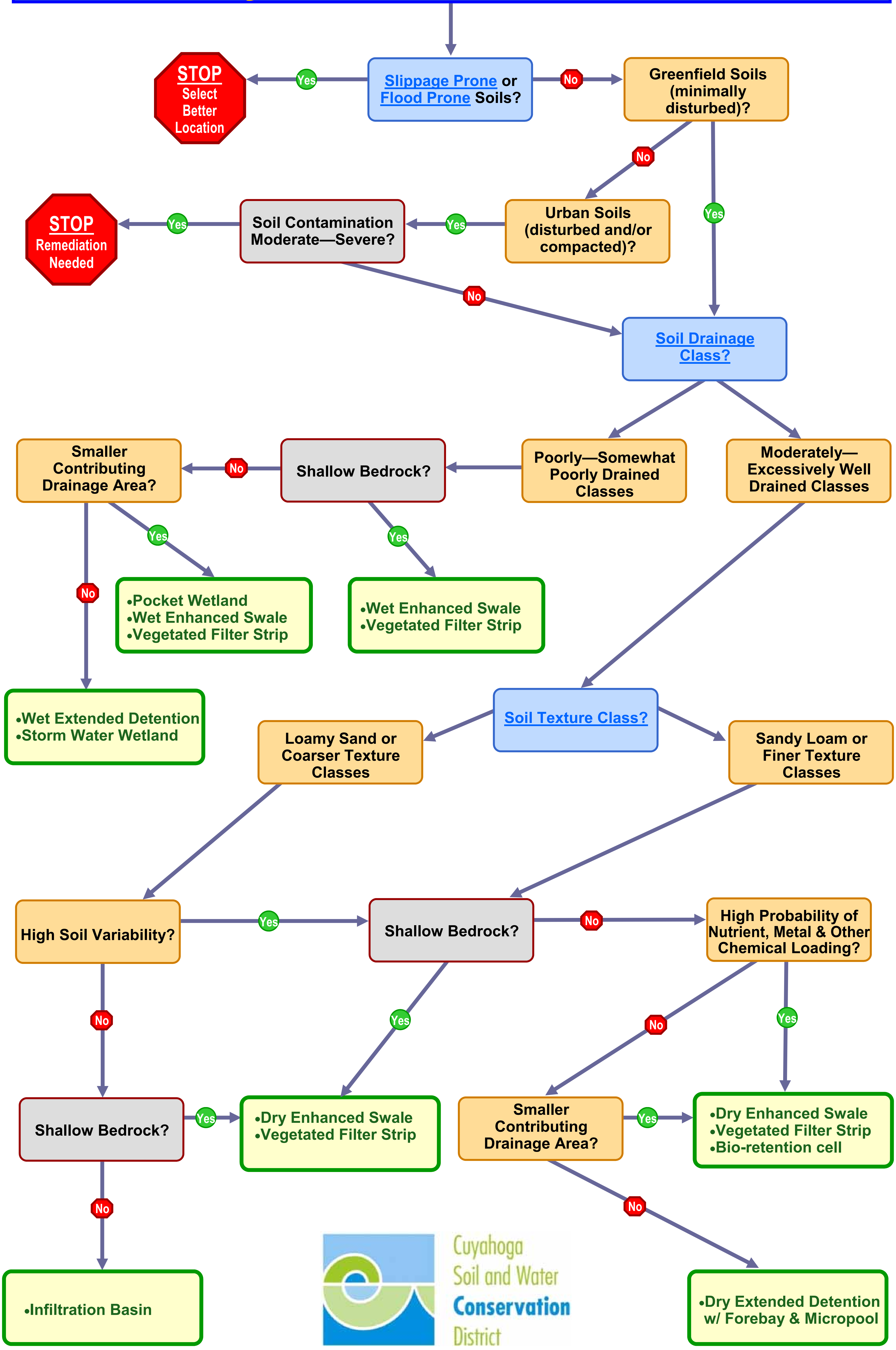
Water Quality BMP Rationale for Soil Conditions



Ion Adsorption and Exchange: Mechanisms for Managing Urban Soil Quality

Adsorption of nutrients and other chemicals is a major natural process attributed to well-decomposed soil organic matter (humus) and clay minerals. The charged surfaces of humus and clay minerals attract, hold, and exchange cations (+) and anions (-), collectively known as ions.

Ion exchange, for example, refers to the interchange between a cation or anion in solution and another cation or anion on the charged surface of humus or clay minerals. As such, Cation Exchange Capacity (CEC) of a soil is defined as the sum total of exchangeable cations that a soil can *adsorb*. The CEC of a specific soil series along with other related attributes (e.g. percent organic matter and clay) can be viewed at Web Soil Survey (go to *Soil Map > Soil Data Explorer > Soil Properties and Qualities >Soil Chemical Properties & Soil Physical Properties).*

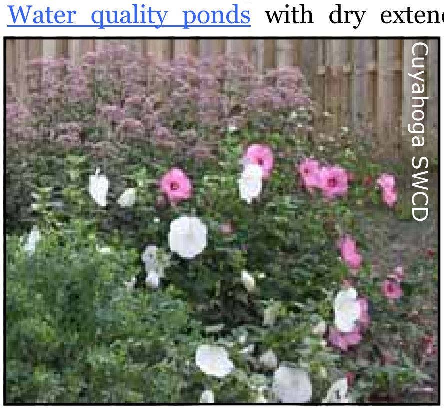
As an example, the Oshtemo series is broadly mapped in parts of Cuyahoga County. The Oshtemo series is a *sandy* soil that has a relatively low CEC (7 $cmol_c kg^{-1}$), organic matter (1.75% surface), and percent clay (6% surface) as recorded in Web Soil Survey. In keeping with this, one could predict that ion adsorption and exchange are typically low for this soil series. Consequently, this series and similar soils have less ability to attract and hold nutrients and other chemicals.

In light of the many benefits of ion absorption and exchange, through use of the Web Soil Survey, one can target areas where increasing soil organic matter can be critical to improving opportunities for urban agriculture and landscaping, as well as pollutant control and ecosystem restoration.

Plants: Matching the Right Plants with the Right Environment

A critical aspect of many water quality facilities is dependent on the appropriate plants being selected for the anticipated growing conditions. Providing most water quality Best Management Practices (BMPs) will have some period of prolonged dewatering, it is critical that the appropriate plants not only be selected, but where they are planted to be properly planned as well.

Many water quality BMPs have various "zones" of storm water inundation. These "zones" would be similar to the elevation lines on a contour map. Just as it is important to match the right water quality BMP with the site and soil conditions, it is equally as important to match the right plants with the anticipated environment within the feature. Water quality ponds with dry extended detention often include a wet micropool and forebay; particularly in areas where wet soils prevail. A bio-retention cell will be wettest in the center of the depression and becoming less wet towards the outer edges. Storm water wetlands often have varied pool depths with deep pools interspersed with shallow pools and upland areas. These varying conditions in conjunction with appropriate landscaping play an integral role in the overall success of the water quality facility.



Remember that it is equally as important to match the right plants with the anticipated environment it will grow in as it is to match the right BMP with the site and soil conditions. Detailed and diverse landscape planning for water quality facilities will lead to improved water quality treatment, habitat, and aesthetics. There are many resources and professionals available that can provide guidance on this topic. This article is a continuation of *Plants: Good for Landscaping and Water Quality* in TQ 10.3.

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