

WEST BASIN MUNICIPAL WATER DISTRICT

JULY 9, 2003 - Water Resources  
McDonald, Kwan

JULY 28, 2003 - Board Meeting

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INFORMATION CALENDAR

WETLANDS UPDATE

SUMMARY:

At the June 23, 2003 Board meeting, staff illustrated potential sites that have been located and studied for possible wetlands projects in the District's service area. Staff also described efforts to secure funding to further study these sites and/or financially support efforts already underway.

As staff coordinates long-term plans to move ahead with site studies, staff will be presenting the process to build a wetlands that includes soils, plants, water balance, biogeochemical processes, wetlands monitoring, and vector control issues.

The typical soil substrate of a wetlands includes three different soil types: Hydric soil, organic soil, and mineral soil.

**Hydric Soils**

Hydric soil occurs within a few inches of the surface of a wetlands, feels squishy, and is present in all wetlands. This soil type absorbs huge amounts of water, usually containing more water than oxygen.

**Organic Soils**

Organic soil, or peat, is a hydric soil containing huge amounts of organic material due to the lack of oxygen. Decomposers are unable to fully decompose organic material, causing a build-up year-after-year of organic matter.

**Mineral Soils**

Mineral soil is on the bottom of wetlands but may not be present in all wetlands. Mineral soil contains very little organic matter, but is rich in natural minerals.

Table 1 provides a comparison between typical organic soils and mineral soils.

**Table 1 - Wetlands Soils Comparison**

Characteristic	Organic Soil	Mineral Soil
Organic matter	> 20%	< 20%
Organic carbon	> 12	< 12
pH	Acid	Neutral
Bulk density	0.2-0.3 g/cc	1.0-2.0 g/cc
Porosity	> 80 %	45-55 %
Hydraulic conductivity	High	Low
Water holding capacity	High	Low
Nutrient availability	Low	High
Cation exchange capacity	High - H dominates	Low - Ca, Mg, K, Na

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Combined together, these wetlands soils provide many benefits and essential components to a functioning wetlands.

### **Physical Substrate**

Wetlands soils act as a physical substrate for plants to attach to and propagate through. They also serve as an interface between the biotic and abiotic environment. Serving as interim and long-term storage compartments, wetlands soils contain nutrients, organic compounds, metals, inorganic compounds, bacteria, and fungi.

### **Biogeochemical Cycling**

The surface chemistry around soil particles is quite often different than the aqueous chemistry in the water column above the sediments, contributing unique capabilities to the biogeochemical cycle.

### **Construction Material**

Soils used to construct wetlands need to have a high degree of workability -- usually a mixture of loamy clay and clayey sand. The site chosen to build a wetlands should contain minimum amounts of rock, gravel, and hardpan layers to help seal the wetlands. Additionally, wetlands should be constructed 2-3 meters above any bedrock formations.

If berms will be constructed as part of the wetlands, soil strength, erodability, compaction characteristics, permeability, and other soil qualities must be considered. Wind erosion on site should also be factored in.

Often times there is a tradeoff in terms of the best soils for constructed wetlands versus the best soils suited for plant support.

### **Soil Formation**

Peat soils (mucky sediments) are the key soils to a wetlands and develop by absorbing annual biomass productions. Standing vegetation in wetlands typically provides 5,000 to 20,000 kilograms per hectare. Most of this is used by the plant in respiration and synthesis and released to solution or to the air. However, the recalcitrant organic compounds become long-term storage in the peat soils, adding to the growth of the peat. Peat soils are therefore typically small in size, compressible, have high water absorption, and are lower density than mineral soils (that have very little organic content).

### FISCAL IMPACTS:

None.

### ENVIRONMENTAL COMPLIANCE:

Not applicable.

COMMITTEE STATUS:

This item was reviewed by the Water Resources Committee on July 9, 2003 and agendaized to the July 28, 2003 Board meeting as information.

RECOMMENDED MOTION:

This item is for information only.

LIST OF EXHIBITS:

None.

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