ATTACHMENT D:
Sediment Basin Sizing

Sediment basins shall, at a minimum, be designed for a 80% reduction of suspended soil particles having a diameter of 0.02 mm or larger. The following equations are used to determine the appropriate surface area and length to width ratio to achieve the target 80% reduction.

The net effectiveness of the basin is calculated by:

Equation 1: NEff = AEff x PEG

Where:

NEff = Net effectiveness of basin (80%)

AEff = Apparent effectiveness = $20(L/W_e) - (L/W_e)^2$ (L and W_e are the particle flow distance and effective basin width, respectively (ft))

PEG = Percent of particles that are equal to or greater than the design-size particle (%)

Once the PEG value is determined from the particle size analysis, it is possible to determine how effective a sediment basin will be for a 80% reduction of the suspended soil particles having a diameter of 0.02 mm or larger (the apparent effectiveness). From the apparent effectiveness, one can determine the appropriate length-to-width ratio using Figure D-1.

The next step is to calculate the runoff to the basin from a 2-year, 24-hour storm event and compare it to 3,600 cubic feet per acre draining to the basin. The greater of the two runoff volumes is then used to size a perforated riser to discharge the runoff volume over a 24- to 72-hour period. Specific guidance on sizing perforated risers is contained in the California Best Management Practice Construction Handbook (available at www.cabmphandbooks.com). Average depth and outlet depth of the basin shall be 2.2 ft and 2.0 ft, respectively. Local vector control regulations may apply. Sediment basins may be fenced if safety (worker or public) is a concern.

The design discharge and the particle settling velocity are used in Equation 1 to find the minimum water surface area of a basin.

Equation 2: $A_s=1.2Q_{out}/V_s$

Where:

A_s = Minimum water surface area of basin (ft^2)

Q_{out}= design discharge from the basin (cfs)

V_s = the settling velocity of the finest particle size determined from a soil particle size analysis or 0.02 mm (medium silt)

Once the minimum surface area is known, basin length and width can be calculated using Equations 3 and 4.

Equation 3: $L=\{(L/W_e) \times A_s\}^{0.5}$

Equation 4: $W_e = A_s / L$

Figure D-1
Apparent Effectiveness of a Sediment Basin