

FARM WATER QUALITY PLANNING MANAGEMENT PRACTICE

*University of California Cooperative Extension
Natural Resources Conservation Service*

Water and Sediment Control Basin

#638



Water and Sediment Control Basins are earth embankments generally constructed across the slope or at the base of the field to form a sediment trap and water detention basin. The purpose is to trap sediment and manage onsite and downstream runoff.

This practice applies to sites where field runoff rates are high and where erosion and control in the fields and ditches is not feasible. Basin size can be reduced when combined with infield erosion prevention practices such as Row Arrangement #557 or Cover Crops #340.

Sediment Basins #350 are not designed to detain peak runoff water in addition to sediment.

Advantages

- Reduced runoff
- Slowly meters out peak flows so peak runoff load to nearby waterbodies is reduced
- Reduced gully erosion downstream
- Reduces sediment leaving property
- Retains some fine-grained sediment that may contain adsorbed pesticides and nutrients

Disadvantages

- Loss of farmable acreage
- May cause pollutants to leach into the groundwater

Practice Effectiveness for Reducing Water Quality NPS Pollution Potential

Erosion-sheet & rill	Erosion-streambank	Pesticides-leaching	Pesticides-dissolved in runoff	Pesticides-adsorbed to sediment	Nutrients-leaching	Nutrients-surface waters
			moderate	significant	moderate	slight to significant

Empty boxes indicate information not yet collected for this practice

Additional sources of information regarding water and sediment control basins:

UC Sustainable Agriculture Research and Extension Program <http://www.sarep.ucdavis.edu/>
 UC Weed Research and Information Center <http://wric.ucdavis.edu/>

The picture and some of the information in this management sheet has been taken from the Natural Resource Conservation Service (NRCS) Handbook of Conservation Practices practice #638. Contact your local NRCS office or visit <http://www.nrcs.usda.gov> for more information.

Picture provided by Daniel Mountjoy, USDA-NRCS

USDA NRCS

Natural Resources
Conservation Service
California

Field Office Technical Guide

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Field Office Technical Guide, Section I

A Practice Specification has not been prepared. Specifications and design details will be prepared upon request of the Area Engineer or State Conservation Engineer.

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

WATER AND SEDIMENT CONTROL BASIN
(No.)
CODE 638

DEFINITION

An earth embankment or a combination ridge and channel generally constructed across the slope and minor watercourses to form a sediment trap and water detention basin.

PURPOSES

A water and sediment control basin may be established to:

- Improve farmability of sloping land;
- Reduce watercourse and gully erosion;
- Trap sediment;
- Reduce and manage onsite and downstream runoff;
- Improve downstream water quality.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to sites where:

1. The topography is generally irregular.
2. Watercourse or gully erosion is a problem.
3. Sheet and rill erosion is controlled by other conservation practices.
4. Runoff and sediment damage land and improvements.
5. Soil and site conditions are suitable.
6. Adequate outlets can be provided.
7. Effective height of the embankment is 6 feet or less. For effective heights greater than six feet, apply standard (378) Pond, (410) Grade Stabilization or TR-60 according to the class and type of structure.

Water and sediment control basins shall not be used in place of terraces. Where a ridge and/or channel extend beyond the detention basin or level

embankment, standards for Terrace (600) or Diversion (362) must be applied as appropriate.

CRITERIA

General Criteria Applicable To All Purposes

This practice may be applied as part of a resource management system designed to achieve the conservation objectives. Other components of this resource management system shall be installed to reduce soil loss in the interval above and below the basin to prevent excessive maintenance and operation problems.

Where land ownership or physical conditions preclude treatment of the upper portion of a slope, a water and sediment control basin may be used to separate this area from, and permit treatment of the lower slope.

The design must limit inundation, infiltration, and seepage to prevent crop damage and/or other problems.

Laws and Regulations - This practice must conform to all Federal, State, and Local laws and regulations. Laws and regulations of particular concern include those involving water rights, dam construction, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

Spacing - Water and sediment control basins are sometimes constructed in series down minor watercourses or swales. Under these circumstances, adjust spacing or include other measures as needed to prevent erosion in the watercourse between basins. In the absence of site-specific information, refer to guidance set forth in NRCS Conservation Practice Standard (600), Terrace.

The system of basins and row arrangements shall be parallel where possible and spaced to accommodate farm widths and crop row spacing.

Spacing design must consider embankment slope lengths, top width, and outlet location.

Cross Section - For portions of the basin controlling only flowing water 3 feet or less deep, embankment slopes must be two horizontal to one vertical, or flatter. For all other portions of the basin, the sum of the upstream and downstream slopes must be 5:1 or flatter with a maximum of 2:1 in either slope. Slopes may be vegetated or flattened to permit cropping.

Earth Embankment - Constructed embankment height must be at least 5 percent greater than design height to allow for settlement. The maximum settled height of the embankment must be 6 feet or less measured from natural ground at centerline of the embankment. The minimum top width of embankments shall be 6 feet.

Foundation Cutoff and Seepage Control - Portions of basin ridges designed to impound more than a 3-foot depth of water must include foundation cutoff and seepage control as required by the standard for (378) Pond.

Capacity - Basins must have capacity to prevent overtopping by runoff from a 10-year frequency, 24-hour duration storm. For larger design storms, apply standard (378) Pond, (410) Grade Stabilization or TR-60 according to the class and type of structure.

In addition to the above storage, basins must have capacity to store at least the anticipated 10-year sediment accumulation, or periodic sediment removal must be provided to maintain the required capacity.

Basin ends must be closed to an elevation that will contain design capacity. Freeboard may be added to design height to provide for safe operation of auxiliary spillways. Auxiliary spillways must not contribute runoff to a lower basin (or pond) except where the lower basin (or pond) is designed to control the flow.

Outlets - Water and sediment control basins must have spillways, underground outlets or soil infiltration outlets that conform to Conservation Practice Standards:

- (378), Pond;
- (412) Grassed Waterway;
- (362) Diversion; or
- (620) Underground Outlet.

Topsoil - Where necessary to restore or maintain productivity, topsoil must be stockpiled and spread over disturbed areas.

Vegetation - Disturbed areas that are not cropped must be established to appropriate vegetation or otherwise protected from erosion using organic or gravel mulch or other measures.

Selection of vegetation species must consider environmental quantity and quality, endangered species needs, and wildlife food and habitat needs. Seedbed preparation, fertilizing, seeding, and mulching must be in accordance with standards for (342) Critical Area Planting and (484) Mulching.

CONSIDERATIONS

Water and sediment control basins should be part of a resource management plan including such practices as terraces, grassed waterways, contouring, a conservation cropping system, conservation tillage, and crop residue management.

Where possible, the basin should be configured to enhance sediment deposition. This can be accomplished by using flow deflectors, inlet and outlet selection, and by adjusting the length to width ratio.

For cropped fields, embankment orientation and crop row direction should be approximately perpendicular to the land slope to support contour farming. The design should support farmability by limiting short point rows or sharp curves. Field boundaries and row lengths should also be considered in planning basin location and row direction.

Operation safety of vehicle and farming equipment should be considered when selecting cut and fill slopes, especially where cropping or haying is planned.

Effects on streams and wetlands must be considered. Mitigation may be required where water is diverted or degraded for downstream uses.

This practice can be used to develop/enhance seasonally ponded areas for migratory waterfowl.

Where possible, the design should enhance habitat for native and endangered species. Effects on downstream water quality and temperature may be critical for some species.

Cultural Resources Considerations

NRCS' objective is to avoid any effect to cultural resources and protect them in their original location. Determine if installation of this practice will have any effect on any cultural resources.

Document any specific considerations for cultural resources in the design docket and the Practice Requirements worksheet.

GM 420, Part 401, the California Environmental Handbook and the California Environmental Assessment Worksheet provide guidance on how the NRCS must account for cultural resources. The Field Office Technical Guide, Section II contains general information, with Web sites for additional information.

Endangered Species Considerations

Determine if installation of this practice, along with any others proposed, will have an effect on any federal or state listed Rare, Threatened or Endangered species or their habitat. NRCS' objective is to benefit these species and others of concern, or at least not have any adverse effect on a listed species. If the Environmental Evaluation indicates that the action may adversely affect a listed species or result in adverse modification of habitat of listed species which has been determined to be critical habitat, NRCS will advise the land user of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the landowner selects one of the alternative conservation treatments for installation; or at the request of the landowners, NRCS may initiate consultation with the U.S. Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game. If the Environmental Evaluation indicates the action will not affect a listed species or result in adverse modification of critical habitat, consultation generally will not apply and usually would not be initiated. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Water Quantity

1. Effects on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation, and groundwater recharge;

2. Effects on downstream flows and aquifers that would affect other water uses and users;
3. Effects on volume of discharge flow on the environmental, social, and economic conditions;
4. Effects on the water table downstream and the results of changes of vegetative growth.

Water Quality

1. Effects on erosion, movement of sediment, pathogens, and soluble and sediment-attached substances that could be carried by runoff;
2. Effects on the visual quality of onsite and downstream water resources;
3. Effects of construction and early establishment of protective vegetation on the surface and ground water;
4. Effects on wetlands and water-related wildlife habitats.

PLANS AND SPECIFICATIONS

Plans and specifications for installing sediment and water control basins must conform to requirements of this standard and must describe requirements for applying the practice and achieving its intended purpose.

OPERATION AND MAINTENANCE

A site specific Operation and Maintenance (O&M) plan must be prepared for and reviewed with the landowner or operator. The plan shall contain guidance to maintain the embankment, design capacity, vegetative cover and outlet.

All plans shall include a provision that after each large storm, basins must be inspected and needed maintenance performed. When sediment storage is full, accumulated sediment must be removed or the basin must be redesigned and modified to restore capacity.

Where designs include underground outlets, O&M plans should include checking for clogging and/or pipe damage.