



## Best Management Practices for Water Quality: Agriculture in the Lower Rio Grande Valley

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## Introduction

### Agriculture in the Arroyo Colorado Watershed

The Arroyo Colorado Watershed is 706 square miles and runs from Mission to the Lower Laguna Madre. The waterbody is impaired for excess nutrients resulting in low levels of dissolved oxygen and elevated bacteria levels. In 2017, local stakeholders developed and published an *Update to the Arroyo Colorado Watershed Protection Plan* that identifies strategies to address water quality issues. The plan is currently being implemented throughout the watershed.

Agricultural production occurs on almost half of the land within the Arroyo Colorado Watershed. One of the main goals of the watershed protection plan is to have best management practices (BMPs) implemented on half of the irrigated agricultural lands by 2027. Runoff from these agricultural fields carry excess nutrients, chemicals such as pesticides and herbicides and sediment, which contribute to the water quality impairments in the Arroyo Colorado.

### What is a BMP?

A BMP is a proven method or technique that can consistently achieve desired pollutant load reductions and improve water quality when implemented at the field level. BMPs can be modified over time to improve their effectiveness as improvements are discovered. BMPs designed to reduce nutrient and pesticide runoff from agricultural land have been implemented in the Arroyo Colorado watershed by producers on a voluntary basis. There are many state and federal programs that can provide funding and assistance to implement BMPs.

### What can you do and who should you contact?

The Texas State Soil and Water Conservation Board (TSSWCB) and the USDA Natural Resources Conservation Service (NRCS) have multiple programs that offer technical and financial assistance to agricultural producers to implement BMPs on their farm. The Environmental Quality Incentives Program (EQIP), offered by NRCS, is an annual program with specific time frames and registration periods.

TSSWCB offers assistance through its Water Quality Management Plan (WQMP) Program. A WQMP is a voluntary site-specific plan developed by local Soil and Water Conservation Districts for producers that include production practices and management measures. Both WQMPs and EQIP are designed to reduce nonpoint source pollution and provide cost share assistance.

If you have questions, you may also contact the Texas AgriLife Extension Service agent for your county.



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## Irrigation Land Leveling

Irrigation Land Leveling is reshaping the surface of land to be irrigated to planned grades. This BMP can improve field gradient for irrigation purposes and reduces runoff frequency and volume.

### What are the benefits of this practice?

- Permite Permits uniform and efficient application of irrigation water to the leveled land
- Helps reduce runoff and erosion

### Where can this practice be applied?

This BMP can be applied to level both surface and subsurface irrigated land based on a detailed engineering survey, design and layout.



## Irrigation Polypipe

Irrigation Polypipe is the use of flexible pipe (commonly called polypipe) to convey and distribute water to the furrow and border irrigated fields. This BMP can lessen water quantity issues for irrigation purposes by more efficiently using water while maximizing yields.

### What are the benefits of this practice?

- Permits uniform and efficient application of irrigation water
- Helps reduce the amount of water lost to evaporation
- Saves producers money on water after the initial cost of setup
- Can increase irrigation uniformity across the field and minimize tail water

### Where can this practice be applied?

This BMP is applicable to agricultural producers that currently use unlined ditches to distribute water to furrow or border irrigated fields.



## Irrigation Sprinkler System

This BMP is an irrigation system equipped with nozzles operated under pressure to efficiently apply water.

### What are the benefits of this practice?

- Applies irrigation water efficiently and uniformly to maintain adequate soil moisture for optimum plant growth without causing excessive water loss, erosion or water quality impairment
- Used for climate control and/or modification
- Applies chemicals, nutrients and/or wastewater
- Reduces particulate matter emissions to improve air quality

### Where can this practice be applied?

- On most crops and irrigable lands with suitable water quality for the purpose intended
- During the planning and design of sprinkler systems for irrigation water and/or wastewater application, chemical application, climate control and/or modification and particular matter emission control





## Irrigation Storage Reservoir

An Irrigation Storage Reservoir is a BMP that is built by constructing a dam, embankment or pit and is used to capture, store and conserve water.

### What are the benefits of this practice?

- Conserves tailwater and stores water to provide a reliable irrigation water supply
- Improve water use efficiency on irrigated land

### Where can this practice be applied?

- To irrigated areas where the available water supply is insufficient to meet conservation requirements during part or all of the irrigation season
- Where water is available for storage from surface runoff, streamflow or a subsurface source
- To a suitable site that is available for the construction of a storage reservoir



## Irrigation Water Management

This BMP is the process of determining and controlling the volume, frequency and application rate of irrigation water in a planned, efficient manner.

### What are the benefits of this practice?

- Manages soil moisture to promote desired crop response
- Optimizes use of available water supplies
- Minimizes irrigation-induced soil erosion
- Decrease nonpoint source pollution of surface and groundwater resources
- Manages salts in the crop root zone
- Manages air, soil or plant micro-climate

### Where can this practice be applied?

- To all irrigated lands where site conditions (soil, slope, crop grown, climate, water quantity and quality, etc) are present and capable of applying water to meet the intended purposes.



## Micro-irrigation Systems

Micro-irrigation is a trickle irrigation system that efficiently applies water directly to the plant root zone by means of emitters, orifices or porous tubing.

### What are the benefits of this practice?

This BMP efficiently and uniformly applies irrigation water and maintains soil moisture for optimum plant growth at high frequency basis. It can be used to apply chemicals directly to the plant root zone.

### Where can this practice be applied?

- On sites where precision irrigation systems are desired and where the soils and topography are suitable for irrigation and proposed plants
- On orchard and row crops, windbreaks, greenhouse crops and residential and commercial landscape systems
- On steep slopes where other methods would cause excessive erosion or on areas where other application devices interfere with cultural operations



### Filter Strips

This BMP is an area of vegetation established to remove sediment, organic materials and other pollutants from runoff and wastewater to lessen the impact of agriculture on water quality.

#### What are the benefits of this practice?

- Reduces sediment, particulate organics and sediment-absorbed contaminant loading in runoff and in surface irrigation tailwater
- Reduces dissolved contaminant and pathogen loading in runoff
- Reduces dissolved contaminants and particulate loading from an animal feeding operation
- Restores, creates or enhances herbaceous habitat for wildlife

#### Where can this practice be applied?

- To areas situated downhill from cropped, grazed or distributed land
- Where sediment, particulate organic matter and/or dissolved contaminants may leave these areas and enter environmentally sensitive areas
- To areas where permanent vegetative establishment is needed to enhance wildlife and beneficial insects or to maintain and enhance watershed function



## Surface and Subsurface Irrigation

This BMP is a system in consisting of necessary water control structures to efficiently distribute water by surface means, such as furrows, borders, contour levees or contour ditches; or by subsurface means such as drip tape.

### What are the benefits of this practice?

- Efficiently conveys and distributes irrigation water to the point of application without causing excessive water loss, erosion or water quality impairment
- Applies chemicals and/or nutrients as part of an irrigation system

### Where can this practice be applied?

- During the planning and design of an irrigation water distribution system or a chemical and/or nutrient application system
- To areas where water supplies are sufficient in quantity and quality to make irrigation practical for the crops to be grown and the application methods to be used



## Tailwater Recovery System

This BMP is a planned irrigation system component that allows for the collection, storage and transportation of irrigation tailwater.

### What are the benefits of this practice?

- Conserves irrigation water supplies
- Improves off-site water quality

### Where can this practice be applied?

- On lands that have a properly designed and installed irrigation system where recoverable irrigation runoff and/or rainfall runoff flows can be anticipated under current or expected management practices
- Applies to the planning and functional design of irrigation tailwater recovery systems including, but not limited to, pickup ditches, sumps, collecting basins, pumping plants and pipelines



## Conservation Crop Rotation

Conservation Crop Rotation is a BMP where various crops are grown on the same piece of land in a planned sequence. The sequence may involve growing high residue-producing crops such as corn or wheat in rotation with low residue-producing crops such as vegetables or soybeans.

The rotation can also involve growing forage crops in rotation with various field crops.

### What are the benefits of this practice?

- Reduces sheet and rill erosion and soil erosion from wind
- Maintains or improves soil organic matter content, soil health and soil condition
- Manages the balance of plant nutrients
- Improves water-use efficiency
- Manages saline seeps
- Manages plant pests (weeds, insects and diseases)
- Provides food and cover for wildlife and food for domestic livestock



### Where can this practice be applied?

This BMP can be applied to all cropland where at least one annually planted crop is included in the crop rotation.

## Forage Harvest Management

Forage Harvest Management is the timely cutting and removal of forages from the field such as hay, green-chop or silage. This BMP is used to promote plant regrowth, control insects and lessen the impact of agriculture on water quality.

### What are the benefits of this practice?

- Optimizes the economic yield of forage at the desired quality and quantity
- Promotes vigorous plant re-growth
- Maintains stand life for the desired time period
- Maintains desired species composition of the stand
- Uses forage plant biomass as a nutrient uptake tool
- Controls insects, diseases and weeds
- Maintains and/or improves wildlife habitat

### Where can this practice be applied?

This BMP can be applied to all land uses where machine harvested forage crops are grown.





## Nutrient Management

Nutrient Management involves managing the amount, placement and timing of plant nutrients to obtain optimum yields and minimize the risk of surface water and groundwater pollution. This BMP is used to reduce nutrient loadings to water bodies and lessen the impact of agriculture on water quality.

### What are the benefits of this practice?

- Supplies plant nutrients for optimum forage and crop yields
- Provides nutrients to quickly obtain and maintain adequate vegetation for conservation cover, critical areas, grassed waterways, vegetative buffers or wildlife habitat
- Minimizes entry of nutrients to surface water and groundwater
- Maintains or improves chemical and biological conditions of the soil

### Where can this practice be applied?

This BMP can be used on land where plant nutrients are applied.



## Pest Management

Pest Management is the managing of weeds, insects and diseases to reduce adverse effects on plant growth, crop production and natural resources. This BMP can lessen the impact of agriculture on water quality.

### What are the benefits of this practice?

- Enhances quantity and quality of commodities
- Minimizes negative impacts of pest control on soil resources, water resources, air resources, plant resources, animal resources and/or humans

### Where can this practice be applied?

This BMP can be applied wherever pests are or will be managed.



## Prescribed Grazing

Prescribed grazing is using grazing animals to manage the controlled harvest of vegetation. This BMP is used to improve or maintain forage for livestock health, reduce runoff frequency and volume, promote economic stability and lessen the impact of agriculture on water quality.

### What are the benefits of this practice?

- Improves or maintains the health and vigor of plant communities
- Improves or maintains quantity and quality of forage for livestock health and productivity
- Improves or maintains water quality and quantity
- Reduces accelerated soil erosion and maintains or improves soil condition
- Improves or maintains the quantity and quality of food and/or cover available for wildlife
- Promotes economic stability through grazing land sustainability

### Where can this practice be applied?

This BMP can be applied to all lands where grazing animals are managed.



## Residue Management

Residue Management is leaving protective amounts of crop residue on the soils surface during a prescribed time of the year by delaying primary tillage or seedbed preparation until immediately prior to planting time. This BMP reduces sediment erosion, increases organic materials and lessens the impact of agriculture on water quality.

### What are the benefits of this practice?

- Reduces sheet and rill erosion
- Reduces soil erosion from wind
- Reduces off-site transport of sediments, nutrients or pesticides
- Provides food and escape cover for wildlife

### Where can this practice be applied?

- To all land where crops are grown
- In the management of residues from biennial or perennial seed crops from the time of seed harvest until re-growth begins next season



## Surface Roughening

Surface Roughening is performing tillage operations that create random roughness of the soil surface. This BMP can help reduce wind erosion, protect plants from windblown particles and lessen the impact of agriculture on water quality.

### What are the benefits of this practice?

- Reduces wind erosion
- Reduces dust emissions into the air
- Reduces deposition of soil into surface water
- Protects plants from abrasion by wind-blown particles

### Where can this practice be applied?

This BMP can be applied to soils that have a surface layer suitable for clod formation and have a high potential for wind erosion because of lack of surface cover. It should not be used as a primary erosion control practice.





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