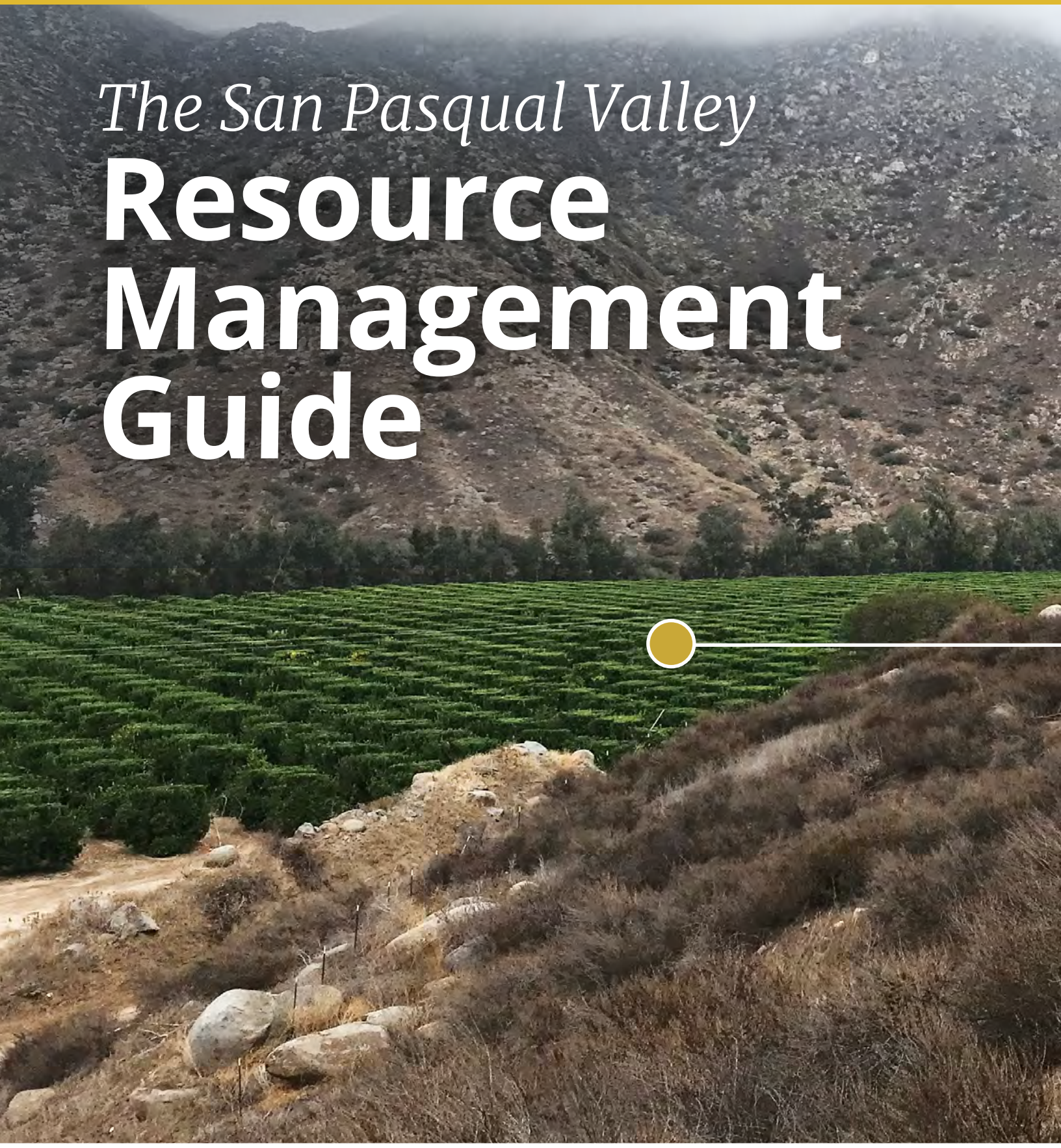
The City of SAN DIEGO

The San Pasqual Valley

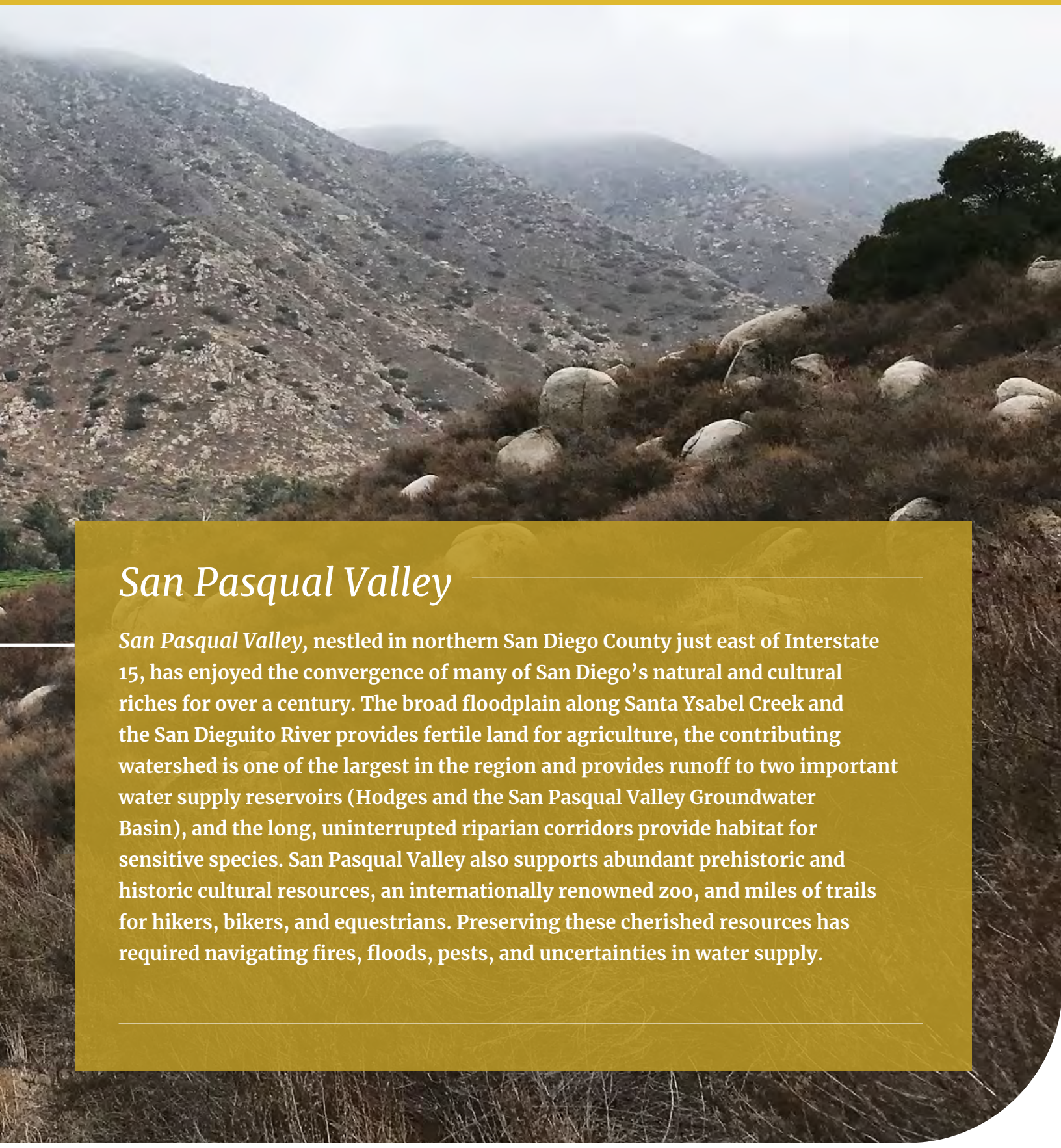
Resource Management Guide

May 2022

Contents



The San Pasqual Valley Resource Management Guide



San Pasqual Valley

San Pasqual Valley, **nestled in northern San Diego County just east of Interstate 15, has enjoyed the convergence of many of San Diego's natural and cultural riches for over a century. The broad floodplain along Santa Ysabel Creek and the San Dieguito River provides fertile land for agriculture, the contributing watershed is one of the largest in the region and provides runoff to two important water supply reservoirs (Hodges and the San Pasqual Valley Groundwater Basin), and the long, uninterrupted riparian corridors provide habitat for sensitive species. San Pasqual Valley also supports abundant prehistoric and historic cultural resources, an internationally renowned zoo, and miles of trails for hikers, bikers, and equestrians. Preserving these cherished resources has required navigating fires, floods, pests, and uncertainties in water supply.**

Hodges Reservoir

Since it was built in 1918, Hodges Reservoir has captured streamflow and groundwater migrating through San Pasqual Valley. Sediment and nutrient loading from this inflow has compounded over the years, contributing to a loss of storage and a growing feedback loop of algal blooms. Efforts to improve storage and water quality within the reservoir are ongoing and include studies assessing wet and dry weather loading to the reservoir, as well as the dynamics of internal nutrient cycling. Reducing sediment and nutrient flow into Hodges Reservoir is necessary to improve the efficiency and longevity of this vital water supply reservoir.

The San Pasqual Valley Groundwater Basin

Similar to Hodges Reservoir, the San Pasqual Valley Groundwater Basin (Basin) serves as a sink that not only captures recharge through the channels, valley floor, and surrounding foothills, but also the chemical constituents carried in those flows. Water moves slowly through this aquifer, vertically and horizontally (from east to west), and it can take decades to see the cumulative impacts of changing inputs. Historically, total dissolved solids and nitrates have been the primary chemical constituents of concern, with evidence suggesting that nitrate levels are tied to evapoconcentration and fertilizer use both within the Basin and contributions from streamflows that originate in the watershed upstream from the Basin.

The Resource Management Guide

The San Pasqual Valley Resource Management Guide is a voluntary guide and framework to help identify and reduce sources of sediment and nutrients to the surface and ground waters in San Pasqual Valley, while simultaneously identifying steps to preserve the cherished natural and cultural resources. This effort is funded by a Proposition 84 Integrated Regional Water Management Program grant with the overall goal of improving water quality and habitat within the Hodges watershed. The Guide builds on already accomplished efforts to improve conservation and stewardship in San Pasqual Valley. It combines tools existing stakeholders and leading resource specialists have developed into a guide to assist current and future Valley lessees in identifying feasible practices that will improve water quality, habitat quality and diversity, and operational efficiencies and longevity (such as practices that conserve water, reduce fertilizer requirements, and prevent erosion). This Guide was also designed to assist San Pasqual Valley lessees that may be required to develop their own resource management programs, such as the Water Quality Protection Plans (WQPPs) required for commercial agricultural operations under the General Agricultural Order.

Hodges Reservoir Watershed

Reducing pollutant loading requires identifying pollutant sources. The Hodges Reservoir watershed is roughly 250-square-miles in size. Major sources of sediment and/or nutrients to the reservoir consist of a broad range of land covers and uses, and transport of these pollutants can occur during both wet weather and dry weather conditions. The primary sources are identified in the aerial photo below.

Pollutant Sources Dry Mixed wet and dry Wet weather only

Land use pages 10-11 San Pasqual Groundwater Basin

Erosion
Erosion of soils contributes sediment and nutrients to downstream waterways. Erosion occurs naturally but can be accelerated by land disturbing activities. Sediment often carries other pollutants with it, including nutrients which have many natural (plants, rocks, animal waste) and anthropogenic (fertilizers, manure) sources.[1]

Channel Erosion
Sediment transport is a natural function of rivers, and often the source of the sediment is the river channel itself. While channel substrate, vegetation, slope, and climate establish the conditions for erosion or aggradation, modifications to the channel or along the banks can reverse or accelerate the natural channel processes.[2]

Wildfire
Wildfires generate nutrient-containing ash and removes soil stabilizing vegetation. Runoff from recently burned areas can be a significant source of both sediment and nutrients.[3]

Vegetation
Decomposing organic matter carried in runoff is a significant natural source of nutrients to downstream waters.

Source: Aerial image Google Earth

Atmospheric Deposition
Gaseous nitrogen is abundant in our atmosphere, and this includes nitrous oxide and ammonia which come from fertilizers and manure. Organic nitrogen and phosphorus attached to fine airborne particulates are also present in our atmosphere, and barren soils in agricultural or animal operations are the primary sources for these airborne particulates. The gaseous and solid particles can be deposited during wet and dry conditions.[4]

Fertilizers
Fertilizers used for commercial or personal agriculture or landscaping are a primary source of nutrients found in surface and ground waters in San Pasqual Valley.[5]

Animal Operations
Potential sources of pollutants from animal operations include waste effluent, manure, and animal feed.[5]

Septic Systems
Improperly designed or maintained septic systems have a high potential to leach nutrients through subsurface flows.

Stockpiles
Uncovered stockpiles of materials containing nutrients, including compost, manure and soils, may contribute pollutants carried in water and in the atmosphere.

Graphic is Schematic

Land Use

Within the valley is a rich diversity of cultural resources representing the distinctive character of each era of the San Pasqual Val development for the area begins in 1853 with the construction of the first irrigation canal for agriculture. By 1912, approximatel field crops and orchards were under irrigation. As part of the City's General Plan, San Pasqual Valley is designated for agricultu space and resource-based parks. The primary uses (operations) within the City of San Diego's properties in San Pasqual Valley of: Orchards, Row Crops, Nurseries, Animal Operations, Sod Farms, Open Space, and Private Residences and Golf Courses.

Land Use

- Orchard
- Animal Operation
- Nursery
- Open Space Park or Preserve
- Residential + Irrigated Landscapes
- Row Crop
- Sod Farm

Source: Aerial image Google Earth

Nutrient and Sediment Sources

Nutrients: *San Pasqual Valley is known for its abundant agricultural lands consisting of various orchard, vine and field crops, nurseries, dairy operations and pastureland. While its agricultural resources are important from both an economic and cultural perspective, they are also one of the primary sources of nutrient loading to the groundwater basin and Hodges Reservoir. Excess or inappropriate management of fertilizers (especially synthetic) and manure can result in leaching excess nitrates into the groundwater basin or conveyance via wind or water downstream.*[6]

Sediment: *The primary source of sediment from San Pasqual Valley entering the downstream waters are from the channels themselves, but this natural geomorphic process is compounded by additional land disturbances from within San Pasqual Valley. These include unmaintained access roads (especially along stream or drainage crossings), downcutting drainage ditches, lack of stabilizing riparian buffers, and bare soils exposed to wind and water transport.*[7]

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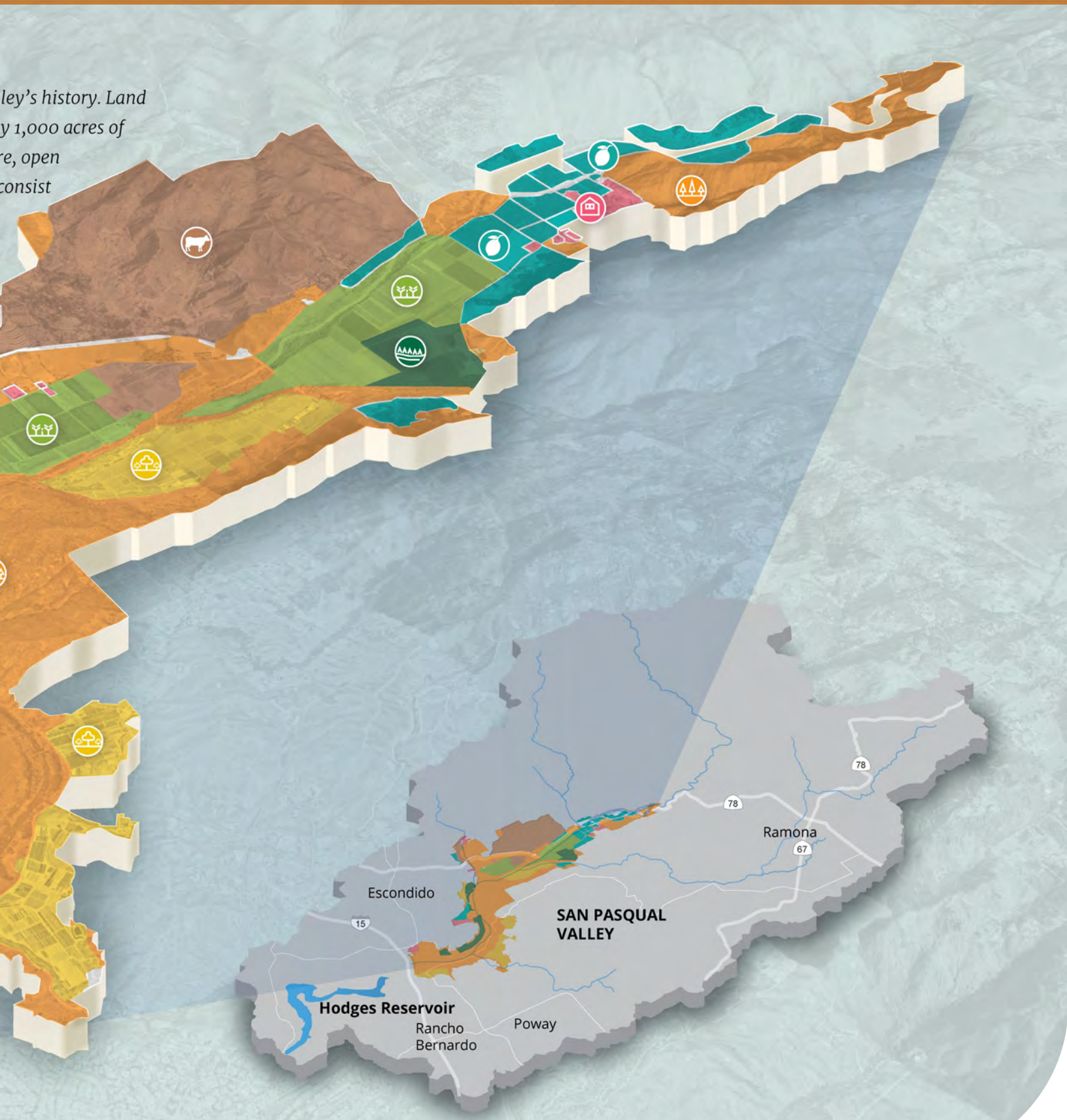


Graphic is Schematic

Pollutant Migration and Accumulation

San Pasqual Valley and Hodges Reservoir

The interconnectivity between San Pasqual Valley's alluvial aquifer and Hodges Reservoir is demonstrated in the graphics below. Hydrologic barriers such as the Hodges Dam and the Valley "Narrows" impede the flushing of pollutants through the system, exacerbating their accumulation.

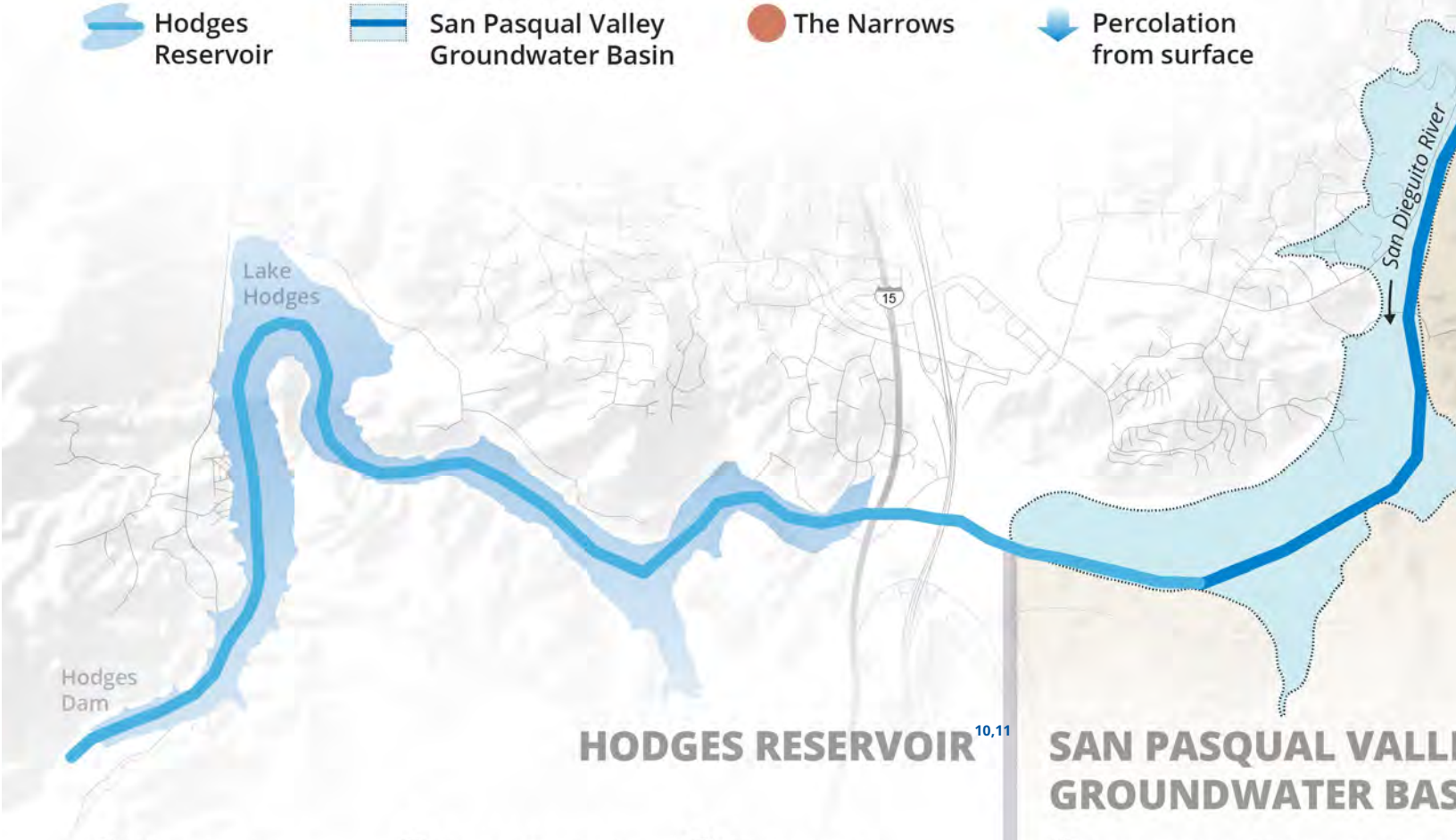
KEY

Hodges Reservoir

San Pasqual Valley Groundwater Basin

The Narrows

Percolation from surface



HODGES RESERVOIR[10,11]

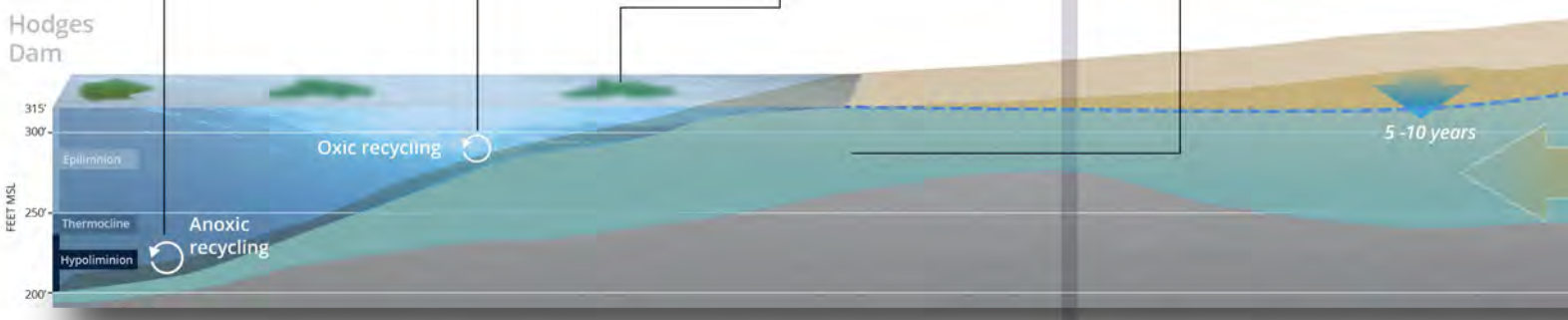
SAN PASQUAL VALL GROUNDWATER BAS

7 When algae in the reservoir dies, it re-releases nutrients, primarily through anoxic recycling in the hypolimnion.

6 A minor fraction is re-released in the epilimnion through oxic recycling.

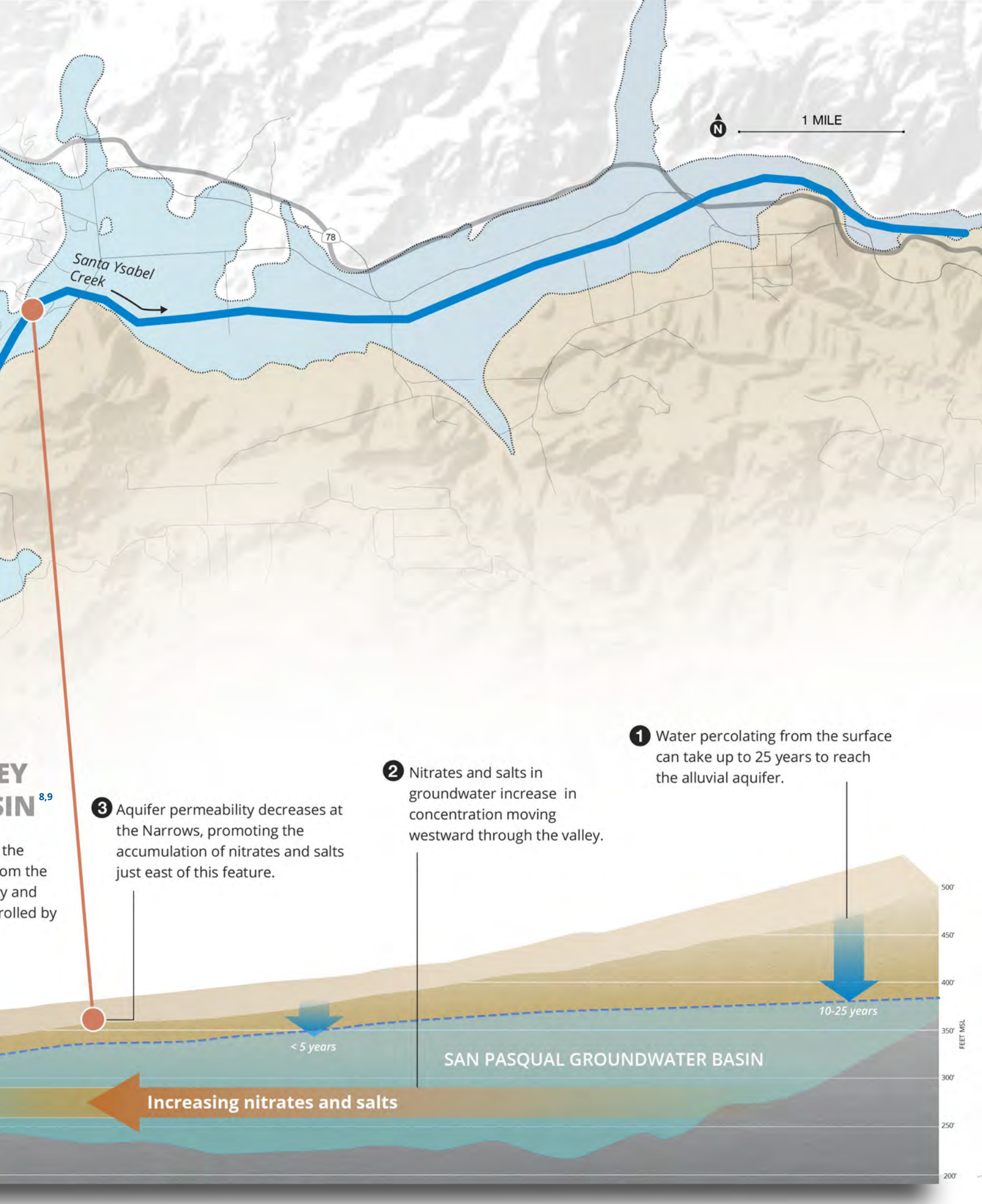
5 Nitrogen and phosporous that enters the system increases algae growth.

4 It can take over 100 years for flow in aquifer to reach Hodges Reservoir fr Narrows due to reduced permeabilit groundwater gradient (which is cont the elevation of Hodges Reservoir).



Source: OpenStreetMap

 See Citations



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The following lists of Best Management Practices (BMPs) were developed in coordination with current operations within San Pasqual Valley. The lists capture BMPs that have proven feasible for operations within San Pasqual Valley, and introduce BMPs that could provide significant benefits in reducing sediment and nutrient loading. Visual schematics of the BMPs for each of the main operations within San Pasqual Valley are provided on the following sheets. These schematics are intended as visual guides to assist with the identification of potentially suitable BMPs for your project. More details for each BMP are provided on individual BMP Information Sheets provided in Attachment A; these include additional resources to assist in the siting and implementation of each BMP.

Physical Best Management Practices

Click on the BMP name to be redirected to a detailed information sheet.

PHYSICAL BMP	INFO SHEET #	APPLICABLE OPERATIONS	WET OR DRY WEATHER BMP	WATERSHED BENEFITS
Soil Stabilization/Revegetation	A-P1		Both	↓Sediment; ↓Nutrient; ↑
Drainage Ditch with Grade Control Structure	A-P2			↓Sediment; ↓Nutrient
Slope Drain	A-P3		Wet	↓Sediment
Culvert	A-P4			
Stabilized Culvert Outlet	A-P5			
Berm	A-P6		Both	
Sediment Trap/Basin	A-P7			↓Sediment; ↓Nutrient
Riparian Buffer/Filter Strip	A-P8			↓Sediment; ↓Nutrient; ↑

- **Orchard**
- **Animal Operation**
- **Nursery**
- **Open Space Park or Preserve**
- **Residential + Irrigated Landscape**
- **Row Crop**
- **Sod Farm**

Additional materials for assessing operational BMP needs are provided in Attachment B. These include self-assessment tools for nurseries, animal operations, and orchards. The quarterly and annual self-assessment reports required under the General Agricultural Order are also provided in Attachment B.

BMPs in this Guide have been split between Physical and Operational BMPs. The Physical BMPs address the general management of stormwater and erosion typical throughout San Pasqual Valley, while the Operational BMPs address specific activities within the main land uses in San Pasqual Valley.

	OPERATIONAL BENEFIT	MAINTENANCE FREQUENCY	LIFESPAN (YEARS)
Habitat	Preserve Soils and Nutrients, Reduce Grading, Increase Local Recharge	Annually & Event Based	1-25
	Preserve Land, Reduce Grading, Increase Local Recharge		10-25
	Preserve Land, Reduce Grading		25
			10-25
	Preserve Land, Reduce Grading, Preserve Surface Water Resources		10
	Reduce Sediment Management (Roads, Culverts), Increase Local Recharge, Preserve Surface Water Resources		
Habitat	Preserve Land, Reduce Grading, Preserve Surface Water Resources		10-25

Physical Erosion

LEGEND ▼ **Stabilize** ◆ **Divert Runoff** ■ **Capture**

1 ▼ ■ **Soil Stabilization/Revegetation**
Bare soils are significant sources of pollutants in runoff. Stabilize and/or revegetate bare soils to slow down water, promote infiltration, and reduce gully formation. Temporary stabilization measures, such as mulching, wood chips, erosion control blankets, or fiber rolls can be used to minimize erosion during the plant establishment period.

2 ◆ ■ **Drainage Ditch with Grade Control Structures**
Direct concentrated flows through ditches with grade control structures (such as check dams) to reduce erosion in operations on access roads. Grade control structures slow the velocity of flow, reduce channel erosion, and promote the capture of pollutants carried in bed- and suspended-loads.

3 ▼ ◆ **Slope Drain**
A slope drain is used to intercept and direct surface runoff on steep slopes in order to minimize gully erosion. These may consist of enclosed pipes or rip-rap lined channels.

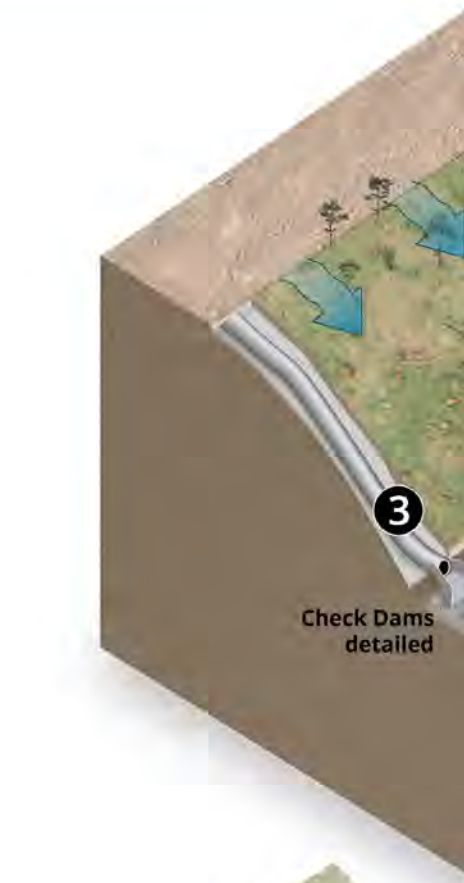
4 ▼ ◆ **Culvert**
Small drainage crossings along dirt roads are significant sources of sediment to downstream waters. Installing properly sized culverts reduces the bed and bank erosions at these crossings.

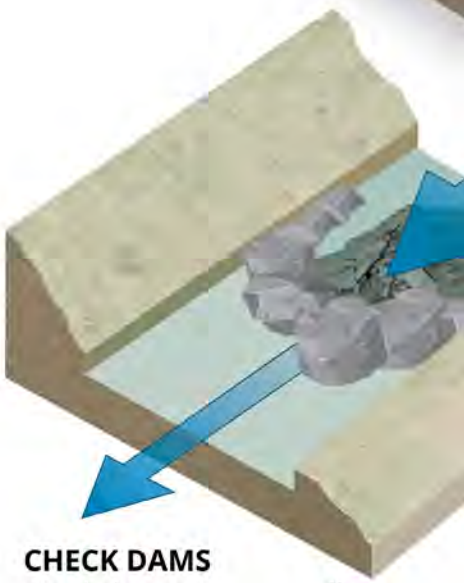
5 ▼ ■ **Stabilized Culvert Outlet**
Outlet protection composed of rock, grouted rip rap, or concrete rubble is placed at the outlet of a pipe or channel to prevent scour of the soil caused by concentrated, high velocity flows.

6 ■ **Sediment Trap/Basin**
A sediment trap or basin is a depressed area where sediment-laden runoff is temporarily detained, allowing sediment to settle out before runoff is discharged.

7 ◆ **Berm**
Berms can be used to divert flows away from erosive areas or potential sources of pollutants and towards stabilized areas or treatment BMPs.

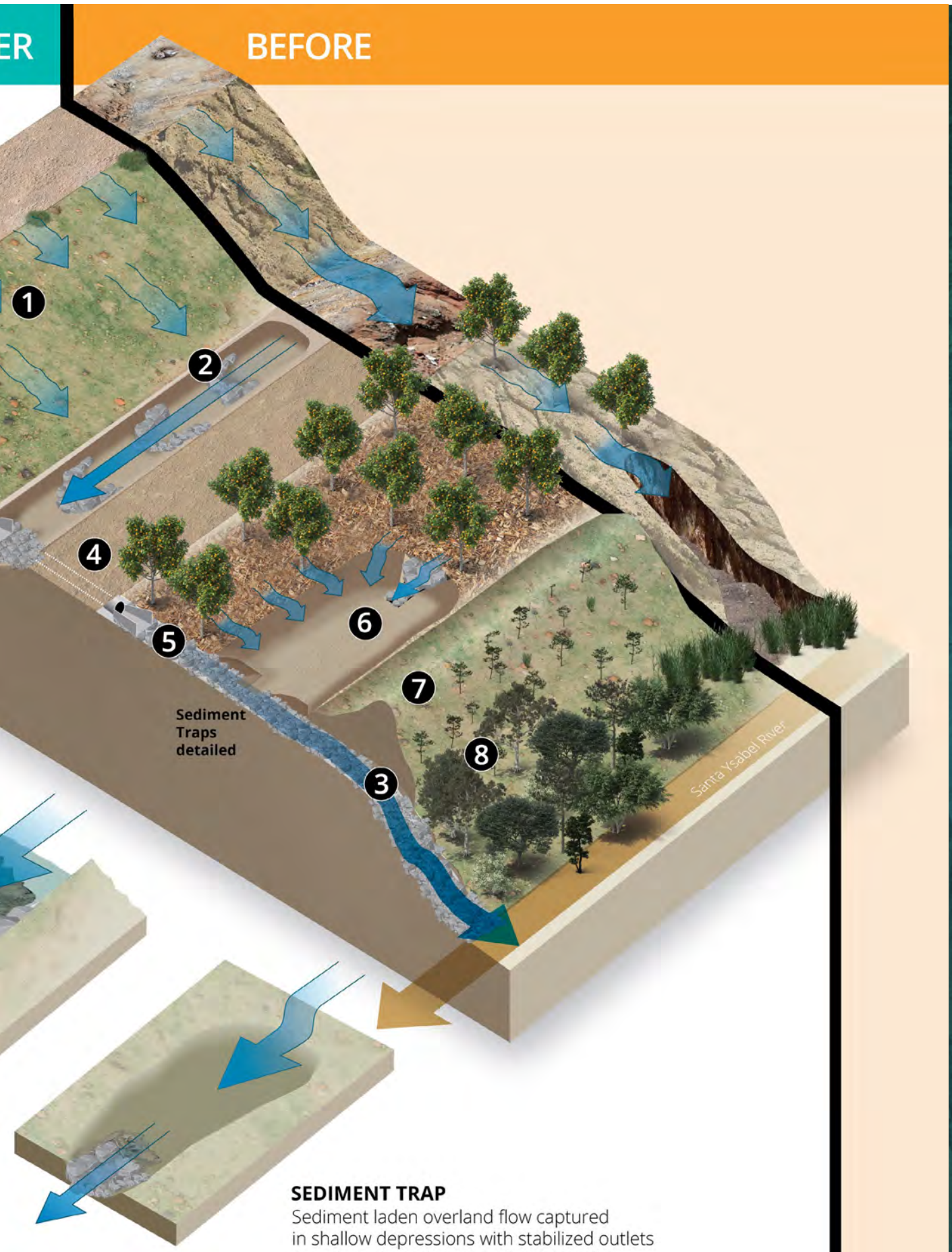
8 ▼ ■ **Riparian Buffer/Filter Strip**
Plant and maintain vegetation between operations and stream channels to remove pollutants from runoff and stabilize banks.





CHECK DAMS
Check dam reduces runoff energy and capture sediment loads

Click on the BMP name to be redirected to a detailed information sheet.



SEDIMENT TRAP
Sediment laden overland flow captured in shallow depressions with stabilized outlets to reduce downstream sediment loading.

Graphic is Schematic

Operational Best Management Practices

Click on the BMP name to be redirected to a detailed information sheet.

OPERATIONAL BMP	INFO SHEET #	APPLICABLE OPERATIONS	WET OR DRY WEATHER BMP	WATERSHED BENEF
Vegetated Waterway	A-01		Both	↓Sediment; ↓Nutr
Heavy Use Area Protection	A-02			↓Sediment; ↓Nutr
NUTRIENT MANAGEMENT BMPs				
Soil Testing	A-03a		Dry	↓Nutrient
Water Testing	A-03b			
Plant Tissue Testing	A-03c			
Manure Testing	A-03d			
Feed Testing	A-03e			
IRRIGATION BMPs				
Efficient Irrigation System	A-04a		Dry	↓Sediment; ↓Nutr
Monitor Soil Moisture	A-04b		Both	
Calculate Crop Irrigation Requirements	A-04c		Both	
MATERIALS STORAGE				
Stockpile Containment	A-05a		Both	↓Sediment; ↓Nutr
Waste Storage	A-05b			↓Nutrient
WASTE MANAGEMENT				
Waste Treatment	A-06a		Both	↓Nutrient
Nutrient Removal Devices	A-06b			
Septic System O&M	A-06c			

 Orchard

 Animal Operation

 Nursery

 Open Space Park or Preserve

 Residential + Irrigated Landscape

 Row Crop

 Sod Farm

FITS	OPERATIONAL BENEFIT	MAINTENANCE FREQUENCY	LIFESPAN (YEARS)
rient; ↑Habitat	Preserve Land, Reduce Grading, Increase Local Recharge, Preserve Surface Water Resources	Annually	5
rient	Preserve Land, Reduce Grading, Improve Animal Health, Reduce Vehicle Wear and Maintenance	6 Months	1-10
	Reduce Fertilizer Costs, Impove Crop Yield and Quality	1-5 years	Ongoing
		Annually	
	Reduce Fertilizer and Feed Costs, Improve Crop and Animal Health and Productivity		
	Reduce Feed Costs, Improve Animal Health and Productivity		
rient	Reduce Energy and Water Costs, Improve Crop Productivity, Conserve Groundwater Resources	6 Months	5-10
	Reduce Energy and Water Costs, Reduce Fertilizer Costs, Improve Crop Productivity, Conserve Groundwater Resources	Daily or Weekly	Ongoing
	Reduce Energy and Water Costs, Improve Crop Productivity, Conserve Groundwater Resources		
rient	Conserve Operation Resources, Improve Site Working Conditions	Annually	1-10
	Preserve Groundwater Resources, Reduce Fertilizer and Water Costs		10-25
	Preserve Groundwater Resources, Reduce Fertilizer and Water Costs	Annually	Ongoing
	Preserve Groundwater Resources, Reduce Water Costs	3-5 Years	15-40
	Preserve Groundwater Resources, Extend Life of Septic System	Annually	

Row Crops

LEGEND ▲ Cover ● Conserve ■ Capture

1 ▲■ Vegetated Waterway
Direct stormwater and irrigation runoff away from agricultural operations to vegetated waterways to reduce surface erosion and pollutant runoff. Vegetation stabilizes channels and removes pollutants from runoff through sediment capture and nutrient uptake.

2 ▲■ Heavy Use Area Protection
Stabilize intensively used ground surfaces with mulch, aggregate, or cementitious material to reduce surface erosion and pollutant runoff.

3 ▲■ Soil Stabilization/Revegetation
Apply mulch and/or revegetate fallowed land to reduce surface erosion. Mulch and cover crops increase soil organic matter which improve soil moisture and nutrient holding capacity, structure, and drainage.

4 ▲■ Materials Storage and Management – Stockpile Containment
Locate stockpiles 100 feet away from waterways on a low permeability surface. Cover stockpiles with a water-resistant material and install a linear sediment barrier around stockpiles to prevent pollutant runoff.

5 ● Irrigation BMPs – Efficient Irrigation
Install micro-irrigation system or pressure compensating sprinklers with high uniformity rating to conserve water, minimize nutrient leaching, and reduce surface erosion.

6 ● Nutrient Management – Water Testing
Test irrigation waters to identify existing bioavailable nutrients for crops. Incorporate nutrients available in water in selecting fertilizers for crops to reduce application of excess nutrients.

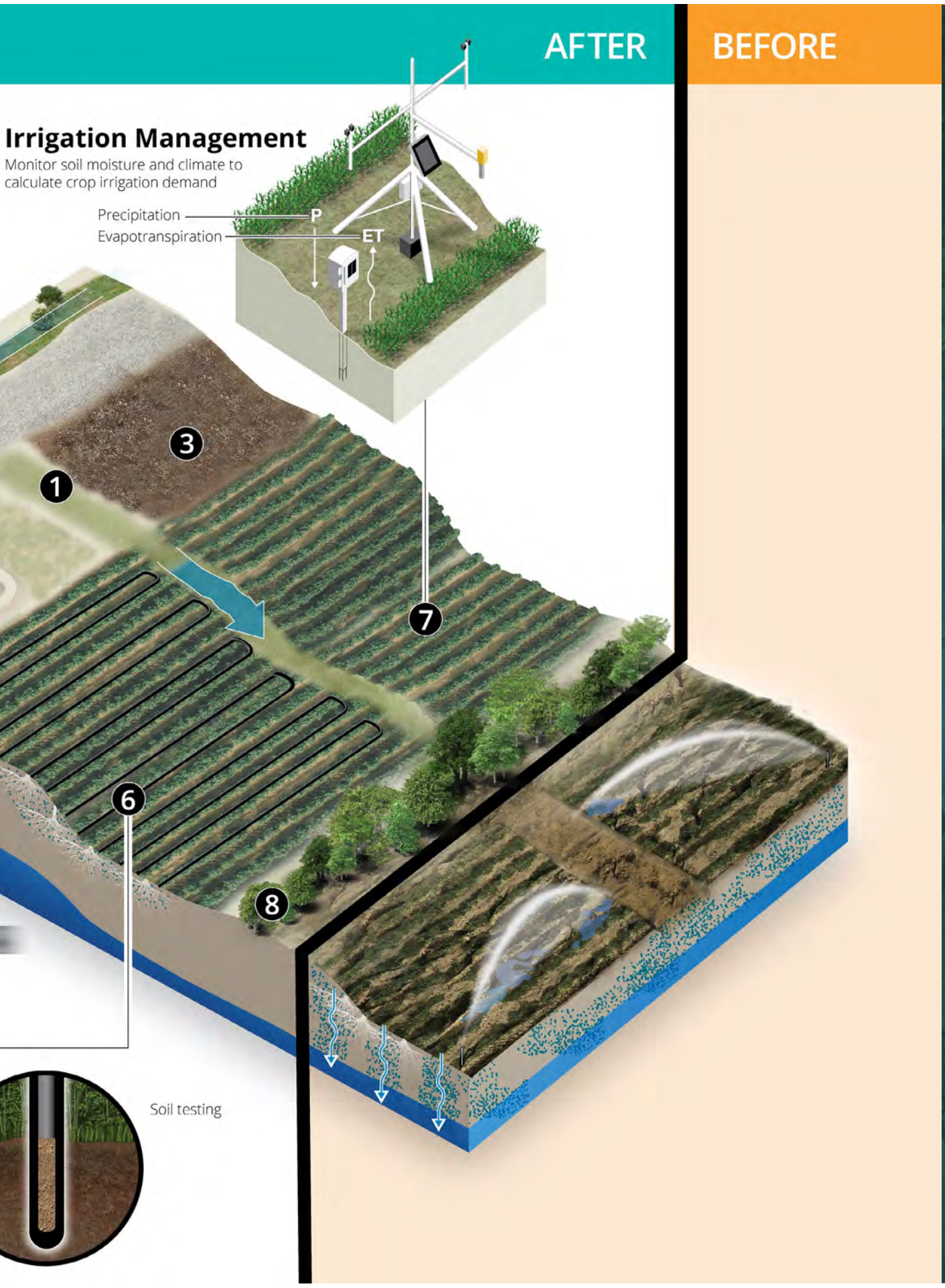
7 ● Irrigation BMPs – Monitor Soil Moisture & Crop Irrigation Requirements
Reduce over-irrigation and leaching of nutrients through soil by developing a system that quantifies irrigation demands. This could include a system that measures available soil moisture and tracks daily crop irrigation demands (such as through CIMIS).

8 ▲■ Riparian Buffer/Filter Strip
Plant and maintain vegetation along boundary of operations to capture and remove pollutants from runoff.

Nutrient Management

Irrigation water testing

Click on the BMP name to be redirected to a detailed information sheet.



Graphic is Schematic

Best Management Practices

Nursery

LEGEND ▲ Cover ● Conserve ■ Capture

1 ▲■ **Vegetated Waterway**
Direct stormwater and irrigation runoff away from agricultural operations to vegetated waterways to reduce surface erosion and pollutant runoff. Vegetation stabilizes channels and removes pollutants from runoff through sediment capture and nutrient uptake.

2 ▲■ **Heavy Use Area Protection**
Stabilize intensively used ground surfaces with mulch, aggregate, or cementitious material to reduce surface erosion and pollutant runoff.

3 ● **Nutrient Management – Water Testing**
Test irrigation waters to identify existing bioavailable nutrients for crops. Incorporate nutrients available in water in selecting fertilizers for crops to reduce application of excess nutrients.

4 ▲■ **Materials Storage and Management**
Stockpile Containment
Locate stockpiles 100 ft. away from waterways on a low permeability surface. Cover stockpiles with a water resistant material and install a linear sediment barrier around stockpiles to prevent pollutant runoff.

5 ● **Irrigation BMPs – Efficient Irrigation**
Install micro-irrigation system or pressure compensating sprinklers with high uniformity rating to conserve water, minimize nutrient leaching, and reduce surface erosion.

6 ● **Irrigation Management -**
Monitor Soil Moisture & Crop Irrigation Requirements
Reduce over-irrigation and leaching of nutrients through potted plants by developing a system that quantifies irrigation demands. This could include a system that measures available soil moisture and tracks daily crop irrigation demands (such as through CIMIS).

7 ■ **Waste Management – Nutrient Removal Device**
Remove pollutants from stormwater and irrigation runoff by installing nutrient removal devices such as iron-enhanced sand filters in drains downgradient of agricultural operations. Sand-iron filters pull dissolved phosphorous out of water.

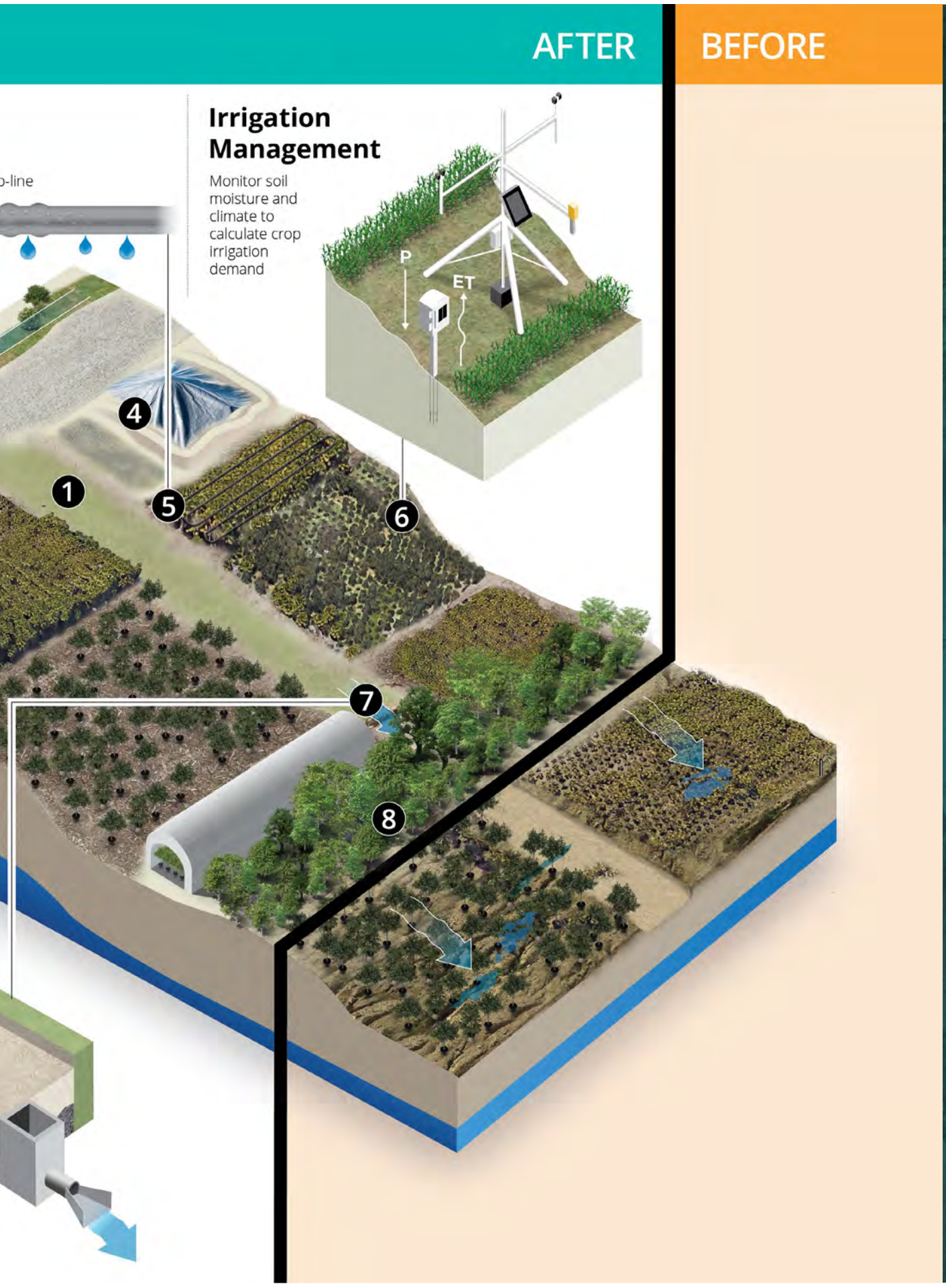
8 ▲■ **Riparian Buffer/Filter Strip**
Plant and maintain vegetation along boundary of operations to capture and remove pollutants from runoff.

Nutrient Management
Irrigation water testing

Efficient Irrigation
Micro-sprinkler/drip

Nutrient Removal Devices

Click on the BMP name to be redirected to a detailed information sheet.



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Animal Operations

LEGEND ▲ Cover ● Conserve ■ Capture

1 ▲■ Vegetated Waterway
Direct stormwater and irrigation runoff away from agricultural operations to vegetated waterways to reduce surface erosion and pollutant runoff. Vegetation stabilizes channels and removes pollutants from runoff through sediment capture and nutrient uptake.

2 ▲■ Materials Storage – Waste
Store solid agricultural waste on an impervious surface with a fixed roof and sidewalls, and liquid agricultural waste in permanent tank or lined earthen lagoon, to prevent runoff and leaching of pollutants. Locate waste storage facilities away from waterways to reduce risk of pollutants entering surface water and groundwater systems.

3 ▲■ Heavy Use Area Protection
Stabilize intensively used ground surfaces with mulch, aggregate, or cementitious material to reduce surface erosion and pollutant runoff.

4 ▲■ Materials Storage and Management – Stockpile Containment
Locate stockpiles 100 feet away from waterways on a low permeability surface. Cover stockpiles with a water-resistant material and install a linear sediment barrier around stockpiles to prevent pollutant runoff.

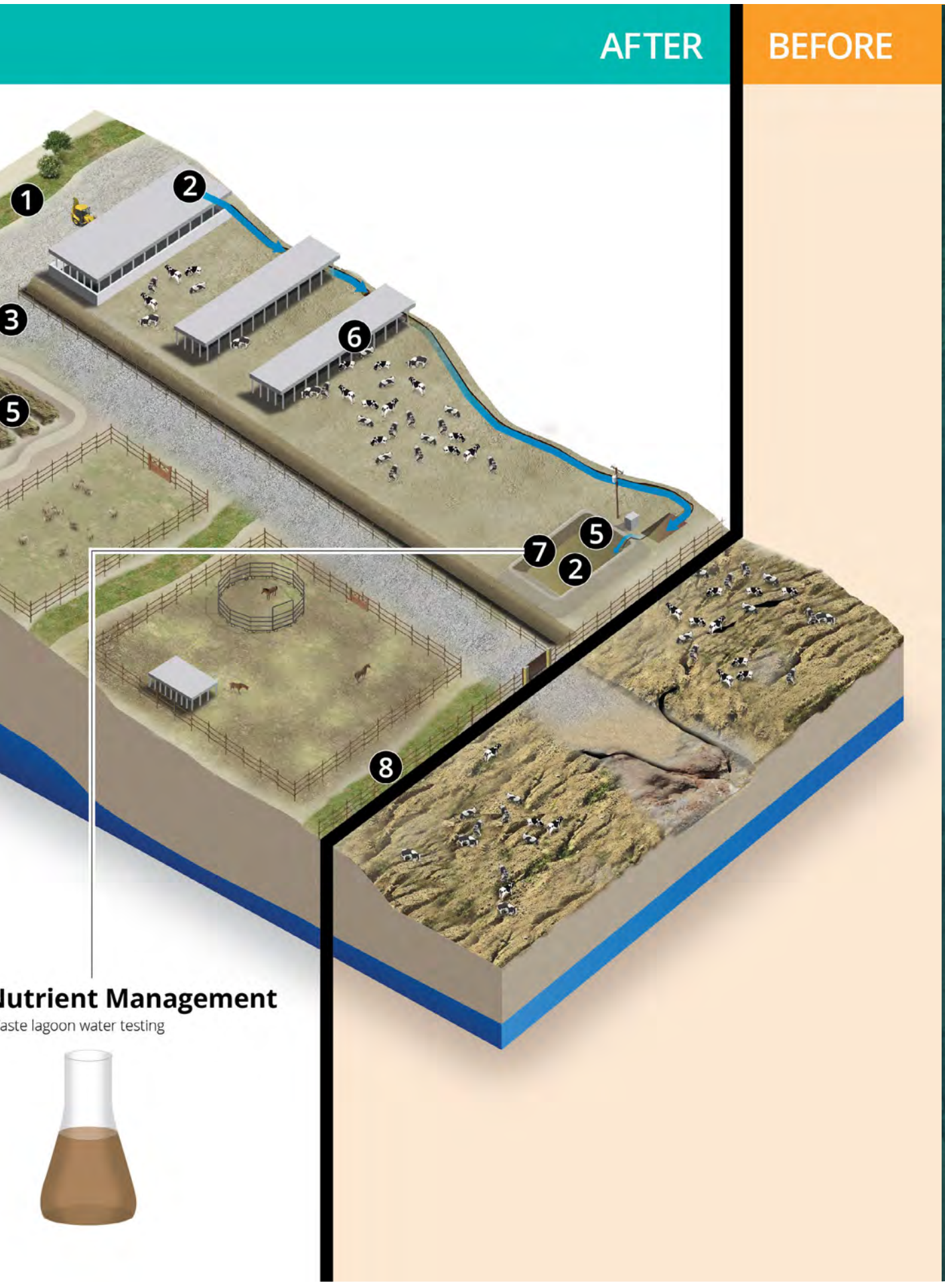
5 ■ Waste Management – Waste Treatment
Treat agricultural waste using physical, chemical, or biological methods to reduce risk of pollutants entering surface water and groundwater systems. Physical treatment includes separation of solids from liquids and sieving to separate fine and coarse solid fractions. Chemical treatment includes application of amendments such as slaked lime, aluminum, and polymers to reduce the solubility of pollutants. Biological treatment includes microbial enhancement by promoting anaerobic or aerobic digestion.

6 ● Nutrient Management – Manure and Feed Testing
Develop a system that assesses livestock feed requirements by assessing nutrient levels in manure and selecting feed sources that will reduce excess nutrients in animal waste.

7 ● Nutrient Management – Water Testing
Test waste lagoon waters used for irrigation to identify available nutrients. Account for the available nutrients in the irrigation water when selecting fertilizers for crops.

8 ▲■ Riparian Buffer/Filter Strip
Plant and maintain vegetation along boundary of operations to capture and remove pollutants from runoff.

Click on the BMP name to be redirected to a detailed information sheet.



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Orchard

LEGEND ▲ Cover ● Conserve ■ Capture

1 ▲■ Vegetated Waterway
Direct stormwater and irrigation runoff away from agricultural operations to vegetated waterways to reduce surface erosion and pollutant runoff. Vegetation stabilizes channels and removes pollutants from runoff through sediment capture and nutrient uptake.

2 ● Nutrient Management – Soil and Water Testing
Test soils and irrigation waters to identify existing bioavailable nutrients for crops. Incorporate nutrients available in soil and water in selecting fertilizers for crops to reduce application of excess nutrients.

3 ● Nutrient Management – Plant Tissue Testing
Develop a system that routinely tests nutrient levels in the crop (variable methods within and between crop types). Results from these analyses can be used to adjust nutrient levels in fertilizers to reduce application of excess nutrients.

4 ▲■ Heavy Use Area Protection
Stabilize intensively used ground surfaces with mulch, aggregate, or cementitious material to reduce surface erosion and pollutant runoff.

5 ● Irrigation BMPs – Efficient Irrigation
Install micro-irrigation system or pressure compensating sprinklers with high uniformity rating to conserve water, minimize nutrient leaching, and reduce surface erosion.

6 ● Irrigation BMPs – Monitor Soil Moisture & Crop Irrigation Requirements
Reduce over-irrigation and leaching of nutrients through soil by developing a system that quantifies irrigation demands. This could include a system that measures available soil moisture and tracks daily crop irrigation demands (such as through CIMIS).

7 ▲■ Soil Stabilization/Revegetation
Applying mulch beneath tree crops can help retain moisture and prevent development of gullies through orchard.

8 ▲■ Riparian Buffer/Filter Strip
Plant and maintain vegetation along boundary of operations to capture and remove pollutants from runoff.

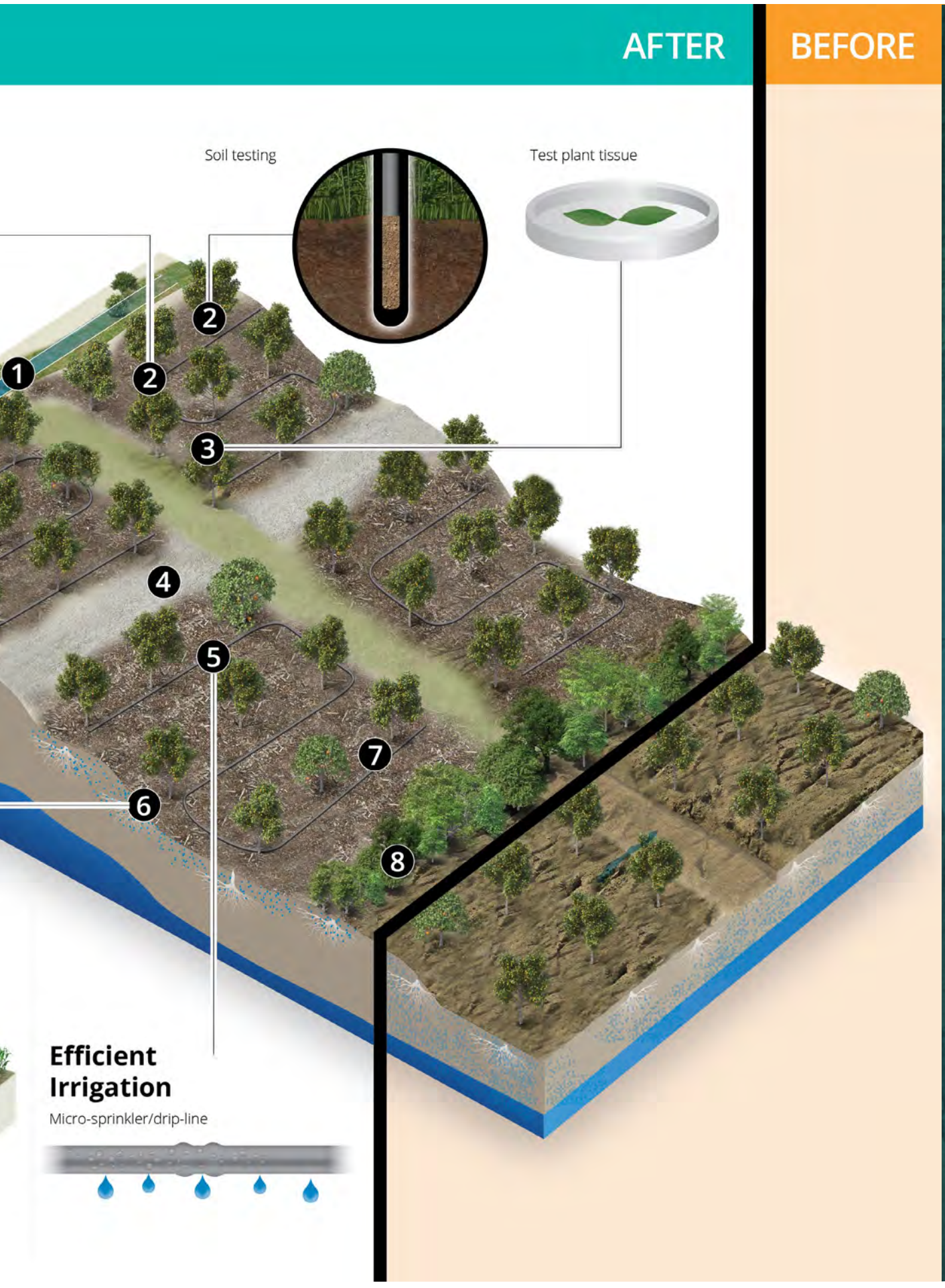
Nutrient Management

Irrigation water testing

Irrigation Management

Monitor soil moisture and climate to calculate crop irrigation demand

Click on the BMP name to be redirected to a detailed information sheet.



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Sod Farm

LEGEND ▲ Cover ● Conserve ■ Capture

1 ▲■ Vegetated Waterway
Direct stormwater and irrigation runoff away from agricultural operations to vegetated waterways to reduce surface erosion and pollutant runoff. Vegetation stabilizes channels and removes pollutants from runoff through sediment capture and nutrient uptake.

2 ▲■ Heavy Use Area Protection
Stabilize intensively used ground surfaces with mulch, aggregate, or cementitious material to reduce surface erosion and pollutant runoff.

3 ▲■ Materials Storage and Management – Stockpile Containment
Locate stockpiles 100 feet away from waterways on a low permeability surface. Cover stockpiles with a water-resistant material and install a linear sediment barrier around stockpiles to prevent pollutant runoff.

4 ● Irrigation BMPs – Monitor Soil Moisture & Crop Irrigation Requirements
Reduce over-irrigation and leaching of nutrients through soil by developing a system that quantifies irrigation demands. This could include a system that measures available soil moisture and tracks daily crop irrigation demands such as through CIMIS).

5 ● Nutrient Management – Soil and Water Testing
Test soils and irrigation waters to identify existing bioavailable nutrients for crops. Incorporate nutrients available in soil and water in selecting fertilizers for crops to reduce application of excess nutrients.

6 ● Irrigation BMPs - Efficient Irrigation
Install pressure compensating sprinklers with high uniformity rating to conserve water, minimize nutrient leaching, and reduce surface erosion.

7 ▲■ Riparian Buffer/Filter Strip
Plant and maintain vegetation along boundary of operations to capture and remove pollutants from runoff.

Efficient Irrigation

Pressure compensating sprinklers with high uniformity rating

Nutrient Management

Irrigation water testing

Soil Testin

Click on the BMP name to be redirected to a detailed information sheet.

Graphic is Schematic

Residential

LEGEND ▲ Cover ● Conserve ■ Capture

1 ● ■ Irrigation BMPs - Efficient Irrigation
Install micro-irrigation system or pressure compensating sprinklers with high uniformity rating to conserve water, minimize nutrient leaching, and reduce surface erosion.

2 ● Irrigation BMPs – Monitor Soil Moisture & Crop Irrigation Requirements
Reduce over-irrigation and leaching of nutrients through soil by developing a system that quantifies irrigation demands. This could include a system that measures available soil moisture and tracks daily crop irrigation demands (such as through CIMIS).

3 ● Nutrient Management – Soil and Water Testing
Test soils and irrigation waters to identify existing bioavailable nutrients for crops. Incorporate nutrients available in soil and water in selecting fertilizers for crops to reduce application of excess nutrients.

4 ▲ ■ Heavy Use Area Protection
Stabilize intensively used ground surfaces with mulch, aggregate, or cementitious material to reduce surface erosion and pollutant runoff.

5 ■ Drainage Ditch with Grade Control Structures
Direct concentrated flows through ditches with grade control structures (such as check dams) to reduce erosion in operations an on access roads. Grade control structures slow the velocity of flow, reduce channel erosion, and promote the capture of pollutants carried in bed- and suspended-loads.

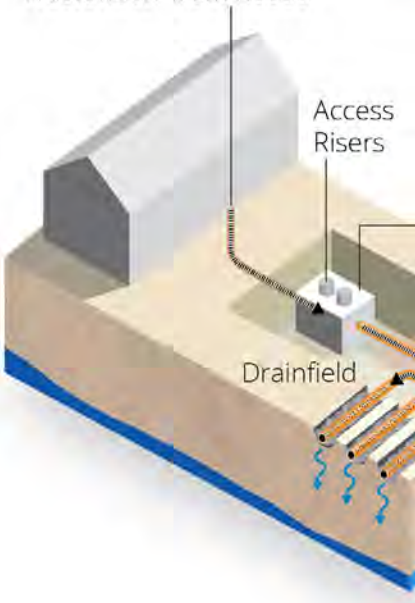
6 ■ Riparian Buffer/Filter Strip
Plant and maintain vegetation between fertilized landscaped areas and water bodies to remove pollutants from runoff.

7 ▲ ■ Vegetated Waterway
Direct stormwater and irrigation runoff away from agricultural operations to vegetated waterways to reduce surface erosion and pollutant runoff. Vegetation stabilizes channels and removes pollutants from runoff through sediment capture and nutrient uptake.

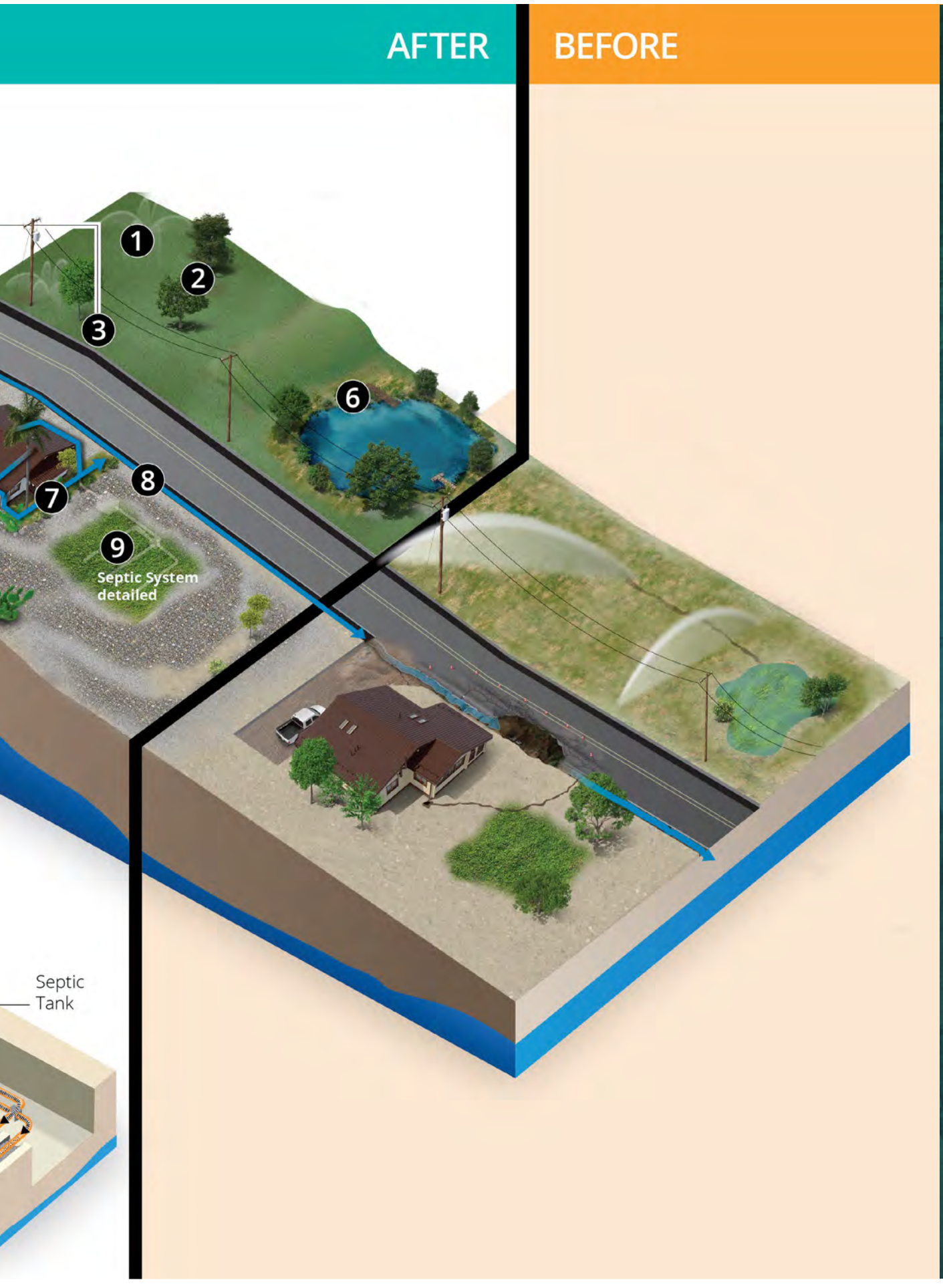
8 ■ Culvert
Small drainage crossings along roads are significant sources of sediment to downstream waters. Installing properly sized culverts reduces the bed and bank erosions at these crossings.

9 ▲ ■ Waste Management – Septic System O&M
Routine maintenance of septic systems is necessary to prevent the system from becoming a significant source of pollutants to groundwater and/or downstream surface water bodies.

Proper Septic System O&M



Click on the BMP name to be redirected to a detailed information sheet.



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San Pasqual Valley Tomorrow

SAN PASQUAL VALLEY PLAN

While the San Pasqual Valley Resource Management Guide is not directly linked to or required by any of the existing plans or regulatory programs in San Pasqual Valley, it aligns with many of their goals, priorities, and objectives. From the City's San Pasqual Valley Plan (1995) to the Groundwater Sustainability Plan, improvement of water quality and preservation of habitat are universal themes identified for maintaining San Pasqual Valley's many resources.

Key objectives for the primary resources within San Pasqual Valley are broadly defined in the San Pasqual Valley Plan. These include preservation of the agricultural preserve, surface and ground water quality, habitat, recreation, and cultural resources. This Plan provides a framework for the City to follow in managing land and developing policy within San Pasqual Valley.

This Resource Management Guide supports San Pasqual Valley's Plan by providing tools to help San Pasqual Valley stakeholders improve water quality and habitat within their operations.

https://www.sandiego.gov/sites/default/files/legacy/planning/community/profiles/pdf/sanpasqual/spvpfv.pdf

Water Quality

Existing water quality conditions and objectives are further defined in San Pasqual Valley's 2014 Salt and Nutrient Management Plan, the 2021 Groundwater Sustainability Plan, and the San Dieguito Watershed Management Area's Water Quality Improvement Plan (WQIP). Water quality in San Pasqual Valley is regulated under the County's Waste Discharge Requirements for Agricultural Operations (R9-2016-0004 & R9-2016-0005) and the Regional MS4 Permit (R9-2013-0001).

The 2014 SPV Groundwater Basin Salt and Nutrient Management Plan

Findings from the 2014 groundwater study concluded that existing nitrate and TDS loading to the alluvial aquifer, if unchanged, will result in a degradation of groundwater quality. The main sources of nitrates to the aquifer came from the larger operations within San Pasqual Valley, although smaller operations using synthetic fertilizers had significantly higher nitrate loading rates per acre. Overall, fertilizers used for agriculture and landscaping in San Pasqual Valley provide approximately 70% of the total nitrate loading to the aquifer. Several BMPs provided in this Resource Management Guide are designed to reduce the quantity of nutrients applied to San Pasqual Valley's crops, which will support the Salt and Nutrient Management Plan's goal to reduce nitrate inputs by 25%.

https://www.sandiego.gov/sites/default/files/final_snmp_may_2014.pdf

The 2021 Groundwater Sustainability Plan

The recently completed San Pasqual Valley Groundwater Sustainability Plan has established sustainability goals for the basin, which include the avoidance of the following undesireable results:

1. Reducing groundwater storage
2. Lowering groundwater levels
3. Degrading groundwater quality
4. Depleting interconnected surface waters

In addition to the water quality benefits associated with several of the Operational BMPs provided in this Resource Management Guide, there are multiple BMPs geared towards increasing water use efficiency that would reduce Valley demands, improving long-term storage and maintenance of groundwater levels.

Agriculture

The County's Waste Discharge Requirements for Agricultural Operations (Agricultural Order)

Enrollment under the Agricultural Order is managed by the San Diego Regional Water Quality Control Board (RWQCB). The Agricultural Order requires commercial agricultural operations to submit Water Quality Protection Plans (WQPPs) to identify the type and location of management practices to prevent the discharge of waste indirectly through irrigation water runoff and infiltration, non-storm water runoff, and storm water runoff.

The majority of the BMPs provided in this Resource Management Guide are designed to reduce pollutant loading and address both wet weather and dry weather sources. An outline of required WQPP components is provided in Attachment C to assist commercial agriculture operations in San Pasqual Valley in developing their own operation specific WQPP.

Order No. R9-2016-0004: General Waste Discharge Requirements for Discharges From Commercial Agricultural Operations for Dischargers That Are Members of a Third-party Group in the San Diego Region (ca.gov)
https://www.waterboards.ca.gov/sandiego/board_decisions/adopted_orders/2016/R9-2016-0004.pdf

Order No. R9-2016-0005: General Waste Discharge Requirements for Discharges From Commercial Agricultural Operations for Dischargers Not Participating in a Third-party Group in the San Diego Region (ca.gov)

https://www.waterboards.ca.gov/sandiego/board_decisions/adopted_orders/2016/R9-2016-0005.pdf

The Regional MS4 Permit (R9-2013-0001)

The City is a responsible agency for permit compliance in the San Dieguito Watershed Management Area (San Dieguito WMA) and contributed to the San Dieguito WMA Water Quality Improvement Plan (San Dieguito WMA WQIP). The WQIP summarizes the beneficial uses and water quality impairments of the waters in the San Dieguito watershed, including Hodges Reservoir. In the recent update to the WQIP, total phosphorus levels in Hodges Reservoir exceeding Basin Plan Water Quality Objectives have led to an ongoing source investigation to better identify where and how the phosphorus is entering the reservoir.

BMPs provided in this Resource Management Guide that reduce stormwater and non-stormwater discharges from carrying organic matter, dissolved phosphorus, and sediment from operations will help reduce the phosphorus loading to the reservoir.

https://www.sandiego.gov/sites/default/files/order_r9-2013-0001.pdf

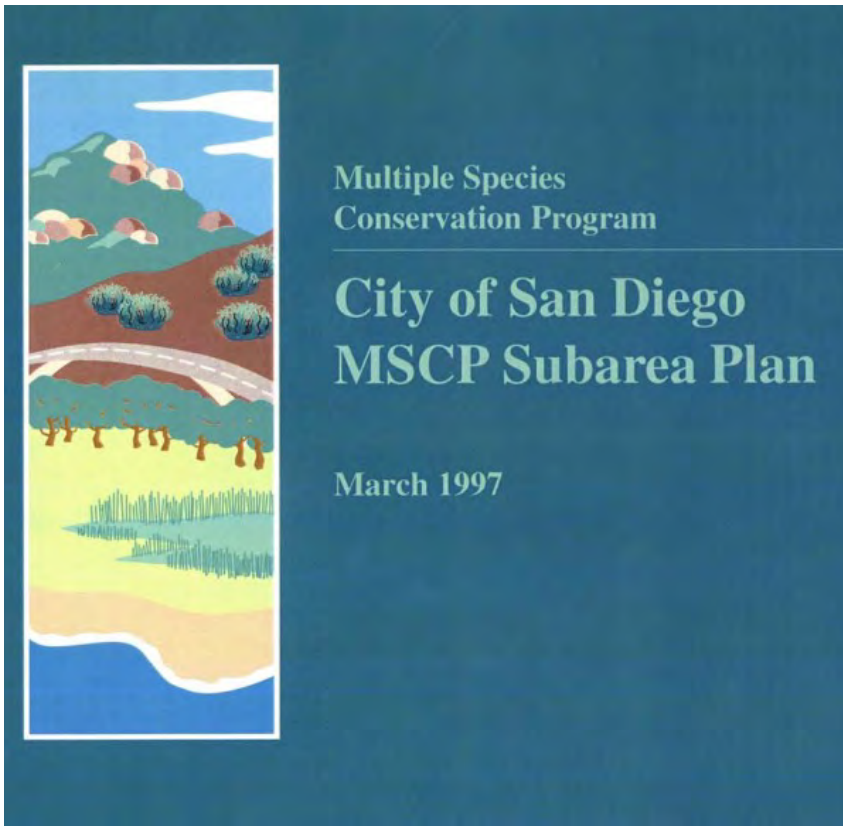
Preservation of Habitat

Four conservation goals have been identified for the Lake Hodges/San Pasqual Valley Cornerstone Lands identified in the Multiple Species Conservation Program, including preservation and/or establishment of:

- Riparian habitat which supports arroyo southwestern toads and least Bell's vireos
- Coastal sage scrub habitat for coastal cactus wrens, California gnatcatchers, rufous-crowned sparrows, orange-throated whiptails, and San Diego horned lizards
- Populations of Encinitas baccharis and wart-stemmed ceanothus
- Native grasslands that support multiple raptor species.

The physical BMPs recommended in this Resource Management Guide can serve to either reduce the loss of riparian habitat to bank erosion, and/or increase riparian habitat where it may be absent.

https://www.sandiego.gov/sites/default/files/legacy/planning/programs/mscp/pdf/subareafullversion.pdf



Arroyo Toad

Least Bell's Vireo

California Gnatcatcher

Cactus Wren

Looking forward

As the demands on our resources grow, and our current uses compound with our historical impacts, we will continue to look for new ways to improve our operations in order to preserve San Pasqual Valley's treasured resources. Investing time and effort into developing, communicating, and enforcing use of BMPs that promote careful stewardship and sustainable use of resources (including water sources, agricultural land, and critical habitat) may initially increase costs, but will yield long-term returns that will support continued utilization and enjoyment of the Valley's bounty for generations to come.

Local Support and Information

University of California Agricultural and Natural Resources Cooperative Extension – San Diego County

http://cesandiego.ucanr.edu/

Resource Conservation District of the Greater San Diego County

https://rcdsandiego.org/

NRCS Escondido office

https://offices.sc.egov.usda.gov/locator/app

The County of San Diego Office of Agriculture, Weights, and Measures:

https://www.sandiegocounty.gov/content/sdc/awm.html

Additional BMP Resources

Natural Resources Conservation Service – Conservation Practices

https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849

Environmental Protection Agency - National Management Measures to Control Nonpoint Source Pollution from Agriculture

https://www.epa.gov/nps/national-management-measures-control-nonpoint-source-pollution-agriculture

Environmental Protection Agency - Best Management Practices to Minimize Agricultural Phosphorous Impacts on Water Quality

https://www.ars.usda.gov/is/np/bestmgmtpractices/best%20management%20practices.pdf

Environmental Protection Agency - Risk Assessment Evaluation for Concentrated Animal Feeding Operations

https://nepis.epa.gov/Exe/ZyPDF.cgi/901V0100.PDF?Dockey=901V0100.PDF

Caltrans – Guidance for Temporary Soil Stabilization

http://website.dot.ca.gov/hq/construc/stormwater/tempsoilstabilizationguide.pdf

Attachment A

BMP Information Sheets

Attachment A/ BMP Information Sheets

Contents

Estimate BMP installation costs are based off of CASQA resources or bid price history accessed in 2021, and are subject to change.

BMP Class	Info Sheet #	BMP Name
Operational	A-O1	Vegetated Waterway
	A-O2	Heavy Use Protection Area
	A-O3a	Nutrient Management–Soil Testing
	A-O3b	Nutrient Management–Water Testing
	A-O3c	Nutrient Management–Plant Tissue Testing
	A-O3d	Nutrient Management–Manure Testing
	A-O3e	Nutrient Management–Feed Testing
	A-O4a	Irrigation–Efficient Irrigation System
	A-O4b	Irrigation–Monitor Soil Moisture
	A-O4c	Irrigation–Calculate Crop Irrigation Requirements
	A-O5a	Materials Storage–Stockpile Containment
	A-O5b	Materials Storage–Waste Storage
	A-O6a	Waste Management–Waste Treatment
	A-O6b	Waste Management–Nutrient Removal Devices
	A-O6c	Waste Management–Septic System O&M

Soil Stabilization/ Revegetation

Bare soils are exposed to wind, water, and physical erosive forces. On slopes, water gains speed and gullies can begin forming within one rainstorm event. These gullies often work their way downslope across access roads and into operations, requiring grading to maintain roads and prevent loss of land. Through temporary mechanical (aggregate, mulch, geotextile fabric) and permanent biological means (revegetation), stabilizing the soils on these bare slopes will limit the development of these features which also serve as sources of pollutants to downstream waters.

BENEFITS

OPERATIONAL:

Reduce gully formation which reduces grading requirements and prevent loss of land and/or damage to crops.

ENVIRONMENTAL:

Reduce sediment and nutrient loading to downstream areas (nutrients are carried in water adsorbed to sediment), as well as reduce runoff volumes/velocities to downstream waterways. Stabilizing slopes also promote soil water retention which potentially could increase local groundwater recharge.

INSTALLATION REQUIREMENTS

MATERIAL OPTIONS:

» Hydroseeding—Hydraulic seeding should be applied with hydraulic mulch or combined with straw mulch, or rolled erosion control products, or an application of a compost blanket.

» Mulch—consists of a shredded bark mixture or a mixture of green materials (for example, shredded shrubs and grasses). Avoid utilizing organic materials with carbon:nitrogen ratios of less than 15:1 as mulch. Materials high in nitrogen, such as compost, manure, grass clippings, vegetable cuttings, green waste, etc., will leach nitrogen and negatively impact water quality if included in mulch. Mulching may draw nutrients out of soils; pre-fixing of the soils may be required to avoid nutrient deficiencies for specific crops.

» Geotextiles—also known as rolled erosion control mats or blankets, these can be made of natural or synthetic materials or a combination of both. Materials should be chosen based size of the area, slope steepness, and soil type/ground cover.

» Soil Binders—includes Short Lived Plant-Material-Based Binders (ex. Psyllium), Long Lived Plant Material-Based Binders (ex. Pitch or Rosin Emulsion), Polymeric Emulsion Blend Binders (ex. PAM), or Cementous Binders (ex. Gypsum).

» Revegetation—Native vegetation should be chosen to ensure long term success. For information about the best species to choose, the NRCS has a guide to choosing vegetation based on site location.

For additional information regarding installation requirements, the California Stormwater Quality Association Best Management Practice Handbook can be consulted.

MAINTENANCE FREQUENCY AND LIFESPAN:

Maintenance frequency will depend on the type of mechanical or biological cover chosen. General maintenance consists of routine inspections to identify bare patches that may require reapplication of groundcover. Temporary groundcover such as straw mulch may need to be replaced after 6 months, whereas semi-permanent mulch (such as wood chips) can have a lifespan up to 5 years.

INSTALLATION AND MAINTENANCE COSTS:

Installation costs will vary, depending on type of mechanical or biological stabilizer chosen.

» Hydroseeding installation costs range from $2,700 to $6,000 per acre, based on site slope steepness, application soil type, and vegetation chosen.

» Mulch installation costs are based on a 2-inch layer ranging from $2,100 to $8,000 per acre for a straw mulch, and >$15,000 per acre for a wood mulch.

» Geotextile or rolled erosion control product installation costs range from $3,000 to $53,000 per acre, based on the type of cover chosen.

» Soil binders can vary in price depending on type of binder chosen. Prices range from $1,100 to $2,200 per acre.

Additional Resources:

NRCS - Vegetated Barrier Conservation Practice Sheet:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_010398.pdf

NRCS - Conservation Practice Standard. Critical Area Planting:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1241316.pdf

NRCS - Conservation Practice Standard. Mulching:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1249892.pdf

NRCS - Fact Sheet. Hydromulching:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_061752.pdf

NRCS - Construction Specifications. Geotextiles:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs141p2_002237.pdf

NRCS – eVegGuide:
https://www.calflora.org/nrcs/index.html

Drainage Ditch with Grade Control Structure

Paved surfaces and compacted soils reduce the infiltration of rainfall leading to increased runoff and the potential for development of headcuts and gullies. Directing runoff into drainage ditches with grade control structures, such as check dams or rock-lined channels, can reduce the erosion of roads and agricultural fields by conveying runoff through stabilized channels.

BENEFITS

OPERATIONAL:

Reduce gully formation within drainage ditches (e.g., through operations or along roads), and reduce operation impacts/maintenance associated with erosion.

ENVIRONMENTAL:

Reduce transport of sediment and nutrients to downstream waters.

INSTALLATION REQUIREMENTS

SITE REQUIREMENTS:

Drainage ditches with grade control structures are generally suitable for channels that drain 10 acres or less and when the inflow channel condition is subcritical (Froude Number <1.0). The height and spacing of grade control structures depends on the channel dimensions and slope. The height of grade control structures should be below the top of the channel. The spacing between grade control structures depends on channel slope—as channel slope increases, the spacing between structures should be decreased. For guidance on site requirements refer to The City of San Diego Drainage Design Manual and other resources listed below.

MATERIAL REQUIREMENTS:

Grade control structures can be constructed of rock riprap, grouted riprap, concrete, sheet piles, gabions, or other materials. The selection of material depends on expected flow velocities, aesthetic considerations, sediment bed load type, and other site conditions. For guidance on material requirements refer to The City of San Diego Drainage Design Manual and other resources listed below.

SIZING REQUIREMENTS:

Ditches constructed as temporary measures should be designed to convey the peak flow associated with a 2-year storm event. Ditches that serve as permanent drainage features should be designed to safely convey the peak flow associated with a 100-year flood event per the City of San Diego's Drainage Design Manual protocol.

Under this protocol, the minimum freeboard for open channels with design flows of less than 10 cfs should be 0.5 ft, while the minimum freeboard for open channels with design flows of more than 10 cfs should be 1 ft.

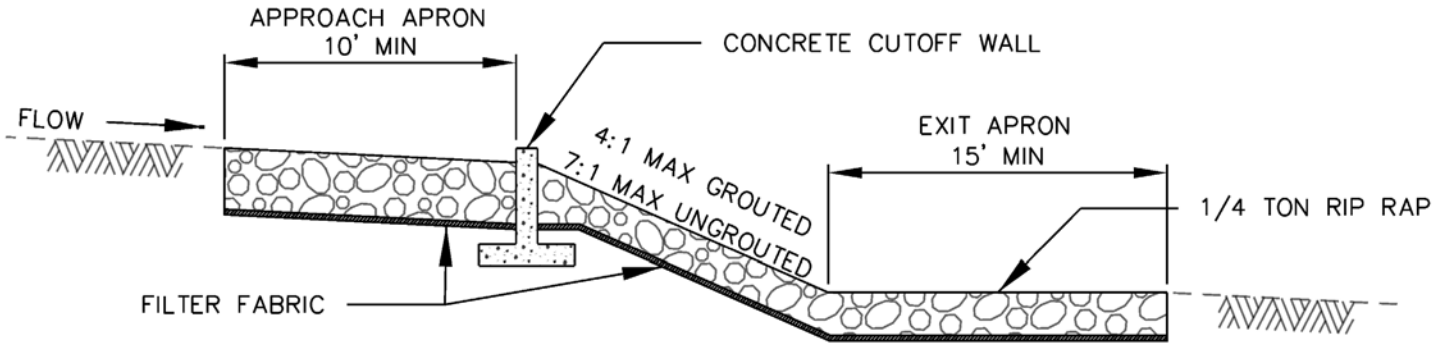
Grade control structures should be designed for a wide range of discharges up to the maximum design flow. For guidance on sizing requirements refer to The City of San Diego Drainage Design Manual and other resources listed below.

MAINTENANCE FREQUENCY AND LIFESPAN:

Grade control structures should be inspected prior to and after rainfall events, and repaired as necessary to maintain effectiveness. The lifespan of grade control structures depends on the material used, site conditions, and how often the structures are maintained. In general, grade control structures are effective for between 10 and 25 years.

INSTALLATION AND MAINTENANCE COSTS:

Installation and maintenance costs vary by material type and size of grade control structures. If materials are readily available onsite, costs will be lower than if material must be imported.



GRADE CONTROL STRUCTURE
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Additional Resources:

City of San Diego - Drainage Design Manual:
https://www.sandiego.gov/sites/default/files/drainage_design_manual_jan2017.pdf

CASQA - California Stormwater BMP Handbook:
https://www.casqa.org/resources/bmp-handbooks

NRCS – Fact Sheet. Rock Check Dam:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_062537.pdf

Slope Drain

A slope drain is used to convey surface flow down steep slopes through a pipe or stabilized channel. Discharge from the pipe should be directed into a stabilized area, where energy dissipators may be added to prevent downstream erosion (A-P5).

BENEFITS

OPERATIONAL:

Reduce erosion from concentrated flows along slopes that can cut through access roads and strip soil from downslope operations.

ENVIRONMENTAL:

Reduce sediment loading in downstream waterbodies.

INSTALLATION REQUIREMENTS

SITE REQUIREMENTS:

Prior to installing a slope drain, a site survey and drainage area evaluation is recommended to ensure appropriate drain diameters and slopes are selected. In general, slope drains are constructed on grades of 5:1 (H: V) 20% or steeper. To avoid erosion surrounding the pipe or channel, the soils are well compacted and vegetated, and the drain extends into a stabilized ditch, channel, or basin. Slope drains should also be anchored in place at a maximum of 30 feet for all piping placed on or within a slope of 3:1 or steeper.

Per CASQA guidance, enclosed slope drains should not be utilized for contributing areas larger than 10 acres. Larger drainage areas may require a series of pipes or a rock-lined channels to convey larger flows, and may also require a Registered Civil Engineer for design and permitting. Aboveground installations may also require special approval from the City of San Diego.

Permitting—A grading permit may be required from the City of San Diego for non-agricultural operations. If construction results in the disturbance of more than 1 acre of soil, Construction General Permit coverage is required. Lastly, construction within USGS mapped "blue line streams" or other jurisdictional waterways (waters of the US or waters of the State) may be subject to additional permitting requirements through the Army Corps of Engineers (404), the San Diego Regional Water Quality Control Board (401), and the California Department of Fish and Wildlife (1600).

MATERIAL REQUIREMENTS:

A slope drain can either be an enclosed pipe or open channel. The enclosed pipe can be made of a rigid material such as corrugated metal pipe, or a more flexible material such as heavy-duty plastic. Open channels can be concrete lined or earthen channels lined with rock or grass. The materials chosen should be based on the drainage area, capacity of design storm event, and slope stability.

SIZING REQUIREMENTS:

Pipes should be sized to not exceed the maximum permissible velocity as outlined in the City of San Diego Drainage Design Manual. For contributing drainage areas less than 10 acres in size, the typical pipe sizing defined in the CASQA guidance are suitable (Table 1.)

Table 1

Minimum Pipe Diameter (inches)	Maximum Drainage Area (Acres)
12	1.0
18	3.0
21	5.0
24	7.0
30	10.0

MAINTENANCE FREQUENCY AND LIFESPAN:

Periodic inspections should be performed, especially immediately following significant rainfall events.

» Inspection of the surrounding area for erosion and scour.

- Scour and erosion can be avoided by compaction of the soil and revegetation. If downstream erosion occurs, then flow from the pipe may need to be slowed by adjusting the energy dissipator.

» Inspection of the drain outlet for clogging or blockages by sediment and debris

- Clear the blockage by removing sediment and debris to help minimize standing water and backflow or instability to the pipe.

» Pipes will need to be inspected for leaking.

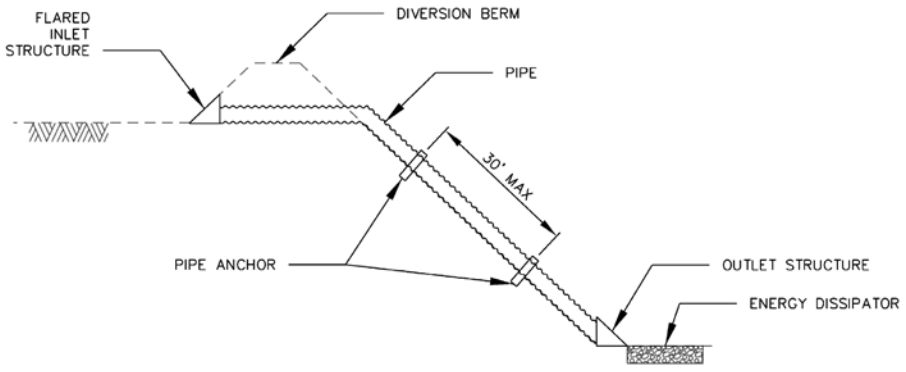
- If leaking is noticed, repair leaks and restore damaged area.

Properly sized and installed slope drains should have lifespans of at least 100-years.

INSTALLATION AND MAINTENANCE COSTS:

Installation costs vary depending on the types and quantities of materials, the complexity of the installations, and whether or not engineering design and permitting is required. Materials for enclosed slope drains can range from $29.00 per linear foot (LF) to $74.00 per LF for corrugated steel pipe, and $36.00 per LF to $192.00 per LF for PVC pipe.

Maintenance costs consist of clearing sediment and debris from the energy dissipater regularly and replacing materials as needed.



SLOPE DRAIN PROFILE

Additional Resources:

City of San Diego - Drainage Design Manual
https://www.sandiego.gov/sites/default/files/drainage_design_manual_jan2017.pdf

CASQA - California Stormwater BMP Handbook
https://www.casqa.org/resources/bmp-handbooks

County of San Diego - Hydrology Manual
https://www.sandiegocounty.gov/content/dam/sdc/dpw/FLOOD_CONTROL/floodcontroldocuments/hydro-hydrologymanual.pdf

Culvert

A culvert is a hydraulic conduit used to convey surface or subsurface water through a barrier (a roadway, embankment, or highway).

BENEFITS

OPERATIONAL:

Protect access roads at drainage crossings. Relieve potentially pooled surface runoff by providing a conveyance for water.

ENVIRONMENTAL:

Reduce sediment loading in downstream waterbodies.

INSTALLATION REQUIREMENTS

SITE REQUIREMENTS:

A culvert should be installed to align with the grade of the natural channel and should not impede the transport of upstream critical coarse sediment. If the addition of a culvert increases the existing limits of flooding, the project owner is required by the City of San Diego to obtain the proper documentation from the affected property owners.

Permitting—A grading permit may be required from the City of San Diego for non-agricultural operations. If construction results in the disturbance of more than 1 acre of soil, Construction General Permit coverage is required. Lastly, construction within USGS mapped "blue line streams" or other jurisdictional waterways (waters of the US or waters of the State) may be subject to additional permitting requirements through the Army Corps of Engineers (404), the San Diego Regional Water Quality Control Board (401), and the California Department of Fish and Wildlife (1600).

MATERIAL REQUIREMENTS:

Culvert materials range from concrete to metals to heavy duty plastic. Materials chosen should meet the criteria for local regulations. For non-concrete culverts, a protection against buoyancy can be provided with the addition of a headwall, end wall, or slope paving. A headwall or other slope protection is also required when the headwater elevation exceeds the top of the culvert conduit.

‹ back

SIZING REQUIREMENTS:

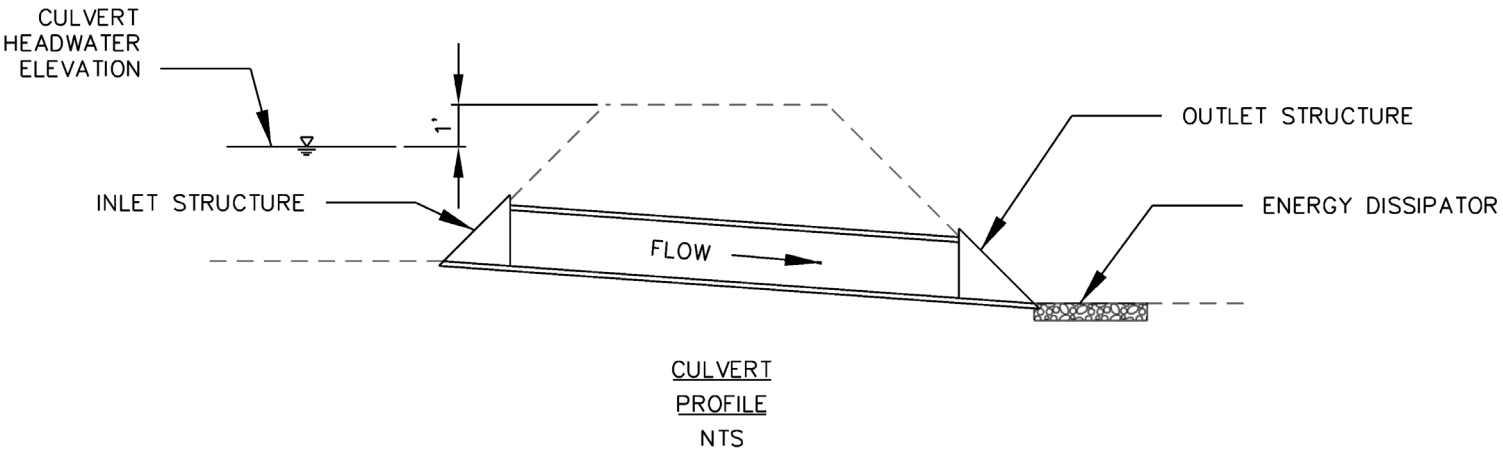
Sizing guidelines are provided in the City of San Diego Drainage Design Manual. A site hydrologic analysis should be completed to size the culvert appropriately. The NRCS Culvert Design Spreadsheet can assist with sizing based on site specific parameters. For culverts installed in the public right of way, a minimum 18-inch diameter is required. More detailed design guidelines can be found in The Federal Highway Administration's Hydraulic Design of Highway Culverts.

MAINTENANCE FREQUENCY AND LIFESPAN:

Maintenance consists of removing debris from the culvert as needed, especially following a large storm event. Maintenance access should be considered if two or more culverts are installed at a crossing.

INSTALLATION AND MAINTENANCE COSTS:

Installation costs can vary depending on size and location. Depending on culvert diameter, costs can range from $90.00 per linear foot for a 6-inch diameter to $300.00 per linear foot for a 36-inch diameter.



CULVERT
PROFILE
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Additional Resources:

City of San Diego - Drainage Design Manual:
https://www.sandiego.gov/sites/default/files/drainage_design_manual_jan2017.pdf

NRCS - Design Spreadsheet. Culvert Design:
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/md/technical/engineering/?cid=nrcseprd1337702

Federal Highway Administration - Hydraulic Design of Highway Culverts:
https://www.fhwa.dot.gov/engineering/hydraulics/pub/12026/hif12026.pdf

Stabilized Culvert Outlet

A stabilized culvert outlet is a structure placed at the outlet of a pipe or channel to prevent scour resulting from high velocity flows discharging onto erosive areas. A stabilized culvert outlet may be comprised of structural concrete, rip rap, grouted rip rap, or concrete rubble.

BENEFITS

OPERATIONAL:

Reduce maintenance or operational impacts resulting from erosion.

ENVIRONMENTAL:

Reduce sediment loading in downstream waterbodies.

INSTALLATION REQUIREMENTS

SITE REQUIREMENTS:

A stabilized culvert outlet is appropriate at points of concentrated discharge in unlined channels prone to scouring.

Permitting—Depending on the size of the feature, contributing drainage area, and downstream waters, specific drainage studies and/or permits may be required for the installation of a stabilized culvert outlet. A grading permit may be required from the City of San Diego for non-agricultural operations. If construction results in the disturbance of more than 1 acre of soil, Construction General Permit coverage is required. Lastly, construction within USGS mapped "blue line streams" or other jurisdictional waterways (waters of the US or waters of the State) may be subject to additional permitting requirements through the Army Corps of Engineers (404), the San Diego Regional Water Quality Control Board (401), and the California Department of Fish and Wildlife (1600).

MATERIAL REQUIREMENTS:

A rip rap energy dissipator consists of a layer of rip rap or broken concrete, a geotextile fabric, a layer of filter material (smaller rock), and a base of sand. An optional concrete sill at the downstream end of the energy dissipator may be constructed to keep the rip rap in place. For flow velocities less than 10 feet per second, 8" diameter rip rap and ¼" filter material shall be used.

A concrete energy dissipator includes a reinforced concrete apron and cutoff wall. Refer to City of San Diego Standard Drawing SDD-105 for details.

For more detailed material requirements and for higher flow velocities, refer to the details on the City of San Diego Standard Drawing SDD-104 and in the City of San Diego Whitebook Section 200-1.7.

SIZING REQUIREMENTS:

» Minimum length of the rip rap is 10 feet or 4 times the diameter of the discharging pipe.

» Minimum width of the rip rap is 3 times the diameter of the discharging pipe.

» For flow velocities less than 10 feet per second, the minimum thickness of the rip rap and filter blanket material is 1.1 ft each.

» For more detailed dimensions and for higher flow velocities, refer to the details on the City of San Diego Standard Drawing SDD-104 and in the City of San Diego Whitebook Section 200-1.7.

MAINTENANCE FREQUENCY AND LIFESPAN:

» Maintenance is typically minimal and may occur annually or after large storm events.

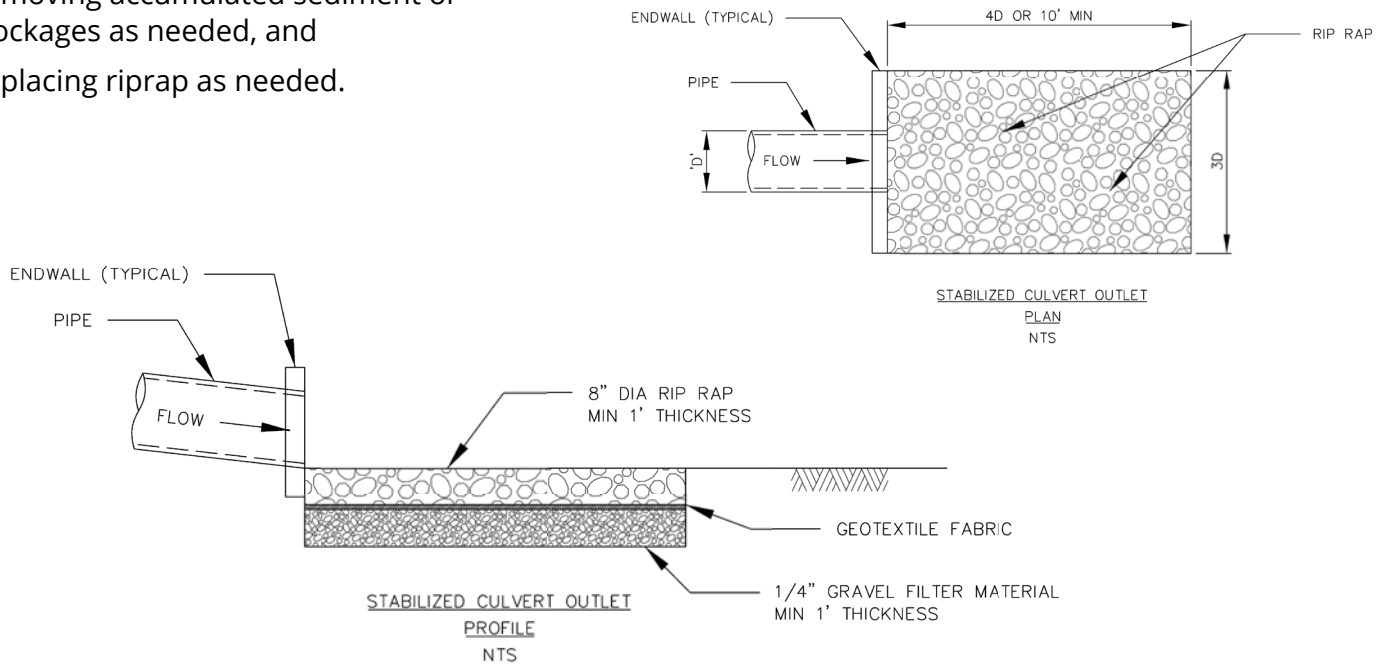
» Stabilized outlets should be inspected for damage after large storm events, including displacement of the riprap, damage to the filter fabric, or scour around the rip rap. If rip rap is displaced during storm events, consider replacing the rip rap with a larger size. Remove any sediment accumulation as required to prevent standing water.

INSTALLATION AND MAINTENANCE COSTS:

» Installation costs vary based on the size of the device and the local availability of material. Costs may range from $100 to $2000 depending on materials, equipment, and labor requirements.

» Maintenance costs are minimal (typically less than $100 per year), and include:

- Visual inspections after major storm events,
- Removing accumulated sediment or blockages as needed, and
- Replacing riprap as needed.



Additional Resources:

CASQA - California Stormwater BMP Handbook:
https://www.casqa.org/resources/bmp-handbooks

City of San Diego - Standard Plans:
https://www.sandiego.gov/sites/default/files/standard_drawings_2018_edition_effective_january_1_2019.pdf

City of San Diego - The "Whitebook":
https://www.sandiego.gov/sites/default/files/the_whitebook_2018_edition_effective_january_1_2019.pdf

NRCS – Conservation Practice Standard. Lined Waterway or Outlet:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_026310.pdf

Berm

A berm is an earthen structure meant to intercept and divert runoff and convey it through or around an area and discharge it in a specific location. It is often used in coordination with a Drainage Ditch with Grade Control Structures (A-P2) to convey flow along the edge of the berm.

BENEFITS

OPERATIONAL:

Reduce operational and maintenance issues caused by or related to runoff flowing through an area, including erosion and ponding. Berms are also used to prevent discharges to ponds, reducing pollutant loading.

ENVIRONMENTAL:

Reduce sediment loading in downstream waterbodies.

INSTALLATION REQUIREMENTS

SITE REQUIREMENTS:

Where overland flow cannot be managed/captured in Filter Strips (A-P9) and Drainage Ditches (A-P2) alone, a berm may be required to redirect flows. This feature is typically installed at the top or bottom of a slope, and directs flows towards another BMP (such as a sediment basin: A-P8) or stabilized outlet/channel.

Permitting—Depending on the size of the feature, contributing drainage area, and downstream waters, specific drainage studies and/or permits may be required for the installation of a berm. A grading permit may be required from the City of San Diego for non-agricultural operations. If construction results in the disturbance of more than 1 acre of soil, Construction General Permit coverage is required. Lastly, construction within USGS mapped "blue line streams" or other jurisdictional waterways (waters of the US or waters of the State) may be subject to additional permitting requirements through the Army Corps of Engineers (404), the San Diego Regional Water Quality Control Board (401), and the California Department of Fish and Wildlife (1600).

MATERIAL REQUIREMENTS:

A berm may be constructed of native material compacted using construction equipment. If the berm is subject to high velocity flows which result in erosion, erosion control measures shall be incorporated in the channel design, potentially including the following:

» Rip rap on the berm embankment

» Rolled erosion control product

For more detailed material guidance for open channels, refer to the details on the City of San Diego Standard Drawing SDD-109 and in the City of San Diego Drainage Design Manual.

SIZING REQUIREMENTS:

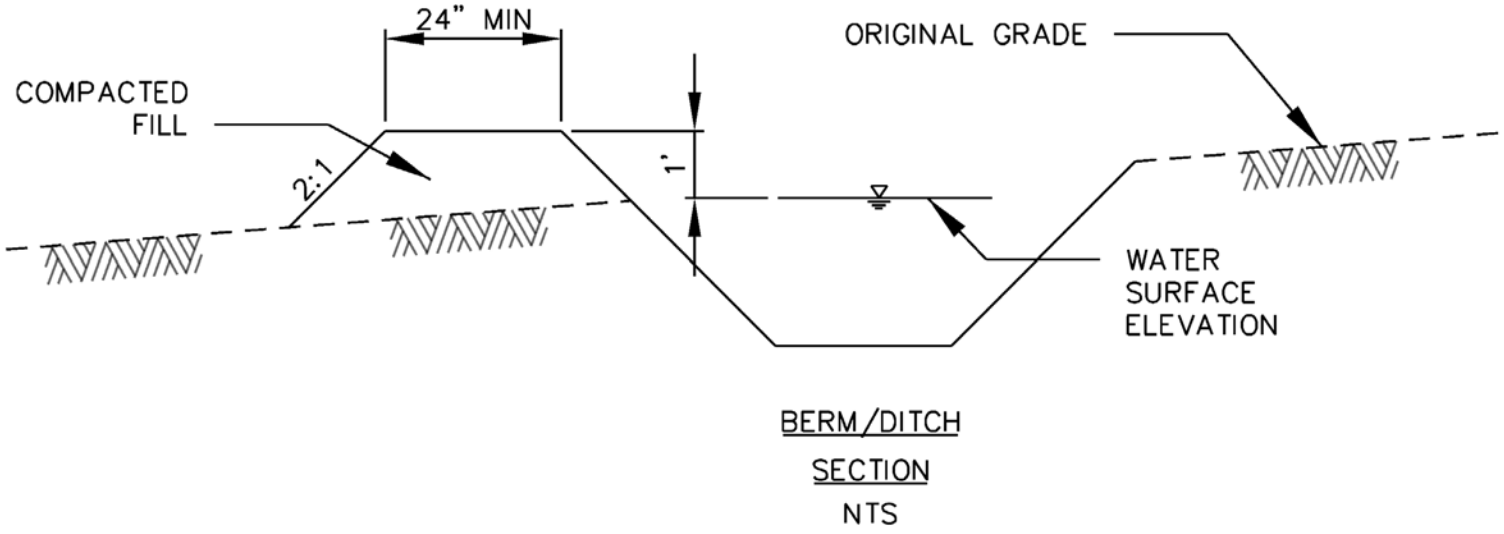
The maximum side slope of a berm should be 2:1. The minimum top width of the berm should be 24".

MAINTENANCE FREQUENCY AND LIFESPAN:

The berm should be inspected prior to and after storm events, and daily during large storm events. For berms exposed to non-stormwater discharges, inspect daily while flows are occurring. Any areas of erosion or scour should be repaired. If erosion occurs, erosion control features should be installed.

INSTALLATION AND MAINTENANCE COSTS:

Installation costs vary based on the size of the berm required and the local availability of material and equipment. Per CASQA, costs range from $19 to $70 per ft for earthwork and stabilization (2016 dollars).



BERM/DITCH SECTION
NTS

Additional Resources:

CASQA - California Stormwater BMP Handbook:
https://www.casqa.org/resources/bmp-handbooks

NRCS - Conservation Practice Standard Overview. Diversion:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_026408.pdf

City of San Diego - Standard Plans:
ttps://www.sandiego.gov/sites/default/files/standard_drawings_2018_edition_effective_january_1_2019.pdf

City of San Diego - Drainage Design Manual:
https://www.sandiego.gov/sites/default/files/drainage_design_manual_jan2017.pdf

Sediment Trap/Basin

A sediment trap or sediment basin is a depression with a controlled outlet which temporarily detains stormwater or other high turbidity runoff, allows the sediment to settle out, and discharges the treated water through a stabilized outlet.

BENEFITS

OPERATIONAL:

Reduce clogging or inundation of operation's infrastructure with sediment, and separate solids from liquids in operation's effluent.

ENVIRONMENTAL:

Reduce transport of sediment and nutrients to downstream waters.

INSTALLATION REQUIREMENTS

SITE REQUIREMENTS:

A sediment trap or basin can be used anywhere there are concentrated flows of high turbidity runoff, including downstream of any erosive areas, unvegetated areas, and steep slopes. A sediment trap is appropriate to treat contributing drainage areas less than 5 acres, whereas a sediment basin should be used to treat contributing drainage areas between 5 and 75 acres.

Permitting—A grading permit may be required from the City of San Diego for non-agricultural operations. If construction results in the disturbance of more than 1 acre of soil, Construction General Permit coverage is required. Lastly, construction within USGS mapped "blue line streams" or other jurisdictional waterways (waters of the US or waters of the State) may be subject to additional permitting requirements through the Army Corps of Engineers (404), the San Diego Regional Water Quality Control Board (401), and the California Department of Fish and Wildlife (1600).

MATERIAL REQUIREMENTS:

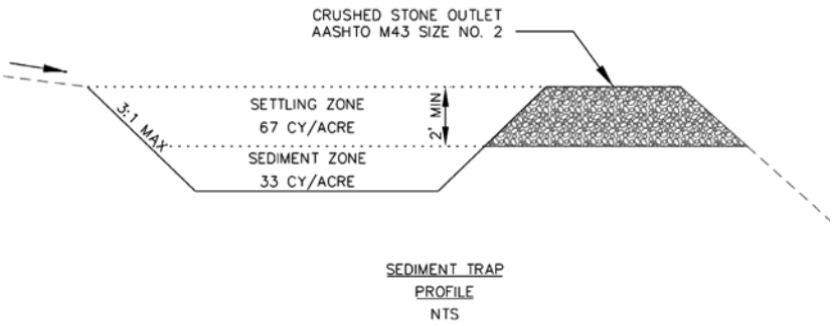
Sediment Traps—For a sediment trap with a crushed stone outlet, the crushed stone should meet AASHTO M43 size No 2 or 24, or its equivalent gradation in crushed gravel.

Sediment Basins—A sediment basin utilizes a perforated riser outlet which may be corrugated metal, HDPE, or reinforced concrete pipe. The riser should include a debris screen at the top to prevent floating debris from entering into the riser. The riser should be wrapped in geotextile filter fabric and encased in gravel. A concrete anchor block may be required at the base of the perforated riser to prevent uplift.

SIZING REQUIREMENTS:

Sediment Traps—Provide a minimum of 67 cubic yards of settling volume capacity per acre of tributary area and a minimum of 33 cubic yards of sediment storage volume capacity per acre of tributary area.

Sediment Basin—The basin length to width ratio should be a minimum of 2:1 with minimum side slopes of 3:1. The basin should be outfitted with a perforated riser outlet and an emergency spillway to convey flows which exceed the design capacity of the riser outlet. The outlet structure of a sediment basin should be designed to detain and release the storage volume for a minimum of 24 hours and a maximum of 96 hours.



SEDIMENT TRAP
PROFILE
NTS

The sediment storage volume for a sediment basin should be calculated using the RUSLE equation to determine the annual sediment loading appropriate for a basin designed to be maintained once per year. The sediment storage zone should be at least 1 ft deep. The settling storage volume for a sediment basin should be calculated from a 2-year storm event with a settling zone at least 2 ft deep.

For more detailed sizing criteria, refer to the CASQA Stormwater BMP Handbook. Any hydraulic and hydrologic calculations required for sediment basin sizing should be prepared by a Registered Civil Engineer.

MAINTENANCE FREQUENCY AND LIFESPAN:

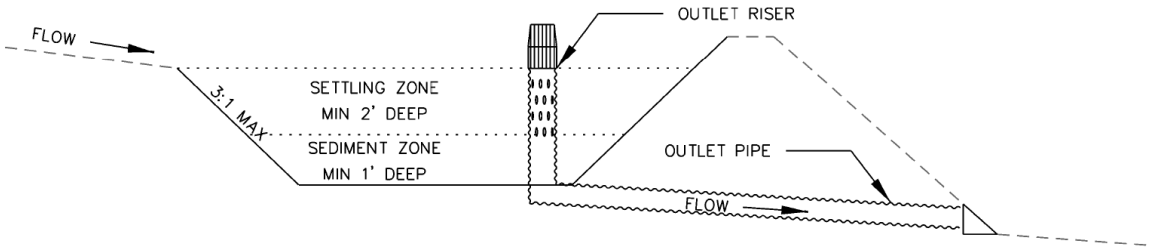
Sediment traps and basins should be inspected before and after each storm event. Accumulated sediment must be removed routinely to restore the basin's storage volume and BMP effectiveness.

Standing water should be discharged from the basin within 96 hours of the end of a storm event.

INSTALLATION AND MAINTENANCE COSTS:

The cost to install a sediment trap or basin is highly variable and is based on the size of the contributing watershed and corresponding volume of the basin.

The primary maintenance cost is the effort to remove and dispose of accumulated sediment. The maintenance cost is variable based on the size of the basin.



SEDIMENT BASIN

Additional Resources:

CASQA - California Stormwater BMP Handbook:
https://www.casqa.org/resources/bmp-handbooks

NRCS – Conservation Practice Standard. Sediment Basin:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_020424.pdf

Riparian Buffer/ Filter Strip

Plants stabilize soils, reduce erosive forces (rainfall and runoff), and capture/utilize sediment and nutrients. Utilizing vegetated barriers along waterways (riparian buffers) and along the edge of operations (filter strips) are effective passive BMPs suitable for most operations in San Pasqual Valley. Although riparian water usage has been linked to increasing salt concentrations in the alluvial aquifer (through evapoconcentration), they are still important features in San Pasqual Valley that can stabilize eroding banks and provide habitat for local wildlife.

BENEFITS

OPERATIONAL:

Stabilize soils adjacent stream channels and reduce head-cutting into operations, filter nutrients out of surface water ponds, and increase soil water retention along the perimeter of operations.

ENVIRONMENTAL:

Reduce sediment and nutrient loading to downstream waters. Improve habitat corridors for wildlife (including pollinators).

INSTALLATION REQUIREMENTS

SITE REQUIREMENTS:

Riparian buffers are the plant communities between San Pasqual Valley operations and the main streams. These unique plant communities typically comprise a mixture of grasses, shrubs, and trees above the active banks of the larger streams. Appropriate locations for implementing this BPM are any of the reaches along the main streams in San Pasqual Valley lacking sufficient riparian overstory.

Filter strips are vegetated buffers designed to capture overland flow from any operation. They must be placed in areas where concentrated flows cannot form rills/gullies, and cannot be used for passage of heavy machinery or livestock.

MATERIAL REQUIREMENTS:

Native grasses, shrubs, and trees should be chosen to ensure long term success. For information about the best species to choose, the NRCS has a guide to choosing vegetation based on site location (eVegGuide link : NRCS eVegGuide 5 (calflora.org)). Operation specific pesticides should be included in the identification of suitable plants for use within riparian buffers or filter strips.

SIZING REQUIREMENTS:

Due to limited available space around existing operations and along the streams in the narrow San Pasqual Valley, the selection of either riparian buffers or filter strips will require balancing the immediate and long-term needs for preserving agriculture, water resources, and habitat. Large riparian buffer widths (>25 feet) are recommended to effectively remove pollutants and protect streambanks, but this may not be feasible in tighter sections of the valley where the available land is limited. Vegetated filter strips also require between 20 and 30 feet to achieve water quality benefits for removing sediment and nutrients from overland flow.

Where these widths cannot be achieved, the implementation of these features at smaller scales will still provide benefits. The establishment of smaller riparian buffers may still provide stabilization of bare banks, thus reducing erosion and transport of pollutants downstream. Smaller filter strips will still provide some attenuation of overland flow, settling out larger particles and reducing peak discharge to the adjacent waters.

MAINTENANCE FREQUENCY AND LIFESPAN:

During the first year of plant establishment, shrubs and trees will need additional watering. Once the plant establishment period is done, maintenance is minimal. Invasive species should be cleared immediately if seen within the riparian buffer as they can deprive vital nutrients and water resources from native plants.

The lifespan of the riparian buffer is dependent on flood events, whereas the filter strips are noted as having 10-year life-spans in the NRCS guidance.

INSTALLATION AND MAINTENANCE COSTS:

Costs of installation will vary based on the size of the installation and the species of vegetation planted. The cost of watering the plants for the first year should be factored into installation costs. Maintenance costs are minimal following the first year.

Additional Resources:

NRCS – eVegGuide:
https://www.calflora.org/nrcs/index.html

NRCS - Conservation Practice Standard. Filter Strip:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1241319.pdf

NRCS - Vegetated Barrier Conservation Practice Sheet:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_010398.pdf

Vegetated Waterway

A vegetated waterway is a shallow open channel that intercepts surface runoff from the surrounding drainage area and directs it to a stable outlet.

BENEFITS

OPERATIONAL:

Filter excess nutrients from water, improving downstream water quality. Increasing groundwater supplies, which could benefit cropped areas.

ENVIRONMENTAL:

Reduce transport of sediment and nutrients to downstream waters.

INSTALLATION REQUIREMENTS

SITE REQUIREMENTS:

A natural water course should be chosen with a gentle slope, but with a gradient no less than 0.5% (steeper channels may require additional channel stabilizing features). Existing ditches and swales are appropriate for this application. Siting new vegetated waterways will require drainage studies assuring the new waterway will be able to convey the peak runoff from the 100-year frequency, 24-hour storm duration storm while not exceeding maximum permissible velocities (as defined in the City of San Diego's Drainage Design Manual). For 100-year events that exceed 10 cubic-feet per second (cfs), additional design criteria apply (see Section 7.4 of the City's Drainage Design Manual).

MATERIAL REQUIREMENTS:

Vegetation for waterways typically consist of grasses, however preference should be given to vegetation that is climatically compatible, requires minimal irrigation, is not invasive, and will be erosion resistant.

SIZING REQUIREMENTS:

Sizing will depend on the surface flow rates.

MAINTENANCE FREQUENCY AND LIFESPAN:

Routine maintenance is necessary to maintain vegetation health. Waterways may need to be cleared of sediment and accumulated debris, especially following a storm event. To ensure vegetation health, irrigation may be necessary during dry periods of the year. During the first year of plant establishment, frequent irrigation and maintenance may be required.

INSTALLATION AND MAINTENANCE COSTS:

Installation costs will vary depending on the size of channel and the type of vegetation chosen. Upkeep will be based on vegetation establishment and growth. For grasses, frequent trimming will be necessary to avoid overgrowth.

Additional Resources:

City of San Diego - Drainage Design Manual:
https://www.sandiego.gov/sites/default/files/drainage_design_manual_jan2017.pdf

NRCS - Conservation Practice Standard. Grassed Waterway:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1263483.pdf

NRCS – Engineering Field Handbook. Grassed Waterways:
https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17766.wba

Heavy Use Area Protection

Heavy use area protection is the stabilization of areas that are frequently and intensively used by animals, people, or vehicles to reduce erosion and protect and improve water quality. Surface treatments can include concrete, other cementitious materials (e.g., agricultural lime), aggregate, mulches, and vegetation.

BENEFITS

OPERATIONAL:

Minimize the development of gullies within operational areas and reduce frequent grading. Improve animal health and reduce vehicle wear and maintenance.

ENVIRONMENTAL:

Reduce transport of sediment and nutrients to downstream waters.

INSTALLATION REQUIREMENTS

SITE REQUIREMENTS:

Heavy use areas should be located as far as possible from water courses and there should be at least a 2 foot separation distance between the bottom of the surface material and the seasonal high groundwater table. Surface water should be prevented from entering the heavy use area to the extent possible.

Filter Strips (A-P9) are complimentary BMPs to include at the downstream edge of heavy use areas (where overland flow is still sheetflow and not concentrated in channels).

MATERIAL REQUIREMENTS:

Suitable materials include concrete, other cementitious materials, aggregate, mulches, and vegetation. Material should be selected based on type of use. If there is potential for groundwater contamination from the heavy use area, the heavy use area should be relocated or an impervious treatment such as concrete should be installed. For guidance on design and construction of concrete slabs and structures refer to the the American Concrete Institute (ACI) and Natural Resources Conservation Service (NRCS) National Engineering Manual.

SIZING REQUIREMENTS:

Heavy use areas can vary widely in size. Because surface treatment costs increase with treatment area it is most cost effective to reduce the size of the heavy use area to the extent possible.

MAINTENANCE FREQUENCY AND LIFESPAN:

Inspection of heavy use area condition should be performed several times per year to determine if maintenance is required. These inspections should occur well before the onset of the rainy season (which may begin anywhere between October and December), and throughout the rainy season (before and after significant rainfall events). Maintenance requirements and lifespan of heavy use areas depend on the type of surface treatment used, level of use, and weather conditions.

INSTALLATION AND MAINTENANCE COSTS:

Installation and maintenance costs vary by material type and area of treatment. Typical costs for various heavy use area treatment materials are provided below. Costs do not include installation and are for materials only.

Table 2

Material	Cost	Units
Gravel	$50–$80	Cubic yard
Mulch	$30–$80	Cubic yard
Cement	$6	Square foot
Vegetation (native biofiltration sod)	$2.50	Square foot

Additional Resources:

City of San Diego - Drainage Design Manual:
https://www.sandiego.gov/sites/default/files/drainage_design_manual_jan2017.pdf

CASQA - California Stormwater BMP Handbook:
https://www.casqa.org/resources/bmp-handbooks

NRCS – Conservation Practice Standard. Heavy Use Area Protection:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1263184.pdf

NRCS –Heavy Use Area Protection:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_017535.pdf

NRCS – Conservation Practice Standard Overview. Heavy Use Area Protection:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1263412.pdf

NUTRIENT MANAGEMENT

Use of fertilizers and feed in San Pasqual Valley are some of the main sources of nutrients entering ground and surface water. Incorporating systems that measure what nutrients are available in the existing soil and water, and weigh those available nutrients against what nutrients are needed in the products (plant or animal), can be used to improve the efficiency of supplement nutrient applications. One or more of the following BMPs can be used to establish a Nutrient Management System: (A-03a Soil Testing, A-03b Water Testing, A-03c Plant Tissue Testing, A-03d Manure Testing, and A-03e Feed Testing).

NUTRIENT MANAGEMENT

Soil and Water Testing

Soil testing provides a snapshot of the nutrients available in the local soil and can be a tool to determine optimal fertilizer application. Soil testing is done to maximize the application of nutrients to increase crop yield and reduce environmental impact through excess fertilizer. Examples of soil testing methods include a sampling probe, hand auger, or spade to collect representative samples of the property.

Water testing can also inform the user of additional nutrients applied through irrigation water. Other valuable metrics from water testing include salinity, pH, and the presence of pathogens or other trace elements. Water testing methods will vary dependent upon water source and testing laboratory. For examples of Nitrogen contribution calculations from irrigation water, see the EPA's National Management Measures or NRCS's Practice Procedures.

BENEFITS

OPERATIONAL:

Reduce operational costs through efficient application of fertilizer for optimal crop yield and quality. Soil testing provides increased understanding of the soil's chemical and physical properties. Irrigation water analysis uncovers the added nutrients applied through irrigation and quantifies the pH and salinity of the water source.

ENVIRONMENTAL:

Reduce nutrient loading to downstream surface and ground waters and improve aquatic habitat through reduced eutrophic conditions.

APPLICATION REQUIREMENTS

SAMPLING LOCATIONS:

Soil testing is useful in row crops, orchards, and sod farms. Soil testing may also be used in community gardens for the same purpose. Soil testing should be representative of the property. The number of cores collected may vary based on the presence of multiple soil types on the property and the size of the property. Depending on the type of soil, soil sample cores can vary between 4-8 inches. NRCS provides an interactive map that can display the soil types present on the property (NCRS- WebSoilSurvey). Soil cores are typically taken in a zig-zag pattern, collecting at least 20 representative samples. Samples should not be taken from near the corners or edges of the fields, and residual crop material should be removed prior to sampling.

Water samples should be taken from all irrigation sources. Groundwater samples should be collected from a sampling port near the wellhead, where surface water samples should be collected from the water body prior to entering the irrigation system. Surface water sampling locations should be established in safe accessible areas that minimize capture of unrepresentative water (e.g. stagnate backwater or shallow waters with excessive turbidity).

MATERIAL REQUIREMENTS:

Soil samples should be collected prior to the application of fertilizers, and are typically collected in clean plastic bags or glass jars (coordinate with lab) using a clean trowel. Soil handling and hold times are dependent on the laboratory methods, and should be confirmed with the laboratory in advance.

Water testing of irrigation wells require the water to run for several minutes prior to taking the sample. Sampling of surface waters used for irrigation (e.g. effluent treatment ponds) will consist of a grab sample; compositing multiple samples from across the holding pond into one sample will help in collecting a representative sample. Sample handling, storage, and hold times will be determined based on laboratory methods used. Water used to irrigate crops and vegetables used for human consumption will need to be tested following FDA's Produce Safety Rule.

Sample labelling systems should be used that identify sample date, location, and sampling personnel.

(Continued on next page)

Soil and Water Testing

APPLICATION REQUIREMENTS (CONTINUED)

MAINTENANCE FREQUENCY AND LIFESPAN:

Soil testing should be completed every 3-5 years, preferably during the same season for reproducibility. Spring season soil testing will likely produce higher nutrient levels than during the Fall and Summer. If manure is added to the field, testing frequency should occur at a higher frequency.

Water testing should occur annually from irrigation wells. If testing from an irrigation canal, effluent treatment pond, or other source, take one sample during winter irrigation and one during summer irrigation if possible.

INSTALLATION AND MAINTENANCE COSTS:

No installation is required. Soil and water sampling tools, labor, and laboratory costs will apply to each sampling event. Proper sampling training is important for result accuracy.

Additional Resources:

GUIDANCE

1. SOIL TESTING

UC Davis, CDFA, and Fertilizer Research and Education Program (FREP) - Soil Test Sampling:
https://apps1.cdfa.ca.gov/fertilizerresearch/docs/Soil_Sampling_P_K.pdf

NRCS - Soil Testing:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_030758.pdf

USDA - Soil Quality Test Kit:
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/health/assessment/?cid=nrcs142p2_053873

NRCS - Web Soil Survey Interactive Map:
https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

UC Cooperative Extension - List of Laboratories for Tissue/Soil/Water- Agricultural Analysis:
https://www.sandiegocounty.gov/content/dam/sdc/awm/docs/Private%20Agricultural%20Labs.pdf

2. WATER TESTING

NRCS - Conservation Practice Standard. Irrigation Water Management:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1263179.pdf

NRCS - Conservation Practice Standard. Well Water Testing:
https://apps1.cdfa.ca.gov/ecosystemservices/docs/WellWaterTesting.pdf

NRCS - 590 Practice Procedures. Animal Feeding Operations Manure Nutrient Management:
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ca/technical/ecoscience/nutrient/?cid=nrcs144p2_064065

EPA - National Management Measures to Control Nonpoint Pollution from Agriculture.
Management Measures: https://www.epa.gov/sites/default/files/2015-10/documents/chap4a.pdf

FDA - The Produce Safety Rule: Standards for the Growing, Harvesting, Packing, and Holding of Produce for Human Consumption.
https://www.regulations.gov/document/FDA-2011-N-0921-18558

FUNDING

Environmental Quality Incentives Program (EQIP) conservation program administered by NRCS can provide financial and technical assistance to install conservation practices that address natural resource concerns
https://www.nrcs.usda.gov/wps/portal/nrcs/main/ca/programs/financial/eqip/

The California Department of Food and Agriculture (CDFA) has a Healthy Soils Program that provides financial incentives to implement BMPs with conservation objectives
https://www.cdfa.ca.gov/oefi/healthysoils/incentivesprogram.html

NUTRIENT MANAGEMENT

Plant Tissue Testing

Plant tissue sampling is a tool to determine if the plants' nutrient supplies are sufficient. When used in conjunction with soil testing (see BMP A-O3a), plant tissue testing can help land users identify nutrient deficiencies or guide effective fertilizer application. Plant tissue testing is useful in row crops, orchards, and nurseries. Plant tissue testing is beneficial to long term nutrient monitoring and management.

BENEFITS

OPERATIONAL:

Reduce operational costs through efficient application of fertilizer for optimal crop yield and quality. Like soil testing, plant tissue testing provides increased understanding of the soil's chemical and physical properties. The process also can identify potential plant toxicity.

ENVIRONMENTAL:

Reduce nutrient loading to downstream surface and ground waters and improve aquatic habitat through reduced eutrophic conditions.

APPLICATION REQUIREMENTS

SAMPLE SELECTION:

Plant tissue samples should be representative of the crop/plant assemblage, including different parts of the plant and life stages. For the best results, sample collection locations should coincide with soil samples. Plant tissue testing should include as many samples as possible and should not contain dead tissue or portions of plant covered in dust/mud. Sampling grain crops should be done before pollination. Testing the portion of the plant that will be harvested is sufficient for crops grown for human consumption. Plants under stress (limited water or high temperatures) should not be used in plant tissue testing. Lastly, samples should not be taken at the corners or borders of fields.

MATERIAL REQUIREMENTS:

Sample techniques, including containers, preservatives, and handling, will vary between media and laboratory analytical methods.

MAINTENANCE FREQUENCY AND LIFESPAN:

Plant tissue testing is best used as a tool when combined with soil testing for long-term fertilizer management. Plant tissue and soil samples may be taken at the same time, at least every 3-5 years. Often, plant tissue testing is useful on a more frequent basis to assess the health and safety of a specific crop.

INSTALLATION AND MAINTENANCE COSTS:

No installation is required. Plant tissue sampling tools, labor, and laboratory costs will apply to each sampling event. Proper sampling training is important for result accuracy, and it is recommended by the EPA to consult with a crop scientist or agronomist during sampling.

Additional Resources:

GUIDANCE:

UC Davis, CDFA, and Fertilizer Research and Education Program (FREP) - Plant Tissue Sampling:
https://apps.cdfa.ca.gov/frep/docs/Plant_Tissue_Sampling.pdf

NRCS - Conservation Practice Standard. Nutrient Management:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1192371.pdf

EPA - National Management Measures to Control Nonpoint Pollution from Agriculture. Management Measures:
https://www.epa.gov/sites/default/files/2015-10/documents/chap4a.pdf

EPA - Administrative Code Part 391 Design Criteria for Sludge Application on Land. Section 391.350 Plant Tissue Sampling and Analysis.
https://www.ilga.gov/commission/jcar/admincode/035/035003910E05300R.html

UC Cooperative Extension - Best Management Options (BMP's). Management Options for Nursuries:
https://ucanr.edu/sites/agwaterquality/files/125550.pdf

FUNDING:

Environmental Quality Incentives Program (EQIP) conservation program administered by NRCS can provide financial and technical assistance to install conservation practices that address natural resource concerns.
https://www.nrcs.usda.gov/wps/portal/nrcs/main/ca/programs/financial/eqip/

NUTRIENT MANAGEMENT

Manure and Feed Testing

Additional Nutrient Management BMPs are those that assess the nutrient inputs and outputs for animal operations in San Pasqual Valley. Testing manure can be used to a) incorporate contribution of nutrients in manure when developing fertilizer application rates, and/or b) adjust animal feed plan to reduce excess nutrients in manure (e.g. nutrients that exceed soil/crop requirements). These data, along with animal specific diet guidelines (as developed by the National Research Council or Cooperative Extension), can be used to develop specific feeding plans that maximize animal health and performance while reducing production of excess nutrients in manure.

BENEFITS

OPERATIONAL:

Maximize productivity of crops and livestock through well developed and monitored fertilizer and feeding programs, and reduce potential for contaminating local groundwater sources.

ENVIRONMENTAL:

Reduce nutrient loading to downstream surface and ground waters and improve aquatic habitat through reduced eutrophic conditions.

APPLICATION REQUIREMENTS

TESTING REQUIREMENTS:

Manure testing to take place immediately after deposited to quantify and adjust the level of nutrients in feed, and prior to application to fields to develop appropriate fertilizer application rates for the crops. Feed testing should occur in conjunction with manure testing to quantify nutrient intake and nutrient excretion rates. Testing should be conducted to assist in the development of suitable feed plans and fertilizer application rates, and should be repeated periodically to ensure targets are being met.

MATERIAL REQUIREMENTS:

Testing of manure and/or feed to be conducted by laboratories that meet local, state, or federal certifications (if applicable). Sample techniques, including containers, preservatives, and handling, will vary between media and laboratory analytical methods.

MAINTENANCE FREQUENCY AND LIFESPAN:

Manure and/or feed testing should be repeated periodically to determine if adjustments in feed plans or fertilizer application rates need be made. At a minimum, these test should be conducted annually and when there are changes in feed source or crops utilizing manure.

INSTALLATION AND MAINTENANCE COSTS:

Typical laboratory costs for standard manure and feed analyses range between $20 and $100 (per sample).

Additional Resources:

GUIDANCE

NRCS - Conservation Practice Standard for Nutrient Management:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1192371.pdf

NRCS - Conservation Practice Standard for Feed Management:
https://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=nrcs143_026292&ext=pdf

NRCS - Conservation Practice Standards for Animal Feeding Operations Manure Nutrient Management:
590 Practice Procedures | NRCS California (usda.gov)

NRCS - Nutrient Management Technical Note No. 8 - Animal Diets and Feed Management:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1046729.pdf

National Research Council - Animal Nutrition Program:
https://animalnutrition.org/nrc_reports

UC Cooperative Extension - Livestock Guidelines
https://cecentralsierra.ucanr.edu/Livestock/

FUNDING

coming soon

IRRIGATION BMPS

Reducing water use will help San Pasqual Valley achieve sustainable yield without limiting agricultural operations, as well as improve water quality conditions in ground and surface waters. The following BMPs will provide operations with tools for improving irrigation efficiency through mechanical means (improve irrigation systems) and through monitoring (available soil moisture and plant irrigation demands).

IRRIGATION

Efficient Irrigation System

Irrigation systems consist of the infrastructure used to transport and distribute water. Efficient irrigation systems are designed to optimize use of available water supplies. Examples of efficient irrigation systems include pressure compensating sprinklers with high distribution uniformity and drip irrigation.

BENEFITS

OPERATIONAL:

Reduce water and energy costs, improve uniform distribution of water across crops and improve plant health.

ENVIRONMENTAL:

Reduce groundwater demands, minimize erosion, and reduce runoff and leaching of nutrients.

INSTALLATION REQUIREMENTS

SITE REQUIREMENTS:

Efficient irrigation systems are applicable to all irrigated land uses. Irrigation systems should be designed to suit the land use type and crop requirements. For example, micro sprinklers or drip irrigation would be suitable for a nursery whereas overhead sprinklers with a high uniformity rating and flow rate control would be suitable for field crops.

MATERIAL REQUIREMENTS:

Irrigation system material requirements vary based on land use type and system capacity requirements. Irrigation system capacity requirements should be computed to determine pipeline and emitter sizing and spacing while accounting for water losses. All pipes and emitters should be of similar materials. The corrosivity of irrigation water should be considered when selecting irrigation system materials.

SIZING REQUIREMENTS:

Irrigation system sizing requirements vary based on land use type and system capacity requirements.

MAINTENANCE FREQUENCY AND LIFESPAN:

Irrigation systems should be regularly inspected for leaks and leaks repaired if found. If filters are used they should be regularly cleaned and kept free of biological contaminants, bacterial slimes, and mineral deposits. Irrigation systems should occasionally be flushed to unclog pipes and emitters. Inspection and maintenance should be performed several times per year. The lifespan of irrigation systems depend on equipment used; if properly maintained, irrigation equipment generally last about 15 to 20 years.

INSTALLATION AND MAINTENANCE COSTS:

Material, installation, and maintenance costs depend on the type of irrigation equipment and total irrigated area.

Additional Resources:

GUIDANCE:

UC Cooperative Extension - Best Management Options (BMP's). Management Options for Nursuries:
https://ucanr.edu/sites/agwaterquality/files/125550.pdf

EPA - National Management Measures to Control Nonpoint Pollution from Agriculture. Management Measures:
https://www.epa.gov/sites/default/files/2015-10/documents/chap4a.pdf

NRCS - Conservation Practice Standard Overview. Irrigation System, Microirrigation:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_025832.pdf

NRCS - Conservation Practice Standard. Irrigation Pipeline:
https://efotg.sc.egov.usda.gov/references/public/NY/nyps430.pdf

FUNDING:

Environmental Quality Incentives Program (EQIP) conservation program administered by NRCS can provide financial and technical assistance to install conservation practices that address natural resource concerns.
https://www.nrcs.usda.gov/wps/portal/nrcs/main/ca/programs/financial/eqip/

IRRIGATION

Monitor Soil Moisture

Implementing soil moisture monitoring with irrigation scheduling can reduce an operation's water demands and reduce losses through deep percolation or runoff. Soil moisture monitoring programs can consist of basic field observations (touch and feel) for point observations, or incorporate soil moisture sensors connected to dataloggers for continuous monitoring. Systems that continually monitor soil moisture will provide a powerful tool for assessing soil moisture responses to varying irrigation schedules and weather conditions (e.g. increased precipitation or evapotranspiration demands).

BENEFITS

OPERATIONAL:

Reduce water and energy costs, reduce leaching of nutrients through soils or carried offsite in runoff, improve uniform distribution of water across soil horizons in crop rooting zones, and improve crop productivity.

ENVIRONMENTAL:

Reduce groundwater demands and nutrient loading to groundwater and downstream water bodies.

INSTALLATION REQUIREMENTS

SITE REQUIREMENTS:

Whether collecting instantaneous soil moisture readings, or installing soil moisture sensors for continuous measurements, the following should be considered when selecting suitable monitoring stations and depths:

- Spatial distribution of different soil types within the operation (resource: NRCS Web of Soils)
- Plant rooting depth

Soil moisture monitoring stations should be selected that best represent conditions throughout the operation, and at multiple depths across the plant rooting zone. Per NRCS guidance, at least three soil moisture monitoring stations should be assessed "per field."

Systems that incorporate soil moisture sensors connected to data-loggers may require use of solar panels to provide power to the system; these units will need to be positioned such that they receive adequate direct sunlight year-round.

MATERIAL REQUIREMENTS:

In terms of materials, manual soil moisture observations only require a shovel or auger to access soils within the plant's rooting zone. Although the physical labor required to collect soil samples from each foot within the plant rooting zone may be prohibitive. If the operation has access to a backhoe, a temporary soil pit may be excavated down to a maximum depth of 48 inches to conduct the assessment (any deeper the trench is classified as a confined space and requires a permit to access). These single-point measurements may be bolstered through use of a portable soil moisture sensor.

If seasonal or annual soil moisture readings are to be collected, these intensive field efforts required for manual observations will need to be repeated during each event. If installing logging soil moisture sensors, this field work should only take place when installing, maintaining, and/or replacing the sensors. Types of soil moisture sensors suitable for agricultural operations measure either soil moisture content (volume of water per volume of soil, reported as a percentage) or soil moisture tension (how tightly water is held within the soil pore space). Soil water content sensors are easier to deploy and are more robust under variable climate/soil conditions, whereas soil moisture tensions sensors, although more complex to install and maintain, measure the component of soil water that directly impacts a plant's ability to access that water. Materials for either system will vary depending on vendor, sensor types, required power supply, datalogging and communication systems, and installation procedures. Wiring should be secured to prevent destruction from animals chewing on the cables.

MAINTENANCE FREQUENCY AND LIFESPAN:

Soil moisture monitoring stations that employ sensors with dataloggers can log uninterrupted for 3 to 5 years before materials need replacing (batteries, sensors, wiring). Although this can change depending on sensor type; for instance, tensiometers that measure soil water tension across a porous membrane may require monthly maintenance of the tensiometer chamber during the dry season.

INSTALLATION AND MAINTENANCE COSTS:

For single point soil moisture observations, material costs may include a soil auger kit ($100-$1,000) and a portable soil moisture probe ($100-$800). For continuous soil moisture monitoring stations, material costs may range between $300 for a nest of three tensiometers not connected to a datalogger, to $1,000 for three soil moisture sensors connected to a datalogger (based on 2021 industry prices). Including a data management service that links the datalogger with an online platform where the data can be viewed in real-time would result in increased annual fees (e.g. platform subscription fees or cellular plan).

Installation and maintenance costs are dependent on labor used and components requiring replacement.

Additional Resources:

UC Cooperative Extension - UC Drought Management. Soil Moisture Monitoring:
https://ucmanagedrought.ucdavis.edu/Agriculture/Irrigation_Scheduling/Soil_Moisture_Monitoring/

University of Minnesota Cooperative Extension - Soil Moisture Sensors for Irrigation Scheduling:
https://extension.umn.edu/irrigation/soil-moisture-sensors-irrigation-scheduling

NRCS - Estimating Soil Moisture by Feel and Appearance:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_051845.pdf

IRRIGATION

Calculate Crop Irrigation Requirements

Incorporating observed/projected Potential Evapotranspiration (ET) demands in with irrigation scheduling can further improve water use efficiency for agricultural operations in San Pasqual Valley. Daily ET demands as reported at the California Irrigation Management Information System (CIMIS) station located in San Pasqual Valley (Station #153) can be adjusted to reflect different crop water demands. With access to daily crop water demands and concurrent soil moisture measurements (see BMP A-O4b), irrigation schedules can be fine-tuned to further reduce irrigation demands for agricultural operations.

BENEFITS

OPERATIONAL:

Reduce water and energy costs and improve crop productivity.

ENVIRONMENTAL:

Reduce groundwater demands.

BMP REQUIREMENTS

Daily ET data are already provided for San Pasqual Valley from CIMIS Station #153 (https://cimis.water.ca.gov/Default.aspx). These data must be modified using crop specific coefficients which have been developed to scale Potential ET measurements to crop-specific ET demands (see DWR resource: California Crop and Soil Evapotranspiration). These data can be used to make daily irrigation decisions, or stored in a database and used to develop monthly/seasonal irrigation programs.

Additional data that will be useful for developing an irrigation schedule that incorporates daily plant water demands include soil moisture (see BMP A-O4b) and development of a management allowable depletion for each crop (the minimum soil moisture level before reducing crop yield).

MAINTENANCE FREQUENCY AND LIFESPAN:

None required.

INSTALLATION AND MAINTENANCE COSTS:

None required.

Additional Resources:

California Department of Water Resources -California Irrigation Management Information System:
https://cimis.water.ca.gov/Default.aspx

California Department of Water Resources - Irrigation Training and Research Center:
https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/exhibits/docs/dd_jardins/part2/ddj_267.pdf

UC Cooperative Extension - UC Drought Management. Evapotranspiration Scheduling:
https://ucmanagedrought.ucdavis.edu/Agriculture/Irrigation_Scheduling/Evapotranspiration_Scheduling_ET/

UC Davis Cooperative Extension - Water Balance Irrigation Scheduling Using CIMIS ETo:
https://lawr.ucdavis.edu/cooperative-extension/irrigation/drought-tips/water-balance-irrigation-scheduling-using-cimis-eto

MATERIALS STORAGE

Proper storage of operations materials will reduce the potential for transport of sediment and nutrients through air and water. Material storage in San Pasqual Valley has been split between general stockpiles (e.g. soil, animal feed, biosolids) and stockpiles containing operations wastes (e.g. decomposing organic matter, animal waste).

MATERIALS STORAGE

Stockpile Containment

Stockpiles are a potential source of pollutants if improperly managed. Stockpiles may consist of solid or semi-solid, organic or non-organic material including mulch, aggregate, soil and soil amendments, feed, bedding, and agricultural waste temporarily stored onsite until utilized or disposed (see Waste Storage Facility BMP for guidance on long-term storage of agricultural waste material). Stockpile containment includes the measures implemented to prevent runoff and leaching of pollutants including stockpile location, storage period, size, covering, and containment.

BENEFITS

OPERATIONAL:

Minimize the loss of stockpile materials and improves site working conditions.

ENVIRONMENTAL:

Reduce transport of sediment and nutrients to downstream waters.

INSTALLATION REQUIREMENTS

SITE REQUIREMENTS:

Stockpiles should be located above the 100-year floodplain elevation or in a facility protected from inundation damage from a 100-year flood event, 100 feet away from waterways, and in an area where the groundwater table will be no closer than 3 feet below the bottom of the stockpile if located on native soil (refer to the Natural Resources Conservation Service Short Term Storage of Animal Waste and By-Products Conservation Practice Standard for additional site requirements and separation distances). Surface drainage should be away from stockpiles in all directions and/or stockpiles should be located in a facility where the material is protected from rainfall and surface flow.

MATERIAL REQUIREMENTS:

Stockpiles should be located on a cementitious surface, geomembrane lined pad, or soils with a maximum saturated hydraulic conductivity class of moderately high (approximately 2 inches per hour). Stockpiles should be covered with a water resistant material such as opaque plastic or polyethylene sheeting (tarp) having a maximum thickness of 6 mils, or other durable, water resistant material. Stockpile covers should be secured using anchors with nylon straps, sandbags, or other tie down mechanisms to withstand windy conditions. During the wet season stockpiles should be contained by a linear sediment barrier or berm to prevent pollutant runoff. Alternatively, stockpiles should be located under a roofed structure to protect the material from rain and wind.

SIZING REQUIREMENTS:

The size of stockpile covers and containment features depends on the size of the stockpile and the material type. For manure and other livestock wastes the maximum height should be no greater than 7 feet and total volume less than or equal to 40,000 cubic feet.

MAINTENANCE FREQUENCY AND LIFESPAN:

Stockpile containment should be regularly inspected and maintained to ensure effectiveness. Plastic and polyethylene covers deteriorate over time and should be checked regularly for rips and tears, especially prior to a storm event. If the stockpile cover is compromised the cover should be replaced.

INSTALLATION AND MAINTENANCE COSTS:

Installation and maintenance costs depend on the stockpile containment method. Plastic or polyethylene covers are the lowest cost cover type and range form a few hundred dollars to several thousand depending on size.

Additional Resources:

NRCS - Conservation Practice Standard. Short Term Storage of Animal Waste and By-Products:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1263507.pdf

https://efotg.sc.egov.usda.gov/references/public/WI/318_WI_CPS-(2017-10r).pdf

CASQA - California Stormwater BMP Handbook:
https://www.casqa.org/resources/bmp-handbooks

MATERIALS STORAGE

Waste Storage

Solid and liquid (including slurries) waste generated from San Pasqual Valley operations can be significant sources of nutrients to downstream waters if not captured and stored properly. Development and use of waste capture, transfer, and storage system will help contain these resources, and ensure compliance with existing or upcoming Waste Discharge Requirements. While both wind and water can transport nutrient-rich organic waste throughout San Pasqual Valley, the focus for this BMP will be on reducing the transport of agricultural waste in water that can enter streamflow or infiltrate into groundwater. These facilities often provide an additional service in "treating" waste prior to re-application in agricultural operations (see Waste Treatment BMP: A-O6a).

BENEFITS

OPERATIONAL:

Reduce contamination of local groundwater source and conserve waste which may be re-utilized for fertilizer and irrigation.

ENVIRONMENTAL:

Reduce nutrient loading to downstream surface and ground waters and improve aquatic habitat through reduced eutrophic conditions.

INSTALLATION REQUIREMENTS

SITE REQUIREMENTS:

Suitable site conditions for waste storage facilities include areas that:

- Are located outside of the 100-year floodplain
- Reduce rainfall/runoff contributions from adjacent operations or non-polluted sources within the facility (such as rooftops and access roads)
- Have sufficient space to contain expected and emergency waste volumes
  - For solid animal waste, use average number of animals and weight to size facility (assuming additional 5% of volume to account for waste not removed)
  - For solid waste facilities open to rainfall, provide sufficient volume to maintain 2 feet of freeboard for a 25-year 24-hour storm (6 inches of freeboard if structure covered)
  - For liquid wastes, additional space required to capture emergency volumes (a 25-year 24-hour storm event) while maintaining 12 inches of freeboard

- Have suitable subsurface conditions including:
  - Low permeable base (e.g. well compacted impermeable native soil, clay liner, or concrete foundation)
  - A minimum of a 2-foot gap between the base of the storage facility and bedrock OR the maximum groundwater elevation
- Are accessible for periodic waste removal and maintenance
- Waste storage ponds (liquid waste) cannot be installed on slopes greater than 12%

MATERIAL AND SIZING REQUIREMENTS:

Material requirements will vary based on storage facility type (solid vs liquid storage), permeability of native soils, and any additional infrastructure that may be required for the separation of liquid from solid waste and the subsequent transfer of the separated wastes.

Solid Waste Storage: In general, solid waste facilities are covered and partially enclosed stacking facilities that preclude rainfall and runoff from mixing with the solid wastes, and allows for access of heavy machinery to load and unload solid wastes. Where covered solid waste storage facilities are not feasible, implement measures to reduce concentration of solid wastes in areas susceptible to wind and water transport (e.g. not in channels, near wind breaks) and change locations annually. Solid waste facilities may also include a system for separating liquid wastes and transporting the liquid waste to a separate storage facility.

Liquid Waste Storage: Liquid waste can be contained in tanks (concrete or metal) or earthen ponds with adequate storage for the 25-year 24-hour storm. This volume may also need to take into consideration a treatment loading rate if aerobic or anaerobic digestion is utilized (see Clemson Cooperative Extension paper: Clemson Cooperative Extension: Management of Lagoons and Storage Structures for Dairy Manure: **https://www.clemson.edu/extension/camm/manuals/dairy/dch4_04.pdf**). A staff gauge is required for liquid waste ponds to ensure maximum capacity is not exceeded. For liquid waste ponds that have a contributing drainage area >50% the surface area of the pond, an emergency spillway that leads to a secondary emergency containment area. Ancillary infrastructure that may accompany a liquid waste pond could include a primary settling basin (to further separate solids) with a stabilized ramp for routine clearing, and an associated pump to transfer the liquid waste.

The NRCS Conservation Practice Standards for Waste Storage provide specific guidance on facility design requirements:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_030616.pdf

(Continued on next page)

MATERIALS STORAGE

Waste Storage

INSTALLATION REQUIREMENTS (CONTINUED)

MAINTENANCE FREQUENCY AND LIFESPAN:

A routine Operation and Maintenance program should be developed that ensures waste storage facilities are adequately maintained to avoid accidental releases of waste, and that waste storage does not exceed the projected operational reuse of the material. Site inspections should take place monthly assessing storage capacity and noting system integrity (e.g. leaks and facilities integrity). Additional inspections before and after significant rainfall events are recommended to ensure suitable storage prior to the event, and that any necessary maintenance is conducted shortly after the event. Maintenance may include removal of accumulated solids and disposal of excess liquids. In the event that solid or liquid wastes exceed storage capacity or breech containment, an Emergency Action Plan should be developed to prevent discharges to downstream waters. The lifespan of a waste storage facility depends on many factors, but in general is approximately 10 years.

INSTALLATION AND MAINTENANCE COSTS:

Installation and maintenance costs vary by waste type, volume, and implementation of waste treatment (see Waste Treatment BMP: A-O6a).

Additional Resources:

NRCS - Conservation Practice for Waste Storage Facilities:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_026465.pdf

NRCS - Conservation Practice Standard for Waste Transfer:
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/crops/?cid=nrcs144p2_027192

NRCS - Conservation Practice Standard for Waste Separation Facilities:
https://efotg.sc.egov.usda.gov/references/public/NY/nyps632.pdf

NRCS – Animal Waste Management. Financial Assistance for Animal Feeding Operations:
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ca/home/?cid=nrcs142p2_000482

NRCS - Conservation Practice Standard. Pond Sealing or Lining – Compacted Soil Treatment:
https://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=nrcseprd1051808&ext=pdf

Clemson Cooperative Extension - Management of Lagoons and Storage Structures for Dairy Manure:
https://www.clemson.edu/extension/camm/manuals/dairy/dch4_04.pdf

WASTE MANAGEMENT BMPS

Management of all biological wastes produced in San Pasqual Valley can drastically improve the long-term water quality conditions of the Groundwater Basin and Hodges Reservoir. This group of BMPs includes methods for treating animal waste, human waste, and excess nutrient loads in irrigation runoff.

WASTE MANAGEMENT

Waste Treatment

Agricultural waste is a potential source of pollutants if improperly managed. Agricultural waste includes livestock wastes, crop debris, and other organic residues. The treatment of agricultural waste reduces the nutrient content, pathogen levels, odors, and gaseous emissions of waste and improves water and air quality. Waste treatment practices fall into three main categories including mechanical, chemical, and biological treatment. Some common treatment techniques include solid/liquid separation, anaerobic and aerobic lagoons, thermo-chemical conversion, and composting. Treated waste may be used as a source of plant nutrients/organic matter for farming, among other uses.

BENEFITS

OPERATIONAL:

Generate products such as compost that can be sold or used onsite to improve soil tilth or treated effluent that can be applied as irrigation.

ENVIRONMENTAL:

Reduce nutrient loading to downstream surface and ground waters and improve aquatic habitat through reduced eutrophic conditions.

INSTALLATION REQUIREMENTS

SITE REQUIREMENTS:

Waste treatment is applicable to any land use where agricultural waste is generated; livestock production in particular is a producer of waste materials that require treatment. Selection of the type, size, and location of the waste treatment facility/process depends on the type of waste including its physical and chemical properties, objectives of treatment, and environmental setting. Waste treatment facilities should be located as close to the waste source as practicable and as far away from waterways as possible. For liquid waste, treatment facilities should be located such that waste is conveyed by gravity flow where possible. Additional factors to consider when determining the best location for a waste treatment facility include topography, groundwater conditions beneath the site, geological and other hazards, wind direction, and proximity to public areas.

MATERIAL REQUIREMENTS:

Agricultural waste may be in the form of a liquid, slurry, semisolid, or solid. Waste of different consistencies requires different treatment techniques. Liquid waste is commonly treated in aerobic or anaerobic lagoons whereas solid waste is composted.

SIZING REQUIREMENTS:

The size of the treatment facility depends on the agricultural waste production volume. The treatment facility should be sized to accommodate peak loading, and for above ground liquid or slurry storage, should include emergency volume for a 25-year, 24-hour rainfall event (see Waste Storage Facility BMP: A-O5b).

MAINTENANCE FREQUENCY AND LIFESPAN:

Waste treatment facilities should be regularly inspected and maintained to avoid accidental release of waste. Maintenance may include removal of accumulated solids and disposal of excess liquids. The lifespan of a waste treatment facility/process depends on many factors, but in general is about 10 years.

INSTALLATION AND MAINTENANCE COSTS:

Installation and maintenance costs vary by waste and treatment type. For example, the largest costs associated with a composting operation would likely be processing equipment and labor whereas the largest cost associated with an anaerobic of aerobic lagoon would be installation of the storage facility.

Additional Resources:

NRCS - Agricultural Waste Management Field Handbook:
https://directives.sc.egov.usda.gov/viewerFS.aspx?hid=21430

NRCS - Waste Treatment
https://efotg.sc.egov.usda.gov/references/public/NY/nyps629.pdf

WASTE MANAGEMENT

Nutrient Removal Devices

Reduction of nutrient loading in dry weather runoff (i.e. effluent from excess irrigation, animal waste, and operation's wash water) is an important step in prolonging the beneficial uses of Hodges Reservoir and San Pasqual Valley's Groundwater Basin. Where operations cannot eliminate excess nutrients from entering their dry-weather discharges (including those to unlined basins where migration through soil occurs), additional measures can be taken to reduce the concentrations in the operation's effluent. New advances in wastewater treatment are making it easier and more cost-effective to implement physical, chemical, and/or biological treatment systems that can reduce both nitrogen and phosphorus concentrations in our effluent.

As phosphorus is the growth-limiting nutrient (less abundant and mobile than nitrogen), an emphasis has been placed on systems that remove phosphorus in this guide. Phosphorus can be carried in particulate or dissolved forms. Particulate phosphorus can settle out of the water column or removed with filters, whereas dissolved phosphorus can be removed through adsorption (attachment), flocculation, or plant uptake. The principal phosphorus of concern is the dissolved phosphorus readily available for plant uptake and is found in irrigation runoff containing P-rich fertilizers and in animal waste.

Types of Nutrient Removal Devices that may be applicable in San Pasqual Valley:

1. Application of flocculating agents to detention basins/waste lagoons
2. Iron enhanced sand filters
3. Natural treatment wetlands
4. Physical filtration systems (e.g. reverse osmosis)

BENEFITS

OPERATIONAL:

Reduce leaching of nutrients (as well as salts) to surface and ground reservoirs, extending their ability to provide water for agriculture and municipal production. Expand options for use of reclaimed water.

ENVIRONMENTAL:

Reduce nutrient loading to downstream surface and ground waters and improve aquatic habitat through reduced eutrophic conditions.

INSTALLATION REQUIREMENTS

SITE REQUIREMENTS:

Site conditions requirements are going to vary depending on effluent type, volume, and selected nutrient removal device. Key components to include in designing the system include:

- Minimize sediment and stormwater contributions to system
  - Natural treatment wetlands are most effective when a static inflow is maintained; stormwater surges could loosen and remobilize nutrients downstream.
  - Physical filtrations systems are prone to fouling/clogging and are limited by system capacity (primary settling/holding pond, pump size, treatment capacity).
  - Iron enhance sand filters can also clog with fine sediment loading (e.g. silts and clays).
- Provide sufficient storage to allow necessary residence time for physical, biological, or chemical processes to adequately remove nutrients
- Iron enhanced sand filters require a minimum of 2-feet of sand (recommended 4 to 6 f).
- Appropriate soil and water chemistry when using chemical agents (flocculating agents) to preclude negative downstream impacts.

MATERIAL REQUIREMENTS:

Materials will vary based on nutrient removal device type.

1. Application of flocculating agents – Aluminum sulfate is a standard flocculating agent but may not be suitable if treated water is to be reapplied to crops with acidic soils (may lead to aluminum toxicity). In these scenarios, a polymeric flocculant is recommended.
2. Iron enhanced sand filters - Source of sand and iron (e.g. iron filings) for installation and routine replacement. Additional materials will include gravel, perforated pipes, and a stabilized culvert outlet (A-P5).
3. Natural treatment wetland – At a minimum, continuous supply of effluent and non-invasive aquatic plants (such as bulrush). Enclosed wetlands may require pumps that control flow rates with stabilized inlets/outlets and screens to remove larger organic debris at the outlets.
4. Physical filtration systems – Treatment system including pump(s), cartridges/filters, electrical, piping and valves.

SIZING REQUIREMENTS:

System's should be sized to capture the dry-weather effluent.

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Nutrient Removal Devices

INSTALLATION REQUIREMENTS (CONTINUED)

MAINTENANCE FREQUENCY AND LIFESPAN:

1. Application of flocculating agents
   - Re-application of flocculating agents dependent on nutrient levels in effluent after treatment (recommended quarterly sampling, minimum annual).
   - Precipitated material dredged from detention basins/waste lagoons may be incorporated into composting.
2. Iron enhanced sand filters
   - System will need to be inspected annually (minimum) to assess a) whether system is saturated with nutrients and b) if the pores have been clogged with fine particles.
   - Depending on nutrient inputs, sand filter may need to be replaced annually to maintain capacity to fix nutrients moving through the system.
3. Natural treatment wetlands
   - A passive natural treatment wetland with no vegetation management will require little to no management (but will also be the least effective at removing nutrients).
   - A managed natural treatment wetland may require seasonal maintenance to clear pumps, screens, prevent concentrated flow-paths (evenly distributed flow across wetland desired) and harvest vegetation.
4. Physical filtration systems (e.g. reverse osmosis)
   - These systems will require routine maintenance to service the pumps and filters (and associated electrical), as well as any dredging required of the potential settling/holding pond.

With proper O&M, each system should function for more than 20 years. The main concern for the nutrient removal devices that may utilized unlined channels or pond would be the complete saturation of the surrounding soils with nutrients, potentially turning the BMP into a nutrient source.

INSTALLATION AND MAINTENANCE COSTS:

Costs will vary depending on nutrient device selected and sizing based on anticipated effluent loading. Addition of flocculating agents to existing waste lagoons is very cost-effective, but may not be suitable depending on local water and soil chemistry. The remaining nutrient removal devices are some of the more expensive BMPs in this guide; creative methods for bringing down costs without reducing water quality benefits are encouraged.

Additional Resources:

1. **Application of flocculating agents to detention basins/waste lagoons**
   - Texas A&M review of flocculant use in Dairy Farm waste lagoons **https://stormwater.ucf.edu/fileRepository/docs/chemicaltreatment/documents/CAT-PAM%20for%20P%20Removal%20(TX).pdf**
2. **Iron enhanced sand filters**
   - BMP details from Minnesota Stormwater Manual **https://stormwater.pca.state.mn.us/index.php/Iron_enhanced_sand_filter_combined**
   - Study assessing nutrient removal efficiency of iron-enhanced media filters **https://www.nature.com/articles/s41598-020-66159-7**
   - CASQA TC-40 - Media Filter **https://www.casqa.org/sites/default/files/BMPHandbooks/tc-40_from_2003_newdevelopmentredevelopment_handbook.pdf**
   - EPA information for media filters (excludes iron enhancement) **https://www3.epa.gov/npdes/pubs/isf.pdf**
3. **Natural treatment wetlands**
   - CASQA - Constructed Wetlands: **https://www.casqa.org/sites/default/files/BMPHandbooks/TC-21.pdf**
4. **Physical filtration systems (e.g. reverse osmosis)**
   - UC Cooperative Extension Resource - Chlorination: **https://ucanr.edu/sites/Climate_Resilient_Agriculture/files/360374.pdf**
   - USGS system with chemical treatment filter: **https://www.usgs.gov/news/new-usgs-filter-removes-phosphorus-waste-water**

WASTE MANAGEMENT

Septic System O&M

A septic system's drainfield (leachfield) and accompanying infrastructure can become a significant nutrient source to surface and ground waters if not properly installed, maintained, and replaced. Following Federal and County guidance for both installation and maintenance will help limit the contribution of nitrogen and phosphorus from these systems.

BENEFITS

OPERATIONAL:

Extend life of drainfield (reduce frequency of costly relocation), reduce potential for contaminating local groundwater sources (especially for properties dependent on their own well water), and reduce maintenance from clogged ports/drains.

ENVIRONMENTAL:

Reduce nutrient loading to downstream surface and ground waters and improve aquatic habitat through reduced eutrophic conditions.

INSTALLATION REQUIREMENTS

SITE REQUIREMENTS:

The primary site requirements for use of conventional septic systems (with drainfields) are soils with adequate drainage (to preclude ponding) and a 5-foot minimum separation between the bottom of the drainfield and the highest historic groundwater elevation observed within/adjacent the site.

Siting of the drainfield is also an important component of improving the efficacy and longevity of a septic system. Place the drainfield in a location that will not be driven on, will be kept clear of deep-rooted shrubs or trees that could send roots into the system's plumbing, and does not receive significant runoff from surrounding areas that create channels or cause ponding.

Other conditions may be required under the State's Onsite Wastewater Treatment System (OWST) Policy (**https://www.waterboards.ca.gov/water_issues/programs/owts/index.html**) depending on expected use (gallons per day or effluent components) and surrounding water quality impairments.

Permitting—Septic systems (or OWSTs) must be permitted through the County of San Diego's Department of Environmental Health (DEH). Septic system design requirements and permitting procedures are provided in their 2015 Local Agency Management Program (LAMP) for Onsite Wastewater Treatment Systems.

MATERIAL REQUIREMENTS:

At a minimum, a conventional septic system consists of a septic tank which separates solids and greases from a household's effluent, and a drainfield to distribute the liquid effluent evenly across a broad subsurface area where remaining pollutants (bacteria, viruses, and nutrients) are filtered through microbial digestion, adsorption to soils, denitrification (anaerobic conversion of nitrates to nitrogen gas), and/or plant uptake.

SIZING REQUIREMENTS:

The system's conveyance capacity will depend on the anticipated effluent loading rate. In general, distributing the liquid effluent over larger drainfield areas will improve the longevity of the systems ability to remove nutrients from water percolating to groundwater.

MAINTENANCE FREQUENCY AND LIFESPAN:

Septic system maintenance will vary based on type and usage, but at a minimum they should be inspected once every three years to assess for leaks and levels of sludge and scum within the septic tank (which may require pumping).

While the average lifespan of a functioning septic system is between 15 and 40 years, improper use or siting could drastically reduce the system's ability to remove nutrients from leaching into groundwater (including phosphorus which can travel subsurface if surrounding soils have reached 100% adsorption capacity). In addition, conditions in San Pasqual Valley may not be suitable for anaerobic denitrification of nitrate beneath the drainfields (require source of organic carbon usually present in moist fine grained soils), meaning that conventional septic systems may become instant sources of nitrates to groundwater in this area. Under these conditions, new technologies may need be pursued to improve system's ability to remove nitrates from leaching into groundwater (e.g. incorporating an organic rich "denitrifying" layer beneath the drainfield).

INSTALLATION AND MAINTENANCE COSTS:

Installation costs for a conventional septic system range between $1,500 and $5,000.

The typical septic system maintenance fee (every 3 to 5 years) ranges between $250 and $500 dollars.

Additional Resources:

San Diego County – Septic Systems:
https://www.sandiegocounty.gov/content/sdc/deh/lwqd/lu_septic_systems.html

San Diego Regional Water Quality Control Board - Onsite Wastewater Treatment Systems (OWST) Policy:
https://www.waterboards.ca.gov/water_issues/programs/owts/owts_policy.html#siting

EPA - Septic Systems. SepticSmart Homeowners:
https://www.epa.gov/septic/septicsmart-homeowners

EPA - Proper Landscaping On and Around Your Septic System:
https://www.epa.gov/sites/default/files/2015-06/documents/septicsmart-week-landscaping-final.pdf

Attachment B

Self Assessment Tools

Attachment B/ Self Assessment Tools

Contents

Self Assessment Tools

Numerous tools are already available that can help operations in San Pasqual Valley identify potential sources of pollutants on-site that can be mitigated through implementation of BMPs.

The San Diego County branch of the University of California's Agriculture and Natural Resources (UC ANR) extension has created operation specific BMPs that are included here in Attachment A, or found here:
PDF files - Agricultural Water Quality (ucanr.edu)

They also provide access to a Self-Assessment Application (Know Your H_2O) which currently supports orchards, greenhouses, and animal operations:
Apps - Agricultural Water Quality (ucanr.edu)

Lastly, the Quarterly and Annual Self-Assessment Report forms required for commercial agricultural operations are provided in this Attachment, and can be found online at the following links:

For Commercial Agricultural Operations that are Members of a Third-Party Group in the San Diego Region (Rp-2016-0004):
Order No. R9-2016-0004 General Waste Discharge Requirements for Discharges From Commercial Ag Ric Ul Tural Operations for Dischargers That Are Members of a Third-party Group in the San Diego Region (ca.gov)

For Commercial Agricultural Operations Not Participating in a Third-Party Group in the San Diego Region (Rp-2016-0005):
General Waste Discharge Requirements for Discharges From Commercial Agricultural Operations for Dischargers Not Participating in a Third-party Group in the San Diego Region (ca.gov)

UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION
AGRICULTURAL WATER QUALITY RESEARCH & EDUCATION
SAN DIEGO COUNTY

SELF ASSESSMENT: GREENHOUSES & NURSERIES


Ag Water Quality
WATER SCHOOL



http://ucanr.org/agwaterquality

Introduction

Agriculture is under increasing scrutiny for its contributions to runoff and nonpoint source pollution. Nonpoint source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. As runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and groundwater. Although agriculture is not the only concern, runoff from agricultural properties may contain contaminant levels that exceed water quality standards. Certain management practices can contribute to nonpoint source pollution in the form of excess sediments, nutrients, salts, pesticides, or pathogenic organisms. In San Diego County, new regulations adopted in 2001 have created new requirements for runoff entering the storm drain system. These new requirements affect many different types of businesses, including agriculture.

San Diego County's storm water permit specifically requires the county and cities to inspect greenhouses and nurseries for storm water violations. *Other types of agriculture are not exempt from complying with water quality regulations. However, at this time other types of agriculture are not required to be regularly inspected for storm water violations.*

Instructions

This self-assessment provides a basis for assessing runoff and nonpoint source pollution potential from greenhouses and container nurseries. Runoff and nonpoint source pollution management on any agricultural property will involve a combination of practices. Not every property will have the same issues or utilize the same Best Management Practices to address them.

The self-assessment questions are divided into the following categories:

A. Property Management
B. Road Management
C. Irrigation Practices
D. Leaching & Runoff
E. Nutrient Assessment & Fertilizer Management
F. Integrated Pest Management

Each question may be checked "Yes, No, or Not Applicable." *Answering "No" to any question indicates an issue that may need to be assessed or reconsidered as a Best Management Practice.* However, this does not necessarily determine evidence of nonpoint source pollution or violation of storm water regulations. A brief explanation is provided under each question explaining its importance to runoff, nonpoint source pollution, and/or Best Management Practices.

Acknowledgements

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Funding also provided by Kee Kitayama Research Foundation, Environmental Quality Incentives Program (EQIP), California Association of Nurserymen, City of Encinitas, and UC Cooperative Extension - County of San Diego.

A. Property Management

1. Does irrigation and other operation runoff during dry weather remain on the property? ***All dry weather runoff is prohibited from entering the storm drain system, which includes street gutters, public waterways, and other conveyances that drain to public waters. Discharging dry weather runoff onto neighboring properties is not allowed unless done with consent. Dry weather runoff may also not be discharged onto public streets and roads.***	☐ Yes ☐ No ☐ N/A ☐ public street/road ☐ storm drain ☐ surface waters ☐ neighbor property
2. Is the property located away from public waterways, which includes streams, rivers, lakes, lagoons, wetlands, and bays? ***A higher potential to pollute exists when public water bodies are located directly on or adjacent to a growing operation. In addition, commercial operations near public water bodies designated as "impaired" under Clean Water Act section 303(d), or regulated under a "total maximum daily load" (TMDL) requirement may have more stringent requirements.***	☐ Yes ☐ No ☐ N/A
3. Has the location of all storm drain inlets, drainage pipes, and ditches and their outfalls been determined? **Are storm drain inlets, drainage pipes, and ditches designated with anti-dumping signs (*e.g., No Dumping)*?** **Is buffer/filter vegetation located between production areas and storm drains?** **Are storm drain inlets, drainage pipes, and ditches protected during activities such as washing and loading/unloading activities that may result in discharge?** ***Growers must be aware of all drainage pipes and ditches on their properties and know where they drain. Designating storm drains and ditches with signs to prevent dumping is encouraged but not required. The regulatory community is looking to detect and disconnect illicit connections to the storm drain system. A storm drain must only convey wet weather runoff. Buffer/filter vegetation can help absorb both dry and wet weather runoff.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
4. Are outdoor driveways, parking areas and loading areas periodically dry cleaned for debris, vehicle residues, and other contaminants? **If wet cleaned, does all runoff remain on the property?** ***Periodic dry cleaning is recommended to prevent debris and residues from washing into the storm drain system during wet weather. Driveways, parking areas, and loading/packing areas may contain contaminants from vehicle fluids and emissions. Oil and other vehicle fluid spills must be cleaned up. Wash runoff may not leave the property. Dry cleaning methods are recommended to avoid creating runoff, and dust control practices also must not create runoff.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

5. Does wash runoff from indoor packing/loading areas and walkways remain on the property? ***Walkways and loading/packing areas may contain contaminants from storage, mixing, or use of fertilizers and other chemicals. Wash runoff may not leave the property. Dry cleaning methods are recommended to avoid creating runoff.***	☐ Yes ☐ No ☐ N/A
6. Is roof runoff prevented from flowing across polluted areas, such as animal pens, parking areas, loading areas, etc.? **Is roof runoff directed into pervious areas (gravel, landscaping) or collection ponds?** ***Roof runoff should not be directed to flow across polluted areas where contaminants will be picked up and washed into the storm drain. If possible, roof runoff should be directed to flow into pervious areas where it can be absorbed or collected. Roof runoff may contain sediments, shading compounds, and organic materials.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
7. Are roof shading compounds managed to avoid washing into the storm drain system during application and removal? ***When wet, many shading compounds and paints contain toxic components that may be hazardous to marine life. Wet shading compounds and paints, as well as wash water from application equipment, must not enter the storm drain. Wash water from removal of dried shading compounds and paints may contribute very fine solid particles to water that remain suspended for long periods of time. Suspended solids can cause problems for aquatic life by blocking sunlight for submerged vegetation and clogging fish gills.***	☐ Yes ☐ No ☐ N/A
8. In landscaped *non-production areas*, are irrigation, fertilization, and pest management properly managed to avoid contaminated runoff? **Are all *non-production* areas managed to prevent erosion?** ***Landscaped areas must not create runoff. Highly erodible areas should be managed with appropriate vegetation or other means to avoid contributing sediments to runoff. Non-production areas may be appropriate for reuse of collected irrigation runoff or constructing collection ponds.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
9. Are fuel tanks and nozzles checked and maintained to prevent leaks? **Are fuel tanks located away from waterways, drainage ditches, and storm drains?** **Are fuel tanks equipped with secondary containment to contain spills?** ***A small amount of petroleum product can contaminate a large body of water. Locating fuel tanks away from waterways, drainage ditches, and storm drains minimizes risk of contamination. Secondary containment provides a method to contain hazardous liquids in the event of an accidental spill or leak.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

10. Are vehicles, trucks, tractors, forklifts, pallet jacks and other equipment regularly maintained to detect and prevent fluid leaks? **Are equipment spills and leaks immediately and properly cleaned up?** **Are collected fluids and solid waste from maintenance properly disposed (e.g., oil, antifreeze, batteries)?** **Are maintenance/storage areas located away from waterways, drainage ditches, and storm drains?** **Are maintenance/storage areas cleaned to avoid oil and grease buildup?** **Does runoff from equipment washing remain on the property?** ***These types of equipment use numerous fluids that are very toxic to the environment. Wash runoff may not leave the property. Washing activities should be done over pervious areas (gravel, landscaping) where runoff will soak into the ground.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
11. Are spill clean-up materials available for all potential types and sizes of spills? **Are significant spills immediately promptly reported?** ***Preparedness for spills can eliminate or minimize runoff of harmful substances into the storm drain in the event of an accident. Basic spill materials include: adequate amount of absorbent material (e.g., kitty litter), broom and dustpan, chemically resistant gloves, and large labeled container to dispose of contaminated absorbent material.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
12. Is the property kept clean and free of solid waste and debris? **Are trash and disposal areas kept clean and located away from waterways, drainage ditches, and storm drains?** **Are dumpsters and waste containers maintained in good condition, regularly emptied, and kept closed?** ***Solid waste and debris can wash away during wet weather or blow off during windy conditions. Solid waste and debris can clog storm drains and cause fatalities for marine life through strangulation or ingestion. It can also create an unsightly mess in waterways and on beaches.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

13. Are pesticides, fertilizers and other chemical products stored in closed, labeled containers, under cover and off the ground? **Are pesticides, fertilizers, and other chemical products disposed according to label directions and all applicable regulations?** **Are chemical tanks and storage areas equipped with secondary containment to contain spills and leaks?** ***Pesticides, fertilizers, and other chemical products must be properly stored and disposed to prevent spills and wet weather washing into the storm drain system. Secondary containment provides a method to contain hazardous liquids in the event of an accidental spill or leak.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
14. Are outdoor stockpiles of materials that are susceptible to wet weather covered and located away from waterways, drainage ditches, and storm drains? ***Materials stockpiled outdoors, such as potting mixes and containers/flats, should be properly located and covered to prevent wet weather washing into the storm drain system.***	☐ Yes ☐ No ☐ N/A
15. Are adequate restrooms or portable sanitation available? **Are restroom toilets, floor, and sink drains properly hooked up to the municipal sewer or a septic system?** **Is portable sanitation located away from waterways, drainage ditches, and storm drains?** **Is portable sanitation regularly maintained?** **Are septic systems and leach fields properly maintained?** ***Properly maintained restrooms and portable sanitation are necessary to prevent human waste and sewage from entering the storm drain system or contaminating groundwater. Human waste contains fecal coliforms, which are monitored by county officials to determine beach closures.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
16. Have all employees received training in runoff, spill, waste, and sanitation management and all applicable regulations? **Are records kept of employee training at the facility?** ***Officially approved employee training checklists are available for nurseries and greenhouses that cover all required regulations. All employees must be trained annually. It is recommended all employees sign a completed checklist to document storm water training. Records must be kept of employee training. Training may additionally include educational workshops, company training manuals, and posted signs.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

17. Has a record-keeping system for water quality issues been started and maintained? ***Record-keeping helps to document management practices A record-keeping system is available from UC Cooperative Extension – County of San Diego at http://cesandiego.ucdavis.edu. Click on "Ag Water Quality Program", then "Grower Resources."***	☐ Yes ☐ No ☐ N/A

B. Road Management & Erosion Control

1. Are new nursery roads properly permitted?	☐ Yes ☐ No ☐ N/A
In road design, is soil type for erodibility and suitability evaluated?	☐ Yes ☐ No ☐ N/A
In road design, are excessive slopes avoided?	☐ Yes ☐ No ☐ N/A
In road construction, is grading performed during dry months?	☐ Yes ☐ No ☐ N/A
In road construction, are exposed soils seeded and mulched to establish vegetation before winter rains? ***To avoid future complications with regulatory agencies, it is necessary to comply with all grading regulations. This may require the submission of an engineering plan for the roads along with specifications and an environmental assessment. Roads that are properly designed, constructed, and maintained will avoid long-term costs of erosion and grading. Exposed soils are subject to erosion losses during winter rains. Sediments are a contaminant in waterways.***	☐ Yes ☐ No ☐ N/A
2. Are waterbreaks (or waterbars) utilized on nursery roads with gradients exceeding 8%?	☐ Yes ☐ No ☐ N/A
Are earthen waterbreaks properly sized (6 in. above and 6 in. below the road surface)?	☐ Yes ☐ No ☐ N/A
Are waterbreaks placed only where water flow has an outlet?	☐ Yes ☐ No ☐ N/A
Does diverted water from waterbreaks flow only into stable areas, avoiding septic fields or waterways?	☐ Yes ☐ No ☐ N/A
Are filter strips used at the outlet of waterbreaks and culverts to trap sediments? ***On gradients over 8%, waterbreaks (or waterbars) are effective in diverting accumulated water from the road surface onto a vegetated fill bank or toward a cutback. Diverted flow should not directly enter into waterways. Filter strips are vegetated areas between roads and waterways that can help trap sediments before they reach waterways. Sediments are a contaminant in waterways.***	☐ Yes ☐ No ☐ N/A

3. Is nursery road use restricted during wet weather? **Are culverts inspected and cleaned out during winter rains?** **Is excessive road maintenance avoided?** ***Using roads during wet weather will aggravate erosion and drainage problems. Maintaining culverts will allow water to drain freely. Avoid excessive road maintenance. Only regrade to remove deep ruts or damaged areas caused by severe storms.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

C. Irrigation Practices

1. Is irrigation water quality regularly monitored by nursery personnel and/or professionally by a lab? **Are water quality records maintained?** ***Regularly testing irrigation water quality is important for maintaining good plant health. Simple equipment can be used to test such parameters as EC, pH, and nitrate-nitrogen. Regularly testing fertigation water is also recommended to monitor fertilizer levels and to ensure injectors are operating properly.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
2. Do spray patterns of overhead or impact sprinkler systems uniformly deliver water without creating overspray in walkways and edges? **Are overhead and impact sprinkler systems used only in watering zones where pots/plants are spaced closely together to avoid runoff?** ***Overhead and impact sprinkler systems have a higher potential to create runoff. Spray patterns should be checked to ensure water is being applied only to plants. Overhead emitters with check-valves can be installed to prevent line drainage and drip damage. Containers should be placed closely together to capture applied water and minimize runoff in the spaces between containers. If necessary, other irrigation methods should be utilized to more efficiently deliver water.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
3. Do fogging/misting systems effectively produce fine water particles? ***Equipment for controlling temperature and humidity should be sized appropriately to prevent runoff.***	☐ Yes ☐ No ☐ N/A
4. Is hand watering performed with the use of an on/off mechanism? ***Hand watering should be performed carefully to avoid creating runoff in spaces between containers and in walkways.***	☐ Yes ☐ No ☐ N/A

5. Are appropriate emitter flow rates for spray stakes/drippers utilized in each watering zone? **Are flow rates the same for all spray stakes/dripper emitters in each watering zone?** **Are spray stake/dripper systems managed to ensure every emitter is located in a container?** ***Emitter flow rates must be correlated with plant types and container sizes. Emitters with flow rates that are too high will apply water faster than containers can absorb, resulting in runoff. Emitters with different flow rates should not be combined in the same watering zone to maintain good uniformity. Each emitter should be located in a container to prevent runoff. Some emitters, such as spray stakes, can be "turned off" when not in use. Emitters that hang below the bench can drain the lateral line after irrigation. The cumulative effect of many emitters creating small individual amounts of runoff can result in large overall runoff volumes.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
6. Has the irrigation system been assessed for worn, outdated, and/or inefficient equipment that can be replaced? **Is appropriate filtration in place for all irrigation equipment?** **Is appropriate pressure regulation in place for all irrigation equipment?** **Is all irrigation equipment regularly checked and repaired for leaks?** **Is all irrigation equipment regularly flushed and managed for clogging?** ***Adapting efficient irrigation technologies can help reduce the amount of runoff. Appropriate filtration will prevent problems associated with clogging, and appropriate pressure regulation will improve uniformity. General maintenance that includes managing leaks and clogging will also improve uniformity and prevent runoff.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
7. Is a uniformity evaluation regularly performed on the irrigation system? ***A uniformity evaluation measures the capability of an irrigation system to evenly deliver water. A system with low uniformity will typically overwater some containers in order to provide adequate water to other containers with lower flowing emitters. High uniformity can be achieved with good system design, pressure regulation, prevention of clogs and leaks, and prevention of line draining. Mission Resource Conservation District (760-728-1332) provides free uniformity evaluations.***	☐ Yes ☐ No ☐ N/A
8. Are specific methods/equipment, such as pot weight, evapotranspiration (ET) data, solar monitoring, or tensiometers, used to help determine irrigation schedules? **Are irrigation duties performed only by employees who understand and practice appropriate irrigation scheduling?** ***Common watering practices can be imprecise and result in runoff. Irrigation scheduling should be based on environmental conditions and plant moisture requirements, and this must constantly be monitored.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

9. Are container sizes and plant types grouped in watering zones according to moisture requirements? ***Grouping together plant or containers with different moisture requirements will likely result in overwatering some plants or containers to provide adequate moisture to others.***	☐ Yes ☐ No ☐ N/A
10. Is pulse irrigation used? ***Pulse irrigation is the practice of splitting irrigations into smaller increments. The goal is to apply water in smaller increments that can be more effectively used by the plants, rather than one larger increment that produces excessive leach rates and runoff.***	☐ Yes ☐ No ☐ N/A
11. Are automatic timers and clocks regularly checked and adjusted to correlate schedules with environmental conditions and plant growth stage? ***Automatic timers/clocks can help implement more complicated irrigation schedules, such as pulsing. They can also reduce labor and avoid operator errors associated with manual systems. However, clocks/timers must also be checked for accuracy, including those that operate during unsupervised hours (i.e., night, early morning).***	☐ Yes ☐ No ☐ N/A

D. Leaching & Runoff

1. Are specific factors, such as appearance of plants or salinity measurements (EC), used to determine leaching practices?	☐ Yes ☐ No ☐ N/A
Are irrigation schedules set to perform leaching at specific irrigation events, rather than at every irrigation?	☐ Yes ☐ No ☐ N/A
Is leaching performed only with fertilizer injectors turned off? ***Leaching is necessary to flush excess salts from the root zone. Excessive leaching, or leaching performed too frequently may contribute to runoff or leaching into groundwater. Different plant species have different tolerances to salts. Use of high fertilizer concentrations may require more leaching to avoid build-up in the root zone.***	☐ Yes ☐ No ☐ N/A
2. Is the amount of leaching that occurs measured or monitored? ***The optimum amount of leaching is 10-15%. This means 10-15% of the water applied runs through the container or root zone. Taking the time to measure will demonstrate how easy it is to excessively leach. Excessive leaching represents wasted water, fertilizer, and greater runoff volumes to manage.***	☐ Yes ☐ No ☐ N/A
3. Do container mixes/media have high water holding capacity while providing adequate drainage? ***Utilizing container media/mixes with higher water holding capacity can reduce leaching and prevent runoff.***	☐ Yes ☐ No ☐ N/A

4. Is irrigation runoff collected from production areas? **Are collection reservoirs/tanks managed to avoid overflow during both dry and wet weather?** ***Collection capacity should be designed to handle runoff needs and probable storm events. Collection should also be designed or lined to prevent contamination of groundwater.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
5. Is runoff water quality regularly monitored? **Are runoff water quality records maintained?** ***Knowing what contaminants are present in runoff is key to proper management. Various options for reuse will depend on the quality of runoff. Basic water quality parameters to test for include pH, EC, nitrates, and phosphates. This can be performed with simple, inexpensive equipment. In addition, it is recommended to test for other contaminants according to the products utilized, such as specific pesticides, that may be present in runoff.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

E. Nutrient Assessment & Fertilizer Management

1. Are container mix/media tests performed? **Are leaf analyses performed?** **Is information from soil or leaf analyses used in fertilizer management?** **Are the most recent nutrient recommendations for your plants used in nutrient management?** ***The goal of successful nutrient management is to provide adequate plant nutrition through various growth stages without over-fertilization. Mix/media testing and leaf analyses can help better manage nutrients. Consult UC Cooperative Extension to obtain the most recent research-backed nutrient recommendations available for your specific crops.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
2. Are nutrients already present in irrigation water and/or recovered runoff considered in nutrient management? **Are nutrients already present in soil amendments considered in nutrient management?** ***Over-fertilization can result if nutrients already present in water and amendments are not taken into account.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

3. Are incorporated solid fertilizers thoroughly mixed throughout the container mix/media and at the correct rate? **Are organic materials or manures thoroughly composted before application?** ***Incorporated fertilizers must be thoroughly and evenly applied at appropriate rates to provide good plant nutrition and to avoid excessive leaching. Composts and manures that are not thoroughly composted have the potential to contribute bacteria and other contaminants to runoff. Organic materials and manures not fully composted may also cause a nitrogen imbalance in the soil, as these materials require nitrogen to break down.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
4. Are slow-release or controlled-release fertilizers utilized? ***Slow-release and controlled-release fertilizers can be successfully used in some situations to minimize leaching losses of nutrients.***	☐ Yes ☐ No ☐ N/A
5. Are topdressed solid fertilizers carefully applied at the correct rate and at the appropriate plant growth stage? ***Topdressed fertilizers must be carefully applied at the correct rate while taking care to keep granules in the container. Application should be timed to correspond with plant growth stage and nutrient needs to provide good nutrition and to avoid excessive leaching.***	☐ Yes ☐ No ☐ N/A
6. Are injected fertilizers carefully mixed and applied at the correct rate? **Is an electrical conductivity (EC) meter or other method regularly used to monitor the liquid fertilizer mix?** **Are injectors calibrated to accurately deliver liquid fertilizer through the irrigation system?** ***Highly soluble liquid fertilizers are easily leached and must be carefully managed. An electrical conductivity (EC) meter can be utilized to easily monitor the fertigation water.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

F. Integrated Pest Management

1. Are plants regularly monitored for pests with proper scouting and monitoring methods, such as traps and plant inspection? **Does the decision to use chemical pesticides include scouting and monitoring information?** ***Establishing an ongoing monitoring system will help detect pest infestations early. By regularly inspecting plants, growers can detect troublesome pests while they are still manageable and before major damage is done.*** ***Evaluating pest populations on a regular basis also helps determine the actual need for chemical control, rather than relying on regularly scheduled chemical applications. Reducing the number of applications will lower production costs and reduce the amount of chemical released into the environment.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
2. Are weather conditions, such as fog and rain, considered in scheduling pesticide applications? **Are irrigation schedules considered in scheduling pesticide applications?** ***Schedule applications to avoid pesticide leaching and runoff.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
3. Are diagnostic lab services or other professional assistance used to determine unknown pathogens, insects, or other growth problems? ***Different pathogens can have similar symptoms. Some insects can also be difficult to identify. Some symptoms may be related to environmental conditions or nutrient and water issues. Accurately diagnosing a problem may sometimes require professional assistance. Successful treatment will depend on an accurate diagnosis.***	☐ Yes ☐ No ☐ N/A
4. Are low-toxicity and/or non-toxic chemicals selected for pest control whenever possible? ***Using less toxic materials reduces risk of pollution. Always read and follow label directions.***	☐ Yes ☐ No ☐ N/A
5. Are pesticides applied only according to the label? **Are improved application techniques used when recommended (e.g., ultra low volume application, surfactants, stickers and sticker-spreaders)?** **Is chemical spray equipment calibrated to ensure accurate application rates?** ***It is illegal to use a chemical product in a manner inconsistent with the label, and this may also pose additional water quality risks. Adopt improved application technology where available, registered and legal, to reduce the amount of chemicals applied and to maximize effectiveness.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

6. Are biological controls integrated when possible and where effective? ***The use of natural predators or parasites to keep harmful pests in check can be highly effective in combination with good management practices and judicious use of chemical agents.***	☐ Yes ☐ No ☐ N/A
7. Is the growing area treated or fumigated before establishing a new crop? **Are weeds eliminated?** **Is contact between hoses and plants minimized to prevent spreading diseases?** **Is standing water eliminated?** ***A clean production environment is essential to pest management. By fumigating or treating greenhouses before establishing a new crop, pest problems from previous crops can be eliminated. Eliminating weeds and other hosts for pest populations makes it more difficult for a pest to establish itself in the growing environment. Standing water should be eliminated to avoid creating ideal conditions for pathogens and insects to reproduce.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
8. Are all plants, plugs, cuttings, and transplants shipped in inspected for pests? **Are plants quarantined before introduction to the growing area?** **Are plants with pests properly treated or disposed before entering the growing area?** ***Only clean plants, plugs, cuttings, or transplants should be allowed to enter the growing area. Carefully inspect all new shipments, discarding or treating any plants with pest problems. Quarantines allow time to monitor plants for any potential pathogen or insect problems. Proper disposal of disease or pest-infested plants will keep these problems out of the growing area.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

Additional Assistance

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UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION
AGRICULTURAL WATER QUALITY RESEARCH & EDUCATION
SAN DIEGO COUNTY

SELF ASSESSMENT: TREE CROPS


Ag Water Quality
WATER SCHOOL



http://ucanr.org/agwaterquality

Introduction

Agriculture is under increasing scrutiny for its contributions to nonpoint source pollution. Nonpoint source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. As runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and groundwater. Although agriculture is not the only concern, runoff from agricultural properties may contain contaminant levels that exceed water quality standards. Certain management practices can contribute to nonpoint source pollution in the form of excess sediments, nutrients, salts, pesticides, or pathogenic organisms. In San Diego County, the storm water permit adopted in 2001 has created new requirements for runoff entering the storm drain system. These new requirements affect many different types of businesses, including agriculture.

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Instructions

This self-assessment provides a basis for assessing runoff and nonpoint source pollution potential from tree crop operations. Runoff and nonpoint source pollution management on any agricultural property will involve a combination of practices. Not every property will have the same issues or utilize the same Best Management Practices to address them.

The self-assessment questions are divided into the following categories:

A. Property Management
B. Road Management & Erosion Control
C. Irrigation Practices
D. Leaching & Runoff
E. Nutrient Assessment & Fertilizer Management
F. Integrated Pest Management

Each question may be checked "Yes, No, or Not Applicable." *Answering "No" to any question indicates an issue that may need to be assessed or reconsidered as a Best Management Practice.* However, this does not necessarily determine evidence of nonpoint source pollution or violation of storm water regulations. A brief explanation is provided under each question explaining its importance to runoff, nonpoint source pollution, and/or Best Management Practices.

Acknowledgements

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Funding also provided by Kee Kitayama Research Foundation, Environmental Quality Incentives Program (EQIP), California Association of Nurserymen, City of Encinitas, and UC Cooperative Extension - County of San Diego.

A. Property Management

1. Does irrigation and other operation runoff during dry weather remain on the property? ***All dry weather runoff is prohibited from entering the storm drain system, which includes street gutters, public waterways, and other conveyances that drain to public waters. Discharging dry weather runoff onto neighboring properties is not allowed unless done with consent. Dry weather runoff may also not be discharged onto public streets/ roads.***	☐ Yes ☐ No ☐ N/A ☐ public street/road ☐ storm drain ☐ surface waters ☐ neighbor property
2. Is the property located away from public waterways, which includes streams, rivers, lakes, lagoons, wetlands, and bays? ***A higher potential to pollute exists when public water bodies are located directly on or adjacent to a growing operation. In addition, commercial operations near public water bodies designated as "impaired" under Clean Water Act section 303(d), or regulated under a "total maximum daily load" (TMDL) requirement may have more stringent requirements.***	☐ Yes ☐ No ☐ N/A
3. Has the location of all drainage pipes/ditches and their outfalls been determined? **Are storm drain ditches designated with signs (*e.g., No Dumping)*?** **Is buffer/filter vegetation located between production areas and storm drains?** ***Growers must be aware of all drainage pipes and ditches on their properties and know where they drain. Designating storm drains and ditches with signs to prevent dumping is encouraged but not required. The regulatory community is looking to detect and disconnect illicit connections to the storm drain system. A storm drain must only convey wet weather runoff. Buffer/filter vegetation can help absorb both dry and wet weather runoff.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
4. Are outdoor driveways, parking areas, and loading areas periodically cleaned for debris, vehicle residues, and other contaminants? **If wet cleaned, does all runoff remain on the property?** ***Periodic dry cleaning is recommended to prevent debris from washing into the storm drain system during wet weather. Driveways, parking areas, and loading/packing areas may contain contaminants from vehicle fluids and emissions. Oil and other vehicle fluid spills must be cleaned up. Wash runoff may not leave the property. Dry cleaning methods are recommended to avoid creating runoff, and dust control practices also must not create runoff.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

5. In landscaped *non-production areas*, are irrigation, fertilization, and pest management properly managed to avoid contaminated runoff? **Are all *non-production* areas managed to prevent erosion?** ***Landscaped areas must not create runoff. Highly erodible areas should be managed with appropriate vegetation or other means to avoid contributing sediments to runoff. Non-production areas may be appropriate for reuse of collected irrigation runoff or constructing collection ponds.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
6. Is roof runoff diverted from flowing across contaminated areas such as animal pens, parking areas, loading areas, etc.? **Is roof runoff directed into pervious areas (e.g., gravel, landscaping) or collection ponds?** ***Roof runoff should not be directed to flow across areas where contaminants will be picked up and washed into the storm drain. If possible, roof runoff should be directed to flow into pervious areas where it can be absorbed or collected.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
7. Are fuel tanks/nozzles checked and maintained to prevent leaks? **Are fuel tanks located away from waterways, drainage ditches, and storm drains?** **Are fuel tanks equipped with secondary containment to contain spills?** ***A small amount of petroleum product can contaminate a large body of water. Locating fuel tanks away from surface waters, drainage ditches, and storm drains minimizes risk of spills into water bodies. Secondary containment provides a method to contain spills in the event of an accidental leak.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
8. Are vehicles/trucks/tractors regularly maintained to detect and prevent fluid leaks? **Are vehicle spills and leaks immediately and properly cleaned up?** **Are collected fluids and solid waste from maintenance properly disposed (e.g., oil, antifreeze, batteries)?** **Are maintenance/storage areas located away from waterways, drainage ditches, and storm drains?** **Are maintenance/storage areas cleaned to avoid oil/grease buildup?** **Does wash runoff remain on the property?** ***Vehicles/trucks/tractors use numerous fluids that are very toxic to the environment. Wash runoff may not leave the property. Washing activities should be done over pervious areas (gravel, landscaping) where runoff will soak into the ground.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

9. Are spill clean-up available materials for all potential types and sizes of spills? **Have all employees been trained in proper procedures for managing a spill?** ***Preparedness for spills can eliminate or minimize runoff of harmful substances into the storm drain in the event of an accident. Basic spill materials include: adequate amount of absorbent material (e.g., kitty litter), broom and dustpan, chemically resistant gloves, and a large labeled container to dispose of contaminated absorbent material.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
10. Is the property kept clean and free of solid waste and debris? **Are adequate numbers of waste containers with lids available and regularly collected to avoid overflow?** **Are waste containers located away from waterways, drainage ditches, and storm drains?** ***Solid waste and debris can clog storm drains and cause fatalities for marine life through strangulation or ingestion. Solid waste and debris also creates an unsightly mess in waterways and on beaches.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
11. Are outdoor storage and stockpile areas covered to prevent wet weather washing into the storm drain system? **Are retired vehicles, equipment, and storage tanks/drums either removed from the property or drained of fluids?** ***Materials stockpiled outdoors should be properly located and covered to prevent wet weather washing into the storm drain system. Retired vehicles, equipment, and storage tanks/drums often contain hazardous materials and should either be removed from the property or drained of fluids to prevent accidental leaks and spills.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
12. Are pesticides, fertilizers, and other chemical products stored in closed, labeled containers, under cover and off the ground? **Are pesticides, fertilizers, and other chemical products and containers disposed according to label directions and all applicable regulations?** ***Pesticides, fertilizers, and other chemical products and their containers must be properly stored and disposed to prevent spills and wet weather washing into the storm drain system.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

13. Are adequate restrooms or portable sanitation available? **Are restroom toilets, floor, and sink drains properly hooked up to the municipal sewer or a septic system?** **Is portable sanitation located away from waterways, drainage ditches, and storm drains?** **Is portable sanitation regularly maintained?** **Are septic systems and leach fields properly maintained?** ***Properly maintained restrooms and portable sanitation are necessary to prevent human waste and sewage from entering the storm drain system or contaminating groundwater. Human waste contains fecal coliforms, which are monitored by county officials to determine beach closures.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
14. Has a record-keeping system for water quality issues been started and maintained? ***Record-keeping helps to document management practices A record-keeping system is available from UC Cooperative Extension – County of San Diego at http://cesandiego.ucdavis.edu. Click on "Ag Water Quality Program", then "Grower Resources."***	☐ Yes ☐ No ☐ N/A

B. Road Management & Erosion Control

1. Are new grove roads properly permitted? **In road design, is soil type for erodibility and suitability evaluated?** **In road design, are excessive slopes avoided?** **In road construction, is final grading performed during dry months?** **In road construction, are exposed soils seeded and mulched to establish vegetation before winter rains?** ***To avoid future complications with regulatory agencies, it is necessary to comply with all grading regulations. This may require the submission of an engineering plan for the roads along with specifications and an environmental assessment. Roads that are properly designed, constructed, and maintained will avoid long-term costs of erosion and grading. Exposed soils are subject to erosion losses during winter rains. Sediments are a contaminant in waterways.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

2. Are waterbreaks (or waterbars) utilized on roads with gradients exceeding 8%? **Are earthen waterbreaks properly sized (6 in. above and 6 in. below the road surface)?** **Are waterbreaks placed only where water flow has an outlet?** **Does diverted water from waterbreaks flow only into stable areas, avoiding septic fields or waterways?** **Are filter strips used at the outlet of waterbreaks and culverts to trap sediments?** ***On gradients over 8%, waterbreaks (or waterbars) are effective in diverting accumulated water from the road surface onto a vegetated fill bank or toward a cutback. Diverted flow should not directly entering into waterways. Filter strips are vegetated areas between roads and waterways, and can help trap sediments before they reach waterways. Sediments are a contaminant in waterways.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
3. Is road use restricted during wet weather? **Are culverts inspected and cleaned out during winter rains?** **Is excessive road maintenance avoided?** ***Using roads during wet weather will aggravate erosion and drainage problems. Maintaining culverts will allow water to freely drain. Avoid excessive maintenance to minimize disturbing the soil. Only regrade to remove deep ruts or damaged areas caused by severe storms.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
4. Are cover crops established on the contour between tree rows for erosion control? **Is mulching used in the sprinkler pattern of the trees for erosion control?** ***Cover crops consisting of planted annual grasses or natural vegetation help stabilize the soil and prevent erosion within the grove. Cover crops should not be allowed in the sprinkler pattern around the trees. Mulching can consist of a clean, organic material such as straw or leaf litter for erosion control directly around the trees in the sprinkler pattern. Mulching 2-4 inches deep will also reduce weed growth, conserve moisture and improve soil tilth. Do not incorporate mulch into the soil.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

C. Irrigation Practices

1. Is irrigation water quality regularly monitored by grove personnel and/or professionally by a lab? ☐ Yes ☐ No ☐ N/A

Are water quality records maintained? ☐ Yes ☐ No ☐ N/A

Regularly testing irrigation water quality is important for maintaining good tree health. Simple equipment can be used to test such parameters as EC, pH, and nitrate-nitrogen. Regularly testing fertigation water is also recommended to monitor fertilizer levels and to ensure injectors are operating properly.

2. Do spray patterns of sprinkler systems uniformly deliver water to target areas? ☐ Yes ☐ No ☐ N/A

Spray patterns should be checked to ensure water is being applied only to the growing areas. Water applied past root zone areas or onto roads wastes water and can result in erosion and runoff.

3. Has the irrigation system been assessed for worn, outdated, and/or inefficient equipment that can be replaced? ☐ Yes ☐ No ☐ N/A

Is appropriate filtration in place for all irrigation equipment? ☐ Yes ☐ No ☐ N/A

Is appropriate pressure regulation in place for all irrigation equipment? ☐ Yes ☐ No ☐ N/A

Is all irrigation equipment regularly checked and repaired for leaks? ☐ Yes ☐ No ☐ N/A

Is all irrigation equipment regularly flushed and managed for clogging? ☐ Yes ☐ No ☐ N/A

Adapting efficient irrigation technologies can help reduce the amount of runoff. Appropriate filtration will prevent problems associated with clogging, and appropriate pressure regulation will improve uniformity. General maintenance that includes managing leaks and clogging will also improve uniformity and prevent runoff.

4. Is a uniformity evaluation regularly performed on the irrigation system? ☐ Yes ☐ No ☐ N/A

A uniformity evaluation measures the capability of an irrigation system to evenly deliver water. A system with low uniformity will typically overwater some trees to provide adequate water to other trees through lower flowing emitters. High uniformity can be achieved with good system design, pressure regulation, prevention of clogs and leaks, and prevention of line draining. Mission Resource Conservation District (760-728-1332) provides free uniformity evaluations.

5. Are specific methods/equipment, such as CIMIS data or tensiometers, used to help determine irrigation schedules? **Are irrigation duties performed only by employees who understand and practice appropriate irrigation scheduling?** ***Common watering practices can be imprecise and result in runoff. Irrigation scheduling should be based on environmental conditions and plant moisture requirements, and this must constantly be monitored.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
6. Is pulse irrigation used? ***Pulse irrigation is the practice of splitting irrigations into smaller increments. The goal is to apply water in smaller increments that can be more effectively used by the plants, rather than one larger increment that produces excessive leach rates and runoff.***	☐ Yes ☐ No ☐ N/A
7. Are automatic timers and clocks regularly checked and adjusted to correlate schedules with environmental conditions and tree growth stage? ***Automatic timers/clocks can help implement more complicated irrigation schedules, such as pulsing. They can also reduce labor and avoid operator errors associated with manual systems. However, clocks/timers must also be routinely checked for accuracy, including those that operate during unsupervised hours (i.e., night, early morning).***	☐ Yes ☐ No ☐ N/A

D. Leaching & Runoff

1. Are specific factors, such as appearance of plants or EC measurements, used to determine leaching practices? **Are irrigation schedules set to perform leaching at specific irrigation events, rather than at every irrigation?** **Is leaching performed only with fertilizer injectors turned off?** ***Leaching is necessary to flush excess salts from the root zone. Excessive leaching, or leaching performed too frequently may contribute to runoff or leaching into groundwater. Different trees have different tolerances to salts. Use of high fertilizer concentrations may require more leaching to avoid build-up in the root zone.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
2. Are irrigation schedules managed according to soil types? ***Irrigation runoff in tree crops is an indication that water is being applied too fast and/or in quantities too large for the soil to absorb. Soils higher in clay will not absorb water as quickly as other soil types. Soils higher in sand may be prone to excessive leach rates. Variations in soil types across a growing operation may require different irrigation schedules. Irrigation schedules may need to be shortened or split into smaller increments (pulsing). Irrigation on slopes will also be more prone to runoff and may cause erosion problems. Sediments are a contaminant in waterways.***	☐ Yes ☐ No ☐ N/A

E. Nutrient Assessment & Fertilizer Management

1. Are soil/media tests performed? **Are leaf analyses performed?** **Is information from soil or leaf analyses used in fertilizer management?** **Are the most recent nutrient recommendations for your trees and growing practices used in nutrient management?** ***The goal of successful nutrient management is to provide adequate plant nutrition through various growth stages without over-fertilization. Soil testing and leaf analyses can help better manage nutrients. Consult UC Cooperative Extension to obtain the most recent research-backed nutrient recommendations available for your specific crops.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
2. Are nutrients already present in irrigation water considered in nutrient management? **Are nutrients already present in soil amendments considered in nutrient management?** ***Over-fertilization can result if nutrients already present in water are not taken into account.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
3. Is nitrogen applied only during the growing season? **Is nitrogen applied in smaller increments throughout the growing season rather than in one large application?** ***Proper timing and amounts of nitrogen application are important to avoid leaching losses. Nitrogen may be added to the soil in a variety of forms that convert to nitrate. Nitrates are extremely soluble in water and can move easily through the soil. Nitrogen applied during the winter is not readily taken up by tree crops. During the growing season, applying nitrogen in smaller increments will better provide nitrogen in quantities the trees can utilize to avoid leaching losses.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
4. Are organic materials or manures thoroughly composted before application? ***Composts and manures that are not thoroughly composted have the potential to contribute bacteria and other contaminants to runoff. Organic materials and manures not fully composted will also cause a nitrogen imbalance in the soil, as they require nitrogen to break down.***	☐ Yes ☐ No ☐ N/A

5. Are injected fertilizers carefully mixed and applied at the correct rate? **Is an electrical conductivity (EC) meter or other method regularly used to monitor the liquid fertilizer mix?** **Are injectors calibrated to accurately deliver liquid fertilizer through the irrigation system?** ***Highly soluble liquid fertilizers are easily leached and must be carefully managed. An EC meter can be utilized to easily monitor the fertigation water.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

F. Integrated Pest Management

1. Are plants regularly monitored for pests with proper scouting/monitoring methods, including traps and plant inspection? **Does the decision to use chemical pesticides include scouting/monitoring information?** ***Establishing an ongoing monitoring system will help detect pest infestations early. By regularly inspecting plants, growers can detect troublesome pests while they are still manageable and before major damage is done.*** ***Evaluating pest populations on a regular basis also helps determine the actual need for chemical control, rather than relying on regularly scheduled chemical applications. Reducing the number of applications will lower production costs and reduce the amount of chemical released into the environment.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
2. Are weather conditions, such as fog and rain, considered in scheduling pesticide applications? **Are irrigation schedules considered in scheduling pesticide applications?** ***Schedule applications to avoid pesticide leaching and runoff.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

3. Are diagnostic lab services or other professional assistance used to determine unknown pathogens, insects, or other growth problems? ***Different pathogens can have similar symptoms. Insects and mites can also be difficult to identify. Some symptoms may be related to environmental conditions or nutrient and water issues. Accurately diagnosing a problem may sometimes require professional assistance.***	☐ Yes ☐ No ☐ N/A
4. Are low-toxicity and/or non-toxic chemicals selected for pest control whenever possible? ***Using less toxic materials reduces risk of pollution. Always read and follow label directions.***	☐ Yes ☐ No ☐ N/A
5. Are pesticides applied only according to the label? **Are improved application techniques used whenever possible (ultra low volume application, surfactants, stickers and sticker-spreaders)?** **Is chemical spray equipment calibrated to ensure accurate application rates?** ***It is illegal to use a chemical product in a manner inconsistent with the label, and this may also pose additional water quality risks. Adopt improved application technology where available, registered and legal, to reduce the amount of chemicals applied and to maximize effectiveness.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
6. Are biological controls integrated when possible and where effective? ***The use of natural predators or parasites to keep harmful pests in check can be highly effective in combination with good management practices and judicious use of chemical agents.***	☐ Yes ☐ No ☐ N/A
7. Is the need for soil treatment assessed before planting a new tree crop? ***Before establishing a new crop, it may be necessary to treat the soil with nematicides or other fumigants to eliminate pathogens and avoid future problems. All soil fumigants and treatments should be handled carefully and according to label instructions.***	☐ Yes ☐ No ☐ N/A
8. Is nursery stock inspected for pests before planting a new crop? ***Only stock that is free of diseases and pests should enter the growing area. Carefully inspect all new nursery stock, discarding or treating any with pest problems. Proper disposal of infested plants will keep pests out of the growing area.***	☐ Yes ☐ No ☐ N/A
9. Are invasive weeds, such as Bermudagrass and Johnsongrass, controlled in the growing areas? ***Although groundcover is recommended in tree crops to minimize erosion, invasive weeds should be eliminated. In particular, Bermudagrass and Johnsongrass should be eliminated to avoid water and nutrient competition with the tree crop. Tillage prior to planting a new crop can help minimize weeds.***	☐ Yes ☐ No ☐ N/A

10. Is ant control practiced? ***Controlling ants will in turn help to control other pests by allowing parasites and predators to be active. Control methods can include skirting the trees or judicious use of chemical pesticides. All pesticides should be handled carefully and according to label instructions.***	☐ Yes ☐ No ☐ N/A
11. Are gophers and squirrels managed? ***Gophers and squirrels damage tree roots. In addition, the holes in the soil they create channel water past tree roots and can cause erosion problems, allowing sediments to enter waterways. Traps and poison bait can be used to manage their populations.***	☐ Yes ☐ No ☐ N/A

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UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION
AGRICULTURAL WATER QUALITY RESEARCH & EDUCATION
SAN DIEGO COUNTY

SELF ASSESSMENT:
ANIMAL AGRICULTURE


Ag Water Quality
WATER SCHOOL



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Introduction

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Instructions

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A. **Property Management**
B. **Road Management & Erosion Control**
C. **Water Use Practices**
D. **Manure and Used Bedding and Mortality Management**
E. **Integrated Pest Management**

Each question may be checked "Yes, No, or Not Applicable." ***Answering "No" to any question indicates an issue that may need to be assessed or reconsidered as a Best Management Practice.*** **However, this does not necessarily determine evidence of nonpoint source pollution or violation of storm water regulations. A brief explanation is provided under each question explaining its importance to runoff, nonpoint source pollution, and/or Best Management Practices.**

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A. Property Management

1. Does all non-storm runoff water, including irrigation water, remain on the property? ***All dry weather runoff is prohibited from entering the storm drain system, which includes street gutters, public waterways, and other conveyances that drain to public waters. Discharging dry weather runoff onto neighboring properties is not allowed unless done with consent. Dry weather runoff may also not be discharged onto public streets/ roads.***	☐ Yes ☐ No ☐ N/A ☐ public street/road ☐ storm drain ☐ surface waters ☐ neighbor property
2. Is the property located away from public waterways, including; streams, rivers, lakes, lagoons, wetlands, and bays? ***A higher potential to pollute exists when public water bodies are located directly on or adjacent to a growing operation. In addition, commercial operations near public water bodies designated as "impaired" under Clean Water Act section 303(d), or regulated under a "total maximum daily load" (TMDL) requirement may have more stringent requirements.***	☐ Yes ☐ No ☐ N/A
3. Has the location of all drainage pipes/ditches and their outfalls been determined? **Are storm drain ditches designated with signs (*e.g., No Dumping)*?** **Is buffer/filter vegetation located between production areas and storm drains?** ***Growers must be aware of all drainage pipes and ditches on their properties and know where they drain. Designating storm drains and ditches with signs to prevent dumping is encouraged but not required. The regulatory community is looking to detect and disconnect illicit connections to the storm drain system. A storm drain must only convey wet weather runoff. Buffer/filter vegetation can help absorb both dry and wet weather runoff.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
4. Are outdoor driveways, parking areas, and loading areas periodically cleaned for debris, vehicle residues, and other contaminants? **If wet cleaned, does all runoff remain on the property?** ***Periodic dry cleaning is recommended to prevent debris from washing into the storm drain system during wet weather. Driveways, parking areas, and loading/packing areas may contain contaminants from vehicle fluids and emissions. Oil and other vehicle fluid spills must be cleaned up. Wash runoff may not leave the property. Dry cleaning methods are recommended to avoid creating runoff, and dust control practices also must not create runoff.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

5. In landscaped areas, are irrigation, fertilization, and pest management properly managed to avoid contaminated runoff? **Are all *non-production* areas managed to prevent erosion?** ***Landscaped areas must not create runoff. Highly erodible areas should be managed with appropriate vegetation or other means to avoid contributing sediments to runoff. Non-production areas may be appropriate for reuse of collected irrigation runoff or constructing collection ponds.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
6. Is roof runoff diverted from flowing across contaminated areas such as animal holding areas, parking areas, loading areas and areas where manure is stored? **Is roof runoff directed into pervious areas (e.g., gravel, landscaping) or collection ponds?** ***Roof runoff should not be directed to flow across areas where contaminants will be picked up and washed into the storm drain. If possible, roof runoff should be directed to flow into pervious areas where it can be absorbed or collected.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
7. Are fuel tanks/nozzles checked and maintained to prevent leaks? **Are fuel tanks located away from waterways, drainage ditches, and storm drains?** **Are fuel tanks equipped with secondary containment to capture spills?** ***A small amount of petroleum product can contaminate a large body of water. Locating fuel tanks away from surface waters, drainage ditches, and storm drains minimizes risk of spills into water bodies. Secondary containment provides a method to contain spills in the event of an accidental leak.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
8. Are vehicles/trucks/tractors regularly maintained to detect and prevent fluid leaks? **Are vehicle spills and leaks immediately and properly cleaned up?** **Are collected fluids and solid waste from maintenance properly disposed (e.g., oil, antifreeze, batteries)?** **Are maintenance/storage areas located away from waterways, drainage ditches, and storm drains?** **Are maintenance/storage areas cleaned periodically to avoid oil/grease buildup?** **Does wash water runoff remain on the property?** ***Vehicles/trucks/tractors use numerous fluids that are very toxic to the environment. Wash runoff may not leave the property. Washing activities should be done over pervious areas (gravel, landscaping) where runoff will soak into the ground.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

9. Are spill clean-up materials and equipment available for all potential types and sizes of spills? **Have all employees been trained in proper procedures for managing spills?** ***Preparedness for spills can eliminate or minimize runoff of harmful substances into the storm drain in the event of an accident. Basic spill materials include: adequate amount of absorbent material (e.g., kitty litter), broom and dustpan, chemically resistant gloves, and a large labeled container to dispose of contaminated absorbent material.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
10. Is the property kept clean and free of solid waste and debris (other than manure)? **Are adequate numbers of waste containers with lids available and is waste collected regularly to avoid overflow?** **Are waste containers checked frequently for leaks?** **Are waste containers located away from waterways, drainage ditches and storm drains?** ***Solid waste and debris can clog storm drains and cause fatalities for marine life through strangulation or ingestion. Solid waste and debris also creates an unsightly mess in waterways and on beaches.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
11. Are retired vehicles, equipment, and storage tanks/drums either removed from the property or drained of fluids? ***Materials stockpiled outdoors should be properly located and covered to prevent wet weather washing into the storm drain system. Retired vehicles, equipment, and storage tanks/drums often contain hazardous materials and should either be removed from the property or drained of fluids to prevent accidental leaks and spills.***	☐ Yes ☐ No ☐ N/A
12. Are pesticides, medications, fertilizers and other chemical products stored in closed, labeled containers, under cover and off the ground? **Are pesticides, medications, fertilizers, and other chemical products and containers disposed according to label directions and all applicable regulations?** ***Pesticides, medications, fertilizers, and other chemical products and their containers must be properly stored and disposed to prevent spills and wet weather washing into the storm drain system.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

13. Are adequate restrooms or portable sanitation available? **Are restroom toilets, floor, and sink drains properly hooked up to the municipal sewer or a septic system?** **Is portable sanitation located away from waterways, drainage ditches, and storm drains?** **Is portable sanitation regularly maintained?** **Are septic systems and leach fields properly maintained?** ***Properly maintained restrooms and portable sanitation are necessary to prevent human waste and sewage from entering the storm drain system or contaminating groundwater. Human waste contains fecal coliforms, which are monitored by county officials to determine beach closures.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
14. Has a record-keeping system for water quality issues been started and maintained? ***Record-keeping helps to document management practices A record-keeping system is available from UC Cooperative Extension – County of San Diego at http://cesandiego.ucdavis.edu. Click on "Ag Water Quality Program", then "Grower Resources."***	☐ Yes ☐ No ☐ N/A

B. Road Management & Erosion Control

1. Are new roads and trails properly permitted? **In road and trail design, are excessive slopes avoided?** **In road and trail construction, are exposed soils seeded and mulched to establish vegetation before winter rains?** ***To avoid future complications with regulatory agencies, it is necessary to comply with all grading regulations. This may require the submission of an engineering plan for the roads and trails along with specifications and an environmental assessment. Roads and trails that are properly designed, constructed, and maintained will avoid long-term costs of erosion and grading. Exposed soils are subject to erosion losses during winter rains. Sediments are a contaminant in waterways.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

2. Are waterbreaks (or waterbars) utilized on roads and trails with gradients exceeding 8%? **Are earthen waterbreaks properly sized (6 in. above and 6 in. below the road or trail surface)?** **Are waterbreaks placed only where water flow has an outlet?** **Does diverted water from waterbreaks avoid septic fields or waterways?** **Are vegetative filter strips used at the outlet of waterbreaks and culverts to trap sediments?** ***On gradients over 8%, waterbreaks (or waterbars) are effective in diverting accumulated water from the road and trail surface onto a vegetated fill bank or toward a cutback. Diverted flow should not directly enter into waterways. Filter strips are vegetated areas between roads and trails and waterways, and can help trap sediments before they reach waterways. Sediments are a contaminant in waterways.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
3. Is road and trail use restricted during wet weather? **Are roads or trails mulched with materials that will minimize erosion?** **Is excessive maintenance and re-grading avoided?** ***Using roads and trails during wet weather will aggravate erosion and drainage problems. Maintaining culverts will allow water to freely drain. Avoid excessive maintenance to minimize disturbing the soil. Only re-grade to remove deep ruts or damaged areas caused by severe storms.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
4. Are cover crops established or is mulching used for erosion control, on any steep slopes near roads or trails? ***Cover crops consisting of planted annual grasses or natural vegetation help stabilize the soil and prevent erosion within the grove. Mulching can consist of a clean, organic material such as straw or leaf litter for erosion control. Mulching 2-4 inches deep will reduce weed growth, conserve moisture and improve soil tilth. Do not incorporate mulch into the soil.***	☐ Yes ☐ No ☐ N/A

C. Water Use Practices

1. If you irrigate, is irrigation water quality regularly monitored professionally by a lab? **Are water quality records maintained?** ***Regularly testing irrigation water quality is important for maintaining good tree health. Simple equipment can be used to test such parameters as EC, pH, and nitrate-nitrogen. Regularly testing fertigation water is also recommended to monitor fertilizer levels and to ensure injectors are operating properly.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

2. Do spray patterns of sprinkler systems deliver water uniformly to target areas? ***Spray patterns should be checked to ensure water is being applied only to the growing areas. Water applied past root zone areas or onto roads wastes water and can result in erosion and runoff.***	☐ Yes ☐ No ☐ N/A
3. Has the irrigation system been assessed for worn, outdated, and/or inefficient equipment that can be replaced? **Is appropriate filtration in place for all irrigation equipment?** **Is appropriate pressure regulation in place for all irrigation equipment?** **Is all irrigation equipment regularly checked and repaired for leaks?** **Is all irrigation equipment regularly flushed and managed for clogging?** ***Adapting efficient irrigation technologies can help reduce the amount of runoff. Appropriate filtration will prevent problems associated with clogging, and appropriate pressure regulation will improve uniformity. General maintenance that includes managing leaks and clogging will also improve uniformity and prevent runoff.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
4. Is animal wash water or cooling water diverted so that it does not enter a stream or drainage? ***Wash and cooling water often contain manure, salts, cleaning compounds or other materials that are found on the animals or under the cages. These materials should not enter streams or waterways.***	☐ Yes ☐ No ☐ N/A
5. Is wash water from animal washing diverted away from manure or used bedding stockpiles or other areas where used bedding or manure may be stored? ***Wash water that passes through manure or bedding stockpiles will pick up nitrates, salts and bacteria that will contaminate streams and waterways.***	☐ Yes ☐ No ☐ N/A
6. Are watering devices regularly checked for leaks? **Is water from watering devices diverted away from streams, waterways or stromdrains of any type?** ***One of the most common causes of excess water in confined animal operations is leaky watering devices. This excess water often picks up contaminates as it passes through areas where animals are kept, and can also increase other problems such as fly breeding.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

D. Manure and Used Bedding and Mortality Management

1. Is manure removed from the area where the animals are kept on a regular basis? **Is it removed from the premises on a regular basis?** ***Manure and used bedding should be removed from areas where animals are kept to avoid any problems with water flowing through these areas and picking up contaminates that will eventually reach the waterways. It is best to remove the manure from the premises on a regular basis, particularly in seasons where there is a likelihood of rainfall and contaminated runoff occurring.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
2. Are manure and used bedding stockpiles away from streams, waterways or stormdrains of any type? ***It is not unusual for manure or used bedding to be stockpiled near the edge of a property where streams or waterways may define the property line. While the nuisances associated with manure, such as exposure to flies and odors may be reduced by stockpiling these materials away from the houses and barns, care should be taken to avoid placing manure or used bedding near streams or waterways where contamination is likely to occur.***	☐ Yes ☐ No ☐ N/A
3. In areas where manure or used bedding are stockpiled before use or removal, are areas around the stockpiles bermed to avoid the movement of contaminated water off the area? **Are stockpiles of manure and used bedding covered to avoid runoff issues in a storm event?** ***In a rain event or even with overhead irrigation, contaminated runoff from a manure or bedding stockpile can easily move into a waterway. Berming around the area where the manure is stored, or covering the stockpiles will help to keep any contaminated water contained.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
4. Is any manure drying or other processing being done on site? **Is manure and used bedding being actively composted?** **Is any manure composting being conducted away from the streams or waterways, or have steps been taken to avoid runoff from compost areas from entering the waterways (berm etc.)?** ***Drying before stockpiling will minimize impacts to water quality and other nuisance issues associated with manure. Composting can greatly aid in reducing manure volume, and provides a good end product for horticultural use. Make sure you check with the UC Cooperative Extension office before beginning a manure composting operation. They can assist you in finding the best composting method, and in making sure that you are following all of the appropriate regulations.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

5. Is animal mortality removed from the premises? **Are smaller animals (poultry) composted along with manure and used bedding?** ***Burying dead animals can cause water quality problems if the decomposing carcass is placed near a waterway. In addition, disease organisms can enter into the waterways from animal mortality. Composting small animals, primarily poultry, is effective as long as the composting is done away from waterways and care is taken to avoid allowing any runoff from the composting material from entering the waterway. It is best to move dead animals off your property with the aid of a rendering service.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A

E. Integrated Pest Management

1. Is your operation regularly monitored for insects and other pests with proper scouting/monitoring methods, including traps and inspections? **Does the decision to use chemical pesticides include scouting/monitoring information?** ***Establishing an ongoing monitoring system will help detect pest infestations early. By regularly inspecting plants, growers can detect troublesome pests while they are still manageable and before major damage is done.*** ***Evaluating pest populations on a regular basis also helps determine the actual need for chemical control, rather than relying on regularly scheduled chemical applications. Reducing the number of applications will lower production costs and reduce the amount of chemical released into the environment.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
2. Are weather conditions, such as fog and rain, considered when scheduling pesticide applications? **Are irrigation schedules considered when scheduling pesticide applications?** ***Schedule applications to avoid pesticide leaching and runoff.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
3. Is professional assistance used to identify unknown pathogens, insects or disease problems? ***Different pests and diseases can have similar symptoms. Accurately diagnosing a problem may sometimes require professional assistance.***	☐ Yes ☐ No ☐ N/A
4. Are low-toxicity and/or non-toxic chemicals selected for pest control whenever possible? ***Using less toxic materials reduces risk of pollution. Always read and follow label directions.***	☐ Yes ☐ No ☐ N/A

5. Are pesticides applied only according to the label? **Are improved application techniques used whenever possible?** **Is chemical spray equipment calibrated to ensure accurate application rates?** ***It is illegal to use a chemical product in a manner inconsistent with the label, and this may also pose additional water quality risks. Adopt improved application technology where available, registered and legal, to reduce the amount of chemicals applied and to maximize effectiveness.***	☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A ☐ Yes ☐ No ☐ N/A
6. Are biological controls integrated into your pest management strategy when possible and where effective? ***The use of natural predators or parasites to keep harmful pests in check can be highly effective in combination with good management practices and judicious use of chemical agents.***	☐ Yes ☐ No ☐ N/A
7. Is ant control practiced? ***Controlling ants will in turn help to control other pests by allowing parasites and predators to be active. Control methods can include judicious use of chemical pesticides. All pesticides should be handled carefully and according to label instructions.***	☐ Yes ☐ No ☐ N/A
8. Are gophers and squirrels managed? ***In addition to posing a danger to certain animals, gophers and squirrels can create channels that carry water and cause erosion, allowing sediments to enter waterways. Traps and poison bait can be used to manage their populations.***	☐ Yes ☐ No ☐ N/A

Additional Assistance

Additional assistance is available from UC Cooperative Extension – County of San Diego. Please call 858-694-2845.

ATTACHMENT I – QUARTERLY SELF-INSPECTION REPORT

Order No. R9 2016-0004, General Waste Discharge Requirements for Discharges from Commercial Agricultural Operations for Dischargers that are Members of a Third-Party Group in the San Diego Region

AGRICULTURAL OPERATION INFORMATION

Name of Agricultural Operation:		
Address:	City:	Zip:
APN:		
Name of Third-Party Group:		
Owner/Operator:	Phone No.:	
Address:	City:	Zip:

INSPECTION INFORMATION

Inspection Conducted by:		Phone No:
Inspection Date:	Inspection Time:	Was it Raining?:

OBSERVATIONS – Attach photographs to form

Irrigation System Inspection Items	Yes	No	NA	Comments
Was irrigation system inspected?				
Was system operating when inspected?				
Were photos taken? (if yes please attach the photos)				
Were leaks/overspray observed?				
Does irrigation runoff remain on the property?				
Were repairs to irrigation system made?				
Other observations?				

Structural Management Practices	Yes	No	NA	Comments
Were management practices used to control runoff and erosion on the property inspected?				
Photos taken (if yes attach)?				
Does irrigation, non-storm water, and storm water runoff remain on the property?				
Are the management practices used to protect compost piles from oversaturation and leachate production in good operating condition?				
Is a 100 foot buffer between compost piles and waterbodies maintained?				
Was erosion observed on roadways?				
Are management practices implemented for proper handling, storage, disposal and management of pesticides, fertilizer, and other chemicals?				
Are pesticides, herbicides and fertilizers shall be applied in accordance with the manufacturer's label?				
Were repairs made?				
Other observations?				

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature:_____ Date:_____

Printed Name: _____Title:_____

General WDRs for Discharges from Commercial Agricultural Operations for Dischargers that are Members of a Third-Party Group

Order No. R9-2016-0004

ATTACHMENT J – ANNUAL SELF-ASSESSMENT REPORT

Order No. R9-2016-0004, General Waste Discharge Requirements for Discharges from Commercial Agricultural Operations for Dischargers that are Members of a Third-Party Group in the San Diego Region

FOR YEAR ENDING: _____

PART A - FACILITY INFORMATION:

Name:		
Address:	City:	Zip:
Contact Person:	No. of Irrigated + Non-Irrigated Acres:	
Telephone:	Email:	
Name of Third-Party Group:		
Assessor Parcel Number(s):		
Type of crops grown on each parcel:		

PART B - PROPERTY OWNER

Name:		
Mailing Address:		
City:	State:	Zip:
Telephone:	Fax:	Email:

PART C - AGRICULTURAL OPERATION OWNER

Name:		
Mailing Address:		
City:	State:	Zip:
Telephone:	Fax:	Email:

PART D - AGRICULTURAL OPERATION - OPERATOR INFORMATION

Name:		
Mailing Address:		
City:	State:	Zip:
County	State:	Zip:
Telephone:	Fax:	Email:

PART E - EDUCATIONAL REQUIREMENT SPECIFICATIONS

Name of Organization providing Water Quality Training:_____

Name of Individual taking Water Quality Training:_____

☐Owner ☐Operator ☐Other: _____

Date annual water quality management training completed: _____

Include copy of certification of completion.

PART F - QUARTERLY SELF-INSPECTIONS

Inspections were conducted on the following dates: Include copies of Inspection Reports_____

_____

PART G – WATER QUALITY PROTECTION PLAN AMENDMENTS

Were amendments made to the Water Quality Protection Plan? ☐Yes ☐No. If yes, attach copy.

PART H - RECORDS MANAGEMENT

Identify whether the following records are being maintained for the Agricultural Operation and are capable of being reviewed during an inspection by the San Diego Water Board. For any record marked "No" or "n/a", provide, as an attachment, a brief explanation/justification.

Pesticide use report	☐Yes ☐No ☐N/A
City/County agricultural inspection reports	☐Yes ☐No ☐N/A
National Organic Program certification inspection reports (if applicable)	☐Yes ☐No ☐N/A
Self-Inspection Forms	☐Yes ☐No ☐N/A
Groundwater quality monitoring data (well data, if applicable)	☐Yes ☐No ☐N/A

PART I - INCIDENTS OF NONCOMPLIANCE

Provide a listing of each incident of noncompliance during the annual monitoring period and, for each incident of noncompliance, provide the cause, the exact dates of non-compliance, and if the noncompliance has not been corrected, the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. Incidents of noncompliance include, but are not limited to 1) failure to pay annual WDR fees (Order No. R9 2016-0004, section III.J), 2) failure to comply with waste discharge prohibitions (Order No. R9 2016-0004, section IV), 3) failure to comply with waste discharge specifications (Order No. R9 2016-0004, section V), 4) failure to obtain the required two-hours of yearly water quality education (Order No. R9 2016-0004 section VII.B), 5) failure to conduct Quarterly Self-Inspection (Order No. R9 2016-0004 section VII.D), 6) a single monitoring result that exceeds either the narrative or numeric water quality objective for a Water Quality Benchmark (Order No. R9 2016-0004, section VI and MRP section VII), 7) the exceedance of a Water Quality Benchmark that triggers the development of a Water Quality Restoration Plan (WQRP), and 8) failure to submit and implement a WQRP(Order No. R9 2016-0004 section VIII.B and MRP section VII).

General WDRs for Discharges from Commercial Agricultural Operations for Dischargers that are Members of a Third-Party Group

Order No. R9-2016-0004

PART J - CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature:_____ Date:_____

Printed Name: _____ Title:_____

INSTRUCTIONS
Annual Self-Assessment Report

PART A – FACILITY INFORMATION

Complete all boxes in Part A. List all parcels enrolled in General Order No. R9-2016-0004. Include additional pages if needed.

PART B – PROPERTY OWNER INFORMATION

Complete all boxes in Part B.

PART C – AGRICULTURAL OPERATION OWNER INFORMATION

Complete all boxes in Part C.

PART D – OPERATOR INFORMATION

Complete all boxes in Part D.

PART E – EDUCATIONAL REQUIREMENT

List name of Water Quality Education provider, date training complete, and attach copy of proof of completion of educational education. If the training was completed by the Owner or Operator listed in Parts C or D, check appropriate box. If training was not completed by the Owner or Operator listed in Parts C or D, include name of person taking training and relationship to the Agricultural Operation.

PART F – QUARTERLY SELF-INSPECTIONS

List dates that the Quarterly Self-Inspections were conducted and attach copies of the Quarterly Self-Inspections forms.

PART G – WATER QUALITY PROTECTION PLAN AMENDMENTS

Attach amendments made to the Water Quality Protection Plan.

PART H - RECORDS MANAGEMENT

Indicate what records have been received and are available for review by the San Diego Water Board.

PART I- INCIDENTS OF NONCOMPLIANCE

On a separate sheet include a list of all incidents of noncompliance the cause, the period of noncompliance including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue and the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

PART J - CERTIFICATION

The Owner or Operation of the Agricultural Operation must complete, sign, and date where indicated.

General WDRs for Discharges from Commercial Agricultural Operations for Dischargers that are Not Members of a Third-Party Group

Order No. R9-2016-0005

ATTACHMENT I – QUARTERLY SELF-INSPECTION REPORT

Order No. R9 2016-0005, General Waste Discharge Requirements for Discharges from Commercial Agricultural Operations for Dischargers Not Participating in a Third-Party Group in the San Diego Region

AGRICULTURAL OPERATION INFORMATION

Name of Agricultural Operation:		
Address:	City:	Zip:
APN:		
Owner/Operator:	Phone No.:	
Address:	City:	Zip:

INSPECTION INFORMATION

Inspection Conducted by:		Phone No:
Inspection Date:	Inspection Time:	Was it Raining?:

OBSERVATIONS – Attach photographs to form

Irrigation System Inspection Items	Yes	No	NA	Comments
Was irrigation system inspected?				
Was system operating when inspected?				
Were photos taken? (if yes please attach the photos)				
Were leaks/overspray observed?				
Does irrigation runoff remain on the property?				
Were repairs to irrigation system made?				
Other observations?				

Structural Management Practices	Yes	No	NA	Comments
Were management practices used to control runoff and erosion on the property inspected?				
Photos taken (if yes attach)?				
Does irrigation, non-storm water, and storm water runoff remain on the property?				
Are the management practices used to protect compost piles from oversaturation and leachate production in good operating condition?				
Is a 100 foot buffer between compost piles and waterbodies maintained?				
Was erosion observed on roadways?				
Are management practices implemented for proper handling, storage, disposal and management of pesticides, fertilizer, and other chemicals?				
Are pesticides, herbicides and fertilizers shall be applied in accordance with the manufacturer's label?				
Were repairs made?				
Other observations?				

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature:_____ Date:_____

Printed Name: _____Title:_____

General WDRs for Discharges from Commercial Agricultural Operations for Dischargers that are Not Members of a Third-Party Group

Order No. R9-2016-0005

ATTACHMENT J – ANNUAL SELF-ASSESSMENT REPORT

Order No. R9-2016-0005, General Waste Discharge Requirements for Discharges from Commercial Agricultural Operations for Dischargers Not Participating in a Third-Party Group in the San Diego Region

FOR YEAR ENDING: _____

PART A - FACILITY INFORMATION

Name:		
Address:	City:	Zip:
Contact Person:	Total Irrigated + Non-Irrigated Acres:	
Telephone:	Email:	
Assessor Parcel Number(s):		
Type of crops grown on each parcel:		

PART B - PROPERTY OWNER

Name:		
Mailing Address:		
City:	State:	Zip:
Telephone:	Fax:	Email:

PART C - AGRICULTURAL OPERATION OWNER

Name:		
Mailing Address:		
City:	State:	Zip:
Telephone:	Fax:	Email:

PART D - AGRICULTURAL OPERATION - OPERATOR INFORMATION

Name:		
Mailing Address:		
City:	State:	Zip:
County	State:	Zip:
Telephone:	Fax:	Email:

PART E - EDUCATIONAL REQUIREMENT SPECIFICATIONS

Name of Organization providing Water Quality Training:_____

Name of Individual taking Water Quality Training:_____

☐Owner ☐Operator ☐Other: _____

Date annual water quality management training completed: _____

Include copy of certification of completion.

PART F - QUARTERLY SELF-INSPECTIONS

Inspections were conducted on the following dates: Include copies of Inspection Reports_____

_____

PART G – WATER QUALITY PROTECTION PLAN AMENDMENTS

Were amendments made to the Water Quality Protection Plan? ☐Yes ☐No. If yes, attach copy.

PART H - RECORDS MANAGEMENT

Identify whether the following records are being maintained for the Agricultural Operation and are capable of being reviewed during an inspection by the San Diego Water Board. For any record marked "No" or "n/a", provide, as an attachment, a brief explanation/justification.

Pesticide use report	☐Yes ☐No ☐N/A
City/County agricultural inspection reports	☐Yes ☐No ☐N/A
National Organic Program certification inspection reports (if applicable)	☐Yes ☐No ☐N/A
Self-Inspection Forms	☐Yes ☐No ☐N/A
Groundwater quality monitoring data (well data, if applicable)	☐Yes ☐No ☐N/A

PART I - INCIDENTS OF NONCOMPLIANCE

Provide a listing of each incident of noncompliance during the annual monitoring period and, for each incident of noncompliance, provide the cause, the exact dates of non-compliance, and if the noncompliance has not been corrected, the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. Incidents of noncompliance include, but are not limited to 1) failure to pay annual WDR fees (Order No. R9 2016-0005, section II.J), 2) failure to comply with waste discharge prohibitions (Order No. R9 2016-0005, section III), 3) failure to comply with waste discharge specifications (Order No. R9 2016-0005, section IV), 4) failure to obtain the required two-hours of yearly water quality education (Order No. R9 2016-0005, section VI.B), 5) failure to conduct Quarterly Self-Inspection (Order No. R9 2016-0005, section VI.E), 6) a single monitoring result that exceeds either the narrative or numeric water quality objective for a Water Quality Benchmark (Order No. R9 2016-0005, section V and MRP section VII), 7) the exceedance of a Water Quality Benchmark that triggers the development of a Water Quality Restoration Plan (WQRP), and 8) failure to submit and implement a WQRP (Order No. R9 2016-0005, section VI.D and MRP section VII).

General WDRs for Discharges from Commercial Agricultural Operations for Dischargers that are Not Members of a Third-Party Group

Order No. R9-2016-0005

PART J - CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature:_____ Date:_____

Printed Name: _____ Title:_____

INSTRUCTIONS

Annual Self-Assessment Report

PART A – FACILITY INFORMATION

Complete all boxes in Part A. List all parcels enrolled in General Order No. R9-2016-0005. Include additional pages if needed.

PART B – PROPERTY OWNER INFORMATION

Complete all boxes in Part B.

PART C – AGRICULTURAL OPERATION OWNER INFORMATION

Complete all boxes in Part C.

PART D – OPERATOR INFORMATION

Complete all boxes in Part D.

PART E – EDUCATIONAL REQUIREMENT

List name of Water Quality Education provider, date training complete, and attach copy of proof of completion of educational education. If the training was completed by the Owner or Operator listed in Parts C or D, check appropriate box. If training was not completed by the Owner or Operator listed in Parts C or D, include name of person taking training and relationship to the Agricultural Operation.

PART F – QUARTERLY SELF-INSPECTIONS

List dates that the Quarterly Self-Inspections were conducted and attach copies of the Quarterly Self-Inspections forms.

PART G – WATER QUALITY PROTECTION PLAN AMENDMENTS

Attach amendments made to the Water Quality Protection Plan.

PART H -RECORDS MANAGEMENT

Indicate what records have been received and are available for review by the San Diego Water Board.

PART I- INCIDENTS OF NONCOMPLIANCE

On a separate sheet include a list of all incidents of noncompliance the cause, the period of noncompliance including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue and the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

PART J -CERTIFICATION

The Owner or Operation of the Agricultural Operation must complete, sign, and date where indicated.

Attachment C

Required Elements of the Agricultural Order Water Quality Protection Plans

Attachment C/ Required Elements of the Agricultural Order Water Quality Protection Plans

In November 2016, the California Regional Water Quality Control Board for the San Diego Region (San Diego Water Board) adopted general waste discharge requirements for discharges from commercial agricultural operations, including storm water runoff, irrigation runoff, and other non-storm water runoff that could affect the quality of waters of the State. Two General Orders were passed that set forth specific waste discharge requirements that commercial agricultural operations must adhere to: 1) for dischargers who belong to a third-party group (Order No. R9-2016-0004), and 2) for dischargers that are not members of a third-party group (Order No. R9-2016-0005). As defined in Order No. R9-2016-0004, a Third-Party Group is "An organization approved by the San Diego Water Board to assist Dischargers in carrying out the terms and conditions of this General Order" and "may be formed based on a defined geographic area, crop(s), or other appropriate grouping" (additional information on the role and responsibilities of a Third-Party Group can be found in Order No. R9-2016-0004).

Both General Orders require dischargers, whether acting as an individual or a member of a Third-Party Group, to prepare and implement a Water Quality Protection Plan (WQPP) to prevent waste discharges that contribute to degradation of waters of the State, which includes both surface water and groundwater. The specific components of the WQPP required under each General Order are included below.

Order No. ORDER NO. R9-2016-0004 (Third Party General Order). General Waste Discharge Requirements for Discharges from Commercial Agricultural Operations for Dischargers that are Members of a Third-Party Group in the san Diego Region. **https://www.waterboards.ca.gov/sandiego/board_decisions/adopted_orders/2016/R9-2016-0004.pdf**

ORDER NO. R9-2016-0005 (Individual General Order). General Waste Discharge Requirements for Discharges from Commercial Agricultural Operations for Dischargers Not Participating in a Third-Party Group in the San Diego Region. **https://www.waterboards.ca.gov/sandiego/board_decisions/adopted_orders/2016/R9-2016-0005.pdf**

Water Quality Protection Plan (WQPP) Requirements for Discharges From Commercial Agricultural Operations for Dischargers That are Members of a Third-party Group in the San Diego Region

1. Members shall prepare a complete WQPP to identify the type and location of management practices12 currently employed and additional management practices based on current conditions at their Agricultural Operation needed to minimize or prevent the discharge of waste to waters of the State either directly or indirectly through irrigation water runoff and infiltration, non-storm water runoff, and storm water runoff.
2. A copy of the WQPP shall be submitted with the NOI.
3. Members shall commence implementation of the WQPP upon receipt of an NOA from the San Diego Water Board.
4. At least quarterly, Members shall evaluate the effectiveness of the management practices in the WQPP and make modifications to the WQPP as necessary.
5. The WQPP shall be kept current and available on the Agricultural Operation site and made available to the San Diego Water Board upon request.
6. The WQPP shall contain all of the following information to be deemed complete:
   A. Name, mailing address, Assessor's Parcel Number,Ω size (in acres), and type of the Agricultural Operation.
   B. Name, mailing address, phone number, email address, and type (individual, corporation, partnership, governmental agency, other) of the owner of the Agricultural Operation.
   C. Name, mailing address, phone number, and email address of the operator of the Agricultural Operation
   D. Name, mailing address, phone number, and email address of the landowner.
   E. Name, mailing address, phone number, and email address of the individual who prepared the WQPP.
   F. Name, mailing address, phone number, and email address of the Third-Party Group primary contact person.
   G. A brief description of the nature of the Agricultural Operation including the activities conducted by the Member which require coverage under this General Order
   H. List of crops grown (i.e., orchard, vineyard, nursery products, row crops) at the Agricultural Operation and the acres dedicated for each type of crop.
   I. List of agricultural chemicals typically applied to crops at the Agricultural Operation, including but not limited to fertilizers and organic amendments, pesticides, and fumigants.
   J. The name of the receiving surface waters (if known) to which irrigation runoff, storm water runoff, and non-storm water runoff from the Agricultural Operation is discharged.

K. A scaled topographic Site Location Map extending one mile beyond the property boundary of the Agricultural Operation and depicting the following:
   i. Property boundaries, roads, structures, and drainage structures.
   ii. Irrigation wells, domestic water supply wells, springs, and other surface water bodies listed in public records or otherwise known to the Member to be in the map area.

L. A scaled Site Plan depicting the following:
   i. Property boundaries, roads, structures, and drainage structures.
   ii. Irrigation wells, domestic water supply wells, springs, surface water bodies, and storm water and non-storm water conveyance systems located within the property.
   iii. Approximate location of growing areas.
   iv. Compost and manure management areas including storage and disposal sites.
   v. Chemical storage areas.
   vi. Surface flow directions and general topographic slope direction lines.
   vii. The location and types of management practices employed.
   viii. The location of groundwater wells used for domestic supply.

M. A detailed description of each current and proposed management practice, including its purpose, operational status, a time schedule for the operation and maintenance of current management practices, and a time schedule for the construction, implementation, operation and maintenance of the proposed management practices not currently in use. This includes but is not limited to management practices related to irrigation efficiency and management, pesticide management, nutrient management, salinity management, and sediment and erosion control to achieve compliance with this General Order. This also includes management practices required to address applicable TMDLs, including but not limited to management practices identified in the Rainbow Creek Nutrient Management Plan. The time schedule for construction and implementation of proposed management practices shall reflect the shortest practicable time required to perform each task and shall include a final date for construction and implementation. The schedule may not be longer than that which is reasonably necessary to achieve compliance with the receiving water limitations contained in section VI of this General Order.

N. A detailed visual observation monitoring program as required by section VII.D of this General Order for evaluating whether management practices are adequate, properly implemented, and effective.

O. Certification and signature in accordance with Signatory and Certification Requirements contained in section IX.E of this General Order.

7. Members shall ensure that all management practices identified in the WQPP are properly operated and maintained. Members shall periodically evaluate the effectiveness of the management practices and shall make modifications to the WQPP as necessary when visual observation monitoring indicates waste discharges have not been adequately addressed in the WQPP.

Water Quality Protection Plan (WQPP) Requirements for Discharges From Commercial Agricultural Operations for Dischargers Not Participating in a Third-party Group in the San Diego Region

1. Dischargers shall prepare a complete WQPP to identify the type and location of management practices11 currently employed and additional management practices based on current conditions at their Agricultural Operation needed to minimize or prevent the discharge of waste to waters of the State either directly or indirectly through irrigation water runoff and infiltration, non-storm water runoff, and storm water runoff.
2. A copy of the WQPP shall be submitted with the NOI.
3. Dischargers shall commence implementation of the WQPP upon receipt of an NOA from the San Diego Water Board.
4. At least quarterly, Dischargers shall evaluate the effectiveness of the management practices in the WQPP and make modifications to the WQPP as necessary.
5. The WQPP shall be kept current and available on the Agricultural Operation site and made available to the San Diego Water Board upon request.
6. The WQPP shall contain all of the following information to be deemed complete:
   A. Name, mailing address, Assessor's Parcel Number, size (in acres), and type of the Agricultural Operation.
   B. Name, mailing address, phone number, email address, and type (individual, corporation, partnership, governmental agency, other) of the owner of the Agricultural Operation.
   C. Name, mailing address, phone number, and email address of the operator of the Agricultural Operation.
   D. Name, mailing address, phone number, and email address of the landowner.
   E. Name, mailing address, phone number, and email address of the individual who prepared the WQPP.
   F. A brief description of the nature of the Agricultural Operation including the activities conducted by the Discharger which require coverage under this General Order .
   G. List of crops grown (i.e., orchard, vineyard, nursery products, row crops) at the Agricultural Operation and the acres dedicated for each type of crop.
   H. List of agricultural chemicals typically applied to crops at the Agricultural Operation, including but not limited to fertilizers, organic amendments, pesticides, and fumigants.
   I. The name of the receiving surface waters (if known) to which irrigation runoff, storm water runoff, and non-storm water runoff from the Agricultural Operation is discharged.
   J. A scaled Site Plan depicting the following:
      i. Property boundaries, roads, structures, and drainage structures.
      ii. Irrigation wells, domestic water supply wells, springs, surface water bodies, and storm water and non-storm water conveyance systems located within the property.
      iii. Approximate location of growing areas.

iv. Compost and manure management areas including storage and disposal sites.

v. Chemical storage areas.

vi. Surface flow directions and general topographic slope direction.

vii. The location and types of management practices employed.

viii. The location of groundwater wells used for domestic supply.

K. A detailed description of each current and proposed management practice, including its purpose, operational status, a time schedule for the operation and maintenance of current management practices, and a time schedule for the construction, implementation, operation and maintenance of proposed management practices not currently in use. This includes but is not limited to management practices related to irrigation efficiency and management, pesticide management, nutrient management, salinity management, and sediment and erosion control to achieve compliance with this General Order. This also includes management practices required to address applicable TMDLs, including but not limited to management practices identified in the Rainbow Creek Nutrient Management Plan. The time schedule for construction and implementation of proposed management practices shall reflect the shortest practicable time required to perform each task and shall include a final date for construction and implementation. The schedule may not be longer than that which is reasonably necessary to achieve compliance with the receiving water limitations contained in section V of this General Order.

L. A detailed visual observation monitoring program as required by section VI.E of this General Order for evaluating whether management practices are adequate, properly implemented and effective.

M. A Surface Water and Groundwater Monitoring Program Plan (Monitoring Program Plan), as required in section VI of the MRP (Attachment A).

N. Certification and Signature in accordance with Certification Requirements contained in section VII.E of this General Order.

O. Dischargers shall ensure that all management practices identified in the WQPP are properly operated and maintained. Dischargers shall periodically evaluate the effectiveness of the management practices and shall make modifications to the WQPP as necessary when visual observation monitoring indicates waste discharges have not been adequately addressed in the WQPP.

Citations

Citation No.	Page No.	Section	Citation
1	8	**Hodges Reservoir Watershed** Erosion	US EPA. 2016. **A Manual to Identify Sources of Fluvial Sediment.** September. Cincinnati, Ohio. Prepared in cooperation with U.S. Geological Survey. https://nepis.epa.gov/Exe/ZyPDF.cgi/P100QVM1.PDF?Dockey=P100QVM1.PDF
2	8	**Hodges Reservoir Watershed** Channel Erosion	City of San Diego. 2014. **San Pasqual Valley Groundwater Basin Salt and Nutrient Management Plan.** May. San Diego, California. Prepared by CH2MHill. Accessed: May 2022 https://www.sandiego.gov/sites/default/files/final_snmp_may_2014.pdf
3	8	**Hodges Reservoir Watershed** Wildfire	US EPA. 2019. **Wildfires: How Do They Affect Our Water Supplies?** https://www.epa.gov/sciencematters/wildfires-how-do-they-affect-our-water-supplies
4	9	**Hodges Reservoir Watershed** Atomspheric Deposition	Jassby, A. D., et al., 1994. **Atmospheric Deposition of Nitrogen and Phosphorus in the Annual Nutrient Load of Lake Tahoe (California-Nevada).** Water Resources Research. Vol. 30, No. 7. Pgs. 2207-2216. July 1994.
5	9	**Hodges Reservoir Watershed** Fertilizers/ Animal Ops	City of San Diego. 2014. **San Pasqual Valley Groundwater Basin Salt and Nutrient Management Plan.** May. San Diego, California. Prepared by CH2MHill. Accessed: May 2022 https://www.sandiego.gov/sites/default/files/final_snmp_may_2014.pdf
6	10	**Land Use** Nutrients	City of San Diego. 2014. **San Pasqual Valley Groundwater Basin Salt and Nutrient Management Plan.** May. San Diego, California. Prepared by CH2MHill. Accessed: May 2022 https://www.sandiego.gov/sites/default/files/final_snmp_may_2014.pdf
7	10	**Land Use** Sediment	City of San Diego. 2014. **San Pasqual Valley Groundwater Basin Salt and Nutrient Management Plan.** May. San Diego, California. Prepared by CH2MHill. Accessed: May 2022 https://www.sandiego.gov/sites/default/files/final_snmp_may_2014.pdf
8	12,13	**Pollutant Migration and Accumilation** San Pasqual Valley Groundwater Basin	City of San Diego. 2014. **San Pasqual Valley Groundwater Basin Salt and Nutrient Management Plan.** May. San Diego, California. Prepared by CH2MHill. Accessed: May 2022 https://www.sandiego.gov/sites/default/files/final_snmp_may_2014.pdf

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9	12,13	**Pollutant Migration and Accumilation** San Pasqual Valley Groundwater Basin	City of San Diego and County of San Diego. 2022. **Final San Pasqual Valley Groundwater Basin Groundwater Sustainability Plan Volume 1: Plan**. September. San Diego, California. Prepared by Woodard & Curran. Accessed: May 2022 https://www.sandiegocounty.gov/content/dam/sdc/pds/SGMA/SPV-Final-GSP-Vol-1-Plan-Final.pdf
10	12,13	**Pollutant Migration and Accumilation** Hodges Reservoir	Zhou, Q., Gibson, C.E., Zhu, Y., 2001. **Evaluation of Phosphorus Bioavailability in Sediments of Three Contrasting Lakes in China and the UK.** Chemosphere. Vol. 42. Pgs. 221-225.
11	12,13	**Pollutant Migration and Accumilation** Hodges Reservoir	Nowlin, W. H., Evarts, J.L., Vanni, M.J., 2005. **Release rate and potential fates of nitrogen and phosphorus from sediments in a eutrophic reservoir.** https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.536.3948&rep=rep1&type=pdf

The City of SAN DIEGO