Rainbow Creek Nutrient Reduction and Management Plan

County of San Diego

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List of Acronyms and Abbreviations

2013 MS4 Permit	Order No. R9-2013-0001, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region
AC	Administrative Citation
ACW	Administrative Citation Warning
AWM	Department of Agriculture, Weights, and Measures
Basin Plan	Water Quality Control Plan for the San Diego Region
BMP	Best Management Practice
BMPDM	Best Management Practices Design Manual
CAR	Corrective Actions Report
CASQA	California Stormwater Quality Association
CEQA	California Environmental Quality Act
County	County of San Diego
CTN	County Television Network
CWA	Clean Water Act
DEH	Department of Environmental Health
DPR	Department of Parks and Recreation
ERP	Enforcement Response Plan
ESA	Environmentally Sensitive Area
F3P	Facility Pollution Prevention Plan
FOG	Fats, oils, and grease
GIS	Geographic Information System
HVWU	High Volume Water Use
ILACSD	I Love a Clean San Diego
JRMP	Jurisdictional Runoff Management Plan
LID	Low Impact Development
MMs	Management Measures
MPs	Management Practices
MRCD	Mission Resource Conservation District
MSCP	Multiple Species Conservation Program
NDVI	Normalized Difference Vegetation Index
NIR	Near Infrared
NOV	Notice of Violation

NPDES..... National Pollutant Discharge Elimination System

NRCS..... Natural Resources Conservation Service

NRMP ..... Nutrient Reduction and Management Plan

OWTS ..... Onsite Wastewater Treatment Systems

P2 ..... Pollution Prevention

PDP..... Priority Development Project

PGA..... Pollutant-generating Activity

Regional Board..... California Regional Water Quality Control Board, San Diego Region

RMA..... Residential Management Area

SANDAG ..... San Diego Association of Governments

SanGIS ..... San Diego Geographic Information Source

SLP..... Sustainable Landscapes Program

SLP Guidelines..... Sustainable Landscape Guidelines: A Watershed Approach to Landscaping

SWPPP..... Stormwater Pollution Prevention Plan

SWQMP..... Storm Water Quality Management Plan

TMDL..... Total Maximum Daily Load

TMDL Monitoring Plan..... Sampling and Analysis Plan for Rainbow Creek Nutrient Reduction TMDL Implementation Water Quality Monitoring

TSS..... Total Suspended Sediment

TTWQ ..... Threat to Water Quality

UCCE..... University of California Cooperative Extension

USDA ..... United States Department of Agriculture

USGS..... United States Geological Survey

WMA ..... Watershed Management Area

WMA AR..... Watershed Management Area Interim Annual Report

WPO ..... Watershed Protection Ordinance

WPP..... Watershed Protection Program

WQBEL ..... Water Quality-Based Effluent Limitations

WQIP ..... Water Quality Improvement Plan

1. Introduction and Scope

In February 2005, the California Regional Water Quality Control Board, San Diego Region (Regional Board) passed Resolution No. R9-2005-006, which adopted an amendment to the Water Quality Control Plan for the San Diego Region (Basin Plan). The amendment (Basin Plan Amendment) incorporated Total Maximum Daily Loads (TMDLs) for total nitrogen and total phosphorous in the Rainbow Creek Watershed (San Diego Regional Water Quality Control Board, 2005). Attachment A, Section B specifies a number of required actions to be taken by the County of San Diego in order to achieve compliance with the Basin Plan Amendment. Section B.2 requires the County of San Diego to prepare and submit a Nutrient Reduction and Management Plan (NRMP) for the Rainbow Creek Watershed. The required elements of the NRMP are specified in Attachment A, Section C. These requirements are collectively intended to provide a watershed-based approach for the protection from, or prevention of, nutrient discharges to Rainbow Creek. Specifically, the NRMP describes activities undertaken by the County of San Diego to reduce nutrients in runoff discharges from key sources consisting of new and existing (1) commercial nurseries, (2) agricultural fields, (3) orchards, (4) parks, (5) residential areas, (6) urban areas, and (7) septic tank disposal system land uses.

This document serves to satisfy the requirements associated with creation of the County of San Diego NRMP and builds upon a description of Management Measures (MMs) and Management Practices (MPs) targeting nutrient reduction and/or elimination that were developed originally by University of California Cooperative Extension (University of California Cooperative Extension, 2015). The 2015 UCCE document is attached for reference in Appendix C, Attachment 5. The scope of the NRMP and following sections are presented as described within Section C of the Basin Plan Amendment.

2. Legal Authority

Through various pertinent ordinances, the County of San Diego has established adequate legal authority to implement the activities highlighted within this NRMP, all of which are fully detailed within the current Jurisdictional Runoff Management Plan (JRMP), 2011General Plan Update, and numerous other design manuals and technical publications. These ordinances include:

1. *Watershed Protection Ordinance* (Ordinance No. 10410 N.S – 1/27/2016, San Diego County Code Section 67.801 ET SEQ.) The Watershed Protection Ordinance (WPO) acts to protect water resources and improve water quality by controlling stormwater conveyance and requiring the use of management practices aimed towards the reduction or elimination of nutrients and other pollutant discharges. (County of San Diego, 2016b)
2. *Water Conservation in Landscaping Ordinance* (Ordinance No. 10032 N.S. - 1/13/2010, San Diego County Code Section 87.601 ET SEQ.) The Water Conservation in Landscaping Ordinance acts to prevent excessive runoff and reduce water waste that occurs from overspray, a potential transport mechanism of nutrients. (County of San Diego, 2010)
3. *On Site Waste Water Treatment Systems Ordinance* (Ordinance No. 10389 N.S. – 7/24/2015, San Diego County Code Section 68.301 ET SEQ.) The purpose of the On Site Waste Water Treatment Systems Ordinance is to implement State laws and regulations and implement additional standards that are necessary to protect the health and safety of the San Diego County community. It also acts to prohibit the improper disposal of sewage and provides regulations

authorizing the Director of the Department of Environmental Health (DEH) to protect public health from threats from sewage. This authority is inclusive of septic tank disposal systems, defined as a key source of nutrients under the Basin Plan Amendment. (County of San Diego, 2015c)

4. *Zoning Ordinance of San Diego County (Ordinance No. 5281 – 10/18/1978 and updated April 2016).* The Zoning Ordinance is applicable to all of the unincorporated areas of San Diego County. The use and employment of all land and any buildings or structures located upon the land and the construction, reconstruction, alteration, expansion, or relocation of any building or structure upon the land must conform to the zone in which the land is located. Zoning Ordinance regulations pertaining to land use and development in residential, agricultural, commercial, industrial, and special purpose zones act to serve the public health, safety and general welfare by specifying use, animal, development, and other relevant activities. (County of San Diego, 2016c)

Figure 1 illustrates an overall organizational chart of County personnel responsible for implementing the NRMP under the authority of these ordinances.

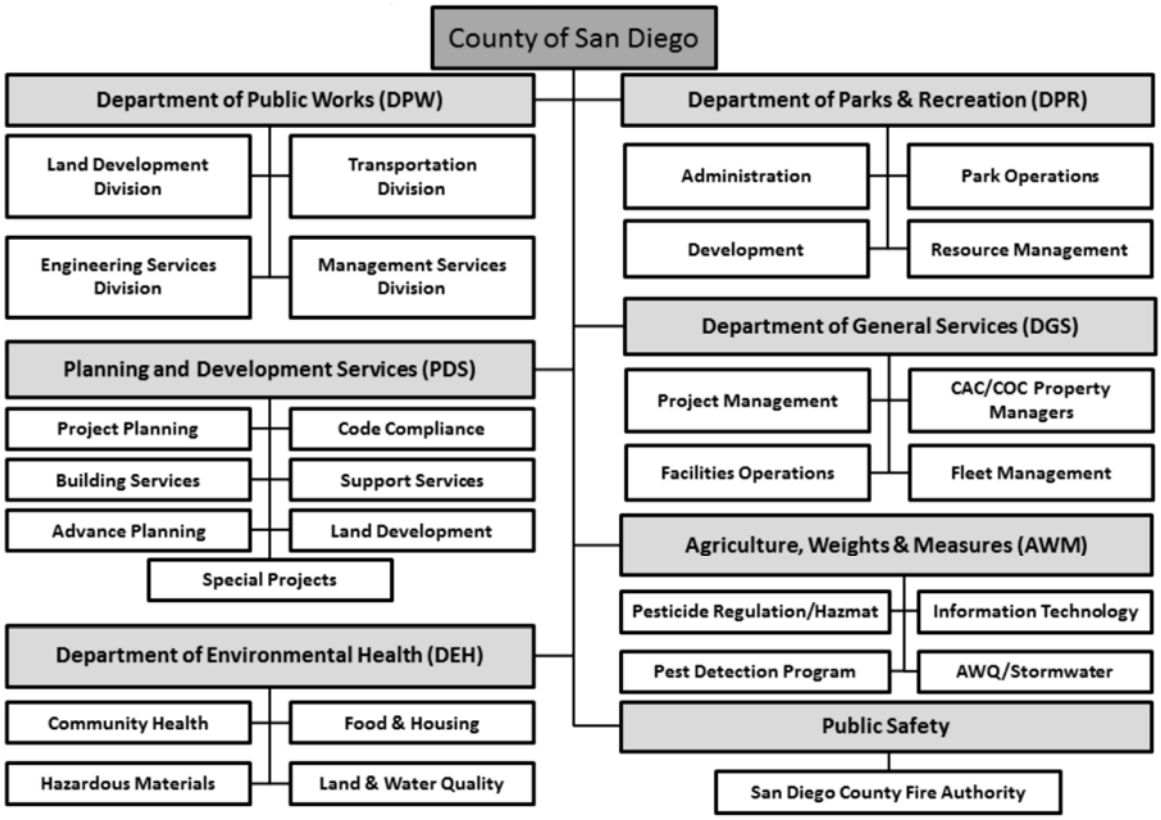


Figure 1. Overview of Departments and Groups Implementing the NRMP

3. General Plan Modification

In August 2011, the County of San Diego adopted its most current *General Plan, A Plan for Growth, Conservation and Sustainability* (County of San Diego, 2011). The General Plan acts as a "constitution" for land use and development within the Rainbow Community Planning Area (CPA) and other unincorporated communities. It establishes planning principles, goals, and policies to guide zoning, subdivision, and infrastructure decisions. The General Plan is guided by principles that seek to focus development and set goals for open space preservation. It also defines strategies related to conservation and improvement of water supply due to shortages from climate change. These strategies include incorporation of sustainable stormwater management policies within the Land Use Element. The Conservation and Open Space Element includes policies relating to the use of drought-efficient landscaping, stormwater filtration, use of impervious surfaces, and the impacts of development on water quality.

In July 2008, a Draft EIR associated with the General Plan Update was circulated for a 60-day public review and comment period. Responses to all comments were prepared and incorporated into the Final EIR, which was certified by the County of San Diego Board of Supervisors. Policies such as the ones described within the Land Use Element and the Conservation and Open Space Element, in combination with the implementation measures, make the General Plan "self-mitigating" from the perspective of water quality and other possible environmental impacts (County of San Diego, 2011).

The Rainbow Community Plan was also amended in 2011 and provides the framework for addressing the critical issues and concerns that are unique to the Rainbow CPA and are not reflected in the broader policies of the General Plan. In addition to community-specific goals and policies, the Rainbow Community Plan identifies resource conservation areas and establishes the Rural Village boundary. As described above, the General Plan and the Rainbow Community Plan are considered protective of water quality in their current format and adequate to achieve the goals of the NRMP.

4. Modify Development Project Approval Process

The County's project approval / permitting process requires compliance with land use regulations to ensure that discharges from proposed developments in the Rainbow Creek Watershed will comply with the nutrient load reductions specified in this TMDL and ensure that nutrient water quality objectives are not exceeded.

The County JRMP was updated in 2015 and followed by an update to the County's WPO and Best Management Practices (BMP) Design Manual (BMPDM) (formerly the SUSMP) in 2016. These documents collectively ensure that proposed development (and redevelopment) is in compliance with water quality objectives, including nutrient load reduction, as required by the Regional Board Order No. R9-2013-0001, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region (2013 MS4 Permit). All three documents are evaluated periodically for effectiveness and updated if necessary.

Programmatic Framework

The JRMP and WPO collectively provide a programmatic framework for the development approval process. The overall goal of the framework is to define a process that will consistently implement

stormwater management activities for new land development and redevelopment projects to minimize impacts to receiving waters and environmental resources, and comply with federal and state laws. (JRMP Section 3.1, WPO Section 67.811)

In order to regulate development, BMPDM Section 1.3 defines a "development project" as construction, rehabilitation, redevelopment, or reconstruction of any public or private projects. Development projects are issued County permits (i.e., grading permit, building permit, on-site wastewater system permit, etc.). The broadness of the definition of a development project will ensure that development associated with the key nutrient sources will be reviewed and approved by County staff. Specific roles and responsibilities of County staff are outlined in Table 3.2 in JRMP Section 3.4.4.1.1.

The County's development review and approval process also includes discretionary permit applications that undergo environmental review prescribed by the California Environmental Quality Act (CEQA) as described in JRMP Section 3.3. Discretionary permit applications must address CEQA thresholds of significance related to water quality. Projects must demonstrate compliance with the WPO. If the project drains to a tributary of an impaired water body listed on the Clean Water Act 303(d) list, it must show that it will not contribute substantial additional pollutants for which the receiving water body is already impaired.

Pollutant Sources

The County has an established method of determining pollutants anticipated to be generated based on project category. Table 3.1 of JRMP Section 3.2.2 identifies the following project categories as either anticipated or potential sources of nutrients:

- Detached residential development
- Attached residential development
- Commercial Development
- Hillside Development
- Parking lots
- Streets, highways, and freeways

The key sources of nutrients in Rainbow Creek are state highways, agricultural fields and orchards, commercial nurseries, residential and urban areas, and septic tank disposal systems, as a result of stormwater runoff, irrigation return flows, and groundwater contributions to the creek. (San Diego Regional Water Quality Control Board, 2005)

Source Control Best Management Practices

The WPO (Section 67.811.a.4) and BMPDM (Section 4.2) require all development projects to implement source control BMPs to avoid and reduce pollutants, including nutrients, in stormwater runoff. Source control BMPs function by reducing the potential for stormwater runoff to come into contact with pollutants. Source control BMPs can be divided up into the following categories:

- Prevent illicit discharges into the MS4;
- Identify the storm drain system using stenciling of signage;
- Protect outdoor material storage areas from rainfall, run-on, runoff, and wind dispersal;

- Protect materials stored in outdoor work areas from rainfall, run-on, runoff, and wind dispersal; and,
- Protect trash storage areas from rainfall, run-on, runoff, and wind dispersal.

Among these various categories are several measures that are particularly effective at reducing nutrients. See Appendix B for the fact sheets from BMPDM Appendix D for source control BMPs such as outdoor storage of equipment or materials exposure reduction, animal facilities BMP guidance, and plant nurseries and garden centers BMP guidance.

Site Design Best Management Practices

The WPO (Section 67.811.a.5) and BMPDM (Section 4.3) also require all development projects to implement site design BMPs (also referred to as Low Impact Development (LID) BMPs) to reduce the rate and volume of stormwater runoff and associated pollutant loads. Site design BMPs minimize soil compaction, reduce impervious area, and disconnect runoff from the storm drain system. Site design BMPs may include the following features:

- Tree wells,
- Impervious area dispersion,
- Green roofs,
- Permeable pavement,
- Rain barrels, or
- Amended soil.

See Appendix B for the fact sheets from BMPDM Appendix D for site design BMPs.

Pollutant Control Best Management Practices

Development projects that exceed the thresholds for Priority Development Project (PDP) designation are required to comply with stormwater pollutant control requirements in addition to the implementation of source control and site design BMPs discussed in the previous sections. PDP thresholds are specified in the WPO (Section 67.811.b.1) and BMPDM (Section 1.4).

PDPs consist of several key nutrient sources including commercial developments and residential developments. The PDP threshold for created and/or replaced impervious area is intentionally lower (2,500 square feet) for projects that discharge within 200 feet of an environmentally sensitive area (ESA). ESAs include all 303(d) impaired water bodies such as Rainbow Creek.

As required by the 2013 MS4 Permit, the County requires PDPs to select pollutant control BMPs based on a hierarchical approach that emphasizes retention and re-use (WPO Section 67.811.b.4&7, BMPDM Section 5.4 & 5.5). Where such BMPs are shown to be infeasible, biofiltration BMPs are permitted followed by flow-through BMPs. Pollutant control BMPs serve to supplement source control and site design BMPs, not replace them.

Table B.6-6 of the BMPDM Appendix B.6.2.3 lists vegetated filter strips, detention basins, and wet ponds as the acceptable flow-through treatment control BMPs for projects that specifically target nutrients as pollutants of concern. The BMPDM also has a modified version of a standard biofiltration BMP that is designed specifically to address nutrients (BF-2 Nutrient Sensitive Media Design). See Appendix B for the fact sheets from BMPDM Appendix D for pollutant control BMPs.

Long Term Operation & Maintenance

In order to serve their intended purpose, BMPs must be properly maintained over their design lifespan. WPO Section 67.812 and BMPDM Chapter 7 outline the required operation & maintenance measures. These documents cover the following:

- Need for permanent inspection and maintenance,
- Step to execute a maintenance agreement,
- Maintenance responsibility,
- Long-term maintenance documentation,
- Inspection and maintenance frequency,
- Measures to control maintenance cost, and
- Maintenance indicators and actions for structural BMPs.

Inspection/Sampling

In addition to the project-specific inspection and maintenance requirements discussed in the previous section, WPO Section 67.813 discusses the County's responsibility to obtain, through easement or otherwise, the ability to legally access private properties to inspect post-construction structural BMPs associated with PDPs. The purpose of the inspection would be to verify the BMP is working properly. Inspections may include sampling to determine of any illegal discharges or illicit connections exist.

Submittal Requirements

In order for projects to demonstrate compliance with County development requirements for stormwater quality, a submittal package is prepared for review by County staff. The required contents of the submittal package are specified in WPO Section 67.811.b.4 and BMPDM Chapter 8. Different Storm Water Quality Management Plan (SWQMP) templates have been created for use depending on the project's PDP status. The SWQMP report template is set up to guide the applicant smoothly through the BMP selection and design process. The submittal package will often include other items such as maintenance plan and agreement, construction plan, geotechnical evaluation, and drainage report.

5. CEQA Reviews

General Plan

The County of San Diego's General Plan (County of San Diego, 2011) is the comprehensive long-range plan that provides the framework for development planning in the unincorporated areas of the County . The General Plan addresses all aspects of the development process, including housing, traffic, public safety, public facilities, land use, natural resources, and open space. In accordance with state law, all land use regulations and decisions made by the County must be consistent with the General Plan. The General Plan was approved through a CEQA review and stakeholder/public review and comment process.

Environmental Review Process per the JRMP

In accordance with the Environmental Review Process defined in Section 3.3 of the County of San Diego JRMP (County of San Diego, 2015b), all County discretionary permit applications undergo environmental review prescribed by the CEQA. Part of this review involves an assessment of the project's potential water quality direct and cumulative impacts, which are documented on a CEQA Initial Study - Environmental Checklist Form. Section IX of this checklist includes review questions specific to hydrology and water quality as shown in the box below (CEQA – Initial Study Environmental Checklist Form).

CEQA – Initial Study Environmental Checklist Form

f) Substantially alter the existing drainage pattern of the site or area, including through the alteration or the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

- ☐ Potentially Significant Impact
- ☐ Less than Significant Impact
- ☐ Less than Significant with Mitigation Incorporated
- ☐ No Impact

Discussion/Explanation:

g) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems?

- ☐ Potentially Significant Impact
- ☐ Less than Significant Impact
- ☐ Less than Significant with Mitigation Incorporated
- ☐ No Impact

Discussion/Explanation:

h) Provide substantial additional sources of polluted runoff?

- ☐ Potentially Significant Impact
- ☐ Less than Significant Impact
- ☐ Less than Significant with Mitigation Incorporated
- ☐ No Impact

Discussion/Explanation:

i) Otherwise substantially degrade water quality?

- ☐ Potentially Significant Impact
- ☐ Less than Significant Impact
- ☐ Less than Significant with Mitigation Incorporated
- ☐ No Impact

Discussion/Explanation:

Additional questions related to flood impact:

j) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

k) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?

l) Expose people or structures to a significant risk of loss, injury or death involving flooding?

m) Expose people or structures to a significant risk of loss, injury or death involving flooding as a result of the failure of a levee or dam?

n) Inundation by seiche, tsunami, or mudflow?

For each question, staff reviews the project proposal and determines if the project will have significant impacts using the County Guidelines for Determining Significance under CEQA. Findings of significance generally lead to additional requirements for environmental review and/or mitigation. The Surface Water Quality Guidelines are used to evaluate whether a discretionary project may have adverse effects on surface water quality. The Surface Water Quality Guidelines provide an overview of local watersheds, summarize existing federal and state regulations, describe typical pollutant effects on water quality, and present guidelines to determine significance under CEQA. As shown in the text box below (Surface Water Quality Guidelines), these guidelines identify significant impacts to water quality to protect the receiving waters from degradation of beneficial uses.

Surface Water Quality Guidelines

The following five guidelines are used to determine significance under CEQA, each of which is described in greater detail in the document:

1. The project is a development project listed in County of San Diego, Code of Regulatory Ordinances (Regulatory Ordinances), Section 67.802(i), as amended, and does not comply with the standards set forth in the Additional Planning, Design and Post- Construction Requirements for Development Projects, Regulatory Ordinances Section 67.810, as amended, or the Additional Requirements for Construction Projects set forth in Regulatory Ordinances, Section 67.809.

2. The project would drain to a tributary of an impaired water body listed on the Clean Water Act Section 303(d) list, and will contribute substantial additional pollutant(s) for which the receiving water body is already impaired.

3. The project would drain to a tributary of a drinking water reservoir and will contribute substantially more pollutant(s) than would normally runoff from the project site under natural conditions.

4. The project will contribute pollution in excess of that allowed by applicable State or local water quality objectives or will cause or contribute to the degradation of beneficial uses.

5. The project does not conform to applicable federal, state, or local "Clean Water" statutes or regulations including, but not limited to, the federal Water Pollution Control Act, California Porter-Cologne Water Quality Control Act, and the County of San Diego Watershed Protection, Stormwater Management, and Discharge Control Ordinance (WPO).

6. The project is located within critical coarse sediment yield areas as mapped in the Watershed Management Area Analysis.

For projects identified as having a significant impact based on the Initial Study Form and the Surface Water Quality Guidelines, the applicant is given the opportunity to redesign the project to reduce any findings of significance to less than significant. For example, if a "Potentially Significant Impact" is selected on the CEQA Initial Study Form for Water Quality, the project proponents are directed to use the BMPDM and other water quality guidelines to increase mitigation through other project design considerations, BMPs, and/or LID techniques. Once the project design has been negotiated and finalized, a formal CEQA document is created and the project will be given either a CEQA Exemption (no impacts), Negative Declaration (less than significant impacts), Mitigated Negative Declaration (less than significant impacts with mitigation incorporated), or Environmental Impact Report (potentially significant impacts).

The CEQA checklist process using these guidelines identifies the projects that may contribute nutrient loading to Rainbow Creek that would result in degradation of the beneficial uses and/or exceedance of water quality objectives. The County requires projects to submit this documentation as part of the permit application process. Projects in the Rainbow Creek Watershed identified as significant will be required to implement specific mitigation that includes stormwater and no-storm flow pollutant control

and management measures to reduce nutrient loading to less than significant to avoid impacts to water quality in Rainbow Creek.

Watershed Protection Ordinance and BMP Design Manual

Projects in the CEQA process are subject to the WPO and BMPDM. Nutrient loading from new and re-development projects in the Rainbow Creek Watershed will be controlled and managed to address potential impacts to water quality through the environmental review process and the requirements of the WPO and design standards of the BMP Design Manual. Refer to Section 4, above, for details on the development project approval process per the WPO and BMPDM.

6. Pollution Prevention

This section describes the steps the County will take to implement pollution prevention methods for nutrients at County-owned sites and to require the use of nutrient pollution prevention methods by owners or operators of nutrient sources not owned by the County.

The 2013 MS4 Permit establishes requirements for all existing development, including industrial, commercial, municipal and residential facilities relating to inventory tracking, BMPs (including pollution prevention methods), implementation and maintenance, and inspections. Under 2013 MS4 Permit Section E.1.a., Legal Authority Establishment and Enforcement, the County "must establish, maintain, and enforce adequate legal authority within its jurisdiction to control pollutant discharges into and from its MS4 through statute, ordinance, permit, contract, order, or similar means." The County's WPO provides authority for the County to regulate the protection of water quality by controlling polluted runoff discharges from entering receiving waters. The WPO establishes minimum required BMPs for existing development based on pollutant-generating activities (PGAs). The specific application of BMPs is determined on a site-by-site basis to address the specific PGAs applicable to each facility. County facilities and other existing development must meet the requirements laid out in the WPO.

Pollution Prevention Implementation at County-owned Sites

The County owns and operates a wide assortment of facilities which have the potential to discharge nutrients to receiving waters. Facilities range from general office buildings to large-scale operations such as airports, wastewater treatment plants, and closed landfills. The County also participates in a variety of activities that have the potential to discharge pollutants but are not associated with a fixed location, such as non-emergency firefighting and special events. Key pollution prevention measures implemented at County facilities for nutrients include proper storage and disposal of wastes, such as green waste; use of dry cleaning methods, such as sweeping or vacuuming in outdoor areas to prevent illicit discharges; maintenance of vehicles and fuel tanks to prevent fluid leaks; and, proper handling and application of fertilizers at landscaped areas.

County facilities and activities must meet the minimum BMP requirements laid out in the WPO. The County is required to designate, implement, and maintain various types of BMPs for all of its existing development. The WPO designates minimum BMP requirements for specific PGAs, listed in Appendix C, Attachment 3**.** Appendix C, Attachment 1 shows the pollutants attributed to PGAs associated with municipal facilities, including which PGAs have the potential to discharge nutrients. The required BMPs are being implemented, operated, and maintained by the County on all municipal facilities. BMP

maintenance follows a schedule which ensures the ongoing operation of these facilities and structures and follows intervals specific to each BMP category needed to minimize discharge of pollutants.

All County-owned facilities classified as high Threat to Water Quality (TTWQ) sites have developed and maintain either a Stormwater Pollution Prevention Plan (SWPPP) or a Facility Pollution Prevention Plan (F3P) to document the selection and locations of designated BMPs appropriate for each site's PGAs. These documents provide site operators guidance for BMP implementation.

Pollution Prevention Implementation for Non-County-Owned Sources

Other existing, non-County-owned development sites that are sources of nutrients must comply with requirements in the WPO. The County ensures that pollution prevention measures are implemented at non-County-owned sources of nutrients by implementing the industrial, commercial, and residential programs outlined in the 2013 MS4 Permit. The requirements including keeping an inventory of existing development sites, conducting routine inspections, and pursuing enforcement actions, as necessary. Inspections and enforcement actions are discussed in greater detail in the following sections. The UCCE Rainbow Creek NRMP (Appendix C, Attachment 5) prescribes pollution prevention methods for agricultural and residential nutrient sources identified in the TMDL in greater detail.

Agricultural Sources (Commercial Nurseries, Agricultural Fields and Orchards)

Commercial nurseries are regulated as commercial facilities under the 2013 MS4 Permit. The County Department of Agriculture, Weights, and Measures (AWM) conducts inspections of commercial nurseries to ensure compliance with the 2013 MS4 Permit and WPO. More details about commercial inspections can be found in the following section. According to the specific PGAs present at the facilities, nurseries must implement minimum BMPs required by the WPO, which include pollution prevention measures addressing nutrients as applicable to the facility, presented in Appendix C, Attachment 3.

AWM inspects irrigated lands and works with farmers in response to observations or complaints of problematic discharges. AWM refers farmers to resources from UCCE[1] or directs farmers to the Escondido field office of the Natural Resources Conservation Service (NRCS) for advice on managing agricultural water quality, including pollution prevention measures pertaining to fertilizer handling and application, reduction of irrigation runoff, and erosion management.

The UCCE Rainbow Creek NRMP (Appendix C, Attachment 5) outlines the following pollution prevention measures for agricultural operations:

- Irrigation management
    - Design irrigation systems for improved efficiency to reduce runoff
    - Regularly maintain irrigation systems to prevent leaks
    - Avoid applying water to non-cropped areas
    - Irrigate at agronomic rates and consider weather conditions

[1] http://ucanr.edu/sites/agwaterquality/Grower_Resources/

- Nutrient management
    - Evaluate irrigation water quality and soils to optimize fertilization
    - Apply fertilizer in an efficient manner that optimizes nutrient availability
    - Avoid fertilizer spills
- Erosion and runoff management
    - Use practices (mulching, soil amendments, cover crops) that improve soil water-holding capacity and reduce erosion
    - Prevent runoff and sediment from leaving property
    - Manage erosion of sloped areas through terracing, vegetation, etc.
    - Design and manage roads to prevent erosion

Residential Areas

The County conducts inspections of residential areas to ensure compliance with the 2013 MS4 Permit and WPO. BMP requirements and recommendations for residential areas are included in Appendix C, Attachment 4. More details about residential inspections and enforcement can be found in the following sections. The inspections for residential areas focus on education and outreach, with targeted education materials distributed at residences in response to observations.

The UCCE Rainbow Creek NRMP (Appendix C, Attachment 5) outlines the following pollution prevention measures for residential areas:

- Garden management
    - Build and maintain healthy soil and avoid over-fertilizing
    - Choose appropriate plants that require less water and are pest-resistant
    - Water efficiently to conserve water and reduce runoff
- Lawn management
    - Water and fertilize lawns carefully and efficiently to avoid runoff
- Pet management
    - Collect and dispose of household pet waste properly

Urban Areas

The County ensures that pollution prevention measures are implemented in urban areas by implementing the industrial, commercial, and residential programs required by the 2013 MS4 Permit. These facilities are required to implement minimum BMPs mandated by the WPO (Appendix C, Attachment 3) based on the PGAs applicable to the facility (Appendix C, Attachment 2). Additional details on stormwater inspections and enforcement measures can be found in the following sections.

Septic Tank Disposal Systems

Water Code Section 13282 allows the Regional Board to authorize a local public agency to issue permits and regulate Onsite Wastewater Treatment Systems (OWTS). The Regional Board has authorized the County DEH to issue certain permits for conventional OWTS systems throughout the County; however,

the authority to issue permits for unconventional OWTS systems with subsurface discharge remains with the Regional Board.

The County permitting process for septic systems ensures that the systems do not cause public exposure to surfacing sewage or contamination of groundwater or surface water. Permit requirements include design criteria and separation requirements from groundwater to ensure that the OWTS does not impact water quality. The County reviews grading and building plans and conducts site inspections after the system has been installed to ensure compliance with these requirements. Additional details about the County permitting process and design criteria for septic systems can be found in Appendix C, Attachment 6.

7. Source Identification (Nutrients)

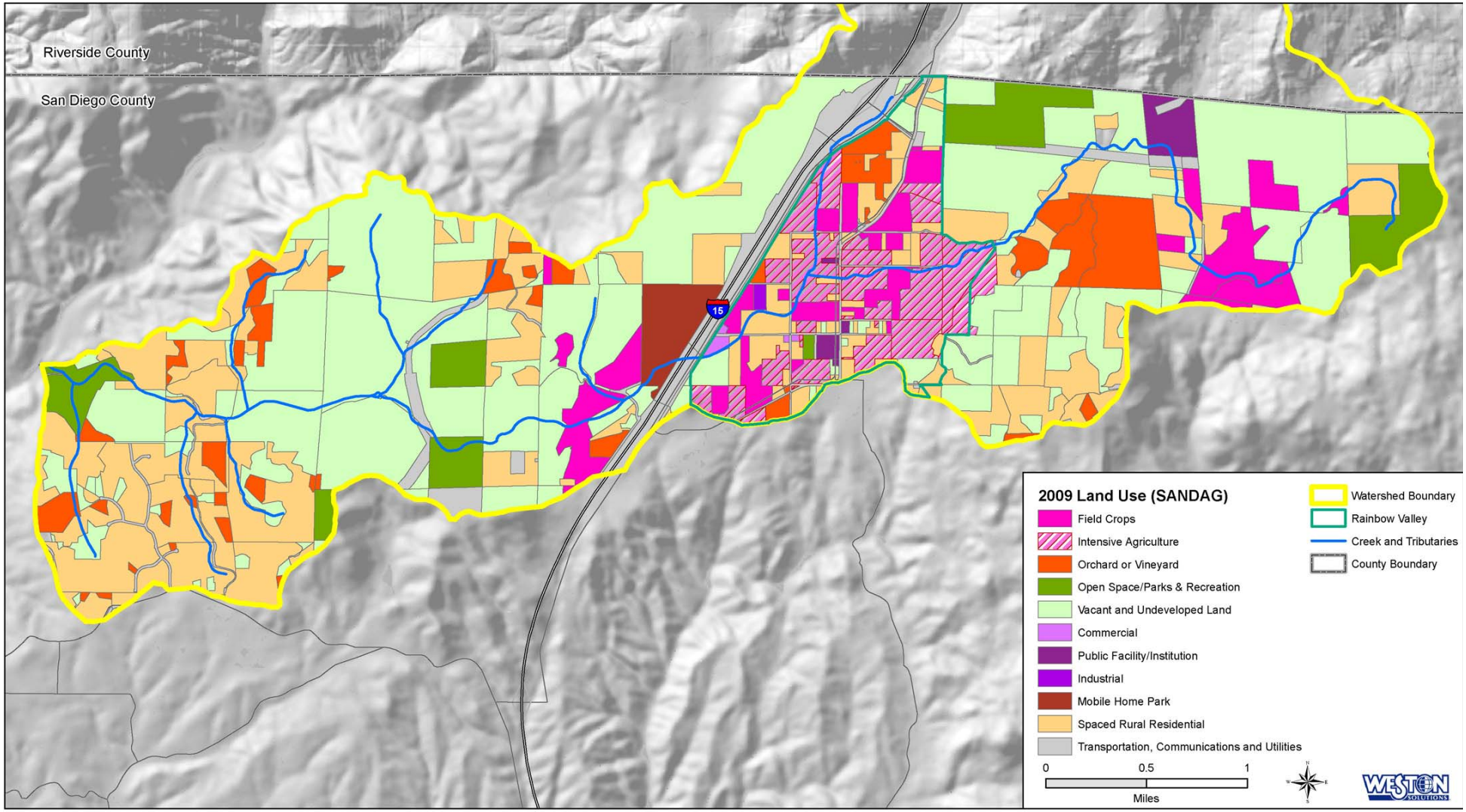
The County completed the *Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed* (Weston Solutions, 2010) that provides a Geographic Information System (GIS)-based TTWQ inventory of nutrients for all parcels within the Rainbow Creek Watershed. The nutrient sources that were inventoried within the Rainbow Creek Watershed included commercial nurseries, agricultural fields and orchards, residential and urban areas, parks, state highways (Caltrans), and septic tank disposal. These sources of nutrients contribute to nutrient levels in Rainbow Creek and its tributaries as a result of stormwater runoff, irrigation return flows, and groundwater contributions to the Creek. (San Diego Regional Water Quality Control Board, 2005) These land uses were identified in the Nutrient TMDL for nutrient loading reductions. In this study, land use-based nutrient sources were quantified to a sub-parcel basis first by land use data and then by refining through the use of updated land use/cover mapping from recent aerial imagery. Nutrient loads for total nitrogen and total phosphorus were estimated using nutrient-specific land use coefficients similar to those reported in the TMDL. This source information was integrated with septic system locations by parcel. The approximate locations of 578 septic systems were mapped, including 172 units within Rainbow Valley.

Sources of nutrients were compiled initially based on parcel map and land use data provided by the San Diego Association of Governments (SANDAG). The compilation of these data sets is shown on Figure 2. These data are periodically updated and can be used as the starting point for future updates of the GIS source database. In order to provide greater resolution of the land use data and to revise potentially outdated land use information, land use/cover was also used to develop the nutrient source inventory. For example, field/row crop areas could not be clearly distinguished from nursery operations using aerial interpretation. The resulting map that incorporates land cover with land use is presented on Figure 3. Mapping was completed at the sub-parcel level to more accurately represent the acreage containing crops as well as other land use/covers affecting potential nutrient export from these parcels.

The land cover information was interpreted from several imagery sources, including:

- Multispectral data acquired by Ocean Imaging in August 2009 (aircraft-based digital data collection in the red, green, blue, and near-infrared (NIR) data bands at 60-centimeters ground resolution) for two focus areas,
- Quickbird imagery of the entire study area from August 2008 (satellite-based platform data collection in red, green, blue, and near-infrared bands at 4-meter spatial resolution that is pan sharpened to 1-meter ground resolution), and
- Google Earth imagery (color, sub-meter resolution).

These data sources, along with the data used for the source inventory, are presented in Table 1. These data sets are periodically updated and can be used to refine and update the current GIS data set. Additional information and detail on the use of these data sets to compile the inventory of nutrient sources is presented in the *Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed* (Weston Solutions, 2010).



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Source: Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed Final Report, Weston Solutions, May 2010

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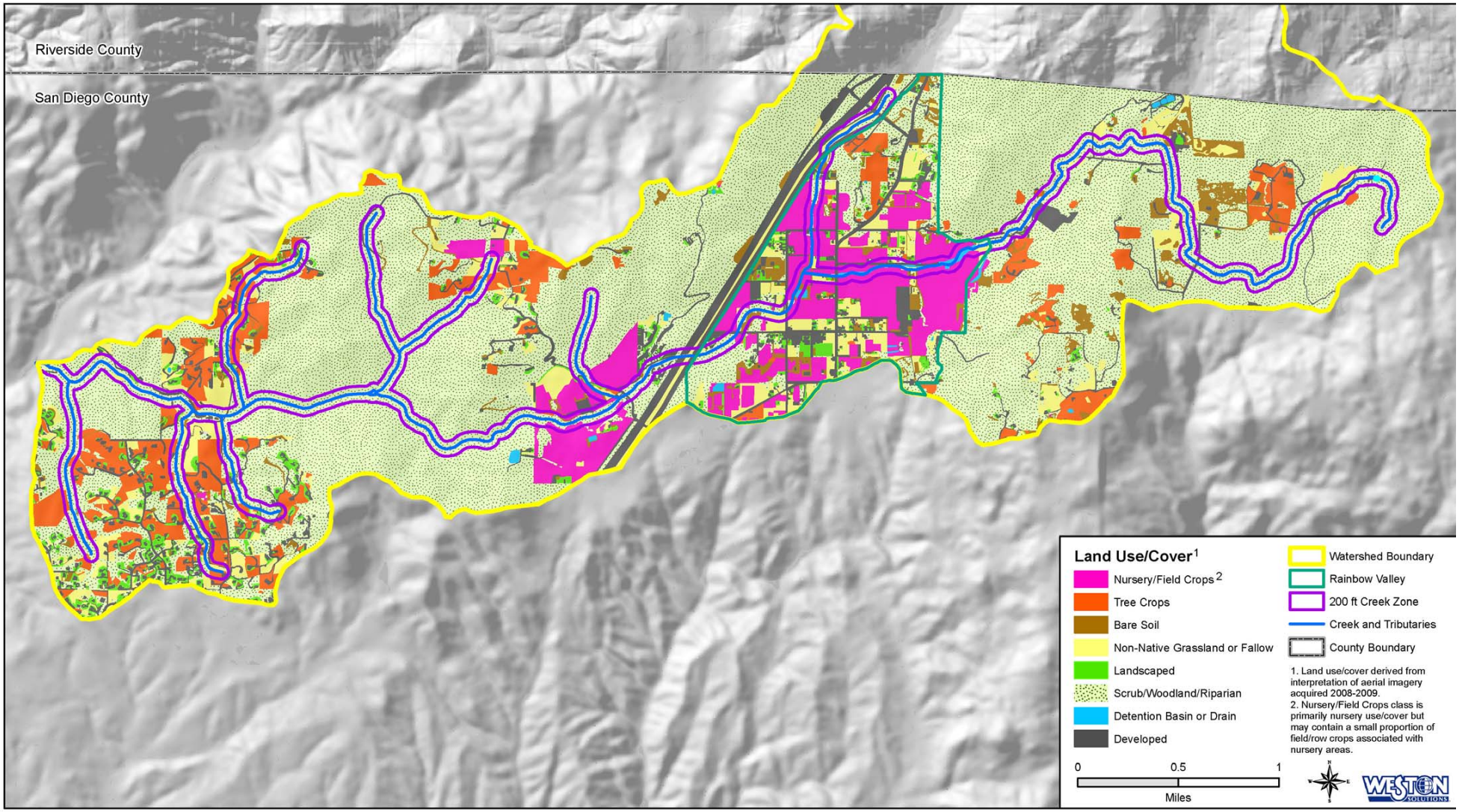
LAND USE MAP BASED ON 2009 SANDAG DATA

Figure 2



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Source: Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed Final Report, Weston Solutions, May 2010

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LAND USE COVER MAP DERIVED FROM IMAGERY INTERPRETATION

Figure 3

Table 1. Compiled and Evaluated Nutrient Source Inventory Data Sets

Data Set	Source	Application	Factor
Rainbow Creek and Tributaries	SanGIS "Rivers" and USGS NHD Flowlines	Define Potential Impact Zones	Transport – SW/R and GW
Parcels	SanGIS "Parcels"	Parcel Boundaries and Attributes	Source (Septic - GW)
Land Use	SANDAG "Land Layers"	Land Use Definitions and Statistics	Nutrient Source
Multispectral Imagery	Quickbird, Aug. 2008 Ocean Imaging, Aug. 2009	Land Cover Mapping, NDVI, Septic Locations	Nutrient Source
High-Resolution Color Imagery	Google Earth Bing Maps	Land Cover, Septic Locations	Nutrient Source
Agricultural Commodity	SANDAG, 2008	Supplementary Data Used in Land Cover Mapping	Nutrient Source
Thermal-Infrared Data	Ocean Imaging, Aug. 2009	Soil Moisture/Irrigation Evidence	Transport – SW/R
2004-2009 Surface Water Quality Data	County of San Diego, Analytical Data and Drainage Area Definitions for 14 Monitoring Stations	Generate Drainage Area Ratings, Correlation Analyses	Relate Water Quality Data to Source and Transport Factors
Slope	Derived from USGS Digital Elevation Model (Resolution: 10m horiz, 1-ft vert.)	Erosion/Soil Loss Calculations	Transport – SW/R
Soil Type	USDA NRCS Soil Survey Geographic Database	Geology – Investigation of GW Pathway	Transport – SW/R and GW
K-factor	USDA NRCS Soil Survey Geographic Database, Soil Data Viewer 5.1	Erosion/Soil Loss Calculations	Transport – SW/R
Rainbow Valley Ground Water Monitoring Network Wells	Rainbow Valley Ground Water Monitoring Network	Investigation of GW Pathway	Not Included
Private Well Bore Logs	County of San Diego State of California	Investigation of GW Pathway	Not Included
Active Case# H12532-002,Global ID# T0607302688	GeoTracker	Investigation of GW Pathway	Not Included
Commercial Nursery Inspection Data	County of San Diego, AWM field data sheets	Inspection Scores: Nutrient Source Control, Irrigation Control, and Erosion Control	Source and Transport
High Volume Water Users	Rainbow Municipal Water District, Fallbrook Public Utility Department	Define Potential High Irrigation Inputs	Transport – SW/R and GW

NDVI: Normalized Difference Vegetation Index
USGS: United States Geological Survey
USDA: United States Department of Agriculture
SanGIS: San Diego Geographic Information Source
SW/R: Stormwater Runoff
GW: Groundwater

The source database also included septic systems. Septic systems were considered a source factor for total nitrogen, impacting water quality via the groundwater pathway to Rainbow Creek and its tributaries. To define the approximate locations of these potential sources, septic system footprints were mapped by generating a 50-foot proximity zone around all houses and other buildings expected to have septic systems based on parcel information and land use data. These polygons were used to represent the locations of all septic systems within the Rainbow Creek Watershed. The polygons of houses and buildings upon which these locations were based had been delineated in the land cover mapping. No data were available on the age or functioning status of the septic systems. The proximity of the septic system to Rainbow Creek and Rainbow Valley or Non-Valley setting was considered to be a key factor in determining its potential to impact surface water.

As listed in Table 1, other data sets used to further define sources and pathways of potential nutrient impact to Rainbow Creek water quality include sediment transport potential based on soil type and erodibility, high volume water use (HVWU), commercial nurseries inspection data and proximity to the creek. These data sets were used to develop factors for assessing the TTWQ. These factors are summarized under Section 8, below, and discussed in more detail in the *Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed* (Weston Solutions, 2010). These data sets may be updated as needed depending on the availability of new data, known or likely significant changes in the data, and available resources.

8. Threat to Water Quality Prioritization (Nutrients)

As summarized in *Section 7, Source Identification (Nutrients),* the nutrient sources and pathways for the Rainbow Creek Watershed were inventoried and mapped as part of the *Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed* (Weston Solutions, 2010). The GIS-based nutrient source inventory was used to develop a TTWQ inventory of nutrients for all parcels within the Rainbow Creek Watershed. The nutrient sources inventoried within the Rainbow Creek Watershed included commercial nurseries, agricultural fields and orchards, residential and urban areas, parks, state highways (Caltrans), and septic tank disposal. These sources of nutrients contribute to nutrient levels in Rainbow Creek and its tributaries through the identified pathways of surface water (stormwater runoff and irrigation return flows) and groundwater contributions to Rainbow Creek. The land-use based sources and transport mechanisms (surface water and groundwater) as defined in the report were used to develop a set of TTWQ factors used to prioritized parcels.

The TTWQ factors were developed using existing data sets to rank the sources at a sub-parcel level (Weston Solutions, 2010). Important to the factors are the two nutrient pathways or transport mechanisms. Figure 4 presents the potential sources of nutrient and the transport mechanisms of surface water/runoff (SW/R) and groundwater (GW). During dry weather periods, nutrients from these sources may be transported to Rainbow Creek and its tributaries from over-irrigation that results in overland surface flows. Where these sources and transport mechanisms are closest to Rainbow Creek, there is a higher potential for impact to Rainbow Creek. Therefore, parcels with sources that are subject to irrigation and are closer to Rainbow Creek will have higher TTWQ factors and rank higher in prioritization. During storm events, nutrients can be transported from sources predominantly by sediments carried by stormwater runoff to Rainbow Creek. Nutrients, particularly total phosphorus, are often adsorbed to fine-grained soil particles that can be transported via stormwater and irrigation runoff. Therefore, combined factors, such as the erosion potential of soils, slope, and soil management,

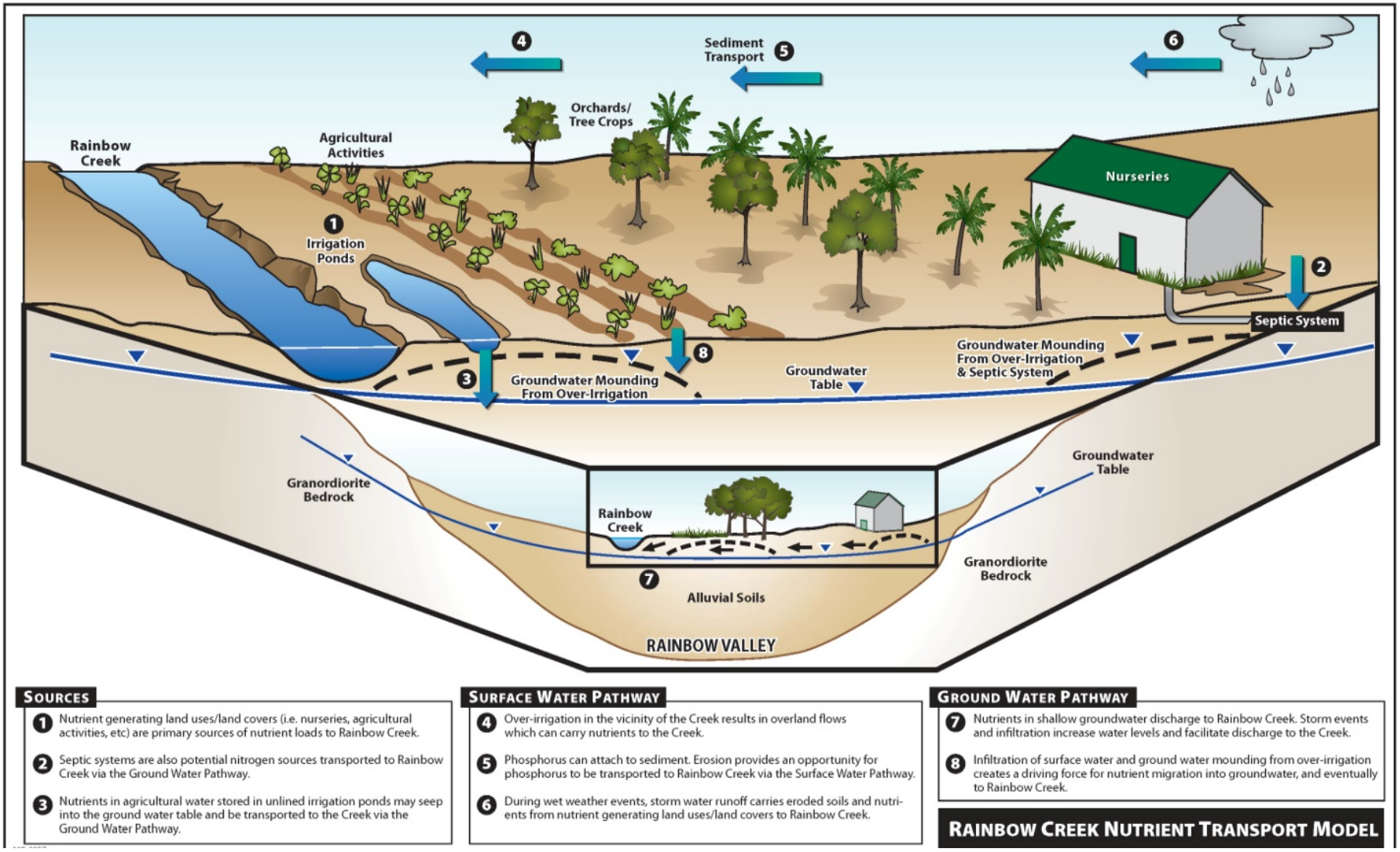
need to be considered in the prioritization process as nutrient transport via sediments is linked to nutrient loading potential as highlighted in the nutrient transport illustration.

The parcel-based nutrient source inventory described in *Section 7, Source Identification (Nutrients),* used available land use and ground/vegetation cover mapping data to define the land use to a sub-parcel level. The land use was then assigned a nutrient land use coefficient consistent with the TMDL (San Diego Regional Water Quality Control Board, 2005). Nutrient loading was then determined for each parcel using these nutrient coefficients and the assigned land uses as summarized in Table 2 (Weston Solutions, 2010). For each parcel, the area in hectares of each managed land use/cover class was multiplied by the associated land use/cover class nutrient coefficient (kg/ha/yr.) for total nitrogen and total phosphorus, separately. A total nutrient load in kilograms per year per parcel was calculated. The parcels were then given a preliminary rank of high, medium, or low for nutrient source loading for nitrogen and phosphorus.

Table 2. Nutrient-Specific Coefficients Applied to Land Use/Cover Classes

Land Use/Cover	Total Nitrogen Coefficient	Total Phosphorus Coefficient
Bare Soil [1]	3.1	0.2
Developed Impervious (Dev) [2]	3.8	0.8
Landscaped	2.6	0.5
Nursery/Field Crops [3]	3.7	0.2
Tree Crops [4]	2.5	0.2
Other Cover Classes [5]	Not applicable [5]	Not applicable [5]

1. Nutrient export coefficient based on average of agricultural classes.
2. Includes roads, pavement, homes, and other building structures (impervious surfaces), except for greenhouses.
3. Includes greenhouses. Class is primarily nursery with limited field/row crop.
4. Tree Crops equates to the orchards and vineyards classification used in the TMDL. Tree Crops is primarily comprised of avocado trees (and some citrus).
5. Consists of unmanaged woody vegetation (woodland, riparian, scrub), non-native grassland or fallow, and detention basins/channels. These types of land cover were not included in the nutrient source weighting calculations. The natural vegetation cover classes could potentially be used to estimate "background" nutrient source, a separate source identified in the TMDL technical report, if nutrient exports coefficients were determined.



Source: Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed Final Report, Weston Solutions, May 2010

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NUTRIENT TRANSPORT IN RAINBOW CREEK WATERSHED

Figure 4

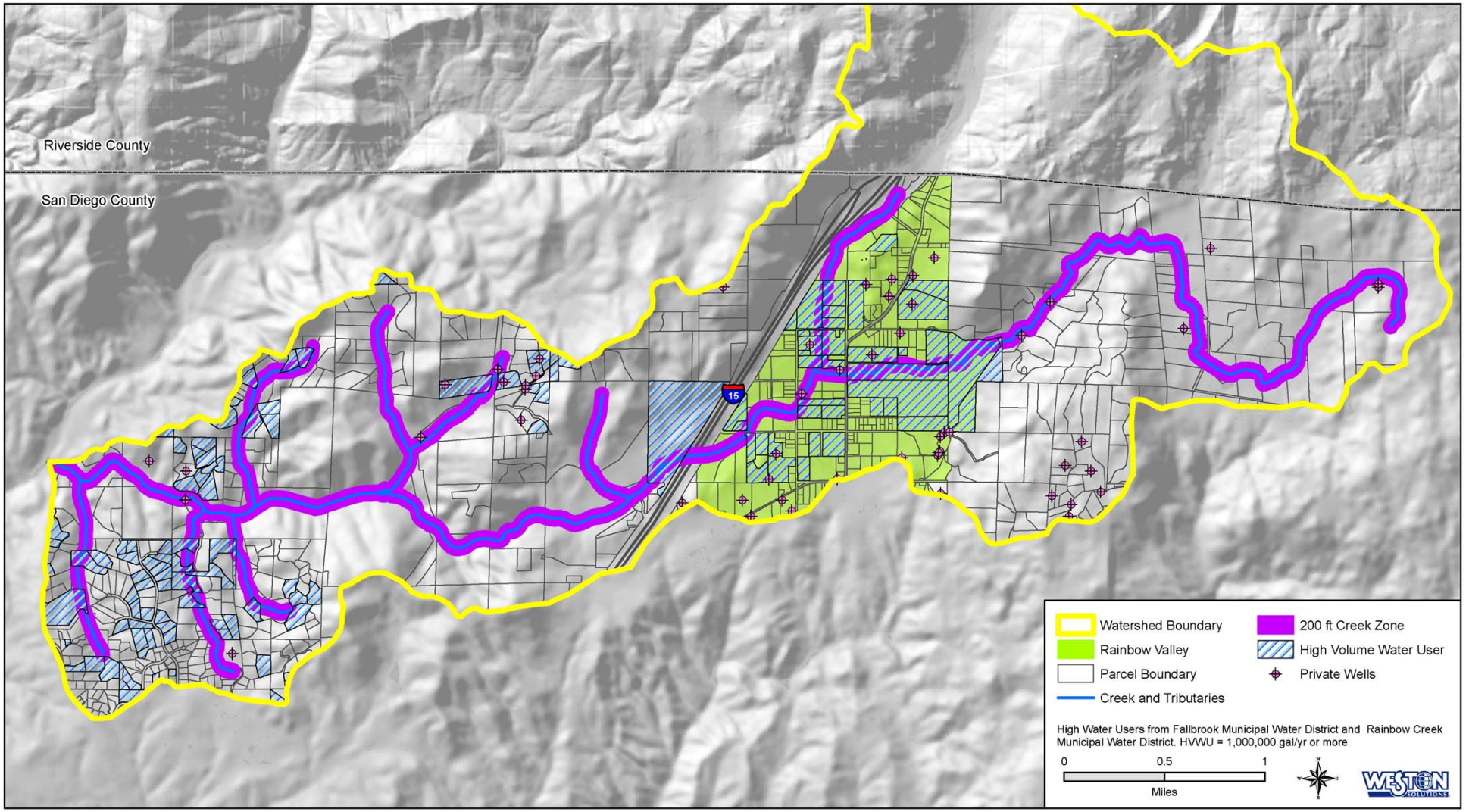
In addition to nutrient loading based on land use, factors for assessing TTWQ also included sediment transport potential based on soil type and erodibility, HVWU, commercial nurseries inspection data, and proximity to Rainbow Creek. Potential soil loss variable was used as a factor influencing phosphorus transport via total suspended sediment (TSS) associated with the surface water/runoff pathway of the conceptual model. The characteristics considered for contributing to potential for soil loss via stormwater and irrigation runoff included acreage, land covers, steepness of slopes, and soil conditions. While this factor provides a useful relative measure of potential erosion and transport, BMPs may be in place on properties to prevent erosion and sediment transport which would lower the actual TTWQ.

HVWU was considered a key transport factor in the surface water/runoff and groundwater pathways for nutrient loading to Rainbow Creek. Parcels that heavily irrigate are likely to contribute irrigation runoff and/or contribute to higher groundwater levels through infiltration. As shown in Figure 4, this condition can increase groundwater discharge to Rainbow Creek and increase nutrient loading from sources with higher water use from irrigation practices. The parcels identified as HVWU are shown on Figure 5. Parcels were stratified into HVWU and non-HVWU levels for TTWQ prioritization on this factor.

Inspection data from the County's AWM on greenhouses and nurseries was also used to develop TTWQ factors. These sources are commercial facilities and subject to inspections under the 2013 MS4 Permit. The inspection data was used to score each of the facilities with regard to compliance with three key management measures that include nutrient source control, irrigation control, and erosion/runoff control. Ratings were based on a presence or absence basis for these management measures. Inspection data was linked to the parcel data in order to assign ranking to each parcel.

Factors used to assess the TTWQ of septic systems included proximity to the creek and location within Rainbow Valley. A higher TTWQ was assigned when the septic system was within 200 feet of Rainbow Creek and its tributaries. The zone of influence for septic systems was extended to 600 feet and considered in the TTWQ assessment. Due to the higher groundwater elevation in Rainbow Valley, septic systems within Rainbow Valley were rated higher. The highest rating was for those septic systems within Rainbow Valley and within 200 feet of Rainbow Creek.

The factors outlined above that considered both source characteristics and transport mechanism for nutrients were integrated in order to assign a relative TTWQ rating for each parcel. Two individual methods were employed. The first approach employed a combination of the individual factors by level or strata. For example, the highest TTWQ rating for nitrogen is assigned to the parcels in the highest nutrient source groups (based on the land use/cover assessment) that are within 200 feet of Rainbow Creek, are designated HVWU, and have a septic system within 200 feet of Rainbow Creek (or 600 feet if within Rainbow Valley). A similar approach is used for phosphorus, absent the septic system sources, and includes those rated high for potential soil loss. The second approach was similar in terms of priorities, but applied a scoring system to each individual parcel and, therefore, provided a numeric rating of the parcel on a scale of 0 to 30, allowing all parcels to be quantitatively compared. The results of this TTWQ rating are provided in Appendix C of *the Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed* (Weston Solutions, 2010).



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Source: Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed Final Report, Weston Solutions, May 2010

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HIGH VOLUME WATER USERS OF IMPORTED WATER AND PRIVATE WELL LOCATIONS

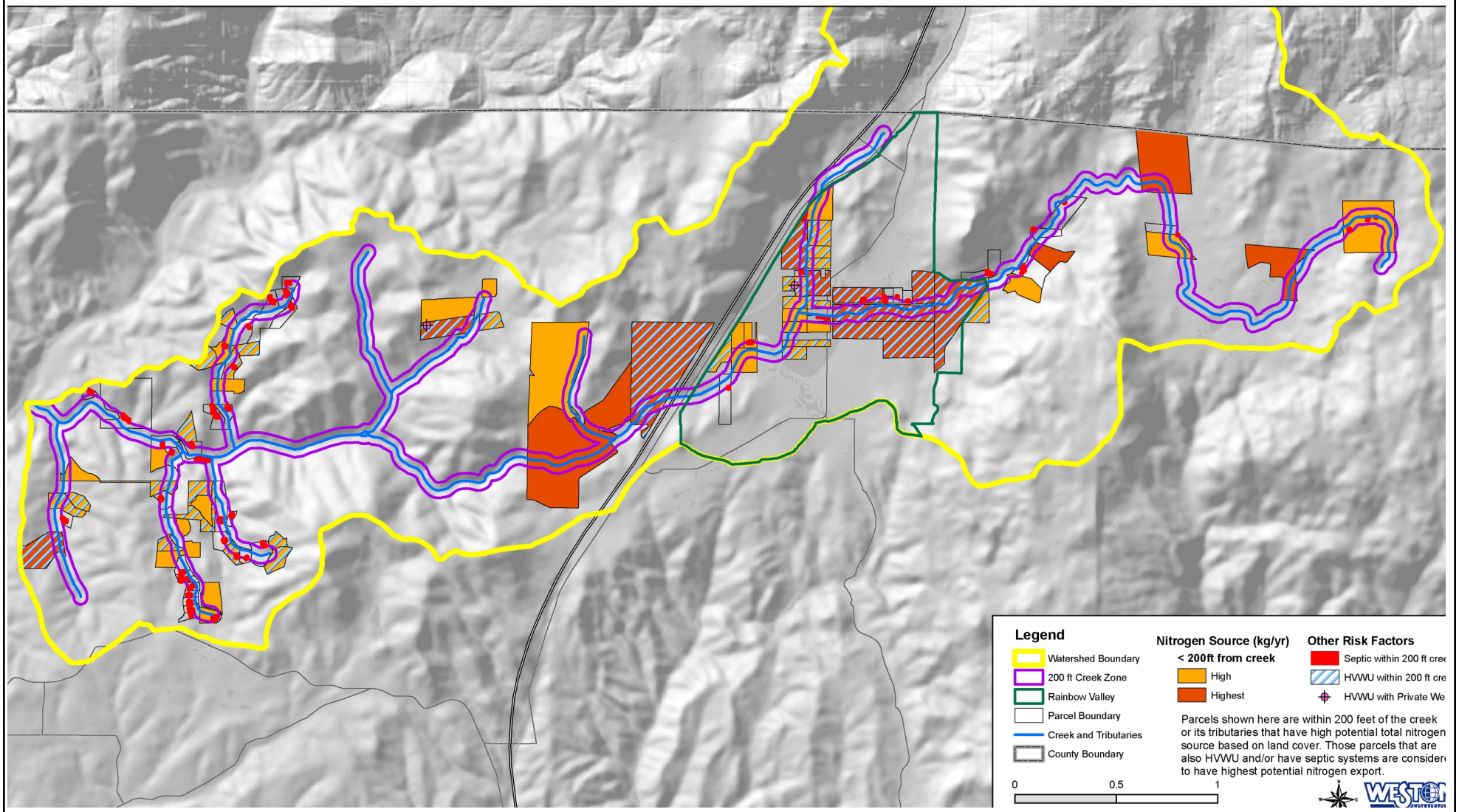
Figure 5

Table 3 presents the results of the categorization of the parcels based on these factors that include potential nutrient source, proximity to Rainbow Creek, and HVWU. A total of 912 parcels were evaluated and categorized. The factors of creek proximity and water use are applied to the parcels that have been identified as low, medium, high, or highest based on the nutrient and phosphorus loading determined using the land-use based loading coefficients and parcel size. The high and highest rated parcels are less than 16 and 11 percent of the total parcels for total nitrogen and total phosphorus, respectively. The integrated results that combined these factors are shown on Figure 6 and Figure 7 for the high and highest rated parcels for total nitrogen and total phosphorus, respectively. Figure 6 and Figure 7 provide a prioritization of parcels using the TTWQ methods outlined. Figure 8 presents the integrated assessment of the parcels using the TTWQ factors for both total nitrogen and phosphorus.

Table 3. Categorization of Parcels Based on Potential Nutrient Source, Proximity to Creek, and HVWU

Constituent	Nutrient Source Rating	Within 200 feet of Rainbow Creek		HVWU Parcel		Total Parcels
		No	Yes	No	Yes[3]	
Total Nitrogen[1]	Low	502	127	613	16 (1)	629
	Medium	98	41	91	48 (11)	139
	High	65	48	63	50 (25)	113
	Highest	17	14	17	14 (10)	31
Total Phosphorus[1]	Low	492	124	597	19 (3)	616
	Medium	133	62	129	66 (19)	195
	High	51	32	52	31 (17)	83
	Highest	6	12	6	12 (8)	18
Total Sediment[2]	Low	509	123	554	78 (27)	632
	Medium	82	39	98	23 (6)	121
	High	47	30	65	12 (3)	77
	Highest	44	38	67	15 (11)	82
	Total Parcels	**682**	**230**	**784**	**128 (47)**	**912**

1. Estimate based on land use/cover nutrient source contribution and does not include unmanaged land use/covers.
2. Estimate based on Soil Loss Equation.
3. Values in parentheses are the number of HVWU also within 200 feet of creek.



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Source: Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed Final Report, Weston Solutions, May 2010

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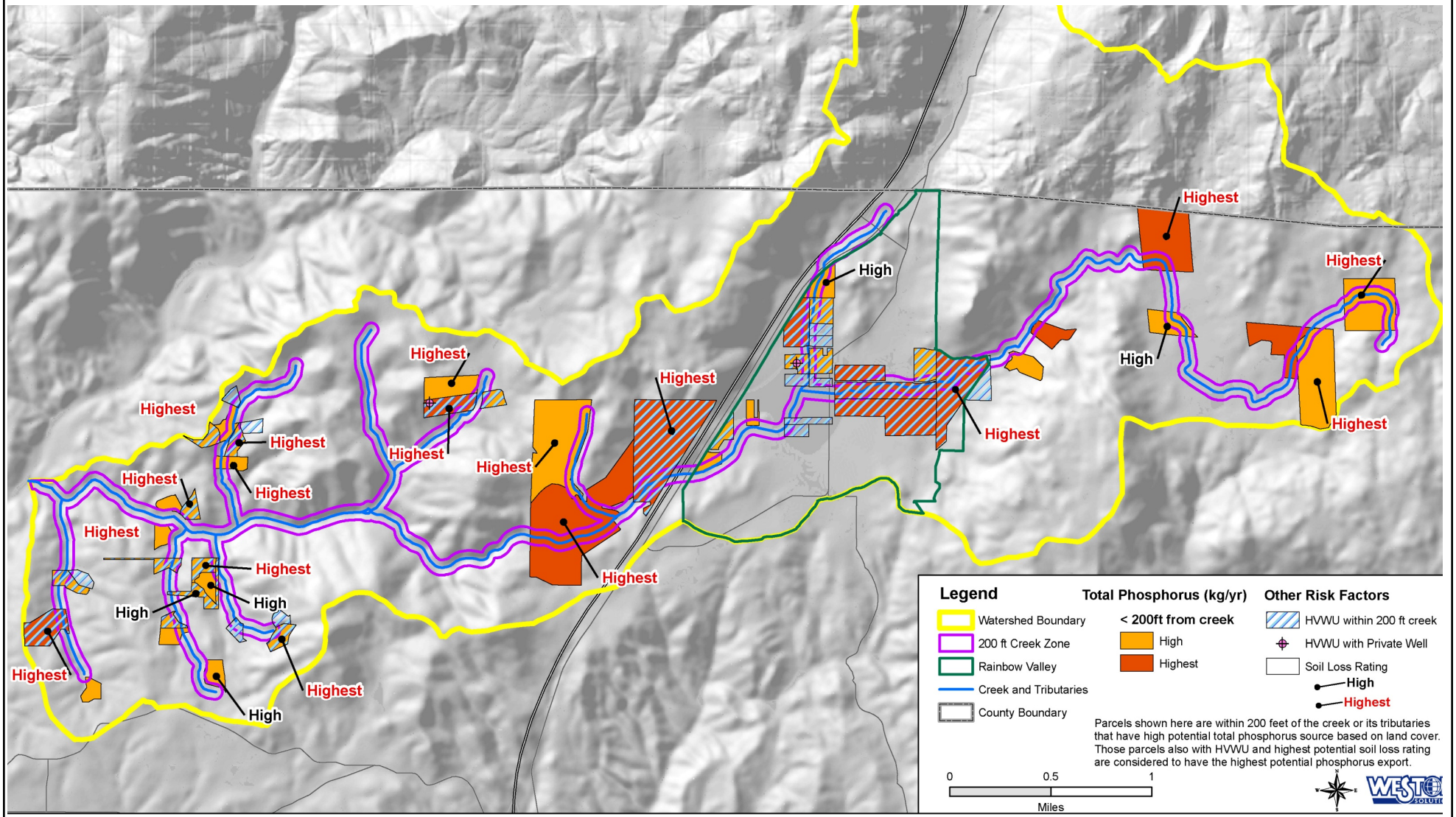
INTEGRATED RESULTS FOR TOTAL `NITROGEN

Figure 6



Source: Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed Final Report, Weston Solutions, May 2010

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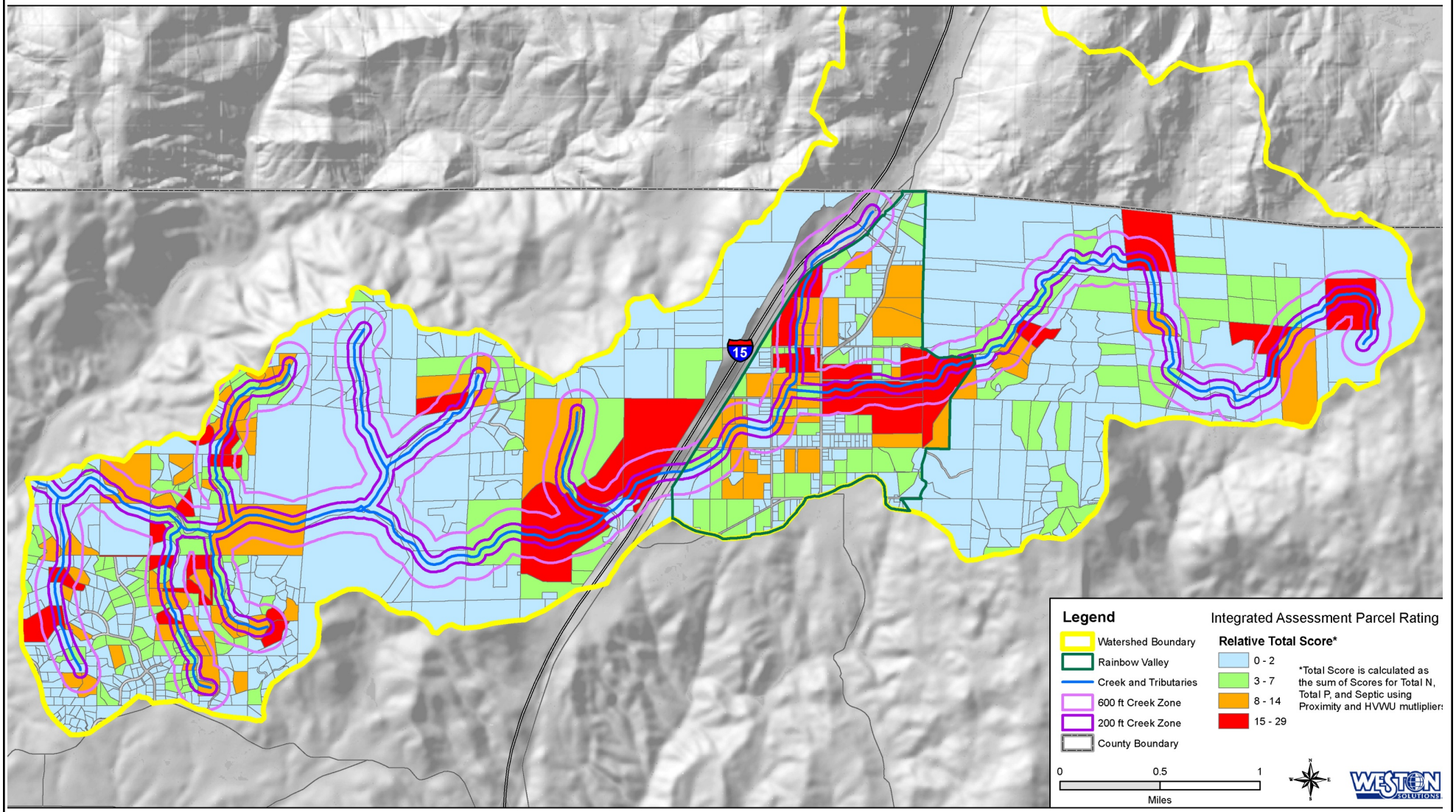
INTEGRATED RESULTS FOR TOTAL PHOSPHORUS

Figure 7



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Source: Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed Final Report, Weston Solutions, May 2010

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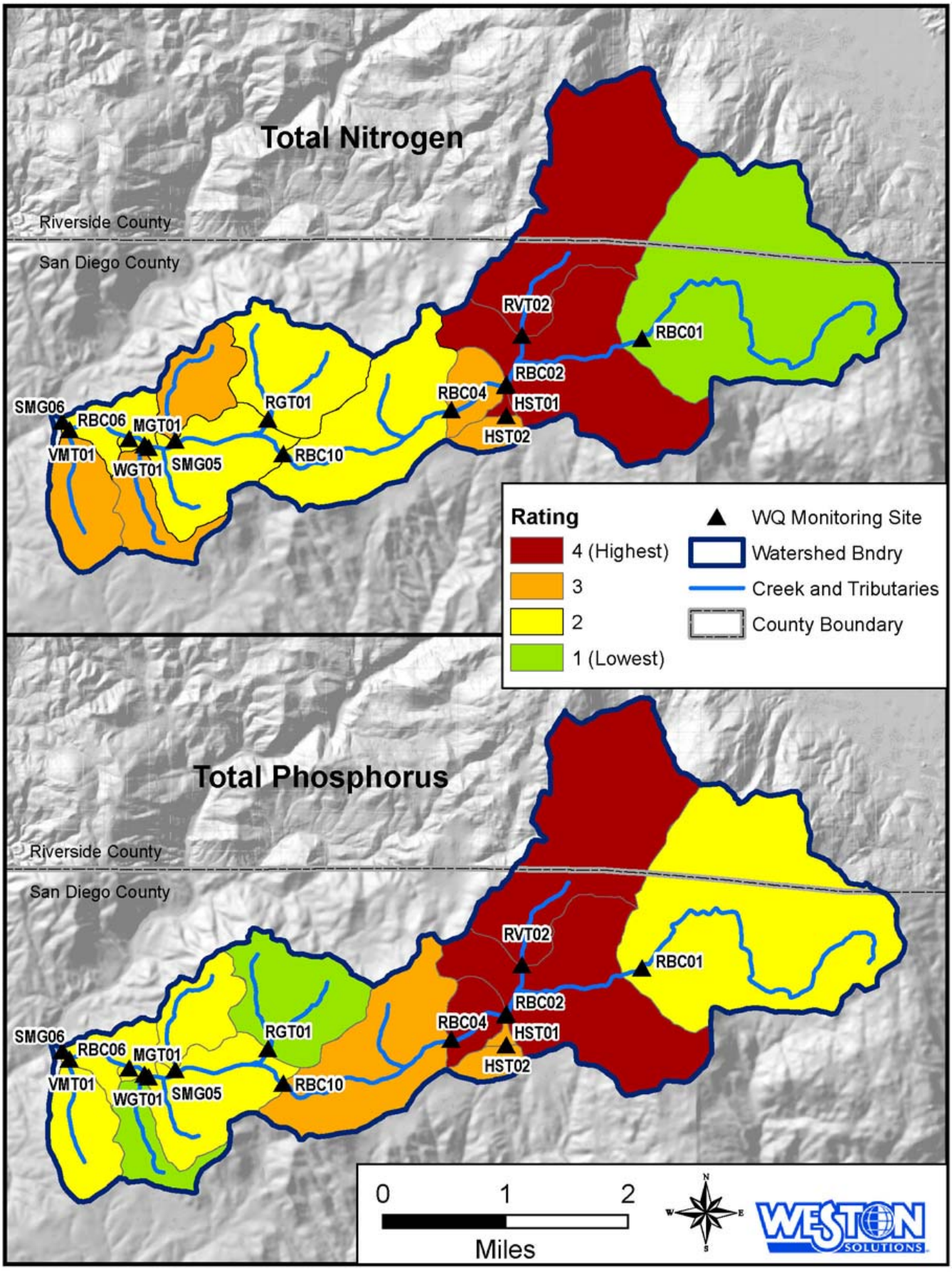
COMPOSITE THREAT TO WATER QUALITY SCORES FOR PARCELS IN RAINBOW CREEK WATERSHED

Figure 8

The GIS-based TTWQ rating assessment was compared to water quality monitoring results from Rainbow Creek and field surveys. Parcel data was summarized on a drainage area basis to compare to nutrient concentrations in Rainbow Creek. The water quality data was collected as part of the ongoing TMDL monitoring program and represented ambient (non-stormwater) conditions. Total nitrogen and phosphorus concentrations in water quality samples were rated (i.e., highest rated has the highest range of concentration to water quality benchmark) and compared to nutrient source parcel data on a drainage area basis. Where a drainage area could be compared to upstream and downstream samples, a better understanding could be made of the correlation between identified source loading and water quality data. The results of this analysis indicated correlation at the monitoring site downstream of the highest priority TTWQ parcels east of I-15 as shown on Figure 9. Field reconnaissance surveys were also conducted to verify results of the desktop aerial survey data and GIS-based assessment of land use based source data. The observations were recorded and summarized in *Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed* (Weston Solutions, 2010).

The existing GIS nutrient source database and TTWQ rating of characterized parcels in the Rainbow Creek Watershed will be used as tools that may be periodically updated. The existing database can be used to identify sources and prioritize these sources using the TTWQ evaluation process as summarized and provided in more detail in the *Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed* (Weston Solutions, 2010). Updates will depend on water quality monitoring results that may indicate trends in nutrient loading that may change prioritization. In addition, land use changes and inspection data may be reviewed for comparison to the existing assessment to determine whether updates are needed that would modify parcel ratings to the extent that management measures would need to be redirected or modified. These metrics for program effective assessment are discussed in more detail in *Section 15, Nutrient Reduction and Management Plan (NRMP) Effectiveness*.



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Source: Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed Final Report, Weston Solutions, May 2010

PROPOSED DRAINAGE AREA RATINGS

Figure 9

9. MP Implementation (Nutrients)

As summarized in *Section 8, Threat to Water Quality Prioritization (Nutrients),* parcels were rated for highest, high, medium, and low TTWQ for total nitrogen, total phosphorus, and composite nutrient TTWQ scores in the *Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed* (Weston Solutions, 2010). The parcels rated high and highest TTWQ scores for total nitrogen and total phosphorus are presented on Figure 6 and Figure 7. Figure 8 presents the composite TTWQ nutrient scores for parcels in the Rainbow Creek Watershed. The parcel-based source characterization and TTWQ scoring provides a tool that includes updates to implementation priorities and sources for management.

The highest and high TTWQ parcels are characterized as having the following attributes:

- the highest priority nutrient sources that include commercial nurseries, agricultural fields and orchards, residential and urban areas, parks, state highways (Caltrans), and septic systems;
- highest determined nutrient loading based on the nutrient specific loading coefficient and area of the specific land use within the parcel;
- located within 200 feet of Rainbow Creek;
- located within high groundwater area and subject to high irrigation use;
- located within an area subject to high soil erodibility in the absence of BMPs (phosphorus only);
- inspection data that indicates non-conformance with three key management measures for high priority commercial nurseries and greenhouses; and,
- septic systems located within 200 feet of the Creek and within a high groundwater table area (nitrogen only).

The County has established a set of minimum MMs/MPs for the high and highest TTWQ nutrient sources as well as medium and low TTWQ nutrient sources defined in the WPO (County of San Diego, 2016b). These MMs/MPs reflect the new requirements of the 2013 MS4 Permit. Commercial/industrial nutrient sources, including high priority nurseries and greenhouses, must meet the applicable requirements set out in the WPO and specified in JRMP Section 5.2.3 (County of San Diego, 2015b). These include operating practices and structural controls to reduce or eliminate the discharge of pollutants in runoff. The use of pollution prevention (P2) practices is always encouraged, and required where applicable and feasible. MMs/MPs or BMP requirements and options are provided for commercial facilities for each type of PGA in JRMP Attachment 5.2 (County of San Diego, 2015b). The specific application of BMPs is determined on a site-by-site basis to address the specific PGAs applicable to each facility identified in Attachment 5.2. BMP requirements for stationary industrial and commercial sites / sources are reviewed annually and updated as necessary. General and minimum BMP requirements are provided in Attachment 5.2 Section B. of the JRMP in accordance with the WPO applicable to industrial, commercial and municipal sources (County of San Diego, 2015b).

Table 4 provides the list of priority commercial/industrial nutrient sources and the pollutant generating activities associated with each source listed in JRMP Attachment 5.1. A reference and link is then provided to Attachment 5.2 of the JRMP that lists the MM/MPs in accordance with the WPO and BMP requirements for each of the PGAs. Table 4 also provides references and links to additional MPs that have been developed as part of the NRMP. These include MM/MPs developed by UCCE for high priority nutrient sources. These MM/MPs are also provided in Appendix C of this NRMP. These MM/MPs and other technical and education materials on water quality are provided on the UCCE website under

Agricultural Water Quality Research and Education (University California Cooperative Extension (UCCE), n.d.). Links are also provided in Table 4 corresponding to the MM/MPs for each specific source. These MM/MPs developed for the NRMP are provided as an additional guidance to reduce nutrient loading directed at owners and operators of nurseries, greenhouses, orchards, and agricultural crops. MM/MPs are also provided to guide residences as discussed below. A link is also provided in Table 4 to the Mission Resource Conservation District (MRCD) website that provides links to the above referenced nutrient management measures and others as listed below (embedded links are provided to each of these resources):

- Best Management Practices for Non-Point Source Pollution
- Rainbow Creek Nutrient Reduction Management Plan (January 2008)
- Best Management Practices to Minimize Agricultural Phosphorus Impacts on Water Quality
- A Review of BMPs for Managing Crop Nutrients and Conservation Tillage to Improve Water Quality
- Natural Resources Conservation Service Nutrient Management
- Comprehensive Nutrient Management Plan
- Fertilizing Agricultural Lands
- Nutrient Management for Vegetable, Fruit, and Nut Crops

In addition to this MM/MP information and guidance, Table 4 also includes references and links to the NRCS local office and to technical information on nutrient management. NRCS provides technical support to the agricultural, dairy, and livestock community with natural resource conservation. These materials provide useful information to the agricultural community on BMPs that can reduce nutrient loading.

In order to serve their intended purpose, the useful life of MM/MPs must be considered. Appendix D provides the expected service life for common practices (Natural Resources Conservation Service, 2016). Updates to this source are periodically posted in the Field Office Technical Guide, Section IV, on the NRCS website.

The County will continue its collaboration with UCCE, MRCD, and NRCS in providing tools to the agricultural community to address water quality issues. Updates to these tools will be done through collaborative efforts, where applicable, and as resources are available. As part of the BMPs required under the JRMP, outreach and education to these priority commercial agricultural sources on these MM/MPs (developed for the NRMP and posted on the UCCE website and NRCS and MRCD web portals) has been and will be conducted through workshops, site inspections and follow-up to non-compliance issues to increase knowledge of these MM/MPs and break down barriers and create bridges to the implementation of these MM/MPs. For the 319(h) grant, two workshops were conducted for the agricultural community.

Table 4. Minimum and Additional Management Measures/Management Practices for Priority Nutrient Sources

High Priority Nutrient Sources	Pollutant (Nutrient) Generating Activities (PGA)	JRMP Reference to Required MM/MP (BMPs)	Reference and Link to Additional MM/MP (BMPs) developed for NRMP	Additional Guidance/ Technical Sheets
Commercial Nurseries and Greenhouses	JRMP – Attachment -5.1 - Table 5.1.9 Category A: Management of Materials, Equipment and Wastes A.3 Waste Handling, Storage and Activities A.3.b Solid Waste A.3.e Liquid Waste A.3.g Green Waste Category D: Outdoor Areas and Activities D.1 Parking, Rooftops and Storage Areas D.2 Building and Grounds Maintenance D.2.a Landscaping D.2.b Fertilizer applications D.2.i Erodible Surfaces & Areas under Construction D.4 Storm Drain Systems D.4.a O&M D.4.b Illicit Discharges & Connections	JRMP Attachment 5.2 – Industrial, Commercial & Municipal BMP Requirements A. Key Definitions B.WPO Excerpts Applicable to Industrial, Commercial &Municipal Source C. BMP Requirements for Specific Industrial, Commercial & Municipal Source PGAs Table 5.2.1 – Required BMPs by PGAs BMPs are provided by Category (A, B & C) and PGA (e.g., A.3.b)	Appendix C, Attachment 5– Chapter 1 provides Management Goals and Practices for Nurseries in the following:* ▪ Irrigation Management ▪ Nutrient Management ▪ Erosion and Runoff Management ▪ Personnel Training ▪ Record Keeping Specific goals and MM/MP are provided for each management area. These and other nutrient management technical support to growers, nurseries and greenhouses are provided by UCCE: http://ucanr.edu/sites/agwaterquality/Grower_Resources/	▪ Link to the NRCS Escondido field office: http://offices.sc.egov.usda.gov/locator/app?service=action/1/ServiceCenterSummary/4/agencyToOfficeLink ▪ NRCS link to Nutrient Management Technical Information and Manure Management Plan http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/ecoscience/mnm/ ▪ Resources for growers from UCCE: http://ucanr.edu/sites/agwaterquality/Grower_Resources/ ▪ MRCD Agricultural Portal: http://missionrcd.org/agriculture/nutrient-management-2/nutrient-best-management-practices/ – Best Management Practices for Non-Point Source Pollution – Rainbow Creek Nutrient Reduction Management Plan – Best Management Practices to Minimize Agricultural Phosphorus Impacts on Water Quality – A Review of BMPs for Managing Crop Nutrients and Conservation Tillage to Improve Water Quality – Natural Resources Conservation Service Nutrient Management – Comprehensive Nutrient Management Plan – Fertilizing Agricultural Lands – Nutrient Management for Vegetable, Fruit, and Nut Crops

Table 4, continued

High Priority Nutrient Sources	Pollutant (Nutrient) Generating Activities (PGA)	JRMP Reference to Required MM/MP (BMPs)	Reference and Link to Additional MM/MP (BMPs) developed for NRMP	Additional Guidance/ Technical Sheets
Agricultural fields and Orchards	No Specific Profile/ Fact Sheet Use Commercial Nurseries and Greenhouses as guide JRMP – Attachment 7.2 - Table 7.2.9 A forthcoming *General Waste Discharge Requirements for Discharges of Wastes from Commercial Agricultural and Nursery Operations within the San Diego Region* is currently under development by the RWQCB and will provide more specific pollutant generating activities associated with this source type.	No Specific Profile/ Fact Sheet Use Commercial Nurseries and Greenhouses as guide A forthcoming *General Waste Discharge Requirements for Discharges of Wastes from Commercial Agricultural and Nursery Operations within the San Diego Region* is currently under development by the RWQCB and will provide more specific BMPs required for activities associated with this source type.	Appendix C, Attachment 5– Chapter 2 provides Management Goals and Practices for Agricultural fields and Orchards in the following: ▪ Irrigation Management ▪ Nutrient Management ▪ Erosion and Runoff Management ▪ Personnel Training ▪ Record Keeping Specific goals and MM/MP are provided for each management area. These and other nutrient management technical support to growers, nurseries and greenhouses are provided by UCCE: http://ucanr.edu/sites/agwaterquality/Grower_Resources/	▪ Link to the NRCS Escondido field office: http://offices.sc.egov.usda.gov/locator/app?service=action/1/ServiceCenterSummary/4/agencyToOfficeLink ▪ NRCS link to Nutrient Management Technical Information and Manure Management Plan: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/ecoscience/mnm/ Resources for growers from UCCE: http://ucanr.edu/sites/agwaterquality/Grower_Resources/MRCD Agricultural Portal: http://missionrcd.org/agriculture/nutrient-management-2/nutrient-best-management-practices/

Table 4, continued

High Priority Nutrient Sources	Pollutant (Nutrient) Generating Activities (PGA)	JRMP Reference to Required MM/MP (BMPs)	Reference and Link to Additional MM/MP (BMPs) developed for NRMP	Additional Guidance/ Technical Sheets
Parks/ Recreational Areas	JRMP – Attachment 5.1 -Table 5.1.12 Category A: Management of Materials, Equipment and Wastes A.3 Waste Handling, Storage and Activities A.3.e Liquid Waste A.3.g Green Waste Category D: Outdoor Areas and Activities D.1 Parking, Rooftops and Storage Areas D.2 Building and Grounds Maintenance D.2.a Landscaping D.2.b Fertilizer applications D.3.d Sidewalks & Paved Areas D.2.i Erodible Surfaces & Areas under Construction D.4 Storm Drain Systems D.4.a O&M D.4.b Illicit Discharges & Connections	e.g., JRMP Attachment 5.2 – Industrial, Commercial & Municipal BMP Requirements A. Key Definitions B.WPO Excerpts Applicable to Industrial, Commercial &Municipal Source C. BMP Requirements for Specific Industrial, Commercial & Municipal Source PGAs Table 5.2.1 – Required BMPs by PGAs BMPs are provided by Category (A, B & C) and PGA (e.g., A.3.b)	Appendix C, Attachment 5 – Chapter 4 provides Management Goals and Practices for Common Pollution Prevention (Roads, Walkways, Vehicles & Restrooms)	

Table 4, continued

High Priority Nutrient Sources	Pollutant (Nutrient) Generating Activities (PGA)	JRMP Reference to Required MM/MP (BMPs)	Reference and Link to Additional MM/MP (BMPs) developed for NRMP	Additional Guidance/ Technical Sheets
Residents and Animal Owners	JRMP Table 5.4.2 Automobiles & Boats: ▪ Parking and storage ▪ Maintenance & Repair ▪ Washing & Cleaning ▪ Lawn & Garden: ▪ Over-irrigation ▪ Fertilizer Use ▪ Household and Home: ▪ Repair & Maintenance ▪ Outdoor Cleaning ▪ Pool, spa & Fountain Care ▪ Septic System Maintenance ▪ Materials & Waste Storage ▪ Waste management & Disposal Pets: ▪ Pet Waste Disposal ▪ Pet Care Livestock and Large Animals ▪ Manure Management ▪ Manure Disposal ▪ Composting	BMP Requirements and Recommendations for Residential Sources JRMP Attachment 5.6 – A. Key Definitions B. WPO Excerpts Applicable to Residential Dischargers C. BMP Requirements and Options for Specific Residential PGAs – Table 5.6.1 - BMP Requirements and Options for Residential Sources- detailed matrix of BMP requirements and recommended options organized by pollutant-generating activity	Appendix C, Attachment 5 – Chapter 3 provides Management Goals and Practices for Residents and Animal Owners in the following: ▪ Septic System Management ▪ Garden Management ▪ Lawn Management ▪ Livestock and Pet Management Specific goals and MM/MP are provided for each management area.	BMP Guidance Handbook MRCD Residential web portal for Rainbow Creek Watershed: http://missionrcd.org/residential/rainbow-creek-watershed/ ▪ Living in a Healthy Watershed ▪ Septic System Information ▪ Residential Irrigation Evaluations ▪ Workshops and Materials MRCD Online Training for Septic System Maintenance: http://missionrcd.org/residential/rainbow-creek-watershed/septic-system-module-rebate/

Table 4, continued

High Priority Nutrient Sources	Pollutant (Nutrient) Generating Activities (PGA)	JRMP Reference to Required MM/MP (BMPs)	Reference and Link to Additional MM/MP (BMPs) developed for NRMP	Additional Guidance/ Technical Sheets
Urban Areas – Roads, Walkways, Vehicles & Restrooms (applies to commercial and municipal sources)	JRMP – Attachment 5.1 1. Automobile Repair, Maintenance, Fueling, and Cleaning (see Table 5.1.1) 2. Airplane and Boat Repair, Maintenance, Fueling and Cleaning (see Table 5.1.2) 3. Equipment Repair, Maintenance, Fueling, and Cleaning (see Table 5.1.3) 4. Vehicle Body Repair and Painting (see Table 5.1.4) 5. Parking Lots and Storage Facilities (see Table 5.1.5) 6. Retail and Wholesale Fueling (see Table 5.1.6) 7. Eating and Drinking Establishments (see Table 5.1.7) 8. Pest Control Services (see Table 5.1.8) 10. Cemeteries (see Table 5.1.10) 11. Golf Courses (see Table 5.1.11) 13. Equine Facilities (see Table 5.1.13) 14. Pet-related Facilities (see Table 5.1.14) 15. Building Material Retailers and Storage (see Table 5.1.15) 17. Municipal Development (see Table 5.1.17)	e.g., JRMP Attachment 5.2 – Industrial, Commercial & Municipal BMP Requirements A. Key Definitions B.WPO Excerpts Applicable to Industrial, Commercial &Municipal Source C. BMP Requirements for Specific Industrial, Commercial & Municipal Source PGAs Table 5.2.1 – Required BMPs by PGAs BMPs are provided by Category (A, B & C) and PGA (e.g., A.3.b)	Appendix C, Attachment 5 – Chapter 4 provides Management Goals and Practices for Common Pollution Prevention	

Table 4 also presents the priority PGAs for residences. The County has considered the residential activities and areas within its jurisdiction and established program priorities and requirements in accordance with the requirements of the 2013 MS4 Permit Provision E.5.2.g. Residential sources are considered high priority within the Rainbow Creek Watershed, which is tributary to the CWA Section 303(d) impaired water body. In accordance to these requirements, the County has established programmatic requirements which address the following types of sources:

- Automobiles and boats (parking, storage, maintenance, repair, and cleaning);
- Lawn and garden care activities and product use;
- Household and home care and maintenance;
- Pet waste management; and,
- Livestock and large animals waste management.

A comprehensive list of residential PGAs considered high TTWQs are presented in JRMP Section 5 in Table 5.4.2. Table 4 presents the residential PGAs from JRMP Section 5 that are identified as TTWQ for nutrients. General and Additional Minimum BMPs that are to be implemented for these nutrient PGAs for residences are set out in WPO Sections 67.801 through 67.806, Section 67.807, and Section 67.813 through 67.814. Table 4 provides the reference and link to Attachment 5.6 - Table 5.6.1 of the JRMP that provides the BMP requirements and recommendations for residential sources organized by PGA. These requirements are reviewed annually and updated as necessary. Additional information and implementation guidance can be found in the BMP Guidance Handbook.

The use of pollution prevention (P2) practices is encouraged wherever possible. Residents are encouraged to use P2 methods through a variety of educational programs and activities. P2 is defined by the WPO Section 67.802 as “practices and process that reduce or eliminate the generation of pollutants such as the use of smaller quantities of toxic materials or substitution of less toxic materials.” A primary objective of the County’s runoff management programs is to promote the use of these practices by residents. Per WPO Section 67.803(e), if the authorized enforcement official identifies a discharge, or activity, or category of facility that is a significant source of contaminants to waters of the United States, the discharger may be required to install, implement, and maintain additional source control or treatment control BMPs.

Septic system MMs/MPs for residential properties were developed for this NRMP and provided in Appendix C. These residential nutrient reduction MMs/MPs also cover garden management, lawn management, and livestock and pet management. These measures are provided as guidance and used in residential outreach and education programs. These measures may be required if the authorized enforcement official identifies a discharge, or activity, or category of facility that is a significant source of contaminants to Rainbow Creek and its tributaries. In addition, the MRCD web portal has guidance for residential septic system maintenance and other information as listed on Table 4. The MRCD web portal has specific content for the Rainbow Creek Watershed.

Table 4 also provides references to the JRMP minimum BMPs for the PGAs identified as potential nutrient sources in urban areas, parks, and roadways that apply to commercial and municipal sources. Municipal source types are listed in Table 4 with the corresponding section of the JRMP that lists the current inventory, program implementation and BMP requirements. Table 4 also references the required BMPs that are provided in Attachment 5.2 Table 5.2.1 of the JRMP. These required BMPs for the identified PGAs are inspected and enforced through the County’s Stormwater Program. Additional

guidance on pollution prevention measures is provided in the MM/MPs developed for this NRMP. Table 4 provides a reference to the Management Goals and Practices for Common Pollution Prevention for nutrients developed as part of the NRMP.

Parks and recreational facilities are potential sources of nutrients. The current inventory of park and recreational facilities, program implementation and BMP requirements for these facilities is presented in the Municipal Section 5.3, sub-section 5.3.9 of the JRMP. Required MM/MPs (BMPs) for parks and recreational facilities are provided in Attachment 5.2 (Industrial, Commercial and Municipal Sources Section 5) of the JRMP. Table 4 provides references to Table 5.2.1 of the JRMP that lists the MM/MPs for the PGAs that have the potential as nutrient sources at parks and recreational facilities. Additional guidance on pollution prevention measures is provided in the MM/MPs developed for this NRMP.

As part of the minimum and additional BMPs required under the JRMP, outreach and education to these priority sources on these MM/MPs (in the JRMP and developed for the NRMP) has been and will be conducted through workshops, site inspections, and follow-up to non-compliance issues to increase knowledge of these MM/MPs, break down barriers, and create bridges to the implementation of these MM/MPs. Workshops have been conducted for residences as part of the NRMP. The results are summarized in *Section 15, Nutrient Reduction and Management Plan (NRMP) Effectiveness*.

10. Inspection of Sites and Sources

This section describes the steps that the County will take to inspect priority sites and sources for compliance with its ordinances and permits as well as nutrient load reductions required under this TMDL. The section also includes steps the County will take to implement follow-up actions and enforce requirements of the WPO, as necessary to obtain compliance.

The County inspects inventoried existing development according to the requirements in the 2013 MS4 Permit. Inspections include an assessment of the presence of non-stormwater discharges, potential discharge of pollutants, and potential illicit connections. The inspections also confirm that the description of the facility has not changed from what is recorded in the current inventory. Onsite inspections are more detailed and should assess the implementation of BMPs required by the WPO for the specific PGAs applicable to each facility, including BMPs addressing nutrient discharges. *Appendix C, Attachment 3* provides minimum BMP requirements for each type of PGA. Where applicable, inspections also verify coverage of the facility under the Industrial General Permit.

Inspections are conducted at a minimum frequency of once every five years, with an equivalent of at least 20 percent of the inventoried industrial, commercial, and municipal facilities undergoing onsite inspections annually. The types of inspections conducted include onsite inspections, drive-by inspections, or visual inspections by trained volunteers. The County uses TTWQ as a metric to determine appropriate inspection frequency and/or inspection type. The specific criteria for determining TTWQ vary between industrial, commercial, municipal and residential facilities and is discussed in greater detail in the following subsections. The County also developed a GIS-based TTWQ inventory specific to nutrients for all parcels within the Rainbow Creek Watershed in San Diego County which is used to inform TMDL implementation actions as well as inspection prioritization. The frequency of inspections must be appropriate to confirm that BMPs required by the WPO for the specific PGAs at the facility are being implemented to reduce the discharge of pollutants and prohibit non-stormwater discharges. The inspection frequency may increase if the site is specifically identified as a priority in the WQIP, in

response to a valid public compliant, or in cases of continued non-compliance. For more information on the TTWQ prioritization process, refer to *Section 8, Threat to Water Quality Prioritization (Nutrients).*

Records of all inspections and re-inspections are kept and retained in an electronic database. The records include the following information:

- Name and location
- Date
- Inspection method
- Observations and findings
- Descriptions of any problems or violations
- Descriptions of any enforcement actions
- Date that problems or violations were resolved.

Inspections of Municipal Facilities

Staff at municipal facilities are required to conduct self-inspections at a frequency determined by the facility's TTWQ level. The County has established a TTWQ questionnaire, based on PGAs applicable to the facility, proximity to impaired waterbodies, compliance history, and other factors (see *Appendix C, Attachment 7*) to determine each facility's TTWQ level (low, moderate, or high) for the purposes of determining inspection frequency. The frequency of self-inspections is prescribed by the JRMP depending on the facility's TTWQ level.

Audits are performed by the County Watershed Protection Program (WPP) staff independent of the site's self-inspections. Audits are conducted at a frequency prescribed in the JRMP depending on the facility's TTWQ level. Audits ensure periodic review of stormwater practices and self-inspection documentation at County facilities and properties. The audit process validates compliance with minimum BMP requirements and reinforces the need for appropriate BMPs to meet the requirements of the 2013 MS4 Permit and WPO. These audits are also conducted to pay particular attention to locations with the potential to discharge pollutants prioritized by each watershed's WQIP. Additionally, audits provide a mechanism to evaluate program effectiveness through annual reviews and inter-departmental reporting. These audits are counted toward the County's compliance with the 2013 MS4 Permit's minimum inspection frequency requirements.

Inspections of Industrial and Commercial Facilities

Inspections of industrial and commercial facilities to determine compliance with the 2013 MS4 Permit and WPO are conducted based on the sites' TTWQ level and are performed, at a minimum, according to the frequencies stipulated in the 2013 MS4 Permit. Facilities are selected for onsite inspections based on the following factors pertaining to TTWQ:

- Proximity to a 303(d) listed water body segment for a facility that generates pollutants contributing to the impairment;
- Proximity to coastal lagoons or other sensitive receiving waters or areas, and operations pose significant potential of discharging pollutants;

- Potential to discharge pollutants to the MS4 (i.e., site design and construction, pollutant-generating activities, irrigation, and material and waste handling);
- Facility compliance history (for BMP deficiencies); and,
- Degree of management oversight, as determined by the inspector's observation of the shop operations and review of stormwater-related documents.

Other factors used to determine the TTWQ include prioritization tools (GIS applications and various resource databases, including the parcel-based TTWQ inventory within the Rainbow Creek Watershed developed by the County), knowledge of PGAs and associated BMPs, and best professional judgement.

Inspections of Agricultural Operations

Agricultural operations, such as commercial nurseries and greenhouses, and irrigated lands, such as orchards and agricultural fields, are identified in the TMDL as nutrient sources. Inspections of nurseries and greenhouse facilities are prioritized and conducted by the County AWM according to the 2013 MS4 Permit inspection requirements for commercial facilities. AWM also conducts inspections of irrigated lands within the County; however, these lands are not regulated under the 2013 MS4 Permit and, thus, inspections are conducted only in response to observations or complaints of problematic discharges.

Inspections of Residential Areas

The County has structured its residential inspection program in compliance with the Provision E.5.c of the 2013 MS4 Permit. Inspections are conducted as drive-by inspections by County staff, with onsite inspections as necessary. The County has developed a GIS-based residential inventory to track Residential Management Areas (RMAs) by hydrologic subarea. Every RMA is inspected at least once every five years. Inspections, where possible, are drainage based, and areas with major outfalls with known persistent flow are prioritized. The inspections focus on education and outreach, with targeted education materials distributed at residences in response to observations.

11. Enforcement of Sites and Sources and Reporting of Non-Compliant Sites

This section describes the steps the County will take to enforce its ordinances, statutes, and permits as necessary to attain compliance with the nutrient load reductions specified in this TMDL. This section also describes the conditions under which the County will report sites that are determined to be recalcitrant in implementing BMPs as required in the WPO.

The County's enforcement procedures are outlined in the Enforcement Response Plan (ERP) as required by the 2013 MS4 Permit. The primary objective of the ERP is to promote voluntary compliance with applicable ordinances and the NPDES permit provisions. In cases of non-compliance, the ERP provides County staff with several enforcement tools to ensure a return to compliance in a timely manner while following due process. "Education first" is a key component of the County's general approach to improving water quality. While emphasizing education as the primary means of achieving compliance, the County also has the necessary authority and procedures in place to investigate and enforce in cases of continued non-compliance. In the event that a violation or potential violation may endanger health or the environment, the County may forego the "education first" approach and proceed immediately to more stringent enforcement measures.

Routine Enforcement Measures

Industrial, commercial, municipal, and residential inspections are conducted to identify sources of potential pollutants that may negatively impact water quality. The County uses progressive enforcement steps outlined below to address violations of the WPO observed during inspections. Some of the factors that influence the selection of appropriate enforcement actions include the threat to water quality and duration of the violation, the cooperation and willingness of the responsible party to correct the conditions, whether the incident is isolated or recurring, and whether the violation or potential impacts will have a detrimental effect on human health or the environment. The progressive enforcement steps established by the County include:

Illicit Discharge Elimination

- An advisory letter sometimes is issued when there is no evidence of an illicit discharge or connection and County staff wants to document that the resident or operator has been notified of his or her BMP responsibilities.
- Verbal warnings are used when an illicit discharge or potential discharge can be easily corrected at the time of investigation or soon afterwards. Educational and outreach materials are often provided to the responsible party.
- A Stormwater Inspection Report/Corrective Actions Report (CAR) is issued to provide a written notice that corrective action is necessary within a certain period of time. A CAR may also be issued on County letterhead depending on the complexity of the case (e.g., if multiple responsible parties are involved). The period to return to compliance is usually 14 calendar days. Properties and activities regulated by additional permits, such as the Industrial General Permit or the Construction General Permit, may require a return to compliance in a shorter period of time, as determined by those permits. In less urgent cases, the responsible party may be given additional time to comply if time is needed to properly plan and implement BMPs (e.g., structural controls).

Development and Planning Processes and Options

With respect to the development and planning process, routine County enforcement mechanisms include the plan-check process, hold on bond and security deposits, and the option to deny construction and/or occupancy permits.

Construction Management

For active construction areas, the County routine enforcement measures include Administrative Warnings and Notices of Violation. Public works projects use contraction plans, specifications, and Stormwater Pollution Prevention Plans to effectively eliminate or control pollutant discharge through stormwater. Adherence with contract provisions is confirmed by inspection staff and enforced using standard payment provisions, liquidated damage clauses, and other means.

Existing Development Areas

The “education first” approach is a key component in the County’s routine enforcement process within existing residential areas. County staff are also required to inspect structural BMPs and respond to

complaints regarding structural BMP performance. Advisory letters, verbal warnings, CARs, and Clean-up and Abatement Notices (in which the County cleans or repairs the structural BMP and then charges the Responsible Party) are all routinely used as follow up measures, if necessary. As field staff conduct investigations, they maintain records and a database of relevant information for each incident. This information is entered into a database that is used for annual reports submitted to the Regional Board.

Escalated Enforcement

In the event that a violation or potential violation may endanger health or the environment, the County may pursue escalated enforcement measures. The County Administrative Code, Title 1, establishes the authority by which the County may use escalated enforcement measures. Use of Administrative Citation Warnings (ACWs), Stop Work or Cease and Desist Orders, and Administrative Citations (ACs) are among the most commonly used methods for escalated enforcement.

The first step in the escalated enforcement process will begin with an ACW, and may be issued to the responsible party with clean-up and BMP requirements. An ACW can also be issued in complaint cases following non-compliance with a Notice of Violation (NOV) or CAR. More than one ACW may be used during this stage of escalated enforcement depending on the details of the enforcement case. For example, if a responsible party is making progress in correcting deficiencies but needs more time to complete the corrections, then another ACW may be used. Stop Work/Cease and Desist Orders are similar options available to the County for escalated enforcement.

The second step for escalated enforcement is to issue an AC with escalated fines. The escalated fines progress from $100, $200, $500, and $1000 per violation up to a total of $10,000. More than one AC may be used during this stage of escalated enforcement depending on the details of the enforcement case. For example, if a responsible party is making progress in correcting violations but needs more time to complete the corrections then another AC may be used to compel compliance.

Another option for escalated enforcement in egregious situations is to issue a civil penalty that may be an alternative to the citation steps. If there is a scenario where none of these options results in compliance, the case may be referred to the Environmental Crimes Task Force for potential criminal prosecution under the State Porter Cologne Water Quality Act or the Federal Clean Water Act. The County WPO provides further detail regarding administrative, civil, and criminal options for escalated enforcement.

Reporting of Non-Compliant Sites to the Regional Board

Attachment B of the 2013 MS4 Permit requires the County to report any non-compliance that may pose a threat to human or environmental health within 24 hours of the County becoming aware of circumstances. In these cases, oral notification will be made to the Regional Board and will be followed up by a written report submitted within 5 calendar days of the incidence of non-compliance. The County will notify the Regional Board by e-mail within 5 calendar days of issuing escalated enforcement action against a site that poses a significant threat to water quality as a result of non-compliance with applicable permits, ordinances, or NPDES provisions.

12. Monitoring to Assess Compliance with Nutrient Load Reductions

This section describes the steps the County will take, or require nutrient sites or sources to take, to conduct monitoring to assess compliance of runoff or groundwater discharges with the load reductions from each of the land use categories assigned a load reduction.

The County conducts monitoring required by the 2013 MS4 Permit. The 2013 MS4 Permit prescribes a transitional monitoring program for the 2013-2014 and 2014-2015 monitoring years, prior to the completion of the WQIP. The WQIP for the Santa Margarita Watershed Management Area will include a Monitoring and Assessment Program which will be implemented after acceptance of the WQIP. The County has also developed and implemented a TMDL Monitoring Plan as required by Attachment E of the MS4 Permit. In addition to this TMDL Monitoring Plan, the County voluntarily developed an MS4 outfall monitoring program to assess the contribution of urban runoff to the nutrient concentrations in Rainbow Creek with intent to determine whether there are discharges of nutrients from the County of San Diego's storm drain outfalls to Rainbow Creek during dry weather.

TMDL Monitoring Plan

Current monitoring in the watershed to assess compliance with the nutrient waste load allocations and receiving water quality targets in the TMDL is conducted according to the *Sampling and Analysis Plan for Rainbow Creek Nutrient Reduction TMDL Implementation Water Quality Monitoring* (TMDL Monitoring Plan) required initially by the 319(h) grant agreement and more recently by the MS4 Permit.

Sampling Sites and Frequency

Samples are collected during dry weather at fourteen sampling locations (listed in Table 5 and shown in Figure 10) specified by the TMDL Monitoring Plan at a minimum frequency of once per month at approximately 30-day intervals. Monitoring is not conducted during any rain event greater than 0.1 inches, and samples are not collected following the rain event until the water level at the sampling location returns to within approximately 10% of the pre-rain creek level. Sites HST01 and HST02 monitor MS4 discharges, whereas the remaining twelve sites are located in the receiving water.

Table 5. Rainbow Creek TMDL Monitoring Plan Sampling Site Locations

Site ID	Location	Latitude	Longitude
RBC01	Rainbow Creek @ Eastern edge of Hines Nursery	33.42042	-117.13571
RBC02	Rainbow Creek @ Huffstatler Road	33.41544	-117.15199
RBC04	Rainbow Creek @ Old Highway 395	33.41272	-117.15853
RBC06	Rainbow Creek @ 2219 Willow Glen Road	33.40881	-117.20539
RBC10	Rainbow Creek @ MWD Crossing	33.40696	-117.18344
SMG05	Rainbow Creek @ Willow Glen Road	33.40788	-117.20104
SMG06	Rainbow Creek @ Stage Coach Lane	33.41056	-117.21477
RVT02	Chica tributary @ 1st Street	33.42126	-117.14983
HST01	Brow Ditch to Rainbow Creek @ Huffstatler Road	33.41526	-117.15204
HST02	Pipe from a nursery along Huffstatler Road (downstream of HST01)	33.41174	117.15196
MGT01	Margarita Glen Tributary to Rainbow Creek	33.40847	-117.19877
RGT01	Rainbow Glen Tributary to Rainbow Creek	33.41107	-117.18569
WGT01	Willow Glen Tributary @ Willow Glen Road	33.40784	-117.20309
VMT01	Via Milpas Tributary to Rainbow Creek	33.40957	-117.21373

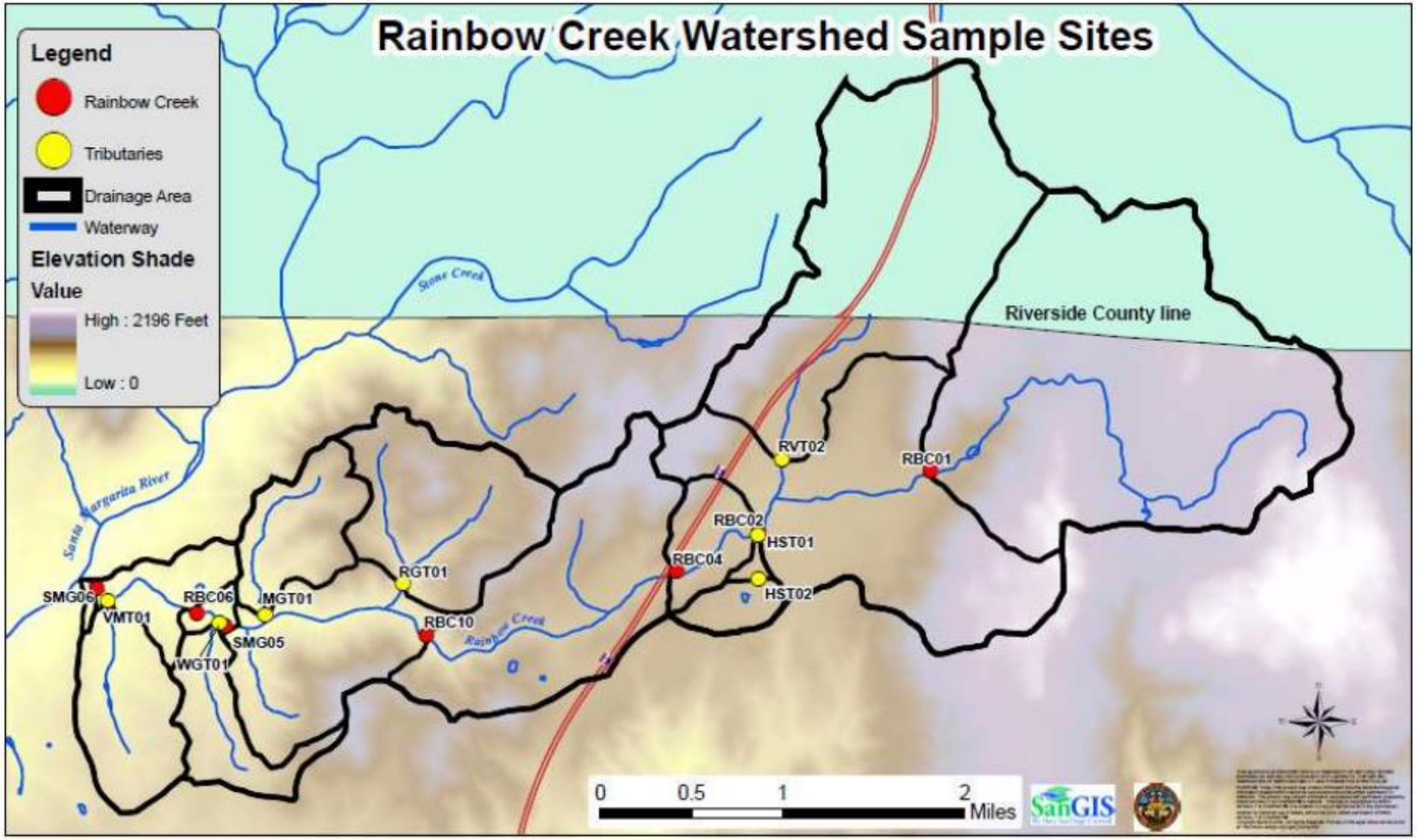


Figure 10. Map of TMDL Monitoring Plan Sampling Locations[2]

[2] County of San Diego, 2015. *Rainbow Creek TMDL Monitoring Program Report for July 2014 through September 2015.*

Sampling Constituents

When water is present, all sampling locations are monitored for in-situ parameters (pH, temperature, conductivity, turbidity and dissolved oxygen). Grab samples are collected for the constituents as summarized in Table 6. The flow rate at each site is estimated using channel cross-section dimensions and either a hand-held flow meter or the floating object technique to measure current velocity. Total nitrogen and total phosphorus concentrations are used to calculate loading rates and flux per acre, which are extrapolated to calculate annual loading rates for the drainage area and the land uses it represents.

Table 6. Water Quality Analytical Parameters for Rainbow Creek TMDL Monitoring Plan

Parameter	Sample Type
pH	Analyzed in Field
Temperature	Analyzed in Field
Conductivity	Analyzed in Field
Dissolved Oxygen	Analyzed in Field
Turbidity	Analyzed in Field
TDS	Grab
Iron	Grab
Sulfate	Grab
Nitrate-N	Grab
Nitrite-N	Grab
TKN	Grab
Ammonia-N	Grab
Total Nitrogen	Calculated
Total Phosphate	Calculated
Orthophosphate-P	Grab

MS4 Outfall Monitoring Program

Sampling Sites and Frequency

MS4 outfalls discharging to Rainbow Creek were identified through desktop analysis and field reconnaissance where field crews identified specific locations of all outfalls and MS4 segments with the potential to discharge to Rainbow Creek during dry weather. The inventory of MS4 outfalls voluntarily monitored under the program are presented in Table 7 and shown in Figure 11. These locations included three historical sites which have been monitored under previous or existing monitoring programs. The historical sites included one site, SMG19, monitored under the dry weather monitoring program according to 2007 MS4 Permit requirements and two sites, HST01 and HST02, monitored since 2005 as part of the TMDL Monitoring Plan.

Table 7. List of Rainbow Creek MS4 Monitoring Locations

Location Name	Map ID (Figure 11)	Location	Latitude	Longitude
MS4-SMG-056	56	Outfall at Old Hwy. 395; 20' south of 2nd St.	33.41741	-117.15581
MS4-SMG-057	57	Outfall at Old Hwy. 395; 1,160' north of 2nd St.	33.42032	-117.15387
MS4-SMG-058	58	Outfall at Old Hwy. 395; 3,290' north of 2nd St.	33.42533	-117.15020
MS4-SMG-061	61	Outfall at Rainbow Valley Blvd.; 1,025' west of Old Hwy. 395	33.42957	-117.14476
MS4-SMG-063	63	Outfall at Rainbow Glen Rd.; 535' west of Rainbow Hills Rd. (Under Bridge)	33.40928	-117.16562
MS4-SMG-083	83	Channel 100' west of Canyon Heights Road on the north side of Rainbow Valley Blvd.	33.40860	-117.15458
MS4-SMG-084	84	Channels on both sides of Rainbow Valley Blvd. at 8th Street.	33.41012	-117.15127
MS4-SMG-085	85	Channel across from 2160 Rainbow Valley Blvd.	33.41166	-117.14760
MS4-SMG-086	86	Channel at 2526 Rainbow Valley Blvd.	33.41813	-117.14783
MS4-SMG-087/ SMG19	87	Channel at 2826 Rainbow Valley Blvd.	33.42356	-117.14336
MS4-SMG-088	88	Channel at Huffstatler Street and Second Street	33.41769	-117.15201
HST01	HST01	Brow Ditch to Rainbow Creek at Huffstatler Street	33.41526	-117.15204
HST02	HST02	Pipe from a nursery along Huffstatler Street	33.41174	-117.15196
SMG19	SMG19	Open Channel at 2908 Rainbow Valley Rd.	33.42489	-117.14240

As mentioned above, at all locations, monitoring visits are conducted during dry weather (no daily precipitation greater than 0.1 inches within 72 hours prior to the visit). Since January 2013, sites MS4-SMG-056, MS4-SMG-057, MS4-SMG-058, MS4-SMG-061, and MS4-SMG-063 were visited approximately quarterly. Sites MS4-SMG-083, MS4-SMG-084, MS4-SMG-085, MS4-SMG-086, MS4-SMG-087 and MS4-SMG-088 were added to the program in September 2014 and, beginning in September 2014, all outfalls were monitored monthly. As mentioned above, HST01 and HST02 were visited monthly since 2005. Site SMG19 is a historical open channel location that had three events monitored in 2011 and 2012, and it is part of the same channel monitored at the MS4-SMG-087 sampling location.

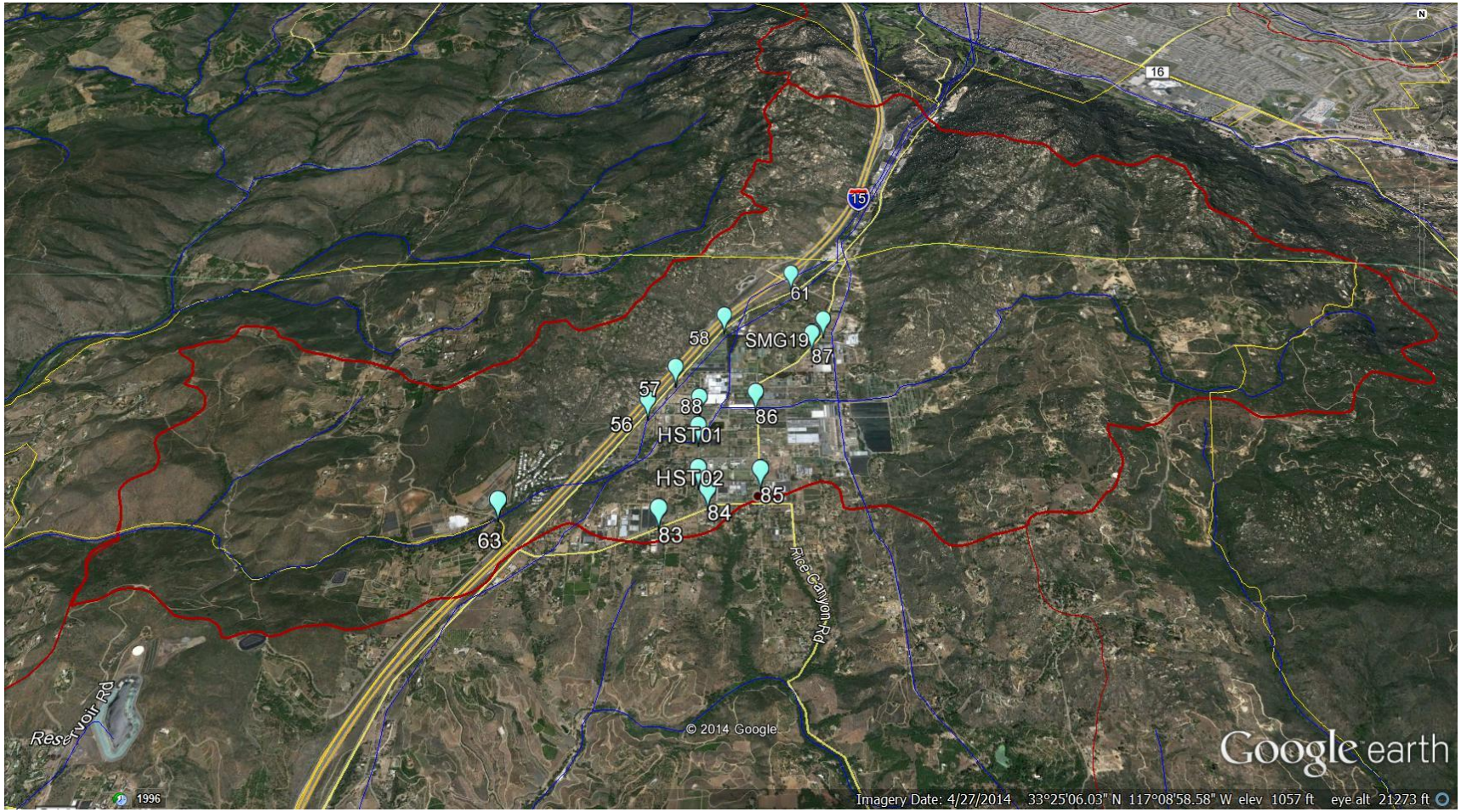


Figure 11. Map of Rainbow Creek MS4 Outfall Monitoring Locations[3]

[3] County of San Diego. 2015. *MS4 Outfall Monitoring at Rainbow Creek.*

Sampling Constituents

When water is present, all sampling locations are monitored for in-situ parameters (pH, temperature, conductivity, turbidity and dissolved oxygen). Grab samples are collected for the constituents as summarized in Table 8.

Table 8. Water Quality Analytical Parameters for MS4 Outfall Monitoring Program

Parameter	Sample Type
pH	Analyzed in Field
Temperature	Analyzed in Field
Conductivity	Analyzed in Field
Dissolved Oxygen	Analyzed in Field
Turbidity	Analyzed in Field
Nitrate-N	Grab
Nitrite-N	Grab
TKN	Grab
Ammonia-N	Grab
Total Nitrogen	Calculated
Total Phosphorus	Calculated
Orthophosphate-P	Grab

13. Community Education and Outreach

The County of San Diego has developed and implemented an educational program to raise community awareness of impairment problems, to promote pollution prevention, and to increase the use of applicable management measures and practices to aid in controlling and reducing nutrient discharges to Rainbow Creek. The County of San Diego leads the ongoing community and education outreach program for the 2013 MS4 Permit, which includes addressing the Rainbow Creek nutrient impairment. Specifically, the County of San Diego has performed education and outreach that targets the reduction of nutrients through the following materials and programs:

- MRCD/NRCS agriculture materials and website (i.e., Ag Web Portal)
- UCCE materials and website
- County of San Diego Jurisdictional Runoff Management Program (JRMP)
- “Be the Solution to Pollution: How to Help in Your Neighborhood”
- “Be the Solution to Stormwater Pollution” calendars and coloring books
- Equine Best Management Practices Manual, Implementation Manual, and Video
- On Line Septic System Maintenance Training
- Sustainable Landscapes
- Rain Barrel and Downspout Disconnects (LID)

- Various Grant Program Workshops

Summaries for each of these materials and programs is provided below.

MRCD/NRCS/Department of Agriculture Materials and Website

The County collaborates with MRCD to provide tools to the agricultural community to address water quality issues. The Ag Web Portal on the MRCD website (http://missionrcd.org/agriculture/) provides links to several nutrient management measures, including the following (embedded links are provided to each of these resources):

- Best Management Practices for Non-Point Source Pollution
- Rainbow Creek Nutrient Reduction Management Plan
- Best Management Practices to Minimize Agricultural Phosphorus Impacts on Water Quality
- A Review of BMPs for Managing Crop Nutrients and Conservation Tillage to Improve Water Quality
- Natural Resources Conservation Service Nutrient Management
- Comprehensive Nutrient Management Plan
- Fertilizing Agricultural Lands
- Nutrient Management for Vegetable, Fruit, and Nut Crops

The MRCD web portal also has guidance for residential septic system maintenance and specific content for the Rainbow Creek Watershed.

UCCE Materials and Website

The County collaborates with UCCE to provide tools to the agricultural community to address water quality issues. Technical and education materials on water quality are provided on the UCCE website under Agricultural Water Quality Research and Education (University California Cooperative Extension (UCCE), n.d.). Nutrient management technical support to growers, nurseries, and greenhouses are provided on the UCCE website at http://ucanr.edu/sites/agwaterquality/Grower_Resources/ and includes self-assessment questionnaires, record keeping notebook system, management manuals, stormwater compliance checklist, and a list of BMPs related to nursery management, orchards and field agriculture operations, residents & animal owners and pollution prevention. The UCCE website also has materials on water conservation and Integrated Pest Management; slide presentations on septic systems, irrigation pumping plants, and pollution mitigation for nurseries; and, a kiosk-based information system to provide users with the current BMPs, laws, and regulations pertaining to agricultural water quality.

County of San Diego Jurisdictional Runoff Management Program

The JRMP presents the programs and strategies of the County of San Diego to reduce the discharge of pollutants to the MS4 and receiving waters to the maximum extent practicable (MEP), which entails improving existing programs and developing new programs. The County updated the JRMP in 2015 to comply with the 2013 MS4 Permit.

Community education and outreach is described in JRMP Section 7.0. Education activities are implemented at the regional, watershed, and jurisdictional levels, as well as to specific target audiences.

At a minimum, the County's education efforts are targeted to reach the following communities: municipal facilities and personnel, construction site owners and developers, industrial and commercial business owners and operators, the general public, school children, and residential communities. Educational outreach by the County is developed and implemented based on the following four objectives:

- Teaching basic awareness;
- Adapting education to specific target audiences;
- Clearly describing specific responsibilities under the WPO; and,
- Providing instruction to successfully implement BMPs, with an emphasis on pollution prevention.

For the residential and general public audiences, the County's educational outreach program, as described in the JRMP, utilizes a multi-media approach. Media types may include print materials, television, radio, websites, billboards, and promotional items. Joining efforts with the County Water Authority, the County of San Diego has been and continues to work to collaborate on efforts to reduce water use and over irrigation. Messages and promotional materials have been tailored to include these messages and to promote the use of native or drought-tolerant plants. Promotional items may include pens, pencils, magnets, and rulers, as well as more behavior-specific items including packages of California poppy seeds to promote the use of native or low maintenance plants. All items contain stormwater messages and the County of San Diego Stormwater Hotline and Project Clean Water website. Outreach materials are distributed by County staff during community events, displayed in kiosks at appropriate locations, and supplied to partner organizations to distribute at their facilities.

Educational outreach activities for the residential and general public audiences include community events, fairs and festivals, clean-up events, and special events. The County of San Diego also implements an "education first" philosophy which allows for residential complaint investigations to provide opportunities for direct interaction and explanation to residents about water quality concerns, pollutants, and BMPs.

Educational outreach activities for school children continue to be a priority for the County of San Diego. The County of San Diego provides education to thirteen elementary school districts and six high school districts in the County's jurisdiction, covering a total of 105 schools. The County of San Diego currently contracts with the San Diego County Office of Education's Splash Science Mobile Lab (Splash Lab) and Green Machine. The Splash Lab is a completely self-contained mobile laboratory that brings simulated environmental conditions to school sites for ease and convenience. This enables schools with limited funding and schools within disadvantaged communities to have easy access to water science education. These presentations provide an interactive opportunity to children to learn about stormwater, water quality, bioassessment, watersheds, pollution, and BMPs. Additionally, outreach to high school students in the County Unincorporated area is provided through a contract with I Love a Clean San Diego (ILACSD). ILACSD gives presentations to high school students, teaching them valuable lessons about watershed protection, water quality, pollution prevention, and local watershed issues.

The County of San Diego Department of Parks and Recreation (DPR) also operates multiple programs at a variety of parks in the County Unincorporated area. The programs reach a variety of students from a multitude of schools and school districts. They also provide services to Boy, Girl, and Cub Scout troupes. The DPR holds approximately 100 outreach events annually, reaching thousands of children. Rangers

and volunteers are trained in the Environmental Education Program to provide multiple interpretive services to the public, such as wildlife conservation programs with live animals, environmental slide programs, safety talks, ranger-led nature walks, plant propagation programs, and community service. Within DPR is the Multiple Species Conservation Program (MSCP), a comprehensive long-term habitat conservation program. The MSCP works to preserve San Diego's unique, native habitats and wildlife for future generations as well as protect watershed and water quality by targeting 172,000 acres of natural areas in San Diego County for conservation.

"Be the Solution to Pollution: How to Help in Your Neighborhood"

This neighborhood guide is a regional product that was developed to educate homeowners' associations, residents, and community groups about simple methods of preventing pollution in residential areas. The guide briefly explains how fertilizers and yard waste, which are common sources of nutrients, can impact the local waterways. The neighborhood guide has specific sections on common nutrient pollution sources such as irrigation runoff, runoff reduction measures, landscaping (including fertilizers, pesticides and herbicides, yard waste, soil conditions, plants, and soil piles), slopes and bare soil, as well as sections on other typical stormwater pollutants such as pet waste, cleaning, car repair and maintenance, trash, swimming pool discharges, and fats, oils, and grease (FOG). Each section describes in plain terms what to look for as signs of pollution or improper practices, and each section clearly communicates what residents should do to prevent stormwater pollution. The neighborhood guide uses appealing, cartoon-style graphics to demonstrate poor practices and proper practices to prevent pollution.

"Be the Solution to Stormwater Pollution" Calendars and Coloring Books

The calendars and coloring books are regional products similar to the neighborhood guide described above as they include text and illustrations of improper practices and proper BMPs to prevent stormwater pollution.

The calendars printed and distributed for 2010, 2012, and 2013 included months that featured nutrient pollutant sources, including fertilizers, clippings and yard waste, irrigation runoff, pesticides, outdoor cleaning, and exposed soil. A 2017 calendar is currently in development that will include months featuring nutrient pollutant sources such as mulch and compost, fertilizers, irrigation runoff, outdoor cleaning, and exposed slopes. The 2017 calendar also includes months that feature rain barrels and downspout diversion. Since 2012, the calendars have been provided in English and Spanish. The 2012 calendar also included an optional survey for recipients. Based on the survey cards that were returned for the region, 83% of respondents correctly answered that grass clippings, fertilizer, and soil and dirt are all causes of water pollution. These are common sources of nutrient pollution. In addition, 64% of respondents reported a change in behavior resulting from information seen about the effects of stormwater pollution.

The coloring books include five select topics from the calendars in a black and white format, one of which is clippings and yard waste. The coloring books are bilingual and are targeted toward children. Studies have shown that teaching children about environmental issues and desired behaviors can affect the knowledge and behavior of parents.

Equine BMP Manual, Implementation Manual, and Video

The County of San Diego developed an Equine BMP Manual, an Equine BMP Implementation Manual, and a video titled "How to Manage Manure: Composting for Horse Owners." Equine facilities and activities are potential sources of nutrients in stormwater runoff from manure and erosion. Equine facilities are also suitable locations for implementing stormwater capture and re-use.

The Equine BMP Manual is targeted to the typical owner or operator of equine facilities. It is written in a non-technical format and focuses on common activities and areas of concern at equine properties. The information presented in the Equine BMP Manual is equally relevant in rural residences of the Rainbow Creek Watershed that house livestock. The common activities and areas of concern included in the Equine BMP Manual are manure management, dirt access roads and trails, arenas and paddocks, stockpiles, horse wash rack drains, vehicle maintenance, housekeeping, site design, exclusionary fencing, pest management, and training and education. Each topic area includes a highlighted best practice and additional practices to protect or improve animal health and protect stormwater from pollution. Resources for additional information are also provided for each topic area as well as pesticide application, vector control, recycling and household hazardous waste, water wells and gray water, the Equine Ordinance, zoning issues, the County of San Diego Air Pollution Control District, California Stormwater Quality Association (CASQA), and Project Clean Water.

The Equine BMP Implementation Manual provides a technical, detailed discussion of design, sizing, and implementation of common equine BMPs, including composting, manure spreading, erosion controls, sediment controls, infiltration, landscaped depression, and capture and re-use. Resource links are also provided for the County of San Diego Watershed Protection Ordinance, CASQA, Livestock and Land website, Natural Resource Conservation Service, and County of San Diego LID Handbook.

The 13-minute video titled "How to Manage Manure: Composting for Horse Owners" was developed by the County of San Diego WPP in collaboration with the Recycling Program and the County Television Network (CTN). The target audience for the video was County residents who own or board horses on their properties. The full-length DVD and equestrian-specific tip cards are distributed at Equine and Trail Associations and equine-specific community events. A shortened version will be aired on the CTN's County Chronicles program.

On Line Septic System Maintenance Training

MRCD provides online septic system maintenance training through their website at http://missionrcd.org/learnaboutseptic/. The online training includes information on what is a watershed, storm drains and runoff, what is a septic system, different types of septic systems, how a septic system treats water, groundwater levels and septic systems, care and maintenance BMPs, septic tank pumping frequency, signs of septic system failure, septic system failure BMPs, septic system contact information, and septic system resources.

Sustainable Landscapes

The County of San Diego, in partnership with the San Diego County Water Authority, City of San Diego, Surfrider Foundation, California American Water, and Association of Compost Producers, has developed *Sustainable Landscape Guidelines: A Watershed Approach to Landscaping* (SLP Guidelines). The SLP Guidelines explain landscaping principles including:

- Building health, living soil that acts as a sponge to absorb water from rainfall or irrigation;
- Collecting stormwater runoff from roofs and other hard surfaces and redirecting it into the soil; and,
- Growing plants that thrive in the San Diego weather conditions and feed local pollinators.

The San Diego Sustainable Landscapes Program (SLP) also provides free landscaping classes. Design seminars help in designing a successful sustainable landscape, including contouring gardens for rainwater capture, creating climate-appropriate plant lists, and creating a plant plan using key design principles to group plants according to water needs. Lawn Be Gone Hands On Workshops demonstrate how to building healthy living soil, remove turf without harmful chemicals, capture water from rooftops and other hard surfaces, and "slow, spread, and sink it" into the landscape. The SLP is made possible by Proposition 84 grant funding through the California Department of Water Resources.

Rain Barrel and Downspout Disconnects (LID)

The County of San Diego WPO urges the efficient use of water, especially outdoors. Preventing over irrigation and unnecessary outdoor water use also prevents polluted water runoff from entering the MS4 and receiving waters. The County of San Diego WPP provides information and resources for rain barrels and downspout disconnects, including the following:

- San Diego County List of Rain Barrel Retailers;
- Rain Barrel Resource Document (a listing of organizations and websites with information on rainwater harvesting, water conservation, waterwise landscape design, and water conservation gardens in San Diego);
- Rain Barrel Fact Sheet;
- Rain Barrel & Mosquitoes Fact Sheet; and,
- Do-it-yourself: How to Make a Rain Barrel.

Implementing rain barrels and downspout disconnects can reduce water pollution as a result of rainwater runoff which carries pesticides, fertilizers, sediment, oil and trash into receiving waters and reduce soil erosion and improve the ability of water to infiltrate into the soil at a reduced intensity.

14. Seek Financial Assistance

The County has pursued and was awarded two grants that include the 319(h) State Water Resources Board water quality grant that funded this NRMP. The County is continually investigating and will pursue alternative funding sources to address nutrient sources where appropriate. Collaboration with NRCS will continue to provide tools, outreach and technical support on MM/MPs to the agricultural and residential communities.

15. Nutrient Reduction and Management Plan (NRMP) Effectiveness

The County uses a number of measurements and metrics to assess the effectiveness of the NRMP. These measurements are performed to assess the outcome of program activities for various outcome levels. These outcome levels include:

- ***Stormwater Program Activities (Level 1)*** – e.g., annual assessment of implementation strategies based on results of outcome assessment
- ***Barriers and Bridges to Action (Level 2)*** – e.g., lack of knowledge of nursery and greenhouse workers on proper nutrient management measures
- ***Target Audience Actions (Level 3)*** – e.g., ineffective or non-compliant BMPs/management measures implemented at nurseries or other high priority sources
- ***Source Contributions (Level 4)*** – e.g., irrigation runoff reductions that translate into a nutrient load reduction
- ***MS4 Contributions (Level 5)*** –e.g., discharges of nutrients from designated MS4 outfalls
- ***Receiving Water Conditions (Level 6)*** – e.g., water quality benchmarks for nitrogen and phosphorus in non-storm flows in Rainbow Creek and its tributaries

These outcome levels are defined in more detail in the CASQA Stormwater Program Effectiveness Assessment Guidelines (CASQA, 2015). The ultimate goals of these measures are to meet the nutrient load reductions stated in the TMDL and the restoration and protection of the beneficial uses of Rainbow Creek. The attainment of these goals can be measured at these various outcome levels to demonstrate the effectiveness of the NRMP implementation.

Stormwater Program Activities (Level 1)

The NRMP implementation for high priority sources is assessed through the requirements stated in the JRMP under the implementation and assessment components of the stormwater program that include inspections, reporting, and monitoring (JRMP, 2015). The JRMP provides the implementation requirements for compliance with the 2013 MS4 Permit for each of the stormwater program components. The implementation of assessment measurements for the high priority sources in the Rainbow Creek Watershed are presented in Section 5 of the JRMP that includes industrial, commercial, municipal and residential sources.

The water quality conditions in the receiving water (Level 6) are periodically assessed through the County's monitoring programs. Assessment of identified source components occurs as part of the ongoing implementation and review of JRMP elements. As applicable, results of JRMP assessments will also be used to describe progress in meeting NRMP goals. Changes in assessment requirements for JRMP elements will be identified as applicable to the Assessment Component of the JRMP or other implementing plans. Collectively, each of these assessment elements will inform an iterative approach to adapt the monitoring and assessment programs, and JRMP to become more effective toward achieving compliance with the provisions of the MS4 Permit.

Barriers and Bridges to Action (Level 2)

In accordance with the JRMP, the assessment of the program effectiveness includes the measurement of the outcomes of facilitation activities. Facilitation activities include training and outreach and education materials and activities. Facilitation activities have outcomes related to ***Barriers and Bridges to Action (Level 2)***. Facilitation activities measurements taken to date include surveys conducted as part of workshops local nurseries and greenhouse facilities and the residential community.

Measurement of the assessment outcome ***Barriers and Bridges to Action (Level 2)*** has been conducted through pre- and post-surveys from the workshops conducted as part of the NRMP under the most

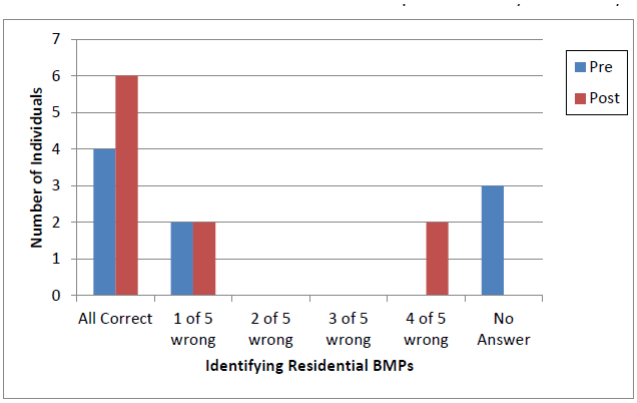
recent 319(h) grant to document the increase in knowledge of attendees. These workshops were conducted by UCCE and MRCD in cooperation with the County. San Diego County's Department of Environmental Health participated in the septic system workshop. The grant included the following workshops:

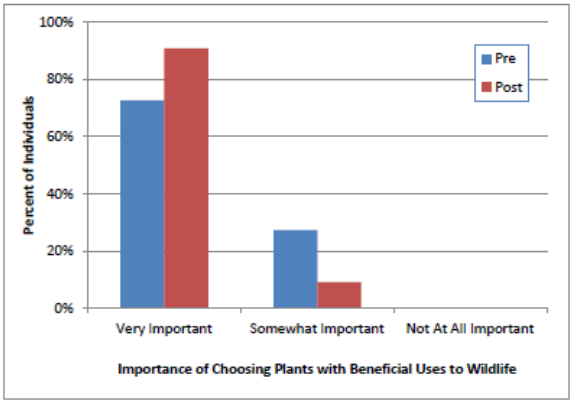
- Eight Residential Community Workshops
    - Best Management Practices for and maximizing the efficiency of Residential Landscape Irrigation Systems. (August 19, 2013)
    - "Backyards and Barnyards" composting landscape yard waste as well as livestock (horses, goats, etc.) waste (January 29, 2014)
    - "Gardening Green" (May 10, 2014)
    - Integrated pest management practices for residential gardens and landscapes (September 13, 2014)
    - "Butterfly Gardening and Common Sense Landscaping" (February 21, 2015)
    - "Life After Lawn" (August 22, 2015)
    - "Prepare Your Property" (November 7, 2015)
    - "Rainwater Harvesting" (April 2, 2016)
- Two Agricultural Community Workshops
    - "The Future of Avocado Production in Southern California" (July 22, 2015)
    - Mission Resource Conservation District's Agricultural Irrigation System Evaluation Program and Irrigation System BMPs (May 20, 2014)
- Two Septic System Workshops (September 27, 2014)

Surveys were conducted pre- and post-workshop presentations and discussions. The complete report of the results of these surveys are provided in the 319(h) Grant Final Report (2016). Highlighting the results of the agricultural workshops that included a workshop on the "The Future of Avocado Production in Southern California," pre-survey and post-survey results showed an increase in the knowledge of growers on the issue of water quality and the impact from irrigation on nearby streams and rivers. An increase in the acknowledgement of operational impacts to water quality was observed. On the post-survey, the participants were asked if the information presented at the workshop caused them to think about how potentially polluted stormwater and irrigation runoff at agricultural operations could be minimized using BMPs. A total of 78 people (92% of those who answered this question) answered "yes" and a total of 7 people (8%) said "no" to this question. The post-survey also asked if the information presented at the workshop would influence how management practices for the agricultural properties would be implemented in order to minimize the possibility of pollutants leaving the property with the irrigation or stormwater runoff. Of the 77 people who answered this question and had agricultural properties, 64 (83%) said "yes" and 13 (17%) said "no" to this question.

The results of the residential community workshops are also provided in the 319(h) Grant Final Report (2016). The pre- and post-survey of the residential attendees were asked to identify all of the BMPs that were appropriate for residential properties. Forty-four percent (44%) of the attendees were able to identify all five of the BMPs in the pre-survey. This increased to sixty percent (60%) of the attendees who answered this question correctly on the post-survey. Increased knowledge of BMPs was also

indicated through questions on manure management. When asked, prior to the workshop, 16 (46%) people felt that livestock manure contributed "a great deal" to water pollution, while 25 people (64%) answered the same way on the post-survey. The results of the surveys also show a consistent increase in the knowledge and awareness of the use of plants in residential landscaping that can reduce water use and be more beneficial to wildlife.





The workshop on septic system BMPs was attended by 38 people. Increased awareness of the proper BMPs for septic system maintenance was indicated in the pre- and post-surveys. Attendees were asked to identify septic system specific BMPs on both the pre- and post-surveys. Prior to the workshop, 14 (45%) people who completed this question knew that all five of the BMPs listed were appropriate for septic system care and maintenance. After the presentations, 29 (76%) people answered this question correctly. Additional results and discussion of the workshop survey results is provided in the 319(h) Grant Final Report (2016).

JRMP Section 8 provides a description of the general residential program and the assessment of the program implementation. The County conducts a variety of programs across multiple departments to prevent and respond to discharges from residential areas in the unincorporated area. These programs emphasize changes in knowledge and awareness (***Barriers and Bridges to Action (Level 2))*** necessary to effect and sustain responsible behavior. The County tailors its programs to address the unique characteristics of the many diverse unincorporated communities. The outreach programs involved in residential implementation are further described in JRMP Section 8. Targeted outcomes for these programs include an increase in awareness and knowledge of targeted audiences. The measurements used to assess the outcomes include surveys similar to those highlighted above for the targeted workshops under the NRMP 319(h) grant.

Target Audience Actions (Level 3)

The JRMP requires assessment of program effectiveness through Feedback and Verification. Feedback and Verification has outcomes related to ***Target Audience Actions (Level 3)***. These include annual inspections of high priority commercial/industrial sources (commercial nurseries, greenhouses, and orchards). These inspections are conducted by County AWM. Feedback and verification includes complaint inspections and special investigations of these commercial facilities. As highlighted under Section 8, the *Parcel-Based Characterization of Nutrient Sources in the Rainbow Creek Watershed* (Weston Solutions, 2010) used the results of the annual inspections as a factor in rating the TTWQ for each parcel. The results of this TTWQ assessment provide a tool for prioritization of implementation measures under the JRMP effectiveness assessment of measures to reduce the source contributions.

JRMP Section 8 describes the steps to require, encourage, and verify the implementation of prescribed BMPs for high priority residential activities. Outcome ***Level 3 Target Audience Actions*** (defined as "Behaviors" in JRMP Section 8) is assessed through residential inspection programs conducted by the County. The objectives of the County's residential enforcement program are to educate the community, promote compliance with applicable ordinances, and return violators to compliance. Although education is emphasized as the primary means of achieving compliance, the County has established the necessary authority and programs to investigate and enforce all potential stormwater violations.

The tools for assessment of compliance of residential activities are feedback and verification. Complaint investigations are used to gather data and information as a response to reports of potential violations, through complaints received from the Stormwater Hotline, online, or from staff referrals. Investigations typically consist of observations, record reviews, and sampling as needed. All reported incidents of pollution originating from residential areas will be investigated and resolved. The lead for the investigations of residential complaints will be the WPP.

Source Load Reduction (Level 4)

Measurement of ***Source Load Reduction (Level 4)*** to assess the effectiveness of implemented BMPs/MM includes the use of the BMP Effectiveness Nutrient Load Reduction Tool that was developed for both structural and non-structural BMPs. The tool calculates loading reductions for wet weather flows through the use of land use data and published runoff coefficients to determine runoff characteristics, and then uses literature values and professional judgement on the effectiveness of the BMP to determine load reduction. The tool also provides an estimate of load reductions achieved by MM/MPs with regard to dry weather flow load reductions through inspections that record whether dry weather flow is observed. If observed, the tool uses professional estimates of runoff reduction for the type of MM/MPs to determine the dry weather load reduction. These include calculating nutrient load reductions achieved from BMPs that limit irrigation runoff that can enter receiving water or infiltrate into the groundwater.

MS4 Contributions and Receiving Water Conditions (Levels 5 and 6)

As discussed under *Monitoring to Assess Compliance with Nutrient Load Reductions*, measurements of ***MS4 Contributions (Level 5) and Receiving Water Conditions (Level 6)*** are conducted as part of the WQIP Monitoring Program that includes TMDL monitoring for Rainbow Creek. Assessment may also be conducted through focused one-time special studies. Annual reporting of receiving water conditions including nutrient concentrations trends in Rainbow Creek are presented in the Santa Margarita Watershed Management Area Interim Annual Report (WMA AR) (Weston Solutions, 2016). After the approval of the WQIP due in January 2018, water quality monitoring data will be presented through the annual WQIP reporting on implementation.

Receiving water monitoring currently includes 14 sampling locations monitored monthly during dry weather. Locations of the current receiving water monitoring in Rainbow Creek and its tributaries are presented in the WMA AR (Weston Solutions, 2016). Dry weather samples are analyzed for nutrients, salinity and TDS. Instantaneous nutrient loadings are presented with long term nutrient concentration trends in the WMA AR to provide data for long-term effectiveness assessment. Receiving water quality data is not used to assess program effectiveness on an annual basis due to inherent variability of water quality data. Long-term trend analysis of receiving water conditions provide a more statistically sound

approach to effectiveness assessment. Trend analysis shows decrease in total phosphorus in both the upper and lower watershed, and decrease in total nitrogen in upper watershed. An increase trend in total nitrogen is reported in the lower watershed. These results are presented on the Project Clean Water website.

16. Nutrient Reduction and Management Plan (NRMP) Annual Report

The Rainbow Creek TMDL also included a NRMP annual report component. The NRMP annual report was to be submitted to the Regional Board by January 31 of each year for the previous fiscal year (reporting period). The TMDL states that the NRMP annual reports should contain the following information:

- Comprehensive description of all activities conducted by the County of San Diego to oversee implementation of the NRMP.
- An accounting of all inspections conducted, enforcement actions taken, and education efforts conducted.
- An assessment of whether actions to implement designated minimum MPs at each nutrient source were actually carried out by dischargers.
- As assessment of the compliance of runoff or groundwater discharges with the load reductions from each of the land use categories assigned a load reduction.
- Identification of water quality improvements or degradation in Rainbow Creek with regard to attainment of the nutrient water quality objectives.
- An evaluation of the effectiveness of the NRMP in achieving the nutrient load reductions required under this TMDL.

The Rainbow Creek TMDL is integral to understanding and addressing water quality concerns within the watershed. For this reason, TMDL requirements will largely be addressed as part of the WQIP development and implementation process.

The purpose of the WQIP is to guide MS4 Copermittees' jurisdictional runoff management programs towards achieving the outcome of improved water quality in MS4 discharges and receiving waters through a process that identifies the highest priority water quality conditions within a watershed and implements strategies through the jurisdictional runoff management programs to achieve improvements in the quality of discharges from the MS4s and receiving waters. 2013 MS4 Permit Provision B.2.a(2) requires that TMDLs applicable to the Watershed Management Area (WMA) be included in the assessment process to identify water quality priorities for the WQIP. The Rainbow Creek Nutrient TMDL will, thus, be considered as part of the process to identify priority water quality conditions in the Santa Margarita WMA.

The implementation efforts described in this document, including jurisdictional strategies identified in the JRMP, will be incorporated into the water quality improvement strategies identified in the WQIP as appropriate to reflect the prioritization of nutrients or nutrient related conditions (such as biostimulatory effects) in Rainbow Creek subwatershed as a water quality condition within the WQIP. The WQIP will also incorporate numeric goals (e.g., TMDL established water quality-based effluent limitations [WQBELs]) that will be used to assess progress towards addressing priority water quality

conditions. The WQIP annual report will include the water quality improvement strategies implemented during the reporting period and will assess the progress of strategies implemented towards achieving numeric goals for highest priority water quality conditions. For example, the WQIP annual report would assess compliance with TMDL allocations or load reductions selected as numeric water quality improvement goals and water quality improvements or degradation with respect to numeric goals. Based on the progress towards achieving numeric goals, measurable reductions of pollutants in discharges or other factors observed during the reporting period as outlined by 2013 MS4 Permit Provision B.5.b, permittees are required to implement an adaptive management process which will include a re-evaluation of water quality improvement strategies, including those strategies incorporated into the WQIP from this NRMP or the JRMP, in the WQIP Annual Report Permit Provisions.

The TMDL reporting requirements will be incorporated into the WQIP annual report. Table 9 provides an overview of WQIP reporting requirements as dictated by the 2013 MS4 Permit and how those requirements will also satisfy the required elements of the NRMP annual report required by the TMDL.

Table 9. Required WQIP and NRMP Annual Report Elements

Permit Provisions	Permit Language	NRMP AR required element
F.3.b.(3)(c)	The findings, interpretations and conclusions from the assessments required pursuant to Provision D.41	d., e.
F.3.b.(3)(d)	The progress of implementing the WQIP, including, but not limited to, the following:	
	(i) The progress toward achieving the interim and final numeric goals for the highest water quality priorities for the WMA;	d., e.
	(ii) The water quality improvement strategies that were implemented and/or no longer implemented by each of the Copermittees during the reporting period and previous reporting periods;	a., b., c.
	(iv) Proposed modifications to the water quality improvement strategies, the public comments received and the supporting rationale for the proposed modifications;	f.
	(vi) Proposed modifications or updates to the Water Quality Improvement Plan and/or each Copermittee's jurisdictional runoff management program document;	f.
F.3.b.(3)(e)	A completed Jurisdiction Runoff Management (Attachment D to the Permit) for each Copermittee in the Watershed Management Area, certified by a Principal Executive Officer, Ranking Elected Official, or Duly Authorized Representative; and	b.

1. Provision D.4 of the 2013 MS4 Permit requires assessments of pollutant reductions in stormwater and non-stormwater discharges.

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18. Other Suggested Resources

- http://offices.sc.egov.usda.gov/locator/app?service=page/ServiceCenterSummary&stateCode=06&cnty=073
- http://ucanr.edu/sites/agwaterquality/Grower_Resources/

Appendix A
Response to
Prior Public Comments

Rainbow Creek
Nutrient Reduction and Management Plan

Response to Public Comment

The Draft Nutrient Reduction Management Plan (NRMP) was submitted for public comment and review. The comment period extended from August 13th until September 14th, 2015.

Comments were submitted and compiled by Loretta Bates at lbates@ucanr.edu.

Comment Submission Form	
Draft Nutrient Reduction Management Plan	
Comment By*: Katiuchka Marquez	**Date***: 08/25/2015
Email: Katiuchka.marquez@amecfw.com	**Organization:** Amec Foster Wheeler

Page *	Comments Received	County of San Diego Response (5/27/16)
General Comment	The Draft NRMP should contain the elements described in Section C of the Resolution Order No. R9-2005-0036. Specifically, this document lacks: a description on how the County will develop and update the inventory for individual nutrient sources (Section C – item 7); establish a priority list for inspection and oversight activities (Section C – item 8); describe the steps and timeline it will take to designate a set of minimum management measures and practices (Section C – item 9); describe the steps it will take to inspect high priority sites and sources (Section C – item 10); describe the steps it will take to enforce ordinances, etc (Section C – item 11); describe steps to notify non-compliant sites to the Regional Board (Section C – item 12); describe the steps to request monitoring program from nutrient sites (Section C – item 13); and describe the steps it will take to develop a long-term strategy for assessing effectiveness of the NRMP (Section C – item 16); and annual report (Section C – item 17).	1) Refer to Introduction and Scope of Revised Document. Document scope has been expanded to reflect all required items under Section C of the Basin Plan Amendment.
General Comment	This document lacks a description of the roles and responsibilities local authorities have in accomplishing these goals; timeline to accomplish goals and organizational chart.	2) Refer to Figure 1 of Revised NRMP Document, which shows an overall organizational chart of County personnel responsible for implementing the NRMP.
9	Nutrient Management Goals and Management Practices: To meet management goal 1, nursery facilities should regularly monitor and sample the quality of the water irrigation source; however, it is unclear which water quality standards nurseries facilities should use to compare with laboratory analytical results. It is unclear how frequent should the soil, plant tissue and fertigation water be tested.	3) The revised document now includes a section entitled "Monitoring to Assess Compliance with Nutrient Load Reductions". This section comprehensively discusses the County's current monitoring program within the Rainbow Creek watershed. This includes dry weather monitoring at 14 locations as well as a pilot program that monitors nutrient concentration at MS4 outfalls. The methods and

Response to Public Comment

Page *	Comments Received	County of San Diego Response (5/27/16)
		analytical procedures used are based upon a Quality Assurance Project Plan (QAPP) which was previously reviewed and approved by the San Diego Regional Water Quality Control Board.
12	<u>Erosion and Runoff Management Goals and Management Practices:</u> To meet management goal 1, water quality from stormwater runoff should be evaluated. This measure may be very expensive for local nurseries. Funding may be required to evaluate water quality from stormwater runoff at nursery facilities. A better approach should be considered that will limit operation and maintenance management goals to nursery facilities, and sampling and analysis of stormwater runoff and to environmental professionals.	4) Implementation of the revised NRMP does not rely on monitoring activity from private parties, although some limited monitoring is currently being undertaken by agricultural groups within the watershed. Ongoing monitoring by County of San Diego DPW staff is sufficient to evaluate compliance with the TMDL. See also response #3.
13 and 14	<u>Erosion and Runoff Management Goals and Management Practices:</u> To meet management goals 3 and 4, nursery facilities should use practices that will reduce erosion and runoff, however, goal details indicate an engineer design approach may be need if erosion and significant stormwater runoff leaving the property is found. This goal may be accomplished by a local authority during inspections and sampling of the water quality at each of these facilities. Funding may be required.	5) Reduction of erosion and dry weather runoff from nurseries can adequately be accomplished by implementing simple and cost effective management practices described within the revised NRMP, all of which are legally enforceable under the County's Watershed Protection Ordinance. The County of San Diego has, and continues, to seek funding to achieve a wide range of water quality goals. This includes two separate Section 319 Grants associated with nutrient reduction in the Rainbow Creek Watershed.
14	<u>Erosion and Runoff Management Goals and Management Practices:</u> To meet management goal 5, nursery facilities should design and manage nursery roads to prevent erosion and contaminated runoff, however, the goal details indicate that local authorities may have more responsibility to accomplish this goal since it involves engineering design and inspection.	6) See response No. 5.
15	<u>Erosion and Runoff Management Goals and Management Practices</u>: To meet management goal 6, nursery facilities should collect excess water irrigation and stormwater runoff and sediment for reuse, however, engineering design of retention basins and recirculation system may require funding and support from local authority.	7) See response No. 5.

Response to Public Comment

Page *	Comments Received	County of San Diego Response (5/27/16)
21-27	Same comments as above on Sections B and C for nurseries.	8) See response No. 5.
28	<u>Record Keeping:</u> Typo error.	9) No longer applicable, this text has be superseded by the current revision to the NRMP.
29	<u>Septic System Management Goals and Management Practices:</u> To meet management goal 1, residents must use appropriate design and size of septic tanks, however, it is not up to them to decide. This is usually based on tests, engineering and approval by the DEH.	10) The NRMP has been clarified in this regard. A discussion of the County's On-Site Waste Water Treatment Systems Ordinance and associated technical references is found within the "Legal Authority" section.
37	This chapter seems to be unrelated to nutrient reduction management practices with the exception of Management Goal 1. Are these goals to be implemented (if applicable) by any resident, facility and business within Rainbow Creek Watershed?	11) No longer applicable, this text has be superseded by the current revision to the NRMP.

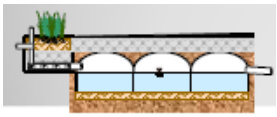
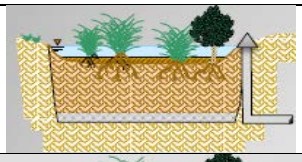
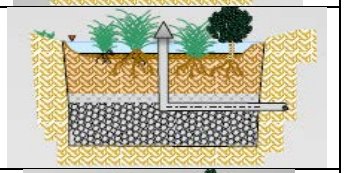
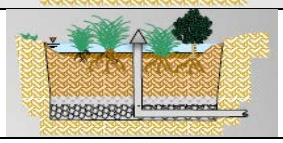
*** Page number reflects original submittal as prepared by UCCE**

Appendix B
Fact Sheets
from BMP Design Manual

Rainbow Creek
Nutrient Reduction and Management Plan

Appendix E BMP Design Fact Sheets

The following fact sheets were developed to assist the project applicants with designing BMPs to meet the storm water obligations:

MS4 Category	Manual Category	Design Fact Sheet	Typical Design
Source Control	Source Control	SC: Source Control BMP Requirements SC-6A: Large Trash Generating Facilities SC-6B: Animal Facilities SC-6C: Plant Nurseries and Garden Centers SC-6D: Automotive-related Uses	
Site Design	Site Design	SD-A Tree Wells SD-B: Impervious Area Dispersion SD-C: Green Roofs SD-D: Permeable Pavement (Site Design BMP) SD-E: Rain Barrels SD-F: Amended Soil	
Retention	Harvest and Use	HU-1: Cistern	
	Infiltration	INF-1: Infiltration Basins INF-2: Bioretention INF-3: Permeable Pavement (Pollutant Control)	
	Partial Retention	PR-1: Biofiltration with Partial Retention	
Biofiltration	Biofiltration	BF-1: Biofiltration BF-2: Nutrient Sensitive Media Design BF-3: Proprietary Biofiltration	
Flow-thru Treatment Control	Flow-thru Treatment Control with Alternative Compliance	FT-1: Vegetated Swales FT-2: Media Filters FT-3: Sand Filters FT-4: Dry Extended Detention Basin FT-5: Proprietary Flow-thru Treatment Control	
		PL: Plant List for Bioretention Facilities	

E.1 Source Control BMP Requirements

Worksheet E.1-1: Source Control BMP Requirements

How to comply: Projects must comply with this requirement by implementing all source control BMPs listed in this section that are applicable and feasible for their project. Applicability must be determined through consideration of the development project's features and anticipated pollutant sources. Appendix E.1 provides guidance for identifying source control BMPs applicable to a project. The Standard and PDP SWQMP templates include sections that must be used to document compliance with source control BMP requirements.

How to use this worksheet:

1. Review Column 1 and identify which of these potential sources of storm water pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your project site plan.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in a table in your project-specific storm water management report. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternatives.

If These Sources Will Be on the Project Site …	… Then Your SWQMP Must Consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Drawings**	**3** **Permanent Controls—List in Table and Narrative**	**4** **Operational BMPs—Include in Table and Narrative**
❑ **A.** Onsite storm drain inlets ❑ Not Applicable	❑ Locations of inlets.	❑ Mark all inlets with the words "No Dumping! Flows to Bay" or similar. See stencil template provided in Appendix I-4	❑ Maintain and periodically repaint or replace inlet markings. ❑ Provide storm water pollution prevention information to new site owners, lessees, or operators. ❑ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Storm Water Quality Handbooks at www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook. ❑ Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Drawings**	**3** **Permanent Controls—List in Table and Narrative**	**4** **Operational BMPs—Include in Table and Narrative**
❑ **B.** Interior floor drains and elevator shaft sump pumps ❑ Not Applicable		❑ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	❑ Inspect and maintain drains to prevent blockages and overflow.
❑ **C.** Interior parking garages ❑ Not Applicable		❑ State that parking garage floor drains will be plumbed to the sanitary sewer.	❑ Inspect and maintain drains to prevent blockages and overflow.
❑ **D1.** Need for future indoor & structural pest control ❑ Not Applicable		❑ Note building design features that discourage entry of pests.	❑ Provide Integrated Pest Management information to owners, lessees, and operators.

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Drawings**	**3** **Permanent Controls—List in Table and Narrative**	**4** **Operational BMPs—Include in Table and Narrative**
❑ **D2.** Landscape/ Outdoor Pesticide Use ❑ Not Applicable	❑ Show locations of existing trees or areas of shrubs and ground cover to be undisturbed and retained. ❑ Show self-retaining landscape areas, if any. ❑ Show storm water treatment facilities.	State that final landscape plans will accomplish all of the following. ❑ Preserve existing drought tolerant trees, shrubs, and ground cover to the maximum extent possible. ❑ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to storm water pollution. ❑ Where landscaped areas are used to retain or detain storm water, specify plants that are tolerant of periodic saturated soil conditions. ❑ Consider using pest-resistant plants, especially adjacent to hardscape. ❑ To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	❑ Maintain landscaping using minimum or no pesticides. ❑ See applicable operational BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Storm Water Quality Handbooks at www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook. ❑ Provide IPM information to new owners, lessees and operators.

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Drawings**	**3** **Permanent Controls—List in Table and Narrative**	**4** **Operational BMPs—Include in Table and Narrative**
❑ **E.** Pools, spas, ponds, decorative fountains, and other water features. ❑ Not Applicable	❑ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet.	❑ If the local municipality requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	❑ See applicable operational BMPs in Fact Sheet SC-72, "Fountain and Pool Maintenance," in the CASQA Storm Water Quality Handbooks at www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook.
❑ **F.** Food service ❑ Not Applicable	❑ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ❑ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	❑ Describe the location and features of the designated cleaning area. ❑ Describe the items to be cleaned in this facility and how it has been sized to ensure that the largest items can be accommodated.	

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
❑ **G.** Refuse areas ❑ Not Applicable	❑ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ❑ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. Also show how the designated area will be protected from wind dispersal. ❑ Any drains from dumpsters, compactors, and tallow bin areas must be connected to a grease removal device before discharge to sanitary sewer.	❑ State how site refuse will be handled and provide supporting detail to what is shown on plans. ❑ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	❑ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on- site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Storm Water Quality Handbooks at www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook.

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Drawings**	**3** **Permanent Controls—List in Table and Narrative**	**4** **Operational BMPs—Include in Table and Narrative Table and Narrative**
❑ **H.** Industrial processes. ❑ Not Applicable	❑ Show process area.	❑ If industrial processes are to be located onsite, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."	❑ See Fact Sheet SC-10, "Non-Storm Water Discharges" in the CASQA Storm Water Quality Handbooks at https://www.casqa.org/resources/bmp-handbooks.
❑ **I.** Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.) ❑ Not Applicable	❑ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or runoff from area and protected from wind dispersal. ❑ Storage of non-hazardous liquids must be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ❑ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	❑ Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of local Hazardous Materials Programs for: ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release Prevention Program ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank	❑ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials" in the CASQA Storm Water Quality Handbooks at www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook.

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Drawings**	**3** **Permanent Controls—List in Table and Narrative**	**4** **Operational BMPs—Include in Table and Narrative**
❑ **J.** Vehicle and Equipment Cleaning ❑ Not Applicable	❑ Show on drawings as appropriate: (1) Commercial/industrial facilities having vehicle /equipment cleaning needs must either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses. (2) Multi-dwelling complexes must have a paved, bermed, and covered car wash area (unless car washing is prohibited onsite and hoses are provided with an automatic shut-off to discourage such use). (3) Washing areas for cars, vehicles, and equipment must be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities must be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility must discharge to the sanitary sewer, or a wastewater reclamation system must be installed.	❑ If a car wash area is not provided, describe measures taken to discourage onsite car washing and explain how these will be enforced.	Describe operational measures to implement the following (if applicable): ❑ Washwater from vehicle and equipment washing operations must not be discharged to the storm drain system. ❑ Car dealerships and similar may rinse cars with water only. ❑ See Fact Sheet SC-21, "Vehicle and Equipment Cleaning," in the CASQA Storm Water Quality Handbooks at www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook.

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Drawings**	**3** **Permanent Controls—List in Table and Narrative**	**4** **Operational BMPs—Include in Table and Narrative**
❑ **K.** Vehicle/Equipment Repair and Maintenance ❑ Not Applicable	❑ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to protect from rainfall, run-on runoff, and wind dispersal. ❑ Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains must not be installed within the secondary containment areas. ❑ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	❑ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ❑ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ❑ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	In the report, note that all of the following restrictions apply to use the site: ❑ No person must dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains. ❑ No vehicle fluid removal must be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids must be contained or drained from the vehicle immediately. ❑ No person must leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
❑ **L.** Fuel Dispensing Areas ❑ Not Applicable	❑ Fueling areas[16] must have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are (1) graded at the minimum slope necessary to prevent ponding; and (2) separated from the rest of the site by a grade break that prevents run-on of storm water to the MEP. ❑ Fueling areas must be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area1.] The canopy [or cover] must not drain onto the fueling area.		❑ The property owner must dry sweep the fueling area routinely. ❑ See the Business Guide Sheet, "Automotive Service—Service Stations" in the CASQA Storm Water Quality Handbooks at https://www.casqa.org/resources/bmp-handbooks.

[16] The fueling area must be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Drawings**	**3** **Permanent Controls—List in**	**4** **Operational BMPs—Include in Table and Narrative**
M. Loading Docks ❑ Not Applicable	❑ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks must be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts must be positioned to direct storm water away from the loading area. Water from loading dock areas should be drained to the sanitary sewer where feasible. Direct connections to storm drains from depressed loading docks are prohibited. ❑ Loading dock areas draining directly to the sanitary sewer must be equipped with a spill control valve or equivalent device, which must be kept closed during periods of operation. ❑ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		❑ Move loaded and unloaded items indoors as soon as possible. ❑ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Storm Water Quality Handbooks at www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook.

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on Drawings**	**3** **Permanent Controls—List in Table and Narrative**	**4** **Operational BMPs—Include in Table and Narrative**
❑ **N.** Fire Sprinkler Test Water ❑ Not Applicable		❑ Provide a means to drain fire sprinkler test water to the sanitary sewer.	❑ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Storm Water Quality Handbooks at www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook
O. Miscellaneous Drain or Wash Water ❑ Boiler drain lines ❑ Condensate drain lines ❑ Rooftop equipment ❑ Drainage sumps ❑ Roofing, gutters, and trim ❑ Not Applicable		❑ Boiler drain lines must be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. ❑ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. ❑ Rooftop mounted equipment with potential to produce pollutants must be roofed and/or have secondary containment. ❑ Any drainage sumps onsite must feature a sediment sump to reduce the quantity of sediment in pumped water. ❑ Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.	

If These Sources Will Be on the Project Site …	… Then Your SWQMP must consider These Source Control BMPs		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on Drawings**	3 **Permanent Controls—List in Table and Narrative**	4 **Operational BMPs—Include in Table and Narrative**
❑ **P.** Plazas, sidewalks, and parking lots. ❑ Not Applicable			❑ Plazas, sidewalks, and parking lots must be swept regularly to prevent the accumulation of litter and debris. Debris from pressure washing must be collected to prevent entry into the storm drain system. Washwater containing any cleaning agent or degreaser must be collected and discharged to the sanitary sewer and not discharged to a storm drain.

E.3 SC-6B Animal Facilities[18]

MS4 Permit Category

Source Control

Manual Category

Source Control

Applicable Performance Standard

Source Control

Primary Benefits

Source Control

Description

Animal facilities have an elevated potential for bacterial loading. If animal fecal material comes into contact with storm water, the storm water can become polluted. Animal facilities include but are not limited to animal shelters, dog daycare centers, veterinary clinics, groomers, pet care stores, and breeding, boarding, and training facilities. The County Engineer may designate additional facilities where animal fecal material is likely to be found.

Design Adaptations for Project Goals

Source control BMPs reduce the amount of pollutants that are generated. This fact sheet contains details on the additional measures required to prevent or reduce pollutants in storm water runoff associated with animal facilities. The requirements presented here are in addition to the source control requirements for all projects:

- Dry weather runoff must be controlled. Dry weather runoff from hosed off areas as part of animal facility operations must not drain to the MS4. Dry weather flows should be retained on-site through implementation of BMPs or collected and discharged to the sanitary sewer.

- Outdoor activity areas must be identified on site plans. Plan reviewers must be able to ensure that runoff from these areas is either diverted to the sanitary sewer or directed to appropriate treatment BMPs. On-site inspection of facilities, grading, and drainage may be required.

[18] Source: City of San Diego Storm Water Standards

- Trash enclosures within animal facilities must be covered to minimize direct precipitation and prevent rainfall from entering enclosures. Structural overhead covers are required as container lids are often left open.

E.4 SC-6C Plant Nurseries and Garden Centers[19]

MS4 Permit Category
Source Control
Manual Category
Source Control
Applicable Performance Standard
Source Control
Primary Benefits
Source Control

Description

Storm water runoff from plant nurseries and garden centers has an elevated risk of being polluted by organics, nutrients, and/or pesticides. Nurseries and garden centers require special attention to protect against these elevated risks. Plant nurseries and garden centers include but are not limited to commercial facilities that grow, distribute, sell, or store plants and plant material. The County Engineer may designate additional facilities if they are likely to be a source of organics, nutrients or pesticides.

Design Adaptations for Project Goals

Source control BMPs reduce the amount of pollutants that are generated. This fact sheet contains details on the additional measures required to prevent or reduce pollutants in storm water runoff associated with plant nurseries or garden center facilities. The requirements presented here are in addition to the requirements of SC-1 through SC-5 which require all development projects to avoid and reduce pollutants in storm water runoff:

- Owner must provide BMP stormwater training to appropriate employees. Employee participation is required to ensure that source controls are properly maintained and behavioral BMPs are followed.

- Eliminate overwatering and overspraying of plants. Overwatering and overspraying of plants increases dry weather flows and pollutant loading, and wastes water. Delivery

[19] Source: City of San Diego Storm Water Standards

systems and schedules should account for different plant types and containers.

- Discharges from outdoor watering areas must be controlled. Regular runoff from outdoor watering can contribute un-authorized dry weather flows to the MS4 (e.g., runoff from watering the plants at garden centers). Runoff water is also likely to be polluted by potting soil mixes and plants that contain fertilizers and/or pesticides. So, regular runoff should be treated and/or retained on-site through BMPs or discharged to the sanitary sewer.

E.6 SD-A Tree Wells

MS4 Permit Category
Site Design
Manual Category
Site Design
Applicable Performance Standard
Site Design
Primary Benefits
Volume Reduction

Tree Wells (Source: County of San Diego LID Manual – EOA, Inc.)

Description

Trees planted to intercept rainfall and runoff can be used as storm water management measures that provide additional benefits beyond those typically associated with trees, including energy conservation, air quality improvement, and aesthetic enhancement. Typical storm water management benefits associated with trees include:

- **Interception of rainfall** – tree surfaces (roots, foliage, bark, and branches) intercept, evaporate, store, or convey precipitation to the soil before it reaches surrounding impervious surfaces
- **Reduced erosion** – trees protect denuded area by intercepting or reducing the velocity of rain drops as they fall through the tree canopy
- **Increased infiltration** – soil conditions created by roots and fallen leaves promote infiltration
- **Treatment of storm water** – trees provide treatment through uptake of nutrients and other storm water pollutants (phytoremediation) and support of other biological processes that break down pollutants

Typical tree well system components include:

- Trees of the appropriate species for site conditions and constraints
- Available soil media reservoir volume based on mature tree size, soil type, water availability, surrounding land uses, and project goals

- Optional suspended pavement design to provide structural support for adjacent pavement without requiring compaction of underlying layers
- Optional root barrier devices as needed; a root barrier is a device installed in the ground, between a tree and the sidewalk, intended to guide roots down and away from the sidewalk in order to prevent sidewalk lifting from tree roots.
- Optional tree grates; to be considered to maximize available space for pedestrian circulation and to protect tree roots from compaction related to pedestrian circulation; tree grates are typically made up of porous material that will allow the runoff to soak through.
- Optional shallow surface depression for ponding of excess runoff
- Optional planter box drain

Design Adaptations for Project Goals

Site design BMP to provide incidental treatment. Tree wells primarily function as site design BMPs for incidental treatment. Benefits from tree wells are accounted for by adjustment factors presented in Appendix B.2. This credit can apply to non-tree wells also (that meet the same criteria).

Design Criteria and Considerations

Tree wells must meet the following design criteria and considerations. Deviations from the below criteria may be approved at the discretion of the County staff if it is determined to be appropriate:

	Siting and Design	*Intent/Rationale*
☐	**Tree species** is appropriately chosen for the development (private or public). For public rights-of-ways, local planning guidelines and zoning provisions for the permissible species and placement of trees are consulted. A list of trees appropriate for site design that can be used by all county municipalities are provided in Appendix E.25	Proper tree placement and species selection minimizes problems such as pavement damage by surface roots and poor growth.
☐	**Tree well placement:** ensure area is graded; and the well is located so that full amount of DCV reduction drains to the well.	Minimizes short-circuiting of run off and assures DCV reductions are retained onsite.

Siting and Design		*Intent/Rationale*
☐	**Location of trees planted along public streets** follows guidance on green infrastructure (Appendix K). Vehicle and pedestrian line of sight and clear recovery zones are considered in tree selection and placement. Unless exemption is granted by County staff the following minimum tree separation distance is followed <table><tr><th>Improvement</th><th>Minimum distance to tree well</th></tr><tr><td>Traffic Signal, Stop sign</td><td>20 feet</td></tr><tr><td>Underground Utility lines (except sewer)</td><td>5 feet</td></tr><tr><td>Sewer Lines</td><td>10 feet</td></tr><tr><td>Above ground utility structures (Transformers, Hydrants, Utility poles, etc.)</td><td>10 feet</td></tr><tr><td>Driveways</td><td>10 feet</td></tr><tr><td>Intersections (intersecting curb lines of two streets)</td><td>25 feet</td></tr></table>	Roadway safety for both vehicular and pedestrian traffic is a key consideration for placement along public streets.
☐	**Underground utilities and overhead wires** are considered in the design and avoided or circumvented. Underground utilities are routed around or through the planter in suspended pavement applications. All underground utilities are protected from water and root penetration.	Tree growth can damage utilities and overhead wires resulting in service interruptions. Protecting utilities routed through the planter prevents damage and service interruptions. Refer to Section 6.6 of the Green Streets Design Criteria in Appendix K for guidelines regarding utility placement and potential conflict with BMP facilities.

Siting and Design		*Intent/Rationale*
☐	**Suspended pavement** design was developed where appropriate to minimize soil compaction and improve infiltration and filtration capabilities. Suspended pavement was constructed with an approved structural cell.	Suspended pavement designs provide structural support without compaction of the underlying layers, thereby promoting tree growth. Recommended structural cells include poured in place concrete columns, Silva Cells manufactured by Deeproot Green Infrastructures and Stratacell and Stratavault systems manufactured by Citygreen Systems.
☐	A minimum soil volume of 2 cubic feet per square foot of canopy projection area is provided for each tree. Canopy projection area is the ground area beneath the tree, measured at the drip line.	The minimum soil volume ensures that there is adequate storage volume to allow for unrestricted evapotranspiration and infiltration. A lower amount of soil volume may be allowed at the discretion of County staff if certified by a landscape architect or agronomist. The retention credit from the tree is directly proportional to the soil volume provided for the tree.
☐	DCV from the tributary area draining to the tree is equal to or greater than the tree credit volume	The minimum tributary area ensures that the tree receives enough runoff to fully utilize the infiltration and evapotranspiration potential provided. In cases where the minimum tributary area is not provided, the tree credit volume must be reduced proportionately to the actual tributary area.

Siting and Design		*Intent/Rationale*
	Inlet opening to the tree that is at least 18 inches wide.	Design requirement to ensure that the runoff from the tributary area does not bypass the BMP.
☐	A minimum 2 inch drop in grade from the inlet to the finish grade of the tree.	Different inlet openings and drops in grade may be allowed at the discretion of County staff if calculations are shown that the diversion flow rate (Appendix B.1.2) from the tributary area can be conveyed to the tree. In cases where the inlet capacity is limiting the amount of runoff draining to the tree, the tree credit volume must be reduced proportionately.
	Grated inlets are allowed for pedestrian circulation. Grates need to be ADA compliant and have sufficient slip resistance.	

Conceptual Design and Sizing Approach for Site Design

1. Determine the areas where tree wells can be used in the site design to achieve incidental treatment. Tree wells reduce runoff volumes from the site. Refer to Appendix B.2. Document the proposed tree locations in the SWQMP.

2. When trees are proposed as a storm water pollutant control BMP, applicant must complete feasibility analysis in Appendix C and D and submit detailed calculations for the DCV treated by trees. Document the proposed tree locations, feasibility analysis and sizing calculations in the SWQMP. The following calculations should be performed and the smallest of the three should be used as the volume treated by trees:

    a. Delineate the DMA (tributary area) to the tree and calculate the associated DCV.

    b. Calculate the required diversion flow rate using Appendix B.1.2 and size the inlet required to covey this flow rate to the tree. If the proposed inlet cannot convey the diversion flow rate for the entire tributary area, then the DCV that enters the tree should be proportionally reduced.

        i. For example, 0.5 acre drains to the tree and the associated DCV is 820 ft^3. The required diversion flow rate is 0.10 ft^3/s, but only an inlet that can divert 0.05 ft^3/s could be installed.

        ii. Then the effective DCV draining to the tree = 820 ft^3 * (0.05/0.10) = 420 ft^3

E.7 SD-B Impervious Area Dispersion

MS4 Permit Category
Site Design

Manual Category
Site Design

Applicable Performance Criteria
Site Design

Primary Benefits
Volume Reduction
Peak Flow Attenuation

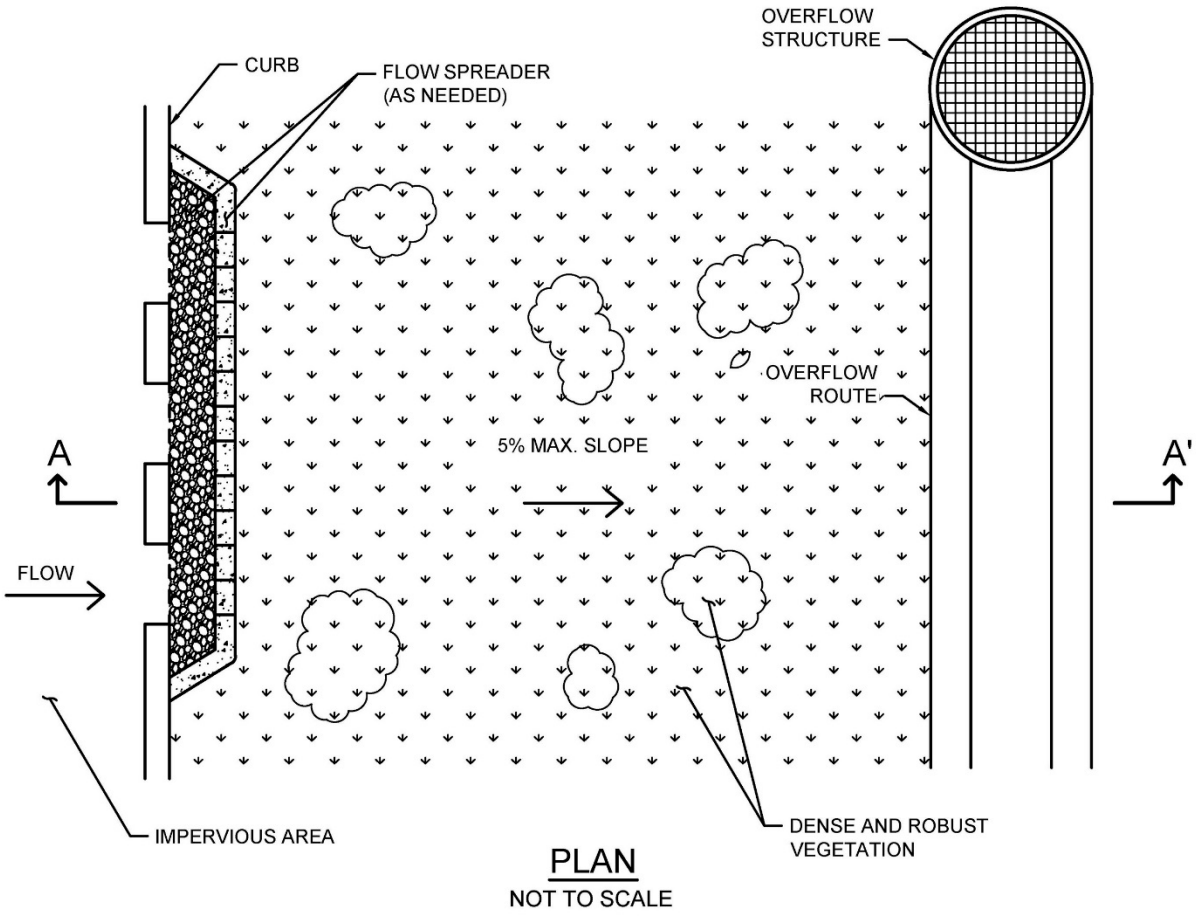
Photo Credit: Orange County Technical Guidance Document

Description

Impervious area dispersion (dispersion) refers to the practice of effectively disconnecting impervious areas from directly draining to the storm drain system by routing runoff from impervious areas such as rooftops (through downspout disconnection), walkways, and driveways onto the surface of adjacent pervious areas. The intent is to slow runoff discharges, and reduce volumes. Dispersion with partial or full infiltration results in significant volume reduction by means of infiltration and evapotranspiration.

Typical dispersion components include:

- An impervious surface from which runoff flows will be routed with minimal piping to limit concentrated inflows
- Splash blocks, flow spreaders, or other means of dispersing concentrated flows and providing energy dissipation as needed
- Dedicated pervious area, typically vegetated, with in-situ soil infiltration capacity for partial or full infiltration
- Optional soil amendments to improve vegetation support, maintain infiltration rates and enhance treatment of routed flows
- Overflow route for excess flows to be conveyed from dispersion area to the storm drain system or discharge point



Typical plan and section view of an Impervious Area Dispersion BMP

Design Adaptations for Project Goals

Site design BMP to reduce impervious area and DCV. Impervious area dispersion primarily functions as a site design BMP for reducing the effective imperviousness of a site by providing partial or full infiltration of the flows that are routed to pervious dispersion areas and otherwise slowing down excess flows that eventually reach the storm drain system. This can significantly reduce the DCV for the site.

Design Criteria and Considerations

Dispersion must meet the following design criteria. Deviations from the below criteria may be approved at the discretion of County Staff if it is determined to be appropriate:

Siting and Design		*Intent/Rationale*
☐	**Impervious area dispersion Placement:** ensure area is graded; and located so that full DCV water drains to the area of dispersion	Minimizes short-circuiting of run off
☐	Dispersion is over areas with soil types capable of supporting or being amended (e.g., with sand or compost) to support vegetation. Media amendments must be tested to verify that they are not a source of pollutants.	Soil must have long-term infiltration capacity for partial or full infiltration and be able to support vegetation to provide runoff treatment. Amendments to improve plant growth must not have negative impact on water quality.
☐	Dispersion has vegetated sheet flow over a relatively large distance (minimum 10 feet) from inflow to overflow route.	Full or partial infiltration requires relatively large areas to be effective depending on the permeability of the underlying soils.
☐	Pervious areas should be flat (with less than 5% slopes) and vegetated.	Flat slopes facilitate sheet flows and minimize velocities, thereby improving treatment and reducing the likelihood of erosion.
Inflow velocities		
☐	Inflow velocities are limited to 3 ft/s or less or use energy dissipation methods (e.g., riprap, level spreader) for concentrated inflows.	High inflow velocities can cause erosion, scour and/or channeling.
Dedication		

Siting and Design		*Intent/Rationale*
☐	Dispersion areas must be owned by the project owner and be dedicated for the purposes of dispersion to the exclusion of other future uses that might reduce the effectiveness of the dispersion area.	Dedicated dispersion areas prevent future conversion to alternate uses and facilitate continued full and partial infiltration benefits.

Vegetation

☐	Dispersion typically requires dense and robust vegetation for proper function. Drought tolerant species should be selected to minimize irrigation needs. A plant list to aid in selection can be found in Appendix E.25.	Vegetation improves resistance to erosion and aids in runoff treatment.

Conceptual Design and Sizing Approach for Site Design

1. Determine the areas where dispersion can be used in the site design to reduce the DCV for pollutant control sizing.
2. Calculate the DCV for storm water pollutant control per Appendix B.2, taking into account reduced runoff from dispersion.
3. Determine if a DMA is considered "Self-retaining" if the impervious to pervious ratio is:
    a. 2:1 when the pervious area is composed of Hydrologic Soil Group A
    b. 1:1 when the pervious area is composed of Hydrologic Soil Group B

E.8 SD-C: Green Roofs

MS4 Permit Category
Site Design

Manual Category
Site Design

Applicable Performance Standard
Site Design

Primary Benefits
Volume Reduction
Peak Flow Attenuation

Location: County of San Diego Operations Center, San Diego, California

Description

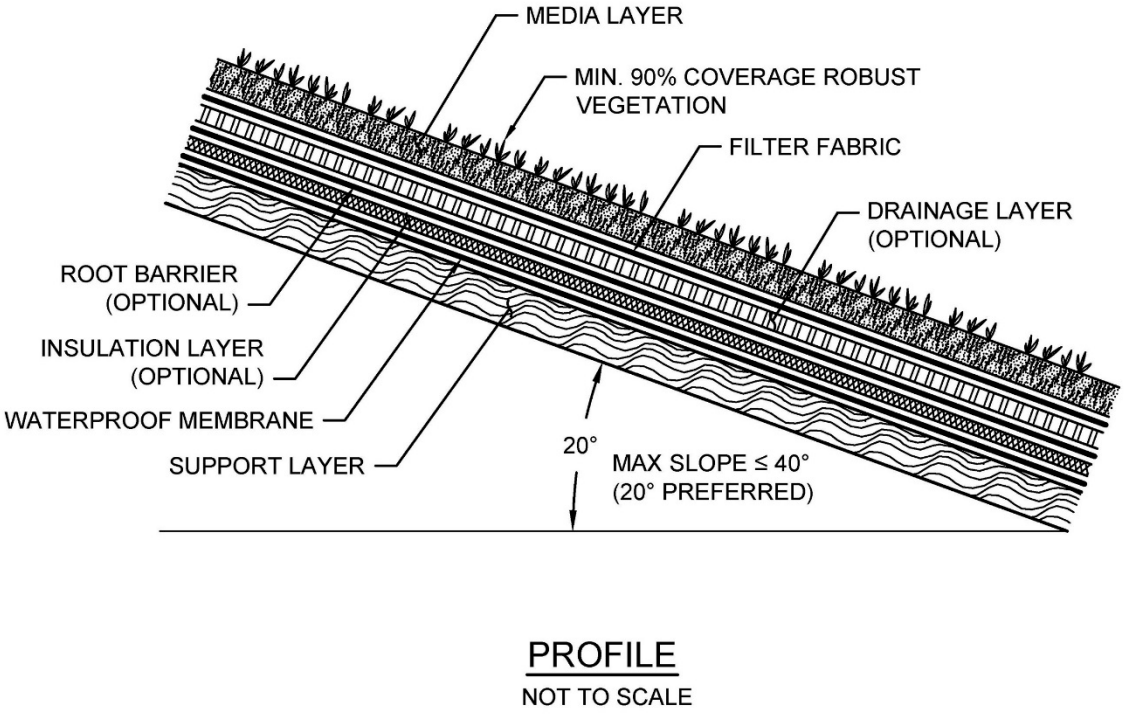
Green roofs are vegetated rooftop systems that reduce runoff volumes and rates, treat storm water pollutants through filtration and plant uptake, provide additional landscape amenity, and create wildlife habitat. Additionally, green roofs reduce the heat island effect and provide acoustical control, air filtration and oxygen production. In terms of building design, they can protect against ultraviolet rays and extend the roof lifetime, as well as increase the building insulation, thereby decreasing heating and cooling costs. There are two primary types of green roofs:

- **Extensive** – lightweight, low maintenance system with low-profile, drought tolerant type groundcover in shallow growing medium (6 inches or less)
- **Intensive** – heavyweight, high maintenance system with a more garden-like configuration and diverse plantings that may include shrubs or trees in a thicker growing medium (greater than 6 inches)

Typical green roof components include, from top to bottom:

- Vegetation that is appropriate to the type of green roof system, climate, and watering conditions
- Media layer (planting mix or engineered media) capable of supporting vegetation growth

- Filter fabric to prevent migration of fines (soils) into the drainage layer
- Optional drainage layer to convey excess runoff
- Optional root barrier
- Optional insulation layer
- Waterproof membrane
- Structural roof support capable of withstanding the additional weight of a green roof



Typical profile of a Green Roof BMP

Design Adaptations for Project Goals

Site design BMP to provide incidental treatment. Green roofs can be used as a site design feature to reduce the impervious area of the site through replacing conventional roofing. This can reduce the DCV and flow control requirements for the site.

Design Criteria and Considerations

Green roofs must meet the following design criteria. Deviations from the below criteria may be approved at the discretion of County staff if it is determined to be appropriate:

Siting and Design		*Intent/Rationale*
☐	Roof slope is ≤ 40% (Roofs that are ≤ 20% are preferred).	Steep roof slopes increases project complexity and requires supplemental anchoring.
☐	Structural roof capacity design supports the calculated additional load (lbs/sq. ft) of the vegetation growing medium and additional drainage and barrier layers.	Inadequate structural capacity increases the risk for roof failure and harm to the building and occupants.
☐	Design and construction is planned to be completed by an experienced green roof specialist.	A green roof specialist will minimize complications in implementation and potential structural issues that are critical to green roof success.
☐	Green roof location and extent must meet fire safety provisions.	Green roof design must not negatively impact fire safety.
☐	Maintenance access is included in the green roof design.	Maintenance will facilitate proper functioning of drainage and irrigation components and allow for removal of undesirable vegetation and soil testing, as needed.
Vegetation		
☐	Vegetation is suitable for the green roof type, climate and expected watering conditions. Perennial, self-sowing plants that are drought-tolerant (e.g., sedums, succulents) and require little to no fertilizer, pesticides or herbicides are recommended. Vegetation pre-grown at grade may allow plants to establish prior to facing harsh roof conditions.	Plants suited to the design and expected growing environment are more likely to survive.
☐	Vegetation is capable of covering ≥ 90% the roof surface.	Benefits of green roofs are greater with more surface vegetation.
☐	Vegetation is robust and erosion-resistant in order to withstand the anticipated rooftop environment (e.g., heat, cold, high winds).	Weak plants will not survive in extreme rooftop environments.
☐	Vegetation is fire resistant.	Vegetation that will not burn easily decreases the chance for fire and harm to the building and occupants.
☐	Vegetation considers roof sun exposure and shaded areas based on roof slope and	The amount of sunlight the vegetation receives can inhibit growth therefore the beneficial

Siting and Design		*Intent/Rationale*
	location.	effects of a vegetated roof.
☐	An irrigation system (e.g., drip irrigation system) is included as necessary to maintain vegetation.	Proper watering will increase plant survival, especially for new plantings.
☐	Media is well-drained and is the appropriate depth required for the green roof type and vegetation supported.	Unnecessary water retention increases structural loading. An adequate media depth increases plant survival.
☐	A filter fabric is used to prevent migration of media fines through the system.	Migration of media can cause clogging of the drainage layer.
☐	A drainage layer is provided if needed to convey runoff safely from the roof. The drainage layer can be comprised of gravel, perforated sheeting, or other drainage materials.	Inadequate drainage increases structural loading and the risk of harm to the building and occupants.
☐	A root barrier comprised of dense material to inhibit root penetration is used if the waterproof membrane will not provide root penetration protection.	Root penetration can decrease the integrity of the underlying structural roof components and increase the risk of harm to the building and occupants.
☐	An insulation layer is included as needed to protect against the water in the drainage layer from extracting building heat in the winter and cool air in the summer.	Regulating thermal impacts of green roofs will aid in controlling building heating and cooling costs.
☐	A waterproof membrane is used to prevent the roof runoff from vertically migrating and damaging the roofing material. A root barrier may be required to prevent roots from compromising the integrity of the membrane.	Water-damaged roof materials increase the risk of harm to the building and occupants.

Conceptual Design and Sizing Approach for Site Design

1. Determine the areas where green roofs can be used in the site design to replace conventional roofing to reduce the DCV. These green roof areas can be credited toward reducing runoff generated through representation in storm water calculations as pervious, not impervious, areas but are not credited for storm water pollutant control.
2. Calculate the DCV per Appendix B.2.

E.9 SD-D Permeable Pavement (Site Design BMP)

Photo Credit: San Diego Low Impact Development Design Manual

Description

Permeable pavement is pavement that allows for percolation through void spaces in the pavement surface into subsurface layers. Permeable pavements reduce runoff volumes and rates and can provide pollutant control via infiltration, filtration, sorption, sedimentation, and biodegradation processes. When used as a site design BMP, the subsurface layers are designed to provide storage of storm water runoff so that outflow rates can be controlled via infiltration into subgrade soils. Varying levels of storm water treatment and flow control can be provided depending on the size of the permeable pavement system relative to its drainage area and the underlying infiltration rates. As a site design BMP permeable pavement areas are designed to be self-retaining and are designed primarily for direct rainfall. Self-retaining permeable pavement areas have a ratio of total drainage area (including permeable pavement) to area of permeable pavement of 1.5:1 or less. Permeable pavement surfaces can be constructed from modular paver units or paver blocks, pervious concrete, porous asphalt, and turf pavers. Sites designed with permeable pavements can significantly reduce the impervious area of the project. Reduction in impervious surfaces decreases the DCV and can reduce the footprint of treatment control and flow control BMPs.

Design Adaptations for Project Goals

Site design BMP to reduce impervious area and DCV. Permeable pavement without an underdrain can be used as a site design feature to reduce the impervious area of the site by replacing traditional pavements, including roadways, parking lots, emergency access lanes, sidewalks, trails and driveways.

Typical Permeable Pavement Components (Top to Bottom)
Permeable surface layer
Bedding layer for permeable surface
Aggregate storage layer with optional underdrain(s)
Optional final filter course layer over uncompacted existing subgrade

Conceptual Design and Sizing Approach for Site Design

1. Determine the areas where permeable pavements can be used in the site design to replace conventional pavements to reduce the DCV. These areas can be credited toward reducing runoff generated through representation in storm water calculations as pervious, not impervious, areas but are not credited for storm water pollutant control.
2. Calculate the DCV per Appendix B.2, taking into account reduced runoff from permeable pavement areas.

E.10 SD-E Rain Barrels

Photo Credit: San Diego Low Impact Development Design Manual

Description

Rain barrels are containers that can capture rooftop runoff and store it for future use. With controlled timing and volume release, the captured rainwater can be used for irrigation or alternative grey water between storm events, thereby reducing runoff volumes and associated pollutants to downstream waterbodies. Rain barrels tend to be smaller systems, less than 100 gallons. Treatment can be achieved when rain barrels are used as part of a treatment train along with other BMPs that use captured flows in applications that do not result in discharges into the storm drain system. Rooftops are the ideal tributary areas for rain barrels.

Design Adaptations for Project Goals

Site design BMP to reduce effective impervious area and DCV. Barrels can be used as a site design feature to reduce the effective impervious area of the site by removing roof runoff from the site discharge. This can reduce the DCV and flow control requirements for the site.

Typical Rain Barrel Components
Storage container, barrel or tank for holding captured flows
Inlet and associated valves and piping
Outlet and associated valves and piping
Overflow outlet
Optional pump
Optional first flush diverters
Optional roof, supports, foundation, level indicator, and other accessories

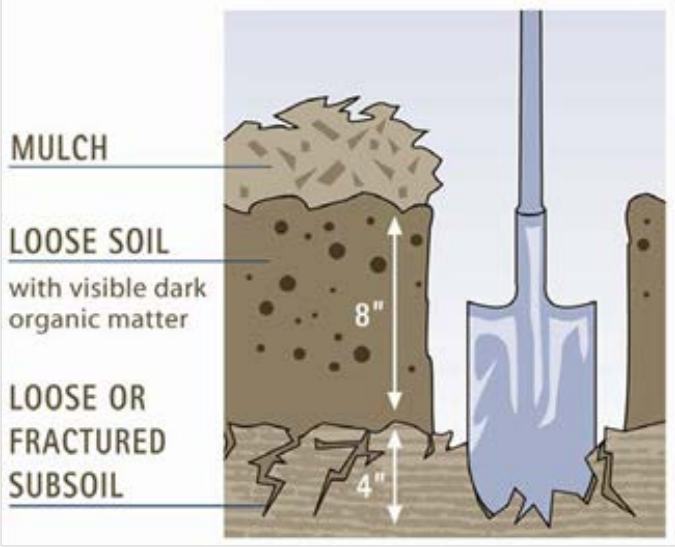
Important Considerations

Maintenance: Rain barrels require regular monitoring and cleaning to ensure that they do not become clogged with leaves or other debris.
Economics: Rain barrels have low installation costs.
Limitations: Due to San Diego's arid climate, some rain barrels may fill only a few times each year.

Conceptual Design and Sizing Approach for Site Design

1. Determine the areas where rain barrels can be used in the site design to capture roof runoff to reduce the DCV. Rain barrels reduce the effective impervious area of the site by removing roof runoff from the site discharge.
2. Calculate the DCV per Appendix B.2, taking into account reduced runoff from permeable pavement areas. Credit can be taken for the full rain barrel volume when each barrel volume is smaller than 100 gallons, and meet the following criteria: total rain barrel volume is less than 0.25 DCV and landscape areas are greater than 30 percent of the project footprint. Credit for harvest and use systems that do not meet the above criteria must be based on the criteria in Appendix B.3 and HU-1 fact sheet.

E.11 SD-F Amended Soil[21]



Planting bed Cross-Section

Description

Naturally occurring (undisturbed) topsoil and vegetation provide important storm water functions including: water infiltration; nutrient, sediment, and pollutant adsorption; sediment and pollutant biofiltration; water interflow storage and transmission; and pollutant decomposition.

Natural functions are largely lost when development strips away native topsoil and vegetation and replaces it with minimal topsoil and sod. Not only are these important storm water functions lost, but such landscapes themselves become pollution generating pervious surfaces due to increased use of pesticides, fertilizers and other landscaping and household/industrial chemicals, the concentration of pet wastes, and pollutants that accompany roadside litter.

Amended soil attains greater storm water functions in the post development landscape, provides increased treatment of pollutants and sediments that result from development and habitation, and minimizes the need for some landscaping chemicals, thus reducing pollution through prevention.

Design Adaptations for Project Goals

Amended soil primarily functions as a site design BMP for reducing the effective imperviousness of a site by providing partial or full infiltration of the flows that are routed to amended soil areas and otherwise slowing down excess flows that eventually reach the storm drain system.

Applications and Limitations

Amending soil per these guidelines is not the same as preservation of naturally occurring topsoil and vegetation. However, amending soil will improve on-site management of storm water flow and

[21] Reprinted from Guidelines and Resources for Implementing Amended Soil BMP T5.13 in WDOE Storm Water Management Manual for Western Washington, 2010, Washington Organic Recycling Council.

water quality.

Soil organic matter can be attained through numerous materials such as compost, composted woody material, and biosolids. It is important that the materials used to meet this Amended Soil Fact Sheet be appropriate and beneficial to the plant cover to be established. Likewise, it is important that imported topsoils improve soil conditions and do not have an excessive percent of clay fines.

The amended soil layer shall have a minimum depth of eight inches except where tree roots limit the depth of incorporation of amendments needed to meet the criteria. Subsoils below the topsoil layer should be scarified at least 4 inches with some incorporation of the upper material to avoid stratified layers, where feasible.

The amended soil layer for trees shall be a minimum of three feet deep and extend at least twelve inches in all directions of the root ball when planted; the amended soil layer for shrubs shall be a minimum of two feet deep and extend at least twelve inches in all directions of the root ball when planted; the length and width must ensure the appropriate volume for the species and site.

Amended Soils can be considered infeasible on slopes greater than 25 percent. Only amended planting holes for trees and shrubs need meet these requirements. Mulching requirements still apply to slopes over 25 percent.

Design Criteria and Considerations

Soil Retention

☐	Retain, in an undisturbed state, the mulch and native topsoil to the maximum extent practicable. In any areas requiring grading remove and stockpile the mulch and topsoil on site in a designated, controlled area, not adjacent to public resources and critical areas, to be reapplied to other portions of the site where feasible.	Relocated soil can be utilized to create berms or high points within the landscaping. They help contain and move water increasing the holding capacity of swales. Berms also become homes for plants that like fast drainage.

Soil Quality

All areas subject to clearing and grading that have not been covered by impervious surface, incorporated into a drainage facility or engineered as structural fill or slope shall, at project completion, demonstrate the following:

☐	Amended soil Shall have a minimum organic matter content of 10% dry weight in planting beds, and 5% organic matter content in turf areas, and a pH from 6.0 to 8.0 or matching the pH of the undisturbed topsoil.	Organic matter, such as leaves and twigs, feed the microbes in the soil. Microbes form part of the soil structure and act like sponges, helping the soil absorb water.
☐	Use compost and other materials that meet organic content requirements: a) The organic content for "pre-approved" amendment rates can be met only using compost that meets the definition of "composted materials" in WAC 173-350-100. This code is available online at: http://apps.leg.wa.gov/wac/default.aspx?cite=173-350 b) The compost must also have an organic matter content of 40% to 65%, and a carbon to nitrogen ratio below 25:1. c) Calculated amendment rates may be met through use of composted materials meeting a) and b) above; or other organic materials amended to meet the carbon to nitrogen ratio requirements, and meeting the contaminant standards of Grade A Compost. The resulting soil should be conducive to the type of vegetation to be established.	Compost contains particles that improve the overall soil structure. As compost decomposes, it encourages the formation of macroaggregate that create a more stable soil structure.

Soil Quality

	A minimum three inch layer of mulch shall be applied on all exposed soil surfaces in each landscaped area except in turf areas, creeping or rooting ground covers or direct seeding applications where mulch is contraindicated.	
☐	Organic mulch materials made from recycled or post-consumer products/materials shall take precedence over inorganic materials or virgin forest products unless the recycled post-consumer organic products are not locally available. Organic mulches are not required where prohibited by County Fire Code.	Mulch creates a blanket protecting the soil and plant roots from temperature change, keeps moisture in by slowing down evaporation and keeps weeds from sprouting by reducing sunlight penetration.
	Highly flammable mulch material, such as straw or small, mini size wood chips, shall not be used in a "Hazardous Fire Area," as that term is defined in the County Fire Code.	

Implementation Options

The soil quality design guidelines listed above can be met by using one of the methods listed below:

1) Leave undisturbed native vegetation and soil, and protect from compaction during construction.
2) Amend existing site topsoil or subsoil either at default "pre-approved" rates, or at custom calculated rates based on tests of the soil and amendment to achieve the organic matter content required..
3) Stockpile existing topsoil during grading, and replace it prior to planting. Stockpiled topsoil must also be amended if needed to meet the organic matter or depth requirements, either at a default "pre-approved" rate or at a custom calculated rate.
4) Import topsoil mix of sufficient organic matter content and depth to meet the requirements.

More than one method may be used on different portions of the same site. Soil that already meets the depth and organic matter quality standards, and is not compacted, does not need to be amended.

Planning/Permitting/Inspection/Verification Guidelines & Procedures

Sitting and Design		*Intent/Rationale*
☐	Establish Amended Soil toward the end of construction and once established, protect from compaction, such as from large machinery use, and from erosion.	Compaction, augmenting or tilling the soil destroys the overall structure of the soil. Healthy soil has lots of tiny little pockets of air, when soils are eroded, graded or disturbed, their structure becomes compacted. Compaction is caused when the tiny air and water bubbles are squeezed out of the soil and microbes are killed.
☐	Plant vegetation and mulch the amended soil area after installation.	Mulch stays on top of the soil and is never worked in. Keep mulch 1 to 6 inches away from stems of plants.
☐	Leave plant debris or its equivalent on the soil surface to replenish organic matter.	Bits of leaves and twigs function as food for microbes living in the soil. Once established, the plants will eventually feed themselves off their own leaf litter.
☐	Use appropriate irrigation.	Knowing your climate zones and the water needs of your landscape will help establish watering zones and watering schedules for your landscape. Rainwater is best for both plants and microbes; provide this as much as possible when it is available. Adjust spray irrigation so that there is no overspray on to hard surfaces. When possible, convert spray systems to drip irrigation. This will reduce runoff and allow water to infiltrate the soil.
☐	Reduce and adjust, where possible, the use of irrigation, fertilizers, herbicides and pesticides, rather than continuing to implement formerly established practices.	Chemical fertilizers, herbicides and pesticides; including organic ones; kill soil microbes.

Runoff Model Representation

Flow reduction credits can be taken in runoff modeling when *SD-F Amended Soil* is used as part of a dispersion design under the conditions described in *SD-B Impervious Area Dispersion.*

Areas meeting the design guidelines may be entered into approved runoff models by adjusting depression storage parameters.

Data Sources

San Diego Sustainable Landscapes Guidelines
San Diego County Water Authority 2015

BMP T5.13 "Post Construction Soil Quality and Depth"
Storm Water Management Manual for Western Washington, August 2012

E.19 BF-2 Nutrient Sensitive Media Design

Some studies of bioretention with underdrains have observed export of nutrients, particularly inorganic nitrogen (nitrate and nitrite) and dissolved phosphorus. This has been observed to be a short-lived phenomenon in some studies or a long term issue in some studies. The composition of the soil media, including the chemistry of individual elements is believed to be an important factor in the potential for nutrient export. Organic amendments, often compost, have been identified as the most likely source of nutrient export. The quality and stability of organic amendments can vary widely.

The biofiltration media specifications contained in the County of San Diego Low Impact Development Handbook: Appendix G -Bioretention Soil Specification (June 2014, unless superseded by more recent edition) and the City of San Diego Low Impact Development Design Manual (page B-18) (July 2011, unless superseded by more recent edition) were developed with consideration of the potential for nutrient export. These specifications include criteria for individual component characteristics and quality in order to control the overall quality of the blended mixes. As of the publication of this manual, the June 2014 County of San Diego specifications provide more detail regarding mix design and quality control.

The City and County specifications noted above were developed for general purposes to meet permeability and treatment goals. In cases where the BMP discharges to receiving waters with nutrient impairments or nutrient TMDLs, the biofiltration media should be designed with the specific goal of minimizing the potential for export of nutrients from the media. Therefore, in addition to adhering to the City or County media specifications, the following guidelines should be followed:

1. Select plant palette to minimize plant nutrient needs

A landscape architect or agronomist should be consulted to select a plant palette that minimizes nutrient needs. Utilizing plants with low nutrient needs results in less need to enrich the biofiltration soil mix. If nutrient quantity is then tailored to plants with lower nutrient needs, these plants will generally have less competition from weeds, which typically need higher nutrient content. The following practices are recommended to minimize nutrient needs of the plant palette:

- **Utilize native, drought-tolerant plants and grasses where possible.** Native plants generally have a broader tolerance for nutrient content, and can be longer lived in leaner/lower nutrient soils.

- **Start plants from smaller starts or seed.** Younger plants are generally more tolerant of lower nutrient levels and tend to help develop soil structure as they grow. Given the lower cost of smaller plants, the project should be able to accept a plant mortality rate that is somewhat higher than starting from larger plants and providing high organic content.

2. Minimize excess nutrients in media mix

Once the low-nutrient plant palette is established (item 1), the landscape architect and/or agronomist should be consulted to assist in the design of a biofiltration media to balance the interests of plant establishment, water retention capacity (irrigation demand), and the potential for nutrient export. The following guidelines should be followed:

- **The mix should not exceed the nutrient needs of plants.** In conventional landscape design, the nutrient needs of plants are often exceeded intentionally in order to provide a factor of safety for plant survival. This practice must be avoided in biofiltration media as excess nutrients will increase the chance of export. The mix designer should keep in mind that nutrients can be added later (through mulching, tilling of amendments into the surface), but it is not possible to remove nutrients, once added.

- **The actual nutrient content and organic content of the selected organic amendment source should be determined when specifying mix proportions.** Nutrient content (i.e., C:N ratio; plant extractable nutrients) and organic content (i.e, % organic material) are relatively inexpensive to measure via standard agronomic methods and can provide important information about mix design. If mix design relies on approximate assumption about nutrient/organic content and this is not confirmed with testing (or the results of prior representative testing), it is possible that the mix could contain much more nutrient than intended.

- **Nutrients are better retained in soils with higher cation exchange capacity.** Cation exchange capacity can be increased through selection of organic material with naturally high cation exchange capacity, such as peat or coconut coir pith, and/or selection of inorganic material with high cation exchange capacity such as some sands or engineered minerals (e.g., low P-index sands, zeolites, rhyolites, etc). Including higher cation exchange capacity materials would tend to reduce the net export of nutrients. Natural silty materials also provide cation exchange capacity; however potential impacts to permeability need to be considered.

- **Focus on soil structure as well as nutrient content.** Soil structure is loosely defined as the ability of the soil to conduct and store water and nutrients as well as the degree of aeration of the soil. Soil structure can be more important than nutrient content in plant survival and biologic health of the system. If a good soil structure can be created with very low amounts of organic amendment, plants survivability should still be provided. While soil structure generally develops with time, biofiltration media can be designed to promote earlier development of soil structure. Soil structure is enhanced by the use of amendments with high humus content (as found in well-aged organic material). In addition, soil structure can be enhanced through the use of organic material with a distribution of particle sizes (i.e., a more heterogeneous mix).

- **Consider alternatives to compost.** Compost, by nature, is a material that is continually evolving and decaying. It can be challenging to determine whether tests previously done on a given compost stock are still representative. It can also be challenging to determine how the

properties of the compost will change once placed in the media bed. More stable materials such as aged coco coir pith, peat, biochar, shredded bark, and/or other amendments should be considered.

With these considerations, it is anticipated that less than 10 percent organic amendment by volume could be used, while still balancing plant survivability and water retention. If compost is used, designers should strongly consider utilizing less than 10 percent by volume.

3. Design with partial retention and/or internal water storage

An internal water storage zone, as described in Fact Sheet PR-1 is believed to improve retention of nutrients. For lined systems, an internal water storage zone worked by providing a zone that fluctuates between aerobic and anaerobic conditions, resulting in nitrification/denitrification. In soils that will allow infiltration, a partial retention design (PR-1) allows significant volume reduction and can also promote nitrification/denitrification.

Acknowledgment: This fact sheet has been adapted from the Orange County Technical Guidance Document (May 2011). It was originally developed based on input from: Deborah Deets, City of Los Angeles Bureau of Sanitation, Drew Ready, Center for Watershed Health, Rick Fisher, ASLA, City of Los Angeles Bureau of Engineering, Dr. Garn Wallace, Wallace Laboratories, Glen Dake, GDML, and Jason Schmidt, Tree People. The guidance provided herein does not reflect the individual opinions of any individual listed above and should not be cited or otherwise attributed to those listed.

E.24 FT-4 Dry Extended Detention Basin

MS4 Permit Category
Flow-thru Treatment Control

Manual Category
Flow-thru Treatment Control

Applicable Performance Standard
Pollutant Control
Flow Control

Primary Benefits
Treatment
Volume Reduction (Incidental)
Peak Flow Attenuation

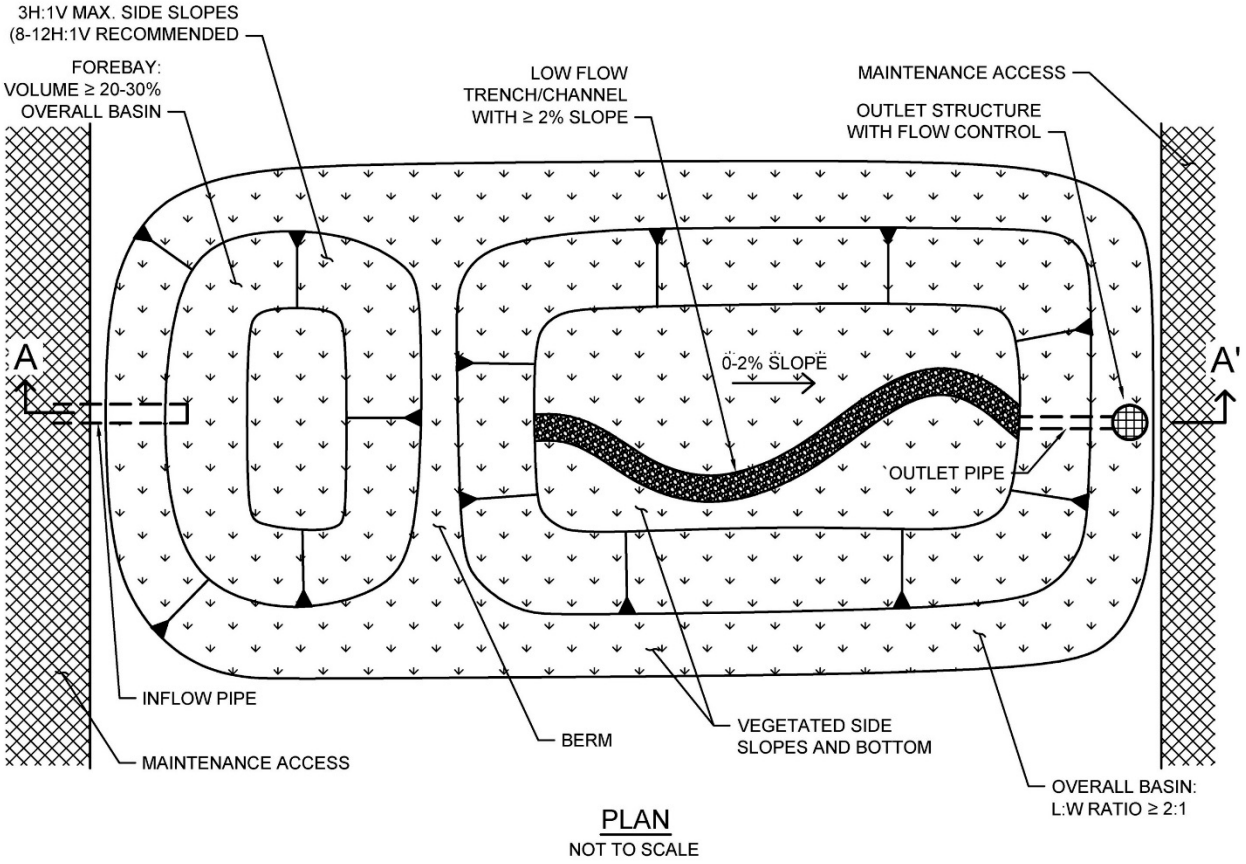
Location: Rolling Hills Ranch, Chula Vista, California; Photo Credit: Eric Mosolgo

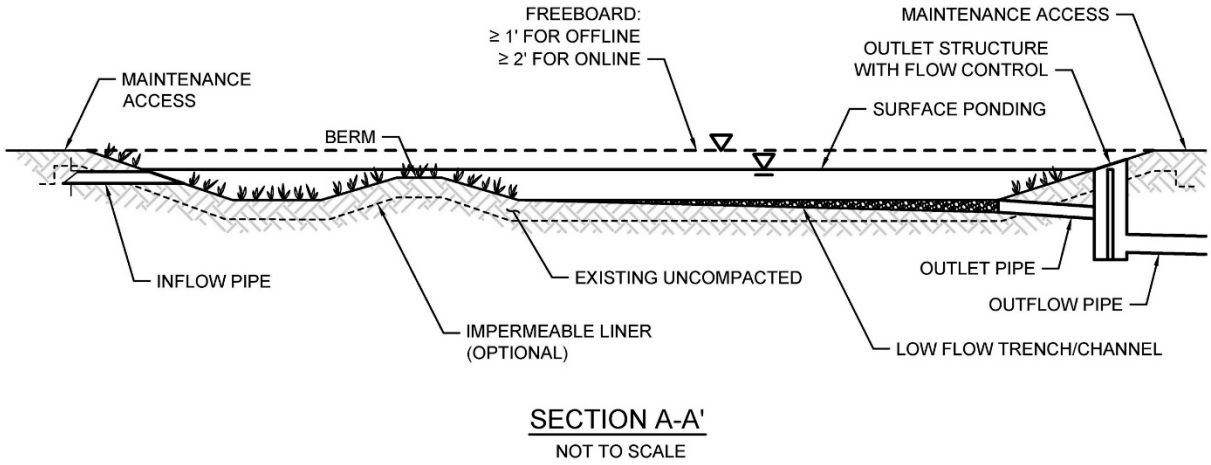
Description

Dry extended detention basins are basins that have been designed to detain storm water for an extended period to allow sedimentation and typically drain completely between storm events. A portion of the dissolved pollutant load may also be removed by filtration, uptake by vegetation, and/or through infiltration. The slopes, bottom, and forebay of dry extended detention basins are typically vegetated. Considerable storm water volume reduction can occur in dry extended detention basins when they are located in permeable soils and are not lined with an impermeable barrier. dry extended detention basins are generally appropriate for developments of ten acres or larger, and have the potential for multiple uses including parks, playing fields, tennis courts, open space, and overflow parking lots. They can also be used to provide flow control by modifying the outlet control structure and providing additional detention storage.

Typical dry extended detention basins components include:

- Forebay for pretreatment
- Surface ponding for captured flows
- Vegetation selected based on basin use, climate, and ponding depth
- Low flow channel, outlet, and overflow device
- Impermeable liner or uncompacted native soils at the bottom of the facility





Typical plan and Section view of a Dry Extended Detention Basin BMP

Design Adaptations for Project Goals

Flow-thru treatment BMP for storm water pollutant control. The system is lined or un-lined to provide incidental infiltration and designed to detain storm water to allow particulates and associated pollutants to settle out. This configuration is considered to provide flow-thru treatment, not biofiltration treatment. Storage provided as surface ponding above a restricted outlet invert is considered detention storage and is included in calculations for the flow-thru treatment volume.

Integrated storm water flow control and pollutant control configuration. Dry extended detention basins can also be designed for flow control. The surface ponding can be designed to accommodate higher volumes than the storm water pollutant control volume and can utilize multi-stage outlets to mitigate both the duration and rate of flows within a prescribed range.

Design Criteria and Considerations

Dry extended detention basins must meet the following design criteria. Deviations from the below criteria may be approved at the discretion of County staff if it is determined to be appropriate:

Siting and Design		*Intent/Rationale*
☐	Placement observes geotechnical recommendations regarding potential hazards (e.g., slope stability, landslides, and liquefaction zones) and setbacks (e.g., slopes, foundations, utilities).	Must not negatively impact existing site geotechnical concerns.
☐	An impermeable liner or other hydraulic restriction layer is included if site constraints indicate that infiltration or lateral flows should not be allowed.	Lining prevents storm water from impacting groundwater and/or sensitive environmental or geotechnical features. Incidental infiltration, when allowable, can aid in pollutant removal and groundwater recharge.
☐	Contributing tributary area is large (typically ≥ 10 acres).	Dry extended detention basins require significant space and are more cost-effective for treating larger drainage areas.
☐	Longitudinal basin bottom slope is 0 - 2%.	Flatter slopes promote ponding and settling of particles.
☐	Basin length to width ratio is ≥ 2:1 (L:W).	A larger length to width ratio provides a longer flow path to promote settling.
☐	Forebay is included that encompasses 20 - 30% of the basin volume.	A forebay to trap sediment can decrease frequency of required maintenance.
☐	Side slopes are ≥ 3H:1V.	Gentler side slopes are safer, less prone to erosion, able to establish vegetation more

Siting and Design		*Intent/Rationale*
		quickly and easier to maintain.
☐	Surface ponding drawdown time is between 24 and 96 hours.	Minimum drawdown time of 24 hours allows for adequate settling time and maximizes pollutant removal. Maximum drawdown time of 96 hours provides vector control.
☐	Minimum freeboard provided is ≥1 foot for offline facilities and ≥2 feet for online facilities.	Freeboard provides room for head over overflow structures and minimizes risk of uncontrolled surface discharge.
☐	Inflow and outflow structures are accessible by required equipment (e.g., vactor truck) for inspection and maintenance.	Maintenance will prevent clogging and ensure proper operation of the flow control structures.
☐	A low flow channel or trench with a ≥ 2% slope is provided. A gravel infiltration trench is provided where infiltration is allowable.	Aids in draining or infiltrating dry weather flows.
☐	Overflow is safely conveyed to a downstream storm drain system or discharge point. Size overflow structure to pass 100-year peak flow.	Planning for overflow lessens the risk of property damage due to flooding.
☐	The maximum rate at which runoff is discharged is set below the erosive threshold for the site.	Extended low flows can have erosive effects.

Conceptual Design and Sizing Approach for Storm Water Pollutant Control Only

To design dry extended detention basins for storm water pollutant control only (no flow control required), the following steps should be taken:

1. Verify that siting and criteria have been met, including placement requirements, contributing tributary area, forebay volume, and maximum slopes for basin sides and bottom.
2. Calculate the DCV per Appendix B based on expected site design runoff for tributary areas.
3. Use the sizing worksheet to determine flow-thru treatment sizing of the surface ponding of the dry extended detention basin, which includes calculations for a maximum 96-hour drawdown time.

Conceptual Design and Sizing Approach when Storm Water Flow Control is Applicable

Control of flow rates and/or durations will typically require significant surface ponding volume, and therefore the following steps should be taken prior to determination of storm water pollutant control design. Pre-development and allowable post-project flow rates and durations should be determined as discussed in Chapter 6 of the manual.

1. Verify that siting and criteria have been met, including placement requirements, tributary area, and maximum slopes for basin sides and bottom.
2. Iteratively determine the surface ponding required to provide detention storage to reduce flow rates and durations to allowable limits. Flow rates and durations can be controlled from detention storage by altering outlet structure orifice size(s) and/or water control levels. Multi-level orifices can be used within an outlet structure to control the full range of flows.
3. If a dry extended detention basin cannot fully provide the flow rate and duration control required by this manual, an upstream or downstream structure with appropriate storage volume such as an additional basin or underground vault can be used to provide remaining controls.
4. After the dry extended detention basin has been designed to meet flow control requirements, calculations must be completed to verify if storm water pollutant control requirements to treat the DCV have been met.

Appendix C
Pollution Prevention Attachments

Rainbow Creek
Nutrient Reduction and Management Plan

Attachment 1. **Municipal PGA Tables**

Attachment 2. **Industrial and Commercial Source Profiles and PGA Tables**

Attachment 3. **WPO required BMPs by PGA for Municipal, Industrial, and Commercial Facilities**

Attachment 4. **Residential WPO BMPs**

Attachment 5. **University of California Cooperative Extension, Rainbow Creek Nutrient Reduction Management Plan (August 2015)**

Attachment 6. **Septic System Permitting Process and Design Criteria**

Attachment 7. **TTWQ Questionnaire**

Table 5.10-1 PGAs and POCs for Roads, Streets, and Highways.

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes									
A.1	**MATERIALS MANAGEMENT**								
A.1.a	Materials Loading & Unloading	X		X	X				
A.1.b	Storage of Materials	X		X			X		
A.2	**WASTE HANDLING AND STORAGE**								
A.2.a	Hazardous Waste						X	X	X
A.2.b	Solid Waste	X		X					
A.2.g	Green Waste		X	X		X			X
A.2.h	Recyclables / Reusables	X		X	X				
Category B: Vehicle and Equipment Activities									
B.2	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
B.2.c	Vehicle and Equipment Fueling				X		X	X	
Category C: Outdoor Area Maintenance									
C.1	**BUILDING AND GROUNDS MAINTENANCE**								
C.1.b	Landscaping Activities	X	X	X					
C.1.c	Pesticide, Herbicide, and Fertilizer Application		X						X
C.1.f	Sidewalks	X		X					
C.1.j	Erodible Surfaces & Areas Under Construction	X		X			X		
C.2	**ROADS AND STREETS**								
C.2.a	Road and Street Maintenance	X			X		X		
C.2.b	Road and Street Use	X	X	X	X	X	X	X	X
C.3	**STORM DRAIN SYSTEMS**								
C.3a	Storm Drain Operation and Maintenance	X	X	X	X		X	X	X
C.3.c	Illicit Discharges & Connections	X	X	X	X	X	X	X	X
Category D: Specific Operations and Activities									
D.4	Abrasive Blasting	X			X				
D.10	Dust & Particulate-Generating Activities	X	X		X				
D.21	Painting or Coating Activities				X		X	X	
D.30	Welding				X				

Table 5.10-2 PGAs and POCs for MS4s.

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes									
A.1	**MATERIALS MANAGEMENT**								
A.1.a	Materials Loading & Unloading	X		X	X				
Category B: Vehicle and Equipment Activities									
B.2	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
B.2.c	Vehicle and Equipment Fueling				X		X	X	
Category C: Outdoor Area Maintenance									
C.1	**BUILDING AND GROUNDS MAINTENANCE**								
C.1.c	Pesticide, Herbicide, and Fertilizer Application		X						X
C.1.j	Erodible Surfaces & Areas Under Construction	X		X					
C.3	**STORM DRAIN SYSTEMS**								
C.3a	Storm Drain Operation and Maintenance	X	X	X	X		X	X	X
C.3.b	Treatment Control BMP Maintenance	X		X	X		X	X	
C.3.c	Illicit Discharges and Connections	X	X	X	X	X	X	X	X
Category D: Specific Operations and Activities									
D.8	Cutting, Trimming, or Grinding	X			X				
D.10	Dust & Particulate-Generating Activities	X	X		X				
D.21	Painting or Coating Activities				X		X	X	
D.29	Weed Abatement and Vegetation Clearing	X		X					X

Table 5.10-3 PGAs and POCs for Solid Waste.

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes									
A.1	**MATERIALS MANAGEMENT**								
A.1.a	Materials Loading & Unloading	X							
A.1.b	Storage of Materials	X							
A.1.c	Liquid Container Storage				X		X	X	
A.2	**WASTE HANDLING AND STORAGE**								
A.2.a	Hazardous Waste				X		X	X	
A.2.b	Solid Waste	X		X		X			
A.2.f	Sanitary Wastes		X	X		X		X	
A.2.g	Green Waste	X	X	X		X			X
Category B: Vehicle and Equipment Activities									
B.1	**VEHICLE AND EQUIPMENT STORAGE**								
B.1.a	Outdoor Vehicle Storage	X			X		X	X	
B.1.b	Outdoor Equipment & Parts Storage	X			X		X	X	
B.2	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
B.2.a	Vehicle & Equipment Repair				X		X		
B.2.c	Vehicle & Equipment Fueling						X	X	
B.2.e	Equipment Cleaning	X			X		X	X	
Category C: Outdoor Area Maintenance									
C.1	**BUILDING AND GROUNDS MAINTENANCE**								
C.1.a	Parking Areas	X		X	X		X	X	
C.1.b	Landscaping Activities	X	X	X		X			X
C.1.c	Pesticide, Herbicide, Fertilizer Application		X		X				X
C.1.j	Erodible Surfaces	X							
C.1.k	Earth Moving Activities & Construction	X		X			X		
C.3	**STORM DRAIN SYSTEMS**								
C.3a	Storm Drain Operation & Maintenance	X	X	X	X		X	X	X
C.3.b	Treatment Control BMP Maintenance	X		X					
C.3.c	Illicit Discharges & Connections	X	X	X	X	X	X	X	X

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
Category D: Specific Operations and Activities									
D.9	Differential Settling Maintenance	X							
D.10	Dust & Particulate-Generating Activities	X							
D.17	Gas Extraction, Well Installation & Destruction	X	X	X			X	X	
D.18	Leachate Collection System Maintenance		X		X	X	X	X	
D.19	Methane Recovery System Maintenance			X			X	X	
D.24	Recreational Uses	X		X					
D.29	Weed Abatement & Vegetation Clearing	X	X	X					X

Table 5.10-4 PGAs and POCs for Wastewater

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes									
A.1	**MATERIALS MANAGEMENT**								
A.1.a	Materials Loading & Unloading		X	X					X
A.1.b	Storage of Materials		X		X	X	X	X	
A.1.c	Liquid Container Storage				X		X	X	X
A.2	**WASTE HANDLING AND STORAGE**								
A.2.a	Hazardous Waste						X	X	X
A.2.b	Solid Waste		X	X	X	X			
A.2.e	Liquid Waste		X		X	X	X	X	
A.2.f	Sanitary Wastes		X	X	X	X	X	X	
A.2.g	Green Waste	X	X	X		X			X
Category B: Vehicle and Equipment Activities									
B.1	**VEHICLE AND EQUIPMENT STORAGE**								
B.1.a	Outdoor Vehicle Storage	X			X		X	X	
B.1.b	Outdoor Equipment & Parts Storage				X		X	X	

Jurisdictional Urban Runoff Management Program

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
B.2	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
B.2.a	Vehicle & Equipment Repair				X		X		
B.2.c	Vehicle & Equipment Fueling						X	X	
B.2.e	Equipment Cleaning	X	X		X	X	X	X	
Category C: Outdoor Area Maintenance									
C.1	**BUILDING AND GROUNDS MAINTENANCE**								
C.1.a	Parking Areas	X		X	X		X	X	
C.1.b	Landscaping Activities	X	X	X		X			X
C.1.c	Pesticide, Herbicide, Fertilizer Application		X		X				X
C.1.f	Sidewalks	X		X					
C.1.j	Erodible Surfaces	X							
C.3	**STORM DRAIN SYSTEMS**								
C.3a	Storm Drain Operation and Maintenance	X	X	X	X		X	X	X
C.3.c	Illicit Discharges & Connections	X	X	X	X	X	X	X	X
Category D: Specific Operations and Activities									
D.10	Dust & Particulate-Generating Activities	X	X		X	X			
D.15	Floors, Mats, & Surface Cleaning	X				X		X	
D.25	Sludge Removal and Disposal	X	X		X	X			
D.27	Treatment Pond Maintenance	X	X			X		X	X
D.28	Wastewater Treatment	X	X	X	X	X	X	X	
D.29	Weed Abatement & Vegetation Clearing	X		X					X

Table 5.10-5 PGAs and POCs for Road Facilities

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes									
A.1	**MATERIALS MANAGEMENT**								
A.1.a	Materials Loading & Unloading	X		X	X		X	X	
A.1.b	Storage of Materials	X	X		X		X	X	
A.1.c	Liquid Container Storage				X		X	X	
A.2	**WASTE HANDLING AND STORAGE**								
A.2.a	Hazardous Waste				X		X	X	X
A.2.b	Solid Waste			X	X	X	X	X	
A.2.e	Liquid Waste				X		X	X	
A.2.f	Sanitary Wastes		X	X		X		X	
A.2.g	Green Waste	X	X	X		X			X
A.2.h	Recyclables / Reusables	X		X	X		X	X	
Category B: Vehicle and Equipment Activities									
B.1	**VEHICLE AND EQUIPMENT STORAGE**								
B.1.a	Outdoor Vehicle Storage	X			X		X	X	
B.1.b	Outdoor Equipment & Parts Storage	X			X		X	X	
B.2	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
B.2.c	Vehicle & Equipment Fueling				X		X	X	
B.2.d	Vehicle Washing	X			X		X	X	
B.2.e	Equipment Cleaning	X			X		X	X	
Category C: Outdoor Area Maintenance									
C.1	**BUILDING AND GROUNDS MAINTENANCE**								
C.1.a	Parking Areas	X		X	X		X	X	
C.1.b	Landscaping Activities	X	X	X		X			X
C.1.c	Pesticide, Herbicide, Fertilizer Application		X		X				X
C.1.e	Rooftop & Downspout Maintenance	X		X	X		X		
C.1.f	Sidewalks	X		X					
C.1.h	Pressure Washing	X			X		X	X	
C.1.j	Erodible Surfaces	X							

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
C.3	**STORM DRAIN SYSTEMS**								
C.3a	Storm Drain Operation & Maintenance	X	X	X	X		X	X	X
C.3.b	Treatment Control BMP Maintenance	X		X	X		X	X	
C.3.c	Illicit Discharges & Connections	X	X	X	X	X	X	X	X
Category D: Specific Operations and Activities									
D.10	Dust & Particulate-Generating Activities	X							
D.15	Floors, Mats, & Surface Cleaning	X				X	X	X	
D.21	Painting or Coating Activities				X			X	

Table 5.10-6 PGAs and POCs for Fleet

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes									
A.1	**MATERIALS MANAGEMENT**								
A.1.a	Materials Loading & Unloading			X			X	X	
A.1.b	Storage of Materials				X		X	X	
A.1.c	Liquid Container Storage				X		X	X	
A.2	**WASTE HANDLING AND STORAGE**								
A.2.a	Hazardous Waste				X		X	X	X
A.2.b	Solid Waste			X	X	X	X	X	
A.2.e	Liquid Waste				X		X	X	
A.2.h	Recyclables / Reusables			X	X		X	X	
Category B: Vehicle and Equipment Activities									
B.1	**VEHICLE AND EQUIPMENT STORAGE**								
B.1.a	Outdoor Vehicle Storage	X			X		X	X	
B.1.b	Outdoor Equipment & Parts Storage				X		X	X	

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PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
B.2	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
B.2.a	Vehicle and Equipment Repair				X		X	X	
B.2.b	Changing Vehicle Fluids				X		X	X	
B.2.c	Vehicle & Equipment Fueling				X		X	X	
B.2.d	Vehicle Washing	X			X		X	X	
B.2.e	Equipment Cleaning	X			X		X	X	X
Category C: Outdoor Area Maintenance									
C.1	**BUILDING AND GROUNDS MAINTENANCE**								
C.1.a	Parking Areas	X		X	X		X	X	
C.1.b	Landscaping Activities	X	X	X		X			X
C.1.e	Rooftop & Downspout Maintenance	X		X	X		X		
C.1.f	Sidewalks	X		X					
C.1.h	Pressure Washing	X			X		X	X	
C.3	**STORM DRAIN SYSTEMS**								
C.3.c	Illicit Discharges & Connections	X	X	X	X	X	X	X	X
Category D: Specific Operations and Activities									
D.4	Abrasive Blasting	X			X		X	X	
D.8	Cutting, Trimming, or Grinding				X		X	X	
D.11	Fabrication				X		X		
D.15	Floors, Mats, & Surface Cleaning	X			X	X	X	X	
D.21	Painting or Coating Activities				X			X	
D.30	Welding				X				

Table 5.10-7 PGAs and POCs for Airports.

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes									
A.1	**MATERIALS MANAGEMENT**								
A.1.a	Materials Loading & Unloading	X	X	X	X		X	X	
A.1.b	Storage of Materials	X	X		X		X	X	
A.1.c	Liquid Container Storage						X	X	
A.2	**WASTE HANDLING AND STORAGE**								
A.2.a	Hazardous Waste				X		X	X	
A.2.b	Solid Waste		X	X	X	X		X	
A.2.c	Food Grease & Oil						X	X	
A.2.f	Sanitary Wastes		X	X		X		X	
A.2.g	Green Waste	X	X	X		X			X
A.2.h	Recyclables / Reusables			X	X		X	X	
Category B: Vehicle and Equipment Activities									
B.1	**VEHICLE AND EQUIPMENT STORAGE**								
B.1.a	Outdoor Vehicle Storage	X			X		X	X	
B.1.b	Outdoor Equipment & Parts Storage				X		X	X	
B.2	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
B.2.a	Vehicle & Equipment Repair				X		X	X	
B.2.b	Changing Vehicle Fluids				X		X	X	
B.2.c	Vehicle & Equipment Fueling				X		X	X	
B.2.d	Vehicle Washing	X			X		X	X	
B.2.e	Equipment Cleaning	X			X		X	X	
Category C: Outdoor Area Maintenance									
C.1	**BUILDING AND GROUNDS MAINTENANCE**								
C.1.a	Parking Areas	X		X	X		X	X	
C.1.b	Landscaping Activities	X	X	X		X			X
C.1.e	Rooftop & Downspout Maintenance	X		X	X		X	X	
C.1.f	Sidewalks	X		X					
C.1.g	Break Areas & Public Areas		X		X	X			
C.1.h	Pressure Washing	X		X	X		X	X	

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
C.1.i	Fire Sprinkler Testing & Maintenance				X	X			
C.1.j	Erodible Surfaces	X							
C.1.k	Earth Moving Activities & Areas Under Construction	X		X			X		
C.3	**STORM DRAIN SYSTEMS**								
C.3a	Storm Drain Operation & Maintenance	X	X	X	X		X	X	X
C.3.b	Treatment Control BMP Maintenance	X		X	X		X	X	
C.3.c	Illicit Discharges & Connections	X	X	X	X	X	X	X	X
Category D: Specific Operations and Activities									
D.1	Accident and Medical Emergency Response			X		X			
D.4	Abrasive Blasting	X			X		X	X	
D.5	Casting, Forging, or Forming				X			X	
D.8	Cutting, Trimming, or Grinding				X		X	X	
D.10	Dust & Particulate-Generating Activities	X			X				
D.15	Floors, Mats, & Surface Cleaning	X				X	X	X	
D.16	Food Preparation			X		X	X		
D.21	Painting or Coating Activities				X			X	
D.23	Ramp & Runway Maintenance	X		X	X		X	X	
D.30	Welding				X				

Table 5.10-8 PGAs and POCs for Parks

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes									
A.1	**MATERIALS MANAGEMENT**								
A.1.a	Materials Loading & Unloading	X	X	X			X	X	
A.1.b	Storage of Materials	X	X		X		X	X	X
A.1.c	Liquid Container Storage				X		X	X	

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PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
A.2	**WASTE HANDLING AND STORAGE**								
A.2.a	Hazardous Waste				X		X	X	X
A.2.b	Solid Waste		X	X	X	X		X	
A.2.c	Food Grease and Oil					X	X		
A.2.d	Pet Waste / Manure		X			X			
A.2.e	Liquid Waste						X	X	
A.2.f	Sanitary Wastes		X	X		X			
A.2.g	Green Waste	X	X	X		X			X
A.2.h	Recyclables / Reusables			X	X		X	X	
Category B: Vehicle and Equipment Activities									
B.1	**VEHICLE AND EQUIPMENT STORAGE**								
B.1.a	Outdoor Vehicle Storage	X			X		X	X	
B.1.b	Outdoor Equipment & Parts Storage	X			X		X	X	
B.2	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
B.2.a	Vehicle & Equipment Repair				X		X	X	
B.2.b	Changing Vehicle Fluids				X		X	X	
B.2.c	Vehicle & Equipment Fueling						X	X	
B.2.e	Equipment Cleaning	X	X		X		X	X	
Category C: Outdoor Area Maintenance									
C.1	**BUILDING AND GROUNDS MAINTENANCE**								
C.1.a	Parking Areas	X		X	X		X	X	
C.1.b	Landscaping Activities	X	X	X		X			X
C.1.c	Pesticide, Herbicide, Fertilizer Application		X		X				X
C.1.e	Rooftop & Downspout Maintenance	X		X	X		X		
C.1.f	Sidewalks	X		X					
C.1.g	Break Areas & Public Areas			X		X			
C.1.h	Pressure Washing	X			X		X		
C.1.j	Erodible Surfaces	X							
C.1.k	Earth Moving Activities & Areas Under Construction	X		X			X		
C.3	**STORM DRAIN SYSTEMS**								
C.3a	Storm Drain Operation & Maintenance	X	X	X	X		X	X	X

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
C.3.b	Treatment Control BMP Maintenance	X		X	X		X	X	
C.3.c	Illicit Discharges & Connections	X	X	X	X	X	X	X	X
Category D: Specific Operations and Activities									
D.10	Dust & Particulate-Generating Activities	X							
D.15	Floors, Mats, & Surface Cleaning	X			X	X	X	X	
D.16	Food Preparation			X		X	X		
D.21	Painting or Coating Activities				X			X	
D.24	Recreational Uses	X		X	X	X	X		
D.26	Special Events	X	X	X	X	X	X	X	
D.29	Weed Abatement & Vegetation Clearing	X	X	X		X			X
D.30	Welding				X				

Table 5.10-9 PGAs and POCs for Buildings and Other Facilities.

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes									
A.1	**MATERIALS MANAGEMENT**								
A.1.a	Materials Loading & Unloading	X		X	X		X	X	
A.1.b	Storage of Materials	X			X		X	X	
A.1.c	Liquid Container Storage				X		X	X	
A.2	**WASTE HANDLING AND STORAGE**								
A.2.a	Hazardous Waste				X	X	X	X	
A.2.b	Solid Waste			X	X	X			
A.2.c	Food Grease and Oil					X	X		
A.2.d	Pet Waste / Manure		X			X			
A.2.e	Liquid Waste					X	X	X	

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PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
A.2.f	Sanitary Wastes		X	X		X		X	
A.2.g	Green Waste	X	X	X		X			X
A.2.h	Recyclables / Reusables			X	X		X	X	
Category B: Vehicle and Equipment Activities									
B.1	**VEHICLE AND EQUIPMENT STORAGE**								
B.1.a	Outdoor Vehicle Storage	X			X		X	X	
B.1.b	Outdoor Equipment & Parts Storage				X		X		
B.2	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
B.2.a	Vehicle & Equipment Repair			X	X		X	X	
B.2.c	Vehicle & Equipment Fueling						X	X	
B.2.d	Vehicle Washing	X			X		X	X	
B.2.e	Equipment Cleaning	X	X		X		X	X	X
Category C: Outdoor Area Maintenance									
C.1	**BUILDING AND GROUNDS MAINTENANCE**								
C.1.a	Parking Areas	X		X	X		X	X	
C.1.b	Landscaping Activities	X	X	X		X			X
C.1.c	Pesticide, Herbicide, & Fertilizer Application		X		X				X
C.1.d	Pool, Spa, & Fountain Maintenance	X	X			X		X	
C.1.e	Rooftop & Downspout Maintenance	X		X	X		X		
C.1.f	Sidewalks	X		X					
C.1.g	Break Areas & Public Areas			X		X			
C.1.h	Pressure Washing	X			X		X		
C.1.i	Fire Sprinkler Testing & Maintenance				X	X			
C.1.j	Erodible Surfaces	X							
C.1.k	Earth Moving Activities & Areas Under Construction	X		X			X		
C.3	**STORM DRAIN SYSTEMS**								
C.3a	Storm Drain Operation & Maintenance	X	X	X	X		X	X	X
C.3.b	Treatment Control BMP Maintenance	X		X	X		X	X	
C.3.c	Illicit Discharges & Connections	X	X	X	X	X	X	X	X
Category D: Specific Operations and Activities									
D.2	Animal Grooming & Washing	X				X		X	

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
D.8	Cutting, Trimming, or Grinding				X				
D.10	Dust & Particulate-Generating Activities	X							
D.15	Floors, Mats, & Surface Cleaning	X				X	X	X	
D.16	Food Preparation			X		X	X		
D.20	Mixing				X			X	
D.21	Painting or Coating Activities			X	X			X	
D.26	Special Events	X	X	X	X	X	X	X	
D.29	Weed Abatement & Vegetation Clearing	X		X					X
D.30	Welding				X				

Table 5.10-10 PGAs and POCs for Pesticide, Herbicide, and Fertilizer Application.

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes									
A.1	**MATERIALS MANAGEMENT**								
A.1.a	Materials Loading & Unloading		X					X	X
A.1.b	Storage of Materials		X					X	X
A.2	**WASTE HANDLING AND STORAGE**								
A.2.a	Hazardous Waste						X	X	X
A.2.b	Solid Waste	X	X	X				X	X
A.2.g	Green Waste		X	X		X		X	X
A.2.h	Recyclables / Reusables			X	X				
Category B: Vehicle and Equipment Activities									
B.2	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
B.2.e	Equipment Cleaning	X	X		X		X	X	X
Category C: Outdoor Area Maintenance									
C.1	**BUILDING AND GROUNDS MAINTENANCE**								
C.1.b	Landscaping Activities	X	X	X					

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
C.1.c	Pesticide, Herbicide, and Fertilizer Application		X						X
Category D: Specific Operations and Activities									
D.6	Chemical Treatment		X					X	X
D.15	Floors, Mats, and Surface Cleaning	X	X		X	X		X	X
D.20	Mixing		X					X	X
D.22	Pesticide or Other Chemical Product Formulation		X					X	X
D.29	Weed Abatement and Vegetation Clearing	X							X

Table 5.10-11 PGAs and POCs for Non-Emergency Fire Fighting Activities.

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes									
A.1	**MATERIALS MANAGEMENT**								
A.1.a	Materials Loading & Unloading			X			X	X	
A.2	**WASTE HANDLING AND STORAGE**								
A.2.b	Solid Waste			X	X	X	X	X	
A.2.e	Liquid Waste		X		X			X	
A.2.g	Green Waste	X	X	X	X				X
Category B: Vehicle and Equipment Activities									
B.2	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
B.2.d	Vehicle Washing	X			X		X	X	
B.2.e	Equipment Cleaning	X			X		X	X	
Category C: Outdoor Area Maintenance									
C.1	**BUILDING AND GROUNDS MAINTENANCE**								
C.1.j	Erodible Surfaces	X							
C.3	**STORM DRAIN SYSTEMS**								
C.3.c	Illicit Discharges & Connections	X	X	X	X	X	X	X	X

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
Category D: Specific Operations and Activities									
D.7	Control Burns	X	X		X			X	
D.10	Dust & Particulate-Generating Activities	X							
D.12	Firefighting Field Training & Drills	X		X					
D.13	Fire Access Roads / Fire Break Creation and Maintenance	X		X					
D.14	Fire Hydrant, Tank, & Hose Testing & Maintenance	X	X	X				X	

Table 5.10-12 PGAs and POCs for Special Events.

PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes									
A.1	**MATERIALS MANAGEMENT**								
A.1.a	Materials Loading & Unloading	X		X	X		X		
A.1.b	Storage of Materials	X		X			X		
A.1.c	Liquid Container Storage				X		X		
A.2	**WASTE HANDLING AND STORAGE**								
A.2.b	Solid Waste	X		X					
A.2.c	Food Grease and Oil		X			X	X		
A.2.d	Pet Waste / Manure		X			X			
A.2.e	Liquid Waste		X					X	
A.2.f	Sanitary Wastes		X	X		X			
A.2.g	Green Waste		X			X			
A.2.h	Recyclables / Reusables			X	X				
Category B: Vehicle and Equipment Activities									
B.2	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
B.2.c	Vehicle and Equipment Fueling						X	X	

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PGA Reference Number	Pollutant-Generating Activity (PGA)	Pollutants-of-Concern (POC)							
		Sediment	Nutrients	Trash & Debris	Metals	Pathogens	Oil & Grease	Other Organics	Pesticides
B.2.e	Equipment Cleaning	X	X	X	X	X	X	X	
Category C: Outdoor Area Maintenance									
C.1	**BUILDING AND GROUNDS MAINTENANCE**								
C.1.a	Parking Areas	X		X	X		X	X	
C.1.f	Sidewalks	X		X					
C.1.g	Break Areas and Public Areas			X		X			
C.1.h	Pressure Washing	X			X		X		
C.2	**ROADS AND STREETS**								
C.2.b	Road and Street Use	X		X	X		X	X	
C.3	**STORM DRAIN SYSTEMS**								
C.3.c	Illicit Discharges & Connections	X	X	X	X	X	X	X	
Category D: Specific Operations and Activities									
D.10	Dust and Particulate-Generating Activities	X							
D.15	Floors, Mats, and Surface Cleaning	X				X	X	X	
D.16	Food Preparation			X		X	X		
D.24	Recreational Uses	X		X		X			
D.26	Special Events	X	X	X	X	X	X	X	

1. Automobile Repair, Maintenance, Fueling, and Cleaning

Applicable SIC Codes

4173 – Bus Terminals and Service Facilities
4231 – Terminal and Joint Terminal Maintenance Facilities for Motor Freight Transportation
7533 – Automotive Exhaust System Repair Shops
7534 – Tire Re-treading and Repair Shops
7537 – Automotive Transmission Repair Shops
7538 – General Automotive Repair Shops
7539 – Automotive Repair Shops, NEC
7549 – Automotive Services (wrecking, undercoating, rust proofing, lubrication)

Description

This category includes establishments engaged in the repair, maintenance, fueling and cleaning of automobiles or similar vehicles. General operations at these facilities consist of repairing engines, transmissions, suspensions, and other mechanical components of the vehicle not generally associated with the body or interior. Additional operations include the removal and replacement of vehicle fluids including fuel and the cleaning of automotive parts and equipment. This category includes but is not limited to service stations, auto mechanics, tire repair and replacement, lube and oil service facilities.

Table 5.1.1 lists the Pollutant-generating Activities potentially associated with automobile repair, maintenance, fueling and cleaning, and indicates the Pollutants-of-Concern (POCs) typically associated with them. Specific PGAs and POCs associated with individual facilities vary depending on their actual uses and operations, and may therefore differ from those presented. Black diamonds indicate that the corresponding PGA is considered a priority.

Table 5.1.1 – Pollutant-generating Activities and Associated Pollutants of Concern for Automobile Repair, Maintenance, Fueling, and Cleaning

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes										
	A.1	**MATERIALS MANAGEMENT**								
	A.1.a	Materials Loading & Unloading	⊙	⊙		⊙		⊙	⊙	
	A.1.b	Storage of Materials	⊙	⊙	⊙			⊙	⊙	
	A.1.c	Outdoor Liquid Container Storage		⊙		⊙		⊙	⊙	
	A.2	**VEHICLE AND EQUIPMENT STORAGE**								
	A.2.a	Outdoor Vehicle Storage				⊙		⊙	⊙	
	A.2.b	Outdoor Equipment & Parts Storage				⊙		⊙	⊙	
	A.3	**WASTE HANDLING, STORAGE, AND DISPOSAL**								
	A.3.a	Hazardous Waste	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
◆	A.3.b	Solid Waste	⊙	⊙	⊙		⊙			
◆	A.3.e	Liquid Waste		⊙	⊙		⊙			
Category B: General Operations and Activities										
	B.1	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
◆	B.1.a	Vehicle & Equipment Repair				⊙		⊙	⊙	
◆	B.1.b	Changing Vehicle Fluids				⊙		⊙	⊙	
	B.1.c	Parts Replacement and Repairs								
	B.2	**WASHING AND CLEANING ACTIVITIES**								
◆	B.2.a	Vehicle Washing		⊙		⊙		⊙	⊙	
◆	B.2.b	Equipment Cleaning		⊙		⊙		⊙	⊙	
◆	B.3	**VEHICLE AND EQUIPMENT FUELING**			⊙	⊙		⊙	⊙	
Category C: Specific Operations and Activities										
	C.3	Automobile Painting			⊙	⊙			⊙	
Category D: Outdoor Areas and Activities										
	D.1	**PARKING, ROOFTOPS, AND STORAGE AREAS**	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2	**BUILDING AND GROUNDS MAINTENANCE**								
	D.2.d	Sidewalks & Paved Areas	⊙	⊙	⊙	⊙	⊙	⊙	⊙	
	D.2.f	Pressure Washing	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4	**STORM DRAIN SYSTEMS**								
	D.4.a	Operation & Maintenance	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4.b	Illicit Discharges & Connections	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

2. Airplane and Boat Repair, Maintenance, Fueling and Cleaning

Applicable SIC Codes

4581 – Airports, Flying Fields, and Services (Aircraft Servicing, Maintenance and Cleaning)
3731 – Ship Building and Repairing
3732 – Boat Building and Repairing

Description

This category includes establishments primarily engaged in operating and maintaining airports and flying fields; in servicing, repairing (except on a factory basis), maintaining, and storing aircraft; and in furnishing coordinated handling services. Operations at these facilities generally consist of mechanical maintenance of the airplane, which may include engine repair, hydraulic repair, fluid removal/replacement and for this category could include body and interior components that are mechanical in nature.

It also includes establishments primarily engaged in the repair, maintenance fueling and cleaning of ships, barges, boats and lighters. Operations include boat and ship repairs not conducted in marinas, which usually consist mechanical maintenance of ships, boats etc., which may include engine repair, driveline repair, fluid removal/replacement and for this category could include body and interior components that are mechanical in nature.

Table 5.1.2 lists the Pollutant-generating Activities potentially associated with airplane and boat repair, maintenance, fueling, and cleaning, and indicates the Pollutants-of-Concern (POCs) typically associated with them. Specific PGAs and POCs associated with individual facilities vary depending on their actual uses and operations, and may therefore differ from those presented. Black diamonds indicate that the corresponding PGA is considered a priority.

Table 5.1.2 – Pollutant-generating Activities and Associated Pollutants of Concern for Airplane and Boat Repair, Maintenance, Fueling, and Cleaning

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes										
	A.1	**MATERIALS MANAGEMENT**								
	A.1.a	Materials Loading & Unloading	⊙		⊙	⊙		⊙		
	A.1.b	Storage of Materials	⊙		⊙			⊙		
	A.1.c	Outdoor Liquid Container Storage				⊙		⊙		
	A.2	**VEHICLE AND EQUIPMENT STORAGE**								
◆	A.2.a	Outdoor Vehicle Storage				⊙		⊙		
	A.2.b	Outdoor Equipment & Parts Storage				⊙		⊙		
	A.3	**WASTE HANDLING, STORAGE, AND DISPOSAL**								
◆	A.3.a	Hazardous Waste								
	A.3.b	Solid Waste	⊙		⊙					

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
	A.3.e	Liquid Waste	⊙	⊙						
Category B: General Operations and Activities										
	B.1	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
◆	B.1.a	Vehicle & Equipment Repair			⊙	⊙		⊙	⊙	
◆	B.1.b	Changing Vehicle Fluids				⊙		⊙	⊙	
	B.1.c	Parts Replacement and Repairs			⊙	⊙		⊙	⊙	
	B.2	**WASHING AND CLEANING ACTIVITIES**								
◆	B.2.a	Vehicle Washing	⊙		⊙	⊙		⊙	⊙	
◆	B.2.b	Equipment Cleaning	⊙		⊙	⊙		⊙	⊙	
◆	B.3	**VEHICLE AND EQUIPMENT FUELING**				⊙		⊙	⊙	
Category C: Specific Operations and Activities										
	C.22	Painting or Coating Activities			⊙	⊙			⊙	
	C.32	Welding				⊙			⊙	
Category D: Outdoor Areas and Activities										
	D.1	**PARKING, ROOFTOPS, AND STORAGE AREAS**	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2	**BUILDING and GROUNDS MAINTENANCE**								
	D.2.d	Sidewalks & Paved Areas	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2.f	Pressure Washing	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.3	**ROADS AND STREETS**								
	D.3.a	Road and Street Maintenance	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.3.b	Road and Street Use	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4	**STORM DRAIN SYSTEMS**								
	D.4.a	Operation & Maintenance	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4.b	Illicit Discharges & Connections	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

3. Equipment Repair, Maintenance, Fueling, and Cleaning

Applicable SIC Codes

7519 – Utility Trailer Rentals
7353 – Heavy Construction Equipment Rentals
7359 – Equipment Rental
7623 – Refrigeration Services and Repair (Refrigerator, HVAC, etc.)
7692 – Welding Repair
7699 – Equipment Repair
7623 – Refrigeration Service and Repair
7699 (Repair Shops and Related Services, Not Else Classified)

Description

Establishments primarily engaged in the repair, maintenance, fueling and cleaning of equipment. Operations generally include engine repair, driveline repair, fuel system maintenance and repair, fluid removal/replacement and degreasing of components and parts.

Table 5.1.3 lists the Pollutant-generating Activities potentially associated with equipment repair, maintenance, fueling and cleaning, and indicates the Pollutants-of-Concern (POCs) typically associated with them. Specific PGAs and POCs associated with individual facilities vary depending on their actual uses and operations, and may therefore differ from those presented. Black diamonds indicate that the corresponding PGA is considered a priority.

Table 5.1.3 – Pollutant-generating Activities and Associated Pollutants of Concern for Equipment Repair, Maintenance, Fueling and Cleaning

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes										
	A.1	**MATERIALS MANAGEMENT**								
	A.1.a	Materials Loading & Unloading	⊙		⊙	⊙		⊙		
	A.1.b	Storage of Materials	⊙		⊙			⊙		
	A.1.c	Outdoor Liquid Container Storage				⊙		⊙		
	A.2	**VEHICLE AND EQUIPMENT STORAGE**								
	A.2.b	Outdoor Equipment & Parts Storage				⊙		⊙		
	A.3	**WASTE HANDLING, STORAGE, AND DISPOSAL**								
	A.3.a	Hazardous Waste				⊙		⊙	⊙	
	A.3.b	Solid Waste	⊙		⊙					
	A.3.e	Liquid Waste	⊙	⊙						
Category B: General Operations and Activities										
	B.1	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
◆	B.1.a	Vehicle & Equipment Repair			⊙	⊙		⊙	⊙	
	B.1.c	Parts Replacement and Repairs			⊙	⊙		⊙	⊙	
	B.2	**WASHING AND CLEANING ACTIVITIES**								
◆	B.2.b	Equipment Cleaning	⊙		⊙	⊙		⊙	⊙	
◆	B.3	**VEHICLE AND EQUIPMENT FUELING**				⊙		⊙	⊙	
Category C: Specific Operations and Activities										
	C.22	Painting or Coating Activities			⊙	⊙			⊙	
	C.32	Welding				⊙			⊙	
Category D: Outdoor Areas and Activities										
	D.1	**PARKING, ROOFTOPS, AND STORAGE AREAS**	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2	**BUILDING and GROUNDS MAINTENANCE**								
	D.2.d	Sidewalks & Paved Areas	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
◆	D.2.f	Pressure Washing	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4	**STORM DRAIN SYSTEMS**								
	D.4.a	Operation & Maintenance	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4.b	Illicit Discharges & Connections	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

4. Vehicle Body Repair and Painting

Applicable SIC Codes

7532 – Top & body repair & paint shops
7536 – Automotive Glass Replacement Shops
7549 – Automotive Services (wrecking, undercoating, rust proofing, lubrication)

Description

Establishments primarily engaged in the repair of automotive tops, bodies, and interiors, or automotive painting and refinishing. Operations at these facilities generally include exterior, interior and frame repair of vehicles, which may include windshield removal/replacement, metal parts fabrication, and removing and replacing fluids to gain access to areas requiring repair.

Table 5.1.4 lists the Pollutant-generating Activities potentially associated vehicle body repair and painting, and indicates the Pollutants-of-Concern (POCs) typically associated with them. Specific PGAs and POCs associated with individual facilities vary depending on their actual uses and operations, and may therefore differ from those presented. Black diamonds indicate that the corresponding PGA is considered a priority.

Table 5.1.4 – Pollutant-generating Activities and Associated Pollutants of Concern for Vehicle Body Repair and Painting

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes										
	A.1	**MATERIALS MANAGEMENT**								
	A.1.a	Materials Loading & Unloading	⊙		⊙	⊙		⊙		
	A.1.b	Storage of Materials	⊙		⊙			⊙		
	A.1.c	Outdoor Liquid Container Storage				⊙		⊙		
	A.2	**VEHICLE AND EQUIPMENT STORAGE**								
	A.2.a	Outdoor Vehicle Storage				⊙		⊙		
	A.2.b	Outdoor Equipment & Parts Storage				⊙		⊙		
	A.3	**WASTE HANDLING, STORAGE, AND DISPOSAL**								
	A.3.a	Hazardous Waste								
◆	A.3.b	Solid Waste	⊙		⊙					
	A.3.e	Liquid Waste	⊙	⊙						
Category B: General Operations and Activities										
	B.1	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
	B.1.a	Vehicle & Equipment Repair			⊙	⊙		⊙	⊙	
	B.1.b	Changing Vehicle Fluids				⊙		⊙	⊙	
	B.1.c	Parts Replacement and Repairs			⊙	⊙		⊙	⊙	
	B.2	**WASHING AND CLEANING ACTIVITIES**								
◆	B.2.a	Vehicle Washing	⊙		⊙	⊙		⊙	⊙	
◆	B.2.b	Equipment Cleaning	⊙		⊙	⊙		⊙	⊙	
	B.3	**VEHICLE AND EQUIPMENT FUELING**				⊙		⊙	⊙	
Category C: Specific Operations and Activities										
◆	C.10	Dust & Particulate Generating Activities	⊙			⊙				
◆	C.22	Painting or Coating Activities			⊙	⊙			⊙	
Category D: Outdoor Areas and Activities										
	D.1	**PARKING, ROOFTOPS, AND STORAGE AREAS**	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2	**BUILDING and GROUNDS MAINTENANCE**								
	D.2.d	Sidewalks & Paved Areas	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4	**STORM DRAIN SYSTEMS**								
	D.4.a	Operation & Maintenance	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4.b	Illicit Discharges & Connections	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

5. Parking Lots and Storage Facilities

Applicable SIC Codes

4225 – General Warehousing and Storage
4226 – Special Warehousing and Storage, Not Elsewhere Classified
7521 – Automotive Parking

Description

Establishments provide storage and parking facilities for short term and long term automotive storage. Operations at these facilities generally consist of supplying a location for cars to be securely stored or parked, which may include preparing cars for long term storage by removing fluids parts or generally moth balling the vehicle.

Table 5.1.5 lists the Pollutant-generating Activities potentially associated with parking lots and storage facilities, and indicates the Pollutants-of-Concern (POCs) typically associated with them. Specific PGAs and POCs associated with individual facilities vary depending on their actual uses and operations, and may therefore differ from those presented. Black diamonds indicate that the corresponding PGA is considered a priority.

Table 5.1.5 – Pollutant-generating Activities and Associated Pollutants of Concern for Parking Lots and Storage Facilities

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes										
	A.1	**MATERIALS MANAGEMENT**								
	A.1.a	Materials Loading & Unloading	⊙		⊙	⊙		⊙		
	A.1.b	Storage of Materials	⊙		⊙			⊙		
	A.1.c	Outdoor Liquid Container Storage				⊙		⊙		
	A.2	**VEHICLE AND EQUIPMENT STORAGE**								
	A.2.a	Outdoor Vehicle Storage				⊙		⊙		
	A.2.b	Outdoor Equipment & Parts Storage				⊙		⊙		
	A.3	**WASTE HANDLING, STORAGE, AND DISPOSAL**								
	A.3.a	Hazardous Waste								
	A.3.b	Solid Waste	⊙		⊙					
	A.3.e	Liquid Waste	⊙	⊙						
Category B: General Operations and Activities										
	B.1	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
	B.1.a	Vehicle & Equipment Repair			⊙	⊙		⊙	⊙	
	B.1.b	Changing Vehicle Fluids				⊙		⊙	⊙	
	B.1.c	Parts Replacement and Repairs			⊙	⊙		⊙	⊙	
	B.2	**WASHING AND CLEANING ACTIVITIES**								
	B.2.a	Vehicle Washing	⊙		⊙	⊙		⊙	⊙	
	B.2.b	Equipment Cleaning	⊙		⊙	⊙		⊙	⊙	
	B.3	**VEHICLE AND EQUIPMENT FUELING**				⊙		⊙	⊙	
Category C: Specific Operations and Activities										
Category D: Outdoor Areas and Activities										
	D.1	**PARKING, ROOFTOPS, AND STORAGE AREAS**	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2	**BUILDING and GROUNDS MAINTENANCE**								
	D.2.a	Landscaping Activities	⊙	⊙	⊙	⊙				⊙
	D.2.d	Sidewalks & Paved Areas	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4	**STORM DRAIN SYSTEMS**								
	D.4.a	Operation & Maintenance	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4.b	Illicit Discharges & Connections	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

6. Retail and Wholesale Fueling

Applicable SIC Codes

5541 – Gasoline Service Stations
5172 – Petroleum and Petroleum Products Wholesalers, Except Bulk Stations and Terminals

Description

Establishments primarily engaged in selling fuels and lubricants for motor vehicles. Operations could include key card services and retail establishments that provide petroleum, ethanol, and other vehicle fueling as well as lubricant products.

Table 5.1.6 lists the Pollutant-generating Activities potentially associated with retail and wholesale fueling, and indicates the Pollutants-of-Concern (POCs) typically associated with them. Specific PGAs and POCs associated with individual facilities vary depending on their actual uses and operations, and may therefore differ from those presented. Black diamonds indicate that the corresponding PGA is considered a priority.

Table 5.1.6 – Pollutant-generating Activities and Associated Pollutants of Concern for Retail and Wholesale Fueling

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes										
	A.1	**MATERIALS MANAGEMENT**								
	A.1.a	Materials Loading & Unloading	⊙		⊙	⊙		⊙		
	A.1.b	Storage of Materials	⊙		⊙			⊙		
	A.1.c	Outdoor Liquid Container Storage				⊙		⊙		
	A.2	**VEHICLE AND EQUIPMENT STORAGE**								
◆	A.2.a	Outdoor Vehicle Storage				⊙		⊙		
	A.2.b	Outdoor Equipment & Parts Storage				⊙		⊙		
	A.3	**WASTE HANDLING, STORAGE, AND DISPOSAL**								
	A.3.a	Hazardous Waste								
	A.3.b	Solid Waste	⊙		⊙					
◆	A.3.e	Liquid Waste	⊙	⊙						
Category B: General Operations and Activities										
	B.1	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
	B.1.a	Vehicle & Equipment Repair			⊙	⊙		⊙	⊙	
◆	B.1.b	Changing Vehicle Fluids				⊙		⊙	⊙	
	B.2	**WASHING AND CLEANING ACTIVITIES**								
	B.2.a	Vehicle Washing	⊙		⊙	⊙		⊙	⊙	
◆	B.3	**VEHICLE AND EQUIPMENT FUELING**				⊙		⊙	⊙	
Category C: Specific Operations and Activities										
Category D: Outdoor Areas and Activities										
	D.1	**PARKING, ROOFTOPS, AND STORAGE AREAS**	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2	**BUILDING and GROUNDS MAINTENANCE**								
	D.2.d	Sidewalks & Paved Areas	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4	**STORM DRAIN SYSTEMS**								
	D.4.a	Operation & Maintenance	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4.b	Illicit Discharges & Connections	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

7. Eating and Drinking Establishments

Applicable SIC Codes

5141 – Groceries, General Line
5149 – Groceries and related Products, Not Elsewhere Classified
5411 – Grocery Stores
5421 – Meat and Fish (Seafood) Markets, Including Freezer Provisioners
5499 – Miscellaneous Food Stores
5812 – Eating Places
5813 – Drinking Places (Alcoholic Beverages)
5999 – Miscellaneous Retail Stores, Not Elsewhere Classified

Description

Establishments primarily engaged in providing prepared or processed foods and beverages to the public. Operations usually including baking, frying, roasting and general preparation of food and the sell and distribution of processed beverages.

The County Department of Environmental Health Food and Housing Division (FHD) currently conducts inspections of food service Countywide. There are 18 cities within the County with more than 12,000 retail food facilities, including over 6,000 restaurants. In order to safeguard public health and to the environment most of these facilities are inspected an average of four times a year. Thus, any person operating a retail food facility (including vending vehicles or a catering business) is required by law to apply for and obtain a valid public health permit.

An eating and drinking establishment means an "operation that stores, prepares packages, serves, vends, or otherwise provides human consumption at the retail level." Overall, this category includes: restaurants, cafeterias, groceries stores, bakeries, delicatessens or all facility requiring a Health Department permit for food preparation. (COSD Food and Housing).

Table 5.1.7 lists the Pollutant-generating Activities potentially associated with eating and drinking establishments, and indicates the Pollutants-of-Concern (POCs) typically associated with them. Specific PGAs and POCs associated with individual facilities vary depending on their actual uses and operations, and may therefore differ from those presented. Black diamonds indicate that the corresponding PGA is considered a priority.

Table 5.1.7 – Pollutant-generating Activities and Associated Pollutants of Concern for Food Service Facilities

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes										
	A.1	**MATERIALS MANAGEMENT**								
	A.1.a	Materials Loading & Unloading	⊙	⊙		⊙		⊙	⊙	
	A.1.b	Storage of Materials	⊙	⊙	⊙			⊙	⊙	
	A.1.c	Outdoor Liquid Container Storage		⊙		⊙		⊙	⊙	
	A.2	**VEHICLE AND EQUIPMENT STORAGE**								
	A.2.a	Outdoor Vehicle Storage				⊙		⊙	⊙	
	A.2.b	Outdoor Equipment & Parts Storage				⊙		⊙	⊙	
	A.3	**WASTE HANDLING, STORAGE, AND DISPOSAL**								
	A.3.b	Solid Waste	⊙	⊙	⊙		⊙			
◆	A.3.c	Food Grease And Oil		⊙	⊙		⊙	⊙		
	A.3.e	Liquid Waste		⊙	⊙		⊙			
	A.3.h	Recyclables / Reusables			⊙	⊙	⊙			
Category B: General Operations and Activities										
	B.2	**WASHING AND CLEANING ACTIVITIES**								
	B.2.b	Equipment Cleaning		⊙		⊙		⊙	⊙	
◆	B.2.c	Floors, Mats, and Surfaces	⊙	⊙	⊙	⊙	⊙	⊙	⊙	
Category C: Specific Operations and Activities										
◆	C.16	Food Preparation		⊙	⊙		⊙	⊙		
Category D: Outdoor Areas and Activities										
	D.1	**PARKING, ROOFTOPS, AND STORAGE AREAS**	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2	**BUILDING and GROUNDS MAINTENANCE**								
	D.2.e	Sidewalks & Paved Areas	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2.f	Break Areas & Public Areas	⊙	⊙	⊙		⊙			
◆	D.2.g	Pressure Washing	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4	**STORM DRAIN SYSTEMS**								
	D.4.a	Operation & Maintenance	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4.b	Illicit Discharges & Connections	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

8. Pest Control Services

Applicable SIC Codes

7342 – Disinfecting and Pest Control Services

0721—Crop Protection

0762—Farm Management Services

0782—Lawn & Garden Services

Description

This category includes establishments primarily engaged in providing pesticide application services. Pest control services conduct mixing and application of pesticides (herbicides, fungicides, or insecticides) using sprays, dusts, vapors, baits, or soil incorporation on trees, shrubs, lawns, botanical crops, or structures. Conducting pest control requires specific training and State or Federal certification to ensure a proper delivery of chemicals into the surrounding environment.

Table 5.1.8 lists the Pollutant-generating Activities potentially associated with pesticide application activities and indicates the Pollutants-of-Concern (POCs) typically associated with them. Specific PGAs and POCs associated with individual facilities vary depending on their actual uses and operations, and may therefore differ from those presented. Black diamonds indicate that the corresponding PGA is considered a priority.

Table 5.1.8 – Pollutant-generating Activities and Associated Pollutants of Concern for Pest Control Services

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes										
	A.1	**MATERIALS MANAGEMENT**								
	A.1.a	Materials Loading & Unloading	⊙		⊙	⊙		⊙		
	A.1.b	Storage of Materials	⊙		⊙			⊙		
	A.1.c	Outdoor Liquid Container Storage				⊙		⊙		
	A.3	**WASTE HANDLING, STORAGE, AND DISPOSAL**								
	A.3.b	Solid Waste	⊙	⊙	⊙		⊙			
◆	A.3.e	Liquid Waste	⊙	⊙						⊙
◆	A.3.g	Green Waste		⊙	⊙		⊙			⊙
Category B: General Operations and Activities										
	B.2	**WASHING AND CLEANING ACTIVITIES**								
◆	B.2.b	Equipment Cleaning	⊙		⊙	⊙		⊙	⊙	⊙
Category C: Specific Operations and Activities										
◆	C.23	Pesticide or Other Chemical Product Formulation.							⊙	⊙
Category D: Outdoor Areas and Activities										
	D.1	**PARKING, ROOFTOPS, AND STORAGE AREAS**	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2	**BUILDING and GROUNDS MAINTENANCE**								
	D.2.a	Landscaping Activities	⊙	⊙	⊙	⊙				⊙
◆	D.2.b	Pesticide, Herbicide, & Fertilizer Application							⊙	⊙
◆	D.2.i	Erodible Surfaces & Areas Under Construction	⊙	⊙	⊙			⊙		⊙
	D.4	**STORM DRAIN SYSTEMS**								
	D.4.a	Operation & Maintenance	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4.b	Illicit Discharges & Connections	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

9. Nurseries and Greenhouses

Applicable SIC Codes

0181 (Ornamental Floriculture and Nursery Products)
8422 (Botanical or Zoological Gardens)

Description

This category includes establishments that have collections of a wide variety of plants or animals for public display or categorized and documented for scientific purposes. The Department of Agriculture, Weights and Measures (AWM) regulates these facilities. Currently there are no botanical gardens in the AWM current inventory.

This category includes establishments primarily engaged in growing plants to offer for sale for planting, propagation, or ornamentation. Operations generally include the cutting, trimming and arrangement of plants and other ornamentals for sale to the public.

Table 5.1.9 lists the Pollutant-generating Activities potentially associated with Nurseries, Greenhouses, and Botanical Gardens, and indicates the Pollutants-of-Concern (POCs) typically associated with them. Specific PGAs and POCs associated with individual facilities vary depending on their actual uses and operations, and may therefore differ from those presented. Black diamonds indicate that the corresponding PGA is considered a priority.

Table 5.1.9 – Pollutant-generating Activities and Associated Pollutants of Concern for Nurseries and Greenhouses

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes										
	A.1	**MATERIALS MANAGEMENT**								
	A.1.a	Materials Loading & Unloading	⊙		⊙	⊙		⊙		
	A.1.b	Storage of Materials	⊙		⊙			⊙		
	A.1.c	Outdoor Liquid Container Storage				⊙		⊙		
	A.3	**WASTE HANDLING, STORAGE, AND DISPOSAL**								
◆	A.3.b	Solid Waste	⊙	⊙	⊙		⊙			
◆	A.3.e	Liquid Waste	⊙	⊙						⊙
◆	A.3.g	Green Waste		⊙	⊙		⊙			⊙
Category B: General Operations and Activities										
	B.2	**WASHING AND CLEANING ACTIVITIES**								
◆	B.2.b	Equipment Cleaning	⊙		⊙	⊙		⊙	⊙	⊙
Category C: Specific Operations and Activities										
◆	C.23	Pesticide or Other Chemical Product Formulation.							⊙	⊙
Category D: Outdoor Areas and Activities										
	D.1	**PARKING, ROOFTOPS, AND STORAGE AREAS**	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2	**BUILDING and GROUNDS MAINTENANCE**								
	D.2.a	Landscaping Activities	⊙	⊙	⊙	⊙				⊙
◆	D.2.b	Pesticide, Herbicide, & Fertilizer Application							⊙	⊙
	D.2.i	Erodible Surfaces & Areas Under Construction	⊙	⊙	⊙			⊙		⊙
	D.4	**STORM DRAIN SYSTEMS**								
	D.4.a	Operation & Maintenance	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4.b	Illicit Discharges & Connections	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

10. Cemeteries

Applicable SIC Codes

6553 – Cemetery Subdividers and Developers
0782 – Law and Garden Services
0783 – Ornamental Shrub and Tree Services

Description

This category includes establishments specifically designated areas set aside to bury the deceased. Operations that generally occur may include mowing, trimming, planting, watering, fertilizing, digging, raking, and sprinkler installation. Landscape activities are conducted to improve the appearance, health, and value of the cemetery scenery. The Department of Agriculture, Weights and Measures (AWM) regulates these facilities.

Table 5.1.10 lists the Pollutant-generating Activities potentially associated with cemetery activities and indicates the Pollutants-of-Concern (POCs) typically associated with them. Specific PGAs and POCs associated with individual facilities vary depending on their actual uses and operations, and may therefore differ from those presented. Black diamonds indicate that the corresponding PGA is considered a priority.

Table 5.1.10 – Pollutant-generating Activities and Associated Pollutants of Concern for Cemeteries

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes										
	A.1	**MATERIALS MANAGEMENT**								
	A.1.a	Materials Loading & Unloading	⊙		⊙	⊙		⊙		
	A.1.b	Storage of Materials	⊙		⊙			⊙		
	A.1.c	Outdoor Liquid Container Storage				⊙		⊙		
	A.2	**VEHICLE AND EQUIPMENT STORAGE**								
	A.2.a	Outdoor Vehicle Storage				⊙		⊙		
	A.3	**WASTE HANDLING, STORAGE, AND DISPOSAL**								
◆	A.3.b	Solid Waste	⊙		⊙					
◆	A.3.e	Liquid Waste	⊙	⊙						
◆	A.3.g	Green Waste		⊙	⊙		⊙			⊙
Category B: General Operations and Activities										
	B.1	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
	B.1.a	Vehicle & Equipment Repair			⊙	⊙		⊙	⊙	
	B.2	**WASHING AND CLEANING ACTIVITIES**								
	B.2.a	Vehicle Washing	⊙		⊙	⊙		⊙	⊙	
	B.2.b	Equipment Cleaning	⊙		⊙	⊙		⊙	⊙	
	B.3	**VEHICLE AND EQUIPMENT FUELING**				⊙		⊙	⊙	
Category C: Specific Operations and Activities										
◆	C.23	Pesticide or Other Chemical Product Formulation.		⊙					⊙	⊙
Category D: Outdoor Areas and Activities										
	D.1	**PARKING, ROOFTOPS, AND STORAGE AREAS**	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2	**BUILDING and GROUNDS MAINTENANCE**								
	D.2.a	Landscaping Activities	⊙	⊙	⊙	⊙				⊙
◆	D.2.b	Pesticide, Herbicide, & Fertilizer Application							⊙	⊙
	D.2.d	Sidewalks & Paved Areas	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
◆	D.2.i	Erodible Surfaces & Areas Under Construction	⊙	⊙	⊙			⊙		⊙
	D.4	**STORM DRAIN SYSTEMS**								
	D.4.a	Operation & Maintenance	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4.b	Illicit Discharges & Connections	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

11. Golf Courses

Applicable SIC Codes

7992 (Public Golf Courses)
7997 (Membership Sports and Recreation Clubs)

Description

This category includes public and private golf and country clubs. Operations at these facilities generally consist of mowing, trimming, planting, watering, fertilizing, digging, raking, sprinkler installation and the general upkeep of water bodies used as ornamental landscaping. AWM currently conducts inspections to evaluate compliance within stormwater regulations.

Table 5.1.11 lists the Pollutant-generating Activities potentially associated with golf courses activities and indicates the Pollutants-of-Concern (POCs) typically associated with them. Specific PGAs and POCs associated with individual facilities vary depending on their actual uses and operations, and may therefore differ from those presented. Black diamonds indicate that the corresponding PGA is considered a priority.

Table 5.1.11 – Pollutant-generating Activities and Associated Pollutants of Concern for Golf Courses

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes										
	A.1	**MATERIALS MANAGEMENT**								
	A.1.a	Materials Loading & Unloading	⊙		⊙	⊙		⊙		
	A.1.b	Storage of Materials	⊙		⊙			⊙		
	A.1.c	Outdoor Liquid Container Storage				⊙		⊙		
	A.2	**VEHICLE AND EQUIPMENT STORAGE**								
	A.2.a	Outdoor Vehicle Storage				⊙		⊙		
	A.2.b	Outdoor Equipment & Parts Storage				⊙		⊙		
	A.3	**WASTE HANDLING, STORAGE, AND DISPOSAL**								
	A.3.b	Solid Waste	⊙		⊙					
	A.3.e	Liquid Waste	⊙	⊙						
◆	A.3.g	Green Waste		⊙	⊙		⊙			⊙
Category B: General Operations and Activities										
	B.1	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
	B.1.a	Vehicle & Equipment Repair			⊙	⊙		⊙	⊙	
	B.1.b	Changing Vehicle Fluids				⊙		⊙	⊙	
	B.2	**WASHING AND CLEANING ACTIVITIES**								
	B.2.a	Vehicle Washing	⊙		⊙	⊙		⊙	⊙	
	B.2.b	Equipment Cleaning	⊙		⊙	⊙		⊙	⊙	
	B.3	**VEHICLE AND EQUIPMENT FUELING**				⊙		⊙	⊙	
Category C: Specific Operations and Activities										
◆	C.23	Pesticide or Other Chemical Product Formulation.							⊙	⊙
Category D: Outdoor Areas and Activities										
	D.1	**PARKING, ROOFTOPS, AND STORAGE AREAS**	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2	**BUILDING and GROUNDS MAINTENANCE**								
◆	D.2.a	Landscaping Activities	⊙	⊙	⊙	⊙				⊙
◆	D.2.b	Pesticide, Herbicide, & Fertilizer Application							⊙	⊙
	D.2.d	Sidewalks & Paved Areas	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
◆	D.2.i	Erodible Surfaces & Areas Under Construction	⊙	⊙	⊙			⊙		⊙
	D.4	**STORM DRAIN SYSTEMS**								
	D.4.a	Operation & Maintenance	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4.b	Illicit Discharges & Connections	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

12. Parks and Other Recreational Facilities

Applicable SIC Codes
7997 (Membership Sports and Recreation Clubs)

Description

This category includes establishments that specifically correspond to a bounded area of land, usually in its natural or semi-natural (landscaped) state, that was set aside for a sport or a recreational purpose for a fairly large group of people. The most prevalent recreational facility in the County other than golf courses are paint ball fields. Paint balling is a sport in which participants use liquid-paint that is captured within spherical gelatin capsules containing primarily non-toxic water-soluble substances and dyes. DPW currently conducts parks and other recreational facility inspections to evaluate compliance within stormwater regulations.

Table 5.1.12 lists the Pollutant-generating Activities potentially associated with recreational parks, and indicates the Pollutants-of-Concern (POCs) typically associated with them. Specific PGAs and POCs associated with individual facilities vary depending on their actual uses and operations, and may therefore differ from those presented. Black diamonds indicate that the corresponding PGA is considered a priority.

Table 5.1.12 – Pollutant-generating Activities and Associated Pollutants of Concern for Parks and Other Recreational Facilities

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes										
	A.1	**MATERIALS MANAGEMENT**								
	A.1.a	Materials Loading & Unloading	⊙		⊙	⊙		⊙		
	A.1.b	Storage of Materials	⊙		⊙			⊙		
	A.1.c	Outdoor Liquid Container Storage				⊙		⊙		
	A.3	**WASTE HANDLING, STORAGE, AND DISPOSAL**								
	A.3.b	Solid Waste	⊙		⊙					
◆	A.3.e	Liquid Waste	⊙	⊙						
◆	A.3.g	Green Waste		⊙	⊙		⊙			⊙
Category B: General Operations and Activities										
	B.2	**WASHING AND CLEANING ACTIVITIES**								
	B.2.b	Equipment Cleaning	⊙		⊙	⊙		⊙	⊙	
Category C: Specific Operations and Activities										
◆	C.22	Painting or Coating Activities			⊙	⊙			⊙	
Category D: Outdoor Areas and Activities										
	D.1	**PARKING, ROOFTOPS, AND STORAGE AREAS**	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2	**BUILDING and GROUNDS MAINTENANCE**								
◆	D.2.a	Landscaping Activities	⊙	⊙	⊙	⊙				⊙
	D.2.b	Pesticide, Herbicide, & Fertilizer Application							⊙	⊙
	D.2.d	Sidewalks & Paved Areas	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
◆	D.2.i	Erodible Surfaces & Areas Under Construction	⊙	⊙	⊙			⊙		⊙
	D.4	**STORM DRAIN SYSTEMS**								
	D.4.a	Operation & Maintenance	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4.b	Illicit Discharges & Connections	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

13. Equine Facilities

Applicable SIC Codes

0272 (Horses and other Equines)
0279 (Animal Specialties, Not Elsewhere Classified)
0291 (General Farms, Primarily Livestock and Animal Specialties)
0752 (Animal Specialty Services, Except Veterinary)
7948 (Services-Racing, Including Track Operation)
7999 (Amusement and Recreation Services, Not Else Classified)

Description

This category includes establishments primarily engaged in selling, transferring, adopting, breeding, boarding, training, grooming, sheltering, or rescuing pets, livestock, or large animals.

This category includes establishments primarily engaged in the operation of riding, training, breeding, boarding, or driving horses; it includes both use of horses for practical, working purposes as well as recreational activities and competitive sports. This category does not include veterinary services.

Table 5.1.13 lists the Pollutant-generating Activities potentially associated with equestrian activities and indicates the Pollutants-of-Concern (POCs) typically associated with them. Specific PGAs and POCs associated with individual facilities vary depending on their actual uses and operations, and may therefore differ from those presented. Black diamonds indicate that the corresponding PGA is considered a priority.

Table 5.1.13 – Pollutant-generating Activities and Associated Pollutants of Concern for Equine Facilities

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes										
	A.1	**MATERIALS MANAGEMENT**								
	A.1.a	Materials Loading & Unloading	⊙		⊙	⊙		⊙		
	A.1.b	Storage of Materials	⊙		⊙			⊙		
	A.1.c	Outdoor Liquid Container Storage				⊙		⊙		
	A.2	**VEHICLE AND EQUIPMENT STORAGE**								
	A.2.a	Outdoor Vehicle Storage				⊙		⊙		
	A.2.b	Outdoor Equipment & Parts Storage				⊙		⊙		
	A.3	**WASTE HANDLING, STORAGE, AND DISPOSAL**								
	A.3.b	Solid Waste	⊙		⊙					
◆	A.3.d	Pet Waste / Manure		⊙			⊙			
	A.3.e	Liquid Waste	⊙	⊙						
◆	A.3.g	Green Waste		⊙	⊙		⊙			⊙
Category B: General Operations and Activities										
	B.1	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
	B.1.a	Vehicle & Equipment Repair			⊙	⊙		⊙	⊙	
	B.2	**WASHING AND CLEANING ACTIVITIES**								
	B.2.a	Vehicle Washing	⊙		⊙	⊙		⊙	⊙	
	B.2.b	Equipment Cleaning	⊙		⊙	⊙		⊙	⊙	
◆	B.2.d	Animal Grooming and Washing	⊙	⊙	⊙		⊙			⊙
	B.3	**VEHICLE AND EQUIPMENT FUELING**				⊙		⊙	⊙	
Category C: Specific Operations and Activities										
◆	C.2	Animal Feeding and Grazing	⊙	⊙			⊙			
◆	C.23	Pesticide or Other Chemical Product Formulation.							⊙	⊙
	C.28	Special Events	⊙	⊙	⊙		⊙	⊙		
Category D: Outdoor Areas and Activities										
	D.1	**PARKING, ROOFTOPS, AND STORAGE AREAS**	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2	**BUILDING and GROUNDS MAINTENANCE**								
	D.2.a	Landscaping Activities	⊙	⊙	⊙	⊙				⊙
◆	D.2.b	Pesticide, Herbicide, & Fertilizer Application							⊙	⊙
	D.2.d	Sidewalks & Paved Areas	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
◆	D.2.i	Erodible Surfaces & Areas Under Construction	⊙	⊙	⊙			⊙		⊙

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
	D.4	**STORM DRAIN SYSTEMS**								
	D.4.a	Operation & Maintenance	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4.b	Illicit Discharges & Connections	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

14. Pet-related Facilities

Applicable SIC Codes
0752 (Animal Specialty Services, Except Veterinary)

Description

This category includes establishments primarily engaged in pet grooming and washing, housing or refuge. Pet Grooming operations generally consist of washing and trimming of animals. Animal kennels are structures such as cages, gates, buildings or yards that house large amounts of cats or dogs and could include pet motels and dog training centers. Operations generally occurring at kennels include animal feeding, washing, clipping and disposal of animal waste.

Table 5.1.14 lists the Pollutant-generating Activities potentially associated with pet-related activities and indicates the Pollutants-of-Concern (POCs) typically associated with them. Specific PGAs and POCs associated with individual facilities vary depending on their actual uses and operations, and may therefore differ from those presented. Black diamonds indicate that the corresponding PGA is considered a priority.

Table 5.1.14 – Pollutant-generating Activities and Associated Pollutants of Concern for Pet-related facilities

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes										
	A.1	**MATERIALS MANAGEMENT**								
	A.1.a	Materials Loading & Unloading	⊙		⊙	⊙		⊙		
	A.1.b	Storage of Materials	⊙		⊙			⊙		
	A.1.c	Outdoor Liquid Container Storage				⊙		⊙		
	A.2	**VEHICLE AND EQUIPMENT STORAGE**								
	A.2.a	Outdoor Vehicle Storage				⊙		⊙		
	A.2.b	Outdoor Equipment & Parts Storage				⊙		⊙		
	A.3	**WASTE HANDLING, STORAGE, AND DISPOSAL**								
	A.3.b	Solid Waste	⊙		⊙					
◆	A.3.d	Pet Waste / Manure		⊙			⊙			
◆	A.3.e	Liquid Waste	⊙	⊙						
◆	A.3.g	Green Waste		⊙	⊙		⊙			⊙
Category B: General Operations and Activities										
	B.1	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
	B.1.a	Vehicle & Equipment Repair			⊙	⊙		⊙	⊙	
	B.2	**WASHING AND CLEANING ACTIVITIES**								
	B.2.a	Vehicle Washing	⊙		⊙	⊙		⊙	⊙	
	B.2.b	Equipment Cleaning	⊙		⊙	⊙		⊙	⊙	
◆	B.2.d	Animal Grooming and Washing	⊙	⊙	⊙		⊙			⊙
	B.3	**VEHICLE AND EQUIPMENT FUELING**				⊙		⊙	⊙	
Category C: Specific Operations and Activities										
	C.28	Special Events	⊙	⊙	⊙		⊙	⊙		
Category D: Outdoor Areas and Activities										
	D.1	**PARKING, ROOFTOPS, AND STORAGE AREAS**	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2	**BUILDING and GROUNDS MAINTENANCE**								
	D.2.a	Landscaping Activities	⊙	⊙	⊙	⊙				⊙
	D.2.b	Pesticide, Herbicide, & Fertilizer Application							⊙	⊙
	D.2.d	Sidewalks & Paved Areas	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
◆	D.2.i	Erodible Surfaces & Areas Under Construction	⊙	⊙	⊙			⊙		⊙
	D.4	**STORM DRAIN SYSTEMS**								
	D.4.a	Operation & Maintenance	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4.b	Illicit Discharges & Connections	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

15. Building Material Retailers and Storage

Applicable SIC Codes

5031 – Wholesale Lumber, Plywood, Millwork & Wood panels
5039 – Construction Materials

Description

Retailers

This category includes establishments primarily engaged in the sale of general line of building materials. Materials may include but are not limited to lumber, flooring, molding, doors, sashes, frames, other millwork, roofing materials, stone, masonry materials, insulation, paint, brick, tile, cement, sand, and gravel.

Storage

This category includes businesses that store or house building materials and supplies short term or for extended periods of time before they are delivered to a buyer.

Table 5.1.15 lists the Pollutant-generating Activities potentially associated with retailers and storage facilities, and indicates the Pollutants-of-Concern (POCs) typically associated with them. Specific PGAs and POCs associated with individual facilities vary depending on their actual uses and operations, and may therefore differ from those presented. Black diamonds indicate that the corresponding PGA is considered a priority.

Table 5.1.15 – Pollutant-generating Activities and Associated Pollutants of Concern for Building Material Retailers and Storage

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes										
	A.1	**MATERIALS MANAGEMENT**								
◆	A.1.a	Materials Loading & Unloading	⊙		⊙	⊙		⊙		
◆	A.1.b	Storage of Materials	⊙		⊙			⊙		
	A.1.c	Outdoor Liquid Container Storage				⊙		⊙		
	A.2	**VEHICLE AND EQUIPMENT STORAGE**								
	A.2.a	Outdoor Vehicle Storage				⊙		⊙		
	A.2.b	Outdoor Equipment & Parts Storage				⊙		⊙		
	A.3	**WASTE HANDLING, STORAGE, AND DISPOSAL**								
	A.3.a	Hazardous Waste								
◆	A.3.b	Solid Waste	⊙		⊙					
	A.3.e	Liquid Waste	⊙	⊙						
Category B: General Operations and Activities										
	B.1	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
	B.1.a	Vehicle & Equipment Repair			⊙	⊙		⊙	⊙	
	B.1.b	Changing Vehicle Fluids				⊙		⊙	⊙	
	B.1.c	Parts Replacement and Repairs			⊙	⊙		⊙	⊙	
	B.2	**WASHING AND CLEANING ACTIVITIES**								
	B.2.a	Vehicle Washing	⊙		⊙	⊙		⊙	⊙	
	B.2.b	Equipment Cleaning	⊙		⊙	⊙		⊙	⊙	
	B.3	**VEHICLE AND EQUIPMENT FUELING**				⊙		⊙	⊙	
Category C: Specific Operations and Activities										
	C.22	Painting or Coating Activities			⊙	⊙			⊙	
Category D: Outdoor Areas and Activities										
◆	D.1	**PARKING, ROOFTOPS, AND STORAGE AREAS**	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2	**BUILDING and GROUNDS MAINTENANCE**								
◆	D.2.d	Sidewalks & Paved Areas	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4	**STORM DRAIN SYSTEMS**								
	D.4.a	Operation & Maintenance	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4.b	Illicit Discharges & Connections	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

16. Marinas

Applicable SIC Codes
4493 – Marinas

Description

This category includes establishments primarily engaged in the repair, maintenance, and cleaning of ships and boats. Operations may include engine repair, driveline repair, fluid removal/replacement and for this category could include body and interior components that are mechanical in nature. The marina may also have re-fueling, washing and repair facilities, may offer out-of-water-storage, and may include ground facilities such as parking lots for vehicles and boat trailers.

Table 5.1.16 lists the Pollutant-generating Activities potentially associated with marinas, and indicates the Pollutants-of-Concern (POCs) typically associated with them. Specific PGAs and POCs associated with individual facilities vary depending on their actual uses and operations, and may therefore differ from those presented. Black diamonds indicate that the corresponding PGA is considered a priority.

Table 5.1.16 – Pollutant-generating Activities and Associated Pollutants of Concern for Marinas

Priority PGA (◆)	PGA Reference Number (see Attachment 5.2)	Pollutant-generating Activity (PGA)	Potential Pollutants-of-Concern (POCs)							
			Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides
Category A: Management of Materials , Equipment, and Wastes										
	A.1	**MATERIALS MANAGEMENT**								
	A.1.a	Materials Loading & Unloading	⊙		⊙	⊙		⊙		
	A.1.b	Storage of Materials	⊙		⊙			⊙		
	A.1.c	Outdoor Liquid Container Storage				⊙		⊙		
	A.2	**VEHICLE AND EQUIPMENT STORAGE**								
	A.2.a	Outdoor Vehicle Storage				⊙		⊙		
	A.2.b	Outdoor Equipment & Parts Storage				⊙		⊙		
	A.3	**WASTE HANDLING, STORAGE, AND DISPOSAL**								
◆	A.3.a	Hazardous Waste								
	A.3.b	Solid Waste	⊙		⊙					
	A.3.e	Liquid Waste	⊙	⊙						
	A.3.f	Sanitary Wastes		⊙	⊙		⊙			
Category B: General Operations and Activities										
	B.1	**VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE**								
◆	B.1.a	Vehicle & Equipment Repair			⊙	⊙		⊙	⊙	
◆	B.1.b	Changing Vehicle Fluids				⊙		⊙	⊙	
	B.1.c	Parts Replacement and Repairs			⊙	⊙		⊙	⊙	
	B.2	**WASHING AND CLEANING ACTIVITIES**								
◆	B.2.a	Vehicle Washing	⊙		⊙	⊙		⊙	⊙	
◆	B.2.b	Equipment Cleaning	⊙		⊙	⊙		⊙	⊙	
	B.3	**VEHICLE AND EQUIPMENT FUELING**				⊙		⊙	⊙	
Category C: Specific Operations and Activities										
	C.22	Painting or Coating Activities			⊙	⊙			⊙	
	C.32	Welding				⊙			⊙	
Category D: Outdoor Areas and Activities										
	D.1	**PARKING, ROOFTOPS, AND STORAGE AREAS**	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.2	**BUILDING and GROUNDS MAINTENANCE**								
	D.2.f	Pressure Washing	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4	**STORM DRAIN SYSTEMS**								
	D.4.a	Operation & Maintenance	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
	D.4.b	Illicit Discharges & Connections	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙

C. BMP Requirements for Specific Industrial, Commercial and Municipal Pollutant-generating Activities (PGAs)

Table 5.2.1 – Required Best Management Practices (BMPs) by Pollutant-generating Activity

Category A: Management of Materials and Wastes	
A.1 MATERIALS MANAGEMENT AND STORAGE	
A.1.a Materials Loading and Unloading	WPO Section 67.808(a)(6)(A) – Use dry clean-up methods i. Use dry methods such as sweeping, vacuuming, raking, and application of absorbents to cleanup Pollutants, unless wet cleanup methods are otherwise allowed in this Chapter. WPO Section 67.808(a)(7)(A) – Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. WPO Section 67.808(a)(7)(D) -- Loading and unloading i. Storm drain inlets located within or down-gradient of loading or unloading areas shall be covered or otherwise protected during loading and unloading activities to prevent the entry of pollutants into the stormwater conveyance system or receiving waters. ii. Equipment and supplies stored in loading and unloading areas shall be properly maintained to prevent leaks and spills to the stormwater conveyance system or receiving waters, and to prevent their contact with rainfall and run-on.
A.1.b Storage of Materials **A.1.c Liquid Container Storage**	WPO Section 67.806(a) – General BMP Requirements (5) Store all materials and wastes with the potential to pollute stormwater in a manner that either prevents contact with rainfall and runoff from storm flows or contains contaminated runoff for treatment and disposal. (6) Locate, configure, and manage stockpiles of soil, green waste and compost to prevent the release of materials to the stormwater conveyance system or receiving waters. WPO Section 67.808(a)(7)(A) – Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. WPO Section 67.808(a)(7)(B) – Hazardous materials and hazardous wastes i. Hazardous materials and wastes shall be stored, managed, and disposed in accordance with applicable federal, state and local laws and regulations. ii. Hazardous materials and wastes shall be stored above the ground. Where practicable, provide overhead coverage for all outside hazardous materials or waste storage areas. If overhead coverage is not available, stored materials shall be covered with an impervious material such as a tarp or other similar method. iv. Secondary containment of hazardous waste shall be provided around storage areas from which a significant potential exists to discharge materials or wastes to the stormwater conveyance system or receiving waters. v. Hazardous waste storage areas shall be inspected by the owner or operator, at least once prior to the rainy season and monthly during the rainy season. vi. Pesticides and other chemical products shall be used, stored, and disposed of in accordance with applicable federal, state, and local laws and regulations.

	WPO Section 67.808(a)(7)(E) -- Storage i. Outdoor storage areas of materials and equipment shall be configured using berms, dikes, or other diversion structures or other measures that elevate stored materials and equipment from site surfaces. ii. Containers shall be kept in a leak-proof condition, securely closed when not in use, and stored in a manner that protects them from contact with stormwater. iii. Storage of cement and masonry materials shall be above ground and covered. iv. Placement of stock piles within any drainage system is prohibited. v. Stockpiles and bulk materials, such as soil, fertilizer, and potting mixture shall be covered during windy and rainy conditions where practicable. Prior to the onset of predicted rain, stockpiles shall be covered and bermed to prevent contact with stormwater. WPO Section 67.808(a)(9)(D) – Rooftops i. Materials which may contaminate stormwater shall not be stored on rooftops unless adequate precautions have been taken to prevent their contact with stormwater.
A.2 WASTE HANDLING AND STORAGE	
A.2.a Hazardous Waste	WPO Section 67.808(a)(7)(A) – Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. WPO Section 67.808(a)(7)(B) -- Hazardous materials and hazardous wastes i. Hazardous materials and wastes shall be stored, managed, and disposed in accordance with applicable federal, state and local laws and regulations. ii. Hazardous materials and wastes shall be stored above the ground. Where practicable, provide overhead coverage for all outside hazardous materials or waste storage areas. If overhead coverage is not available, stored materials shall be covered with an impervious material such as a tarp or other similar method. iii. Paints, coatings, thinners, and other materials shall be disposed of in accordance with this chapter. iv. Secondary containment of hazardous waste shall be provided around storage areas from which a significant potential exists to discharge materials or wastes to the stormwater conveyance system or receiving waters. v. Hazardous waste storage areas shall be inspected by the owner or operator, at least once prior to the rainy season and monthly during the rainy season. vi. Pesticides and other chemical products shall be used, stored, and disposed of in accordance with applicable federal, state, and local laws and regulations. vii. The outdoor application of fertilizers and pesticides is prohibited during rainfall. viii. Pesticide use shall be reduced to the MEP in areas where recurring applications of pesticides are performed.

A.2.b Solid Waste **A.2.c Food Grease And Oil**	WPO Section 67.808(a)(7)(A) – Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. WPO Section 67.808(a)(8) (C) -- Solid, non-hazardous waste i. Trash storage and disposal areas shall be kept clean and free of debris. ii. Dumpsters, grease bins, and other containers shall be maintained in a clean and leak proof condition and shall be kept securely closed when not in use. iii. Materials and equipment necessary for the clean-up of trash and debris shall be maintained and kept readily accessible. iv. Loose aggregate, mortar, and dust shall be routinely cleaned up using dry cleanup methods such as sweeping or vacuuming. Wet methods may be used only if necessary to adequately clean equipment for reuse, or where water must be used to lubricate and flush a cut, but only if performed in accordance with this chapter. WPO Section 67.808(a)(7)(E) – Storage i. Outdoor storage areas of materials and equipment shall be configured using berms, dikes, or other diversion structures or other measures that elevate stored materials and equipment from site surfaces. ii. Containers shall be kept in a leak-proof condition, securely closed when not in use, and stored in a manner that protects them from contact with stormwater.
A.2.d Pet Waste / Manure	WPO Section 67.808(a)(7) (C) -- Solid, non-hazardous waste i. Trash storage and disposal areas shall be kept clean and free of debris. ii. Dumpsters, grease bins, and other containers shall be maintained in a clean and leak proof condition and shall be kept securely closed when not in use. iii. Materials and equipment necessary for the clean-up of trash and debris shall be maintained and kept readily accessible. v. All areas where livestock, horses or other large animals are confined shall be bermed or curbed in a manner that avoids a discharge to the stormwater conveyance system or receiving water. If berms or curbs are not practicable, manure shall be cleaned up at least twice weekly and must be composted or properly stored prior to disposal. WPO Section 67.808(a)(7)(E) – Storage ii. Containers shall be kept in a leak-proof condition, securely closed when not in use, and stored in a manner that protects them from contact with stormwater. iv. Placement of stock piles within any drainage system is prohibited. v. Stockpiles and bulk materials, such as soil, fertilizer, and potting mixture shall be covered during windy and rainy conditions where practicable. Prior to the onset of predicted rain, stockpiles shall be covered and bermed to prevent contact with stormwater.

A.2.e Liquid Waste **A.2.f Sanitary Wastes**	WPO Section 67.808(a)(6) -- Liquid waste management B. Disposal of slurries to the stormwater conveyance system or receiving waters is prohibited. C. Rinse water shall be confined to a designated area such as a sanitary sewer, dead-end sump, process treatment system, or hole where water percolates or evaporates and solids are removed for collection and disposal. Rinse water and solids shall be re-used, recycled, or disposed of in accordance with this chapter. D. Wash water shall be directed to an approved sanitary sewer or landscaped locations. E. Wash racks. i. Wash rack areas shall have perimeter control and be properly sloped to a grated floor drain. ii. Wash rack areas shall drain to the sanitary sewer or to a holding tank. F. Disposal of wastewater to the stormwater conveyance system, receiving waters, or the ground, is prohibited. G. If provided, pump-out services for boats, portable toilets, or other holding tanks shall be conducted in a manner that prevents the release of sewage to the stormwater conveyance system or receiving waters. H. Wastewater shall be disposed to the sanitary sewer at the job site or to a holding tank. Disposal of wastewater contained in holding tanks shall be disposed of to the sanitary sewer at the business's company headquarters or at an approved location. I. Discharging backwash wastewater to the stormwater conveyance system or receiving waters is prohibited. Backwash wastewater may be disposed to the sanitary sewer; to a holding tank or settling pond; or where allowed by this chapter, by infiltration to the soil. J. Pool, spa, and fountain water intended for discharge to the stormwater conveyance system shall contain a concentration of zero ppm chlorine or bromine prior to discharge. K. Pool, spa, and fountain water discharged after acid washing shall be neutralized to a pH of 7.2 - 8.0. L. If rinse water from the cleaning of portable sanitary toilet closets cannot be properly disposed of to the sanitary sewer at a job site, it shall be contained prior to disposal at the service facility or other approved facility. M. Wash and rinse water from building and pavement washing that cannot be properly disposed of at the job site shall be collected and contained for recycling, reuse, or proper disposal. N. Where irrigation tail-water return ponds are used, the ponds shall be designed with the appropriate vertical separation between the base of the pond and the seasonal high groundwater mark and must be lined or managed to prevent the movement of water-soluble chemicals to the groundwater and to stormwater flows. WPO Section 67.808(a)(7)(A) – Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. WPO Section 67.808(a)(7)(E) – Storage ii. Containers shall be kept in a leak-proof condition, securely closed when not in use, and stored in a manner that protects them from contact with stormwater.

A.2.g Green Waste	WPO Section 67.806(a) – General BMP Requirement (6) Locate, configure, and manage stockpiles of soil, green waste and compost to prevent the release of materials to the stormwater conveyance system or receiving waters. WPO Section 67.808(a)(7) (C) -- Solid, non-hazardous waste i. Trash storage and disposal areas shall be kept clean and free of debris. ii. Dumpsters, grease bins, and other containers shall be maintained in a clean and leak proof condition and shall be kept securely closed when not in use. iii. Materials and equipment necessary for the clean-up of trash and debris shall be maintained and kept readily accessible. iv. Loose aggregate, mortar, and dust shall be routinely cleaned up using dry cleanup methods such as sweeping or vacuuming. Wet methods may be used only if necessary to adequately clean equipment for reuse, or where water must be used to lubricate and flush a cut, but only if performed in accordance with this chapter. WPO Section 67.808(a)(7)(E) – Storage ii. Containers shall be kept in a leak-proof condition, securely closed when not in use, and stored in a manner that protects them from contact with stormwater.
A.2.h Recyclables / Reusables	WPO Section 67.808(a)(6) -- Liquid waste management M. Wash and rinse water from building and pavement washing that cannot be properly disposed of at the job site shall be collected and contained for recycling, reuse, or proper disposal. WPO Section 67.808(a)(7)(A) – Spill prevention and response iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. WPO Section 67.808(a)(7)(E) – Storage ii. Containers shall be kept in a leak-proof condition, securely closed when not in use, and stored in a manner that protects them from contact with stormwater.

Category B: Vehicle and Equipment Activities	
B.1 VEHICLE AND EQUIPMENT STORAGE	
B.1.a Outdoor Vehicle Storage **B.1.b Outdoor Equipment and Parts Storage**	WPO Section 67.808(a)(7)(D) -- Loading and Unloading i. Equipment and supplies stored in loading and unloading areas shall be properly maintained to prevent leaks and spills to the stormwater conveyance system or receiving waters, and to prevent their contact with rainfall and run-on. WPO Section 67.808(a)(7)(E) -- Storage i. Outdoor storage areas of materials and equipment shall be configured using berms, dikes, or other diversion structures or other measures that elevate stored materials and equipment from site surfaces. WPO Section 67.808(a)(8) -- Vehicles and equipment (F) Fluids shall be drained from any retired vehicles or equipment stored on site. WPO Section 67.808(a)(9)(C) -- Parking lots and vehicle storage areas i. Wet clean-up methods may only be used where adequate precautions have been taken to prevent the entry of wash water and other contaminants into the stormwater conveyance system or receiving waters. ii. Vehicle maintenance and repair operations with the potential to release pollutants are prohibited at commercial parking lots and storage facilities. WPO Section 67.808(a)(9)(D) -- Rooftops Equipment such as emergency generators, HVAC systems and other similar items located on rooftops shall be inspected and preventive maintenance conducted to prevent leaks and spills.

B.2 VEHICLE AND EQUIPMENT REPAIR, MAINTENANCE, AND SERVICE	
B.2.a Vehicle and Equipment Repair **B.2.b Changing Vehicle Fluids** **B.2.c Vehicle and Equipment Fueling**	WPO Section 67.808(a)(5) – Housekeeping. A. The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. B. Areas where work is being actively conducted shall be cleaned daily using dry clean-up methods such as sweeping, wiping, vacuuming, or raking. Wet clean-up methods such as hosing may only be used if precautions have been taken to prevent the discharge of wash water or other materials to the stormwater conveyance system or receiving waters. WPO Section 67.808(a)(7)(A) – Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. WPO Section 67.808(a)(8) -- Vehicles and Equipment A. All vehicles and equipment shall be properly maintained and inspected to ensure their proper functioning. D. The use of hose-off or single-use engine degreasing chemicals is prohibited, unless captured and properly disposed. E. Maintenance and repair equipment shall be kept clean to avoid the build up of grease and oil. F. Fluids shall be drained from any retired vehicles or equipment stored on site. G. Vehicle and equipment maintenance and repair work such as body work shall be conducted indoors or under cover, where practicable. If work cannot be conducted indoors or under cover, other BMPs shall be implemented to prevent the discharge of pollutants into the stormwater conveyance system or receiving waters. H. Major repair and maintenance work on boats over or in the water is prohibited. Touch-up painting, tune ups, or other similar activities are not considered major repair or maintenance work, but may only be conducted over or in the water if adequate precautions have been taken to prevent the entry of pollutants into the water. WPO Section 67.808(a)(9) -- Outdoor areas--housekeeping and grounds keeping practices. C. Parking lots and vehicle storage areas. ii. Vehicle maintenance and repair operations with the potential to release pollutants are prohibited at commercial parking lots and storage facilities. WPO Section 67.808(a)(7)(B) -- Hazardous materials and hazardous wastes i. Hazardous materials and wastes shall be stored, managed, and disposed in accordance with applicable federal, state and local laws and regulations.
B.2.d Vehicle Washing **B.2.e Equipment Cleaning**	WPO Section 67.808(a)(8) -- Vehicles and Equipment (B) Vehicles and equipment shall not be washed in areas where wash water or rinse water will drain to the stormwater conveyance system or receiving waters. (C) Infiltration of wash or rinse water to pervious surfaces is allowed with a minimum of 10 feet separation between the groundwater and the pervious surface, except that wash or rinse water generated from cleaning engines, mechanical parts, or heavy equipment shall not infiltrate a pervious surface. (D) The use of hose-off or single-use engine degreasing chemicals is prohibited, unless captured and properly disposed. (E) Maintenance and repair equipment shall be kept clean to avoid the build up of grease and oil.

Category C: Outdoor Area Maintenance	
C.1 BUILDING AND GROUNDS MAINTENANCE	
C.1.a Parking Areas	WPO Section 67.808(a)(9)(C) -- Parking lots and vehicle storage areas i. Wet clean-up methods may only be used where adequate precautions have been taken to prevent the entry of wash water and other contaminants into the stormwater conveyance system or receiving waters. ii. Vehicle maintenance and repair operations with the potential to release pollutants are prohibited at commercial parking lots and storage facilities. WPO Section 67.808(a)(9)(D) -- Rooftops i. Materials which may contaminate stormwater shall not be stored on rooftops unless adequate precautions have been taken to prevent their contact with stormwater. ii. Equipment such as emergency generators, HVAC systems and other similar items located on rooftops shall be inspected and preventive maintenance conducted to prevent leaks and spills. iii. Substances such as bird droppings, grease, leaves, that have accumulated on rooftops shall be removed, as practicable, to prevent or reduce the discharge of contaminants directly or indirectly to the stormwater conveyance system or receiving waters. iv. Where feasible, roof downspouts shall be routed away from work areas and toward pervious areas such as lawns, except where required under section 67.812.
C.1.b Landscaping Activities	WPO Section 67.808(a)(6) -- Liquid waste management N. Where irrigation tail-water return ponds are used, the ponds shall be designed with the appropriate vertical separation between the base of the pond and the seasonal high groundwater mark and must be lined or managed to prevent the movement of water-soluble chemicals to the groundwater and to stormwater flows. WPO Section 67.808(a)(9)(B) -- Landscaping and grounds keeping i. Exposed slopes shall be stabilized as soon as possible. ii. Paved surfaces such as sidewalks shall be cleaned regularly using dry clean-up methods such as sweeping or vacuuming. Hosing is permissible only after surfaces have previously been cleaned using dry methods, and only if precautions have been taken to prevent the discharge of runoff to the storm drain.
C.1.c Pesticide, Herbicide, and Fertilizer Application	WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. WPO Section 67.808(a)(7)(B) -- Hazardous Materials and hazardous wastes vi. Pesticides and other chemical products shall be used, stored, and disposed of in accordance with applicable federal, state, and local laws and regulations. vii. The outdoor application of fertilizers and pesticides is prohibited during rainfall. viii. Pesticide use shall be reduced to the MEP in areas where recurring applications of pesticides are performed
C.1.d Pool, Spa, and Fountain Maintenance	WPO Section 67.808(a)(6) -- Liquid waste management I. Discharging backwash wastewater to the stormwater conveyance system or receiving waters is prohibited. Backwash wastewater may be disposed to the sanitary sewer; to a holding tank or settling pond; or where allowed by this chapter, by infiltration to the soil. J. Pool, spa, and fountain water intended for discharge to the stormwater conveyance system shall contain a concentration of zero ppm chlorine or bromine prior to discharge. K. Pool, spa, and fountain water discharged after acid washing shall be neutralized to a pH of 7.2 - 8.0. WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations.

C.1.f Sidewalks and Paved Areas	WPO Section 67.808(a)(5) – Housekeeping. A. The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. B. Areas where work is being actively conducted shall be cleaned daily using dry clean-up methods such as sweeping, wiping, vacuuming, or raking. Wet clean-up methods such as hosing may only be used if precautions have been taken to prevent the discharge of wash water or other materials to the stormwater conveyance system or receiving waters. WPO Section 67.808(a)(6) -- Liquid waste management M. Wash and rinse water from building and pavement washing that cannot be properly disposed of at the job site shall be collected and contained for recycling, reuse, or proper disposal. WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. WPO Section 67.808(a)(9)(B) -- Landscaping and grounds keeping ii. Paved surfaces such as sidewalks shall be cleaned regularly using dry clean-up methods such as sweeping or vacuuming. Hosing is permissible only after surfaces have previously been cleaned using dry methods, and only if precautions have been taken to prevent the discharge of runoff to the storm drain.
C.1.g Break Areas and Public Areas	WPO Section 67.808(a)(5) – Housekeeping. A. The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. B. Areas where work is being actively conducted shall be cleaned daily using dry clean-up methods such as sweeping, wiping, vacuuming, or raking. Wet clean-up methods such as hosing may only be used if precautions have been taken to prevent the discharge of wash water or other materials to the stormwater conveyance system or receiving waters. WPO Section 67.808(a)(6) -- Liquid waste management M. Wash and rinse water from building and pavement washing that cannot be properly disposed of at the job site shall be collected and contained for recycling, reuse, or proper disposal. WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. WPO Section 67.808(a)(8) (C) -- Solid, non-hazardous waste vi. Loose aggregate, mortar, and dust shall be routinely cleaned up using dry cleanup methods such as sweeping or vacuuming. Wet methods may be used only if necessary to adequately clean equipment for reuse, or where water must be used to lubricate and flush a cut, but only if performed in accordance with this chapter. WPO Section 67.808(a)(9)(B) -- Landscaping and grounds keeping ii. Paved surfaces such as sidewalks shall be cleaned regularly using dry clean-up methods such as sweeping or vacuuming. Hosing is permissible only after surfaces have previously been cleaned using dry methods, and only if precautions have been taken to prevent the discharge of runoff to the storm drain.

C.1.h Pressure Washing	WPO Section 67.808(a)(6) -- Liquid waste management (A) Wet cleanup methods such as hosing, steaming or pressure washing is prohibited except where adequate precautions have been taken to prevent the discharge of wash water or other pollutants into the stormwater conveyance system or receiving waters. Adequate measure may include filtering all pollutants from the water prior to discharge. (B) Disposal of slurries to the stormwater conveyance system or receiving waters is prohibited. (C) Rinse water shall be confined to a designated area such as a sanitary sewer, dead-end sump, process treatment system, or hole where water percolates or evaporates and solids are removed for collection and disposal. Rinse water and solids shall be re-used, recycled, or disposed of in accordance with this chapter. (D) Wash water shall be directed to an approved sanitary sewer or landscaped locations. (E) Wash racks. i. Wash rack areas shall have perimeter control and be properly sloped to a grated floor drain. ii. Wash rack areas shall drain to the sanitary sewer or to a holding tank. (F) Disposal of wastewater to the stormwater conveyance system, receiving waters, or the ground, is prohibited. (G)If provided, pump-out services for boats, portable toilets, or other holding tanks shall be conducted in a manner. that prevents the release of sewage to the stormwater conveyance system or receiving waters. (H) Wastewater shall be disposed to the sanitary sewer at the job site or to a holding tank. Disposal of wastewater contained in holding tanks shall be disposed of to the sanitary sewer at the business's company headquarters or at an approved location. (I) Discharging backwash wastewater to the stormwater conveyance system or receiving waters is prohibited. Backwash wastewater may be disposed to the sanitary sewer; to a holding tank or settling pond; or where allowed by this chapter, by infiltration to the soil. (J) Pool, spa, and fountain water intended for discharge to the stormwater conveyance system shall contain a concentration of zero ppm chlorine or bromine prior to discharge. (K) Pool, spa, and fountain water discharged after acid washing shall be neutralized to a pH of 7.2 - 8.0. (L) If rinse water from the cleaning of portable sanitary toilet closets cannot be properly disposed of to the sanitary sewer at a job site, it shall be contained prior to disposal at the service facility or other approved facility.
C.1.i Fire Sprinkler Testing and Maintenance	Applicable General BMP Requirements, as established in WPO Section 67.806(a) – General BMP Requirements, must be implemented.
C.1.j Erodible Surfaces **C.1.k Earth Moving Activities and Areas Under Construction**	WPO Section 67.806(a) – General BMP Requirements (4) Protect, from erosion, those slopes that have been disturbed by clearing, grading, or landscaping and are more than three feet in height or steeper than 3:1 (run-to-rise). Slope protection shall occur prior to the first rainy season following the clearing, grading or landscaping of the slope and continuously thereafter.
C.2 ROADS AND STREETS	
C.2.a Road and Street Maintenance	WPO Section 67.808(a)(7) (C) -- Solid, non-hazardous waste vi. Loose aggregate, mortar, and dust shall be routinely cleaned up using dry cleanup methods such as sweeping or vacuuming. Wet methods may be used only if necessary to adequately clean equipment for reuse, or where water must be used to lubricate and flush a cut, but only if performed in accordance with this chapter. WPO Section 67.808(a)(5) -- Housekeeping (A) The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations.

C.2.b Road and Street Use	WPO Section 67.808(a)(5) -- Housekeeping (A) The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. WPO Section 67.808(a)(7)(A) -- Spill prevention and response iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations.
C.3 STORM DRAIN SYSTEMS	
C.3.a Operation and Maintenance	WPO Section 67.808(a)(5) -- Housekeeping (A) The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter.
C.3.c Illicit Discharges and Connections	WPO Section 67.806(a) – General BMP Requirements (3) Eliminate illicit connections. WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. (A) Storm drain inlets located within or down gradient of the activity shall be covered or otherwise protected from the entry of pollutants during hours of operation.

Category D: Specific Operations and Activities	
D.1 Accident and Medical Emergency Response	WPO Section 67.808(a)(5) -- Housekeeping (B) Areas where work is being actively conducted shall be cleaned daily using dry clean-up methods such as sweeping, wiping, vacuuming, or raking. Wet clean-up methods such as hosing may only be used if precautions have been taken to prevent the discharge of wash water or other materials to the stormwater conveyance system or receiving waters. WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations.
D.2 Animal Grooming and Washing	WPO Section 67.808(a)(6) -- Liquid waste management C. Rinse water shall be confined to a designated area such as a sanitary sewer, dead-end sump, process treatment system, or hole where water percolates or evaporates and solids are removed for collection and disposal. Rinse water and solids shall be re-used, recycled, or disposed of in accordance with this chapter. D. Wash water shall be directed to an approved sanitary sewer or to approved landscaped locations. WPO Section 67.808(a)(7) (C) -- Solid, non-hazardous waste All areas where livestock, horses or other large animals are confined shall be bermed or curbed in a manner that avoids a discharge to the stormwater conveyance system or receiving water. If berms or curbs are not practicable, manure shall be cleaned up at least twice weekly and must be composted or properly stored prior to disposal.
D.3 Animal Keeping and Feeding	WPO Section 67.808(a)(5) – Housekeeping. A. The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. B. Areas where work is being actively conducted shall be cleaned daily using dry clean-up methods such as sweeping, wiping, vacuuming, or raking. Wet clean-up methods such as hosing may only be used if precautions have been taken to prevent the discharge of wash water or other materials to the stormwater conveyance system or receiving waters. WPO Section 67.808(a)(7) (C) -- Solid, non-hazardous waste v. All areas where livestock, horses or other large animals are confined shall be bermed or curbed in a manner that avoids a discharge to the stormwater conveyance system or receiving water. If berms or curbs are not practicable, manure shall be cleaned up at least twice weekly and must be composted or properly stored prior to disposal.
D.4 Abrasive Blasting	WPO Section 67.808(a)(5) – Housekeeping. A. The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. B. Areas where work is being actively conducted shall be cleaned daily using dry clean-up methods such as sweeping, wiping, vacuuming, or raking. Wet clean-up methods such as hosing may only be used if precautions have been taken to prevent the discharge of wash water or other materials to the stormwater conveyance system or receiving waters. WPO Section 67.808(a)(7) (C) -- Solid, non-hazardous waste vi. Loose aggregate, mortar, and dust shall be routinely cleaned up using dry cleanup methods such as sweeping or vacuuming. Wet methods may be used only if necessary to adequately clean equipment for reuse, or where water must be used to lubricate and flush a cut, but only if performed in accordance with this chapter.

D.5 Casting, Forging, or Forming	WPO Section 67.808(a)(5) – Housekeeping. A. The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. B. Areas where work is being actively conducted shall be cleaned daily using dry clean-up methods such as sweeping, wiping, vacuuming, or raking. Wet clean-up methods such as hosing may only be used if precautions have been taken to prevent the discharge of wash water or other materials to the stormwater conveyance system or receiving waters. WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. WPO Section 67.808(a)(7) (C) -- Solid, non-hazardous waste iv. Loose aggregate, mortar, and dust shall be routinely cleaned up using dry cleanup methods such as sweeping or vacuuming. Wet methods may be used only if necessary to adequately clean equipment for reuse, or where water must be used to lubricate and flush a cut, but only if performed in accordance with this chapter.
D.6 Chemical Treatment	WPO Section 67.806(a) – General BMP Requirements (2) Implement, as practicable, those stormwater pollution prevention practices that are generally recognized in that discharger's industry or business as being effective and economically advantageous WPO Section 67.808(a)(5) – Housekeeping. A. The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. B. Areas where work is being actively conducted shall be cleaned daily using dry clean-up methods such as sweeping, wiping, vacuuming, or raking. Wet clean-up methods such as hosing may only be used if precautions have been taken to prevent the discharge of wash water or other materials to the stormwater conveyance system or receiving waters. WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations.
D.7 Control Burns	WPO Section 67.806(a) – General BMP Requirements (4) Protect, from erosion, those slopes that have been disturbed by clearing, grading, or landscaping and are more than three feet in height or steeper than 3:1 (run-to-rise). Slope protection shall occur prior to the first rainy season following the clearing, grading or landscaping of the slope and continuously thereafter.

D.8 Cutting, Trimming, or Grinding	WPO Section 67.808(a)(5) – Housekeeping. A. The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. B. Areas where work is being actively conducted shall be cleaned daily using dry clean-up methods such as sweeping, wiping, vacuuming, or raking. Wet clean-up methods such as hosing may only be used if precautions have been taken to prevent the discharge of wash water or other materials to the stormwater conveyance system or receiving waters. WPO Section 67.808(a)(6) -- Liquid waste management B. Disposal of slurries to the stormwater conveyance system or receiving waters is prohibited. M. Disposal of wastewater to the stormwater conveyance system, receiving waters, or the ground, is prohibited. WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. WPO Section 67.808(a)(7) (C) -- Solid, non-hazardous waste vi. Loose aggregate, mortar, and dust shall be routinely cleaned up using dry cleanup methods such as sweeping or vacuuming. Wet methods may be used only if necessary to adequately clean equipment for reuse, or where water must be used to lubricate and flush a cut, but only if performed in accordance with this chapter.
D.9 Differential Settling Maintenance	Applicable General BMP Requirements, as established in WPO Section 67.806(a) – General BMP Requirements, must be implemented.
D.10 Dust and Particulate-Generating Activities	WPO Section 67.806(a) – General BMP Requirements (1) Prior to the rainy season, remove or secure any significant accumulations of eroded soils from slopes previously disturbed by landscaping, clearing or grading, if those eroded soils could otherwise enter and impact the stormwater conveyance system or receiving waters during the rainy season. (2) Implement, as practicable, those stormwater pollution prevention practices that are generally recognized in that discharger's industry or business as being effective and economically advantageous. (3) Eliminate illicit connections. (4) Protect, from erosion, those slopes that have been disturbed by clearing, grading, or landscaping and are more than three feet in height or steeper than 3:1 (run-to-rise). Slope protection shall occur prior to the first rainy season following the clearing, grading or landscaping of the slope and continuously thereafter. (5) Store all materials and wastes with the potential to pollute stormwater in a manner that either prevents contact with rainfall and runoff from storm flows or contains contaminated runoff for treatment and disposal. (6) Locate, configure, and manage stockpiles of soil, green waste and compost to prevent the release of materials to the stormwater conveyance system or receiving waters. WPO Section 67.808(a)(5) – Housekeeping. A. The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. WPO Section 67.808(a)(7) (C) -- Solid, non-hazardous waste iv. Loose aggregate, mortar, and dust shall be routinely cleaned up using dry cleanup methods such as sweeping or vacuuming. Wet methods may be used only if necessary to adequately clean equipment for reuse, or where water must be used to lubricate and flush a cut, but only if performed in accordance with this chapter.

D.11 Fabrication	WPO Section 67.806(a) – General BMP Requirements (2) Implement, as practicable, those stormwater pollution prevention practices that are generally recognized in that discharger's industry or business as being effective and economically advantageous. WPO Section 67.808(a)(5) – Housekeeping. A. The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. B. Areas where work is being actively conducted shall be cleaned daily using dry clean-up methods such as sweeping, wiping, vacuuming, or raking. Wet clean-up methods such as hosing may only be used if precautions have been taken to prevent the discharge of wash water or other materials to the stormwater conveyance system or receiving waters WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. WPO Section 67.808(a)(7) (C) -- Solid, non-hazardous waste vi. Loose aggregate, mortar, and dust shall be routinely cleaned up using dry cleanup methods such as sweeping or vacuuming. Wet methods may be used only if necessary to adequately clean equipment for reuse, or where water must be used to lubricate and flush a cut, but only if performed in accordance with this chapter.

D.12 Firefighting Field Training and Drills	WPO Section 67.806(a) – General BMP Requirements (4) Protect, from erosion, those slopes that have been disturbed by clearing, grading, or landscaping and are more than three feet in height or steeper than 3:1 (run-to-rise). Slope protection shall occur prior to the first rainy season following the clearing, grading or landscaping of the slope and continuously thereafter. (8) Use dry methods such as sweeping, vacuuming, raking, and application of absorbents to cleanup Pollutants, unless wet cleanup methods are otherwise allowed in this Chapter. WPO Section 67.808(a)(6) -- Liquid waste management H. Wastewater shall be disposed to the sanitary sewer at the job site or to a holding tank. Disposal of wastewater contained in holding tanks shall be disposed of to the sanitary sewer at the business's company headquarters or at an approved location. WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. WPO Section 67.808(a)(7)(B) -- Hazardous Materials and hazardous wastes i. Hazardous materials and wastes shall be stored, managed, and disposed in accordance with applicable federal, state and local laws and regulations. ii. Hazardous materials and wastes shall be stored above the ground. Where practicable, provide overhead coverage for all outside hazardous materials or waste storage areas. If overhead coverage is not available, stored materials shall be covered with an impervious material such as a tarp or other similar method. iii. Paints, coatings, thinners, and other materials shall be disposed of in accordance with this chapter. iv. Secondary containment of hazardous waste shall be provided around storage areas from which a significant potential exists to discharge materials or wastes to the stormwater conveyance system or receiving waters. v. Hazardous waste storage areas shall be inspected by the owner or operator, at least once prior to the rainy season and monthly during the rainy season. vi. Pesticides and other chemical products shall be used, stored, and disposed of in accordance with applicable federal, state, and local laws and regulations. vii. The outdoor application of fertilizers and pesticides is prohibited during rainfall. viii. Pesticide use shall be reduced to the MEP in areas where recurring applications of pesticides are performed. WPO Section 67.808(a)(7)(C) -- Solid, non-hazardous waste i. Trash storage and disposal areas shall be kept clean and free of debris. ii. Dumpsters, grease bins, and other containers shall be maintained in a clean and leak proof condition and shall be kept securely closed when not in use. iii. Materials and equipment necessary for the clean-up of trash and debris shall be maintained and kept readily accessible. iv. Loose aggregate, mortar, and dust shall be routinely cleaned up using dry cleanup methods such as sweeping or vacuuming. Wet methods may be used only if necessary to adequately clean equipment for reuse, or where water must be used to lubricate and flush a cut, but only if performed in accordance with this chapter. v. All areas where livestock, horses or other large animals are confined shall be bermed or curbed in a manner that avoids a discharge to the stormwater conveyance system or receiving water. If berms or curbs are not practicable, manure shall be cleaned up at least twice weekly and must be composted or properly stored prior to disposal.

D.13 Fire Access Roads / Fire Breaks Maintenance / Creation	WPO Section 67.806(a) – General BMP Requirements (4) Protect, from erosion, those slopes that have been disturbed by clearing, grading, or landscaping and are more than three feet in height or steeper than 3:1 (run-to-rise). Slope protection shall occur prior to the first rainy season following the clearing, grading or landscaping of the slope and continuously thereafter. WPO Section 67.808(a)(9) – Outdoor Areas—housekeeping and grounds keeping practices. (A) Storm drain inlets located within or down gradient of the activity shall be covered or otherwise protected from the entry of pollutants during hours of operation. WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. WPO Section 67.808(a)(7)(B) -- Hazardous Materials and hazardous wastes i. Hazardous materials and wastes shall be stored, managed, and disposed in accordance with applicable federal, state and local laws and regulations. ii. Hazardous materials and wastes shall be stored above the ground. Where practicable, provide overhead coverage for all outside hazardous materials or waste storage areas. If overhead coverage is not available, stored materials shall be covered with an impervious material such as a tarp or other similar method. iii. Paints, coatings, thinners, and other materials shall be disposed of in accordance with this chapter. iv. Secondary containment of hazardous waste shall be provided around storage areas from which a significant potential exists to discharge materials or wastes to the stormwater conveyance system or receiving waters. v. Hazardous waste storage areas shall be inspected by the owner or operator, at least once prior to the rainy season and monthly during the rainy season. vi. Pesticides and other chemical products shall be used, stored, and disposed of in accordance with applicable federal, state, and local laws and regulations. vii. The outdoor application of fertilizers and pesticides is prohibited during rainfall. viii. Pesticide use shall be reduced to the MEP in areas where recurring applications of pesticides are performed. WPO Section 67.808(a)(7)(C) -- Solid, non-hazardous waste i. Trash storage and disposal areas shall be kept clean and free of debris. ii. Dumpsters, grease bins, and other containers shall be maintained in a clean and leak proof condition and shall be kept securely closed when not in use. iii. Materials and equipment necessary for the clean-up of trash and debris shall be maintained and kept readily accessible. iv. Loose aggregate, mortar, and dust shall be routinely cleaned up using dry cleanup methods such as sweeping or vacuuming. Wet methods may be used only if necessary to adequately clean equipment for reuse, or where water must be used to lubricate and flush a cut, but only if performed in accordance with this chapter. v. All areas where livestock, horses or other large animals are confined shall be bermed or curbed in a manner that avoids a discharge to the stormwater conveyance system or receiving water. If berms or curbs are not practicable, manure shall be cleaned up at least twice weekly and must be composted or properly stored prior to disposal.
D.14 Fire Hydrant, Tank, and Hose Testing and Maintenance	WPO Section 67.808(a)(8) -- Vehicles and equipment. (A) All vehicles and equipment shall be properly maintained and inspected to ensure their proper functioning. (B) Vehicles and equipment shall not be washed in areas where wash water or rinse water will drain to the stormwater conveyance system or receiving waters. (C) Infiltration of wash or rinse water to pervious surfaces is allowed with a minimum of 10 feet separation between the groundwater and the pervious surface, except that wash or rinse water generated from cleaning engines, mechanical parts, or heavy equipment shall not infiltrate a pervious surface.

D.15 Floors, Mats, and Surfaces	WPO Section 67.808(a)(5) -- Housekeeping (B) Areas where work is being actively conducted shall be cleaned daily using dry clean-up methods such as sweeping, wiping, vacuuming, or raking. Wet clean-up methods such as hosing may only be used if precautions have been taken to prevent the discharge of wash water or other materials to the stormwater conveyance system or receiving waters. WPO Section 67.808(a)(6) -- Liquid waste management A. Wet cleanup methods such as hosing, steaming or pressure washing is prohibited except where adequate precautions have been taken to prevent the discharge of wash water or other pollutants into the stormwater conveyance system or receiving waters. Adequate measure may include filtering all pollutants from the water prior to discharge. B. Disposal of slurries to the stormwater conveyance system or receiving waters is prohibited. C. Rinse water shall be confined to a designated area such as a sanitary sewer, dead-end sump, process treatment system, or hole where water percolates or evaporates and solids are removed for collection and disposal. Rinse water and solids shall be re-used, recycled, or disposed of in accordance with this chapter. D. Wash water shall be directed to an approved sanitary sewer or landscaped locations. WPO Section 67.808(a)(9)(B) -- Landscaping and grounds keeping ii. Paved surfaces such as sidewalks shall be cleaned regularly using dry clean-up methods such as sweeping or vacuuming. Hosing is permissible only after surfaces have previously been cleaned using dry methods, and only if precautions have been taken to prevent the discharge of runoff to the storm drain.
D.16 Food Preparation	WPO Section 67.808(a)(5) – Housekeeping. A. The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. B. Areas where work is being actively conducted shall be cleaned daily using dry clean-up methods such as sweeping, wiping, vacuuming, or raking. Wet clean-up methods such as hosing may only be used if precautions have been taken to prevent the discharge of wash water or other materials to the stormwater conveyance system or receiving waters WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations.
D.17 Gas Extraction	Applicable General BMP Requirements, as established in WPO Section 67.806(a) – General BMP Requirements, must be implemented.
D.18 Leachate Collection System Maintenance	Applicable General BMP Requirements, as established in WPO Section 67.806(a) – General BMP Requirements, must be implemented.
D.19 Methane Recovery System Maintenance and Repair	Applicable General BMP Requirements, as established in WPO Section 67.806(a) – General BMP Requirements, must be implemented.

D.20 Mixing	WPO Section 67.806(a) – General BMP Requirements (2) Implement, as practicable, those stormwater pollution prevention practices that are generally recognized in that discharger's industry or business as being effective and economically advantageous WPO Section 67.808(a)(5) – Housekeeping. A. The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. B. Areas where work is being actively conducted shall be cleaned daily using dry clean-up methods such as sweeping, wiping, vacuuming, or raking. Wet clean-up methods such as hosing may only be used if precautions have been taken to prevent the discharge of wash water or other materials to the stormwater conveyance system or receiving waters. WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. WPO Section 67.808(a)(7) (C) -- Solid, non-hazardous waste vi. Loose aggregate, mortar, and dust shall be routinely cleaned up using dry cleanup methods such as sweeping or vacuuming. Wet methods may be used only if necessary to adequately clean equipment for reuse, or where water must be used to lubricate and flush a cut, but only if performed in accordance with this chapter.
D.21 Painting or Coating Activities	WPO Section 67.806(a) – General BMP Requirements (2) Implement, as practicable, those stormwater pollution prevention practices that are generally recognized in that discharger's industry or business as being effective and economically advantageous WPO Section 67.808(a)(5) – Housekeeping. A. The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. B. Areas where work is being actively conducted shall be cleaned daily using dry clean-up methods such as sweeping, wiping, vacuuming, or raking. Wet clean-up methods such as hosing may only be used if precautions have been taken to prevent the discharge of wash water or other materials to the stormwater conveyance system or receiving waters. WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations.
D.22 Pesticide or Other Chemical Product Formulation	WPO Section 67.806(a) – General BMP Requirements (2) Implement, as practicable, those stormwater pollution prevention practices that are generally recognized in that discharger's industry or business as being effective and economically advantageous. (7) Use all materials with the potential to pollute runoff, such as outdoor cleaning and maintenance products, fertilizers, pesticides and herbicides in accordance with label directions. No such product may be disposed of or rinsed into receiving waters or the stormwater conveyance system. WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations.

D.23 Ramp and Runway Maintenance	WPO Section 67.808(a)(5) – Housekeeping. A. The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. B. Areas where work is being actively conducted shall be cleaned daily using dry clean-up methods such as sweeping, wiping, vacuuming, or raking. Wet clean-up methods such as hosing may only be used if precautions have been taken to prevent the discharge of wash water or other materials to the stormwater conveyance system or receiving waters.
D.24 Recreational Uses	WPO Section 67.808(a)(6) -- Liquid waste management F. Disposal of wastewater to the stormwater conveyance system, receiving waters, or the ground, is prohibited. G. If provided, pump-out services for boats, portable toilets, or other holding tanks shall be conducted in a manner that prevents the release of sewage to the stormwater conveyance system or receiving waters. L. If rinse water from the cleaning of portable sanitary toilet closets cannot be properly disposed of to the sanitary sewer at a job site, it shall be contained prior to disposal at the service facility or other approved facility.
D.25 Sludge Removal and Disposal	WPO Section 67.808(a)(6) -- Liquid waste management B. Disposal of slurries to the stormwater conveyance system or receiving waters is prohibited.
D.26 Special Events	WPO Section 67.806(a) – General BMP Requirements (8) Use dry methods such as sweeping, vacuuming, raking, and application of absorbents to cleanup Pollutants, unless wet cleanup methods are otherwise allowed in this Chapter.
D.27 Treatment Pond Maintenance	WPO Section 67.808(a)(6) -- Liquid waste management B. Disposal of slurries to the stormwater conveyance system or receiving waters is prohibited. F. Disposal of wastewater to the stormwater conveyance system, receiving waters, or the ground, is prohibited. N. Where irrigation tail-water return ponds are used, the ponds shall be designed with the appropriate vertical separation between the base of the pond and the seasonal high groundwater mark and must be lined or managed to prevent the movement of water-soluble chemicals to the groundwater and to stormwater flows.
D.28 Wastewater Treatment	WPO Section 67.808(a)(6) -- Liquid waste management F. Disposal of wastewater to the stormwater conveyance system, receiving waters, or the ground, is prohibited. I. Discharging backwash wastewater to the stormwater conveyance system or receiving waters is prohibited. Backwash wastewater may be disposed to the sanitary sewer; to a holding tank or settling pond; or where allowed by this chapter, by infiltration to the soil.
D.29 Weed Abatement and Vegetation Clearing	WPO Section 67.806(a) – General BMP Requirements (1) Prior to the rainy season, remove or secure any significant accumulations of eroded soils from slopes previously disturbed by landscaping, clearing or grading, if those eroded soils could otherwise enter and impact the stormwater conveyance system or receiving waters during the rainy season. (2) Implement, as practicable, those stormwater pollution prevention practices that are generally recognized in that discharger's industry or business as being effective and economically advantageous. (8) Use dry methods such as sweeping, vacuuming, raking, and application of absorbents to cleanup Pollutants, unless wet cleanup methods are otherwise allowed in this Chapter.

D.30 Welding	WPO Section 67.808(a)(5) – Housekeeping. A. The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. B. Areas where work is being actively conducted shall be cleaned daily using dry clean-up methods such as sweeping, wiping, vacuuming, or raking. Wet clean-up methods such as hosing may only be used if precautions have been taken to prevent the discharge of wash water or other materials to the stormwater conveyance system or receiving waters.
D.31 Automobile Painting	WPO Section 67.806(a) – General BMP Requirements (2) Implement, as practicable, those stormwater pollution prevention practices that are generally recognized in that discharger's industry or business as being effective and economically advantageous WPO Section 67.808(a)(5) – Housekeeping. A. The property on which the business activity is located shall be inspected for accumulations of debris, litter, waste, organic matter, such as leaves or cut grass or other materials. Such accumulations shall be removed and disposed of in accordance with this chapter. B. Areas where work is being actively conducted shall be cleaned daily using dry clean-up methods such as sweeping, wiping, vacuuming, or raking. Wet clean-up methods such as hosing may only be used if precautions have been taken to prevent the discharge of wash water or other materials to the stormwater conveyance system or receiving waters. WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations.
D.32 Methane Recovery System Condensate Collection	WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations.

D.33 Fire Lane Maintenance / Creation	WPO Section 67.808(a)(7)(A) -- Spill prevention and response i. Materials and equipment necessary for spill response shall be maintained and kept readily accessible. ii. All operators, employees, and workers conducting potential discharge activities shall be trained in their proper use. iii. Spills and leaks shall be promptly cleaned up and the generated waste disposed of in accordance with the applicable federal, state and local laws and regulations. WPO Section 67.808(a)(7)(B) -- Hazardous Materials and hazardous wastes i. Hazardous materials and wastes shall be stored, managed, and disposed in accordance with applicable federal, state and local laws and regulations. ii. Hazardous materials and wastes shall be stored above the ground. Where practicable, provide overhead coverage for all outside hazardous materials or waste storage areas. If overhead coverage is not available, stored materials shall be covered with an impervious material such as a tarp or other similar method. iii. Paints, coatings, thinners, and other materials shall be disposed of in accordance with this chapter. iv. Secondary containment of hazardous waste shall be provided around storage areas from which a significant potential exists to discharge materials or wastes to the stormwater conveyance system or receiving waters. v. Hazardous waste storage areas shall be inspected by the owner or operator, at least once prior to the rainy season and monthly during the rainy season. vi. Pesticides and other chemical products shall be used, stored, and disposed of in accordance with applicable federal, state, and local laws and regulations. vii. The outdoor application of fertilizers and pesticides is prohibited during rainfall. viii. Pesticide use shall be reduced to the MEP in areas where recurring applications of pesticides are performed. WPO Section 67.808(a)(7)(C) -- Solid, non-hazardous waste i. Trash storage and disposal areas shall be kept clean and free of debris. ii. Dumpsters, grease bins, and other containers shall be maintained in a clean and leak proof condition and shall be kept securely closed when not in use. iii. Materials and equipment necessary for the clean-up of trash and debris shall be maintained and kept readily accessible. iv. Loose aggregate, mortar, and dust shall be routinely cleaned up using dry cleanup methods such as sweeping or vacuuming. Wet methods may be used only if necessary to adequately clean equipment for reuse, or where water must be used to lubricate and flush a cut, but only if performed in accordance with this chapter. v. All areas where livestock, horses or other large animals are confined shall be bermed or curbed in a manner that avoids a discharge to the stormwater conveyance system or receiving water. If berms or curbs are not practicable, manure shall be cleaned up at least twice weekly and must be composted or properly stored prior to disposal. WPO Section 67.808(a)(9) – Outdoor Areas—housekeeping and grounds keeping practices. (A) Storm drain inlets located within or down gradient of the activity shall be covered or otherwise protected from the entry of pollutants during hours of operation.
D.34 Process Water Pre-Treatment	Applicable General BMP Requirements, as established in WPO Section 67.806(a) – General BMP Requirements, must be implemented.

C. BMP Requirements and Recommendations for Specific Residential Pollutant-generating Activities (PGAs)

Table 5.6.1 – Required and Recommended Best Management Practices (BMPs) by Pollutant-generating Activity

Pollutant Generating Activity	Best Management Practice
AUTOMOBILE AND BOAT	
Parking and storage	**WPO Section 67.807(c)** (1) Remove excess accumulations of oil and grease deposited by vehicles from parking areas, using dry cleanings methods (e.g., absorbents, scraping, vacuuming, sweeping, mop and bucket). (2) Move vehicles or boats from streets when notified to allow street cleaning.
Maintenance and repair	**WPO Section 67.807(a)** (1) Perform all repair and maintenance activity under a permanent roof or other permanent cover, where feasible. (2) All maintenance and repair activities conducted without cover or without BMPs to prevent discharges are prohibited during times of precipitation. (3) Promptly contain and clean up any release of fluids, including boat bilge water, during repair or maintenance. Dispose of any absorbent materials used as required by law. (4) Degreasing or pressure washing of engines and other parts is prohibited unless the liquid wastes are contained and properly disposed of as required by law.
Washing and cleaning	**WPO Section 67.805(e)(2)** (A) Whenever feasible, the discharge of wash water shall be directed to landscaped areas or other pervious surfaces; and (B) The amount of water, washing detergent and other vehicle wash products used shall be the minimum amount necessary to completely wash the vehicle. This requirement shall be deemed violated if visible soap scum, oil sheen, or other by-products of residential vehicle washing reach the gutter or other drainage conveyance device in front of the residence where the vehicle is being washed. **WPO Section 67.807(b)** (1) Wash individual motor vehicles over porous surfaces such as lawns and gravel areas, where feasible. (2) Do not directly or indirectly dispose of unused detergent solutions into the stormwater conveyance system or receiving waters. Disposal to the sanitary sewer, such as sink toilet or floor drain or to a porous surface is required. (3) Do not use “hose off” or single use engine degreasing chemicals unless captured and disposed of properly. (4) Washing of motor vehicles (other than individual residential motor vehicles) is prohibited. (5) Do not degrease or pressure wash engines and other parts the liquid wastes are contained and properly disposed of as required by law.

Pollutant Generating Activity	Best Management Practice
	Recommended Pollution Prevention • Use a commercial car washing facility instead of washing and cleaning automobiles in residential areas. • Use low toxic substitutes to wash and clean automobiles and boats. • Clean parts mechanically or pressure clean.
Material and waste storage	**WPO Section 67.807(a)(5)** Store automotive and boat material and wastes indoors, under cover, or in secure and watertight containers.
Waste management and disposal	**WPO Section 67.807(d)(4)** Do not dispose of household hazardous waste directly or indirectly to the trash or to the street, gutter or storm drain.
LAWN AND GARDEN	
Over-irrigation	**WPO Section 67.807(d((1)** Adjust irrigation systems to avoid runoff that may cause a discharge to the storm drain.
	Recommended Pollution Prevention • Adjust irrigation schedule according to seasonal changes.
Chemical product use (fertilizers, pesticides, and herbicides)	**WPO Section 67.807(d)(2)** Clean up and properly dispose of spills from gardening chemicals, fertilizers, or soil to non-porous surfaces.
	Recommended Pollution Prevention • Use low-maintenance plants (native) that do not require fertilizer. • Use organic, slow-releasing, and/or low-toxic substitutes and use only when needed. Avoid using sprays. • Avoid applying chemicals prior to or during storm events. • Use fertilizer substitutes, such as mulch of leaves, bark, and composted manure and/or garden waste where it is not likely to get carried off into storm drains. • Use integrated pest management practices.
Materials and waste storage	**WPO Section 67.807(d)(3)** Store lawn and garden care products in closed, labeled containers, such as in covered areas, off the ground, or under protective tarps, and in a manner that will not lead to a discharge.
Waste management and disposal	**WPO Section 67.807(d)(4)** Do not dispose of household hazardous waste directly or indirectly to the trash or to the street, gutter or storm drain.
	Recommended Pollution Prevention • Compost green waste.

Pollutant Generating Activity	Best Management Practice
HOUSEHOLD AND HOME	
Painting	**WPO Section 67.807(e)(1)** Do not clean painting equipment in or over streets, sidewalks, gutters, or yard drains.
Repair and maintenance	**WPO Section 67.807(e)(2)** Minimize and contain all spills of hazardous materials, if it is safe to do so.
Outdoor cleaning	**Recommended Pollution Prevention** • Use dry methods (sweep, vacuum, etc.) to clean outdoor areas, such as sidewalks, driveways, and patios. • Divert wash water to landscaped or pervious surfaces using portable berms or sandbags. Remove and discard accumulated residual litter. • Protect storm drain inlets from run-off.
Pool, spa, and fountain care	**WPO Section 67.805(e)(3)** (A) Residual chlorine from swimming pools and fountains must be eliminated prior to discharging to the stormwater conveyance system or receiving waters; (B) Filter backwash, acid-wash water (pH <7.2 and > 8.0), and algaecide-treated pool water are prohibited from discharge to the stormwater conveyance system or receiving water; and (C) The discharge of saline swimming pool water must be directed to the sanitary sewer, landscaped areas, or other pervious surfaces that can accommodate the volume of water, unless the saline swimming pool water can be discharged via a pipe or concrete channel directly to a naturally saline water body (e.g. Pacific Ocean).
	Recommended Pollution Prevention • Properly maintain pools, spas, and fountains to prevent the need for excessive toxic chemicals. • Never clean filters in the street, gutter, or storm drain. Rinse cartridge filters onto a dirt area and spade filter residue into the soil. Keep backwash discharges out of the street and storm drain. Backwash sand and diatomaceous earth filters onto a dirt area. Dispose of spent filter materials in the trash. • Dispose of backwash wastewater to the sanitary sewer, to a holding tank or settling pond, or by infiltration to the soil.
Materials and waste storage	**WPO Section 67.807(e)(3)** Store household hazardous materials indoors or under cover, and in closed and labeled containers.
Waste management and disposal	**WPO Section 67.807(d)(4)** Do not directly or indirectly dispose of household hazardous waste to the trash or to the street, gutter or storm drain.

Pollutant Generating Activity	Best Management Practice
PETS	
Pet waste disposal	**WPO Section 67.807(f)(2)** Wastes from small animals (e.g., dogs and cats) shall be picked up and disposed of at least weekly.
	Recommended Pollution Prevention • Pick up waste around the home and during walks. • Properly dispose of waste into a covered receptacle immediately to prevent material from entering into the stormwater conveyance system or receiving waters. • Flush waste down the toilet where it is properly treated.
Pet care	**Recommended Pollution Prevention** • Bathe and clean pets indoors to allow wash water to drain into the sanitary sewer. • Wash pets over porous surfaces such as lawns and gravel areas. • Do not directly or indirectly dispose of unused detergent solutions to the stormwater conveyance system or receiving waters. Instead dispose of solutions to the sanitary sewer (e.g., through a sink, toilet or floor drain) or to a porous surface.
LIVESTOCK AND LARGE ANIMALS	
Manure management	**WPO Section 67.807(f)(1)** Where practicable, berm or curb all areas where livestock, horses or other large animals are confined to contain animal waste where it is produced, or manage waste in a manner that avoids a discharge to the stormwater conveyance system or receiving waters. If compliance is not practicable, clean up manure at least twice weekly and compost or properly store it prior to disposal.
Manure disposal	**Recommended Pollution Prevention** • Dispose of manure in a covered waste receptacle.
Composting	**WPO Section 67.807(f)(2)** Locate, configure, or manage areas used to store or compost manure to prevent runoff to stormwater conveyance system or receiving waters.

Rainbow Creek
Nutrient Reduction Management Plan

August 2015 (Revised Draft)

University of California
Cooperative Extension

County of San Diego

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Introduction to the Rainbow Creek TMDL and NRMP

This Nutrient Reduction Management Plan (NRMP) is a requirement of the Rainbow Creek Total Maximum Daily Load (TMDL) program for nitrogen (N) and phosphorus (P). The TMDL was adopted by the California Regional Water Quality Control Board, San Diego Region in 2005 and mandates the reduction of total N and total P to levels that restore the creek's beneficial uses. The impacted beneficial uses identified in the TMDL include municipal water supply (MUN), contact and non-contact water recreation (REC-1 and REC-2), warm and cold freshwater habitat (WARM and COLD), and wildlife habitat (WILD). The full TMDL report is available at http://www.waterboards.ca.gov/sandiego/water_issues/programs/tmdls/rainbowcreek.shtml

The NRMP was originally developed by University of California Cooperative Extension and the Rainbow Creek Nutrient Reduction Management Plan Stakeholder Advisory Committee with the objective of providing the businesses and residents of Rainbow Creek Watershed with a user-friendly document that summarizes readily available nutrient reduction measures. If implemented, these strategies will advance the goal of reducing nutrient levels in Rainbow Creek and help restore the creek's beneficial uses as required by the TMDL. The NRMP provides a range of specific management options targeting commercial nurseries, field agriculture and orchard operations, residents, animal owners, as well as general practices applicable to all land uses in the watershed.

Detailed information on N and P loading reductions for various land use categories, as required by the TMDL is provided in Appendix 1 (pg. 40). Based on estimates of N and P concentrations in Rainbow Creek, the TMDL mandates overall N and P reductions of 74% and 85%, respectively.

The NRMP was updated in 2015 with funding supplied by the State Water Resources Control Board (SWRCB) and the U.S. Environmental Protection Agency through the Federal Nonpoint Source Pollution Control Program (Clean Water Act Section 319). Revisions to the original organization were made by the University of California Cooperative Extension to increase accessibility of information for users.

Water Quality Targets

The water quality objective for the protection of the municipal water supply beneficial use is 10 mg/ Liter nitrogen and is based on established public health standards for nitrate in drinking water. Nitrate-nitrogen levels in excess of 10 mg/ L have been shown to impair bloodstream oxygen-carrying capacity in infants, leading to methemoglobinemia or 'blue baby syndrome'. There is no comparable drinking water standard for phosphorus. If implemented, the management options outlined in this NRMP will reduce nitrogen concentrations in Rainbow Creek and will allow the restoration of the MUN beneficial use over time.

The San Diego Region Basin Plan does not define precise water quality objectives for N and P for the protection of recreational and habitat-related beneficial uses. Instead, the

Basin Plan references desired goals when site-specific data are lacking, as is the case with Rainbow Creek. These desired goals are 0.1 mg/L P in flowing waters and an N to P ratio of 10:1, which is translated to 1.0 mg/L N in the Rainbow Creek TMDL report.

The total allowable daily loads for nitrogen and phosphorus are calculated based on these Basin Plan goals with the intent of restoring the contact and non-contact recreation, warm and cold freshwater, and wildlife habitat beneficial uses. Elevated nitrogen and phosphorus levels impair the REC-1 and REC-2 beneficial uses of Rainbow Creek by stimulating the growth of unsightly and potentially noxious algal blooms and mats. This condition normally occurs during warm periods when abundant nutrients (N and P) and sunlight stimulate photosynthesis and the over-production of algal biomass. Impairment of the WARM, COLD, and WILD beneficial uses results from the wide fluctuations in dissolved oxygen (O_2) associated with such algal blooms.

Executive Summary

The NRMP chapters below are arranged in relation to nutrient source categories/ land uses (nurseries, field agriculture/orchards, residential/animal, and common). However, the Stakeholder Advisory Committee concluded that users of this document might find it helpful to also consider the management options according to the manner in which nutrient reduction is achieved. The following groups of management options were identified:

1. *Water Conservation Measures*

   Residential and commercial water use in Rainbow Watershed has, over time, resulted in a year round flowing creek and a highly elevated groundwater table. The use of water for irrigation, cleaning and maintenance activities, and on-site sewage disposal mobilize soluble and particulate forms of nitrogen and phosphorus and transport them from their point of origin/ application to Rainbow Creek via surface and subsurface flow. Water conservation by the residents and businesses in the watershed will reduce the ongoing transport of nutrients to Rainbow Creek; reduce pressures on regional water supply systems, and save money.

2. *Measures that Prevent Unnecessary Runoff*

   Many management options outlined in this document address the goal of preventing surface runoff from leaving a particular property and moving offsite into the drainage system. If not retained on site, the nutrients contained in water, soil, fertilizers, and green waste are likely to ultimately reach the creek. Runoff prevention measures are extremely effective methods of reducing nutrient loading, especially when used in conjunction with water conservation.

3. *Measures that Minimize Fertilizer Use*

   The overuse of nitrogen and phosphorus-containing fertilizers provides an obvious pathway for the contamination of Rainbow Creek. Effective formulation and application of plant fertilizer is a critical element of the overall nutrient reduction strategy.

4. *Maintenance/ Good Housekeeping Measures*

   These management options are designed to prevent the unnecessary exposure of fertilizers, animal wastes, septic system wastes, and green waste to the environment where they may be transported to Rainbow Creek by runoff, wind, or accidental or illicit disposal.

The following chapters are designed to briefly introduce each land use to be addressed, outline all potential management options in detail, and provide a list of priority management practices based on effectiveness and ease of implementation. Additional useful information directed to septic systems, online resources, and photographs of the various management options is provided in the appendices.

Chapter 1: Management Options for Nurseries

Introduction

The Rainbow Creek watershed is home to over 150 nurseries, covering approximately 5% of the watershed. These nurseries grow a wide variety of plant species, including palms and other tropical plants, ornamental shrubs, flowers, cacti, herbs, mushrooms, and many more. While the warm climate is suited to many native species, as well as non-natives such as South African protea, Rainbow and Fallbrook nurseries are almost always obligated to use irrigation and/or fertilization to produce sufficient yields. Unfortunately, these practices contribute significantly to the problem of nutrient pollution in Rainbow Creek.

The Rainbow Creek TMDL estimates the nutrient load from commercial nurseries by multiplying established loads from nurseries in comparable regions by the area of land used for nurseries in Rainbow Creek. According to the TMDL, commercial nurseries contribute 15% of the annual nitrogen load in Rainbow Creek and 7% of the annual phosphorus load. In order to comply with the TMDL, commercial nurseries in Rainbow Creek are required to make a 77% reduction in their nitrogen contribution, from 507 to 116 kg N/yr, and a 90% reduction in their phosphorus contribution, from 27.4 to 3 kg P/yr.

What follows is a list of Management Goals (MG) for nursery operators to reduce excess nitrogen and phosphorus, along with diverse management practices nursery operators can choose from to help reduce their nitrogen and phosphorus contributions.

A. Irrigation Management Goals and Management Practices

The first section addresses irrigation management as a way of reducing nutrient runoff from nurseries. The overall goal of irrigation management is to use irrigation water in a way that minimizes the amount of wasted water and the amount of water leaving the property and potentially reaching the creek. Since nutrients are most often carried to the creek through surface or ground water, then minimizing the amount of water runoff will minimize nutrient runoff as well.

Management Goal 1. Design or retrofit your irrigation system for improved irrigation uniformity and efficiency to reduce runoff and leaching.

Management Practices to Meet Goal 1.

1.1 Conduct an in-house irrigation audit or utilize professional services to determine the efficiency of the system and make appropriate adjustments. An irrigation system audit or evaluation typically includes measuring the distribution uniformity of sprinklers using the “catch can” method and of emitters by a representative discharge sampling, as well as pressure distribution methods.

1.2 Have a schedule for regular audits; over time an efficient system can become inefficient if modifications are made or as clogging and wear reduce uniformity.

1.3 Make system upgrades, improvements and/or repairs, as audits require.

1.4 If irrigation uniformity remains low after all practical improvements have been made, consider converting to an irrigation system with the potential for high uniformity.

1.5 Use pressure regulators where appropriate. (Photo #1, p. 45)

1.6 Use emitters that minimize pressure differences or pressure compensating emitters. (Photo #2, p.45)

1.7 When growing on slopes, compensate for pressure differences at the top and bottom of the slope by running the main line vertical to the slope with pressure controllers at each horizontal line junction and running each sub-line horizontal to the slope; include a pressure control valve.

1.8 When using overhead or impact systems, use flow control nozzles when pressure is too high or variable. (Photo #3, p.45)

1.9 Each watering zone should have spray stake/emitters with similar flow rates to maintain good uniformity; do not combine emitters with different flow rates in the same watering zone.

1.10 Place plant types and pot sizes with similar water needs in the same watering zone.

1.11 Correlate emitter flow rates for spray stakes and drippers with plant types, media infiltration rates, and pot sizes in each watering zone; emitters with flow rates that are too high will apply water faster than plants can absorb and runoff will result.

1.12 Use appropriate and uniform nozzle sizes.

1.13 Use sprinkler heads with a high uniformity rating.

Management Goal 2. Regularly maintain your irrigation system so that it continues to operate efficiently.

Management Practices to Meet Goal 2.

2.1 Regularly inspect for leaks in mains and laterals, in irrigation connections, or at the ends of drip tape and feeder lines. Repair any found leaks. (Photo, #4, p.45)

2.2 Regularly flush and unclog lines and emitters, keeping them free of mineral deposits and biological contaminants such as algae and bacterial slimes.

2.3 Ensure that appropriate filtration is used and regularly clean filters.

2.4 Maintain appropriate pressure throughout the system.

2.5 Regularly replace worn, outdated or inefficient irrigation system components and equipment.

Management Goal 3. Regularly manage crops, crop areas, and irrigation systems to avoid applying water to non-cropped areas or applying irrigation when not needed.

Management Practices to Meet Goal 3.

3.1 When using overhead or impact systems, regularly space pots or plants as closely together as is possible without compromising plant quality due to reduced light. This will minimize runoff from spaces between pots and plants. (Photo #5, p.45)

3.2 Manage spray stake and dripper systems to ensure every emitter is located in a plant or pot; manage harvest operations and retail areas to avoid creating watering zones with emitters located outside of pots. (Photo #6, p.45)

3.3 Consolidate plants and shut off irrigation in unused portions, including spray stakes and other emitters that can be "turned off" when not in use. Backfill plants into areas where plants have been removed.

3.4 Consider using overhead emitters with check-valves to prevent line drainage and drip damage. (Photo #7, p.46)

3.5 Use an on/off valve in hand watering systems to prevent runoff. (Photo #8, p.46)

3.6 Check regularly to ensure that spray patterns of overhead irrigation systems are managed to uniformly deliver water only to plants, without creating overspray in walkways and edges.

Management Goal 4. Use appropriate irrigation rates and scheduling.

Management Practices to Meet Goal 4.

4.1 Base irrigation scheduling and amount on environmental conditions and plant moisture requirements. Water requirements can be determined from a reference evapotranspiration (ET) value modified with a coefficient for the specific crop. ET and coefficient values, which reflect actual weather conditions, are available from the California Irrigation Management Information System—CIMIS, although coefficient values for many ornamental crops have yet to be determined. Irrigation scheduling can also be based on measured water content in the soil or plant growing media (determined with pot weight, tensiometer, electrical resistance blocks, or dielectric soil moisture sensor). (Photo #9, p.46)

4.2 Regularly adjust irrigation schedules to reflect changes in weather, plant needs, or measured soil moisture values.

4.3 Group pot sizes and/or plant types in watering zones according to moisture requirements

4.4 Avoid irrigating outdoors in windy conditions

4.5 Consider pulse irrigation to split irrigation into smaller increments that can more be used by plants.

4.6 When automatic time clocks are used, check regularly for accuracy and adjust to correlate scheduling with changing environmental conditions and plant growth stage. (Photo #10, p.46)

Top Priority Irrigation Management Options

The following is a list of those options we recommend as priorities based on effectiveness, ease of implementation and cost. Full descriptions of these priority practices can be found in the previous sections indicated by the numbers in parentheses.

- pressure regulators (1.5)
- pressure minimizing emitters (1.6)
- slope pressure control (1.7)
- group flow rates (1.9)
- group plants by need (1.10)
- use highly uniform sprinkler heads (1.13)
- inspect/repair leaks (2.1)
- maintain filters (2.3)
- maintain appropriate pressure (2.4)
- replace parts (2.5)
- keep emitters in plants (3.2)
- turn off irrig. in unused areas and backfill (3.3)
- use on/off valves (3.5)
- check overhead emitters for direction (3.6)
- base irrigation schedule on water needs (4.1)
- adjust to weather (4.2)
- group plants by needs (4.3)
- avoid irrigating when windy (4.4)
- check automatic clocks (4.6)

B. Nutrient Management Goals and Management Practices

The second section addresses Nutrient Management. The goal here is to apply only the amount of nutrients actually needed and usable by the target plants, and at the appropriate time based on plant growth stage and environmental factors. The intended result is that fewer nutrients end up unused and exposed to runoff. In addition, nutrient management involves handling fertilizers carefully at all stages of their use in order to prevent runoff to the creek.

Management Goal 1. Evaluate irrigation water, soils, growing media, and plant tissue to optimize plant growth and fertilization

Management Practices to Meet Goal 1.

1.1 Regularly monitor the quality of your irrigation source water. Sample seasonally (if well water or if surface water such as ponds or creeks) or annually (if municipal water). Analyze for levels of constituents such as bicarbonates (HCO_3^-), sodium (Na), chloride (Cl^-), nitrate (NO_3^-), boron (B_3), soluble salts, and pH. Undesirable levels of these constituents may affect crop growth and health. Utilize a commercial lab for analysis. Soluble salts, pH, nitrate, and phosphate (PO_4) can be analyzed on-site with instruments and kits designed for use by individual growers. (Photo #11, p.46)

1.2 If well water is used on-site for human consumption, have the well water tested

1.3 Maintain records of irrigation source water quality, especially if of variable quality.

1.4 Consider nutrients already present in your irrigation water, recovered runoff, composts, manures, and previous fertilizer applications in fertilizer management decision-making**.** Over-fertilization can result if nutrients already present in the growing environment are not taken into account.

1.5 Regularly test soil/growing media for nutrients, soluble salts, and pH. Along with plant tissue analysis, soil tests are your best guide to effective use of fertilizers. (Photo #12, p.46)

1.6 Test plant tissue to determine concentrations of macro- and micronutrients.

1.7 Use information and recommendations from soil, growing media, and plant tissue analyses in fertilization management.

1.8 When available, use nutrient recommendations for your specific crop. Use the most up- to-date recommendations from farm advisors and publications.

1.9 Periodically test fertigation water to monitor fertilizer levels and ensure injectors are properly operating.

Management Goal 2. Conduct efficient fertilizer and leaching practices.

Management Practices to Meet Goal 2.

2.1 Incorporate solid fertilizers in a manner that optimizes nutrient availability to growing roots. When mixing fertilizer into media, be sure that fertilizer is evenly distributed throughout the root zone/container and at the correct rate; this will provide good nutrition and avoid leaching losses of fertilizer nutrients.

2.2 Use composts or manures that are thoroughly composted before application. Composts and manures that are not thoroughly composted may contribute bacteria and other contaminants to runoff. (Photo #13, p.47)

2.3 Carefully apply top-dressed fertilizers to keep granules in the pot or around the plants at the correct rate. (Photo #14, p.47)

2.4 Ensure that injected fertilizers are carefully mixed and applied at correct rates. Excessive amounts of highly soluble liquid fertilizers are easily lost with leachate water.

2.5 Calibrate fertilizer injectors to accurately deliver liquid fertilizer through the irrigation system.

2.6 Utilize slow-release or controlled-release fertilizers to minimize leaching losses of nutrients.

2.7 Time fertilizers with environmental parameters and growth stage of the plants. Fertilizer management that provides nutrients at appropriate growth stages will result in better plant nutrition and minimize nutrient losses to the environment

2.8 Flush excess salts from the root systems by using carefully managed leaching practices. Excessive leaching represents wasted water, fertilizer, and greater runoff volumes to manage. Excess nutrients carried by leached water can be a source of groundwater and surface water contamination.

2.9 Use the electrical conductivity (EC) of root media or leachate water to determine leaching practices. The soluble salt level of leachate water and/or root media can be monitored with a portable EC meter. Different plants have different tolerances to EC. High fertilizer concentrations are not recommended, as they require frequent leaching to avoid salt build-up in containers.

2.10 Set irrigation schedules to perform leaching at specific irrigation events, rather than every time irrigation is performed. Perform leaching only with fertilizer injectors turned off (clear water).

2.11 Measure the amount of leaching that occurs, and ensure that only 10-15% of the water applied runs through the container. Without actual measuring, the tendency is to underestimate leachate volumes and therefore leach excessively.

Management Goal 3. Avoid fertilizer material spills during all phases of transport, storage, and application.

Management Practices to Meet Goal 3.

3.1 Store fertilizers in a storage structure that complies with local, state, and federal guidelines. (Photo #15, p.47)

3.2 Locate fertilizer storage and mixing areas as far away from water conveyances (streams, creeks, and storm drains) as possible.

3.3 Prevent fertilizer residues from washing into surface waters. One strategy is to include a concrete pad and curb to contain spills and leaks in the fertilizer storage facility. This pad area should be protected from rainfall and irrigation to prevent fertilizer residues from washing into surface water bodies.

3.4 Equip fertilizer tanks with secondary containment to contain spills and leaks. (Photo #16, p.47)

3.5 Conduct fertilizer mixing and loading operations on an impermeable surface such as a concrete floor in areas where potential for runoff is low; perform fertilizer operations at least 100 feet down-slope of a well or other water supply. These are legal requirements. (Photo # 17, p.47)

3.6 Verify regularly that fertigation equipment is properly calibrated and fertilizer solution tanks are free of leaks.

3.7 When transporting liquid fertilizer, do not overfill trailers or tanks. Cover loads properly and display appropriate placards on vehicles.

3.8 When transferring fertilizer into on-farm storage or into a fertilizer applicator, take care that you do not allow materials to spill.

3.9 Immediately clean up fertilizer spills, and do so according to a predetermined protocol.

3.10 Use check valves on application equipment. When applying fertilizer from a tractor or rig in a field, shut off the fertilizer applicators during turns.

3.11 Whenever you are injecting fertilizer into irrigation water, make sure that you do not allow backflow into wells or other water sources; install backflow prevention devices and check them at least once a year, recording the date and result of this check.

3.12 Dispose fertilizer bags in trash bins with lids to prevent trash with fertilizer residues from blowing into nearby waterways.

Top Priority Nutrient Management Options

The following is a list of those options we recommend as priorities based on effectiveness, ease of implementation and cost. Full descriptions of these priority practices can be found in the previous sections indicated by the numbers in parentheses.

- keep records of water quality (1.3)
- use crop recommendations (1.8)
- test fertigation water (1.9)
- distribute solid fertilizer evenly (2.1)
- use injected fertilizer carefully (2.4)
- calibrate fertilizer injectors (2.5)
- time fertilizer use with growth (2.7)
- use EC for leaching (2.9)
- only leach sometime (2.10)
- use compliant storage of fertilizers (3.1)
- use secondary containment (3.4)
- mix and load on impermeable surface (3.5)
- inspect equipment (3.6)
- cover and avoid overfilling liquid fert. (3.7)
- avoid spilling in transfer (3.8)
- clean spills immediately (3.9)
- check valves (3.10)
- avoid backflow during fertigation (3.11)
- dispose of fertilizer bags in covered bins (3.12)

C. Erosion and Runoff Management Goals and Management Practices

The third section deals with erosion and runoff management designed to prevent sediments and water, which can both carry nutrients, from leaving the nursery property. Erosion and runoff management involves modifying soil and container substrates to enhance their ability to hold water, creating barriers to the movement of sediments and water and capturing unused irrigation water for reuse or storage. While the TMDL does not regulate sediments in the creek specifically, erosion and runoff management can help decrease the amount of nutrients reaching the creek.

Management Goal 1. Evaluate water quality of storm runoff to comply with water regulations and determine options for reuse or treatment.

Management Practices to Meet Goal 1.

1.1 Inventory chemicals used in your operation, especially those likely to be present in runoff such as pesticides, fertilizers, and shading compounds.

1.2 To measure the effect of management practices, regularly sample storm runoff water. Irrigation runoff should not exit property. Follow commercial lab instructions for taking and handling storm runoff samples, as this will greatly affect the results.

1.3 Conduct analyses on runoff water samples to determine what is in it and at what levels. Parameters to test for include pH, electrical conductivity (EC), nitrate (NO^{3-}) and phosphate (PO_4), which can be analyzed on site with instruments and kits designed for use by growers. Alternatively, water samples can be sent to commercial labs. In addition, it is recommended to use a good commercial lab to test for other contaminants such as specific pesticides that you suspect may be present in runoff. The lab should use EPA standards and be certified for Good Laboratory Practices (GLP).

1.4 Compare water analyses against local and state water quality standards and regulations.

Management Goal 2. Use practices that improve soil/media infiltration and water-holding capacity to reduce soil erosion, runoff, and excessive leaching.

Management Practices to Meet Goal 2.

2.1 Incorporate organic amendments on sandy soil to improve water holding capacity and prevent excessive leaching.

2.2 Incorporate amendments on clayey soil to improve infiltration and reduce runoff.

2.3 Use mulches or cover crops on bare soil to reduce runoff. (Photo #18, p.47)

2.4 Test media used in containers and select media for high water holding capacity as well as good drainage.

2.5 Consider the use of wetting agents in container media to increase water absorption, allow quicker wetting, and reduce channeling down the sides of pots. Wetting agents should not be overused, as they can be toxic to plants and a contaminant in runoff.

Management Goal 3. Use practices that will retard movement of runoff water and sediment and keep it on the property.

Management Practices to Meet Goal 3.

3.1 Determine where and how much erosion and runoff is generated and if runoff exits the property. All dry weather runoff and sediment is prohibited from entering street gutters, rivers, creeks, or other conveyances that drain to public waters. Discharging dry weather runoff and sediment onto neighboring properties is also illegal, unless done with consent.

3.2 Establish engineered barriers or buffers between production areas and ditches, creeks, ponds, lakes, or wetlands. Examples of plant buffers include vegetated buffer strips, grass-lined channels, grass swales, and constructed wetlands. Buffer vegetation can help absorb both dry and wet weather contaminated runoff if properly located. Engineered barriers such as berms and containment structures can regulate runoff flow and contain it. For example, detention basins can temporarily hold excess storm water; the basin will slowly drain as the collected water infiltrates into permeable soil or evaporates. (Photo #19 and #20, p.48)

3.3 Convert paved or bare soil areas to vegetation that will retard runoff and take up nutrients, pesticides, and other pollutants wherever possible. (Photo #21, p.48)

3.4 Consider using polyacrylamide (PAM) to remove sediment from runoff water.

3.5 Use windbreaks or shelterbelts in areas prone to wind erosion. (Photo #22, p.48)

3.6 If your property is affected by discharge sediment or runoff from upslope or upstream properties, use practices to contain this sediment or runoff (such as diversions, filter strips, sediment basins, underground outlets, etc.).

3.7 Perform maintenance on any runoff buffers annually or as needed to ensure they continue to function as intended.

Management Goal 4. Manage hilly, sloped areas to prevent soil erosion and increased runoff volume and velocity. This includes hilly production areas as well as sloped non-production areas.

Management Practices to Meet Goal 4.

4.1 Use terraces where appropriate to control soil erosion and runoff. Ensure that any required permits are obtained for larger-scale terracing. (Photo #23, p.48)

4.2 Use mulches where appropriate to control soil erosion and runoff.

4.3 Use vegetation (cover crops, buffer strips, grassed swales, etc.) to control soil erosion and runoff.

4.4 Use berms to control soil erosion and runoff. (Photo #24, p.48)

4.5 Use proper irrigation management in hilly production areas and in hilly landscaped non-production areas avoid runoff and soil erosion.

4.6 Use proper pest and nutrition management practices in hilly production areas and in hilly landscaped non-production areas to avoid pesticide and fertilizer runoff.

4.7 Perform maintenance on any hill erosion buffers annually or as needed to ensure they continue to function as intended.

Management Goal 5. Design and manage nursery roads to prevent erosion and contaminated runoff.

Management Practices to Meet Goal 5.

5.1 Ensure that all new roads are properly designed and permitted to avoid erosion. This may require the submission of an engineering plan, specifications, and an environmental assessment. Soils should be evaluated for erodibility, and excessive slopes should be avoided.

5.2 Use waterbreaks (waterbars) on nursery roads with gradients exceeding 8%. These should be properly sized and placed only where water flow has an outlet and diverted water does not flow into septic fields or waterways.

5.3 Use filter strips between roads and waterways to absorb runoff from roads and trap toxic sediment. (Photo #25, p.49)

5.4 Inspect culverts and clean them out during winter rains so that water drains freely. (Photo #26, p.49)

5.5 Prevent contaminant-laden dust from traffic and wind erosion by sealing or watering unpaved roads. This will also help in mite control. Ensure that dust control with applied water does not create runoff.

5.6 Perform road maintenance annually or as needed.

Management Goal 6. Collect excess irrigation and storm water runoff and sediment.

Management Practices to Meet Goal 6.

6.1 Use retention basins to store excess irrigation runoff and storm water. Basin capacity should be designed on the basis of probable storm events and to prevent seepage and groundwater contamination. Use qualified engineers for design and implementation. (Photo #27, p.49)

6.2 Use captured water to irrigate non-crop areas, thereby preventing overflow.

6.3 Use captured water and then recycle it onto crops, treating or blending with fresh water as necessary, avoiding basin overflow during both dry and wet weather. (Photo #28, p.49)

Management Goal 7. Manage greenhouse roof runoff to reduce pollution and erosion, to prevent flooding, and improve drainage.

Management Practices to Meet Goal 7.

7.1 Direct roof runoff away from the municipal storm water system or sewer system. Roof runoff may contain pollutants e.g. toxic sediments and shading compounds.

7.2 Direct roof runoff into pervious areas (gravel, vegetative, paving material, self-contained tail water system or retention ponds).

7.3 Reuse collected roof runoff to irrigate non-crop or crop areas. (Photo #29, p.49)

Top Priority Erosion/runoff Management Options

The following is a list of those options we recommend as priorities based on effectiveness, ease of implementation and cost. Full descriptions of these priority practices can be found in the previous sections indicated by the numbers in parentheses.

- inventory chemicals used (1.1)
- sample runoff water (1.2)
- analyze runoff water (1.3)
- compare with standards (1.4)
- mulch/cover crop (2.3)
- note runoff amt. and locations (3.1)
- use berms (4.4)
- use proper hill irrigation (4.5)
- use proper pest/nutrient mgmt. on hills (4.6)
- design new roads to avoid erosion (5.1)
- inspect/clean culverts (5.4)

D. Personnel Training

This section outlines the various practices in which all relevant operation personnel should be trained. Training ensures that personnel understand why and how nutrient reduction management practices should be done and increases the likelihood that practices will be implemented. (Photo #30 p.49)

Management Goal 1. Provide appropriate training for personnel involved in irrigating in a language that personnel clearly understand, and maintain records documenting training.

Management Practices to Meet Goal 1.

1.1 Provide training to ensure that irrigation duties are performed only by personnel who understand and practice appropriate irrigation scheduling, irrigation application practices, and crop management practices related to runoff management.

1.2 Ensure that appropriate personnel are trained in proper irrigation system maintenance procedures and record keeping related to maintenance.

1.3 If in-house irrigation audits are performed, ensure that personnel are trained to evaluate irrigation systems correctly and regularly.

Management Goal 2. Provide organized training sessions for personnel handling fertilizers in a language that personnel clearly understand, and maintain records documenting training.

Management Practices to Meet Goal 2.

2.1 Provide training to ensure that appropriate personnel understand how and when to use fertilizers.

2.2 Provide training to ensure that appropriate personnel understand how and when to leach.

2.3 Provide training to ensure that appropriate personnel understand safe fertilizer transport, storage, and disposal practices.

2.4 Provide training for all personnel on what to do in case of a fertilizer spill.

Management Goal 3. Provide organized training sessions for personnel in runoff management in a language that personnel clearly understand, and maintain records documenting training.

Management Practices to Meet Goal 3.

3.1 Ensure that all appropriate employees receive training in runoff management and all applicable regulations. All growing operation employees must understand and implement the required practices for runoff management to be effective.

3.2 Train staff so that they become aware of all drainage conduits and ditches on the property and know where they drain.

3.3 Ensure that all municipal stormwater or sewer system conduits and ditches are stenciled or designated with signs, and that there are no illicit connections to the municipal stormwater or sewer system.

Top Priority Personnel Management Options

We also recommend prioritizing all personnel training.

E. Record Keeping

This section describes the pieces of information of which growers should keep record. Records allow growers to prove which practices they have implemented in order to reduce their nutrient contribution, in addition to complying with other regulations that require records.

Management Goal 1. Maintain records of all nursery practices and data.

Management Practices to Meet Goal 1.

1.1 Maintain records of fertilizer use. These may be required by regulatory agencies and are useful in obtaining permits or conditional waivers for agricultural discharge. Records can help you make informed decisions regarding fertilizer management.

1.2 Maintain records of runoff water quality for at least 5 years.

1.3 Implement and maintain a record-keeping system for documenting management practices addressing runoff management. Record-keeping may be required by some regulating authorities.

1.4 Maintain records of all personnel training for at least 5 years. Records should include when training occurred, who led the training, who participated, and what information was covered.

Top Priority Personnel Management Options.

We also recommend prioritizing all record keeping (Sec. E).

Chapter 2: Management Options for Orchards and Field Agriculture Operations

Introduction

Orchards and field agriculture operations cover approximately 11% and 6% of the Rainbow Creek watershed, respectively. Field agriculture operations in the watershed grow mostly warm-weather row crops such as pumpkins and aloe. Rainbow Creek orchards focus largely on citrus and avocados, as well as some in-ground palms for nursery sales. Because of their strong presence in the watershed and common use of irrigation and fertilization for increased yields, field agriculture and orchards contribute significantly to the nitrogen and phosphorus loads in Rainbow Creek.

The Rainbow Creek TMDL estimates the nutrient load from fields and orchards by multiplying established loads from comparable regions by the area of land used for each type of operation. These estimations show that field agriculture contributes 20% of the annual nitrogen load from land uses in Rainbow Creek and 9% of the annual phosphorus load. Orchards are estimated to contribute 22% and 16% of nitrogen and phosphorus, respectively. In order to comply with the TMDL, agricultural fields in Rainbow Creek are required to make a 77% reduction in their nitrogen contribution, from 655 to 151 kg N/yr, and a 90% reduction in their phosphorus contribution, from 35.4 to 4 kg P/yr. Orchards are required to make a 77% reduction in nitrogen contribution, from 790 to 182 kg N/yr and a 90% reduction in phosphorus contribution from 63 to 6 kg P/yr.

What follows is a list of the Management Goals (MG) for orchard and field managers to reduce excess nitrogen and phosphorus contributions.

A. Irrigation Management Goals and Management Practices

The first section addresses irrigation management as a way of reducing nutrient runoff from fields and orchards. The overall goal of irrigation management is to use irrigation water in a way that minimizes the amount of wasted water and the amount of water leaving the property and potentially reaching the creek. Since nutrients are most often carried to the creek through surface or ground water, then minimizing the amount of water runoff will minimize nutrient runoff as well.

Management Goal 1. Design or retrofit your irrigation system for improved irrigation uniformity and efficiency to reduce runoff and leaching.

Management Practices to Meet Goal 1.

1.1 Conduct an irrigation audit or utilize professional services to determine the efficiency of the system and make appropriate adjustments. An irrigation system audit or evaluation typically includes measuring the distribution uniformity of sprinklers using the “catch can”

method and of emitters by a representative discharge sampling, as well as pressure distribution methods.

1.2 Have a schedule for regular audits; over time an efficient system can become inefficient if modifications are made or as clogging and wear reduce uniformity.

1.3 If irrigation uniformity remains low after all practical improvements have been made, consider converting to an irrigation system with the potential for high uniformity.

1.4 Use pressure regulators where appropriate.

1.5 Use emitters that minimize pressure differences or pressure compensating emitters.

1.6 When growing on slopes, compensate for pressure differences at the top and bottom of the slope by running the main line vertical to the slope with pressure controllers at each horizontal line junction and running each subline horizontal to the slope; include a pressure control valve.

1.7 When using overhead or impact systems, use flow control nozzles when pressure is too high or variable.

1.8 Each watering zone should have spray stake/emitters with similar flow rates to maintain good uniformity; do not combine emitters with different flow rates in the same watering zone.

1.9 Correlate emitter flow rates for spray stakes and drippers with plant types; emitters with flow rates that are too high will apply water faster than plants can absorb and runoff will result.

1.10 Use appropriate and uniform nozzle sizes.

1.11 Use sprinkler heads with a high uniformity rating.

Management Goal 2. Regularly maintain your irrigation system so that it continues to operate efficiently.

Management Practices to Meet Goal 2.

2.1 Inspect monthly for leaks and clogs in mains and laterals, in irrigation connections, or at the ends of drip tape and feeder lines. Repair any found leaks.

2.2 Flush and unclog lines and emitters yearly, keeping them free of mineral deposits and biological contaminants such as algae and bacterial slimes.

2.3 Ensure that appropriate filtration is used and regularly clean filters.

2.4 Maintain appropriate pressure throughout the system.

2.5 Regularly replace worn, outdated or inefficient irrigation system components and equipment.

Management Goal 3. Regularly manage crops, crop areas, and irrigation systems to avoid applying water to non-cropped areas or applying irrigation when not needed.

Management Practices to Meet Goal 3.

3.1 Manage spray stake and dripper systems to ensure every emitter is located near a plant or plants; manage harvest operations to avoid creating watering zones with emitters located away from plants.

3.2 Shut off irrigation in unused areas, including spray stakes and other emitters that can be "turned off" when not in use.

3.3 Consider using emitters with check-valves to prevent line drainage and drip damage.

3.4 Use an on/off valve in hand watering systems to prevent runoff. (Photo #31, p.50)

3.5 Check regularly to ensure that spray patterns of irrigation systems are managed to uniformly deliver water directly to plants.

Management Goal 4. Use appropriate irrigation rates and scheduling.

Management Practices to Meet Goal 4.

4.1 Base irrigation scheduling and amount on environmental conditions and plant moisture requirements. Water requirements can be determined from a reference evapotranspiration (ET) value modified with a coefficient for the specific crop. ET and coefficient values, which reflect actual weather conditions, are available from the California Irrigation Management Information System—CIMIS, although coefficient values for many ornamental crops have yet to be determined. Irrigation scheduling can also be based on measured water content in the soil (determined with pot weight, tensiometer, electrical resistance blocks, or dielectric soil moisture sensor). (Photo #9, p.46)

4.2 Regularly adjust irrigation schedules to reflect changes in weather, plant needs, or measured soil moisture values.

4.3 Avoid irrigating outdoors in windy conditions.

4.4 Consider pulse irrigation to split irrigation into smaller increments that can more effectively be used by plants.

4.5 When automatic time clocks are used, check regularly for accuracy and adjust to correlate scheduling with changing environmental conditions and plant growth stage. (Photo #10, p.46)

Top Priority Irrigation Management Options:

The following is a list of those options we recommend as priorities based on effectiveness, ease of implementation and cost. Full descriptions of these priority practices can be found in the previous sections indicated by the numbers in parentheses.

- irrigation audits (1.1)
- pressure regulators (1.4)
- pressure minimizing emitters (1.5)
- maintain appropriate pressure (2.4)
- replace parts (2.5)
- keep emitters in plants (3.1)

- slope pressure control (1.6)
- flow control nozzles (1.7)
- group flow rates (1.8)
- use approp. flow rate for plant type (1.9)
- use uniform nozzle sizes (1.10)
- use highly uniform sprinkler heads (1.11)
- inspect/repair leaks (2.1)
- flush/unclog lines (2.2)
- maintain filters (2.3)
- turn off irrig. in unused areas (3.2)
- use check valves (3.3)
- use on/off valves (3.4)
- check overhead emitters for direction (3.5)
- base irrig. schedule on water needs (4.1)
- adjust to weather (4.2)
- use pulse irrigation (4.4)
- check automatic clocks (4.5)

B. Nutrient Management Goals and Management Practices

The second section addresses nutrient management. The goal here is to apply only the amount of nutrients actually needed and usable by the target plants, and at the appropriate time based on plant growth stage and environmental factors. The intended result is that fewer nutrients end up unused and exposed to runoff. In addition, nutrient management involves handling fertilizers carefully at all stages of their use in order to prevent runoff to the creek.

Management Goal 1. Evaluate irrigation water, soils, growing media, and plant tissue to optimize plant growth and avoid over-fertilization.

Management Practices to Meet Goal 1.

1.1 Regularly monitor the quality of your irrigation source water. Sample seasonally (if well water or if surface water such as ponds or creeks) or annually (if municipal water). Analyze for levels of constituents such as bicarbonates (HCO^-), chloride (Cl^-), sodium (Na), nitrate (NO^-), boron (B), soluble salts, and pH. Undesirable levels of these constituents may affect crop growth and health. Utilize a commercial lab for analysis. Soluble salts, pH, nitrate and phosphate (PO_4^{3-}) can be analyzed on-site with instruments and kits designed for use by individual growers. (Photo #11, p.46)

1.2 If well water is used on-site for human consumption, have the well water tested regularly for contamination from fertilizers.

1.3 Maintain records of irrigation source water quality, especially if of variable quality.

1.4 Consider nutrients already present in your irrigation water, recovered runoff, composts, manures, and previous fertilizer applications in fertilizer management decision-making**.** Over-fertilization can result if nutrients already present in the growing environment are not taken into account.

1.5 Regularly test soil for nutrients, soluble salts, and pH. Along with plant tissue analysis, soil tests are your best guide to effective use of fertilizers. (Photo #12, p.46)

1.6 Test plant tissue to determine concentrations of macro- and micronutrients.

1.7 Use information and recommendations from soil and plant tissue analyses in fertilization management.

1.8 When available, use nutrient recommendations for your specific crop. Use the most up- to-date recommendations from farm advisors and publications.

1.9 Regularly test fertigation water to monitor fertilizer levels and to ensure injectors are properly operating.

Management Goal 2. Conduct efficient fertilizer and leaching practices.

Management Practices to Meet Goal 2.

2.1 Incorporate solid fertilizers in a manner that optimizes nutrient availability to growing roots. Incorporate solid fertilizers into the soil through disking, plowing, rotary tilling or subsurface banding; this will provide good nutrition and avoid leaching losses of fertilizer nutrients.

2.2 Use composts or manures that are thoroughly composted before application. Composts and manures that are not thoroughly composted may contribute bacteria and other contaminants to runoff.

2.3 Carefully apply top-dressed fertilizers to keep granules around the plants at the correct rate. If using a spreader with an uneven broadcast ensure fields are bordered by vegetation to trap misapplied nutrients.

2.4 Ensure that injected fertilizers are carefully mixed and applied at correct rates. If applying fertilizers using sprinkler irrigation ensure that fields are bordered by vegetation. Avoid sprinkler fertigation during windy weather.

2.5 Calibrate fertilizer injectors to accurately deliver liquid fertilizer through the irrigation system.

2.6 Utilize slow-release or controlled-release fertilizers to maximize the amount of fertilizer used by plants.

2.7 Time fertilizers with environmental parameters and growth stage of the plants. Fertilizer management that provides nutrients at appropriate growth stages will result in better plant nutrition and minimize nutrient losses to the environment.

Management Goal 3. Avoid fertilizer material spills during all phases of transport, storage, and application.

Management Practices to Meet Goal 3.

3.1 Store fertilizers in a storage structure that complies with local, state, and federal guidelines. (Photo #15, p.47)

3.2 Locate fertilizer storage and mixing areas as far away from water conveyances (streams, creeks, and storm drains) as possible.

3.3 Build a concrete pad and curb to contain spills and leaks in the fertilizer storage facility. This pad area should be protected from rainfall and irrigation to prevent fertilizer residues from washing into surface water bodies.

3.4 Equip fertilizer tanks with secondary containment to contain spills and leaks. (Photo #16, p.47)

3.5 Conduct fertilizer mixing and loading operations on an impermeable surface such as a concrete floor in areas where potential for runoff is low; perform fertilizer operations at least 100 feet down-slope of a well or other water supply. These are legal requirements. (Photo #17, p.47)

3.6 Verify regularly that fertigation equipment is properly calibrated and fertilizer solution tanks are free of leaks.

3.7 When transporting fertilizer, do not overfill trailers or tanks. Cover loads properly and display appropriate placards on vehicles.

3.8 When transferring fertilizer into on-farm storage or into a fertilizer applicator, take care that you do not allow materials to spill.

3.9 Immediately clean up fertilizer spills, and do so according to a predetermined protocol.

3.10 Use check valves on application equipment. When applying fertilizer from a tractor or rig in a field, shut off the fertilizer applicators during turns.

3.11 Whenever you are injecting fertilizer into irrigation water, make sure that you do not allow backflow into wells or other water sources; install backflow prevention devices and check them at least once a year, recording the date and result of this check.

3.12 Dispose fertilizer bags in trash bins with lids to prevent trash with fertilizer residues from blowing into nearby waterways.

***Top Priority Nutrient Management Options**:*

The following is a list of those options we recommend as priorities based on effectiveness, ease of implementation and cost. Full descriptions of these priority practices can be found in the previous sections indicated by the numbers in parentheses.

- test soil and plant tissue for nutrients and use data in fertilizer management (1.5-1.7)
- test well water (1.2)
- use crop recommendations (1.8)
- periodically test fertigation water (1.9)
- disk/plow in solid fertilizer (2.1)
- grow border vegetation (2.3)
- calibrate fertilizer injectors (2.5)
- use controlled-release fertilizer (2.6)
- avoid backflow during fertigation (3.11)
- apply top fertilizer and injected fertilizer carefully (2.3, 2.4)
- time fertilizer use with growth
- use compliant storage of fertilizers
- store fertilizers far from waters (3.2)
- mix and load on impermeable surface (3.5)
- inspect equipment (3.6)
- clean spills promptly (3.9)
- check valves (3.10)

C. Erosion and Runoff Management Goals and Management Practices

The third section deals with erosion and runoff management designed to prevent sediments and water, which can both carry nutrients, from leaving the property. Erosion and runoff management involves modifying soil to enhance its ability to hold water, creating barriers to the movement of sediments and water and capturing unused irrigation water for reuse or

storage. While the TMDL does not regulate sediments in the creek specifically, erosion and runoff management can help decrease the amount of nutrients reaching the creek.

Management Goal 1. Evaluate water quality of storm runoff to comply with water regulations and determine options for reuse or treatment.

Management Practices to Meet Goal 1.

1.1 Inventory chemicals used in your operation, especially those likely to be present in runoff such as pesticides, fertilizers, and shading compounds.

1.2 Regularly sample storm runoff water, as there will likely be seasonal variations in the analyses. Irrigation runoff should not exit property. Follow commercial lab instructions for taking and handling storm runoff samples, as this will greatly affect the results.

1.3 Conduct analyses on runoff water samples to determine what is in it and at what levels. Parameters to test for include pH, electrical conductivity (EC), nitrate (NO_3^-) and phosphate (PO_4^{3-}) that can be analyzed on site with instruments and kits designed for use by growers. Alternatively, water samples can be sent to commercial labs. In addition, it is recommended to use a good commercial lab to test for other contaminants according to the products utilized such as specific pesticides that you suspect may be present in runoff. The lab should use EPA standards and be certified for Good Laboratory Practices (GLP).

1.4 Compare water analyses against local and state water quality standards and regulations.

Management Goal 2. Use practices that improve soil/media infiltration and water-holding capacity to reduce soil erosion, runoff, and excessive leaching.

Management Practices to Meet Goal 2.

2.1 Incorporate organic amendments on sandy soil to improve water holding capacity and prevent excessive leaching.

2.2 Incorporate amendments on clayey soil to improve infiltration and reduce runoff.

2.3 Use mulches or cover crops on bare soil to reduce runoff. (Photo #32, p.50)

2.4 Maintain crop residues when not using cover crops. (Photo #33, p.50)

Management Goal 3. Use practices that will retard movement of runoff water and sediment and keep it on the property.

Management Practices to Meet Goal 3.

3.1 Determine where and how much erosion and runoff is generated and if runoff exits the property. All dry weather runoff and sediment is prohibited from entering street gutters, rivers, creeks, or other conveyances that drain to public waters. Discharging dry weather runoff and sediment onto neighboring properties is also illegal, unless done with consent.

3.2 Establish engineered barriers or buffers between production areas and ditches, creeks, ponds, lakes, or wetlands. Examples of plant buffers include vegetated buffer strips, grass-lined channels, grass swales, and constructed wetlands. Buffer vegetation can help absorb

both dry and wet weather contaminated runoff if properly located. Engineered barriers such as berms and containment structures can regulate runoff flow and contain it. For example, detention basins can temporarily hold excess storm water; the basis will slowly drain as the collected water infiltrates into permeable soil or evaporates. (Photo #19 and #20, p.48)

3.3 Discharge pumped or runoff water into filter areas

3.4 Shape and seed field edges to filter runoff as much as possible.

3.5 Use conservation tillage practices such as no-till, ridge till, strip till and minimum till. (Photo #34, p.50)

3.6 Convert paved or bare soil areas to vegetation that will retard runoff and take up nutrients, pesticides, and other pollutants wherever possible. (Photo #21, p.48)

3.7 Consider using polyacrylamide (PAM) to remove sediment from runoff water.

3.8 Use windbreaks or shelterbelts in areas prone to wind erosion. (Photo #22, p.48)

3.9 If your property is affected by discharge sediment or runoff from upslope or upstream properties, use practices to contain this sediment or runoff (such as diversions, filter strips, sediment basins, underground outlets, etc.).

3.10 Perform maintenance on runoff barriers annually or as needed to ensure they continue to function as intended.

Management Goal 4. Manage hilly, sloped areas to prevent soil erosion and increased runoff volume and velocity. This includes hilly production areas as well as sloped non-production areas.

Management Practices to Meet Goal 4.

4.1 Use terraces where appropriate to control soil erosion and runoff. (Photo #35, p.50)

4.2 Use appropriate mulches where appropriate to control soil erosion and runoff. Ensure that mulch will stick to the soil where applied, and does not include large clumps that will run off instead of absorbing/blocking water flow.

4.3 Use vegetation (cover crops, buffer strips, grassed swales, etc) to control soil erosion and runoff.

4.4 Use berms to control soil erosion and runoff. (Photo #24, p.48)

4.5 Use proper irrigation management in hilly production areas and in hilly landscaped non-production areas avoid runoff and soil erosion.

4.6 Use proper pest and nutrition management practices in hilly production areas and in hilly landscaped non-production areas to avoid pesticide and fertilizer runoff.

4.7 Perform maintenance on erosion control annually or as needed to ensure they continue to function as intended.

Management Goal 5. Design and manage property roads to prevent erosion and contaminated runoff.

Management Practices to Meet Goal 5.

5.1 Ensure that all new roads are properly designed and permitted to avoid erosion. This may require the submission of an engineering plan, specifications, and an environmental assessment. Soils should be evaluated for erodibility, and excessive slopes should be avoided. To prevent contaminant-laden dust from traffic and wind erosion, seal or water unpaved roads. Roads can be sealed with non-toxic sealants, or seeded with perennial grass when possible.

5.2 Use waterbreaks (waterbars) on property roads with gradients exceeding 8%. These should be properly sized and placed only where water flow has an outlet and diverted water does not flow into septic fields or waterways.

5.3 Use filter strips between roads and waterways to absorb runoff from roads and trap toxic sediment. (Photo #25, p.49)

5.4 Inspect culverts and clean them out during winter rains so that water drains freely. When not maintained, build-up of eroded soil or other matter can clog culverts, potentially directing water over areas where it can become contaminated. To avoid creating contaminated runoff, culverts must be kept clear. (Photo #26, p.49)

5.5 Perform road maintenance annually or as needed.

Management Goal 6. Collect excess irrigation and storm water runoff and sediment.

Management Practices to Meet Goal 6.

6.1 Use retention basins to store excess irrigation runoff and storm water. Basin capacity should be designed on the basis of probable storm events and to prevent seepage and groundwater contamination. Use qualified engineers for design and implementation. (Photo #27, p.49)

6.2 Use captured water to irrigate crops and/or non-crop areas, thereby preventing basin overflow. (Photo #28, p.49)

6.3 Consider planting water-loving crops (e.g. curly willow, papyrus) in collection basins to absorb water. (Photo #20, p.48)

Management Goal 7. Manage roof runoff to reduce pollution and erosion to prevent flooding and improve drainage.

Management Practices to Meet Goal 7.

7.1 Direct roof runoff to avoid flow across areas where contaminants will be washed into the municipal storm water, sewer system, or agricultural drainage system. Roof runoff may contain pollutants e.g. toxic sediments and shading compounds. (Photo #29, p.49)

7.2 Direct roof runoff into pervious areas (gravel, vegetative, paving material, self- contained tail water system or retention ponds). (Photo #29, p.49)

7.3 Reuse collected roof runoff to irrigate non-crop or crop areas. (Photo #29, p.49)

Top Priority Erosion/Runoff Management Options:

The following is a list of those options we recommend as priorities based on effectiveness, ease of implementation and cost. Full descriptions of these priority practices can be found in the previous sections indicated by the numbers in parentheses.

- inventory chemicals used (1.1)
- sample runoff water (1.2)
- analyze runoff water (1.3)
- compare against regulatory standards (1.4)
- maintain crop residues on unused land (2.4)
- determine runoff amount and locations (3.1
- use barriers/buffers to water flow (3.2)
- shape/seed field edges (3.4)
- use sticking mulches (4.2)
- use vegetation to block water flow (4.3)
- use berms (4.4)
- use proper hill irrigation (4.5)
- use proper hill pest/nutrient mgt. (4.6)
- direct roof runoff to avoid contaminants (7)

D. Personnel Training

This section outlines the various practices in which all relevant operation personnel should be trained. Training ensures that personnel understand why and how nutrient reduction management practices should be done and increases the likelihood that practices will be implemented. (Photo #30, p.49)

Management Goal 1. Provide appropriate training for personnel involved in irrigating in a language that personnel clearly understand.

Management Practices to Meet Goal 1.

1.1 Provide training to ensure that irrigation duties are performed only by personal who understand and practice appropriate irrigation scheduling, irrigation application practices, and crop management practices related to runoff management.

1.2 Ensure that appropriate personnel are trained in proper irrigation system maintenance procedures and record keeping related to maintenance.

1.3 If irrigation audits are performed, ensure that personnel are trained to evaluate irrigation systems correctly and regularly.

Management Goal 2. Provide organized training sessions for personnel handling fertilizers in a language that personnel clearly understand.

Management Practices to Meet Goal 2.

2.1 Provide training to ensure that appropriate personnel understand how and when to use fertilizers.

2.2 Provide training to ensure that appropriate personnel understand safe fertilizer transport, storage, and disposal practices.

2.3 Provide training for all personnel on what to do in case of a fertilizer spill.

Management Goal 3. Provide organized training sessions for personnel in runoff management in a language that personnel clearly understand.

Management Practices to Meet Goal 3.

3.1 Ensure that all appropriate employees receive training in runoff management and all applicable regulations. All growing operation employees must understand and implement the required practices for runoff management to be effective.

3.2 Train staff so that they become aware of all drainage conduits and ditches on the property and know where they drain.

3.3 Ensure that all municipal stormwater or sewer system conduits and ditches are stenciled or designated with signs, and that there are no illicit connections to the municipal stormwater or sewer system.

Top Priority Personnel Training Options:

We also recommend prioritizing all personnel training (Sec. D).

E. Record Keeping

This section describes the pieces of information of which growers should keep record. Records allow growers to prove which practices they have implemented in order to reduce their nutrient contribution, in addition to complying with other regulations that require records.

Management Goal 1. Maintain records of all nursery practices and data.

Management Practices to Meet Goal 1.

1.1 Maintain records of fertilizer use. These may be required by regulatory agencies and are useful in obtaining permits or conditional waivers for agricultural discharge. Records can help you make informed decisions regarding fertilizer management.

1.2 Maintain records of runoff water quality for at least 5 years.

1.3 Implement and maintain a record-keeping system for documenting management practices addressing runoff management. Record-keeping may be required by some regulating authorities.

1.4 Maintain records of all personnel training for at least 5 years. Records should include when training occurred, who led the training, who participated, and what information was covered.

Top Priority Record Keeping Management Options:

We also recommend prioritizing all record keeping (Sec. E).

Chapter 3: Management for Residents and Animal Owners

Introduction

The Rainbow Creek watershed is for the most part sparsely populated, but certain areas in the watershed have a high density of residences and businesses. Homes and offices can contribute nitrogen and phosphorus to the creek through the use of septic tank disposal systems and through landscape irrigation and fertilization. In addition, animal ownership in the area, which mostly consists of hobby horses and some goats and fowl, can contribute nutrients from runoff of manure and used bedding, either directly or through contaminated water.

The Rainbow Creek TMDL estimates the nutrient load from residential sources by multiplying established loads from comparable regions by the area of land used for residences. These estimations show that residential sources contribute 17% of the annual nitrogen load from land uses in Rainbow Creek and 32% of the annual phosphorus load. In order to comply with the TMDL, residential areas in Rainbow Creek are required to make a77% reduction in their nitrogen contribution, from 650 to 149 kg N/yr, and a 90% reduction in their phosphorus contribution, from 125 to 12 kg P/yr. Septic tanks systems as a whole are also required to make a 77% reduction in nitrogen contribution, from 200 to 46 kg N/yr.

The following management options were developed to help home, business, and animal owners work toward compliance with the TMDL by choosing those options that make the most sense for them. First, we will list the management options we consider to be priorities based on effectiveness, cost and ease of implementation.

A. Septic System Management Goals and Management Practices

The first section addresses septic system design and management as a way of reducing the nutrient contribution from residences and offices. It describes the proper design and maintenance required to help minimize the risk of damage to the septic system, which can result in added nutrient contribution.

Management Goal 1. Design/retrofit your septic system to fit your household's or staff's needs and maintain the system with inspection and pumping.

Management Practices to Meet Goal 1.

1.1 Ensure you are using the appropriate size and type of septic system, whether through new design or upgrade, for your household and your volume of water and solids.

1.2 Do not construct structures, walkways, patios, swimming pools, equipment storage, driveways or parking lots over a leach field to prevent pressure damage and maintain maximum evapotranspiration.

1.3 Divert surface flow away from the leach field to avoid erosion, minimize excess filtration in the leach field and maximize the function of the leach lines.

1.4 Plant only shallow-rooted plants over the leach field. Deep roots of trees and shrubs can cause damage to the system. (Photo #36, p.50)

1.5 Have your system inspected and pumped as recommended, generally every 3 to 5 years. See Appendix 2 for recommended inspection and pumping frequencies (p.41). Keep a record of when and by whom the system was inspected and pumped.

1.6 Keep records of your system size and location of the tank and leach field. Records of systems for houses built after 1975 can be obtained from the Department of Environmental Health.

1.7 Familiarize yourself with the layout of the septic system: tank inlet, tank cover, tank outlet, and leach lines. Any unusual wetness or plant growth might indicate leakage. See Appendix 2 for a diagram and description of septic system (p.41).

Management Goal 2. Use water efficiently to reduce the risk of liquid overload to the system.

Management Practices to Meet Goal 2.

2.1 When renovating, install high-efficiency toilets and showerheads to save water. To save water with a standard toilet, place a plastic milk jug filled with small rocks and tightly capped into the toilet tank, away from any moving parts. The jug will displace the water in the tank and allow the toilet to use less water with each flush.

2.2 Install faucet aerators in the kitchen and bathroom to reduce the volume of water used.

2.3 Turn off faucets when not in use while shaving, brushing teeth, washing dishes, etc.

2.4 Run the dishwasher and clothes washer only when they are full. Avoid running the clothes washer multiple times in one day to give the system time to process the water.

2.5 Fix all leaking faucets and toilets promptly.

Management Goal 3. Avoid discharging any clogging or hazardous materials into the system.

Management Practices to Meet Goal 3.

3.1 Minimize or avoid use of the garbage disposal to reduce the amount of solid matter entering the system.

3.2 Collect grease in a container near the sink rather than pouring it down the drain.

3.3 After scraping plates, use paper towels to finish wiping off food residue such as sauces and oil.

3.4 Do not flush non-degradable items such as diapers, sanitary napkins, kitty litter, paper towels, dental floss, cotton swabs, cigarette butts, coffee grounds, etc. that can clog pipes.

3.5 Do not pour hazardous materials such as household chemicals, gasoline, oil, pesticides, antifreeze or paint down drains. These materials can destroy the biological treatment taking place in the system and can contaminate surface and ground water.

3.6 Do not use commercially sold septic tank additives, which can disrupt the biological processes occurring in the tank.

Top Priority Septic System Management Options:

The following is a list of those options we recommend as priorities based on effectiveness, ease of implementation and cost. Full descriptions of these priority practices can be found in the previous sections indicated by the numbers in parentheses.

- avoid construction over leach field (1.2)
- shallow-rooted plants over leach field (1.4)
- pump septic system regularly (1.5)
- use high-efficiency toilets (2.1)
- use faucet aerators (2.2)
- turn off faucets (2.3)
- run dish/clothes washers only when full (2.4)
- fix leaking faucets and toilets (2.5)
- avoid garbage disposal (3.1)
- collect grease in a jar (3.2)
- do not flush non-degradable items (3.4)
- do not pour hazmats in drain (3.5)

B. Garden Management Goals and Management Practices

The second section addresses garden management practices. These practices encourage the establishment of healthy soil that can retain water and nutrients, the choice of appropriate plants for the climate of Rainbow Creek, and the efficient use of water and nutrients to minimize loss of these landscaping elements from the property.

Management Goal 1. Build and maintain healthy soil.

Management Practices to Meet Goal 1.

1.1 Use soil tests to determine how much nitrogen, phosphorus, potassium, lime, etc your soil already has. If enough of one or more nutrients already exists in your soil, you can avoid adding them artificially. Contact the Mission Resource Conservation District or Cooperative Extension office for soil tests. (Photo #37, p.51)

1.2 Use compost to increase the nutrient absorption capacity and porosity of your soil. Dig or rototill one to three inches of compost into 6 to 12 inches of top soil when you're making new beds. Compost helps sandy soils hold nutrients and water, loosens clay soils and feeds the beneficial soil life so it can feed and protect your plants. Compost can be obtained from garden stores or the county landfill, or you can make your own. See Appendix 3 for helpful online composting resources (p.43). To make your own compost you can use leaves, chopped stalks, flowers and grass, as well as vegetable scraps and coffee grounds from the kitchen. Meats, dairy and oils can attract pests, so should be avoided. Turn your compost every few weeks with a pitchfork to distribute air and moisture. Sprinkle water on your pile in dry weather. Compost is ready when the waste becomes a dark, crumbly material that is uniform in texture. Use the hand-squeeze test: The compost should hold its shape when squeezed but then crumble gently as you open your hand. You can then spread your compost in garden beds, under shrubs, on your lawn, or use it as potting soil. (Photo #38, p.51)

1.3 Avoid placing compost piles near drains or surface waters.

1.4 Spread mulch, a layer of organic material like leaves, aged wood chips, compost or grass clippings around your plants in spring or fall. Never exceed more than three inches of mulch in your landscaping beds, and keep mulch about an inch away from stems and tree trunks. Mulch stabilizes soil temperature, prevents weeds, feeds the soil for healthier plants and helps to conserve water. (Photo #39, p.51)

1.5 When fertilizer is required use slow-release fertilizer. Nutrients are distributed to plants more evenly and slowly, allowing plants to use more of the nutrients provided. Fewer nutrients are therefore unused and able to leave the property as runoff.

1.6 When fertilizing, following fertilizer instructions carefully. Take care to ensure no fertilizer is applied to sidewalks or walkways. Do not fertilize during or directly before rain.

Management Goal 2. Choose appropriate plants for your site.

Management Practices to Meet Goal 2.

2.1 Assess the characteristics of your garden site (soil pH, soil type and sunlight) as well as your desires for the garden (privacy, play area, color) to determine appropriate plants.

2.2 Select plants that grow well in a warm and dry climate and fit the amount of sun, type of soil and water available in your yard. When possible, use low-water plants to save the time and expense of watering and minimize runoff. See Appendix 3 for websites with helpful plant lists (p.43). Think about how big a tree or shrub will be when mature, especially next to your house or driveway and near power lines.

2.3 Choose pest-resistant plants. Many garden centers and nurseries offer information about pest and disease-resistant plant varieties. After they're established, they'll save you time and money on pest control.

Management Goal 3. Water efficiently to conserve water and minimize the amount of water running off the property.

Management Practices to Meet Goal 3.

3.1 Perform an irrigation system review to ensure your system is in working order.

3.2 Perform an irrigation review, consulting published irrigation recommendations, to determine the amount of water required by your plants. Both over- and under-watering can be damaging to plants.

3.3 Use soaker hoses or drip irrigation rather than sprinklers on beds to save water. (Photo #40, p.51)

3.4 Water in the early morning if possible. Water evaporates more readily at midday, and in the evening water is more likely to encourage the growth of mold or plant diseases.

3.5 Use an outdoor water timer to automatically adjust watering to weather conditions.

Top Priority Garden Management Options:

The following is a list of those options we recommend as priorities based on effectiveness, ease of implementation and cost. Full descriptions of these priority practices can be found in the previous sections indicated by the numbers in parentheses.

- use compost (1.2)
- use mulch (1.4)
- use slow-release fertilizer (1.5)
- fertilize carefully (1.6)
- assess garden needs (2.1)
- perform irrigation system review (3.1)
- perform irrigation needs review (3.2)
- use drip irrigation (3.3)
- water in early morning (3.4)
- use an outdoor water timer (3.5)

C. Lawn Management Goals and Management Practices

The third section deals with lawn management practices designed to prevent water and nutrients from leaving the property. Often in Southern California and other areas of dry, warm weather residents choose to landscape with native and low-water-use plants instead of traditional lawn grass. However, if you choose to grow a lawn, these practices can be used to maximize the efficiency of water and fertilizers and to prevent runoff.

Management Goal 1. Water and fertilize lawns carefully and efficiently to avoid runoff.

Management Practices to Meet Goal 1.

1.1 Plant lawns only on relatively level ground with sufficient sun. When planting lawns consult with your local nursery or the UCCE Master Gardeners to determine the best variety for your location. On slopes or shady areas consider planting other ground covers that require less water and maintenance. (Photo #41, p.51)

1.2 Incorporate 6 to 12 inches of compost into the soil for a new lawn. Top dress existing lawns with a quarter- to half-inch of compost every spring or fall to maintain soil nutrients and porosity.

1.3 Sharpen the mower blade frequently to cut the grass blades cleanly and evenly. Dull mower blades leave jagged tips on the grass that will dry out and turn brown, which causes many homeowners to over-water or over-fertilize needlessly.

1.4 Maintain an optimal blade height to keep the lawn healthy.

1.5 Aerate and de-thatch lawns routinely to provide a healthy root system. This practice can lead to more efficient irrigation and fertilizer use by allowing the soil easier access to applied water and nutrients.

1.6 Avoid placing lawn clippings in storm drains or in areas where they are likely to be washed into drains. Clippings can be composted or thrown away.

1.7 Use slow-release fertilizers when necessary to maximize the benefit to plants.

1.8 Water only as much as required by your variety of grass. Avoid over watering your lawn to prevent runoff. (Photo #42, p.51)

1.9 Water in the early morning, if possible, minimize evaporation and growth of mold and plant diseases.

1.10 Ensure that sprinklers do not water sidewalks or other impervious areas. (Photo #42, p.51)

Top Priority Lawn Management Options:

The following is a list of those options we recommend as priorities based on effectiveness, ease of implementation and cost. Full descriptions of these priority practices can be found in the previous sections indicated by the numbers in parentheses.

- use compost (1.2)
- use slow-release fertilizer (1.7)
- water in early morning (1.9)
- avoid watering sidewalks (1.10)

D. Livestock and Pet Management Goals and Management Practices

The fourth section provides management options to prevent the contribution of nutrients by pets and livestock. Animals can contribute nutrients to the creek and groundwater primarily through their waste. These management options help to keep waste and water contaminated with waste from reaching surface and/or ground waters. Practices that address erosion are intended to prevent soil and water contaminated with nutrients from leaving the property and entering waterways.

Management Goal 1. Design and manage property facilities to prevent erosion and contaminated runoff.

Management Practices to Meet Goal 1.

1.1 Locate livestock facilities and conduct activities away from waterways, flood-prone areas and steep hillsides. Address water quality concerns in the design of new facilities and work to upgrade existing facilities.

1.2 Ensure that all new roads are properly designed and permitted to avoid erosion. This may require the submission of an engineering plan, specifications, and an environmental assessment. Soils should be evaluated for erodibility, and excessive slopes should be avoided.

1.3 Ensure that all new horse trails are designed to avoid erosion. Incorporate switchbacks on sloping trails.

1.4 Prior to October 1st, re-blade and repair erosion-prone roads and trails. Make sure they are graded properly to minimize erosion.

1.5 Install erosion control devices such as sandbags, silt fences and straw wattles along erosion-prone roads and trails as temporary measures. If left alone in place, these devices can break down and present a safety hazard. (Photo #43 and #44, p.52)

1.6 Use waterbreaks (waterbars) on property roads with gradients exceeding 8%. These should be properly sized and placed only where water flow has an outlet and diverted water does not flow into septic fields or waterways.

1.7 Use filter strips between roads and waterways to absorb runoff from roads and trap sediment. (Photo #25, p.49)

1.8 Inspect culverts and clean them out prior to October 1st, so that water drains freely during winter rains. (Photo #26, p.49)

1.9 Prevent contaminant-laden dust from traffic and wind erosion by sealing or watering unpaved roads. Ensure that dust control with applied water does not create runoff.

1.10 Use dry cleaning methods, such as sweeping regularly in parking areas and roads to remove dirt and other contaminants that could enter waterways.

Management Goal 2. Limit runoff of livestock waste by containing animals and their waste.

Management Practices to Meet Goal 2.

2.1 Use fencing to restrict livestock access to surface waters and drainage areas. Fencing limits the amount of animal waste reaching these areas, in addition to protecting surface water edges from erosion caused by livestock grazing. (Photo #45, p.52)

2.2 Use barriers such as vegetated filter strips to protect surface waters, hold soil in place and filter runoff water. Buffers can be built around animal holding areas or facilities, and/or along the edge of surface waters. They can also be used to separate animal grazing areas from cropland treated with manure. (Photo #25, p.49)

2.3 Divert rainwater away from animal confinement areas to keep water from picking up wastes.

Management Goal 3. Keep livestock wash water away from surface and ground water.

Management Practices to Meet Goal 3.

3.1 Divert animal wash or cooling water away from surface waters and/or into vegetate filter strips and/or gravel filtration areas to allow for absorption of nutrients and salts.

3.2 Divert animal wash or cooling water away from manure and used bedding stockpiles to prevent water from collecting nutrients and salts.

Management Goal 4. Collect and store livestock waste carefully to prevent runoff of wastes.

Management Practices to Meet Goal 4.

4.1 Utilize animal bedding such as straw or wood shavings in confinement areas to absorb moisture and manure. (Photo #46, p.52)

4.2 Clean animal pens at least twice per week or as needed to prevent build up of wastes.

4.3 Use sheds or dumpsters, located away from surface waters, for storage of waste. Waste can then be incorporated into soil to meet the needs of treated plants or transported out of the watershed for disposal in a landfill.

Management Goal 5. Treat animal wastes to create safe, usable material for fertilization or soil treatment.

Management Practices to Meet Goal 5.

5.1 Compost manure in sheds or open-air stacks to make a humus-like material that can be applied to land as a fertilizer or soil conditioner. Regularly mix or turn the stack to provide air for decomposition of waste solids. Household organic waste can be added to this compost. If spreading a thin layer of horse manure over the top of cropland, use approximately 7 tons/acre. If incorporating into the soil use between 5 and 6 tons/acre to distribute 80 lb N/acre. (Photo #13, p.47)

Management Goal 6. Collect and dispose of household pet waste properly to avoid contribution to surface or groundwater nutrient levels.

Management Practices to Meet Goal 6.

6.1 Collect pet wastes from yard and pet walking areas daily and dispose of in trash. (Photo #47, p.52)

6.2 Do not compost pet wastes to prevent transmission of parasites.

6.3 Dispose of used kitty litter in the trash as opposed to flushing down the toilet.

***Top Priority Animal Management Options**:*

The following is a list of those options we recommend as priorities based on effectiveness, ease of implementation and cost. Full descriptions of these priority practices can be found in the previous sections indicated by the numbers in parentheses.

- inspect/clean culverts (1.8)
- divert wash water into barriers (3.1)
- div. water away from manure/bedding (3.2)
- clean pens 2 times/week or as needed (4.2)
- store dry wastes in sheds (4.3)
- collect pet waste and dispose in trash (6.1)
- do not compost dog and cat waste (6.2)
- put kitty litter in trash (6.3)

Chapter 4: Common Pollution Prevention Management Options

Introduction

The section illustrates further ways all those working and/or living in the Rainbow Creek watershed can reduce their nutrient contribution from areas such as roads, walkways, vehicles and restrooms. These management options apply to all types of development, commercial and residential, in the watershed.

Management Goal 1. Ensure that all non-production areas do not contribute to dry or wet weather runoff. These include walkways, driveways, packing areas, loading areas and parking areas.

Management Practices to Meet Goal 1.

1.1 Clean indoor walkways, loading areas, and packing areas using only "dry" methods (such as sweeping, dry absorbents) or if wet cleaned, ensure that wash- and rinse-water remain on the property. These areas may contain fertilizers, pesticides and vehicle fluids that could contaminate surface or groundwater.

1.2 Periodically clean outdoor driveways, walkways, parking areas, loading areas, and packing areas to remove debris, vehicle residues, and other contaminants and prevent them from washing off during wet weather. Use only "dry" methods (such as sweeping, dry absorbents) or if wet cleaned, ensure that wash- and rinse-water remain on the property.

Management Goal 2. Maintain vehicles, trucks and tractors and their storage areas so that they do not leak fluids into ground or surface waters.

Management Practices to Meet Goal 2.

2.1 Regularly maintain vehicles, trucks, and tractors used in the operation to detect and prevent fluid leaks that are very toxic to the environment.

2.2 Take vehicles to a car wash, or ensure that wash runoff from vehicles, trucks, and tractors remains on the property and does not drain into the municipal stormwater or sewer system, or leach into groundwater.

2.3 Properly dispose of collected fluids. (Photo #48, p.52)

2.4 Whenever possible, remove vehicles, equipment, and storage tanks that are no longer used on the property.

2.5 Drain and properly dispose of fluids from vehicles and equipment in long-term storage.

2.6 Locate maintenance and storage areas for vehicles, trucks, and tractors where wet weather will not wash fluids into surface water or cause them to percolate into groundwater.

2.7 Clean maintenance and storage areas to avoid oil and grease buildup.

2.8 Immediately and properly clean up spills from vehicles, trucks and tractors.

Management Goal 3. Locate and maintain fuel tanks so that they do not leak, spill, overflow, or leach into ground or surface water.

Management Practices to Meet Goal 3.

3.1 Locate fuel tanks where wet weather will not wash fluids into surface water or cause them to percolate into groundwater.

3.2 Check and maintain fuel tanks to prevent leaks.

3.3 Perform fueling activities carefully to avoid overflow and spills.

3.4 Immediately and properly clean up fuel spills.

Management Goal 4. Keep the property free of green waste, construction debris and trash so that it does not clog storm drains and create an unsightly mess in waterways and on beaches.

Management Practices to Meet Goal 4.

4.1 Regularly maintain the entire property to keep it clean and free of debris. Solid waste and debris can cause fatalities for marine life through strangling or ingestion.

4.2 Ensure that an adequate number of waste containers are available where needed and that they are regularly collected to avoid overflow.

4.3 Ensure that waste containers are kept in good condition and kept closed.

4.4 Ensure that waste containers, collection areas, storage areas, and stockpile areas are located indoors or covered when outdoors to prevent wet weather or wind from washing or blowing trash into storm drains and waterways.

4.5 Dispose of green waste in designated green waste receptacles or compost in a contained compost pile or bin.

Management Goal 5. Maintain restrooms to avoid spills and leakage of fecal coliform from human waste into the municipal stormwater or sewer system. Fecal coliform at high levels causes beach closures and poses serious human and animal health hazards.

Management Practices to Meet Goal 5.

5.1 Ensure that adequate restrooms and portable toilets are available where needed. Providing restrooms prevents human waste from contributing nutrients to the soil or water of the property. In addition, restrooms are required in work places by the Department of Labor's Occupational Safety and Health Standards.

5.2 Ensure that toilets, floor, and sink drains in restrooms are properly hooked up to the sanitary sewer system.

5.3 Ensure that portable toilets are located where wet weather will not wash waste into the municipal stormwater system and where vehicles will not knock them over.

5.4 Ensure that restrooms and portable toilets are regularly maintained to prevent sewage and human waste from entering the municipal stormwater systems.

Management Goal 6. Provide organized training sessions in waste, sanitation, and spill management for all personnel in a language that they clearly understand, and maintain records documenting training.

Management Practices to Meet Goal 6.

6.1 Ensure that all employees receive training in proper waste disposal and use of restrooms/portable toilets.

6.2 All employees should be trained on what to do in the event of a spill.

6.3 Educate and require your employees to recycle all the waste that you can from your nursery operation, such as metal, oil, paper, and plastic.

6.4 Educate employees in the proper disposal of batteries, paints, and other potentially hazardous materials used.

6.5 Document and maintain records of employee training for at least five years. Record-keeping helps to document waste, sanitation, and spill management practices and is required by some regulating authorities.

Appendix 1: Nitrogen and Phosphorus Reductions Required by the TMDL

The TMDL report outlines required nutrient reductions over a 16-year period beginning 2005. These initial estimates were developed by the California Regional Water Quality Control Board, San Diego Region. These are based on available land use models and are calculated by multiplying the acreage of land in a particular use in 2000 by an appropriate nutrient export coefficient obtained from literature studies. These reductions will serve as targets with which to begin the process of reducing nutrient levels in Rainbow Creek. The TMDL includes provisions for re-evaluating the nutrient reduction targets at regular intervals as the program is implemented and new data becomes available. The following tables summarize the required percent reductions and the current and final target amounts of each nutrient in kilograms per year.

Required Reduction in Nitrogen

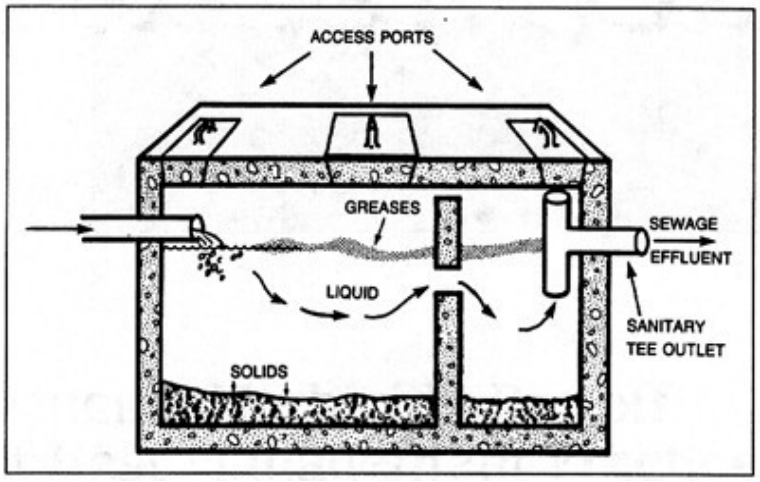
Source	% Required Reduction	Current kg N/yr	Target kg N/yr
Commercial Nurseries	77	507	116
Agricultural Fields	77	655	151
Orchards	77	790	182
Residential Areas	77	650	149

Required Reduction in Phosphorus

Source	% Required Reduction	Current kg P/yr	Target kg P/yr
Commercial Nurseries	89	27.4	3
Agricultural Fields	89	35.4	4
Orchards	90	63	6
Residential Areas	90	125	12

Appendix 2: Septic System Diagrams and Tables

Cross Sectional Diagram of Typical Septic Tank



There are two main parts to the basic septic system: the septic tank and the drain field. Household wastewater first flows into the septic tank where it should stay for at least a day. In the tank, heavy solids in the wastewater settle to the bottom forming a layer of sludge, and grease and light solids float to the top forming a layer of scum. The sludge and scum remain in the tank where naturally occurring bacteria work to break them down. The bacteria cannot completely break down all of the sludge and scum, however, and this is why septic tanks need to be pumped periodically. The separated wastewater in the middle layer of the tank is pushed out into the drain field as more wastewater enters the septic tank from the house. If too much water is flushed into the septic tank in a short period of time, the wastewater flows out of the tank before it has had time to separate. This can happen on days when water use is unusually high, or more often if the septic tank is too small for the needs of the household.

Homeowners should stagger their laundry throughout the week and try to do no more than two wash loads per day. When wastewater leaves a septic tank too soon, solids can be carried with it to the drain field. Drain fields provide additional treatment for the wastewater by allowing it to trickle from a series of perforated pipes, through a layer of gravel, and down through the soil. The soil acts as a natural filter and contains organisms that help treat the waste. Solids damage the drain field by clogging the small holes in the drain field pipes, and excess water strains the system unnecessarily. Conventional septic systems are a very simple way to treat household wastewater. They contain no moving parts and are easy to operate and maintain. Although homeowners must take a more active role in maintaining septic systems, once they learn how their systems work, it is easy for them to appreciate the importance of a few sound operation and maintenance practices.

Recommended Septic Tank Pumping Frequencies (in years)

Household Size (Number of Occupants)										
	1	2	3	4	5	6	7	8	9	10
Tank Size (gal)*										
1000	12.4	5.9	3.7	2.6	2.0	1.5	1.2	1.0	0.8	0.7
1250	15.6	7.5	4.8	3.4	2.6	2.0	1.7	1.4	1.2	1.0
1500	18.9	9.1	5.9	4.2	3.3	2.6	2.1	1.8	1.5	1.3
2000	25.4	12.4	8.0	5.9	4.5	3.7	3.1	2.6	2.2	2.0

* Septic Tank minimum size requirements

1000 gallons for 1-3 bedrooms

1250 gallons for 4 bedrooms

1500 gallons for 5-6 bedrooms

Appendix 3: Helpful Online Resources

General:

University of California Cooperative Extension
http://cesandiego.ucanr.edu/

The UC Cooperative Extension, a branch of the UC Division of Agriculture and Natural Resources, employs farm, 4-H, and nutrition, family and consumer sciences advisers throughout the state to research and provide public education on these topics.

Master Gardener Association
http://www.mastergardenerssandiego.org/

The Master Gardeners are a branch of the University of California Cooperative Extension. They are over 100 trained volunteers who provide free home gardening and pest control advice in the county.

United States Department of Agriculture
http://www.usda.gov

The USDA is the federal department devoted to issues of food, agriculture, and natural resources. It oversees federal farm policies such as the Farm Bill, and also has departments in each state.

Natural Resources Conservation Service
http://www.nrcs.usda.gov

The NRCS is the division of the US Department of Agriculture dedicated to helping private landowners and operators in the conservation of natural resources.

Mission Resource Conservation District
http://www.missionrcd.org

The MRCD is a unit of state government that disseminates information on natural resource conservation issues, agricultural advice, and environmental quality/wildlife concerns. This website provides advice for growers and residents of the area. In addition, MRCD can be contacted for irrigation water and soil tests.

County of San Diego
http://www.co.san-diego.ca.us/

Use this website to access all County of San Diego projects, departments and resources.

County of San Diego Agriculture, Weights and Measures
http://www.sdcounty.ca.gov/awm/

This site links to all agriculturally related programs in the County of San Diego.

San Diego Regional Water Quality Control Board
http://www.waterboards.ca.gov/sandiego/

The RWQCB works to "preserve, enhance and restore" the quality of regional water bodies. This site links to all RWQCB programs and regulations.

Project Clean Water
www.projectcleanwater.org

Project Clean Water is an organization that provides a forum for interested parties to identify, become educated, discuss, and find consensus on relevant water issues in the San Diego Region.

Water Smart - San Diego County Water Authority
http://www.watersmartsd.org/
This site is operated by the San Diego County Water Authority and can be used as a point location for drought and water conservation information and programs

Composting:

How to Compost
http://www.howtocompost.org

This site provides a large amount of information on composting from small to large scale.

Cornell Composting
http://cwmi.css.cornell.edu/composting.htm

This site is operated by the Cornell University Waste Management Institute and provides information on the science and practice of composting.

Solana Center for Environmental Innovation
http://www.solanacenter.org/composting

This site is the composting page of the site of the Solana Center, a private nonprofit organization located in San Diego County. The composting page includes a downloadable "Guide to Backyard Composting," among other useful information.

Low Water-Use Plants:

The Water Conservation Garden Low Water-Use Plants List
http://thegarden.org/learn/landscape-and-garden-resources/

This website contains both a “nifty 50” short list for convenience as well as longer lists of plants.

San Marcos Growers Low Water-Use Plants List
http://www.smgrowers.com/products/plants/region_list.asp?region_id=19&page=1

This site from the San Marcos Growers in Santa Barbara provides an extensive list of low water use plants

Appendix 4: Photographs

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Photo 9: CIMIS weather monitoring, p. 8

Photo 10: Automatic watering clocks, p. 8

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Photo 12: Soil/growing media testing, p. 9

Photo 13: Thoroughly-composted compost, p. 10

Photo 14: Top-dress fertilizer in pot, p. 10

Photo 15: Fertilizer storage container, p. 11

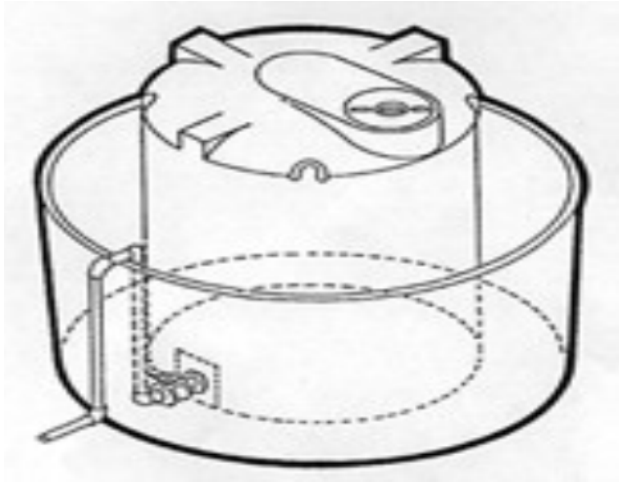

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Photo 19: Grass-lined channel, p. 13

Photo 20: Drainage channel with water-loving plants, p. 13

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Photo 22: Windbreaks to control erosion, p. 13

Photo 23: Terraced hills, p. 14

Photo 24: Berm, p. 14

Photo 25: Filterstrip next to waterway, p. 14

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Photo 48: Vehicle oil disposal, p. 37

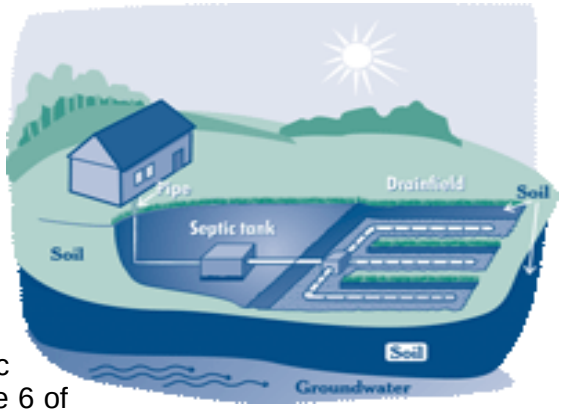
County of San Diego

Department of Environmental Health
Land and Water Quality Division
www.sdcdeh.org

San Diego Office
5500 Overland Avenue, Ste. 210
San Diego, CA 92123
(858) 565-5173

San Marcos Office
151 E. Carmel Street
San Marcos, CA 92078
(760) 471-0730

Onsite Wastewater Treatment Systems
(Septic Systems)
Permitting Process and Design Criteria



This document describes how onsite wastewater treatment systems (OWTS) are reviewed and permits issued in San Diego County. The document also summarizes key design criteria for these systems. This document relies on and should be read together with the County's "Onsite Wastewater System Groundwater Policy."

Persons seeking OWTS permits from the County should also review Chapter 3 [Septic Tanks and Seepage Pits] of Division 8 of Title 6 of the County Code of Regulatory Ordinances (County Code sections 68.301 et seq.), and applicable grading, building, and land use rules for the relevant municipal jurisdiction.

State, County, and City Roles

State / County Coordination

Onsite wastewater treatment systems discharge pollutants to groundwater, and therefore are regulated by the State Water Code. Water Code section 13282, allows Regional Water Quality Control Boards (RWQCB) to authorize a local public agency to issue permits for and to regulate OWTS "to ensure that systems are adequately designed, located, sized, spaced, constructed and maintained." The RWQCB, with jurisdiction over San Diego County authorizes the County of San Diego (County), Department of Environmental Health (DEH) to issue certain OWTS permits throughout the county including within incorporated cities. No city within San Diego County is authorized to issue these permits.

The RWQCB has imposed conditions and restrictions on the County's permit program. The County is authorized to issue permits for conventional OWTS, e.g., for septic tank and leach line and seepage pit systems anywhere in the County. The County can issue permits for mound systems in the Valley Center area only. The County is not authorized at present to issue permits for any other kind of unconventional OWTS that will have a

subsurface discharge, unless no other option is available as a repair to an existing dwelling. The County is considering seeking such authorization. However, at present, persons seeking discharge permits for types of OWTS that the County is not authorized to permit must apply directly to the RWQCB for a state permit.

The DEH enforces the RWQCB, Region 9, requirements of maintaining at least a five-foot separation between the bottom of the OWTS disposal point and the highest anticipated groundwater level. Projects within the Colorado Regional Water Quality Control Board, Region 7, located east of the coastal mountains (desert), are subject to greater separation requirements, due to the extreme permeability and transmissibility of some desert basin soils.

The goal of DEH's OWTS program is to ensure that installed onsite sewage disposal systems will last the life of the dwellings they serve, and not cause any public exposure to surfacing sewage or any contamination of groundwater or surface waters. The County concurs with the RWQCB that the separation requirements the RWQCB has imposed are appropriate minimum requirements necessary to protect groundwater quality and public health whenever septic tanks and leach lines or seepage pits are used as an OWTS. These requirements are a condition of the State's authorization for the County to issue OWTS permits locally. These restrictions cannot be modified by the County on a case-by-case basis, and must be rigorously implemented. The County's "Onsite Wastewater System Groundwater Policy" describes in detail how the County ensures that these State-imposed requirements are met.

County DEH / Local Land Use Agency Coordination

County DEH OWTS review procedures provide documents that applicants may need to take to land use agencies to secure other required local permits. County DEH also reviews plans submitted to these agencies to ensure that an OWTS will match up with the project to be constructed. The fundamental point that persons seeking OWTS permits must remember is that the County DEH OWTS permit process and local (including County) land use approval and permitting processes *are separate processes*. While they are coordinated to some extent, a County DEH OWTS permit or related approval is *never* a substitute for a required local grading, land use or building permit. Similarly, no local land use approval or permit (e.g., approval of a subdivision map or lot split or boundary adjustment, even after preliminary septic system review by DEH), is a substitute for a County DEH OWTS permit, or a guarantee that such a permit can be issued.

System Design Considerations

The most common type of OWTS found in San Diego County consists of a septic tank connected to leach lines. Variations of this system may include a septic tank connected to either a horizontal or vertical seepage pit. In some applications, the disposal field is at a higher elevation than the building site. In this instance, a pressure-system is used to deliver the sewage to a standard disposal field were it is distributed by gravity flow. All of these examples would be considered a "conventional" onsite wastewater system because no further sewage treatment is performed between the septic tank and the disposal field. In all cases, the sewage effluent is discharged below the ground surface, and is digested by bacteria in unsaturated soil zones for treatment of the sewage underground. These systems are designed to operate in all weather conditions with minimal maintenance, other than periodic septic tank pumping to remove sludge from the septic tank.

The size and type of OWTS needed for a particular building project will be a function of the following factors:

Soil Permeability: Permeability determines the degree to which soil can accept sewage discharge over a period of time. Permeability is measured by percolation rate, in minutes per inch (MPI).

Unsaturated Soil Interval: The distances between the bottom of the OWTS leach field trenches and the highest anticipated groundwater level or the shallowest impervious subsurface layer at a site.

Peak Daily Flow: The anticipated peak sewage flow in gallons per day. In many cases the number of bedrooms for a proposed home is used as an indicator of peak daily flow.

Net Usable Land Area: The area available that meets all setback requirements to structures, easements, watercourses, or other geologic limiting factors for the design of an OWTS

Some sites are not acceptable for conventional OWTS based on low soil permeability, regardless of the unsaturated soil interval available at the site.

All conventional OWTS in San Diego will require at least 5 feet of unsaturated soil between the bottom of the sewage disposal system and the highest anticipated groundwater level for the site. Depth to groundwater varies tremendously with the amount of rainfall for many areas in San Diego County. Therefore, the highest anticipated groundwater levels must be established for any OWTS design in order to meet this separation requirement. Details are provided in the County's "Onsite Wastewater System Groundwater Policy."

At sites affected by a shallow impervious layer of rock or clay, a minimum five-foot unsaturated soil interval is required between the bottom of the disposal system and the shallowest impervious layer.

The net useable land area required for an OWTS will usually depend primarily on soil permeability and peak daily flow. Details on set back requirements and net useable land areas requirements are provided below.

The Permit Process

"Certifications" are Not OWTS Permits

The process for obtaining an OWTS permit for development on a legal lot in the County of San Diego is described in this section. This process must be completed even if a lot has previously been "certified" by the County for a septic system. Typically, any such prior certification will be noted in land use records, e.g., through a map or plan notation that the lot is "approved" or "certified" for a septic system, or in a separate County-issued "certificate of compliance". These notes and certificates may also state conditions for an acceptable OWTS, such as a minimum required leach line length. *No matter how detailed and final they appear to be, these map and plan notations and certificates of*

compliance are not OWTS permits, and they do not assure that an OWTS permit can be issued.

There are several reasons that prior County certifications as part of the land use process do not ensure that an OWTS permit will be issued. First, County DEH can only issue OWTS permits as authorized by the RWQCB. That authorization requires completion of the kind of process described in this section. Second, site characterization work and analysis performed to support prior County certifications may have been the best that could have been done at the time (e.g., in a period of below normal rainfall), but may nevertheless be inadequate to support an OWTS permit. Third, new information may have come to light since a certification was issued, due to measurements taken on or near the site under different rainfall conditions. This is more likely to be the case for older certifications. Fourth, these certifications are not based on detailed project and OWTS designs and layout plans. Certification of a lot for a septic system is not the same thing as approval of a specific system, at a specific location, for a specific project, on that lot. Finally, these certifications provide no legal entitlement. Even if a certification was construed as a permit to construct an OWTS, that permit would expire after one year unless the system was actually constructed, inspected, and given final approval.

Certifications, while not a guarantee that an OWTS permit will be issued, may still be relevant at many sites. This is more likely when the information relied on for the certification is recent, of high quality, and was collected during a normal average rainfall year.

Steps in the Permitting Process

The County DEH OWTS permitting process includes the steps set out below:

1. If a percolation test is needed, the applicant must submit a percolation test and design as performed by a registered civil engineer, registered geologist or registered environmental health specialist, certified by DEH for testing within San Diego County, for County DEH approval. The certification process for design consultants is an orientation process provided by staff to the industry of the Department's design criteria. In some cases, a new percolation test may not be needed, e.g., if the County certified a prior test during the subdivision or lot split process, and more recent information raises no new concerns or issues.

   A percolation test may be required when:

   - No previous County DEH certification was provided for the lot or parcel;
   - The previous certification was issued without a percolation test;
   - Grading or other soil disturbance has occurred in the proposed septic system location;
   - The system is being shifted out of the previously tested area; or
   - A disposal system other than the system previously considered is being proposed.

   DEH approval of a percolation test design expires after one year, however the test data remains valid and may be used later to design and size an OWTS for a project.

Note: Grading or clearing of brush for the purposes of completing a percolation test must be approved by the Department of Planning and Land Use and requires the implementation of stormwater best management practices.

2. With percolation test data and other data in hand, the applicant must develop and submit a Layout Design for the proposed building project and specific OWTS, for County DEH review. The Layout Design must take percolation test data and this guidance into account. See below, "The Layout Design" for additional information on submission requirements.

3. After review, if it appears likely that the proposed OWTS can be permitted at the site, County DEH will provide an approval for the Layout Design. The County may require additional testing before providing this approval. In some cases, this additional testing will include depth to groundwater measurements during a normal average rainfall year. This may delay County DEH approval for a year or more. In some cases, DEH may conclude that a conventional OWTS cannot be safely used on the lot. Because of the potential for delays or disapproval, DEH recommends that applicants submit a Layout Design and obtain an approval **before** incurring costs for detailed building plans and architectural fees.

   The approved layout will state whether a field check of completed grading by County DEH is required. The Approval Sheet expires after one year.

4. Typically, local land use agencies will require submission of the DEH Approval Sheet before any grading or building permits are issued.

   Some projects will require local grading permits and some will not. Requirements for grading permits in the unincorporated area of the County are discussed briefly below. *Approved layouts and OWTS permits are not grading permits.*

5. Before a permit to construct the OWTS can be issued, the applicant must provide County DEH proof that a potable water supply is available for the project. Potable water in this context is water that meets bacteriological and nitrate water quality standards as defined in the California Safe Drinking Water Act for a private residence. In some situations, additional water quality testing may be required.

6. Building plans, bearing the appropriate stamp which documents plan submittal to the local land use agency, must be submitted to County DEH. The plans need not be approved by the local land use agency before being submitted to County DEH, but any significant plan amendments should be provided to DEH. County DEH will review these plans to ensure that they correspond to the project described in the approved Layout Design.

7. If the local land use agency does not require a grading permit, and the requirements set out above have been met, a permit to construct the OWTS will be issued. This permit expires after one year.

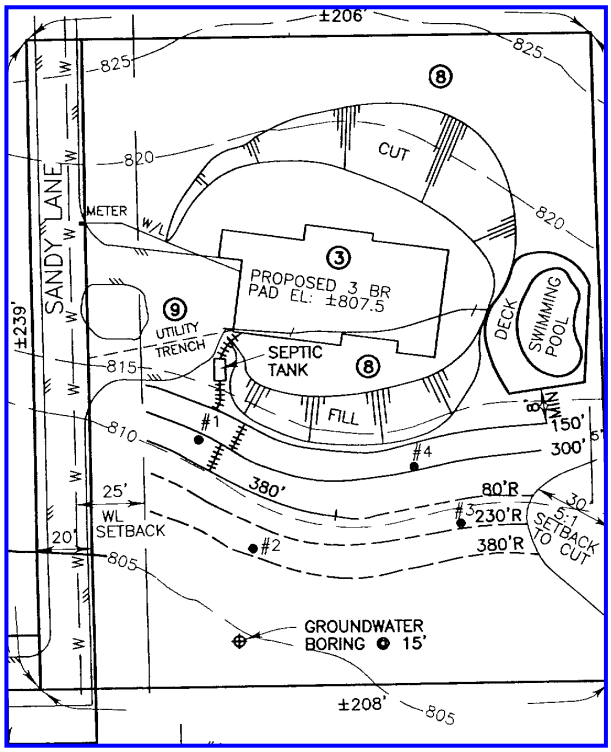
8. If the local land use agency requires submission of a grading plan, and that plan was not submitted to DEH with the Layout Design, the grading plan must be submitted to DEH for review and approval before grading actually begins. DEH will review the grading plan to verify that it is in agreement with the approved Layout Design.

9. If the Approval Sheet for the Layout Design indicates that a field check of complete grading is required, that field check must be completed before a permit to construct the OWTS is issued. If the completed grading is checked and corresponds to the approved layout and the other requirements above have been met, a permit to construct the OWTS will be issued. This permit expires after one year.

10. Once the permit to construct the OWTS, has been obtained, the OWTS can be installed. The system must be inspected by County DEH before the system is backfilled. If that inspection is satisfactory, DEH will sign off on ("final") the OWTS permit (Occasionally, DEH will hold final approval on the OWTS permit pending specific conditions to be met.).

11. In the unincorporated parts of the County, if a building permit relies on an OWTS, County land use agencies will require DEH approval of a layout design and a valid permit to construct the OWTS before building plans are approved or a building permit is issued. Other local land use agencies also typically require that a permit to construct the OWTS be issued before building plans will be approved or a building permit issued.

12. Local land use agencies typically require that the OWTS inspection be completed and the OWTS permit be made final by DEH before occupancy permits are issued.



The Layout Design

A layout design of the proposed building construction and onsite wastewater system is required. This drawing should be prepared using standard engineer's scale on 81/2" x 11" or 11"X17"size paper. The basis for the OWTS design will be from percolation testing data and/or conditions of approval from a recorded subdivision map, parcel map, boundary adjustment, or certificate of compliance. The size of the onsite wastewater system is a function of the number of bedrooms or dwellings and the percolation rate of the soil on the site.

The layout design should contain the following information:

- Site Address;
- Tax Assessor's Parcel Number;
- Owner's Name, mailing address, and phone number;
- Consultant's name, mailing address, and phone number;
- Type of proposed construction (number of bedrooms for home);
- Number of existing or proposed bedrooms;

- Purpose of project (e.g. new dwelling, new structure, guesthouse, an addition, etc.) Specify scope of work;
- Legal Basis of parcel (map and lot number);
- Vicinity Map, Scale, North arrow, Thomas Bros. Map coordinates;
- Property Lines and lot dimensions;
- Topographical lines and elevation points (pad, floor, top leach line, etc);
- Percent slope and direction of fall;
- Proposed OWTS design detail;
- Proposed grading with 5:1 setbacks shown along with any impacts to the site and/or adjacent property. Include energy dissipaters for pad drainage;
- All known, recorded easements on or within 20 feet of lot boundaries (open-space, utility, road, waterline, etc.);
- Identify source of potable water;
- Location of all public waterlines on or within 20 feet of property and signed water line statement;
- Location of all wells on or within 150 feet of property;
- Any soils testing information, such as deep borings or percolation tests, plotted on the design.

The layout or percolation test design approval is valid for one year. The soils testing data does not expire and will be valid in the use of the system design, unless site conditions change. If a site review reveals any evidence of groundwater changes, including but not limited to; plant growth, ponding water, new information on adjacent lots or OWTS failures in the area, additional groundwater test borings may be required. DEH staff will specify the depth and the locations of the additional test borings in consultation with project environmental health specialists, engineers and/or geologists.

- If groundwater is observed in the borings and/or DEH has reason to believe that groundwater could rise to an unacceptable level (within 5 feet of the disposal point) during the course of a normal rainfall season, a permit will not be issued and monitoring may be required. Monitoring must be conducted during the course of a normal rainfall year when full groundwater recharge has occurred.

- The environmental health specialist, engineer or geologist must support their express conclusion that the highest historic groundwater elevation will not encroach upon the 5-foot minimum separation from the bottom of the proposed OWTS. The supporting data shall include, but not be limited to, data on the sites topography, soils, geology, basin studies, hydro geologic studies, and groundwater-monitoring data from the onsite and off site observation wells through a normal rainfall year. [1]

Information on the layout shall also include the septic certification found in one of the following documents: Recorded Map, Parcel Map, Division of Land Plat, Boundary Adjustment, Certificate of Compliance, approved Percolation Test or a Layout with a waiver of percolation testing. ***The certification provided on the legal description does not ensure the lot can be approved for development based on the use of an onsite wastewater system. It only provides a basis on which to size the onsite wastewater system.*** A previously approved, valid layout must reflect the current proposed development of the parcel including dwelling size and location, grading and any recent off-site impacts that may affect septic system siting; otherwise, a field review will be required.

[1] For more information in regards to groundwater see DEH Onsite Wastewater System Groundwater Policy

Primary and Reserve Area Requirements

In addition to primary system design criteria, all OWTS design proposals, for both new construction and additions to an existing structure, must show 100% reserve area for the active OWTS unless the percolation rates require more than 100% reserve area. Refer to the leach line footage charts on accompanying pages.

1 to 60 MPI:	100% Reserve Area	no minimum lot size for existing lots
61 to 90 MPI:	200% Reserve Area	3.0 acre minimum lot size required
91 to 120 MPI:	300% Reserve Area	5.0 acre minimum lot size required

Percolation rates in excess of 120 minutes per inch demonstrate impermeable soil that should not be considered suitable for an OWTS, as this will have a high probability of premature failure.

Any parcels once certified with reserve area smaller than the current standards must meet current design standards.

Septic Tank Sizing Requirements for One Dwelling

DEH recommends that you always size your septic system to accommodate one additional bedroom and that a septic tank effluent filter be installed on the outlet side of the septic tank. The minimum size septic tank is 1,000 gallons for 1 to 3 bedrooms, 1,200 gallons for 4 bedrooms and 1,500 gallons for 5 or 6 bedrooms. This does not apply to second dwellings, which may require an additional septic tank and separate leach field. The layout approval is the approval of the design for the onsite wastewater system and is *not* the permit for the installation.

Second Dwelling Septic Tank Sizing

Since each dwelling can have a kitchen with a dishwasher and garbage disposal, along with a laundry facility, second dwellings are not comparable to an additional bedroom when calculating the size of an OWTS. If a common system is used for both the main house and the second dwelling, the tank size must be calculated as separate flows for each dwelling, even if a common septic tank is used.

The requirements will be as follows:

Main Dwelling	Second Dwelling	Minimum Tank Size
1 BR	1 BR	1000 Gallons
2 BR	1 BR	1200 Gallons
2 BR	2 BR	1500 Gallons
3 BR	1 BR	1500 Gallons
3 BR	2 BR	1500 Gallons
4 BR	1 BR	1500 Gallons
4 BR	2 BR	2000 Gallons

Dwellings that have more bedrooms than the above will require a design with oversized or a battery-type tank, if a common system is being proposed. Separate tanks for each dwelling could be used even if connected to a common disposal field.

Setbacks

Setbacks in layout designs refer to the required spacing in distance from components of the sewage disposal system and to structures, property lines, easements, watercourses, wells, or grading. Specific setback requirements will vary based on the type of system design and site conditions. These are:

System Component	Setback To:	Minimum Distance
Septic Tank	Structure	5 feet
Septic Tank	Property Line	5 feet
Septic Tank	Water Well	100 feet
Leach Lines	Structure	8 feet
Leach Lines	Property Line	5 feet
Leach Lines	Water Lines (Public)	25 feet from edge of easement [1]
Leach Lines	Water Well	100 feet [2]
Leach Lines	Drainage Course	50 feet from top of bank
Leach Lines	Flowing Stream	100 feet from top of bank
Leach Lines	Pond	100 feet from spillway elev.
Leach Lines	Domestic Water Supply Reservoir	200 feet from the high water line [3]
Leach Lines	Aqueduct	100 feet from edge of easement [4]
Leach Lines	Road Easements	8 feet from edge of ultimate easement width [5]
Leach Lines	Cut Slopes	5:1 Setback from top of cut slope [6]
Leach Lines	Septic Tank	5 feet
Leach Lines	Leach Lines	10 feet
Leach Lines	Seepage Pits	15 feet
Seepage Pits	Structure	10 feet
Seepage Pits	Property Line	10 feet
Seepage Pits	Water Lines (Public)	25 feet from edge of easement [1]
Seepage Pits	Water Well	150 feet [2]
Seepage Pits	Drainage Course	50 feet from top of bank
Seepage Pits	Flowing Stream	100 feet from top of bank
Seepage Pits	Pond	100 feet from spillway elev.
Seepage Pits	Domestic Water Supply Reservoir	200 feet from the high water line [3]
Seepage Pits	Aqueduct	100 feet from edge of easement [4]
Seepage Pits	Road Easements	10 feet from edge of ultimate easement width [5]
Seepage Pits	Cut Slopes	5:1 Setback from top of cut slope [6]
Seepage Pits	Septic Tank	5 feet
Seepage Pits	Seepage Pits	20 feet

1. The setback to a domestic water line may increase if the 5:1 setback of the utility trench depth exceeds the 25-ft setback.
2. The minimum setback may be increased if site conditions show the minimum setback is insufficient to protect groundwater supplies.
3. The State Department of Public Health revised their setback criteria to reservoirs and this setback reflects the current recommendation.
4. Any reduction in the Aqueduct setback requires approval from the San Diego County Water Authority or other purveyor, if another district.

5. The setback may increase if the 5:1 setbacks to road cuts are greater than the minimum setback.
6. No part of an onsite wastewater system, with the exception of a septic tank, pump chamber, enclosed filter, or tight sewer pipe, shall be located closer than a 5:1 setback distance to the top of a cut bank, or the edge of an excavation. The horizontal distance would be five times the height of the cut or depth of the excavation. This setback would also be applied to the top of an eroded bank or natural slope in excess of 60%.

Leach Line Linear Footage Requirements

The charts located at the end of this policy show the corresponding length of leach line as a function of percolation rate and the number of bedrooms for a single-family dwelling. *The one-bedroom design lengths correspond to 2nd dwelling systems on a shared system with the main house or its own system.

Seepage Pits

Seepage Pits will require full percolation testing by a licensed civil engineer, registered geologist, or registered environmental health specialist.

- Horizontal seepage pits cannot be used if percolation rates exceed 30 minutes per inch.
- Vertical seepage pits are restricted to coastal sedimentary basins that have saltwater intrusion into the groundwater with TDS levels in excess of 1500 ppm.
- Desert seepage pits are used alluvial areas of the San Diego County desert areas, and percolation testing may be waived.

Grading Plan Review

Upon approval of a layout by DEH, the Specialist will write in the grading line on the approval form indicating whether a field check of completed grading is required prior to issuance of a septic tank permit. Keep in mind that DEH grading approval is not the same as local land use agency grading approval. For the unincorporated parts of the County, some small projects may not require grading permits. For other projects, County land use agencies issue the following kinds of grading permits:

- **Minor Grading**: Processed through the Department of Planning and Land Use (DPLU), Building Division. Please see the Grading Plan Checklist (DPLU: BLDG-009, Rev. 1-99). Phone: (858) 565-5920.

- **Major Grading**: Processed through the Department of Public Works, Land Development Division, Grading Improvements. Please see the Major Grading Plan Checklist. Phone: (858) 694-3281.

Minor and/or major grading plans will be reviewed by DEH prior to grading to determine impacts to the approved onsite wastewater system and adjacent properties. After completion of the grading, the appropriate DEH field office must be contacted to arrange for a field check, unless the field check is waived on the layout approval.

Building Plan Review

The DEH recommends that you obtain approval of your onsite wastewater system prior to expending funds for a final set of architectural plans for your home. Plans for a new or second dwelling must be submitted to the DPLU, Building Division at the Ruffin Road office for processing and approval. Upon approval of the plans, the owner/agent may hand carry the plans to the DEH counter at any of the DEH field offices for a verification of bedrooms and plot plan concurrence with the approved layout. Bedrooms are used to determine the potential occupancy of a dwelling and therefore the potential amount of wastewater that will be generated. Libraries, dens, sewing rooms, recreation rooms and similar rooms may be counted as bedrooms unless the entrance wall is greater than 50% open or other means which eliminate privacy. The presence of a closet is not a determining factor for a bedroom.

GUIDELINES

1. Once the living room, dining room, family room, kitchen, bathrooms, and utility rooms have been established, all other rooms shall be considered as potential sleeping rooms. Dens, libraries, studies, weight rooms, sewing rooms, workshops, etc., shall be determined as bedrooms if they do not conform to the criteria listed below.
2. All other habitable rooms totaling at least seventy (70) square feet in size are to be considered bedrooms suitable for sleeping purposes, regardless of whether or not they contain closets or have access to a bathroom.
3. Rooms that open to a living room, dining room, family room, kitchen, or entry way, and have a single, un-obstructive opening (no doors) with a minimum 50% opening of the total wall space (minimum 6' wide) with archways or other acceptable means shall not be considered as bedrooms, due to the lack of personal privacy presented by the opening.
4. Rooms that can only be accessed through another bedroom are to be considered part of that bedroom, such as master suite and not an additional bedroom.
5. In the case of an ambiguous situation, where it is not clear as to whether or not a room is a bedroom, the plans may be re-reviewed on a case-by-case basis by the area supervisor for the respective district.
6. Any cases, which will require the relocation or modification of doorways, are to be reviewed and approved by the Department of Planning & Land Use to address any structural considerations such as load bearing walls. This is to be done prior to approval or sign-off by the Department of Environmental Health.

Potable Water Supply

DEH will require proof of potable water supply. A public water supply should be confirmed with proof of a service availability letter from the water purveyor. A domestic water well will require proof of potability. A copy of the Well Laboratory Report that indicates the absence of bacteria and nitrate contamination of less than 10 mg/l of Nitrate-N or 45 mg/l of nitrate will be necessary for proof of potability of a private well. The date of the test cannot be more than 1 year old. If a valid test does not exist, the well must be sampled for bacteriological and nitrate levels. Hand-dug water wells will not be accepted as a potable water supply.

DEH staff will collect water samples from private wells, which will be tested at the County of San Diego Public Health Lab. A fee is required for the water sample analysis.

When all applicable items above have been completed to the satisfaction of this Department, a septic tank permit can be issued to the owner/agent or to a contractor with the required license(s) from any of the above-listed DEH offices. The permit is valid for one year.

In order to make septic tank permit processing as smooth as possible, it is recommended that you maintain a record of all paperwork and project control numbers obtained from each Department.

Definitions

Absorption Area:	The amount of land area required to treat a daily discharge of sewage based on percolation rate and design flow, described in square feet.
Aqueduct:	A municipal water pipeline located in an easement for the San Diego County Water Authority and the Metropolitan Water Authority.
Bedroom:	A habitable room totaling at least seventy (70) square feet in size, considered suitable for sleeping purposes, regardless of whether or not the room contains or has access to a closet and a full or ¾ bathroom, and does not directly open to a garage or other bedroom.
Chamber System:	A leach field design that uses a plastic chamber instead of perforated pipe and rock in the excavation.
Circulation Element:	A public road that has been designated by the Department of Public Works as a major traffic collector.
Cut Bank**:**	The vertical distance across of the face of graded slope where soil has been removed.
Daily Sewage Flow**:**	The amount of sewage generated in a 24-hr period,
Drainage Course:	A seasonal stream, eroded channel, lined drainage channel, swale, gully, ravine, dry creek bed, etc.
Easement:	A recorded section of land used for specific purpose or restricted from development such as utilities, roadways, water mains, open-space, drainage, etc.
5:1 Setback:	A horizontal distance 5 times the height of a cut bank or depth of an excavation to an OWTS located up gradient.
Groundwater:	Subsurface water present in the upper soil zones, in the void spaces between soil particles, between confining soil layers, and in aquifers.
Health Dept. Certification:	The sizing requirements for an OWTS established by a previously approved percolation test, recorded land division plat, recorded parcel map, recorded subdivision, boundary adjustment, or certificate of compliance.

Holding Tank:	A temporary sewage disposal system consisting of a 1500 gallon septic tank, alarm system, and maintenance contract; intended for a short duration until an approved sewer is installed.
Horizontal Seepage Pit:	A component of a sewage disposal system that consist of pre-cast concrete rings within an excavation typically 5-feet wide, and 8-feet deep. Percolation rates cannot exceed 30 minutes per inch.
Leach Line:	A component of a sewage disposal system that consist of an 18-inch wide trench, 3 to 5 feet deep, with perforated leach line pipe suspended over a bed of 1.5-inch diameter rock.
Percolation Rate:	The amount of time it takes water to be absorbed into the soil within a test boring under controlled, saturated conditions and described in minutes per inch.
Pump Chamber:	Typically a modified septic tank used to contain the pump system for a non-gravity sewage disposal system.
Reserve Area:	It is an area available for replacement of the active disposal field design. Average percolation rates of 60 minutes per inch or less require 100% reserve area. Percolation rates from 61 to 90 minutes per inch require 200% reserve area. Percolation rates from 91 to 120 minutes per inch require 300% reserve area. Percolation rates greater than 120 minutes per inch are not considered permeable soil. Reserve areas must meet all of the design requirements of a primary system area.
Septic Tank:	Used to settle and separate the solids and sewage effluent. Only partial sewage treatment occurs within the septic tank, and the sewage effluent leaving the tank still contains pathogens.
Surge Tank:	Receives sewage effluent from the pump chamber to allow gravity-flow into the leach field or seepage pit in a non-gravity system.
Vertical Seepage Pit:	A component of a sewage disposal system that is used in coastal, sedimentary basins that are degraded by salt water. Vertical seepage pits must maintain the same separation to groundwater as other conventional designs. Vertical seepage pits are restricted from inland, granitic basins where groundwater is used for a drinking water resource.

DISPOSAL TRENCH LENGTH BASED ON PERCOLATION TEST RESULTS

Percolation Rate Average Time in Minutes/Inch (MPI)
Number of Bedrooms

MPI	1*	2	3	4	5	6
1	200	200	240	270	280	300
2	200	200	240	270	280	300
3	200	200	240	270	280	300
4	200	220	260	290	300	310
5	200	240	290	320	320	340
6	200	250	300	340	350	360
7	210	260	310	350	370	380
8	210	265	320	360	390	400
9	220	270	320	360	400	410
10	220	275	330	370	410	420
11	220	280	340	380	420	430
12	230	285	340	380	430	440
13	230	290	350	390	430	450
14	235	295	350	400	440	460
15	240	300	360	400	450	470
16	240	300	360	410	450	490
17	240	305	370	410	460	500
18	250	310	370	420	460	510
19	250	310	380	420	470	520
20	250	315	380	430	470	520
21	260	320	380	430	480	530
22	260	320	390	440	480	530
23	260	325	390	440	490	550
24	260	330	400	450	500	560
25	260	330	400	450	500	560
26	270	335	400	450	510	570
27	270	340	410	460	515	575
28	270	340	410	460	515	575
29	270	345	420	470	525	585
30	280	350	420	470	525	585
31	280	350	420	480	535	595
32	280	355	430	480	535	595
33	290	360	430	490	545	605
34	290	360	440	490	545	605
35	290	365	440	500	555	615
36	300	370	440	500	555	615
37	300	370	450	500	555	615
38	300	375	450	510	565	625
39	300	380	460	510	565	625
40	300	380	460	520	575	635

Percolation Rate Average Time in Minutes/Inch (MPI)
Number of Bedrooms

MPI	1*	2	3	4	5	6
41	310	385	460	520	575	635
42	310	390	470	530	585	645
43	310	390	470	530	585	645
44	310	395	480	540	595	655
45	320	400	480	540	595	655
46	320	400	480	540	595	655
47	320	405	490	550	605	665
48	330	410	490	550	605	665
49	330	410	500	560	615	675
50	330	415	500	560	615	675
51	340	420	500	560	615	675
52	340	420	510	570	625	685
53	340	425	510	580	635	695
54	340	430	520	580	635	695
55	340	430	520	580	635	695
56	350	435	520	590	645	705
57	350	440	530	590	645	705
58	350	440	530	600	655	715
59	350	445	540	600	655	715
60	360	450	540	610	665	725
61	370	460	550	620	690	740
62	380	470	560	630	680	720
63	390	480	570	640	690	730
64	400	490	580	650	700	740
65	420	500	580	660	710	750
66	420	510	600	670	720	760
67	430	520	610	680	730	770
68	440	530	620	690	740	780
69	450	540	630	700	750	790
70	460	550	640	710	760	800
71	470	560	650	720	770	810
72	480	570	660	730	780	820
73	490	580	670	740	790	830
74	500	590	680	750	800	840
75	510	600	690	760	810	850
76	520	610	700	770	820	860
77	530	620	710	780	830	870
78	540	630	720	790	840	880
79	550	640	730	800	850	890
80	560	650	740	810	860	900

Percolation Rate Average Time in Minutes/Inch (MPI) Number of Bedrooms

PI	2	3	4	5	6
81	660	750	820	870	910
82	670	760	830	880	920
83	680	770	840	890	930
84	690	780	850	900	940
85	700	790	860	910	950
86	710	800	870	920	960
87	720	810	880	930	970
88	730	820	890	940	980
89	740	830	900	950	990
90	755	845	915	965	1005
91	770	860	930	980	1020
92	785	875	945	995	1035
93	800	890	960	1010	1050
94	815	905	975	1025	1065
95	830	920	990	1040	1080
96	845	935	1005	1055	1095
97	860	950	1020	1070	1110
98	875	965	1035	1085	1125
99	890	980	1050	1100	1140
100	905	995	1065	1115	1155
101	920	1010	1080	1130	1170
102	935	1025	1095	1145	1185
103	950	1040	1110	1160	1200
104	965	1055	1125	1175	1215
105	980	1070	1140	1190	1230
106	995	1085	1155	1205	1245
107	1010	1100	1170	1220	1260
108	1025	1115	1185	1230	1270
109	1040	1130	1200	1250	1290
110	1055	1145	1215	1265	1305
111	1070	1160	1230	1280	1320
112	1085	1175	1245	1295	1335
113	1100	1190	1260	1310	1350
114	1115	1205	1275	1325	1365
115	1130	1220	1290	1340	1380
116	1145	1235	1305	1355	1395
117	1160	1250	1320	1370	1410
118	1175	1265	1335	1385	1425
119	1190	1280	1350	1390	1440
120	1210	1300	1370	1420	1460

Facility/Property:
Date:

Threat-to-Water Quality (TTWQ) Questionnaire

1. How many pollutant generating activities (PGAs) occur at the facility/property (total from Table 1-1)?
    a. < 6 – 1 point
    b. 6-14 – 3 points
    c. 15-24 – 5 points
    d. > 25 – 10 points
2. Does the facility complete and record their self-inspections on a timely and thorough basis?
    a. Yes, always – 1 point
    b. Usually – 3 points
    c. Not always – 5 points
3. Are employees trained annually on stormwater and pollution prevention?
    a. All applicable staff– 1 point
    b. Some applicable staff – 3 points
    c. None – 5 points
4. Is the property within the floodplain or floodway?
    a. No – 1 point
    b. Partially – 3 points
    c. Yes – 5 points
5. What is the approximate impervious drainage area of your facility (including drainage from roofs, paved areas, roads, parking lots, etc)?
    a. < 5,000 sq ft – 1 point
    b. Around 5,000 sq ft – 3 points
    c. > 5,000 sq ft – 5 points
6. Does the impervious surface runoff discharge to a storm drain or receiving water body (i.e. river, creek, lake, natural drainage)?
    a. No – 1 point
    b. Yes – 5 points
7. Does the impervious surface drain to an Environmentally Sensitive Area (ESA)?
    a. No – 1 point **(if no, go to question 8)**
    b. Yes – 5 points

    7.a. What is the property distance to an ESA?
        a. > 200ft – 1 point
        b. < 200ft – 3 points
        c. Within ESA– 5 points
8. What volume of trash/debris does the facility grounds generate/receive/collect?
    a. Light: ≤ 55 gallon drum weekly – 1 point
    b. Moderate: > 55 gallon drum weekly – 5 points
    c. Heavy: > 1 dumpster weekly – 10 points
9. Does the facility have a history of spills or leaks within the past 3 years?
    a. No – 1 point
    b. No major spills and only a few small spills – 3 points
    c. No major spills and several small spills – 5 points
    d. Major spill on record – 10 points

(continued on next page)

Facility/Property:
Date:

10. Does the property have areas of erosion?
    a. None, or erosion control best management practices are in place – 1 point
    b. Some, or partial control of erosion – 5 points
    c. Many, and minimal erosion control – 10 points
11. Are non-stormwater discharges (example: irrigation runoff) either eliminated or controlled?
    a. Yes – 1 point
    b. Partially – 3 points
    c. No – 5 points
12. Is hazardous waste generated at the facility?
    a. No – 1 point
    b. Minor, infrequent amounts – 3 points
    c. Regularly – 5 points
13. Does the facility have pollution prevention programs in place?
    a. Yes – 1 point
    b. Plan to implement soon – 3 points
    c. No – 5 points
14. Does the facility implement stormwater BMPs as required?
    a. Yes – 1 point
    b. Sometimes – 3 points
    c. No – 5 points
15. Are the source control BMPs (sweeping, drip pans, fiber rolls) well maintained/ performed on a regular basis?
    a. Yes – 1 point
    b. Partially – 5 points
    c. No – 10 points
16. Are the storm drain system and/or any treatment control BMPs (such as oil water separators, detention basins, vegetated swales, filter inserts, gabions, permeable pavement, etc) regularly inspected and maintained?
    a. N/A – 0 points
    b. Yes – 1 point
    c. Occasionally – 5 points
    d. No – 10 points
17. During self-inspections, are corrections made in a timely manner to resolve issues?
    a. Yes – 1 point
    b. Sometimes – 3 points
    c. No – 5 points
18. After an audit, has a follow-up site visit been required by the WPP auditors within the past three (3) years?
    a. No, found in compliance – 0 points
    b. Only minor corrections have been required via picture report – 3 points
    c. Yes, once – 5 points
    d. Yes, more than once – 10 points
19. Has the facility/property received a Past-Due Notice from WPP in the past 3 years regarding any pending corrective action(s)?
    a. No corrective actions have been requested – 0 points
    b. No – 1 point
    c. Yes, once – 3 points
    d. Yes, more than once – 5 points

(continued on next page)

Facility/Property:
Date:

Total the points for each question answered above. Record your score below.

TOTAL: _____

Scoring

Under 28 = **Low** Threat to Water Quality (TTWQ). At a minimum, inspect **annually**
28-62 = **Medium** TTWQ. At a minimum, inspect **semi-annually** (once every 6 months)
63 and above = **High** TTWQ. At a minimum, inspect **quarterly**

Facility self-inspection schedules are determined by this Threat to Water Quality (TTWQ) questionnaire. According to the TTWQ questionnaire results, this facility conducts self-inspections:

☐ **Annually** ☐ **Semi-Annually** ☐ **Quarterly**

Disclaimer: DPW WPP stormwater auditors must approve the TTWQ self-inspection frequency and have the authority to raise or lower the frequency based on compliance history.

Notes:

Appendix D
NRCS Expected Service Life

Rainbow Creek
Nutrient Reduction and Management Plan

INDEX OF CONSERVATION PRACTICES
(Listed in Numerical Order by Practice Code)

CODE	PRACTICE NAME	Units	Lifespan (Yrs)	Responsible Discipline	CA Standard	Specifi-cation	Implementation Requirements	Operation & Maintenance	Statement of Work
309	Agrichemical Handling Facility	no	15	EE	Apr-16	2/	Apr-16	Apr-16	Apr-16
310	Bedding	ac	3	WME	Apr-11	2/	------	Apr-11	Apr-11
311	Alley Cropping	ac	15	FOR	Oct-11	3/	------	------	Oct-11
313	Waste Storage Facility 313A-Shotcrete Structure 313B-Pond 313C-Concrete Structure	no	15	EE	Sep-07	 Nov-09 Nov-09 Nov-09	 Sep-04 Sep-04 Sep-04	Nov-09	Aug-04
314	Brush Management 314A-Juniper Control 314B-Multiple Year Treatment 314C-Multiple Species	ac	10	RANGE	May-12	 Oct-15 Aug-14 Oct-15	May-12 May-12 Aug-14 Oct-15	------	Aug-04
315	Herbaceous Weed Control 315A-Mechanical 315B-Biological 315C-Chemical 315D-Multiple Year Treatment	ac	5	RANGE	Oct-11	8/	 Aug-14 Aug-14 Aug-14 Aug-14	------	Mar-12
316	Animal Mortality Facility	no	15	EE	Jan-11	2/	Jan-11	------	Jan-11
317	Composting Facility	no	15	EE-AGRON	Mar-12	2/	------	Mar-12	Mar-12
319	On-Farm Secondary Containment Facility	no	15	EE	Dec-15	2/	------	------	Dec-15
320	Irrigation Canal or Lateral	ft	15	WME	Mar-12	Mar-12	Mar-12	Mar-12	Mar-12
324	Deep Tillage	ac	1	AGRON	Nov-14	5/	Nov-14	------	Nov-14
325	High Tunnel System	sq ft	5	AGRON	Oct-15	Oct-15	Oct-15	------	Oct-15
326	Clearing and Snagging	ft	5	CE	Apr-11	Apr-11	Apr-11	Apr-11	Apr-11
327	Conservation Cover 327A-Pollinators	ac	5	BIOL-AGRON	Apr-16	Aug-14 Nov-15	Apr-15	------	Apr-16
328	Conservation Crop Rotation	ac	1	AGRON	Mar-12	Mar-12	Mar-12	------	Mar-12
329	Residue and Tillage Management, No-Till	ac	1	AGRON	Nov-14	Nov-14	Nov-14	------	Nov-14
330	Contour Farming	ac	5	AGRON	Nov-14	Jul-00	Dec-15	------	Nov-14
331	Contour Orchard and Other Perennial Crop	ac	10	AGRON	Jun-11	Jun-11	------	------	Jun-11
332	Contour Buffer Strips	ac	5	AGRON	Dec-15	5/	Dec-15	------	Dec-15
338	Prescribed Burning	ac	1	RANGE-FOR	Nov-13	Oct-02	Oct-02	------	Nov-13
340	Cover Crop	ac	1	AGRON	Apr-15	Dec-15	Apr-15	------	Oct-11
342	Critical Area Planting 342A-Herbaceous 342I-Dune Stabilization	ac	10	AGRON-AqEco	Nov-14	 Nov-14 Jul-00	Dec-15 Jul-00	------	Nov-14
345	Residue and Tillage Management, Reduced Till	ac	1	AGRON	Nov-14	Nov-14	Nov-14	-----	Nov-14

CODE	PRACTICE NAME	Units	Lifespan (Yrs)	Responsible Discipline	CA Standard	Specifi-cation	Implementation Requirements	Operation & Maintenance	Statement of Work
348	Dam, Diversion	no	15	DE	Oct-11	Nov-09	Oct-11	Nov-09	Oct-11
350	Sediment Basin	no	20	DE	Jun-10	2/	------	Jun-10	Jun-10
351	Well Decommissioning	no	20	EG	Oct-15	2/	Oct-15	Oct-15	Oct-15
353	Monitoring Well	no	15	EG	Oct-15	2/	Oct-15	Oct-15	Oct-15
355	Groundwater Testing	no	1	EG	Oct-15	2/	Oct-15	------	Oct-15
356	Dike	ft	20	HE	Jun-08	Nov-09	Oct-03	Nov-09	Aug-04
359	Waste Treatment Lagoon	no	15	EE	Sep-04	Nov-09	Sep-04	Nov-09	Aug-04
360	Waste Facility Closure	no	15	EE	Oct-12	2/	------	Oct-12	Oct-12
362	Diversion	ft	10	AE	Apr-11	Apr-11	Apr-11	Apr-11	Apr-11
366	Anaerobic Digester	no	25	EE	Apr-11	2/	------	------	Apr-11
367	Roofs and Covers	no	10	EE	Oct-11	2/	------	------	Oct-11
368	Emergency Animal Mortality Mgmt				Dec-15				Dec-15
371	Air Filtration and Scrubbing	no	10	AQS - ARS - ENG	Mar-12	6/	------		Mar-12
372	Combustion System Improvement 372A-Irrigation Engines 372B-Mobile Off-Road Agricultural Engines and Equipment	no	10	AQS - ENG	Sep-10	Dec-15	Nov-14	 Aug-13 Aug-13	Sep-10
373	Dust Control on Unpaved Roads and Surfaces	sq ft	1	AQS	Sep-10	Sep-10	Sep-10	Sep-10	Sep-10
374	Farmstead Energy Improvement	no	10	ENERGY-AE	Oct-11	7/	Nov-14	Nov-14	Nov-14
375	Dust Control from Animal Activity on Open Lot Surfaces	ac	1	AQS	Oct-11	6/	------	------	Oct-11
376	Field Operations Emissions Reduction	ac	1	AQS-AGRON	Oct-15	5/ or 7/	Jan-16	Jan-16	------
378	Pond	no	20	DE	Oct-11	Nov-09	Oct-11	Nov-09	Oct-11
379	Multi-Story Cropping	ac	10	FOR-(AGRON)	Oct-12	3/ or 5/	------	------	Oct-12
380	Windbreak/Shelterbelt Establishment	ft	15	FOR	Apr-13	Apr-13	Apr-13	------	Apr-13
381	Silvopasture Establishment	ac	15	FOR-RANGE	Oct-12	3/ or 8/	------	------	Oct-12
382	Fence 382A-Barbed,Smooth,Woven 382B-Suspension 382C-Electrical 382D-Wildlife Friendly	ft	20	RANGE with BIOLOGY	Aug-14	 Aug-15 May-12 Aug-15 May-12 (Job Sheet)	 Aug-15 - - - Aug-15 - - -	------	May-12
383	Fuel Break	ac	10	FOR	Oct-12	3/	------	-----	Oct-12
384	Woody Residue Treatment	ac	10	FOR	Oct-11	3/	Apr-15	-----	Oct-11
386	Field Border	ac	10	AGRON	Nov-14	Nov-14	Nov-14	------	Nov-14
388	Irrigation Field Ditch	ft	15	WME	Mar-12	Mar-12	Mar-12	Mar-12	Mar-12
390	Riparian Herbaceous Cover	ac	5	BIOL	Apr-07	4/	Aug-06	------	Aug-04
391	Riparian Forest Buffer	ac	15	FOR -BIOL	Nov-13	Aug-06	Aug-06	------	Nov-13
393	Filter Strip	ac	10	AGRON	Nov-14	Job Sheet, 2011	Nov-14	Oct-11	Nov-14
394	Firebreak 394A-Standard 394B-Fuel Break	ft	5	FOR	Oct-12	 Oct-02 Jul-00	 Oct-02 Oct-02	------	Oct-12
395	Stream Habitat Improvement & Management	ac	5	AqEco	May-12	4/	------	May-12	May-12

CODE	PRACTICE NAME	Units	Lifespan (Yrs)	Responsible Discipline	CA Standard	Specifi-cation	Implementation Requirements	Operation & Maintenance	Statement of Work
396	Aquatic Organism Passage	mi	5	AqEco	Jun-11	Jun-11	Jun-11	Jun-11	Jun-11
397	Aquaculture Ponds	ac	10	AE-BIOL	Jun-10	2/	------	Jun-10	Jun-10
398	Fish Raceway or Tank	ft	10	AqEco-DE	Jun-10	2/	------	Jun-10	Jun-10
399	Fishpond Management	no	1	AqEco	Oct-12	4/	------	------	Oct-12
402	Dam	ac-ft	15	DE	Oct-11	2/	Oct-11	Nov-09	Oct-11
410	Grade Stabilization Structure 410A-Rock Drops	no	15	DE	Dec-15	Nov-09 Nov-09	Dec-15 Jul-00	Nov-09 ------	Dec-15 -----
412	Grassed Waterway	ac	10	AE - AGRON	Dec-15	Jun-10	Dec-15	Jun-10	Dec-15
422	Hedgerow Planting 422A-Pollinators	ft	15	BIOL	Mar-12	Mar-12 Nov-15	Apr-15	------	Mar-12
423	Hillside Ditch	ft	10	AE	Nov-09	2/	------	Nov-09	Nov-09
428	Irrigation Ditch Lining 428A-Concrete	ft	20	WME	Oct-11 ------	 Apr-11	Apr-11 ------	Apr-11 ------	Apr-11 ------
430	Irrigation Pipeline 430CMP-Corrugated Metal Pipe 430PP- Plastic Pipe 430SP-Steel Pipe	ft	20	WME	Jun-11	 Jun-11 Apr-13 Jun-11	Jun-11 ----- ----- -----	Jun-11 ----- ----- -----	Jun-11 ----- ----- -----
432	Dry Hydrant	no	15	HE	Mar-12	2/	------	Mar-12	Mar-12
436	Irrigation Reservoir	ac-ft	15	WME	Oct-11	2/	------	Jun-11	Jun-10
441	Irrigation System, Microirrigation	ac	15	WME	Apr-15	Nov-14	Nov-14	Nov-14	Nov-14
442	Sprinkler System 442A: Above-ground Mainlines and Laterals	ac	15	WME	Apr 2015	Nov-14 Nov-09	Nov-14 Sep-04	Nov-14 ------	Nov-14 -------
443	Irrigation System, Surface and Subsurface	ac	15	WME	Jun-11	Jun-11	Jun-11	Jun-11	Jun-11
447	Irrigation System, Tailwater Recovery	no	15	WME	Dec-15	Apr-11	Dec-15	Apr-11	Apr-11
449	Irrigation Water Management	ac	1	WME-AGRON	Apr-16	Nov-09	Oct-11	------	Apr-16
450	Anionic Polyacrylamide (PAM) Application	ac	1	WME	Oct-11	Sep-10	Sep-10	Sep-10	Sep-10
453	Land Reclamation, Landslide Treatment	ac	15	SE	Jul-05	2/	------	Nov-09	Jul-05
455	Land Reclamation, Toxic Discharge Control	no	15	EE	Aug-06	2/	------	Nov-09	Aug-04
457	Mine Shaft and Adit Closing	no	15	SE	Jul-05	2/	------	Nov-09	Jul-05
460	Land Clearing	ac	10	AE	Mar-12	2/	------	------	Mar-12
462	Precision Land Forming	ac	10	AE	Apr-16	2/	------	------	Apr-16
464	Irrigation Land Leveling	ac	15	WME	Mar-12	Mar-12	Mar-12	Mar-12	Mar-12
466	Land Smoothing	ac	10	AE	Nov-14	2/	Nov-14	Nov-14	Aug-04
468	Lined Waterway or Outlet	ft	15	AE	Jun-11	Jun-11	Jun-11	Jun-11	Jun-11
472	Access Control	ac	10	FOR-RANGE	May-10	------	------	------	May-10
482	Mole Drain	ft	3	WME	Mar-04	2/	------	------	Aug-04
484	Mulching	ac	1	AGRON	Sep-15	Nov-14	Nov-14	------	Nov-14 -------
490	Tree/Shrub Site Preparation 490A-Windbreak/Hedgerow 490B-Forestland	ac	1	FOR	Jun-08	 Oct-02 Oct-02	 Oct-02 Oct-02	------	Oct-11
500	Obstruction Removal	ac	10	AE	Jun-10	2/	------	------	Jun-10
511	Forage Harvest Management	ac	1	RANGE-(AGRON)	Apr-11	5/	Apr-11	------	Apr-11

CODE	PRACTICE NAME	Units	Lifespan (Yrs)	Responsible Discipline	CA Standard	Specifi-cation	Implementation Requirements	Operation & Maintenance	Statement of Work
512	Forage and Biomass Planting	ac	5	RANGE-(AGRON)	Jun-11	Jun-11	Dec-15	------	Jun-11
516	Livestock Pipeline	ft	20	WME	Oct-12	Oct-12	Oct-12	Oct-12	Oct-12
528	Prescribed Grazing	ac	1	RANGEw/:	Oct-12			------	Oct-12
	528A-Annual Rangeland					Aug-13	Aug-13		
	528B-Irrigated Pasture			AGRON		Aug-13	Aug-13		
	528C-Perennial Rangeland					Aug-13	Aug-13		
	528D-Wetlands			AqECO		Oct-12	Oct-12		
	528E-Forest & Woodland			FORESTRY		Nov-13	Oct-12		
	** Supplement to Specification					Dec-15			
533	Pumping Plant	no	15		Oct-11		Jun-10	Jun-10	Jun-10
	533A-(none)			WME					
	533B-Electric Submersible Pump					June-10	Jun-10		
	533C-Solar/Wind Power					June-10	June-10		
543	Land Reclamation, Abandoned Mined Land	ac	15	SE-AGRON	Sep-07	2/	------	Nov-09	Sep-07
544	Land Reclamation, Currently Mined Land	ac	15	SE-AGRON	Sep-07	2/	------	Nov-09	Sep-07
548	Grazing Land Mechanical Treatment	ac	1	RANGE	May-12	May-12	May-12	------	May-12
550	Range Planting	ac	5		Dec-15		Dec-15	------	May-12
	550A-Annual Plant Species			RANGE	-----	May-12	-----		-----
	550B-Perennial Plant Species				-----	May-12	-----		-----
554	Drainage Water Management	ac	1	WME	Apr-11	2/	------	Apr-11	Apr-11
555	Rock Barrier	ft	10	AE	Apr-11	2/	------	Apr-11	Apr-11
557	Row Arrangement	ac	5	AE	Nov-14	2/	------	------	Nov-15
558	Roof Runoff Structure	no	15	EE	Dec-15	2/	------	Dec-15	Dec-15
560	Access Road	ft	10	AE	Apr-16	May-12	Apr-16	May-12	Apr-16
561	Heavy Use Area Protection	sq ft	10	AE	Dec-15	2/	------	Jun-10	Dec-15
	561A-Coal Ash Soil Surfacing				-------	Jun-10	------	------	------
562	Recreation Area Improvement	ac	15	LA-FOR	Oct-02	Oct-02	Oct-02	------	Aug-04
566	Recreation Land Grading and Shaping	ac	15	AE	Aug-14	2/	------	Nov-09	Aug-04
570	Stormwater Runoff Control	no	1	AE	Oct-11	2/	------	Oct-11	Oct-11
572	Spoil Spreading	ac	1	AE	Jun-10	2/	------	Jun-10	Jun-10
574	Spring Development	no	20	WME-(AqECO)	Nov-14	Nov-09	Oct-02	Nov-09	Nov-14
575	Trails and Walkways	ft	10	AE-RANGE	Nov-14	2/	Nov-14	Nov-14	Nov-14
576	Livestock Shelter Structure	no	10	RANGE	Dec-15	8/	-----	-----	Dec-15
	576A-Portable						Dec-15	Dec-15	
578	Stream Crossing	no	10	EG-AqEco	Aug-13	Mar-12	Mar-12	Mar-12	Mar-12
580	Streambank and Shoreline Protection	ft	20	DE	Jun-11	Jun-11	Jun-11	Jun-11	Jun-11
582	Open Channel	ft	15	DE	Dec-15	2/	------	Nov-09	Dec-15
584	Channel Bed Stabilization	ft	10	EG	Jun-11	Jun-11	Jun-11	Jun-11	Jun-11
585	Stripcropping	ac	5	AGRON	Nov-14	5/	Nov-14	-----	Nov-14
587	Structure for Water Control	no	20		Jan-11		May-10	May-10	May-10
	587A-Corrugated Metal Pipe				-----	May-10	May-10	----	-----
	587B-Plastic Pipe Culverts			DE	-----	Oct-11	May-10	----	-----
	587B-Fish Screen				-----	May-10	May-10	May-10	-----
	587D-Wind Machines				-----	Oct-11	Oct-11	Oct-11	-----
588	Cross Wind Ridges	ac	1	AGRON	Nov-14	Sep-10	Nov-15	------	Nov-15
590	Nutrient Management	ac	1	AGRON-EE	Aug-15	Mar-13	------	------	Mar-13
591	Amendments for Treatment of Agricultural Waste	ani unt	1	EE	Nov-14	2/	------	------	Nov-14

CODE	PRACTICE NAME	Units	Lifespan (Yrs)	Responsible Discipline	CA Standard	Specifi-cation	Implementation Requirements	Operation & Maintenance	Statement of Work
592	Feed Management	ani unt	1	AGRON-RANGE	Oct-12	5/	------	------	Oct-12
595	Integrated Pest Management (IPM)	ac	1	AGRON	Dec-12	------	------	------	Mar-13
600	Terrace	ft	10	AE	Apr-16	2/	------	Jun-10	Apr-16
601	Vegetative Barrier	ft	5	AGRON	May-12	May-12 (Job Sheet)	------	------	May-12
603	Herbaceous Wind Barriers	ft	5	AGRON	May-12	May-12 (Job Sheet)	------	------	May-12
606	Subsurface Drain 606A-Tubing, 15 Inches or Less	ft	20	WME	Mar-12	----- Mar-12	----- Mar-12	Mar-12	Mar-12
607	Surface Drain, Field Ditch	ft	15	WME	Apr-11	Apr-11	Apr-11	Apr-11	Apr-11
608	Surface Drain, Main or Lateral	ft	15	WME	Apr-11	Apr-11	Apr-11	Apr-11	Apr-11
609	Surface Roughening	ac	1	AGRON	Dec-15	Dec-15	Dec-15	------	Dec-15
610	Salinity and Sodic Soil Management 610A-Irrigated Lands	ac	1	WME-AGRON	Mar-12	 Mar-12	 Mar-12	------	Mar-12
612	Tree/Shrub Establishment 612A-Bareroot/Container Stock 612B-Direct Seeding 612C-Pole Plantings / Cuttings	ac	15	FOR	Oct-11	 Aug-06 Aug-06 Aug-06	 Apr-15 Aug-06 Aug-06	------	Oct-11
614	Watering Facility	no	10	AE-BIOL-(RANGE)	Dec-15	Nov-09	Oct-02	Nov-09	Dec-15
620	Underground Outlet	ft	20	AE	Nov-14	Mar-12	Mar-12	Mar-12	Nov-14
629	Waste Treatment	no	10	EE	Nov-14	2/	------	Nov-14	Nov-14
630	Vertical Drain	no	10	EG	Mar-12	2/	------	Mar-12	Mar-12
632	Waste Separation Facility	no	15	EE	Nov-14	2/	------	Nov-14	Nov-14
634	Waste Transfer	no	15	EE	Apr-16	2/	Apr-16	Apr-16	Apr-16
635	Vegetated Treatment Area	ac	10	EE-AGRON	Nov-09	2/	------	Nov-09	Nov-09
636	Water Harvesting Catchment	no	20	WME	Jun-11	2/	------	Jun-11	Jun-11
638	Water and Sediment Control Basin	no	10	AE	Nov-09	2/	Nov-09	Nov-09	Nov-09
640	Waterspreading	ac	15	WME	Nov-14	2/	------	Nov-09	Nov-14
642	Water Well	no	20	EG	Oct-15	Oct-15	Oct-15	Oct-15	Oct-15
643	Restoration and Management of Rare or Declining Habitats	ac	1	BIOL	Mar-12	4/	------	------	Mar-12

CODE	PRACTICE NAME	Units	Lifespan (Yrs)	Responsible Discipline	CA Standard	Specifi-cation	Implementation Requirements	Operation & Maintenance	Statement of Work
644	Wetland Wildlife Habitat Management	ac	1	AqECO	Jan-11	Mar-13 (Job Sheet)	A-D May-15	------	Aug-04
	644A-Cropland, Winter Flooding with Variable Drawdown					May-15			
	644B-Cropland, Seasonal Inundation with Staggered Flood-Up					May-15			
	644C-Cropland, Seasonal Inundation with Gradual Drawdown					May-15			
	644D-Cropland, Forage Management for Waterbirds					May-15			
	644E-Cropland, Habitat Ponds					Aug-15			
	644F-Cropland, Temporary Nesting Islands					Aug-15			
645	Upland Wildlife Habitat Management	ac	1	BIOL	Jun-11	Jun-11	Jun-11	------	Jun-11
646	Shallow Water Development and Management	ac	5	AqECO	Jan-11	May-12 (Job Sheet)	------	------	-----
647	Early Successional Habitat Development/Management	ac	1	BIOL	Mar-12	4/	------	------	Mar-12
649	Structures for Wildlife	no	5	BIOL	Nov-14			-----	Nov-14
	A. Wildlife Brush and Rock Piles					JS-Nov-14			
	B. Nest Structures, Barn Owl					JS-Apr-15			
	C. Nest Structures, Wood Duck					JS-Apr-15			
	D. Nest Structures, Burrowing Owl					JS-Apr-15			
	E. Nest Structures, Bat Houses					Oct-15			
	H. Nesting/Loafing Islands					JS-Apr-15			
	L. Raptor Perch Pole					Oct-15			
	M. Escape Ramp Retrofit					Oct-15			
	649-Nest Structures Overview								
	649-All Activities-Impl. Req. (IR)						Apr-15		
650	Windbreak/Shelterbelt Renovation	ft	15	FOR	Apr-13	Apr-13	Apr-13	------	Apr-13
654	Road/Trail/Landing Closure and Treatment	ft	10	FOR-AE	Jun-09	Jun-09	Jun-09	Jun-09	Jun-09
655	Forest Trails and Landings	ft	5	FOR-AE	Jan-11	Jan-11	Jun-11	Jun-11	Jun-11
656	Constructed Wetland	ac	15	EE-AqECO	May-12	2/	------	May-12	May-12
657	Wetland Restoration	ac	15	AqECO-WME	Jan-11	2/	------	Nov-09	Aug-04
658	Wetland Creation	ac	15	AqECO-WME	Jan-11	2/	------	Nov-09	Aug-04
659	Wetland Enhancement	ac	15	AqECO-WME	Jan-11	2/	------	Nov-09	Aug-04
660	Tree/Shrub Pruning	ac	10	FOR	Apr-16	Apr-16	Apr-16	------	Apr-16
666	Forest Stand Improvement	ac	10	FOR	Oct-11			------	Oct-11
	666A-Coastal Douglas Fir / Redwood					Oct-02	Oct-02		
	666B-Ponderosa Pine / Jeffrey Pine / Sierra Mixed Conifer					Oct-02	Jul-00		
	666C-Aspen/Cottonwood/Other					Oct-02	Oct-02		
	666D-Competing Vegetation Control					Oct-02	Oct-02		
670	Lighting System Improvement	no	10	ENERGY-AE	Aug-13	Nov-14	Nov-14	Nov-14	Nov-14

CODE	PRACTICE NAME	Units	Lifespan (Yrs)	Responsible Discipline	CA Standard	Specifi-cation	Implementation Requirements	Operation & Maintenance	Statement of Work
672	Building Envelope Improvement 672A-Greenhouse Energy Shade Screens 672B-Insulation	no	10	ENERGY - ENG	Aug-13	7/ Aug-13 Nov-14	Nov-14	Nov-14	Nov-14
735	Waste Gasification Facility 1/	no	10	ENG	Jan-12	------	------	------	------
740	Pond Sealing or Lining, Soil Cement 1/	no	20	SE	Jun-08	Nov-09	Jun-08	Nov-09	Jan-06
521A	Pond Sealing or Lining, Flexible Membrane	no	20	CE	Oct-12	Nov-09	Apr-07	Nov-09	Oct-12
521B	Pond Sealing or Lining, Soil Dispersant	no	20	AE	Apr-11	Apr-11	Apr-11	Apr-11	Apr-11
521C	Pond Sealing or Lining, Bentonite Sealant	no	15	SE	Apr-11	Apr-11	Apr-11	Apr-11	Apr-11
521D	Pond Sealing or Lining, Compacted Clay Treatment	no	15	SE	Apr-11	Apr-11	Apr-11	Apr-11	Apr-11
589C	Cross Wind Trap Strips	ac	5	AGRON	Dec-15	Dec-15	Dec-15	------	Dec-15

1/ California Interim Practice (Copy located in eFOTG Section IV - C - Conservation Practices - CA Interim)

Area Engineer or State Conservation Engineer

State Forester

Area Biologist or State Biologist

State Agronomist.

State Air Quality Specialist

State Energy Conservation Specialist, Area Engineer, or State Conservation Engineer

State Range Specialist.

Technical Specialist Abbreviations

AE - Agricultural Engineer
AGRON - Agronomist
AH - National Leader Animal Husbandry
AqEco - Aquatic Ecologist
AQS - Air Quality Specialist
ARS - Atmospheric Resource Specialist
BIOL - Biologist or Wetlands Biologist
CE - Construction Engineer
CED - Conservation Engineering Division
DE - Design Engineer

CODE	PRACTICE NAME	Units	Lifespan (Yrs)	Responsible Discipline	CA Standard	Specifi-cation	Implementation Requirements	Operation & Maintenance	Statement of Work
						Construction Specification	Last Review		
901	Concrete (3000 psi)			ENG		Jun-10	Jun-10		
901	Concrete (4000 psi)			ENG		Dec-15	Dec-15		
902	Concrete Block Structure			ENG		Jul-05	Jul-05		
903	Earthfill			ENG		Mar-12	Mar-12		
904	Gabions			ENG		Jul-05	Jul-05		
905	Geotextile Fabric			ENG		Jul-05	Jul-05		
906	Post and Wire Revetment			ENG		Jul-05	Jul-05		
907	Rock Riprap			ENG		Jun-08	Jun-08		
908	Grouted Rock Riprap			ENG		Jul-05	Jul-05		
909	Control of Water (to facilitate construction)			ENG		Jul-05	Jul-05		

Technical Specialist Abbreviations

AE - Agricultural Engineer
AGRON - Agronomist
AH - National Leader Animal Husbandry
AqEco - Aquatic Ecologist
AQS - Air Quality Specialist
ARS - Atmospheric Resource Specialist
BIOL - Biologist or Wetlands Biologist
CE - Construction Engineer
CED - Conservation Engineering Division
DE - Design Engineer