The City of Morro Bay

Urban Runoff Program

California Polytechnic State University · San Luis Obispo
College of Architecture and Environmental Design
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Within this section of the Morro Bay Urban Runoff Program the issues of water quality and urban runoff are briefly introduced. The purpose and organization of the contents within this document are identified.
INTRODUCTION

Urban runoff is a problem that plagues every city around the world. As water is a life sustaining resource, its quality is an issue that stands out in everyone’s mind. The issues of water quality and urban runoff are closely linked, as urban areas provide several genres of pollutants that can be deposited into our waterways. This becomes quite an issue when a city encompasses an ocean, bay, and an estuary. The City of Morro Bay has recognized water quality as a definite problem within its jurisdiction and has proposed to enact an urban runoff program to remedy this problem.

In a five-week period the students of California Polytechnic University San Luis Obispo, under the direction of Dr. Michael Boswell, have developed a proposal that will be brought to the city complete with recommendations. The class began by researching planning issues on the national, regional, and local level that relate to urban runoff. After gathering all the necessary background information we worked on Watershed Management determining the existing regulations and then offered recommendations that the city should consider.

The first category is the Planning section which consists of information on the importance of an Urban Runoff Program, how it should be implemented, what other governmental bodies should be taken into consideration in the process as well as existing information they may have. Additionally, problems specific to the City of Morro Bay are included. These section headings are as follows, the State of California, Federal, City of Morro Bay, the Morro Bay National Estuary Program (MBNEP), San Luis Obispo County, the Regional Water Quality Conservation Board (RWQCB), and Existing Conditions.

The second category is Watershed Management, which consists of current regulations that would affect urban runoff as well as recommendations for amendments or new regulations that would help in solving the problem. This second category contains sections as follows, Watershed Planning, Land Conservation, Aquatic Buffers, Site Design, Erosion and Sediment Control, Stormwater Best Management Practices (BMPs), Non-Stormwater Discharges, and Water Quality Monitoring.

The National Pollutant Discharge Elimination System (NPDES) Phase II requirements state that stormwater discharge permits are required as of May 31, 2002. This requirement is specific to all municipalities within designated urbanized areas, with populations of at least 10,000 or 1000 people per square mile.

This document was created for the purpose of assisting the City of Morro Bay in the beginning stages of developing an Urban Runoff Program. More specifically, this document should be considered as source of reference, allowing planning staff to access a wide variety of information from one comprehensive source. Information regarding existing state, federal and local policies, regulations, acts, and programs that have some affect on a city’s development and standards of urban runoff programs are summarized thus creating a document to model an Urban Runoff Program.

We researched existing conditions in order to provide a clear overview of the sources of pollution and watershed characteristics, which will assist the city in developing a program that addresses these conditions. The document identifies potential BMPs that the city may wish to implement in their program. One of our goals in
developing this document was to address BMPs that are innovative and unique to the conditions of the city and the surrounding environment.

**Project Preparation**

This document was prepared by the California Polytechnic State University, San Luis Obispo, City and Regional Planning 342: Regional and Environmental Planning Lab. The goal of this course was to address local and regional environmental planning. Professor Michael R. Boswell as the Project Director facilitated the development of this document. Our Project Manager was Susan Kefer. Amon Browning, Zack Dahl, and Erin Bishop held the roles of Planning Lead, Watershed Management Lead, and Production Lead, respectively. Each member of the class had a responsibility as part of the Planning, Watershed Management, and the Production teams.
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Justification

This section of the Morro Bay Urban Runoff Program introduces the Model Urban Runoff Program (MURP), Morro Bay’s Comprehensive Conservation and Management Program (CCMP), the Coastal CRP Program, and the National Pollution Discharge Elimination System (NPDES). Remaining consistent with existing regulatory plans and programs was a primary focus while developing the MBURP.
JUSTIFICATION

In researching the Model Urban Runoff Program (MURP), Morro Bay’s Comprehensive Conservation and Management Plan (CCMP), the Coastal CRP Plan, and the National Pollution Discharge Elimination System (NPDES) we have achieved a comprehensive understanding of existing programs and regulations related to Morro Bay’s water quality issues. Thus, as we develop the Morro Bay Urban Runoff Program (MBURP) we strive enhance the preservation and protection of water quality in Morro Bay while also remaining consistent with the provisions of existing programs and regulations.

The Model Urban Runoff Program, prepared for the Cities of Monterey and Santa Cruz, instructs small municipalities in creating an Urban Runoff Program specific to the water quality concerns in their community. As a “how to” guide, the MURP provides a framework assisting a community in the development of a comprehensive program that will be consistent with NPDES Phase II regulations. The MURP consists of four elements in modeling an URP for small municipalities: assessment, development, implementation, and evaluation. The MURP advises communities to research existing resources that address urban runoff, evaluate the current condition of water resources within the area, establish a program management plan, and develop program elements. This document provided valuable information and guidance while developing the Morro Bay Urban Runoff Program. In consulting the MURP we were able to understand the process and components that were necessary to complete our document for Morro Bay.

Morro Bay was nominated in June of 1990 as a National Estuary after three decades of environmental efforts to preserve and protect the Bay. After being accepted in October 1995 as one of only 28 national programs in the National Estuary Program (NEP) Morro Bay became recognized as a valued natural asset in California. Having the status of a National Estuary, Morro Bay qualified for funding and assistance in developing and implementing a program to preserve the integrity of this natural resource. Morro Bay National Estuary Program (MBNEP) strives to develop and implement a Comprehensive Conservation and Management Plan (CCMP) to ensure that the water quality issues are addressed and actions are developed to prevent further destruction of Morro Bay’s estuary. Additionally, the CCMP provides an outline of goals that should be achieved through the implementation of this plan. Through researching the CCMP we are able to incorporate the goals and actions that are identified in Morro Bay’s CCMP into the Morro Bay Urban Runoff Program.

The Plan for Controlling Polluted Runoff (Coastal CPR Plan) created under the direction of the California Coastal Commission provides opportunity to reduce non-point source pollution that adversely impacts California’s coastal waters. The protection, conservation, restoration, and enhancement of environmental and human-based resources of the California coast and ocean remain a significant purpose for the California Coastal Commission (Coastal CRP Plan, 1). The consideration of water quality issues as presented by non-point source pollution remains a significant factor in the Commission accomplishing their water quality goals. A timeline has been established for the
implementation of measures under the Coastal CRP Plan. In developing the Morro Bay Urban Runoff Program we strive to coordinate our efforts and recommendations with the objects of the Coastal CRP Plan. In addressing non-point source pollution in the MBURP we will assist the California Coastal Commission in the protection of coastal waters.

As March 10, 2003 approaches small municipalities (population greater than 10,000 or population density of at least 1,000 persons per square mile) must be prepared to issue storm water permits as required by NPDES Phase II. Through implementing an Urban Runoff Program, Morro Bay will have addressed Urban Runoff Issues in compliance with NPDES Phase II requirements. The new regulations of NPDES Phase II will require “operators of regulated small municipal separate storm sewer systems (MS4s)” to apply for NPDES storm water permits and “implement best management practices (BMP) that effectively reduce or prevent the discharge of pollutants into receiving waters.” (EPA) Small municipalities are also required to create measurable goals and regularly evaluate the effectiveness of the program. Included in the NPDES Phase II requirements are six minimum control measures:

- Public Education and Outreach,
- Public Participation and Involvement,
- Illicit Discharge Detection and Elimination,
- Construction Site Runoff Control,
- Post-Construction Runoff Control, and
- Pollution Prevention and Good Housekeeping.

The purpose of these minimum control measures is to effectively reduce the discharge of pollutants into water bodies. When these measures are correctly and systematically implemented the desired outcome of less polluted waters should result. Additionally, the NPDES Phase II regulations have outlined applicable standards that describe the purpose of a stormwater management program. These standards expect small municipalities to:

- Reduce the discharge of pollutants to the “maximum extent practicable,”
- Protect water quality, and
- Satisfy the appropriate water quality requirements of the Clean Water Act.

After obtaining a storm water permit a small municipality has the time allowed to develop and fully implement a stormwater management program. The stormwater management plan should address the six minimum control measures and adhere to the applicable standards to remain consistent with NPDES Phase II regulations. Using the Model Urban Runoff Program as framework for creating the Morro Bay Urban Runoff Program we followed we have considered these requirements and developed recommendations accordingly. The MURP determines that the six minimum control measures as defined by NPDES Phase II comprise the minimum Urban Runoff Program. Additionally, the MURP recommends that BMPs should be implemented within each of the six minimum control measures. Clearly, the NPDES Phase II regulations work in conjunction with the development and implementation of an Urban Runoff Program. As we develop the MBURP it is important to adhere to the existing regulations and standards addressed by NPDES Phase II. Thus, as the deadline approaches small municipalities, the City of Morro Bay should be well prepared for meeting the national requirements.
Disclaimer
The City and Regional Planning students of California State University Polytechnic, San Luis Obispo, prepared this document. The information contained within the Morro Bay Urban Runoff Program is not legally binding and holds no precedence over an Urban Runoff Program implemented by the City of Morro Bay.
Urban Runoff Program
Recommendations

This section of the document identifies the recommendations we have developed and suggest for the City of Morro Bay. Included in our recommendations is an approach to implement a funding mechanism for Morro Bay’s Urban Runoff Program.
URBAN RUNOFF PROGRAM RECOMMENDATIONS

Watershed Planning

Watershed Planning is a considerably important watershed protection tool as it provides a city with the opportunity to address specific water quality issues and offers the opportunity to develop a program to remedy problems. The natural and built environments are shaped by the decisions implemented through watershed planning. For example, conventional zoning in combination with local codes can limit development density and often require parking requirements that create vast amounts of impervious surface cover resulting in undesirable polluted runoff (BASHNAA, 1999). Watershed Planning considers water resources as a determining factor in regulating zoning. Particularly, areas zoned as industrial or commercial require specific attention due to excess pollutants that may seriously impact on sensitive areas. The Rapid Watershed Planning Handbook states an objective of watershed planning as critical analysis of the “degree and location of future development (and impervious cover) that is expected to happen in a watershed” (2.3). Thus, watershed planning remains a significant factor in understanding the relation of zoning and impervious cover to water quality. Watershed planning techniques including watershed-based zoning, transfer of development rights, and overlay zoning provide options to address specific issues within the City. These alternatives, as described in the Rapid Watershed Planning Handbook, are described below:

- **Watershed-based zoning**
  This watershed planning technique requires an area to be divided into subwatersheds to assist in future land use decisions. Each subwatershed should be analyzed for existing conditions in addition to current and potential future development (including impervious cover). Each subwatershed should then be classified according to the amount of potential future impervious cover and future development should occur within subwatersheds as deemed appropriate. (2.5)

- **Overlay Zoning**
  Overlay zoning applies specific criteria or restrictions to a defined location allowing land use requirements to be managed in order to achieve a preferred end result. Overlay zoning allows additional standards to be implemented in a specific location without dismissing the intentions of the base zoning. (2.6)

- **Transfer of Development Rights (TDR)**
  The intention of TDR coordinates with applying watershed-based zoning. TDR provides the opportunity to restrict development in particularly sensitive subwatersheds and encourage development in appropriate subwatersheds.

Recommendations:

**WP-1** Dog parks shall be built no closer than 1,000 feet from any natural body of water. Further, native vegetation should be added and maintained in the buffers between dog parks and storm drains located on the street.
WP-2 All new industries with the potential to release heavy metal pollutants should not be allowed to operate within the Shasta St., 451 Embarcadero, Morro Blvd and Market Street areas (see Watershed Planning Map) as their storm drains are already impacted by heavy metal pollutants.

WP-3 Gasoline service stations, oil change service stations, automobile repair shops etc. shall be located 1,000 feet from any natural bodies of water.

WP-4 Newly developed parking lots greater than 10,000 sq. ft shall be located a 1,000 feet from any natural bodies of water. Existing parking lots near the bay or estuary should add and maintain native vegetated buffers.

WP-5 Parking requirements in environmentally sensitive areas shall be minimized and to be no more than 30% of the maximum site area. For sites that require more than the allocated parking, permeable paving shall be utilized.

WP-6 Parking garages shall be utilized in high-density areas and commercial regions to reduce impervious surfaces.

WP-7 Current zoning shall be changed to allow for greater building heights in order to decrease the construction of impermeable surface areas.

WP-8 Utilize Transfer of Development Rights in industrial locations adjacent to the environmentally sensitive habitats of Morro and Little Morro Creeks.
Land Conservation

An important tool for watershed management is Land Conservation that helps to maintain important ecosystems and preserve a satisfactory level of water quality.

Some of the most important types of land that may need to be conserved in a watershed are (Center for Watershed Protection, 1998):

- Critical habitats for plant and animal communities
  A critical habitat is defined as a habitat in which certain populations of animals or plants could not survive outside of that habitat. Examples of critical habitats include wetlands, habitat for rare and endangered species, and native vegetation areas.

- Aquatic corridors along streams and shorelines
  Aquatic corridors are areas where land and water interact. Floodplains, small estuarine coves, stream crossings, and steep slopes are examples of aquatic corridors.

- Hydrologic reserve areas that sustain a stream’s hydrologic regime
  Hydrologic reserves are undeveloped areas that must be kept undeveloped. These areas are nature’s method of keeping the flow of water running smoothly and in control. Examples include forests, meadow, prairies, and wetlands.

- Water hazards that pose a risk of potential pollution spill
  These particular land uses and activities create a high risk of possible water pollution. Examples of water pollution hazards include septic systems, landfills, industrial discharges, above or below ground tanks, and pesticide applications.

Land Conservation Techniques

The conservation of natural areas can be attained using a variety of land conservation techniques. The following alternatives offer a variety of methods to conserve land.

- Land Acquisitions
  Land acquisition clearly is an effective land conservation method as it assures a great degree of control over property. Land purchased from a landowner is first appraised and then assigned a market value. The seller may receive a tax incentive for selling at a price lower than market value. To ensure the purchase of a property through land acquisition, a Right of First Refusal may be signed. This is a landowner’s written promise to offer you the first opportunity to buy his land should he decide to sell.

- Conservation Easement
  A conservation easement is a legal agreement between the landowner and trust agency to permanently protect land while under ownership of the landowner. However, easements can either allow the easement holder to do something on the property such as a creek restoration project or easements could possibly restrict the landowner from activities on the property such as developing the land. Conservation easements are generally included in a Land Enhancement Plan, which identifies
problem areas and determines corrective measures. Conservation easements are used in conjunction with the Land Easement Plan to acquire and then restore the land.

- **Regulate Land Alteration**
  In regulating land alteration, usually through the permit process, a city may set restrictions on development within its jurisdiction. Examples include growth management ordinances and land use laws.

- **Exclusion or Setback of Water Pollution Hazards**
  The identification of pollution sources and determination of prevention methods assist in developing wise land use decisions. Certain land uses or activities that create a water pollution hazard may be excluded. Conversely, specific setbacks for other land uses or activities creating water pollution hazards may require a setback from sensitive areas such as requiring buffers around wetlands. Hazards be kept under close watch because they have the potential of creating significant damage to the environment and to people’s health.

- **Landowner Stewardship**
  Landowner stewardship is an agreement arranged with the landowner and an agency as a personal commitment by a landowner to maintain land under good management practices developed by an agency. Money, information, and expertise are provided by the agency to ensure good management. An agency that provides fencing to prevent livestock from entering a creek on the landowner’s property is an excellent example of land stewardship.

**Recommendations:**

**LC-1** Determine and purchase land that would be appropriate to acquire through land acquisition.

**LC-2** Implement a Land Enhancement Plan including plans for conservation easements.

**LC-3** Establish and enforce applicable land use laws or policies to regulate development.

**LC-4** Exclude land uses or activities that create hazardous water pollution or implement protective measures such as buffers or setbacks.

**LC-5** Promote good land management practices through the implementation of landowner stewardship.
Aquatic Buffers

A certain distance should be maintained from the watershed where development and activities can be restricted, prohibited, or monitored through the use of setbacks and vegetation in order to prevent urban runoff and other contaminants from entering a watershed. These measures are typically known as aquatic buffers. Aquatic buffers serve as natural boundaries between local waterways and existing development. They help protect water quality by filtering pollutants, sediment, and nutrients from runoff. Additional benefits of aquatic buffers include flood control, stream bank stabilization, stream temperature control, and room for lateral movement of the stream channel. Good aquatic buffer ordinances specify the size and management of the stream buffer and are a specific planning tool to protect stream quality and aquatic habitat (EPA, 1999).

According to the EPA’s website Aquatic Buffers, buffers adjacent to streams and coastlines serve a multitude of useful purposes, such as:

- Restoring and maintaining the chemical, physical, and biological integrity of the water resources,
- Removing pollutants delivered from urban stormwater,
- Reducing erosion and sediment entering the stream,
- Stabilizing stream banks,
- Providing infiltration of stormwater runoff,
- Maintaining base flow of streams,
- Contributing the organic matter that is a source of food and energy for the aquatic ecosystem,
- Providing tree canopy to shade streams and promote desirable aquatic organisms,
- Providing riparian wildlife habitat, and
- Furnishing scenic value and recreational opportunity.

Currently, the City of Morro Bay’s Municipal Zoning Ordinance, section 17.40.040 requires buffers surrounding wetlands and non-urban streams to be a minimum of 100 feet, and buffers surrounding urban streams to be 50 feet. Although this method can be somewhat effective, the Environmental Protection Agency has detailed a “model ordinance to protect local resources” which has been adapted by cities nationwide. One particular suggestion of this model ordinance which is especially pertinent to reducing pollutants introduced into watersheds through urban runoff is to use a “three zone buffer system” which separates an aquatic buffer setback into three distinct zones in which varying uses are allowed. (See figure).

A typical model of the three zone buffering system is defined below:

- Zone 1: Streamside Zone
  This zone begins at the edge of the stream and typically extends a distance such as 25 feet. Since this area is directly adjacent to the stream, it is the most sensitive and thus is most highly protected. Uses in this zone are often restricted to measures for flood control and foot and automobile crossings. Ideally, streamside vegetation should be undisturbed.
The three zone urban stream buffer system area

Source: (Welsch, 1991)

- **Zone 2: Middle Zone**
  The middle zone requires a distance between development and the waterway. It typically begins from the streamside zone extending at least 50 feet. The allowed uses in this zone usually include biking and hiking paths, stormwater management facilities, or other recreational uses.

- **Zone 3: Outer Zone**
  This zone helps filter the initial runoff from residential and commercial development. It typically begins from the middle zone extending 25 feet. It “restricts septic systems, permanent structures or impervious cover, with the exception of paths, and encourages the planting of native vegetation to increase the total width of the buffer” (EPA).

  The effectiveness of buffering systems can be positively impacted by factors such as permeable but not sandy soils, slopes less than 5 percent, presence of organic matter, and dense grass covers or other vegetation. Some factors that impede the performance of aquatic buffers are compacted soils, slopes greater than 5 percent, ice covers or snowmelt conditions, and sparse vegetative cover.

  This model is not meant to be comprehensive; it is only to be used as a suggestion to guide urban development. According to the EPA, “although a three-zone buffer system is highly recommended, the widths and specific uses allowed in each zone may vary between jurisdictions.” But with proper research and management, buffering systems around urban streams can reduce the amount of pollutants significantly.

**Recommendation:**
**AB-1** Establish a three zone buffer system along the creeks of Morro Bay.
Site Design

There are a variety of possible methods to control stormwater and urban runoff through site design. Some of these techniques are expensive, but some are relatively inexpensive that may even increase the property value. Conveyance and infiltration are two approaches to controlling runoff through site design. Conveyance entails moving the water off the site into stormwater and sewer systems. Infiltration requires moving the stormwater into the soil. Through various site design features we can utilize one of these methods to manage urban runoff.

The initial process in site planning is to define boundaries and the development envelope. Set backs, preservation of significant vegetation, and erosive soils and slopes are some of the factors that determine the development envelope. In developing the site, impervious areas directly connected to the storm drain system must be minimized since they are the greatest contributors to non-point source pollution. A basic site planning principle is to limit the overall impervious land coverage or directing the runoff to small permeable depressions (Richman, 1999).

An important factor in site design is maximizing permeability. Minimizing impervious areas, using permeable paving materials, clustering buildings, and reducing building footprint are all methods that will contribute to increasing permeability. In addition to the environmental and aesthetic benefits, this allows for the reduction or elimination of expensive underground storm drain systems. Another element in good site design is to use drainage as a design element. The drainage system can suggest pathway alignment and location of parks and play areas (Richman, 1999).

Parking and Driveways

Driveways can comprise up to 40 percent of the total transportation network in a conventional development. Streets, turn-arounds, and sidewalks comprise the remaining 60 percent. Driveways offer a relatively simple opportunity to improve both aesthetics and permeability of residential developments (Richman, 1999, 64-6). The following are recommendations relevant to parking and driveway issues.

Recommendations:
(Richman, 1999)

SD-1 Driveways to garages that are set back from the street should remain narrow and maximize the use of permeable surfaces.
SD-2 Cities should allow tandem parking in driveways if not already applicable.
SD-3 If possible two garages should share one driveway, maximizing the lot by sharing the driveway with a neighbor.
SD-4 Rear alleys that are covered with permeable surfaces also cut down on total surface cover and maximize permeability.
SD-5 Slope the paving surface to a ground cover area as opposed to a stormwater drainage system.
SD-7 Maximize crushed aggregate and pavers on sand.
SD-8 Only pave under the wheel surface to reduce surface coverage by 60-70 percent.
SD-9 Use flared driveways at the entrance of two car garages.
Structures
Buildings offer numerous opportunities to improve runoff conditions as well. The design of the building has a direct effect on how much surface area is covered. A thousand square foot two story building covers half as much surface area of a thousand square foot one story building (Richman, 1997). Making a footprint of a building smaller can help with runoff and should be considered in future development. The proper selection of building materials can also improve runoff conditions. The following are recommendations specific to structures.

Recommendations:
(Richman, 1999)
SD-10 If a gutter or downspout system is being used to catch rainwater, roof runoff that is concentrated, then a dry-well or cistern can be used to handle the water. A dry-well is constructed by digging a hole at least 10 feet from the foundation and filled with graded aggregate. Water is stored in the dry-well and slowly allows water to infiltrate the soil.
SD-11 Buildings that do not use a gutter system can optimize stormwater infiltration by landscaping around the base of eaves. The plants must be strong enough to endure heavy runoff and periodic soil saturation. Planting around the house can prevent soil erosion from concentrated sheet flows coming off the roof. In natural landscapes soil infiltration is relatively high due to biological activity that builds soil porosity. Through urbanization we must maximize the remaining non-covered surfaces by a few simple landscaping techniques.
SD-12 Grass vegetated swales can be used in residential and parking areas. By making these surfaces concaved instead of convex like they are generally planned, water can drain to these areas and pollution can absorb thought the soils and be removed. Some drainage may be needed to handle extensive rain periods. Some maintenance may need to occur on your site such as clearing of drains and proper mulching to protect plant roots. Woodchips and other mulching materials help retain water on the surface where most plants require water.
SD-13 Avoid using separators such as diesel and petroleum products when working with concrete.
SD-14 Avoid using railroad ties and materials that have been pressure treated in wood preservatives.
SD-15 Avoid roofing materials that cause polluted runoff. Use materials such as slate, steel, stone, and terra cotta tiles.
SD-16 Test for lead in paints before removal to prevent lead chips from landing on and leaching into the soil.

Outdoor Work Areas
Polluted runoff can be prevented from outdoor work areas such as loading docks, fuel areas, and equipment washes by the use of conveyance methods. Instead of soil infiltration, conveyance collects and conveys the runoff directing it to a sewer system. If designed properly, outdoor work areas can reduce impacts on stormwater quality and sewage treatment plants (Richman, 1999). The following are a list of actions recommended for outdoor work areas:
**Recommendations:**
(Richman, 1999)
SD-17 Create an impermeable surface to avoid infiltration.
SD-18 Cover outdoor work areas with a roof. This prevents rainwater from becoming polluted runoff.
SD-19 Curb around the perimeter of the area to prevent water from entering the site.
SD-20 Directly connect runoff from outdoor work areas to a sewer. Approval must be obtained from the appropriate sanitary sewage agency.
SD-21 Locate outdoor work areas away from storm drains or catch basins.

- **Fueling Stations**
  Fueling stations have special guidelines that should be followed and should be focused on. These are described in a Best Management Practice Guide for retail gasoline outlets developed by the California Stormwater Quality Task Force, in cooperation with major gasoline corporations (Richman, 1999, 78).

- **Drainage System Design** (Richman, 1999, 34)
  The drainage system design process, as laid out by the Bay Area Stormwater Management Agencies Association, is a four-step process. The first step involves minimizing the Directly Connected Impervious Area (DCIA) of the site. Impervious area is considered disconnected if “intervening impervious areas receiving runoff (p) … [are] at least one half the size of the areas generating runoff (i) In terms of a formula then, p ≥ ½ i. The next step is to “identify DCIA requiring treatment.” Under some circumstances all of the runoff may not require treatment. The third step is to “select stormwater quality controls for the remaining impervious area.” The main stormwater quality controls that might be used are infiltration, detention / retention and bio-filters. The fourth and final step is to “integrate stormwater quality controls into the site design.”

  An understanding of various site conditions is necessary when determining what stormwater quality controls is appropriate for the site. Local climate is important because it affects the type of vegetation that can be used in the controls. It is important to know what types of soils are present on the site. The degree of permeability of the soil is a very important factor in determining which controls to use. Erosion is also an important factor. Erosion can cause the stormwater controls in place to function inefficiently or not at all. The slope of the site will also determine which stormwater quality controls may be used. All of these considerations should be taken into mind when designing a runoff plan for a site.

- **On-Site Structures**
  As mentioned above, the main stormwater controls are infiltration, detention/retention, and bio-filters. Infiltration is a process that seeks to move the stormwater into the unsaturated soil. Infiltration uses ponds and other means infiltrate water into the unsaturated soil. Soil type usually determines whether infiltration can be used. It cannot be used if the soil relatively impermeable (Richman, 1999). Selection of plant species can improve the infiltration process. “Deep rooted plants help to build soil porosity. Plant leaf-surface are helps to collect rainwater before it lands on the soil, especially in light rains, increasing the overall water-holding potential of the landscape.” (Richman, 1999, 71) Retention and detention basins differ
from infiltration in that their goal is not to introduce stormwater into the soil, but rather to hold it for later release. Detention basins hold the water until after the storm and then remain dry until the next storm. Retention basins permanently hold some degree of water (Richman, 1999). Retention and detention are most often used when soil is less permeable. Bio-filters (also called vegetated swales) attempt to move the water slowly at shallow angles so that it has opportunity to infiltrate the unsaturated soil (Richman, 1999). It is very important that slow shallow sheet flow be maintained. It may also be desirable to use wetland vegetation in the bio-filter. For example, reeds filter out much of the phosphorous in water. Soil type will also dictate whether a bio-filter may be used (Richman, 1999).

**Recommendations:**

**SD-22** The use of detention/retention ponds and bio-filters can be used where suitable in site design process.

**SD-23** Use a dual drainage system in roads and provide a concave median.

**SD-24** Provide a landscaped infiltration/detention basin in the middle of cul-de-sac.

**SD-25** Construct barriers such as landscape graduations along busy edges.

**SD-26** Maximize the retention of existing vegetation by minimizing the building area of a site with small building footprints (Hyde, 48).

**SD-27** Protect and restore ecology within the city by “greening the city.” This means creating a green environment with fruit tree-lined street, a creek meandering through an urban neighborhood, geraniums and basil adorning a window box, wildflowers blossoming amid rows of houses, and tomato plants growing in a community garden (Roseland, 40).
Erosion and Sediment Control

Erosion is the detachment of particles of soil and surface sediments and rocks, occurs by hydrological (fluvial) processes of sheet erosion, rilling and gully erosion, and through mass wasting and the action of wind (GCRIO, 2000). Erosion, both fluvial and wind is generally greatest in dry regions, where soil is poorly developed and there is little protection by vegetation. Soil erosion is a significant social and economic problem as well as an essential factor in assessing ecosystem health and function. Estimates of erosion including sediment transport and storage in lowlands, reservoirs, estuaries, and irrigation and hydropower systems are essential to issues of land and water management. In the USA, soil erodes at about 17 times the rate at which it forms (GCRIO, 2000). Erosion is a natural process that is strongly modified by human activities. The purpose of applying erosion and sediment control as a tool to avoid polluted runoff is to reduce the impact of erosion during construction. Additionally, conservation areas and buffers should be protected during the construction process.

Runoff provides an important transporting medium for a wide range of chemical pollutants that are carried by the moving water (GCRIO, 2000). As runoff occurs, less water enters the ground and resulting stream sediment degrades water supplies for municipal and industrial use. As a result, increased turbidity of coastal waters due to sediment load may adversely affect water organisms.

Land degradation is caused by the deposition of eroded soil particles with absorbed contaminants, can endanger entire ecosystems along continental margins, in estuaries, wetlands and bottomlands, and on other areas of low slope angle (GCRIO, 2000). Soil erosion both affects and is affected by vegetation and crop cover. Monitoring soil and sediment erosion is extremely important in determining rates of land degradation (GCRIO, 2000).

Control practices for sediment and erosion should be applied prior to, during, and following construction phases; temporary and permanent mitigation measures should be implemented. Road stabilizers, sediment barriers, dikes, sediment traps, flumes, and protection of waterway outlets are examples of structural improvements to lessen the impact of erosion. Vegetative practices include grass establishment, mulches, and various vegetative controls to stop erosion (Stormwater Management Practices, 6-5).

Vegetative barriers are good for both permanent and temporary measures to slow erosion. For example, sod is an extremely fast way to stop eroding soil as well as adding easy aesthetic value to the area. Root structures from the sod hold soil together so that water or wind does not carry it away. Vegetative barriers are cost effective and quick ways to stop erosion and make an area more beautiful.

Structural barriers are just as effective as vegetative barriers depending on the situation in which it is used. Sediment traps or temporary sediment fencing, for example, hold sediment so it will not flow out of the area. Most structural barriers are concrete man made structures, although natural barriers such as large rocks and stones could serve the same purpose.

The following methods derived from Stormwater Management Practices are appropriate methods to lessen the impact of erosion:
Recommendations:

ES-1 Temporary Gravel Construction Entrance: A gravel pad, located at points of vehicular ingress and egress on a construction site, to reduce the mud transported onto public roads and other paved areas.

ES-2 Construction Road Stabilization: Temporary stabilization with stone of access roads, subdivision streets, parking areas and other traffic areas immediately after grading to reduce erosion caused by vehicles during wet weather, and to prevent having to re-grade permanent roadbeds between initial grading and final stabilization.

ES-3 Straw Bale Barrier: A temporary sediment barrier composed of straw bales placed across or at the toe of a slope to intercept and detain sediment and decrease flow velocities from drainage areas of limited size; applicable where sheet and rill erosion from low to moderate channel flows may be a problem. Maximum effective life is 3 months.

ES-4 Silt Fence: A temporary sediment barrier constructed of posts, filter fabric and, in some cases, a wire support fence, placed across or at the toe of a slope or in minor drainage way to intercept and detain sediment and decrease flow velocities from drainage areas of limited size; applicable where sheet and rill erosion or small concentrated flows may be a problem. Maximum effective life is 6 months.

ES-5 Brush Barrier: A temporary sediment barrier composed of limbs, weeds, vines, root mat, soil, rock and other cleared materials pushed together to form a berm; located across or at the toe of a slope to intercept and detain sediment and decrease flow velocities.

ES-6 Storm Drain Inlet Protection: The installation of various kinds of sediment trapping measures prior to permanent stabilization of the disturbed area; limited to drainage areas not exceeding one acre, and not intended to control large, concentrated stormwater flows.

ES-7 Temporary Diversion Dike: A ridge of compacted soil located at the top or base of a sloping disturbed area to divert off-site runoff away from unprotected slopes and to a stabilized outlet, or to divert sediment-laden runoff to a sediment trapping structure. Maximum effective life is 18 months.

ES-8 Temporary Fill Diversion: A channel with supporting ridge on the lower side cut along the top of an active earth fill to divert runoff away from the unprotected full slope to a stabilized outlet or sediment trapping structure; applicable where the area at the top of the fill drains toward the exposed slope and continuous fill operations make the use of a temporary diversion dike unfeasible; maximum effective life is one week.

ES-9 Temporary Right-Of-Way Diversion: A ridge of compacted soil or loose gravel constructed across a disturbed right-of-way or similar sloping area to shorten the flow length within the disturbed strip and divert the runoff to a stabilized outlet. Earthen diversions are applicable where there will be little or no construction traffic within the right-of-way, and gravel structures are applicable where vehicular traffic must be accommodated.

ES-10 Diversion: A permanent channel with a ridge on the lower side constructed across a slope to reduce slope length and intercept and divert stormwater runoff to a stabilized outlet to prevent erosion on the slope.
ES-11 Temporary Sediment Trap: A small ponding area, formed by constructing an earthen embankment with a gravel outlet across a drainage swale, to detain sediment-laden runoff from small-disturbed areas for enough time to allow most of the sediment to settle out. Maximum effective life is 18 months.

ES-12 Temporary Sediment Basin: A basin with a controlled stormwater release structure, formed by constructing an embankment of compacted soil across a drainage way, to detain sediment-laden runoff from disturbed areas greater than 5 acres for enough time to allow most of the sediment to settle out. Can be constructed only where there is sufficient space and appropriate topography. Maximum effective life is 18 months unless designed as a permanent pond by a qualified professional engineer.

ES-13 Temporary Slope Drain: A flexible or rigid tube or conduit, used before permanent drainage structures are installed, intended to conduct concentrated runoff safely from the top to the bottom of a disturbed slope without causing erosion on or below the slope.

ES-14 Paved Flume: A permanent concrete-lined channel constructed to conduct concentrated runoff from the top to the bottom of a slope without causing erosion on or below the slope.

ES-15 Stormwater Conveyance Channel: A permanent channel designed to carry concentrated flows without erosion. Applicable to man-made conveyances, including roadside ditches, and to natural channels that need modification to accommodate increased flows generated by land development, but not applicable for stormwater treatment.

ES-16 Outlet Protection: The installation of paved and/or riprap channel sections and/or stilling basins below storm drain outlets to reduce erosion from scouring at outlets and to reduce flow velocities before stormwater enters receiving channels below these outlets.

ES-17 Riprap: A permanent, erosion-resistant ground cover of large, loose, angular stone usually underlain by erosion matt or filter fabric expected vegetative cover, etc., are such that soil may erode under design flow conditions.

ES-18 Check Dams: Small, temporary dams constructed across a drainage ditch to reduce the velocity of concentrated flows, reducing erosion of the swale or ditch. Limited to use in small open channels draining 10 acres or less; should not be used in live stream.

ES-19 Waterway Drop Structure: A permanent structure or series of structures designed to step water flow down a slope without causing channel erosion; applicable in natural or man-made channels with long, relatively step reaches.

ES-20 Level Spreader: An outlet for dikes and diversions consisting of an excavated depression constructed at zero grade across a slope to convert concentrated, sediment-free runoff to sheet flow and release it onto areas of undisturbed soil stabilized by existing vegetation.

ES-21 Subsurface Drain: A perforated conduit installed beneath the ground to intercept and convey groundwater. Prevents slopping soils from becoming excessively wet and subject to sloughing, and improves the quality of the vegetative growth medium in excessively wet areas by lowering the water table. Can also be used to drain detention structures.
ES-22 **Surface Roughening**: Grading practices such as stair-stepping or grooving slopes or leaving slopes in a roughened condition by not fine-grading them. Reduces runoff velocity, provides sediment trapping and increases infiltration, all of which facilitate establishment of vegetation on exposed slopes. Applicable to all slopes steeper than 3:1 or that has received final grading but will not be stabilized immediately. Also recommended for other exposed slopes. 

ES-23 **Topsoiling**: Preserving and using topsoil to provide a suitable growth medium for vegetation used to stabilize disturbed areas. Topsoiling is applicable where preservation or importation of topsoil is the most cost-effective method of providing a suitable growth medium; not recommended for slopes steeper than 2:1. 

ES-24 **Temporary Seeding**: Establishment of temporary vegetative cover on disturbed areas by seeding with appropriate rapidly-growing plants on sites that will not be brought to final grade for periods of 30 days to one year. 

ES-25 **Permanent seeding**: Establishment of perennial vegetative cover by planting seed on rough-graded areas that will not be brought to final grade for a year or more or where permanent, long-lived vegetative cover is needed on fine-graded areas. 

ES-26 **Sodding**: Stabilizing fine-graded areas by establishing permanent grass stands with sod. Provides immediate protection against erosion areas where immediate aesthetic effect is desirable.
Stormwater Best Management Practices

Upon implementation, Best Management Practices (BMPs) provide the opportunity to protect water quality and prevent polluted urban runoff. The intention of BMPs as stated by the Rapid Watershed Planning Handbook is to “delay capture, store, treat, or infiltrate stormwater runoff” (2.20). The BMPs recommendations in this section exclude the specific issues and recommendations addressed in the sections of site design and sedimentation. BMPs concerning those matters can be found under their respective areas of this plan. Best management practices under this section, however, address structural and non-structural solutions concerning municipal programs, housekeeping techniques, and mechanical devices. As suggested in the California Stormwater Best Management Practices Handbook (1993, 4-14), housekeeping practices are likely to have a significant impact on the surrounding environment reducing excessive sedimentation, nutrients, toxic metals, oil and grease, and oxygen demanding substances. Other practices helpful in reducing excessive sedimentation, nutrients, and toxic metals are also dealt with in the Morro Bay Natural Estuary Program’s Comprehensive Conservation Management Plan (1999) (see MBNEP section of this plan for further reference).

Non-structural Stormwater BMPs

Non-structural Stormwater BMPs are practices that are intended to improve runoff quality by reducing the generation and accumulation of potential stormwater runoff contaminants at or near their source (The Florida Development Manual: Stormwater Management Practices, 6-1).

Recommendations:

BMP-1 Create volunteer work forces to stencil storm drain inlets, catch basin, channels, and creeks with prohibitive language and graphic icons that discourages the illegal dumping of unwanted materials. Also display signs near drainage channels and creeks to create public awareness (CSBMP Handbook 1993, 4-23).

BMP-2 Maintain catch basin and storm drain water inlets on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, and restore the catch basins' sediment trapping capacity (CSBMP Handbook 1993, 4-67).

BMP-3 Aggressively enforce anti-littering and illegal dumping ordinances. Clean catch basins regularly to reduce the possibility of sediment and pollutant loading from the flushing effect of storm water inflow (CSBMP Handbook 1993).

BMP-4 Manage the use of fertilizer to keep it on the land and out of waterways through creating public awareness via reminders enclosed with water and sewer bills, notices to institutions and businesses, soil testing to assure the use of optimum lime and fertilizer application rates, and proper timing of fertilizer applications.(Florida Development Manual: Stormwater Management Practices, 6-10).

BMP-5 Implement routine management and handling of urban refuse, litter and fallen leaves in ways that will prevent water pollutants (Florida Development Manual, Stormwater Management Practices, 6-2).

BMP-6 Promote proper cleanup, storage, and use of potentially harmful materials (i.e.
fertilizers, pesticides, cleaning solutions, paint products, automotive products, and swimming pool chemicals). Advocate safer alternative products, hazardous wastes collection sites/centers, recycling centers for used oil, vehicle leakage and spillage control, and aboveground tank leakage and spillage control to reduce hazardous runoff into stormwater (CSBMP 1993, 4-14).

**BMP-7** Conduct street cleaning regularly in order to reduce the pollution of stormwater from street surfaces (CSBMP, 1993, 4-64).

**BMP-8** Implement mechanical vegetation control that includes leaving existing vegetation, cutting less frequently, hand cutting, planting low maintenance vegetation, and properly disposing of clippings and cuttings (CSBMP, 1993, 4-69).

**Structural Stormwater BMPs**

Structural Stormwater BMPs are physical elements incorporated into the physical environment that intend to improve runoff quality by controlling and preventing polluted urban runoff.

**Recommendations:**

**BMP-9** Catch stormwater and filter pollutants through the use of infiltration trenches and basins. Prevent clogging infiltration trenches with a wide vegetation buffer to catch solids (Field, 1993). In residential areas the vegetation buffer can be incorporated into front yards.

**BMP-10** In high pollution areas install conventional flow regulators for combined sewer overflow control in storm sewers to divert the first rain runoff to existing sewage to treatment plant or to a storage facility for dry weather treatment (Field, 1993).

**BMP-11** Install oil /grit separators, in ground structure designed to remove sediment and hydrocarbons from urban runoff, at stormwater system street inlets in high traffic areas, industrial areas, and inlets near Highway 1, and in areas with high potential of petroleum spills (Minnehaha Creek Watershed District, 2001).
**BMP-12** Add catch basins inserts to all storm drains to filter pollutants and sediments (Pollution Prevention, 2001).

**BMP-13** Create a city maintained municipal wet pond in South Morro Bay where older development did not require the use of drainage basins. A municipal drainage basin allows particulate pollutants to settle out and dissolve pollutants to be removed by biological uptake or other decay process (Field, 1993, 192).

**BMP-14** Implement bio-retention systems on Embarcadero Street and in commercial and residential areas. A bio-retention system is a plot of land consisting of a layer of made soil: mulch and plantings. The plot is designed to appear as a natural and appealing landscaped area. Stormwater enters the bio-retention area and is temporarily stored in a shallow pond on top of the mulch layer. The pond water then filters downward through soil and is absorbed through plantings. Excess water is collected by an under drainpipe and discharged to an existing stormwater pipe (City of Greensboro, 2001).
Non-Stormwater Discharges

Most non-stormwater discharges are strictly governed under the National Pollutant Discharge Elimination System (NPDES) requiring a state or federal permit. The basic kinds of non-stormwater discharges in a subwatershed are septic systems, sanitary sewers (Center for Watershed Planning):

Septic Systems (on-site sewage disposal systems) are used to treat and discharge wastewater from toilets, washbasins, bathtubs, washing machines, and other water consumptive items that can be sources of high pollutant loads. One out of four homes in the country uses a septic system, collectively discharging a trillion gallons of wastewater annually. Unlike other non-stormwater discharges, septic systems are not regulated under NPDES, but are approved by local and state health agencies (SWMRC, 1999).

Sanitary sewers collect wastewater in a central sewer pipe and send it to a municipal treatment plant. Ideally, this permits more efficient collection of wastewater, and often greater levels of pollutant reduction. The extension of sanitary sewer lines is not without some risk, however, as it has the potential to induce more development than may have been possible in a watershed previously served only by on-site sewage disposal systems (particularly when soils are limiting). In addition, not every sanitary sewer conveyance and treatment systems are capable of achieving high levels of pollutant reduction (SWMRC, 1999).

A planner should also investigate whether other non-stormwater discharges are a factor in the subwatershed. Examples include industrial NPDES discharges, urban "return flows" (discharges caused by activities such as car washing and watering lawns), water diversions, and runoff from confined animal feeding lots (SWMRC, 1999).

Recommendations:

NSD-1 The City can identify and prioritize areas to focus its program in several different ways. It can conduct a field investigation of all storm system outfalls during the dry season, which can point out outfalls of concern. May need to repeat this investigation a few times because discharges tend to be intermittent. The city can also rely on land use information and its storm drain master plan to determine potential areas of illicit connections and discharges. Using the map the city can mark out outfalls that are associated with industrial/commercial areas and/or older section of the city, then identify the areas that drain to those outfalls and note the businesses located within the marked areas (MURP, 1998).

NSD-2 Track flows back to potential dischargers and conduct aboveground inspections. Signs of an illicit connection include abnormal water flows during the dry season, any unusual flows in subdrains used for dewatering, pungent odors, discoloration or oily substances in the water, or stains and waste residue in ditches, channels, or drain boxes (MURP, 1998).
Water Quality Monitoring

There are many local agencies currently monitoring different areas of Morro Bay. The following programs are currently in place to monitor the nutrients, heavy metals, bacteria, fresh water flow, habitat, and sedimentation:

Nutrients:
- National Monitoring Program
- Efficient Water Management Practices
- Training and Education Program

Heavy Metals and Toxics:
- City Storm Drainage Plan
- Environmental Monitoring Programs
- City storm Drain Master Plan
- CCC Urban Model Urban Runoff Program
- California Department of Pesticide and Regulations

Bacteria:
- City Waste Water Management Programs
- City Sewer Master Plan
- County Waste Management

Freshwater Flow:
- SLO County Estero Area Plan
- City of Morro Bay Master Water Plan
- County Flooding and Drainage Permits and Programs
- Stream Watershed Planning and Restoration
- Water Rights
- Take of Fish and Wildlife Programs

Habitat:
- City Waterfront Master Plan
- County Development Review
- County Parks Development Plan

Sedimentation:
- County Development Review
- County Drainage Plan Review
- Non-point source management
- USFS Los Padres National Forest Plan

Water quality monitoring implementations for Morro Bay have issues concerning runoff, which have high levels of metals, and bacteria that run off into Torro Creek, Morro Creek, Little Morro Creek, and Chorro Creek. The Central Coast Regional Water Quality Board (CCRWQB) goal is addressed in Chapter 5.3.
The goal requires the monitoring of the implementation of CCMP actions and the health of the Morro Bay ecosystem (CCRWQCB, 1999). The Regional Water Quality Board has goals and program objectives. The program objectives are found in Chapter 6 Surveillance and Monitoring under the first section, which lists the objectives of the RWQCB. The goal of the RWQCB is to provide an overall, continuing assessment of water quality in the state. This goal is to be achieved by statewide monitoring of water quality parameters that can affect beneficial uses of state waters. Toxic Substances Monitoring and the State Mussel Watch program are also included in the goal (Regional Water Quality Board September 8, 1994).

**Recommendations:**

- **WQM-1** Monitor water quality of storm water run off for storm drains.
- **WQM-2** Work with other organizations such as the Central Coast Regional Water Quality Board.
- **WQM-3** Monitoring programs can be “piggybacked” with existing events such as National Coastal Clean Up Day, which takes place every September (Model Urban Runoff Program, 1998).
- **WQM-4** Implement a volunteer monitoring program for the city that encourages public involvement and support for monitoring urban runoff.
Funding Mechanisms

Stormwater Utility Service Fees are an innovative approach to providing funding for stormwater management programs. This form of funding is becoming popular throughout the nation; “in the early 1970s there were only one or two true storm water utilities in existence In the early 1990s there were over 200 storm water utilities. This number is expected to more than triple in the next decade as the financial impacts of stormwater quality legislation reach the many small municipalities” (Debo, 80). The Stormwater Utility Service Code, currently existing in Orlando, Florida, identifies significant components in developing a stormwater management program (Orlando). These objectives are to design a stormwater master plan, reduce stormwater runoff problems, encourage and facilitate urban water resources management techniques, and implement reasonable stormwater fees. Certainly, funding remains necessary to develop a novel program within a community. Stormwater Utility Service Fees provide an attractive alternative to collect the necessary funding in order for the city to provide necessary actions in alleviating the problems generated by urban runoff.

Each city may develop its own method of calculating a Stormwater Utility Service Fee. Several methodologies have been applied in cities where this utility fee currently exists. Debo further explains, “No two utilities are identical just as no two communities are just alike. Therefore it is not prudent to follow a pre-fabricated ‘one size fits all’ approach, but seek to carefully understand the make-up of the community’s stormwater systems, capabilities and issues” (81). The most common methods are as follows:

- **Flat rate fee**
  This simplistic method of implementing a Stormwater Utility Service Fee is straightforward. The city defined each property within its jurisdiction as residential or non-residential. Then the city assigns a flat rate fee to each category. For example, in Eustis, Florida, the city decided that each residential property pay $3.00 per month and each non-residential property pay $6.00 per month. The advantage to this alternative is obvious; the method of calculation is not complex. However, it is unfavorable to the city because it may not meet the financial demand of maintaining a stormwater management program.

- **Fee based on impervious area**
  Many cities currently enforcing a Stormwater Utility Service Fee appear to use this method of calculation. Initially, the city must determine its Equivalent Residential Unit (ERU). The ERU is “a unit of measure (the weighted average of impervious area) which provides a basis for comparing the runoff generated by one parcel with that generated by another” (Orlando). For example, Miami-Dade County defined the weighted average of impervious area as 1,548 square feet. Then the city must assign a rate for one ERU and divide the billing into categories, usually defined as residential and non-residential properties. “The fee could then be calculated by determining the impervious area of each parcel of land; divide it by the value assigned to one ERU, which would be 1,548 square feet in Miami-Dade County. Multiply the answer by the monetary rate assigned for one ERU. The result is the monthly fee for the property” (Miami-Dade).
Additionally, it would be at the discretion of the city to determine if both residential and non-residential properties would pay the fees as calculated above. However, it is an alternative to consider each residential property as one ERU and use the above formula only for calculating fees for non-residential properties. The advantage of basing fees on impervious area is that the property owners within the city are paying a fair amount for their contribution to the city’s urban runoff problems. However, it requires more effort on behalf of the city to determine and implement the Stormwater Utility Service Fee for each property.

Stormwater Utility Service Fees can be enforced through the existing local government structure. The program could be implemented through a Utility Bureau in the Department of Public Works. The program currently existing in Orlando rests on the responsibilities of “planning, developing, and implementing stormwater management plans; financing, constructing, maintaining, rehabilitating, inspecting, and managing existing and new stormwater facilities; collecting fees and charges for the utility division; implementing and enforcing the provisions of this Code; and other related duties upon the City Engineer and City Finance Director as directed by the Public Works Director” (Orlando). Stormwater Utility Service Fees can be billed to each property owner either on existing utility bills or as a separate bill.

Clearly, in developing a stormwater management program the city has many opportunities and powers to tailor the program to fit its unique needs and desires. Cities with existing programs offer information about how the program is implemented and enforced.

**Recommendation:**
**FM-1** Implementation of a Stormwater Utility Service Fee in the City of Morro Bay.
Citizen Participation

This section of the Morro Bay Urban Runoff Program addresses two specific minimum control measures, Public Participation/Involvement and Public Education and Outreach by developing a program to encourage citizen participation throughout the progress of the MBURP.
CITIZEN PARTICIPATION

As the involvement of the community continues to be an important element in government programs and policies, it is evident that citizen participation is significant in creating desirable results to community issues. Including citizen participation in the development process eliminates future discrepancies over projects. Through involving citizens in developing solutions with community leaders citizens develop an ownership of projects and policies in which they were involved and feel responsibility for shaping their community. The ideas generated and resulting solutions with public input are more comprehensive than solutions developed without involving the public. It is important to consider community demographics in developing a community participation program. This ensures that all members of the community have the opportunity for involvement in issues concerning the community. As the Morro Bay Urban Runoff Program is developed it is advised that citizen participation be integrated throughout the process.

Furthermore, as prescribed by the National Pollution Discharge Elimination System (NPDES), a Citizen Participation Program is essential in an Urban Runoff Program. Two of the six minimum control measures require involving the public. Thus, the contents of this section of the Morro Bay Urban Runoff Program will outline a suggested program for the above mentioned minimum control measures.

Public Participation/Involvement

The Public Participation/Involvement Minimum Control Measure allows for broader public support as the public becomes partially responsible for the program, shorter implementation schedules, a broader base of expertise and economic benefits, and a network of resources and relationships to help in the development of an Urban Runoff Program (NPDES). The requirements set forth by NPDES for this control measure are to comply with relevant public notice requirements and to determine appropriate BMPs and measurable goals.

- Identify Stakeholders

Present all stakeholders with the opportunity to participate in the development on the Morro Bay Urban Runoff Program by ensuring adequate notification of public meetings is accessible by persons of all races, ages, and incomes in the population. Involving a diverse population in the development of the program will allow for a variety of concerns, ideas, and resources throughout the process. Additionally, industrial and commercial representatives, community organization leaders, and local government leaders should be involved in the process. Public notifications of public involvement opportunities should be posted at various locations and in a multi-lingual format. Examples include, but are certainly not limited to: Morro Bay’s visitor’s center, commercial facilities, industrial facilities, library, veterans building, community center, recreational events, post office, schools, newspapers, community meeting locations, flyers, city web page, and public television or local news stations.

American Factfinder, a tool on the United States Census web page, identifies the following as characteristics of Morro Bay. The information can be used in the attempt to notify and recruit a diverse cross-section of the population.
### Race Percent of Population

<table>
<thead>
<tr>
<th>Race</th>
<th>Percent of Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>89.4%</td>
</tr>
<tr>
<td>African American</td>
<td>0.7%</td>
</tr>
<tr>
<td>American Indian and Alaska Native</td>
<td>0.9%</td>
</tr>
<tr>
<td>Asian</td>
<td>1.8%</td>
</tr>
<tr>
<td>Native Hawaiian /Other Pacific Islander</td>
<td>0.1%</td>
</tr>
<tr>
<td>Other</td>
<td>4.1%</td>
</tr>
<tr>
<td>Two or more races</td>
<td>2.9%</td>
</tr>
</tbody>
</table>

Source: [www.factfinder.census.gov](http://www.factfinder.census.gov) 2000 U.S. Census Data

### Language Spoken at Home Percent of Population (other than English) (Persons 5 years and older)

<table>
<thead>
<tr>
<th>Language Spoken at Home</th>
<th>Percent of Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speak a language other than English</td>
<td>8.0%</td>
</tr>
<tr>
<td>Do not speak English &quot;very well&quot;</td>
<td>4.0%</td>
</tr>
<tr>
<td>Speak Spanish</td>
<td>4.7%</td>
</tr>
<tr>
<td>Do not speak English &quot;very well&quot;</td>
<td>2.7%</td>
</tr>
<tr>
<td>Speak Asian or Pacific Island language</td>
<td>0.6%</td>
</tr>
<tr>
<td>Do not speak English &quot;very well&quot;</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

Source: [www.factfinder.census.gov](http://www.factfinder.census.gov) 1990 U.S. Census Data

### Age Percent of Population

<table>
<thead>
<tr>
<th>Age</th>
<th>Percent of Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 18 (school age)</td>
<td>15.2%</td>
</tr>
<tr>
<td>18-24 (young adult)</td>
<td>9.0%</td>
</tr>
<tr>
<td>25-44 (adult)</td>
<td>29.7%</td>
</tr>
<tr>
<td>45-64 (mature adult)</td>
<td>20.1%</td>
</tr>
<tr>
<td>65 and over (retirement age)</td>
<td>25.9%</td>
</tr>
</tbody>
</table>

Source: [www.factfinder.census.gov](http://www.factfinder.census.gov) 1990 U.S. Census Data

### Household Income Percent of Population

<table>
<thead>
<tr>
<th>Household Income</th>
<th>Percent of Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $24,999</td>
<td>46.8%</td>
</tr>
<tr>
<td>$25,000 to $49,999</td>
<td>34.2%</td>
</tr>
<tr>
<td>$50,000 to $74,999</td>
<td>13.7%</td>
</tr>
<tr>
<td>$75,000 to $99,999</td>
<td>2.1%</td>
</tr>
<tr>
<td>$100,000 or more</td>
<td>3.1%</td>
</tr>
</tbody>
</table>

Source: [www.factfinder.census.gov](http://www.factfinder.census.gov) 1990 U.S. Census Data

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**Public Presentation**

The objective of a public presentation is to introduce, educate, and involve the stakeholders and citizenry of Morro Bay in a program designed to reduce, mitigate, and improve urban runoff pollution problems. The NPDES suggests explaining the existence of an urban runoff pollution problem and convincing the community to assist in remedying the problem. Additionally, the presentation should address funding for the
program including the method of achieving adequate funding and the current financial needs.

Locations, dates, and times of public presentations should be chosen carefully to accommodate the diverse cross-section of the population. A variety of factors such as expected crowd size, use of equipment, and purpose of the gathering should determine the location of public presentations. Additionally, childcare and refreshments should be provided at the meetings to accommodate all persons. At these meetings, it is possible to involve children in educational activities relevant to urban runoff pollution. This would be an excellent opportunity to provide educational activities and outreach materials. The following are rental locations available in Morro Bay; however, it may be possible to acquire a location free of charge such as a school gymnasium or council chambers.

- Morro Bay Community Center: 1001 Kennedy Way
  3,680 square feet
- The Veteran’s Memorial Building: 209 Surf Street
  3,190 square feet
- Library Program Room: 625 Harbor Street
  1,400 square feet

Agenda:
- Distribute survey to attendees to determine the diversity of the group
  - Use this information to:
    - Seek the underrepresented stakeholders and citizens
    - Create a network of interested stakeholders and citizens
- Detailed definition of Morro Bay’s urban runoff pollution issues
- Educate need for resolution of urban runoff pollution
- Provide examples specific to Morro Bay
  - Pictures of local creeks, beaches, polluted runoff, etc.
  - Statistics relevant to water quality
- Introduction and detailed description of the MBURP
- Encourage stakeholders and citizens to develop responsible actions that improve or prevent polluted urban runoff
  - Examples of opportunities for education:
    - Use of chemicals outdoors or in workshops
    - Automobile maintenance
    - Storm drain awareness
- Introduce current financial status of the program
  - Disclose capital replacement and improvement projects
    (including estimated costs for implementation)
- Provide opportunities for public contribution
  - Join organizations
  - Financially support the program
  - Develop an Adopt-a-Creek or Adopt-a-Storm Drain program
- Question and Answer Session
  - Respond to questions and comments
  - Solve concerns
• Form specific task forces such as:
  • Beach Task Force;
  • Creek Task Force;
  • Business Compliance Task Force;
  • Program Advisory Committee; and
  • Community Action Group.

• Provide information for future public involvement opportunities.
• Develop agenda or responsibility for task force groups.
• Provide opportunity for community feedback:
  • Prepare community charrettes or workshops to allow the community to brainstorm, identify concerns and issues, develop graphic representations of ideas, build consensus about decisions and opportunities
  • Ask for alternative ideas or objections
  • Consider, analyze, and incorporate community feedback into the development of the MBURP and relevant events
  • Provide a suggestion box at public locations
  • Create a suggestion/email link on community web page

Refer to Public Education and Outreach, *Using Educational Materials and Strategies* in the Citizen Participation section of this document (page ???????) for additional opportunities to involve the public.

• *Establish Measurable Goals*

At the start of the planning process measurable goals for the implementation of a Public Participation/Involvement Program should be configured. These goals should have a timeline attached and address specific issues relevant to the Public Participation/Involvement Minimum Control Measure. Examples of measurable goals, as provided by the MURP, include:

• Conducting presentations to the City Council/Board of Supervisors in the URP’s first year;
• Holding public meetings to involve restaurant and auto service industries in the BMPs development process within the URP’s first 18 months; and
• Attending neighborhood meetings throughout the municipality to involve the residential community in the development of the illicit discharge detection and elimination program within the URP’s first two years.

The following measurable goals are presented by NPDES:

• Notice of a public meeting in several different print media and bilingual flyers; citizen panel established; volunteers organized to locate outfalls/illicit discharges and stencil drains in the first year of the program;
• Final recommendations of the citizen panel; radio spots promoting program and participation in the second year of the program;
• A certain percentage of the community participation in community clean-ups in the third year of the program; and
• Citizen watch groups established in a certain percentage of neighborhoods; outreach to every different population sector completed in the fourth year of the program.

Public Education and Outreach

The Public Education and Outreach Minimum Control Measure ensures “greater support for the program as the public gains a greater understanding of the reasons why it is necessary” and greater compliance as citizens become familiar with personal responsibilities and individual actions (NPDES). For this particular control measure, NPDES requires the implementation of a educational program to inform the community on the impacts of urban runoff pollution and preventative measures through the distribution of educational materials and/or outreach activities and the determination of best management practices (BMPs) and measurable goals. Through a Public Education and Outreach Program citizens become aware of the impacts of urban runoff pollution and how they can help minimize or prevent this problem.

• Forming Partnerships

NPDES recommends forming partnerships with governmental entities, non-governmental organizations (e.g., environmental, civic, and industrial organizations), or existing programs to achieve the requirements for this program. This is a cost-effective method to developing successful educational and outreach strategies. The Planning Context Management section of this document identifies several relevant entities and organizations.

• Using Educational Materials and Strategies

The following educational and outreach ideas are derived from information provided for this control measure by the MURP:

• Brochures or fact sheets for general public and specific audiences;
• Recreational guides to educate groups such as golfers, hikers, paddlers, climbers, fishermen, and campers;
• Alternative information sources, such as web sites, bumper stickers, refrigerator magnets, posters for bus stops, and restaurant placemats;
• A library or educational materials for community and school groups;
• Volunteer citizen educators to staff a public education task force;
• Event participation with educational displays at home shows and community festivals or farmers market;
• Storm drain stenciling with messages such as “Do Not Dump – Drains Directly to Bay;”
• Storm water hotlines for information and for citizen reporting of polluters;
• Economic incentives to citizens and businesses (e.g., rebates to homeowners for purchasing mulching lawnmowers or biodegradable lawn products); and
• **Tributary signage** to increase public awareness of local water resources.
There exist additional opportunities for educating the public including, but not limited to school assemblies, television commercials, radio commercials, and newsletters delivered via mail.

• **Reaching Diverse Audiences**
  - There should be efforts made to reach the all sectors of the population in Morro Bay.
  - The MURP suggests the following method for addressing the residential sector of the community:
    - Develop a residential outreach program to target home auto maintenance activities, general home maintenance, landscape maintenance, weed and pest control, fertilization, yard debris, and pet waste disposal.
  - Additionally, outreach program should be developed that targets children in the community. Children are a crucial element in providing educational and outreach opportunities. The following are ideas to reach the young population sector:
    - Implement a School Assembly Program. “In a two week countywide tour … in San Mateo County in 1997, 24 schools participated and over 8,000 students attended the interactive assembly program.” School assemblies have potential to reach a great number of persons. This is also a great opportunity to distribute educational outreach materials for students to bring home (MURP)
    - Sponsor and promote a Storm Water or Water Quality Award at the local Science Fair to encourage students to explore relevant issues (MURP).
    - Introduce a Storm Water or Water Quality poster contest to local schools. Display completed posters in public locations such as government buildings or community centers.
    - Adjust science class curriculum to include experiments that coincide with the MBURP (e.g., water quality monitoring, impacts of urban runoff pollution)
  - Refer to Public Participation/Involvement: *Identify Stakeholders* in the Citizen Participation section of this document for specific information on reaching diverse audiences.

• **Establish Measurable Goals**
  At the start of the planning process measurable goals for the implementation of a Public Education and Outreach Program should be configured. These goals should have a timeline attached and address specific issues relevant to the Public
Participation/Involvement Minimum Control Measure. Examples of measurable goals, as provided by the MURP, include:

- Label storm drain inlets within first two years of the program;
- Distribute outreach materials on getting the message out to 100 percent of homes in the first/second year of the program; and
- Distribute outreach materials on targeted residential sources to 100 percent of homes in the third year of the program.

NPDES identifies the following measurable goals:

- Brochures developed (bilingual, if appropriate) and distributed in water utility bills; a storm water hotline in place; volunteer educators trained in the first year of the program;
- A web site created; school curricula developed; storm drains stenciled in the second year of the program;
- A certain percentage of restaurants no longer dumping grease and other pollutants down storm sewer drains in the third year of the program; and
- A certain percentage reduction in litter or animal waste detected in discharges in the fourth year of the program.

• **Increase public awareness about urban runoff pollution**
  
  Determine an appropriate method for distributing outreach materials. Establish an urban runoff hotline to promote reporting of polluters and to provide relevant information about urban runoff pollution or the MBURP.

• **Public involvement through volunteer activities**
  
  The MURP emphasizes the impact that volunteers have in the development of an Urban Runoff Program. “Volunteers spread the word about urban runoff issues, create a sense of community ownership, and get important tasks accomplished.” Possible opportunities for volunteers include:

  - Program Advisory Committee;
  - Community Action Group;
  - Specific Task Forces;
  - Storm Drain Stenciling;
  - Water Quality Monitoring; and
  - Volunteer Citizen Educators.
Existing conditions within the City of Morro Bay were researched along with Federal, State, Regional, and Local organizations, regulations, and policies. In understanding the goals of existing factors relevant to urban runoff issues, we were able to develop co-coordinating recommendations for the City of Morro Bay.
PLANNING MANAGEMENT CONTEXT

Existing Conditions Study

Urban development causes an increase in the amount of impervious surfaces, which have a serious effect on drainage. When rainwater hits impervious surfaces, the natural hydrological process that was once present is altered. Instead of seeping into the dirt or traveling down a streambed, the storm water is retained on top of the asphalt where it follows the slope of the site.

The most recent National Water Quality Inventory reports that runoff from urban areas is the leading source of impairments to surveyed estuaries and the third largest source of water quality impairments to surveyed lakes. In addition, population and development trends indicate that by year 2010 more than half of the Nation will live in coastal towns and cities. Runoff from these rapidly growing urban areas will continue to degrade coastal waters. (EPA, 1997)

Land use changes can affect urban runoff. Residential, industrial, and commercial developments can greatly increase the timing and magnitude of this runoff. Because of impervious surfaces such as pavement and rooftops, a typical city block generates nine times more runoff than a woodland area of the same size (EPA, 1997).

Conventional urban development also increases the amount of runoff due to the presence of gutters, drains, and sewers. These stormwater removal systems carry the water more rapidly. Once it leaves the system and enters into a stream, large volumes of quickly flowing runoff erode streambanks, damage streamside vegetation, and widen stream channels. In turn, this results in lower water depths during non-storm periods, higher than normal water levels during wet weather periods, increased sediment load, and higher water temperatures (EPA, 1997).

Artificial drainage systems are not the only popular development trend that worsens urban runoff. Wide streets and expansive parking lots produce even more runoff than similar developments of 40 to 50 years ago (NIPC, February 2001).

Another type of development that poses a serious threat to urban runoff is road construction. Materials deposited on roads and other surfaces can be carried away in surface runoff. Examples of materials that can be carried away include street litter, car oil, pesticides found in lawn care, animal feces, and materials deposited from the atmosphere. If these pollutants are left untreated they could potentially damage the aquatic life in downstream lakes, streams, bays and wetlands.

Soil erosion is also a major source of water pollution, especially in areas of construction. Where there is soil erosion, sedimentation is increased and deposited.

Other sources of polluted runoff are point and non-point sources. Point sources refer to discharges that can be traced back to pipes or other conveyance systems. Municipal wastewater discharges (water quality depends on treatment provided, and how it is diluted) and Industrial discharges are both point sources. The National Pollution Discharge Elimination System permit program of the Clean Water Act, which regulates stormwater discharges, addresses urban point source pollution.

Non-point sources include surface runoff from urban, agriculture, and commercial areas, discharges from solid waste disposal sites, and wastewater from septic tanks. Non-point source management developed by individual states under the Clean Water Act discusses urban non-point source pollution. In states and territories with coastal zones,
programs to protect coastal waters from non-point source pollution are also required by section 6217 of the Coastal Zone Act Reauthorization Amendments (EPA, 1997).

Agriculture, forestry, and mining can also negatively affect urban runoff. Sediments from eroding farmlands frequently carry pesticides, fertilizers, and other chemicals. Runoff from commercial forests often contains high levels of sediments and pesticides. Surface runoff from mines can also carry a lot of sediment.

The Model Urban Runoff Program’s (MURP, July 1998) handbook lists a series of pollutants commonly found in an urban environment. Some of these pollutants are:

- sediments
- nutrients
- pathogens
- petroleum hydrocarbons
- heavy Metals
- floatables
- synthetic organisms

The “Best Management Practice Handbook” written by the Stormwater Quality Task Force explains these pollutants in detail; the following information identifies and describes these pollutants (BMP, 1993):

Sediments

Sediments can be any type of dirt, gravel, soil, or results of erosion, usually contingent upon the force of the runoff. Not only can sediments speed the filling of a bay such as the Morro Bay estuary, but can be adverse to aquatic life. The Morro Bay General Plan states, “An increase in the development located within the Los Osos and Chorro Creek watersheds has increased the amount of sediment entering the creeks. This, in turn has increased the amount of sediment entering the estuary and accelerated the infilling of the bay.” (City of Morro Bay 1981,Page II-45)

The urban area of Morro Bay has contributed to high turbidity and filterable solids heading into Morro Bay. “First flush sampling conducted in 1995 showed that these levels increase in gutters and storm drains.” (CCMP 1999, Section 2.5 pg.55) Though the city’s problems with sediment loading is far less than the creeks in the area, sediment leaving urban areas is a problem not just with the increased sediment, but also the pollutants carried in the sediment itself.

Nutrients

These pollutants, often resulting from sewage, consist of materials such as nitrogen and phosphorus. These nutrients accelerate organic growth, such as bacteria and algae. This can result in eutrophication, a process by which excessive nutrients stimulate algae growth resulting in clouded, murky water, oxygen depletion, and plants which out compete the aquatic animals. This phenomenon proves detrimental to the creature’s existence.

Localized areas within the City of Morro Bay are suspected of dumping nutrients into the bay. In particular the Morro Bay embarcadero storm drains have been labeled a problem spot (CCMP 1999, pg. 60 Table 2.12). Some of the substances commonly found in the City of Morro Bay’s stormwater runoff are attributed to fertilizers and household
chemicals. According to the CCMP, fertilizers may be responsible for about one-third of excess nitrogen that is polluting the bay (CCMP 1999, Section 4.4 pg. 180).

- **Pathogens**
  Pathogens, meaning disease-causing bacteria and viruses, are commonly a result of pet feces, or other organic material that accumulates on lawns, gutters, around septic tanks and is washed into storm drains after a heavy rain. Not only can these infect and disease aquatic organisms, many bacteria can consume dissolved oxygen resulting in fish kills.

- **Petroleum Hydrocarbons**
  Petroleum hydrocarbons, gasoline, and automobile products are common in urban settings. Their sources are many. Introduced into the storm drains from sources such as oil changes, leaky automobiles, and gasoline service stations they can be seen in the sheen apparent on a parking lot or bay following rain. Highly toxic to both wetlands and marine animals, according to the Environmental Protection Agency’s “Managing Urban Runoff” web page (EPA, 1997), “used oil from a single oil change can pollute up to a million gallons of fresh water” and “a pint of oil dumped in a storm drain can create a one-acre oil slick on open water.” The City of Morro Bay has determined that many of the direct discharge points coming from the city, have petroleum-based contaminants, and that contaminants the Morro Bay Estuary (CCMP1999, Section 4.1 pg. 110). In the City of Morro Bay’s Proposed Land Use Plan of the Local Coastal Program, it states, “Grease and oil—these substances float on the water acting as a barrier between air and water, thereby preventing oxygen from dissolving.” (City of Morro Bay June 1981, p.207) This also comes from urban runoff as well as boats and other watercraft in the bay.

- **Heavy Metals**
  Heavy metals, materials such as chromium, lead, and copper are introduced into stormwater by sources such as household paints and cleaners, antifreeze, automobile brake pads and exhausts, and leachate from landfills. These metals can accumulate in the tissues of aquatic plants and animals, not only causing harm to the organisms, but through a process called bio-magnification can be passed up through the food chain and affect humans in such ways as brain damage and birth defects.

  Inorganic metals in Morro Bay (copper, lead, zinc, iron, and nickel) have been measured in stormwater sites. Examples of these metals have been found on Shasta St., 451 Embarcadero, 3rd/ El Morro, Coastal Boating and the boatyard on Morro Bay’s waterfront based on 1994-1997 stormwater sampling data. In particular, “the boatyard on Morro Bay’s waterfront has the highest copper levels, 240 times the CMC (Criteria Maximum Concentrations) level” (CCMP 1999, pg.69 Table 2.15).

- **Floatables**
  Floatables are objects such as plastics, cans, diapers, and other floatable objects that can be washed away by rainwater and deposited into the waterways. Not only do these object become unsightly, they can cause harm to living organisms depending on what kinds of materials they are made of.
This list is not meant to be exhaustive or comprehensive, but only to describe some of the problematic consequences resulting from runoff. Depending on the industry typical of the city or the locality of the water routes, these can fluctuate accordingly. The objective of this description is to detail the contaminants likely to be found in an urban setting that should be addressed.
Federal Legislation
Clean Water Act

In response to growing public concern for serious and widespread water pollution, Congress enacted the Federal Water Pollution Control Act of 1972, was amended in 1977 and renamed the Clean Water Act (Environmental Protection Agency Office of Wastewater Management). It was then reauthorized in 1991. The Clean Water Act is the primary federal law that protects the nation’s waters, including lakes, rivers, aquifers and coastal areas. The Clean Water Act's main objectives are to restore and maintain the chemical, physical, and biological wellbeing of the nation’s waters. These objectives translate into two fundamental national goals:

1. To eliminate the discharge of pollutants into the nation's waters
2. To achieve water quality levels that are fishable and swimable

The Clean Water Act is the foremost federal legislation that provides the framework of standards, technical tools and financial assistance to address the causes of pollution and poor water quality, including, but not limited to, polluted runoff from urban and rural areas. For instance, the Clean Water Act:

- Requires major industries, to meet performance standards to ensure pollution control; charges states and tribes with setting specific water quality criteria appropriate for their waters and developing pollution control programs to meet them;
- Provides funding to states and communities to help them meet their clean water infrastructure needs; and
- Protects valuable wetlands and other aquatic habitats through a permitting process that ensures development and other activities are conducted in an environmentally sound manner.

National Pollution Discharge Elimination System

The Clean Water Act makes it unlawful for any persons to discharge any pollutant from a point source into navigable waters unless a National Pollutant Discharge Elimination System (NPDES) permit is obtained (Clean Water Act 33 U.S.C. s/s et seq. 1977). The Environmental Protection Agency under the Clean Water Act, instituted the NPDES to issue permits to waste water discharges, including cities. The purpose of the NPDES Program is to protect human health and the environment. Phase II is the newest legislation as of 1999. This new legislation requires small municipalities like Morro Bay to apply for comply with the NPDES requirements to receive a Municipal Separate Sewer System (MS4) permit allowing them to discharge waste into local waterways.

To receive this NPDES Phase II permit Morro Bay has to meet these federal minimum requirements.

- Apply for a permit.
- Develop a storm water management program including the six minimum control measures (see below).
- Implement the storm water management programs using appropriate storm water management controls, or “best management practices” (BMPs).
- Develop measured goals for the program.
• Periodically evaluate effectiveness of the program.

The six minimum control measures of a successful Storm Water Management Program are:

1. **Public outreach** - Distribute educational material, inform citizens of impacts of polluted stormwater run off and how they can prevent it.

2. **Public Participation/Involvement** - Encourage citizen representation on program development and implementation. Create a citizen panel of water management and effectively publicize public hearings.

3. **Illicit Discharge (Illegal dumping)** - Develop and implement a plan to detect and eliminate illicit discharges into storm sewers. Raise public awareness of problem. According to the National Urban Runoff Program (NURP) the biggest contributors to this problem are car-related industries and improper plumbing and connections that were previously approved by the municipality.

4. **Construction Site Runoff Control** - Developing, implementing, and enforcing an erosion and sediment control program for construction activities that disturb 1 or more acres of land.

5. **Post Construction Runoff Controls** - Developing, implementing and enforcing a program to address discharges of post-construction storm water runoff from new development. Applicable controls could include preventative actions such as protecting sensitive areas (e.g. wetlands) or the use of structural Best Management Practices (BMPs) such as grassed swales or porous pavement.

6. **Pollution Prevention/Good Housekeeping** - Developing and implementing a program with the goal of preventing or reducing pollutant runoff from municipal operations. The program must include municipal staff training on pollution prevention in the use of pesticides or street salt or frequent catch basin cleaning.

Morro Bay’s Storm Water Management Program has to meet the NPDES’s minimum standards called Applicable Standards. These are based on the Clean Water Act section 402(p)(6):

• Reduce the discharge of pollutants from Morro Bay the city to the maximum extent practicable.
• Protect Water Quality

Successful implementation of approved Best Management Practices would be considered compliance with the (MEP) requirement.
Environmental Protection Agency’s Enforcement

The mission of the United States Environmental Protection Agency (EPA) is to protect human health and to safeguard the natural environment - air, water, and land - upon which life depends (EPA Mission Statement, 2000).

The EPA implements the Federal laws designed to promote public health by protecting our Nation’s air, water, and soil from harmful pollution. EPA endeavors to accomplish its mission systematically by proper integration of a variety of research, monitoring, standard setting, and enforcement activities. As a complement to its other activities, EPA coordinates and supports research and anti-pollution activities of state and local governments, private and public groups, individuals, and educational institutions. EPA also monitors the operations of other federal agencies with respect to their impact on the environment (EPA History, 2000).

The enactment of major new environmental laws and important amendments to older laws in the 1970s and 80s greatly expanded EPA's responsibilities. The Agency now administers ten comprehensive environmental protection laws:

- The Clean Air Act (CAA)
- The Clean Water Act (CWA)
- The Safe Drinking Water Act (SDWA)
- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund)
- The Resource Conservation and Recovery Act (RCRA)
- The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
- The Toxic Substances Control Act (TSCA); the Marine Protection, Research, and Sanctuaries Act (MPRSA)
- Uranium Mill Tailings Radiation Control Act (UMTRCA)
- Pollution Prevention Act (PPA)

The Environmental Protection Agency’s purpose is to ensure that all Americans are protected from significant risks to human health and the environment where they live, learn and work. National efforts to reduce environmental risk are based on the best available scientific information. Federal laws protecting human health and the environment are enforced fairly and effectively. Environmental protection is an integral consideration in U.S. policies concerning natural resources, human health, economic growth, energy, transportation, agriculture, industry, and international trade, and these factors are similarly considered in establishing environmental policy (Environmental Protection Agency Mission Statement, 2000).

The Water Quality Protection Division, issues the NPDES permits and the Water Enforcement Branch assures that all discharges comply with the NPDES permits. The Water Enforcement Branch has three Sections that assure compliance with the NPDES permitting program:

- Texas-New Mexico NPDES
- Louisiana, Arkansas and Oklahoma’s NPDES
• Compliance Monitoring

The sections perform technical, scientific and administrative review and they assure
the adequacy and validity of technical and scientific data and findings in developing and
issuing administrative orders, administrative penalty orders, and in referrals to the
Department of Justice. The sections coordinate enforcement actions with State actions
and perform oversight functions on States that have assumed enforcement responsibility
of the NPDES program (EPA CWA Enforcement, 2000).

All Americans will have drinking water that is clean and safe to drink. Effective
protection of America's rivers, lakes, wetlands, aquifers, and coastal and ocean waters
will sustain fish, plants, and wildlife, as well as recreational, subsistence, and economic
activities. Watersheds and their aquatic ecosystems will be restored and protected to
improve public health, enhance water quality, reduce flooding, and provide habitat for
wildlife (EPA, 2000).
State of California
California Coastal Commission

Mission
"To protect, conserve, restore and enhance environmental and human-based resources of the California coast and ocean for environmentally sustainable and prudent use by current and future generations."

Plan For Controlling Urban Runoff (Coastal CPR Plan)
Outlines the Commission's authorities to address polluted runoff and identifies actions to achieve the Commission's objective to reduce urban runoff. The Coastal Plan specifies the Commission's role in addressing polluted runoff within the confines of existing budgets, and statutory authority.

Description
The Coastal CPR Plan is comprised of four interrelated elements with actions and milestones. These elements are:
- Implementation of management Measures through Planning, regulation, and Technical Assistance,
- Administrative Coordination,
- Public Participation and Education, and
- Funding.

The Coastal CPR Plan aims at:
- Minimizing adverse effects of wastewater discharges,
- Controlling runoff,
- Minimizing hydro-modification and stream alterations that substantially interfere with surface water flow, and
- Maintaining natural ventilation buffers that protect riparian corridors.

Actions
In implementing the Coastal CPR Plan, the Commission recognizes the need to use limited resources efficiently as well as to ensure actions are tailored to match the diversity of California's climate and land use activities. Part of this strategy is to focus attention where water quality problems exist and where the coastal program can make a difference in correcting those problems.

California Coastal Act
Mandates the protection and restoration of coastal waters. The Coastal Act by initiative, created the Coastal Commission who has the authority to regulate land use in the coastal zone (Fulton, 1999).

Description
The Commission certifies Local Coastal Plans (LCPs) and approves coastal development permits (CDPs), energy projects, and federal projects consistent with these policies. LCPs are usually included as an element in the general plan and when completed, and certified, by the Coastal Commission, the city or county would regain the authority for the permits (Fulton, 1999).
Actions
The coastal program protects water quality through management of development that generates runoff or creates spills. The Commission also implements educational and technical assistance programs and coordinates with other agencies to address land-use and development activities that may generate polluted runoff.

California's Non-point Source (NPS) Pollution Control Program
Mission
The Mission of the NPS Program Plan is to improve the State's ability to effectively manage NPS pollution and conform to the requirements of the federal Clean Water Act and the federal Coastal Zone Act Reauthorization Amendments of 1990.

Description
The NPS Program Plan was developed by staffs of the SWRCB's Division of Water Quality and the California Coastal Commission (CCC) in coordination with the RWQCB's and staffs from over twenty other State agencies.

Action
Local Governments enforce the NPS Program Plan through their local legislation. The NPS Program Plan provides local governments with an outline, which enables them to develop their own pollution controls, such as urban runoff programs.

State Water Resource Control Board (SWRCB)
Mission
The mission of the SWRCB is to ensure the highest reasonable quality of waters of the state, while allocating those waters to achieve the optimum balance of beneficial uses.

Description
The State Water Resources Control Board (SWRCB) was created by the Legislature in 1967. The joint authority of water allocation and water quality protection enables the SWRCB to provide comprehensive protection for California's waters.

Action
Industrial facilities and construction sites are regulated by the SWRCB through general storm water permits.

California's Porter-Cologne Water Quality Control Act (1969)
Mission
Activities and factors that may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible.
Description

The Legislature further finds and declares that the health, safety and welfare of the people of the state requires that there be a statewide program for the control of the quality of all the waters of the state; that the state must be prepared to exercise its full power and jurisdiction to protect the quality of waters in the state from degradation originating inside or outside the boundaries of the state; that the waters of the state are increasingly influenced by inter basin water development projects and other statewide considerations; that factors of precipitation, topography, population, recreation, agriculture, industry and economic development vary from region to region within the state; and that the statewide program for water quality control can be most effectively administered regionally, within a framework of statewide coordination and policy.

Actions

Established the Responsibilities and authorities of the nine Regional Water Quality Control Boards and the State Water Resource Control Board.
San Luis Obispo County

The following guidelines adapted from the San Luis Obispo County Department of Planning and Building pertain to site drainage and locating retention basins.

- Drainage basin location. The minimum setback for drainage retention basins from a sewage effluent leaching pit or disposal field shall be a minimum of five feet horizontal.
- Drainage basin capacity. For single-family residences, duplexes and triplexes, the basin in cubic feet may be determined by dividing the total square footage of impervious surfacing on the lot by 7. For others, the basin shall be engineered.
- Drainage basin design and construction specifications. Where required, drainage retention basins shall be designed and constructed in accordance with the following standards.
  
  A. Drainage retaining facilities shall be physically "formed" structures such as:
     1) leach trenchers, or
     2) recessed planter areas with redwood sidewalls.
  
  B. Recessed planters and drainage basins shall not exceed one foot in depth, unless fenced.
  
  C. The required capacity may be provided by more than one basin, provided there is sufficient contributing area for each to function.
  
  D. Rock filled basins will be allowed 25% of the volume of an open pit.

- Addition to existing buildings. With permits for additions to existing buildings, if the impervious area being added is more than 25% of the existing impervious area of the site, a basin shall be provided to accept runoff for the total impervious area on the site, including existing buildings, structures, and charade.

- Driveway runoff. Where it is impractical to direct driveway runoff to a basin, it may be allowed to leave the site provided an equal amount of runoff is retained from other surfaces.

- Other drainage. Engineered plans may be required for any other drainage situation, such as when the site is in the path of historic flow from off-site.

- Site grading. Final grading of lots shall be in conformance with Chapter 70 of the Uniform Building Code and Sections Code and Section 23.05.020 through 23.05.036 of the Coast Zone Land Use Ordinance.

Erosion Sedimentation Control Plan: Information taken from SLO County Clerk-Recorder. (www.slonet.org/~clerkrec) 22.05.034 Erosion and Sedimentation Control Plan required the following:

A. Requirements. An erosion and sedimentation control plan shall be required as part of the grading permit application except when all of the following site characteristics exist:

   (1) Site has a maximum slope less than ten percent in the area to be graded;
   (2) Site is not located within geologically unstable areas;
   (3) Site is located on soils rated as having a low erosion hazard by the USDA Soil Conservation Service (unless area building inspector is aware of the potential for erosion problems in the area);
(4) Site is located more than three hundred feet from the top bank of any blue line water course or water feature shown on the most current 7 ½ minute USGS quadrangle map;
(5) The grading will not cause organic or earthen materials from logging, construction or other land disturbance activities to be carried into a swale, drainage way, watercourse, or onto adjacent properties by rainfall or runoff;
(6) All grading and site disturbance activities will: (1) occur after April 15th and before October 15th and (2) will create minimal site disturbance from combined activities.

B Erosion and Sediment Control Plan Content. An erosion and sediment control plan shall address both temporary and final measures. Measures shall be in place to control erosion and sedimentation prior to the commencement of grading and site disturbance activities unless the director determines temporary measures to be unnecessary based upon location, site characteristics, or time of year. Plans may be incorporated into and approved as part of a grading or drainage plan, but must be clearly identified as an erosion and sedimentation control plan. Erosion and sedimentation control plans are reviewed and approved by the director of planning and building. The plan shall be prepared by a certified sediment and erosion control specialist, a registered civil engineer, registered architect or landscape architect, certified California nurseryman, licensed landscape contractor, resource conservation district or USDA Natural Resource Conservation Service Specialist, or other qualified persons acceptable to the department of planning and building with competence and experience in erosion control plan preparation and implementation. The plan shall consist of graphic and narrative information of sufficient clarity to indicate the nature, extent, location and placement recommendations of the erosion and sedimentation control measures proposed and show in detail that they will conform to the provisions of this chapter. The location of all practices, methods, and devices shall be shown on the grading plan, or on a separate plan at the discretion of the director. If separate, it shall be attached to the grading plan used in the field. The plan shall contain, but need not be limited to, all the following information unless some of the information is waived by the director as not needed for the review of a particular site and its characteristics:
(1) Grading limits shall be graphically defined on the plan and staked out before site disturbance begins;
(2) An estimate of sediment yields before, during, and after construction of the project for a three-year period or until re-vegetation is established. (One acceptable method is the "Universal Soil Loss Equation" developed by the USDA Agricultural Research Service);
(3) Proposed methods and a description of the practices to be used to protect exposed erodible areas during construction, including temporary mulching, seeding or other recognized surface stabilization measures;
(4) Proposed temporary and final methods and a description of the practices to be used for cut or fill slopes to prevent erosive surface runoff, including earth
or paved interceptors and diversions, energy-absorbing structures, or devices and techniques to reduce the velocity of runoff water;

(5) When re-vegetation is required for smaller disturbed areas near habitats identified at the state and/or federal levels as sensitive (e.g., near creeks or wetlands, coastal scrub), propose an alternative "native-friendly" mix of seeds and/or cuttings that are compatible with the sensitive habitat. The alternative mix to be used shall:

(a) grow reasonably quick;
(b) be from locally- or commercially-available native seed or plant stock;
(c) be compatible with the surrounding native habitat and climate; and
(d) be free from noxious weed seed of local and statewide importance (as identified by the agricultural commissioner’s office). Larger areas to be reseeded should consult with a qualified botanist or other qualified expert of native plants to survey the site and determine the best mix of native species;

(6) Proposed methods and description of the temporary and final practices to retain sediment on the site, including sediment basins and traps, vegetative filter strips, or other recognized measures, a schedule for their maintenance and upkeep, and provisions for responsibility of maintenance. Include design criteria for the trapping efficiency and storage capacities of sediment basins for flows from a ten-year storm;

(7) Proposed methods, application technique, seed and fertilizer rate, sequence, and description of final erosion control practices for revegetation of all surfaces disturbed by vegetation removal, grading, haul roads, or other construction activity, unless covered with impervious or other improved surfaces authorized by approved plans. A schedule for maintenance and upkeep of re-vegetated areas shall be included. Erosion control methods may include a combination of approved mechanical or vegetative measures, including those described in USDA Soil Conservation Service Bulletin 347, Controlling Erosion on Construction Sites or the Drainage Improvement Guide for Unpaved Roads;

(8) The type, location and extent of pre-existing and undisturbed vegetation on the site;

(9) An estimate of the cost of implementing and maintaining all erosion and sediment control practices where bonds or other financial assurances are proposed or required;

(10) A statement by the individual preparing the plan that the plan represents the minimum site disturbance necessary to achieve erosion and sediment control;

(11) Descriptions of proposed methods to limit access routes and stabilize all access points, and to delineate clearing limits, easements, setbacks, sensitive areas, buffer areas, and drainage courses;
(12) Other additional plans, drawings, calculations, photographs, or other information which are necessary to adequately review, assess and evaluate proposals and to show that they conform with the requirements of this chapter.

(c) Regional Water Quality Control Board Review. For projects that disturb greater than five acres of land, the erosion control plan must be part of a storm water pollution prevention plan as required for compliance with NPDES Storm Water Discharge General Permits for Construction Activity administered by the State Water Resources Control Board and the Regional Water Quality Control Board.

(d) Field and Weather Conditions. If field or weather conditions warrant, the director may require erosion and sedimentation control if not originally required or modification of the erosion and sedimentation control methods, procedures or devices after grading activities commence. (Ord. 2863 § 1 (part), 1999)
The City of Morro Bay
General Plan

In the General Plan, the Public Facilities & Service Element addresses drainage for the city. Morro Bay must deal with storm runoff from large areas outside the city that flow through several of its major watercourses. Local runoff from urban type development on the streets must be conveyed through its storm drains. Additionally, Flood Insurance Rate Maps show 100-year flood plains associated with its creeks. Smaller flooding problems generally are caused by a lack of adequate facilities to control the runoff. To prevent these flooding problems, the city has standard drawings pertaining to street construction cross slopes and gutter slopes for drainage, curbs, gutters, and various types of inlets and manholes. However some of the existing drainage facilities have not been updated to these standards. The city uses its Storm Drain Master Plan, prepared in 1987, to project the City’s future drainage infrastructure needs and develop an improvement plan. Currently the plan identifies 22 drainage projects, only 3 where completed by 1999. In the City of Morro Bay’s Draft CIP they have it projected out to the year 2012. Mentioned in the Element where four primary drainage-related ordinances that the city implements:

The Flood Damage Prevention Ordinance, Chapter 14.72 of the Municipal Code (see attached summary), the Environmentally Sensitive Habitat District Ordinance, Chapter 17.40 of the Municipal Code (see attached summary), the Uniform Building Code requirements to siltation control, and the Subdivision Map Act that requires adequate drainage in new subdivisions.

The General Plan also includes several Goals and Policies and Measures related to drainage.

Goal 31: an efficient water and sewer system
Policy PF-7: The city shall require leakage of sewer lines shall be minimized. Leaking sewer lines identified in the City’s Sewer Master Plan Study shall be replaced on a phasing schedule adopted as part of the City’s Capital Improvement Plan
Goal 32: adequate facilities to control storm drainage.
Policy PF-8: The City shall continue to implement the drainage improvements listed in the Drainage Master Plan. The identified improvements shall be implemented on a need-prioritized basis.
Policy PF-9: The city shall continue to implement its Flood Damage Prevention Ordinance and other ordinances related to flood prevention.
Goal 39: Recognized and protected environmentally sensitive habitat
Measure OSC-2I: The City shall require the biological productivity of the City’s environmentally sensitive habitat areas to be maintained and, where feasible, restored through maintenance and enhancement of the quantity and quality of Morro and Chorro groundwater basins and through prevention of the interference with surface water flow. Stream flows adequate to maintain riparian and fisheries habitat shall be protected.
Measure OSC-2K: New development adjacent to wetlands shall not result in adverse impacts due to additional sediment, runoff, noise, and other disturbances.

Municipal Code
Section 17.40.040 Environmental sensitive habitat overlay zone.
• Stream Corridors: Flood control projects where no other method for protecting existing structures in the floodplain is feasible and where such protection is necessary for public safety or to protect existing development; road and bridges where no alternative route/location is feasible and if support structures are no sited in the environmentally sensitive habitat.

• Types of Environmentally Sensitive Habitat Areas. Estuary; coastal water body partially obstructed, which ocean water is at least occasionally diluted by freshwater runoff from the land.

• Buffers Required. The Wetlands minimum buffer surrounding wetlands shall be one hundred feet; review area, minimum of two hundred feet.

• Streams. The minimum buffer for steams shall be one hundred feet in non-urban areas and fifty feet in urban areas.

Ordinance No. 477
Section 14.72.010 Statutory authorization, findings of fact, purpose and methods.

B. Findings of Fact
The flood hazard areas of the City of Morro Bay are subject to periodic inundation, which results in loss of life and property, health . . . and the general welfare.

D. Methods of Reducing Flood Losses.
1. restrict or prohibit uses which are dangerous to health, safety, and property due to water hazards, or which result in damaging increases in flood heights or velocities;
2. require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction.
3. control the alteration of natural floodplains, streams channels, and natural protective barriers, which help accommodate or channel flood waters;
4. control filling, grading . . . which may increase flood damage
5. prevent or regulate the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

Section 14.72.050 Provision for Flood Hazard
B. Standards for Utilities
1. All new and replacement water supply and sanitary sewage systems shall be designed to minimize or eliminate:
   a. infiltration of flood waters into the systems, and
   b. discharge from the systems into flood waters

C. Standards for Subdivisions
3. All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize flood damage.

All subdivisions shall provide adequate drainage to reduce exposure to flood hazards
City of Morro Bay Storm Drain Master Plan

Recommended Projects:

There is a list of 22 construction projects that are recommended to improve existing storm runoff problems. The projects were given a ranking in a descending order of significance: the potential for property damage, traffic problems, the area use intensity and extended periods of ponding, which are addressed in chapter VII (see City of Morro Bay Storm Drain Master Plan Volume I August 4, 1987).

Present drainage programs and policies:

The City of Morro Bay has maintained a program of limited capital improvements and maintenance of storm drain facilities in the city. Due to Morro Bay's limited budget it has a secondary level of improvement and only relevant streets with improvements will be improved (City of Morro Bay Storm Drain Master, 1987).

Present drainage standards:

Curbs and gutters are required for new commercial and large or multi-family residential developments. Curbs and gutters are not required for inflow development of existing residential neighborhoods. Were street improvements are being developed including handling storm drainage, it has been a provisional standard to require that the improved streets don't overflow onto sidewalks or walkways during a 25-year flood (City of Morro Bay Storm Drain Master Plan, 1987).
The Morro Bay National Estuary Program
Comprehensive Conservation and Management Plan

The Morro Bay National Estuary Program is a program that was formed to protect the bay and its natural resources. The Program’s Comprehensive Conservation & Management Plan (CCMP) was developed by several agencies that have interest in the well being of the bay. The plan contains a series of programs and voluntary action that should be followed by the participating agencies. There is no enforcement program in writing however the programs have been developed by the participatory agencies and therefore those agencies will likely strive to implement them. The CCMP was designed to protect the Morro Bay estuary and has many related issues concerning urban run off. This plan is an important step in the conservation of the bay, because it coordinates the efforts of all participating agencies.

The overall objectives of the CCMP under the Morro Bay National Estuary Program are to:

- slow the process of bay sedimentation,
- reestablish healthy steelhead trout habitat,
- ensure the bay water remains of sufficient quality,
- ensure the integrity of the broad diversity of natural habitats and associated native wildlife,
- maintain watershed functional integrity,
- protect social, economic, and environmental benefits provided by the bay and watershed, and
- promote public awareness and involvement in estuarine management issues.

Without the CCMP, each agency would be carrying out their own programs, which would be less effective and possibly contradictory to other program objectives. Concerns of the CCMP in protecting the estuary are listed as cross-cutting, sedimentation, bacteria, nutrients, freshwater flow, heavy metals and toxics, habitat, steelhead, and public education through outreach.

The following sections listed in the CCMP (1999) should be looked at as a starting point for implementing the urban runoff plan.

- Section 4.1, headings CC-1, CC-3, CC-4, CC-5, and CC-6 address the concerns dealing with cross-cutting.
- Section 4.2, headings SED-1, SED-2, SED-4, and SED-5, in the CCMP addresses means to reduce the sedimentation into the estuary and increase clarity of estuary waters; reduce agricultural soil loss and increase stakeholder development and implement Best Management Practices (BMPs) on their land; and reduce bed load and stream bank soil erosion.
- Section 4.3, heading BACT-9 addresses a way to promote consistent and comprehensive water quality standards and monitoring efforts region-wide.
- Section 4.4, heading NUT-4 addresses ways to decrease fertilizer runoff from residential and golf course areas.
• Sections 4.6, headings HMT-2 and HMT-4, in the CCMP address ways to reduce the introduction of heavy metals and other toxic pollutants to watershed streams, estuary waters and estuary sediments.

• Section 4.11, headings EDU-1 and EDU-7 addresses ways to increase public awareness of resources, processes, and priority problems within estuarine, stream, riparian, upland, and wetland habitats.
Regional Water Quality Control Board

Mission Statement

The State Water Resources Control Board (SWRCB) was created by the Legislature in 1967. The mission of the SWRCB is to ensure the highest reasonable quality of waters of the state, while allocating those waters to achieve the optimum balance of beneficial uses. The joint authority of water allocation and water quality protection enables the SWRCB to provide comprehensive protection for California's waters.

The SWRCB consists of five full-time salaried members, each filling a different specialty position. Board members are appointed to four-year terms by the Governor and confirmed by the Senate.

There are nine Regional Water Quality Control Boards (RWQCBs). The mission of the RWQCB is to develop and enforce water quality objectives and implementation plans that will best protect the beneficial uses of the State's waters, recognizing local differences in climate, topography, geology, and hydrology.

Each RWQCB has nine part-time members appointed by the Governor and confirmed by the Senate. Regional Boards develop "basin plans" for their hydrologic areas, issue waste discharge requirements, take enforcement action against violators, and monitor water quality.

The task of protecting and enforcing the many uses of water, including the needs of industry, agriculture, municipal districts, and the environment is an ongoing challenge for the SWRCB and RWQCB.

History

In 1949, the Dickey Water Pollution Act created a "State Water Pollution Control Board." The state board consisted of nine gubernatorial appointees representing specific interests and four ex officio state officials. Its duties included formulating statewide policy for pollution control and coordinating the actions of various state agencies and political subdivisions of the state in the control of water pollution.

In 1969, the State Legislature enacted the Porter-Cologne Water Quality Control Act. This Act contains a complete regulatory framework for the regulation of waste discharges to both surface and ground waters of the state. The Porter-Cologne Act became one of the nation's strongest pieces of anti-pollution legislation. Through it, the State Water Board and the nine Regional Water Quality Control Boards (Regional Boards) have been entrusted with broad duties and powers to preserve and enhance all beneficial uses of the state's immensely complex waterscape.
Role during the Urban Runoff Program Process

The RWQCB is working to create standards to be used when writing an Urban Runoff program. Currently, it is recommended that cities with a population larger than 10,000 or more than 1,000 people per square mile implement an Urban Runoff Program. The Board is using Monterey Bay’s Urban Runoff Program as a model for other cities and municipalities to follow. The Board does not write the URP, that responsibility is left up to the city or municipality. But it will act as a consultant and make sure that the document stays consistent with current regulations. Once the URP is written, the Board will issue a permit that gives the city the authority to enforce it. The city will be monitored by the RWQCB to make sure that the URP is being enforced. It is up to the city to implement the URP and work toward achieving the stated goals. The Board makes sure that the city is following and maintaining the goals and objectives that they laid out in their URP.

Means of enforcement

Enforcement tools available to the Regional Board range from simple letters to the discharger, through formal Regional Board order, and direct penalty assessments, to judicial abatement for civil and/or criminal penalties. This is usually initiated by the Board, but enforced by the city or municipality in charge. Legally noticed public hearings are required for most actions, but some enforcement actions (e.g. Cleanup or Abatement Orders) have been delegated to staff to allow for a quicker response than regularly scheduled Regional Board meetings can provide.
Planning Process

The process for developing the Morro Bay Urban Runoff Program is described in this section. The objectives of this project are outlined. Also identified are the individual elements of research and teamwork encountered in the project by the City and Regional Planning students.
PLANNING PROCESS

The Morro Bay Urban Runoff Program has been developed as a project by students enrolled in City and Regional Planning 342, Winter 2001, Regional and Environmental Planning Lab. The period of February 13- March 20, 2001 was dedicated to developing an Urban Runoff Program (URP) for the City of Morro Bay using the Model Urban Runoff Program (MURP), as a guiding document. Although the city is currently engaged in designing an URP, and we were not officially hired, the purpose of this document is to supplement the work of the city staff. Through this project we have learned to:

- Develop and manage a planning project,
- Apply the principles of watershed planning and protection,
- Research innovative watershed protection tools,
- Examine and understand the complex structure of local, regional, state, and federal plans, laws, and regulations concerning water and land use, and
- Produce a professional planning product, including documents, presentations, and digital information.

The process for developing the Morro Bay Urban Runoff Program consists of three parts: planning, watershed management, and production. Each student held a responsibility within each part. Additionally, a student leader facilitated communication and progress for each the Planning Team, the Watershed Management Team, and the Production Team. The Project Managers responsibility was to coordinate between the groups and teams and assist in developing the project. City and Regional Planning Professor, Michael Boswell was our Project Director.

We met in class on Tuesdays and Thursdays. The first hour of class was a General Meeting in which progress and goals would be discussed. The second hour of class was our Management Meetings in which we would divide into our assigned teams to collaborate, research, and develop the project. We all were responsible for researching outside of class and for doing field studies as well.

The first task involved researching and writing our findings as Planning Teams. The Planning Team consisted of seven sections: the State of California, Federal programs and laws, City of Morro Bay, the Morro Bay National Estuary Program, San Luis Obispo County, Regional Water Quality Control Board, and Existing Conditions. Each student was responsible for researching one of these in order to learn from them and to get a good starting place for writing our own recommendations for the City of Morro Bay’s URP.

At the end of the first week we compiled all of our summary reports on the existing conditions and then moved onto the Watershed Management portion. The second task completed as The Watershed Management Team involved research and analysis by eight groups: Watershed Planning, Land Conservation, Aquatic Buffers, Site Design, Erosion and Sediment Control, Stormwater BMPs, Non-Stormwater Discharges and Water Quality Monitoring. We researched how each of the above sections can be used as tools for developing an Urban Runoff Program for the City of Morro Bay. Summary reports included relevant recommendations for each of the eight sections.
The final task in developing the Morro Bay Urban Runoff Program was to produce the final document. The Production groups include Copy Editors, Editors, Consistency Review, Webpage Development, Mapping, Graphics, and Presentation. Five students presented the final document of the Morro Bay Urban Runoff Program to the class and invited guests from the City of Morro Bay and Cal Poly’s City and Regional Planning Department. Overall, the entire process was completed rather smoothly. As students we have gained the ability to develop a professional comprehensive planning document in addition to learning about a significant environmental issue.

The Citizen Participation Program was completed in a subsequent class, CRP 436: Mediation and Negotiation, during Spring Quarter 2001. In this class, several groups of students researched material to concerning citizen participation and Urban Runoff Program requirements to develop a citizen participation program. To compile the various ideas and program elements the compilation and finalization of the citizen participation program was completed as part of an independent study project during Spring Quarter.
Bibliography

All sources documented within this document are identified in this section. These sources serve as an excellent reference for further information on the issues identified within the Morro Bay Urban Runoff Program.
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