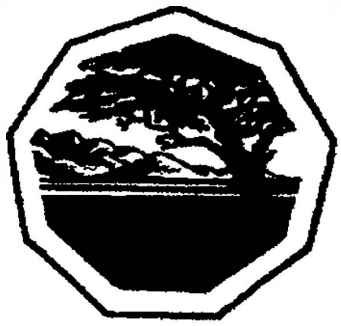
FORT ORD REUSE AUTHORITY



STORM WATER MASTER PLAN

MARCH 2005

Consulting Civil and Structural Engineers

CREEGAN + D'ANGELO

Consulting Civil and Structural Engineers

March 1, 2005 702012

Mr. James A. Feeney, Assistant Executive Officer
Fort Ord Reuse Authority
100 12th Street, Building 2880
Marina, CA 93933

Subject: Storm Water Master Plan

Dear Mr. Feeney:

This Storm Water Master Plan is prepared for the Fort Ord Reuse Authority (FORA) as part of FORA's obligations as defined in the 1997 Base Reuse Plan. In 2002, the storm water outfall pipes that extended into Monterey Bay were removed and several percolation basins constructed west of Route 1. These percolation basins are temporary with the long-term objective to percolate all storm water on the east side of Route 1 as part of the redevelopment of the former Ford Ord.

This Master Plan provides guidelines for implementing the storm water component of the Reuse Plan. It is available to the land use jurisdictions as well as developers and engineers.

The soil conditions at the former Fort Ord are ideal for percolation of storm water. There is flexibility in the design of the storm water facilities as long as the objectives of the Fort Ord Base Reuse Plan are accomplished.

Creegan + D'Angelo appreciated the opportunity to work with the FORA staff in preparing the Storm Water Master Plan.

Very truly yours,

Stanley Kulakow, PE
Vice President/Principal Engineer

SK/tj

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FORT ORD REUSE AUTHORITY

STORM WATER MASTER PLAN

MARCH 2005

FORT ORD REUSE AUTHORITY (FORA)
STORM WATER MASTER PLAN

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A. Design of Storm Water Drainage Facilities in Marina, CA
B. BMPs and Measurable Goals for the Monterey Regional Storm Water Management District dated December 8, 2004
C. Model Storm Water Ordinance
D. Storm Water Design Manual

FORT ORD REUSE AUTHORITY (FORA)
STORM WATER MASTER PLAN

FIGURES Page

TABLES

EXECUTIVE SUMMARY

Introduction

The Fort Ord Reuse Authority (FORA) through the Base Reuse Plan of 1997 has been obligated to eliminate all ocean storm water discharges and to infiltrate all storm water east of Highway 1. The former Fort Ord system of storm sewers drained a cantonment area of 4.7 square miles with some runoff being percolated in basins and the majority of runoff being discharged through ocean outfalls to Monterey Bay. All four of the outfalls have failed and, FORA implemented a project to temporarily divert the runoff from three of the failed outfalls to infiltration basins west of Highway 1.

This Plan summarizes existing infrastructure and hydrologic conditions for the former Fort Ord cantonment area and provides guidelines for meeting the FORA obligation for on-site infiltration. Locations and types of infiltration facilities to include pre-treatment equipment are presented for disposal of storm water from publicly owned lands such as streets, parking lots, and parks as well as areas of private development. The Plan also describes the current and near-term regulatory environment and presents a model storm water ordinance and a storm water design manual.

Existing Storm Water System

Storm water runoff from the 4.7 square mile cantonment area has been discharged through five ocean outfalls ranging from 36" to 60" diameter and two infiltration basins at the north and south ends of the area. The tributary areas range from 0.29 square miles for the north infiltration basin to 2.10 square miles for the 60" diameter ocean outfall. The tributary area to the 60" outfall lies entirely within the jurisdiction of the U.S. Army rather than FORA and is not specifically discussed in this report. Management of storm water runoff to the three remaining outfalls and one infiltration basin west of Highway 1 is the primary topic of this Plan. A thorough analysis of the existing storm drainage system, tributary areas, peak flows, and hydraulic capacity was presented in the Master Plan for Improvements to the Storm Drainage System by Schaaf and Wheeler (2001). Further information about the condition of the storm drains is provided in the Fort Ord Drain Field Review and Needs Assessment by Schaaf and Wheeler (2000).

In 2003 FORA completed a project to divert storm water runoff from two 48" and one 54" outfalls to infiltration areas west of Highway 1. The project also includes removal of the unsightly and potentially dangerous failed outfall structures.

Current Regulatory Environment

Marina and Seaside, the two cities having public jurisdiction over the redeveloped cantonment area of Fort Ord, have utilized different approaches to storm water management. The City of Marina has historically relied entirely on on-site infiltration of storm water while the City of Seaside had relied upon ocean discharge through a 90" interceptor with the outfall within Sand City. The City of Marina has policies in place for on-site infiltration and design standards for infiltration basins. A copy of the City of Marina Design Standards is included as Appendix A. A drainage report, calculations and plans must be approved by the City Engineer as part of the permitting process, and no runoff from a site is allowed to flow to public streets. Although the City of Seaside has no ordinance requiring on-site infiltration of storm water, it is developing a storm water ordinance to meet Phase II National Pollution Discharge Elimination System (NPDES) requirements.

The goal of the Phase II NPDES Permit Program is to reduce adverse effects to water quality and aquatic habitat by instituting various controls on municipal separate storm sewer systems. This is accomplished by implementing Best Management Practices (BMPs) that apply to urbanized areas and construction sites. Many of the BMPs encourage on-site infiltration or other methods of reducing the volume of storm water runoff. A listing of the BMPs and Measurable Goals for the Cities of Marina and Seaside is provided in Appendix B. Development in the Fort Ord dunes west of Highway 1 is also subject to permitting by the California Coastal Commission and other state and federal agencies.

Storm Water Management Planning

The political entities within the former Fort Ord cantonment area are in various stages of their master planning process. The U.S. Army is responsible for storm water management for the land in the Ord Military Community (OMC). California State University of Monterey Bay (CSUMB) has the largest contributing land area within the containment area and has a Master Plan that was prepared in 1997. This Plan is undergoing revisions because it relies on discharges to the storm drainage system and was written prior to the current Outfall Removal and Storm Water Diversion Project. This Master Plan is intended to be the guiding document for storm water management of the public and private development areas within the Fort Ord regions of the Cities of Marina and Seaside and the CSUMB campus.

Implementation Program

Since most of the FORA area overlies well-drained, highly permeable sandy soils, infiltration basins or subsurface infiltration systems will be effective storm water disposal methods. The basic criterion in developing this Storm Water Master Plan is that all storm water originating within a political jurisdiction is infiltrated within that jurisdiction. In addition, existing storm drain pipelines are not used to transport the storm runoff of one political jurisdiction across another jurisdiction or from one private development to another. The preferred method of infiltrating storm runoff from streets will be with subsurface infiltration systems. Subsurface systems require minimal surface area, are independent of the existing drainage system, and can be easily adapted to the boundaries of political jurisdictions. Recommendations are also made for locating infiltration basins for street runoff and other runoff as desired by the political entities. Basins generally must be located along the existing drainage system and require valuable land space. Infiltration basins can be cleaned to renew the infiltration rate, however this is not feasible with subsurface systems.

A Model Storm water Ordinance has been prepared for the entities within the FORA area and is included as Appendix C. The purpose of the ordinance is to establish minimum storm water management requirements and controls to protect and safeguard the general health, safety, and welfare of the public residing within the present FORA area.

Design standards and details for typical storm water infiltration systems are provided in Appendix D, Storm Water Design Manual. Both infiltration basins and subsurface infiltration systems should be designed on the basis of 1000 square feet of flooded area per acre of impervious tributary area. The basins are to have a minimum depth of 4 feet and thus provide 4000 cubic feet of storage per acre of impervious surface. Subsurface systems are to have the minimum equivalent storage of 4000 cubic feet per acre of impervious tributary area. Infiltration chambers and large-diameter infiltration pipes are the recommended subsurface infiltration systems.

Effect on this Storm Water Master Plan

This Storm Water Master Plan is prepared for the Fort Ord Reuse Authority (FORA) to convey the information FORA has gathered during its evaluation of the existing onsite drainage system and development of alternative storm water disposal means and methods. Further, FORA is providing recommendations relative to the best management practices for onsite percolation and disposal of storm water within the cantonment area of the former Fort Ord.

FORA has observed and followed its own recommendations in conjunction with roadway project design and construction. The roadways drain and percolate all runoff within the road rights-of-way. The facilities FORA has constructed will be transferred to the land use jurisdiction, within whose boundaries the facilities lie, for operation and maintenance. The design of these facilities was based on the information presented in this Storm Water Master Plan.

FORA presents this Storm Water Master Plan as only a suggestion to the land use jurisdictions for a uniform design standard that could be applied throughout the cantonment area. The use made of this Storm Water Master Plan and its adoption, partial adoption or non-use by any land use jurisdiction is at the sole discretion of that land use jurisdiction.

CHAPTER 1
INTRODUCTION

Background

The redevelopment area of the former Fort Ord overlies a relic dune formation that slopes gradually westward towards Monterey Bay and to the north and east towards the Salinas Valley (Figure 1-1). The average annual rainfall of about 13.5 inches falls almost entirely from October to April. As is evidenced by the absence of natural drainage courses westward towards Monterey Bay, rainfall prior to development of this area would percolate more or less in place in the porous soils.

As Fort Ord developed, a system of storm sewers was installed in the approximately 4.7 square mile cantonment area. Most of this system ultimately discharged to 4 large outfall pipes that terminated on the beach in the surf zone. Two additional drainage systems discharged to infiltration basins at the north and south ends of Fort Ord. Over time and with significant coastal recession, three of these outfall structures failed, resulting in extensive erosion of the dune bluffs from uncontrolled discharge of storm water

The US Army Corps of Engineers (USACE) made temporary repairs at two of the failed outfall pipes (60-inch and North 48-inch outfalls) to check further erosion of the dunes; however, they did not undertake a similar project for the third failed pipeline (the 54-inch outfall). The Fort Ord Reuse Authority (FORA) developed and constructed a project to divert the storm water from the 48-inch and 54-inch pipelines to percolation basins west of Highway 1. Construction of the FORA infiltration system was completed in the fall of 2003.

FORA Obligation

Though repairs have been installed at the failed pipelines and diversions to infiltration basins have been constructed, these are considered temporary measures to avoid further damage to the coastal dunes. FORA is obligated by the Fort Ord Reuse Plan for the long-term management of storm water so that no further discharges occur to the Monterey Bay Marine Sanctuary. Therefore redevelopment of the cantonment area should provide adequate facilities for on-site infiltration of storm water runoff, and that existing impervious surfaces should be modified or the runoff managed and redirected to suitable infiltration facilities. Storm water management should occur within each jurisdiction to preclude the need for formation of funding mechanisms to finance the operation and maintenance of disposal systems and sites.

Scope and Purpose

This Master Plan summarizes existing infrastructure and hydrologic conditions for the cantonment area of the former Fort Ord and provides guidance for future development to meet the recommended obligation for on-site infiltration. It also presents a description of the current and near-term regulatory environment, a model storm water ordinance, and a storm water design manual. It can be useful to developers and public agencies alike.

Effect on this Storm Water Master Plan

This Storm Water Master Plan is prepared for the Fort Ord Reuse Authority (FORA) to convey the information FORA has gathered during its evaluation of the existing onsite drainage system and development of alternative storm water disposal means and methods. Further, FORA is providing recommendations relative to the best management practices for onsite percolation and disposal of storm water within the cantonment area of the former Fort Ord.

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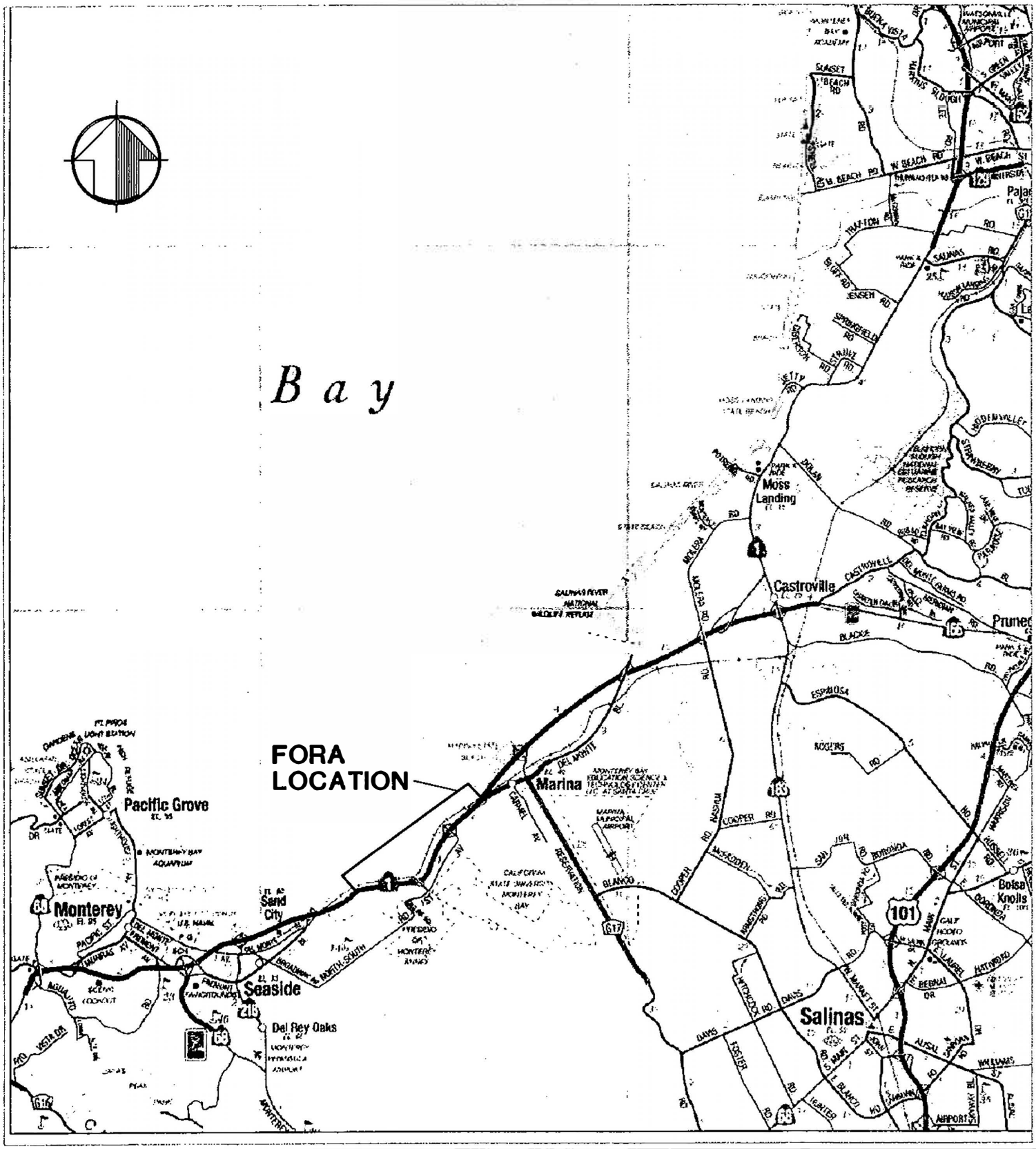

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Consulting Civil and Structural Engineers

FAIRFIELD, MONTEREY, PLEASANTON, SAN FRANCISCO, SAN JOSE

DRAWN BY: SAS	DATE: 10-11-04
CHECKED BY: ADS	SCALE:
APPROVED BY: ADS	JOB NO: 702012.40

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SHEET 1 OF 1 **FIGURE 1-1**

CHAPTER 2
EXISTING STORM DRAIN SYSTEM AND HYDROLOGY

A thorough analysis of the existing storm drainage system for the cantonment area of the former Fort Ord, its tributary areas, peak flows, and hydraulic capacity was prepared for FORA in the Master Plan for Improvements to the Regional Storm Drain System, prepared by Schaaf and Wheeler (2001). That analysis and information has been used as a basis for design of recent storm water improvements for FORA and as the basis for recommendations in this Master Plan. Selected data from that report describing the tributary areas and respective storm water yields are summarized in Table 2-1 and 2-2 with the tributary areas shown in Figure 2-1. The tributary subareas and political subdivisions are illustrated in Figure 2-2.

Table 2-1 Tributary area analysis for existing storm drain outfalls west of Highway 1. (Data from Schaaf and Wheeler, 2001[1]).

Outfall	Tributary Area Designation	Tributary Area (sq. mi.)	% Impervious	Note
(Existing percolation basin east of Hwy 1)	A			Lies within land destined for the City of Marina
(Existing percolation basin west of Hwy 1)	B	0.29	54	
54"	C	0.30	87.4	Diversions necessary east of Hwy 1.
North 48"	D1	0.60	62.7	Diversions necessary east of Hwy 1.
South 48"	D2	0.51	42.1	Diversions necessary east of Hwy 1.
60"	E	2.10	27	U.S. Army responsibility. The RCI and City of Seaside redevelopment area is within the tributary area.
36"	F			The City of Seaside portion of tributary area is the Seaside Highlands Residential development. Construction of the percolation basin was completed in 2003. Remaining flows in 36" outfall originate on Caltrans right of way of Hwy 1.

[1] Table-1, page 9, Master Plan for Improvements to the Regional Storm Drainage System, August 2001, Schaaf and Wheeler with additional information added regarding tributary areas E and F.

The original storm drainage system, shown in Figure 2-1, discharged to five ocean outfalls, one percolation basin west of Highway 1, and some additional inland infiltration sites east of Highway 1. The southernmost of the ocean outfalls, a 36-inch diameter pipe, was recently diverted into percolation basins east of Highway 1 within the present Seaside Highlands development project in the City of Seaside. Data for all outfalls are presented in Tables 2-1 and 2-2, arranged from north to south. The permanent percolation basin for tributary area F was completed in 2003. Tributary Area A drains to a percolation site east of Highway 1 within the City of Marina. The storm drain system (Tributary Area B) discharges to a percolation basin just east of the dunes near the northern boundary of the former Fort Ord. Drainage from this area should be diverted to infiltration facilities east of Highway 1. The 60" (Tributary Area E) discharges to the beach over a recently constructed erosion control structure and flows to Monterey Bay. The majority of Tributary Area E lies within the jurisdiction of the US Army with a small portion within the City of Seaside jurisdiction. Management of the City of Seaside portion will be discussed in this Plan and general recommendations for the US Army area will also be presented. The management of storm flows to the remaining storm drainage system, the 54", the North 48" and the South 48", and Basin B (Tributary Areas B, C, D1, and D2 respectively), is the primary topic of this Master Plan.

The former Fort Ord initially developed to the west of Highway 1 near the coastal dunes, and then expanded to the east as buildings were added. With the new construction, additional storm runoff was diverted to the existing storm pipes that drained to the ocean outfalls. As a result, the trunk lines near Highway 1 are the most undersized. The oldest storm drains and those most likely in need of repair also are near Highway 1.

Table 2-2 Peak discharge and estimated storm drain system conveyance capacity for outfall tributary areas . (Data from Schaaf and Wheeler, 2001[2]).

Tributary Area Designation	100-year peak discharge (cfs)	10-year peak discharge (cfs)	2-year peak discharge (cfs)	Estimated storm drain capacity (cfs)
B	210	140	90	120
C	310	210	140	90
D1	360	240	160	200
D2	210	140	100	110
E	550	360	250	320
F				

[2] Table-2, page 11, Table-3, page 12, Master Plan for Improvements to the Regional Storm Drainage System, August 2001, Schaaf and Wheeler

Outfall Removal and Storm Water Diversion Project

FORA has completed a project to divert storm water from the 54-inch, north-48 inch and south 48-inch outfalls (Tributary Areas C, D1, and D2, respectively) to percolation areas in the dunes west of Highway 1, just east of the shoreline. Construction of these diversions was completed in the fall of 2003. The project also included removal of the unsightly and potentially hazardous failed outfall structures from the beach. Since the entire dune and beach area west of Highway 1 is to be conveyed to the California State Department of Parks and Recreation, the long-term goal is to eventually terminate all flow to the percolation sites. This can only be done after adequate measures are in place throughout the upstream drainage system to infiltrate all storm water east of Highway 1.

Ownership and Jurisdiction

The cantonment area of the former Fort Ord that is tributary to the existing ocean outfalls lies in five jurisdictions, the City of Marina, the City of Seaside, California State University Monterey Bay (CSUMB), Monterey County and the US Army, Presidio of Monterey. Tributary Areas B, C, D1, and D2 lie entirely within the boundaries of the City of Marina and the City of Seaside, with approximately 51 percent of the area included within the boundaries of the CSUMB campus. As land is transferred and redeveloped, responsibility for storm water improvements may be further divided between privately developed areas and those areas that remain as public facilities and lands. The jurisdictional and tributary area boundaries are shown in Figure 2-2. The total area of existing impervious area and public street right of way area for Tributary Areas B, C, D1, and D2 is summarized by respective jurisdiction in Table 2-3. Area E is primarily under OMC jurisdiction with a small area within the CSUMB boundary and a larger area within the City of Seaside. The majority of roads and other impervious surfaces lie within OMC jurisdiction. The CSUMB jurisdiction within Area E includes only a segment of Durham Street, and the Seaside jurisdiction is primarily golf courses or undeveloped lands. Only the portion of General Jim Moore Blvd. within Area F is within the jurisdiction of the City of Seaside.

Existing Impervious Surface

For the purposes of storm water planning and design, potential storm water yields are assumed to be directly proportional to the quantity of impervious surface within the upstream tributary area. For Tributary Areas B, C, D1, and D2, the jurisdiction with the largest amount of existing impervious surface is CSUMB, with approximately 312 acres, or about 48 percent of the total. Land outside the CSUMB boundary and within the City of Marina constitutes the next largest percent of impervious surface, 292 acres, or about 46 percent. The remaining 6 percent of the total existing impervious surface, about 35 acres, is in the City of Seaside outside the CSUMB boundaries to the south.

Table 2-3 Summary of stormwater data by tributary area and political jurisdiction.

Item	Tributary Area B	Tributary Area C (54" Storm Drain System)	Tributary Area D1 (N48" Storm Drain System)	Tributary Area D2 (S48" Storm Drain System)	Tributary Area E (60" Storm Drain System)	Totals (Areas B, C D1, D2, and E)
Master Plan Data (S&W, 2001)						
Total Area (acres)	186	201	407	342	1344	2480
Impervious Area(acres)	100	168	241	137	363	1009
10 year Q_{peak}(cfs)	140	210	240	140	360	1090
100 year Q_{peak}(cfs)	210	310	360	210	550	1640
Q_{max}(cfs) in pipeline, due to limited conveyance capacity	120	90	200	110	320	840
10 year Volume (AF)	33	56	80	45	120	334
100 year Volume (AF)	53	85	126	76	220	560
Percolation Basins, West Hwy. 1, Design Criteria (2003)						
Q_{max}(cfs) Based on Limited Conveyance System	120	90	200	110	n/a	520
Flooded Dune Area, (acres)		2.9			n/a	n/a
Total Stormwater Volume (AF)		75	n/a	n/a	n/a	na/
City of Marina						
Total Area (acres)	186	134	140	10	0	470
Percent of Tributary Area	100%	67%	34%	3%	0	19%
Impervious Area(acres)	100	112	83	4	0	299
Included Street Area (acres)	10.2	9.2	11.1	0.3	0	30.9
CSUMB						
Total Area (acres)	0	67	267	245	4	583
Percent of Tributary Area	0%	33%	66%	72%	1%	24%
Impervious Area (acres)	0	56	158	98	0.5	312
Included Street Area (acres)	0	4.6	14.8	13.6	0.5	33
City of Seaside						
Total Area (acres)	0	0	0	87	n/a	n/a
Percent of Tributary Area	0%	0%	0%	25%	n/a	n/a
Impervious Area (acres)	0	0	0	35	n/a	n/a
Included Street Area (acres)	0	0.0	0.0	6.4	12.6*	19.0
Streets						
Total Area (acres)	10.2	13.8	25.9	20.3	13.1	83
Percent of Tributary Area	5.5%	6.9%	6.4%	5.9%	1.0%	3.4%

* Street area of Gen. Jim Moore Blvd. only

Assumed right of way for street calculations (ft)= 40

GRAPHIC SCALE

LEGEND

DRAINAGE AREA

CITY/COUNTY BOUNDARY

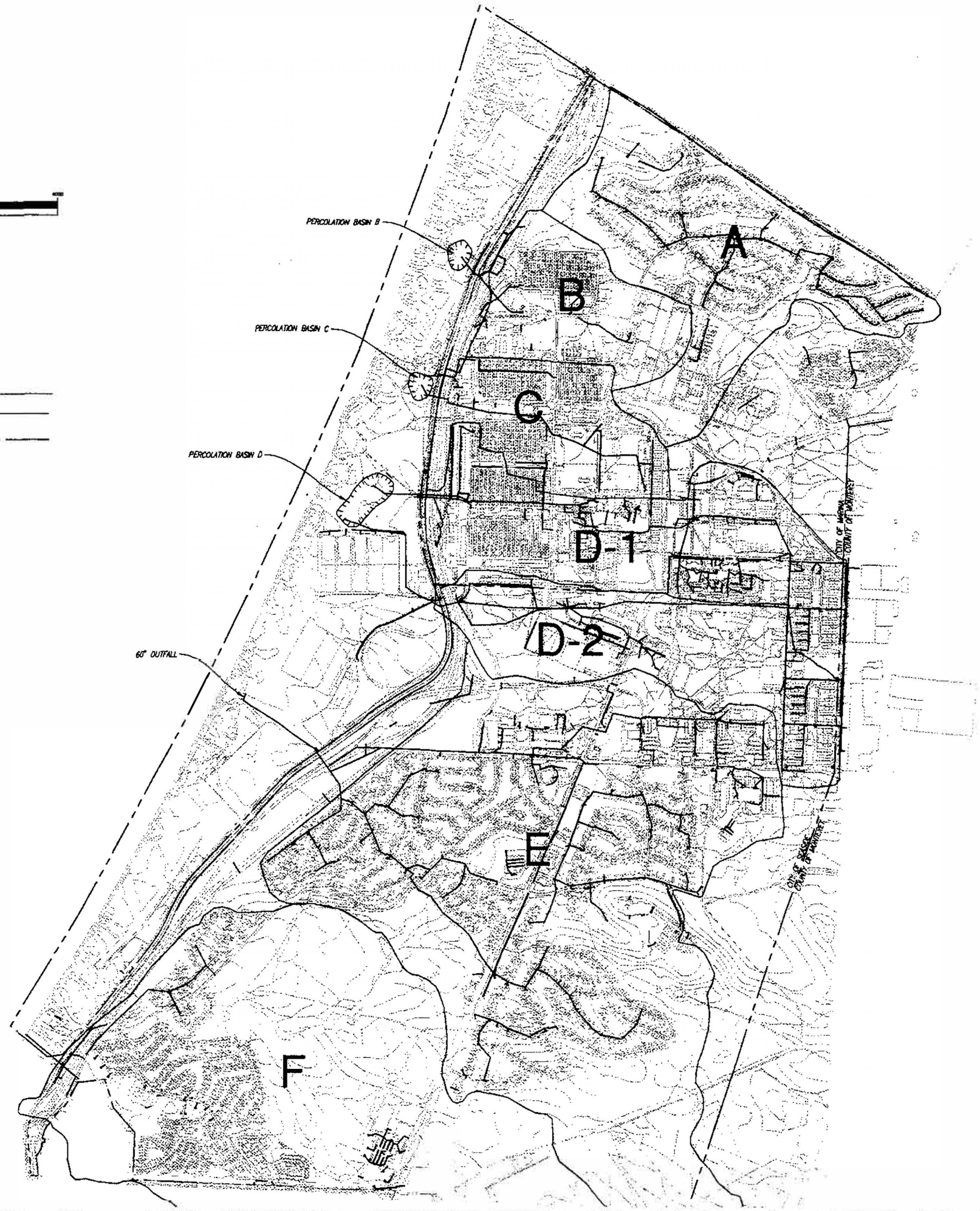

FIGURE 2-1

FORA STORM WATER MASTER PLAN
EXISTING DRAINAGE SYSTEM AND DRAINAGE AREAS
SEASIDE /MARINA Monterey County California

SHEET NUMBER 1 OF 2 SHEETS
DRAWING NO. 702012.40

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BY	DESCRIPTION	DATE

REVISED BY:	ADS
DRAWN BY:	SAS
CHECKED BY:	ADS
DATE:	10-08-04
SCALE:	AS NOTED

GRAPHIC SCALE

0 1000 2000 4000

LEGEND

DRAINAGE SUB AREA

CITY/COUNTY BOUNDARY

CSUMB BOUNDARY

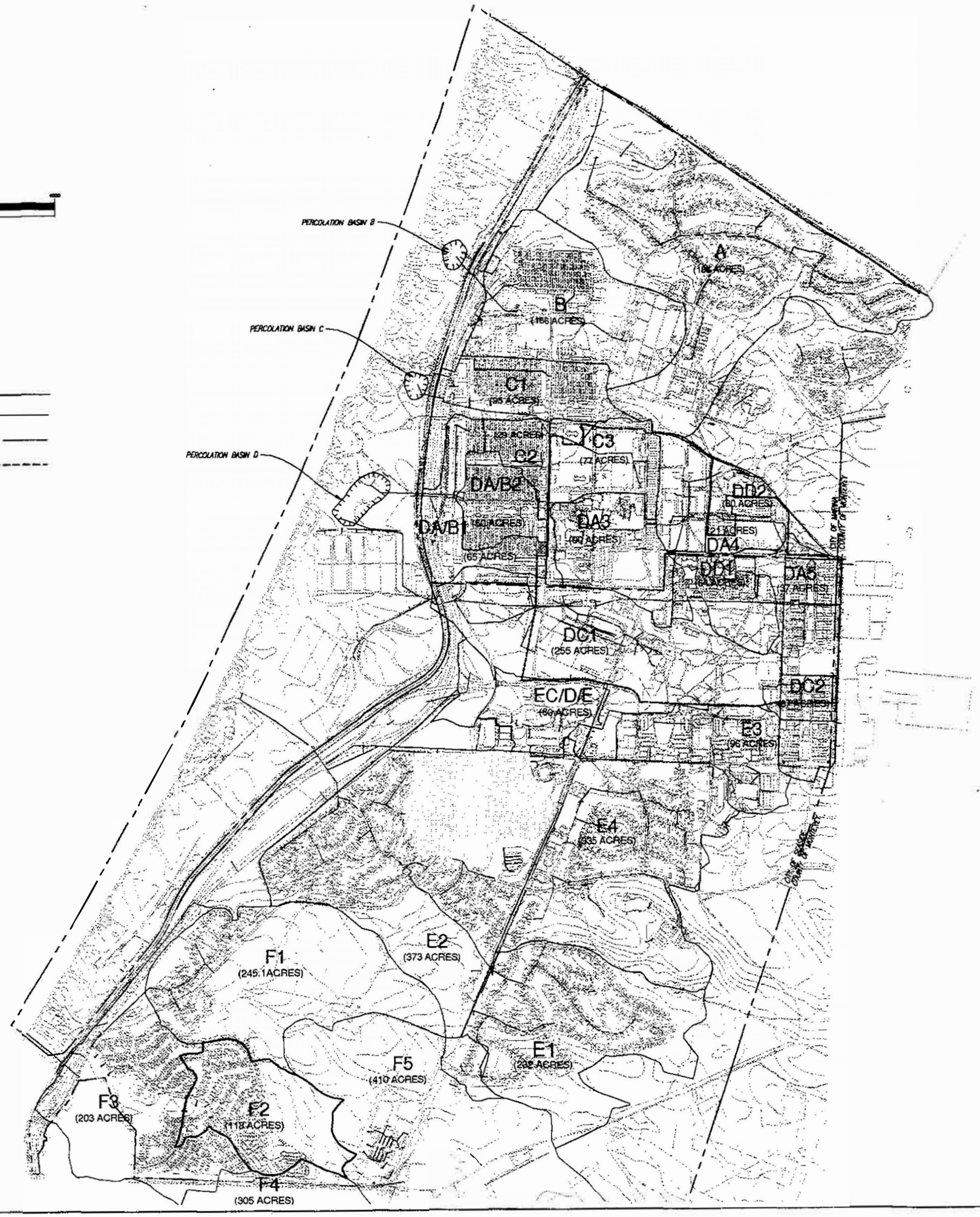

FIGURE 2-2

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AJS DESIGNED
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AJS CHECKED
10-06-04 DATE
AS NOTED SCALE

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FORA STORM WATER MASTER PLAN
DRAINAGE SUB-AREAS
AND POLITICAL JURISDICTIONS
SEASIDE /MARINA Monterey County California

SHEET NUMBER 2
OF 2 SHEETS
DRAWING NO. 7020[1]2.40

CHAPTER 3
CURRENT REGULATORY ENVIRONMENT

Fort Ord Base Reuse Plan (May 1996)

The FORA Board of Directors adopted in June 1997 the Fort Ord Base Reuse Plan (BRP), dated May 1996, obligating the Cities of Marina and Seaside and Monterey County to those objectives of the Conservation Element of the Reuse Plan that affect Hydrology and Water Quality (Section 4.4.21). Policies and Programs of the BRP make it imperative that Marina, Seaside and Monterey County develop, adopt and implement certain programs to protect and preserve ground water supplies.

A component of the adopted policies addresses the management of surface waters and non-point source pollution control and assigns performance requirements to Marina, Seaside and Monterey County on their Fort Ord lands.

Existing City Ordinances

The two cities having public jurisdiction over the redeveloped cantonment area of the former Fort Ord are Marina and Seaside. Historically the City of Marina has relied entirely on on-site percolation of storm water and has not used ocean outfalls for storm water discharge. In contrast, the City of Seaside has relied upon ocean discharge through pipelines to Roberts Lake and a 90-inch diameter interceptor that currently outfalls to the beach in Sand City. Seaside has provided hydrologic drainage area percolation facilities in Drainage Area F and on-site percolation in recent development projects within the City.

City of Marina

The City of Marina currently has policies in place for on-site infiltration, as well as design standards for infiltration basins. Developers are currently required to provide infiltration facilities for all post-development runoff generated on-site for the 10-year storm. A copy of these standards is provided as Appendix A. No runoff from the site is allowed to flow to public streets. A Drainage Report including calculations and plans is required to be submitted for approval by the City Engineer as part of the permitting process. The City is in the process of upgrading its subdivision ordinance to formally articulate its design standards for land development.

In Appendix A, design factors include an equation for rainfall intensity, runoff coefficients for various land uses, and an allowable infiltration rate of 12 inches per hour. The designer must provide sufficient storage so that the storage plus infiltration equals or exceeds the cumulative runoff. A sample calculation illustrates the use of the design procedure for a combined single-family residential and undeveloped area.

City of Seaside

The City of Seaside currently does not have an ordinance that requires on-site infiltration of storm water, though it is in the process of developing a storm water ordinance to meet Phase-II NPDES requirements. Storm water infiltration requirements for new developments, such as the new Seaside Highlands subdivision on Fort Ord, are currently specified and enforced on a case-by-case basis through the plan-check and permitting process.

The City of Seaside does have an ordinance that requires the post-development runoff not exceed the pre-development runoff. The City requires that storm drainage facilities accommodate the 100-year storm.

Phase-II NPDES Storm Water Permit Requirements

The goal of the Phase II NPDES Permit program is to reduce the adverse impacts of storm water on water quality and aquatic habitat by instituting various controls on unregulated storm water. This is accomplished by implementing and enforcing a series of Best Management Practices (BMP's) that apply to urbanized areas and construction practices. The BMP's are designed to reduce the discharge of pollutants from municipal separate storm sewer systems such as presently exist in the cantonment area of the former Fort Ord. Although the goal of the Phase II program is not specifically targeted at on-site infiltration practices, many of the BMP's encourage on-site infiltration or other methods of reducing the volume of storm water runoff.

Former Fort Ord is, as a unit, considered to be an industrial discharger under NPDES Ph-II.

The cities of Marina and Seaside along with seven other member entities from the Monterey Peninsula are jointly developing a Monterey Regional Storm Water Management Plan (MRSWMP). The Central Coast Regional Water Quality Control Board has reviewed their application for a Group Phase-II NPDES Storm Water Permit and posted the application on their Internet site. Several environmental organizations have reviewed the permit application and requested additions and modifications to the plan. The stormwater management group is now developing the final draft of the management plan with input from the Regional Board and the reviewers. The permit includes a list of BMP's and specific Measurable Goals along with an implementation schedule. All member entities of the stormwater management plan will follow the same schedule for implementing the BMP's. The current (December 8, 2004) BMP's and Measurable Goals for the MRSWMP are provided in Appendix B.

The BMP's and Measurable Goals in Appendix B for the MRSWMP are based on minimum measures for programs such as public education and participation, illicit discharge detection and elimination, construction activity management, and municipal operations. Each of the minimum measures lists a water quality issue, BMP's for mitigating the issue, and measurable goals for documenting success of the practices. Water quality issues are specific water quality problems or contaminant issues encountered within the two cities. The BMP's range from practices such as disposal of specific contaminants to more general inspection requirements. Measurable water quality goals provide specific dates and reductions to be achieved by the BMP's.

California Coastal Commission and Other Agencies

Development west of Highway 1 in the Fort Ord Dunes area is subject to permitting by the California Coastal Commission. The Outfall Removal and Storm Water Diversion Project, which removed the unsightly and potentially hazardous outfall structures from the beach and will reduce future erosion of the dune habitat, was approved by the Commission. One of the conditions of approval is that in the long term, redevelopment activities will provide sufficient upstream diversions east of Highway 1 so that the diversion structures may be removed and the percolation basins restored to native dune habitat.

Other agencies that may influence storm water management practices on the former Fort Ord include the US Fish and Wildlife Service and California Department of Fish and Game, as they are involved with threatened and endangered species that may be present in areas sited for percolation basins. Also, the California Regional Water Quality Control Board is responsible for water quality issues under the requirement for a 401 Water Quality Permit or Waiver. Each of these agencies is involved in permitting issues related to the development of storm water percolation facilities.

CHAPTER 4
STORM WATER MANAGEMENT PLANNING

The political entities within the cantonment area of the former Fort Ord are in various stages of their master planning process.

US Army:

The US Army is responsible for redevelopment of the land within the Ord Military Community (OMC) and all associated storm water management activities. These areas are part of the Residential Communities Initiatives (RCI) program. This area is outside of the FORA redevelopment area and contributes almost all of the current runoff to the failed 60-inch ocean outfall. With future redevelopment of FORA parcels using on-site infiltration, the RCI area will account for all discharge to the 60-inch outfall.

RCI has prepared a plan for storm water management and disposal within portions of the OMC. This plan will be a relevant part of their redevelopment activities.

CSUMB:

CSUMB with 51% of the cantonment tributary area and the greatest impervious surface is the largest stormwater contributor of all the entities in the cantonment area. It lies in the tributary areas for each of the three outfalls that have been diverted to percolation basins west of Highway 1.

A Master Plan for CSUMB was prepared in 1997 to guide its growth and revised in 2004. The 2004 Master Plan and Environmental Impact Report state the University should prepare a Master Drainage Plan. This plan should recognize the removal of the outfall structure and the diversion of storm water to temporary percolation basins west of Route 1. In accordance with the FORA Reuse Plan, the long-term objective is to percolate all storm water within each jurisdiction including CSUMB.

FORA Redevelopment:

The FORA redevelopment area addressed in this Storm Water Master Plan includes the municipal jurisdictions of Marina and Seaside, the CSUMB campus, and Monterey County. This Master Plan is intended to be the advisory document for storm water management for the Fort Ord regions of the cities of Marina and Seaside, Monterey County, and the CSUMB campus. As mentioned throughout this Master Plan, FORA is obligated to manage storm water to eliminate ocean discharges and provide alternative disposal of storm water in keeping with NPDES Phase-II, BMPS. This obligation is imposed by the Fort Ord Reuse Plan and the associated environmental document.

Infiltration Area Requirements:

To facilitate planning, a value for the minimum amount of storm water infiltration pond area per acre of impervious surface was developed. Assuming sites with sandy dune soils will be chosen for infiltration facilities, a percolation rate of 12 inches per hour would be appropriately conservative to ensure long-term performance. Using the 100-year storm hydrograph for the 54-inch outfall basin as the design peak storm, a theoretical basin was modeled with a 12-inch per hour percolation rate and a maximum depth of 4 feet. The ratio of the modeled basin area to the assumed impervious runoff area was 0.022 infiltration basin acres (1968 ft^2) per impervious acre. This value was rounded up to a design value of 1000 ft^2 of infiltrative surface per impervious acre of development. It represents the minimum infiltrative surface requirement for development. On sites with less permeable soils, a lower infiltration rate will result in a proportionally larger basin or subsurface infiltration system.

Tables 4-1, 4-2, and 4-3 were prepared to illustrate the amount of infiltrative surface area that will be theoretically required for complete redevelopment of the various political jurisdictions, at varying amounts of impervious surface in the watershed. Also included in these tables is a calculation of the amount of infiltration surface that will be needed to accommodate the public street areas. For example, as shown in Table 4-1, for CSUMB to fully develop, a minimum of 21.3 acres of infiltration surface will be required assuming 80 percent impervious cover. Of that required infiltration surface, 1.36 acres would be necessary to accommodate the public street right of way, assuming 90 percent impermeable cover. Tables 4-2 and 4-3 provide similar information for 60 percent and 40 percent impervious cover, respectively. Note that this infiltration surface could either be in the form of a percolation basin flooded to an average depth of 4 feet, or a subsurface infiltration system with an equivalent amount of infiltration area and storage. Also, the required infiltration area is proportionally lower if less impervious development occurs. Specific infiltration basin locations and other types of infiltration systems, including structural modifications to existing paved areas, are discussed in Chapter 5.

Jurisdictional Standards:

The objective of this Storm Water Master Plan is to provide recommendations for the long-term, appropriately designed, storm water percolation facilities to provide for the public and private facilities which are part of each development. The Cities of Marina and Seaside should develop design standards that will eliminate any storm water discharges to the existing percolation basin west of Route 1.

Each development project should be required to develop a storm water collection and percolation system subject to the approval of the Public Works Director/City Engineer that accomplishes the objectives of this Storm Water Master Plan.

Table 4-1 Summary of Minimuim Required Infiltration Areas with 80% Impervious Surface in Tributary Area

Area or Sub-Area	Total Area	Total Street Area	City of Marina					CSUMB					City of Seaside				
			Total Area	Total Infiltration Area East of Hwy 1	Street Length	Street Area	Street Infiltration Area East of Hwy 1	Total Area	Total Infiltration Area East of Hwy 1	Street Length	Street Area	Street Infiltration Area East of Hwy 1	Total Area	Total Infiltration Area East of Hwy 1	Street Length	Street Area	Street Infiltration Area East of Hwy 1
	acres	acres	acres	acres	miles	acres	acres	acres	acres	miles	acres	acres	acres	acres	miles	acres	acres
B	186	10.2	186	3.4	2.10	10.2	0.21										
C	201	13.8	134	2.5	1.91	9.2	0.19	67	1.2	0.94	4.6	0.09					
C1	95	6.0	95	1.7	1.24	6.0	0.12										
C2	29	2.7	29	0.5	0.57	2.7	0.06										
C3	77	5.1	10	0.2	0.10	0.5	0.01	67	1.2	0.94	4.6	0.09					
D1	407	25.9	140	2.6	2.30	11.1	0.23	267	4.9	3.05	14.8	0.31					
DA/B1	65	3.7	65	1.2	0.76	3.7	0.08										
DA/B2	50	5.5	50	0.9	1.14	5.5	0.11										
DA3	90	7.6						90	1.7	1.56	7.56	0.16					
DA4	21	0.0	4	0.1				17	0.3								
DA5	37	4.2	3	0.1				34	0.6	0.87	4.2	0.09					
DD1	64	3.0						64	1.2	0.62	3.0	0.06					
DD2	80	1.9	18	0.3	0.39	1.9	0.04	62	1.1	0.00	0.0	0.00					
D2	342	20.3	10	0.2	0.06	0.3	0.01	245	4.5	2.81	13.6	0.28	87	1.6	1.32	6.4	0.13
DC1	255	9.8	10	0.2	0.06	0.3	0.01	192	3.5	1.68	8.1	0.17	53	1.0	0.28	1.4	0.03
DC2	87	10.5						53	1.0	1.13	5.5	0.11	34	0.6	1.03	5.0	0.10
Totals	1136	70.2	470	8.6	6.37	30.9	0.64	579	10.6	6.80	32.9	0.68	87	1.6	1.32	6.4	0.13

Assumed overall average runoff factor (%)= 80%
Assumed right of way for street calculations (ft)= 40
Assumed runoff factor for street right of way (%)= 90%
Assumed infiltration area requirement (ft^2/impervious acre)= 1000

Table 4-2 Summary of Minimuim Required Infiltration Areas with 60% Impervious Surface in Tributary Area

Area or Sub-Area	Total Area	Total Street Area	City of Marina					CSUMB					City of Seaside				
			Total Area	Total Infiltration Area East of Hwy 1	Street Length	Street Area	Street Infiltration Area East of Hwy 1	Total Area	Total Infiltration Area East of Hwy 1	Street Length	Street Area	Street Infiltration Area East of Hwy 1	Total Area	Total Infiltration Area East of Hwy 1	Street Length	Street Area	Street Infiltration Area East of Hwy 1
	acres	acres	acres	acres	miles	acres	acres	acres	acres	miles	acres	acres	acres	acres	miles	acres	acres
B	186	10.2	186	2.6	2.10	10.2	0.21										
C	201	13.8	134	1.8	1.91	9.2	0.19	67	0.9	0.94	4.6	0.09					
C1	95	6.0	95	1.3	1.24	6.0	0.12										
C2	29	2.7	29	0.4	0.57	2.7	0.06										
C3	77	5.1	10	0.1	0.10	0.5	0.01	67	0.9	0.94	4.6	0.09					
D1	407	25.9	140	1.9	2.30	11.1	0.23	267	3.7	3.05	14.8	0.31					
DA/B1	65	3.7	65	0.9	0.76	3.7	0.08										
DA/B2	50	5.5	50	0.7	1.14	5.5	0.11										
DA3	90	7.6						90	1.2	1.56	7.56	0.16					
DA4	21	0.0	4	0.1				17	0.2								
DA5	37	4.2	3	0.0				34	0.5	0.87	4.2	0.09					
DD1	64	3.0						64	0.9	0.62	3.0	0.06					
DD2	80	1.9	18	0.2	0.39	1.9	0.04	62	0.9	0.00	0.0	0.00					
D2	342	20.3	10	0.1	0.06	0.3	0.01	245	3.4	2.81	13.6	0.28	87	1.2	1.32	6.4	0.13
DC1	255	9.8	10	0.1	0.06	0.3	0.01	192	2.6	1.68	8.1	0.17	53	0.7	0.28	1.4	0.03
DC2	87	10.5						53	0.7	1.13	5.5	0.11	34	0.5	1.03	5.0	0.10
Totals	1136	70.2	470	6.5	6.37	30.9	0.64	579	8.0	6.80	32.9	0.68	87	1.2	1.32	6.4	0.13

Assumed overall average runoff factor (%)= 60%
Assumed right of way for street calculations (ft)= 40
Assumed runoff factor for street right of way (%)= 90%
Assumed infiltration area requirement (ft^2/impervious acre)= 1000

Table 4-3 Summary of Minimuim Required Infiltration Areas with 40% Impervious Surface in Tributary Area

Area or Sub-Area	Total Area	Total Street Area	City of Marina					CSUMB					City of Seaside				
			Total Area	Total Infiltration Area East of Hwy 1	Street Length	Street Area	Street Infiltration Area East of Hwy 1	Total Area	Total Infiltration Area East of Hwy 1	Street Length	Street Area	Street Infiltration Area East of Hwy 1	Total Area	Total Infiltration Area East of Hwy 1	Street Length	Street Area	Street Infiltration Area East of Hwy 1
	acres	acres	acres	acres	miles	acres	acres	acres	acres	miles	acres	acres	acres	acres	miles	acres	acres
B	186	10.2	186	1.7	2.10	10.2	0.21										
C	201	13.8	134	1.2	1.91	9.2	0.19	67	0.6	0.94	4.6	0.09					
C1	95	6.0	95	0.9	1.24	6.0	0.12										
C2	29	2.7	29	0.3	0.57	2.7	0.06										
C3	77	5.1	10	0.1	0.10	0.5	0.01	67	0.6	0.94	4.6	0.09					
D1	407	25.9	140	1.3	2.30	11.1	0.23	267	2.5	3.05	14.8	0.31					
DA/B1	65	3.7	65	0.6	0.76	3.7	0.08										
DA/B2	50	5.5	50	0.5	1.14	5.5	0.11										
DA3	90	7.6						90	0.8	1.56	7.56	0.16					
DA4	21	0.0	4	0.0				17	0.2								
DA5	37	4.2	3	0.0				34	0.3	0.87	4.2	0.09					
DD1	64	3.0						64	0.6	0.62	3.0	0.06					
DD2	80	1.9	18	0.2	0.39	1.9	0.04	62	0.6	0.00	0.0	0.00					
D2	342	20.3	10	0.1	0.06	0.3	0.01	245	2.2	2.81	13.6	0.28	87	0.8	1.32	6.4	0.13
DC1	255	9.8	10	0.1	0.06	0.3	0.01	192	1.8	1.68	8.1	0.17	53	0.5	0.28	1.4	0.03
DC2	87	10.5						53	0.5	1.13	5.5	0.11	34	0.3	1.03	5.0	0.10
Totals	1136	70.2	470	4.3	6.37	30.9	0.64	579	5.3	6.80	32.9	0.68	87	0.8	1.32	6.4	0.13

Assumed overall average runoff factor (%)= 40%
Assumed right of way for street calculations (ft)= 40
Assumed runoff factor for street right of way (%)= 90%
Assumed infiltration area requirement (ft^2/impervious acre)= 1000

CHAPTER 5
IMPLEMENTATION PROGRAM

The basic criterion in developing this Storm Water Master Plan is that all storm water originating within a political jurisdiction is to be infiltrated within that jurisdiction. In addition, existing storm drain pipelines are not to be used to transport the storm runoff of one political jurisdiction across another jurisdiction.

Much of the existing system of drainage pipes is expected to be abandoned or removed as the former Fort Ord is redeveloped. Initially, the existing drainage system is to remain operable for runoff from roads, other public areas, and areas not yet redeveloped. Storm runoff from redevelopments is planned to be infiltrated on-site primarily with subsurface infiltration systems. Storm runoff from roads and public areas should be infiltrated on-site with subsurface systems or diverted to new or existing infiltration basins east of Highway 1. All runoff should eventually to be transferred from the infiltration basins west of Highway 1 to infiltration basins or subsurface infiltration systems east of Highway 1. At build out, there should be a much reduced storm drain network for roads and other public impervious areas and a reduced volume of drainage to infiltration basins west of Highway 1. The cost savings due to not maintaining and operating the present aging and extensive drainage system provides incentive for timely installation of on-site infiltration systems.

Further, the implementation of this program will aid in meeting the objectives of the Base Reuse Plan's conservation element as those objectives pertain to the Cities of Marina and Seaside and Monterey County.

A Model Storm Water Ordinance for consideration and possible use by the political jurisdictions within the former Fort Ord area is included as Appendix C. The purpose of the ordinance is to establish minimum storm water management requirements and controls for protecting and safeguarding the general health, safety and welfare of the public residing in watersheds within the former Fort Ord area. It applies to all major subdivisions or site plan applications unless eligible for an exemption or granted a waiver by the jurisdictional storm water authority. The Storm Water Design Manual, Appendix D, provides criteria, specifications, and standards for proper implementation of the standards of the Model Storm Water Ordinance. The model ordinance presents permitting information and requirements and considerations for waivers to provisions of the ordinance. It further describes basic storm water management design criterion, requirements for storm water plan approval, and construction procedures. It then concludes with maintenance and repair requirements and enforcement of the ordinance with penalties for non-compliance.

On-Site Subsurface Infiltration Systems for Streets

The preferred method of infiltrating storm runoff from streets may be with subsurface infiltration systems. Subsurface infiltration systems provide several advantages in comparison with infiltration basins. The subsurface systems can be placed beneath or along the streets so that no valuable land is required. Street drainage to subsurface systems could be largely independent of the existing drainage system. Tables 4-1 to 4-3 show that within many drainage sub-areas infiltration basins of only 0.1 to 0.2 acres are required for street drainage. Very likely, infiltration basins for these small areas along with the collection systems will be more expensive than subsurface systems. With the flexibility of on-site drainage, each political entity can implement their street drainage program independently of any other drainage activities. The drainage from individual streets or sections of streets can be done without depending on storm drainage outlets. For example, Second Avenue from Lightfighter Drive to Imjin Parkway was recently rebuilt with subsurface infiltration chambers along its entire length. For this reason, it is not shown as requiring any infiltration area for storm drainage.

The required subsurface infiltration areas for the streets within the former Fort Ord area are listed in Table 5-1. The street lengths are listed for drainage sub-areas so that the cost of subsurface systems and infiltration basins can be more easily compared for each sub area. The Infiltration Area Requirements developed in Chapter 4 require four cubic feet of storage volume for each square foot of surface infiltration area. The values in Table 5-1 can be multiplied by four to obtain the required storage values for individual streets.

Potential Infiltration Basin Sites

Suggestions are also made here for locating infiltration basins for street runoff and other runoff as desired by the land use jurisdiction. Schaaf and Wheeler divided the former Fort Ord cantonment into drainage areas and sub-areas that correspond with the existing storm drain system and former ocean outfalls. This is a logical division of the overall drainage area and recommendations for infiltrating the storm runoff within the areas and sub-areas will be presented here. Table 5-2 lists descriptive information about the sub-areas, suggested locations for future potential infiltration basins and remarks about the installation of the basins. Suggested locations of the potential infiltration basins are illustrated in Figure 2. If a satisfactory infiltration basin site does not exist within a sub-area, suggestions are made for discharge to basins within other sub-areas or for on-site subsurface infiltration.

The new infiltration basins west of Highway 1 are referred to by the name of the ocean outfall that they replace. The names West Basin C, West Basin D1, and West Basin D2 will thus refer to the basins accepting the runoff previously discharged to the 54-inch, N48-inch, and S48-inch outfalls. West Basin B will refer to the existing infiltration basin west of Highway 1 that presently receives the storm runoff from Area B. The newly constructed infiltration basins for the Seaside Highlands development project in Area F will be referred to as Basin F.

Table 5-1. Subsurface infiltration areas for streets by drainage subarea and political jurisdiction

AREA	B	C1	C2	C3		DA/B1	DA/B2	DA3	DA5	DD1	DD2	DC1			DC2		Total-All Basins			Total
JURIS-DICTION	MARINA	MARINA	MARINA	MARINA	C.S.U.M.B.	MARINA	MARINA	C.S.U.M.B.	C.S.U.M.B.	C.S.U.M.B.	MARINA	MARINA	C.S.U.M.B.	SEASIDE	C.S.U.M.B.	SEASIDE	MARINA	C.S.U.M.B	SEASIDE	All Jurisdictions
	sq-ft																			
STREET																				
13th	1231																1231			1231
12th	2562																2562			2562
11th	2066																2066			2066
10th	1008	1521															2529			2529
9th		2041															2041			2041
8th			1033	455	1008												1488	1008		2496
7th			727				521										1248			1248
6th			711				719										1430			1430
5th					645		1116	446									1116	1091		2207
4th							1124	479									1124	479		1603
3rd						1264		1744	1694	1074							1264	4512		5777
2nd						1264							1488				1264	1488		2752
1st								1198	1017	1314			2083					5612		5612
A										314					893			1207		1207
B															893	893		893	893	1785
Butler															893	893		893	893	1785
Durham																917			917	917
Gigling																868			868	868
Imjin Pkwy	1017																1017			1017
AVENUE																				
1st		967				802	1512					264	1719				3545	1719		5264
2nd																				
3rd	1298	868			1041			579									2165	1620		3785
4th					1405			1116										2521		2521
5th								909										909		909
6th									1091									1091		1091
7th															2248	934		2248	934	3182
8th St Cutoff											1694						1694			1694
Jim Moore								331					1289	1240				1620	1240	2860
Light Fighter													744					744		744
TOTALS																				
AREA (sq-ft)	9182	5397	2471	455	4099	3331	4992	6802	3802	2702	1694	264	7322	1240	4926	4504	27785	29653	5744	63182
AREA (ac)	0.21	0.12	0.06	0.01	0.09	0.08	0.11	0.16	0.09	0.06	0.04	0.01	0.17	0.03	0.11	0.10	0.64	0.68	0.13	1.45

Assumed Right of Way (ft)= 40
Assumed runoff factor for street right of way (%)= 90%

Table 5-2. Present and future potential infiltration basin locations for the FORA drainage sub-areas.

Area or Sub-Area	Former Ocean Outfall	Area Acres	Land Use Jurisdiction	Present Drainage Discharge	Future Potential Infiltration Basin	Suggested Location of Future Potential Infiltration Basin	Remarks
B	None	186	Marina	West Basin B	New Basin within B	East of 1st Ave between 10th and 11th St.	Removal of buildings required for large basin
C1	54-inch	95	Marina	West Basin C	New Basin within C1	East of 1st Ave between 9th and 10th St.	Removal of buildings required
C2	54-inch	29	Marina	West Basin C	New Basin within C2	West of 2nd Ave. between 7th and 8th St.	Removal of barracks required
C3	54-inch	77	CSUMB	West Basin C	New Basin within C3	CSUMB Property	Removal of buildings and pavement required
			CSUMB	West Basin C			
DA/B1	N48-inch	65	Marina	West Basin D1	New Basin within DA/B1	Along Quarter-master rail loading area	Removal of tracks, buildings, and pavement required
DA/B2	N48-inch	50	Marina	West Basin D1	New Basin within DA/B2	NE of 1st Ave. and 5th St.	Removal of barracks required
DA3	N48-inch	90	CSUMB	West Basin D1	New Basin within DA3	SE of university police building	Open area, good natural depression
DA4	N48-inch	21	CSUMB	West Basin D1	New Basin within DA4	NW of 6th Ave. and 3rd St.	Removal of buildings required
			Marina	West Basin D1	None. Use Subsurface System		No street area

Table 5-2. Present and future potential infiltration basin locations for the FORA drainage sub-areas.

Area or Sub-Area	Former Ocean Outfall	Area Acres	Land Use Jurisdiction	Present Drainage Discharge	Future Potential Infiltration Basin	Suggested Location of Future Potential Infiltration Basin	Remarks
DA5	N48-inch	37	CSUMB	West Basin D1	New Basin within DA5	SW of 6th Ave. and 3rd St.	Space for small basin for street runoff
			Marina	West Basin D1	None. Use Subsurface System		No street area
DD1	N48-inch	64	CSUMB	West Basin D1	New Basin within DA3	S of university police building	
DD2	None	80	Marina	Existing Basin in DD2	Existing Basin in DD2	S of 8th St. Cutoff	Basin needs to be shaped and enlarged
			CSUMB	Existing Basin in DD2	None. Use Subsurface System		No street area
DC1	S48-inch	255	CSUMB	West Basin D2	New basin within DC1	Basin SE of 2nd Ave. and 1st St.	
			Seaside	West Basin D2	New basin within DC1	Basin SE of 1st Ave. and 1st St	
			Marina	West Basin D2	None. Use Subsurface System		Small street area along 1st St.
DC2	S48-inch	87	CSUMB	West Basin D2	New Basin within DC1	Basin SE of 2nd Ave. and 1st St.	
			Seaside	West Basin D2	None. Use Subsurface System		
EC/D/E	None	60	POM	Existing Basin in EC/D/E	Existing Basin within EC/D/E	SE of 1st Ave. and Light Fighter Dr.	Basin can be expanded
E1	60-inch	232	POM/Seaside	60-inch Outfall	New Basin within E1	Between Gen. Jim Moore Dr. and Ardennes Dr.	Removal of some existing houses in a portion of RCI Redevelopment Area

Table 5-2. Present and future potential infiltration basin locations for the FORA drainage sub-areas.

Area or Sub-Area	Former Ocean Outfall	Area Acres	Land Use Jurisdiction	Present Drainage Discharge	Future Potential Infiltration Basin	Suggested Location of Future Potential Infiltration Basin	Remarks
E2	60-inch	373	POM/Seaside	60-inch Outfall	New Basin within E2	West of Okinawa Rd. and Noumea Rd.	Removal of some existing houses required
E3	60-inch	96	POM/Seaside	60-inch Outfall	New Basin within E3	SW of Malmedy and Durham	Small basin or underground percolation system for street runoff only & on-site infiltration system for DOD center
E4	60-inch	335	POM	60-inch Outfall	New Basins within E4	SE of Gen. Jim Moore Rd. and Gigling Rd.	Space is available for several smaller basins. See RCI Specific Plan.
F1	36-inch	245	POM/Seaside	Basin F	Basin F	N of Seaside High School and Golf Courses	Completed 2003
F2	36-inch	118	Seaside	Basin F	Basin F	N of Seaside High School and Golf Courses	Includes area within Seaside Highland Complex
F3	36-inch	203	Seaside	Basin F	Basin F	N of Seaside High School	Includes area within Seaside Highland Complex
F4	36-inch	305	Seaside	Basin F	Basin F	N of Seaside High School	Existing basin S of Hourglass St. and Hill Pl. to be abandoned
F5	None	410	Seaside	On-Site Infiltration Basins	On-Site Infiltration Basins	Seaside Golf Courses	No previous flow to ocean outfalls

Area B: Area B consists of a 186-acres now draining through a 48-inch storm drain to a basin west of Highway 1. This area is not divided into sub-areas, and the suggested infiltration site is east of 1st Avenue between 10th and 11th streets. The natural depression at the site is sufficiently large for the 0.42-acre basin required to infiltrate runoff from the streets, but would have to be enlarged for additional runoff. Enlargement of the natural depression would require removal of buildings, deep cuts to maintain the recommended grade of the basin bottom and the long-term commitment of prime development land to this use. For this reason, on-site subsurface infiltration chambers are a good alternative for storm runoff from the remaining impervious surfaces.

Area C: Area C is divided into three sub-areas that previously discharged to the 54-inch ocean outfall and now drain to an infiltration basin west of Highway 1 (West Basin C). Potential infiltration basin sites for each of these three sub-areas are listed in Table 5-1.

Sub-area C1: Sub-area C1 lies entirely within the Marina jurisdiction. There are no existing depressions in this sub-area, and the lowest elevation is at the location of the former Post Laundry near Highway 1. Building removal and extensive excavation would be required for basin construction. Although an infiltration basin is feasible for this sub-area, subsurface infiltration chambers beneath the streets and on-site infiltration for the remainder of the area are viable options. The long-term commitment of land to the Highway 1 buffer may provide sites of opportunity for Sub-area C1.

Sub-area C2: Sub-area C2 also lies entirely within the Marina jurisdiction and is covered, almost entirely, with barracks of wood construction. A natural depression exists within the barracks west of 2nd Avenue. Removal of some of the barracks would be required to enlarge the depression and excavate an infiltration basin. The basin could either be sized to infiltrate the street runoff or be enlarged to accept runoff from additional impervious surfaces.

Sub-area C3: Sub-area C3 lies, to a minor extent, within the jurisdiction of Marina and to a greater extent within the jurisdiction of CSUMB. An infiltration basin can be placed entirely within the CSUMB jurisdiction if pavement now on the area were removed. Storm runoff from the smaller Marina area could either be diverted to on-site subsurface infiltration systems or be discharged through the existing storm drain to a basin in sub-area C2. A large percentage of this sub-area is paved, and runoff could be significantly reduced by pavement removal.

Area D1: Area D1 contains the area that previously discharged to the N48" ocean outlet and now discharges to an infiltration basin west of Highway 1 (West Basin D1). It consists of five sub-areas; DA/B1, DA/B2, DA3, DA4, and DA5; that discharge to West Basin D1 and sub-areas; DD1 and DD2, that discharge to an existing infiltration basin in sub-area DD2. Potential infiltration basin sites for each of the sub-areas are listed in Table 5-1. The sub-areas either lie entirely within the CSUMB or Marina jurisdictions or within both jurisdictions.

Sub-area DA/B1: Sub-area DA/B1 within the Marina jurisdiction contains a low area suitable for an infiltration basin; however, construction of the basin would require extensive removal of buildings, pavement and rails in the location of the former Fort Ord rail facilities. Because of the cost of both removing existing facilities and constructing an infiltration basin and the long-term commitment of land, subsurface infiltration chambers are recommended for the street runoff from this sub area, along with on-site infiltration within development parcels.

Sub-area DA/B2: Sub-area DA/B2 also lies within the Marina jurisdiction and is covered almost entirely with barracks of wood construction. A low-lying area where the present storm drains discharge from the area could be a suitable location for an infiltration basin. Some of the barracks would have to be removed to provide space for the infiltration basin. The basin could be sized to accommodate runoff from the streets only or sized to infiltrate runoff from additional impervious surfaces, however the long-term commitment of land to this use may give preference to subsurface and on-site infiltration.

Sub-area DA3: Sub-area DA3 lies within the CSUMB jurisdiction and contains a natural depression south of the University Police building. The depression contains no buildings or other improvements and is suitable for an infiltration basin. The basin could be sized to infiltrate street runoff or to infiltrate the runoff from all impervious surfaces within the sub-area.

Sub-area DA4: Sub-area DA4 within the jurisdictions of both Marina and CSUMB is small with the open area covered almost entirely with pavement. Some of the pavement would have to be removed for an infiltration basin in the northeast portion of the area. Storm runoff from the smaller Marina area could be diverted to subsurface infiltration systems. Since a large percentage of this sub-area is paved, pavement removal would significantly reduce the amount of storm runoff.

Sub-area DA5: Sub-area DA5 is primarily within the CSUMB jurisdiction with a smaller area within Marina. The CSUMB area east of 6th Avenue contains permanent buildings in the low-lying area and is not a suitable location for an infiltration basin. The potential basin site southwest of 6th Avenue and 3rd Street. is small and primarily suited for the street runoff. The Marina area of this sub-area contains no road drainage, and the small area is suitable for subsurface infiltration of the storm runoff.

Sub-area DD1: Runoff from sub-area DD1 presently discharges north through a 24-inch corrugated metal drain to an existing infiltration basin in sub-area DD2. Since the DD2 infiltration basin is within the Marina jurisdiction, storm runoff from sub-area DD1 will need to be diverted to another infiltration basin. At high flows, storm water from this sub-area now overflows into sub-area DA3 within the CSUM jurisdiction. A basin within the DA3 sub-area could be enlarged to accommodate street runoff from the CSUMB portion of DD2, or the street runoff could be infiltrated through subsurface infiltration chambers.

Sub-area DD2: Sub-area DD2 lies within both the CSUMB and Marina jurisdictions, and storm runoff is discharged to an existing infiltration basin within the Marina jurisdiction. The infiltration basin is a natural depression that can be enlarged, and it is suggested that storm runoff from the Marina portion of sub-area DD2 continue to be discharged to this basin. None of the natural depression of sub-area DD2 is within the CSUMB jurisdiction, and storm runoff from CSUMB lands would best be infiltrated on site, within the CSUMB portion of DD2.

Area D2: Area D2 contains the area that previously discharged to the N48" ocean outlet and now discharges to an infiltration basin (West Basin D2) west of Highway 1. It contains sub-areas DC1 within Marina, CSUMB, and Seaside and DC2 within Seaside and CSUMB.

Sub-area DC1: Sub-area DC1 is a large area with many outdoor facilities but a limited number of buildings. The topography is such that infiltration basins could be located in both the CSUMB and Seaside portions. The potential locations of these basins are listed in Table 5-1. These basins could be sized to accommodate only the street runoff or the street runoff plus runoff from additional impervious surfaces. The Seaside jurisdictional area could be infiltrated through subsurface facilities. The Marina jurisdiction is small and an infiltration basin for street runoff is not justified. Subsurface infiltration chambers along the streets are recommended for this small area.

Sub-area DC2: Sub-area DC2 lies primarily within the CSUMB jurisdiction with a small portion to the south within the Seaside jurisdiction. The natural drainage is toward the northwest corner of the sub-area that is now covered with permanent buildings. As a result, this low-lying area may not be a suitable area for an infiltration basin. Since the runoff passes through storm drains into sub-area DC1, the size of a potential CSUMB infiltration basin in that sub-area could be increased to accept the runoff from DC2. This could be limited to street storm runoff or increased to runoff from streets plus additional impervious surfaces. The smaller Seaside area also has no natural infiltration basin site, and all runoff could be diverted to on-site subsurface infiltration systems.

Area E: Area E contains the drainage areas that previously discharged to the failed 60-ocean outfall and now discharged to a temporary ocean outlet. Most of the drainage system within this area is for buildings and facilities belonging to the US Army. The areas within the Seaside jurisdiction are smaller and undeveloped and contribute little runoff to the storm drainage system. Since the existing storm drains are the responsibility of the US Army rather than FORA, only general information will be provided for the sub-areas. The U.S. Army Residential Communities Initiative (RCI) program has incorporated alternate disposal facilities in its construction plans.

Sub-area EC/C/D: Storm water from this sub-area discharge into a depression north of the Commissary, and no measures are recommended to prevent runoff to the west of Highway 1.

Sub-area E1: This area generally consists of the Marshall Park housing area and undeveloped lands to the south. The existing storm drain exits the sub-area in a low-lying area between General Jim Moore Drive and Ardennes Drive. A small infiltration basin could be located in this area, but several houses may need to be removed to provide space for the basin. No other areas suitable for infiltration basins lie within this sub-area. The areas in Seaside will be suitable for on-site infiltration systems as they are developed. E1 contains Seaside lands proposed for incorporation into a golf course development project, which would be suitable for on-site infiltration.

Sub-area E2: This area primarily consists of the Stillwell housing area and the Stillwell Elementary School. It also includes the 102-acre Seagate Development for which all storm runoff can be infiltrated on site. Similar to sub-area E1, the existing storm drain exits through a low-lying area suitable for a small infiltration basin. On-site infiltration should be provided in the Army's RCI development possibly rerouting Noumea Road and Okinawa Road. No other areas suitable for infiltration basins lie within this sub-area. The area excluding, the 102-acre Seagate Development, within the Seaside jurisdiction may primarily be occupied by a golf course, and on-site infiltration of storm drainage is expected to be readily attainable.

Sub-area E3: The existing storm drains in this sub-area exit the area through a depression southwest of the Malmedy and Durham intersection. The depression would be a suitable location for an infiltration basin, but the small available area would limit the size and capacity. Runoff from sub-area E3 could also be conveyed through drains to an enlarged and improved infiltration basin north of the Commissary. The Seaside portion of E3 ($\pm$ ¾ of E3) cannot go to Ord Military Community lands.

Sub-area E4: Sub-area E4 includes a large US Army housing area and a largely undeveloped area to the south within the Seaside jurisdiction. Essentially all of the existing storm drainage system is within the US Army jurisdiction. The low-lying area southeast of General Jim Moore Drive and Gigling Road is suitable for an infiltration basin. Additional, smaller basins could also be installed upstream from this basin to add capacity to a basin infiltration system. The mostly un-developed area within the Seaside jurisdiction is suitable for on-site infiltration systems. Runoff from sub-area E4 could also be conveyed through drains to an enlarged and improved infiltration basin north of the Commissary

Area F: Storm runoff from area F previously discharged to an infiltration basin north of Seaside High School with any overflow draining through a 36-inch ocean outfall. Infiltration basin F has recently been enlarged to store and infiltrate all of the runoff from storm drains within Area F. For this reason, no additional infiltration basins or facilities are recommended for this area. Runoff from the undeveloped areas within the Seaside jurisdiction can be infiltrated on-site as the areas are developed.

Recommended Infiltration Practices

Since most of the cantonment area of the former Fort Ord lies over well-drained, sandy soils with rapid permeability, simple rapid infiltration basins or subsurface infiltration systems will be effective storm water disposal practices. They can be sized based on a conservative infiltration rate in the sandy soil of 12 in/hr. Unless unusual site conditions exist, this infiltration rate can be assumed to be free from limitations due to perched water tables or high seasonal groundwater. The applicant also could have the option of demonstrating a higher infiltration rate by providing a site-specific infiltration study. If such a study is provided, the maximum allowable infiltration rate considering long-term maintenance will be no larger than 40 percent of the measured rate.

Based on the analysis on page 4-2, infiltration basins and infiltration galleries should both be designed on the basis of 1,000 ft^2 of flooded area per acre of impervious acre in the tributary area. An impervious surface is defined as a parking area, sidewalk, roof area or other area that limits infiltration by more than 60 percent.

A. Infiltration Basins- To meet the general area requirement of 1,000 ft^2 per impervious acre, the pond must allow flooding to a 4-foot depth over 90 percent of its area. This means that with a minimum freeboard of 1 foot, infiltration basins should have a minimum depth of 5 feet below natural grade.

B. Subsurface Infiltration Systems- These are subsurface systems that provide the same infiltration surface and storage requirement as an equivalent infiltration basin for the same tributary area. In addition, since maintenance of the subsurface infiltration surface is problematic, a pretreatment device such as an interceptor tank or equivalent must also be installed and maintained.

Design standards and details for the typical storm water infiltration systems recommended above are provided in Appendix D, Storm Water Design Manual.

Best Management Practices

The Best Management Practices which have been adopted by the Monterey Regional Storm Water Management District of which the cities of Marina and Seaside and Monterey County has adopted the Measurable Goals and Best Management Practices listed in Appendix B. Each private developer should be responsible for implementing the Best Management Practices for their project. The proposed BMP for the project will be subject to the approval of the Public Works Director/City Engineer of each political entity.

Each developer should be required to post Performance and/or Payment Bonds to insure the facilities are constructed in accordance with the required approvals and in accordance with the appropriate regulations, including NPDES permits.

Capital Costs

Infiltration basins are an expensive way of providing open space, because they occupy level land area that might be used for development. Subsurface infiltration systems generally have a higher installation and maintenance cost, but they allow utilization of the land they occupy for parking, streets, recreation areas, etc.

Determination of infiltration requirements should be made on a case-by-case basis for each project, dependent upon the criteria for each political jurisdiction. Infiltration tests should be required as part of the Geotechnical Investigation prepared for each project and be site-specific. Requirements for the amount of infiltration area should be determined based on the results of field tests and the established criteria for each political jurisdiction. The final locations for infiltration basins which surface or subsurface are to be flexible and coordinated with the land use plan for each proposed project and subject to the approval of the political jurisdiction.

REFERENCES

Fort Ord Reuse Agency , 2001, Master Plan for Improvements to the Regional Storm Drainage System, prepared by Schaaf and Wheeler Consulting Engineers

California State University Monterey Bay, 1997, CSUMB Master Plan

City of Marina, 2003, Excerpts from design standards and municipal code, and personal conversation with Charles Johnson, Public Works Director.

City of Seaside, 2003, Email correspondence with Dianna Ingersoll, Public Works Director

City of Seaside, 2000, Fort Ord Storm Drain Field Review and Needs Assessment prepared by Schaaf and Wheeler Consulting Engineers.

California State University Monterey Bay, 2004, CSUMB Master Plan and Draft Environmental Impact Report

Appendix A

Design of
Storm Water Drainage Facilities
In Marina, California

DESIGN OF

STORM WATER DRAINAGE FACILITIES

IN MARINA, CALIFORNIA

MARCH 2005

HYDRAULIC DESIGN FACTORS:

A. The 10-year design storm shall be a rainfall expressed by the following formula:

$$i = \frac{5.68}{\sqrt{t}}$$

Where i = intensity of rainfall in inches per hour
t = Duration of storm in minutes

B. Runoff Coefficients (for estimation purposes only):

Residential	K
Single Family Areas	0.30 – 0.60
Multi-Family/Apt. Areas	0.50 – 0.80
Industrial	
Light	0.50 – 0.80
Heavy	0.60 – 0.90
Parks	0.10 – 0.25
Playgrounds	0.20 – 0.35
Streets	0.70 – 0.95
Roofs	0.75 – 0.95
Landscaped areas	0.05 – 0.10
Undeveloped areas	0.05 – 0.30

NOTES:

1. The area to be used in runoff calculations shall include the proposed development and all developed and undeveloped areas draining into the proposed development.
2. Runoff coefficients shall be calculated based on actual pervious and impervious areas.

C. Infiltration rate for percolation pond is 12 inches per hour.

SAMPLE CALCULATION

GIVEN

POND STORAGE CAPACITY CALCULATED AS FOLLOWS:

DEPTH (FT)	CONTOUR AREA (SQ. FT.)	CONTOUR AVG. AREA (SQ. FT.)	STORAGE VOLUME (CUBIC FT.)
7 FT.	4,810		
		FREEBOARD	
6 FT.	4,010		
		3,645	12,755
5 FT.	3,280		
		2,850	9,110
4 FT.	2,620		
		2,325	6,260
3 FT.	2,030		
		1,770	3,935
2 FT.	1,510		
		1,285	2,165
1 FT.	1,060		
		880	880
0 FT.	700		

WATERSHED AREA:

A_1 = Single Family Residential, 5.8 acres; $K_1 = 0.35$
A_2 = Undeveloped Area, 4.0 acres; $K_2 = 0.05$

DETERMINE:

PERCENT OF TOTAL POND STORAGE NEEDED.

SOLUTION:

POND STORAGE = RUNOFF – INFILTRATION

FIND RUNOFF:

$$R - K\,i\,A\,t \qquad R = \frac{ft^3}{Sec} \times 60\ \frac{Sec}{Min} \times \text{min} = ft^3$$

K = Runoff Coefficient
A = Area in Acres
t = Time in Minutes
i = Inches per Hour

$R = K_1\,i\,A_1\,60\,t + K_2\,i\,A_2\,60\,t$

$R = 0.35(5.68t^{-1/2})\ 5.8\ (60)\ t + 0.05\ (5.68t^{-1/2})\ 4.0(60)\ t$
$R = 759.98\ t^{1/2})$

FIND INFILTRATION:

(Contour Area of ½ depth)

$I = \bar{A}\,pt$ $\quad \bar{A}$ = Contour Area at ½ depth
p = Infiltration Rate

$$I = 2030\ ft^2 \times 1\ \frac{ft}{hr} \times t\ \text{min} \times 1\ \frac{hr}{60}\ \text{min}$$

$I = 33.83\ t$

POND STORAGE:

$PS = R - I$
$PS = 759.98\ t^{1/2} - 33.83\ t$

$$\text{Max.PS} = \frac{dPS}{dt} = \frac{759.98}{2} t^{-1/2} - 33.83 = 0$$

$$t = \left[\frac{759.98}{2(33.83)}\right]^2$$

$t = (11.23)^2 = 126.11$ min.
Max. PS = 759.98 (11.23) – 33.83 (126.11)
Max. PS = 4,268 ft^3

4,268 ft^3 = 33.5% of Total Pond Storage

STANDARDS

OPEN PONDS:

Pond will be excavated below natural ground with no levees.

Excavation slopes will be 3:1 or flatter. If retaining walls are proposed, the design will be approved by the City Engineer.

Ponds maintained by the City will be enclosed with a 6-foot high chain link fence. The fence may be located in conformance with subdivision setback lines.

A six-foot wide access path will be provided around the pond perimeter within the fenced area.

A 16-foot wide access gate and paved driveway will be provided.

An equipment access ramp 8 feet wide and not steeper than 5:1 will be provided for access to the bottom of the pond.

Pond design will incorporate erosion control measures.

Appendix B

BMPs and Measurable Goals for the Monterey Regional Storm Water Management District dated December 8, 2004

Monterey Regional Storm Water Management Program

Revised December 8, 2004

TABLE 4-1 MCM1: PUBLIC EDUCATION & OUTREACH:
Permit holders must implement a public education program to distribute educational materials to the community and/or conduct outreach activities about the impacts of storm water discharges on water bodies and the steps that the public can take to reduce pollutants in storm water runoff.

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Provide public education to increase awareness of what constitutes poor stewardship of storm water as a resource. The education and outreach plan will focus on topics such as reducing pollution from lawn and gardening activities, improper disposal of household hazardous wastes, illegal disposal activities, pet wastes, improper handling and disposal of trash, restaurant activities, and automotive activities. Increased education will ultimately result in decreased pollution.	Educate the audience about the causes of storm water pollution and the things they can do to reduce this pollution. (See Appendix E for Public Education and Outreach Program)	1-1.a	Develop & Implement a comprehensive Education & Outreach Plan for the entire region targeting all ages, classes, and ethnic groups	X					Date plan completed and implemented	MRSWMP Group in partnership with MBNMS
		1-1.b	Review & revise "Year 1 Public Education & Outreach Plan" to maximize efficiency in audience reached, and address current contaminants impacting water quality. Changes will be based on input from the public, volunteer monitoring network data, budgetary constraints, and contaminants of concern or audiences not covered as in depth in prior years.		X	X	X	X	Date plan revisions are put into place	MRSWMP Group in partnership with MBNMS

TABLE 4-1 MCM2: PUBLIC PARTICIPATION & INVOLVEMENT: **The public should be included in developing, implementing, and reviewing the permit holder's storm water management program.** **The permit holders should make efforts to reach out and engage all economic and ethnic groups within their permit boundaries.**										
BMP Intent	**Best Management Practice / Activity**	**BMP#**	**Implementation Plan**	**Permit Yr 1**	**Permit Yr 2**	**Permit Yr 3**	**Permit Yr 4**	**Permit Yr 5**	**Measurable Goals.**	**Implementers**
Increase public awareness of what constitutes poor stewardship of storm water as a resource and increase public actions such as reporting of problems to authorities. This ultimately will result in decreased pollution.	Encourage general public and stakeholder involvement in identifying and solving storm water management problems by holding two publicly advertised "Public Involvement Workshops" per a year. Public advertisement will be via local newspapers, city websites, community calendars, and/or MRSWMP email list serve.(See Appendix F for Public Education and Outreach Program)	2-1.a	Draft annual report will be posted on website and in city offices 1 week prior to Workshop No. 1 for review by public.	X	X	X	X	X	All written public comments submitted and notes taken at workshop will be considered for inclusion in the annual report and kept on file.	MRSWMP Group & MS4 Administration

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Increase public awareness of what constitutes poor stewardship of storm water as a resource and increase public actions such as reporting of problems to authorities. This ultimately will result in decreased pollution.	Encourage general public and stakeholder involvement in identifying and solving storm water management problems by holding two publicly advertised "Public Involvement Workshops" per a year. Public advertisement will be via local newspapers, city websites, community calendars, and/or MRSWMP email list serve.(See Appendix F for Public Education and Outreach Program)	2-1.b	Workshop #1 to be held annually in July/August prior to Annual Report submission to explain the Phase II Permit objectives and solicit public input on the success of the current BMPs and Measurable Goals. (Note: In year one no draft annual report will have been prepared for review at Workshop #1, as year one will have just begun Consequently this Workshop in year one will focus on general overview of Phase II requirements, and BMPs selected to increase overall awareness and knowledge of Phase II program by the general public. .)	X	X	X	X	X	40 participants per workshop	MRSWMP Group

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Increase public awareness of what constitutes poor stewardship of storm water as a resource and increase public actions such as reporting of problems to authorities. This ultimately will result in decreased pollution.	Encourage general public and stakeholder involvement in identifying and solving storm water management problems by holding two publicly advertised "Public Involvement Workshops" per a year. Public advertisement will be via local newspapers, city websites, community calendars, and/or MRSWMP email list serve. (See Appendix F for Public Education and Outreach Program)	2-1.c	Workshop #2 to be held in March/April annually: (Note: Workshop in year one will either focus on general overview of Phase II requirements, and BMPs selected to increase overall awareness and knowledge of Phase II program by the general public, or will focus on a specific target audience and associated contaminants of concern. The decision on the focus for this year one Workshop will be based on knowledge and experience gained by the Permittees from carrying out the MRSWMP up to the time this Workshop is scheduled.)	X					40 participants per workshop	MRSWMP Group

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Increase public awareness of what constitutes poor stewardship of storm water as a resource and increase public actions such as reporting of problems to authorities. This ultimately will result in decreased pollution.	Encourage general public and stakeholder involvement in identifying and solving storm water management problems by holding two publicly advertised "Public Involvement Workshops" per a year. Public advertisement will be via local newspapers, city websites, community calendars, and/or MRSWMP email list serve. (See Appendix F for Public Education and Outreach Program)	2-1.d	Workshop #2 to be held in Mar-April annually: Workshop in years 2-5 will focus on a specific target audience and associated contaminants of concern. Topic/audience will be chosen each year based on historical contaminants of concern for industries common to permit jurisdiction area, volunteer monitoring network data, and topic/audience not chosen the prior year. Priority will be given to Attachment 4 listed industries.		X	X	X	X	40 participants per workshop	MRSWMP Group

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Increase public awareness of what constitutes poor stewardship of storm water as a resource and increase public actions such as reporting of problems to authorities. This ultimately will result in decreased pollution.	Encourage general public participation in programs and activities designed to promote understanding and awareness of storm water pollution, such as cleanup events and restoration activities. (See Appendix F for Public Education and Outreach Program)	2-2.a	Provide financial sponsorship support for Annual Coastal Cleanup Day in Monterey County or other local beach clean up efforts.	X	X	X	X	X	Annual financial sponsorship of jurisdiction wide event	MRSWMP Group
		2-2.b	Recruit volunteers through municipal employee base for Annual Coastal Clean Up Day or other local clean up efforts.	X	X	X	X	X	Each permit holder to recruit volunteers through two separate agency channels; e.g. email, paycheck stuffers, internal newsletters, etc.	MS4 Administration
		2-2.c	Provide support for, or assistance with storm drain stenciling through providing supplies, volunteer recruitment & dedicating MRSWMP allocated hours by MBNMS staff	X	X	X	X	X	520 allocated MBNMS staff hours by MRSWMP Group. Financial support for supplies to be provided by each permit holder as needed within their jurisdiction.	MRSWMP Group in partnership with MBNMS

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Increase public awareness of what constitutes poor stewardship of storm water as a resource and increase public actions such as reporting of problems to authorities. This ultimately will result in decreased pollution.	Encourage general public participation in programs and activities designed to promote understanding and awareness of storm water pollution, such as cleanup events and restoration activities. (See Appendix F for Public Education and Outreach Program)	2-2.d	Provide financial support for, and assistance with volunteer monitoring programs such as: Urban Watch, First Flush, or other storm water quality protective programs	X	X	X	X	X	$500 annual contribution by group and each permit holder to recruit volunteers through two separate agency channels; e.g. email, paycheck stuffers, internal newsletters, etc.	MRSWMP Group & MS4 Administration

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Collaborate and participate in ongoing volunteer water quality monitoring efforts by becoming an active participant in the Citizen Water Quality Monitoring Network. This will ensure collaboration and participation in the ongoing volunteer water quality monitoring efforts and give permit holders a clearer understanding of the contaminants of concern in their jurisdiction.	Become an active participant in the Citizen Water Quality Monitoring Network (See Appendix F for Public Education and Outreach Program)	2-3.a	A representative from the MRSWMP group will attend each monitoring network meeting and report back to permit holder group. Permit holders will also recruit volunteers through employee and citizen group channels, websites, and / or newsletters to participate in volunteer network monitoring activities.	X	X	X	X	X	100% of monitoring network meetings to be attended annually by member of MRSWMP group and each permit holder to recruit volunteers through at least two channels within their agency; e.g. email, paycheck stuffers, internal newsletters, etc.	MRSWMP Group & MS4 Administration

TABLE 4-1 MCM3: ILLICIT DISCHARGE & DETECTION:

EPA recommends that the plan to detect and address illicit discharges (discharges to storm drains and sewers that is not composed entirely of storm water) include the following four components: procedures for locating priority areas likely to have illicit discharges; procedures for tracing the source of an illicit discharge; procedures for removing the source of the discharge; and procedures for program evaluation and assessment.

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Promote the reporting of illicit discharges by having a system for receiving such reports.	Create a unified place for public to call in potential illicit discharges	3-1.a	Create agreement with 1800CLEANUP as single call-in center to report illicit discharges by zip code	X					Date agreement went live.	MRSWMP Group
		3-1.b	Advertise call-in number on MRSWMP generated media and educational materials	X	X	X	X	X	Advertised on a minimum of 8 different media pieces: 4 in English, 4 in Spanish	MRSWMP Group

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Promote the reporting of illicit discharges by having a system for receiving such reports.	Create a unified place for public to call in potential illicit discharges	3-1.c	Each permit holder will create an internal protocol for handling reports of potential illicit discharges within their zip code. Calls into the 1800CLEANUP # will be directed by zip code to a phone number for a specific permit holder response contact person. There will be both a "during work hours" and "after hours" phone number for each permit holder. Callers will be instructed to call 911 in the case of any immediate hazards. Each permit holder will be responsible for logging, investigating, and responding to each call. Documentation will be kept on the response and outcome of the reported incident.	X	X	X	X	X	Date protocol developed and in use.	MRSWMP Group w/MS4 Administration

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Promote the reporting of illicit discharges by having a system for receiving such reports.	Create a unified place for public to call in potential illicit discharges	3-1.d	Using protocol developed under BMP 3-1.c, investigate and take appropriate action on each report that is received.	X	X	X	X	X	100% of all reports of illicit discharge investigated and report on outcome of each case in the form of "closed", "ongoing enforcement", or "still investigating source".	MS4 Administration
Have accurate storm drain maps to help locate illicit discharges and/or dischargers.	Storm water system mapping	3-2.a	Develop a storm drain system map showing the location of all outfalls and the names and locations of all waters of the state and other MS4s that receive discharges from those outfalls	20% minimum	20% minimum	20% minimum	20% minimum	20% minimum	100 % of MRSWMP jurisdiction to be mapped by end of permit year 5.	MS4 Administration
		3-2.b	Update maps annually to include new facilities as appropriate.		X	X	X	X	Date maps were revised	MS4 Administration

Reduce pollution from illicit connections and/or discharges.	Inventory of businesses and industries to be monitored for illicit connections and/or discharges	3-3.a	Create inventory of all Attachment 4 listed businesses and industries to be monitored for potential illicit connections and/or discharges	X					Date inventory was completed.	MS4 Administration

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Reduce pollution from illicit connections and/or discharges.	Revise current inspection programs to include determination of the existence of illicit connections and/or discharges; i.e., sewer overflows, fluid dumping in catch basins etc.	3-4.a	Develop inspection checklist		X				Date inspection list was agreed upon by MRSWMP group	MRSWMP group
		3-4.b	Develop protocol for taking action against identified illicit connectors / dischargers		X				Date protocol was agreed upon	MRSWMP Group and MS4 Administration
		3-4.c	Create specific illicit connection training program & materials for municipal employees and inspectors		X				Materials distributed to 100% of appropriate municipal public works department heads for distribution to employees / inspectors	MRSWMP Group and MS4 Administration
		3-4.d	Inspect businesses for illicit connections through existing municipal inspections and employee awareness			X	X	X	Minimum of 5% of inventoried businesses per year	MS4 Administration
		3-4.e	Create hotline for public reporting of illicit connections	X					See BMP 3-1.a	MRSWMP Group
		3-4.f	Develop protocol for responding to reported illicit connections	X					See BMP 3-1.c	MS4 Administration

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals	Implementers
Reduce pollution from illicit connections and/or discharges.	Revise current inspection programs to include determination of the existence of illicit connections and/or discharges; i.e., sewer overflows, fluid dumping in catch basins etc.	3-4.g	Take action as necessary to eliminate 100% of the illicit connections that are identified in this year	X	X	X	X	X	100% of all reports of illegal connections investigated and report on outcome of each case in the form of "closed", "ongoing enforcement", or "still investigating source".	MS4 Administration

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Reduce pollution from illegal disposal activities	Adopt an ordinance with standards for storm water pollution prevention. Ordinance to include definitions of illegal disposal activities, including requirements pertaining to mat wash downs, hood cleaning, etc., and requiring firms to notify Public Works of all such cleaning activities, with penalties for violations. Ordinance will also outline responsibility for any clean up determined necessary.	3-5.a	The intention is to develop a single template ordinance which will be adopted by each municipality and will cover all aspects of storm water pollution and prevention associated with illegal disposal activities. For MS4 urban areas meeting the Phase II Permit Attachment 4 criteria, their final adopted ordinance will have to meet subject criteria.	X					Date template ordinance agreed upon	MS4 Administration in cooperation with MRSWMP group
	Develop illegal disposal definitions and policies and procedures guidance document	3-5.b	Develop template guidance document for illegal disposal activity policies and procedures		X				Date guidance document completed	MRSWMP Group
		3-5.c	Adopt guidance document revised to be specific to each permit holder's needs by each permit holder		X				Date revised guidance document adopted by MS4	MS4 Administration

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Reduce pollution from illegal disposal activities	Develop illegal disposal definitions and policies and procedures guidance document	3-5.d	Adopt ordinance revised to be specific to each permit holder's needs through appropriate City Council procedures		X				Date ordinance adopted by MS4	MS4 Administration
		3-5.e	Train appropriate staff on the adopted ordinance			X	X	X	100 % of existing appropriate staff trained by year 3, then all new employees every year after that	MS4 Administration
		3-5.f	Implement ordinance			X	X	X	Date ordinance implemented	MS4 Administration
Reduce pollution from recreational vehicles and boats	Inspection program to ensure compliance from RVs & boats	3-6.a	Create list of all RV & boat storage and launch areas where discharges potentially could take place	X					Date complete inventory created	MS4 Administration
		3-6.b	Create inspection list for use when inspecting RV & boat storage and launch areas		X				Date checklist created	MRSWMP Group
		3-6.c	Inspect each RV and boat storage and launch area annually, and take action to correct any observed violations of the discharge ordinance			X	X	X	100% of RV & boat use areas inspected annually	MS4 Administration

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Inform employees, businesses, and the general public of the hazards that are generally associated with illegal discharges and improper disposal of waste.	Implement a permit boundary-wide education program addressing the negative effects on water quality through illegal discharges, improper waste disposal and other non-storm water discharges.	3-7.a	See BMP 1-1.a and Appendix E for Public Education and Outreach Program	X	X	X	X	X	Date plan completed and implemented	MRSWMP Group in partnership with MBNMS

TABLE 4-1 MCM4: CONSTRUCTION SITE STORM WATER RUNOFF CONTROL:
The permit holders must develop a program to control the discharge of pollutants from construction sites = 1 one acre size. The program must include review of Storm Water Pollution and Prevention Plans, inspection of construction sites and enforcement actions against violators.

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Reduce pollution from construction sites by developing guidelines and standards for construction site runoff. These will address erosion and sediment controls, and shall contain requirements for construction site operators to: implement appropriate erosion and sediment control BMPs; to control waste that may cause adverse impacts to water quality such as discarded building materials, concrete truck washout, paint and plastering wash down, chemicals, litter, and sanitary waste at the construction site.	Adopt an ordinance with standards for storm water pollution prevention associated with construction activities. Ordinance to include standards for general construction site waste management for construction activities as defined by the General Construction Storm Water Permit.	4-1.a	The intention is to develop a single template ordinance which will be adopted by each municipality and will cover all aspects of storm water pollution and prevention associated with construction activities. For MS4 urban areas meeting the Phase II Permit Attachment 4 criteria, their final adopted ordinance will have to meet subject criteria.	X					Date template ordinance was completed	MS4 Administration in cooperation with MRSWMP group

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Reduce pollution from construction sites by developing guidelines and standards for construction site runoff. These will address erosion and sediment controls, and shall contain requirements for construction site operators to: implement appropriate erosion and sediment control BMPs; to control waste that may cause adverse impacts to water quality such as discarded building materials, concrete truck washout, paint and plastering wash down, chemicals, litter, and sanitary waste at the construction site.	Develop construction site BMP policies and procedures guidance document	4-1.b	Develop template construction site BMP policies and procedures guidance document		X				Date guidance document completed	MRSWMP Group
		4-1.c	Adopt guidance document revised by each permit holder to be specific to each permit holder's needs			X			Date revised guidance document adopted by MS4	MS4 Administration
		4-1.d	Adopt ordinance revised to be specific to each permit holder's needs through appropriate City Council procedures			X			Date ordinance adopted by MS4	MS4 Administration
		4-1.e	Train appropriate staff on the adopted ordinance			X	X	X	100 % of existing appropriate staff trained by year 3, then all new employees every year after that	MS4 Administration
		4-1.f	Implement ordinance and guidance document.			X			Date ordinance implemented	MS4 Administration

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Reduce pollution from construction sites by developing guidelines and standards for construction site runoff. These will address erosion and sediment controls, and shall contain requirements for construction site operators to: implement appropriate erosion and sediment control BMPs; to control waste that may cause adverse impacts to water quality such as discarded building materials, concrete truck washout, paint and plastering wash down, chemicals, litter, and sanitary waste at the construction site.	Develop and implement procedures for site plan review, including consideration of potential water quality impacts	4-2.a	Develop site plan review procedures using reference materials such as the CASQA (California Storm Water Quality Association) BMP Handbooks for revisions to plans.		X				Date site plan procedures went in place	MS4 Administration in cooperation with MRSWMP group
		4-2.b	Train appropriate staff of procedures			X	X	X	100 % of existing appropriate staff trained by year 3, then all new employees every year after that	MS4 Administration
		4-2.c	Implement new site plan review procedures			X	X	X	Date of implementation	MS4 Administration
	Develop and implement procedures for site inspection and enforcement of BMP control measures	4-3.a	Develop ranking criteria and site inspection procedures		X				Date ranking criteria and site inspection procedures were in place	MS4 Administration in cooperation with MRSWMP group

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Reduce pollution from construction sites by developing guidelines and standards for construction site runoff. These will address erosion and sediment controls, and shall contain requirements for construction site operators to: implement appropriate erosion and sediment control BMPs; to control waste that may cause adverse impacts to water quality such as discarded building materials, concrete truck washout, paint and plastering wash down, chemicals, litter, and sanitary waste at the construction site.	Develop and implement procedures for site inspection and enforcement of BMP control measures.	4-3.b	Create progressive enforcement protocol		X				Date enforcement protocol in place	MS4 Administration in cooperation with MRSWMP group
		4-3.c	Train appropriate staff on procedures		X	X	X	X	100 % of existing appropriate staff trained by year 2, then all new employees every year after that, with periodic refresher training provided to staff after their initial training	MS4 Administration
		4-3.d	Inspect the construction sites subject to the storm water pollution prevention ordinance per ranking criteria and procedures developed in BMP 4-3.a, and take appropriate action to have any observed violations corrected			X	X	X	100% implementation of goals set in ranking criteria developed in BMP 4-3.a	MS4 Administration in cooperation with MRSWMP group

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Reduce pollution from construction sites by developing guidelines and standards for construction site runoff. These will address erosion and sediment controls, and shall contain requirements for construction site operators to: implement appropriate erosion and sediment control BMPs; to control waste that may cause adverse impacts to water quality such as discarded building materials, concrete truck washout, paint and plastering wash down, chemicals, litter, and sanitary waste at the construction site.	Develop and implement procedures for receipt and consideration of information submitted by the public regarding storm water runoff impacts associated with construction projects.	4-4.a	Develop procedures for receipt of information from public (Cover under BMP 3-1.a)	X					Date procedures in place	MS4 Administration in cooperation with MRSWMP group

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Reduce pollution from construction sites by developing guidelines and standards for construction site runoff. These will address erosion and sediment controls, and shall contain requirements for construction site operators to: implement appropriate erosion and sediment control BMPs; to control waste that may cause adverse impacts to water quality such as discarded building materials, concrete truck washout, paint and plastering wash down, chemicals, litter, and sanitary waste at the construction site.	Develop and implement procedures for receipt and consideration of information submitted by the public regarding storm water runoff impacts associated with construction projects.	4-4.b	Establish internal protocol for how information received will be considered, handled, and responded to. (See BMP 3-1.c)	X					Date protocol in place	MS4 Administration
	(See Appendix E for Public Education and Outreach Program)	4-4.c	Educate public on the procedures for reporting potential impacts by construction projects on run off (See BMP 1-1.a)		X	X	X	X	Number of methods used to educate public about impacts of construction on storm water quality	MS4 Administration in cooperation with MRSWMP group

TABLE 4-1 MCM5: POST-CONSTRUCTION STORM WATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVLOPMENT:
Permit holders must educate the development community about the importance of the storm water program.
This will include adopting standards for incorporating environmental measures into new construction that minimize storm water impacts.

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Reduce post-construction pollution by developing post construction guidelines and standards for storm water runoff from new development and redevelopment. These will address such pollutants as sediments, chemicals, oils and grease, metals, and nutrients, as well as erosion and flooding.	Adopt an ordinance with standards for storm water pollution prevention associated with storm water systems installed in new developments and redevelopments. Ordinance to include standards for the design, operation, and maintenance of post-construction storm water pollution prevention systems in new developments and redevelopment.	5-1.a	The intention is to develop a single template ordinance which will be adopted by each municipality and will cover all aspects of storm water pollution and prevention associated with new developments and redevelopment. For MS4 urban areas meeting the Phase II Permit Attachment 4 criteria, their final adopted ordinance will have to meet subject criteria.	X					Date template ordinance completed	MS4 Administration in cooperation with MRSWMP group
	Develop post-construction BMP policies and procedures guidance document.	5-1.b	Develop template post-construction BMP policies and procedures guidance document		X				Date guidance document completed	MRSWMP Group

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Reduce post-construction pollution by developing post construction guidelines and standards for storm water runoff from new development and redevelopment. These will address such pollutants as sediments, chemicals, oils and grease, metals, and nutrients, as well as erosion and flooding.	Develop post-construction BMP policies and procedures guidance document	5-1.c	Adopt guidance document revised to be specific to each permit holder's needs by each permit holder		X				Date guidance document adopted by permit holder	MS4 Administration
		5-1.d	Adopt ordinance revised to be specific to each permit holder's needs through appropriate City Council procedures		X				Date ordinance adopted by MS4	MS4 Administration
		5-1.e	Train appropriate staff on the adopted ordinance			X	X	X	100 % of existing appropriate staff trained by year 3, then all new employees every year after that	MS4 Administration
		5-1.f	Implement ordinance and guidance document			X			Date ordinance implemented	MS4 Administration
	Develop and implement procedures for review of construction plans.	5-2.a	Develop plan review procedures using reference materials such as the CASQA (California Storm Water Quality Association) BMP Handbooks for revisions to plans.		X				Date site plan procedures implemented.	MS4 Administration in cooperation with MRSWMP group

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Reduce post-construction pollution by developing post construction guidelines and standards for storm water runoff from new development and redevelopment. These will address such pollutants as sediments, chemicals, oils and grease, metals, and nutrients, as well as erosion and flooding.	Develop and implement procedures for review of construction plans.	5-2.b	Review 100% of project plans subject to the post-construction storm water pollution prevention ordinance for compliance with this ordinance during design and construction			X	X	X	100% of site plans reviewed for compliance	MS4 Administration
	Develop and implement procedures for post-construction site inspection and enforcement of storm water pollution control systems	5-3.a	Develop site inspection procedures and guidance document for self-certification by facility owners		X				Date site inspection procedures implemented.	MS4 Administration in cooperation with MRSWMP group
		5-3.b	Develop agreement to be signed by all facility owners that they will comply with inspection & self-certification requirements to ensure post-construction BMP compliance		X				Date agreement developed	MS4 Administration in cooperation with MRSWMP group
		5-3.c	Require annual inspection and self-certification by facility owner		X	X	X	X	100% of construction sites inspected and self-certified	MS4 Administration

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Reduce post-construction pollution by developing post construction guidelines and standards for storm water runoff from new development and redevelopment. These will address such pollutants as sediments, chemicals, oils and grease, metals, and nutrients, as well as erosion and flooding.	Enforcement for non compliance with inspection and self-certification process	5-4.a	MS4 will impose fines per agreement developed in BMP 5-3.b to finance compliance and certification.			X	X	X	100% of construction sites inspected and self-certified	MS4 Administration in cooperation with MRSWMP group

TABLE 4-1 MCM6: POLLUTION PREVENTION / GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS: Permit holders must examine their own activities and develop a program to minimize the discharge of pollutants from the corporation yard, fleet services, and other permit holder owned facilities. This also includes monitoring street sweeping programs to track performance.										
BMP Intent	**Best Management Practice / Activity**	**BMP#**	**Implementation Plan**	**Permit Yr 1**	**Permit Yr 2**	**Permit Yr 3**	**Permit Yr 4**	**Permit Yr 5**	**Measurable Goals.**	**Implementers**
Minimize pollution from improper discharge or disposal of materials.	Develop and implement an education and training program for employees about the impacts of storm water pollution from municipal activities and hazardous materials disposal, and how to implement the selected BMPs to reduce these impacts	6-1.a	Develop template municipal activities training program for municipal employees	X					Date template training program completed.	MS4 Administration in cooperation with MRSWP group and MBNMS
		6-1.b	Train appropriate municipal employees		X	X	X	X	100 % of existing appropriate staff trained by year 2, then all new employees every year after that	MS4 Administration in cooperation with MRSWP group
	Inspection program of municipal hazardous materials storage facilities	6-2.a	Develop proper inspection procedures and guidelines for proper hazardous materials storage using reference materials such as the CASQA (California Storm Water Quality Association) BMP Handbooks for revisions to plans.		X				Date inspection procedures & guidelines completed	MS4 Administration in cooperation with MRSWP group

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Minimize pollution from improper discharge or disposal of materials.	Inspection program of municipal hazardous materials storage facilities	6-2.b	Train appropriate staff on proper inspection procedures			X	X	X	100 % of existing appropriate staff trained by year 3, then all new employees every year after that	MS4 Administration in cooperation with MRSWP group
		6-2.c	Implement inspection program			X	X	X	100% of municipal hazardous materials storage facilities inspected each year	MS4 Administration
Minimize pollution from used motor oil being disposed of improperly.	Develop and implement procedures for proper disposal of used motor oil	6-3.a	Develop procedures for proper disposal of used motor oil	X					Date procedures put in place	MS4 Administration
		6-3.b	Train appropriate staff on proper inspection procedures		X	X	X	X	100 % of existing appropriate staff trained by year 2, then all new employees every year after that	MS4 Administration in cooperation w/ MRSWMP Group
		6-3.c	Implement inspection program		X				Date inspection program implemented	MS4 Administration

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Minimize pollution from landscaping & lawn care management and pest control management activities.	Develop and implement a program that effectively manages landscaping and lawn care activities to minimize the potential for storm water pollution.	6-4.a	Perform spraying during times where rain is not predicted	X	X	X	X	X	100% of spraying done when rain is not predicted	MS4 Administration
		6-4.b	Protect all stock piled materials from erosion such as covering , placing away from all watercourses and storm drain inlets, etc..	X	X	X	X	X	100% of stock piled materials protected from erosion	MS4 Administration
		6-4.c	Implement procedures to minimize irrigation runoff such as using automatic timers, drip irrigation, pop up sprinkler heads, irrigating slowly, inspecting sprinklers while running and adjusting, using drought tolerant plants, etc.	X	X	X	X	X	Irrigation minimization measures given first priority to be used in landscaping	MS4 Administration
		6-4.d	Utilize integrated pest management (IPM) techniques whenever possible for fertilizer, pesticide, and vegetation management	X	X	X	X	X	IPM Techniques given first priority for use in pest management	MS4 Administration

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Minimize pollution from landscaping & lawn care management and pest control management activities.	Develop and implement a program that effectively manages landscaping and lawn care activities to minimize the potential for storm water pollution.	6-4.e	Train appropriate staff on proper lawn care management techniques to prevent storm water pollution	X	X	X	X	X	100 % of existing appropriate staff trained by year 1, then all new employees every year after that	MS4 Administration in cooperation w/ MRSWMP Group
Minimize pollution for improper discharge of chlorinated and/or brominated water from swimming pools & spas.	Develop and implement procedures to ensure the dechlorination and/or debromination of pool water prior to discharge to the storm water system	6-5.a	Develop procedures for pool water discharge		X				Pool water dechlorinated and/or debrominated prior to discharge 100% of the time	MS4 Administration in cooperation with MRSWMP Group
Minimize pollution from street and parking lot cleaning.	Conduct sweeping on a frequent and regular basis and focus sweeping schedule on high impact/dry weather sites	6-6.a	Conduct sweeping on a regular basis	X	X	X	X	X	Sweep on determined schedule appropriate for each MS4	MS4 Administration
Minimize pollution from automotive maintenance activities.	Develop and implement a program to prevent pollutants from automotive activities, such as vehicle fluids, from entering storm drains	6-7.a	Provide designated area for all vehicle maintenance	X	X	X	X	X	100% of permit holders have designated area for vehicle maintenance	MS4 Administration

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Minimize pollution from automotive maintenance activities	Develop and implement a program to prevent pollutants from automotive activities, such as vehicle fluids, from entering storm drains	6-7.b	Move maintenance and repair activities indoors or under a covered area whenever possible	X	X	X	X	X	100% maintenance and repair activities moved indoors or covered area whenever possible	MS4 Administration
		6-7.c	Stencil all storm drain inlets in corporate yard area (See BMP 2-2.c)	X	X	X	X	X	100% of storm drain inlets in corporate yard stenciled by year 1 and any new inlets which may be created immediately after being built	MS4 Administration in cooperation w/ MRSWMP and MBNMS
		6-7.d	Collect all leaking or dripping fluids in drip pans or containers and dispose/recycle properly	X	X	X	X	X	100% of all leaks or spills contained and disposed of properly	MS4 Administration

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Minimize pollution from automotive maintenance activities.	Develop and implement a program to prevent pollutants from automotive activities, such as vehicle fluids, from entering storm drains.	6-7.e	Store materials and wastes under cover whenever possible	X	X	X	X	X	100% of materials stored under cover whenever possible	MS4 Administration
		6-7.f	Do not dispose of oil filters in trash cans. Contact oil supplier or recycler for recycle bin	X	X	X	X	X	100% of waste oil filters recycled	MS4 Administration
		6-7.g	Train all employees repairing municipal vehicles on proper pollution prevention techniques		X	X	X	X	100 % of existing appropriate staff trained by year 2, then all new employees every year after that every year after that.	MS4 Administration in cooperation w/ MRSWMP group

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Minimize pollution from municipal vehicle washing activities	Develop and implement a program to prevent pollutants from washing municipal vehicles, such as vehicle fluids and phosphate soaps, from entering storm drains.	6-8.a	Vehicle & equipment washing facilities equipped with storm water pollution control measures from reference materials such as the CASQA (California Storm Water Quality Association) BMP Handbooks.			X	X	X	100% of vehicle washing facilities are equipped with storm water pollution control measures	MS4 Administration
		6-8.b	Hoses with nozzles that have automatic shut off when left unattended	X	X	X	X	X	100% of hoses for vehicle washing have shut off nozzles	MS4 Administration
		6-8.c	Vehicles washed in area that does not allow detergents to flow to storm drain system			X	X	X	100% of chosen wash areas do not drain to storm drain system	MS4 Administration
Minimize pollution from municipal vehicle washing activities		6-8.d	Trash container supplied in vehicle wash area	X	X	X	X	X	Trash container present in 100% of municipal vehicle washing areas	MS4 Administration

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Minimize pollution from municipal vehicle washing activities	Develop and implement a program to prevent pollutants from washing municipal vehicles, such as vehicle fluids and phosphate soaps, from entering storm drains	6-8.e	Training of municipal employees in proper washing techniques			X	X	X	100 % of existing appropriate staff trained by year 1, then all new employees every year after that	MS4 Administration in cooperation w/ MRSWMP group
		6-8.f	Vehicle washing facilities inspected for compliance with reference materials such as the CASQA (California Storm Water Quality Association) BMP handbooks.			X	X	X	100% of municipal vehicle washing areas inspected quarterly	MS4 Administration
Minimize pollution from roadway and bridge maintenance.	Develop and implement policies and procedures to prevent pollutants from bridge and street maintenance activities, such as paving and painting work, from entering storm drains	6-9.a	Regular street sweeping: (See BMP 6-6.a)	X	X	X	X	X	Sweep on determined schedule appropriate for each MS4	MS4 Administration
		6-9.b	Schedule all pavement marking for dry weather	X	X	X	X	X	100% of all pavement marking scheduled for dry weather	MS4 Administration
		6-9.c	Transfer and load all paint away from storm drain inlets	X	X	X	X	X	100% of all paint transferred and loaded away from storm drain inlets	MS4 Administration

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Minimize pollution from roadway and bridge maintenance	Develop and implement policies and procedures to prevent pollutants from bridge and street maintenance activities, such as paving and painting work, from entering storm drains	6-9.d	Protect storm drain inlets prior to road work	X	X	X	X	X	100% of storm drain inlets protected prior to road work	MS4 Administration
		6-9.e	Protect all stockpiled materials from erosion such as covering , placing away from all watercourses and storm drain inlets, etc.	X	X	X	X	X	100% of stock piled materials protected from erosion.	MS4 Administration
		6-9.f	Collect all stockpiles, excess, and sweepings from street projects and dispose of properly	X	X	X	X	X	100% of stockpiles and sweepings collected and disposed of properly	MS4 Administration
Minimize pollution from contaminants accumulated in storm sewer systems.	Develop and implement a program of regularly cleaning storm drains and inlets to prevent accumulated pollutants from being discharged with the storm water	6-10.a	Stencil catch basins and inlets as needed as prevention measure: (See BMP 2-2.c)	X	X	X	X	X	100% of appropriate catch basins stenciled	MS4 Administration in cooperation w/ MRSWMP and MBNMS

BMP Intent	Best Management Practice / Activity	BMP#	Implementation Plan	Permit Yr 1	Permit Yr 2	Permit Yr 3	Permit Yr 4	Permit Yr 5	Measurable Goals.	Implementers
Minimize pollution from contaminants accumulated in storm sewer systems	Develop and implement a program of regularly cleaning storm drains and inlets to prevent accumulated pollutants from being discharged with the storm water	6-10.b	Inspect catch basins and inlets annually prior to rainy season	X	X	X	X	X	Minimum 35% of catch basins and inlets to be inspected annually on a rotating basis to cover 100% every 3 years	MS4 Administration
		6-10.c	Clean and repair catch basins, inlets and piping as identified through inspections as needed prior to November 1st annually	X	X	X	X	X	By November 1st, annually, address cleaning and repair needs of prioritized catch basins, inlets & piping as identified during inspections	MS4 Administration
		6-10.d	Re-inspect identified problem areas of debris accumulation during wet season	X	X	X	X	X	Re-inspect 100% of problem areas	MS4 Administration
		6-10.e	Keep documentation of inspections and cleanings	X	X	X	X	X	Documentation kept on file	MS4 Administration

Appendix C

Model Storm Water Ordinance

Model Storm Water Ordinance

Section 1.General Provisions

1.1. Findings of Fact

It is hereby determined that:

Land development projects, both past and present, and associated impervious cover, alter the hydrologic response of local watersheds and increase storm water runoff rates and volumes, causing flooding, stream channel erosion, and sediment transport and deposition. This storm water runoff volume should be infiltrated on the land on which the storm water precipitates.

Therefore, the (jurisdictional storm water authority) establishes this set of storm water management practices applicable to all areas within the former Fort Ord to minimize and eventually eliminate all storm water discharges to the existing storm drain system which drains to Monterey Bay or to percolation basins west of Highway 1. It is determined that the regulation of storm water runoff discharges from previously developed areas and land development projects and other construction activities in order to control and minimize storm water runoff rates and volumes, soil erosion, stream channel erosion, and nonpoint source pollution associated with storm water runoff is in the public interest and will prevent threats to public health and safety and environmental damage.

1.2. Purpose

The purpose of this ordinance is to establish minimum storm water management requirements and controls to protect and safeguard the general health, safety, and welfare of the public residing in watersheds within this jurisdiction. This ordinance seeks to meet that purpose through the following objectives:

1. contain all storm water runoff from development or re-development in order to eliminate discharges to the existing storm drain system and thereby eliminate the need for discharge to off-site percolation areas in the dunes west of Highway 1; and

2. eliminate increases in nonpoint source pollution caused by storm water runoff from development which would otherwise degrade local water quality; and

3. eliminate the volume of surface water runoff which flows from any specific site during and following development or re-development; and

4. eliminate storm water runoff rates and volumes, soil erosion and nonpoint source pollution, through storm water management controls and ensure that these management controls are properly maintained and pose no threat to public safety.

1.3. Applicability

This ordinance shall be applicable to all subdivision or site plan applications, unless eligible for an exemption or granted a waiver by the (jurisdictional storm water authority) under the specifications of Section 4 of this ordinance. The ordinance also applies to land development activities that are smaller than the minimum applicability criteria if such activities are part of a larger common plan of development that meets the following applicability criteria, even though multiple separate and distinct land development activities may take place at different times on different schedules. In addition, all plans must also be reviewed by local environmental protection officials to ensure that established water quality standards will be maintained during and after development of the site and that post construction runoff levels are consistent with any local and regional watershed plans.

To prevent the adverse impacts of storm water runoff, the jurisdictional storm water authority has developed a set of performance standards that must be met at new development sites. These standards apply to any construction activity disturbing 2,000 or more square feet of land. The following activities may be exempt from these storm water performance criteria:

1. Additions or modifications to existing single family structures

2. Developments that do not disturb more than 2,000 square feet of land, provided they are not part of a larger common development plan

3. Repairs to any storm water treatment facility deemed necessary by the (jurisdictional storm water authority)

When a site development plan is submitted that qualifies as a redevelopment project as defined in Section 2 of this ordinance, decisions on permitting and on-site storm water requirements shall be governed by special storm water sizing criteria found in the current storm water design manual. This criterion is dependent on the amount of impervious area at completion of the redevelopment and its impact on storm water yield. Final authorization of all redevelopment projects will be determined after a review by the (jurisdictional storm water authority).

1.4. Compatibility with Other Permit and Ordinance Requirements

This ordinance is not intended to interfere with, abrogate, or annul any other ordinance, rule or regulation, stature, or other provision of law. The requirements of this ordinance should be considered minimum requirements, and where any provision of this ordinance imposes restrictions different from those imposed by any other ordinance, rule or

regulation, or other provision of law, whichever provisions are more restrictive or impose higher protective standards for human health or the environment shall be considered to take precedence.

1.5. Severability

If the provisions of any article, section, subsection, paragraph, subdivision or clause of this ordinance shall be judged invalid by a court of competent jurisdiction, such order of judgment shall not affect or invalidate the remainder of any article, section, subsection, paragraph, subdivision or clause of this ordinance.

1.6. Development of a Storm Water Design Manual

The (jurisdictional storm water authority) may furnish additional policy, criteria and information including specifications and standards for the proper implementation of the requirements of this ordinance and may provide such information in the form of a Storm Water Design Manual.

This manual should include a list of acceptable storm water treatment practices, including the specific design criteria for each storm water practice. The manual may be updated and expanded from time to time, at the discretion of the local review authority, based on improvements in engineering, science, monitoring and local maintenance experience. Storm water treatment practices that are designed and constructed in accordance with these design and sizing criteria may be presumed to meet the minimum water quality performance standards.

Section 2. Definitions:

"Accelerated Erosion" means erosion caused by development activities that exceeds the natural processes by which the surface of the land is worn away by the action of water, wind, or chemical action.

"Applicant" means a property owner or agent of a property owner who has filed an application for a storm water management permit.

"Best Management Practices" mean activities, practices, and procedures to prevent or reduce the discharge of pollutants directly or indirectly to storm drain systems and subsurface waters.

"Building" means any structure, either temporary or permanent, having walls and a roof; designed for the shelter of any person, animal, or property; and occupying more than 100 square feet of area.

"Channel" means a natural or artificial watercourse with a definite bed and banks that conducts continuously or periodically flowing water.

"Dedication" means the deliberate appropriation of property by its owner for general public use.

"Detention" means the temporary storage of storm runoff in a storm water management practice with the goals of controlling peak discharge rates and providing gravity settling of pollutants.

"Detention Facility" means a detention basin or alternative structure designed for the purpose of temporary storage of stream flow or surface runoff and gradual release of stored water at controlled rates.

"Developer" means a person who undertakes land disturbance activities.

"Drainage Easement" means a legal right granted by a landowner to a grantee allowing the use of private land for storm water management purposes.

"Erosion and Sediment Control Plan" means a plan that is designed to minimize the accelerated erosion and sediment runoff at a site during construction activities.

"Fee in Lieu" means a payment of money in place of meeting all or part of the storm water performance standards required by this ordinance.

"FORA" means Fort Ord Reuse Authority.

"Hotspot" means an area where land use or activities generate highly contaminated runoff with concentrations of pollutants in excess of those typically found in storm water.

"Hydrologic Soil Group (HSG)" means a Natural Resource Conservation Service classification system in which soils are categorized into four runoff potential groups. The groups range from A soils, with high permeability and little runoff production, to D soils, which have low permeability rates and produce much more runoff.

"Impervious Cover" means those surfaces that cannot effectively infiltrate rainfall (e.g., building rooftops, pavement, sidewalks, driveways, etc).

"Industrial Storm Water Permit" means an National Pollutant Discharge Elimination System permit issued to a commercial industry or group of industries which regulates the pollutant levels associated with industrial storm water discharges or specifies on-site pollution control strategies.

"Infiltration" means the process of percolating storm water into the subsoil.

"Infiltration Basin" means a constructed basin providing both temporary storage and infiltration of storm runoff into the soil.

"**Infiltration Facility**" means any structure or device designed to infiltrate retained water to the subsurface. These facilities may be above grade or below grade.

"**Land Disturbance Activity**" means any activity that changes the volume or peak flow discharge rate of rainfall runoff from the land surface. This may include the grading, digging, cutting, scraping, or excavating of soil, placement of fill materials, paving, construction, substantial removal of vegetation,, or any activity which bares soil or rock or involves the diversion or piping of any natural or man-made watercourse.

"**Landowner**" means the legal or beneficial owner of land, including those holding the right to purchase or lease the land, or any other person holding proprietary rights in the land.

"**Maintenance Agreement**" means a legally recorded document that acts as a property deed restriction, and which provides for long-term maintenance of storm water management practices.

"**National Pollution Discharge Elimination System (NPDES)**" means regulations and procedures developed by the Environmental Protection Agency (EPA) to fulfill the requirements of the Federal Water Pollution Control Act and any subsequent amendment thereto.

"**Nonpoint Source Pollution**" means pollution from any source other than from any discernible, confined, and discrete conveyances, and shall include, but not be limited to, pollutants from agricultural, silvicultural, mining, construction, subsurface disposal and urban runoff sources.

"**Offset Fee**" means a monetary compensation paid to a local government for failure to meet pollutant load reduction targets.

"**Off-Site Facility**" means a storm water management measure located outside the subject property boundary described in the permit application for land development activity.

"**On-Site Facility**" means a storm water management measure located within the subject property boundary described in the permit application for land development activity.

"**Recharge**" means the replenishment of underground water supplies.

"**Redevelopment**" means any construction, alteration or improvement exceeding ____ square feet in areas where existing land use is high density commercial, industrial, institutional or multi-family residential.

"**Stop Work Order**" means an order that requires that all construction activity on a site be stopped.

"Storm Water Management" means the use of structural or non-structural practices that are designed to reduce or eliminate storm water runoff pollutant loads, discharge volumes, and/or peak flow discharge rates.

"Storm Water Retrofit" means a storm Water management practice designed for an existing development site that previously had either no storm water management practice in place or a practice inadequate to meet the storm water management requirements of the site.

"Storm Water Runoff" means flow on the surface of the ground, resulting entirely from precipitation.

"Storm Water Treatment Practices (STPs)" means measures, either structural or nonstructural, that are determined to be the most effective, practical means of preventing or reducing point source or nonpoint source pollution inputs to storm water runoff and water bodies.

"Subsurface Infiltration System" means a subsurface structure or device designed to infiltrate retained storm runoff to the subsoil.

"Water Quality Volume (WQ_v)" means the storage needed to capture and treat 90% of the average annual storm water runoff volume. Numerically **(WQ_v)** will vary as a function of long-term, statistical rainfall data.

"Watercourse" means a permanent or intermittent stream or other body of water, either natural or man-made, which gathers or carries surface water.

Section 3. Permit Procedures and Requirements

3.1. Permit Required

No land owner or land operator should receive any of the building, grading or other land development permits required for land disturbance activities without first meeting the requirements of existing jurisdictional ordinance for storm water management prior to commencing the proposed development activity.

3.2. Application Requirements

Unless specifically excluded by this ordinance, any land owner or operator desiring a permit for a land disturbance activity should submit to the jurisdictional storm water authority a permit application on a form provided by the jurisdictional storm water authority for that purpose.

Unless otherwise excepted by this ordinance, a permit application should be accompanied by the following in order that the permit application is considered: a storm water management concept plan; a maintenance agreement; and a non-refundable permit review fee.

The storm water management plan is to be prepared to meet the requirements of the jurisdictional ordinance, the maintenance agreement is to be prepared to meet the requirements of the jurisdictional ordinance, and fees shall be those established by the (jurisdictional storm water authority).

3.3. Application Review Fees

The fee for review of any land development application should be based on the amount of land to be disturbed at the site, and the fee structure should be established by the (jurisdictional storm water authority). All monetary contributions should be credited to an appropriate capital improvements program project, and should be made prior to the issuance of any building permit for the development.

3.4. Application Procedure

- Applications for land disturbance activity permits are to be filed with the (appropriate review agency) on any regular business day.
- A copy of this permit application should be forwarded to (jurisdictional storm water authority) for review
- Permit applications should include the following: two copies of the storm water management concept plan, two copies of the maintenance agreement, and any required review fees.
- Within the time period established by the jurisdiction, following receipt of a complete permit application, including all documents as required by ordinance, the (jurisdictional storm water authority) should inform the applicant whether the application, plan and maintenance agreement are approved or disapproved.
- If the permit application, storm water management plan or maintenance agreement are disapproved, the applicant may revise the storm water management plan or agreement. If additional information is submitted, the jurisdictional storm water authority should, within a pre-determined time period, from the date the additional information is received inform the applicant that the plan and maintenance agreement are either approved or disapproved.
- If the permit application, final storm water management plan and maintenance agreement are approved by the (jurisdictional storm water authority), all appropriate land disturbance activity permits may be issued.

3.5. Permit Duration

Permits issued under this section should be valid from the date of issuance through the date the jurisdictional storm water authority notifies the permit holder that all storm water management practices have passed the final inspection required under permit condition.

Section 4. Waivers to Storm Water Management Requirements

4.1. Waivers for Providing Storm Water Management

1. Every applicant should provide for storm water management unless they file a written request to waive this requirement. Requests to waive the storm water management plan requirements should be submitted to the jurisdictional storm water authority for approval. The minimum requirements for storm water management may be waived in whole or in part upon written request of the applicant, provided that at least one of the following conditions applies:

    - It can be demonstrated that the proposed development is not likely to impair attainment of the objectives of the jurisdictional ordinance.

2. Alternative minimum requirements for on-site management of storm water discharges have been established in a storm water management plan that has been approved by the (jurisdictional storm water authority) and that is required to be implemented by local ordinance.

    - Provisions are made to manage storm water by an off-site facility. The off-site facility should be required to be in place and to be designed and adequately sized to provide a level of storm water control that is equal to or greater than that which would be afforded by on-site practices, and a legally obligated entity is responsible for long-term operation and maintenance of the off-site storm water facility.

    - The (jurisdictional storm water authority) finds that meeting the minimum on-site management requirements is not feasible due to the natural or existing physical characteristics of a site and an alternative site is available.

    - Non-structural practices are provided that reduce the generation of storm water from the site, the size and cost of storm water storage, and provide partial removal of pollutants.

In instances where one of the conditions above applies, the (jurisdictional storm water authority) may grant a waiver from strict compliance with storm water management provisions that are not achievable, provided that acceptable mitigation measures are provided. However, to be eligible for a variance, the applicant should demonstrate to the satisfaction of the (jurisdictional storm water authority) that the downstream waterways will not be subject to:

- Deterioration of existing culverts, bridges, and other structures;
- Deterioration of biological functions or habitat;
- Accelerated stream bank or streambed erosion or siltation;
- Increased threat of flood damage to public health, life and property;
- Failure to meet the goal of curtailing storm water flows to the westerly side of Highway 1.

Furthermore, where compliance with minimum requirements for storm water management is waived, the applicant should satisfy the minimum requirements by meeting one of the mitigation measures selected by the jurisdictional storm water authority. Mitigation measures may include, but are not limited to, the following:

The creation of a storm water management facility or other drainage improvements on previously developed properties, public or private, that currently lack storm water management facilities should be designed and constructed in accordance with the purposes and standards of the jurisdictional ordinance.

4.2. Fee in Lieu of Storm Water Management Practices.

Where the (jurisdictional storm water authority) waives all or part of the minimum storm water management requirements, or where the waiver is based on the provision of adequate storm water facilities provided downstream of the proposed development, the applicant may be required to pay a fee in an amount determined by the (jurisdictional storm water authority).

When an applicant obtains a waiver of the required storm water management, the monetary contribution required should be in accordance with a fee schedule (unless the developer and the storm water authority agree on an alternate contribution) established by the (jurisdictional storm water authority), and based on the cubic feet of storage required for storm water management of the development in question. All of the monetary contributions should be credited to an appropriate capital improvements program project and should be made by the developer prior to the issuance of any building permit for the development.

4.3. Dedication of land

In lieu of a monetary contribution, an applicant may obtain a waiver of the required storm water management by entering into an agreement with the jurisdictional storm water authority for the granting of an easement or the dedication of land by the applicant, to be used for the construction of an off-site storm water management facility. The agreement should be entered into by the applicant and the jurisdictional storm water authority prior to the recording of plats or, if no record plat is required, prior to the issuance of the building permit.

Section 5. General Performance Criteria for Storm Water Management

Unless judged by the (jurisdictional storm water authority) to be exempt or granted a waiver, the following performance criteria should be addressed for storm water management at all sites:

1. All site designs should establish storm water management practices to control the peak flow rates and total volume of storm water discharge associated with specified design storms (preferably 100-year return frequency storm) and reduce the generation of storm water. These practices should seek to utilize pervious areas for storm water treatment and to infiltrate storm water runoff from driveways, sidewalks, rooftops, parking lots, and landscaped areas to the maximum extent practical to provide treatment for both water quality and quantity.

2. All storm water runoff generated from new development shall not discharge storm water directly to an off-site storm drainage system. All storm water should be percolated on-site.

3. Groundwater recharge rates should be maintained, by promoting infiltration through the use of structural and non-structural methods. At a minimum, recharge from the post development site should mimic or exceed the recharge from pre-development site conditions.

4. For new development, structural STPs should be designed to remove all post-development total suspended solids load (TSS). It is presumed that a STP complies with this performance standard if it is:

   - sized to capture the prescribed water quality volume (WQ_v).
   - designed according to the specific performance criteria outlined in the local storm water design requirements,
   - constructed properly, and
   - maintained regularly.

5. Industrial and commercial sites should be required to prepare and implement a storm water pollution prevention plan, and should file a notice of intent (NOI) under the provisions of the National Pollutant Discharge Elimination System (NPDES) general permit. The storm water pollution prevention plan requirement applies to both existing and new sites. The determination of the need for NPDES and NOI compliance should be made by the jurisdiction.

6. Storm water discharges from land uses or activities with higher potential pollutant loadings, known as "hotspots", may require the use of specific structural STPs and pollution prevention practices.

7. Prior to design, applicants should consult with the (jurisdictional storm water authority) to determine if they are subject to additional storm water design requirements.

8. The calculations for determining flow rates and volumes are found in the storm water Design Manual and should be used for sizing all storm water management practices.

Section 6. Basic Storm Water Management Design Criteria

6.1. Minimum Control Requirements

All storm water management practices should be designed so that the specific storm frequency storage volumes (e.g., recharge, water quality, design frequency of 100-year/ 24-hour) as identified in the current storm water design manual are met, unless the (jurisdictional storm water authority) grants the applicant a waiver or the applicant is exempt from such requirements.

In addition, if hydrologic or topographic conditions warrant greater control than that provided by the minimum control requirements, the (jurisdictional storm water authority) should reserve the right to impose any and all additional requirements deemed necessary to control the volume, timing, and rate of runoff.

6.2 Site Design Feasibility

Storm water management practices for a site should be chosen based on the physical conditions of the site. Among the factors that should be considered:

- Topography
- Maximum Drainage Area
- Depth to Water Table
- Soils
- Slopes
- Terrain
- Head
- Location in relation to environmentally sensitive features or ultra-urban areas

Applicants should consult the Storm Water Design Manual for guidance on the factors that determine site design feasibility when selecting a storm water management practice.

6.3. Pretreatment Requirements

Every storm water treatment system should have an acceptable form of water quality pretreatment, in accordance with the pretreatment requirements found in the current storm water design manual. Certain storm water treatment practices, as specified in the Storm Water Design Manual, should be prohibited even with pretreatment in the following circumstances:

1. Storm water is generated from highly contaminated source areas known as "hotspots"

2. Storm water is carried in a conveyance system that also carries contaminated, non- storm water discharges

3. Storm water is being managed in a designated groundwater recharge area.

4. Certain geologic conditions exist that prohibit the proper pretreatment of storm water

6.4. Treatment/Geometry Conditions

All storm water management practices should be designed to capture and treat storm water runoff according to the specifications outlined in the Storm Water Design Manual. These specifications will designate the water quantity and quality treatment criteria that apply to an approved storm water management practice.

6.5. Landscaping Plans Required

It is recommended that all storm water management plans have a landscaping plan detailing both the vegetation to be incorporated in the storm water management plan and how and who will manage and maintain this vegetation. A registered landscape architect should prepare this plan.

6.6. Maintenance Agreements

All storm water treatment practices should have an enforceable operation and maintenance agreement to ensure the system functions as designed. This agreement should include any and all maintenance easements required to access and inspect the storm water treatment practices, and to perform routine maintenance as necessary to ensure proper functioning of the storm water treatment practice. In addition, a legally binding covenant specifying the parties responsible for the proper maintenance of all storm water treatment practices should be secured prior to issuance of any permits for land disturbance activities.

6.7. Non-Structural Storm Water Practices

The use of non-structural storm water treatment practices is encouraged in order to minimize the reliance on structural practices. Credit in the form of reductions in the amount of storm water that is to be managed could be earned through the use of non-structural practices that reduce the generation of storm water from the site. Non-structural practices are explained in detail in the current design manual and applicants wishing to obtain credit for use of non-structural practices should ensure that these practices are documented and remain unaltered by subsequent property owners.

Section 7. Requirements for Storm Water Management Plan Approval

7.1. Storm Water Management Plan Required for All Developments.

No application for development should be approved unless it includes a storm water management plan detailing in concept how runoff and associated water quality impacts resulting from the development will be controlled or managed. This plan should be prepared by a registered Professional Civil Engineer and indicate how the storm water will be managed on-site, and the general location and type of practices.

The storm water management plan(s) should be referred for comment to all other interested agencies, and any comments should be addressed in a final storm water management plan. This final plan should be signed by a professional engineer (PE) licensed to practice Civil Engineering, who verifies that the design of all storm water management practices meet the submittal requirements outlined in the Submittal Checklist found in the storm water design manual. No building, grading, or sediment control permit should be issued until a satisfactory final storm water management plan, or a waiver thereof, has undergone a review and been approved by the (jurisdictional storm water authority) after determining that the plan or waiver is consistent with the requirements of this ordinance.

7.2. Storm Water Management Concept Plan Requirements

A storm water management concept plan should be required with all permit applications and should include sufficient information (e.g., maps, hydrologic calculations, etc) to evaluate the environmental characteristics of the project site, the potential impacts of all proposed development of the site, both present and future, on the water resources, and the effectiveness and acceptability of the measures proposed for managing storm water generated at the project site. The intent of this conceptual planning process is to determine the type of storm water management measures necessary for the proposed project, and ensure adequate planning for management of storm water runoff from future development. To accomplish this goal the following information should be included in the concept plan:

- A map (or maps) indicating the location of existing and proposed buildings, roads, parking areas, utilities, and structural storm water management and sediment control facilities should be shown on this plan. The map(s) should also clearly show proposed land use with tabulation of the percentage of surface area to be adapted to various uses, drainage patterns, locations of utilities, roads and easements, and the limits of clearing and grading. A written description of the site plan and justification of proposed changes in natural or existing conditions should also be required.

- Sufficient engineering analysis should be performed to show that the proposed storm water management measures are capable of controlling runoff from the site in compliance with this ordinance and the specifications of the Storm Water Design Manual.

- A written or graphic inventory should be done of the natural resources at the site and surrounding area as they exist prior to the commencement of the project and also a description of the watershed and its relation to the project site. This description should include a discussion of soil conditions, topography, and other vegetative areas on the site. Particular attention should be paid to environmentally sensitive features that provide particular opportunities or constraints for development.

- A written description of the required maintenance burden should be done for any proposed storm water management facility. It shall include the method of financing the required maintenance.

- Compliance with the requirements for maintenance reporting should be indicated.

- The (jurisdictional storm water authority) may also require a concept plan to consider the maximum development potential of a site under existing zoning, regardless of whether the applicant presently intends to develop the site to its maximum potential.

For development or redevelopment occurring on a previously developed site, an applicant may be required to include within the storm water concept plan measures for controlling existing storm water runoff discharges from the site in accordance with the standards of the ordinance to the maximum extent practicable.

7.3. Final Storm Water Management Plan Requirements

After review of the storm water management concept plan, and modifications to that plan as deemed necessary by the (jurisdictional storm water authority), a final storm water management plan should be submitted for approval. The final storm water management plan, in addition to the information from the concept plan, should include all of the information required in the Final Storm water Management Plan checklist found in the Storm Water Design Manual. This includes:

1. Contact Information

The name, address, and telephone number of all persons having a legal interest in the property and the tax reference number and parcel number of the property or properties affected.

2. Topographic Base Map

A 1" = 40' topographic base map of the site which extends a minimum of 200 feet beyond the limits of the proposed development and indicates existing surface water drainage including streams, ponds, culverts, ditches, and wetlands; current land use including all existing structures within the upstream tributary area; locations of utilities, roads, and easements; and significant natural and manmade features not otherwise shown.

3. Calculations

Hydrologic and hydraulic design calculations for the pre-development and post-development conditions for the design storms specified in the ordinance. Such calculations shall include (i) description of the design storm frequency, intensity and duration, (ii) time of concentration, (iii) Soil Curve Numbers or runoff coefficients, (iv) peak runoff rates and total runoff volumes for each watershed area, (v) infiltration rates, where applicable, (vi) culvert capacities, (vii) flow velocities, (viii) data on the increase in rate and volume of runoff for the design storms referenced in the Storm Water Design Manual, and (ix) documentation of sources for all computation methods and field test results.

4. Soils Information

If a storm water management control measure depends on the hydrologic properties of soils (e.g., infiltration basins), then a soils report prepared by a Professional Geotechnical Engineer or Engineering Geologist should be submitted. The soils report is to be based on on-site boring logs or soil pit profiles. The number and location of required soil borings or soil pits shall be determined based on what is needed to determine the suitability and distribution of soil types present at the location of the control measure.

5. Maintenance, Financing and Repair Plan,

The design and planning of all storm water management facilities should include detailed maintenance and repair procedures to ensure their continued function. These plans should identify the parts or components of a storm water management facility that need to be maintained and the equipment and skills or training necessary. Provisions for the periodic review and evaluation of the effectiveness of the maintenance program and the need for revisions or additional maintenance procedures should be included in the plan. A financing plan for said maintenance should be included.

- Landscaping plan

The applicant should present a detailed plan for management of vegetation at the site after construction is finished, including who will be responsible for the maintenance of vegetation at the site and what practices will be employed to ensure that adequate vegetative cover is preserved. A registered landscape architect should prepare this plan. The cost of said maintenance should be included in the Maintenance Financing Plan.

- Maintenance Easements

The applicant should ensure access to all storm water treatment practices at the site for the purpose of inspection and repair by securing all the maintenance easements needed on a permanent basis. These easements will be recorded with the plan and will remain in effect even with transfer of title to the property.

- Maintenance Agreement

The applicant should execute an easement and an inspection and maintenance agreement binding on all subsequent owners of land served by an on-site storm water management measure in accordance with the specifications of this ordinance.

- Erosion and Sediment Control Plans for Construction of Storm Water Management Measures
- Maintenance Plan
- Maintenance Financing Plan

The applicant should prepare an erosion and sediment control plan for all construction activities related to implementing any on-site storm water management practices in keeping with the requirements of the Regional Water Quality Control Board.

- Other Environmental Permits

The applicant should assure that all other applicable environmental permits have been acquired for the site prior to approval of the final storm water design plan.

7.4. Performance Bond/Security.

The (jurisdictional storm water authority) may, at its discretion, require the submittal of a performance security or bond prior to issuance of a permit in order to insure that the storm water practices are installed by the permit holder as required by the approved storm water management plan. The amount of the installation performance security should be the total estimated construction cost of the storm water management practices approved under the permit plus an additional amount to provide for costs associated with the jurisdictional storm water authority, assuming the completion of the storm water management practices. The performance security should contain forfeiture provisions for failure to complete work specified in the storm water management plan.

The installation performance security should be released in full only upon submission of "as built plans" and written certification by a registered professional civil engineer that the storm water practice has been installed in accordance with the approved plan and other applicable provisions of the ordinance. The (jurisdictional storm water authority) should make a final inspection of the storm water practice to ensure that it is in compliance with the approved plan and the provisions of this ordinance. Provisions for a partial pro-rata release of the performance security based on the completion of various development stages can be made at the discretion of the jurisdictional storm water authority.

Section 8. Construction Inspection

8.1. Notice of Construction Commencement

The applicant should be required to notify the (jurisdictional storm water authority) in advance before the commencement of construction. Regular inspections of the storm water management system construction should be conducted by the staff of the jurisdictional storm water authority or certified by a professional civil engineer or their designee who has been approved by the jurisdictional storm water authority. All inspections should be documented, and written reports should be prepared that contain the following information:

- The date and location of the inspection;
- Whether construction is in compliance with the approved storm water management plan
- Variations from the approved construction specifications
- Any violations that exist
- Compliance with Regional Water Quality Control Board requirements

If any violations are found, the property owner should be notified in writing of the nature of the violation and the required corrective actions. No added work should proceed until

any violations are corrected and all work previously completed has received approval by the (jurisdictional storm water authority).

8.2. As Built Plans

All applicants should be required to submit "as built" plans for any on-site storm water management practices after final construction is completed. The plan should show the final design specifications for all storm water management facilities and should be certified by a professional civil engineer. A final inspection by the jurisdictional storm water authority should be required before the release of any performance securities.

8.3. Landscaping and Stabilization Requirements

Any area of land from which the natural vegetative cover has been either partially or wholly cleared or removed by development activities should be revegetated within ten (10) days from the substantial completion of such clearing and construction. The following criteria should apply to revegetation efforts:

Reseeding should be done with an annual or perennial cover crop accompanied by placement of straw, wood or paper fiber mulch or equivalent of sufficient coverage to control erosion until such time as the cover crop is established on over ninety percent (90%) of the seeded area.

Replanting with native woody and herbaceous vegetation should be accompanied by placement of straw, wood or paper fiber mulch or equivalent of sufficient coverage to control erosion until the plantings are established and are capable of controlling erosion.

All seed and planting materials should be selected from non-invasive native plant species.

Any area of revegetation should exhibit survival of a minimum of seventy-five percent (75%) of the cover crop throughout the year immediately following revegetation. Revegetation should be repeated in successive years until the minimum seventy-five percent (75%) survival for one (1) year is achieved.

In addition to the above requirements, a landscaping plan must be submitted with the final design describing the vegetative stabilization and management techniques to be used at a site after construction is completed. This plan should explain not only how the site will be stabilized after construction, but who will be responsible for the maintenance of vegetation at the site and what practices will be employed to ensure that adequate vegetative cover is preserved. This plan should be prepared by a registered landscape architect and be approved prior to receiving a permit.

Section 9. Maintenance and Repair of Storm Water Facilities

9.1. Maintenance Easement

Prior to the issuance of any permit that has a storm water management facility as one of the requirements of the permit, the applicant or owner of the site should be required to execute a maintenance easement agreement that is binding on all subsequent owners of land served by the storm water management facility. The agreement should provide for access to the facility at reasonable times for periodic inspection by the (jurisdictional storm water authority), or their contractor or agent, and for regular or special assessments of property owners to ensure that the facility is maintained in proper working condition to meet design standards and any other provisions established by ordinance. The easement agreement should be recorded by the (jurisdictional storm water authority) at the Monterey County Recorder's Office.

9.2. Maintenance Covenants

Maintenance of all storm water management facilities should be ensured through the creation of a formal maintenance covenant approved by the (jurisdictional storm water authority) and recorded at the Monterey County Recorder's Office prior to final plan approval. As part of the covenant, a schedule should be developed for when and how often maintenance will occur to ensure proper function of the storm water management facility. The covenant should also include plans for periodic inspections to ensure proper performance of the facility between scheduled maintenance.

The (jurisdictional storm water authority), in lieu of an maintenance covenant, could accept dedication of any existing or future storm water management facility for maintenance, provided such facility meets all the requirements of this chapter and includes adequate and perpetual access and sufficient area, by easement or otherwise, for inspection and regular maintenance and provisions for financing the required maintenance.

9.3. Requirements for Maintenance Covenants

All storm water management facilities should undergo, at the minimum, an annual inspection to document maintenance and repair needs and ensure compliance with the requirements of the ordinance and accomplishment of its purposes. These needs may include; removal of silt, litter and other debris from all catch basins, inlets and drainage pipes, grass cutting and vegetation removal, and necessary replacement of landscape vegetation. Any maintenance needs found should be addressed in a timely manner, as determined by the (jurisdictional storm water authority), and the inspection and maintenance requirement may be increased as deemed necessary to ensure proper functioning of the storm water management facility.

9.4. Inspection of Storm Water Facilities

Inspection programs may be established on any reasonable basis, including but not limited to: routine inspections; random inspections; inspections based upon complaints or other notice of possible violations; inspection of drainage basins or areas identified as higher than typical sources of sediment or other contaminants or pollutants; inspections of businesses or industries of a type associated with higher than usual discharges of contaminants or pollutants or with discharges of a type which are more likely than the typical discharge to cause violations of state or federal water or sediment quality standards or the NPDES storm water permit; and joint inspections with other agencies inspecting under environmental or safety laws. Inspections could include, but not be limited to: reviewing maintenance and repair records; sampling discharges, surface water, groundwater, and material or water in drainage control facilities; and evaluating the condition of drainage control facilities and other storm water treatment practices.

9.5. Right-of-Entry for Inspection

When any new drainage control facility is installed on private property, or when any new connection is made between private property and a public drainage control system, sanitary sewer or combined sewer, the property owner should be required to grant to the (jurisdictional storm water authority) the right to enter the property at reasonable times and in a reasonable manner for the purpose of inspection. This should include the right to enter a property when there is a reasonable basis to believe that a violation of the ordinance is occurring or has occurred, and to enter when necessary for abatement of a public nuisance or correction of a violation of the ordinance.

9.6. Records of Installation and Maintenance Activities.

Parties responsible for the operation and maintenance of a storm water management facility should make records of the installation and of all maintenance and repairs, and should retain the records for at least 10 years. These records should be made available to the jurisdictional storm water authority during inspection of the facility and at other reasonable times upon request.

9.7 Failure to Maintain Practices

If a responsible party fails or refuses to meet the requirements of the maintenance covenant, the (jurisdictional storm water authority), after reasonable notice, could correct a violation of the design standards or maintenance needs by performing all necessary work to place the facility in proper working condition. In the event that the storm water management facility becomes a danger to public safety or public health, the jurisdictional storm water authority should notify the party responsible for maintenance of the storm water management facility in writing. Upon receipt of that notice, the responsible person could have 30 days to effect maintenance and repair of the facility in an approved manner. After proper notice, the (jurisdictional storm water authority) could assess the owner(s) of the facility for the cost of repair work and any penalties; and the cost of the

work could be a lien on the property, or prorated against the beneficial users of the property, and could be placed on the tax bill and collected as ordinary taxes by the county.

Section 10. Enforcement and Penalties.

10.1. Violations

Any development activity that is commenced or is conducted contrary to this Ordinance could be restrained by injunction or otherwise abated in a manner provided by law.

10.2. Notice of Violation.

When the jurisdictional storm water authority determines that an activity is not being carried out in accordance with the requirements of this Ordinance, it should issue a written notice of violation to the owner of the property. The notice of violation ought to contain:

1. the name and address of the owner or applicant;

2. the address when available or a description of the building, structure or land upon which the violation is occurring;

3. a statement specifying the nature of the violation;

4. a description of the remedial measures necessary to bring the development activity into compliance with this Ordinance and a time schedule for the completion of such remedial action;

5. a statement of the penalty or penalties that could or may be assessed against the person to whom the notice of violation is directed;

6. a statement that the determination of violation could be appealed to the municipality by filing a written notice of appeal within fifteen (15) days of service of notice of violation.

10.3. Stop Work Orders

Persons receiving a notice of violation could be required to halt all construction activities. This "stop work order" could be in effect until the jurisdictional storm water authority confirms that the development activity is in compliance and the violation has been satisfactorily addressed. Failure to address a notice of violation in a timely manner may result in civil, criminal, or monetary penalties in accordance with the enforcement measures authorized in the ordinance.

10.4. Civil and Criminal Penalties

In addition to or as an alternative to any penalty provided herein or by law, any person who violates the provisions of this Ordinance could be punished by a fine of not less than _____Dollars ($_____) or by imprisonment for a period not to exceed _____ days (____days), or both such fine and imprisonment. Such person could be guilty of a separate offense for each day during which the violation occurs or continues.

10.5. Restoration of lands

Any violator could be required to restore land to its undisturbed condition. In the event that restoration is not undertaken within a reasonable time after notice, the jurisdictional storm water authority could take necessary corrective action, the cost of which could become a lien upon the property until paid.

10.6. Holds on Occupation Permits

Occupation permits may not be granted until a correction to all storm water practices have been made and accepted by the (jurisdictional storm water authority).

Approved by: _____

(Signature)

Typed or printed name:_____

Title:_____

Date:_____

Storm Water Management Plan

Checklist and Submittal Requirements

I. Preliminary Report and Concept Plan:

A. Applicant information
   1. Name, legal address, and telephone number
   2. Common address and legal description of site
   3. Vicinity map
   4. Existing and proposed mapping and plans (recommended scale of 1" = 40'), which illustrate at a minimum:
      a. Existing and proposed topography (minimum of 2-foot contours recommended)
      b. Existing off-site storm drainage system
      c. Tributary area
      d. Mapping of predominant soils from USDA soil surveys and other sources
      e. Boundaries of existing predominant vegetation and proposed limits of clearing
      f. Location of existing and proposed roads, buildings, and other structures
      g. Existing and proposed utilities (e.g., water, sewer, gas, electric) and easements
      h. Location of existing and proposed conveyance systems such as grass channels, swales, and storm drains

B. Geotechnical/Geologic Analysis of the percolation capacity of the subsoil:
   1. Recommendation for long-term percolation rates
   2. Recommendations for maintenance requirements

C. Preliminary location, size, and limits of disturbance of proposed structural Storm water management practices

D. Hydrologic and hydraulic analysis including:

1. Existing condition analysis for runoff rates, volumes, and velocities presented showing methodologies used and supporting calculations

2. Proposed condition analysis for runoff rates, volumes, and velocities showing the methodologies used and supporting calculations

3. Preliminary analysis of potential downstream impact/effects of project, where necessary

4. Preliminary selection and rationale for structural storm water management practices

5. Preliminary sizing calculations for structural storm water management practices including, contributing drainage area, storage, and outlet configuration

6. Preliminary landscaping plans for structural storm water management practices and any site reforestation or re-vegetation

7. Preliminary erosion and sediment control plan that at a minimum meets the requirements outlined in local Erosion and Sediment Control guidelines

8. Identification of preliminary waiver requests

II. Final Report – Plans, Specifications, Estimates and Maintenance Program

The Final Report shall include all pertinent information contained in the Preliminary Report; provide a complete analysis of the hydrologic aspects of the proposed plan; contain plans, specifications, and a cost estimate; contain a complete maintenance program including financing; and respond to all requirements of the ordinance.

Generally, it shall contain the following:

A. Location, size, maintenance access, and limits of disturbance of proposed structural storm water management practices.
B. Representative cross-section and profile drawings and details of structural storm water management practices and conveyances (i.e., storm drains, open channels, swales, etc.)
C. Existing and proposed structural elevations (e.g., invert of pipes, manholes, etc.)
D. Design water surface elevations
E. Structural details of outlet structures, embankments, spillways, stilling basins, grade control structures, conveyance channels, etc.
F. Logs of borehole investigations that may have been performed along with supporting geotechnical report
G. Hydrologic and hydraulic analysis for all structural components of storm water system (e.g., storm drains, open channels, swales, management practices, etc.) for applicable design storms
H. Existing condition analysis for time of concentrations, runoff rates, volumes, velocities, and water surface elevations showing methodologies used and supporting calculations
I. Proposed condition analysis for time of concentrations, runoff rates, volumes, velocities, water surface elevations, and routing showing the methodologies used and supporting calculations
J. Final sizing calculations for structural storm water management practices including, contributing drainage area, storage, and outlet configuration
K. Stage-discharge or outlet rating curves and inflow and outflow hydrographs for storage facilities (e.g., storm water ponds and wetlands)
L. Final analysis of potential downstream impact/effects of project, where necessary
M. Final landscaping plans for structural storm water management practices and any site reforestation or re-vegetation
N. Structural calculations, where necessary
O. Applicable construction specifications
P. Erosion and sediment control plan that at a minimum meets the requirements of the local Erosion and Sediment Control Guidelines
Q. Sequence of construction
R. Maintenance plan which will include:

1. Name, address, and phone number of responsible parties for maintenance
2. Description of annual maintenance tasks
3. Description of applicable easements
4. Description of funding source
5. Minimum vegetative cover requirements
6. Access and safety issues
7. Testing and disposal of sediments that will likely be necessary
8. Evidence of acquisition of all applicable local and non-local permits
9. Evidence of acquisition of all necessary legal agreements (e.g., easements, covenants, land trusts)
10. Waiver requests
11. Review agency should have inspector's checklist identifying potential features to be inspected on site visits

Appendix D

Storm Water Design Manual

STORM WATER DESIGN MANUAL

This design manual has been developed to provide design standards and typical designs for storm water infiltration systems in the Fort Ord Reuse Authority (FORA) area. Standards and designs for both infiltration basins and subsurface infiltration systems are included in the Manual. The Manual also includes a list of Best Management Practices (BMP's) to be used by developers within the FORA area.

Storm water infiltration systems shall be designed to both store and infiltrate the 100-year, 24-hour storm from the upstream drainage area. Designers shall consider both the protection of property on the land surface and the protection of underground water quality. To protect groundwater from possible contamination, runoff from designated hot spot land uses shall be treated to remove hydrocarbons, trace metals or toxicants as required. Also, no infiltration facility shall be located within 100 feet of a water supply well.

Designers may use both structural and non-structural methods to reduce the runoff from a redeveloped area. Examples of these methods are grassed surfaces, porous pavements, grass-paved surfaces, and dry wells for roof runoff. Design standards for runoff reducing methods will not be addressed in this Storm water Design Manual. However, designers who can verify the effectiveness of these methods may reduce downstream infiltration systems proportionately.

Part 1. Measurement of Infiltration Rates

Infiltration rates shall be measured in situ according to the standards presented in:

- *Annual Book of ASTM Standards*, 1997. Section 4, Vol. 4.08, Soil and Rock (I): Designation D 3385-94, Standard Test Method for Infiltration Rate of Soils in Field Using a Double-Ring Infiltrometer, pp. 331-337.
- *Annual Book of ASTM Standards*, 1998. Section 4, Vol. 4.09, Soil and Rock (II): Designation D 5093-90, Standard Test Method for Field Measurement and Infiltration Rate Using a Double-Ring Infiltrometer with a Sealed-Inner Ring, pp. 87-92.
- Johnson, A.I., 1963, "A field method for measurement of infiltration," United States Geological Survey, Water-Supply Paper, W 1544-F, p. F1-F27.

Alternative methods other than the referenced standards shall use a double-ring apparatus and be acceptable to the local political jurisdiction. The minimum infiltration testing is one infiltration test per 5000 square feet with a minimum of two tests per facility. All tests shall be made within the proposed limits of the facility at the elevation of the proposed infiltration surface. The design infiltration rate shall be no more than 60 percent of the measured infiltration rate for basins and 40% for subsurface systems.

Part 2. Infiltration Basin Design Standards and Standard Plan

Infiltration basins are to be designed to meet the following criteria.

- The basin area is to be 1000 sq-ft per acre of impermeable surface area. Both the basin bottom and the wetted sloping area of the basin up to the design depth are included in this area.
- The design depth of the basin is to be 4 feet with one foot of additional freeboard.
- The 1000-sq-ft area and 4-foot depth requirements provide a storage capacity of 4000 cu-ft per acre of impermeable surface area.
- Basin slopes shall be 3 horizontal to 1 vertical or flatter.
- The depth of excavation shall be a minimum of 5 feet below natural grade.
- The design criterion is based on a design infiltration rate of 12 in/hr. If the design infiltration rate is less than 12 in/hr, the basin area shall be increased proportionately.
- If the basin area is increased because the infiltration rate is less than 6 in/hr, the storage capacity shall continue to be 4000 cu-ft per acre of impermeable surface area.
- All infiltration basins shall be designed to be fully dewatered within 48 hours of the storm event.

Infiltration basins shall be installed in accordance with the Infiltration Basin Detail (Standard Plan) illustrated in Figure D-1. Construction activities shall leave the basin surface un-compacted, and upon completion, the basin surface shall have the same infiltration rate as the undisturbed soil. Before acceptance of the finished basin, all silt and foreign material shall be removed from the basin bottom.

Pretreatment of storm water before it enters an infiltration basin is desirable. The minimum recommended treatment is a stilling basin to allow the larger suspended particles to settle. Flow through a grass filter strip to allow additional settling of suspended solids is also recommended. If a grass filter strip is utilized, it must be equipped with a sprinkler irrigation system to maintain the grass during the dry season. The length of operating time before an infiltration basin must be cleaned is inversely proportional to the amount of suspended solids removed from the storm runoff through pretreatment.

Part 3. Subsurface Infiltration System Designs and Standard Plans

Subsurface infiltration systems may be either of the infiltration chamber type or the infiltration pipe type. Infiltration chambers are designed with a large open bottom area and provide a large storage volume below the ground surface. Infiltration pipes are made of large diameter perforated pipe that requires a large trench bottom area and provides a large storage volume. Because of the large volume of storage required, subsurface infiltration systems consisting of trenches or boreholes filled with gravel or crushed rock are not recommended.

Subsurface infiltration systems are to be designed with the same infiltration area, storage volume and infiltration rate as the infiltration basins. The infiltration area of infiltration chambers is to be the bottom area of the chamber, and the infiltration area for infiltration pipes is to be the bottom of area of the excavated trench. To meet the storage requirement, each acre of impervious area will require 4000 cu-ft (29,900 gal) of storage capacity. This storage volume is equivalent to an

infiltration basin area of 1000 square feet covered to a depth of 4 feet. Storage capacity may be provided upstream of a subsurface infiltration system to reduce the storage capacity required by infiltration chambers or pipes. Infiltration rates shall be measured in the same manner as for infiltration basins. Subsurface infiltration systems are to be suitable for use under either a native soil surface cover or an impervious surface cover. The systems shall have load ratings of H-20 under traffic areas and H-10 under non-traffic areas.

Infiltration chambers shall be installed in accordance with the Infiltration Chamber Detail (Standard Plan) illustrated in Figure D-2. Both concrete and high-density polyethylene (HDPE) are acceptable materials for the chambers. Infiltration chambers can be installed in any desired length, and multiple rows of chambers can be connected together with manifolds.

Infiltration pipes shall be installed in accordance with the Infiltration Pipe Detail (Standard Plan) illustrated in Figure D-3. To meet the storage requirement of 4000 cu-ft per acre of impervious surface only large-diameter perforated pipe is recommended for the infiltration pipes. The storage capacity of the surrounding crushed rock filter is not to be used to satisfy the storage requirement.

Since maintenance of a subsurface infiltration area is not feasible, a pretreatment device must be installed upstream of all subsurface systems. This device is to remove floating and suspended materials that are likely to seal the infiltration surface or to contaminate groundwater. The minimum treatment shall be an oil-sediment separator to remove floating oil and settleable sediment. In addition, filtration to remove silt-size and finer particles is highly recommended. These pretreatment devices should be compact systems that are suitable for underground operation and maintenance. Pretreatment devices must be maintained to continually provide the capacity to remove floating and suspended sediment.

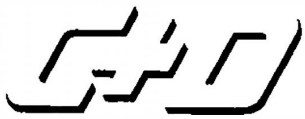
Part 4. Best Management Practices

Best Management Practices (BMP's) are practices designed to reduce the discharge of pollutants from municipal separate storm sewer systems (MS4s). The BMP's were developed by the EPA office of Wastewater Management to provide guidelines for developing and implementing storm water management programs. They are designed to reduce both the volume of storm runoff and the concentration of pollutants in the runoff.

BMP's are based on the National Pollution Discharge Elimination System (NPDES) Phase II's six minimum control measures. The six measures are:

1. Public education and outreach on storm water impact projects.
2. Public involvement/participation.
3. Illicit discharge detection and elimination.
4. Construction site storm water runoff control.
5. Post-construction storm water management in new development and redevelopment.
6. Pollution prevention/good housekeeping for municipal operations.

The main emphasis for both new development and redevelopment will be on control of storm water runoff from construction sites and post-construction storm water management.



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