# Duxbury Reef Area of Special Biological Significance (ASBS) Final Compliance Plan

*Submitted in Compliance with State Water Resources Control Board Resolution No. 2012-0031 (Ocean Plan Special Protections for ASBS)*

**Prepared for:**
County of Marin
P.O. Box 4186
San Rafael, CA 94913-486

**Prepared by:**
County of Marin Staff
and

EOA, Inc.
1410 Jackson St.
Oakland, CA 94612

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# EXECUTIVE SUMMARY

In 1972, the California State Water Resources Control Board (State Water Board) adopted the California Ocean Plan (Ocean Plan) as the State's water quality control plan for ocean waters. It has since been reviewed every three years and updated as necessary. The Ocean Plan provides the basis for regulation of waste discharges to ocean waters and applies to both point and nonpoint source discharges. It identifies Beneficial Uses of California's ocean waters, establishes Water Quality Objectives (WQOs), and sets forth a program of implementation. The Ocean Plan prohibits waste discharges, including storm water runoff, to Areas of Special Biological Significance (ASBS). This absolute waste discharge prohibition applies unless an "exception" is granted.

On March 20, 2012, the State Water Board adopted a General Exception to the Ocean Plan waste discharge prohibition to ASBS. The General Exception (State Water Board Resolution No. 2012-0012, as amended by 2012-0031) governs point and nonpoint source waste discharges to ASBS, including storm water runoff. It includes Special Protections for Beneficial Uses of ASBS and requires development of ASBS Compliance Plans by permitted point source dischargers or ASBS Pollution Prevention Plans by non-point source dischargers. Twenty-seven applicants, including the County of Marin (County) for the Duxbury Reef ASBS, were granted coverage under the General Exception. The Special Protections requirements were incorporated into the 2013 Statewide Phase II Small MS4 General Permit (Order No. 2013-0001-DWQ) as Attachment C which provides the regulatory mechanism to enforce the Special Protections. This Duxbury Reef ASBS Compliance Plan describes how the County will comply with the Special Protections. It addresses the portion of the Duxbury Reef ASBS watershed that is under County jurisdiction and is subject to the National Pollutant Discharge Elimination System (NPDES) General Permit and Waste Discharge Requirements for Storm Water Discharges from MS4s (Order No. 2013-0001-DWQ; Phase II permit).

The Duxbury Reef ASBS is located on the southern tip of the Point Reyes peninsula near the unincorporated community of Bolinas in Marin County, California. Duxbury Reef is the largest shale reef in California and an extensive system of rocky intertidal and subtidal habitat. The watershed draining to the ASBS covers approximately 5 square miles (3,090 acres), and the ASBS includes 3.8 miles of coastline. The largely rural watershed has just over 2 percent impervious area and is dominated by open-space land to the north and a rural residential area in the south. The County's jurisdictional area is dominated by the Bolinas Mesa rural residential community which is situated on a relatively flat terrace with steep coastal bluffs that are vulnerable to episodic bluff erosion. The area which is roughly 15-percent impervious is drained by a network of vegetated roadside ditches that discharge directly to the ASBS or to the ASBS via Alder Creek and its tributaries. The State Water Board identified 52 natural and anthropogenic drainages to Duxbury Reef ASBS, including five active drainages for which the County is fully or partially responsible.

Storm water runoff and non-storm water discharges from the County's jurisdictional area are regulated under the Phase II permit. The Phase II permit prohibits most non-storm water discharges and specifies actions necessary to reduce the discharge of pollutants in storm water to the Maximum Extent Practicable. With the assistance and guidance of the Marin County Stormwater Pollution Prevention Program (MCSTOPPP), the County is implementing the Phase II permit requirements. Non-structural Best Management Practices (BMPs) required by the Phase II permit include public education and outreach, inspections of businesses and construction sites, construction site stormwater pollution prevention, spill response, investigation of illicit discharges, and associated reporting to the Regional Water Board. Structural BMPs include post-construction storm water management for development

consisting of site design measures, source control measures, LID design standards, and hydromodification management measures.

The Ocean Plan Special Protections requirements were integrated into the 2013 Phase II permit in Attachment C. There are a number of areas where existing stormwater program activities were modified for implementation in the ASBS watershed. An inspection program has been adopted by the County to comply with requirements in the Special Protections to inspect storm drain outlet pipes to the ASBS and to conduct more frequent inspections of industrial, commercial, and construction sites. In addition, the County is conducting public outreach that targets residences in the ASBS watershed. Using SWRCB grant funds in the summer and fall of 2013, the County retrofitted the parking area of the Agate Beach County Park) with pervious pavement and integrated storm water retention and infiltration structures. A report for the SWRCB (SCCWRP 2003) identified the Agate Beach parking lot as the upstream source for the County's largest ASBS discharge (DUX009). The installation of structural BMPs at this location has been shown to be effective at addressing this source. Pre- and post-construction water quality monitoring of the parking lot project demonstrated a nearly 60% reduction in runoff volume as well as reductions in the concentrations of sediment, oil and grease and some trace metals resulting from the parking lot BMPs (Schiff and Brown, 2015; Voeller and Carson, 2015).

The ASBS Special Protections contain monitoring requirements for identified discharges to an ASBS. These mandatory requirements include the Core Discharge Monitoring Program and the Ocean Receiving Water and Reference Area Monitoring Program which together are meant to characterize the discharge and its impact on the ASBS receiving waters. In order to meet the monitoring requirements, the County joined the Central Coast ASBS Regional Monitoring Program (CCRMP). The initial two-year monitoring program commenced with discharge and receiving water sampling during three 2013-2014 wet season storm events (analysis results are pending), and continued during 2014-2015 wet season. Limited storm events required postponing the completion of characterization monitoring until the 2015-16 wet season. The final report from the CCRMP ASBS monitoring is available (AMS 2016).

Based on analysis of pre-storm sample results from the receiving waters, there appear to be pollutant sources outside of local stormwater discharges that are impacting the ocean water quality at Duxbury Reef. Pollutant sources could include geology, atmospheric deposition, discharges to the ASBS from lands not under County jurisdiction, or more likely from large regional sources such as San Francisco Bay or ocean waters outside of the ASBS. In this case, structural and non-structural BMPs implemented on land in the ASBS watershed may not necessarily lead to compliance with "natural water quality" in ocean receiving waters. However, the County will continue to maintain the structural and non-structural BMPs detailed in this plan in order to improve discharge water quality maximum extent practicable and comply with the Special Protections.

The County will implement all Special Protections requirements consistent with the schedule set forth in the State Water Board Resolution or modifications to it approved by the SWRCB staff. Compliance measures will be reported in the County's Phase II permit annual report.

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# LIST OF ABBREVIATIONS

| | |
|---|---|
| ASBS | Area(s) of Special Biological Significance |
| BCPUD | Bolinas Community Public Utility District |
| BMP | Best Management Practice |
| CCRMP | Central Coast Regional Monitoring Program |
| CDA | Community Development Agency |
| CEQA | California Environmental Quality Act |
| CPA | Compliance Plan Area |
| CWA | Clean Water Act |
| DPW | Department of Public Works |
| EHS | Environmental Health Services |
| EIR | Environmental Impact Report |
| ICWMP | Integrated Coastal Watershed Management Plan |
| IDDE | Illicit Discharge Detection and Elimination |
| IP | Implementation Program |
| LCP | Local Coastal Program |
| LID | Low Impact Development |
| LUP | Land Use Plan |
| MCSTOPPP | Marin County Stormwater Pollution Prevention Program |
| MRP | Municipal Regional Permit |
| MS4 | Municipal Separate Storm Sewer System |
| MSMVCD | Marin/Sonoma Mosquito and Vector Control District |
| NPDES | National Pollution Discharge Elimination System |
| OWOW | Our Water – Our World |
| PAH | Polynuclear Aromatic Hydrocarbons |
| QAPP | Quality Assurance Project Plan |
| RCD | Resource Conservation District |
| SCCWRP | Southern California Coastal Water Research Project |
| SWPPP | Storm Water Pollution Prevention Plan |
| SWQPA | State Water Quality Protection Area |
| TBWC | Tomales Bay Watershed Council |
| TMDL | Total Maximum Daily Load |
| USAF | United States Air Force |
| USEPA | United States Environmental Protection Agency |
| WQO | Water Quality Objective |

# 1.0 INTRODUCTION

On March 20, 2012, the California State Water Resources Control Board (State Water Board) adopted a General Exception to the California Ocean Plan waste discharge prohibition to Areas of Special Biological Significance (ASBS). The General Exception (State Water Board Resolution No. 2012-0012, as amended by 2012-0031) governs point and nonpoint source waste discharges to ASBS, including storm water runoff. It includes Special Protections for Beneficial Uses of ASBS and requires development of ASBS Compliance Plans by permitted point source dischargers or ASBS Pollution Prevention Plans by non-point source dischargers. Twenty-seven applicants, including the County of Marin (County) for the Duxbury Reef ASBS, were granted coverage under the General Exception. This ASBS Compliance Plan describes how the County, a National Pollutant Discharge Elimination System (NPDES) program permitted point source discharger, will comply with the Special Protections.

Core Discharge and the Ocean Receiving Water and Reference Area Monitoring Programs characterized the discharge, receiving waters and establishing the natural water quality reference conditions during the2013-14, 2014-15 and 2015-16 winter seasons.

The content and organization of this ASBS Compliance Plan follow the requirements described in Provision I.A.2 of Attachment B (Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges) to the General Exception Resolution. Following this introduction, Section 2 provides a regulatory background and describes fundamental provisions of the Special Protections. Section 3 describes the Duxbury Reef ASBS watershed. Section 4 describes the existing regulatory programs address water quality in the ASBS. Section 5 describes the structural and non-structural Best Management Practices (BMPs) currently employed or planned in the future. Section 6 summarizes the County's ASBS monitoring program. Section 7 includes the compliance and implementation schedule. References used in the development of this ASBS Compliance Plan are cited in Section 8.

# 2.0 ASBS REGULATORY BACKGROUND

In 1972, the State Water Board adopted the California Ocean Plan (Ocean Plan) as the State's water quality control plan for ocean waters. The Ocean Plan provides the basis for regulation of waste discharges to coastal waters and applies to both point and nonpoint sources discharges. It is implemented by the State Water Board and the six coastal Regional Water Quality Control Boards (Regional Water Boards). In Marin County, the San Francisco Bay Regional Water Board is the lead agency for Ocean Plan implementation.

The Ocean Plan identifies Beneficial Uses of California's ocean waters, establishes narrative and numerical Water Quality Objectives (WQOs) protective of those Beneficial Uses, identifies areas where discharges are prohibited, and sets forth a program of implementation to ensure that WQOs are achieved and Beneficial Uses are protected. The California Water Code requires review of the Ocean Plan at least every three years to ensure that current standards are adequate and continue to protect indigenous marine species and human health. The current 2012 Ocean Plan was adopted by the State Water Board with Resolution No. 2012-0056 and is in effect as of August 19, 2013.

Shortly after adoption of the 1972 Ocean Plan, the State Water Board designated 34 ASBS, comprising approximately one-third of the State's coastline, including the Duxbury Reef ASBS. ASBS support an unusual variety of aquatic life, and often host unique individual species. They are considered the basic building blocks for a sustainable, resilient coastal environment and economy. Since 1983 the Ocean Plan has prohibited waste discharges to ASBS and states that "discharges shall be located a sufficient distance from such designated areas to assure maintenance of natural water quality conditions in these areas." This absolute waste discharge prohibition applies unless an "exception" is granted.

As of January 2005, ASBS areas were re-designated as a subset of "State Water Quality Protection Areas" (SWQPAs) that require special protection. Section 36700(f) of the Public Resources Code defines a state water quality protection area as "a non-terrestrial marine or estuarine area designated to protect marine species or biological communities from an undesirable alteration of natural water quality, including but not limited to, areas of special biological significance that have been designated by the State Water Board through its water quality control planning process." The section further states that "In a state water quality protection area, point source waste and thermal discharges shall be prohibited or limited by special conditions. Nonpoint source pollution shall be controlled to the extent practicable."

Recognizing that point and nonpoint source discharges into ASBS are occurring, despite the Ocean Plan prohibition, the State Water Board contracted with the Southern California Coastal Water Research Project (SCCWRP) to survey by foot or boat all discharges into ASBS in California. SCCWRP (2003) identified 1,658 discharges into ASBS statewide, many of which are storm water outfalls permitted under the NPDES program through Municipal Separate Storm Sewer System (MS4) permits to local governments (State Water Board 2012).

On October 18, 2004, following the SCCWRP study, the State Water Board notified the County that they must cease storm water and non-storm water waste discharges into the Duxbury Reef ASBS, or apply for an exception to the Ocean Plan. The County was one of 27 applicants requesting an exception to discharge to various ASBS throughout California. The exception was approved by the State Water Board as part of a General Exception in Resolution No. 2012-0012 titled, "Approving Exceptions to the California Ocean Plan for Selected Discharges into Areas of Special Biological Significance, Including Special Protections for Beneficial Uses, and Certifying a Program Environmental Impact Report." The

exception is a special permission, granted by the State Water Board, to discharge into the ASBS. It is not a discharge permit and only applies to point and nonpoint source discharges (e.g., stormwater runoff, which can be either a point or nonpoint discharge) provided they are covered under an appropriate authorization, such as an NPDES permit. Stringent Special Protections were adopted by the State Water Board as conditions for the Ocean Plan Exception. State Water Board Resolution No. 2012-0031 revised the deadline for compliance with natural ocean water quality from four years to six years. Potential environmental effects of the General Exception and Special Protections were evaluated in an Environmental Impact Report in accordance with the requirements of the California Environmental Quality Act (CEQA) (State Water Board 2012).

## 2.1. Special Protections

This ASBS Compliance Plan describes how the County, a point source (storm drain system) discharger permitted under the NPDES program, will comply with the Special Protections.

### 2.1.1. Permitted Point Source Storm Water Discharges

Permitted point source storm water discharges into an ASBS are only allowed under the conditions set forth in Provision I.A.1.a of the Special Protections, which include:

(1) The discharges are authorized by an NPDES permit issued by the State Water Board or Regional Water Board;
(2) The discharges comply with all of the applicable terms, prohibitions, and special conditions contained in the Special Protections; and
(3) The discharges:
    (i) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;
    (ii) Are designed to prevent soil erosion;
    (iii) Are composed of only storm water runoff.

In addition, discharges composed of storm water runoff shall not alter natural ocean water quality in an ASBS, the discharge of trash is prohibited and only discharges from existing storm water outfalls are allowed.

### 2.1.2. Permitted Point Source Non-Storm Water Discharges

Non-storm water discharges into an ASBS are prohibited except as provided in the Special Protections. ”Non-storm water discharges” are defined in two ways in the Special Protections. The first definition is as “any waste discharges from an MS4 or other NPDES permitted storm drain system to an ASBS that are not composed entirely of storm water” (p.2), and the second definition is as “Any runoff that is not the result of a precipitation event. This type of runoff is often referred to as ‘dry weather flow’” (p.20).

Several types of non-storm water discharges are allowed under Provision I.A.1.e.(2) of the Special Protections, “provided that the discharges are essential for emergency response purposes, structural stability, slope stability or occur naturally.” These include:

(a) Discharges associated with emergency firefighting operations.
(b) Foundation and footing drains.
(c) Water from crawl space or basement pumps.
(d) Hillside dewatering.
(e) Naturally occurring groundwater seepage via a storm drain.

(f) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

In addition, an NPDES permitting authority (i.e., State or Regional Water Board) "may authorize non-storm water discharges to an MS4 with a direct discharge to an ASBS only to the extent the NPDES permitting authority finds that the discharge does not alter natural ocean water quality in the ASBS." Special Protections Provision I.A.1.e.(3) states that "authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in the Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS."

## 2.2. Water Quality Objectives

Chapter II of the Ocean plan sets forth narrative and numeric limits or levels of water quality characteristics for ocean waters to protect Beneficial Uses, and includes bacterial (for water contact recreation and shellfish harvesting), physical, chemical, and biological standards. Provision II.A.3 of the Ocean Plan states that "compliance with the water quality objectives of this chapter shall be determined from samples collected at stations representative of the area within the waste field where initial dilution is completed." For surface discharges, such as the Duxbury Reef ASBS discharges, initial dilution is "considered to be completed when the momentum induced velocity of the discharge ceases to produce significant mixing of the waste, or the diluting plume reaches a fixed distance from the discharge to be specified by the Regional Board, whichever results in the lower estimate for initial dilution."

### 2.2.1. Natural Water Quality Definition

In response to regulatory concerns about ASBS, the State Water Board empanelled eight experts from different scientific disciplines to develop a functional definition of "natural water quality."

The Natural Water Quality Committee (NWQC) recognized that natural ocean water would be expected to vary noticeably from place to place and from time to time, and that there are naturally occurring large-scale ocean cycles that dramatically influence water quality characteristics over longer time frames, that the oceans are no longer free from man-made constituents with trace contaminants being measureable world-wide and that truly natural water quality probably does not now exist in California's coastal ocean. Consequently, it considered that defining natural water quality with specified constituent concentrations was impractical, and recommended comparisons of ASBS water quality to water quality measured at reference sites (i.e., in the ocean at the mouths of streams whose watersheds were >90% undeveloped land) in order to gauge whether stormwater discharges cause "alteration of natural water quality." The Natural Water Quality Committee set up criteria that could be used to evaluate reference sites and to define *operational natural water quality* at the reference sites. The criteria included the following (SCCWRP 2010):

- Sites should be in the surf zone at the mouth of a freshwater input (watershed).
- The upstream watershed should have no more than 5% development based on National Landcover Database (the development threshold was 10% in Southern California sites).
- Samples should have no detections of strictly anthropogenic pollutants (e.g. pesticides, DDT, PCBs, etc.).

Reference area receiving waters must not hinder the ability of marine life to respond to natural cycles and processes (i.e. no observed toxicity). Moreover, the Committee established a statistical indicator of natural water quality based on the concentrations of pollutants within the entire population of reference sites. The Committee recommended that ocean concentrations of a pollutant at a stormwater

discharge in an ASBS would be considered to have altered natural water if it exceeded the 85th percentile of measurements of that pollutant in all reference site samples.

It was noted by the NWQC that "Although 'maintenance of natural water quality conditions' in ASBS would be desirable, such a goal may not always be realistic. Considering the definition of 'natural water quality', and considering the nature, extent, and magnitude of anthropogenic influences on California coastal waters (and their ecosystems) and on the watersheds and stream systems that drain to the coast, it seems unlikely that 'natural water quality conditions' (or, for that matter, natural biological conditions) are or can be consistently achieved and maintained in all ASBS at all times"(SCCWRP 2010).

Observed differences in reference area water quality data show that there are significant regional and sub-regional differences in natural water quality between and among areas in north, central and southern California (AMS 2016; Schiff et al, 2015). Duxbury Reef lies between the northern and central reference areas (60 –miles south of the southern-most North Region site, and 40-miles north of the northern-most Central Region site), and will be compared to the most appropriate "natural water quality" definition. The influence of San Francisco Bay on near shore ocean conditions in the region will be considered as monitoring results are compared to natural water quality. In their 2010 report, the NWQC anticipated situations like this noting that "One concern related to the management and regulation of a specific ASBS is that the conditions of the ambient receiving waters may be influenced as much, or more, by discharges outside of the ASBS. These external ASBS discharges, if large enough, may overwhelm discharges inside the ASBS" (SCCWRP 2010).

As an example: Analysis of monitoring data from Duxbury Reef demonstrate several events where pre-storm receiving water monitoring samples were elevated for several constituents relative to an 85th percentile reference area value calculated from all reference areas in the Central Coast ASBS Regional Monitoring Program (CCRMP). The finding that it is possible that "natural water quality" may not be met even prior to any stormwater runoff from the upstream watershed suggests significant influence of sources outside of the ASBS watershed's stormwater conveyance system.

A full analysis of the two-year characterization dataset demonstrates significant differences in reference area water quality between sites. This is most evident with respect to trace metals with northern reference areas having much higher trace metal concentrations than those in the southern part of the Central Coast monitoring program area (AMS 2016). Because the observed differences appear to reflect real geographic differences in background levels of some constituents in "natural" receiving waters, the 85th percentile "natural water quality" definition will vary on a sub-regional scale. Therefore, receiving water quality at Duxbury Reef will be compared to the 85th percentile calculated from the two most proximate reference areas monitored by the program. These issues will also be pursued in discussions with both State and Regional Waterboard staff.

## 2.3. Compliance Plan

The Special Protections require development of a Compliance Plan that describes the measures by which the Special Protections will be achieved. The County's incorporated municipalities and unincorporated areas within the NPDES permit boundary, including a portion of unincorporated Bolinas draining to the Duxbury Reef ASBS, are covered under the State of California's NPDES General Permit and Waste Discharge Requirements for Storm Water Discharges from MS4s (Order No. 2013-0001-DWQ; Phase II permit). This ASBS Compliance Plan addresses the portion of the Duxbury Reef ASBS watershed that is under County jurisdiction and is subject to the Phase II permit.

The Draft ASBS Compliance Plan was submitted on September 19, 2014, per the time adjustment granted by the State Water Board on August 14, 2013, and was subject to approval by the Executive Officer of the State Water Board. The Final ASBS Compliance Plan was submitted prior to September 20, 2015, one year after submittal of the Draft ASBS Compliance Plan. This revised Final ASBS Compliance Plan incorporates our understanding of monitoring results and natural water quality relative to Duxbury Reef ASBS. Implementation of the ASBS Compliance Plan will continue to be reported in the County's Phase II permit annual reports.

If a County identified discharge were causing or contributing to an alteration of natural ocean water quality in the ASBS, it may be necessary to revise the ASBS Compliance Plan. A process for evaluating potential alterations to natural water quality in the ASBS and their potential causes was developed by the Central Coast ASBS Regional Monitoring Program (AMS 2016). However, establishing a link between anthropogenic sources in storm water discharge and water quality in the ASBS receiving water is challenging for a number of reasons, including the high variability in stormwater monitoring results and the multitude of factors that may impact water quality in the ASBS receiving water such as geology, atmospheric deposition, discharges to the ASBS from lands not under County jurisdiction, the influence of water from San Francisco Bay or other ocean waters outside of the ASBS.

In any case, if additional structural BMP's are implemented, or if changes to the stormwater conveyance facilities are made, this compliance plan and the associated maps will be updated and submitted to the Regional and State Waterboards.

# 3.0 DUXBURY REEF ASBS DESCRIPTION

The Duxbury Reef ASBS is located on the southern tip of the Point Reyes peninsula near the community of Bolinas in Marin County, California. The ASBS area extends south from the mouth of Arroyo Hondo Creek to the southern extent of a wave-cut bedrock bench which creates the reef. The watershed draining to the ASBS covers approximately 5 square miles (3,090 acres), and the ASBS includes 3.8 miles of coastline (Figure 3.1). The County has jurisdiction, and is covered by the Phase II permit, on most of the Bolinas Mesa, at the southern end of the ASBS watershed area. Figure 3.1 maps the County MS4 permit boundary which is the area addressed by this ASBS Compliance Plan. This area is hereinafter referred to as the Compliance Plan Area, or CPA and represents roughly 377 acres, or just over 12% of the area draining to the Duxbury Reef ASBS.

The ASBS watershed includes Alder Creek, Mesa Creek (also known as Jack's Creek), Arroyo Hondo, and numerous intermittent streams. Both Alder and Mesa Creeks drain a portion of the Bolinas Mesa. Arroyo Hondo drains areas of the Point Reyes National Seashore and discharges to the north extent of the ASBS. The ASBS shoreline is split in ownership between the National Park Service (Arroyo Hondo South to Poplar Road) and private and state lands on the Bolinas Mesa. The Duxbury Reef State Marine Conservation Area and Extension is managed by the California Department of Fish and Game, and extends offshore for a distance of 1,000 feet.

Duxbury Reef is the largest shale reef in California (State Water Board 1979). Depths are primarily shallow, approximately 30 feet at 0.5 miles from shore, and 60 feet at 1 mile from shore. A narrow beach at the base of the cliffs provides limited sandy subtidal habitat mixed with large smoothed boulders. The cliffs are unstable and also subject to wind and wave erosion. Duxbury Reef contains an extensive system of rocky intertidal and subtidal habitat. At lower tides, extensive tide pools lined with seaweed and beds of mussels and a wide variety of invertebrates are exposed (Pawley 2007). The 1979 Reconnaissance Survey Report for the Duxbury Reef Reserve and Extension (State Water Board 1979) incorporated habitat and species data collected along the reef which included subtidal and intertidal marine invertebrates, marine plants and marine fish species. The reef contains a variety of habitats and marine species, including a rich intertidal biota such as sea slugs, clams and worms, a rare burrowing anemone and unique acorn worm (Fall Creek Engineering and Strelow Consulting 2007).

Fifty-two drainages were identified in the 2003 SCCWRP survey of the Duxbury Reef ASBS. Thirty-seven of these were listed as outlets (i.e., streams) and springs/seeps. The remaining drainages included 10 identified discharges and five unknowns. These five unknown drainages appear to have been supply lines for homes lost in previous landslides and are no longer active. One of the identified discharges, DUX009, is actually a conduit conveying Waters of the United States from an unnamed stream on the Bolinas Mesa to Agate Beach adjacent the Alder Creek outlet. State Water Board staff considers this a medium priority ASBS, due to the drainage from homes, roads, the Agate Beach parking lot, and other areas.

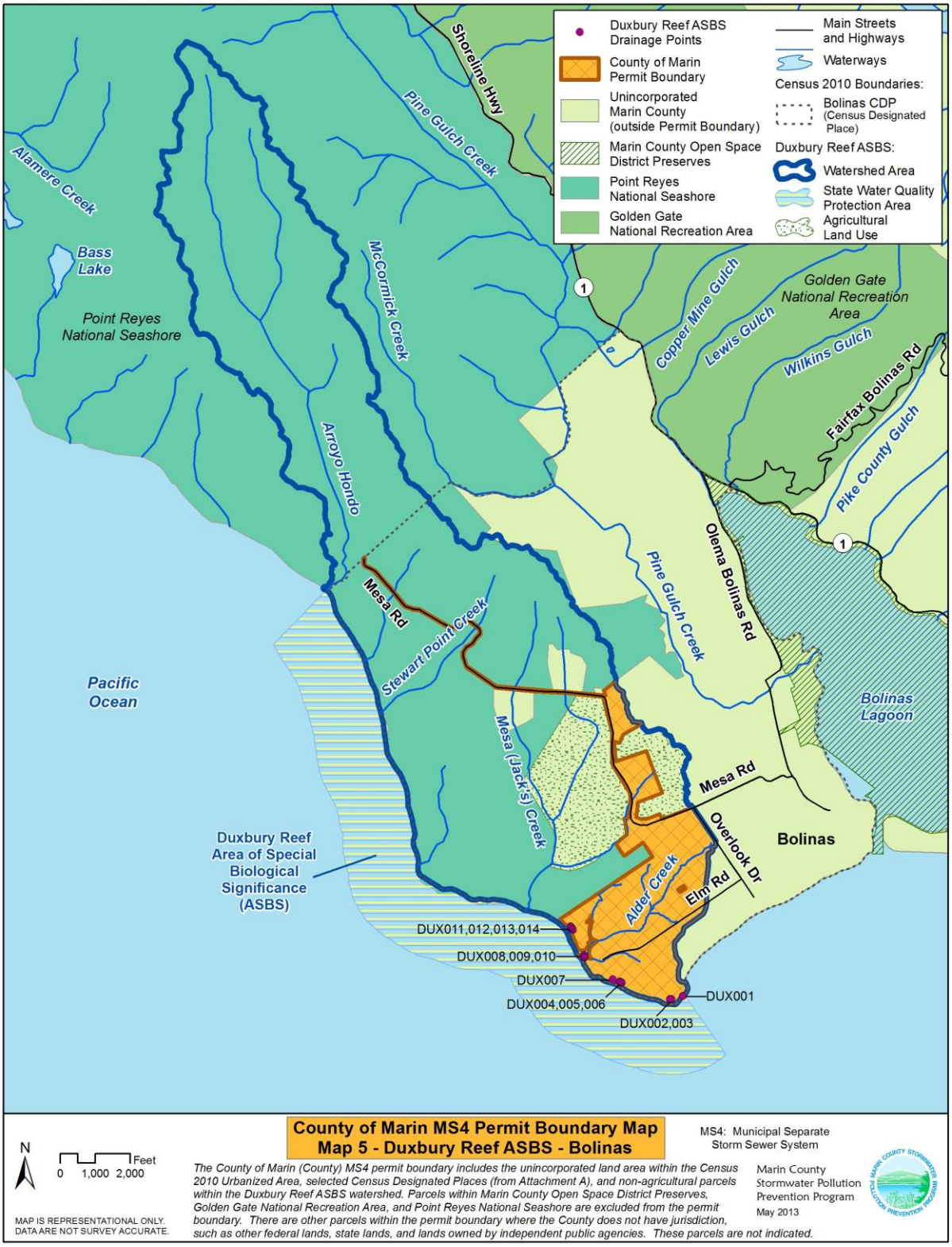


**Figure 3.1.** Duxbury Reef ASBS Watershed, showing CPA (County of Marin MS4 permit boundary)

## 3.1. Land Use and Drainage

The northern half of the ASBS watershed is less populated than the rest, having only two permanent residences. One residence is a six-person Coast Guard Station and the other is a cancer hospice (Commonweal Hospice). There are also a few trails leading to an expansive beach in this area, and the access road has very limited automobile traffic. These areas are outside of the CPA.

The southern half of the watershed includes the CPA, which is mainly comprised of rural residential areas on the Bolinas Mesa. This area is under the County's jurisdiction and storm water runoff discharges are regulated under the Phase II MS4 permit. The MS4 discharges primarily to Alder Creek and its southern tributary. With approximately 250 homes, the majority of the land use on Bolinas Mesa is rural residential; however, there are several horticultural operations (commercial gardens, primarily), a variety of commercial sole proprietorships (a dentist office, physicians' offices, photographer, various consultants, etc.) and certain ranching/livestock/horse boarding operations. Due to the rural nature of the area, some Bolinas Mesa residents have chickens, goats, horses and/or other livestock on their property. Homes on the Bolinas Mesa are served by on-site wastewater treatment systems.

In 2007, desktop and field research was conducted in order to better characterize the Duxbury Reef ASBS watershed (Fall Creek Engineering and Strelow Consulting 2007). The report includes a description of land uses, potential storm water pollution issues, and project recommendations within the watershed. Table 3.1 presents land use information compiled for the report. These land uses are mapped in Figure 3.2. A relatively low percentage of land uses in the overall 3,090-acre ASBS watershed are identified as commercial and residential and the area within the CPA is dominated by residential land uses.

**Table 3.1.** Duxbury Reef ASBS Watershed Land Uses.

| Duxbury Land Use | Area (square feet) | Area (acres) | % of Land Area |
|---|---|---|---|
| Natural Zone | 65,087,603 | 1,492 | 48.4 % |
| Grazeland | 33,781,516 | 776 | 25.1 % |
| Single Family Residential | 10,721,833 | 246 | 8.0 % |
| Transportation | 5,091,645 | 117 | 3.8 % |
| Agriculture | 3,981,849 | 91.4 | 3.0 % |
| Coast Guard | 3,817,176 | 87.6 | 2.8 % |
| Commonweal Hospice | 3,240,393 | 74.4 | 2.4 % |
| Former Grazeland | 2,945,692 | 67.6 | 2.2 % |
| BCPUD | 2,493,361 | 57.2 | 1.9 % |
| Publicly Owned Non-taxable | 1,801,563 | 41.4 | 1.3 % |
| Vacant | 885,239 | 20.3 | 0.7 % |
| Equestrian | 577,309 | 15.5 | 0.5 % |
| Privately Owned Non-taxable | 28,001 | 0.6 | 0.02 % |
| **TOTAL** | **134,554,265** | **3,089** | **100 %** |

Notes: BCPUD = Bolinas Community Public Utility District
Source: Fall Creek Engineering and Strelow Consulting 2007

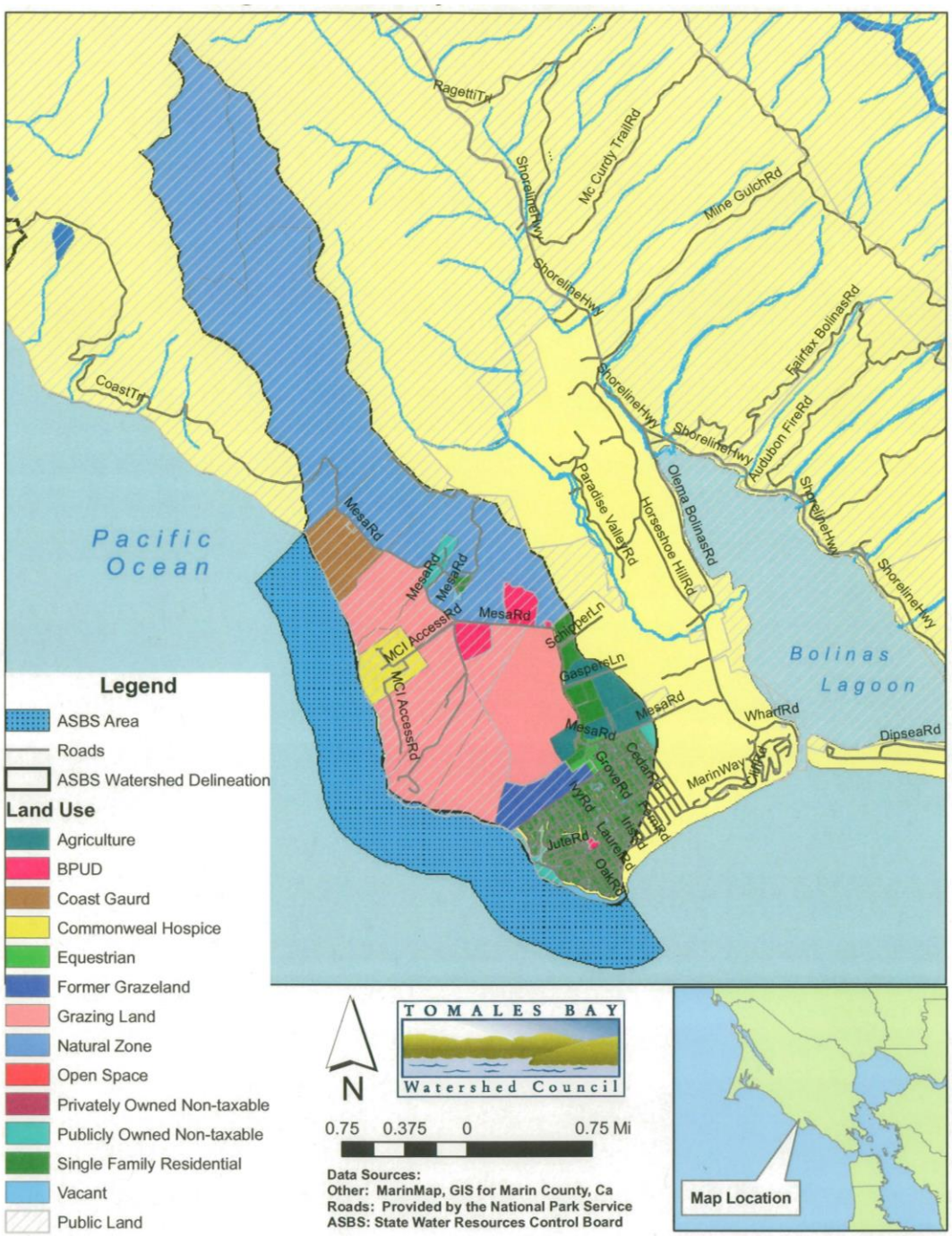


**Figure 3.2.** Duxbury Reef ASBS Land Use (Source: Fall Creek Engineering and Strelow Consulting 2007)

An estimated 77% of the roads within the 275-acre Alder Creek watershed are unpaved and are not maintained by the County. The remaining 23% of roads are County maintained and paved. There are approximately 72 residential blocks located within the Alder Creek watershed with an estimated average of 35,000 square feet of impervious surface per block. Dirt roads were considered semi-permeable surface (20%) for the purposes of this analysis. The estimated impervious surface area within the Alder Creek watershed is 1,848,000 square feet, or 42 acres. Therefore, an estimated 15.4% of the Alder Creek watershed area is impervious surface (Fall Creek Engineering and Strelow Consulting 2007).

The Bolinas Community Public Utility District (BCPUD) provides water service to the town of Bolinas from the Arroyo Hondo watershed. Due to the existing water service moratorium in place by BCPUD, as well as County land use restrictions, no future development or growth is anticipated in the area outside of National Park Service ownership.

Stormwater runoff from Bolinas Mesa flows overland or through groundwater seepage within a system of vegetated ditches and road-crossing culverts to the major drainages or directly to the ocean (Figure 3.4). The largest Bolinas Mesa drainage network includes Alder Creek and several tributary drainages to the north and south. Alder Creek flows from east to west, through the rural residential neighborhoods on the Bolinas Mesa before emptying onto Agate Beach. Adjacent to where Alder Creek empties onto the beach, an unnamed seasonal stream flows through a culvert and joins Alder Creek. In typical years, both Alder Creek and the unnamed stream are completely dry between the months of April and November and therefore do not discharge into the Duxbury Reef ASBS during those months (Fall Creek Engineering and Strelow Consulting 2007). While the unnamed stream has been called a tributary that joins Alder Creek from the south, the topography on the Bolinas Mesa separates the two watersheds until stream flow converges on Agate Beach (Figure 3.3).

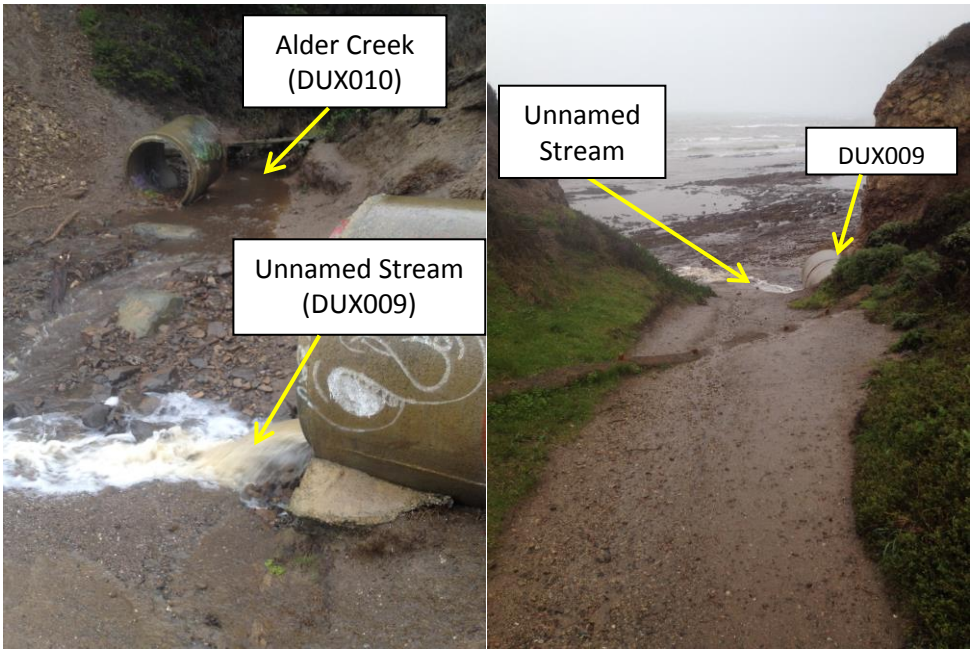


**Figure 3.3.** Alder Creek and Unnamed Stream Confluence Detail, Duxbury Reef (photo courtesy of Rob Carson, February 2014)

Figure 3.4 shows storm water conveyance features within the drainage areas to the various ASBS drainage points. The map shows that the Bolinas Mesa storm drain network is dominated by vegetated ditches and road-crossing culverts. Urban runoff impacts from this area to the ASBS may be relatively minor given that the size of the watersheds draining either private or county urban lands to the Duxbury Reef area is very small and is almost 85% pervious surfaces, the area is rural and most of the stormwater system infrastructure could be considered Low Impact Development (LID) with grassy swales and vegetated ditches that promote infiltration

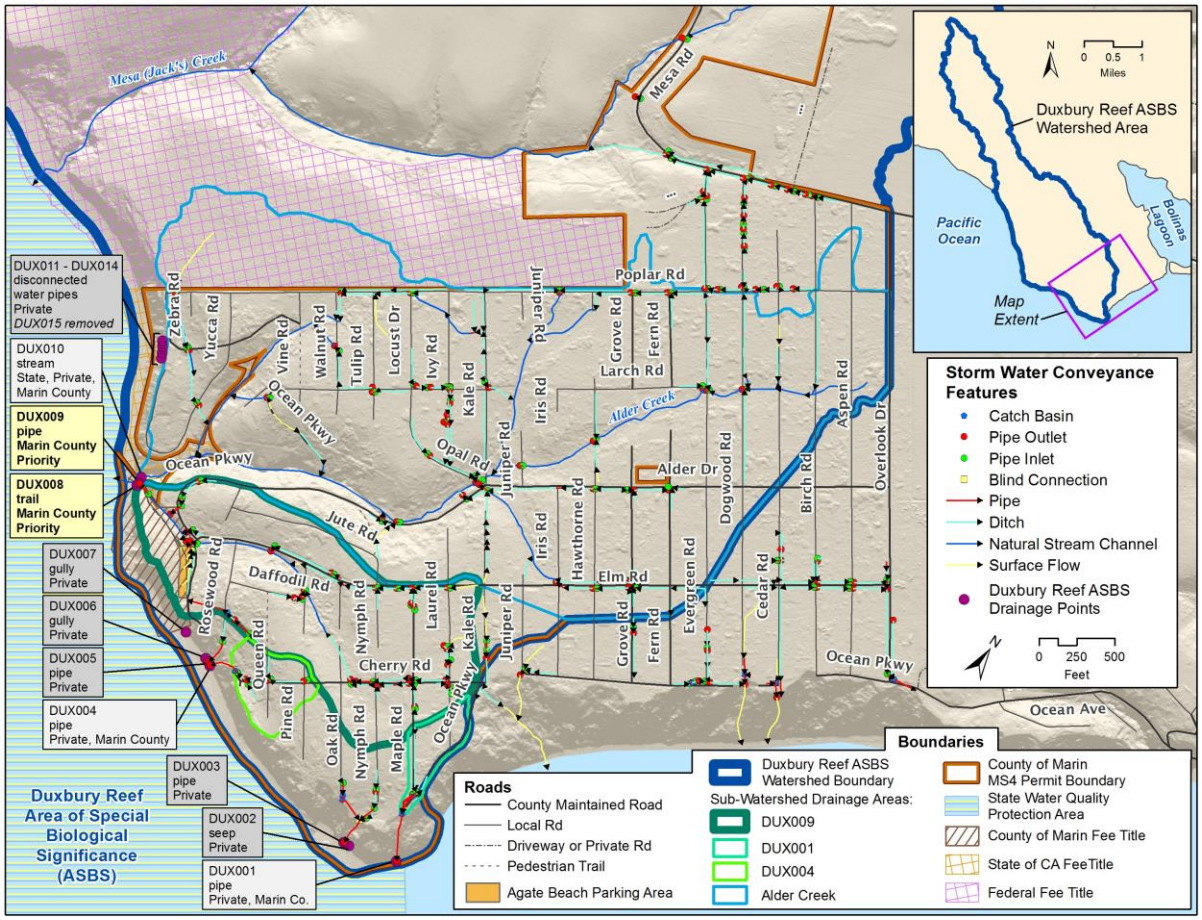


**Figure 3.4.** Bolinas Mesa Major Drainages and Duxbury Reef ASBS Discharges

## 3.2. Landslides and Erosion

Soil erosion is the process of dislodgement and transport of soil particles from the surface by water and wind. It is a natural process but can be exacerbated by anthropogenic activities (e.g., construction of impervious surface, compaction) that reduce infiltration and increase the volume and flow rate of stormwater runoff. Wetting of subsurface materials can also contribute to erosion on coastal bluffs.

Numerous landslides have been observed in the Arroyo Hondo portion of the Duxbury Reef ASBS watershed (Fall Creek Engineering and Strelow Consulting 2007) which is outside of the CPA. Considering the remote location of these landslides, they are likely naturally occurring.

Erosion of the coastal bluffs (or bluff erosion) is another natural process that occurs in the Duxbury Reef ASBS. The Bolinas Mesa, underlain by Monterey Shale and located on a relatively flat terrace with steep bluffs of 140 to 200 feet high, is particularly susceptible to bluff erosion because of deep weathering and extensive fracturing of the bedrock (Marin County 2003). Significant damage to property, including loss of roads, other infrastructure, and residences has occurred in the recent past as a result of bluff erosion (Fall Creek Engineering and Strelow Consulting 2007). Bluff erosion is episodic and typically occurs during very wet years. The County reviewed average bluff erosion rates from several published studies and reported maximum rates of 32 inches per year for the bluffs between Duxbury Point and Poplar Road, and 36 inches per year for the bluffs north of Poplar Road (Marin County 2003). The contribution

of surface and subsurface water from septic systems, irrigation, and other sources, can greatly increase the rates of bluff erosion. Policies directed at reducing infiltration can conflict with the low impact development (LID) measures recommended in the Special Protections and the Phase II MS4 permit. Bluff areas prone to erosion are shown in Figure 3.5.

A key question for land use managers is how large are local impacts on near shore biological communities compared to those from large scale natural processes. Distinguishing locally derived impacts within large scale oceanographic processes is very challenging. For example, the relationship between the rates of natural coastal erosion along the Bolinas Mesa compared to that associated with unmaintained social trails is not documented; however, visual observations suggest that the social trails represent a very small proportion of sediment loading to the area (Fall Creek Engineering and Strelow Consulting 2007).

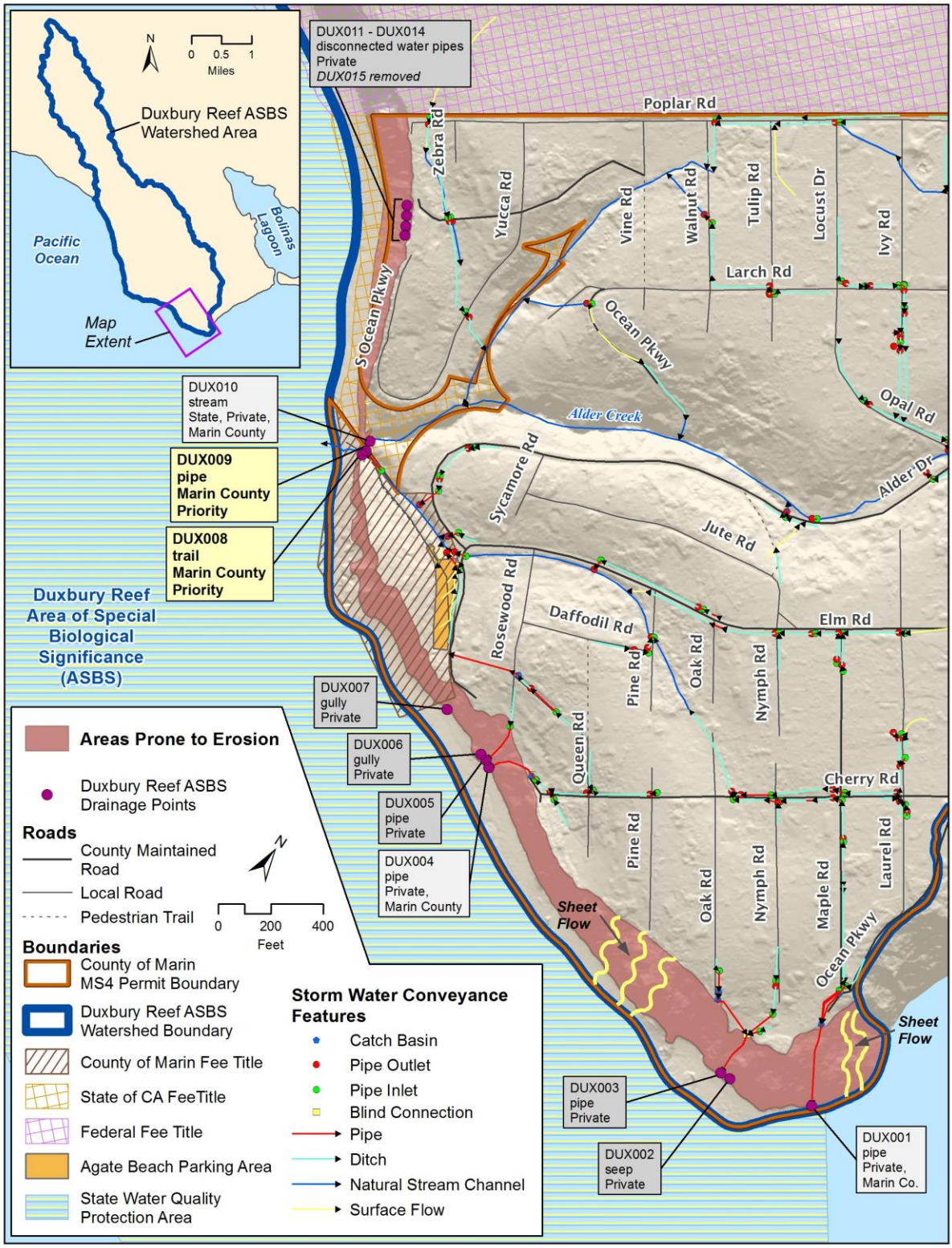


**Figure 3.5.** Areas Prone to Erosion along Duxbury Reef ASBS

## 3.3. Drainages to Duxbury Reef ASBS

The 2003 SCCWRP survey identified fifty-two "drainages" to Duxbury Reef ASBS. In addition to location and size, each drainage was categorized according to one of four source types: discharge, outlet, spring/seep, or unknown. The term "outlet" was used to describe natural streams and gullies, which themselves may be impacted by upstream pollutants, but are regulated under the Basin Plan (Regional Water Board 2010). Spring/seeps also fall into this category. The Special Protections requirements apply only to drainages categorized as "discharges" which are defined as 'an anthropogenic source or location of a discernible volume of water that flows or is released directly into or immediately adjacent to the marine environment of a SWQPA.' The 2003 SCCWRP study further narrowed the source of the discharges according to upstream land use. In the Duxbury Reef ASBS, discharge sources include non-point, rural watershed, rural residential watershed, and parking lot. The 2003 SCCWRP study identified five storm drains (four small and one municipal), six non-point sources, 16 gullies, two streams, 18 outlets, and five unknown source types. These drainages were listed in Appendix 5 of the Program Draft and Final Environmental Impact Reports (EIR) (State Water Board 2011 and 2012).

County staff reviewed the discharge information from the SCCWRP study and EIRs and conducted field reconnaissance to verify the data. A total of 15 drainages into the Duxbury Reef ASBS were assessed, including four of the identified storm drain discharges from County maintained roadways or facilities, four natural drainages (i.e., creeks, seeps), two non-point discharges, and six discharges from private property (four of which are no longer connected). County modifications to the original drainage list (primarily relating to threat level and responsibility) were proposed to State Water Board staff during a subsequent field visit and approved in an email dated February 17, 2012. Although DUX009 is a relatively short (25 feet long) culvert conveying flow from the unnamed stream directly onto Agate Beach where it meets Alder Creek, State Water Board staff did not change the "source type" of DUX009 from "discharge" to "outlet," as would be expected according to the definition of outlet in the SCCWRP (2003) report (pg. 5). DUX009 is greater than 18 inches in diameter and therefore triggers additional Core Discharge monitoring requirements and is inspected twice annually according to Special Protections requirements. County-maintained and private drainages are listed in Table 3.2 and shown in Figures 3.4 and 3.6. All other Duxbury Reef ASBS drainages are located north of the CPA and are the responsibility of the National Park Service.

**Table 3.2**. County and Private Duxbury Reef ASBS Drainages

| Discharge Point ID | Location | Threat Level | Approx. Size | Responsible Parties | Source Type | Type and Upstream Source |
|---|---|---|---|---|---|---|
| DUX001 | Maple Rd. | M* | 8 in | **County**, Private | Discharge | Small storm drain; rural residential, private & County roads |
| DUX002 | Nymph Rd. | L | 2 m | Private | Spring/seep | Groundwater seep |
| DUX003 | Nymph Rd. and Oak Rd. | M | 6 in | Private | Discharge | Small storm drain; rural residential, private unpaved roads |
| DUX004 | Queen Rd. | M* | 12 in | **County**, Private | Discharge | Small storm drain; rural residential, private & County roads |
| DUX005 | Rosewood Rd. | M | 8 in | Private | Discharge | Small storm drain; rural residential, private unpaved roads |
| DUX006 | Residence on Rosewood Rd. | L | 4 m | Private | Outlet | Gully; yard runoff, bluff erosion |
| DUX007 | Residences on Rosewood Rd. | L | 5 m | Private | Outlet | Gully; rural residential |
| **DUX008**† | Pedestrian trail to beach | L | 3 m | **County** | Discharge | Unpaved pedestrian trail connecting Agate Beach parking lot** to Agate Beach |
| **DUX009**† | Unnamed tributary to Alder Creek | M | 48 in | **County** | Discharge*** | Culvert (pipe); Agate Beach parking lot & facilities, rural residential |
| DUX010 | Alder Creek | L* | 2 m | **County**, Private, State | Outlet | Creek; pedestrian trail, rural residential |
| DUX011 | Ocean Pkwy. | L | 4 in | County, Private | Unknown | Disconnected water pipe |
| DUX012 | Ocean Pkwy. | L | 4 in | County, Private | Unknown | Disconnected water pipe |
| DUX013 | Ocean Pkwy. | L | 4 in | County, Private | Unknown | Disconnected water pipe |
| DUX014 | Ocean Pkwy. | L | 4 in | County, Private | Unknown | Disconnected water pipe |
| DUX015 | Ocean Pkwy. | L | 4 in | County, Private | Unknown | Missing (i.e., removed) |

Notes: m = meters, in = inches

† **Denotes a Priority Discharge**

*Appendix 5 to the Special Protections Final EIR contains multiple worksheets listing outfalls, discharges and drains and their identified threat level. The worksheets contain inconsistencies in identified threat levels for DUX001, DUX004, DUX009 and DUX010. This table lists the corrected threat level confirmed by State Water Board staff in email correspondence dated February 17, 2012.

**In summer 2013, Agate Beach parking lot was replaced with a pervious concrete section designed to treat stormwater from the lot before discharging it to an adjacent vegetated swale and then to the unnamed stream that flows to DUX009.

***DUX009 should be classified as an “outlet” source type according to the definition provided in SCCWRP 2003.

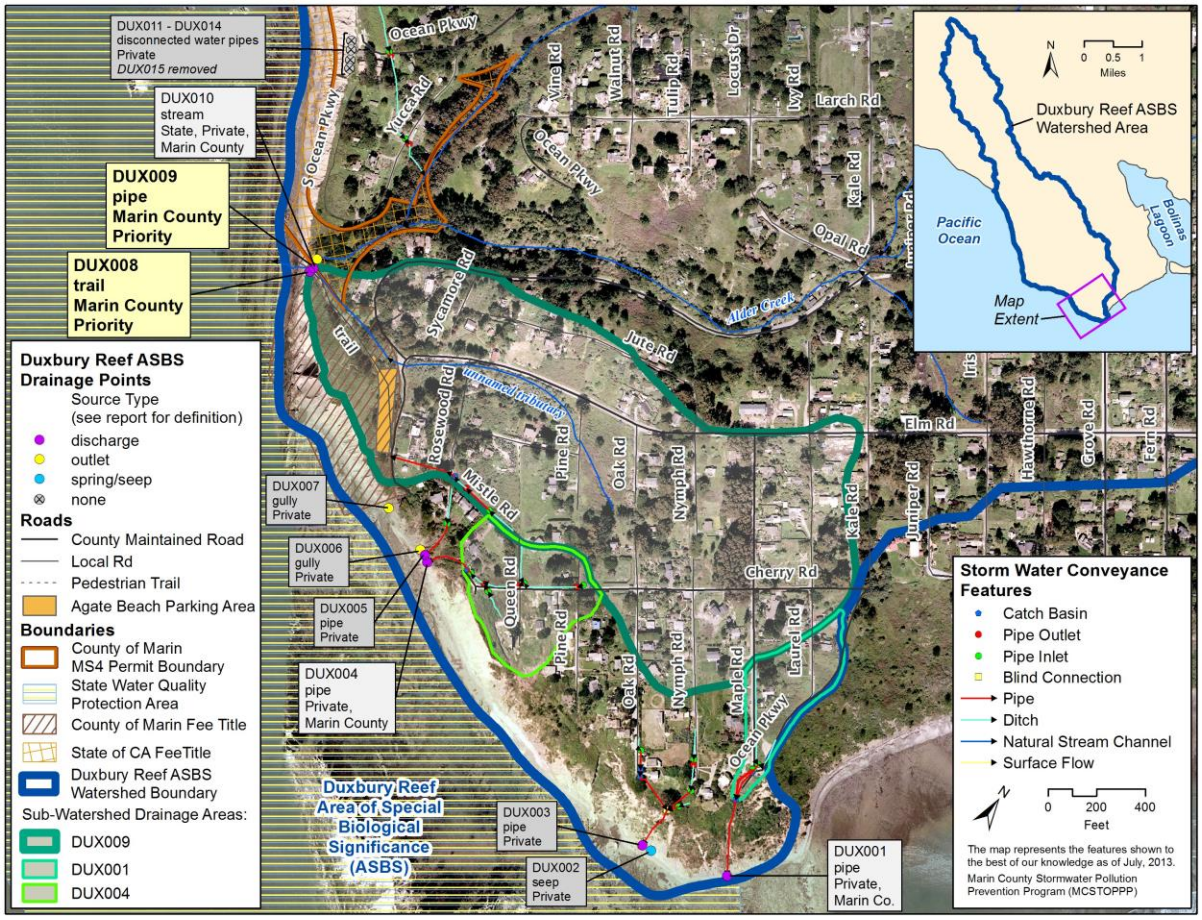


**Figure 3.6.** Duxbury Reef ASBS Drainage Points

The County is fully or partially responsible for five active drainages (DUX001, DUX004, DUX008, DUX009 and DUX010). Two discharge locations (DUX001 and DUX004) are on private property but County maintained roads contribute stormwater runoff that flows onto private property before discharging to the drainage pipes. Two other discharges (DUX008 and DUX009) are on County-owned land, are located downstream of the Agate Beach parking lot, and are the two County Priority Discharges. Runoff from the parking lot[1] infiltrates into the pervious concrete section of the lot into bottomless underground chambers. The chambers provide storage and promote infiltration. If the chambers are full, overflow pipes carry treated runoff into an adjacent vegetated swale, through a parking lot driveway culvert and into the unnamed stream. Runoff then joins the stream flow for 400 feet before reaching DUX009, a 48-inch diameter, 25-foot long concrete culvert. The unnamed stream receives runoff from a small subwatershed (less than 75 acres) on the Bolinas Mesa. Runoff from this small subwatershed enters the DUX009 culvert and discharges into the Duxbury Reef ASBS at Agate Beach. DUX008 is the lower end (approximately 100ft) of the unpaved access path to the beach. Most of the runoff from the access trail is directed through small culverts or waterbars into the unnamed tributary flowing to DUX009, only the

[1] See Section 5.2.2 for a description of the new partial pervious concrete lot (and other structural BMPs) that were installed in summer 2013 to control and treat storm water runoff from the parking lot and to prevent potential leaks and spills from portable toilets.

last portion drains directly to the beach. DUX010 is the outlet of Alder Creek. The point at which Alder Creek drains to the beach is located on State property less than 5 feet north of DUX009 (Figure 3.7). A section of abandoned 48-inch diameter cement pipe near at the outlet suggests that Alder Creek was once culverted at this location, but has since altered its flow path.

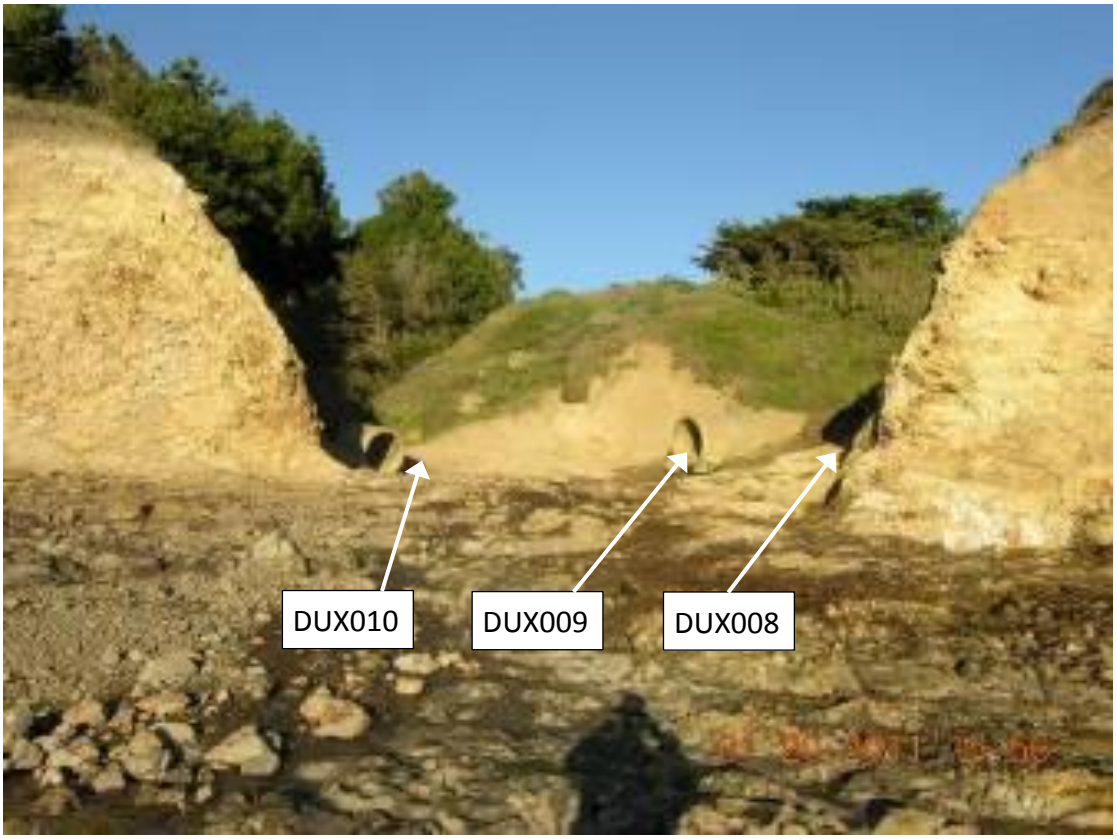


**Figure 3.7.** Duxbury Reef ASBS Drainages DUX008, DUX009, and DUX010.

## 3.4. Existing and Potential Water Quality Impacts

Pollutants potentially generated from the developed areas of Bolinas Mesa and Agate Beach parking lot of the Duxbury Reef ASBS watershed and conveyed by stormwater runoff include typical urban pollutants: trash, pesticides, polynuclear aromatic hydrocarbons (PAHs), petroleum hydrocarbons (e.g., gasoline, diesel fuel, and oil and grease), metals, nutrients, sediment, and pathogens. Other pollutants potentially discharged to this part of the Duxbury Reef ASBS include sediment from coastal bluff erosion and social trails along the bluffs, and septic system non-point source discharges from Bolinas Mesa.

Water quality monitoring from the Core Discharge and Receiving Waters Monitoring Programs identified only three occasions where post-storm receiving water samples from Duxbury Reef exceeded the calculated 85$^{th}$ percentile reference condition for the required monitoring parameters in the Special Protections. One was for silver, which is not likely from an anthropogenic source (Subsequent samples for silver were well below the 85$^{th}$ percentile threshold). The other two were for PAHs, but there were no corresponding detections of PAHs in the concurrent discharge samples from DUX009. Given the proximity of the large urban stormwater sources of San Francisco Bay, the receiving water concentrations may reflect influences beyond the Bolinas Mesa.

# 4.0 EXISTING REGULATORY PROGRAMS ADDRESSING WATER QUALITY IN THE ASBS

Several plans, policies, and ordinances exist that have been developed to protect natural resources throughout the County and the Beneficial Uses of the ocean and other water bodies. The Phase II permit and several other overarching plans are described in this Section. The requirements and compliance schedules of these programs are generally consistent with the requirements of the Special Protections. Additional programs being implemented (or planned) to meet requirements of the Special Protections are described in Section 5 of this Compliance Plan.

## 4.1. Phase II Permit

Storm water runoff and non-storm water discharges from the Compliance Plan Area (CPA) are regulated under the Phase II MS4 General NPDES Permit (Phase II permit). The County is a Permittee and coordinates through the Marin County Stormwater Pollution Prevention Program (MCSTOPPP) with the 11 cities and towns in Marin County, which are also Permittees. County Department of Public Works (DPW) is responsible for coordinating storm water management and Phase II permit compliance within the unincorporated areas subject to the Phase II permit within the County, including the areas of Bolinas which drain to the Duxbury Reef ASBS. DPW implements the local storm water program and storm water control measures required by the Phase II permit in cooperation with other County departments with the guidance and support of MCSTOPPP. The Special Protections for ASBS are included as Attachment C to the Phase II permit.

The current Phase II permit (Order No. 2013-0001-DWQ) went into effect on July 1, 2013. Storm water control measures include a number of structural and non-structural BMPs which have been implemented, or are being developed for implementation based on revised requirements of the earlier version of the permit (Order No. 2003-0005-DWQ). Implementation of many of the new or modified BMPs required in the Phase II permit is being phased in over several years. The MCSTOPPP Action Plan 2010 (EOA 2005) is the approved Storm Water Management Plan (SWMP) which was required by the previous Phase II permit. The current Phase II permit is much more prescriptive and does not require development of a SWMP. Also, MCSTOPPP and the County develop guidance manuals and outreach materials to facilitate implementation of the Phase II permit requirements, particularly ones that relate to development and construction projects, creek-friendly landscaping, Low Impact Development design, equestrian management, and pesticide use.

Non-structural BMPs required by the Phase II permit include public education and outreach, inspections of businesses and construction sites, construction site stormwater pollution prevention, spill response, investigation of illicit discharges, street sweeping and other municipal maintenance, and associated reporting to the Regional Water Board. Structural BMPs include post-construction storm water management consisting of site design measures, source control measures, LID design standards, and hydromodification management measures. In the past, MCSTOPPP documented local and countywide Phase II permit compliance efforts in Annual Reports to the Regional Water Board. Annual Reports included information on implementation of BMPs on the Bolinas Mesa. In the future, the County will report on ASBS Compliance Plan implementation to the State and Regional Water Boards through the state's Storm Water Multiple Application and Report Tracking System (SMARTS). MCSTOPPP will provide technical and regulatory annual reporting support.

In May 2015, the County approved changes to its' Code of Ordinances to provide the County the authority to implement applicable Phase II permit requirements, including Special Protections for the Duxbury Reef ASBS. Chapter 23.18 contains the County of Marin Stormwater Runoff Pollution Prevention Ordinance and is intended to protect and enhance the water quality of Marin's watercourses, water bodies and wetlands in a manner pursuant to and consistent with the Clean Water Act and the Porter-Cologne Water Quality Control Act. It includes BMPs for construction and new and redevelopments, illicit discharge and littering regulations, watercourse protection, and inspection authority and procedure. Chapter 23.08 contains the grading ordinance, including requirements for erosion and sediment control plans. The development code, Chapter 24.04 contains two sections related to the stormwater controls: Section 24.04.625 details requirements for Erosion and Sediment Control Plans (ESCP) and Section 24.04.627 contains requirements for permanent stormwater controls for development and redevelopment, and requirements for stormwater control plans.

## 4.2. Local Coastal Program

The Local Coastal Program (LCP) is the County's guiding document for implementation of the State Coastal Act (administered by the Coastal Commission). The LCP is the primary document that governs land development in the Marin County Coastal Zone. It is comprised of a Land Use Plan (LUP), an Implementation Program (IP), and accompanying land use and zoning maps. The LCP LUP contains information and policies pertaining to issues such as build-out and development, water supply capacity, wastewater treatment capacity, recreation, impervious surface zoning standards, non-point surface runoff controls, and sensitive species and habitat protection in unincorporated coastal area of Marin County. The LCP IP contains and references specific sections of the County Development Code of Ordinances. All development in the Coastal Zone must comply with the policies and ordinances of the LCP in order to be issued a coastal permit, or be granted an exemption from the requirements.

Several LCP policies are specifically directed at Bolinas Mesa or Duxbury Reef (Marin 2013). Policy C-BOL-3 requires that new construction, redevelopment, and rehabilitation of existing structures on Bolinas Mesa be in accordance with adopted policies of the 1984 Bolinas Gridded Mesa Plan (22.66.050). These include restrictions on development near the bluffs, along creeks, and in areas with soils inappropriate for septic systems (EDAW, Inc. and the Mesa Plan Resource Group 1984). LCP Policy C-PA-8 protects public use of the two access trails across Bolinas Mesa to the beach and protects the natural resources of Duxbury Reef itself, in part through signage notifying trail users of the fragile coastal resources of the area (22.64.180). County Code 22.64.060 is referenced in the LCP, prohibiting new construction on vacant lots within Bluff Erosion Zones on Bolinas Mesa.

## 4.3. Programs on Agricultural Lands

The County stormwater program does not have jurisdiction over agricultural land, which makes up almost 30% of the land area in the Duxbury Reef ASBS watershed, most of which is located on federal National Park Service (NPS) land (Figures 3.1 and 3.2). Instead, the Marin Resource Conservation District (RCD) assists County agricultural landowners with erosion and flood control problems, and the NPS Rangelands Program assists ranchers operating on Federal lands under Special Use Permits. Both the Marin RCD and the NPS facilitate the construction of conservation projects intended to protect and enhance water quality and wildlife habitat.

# 5.0 BEST MANAGEMENT PRACTICES

The County will continue to implement the Phase II permit, LCP, and Code of Ordinances which require a range of structural and non-structural BMPs, as well as monitoring and reporting. The additional BMPs that are or will be employed in the CPA to comply with the Special Protections are included in the comprehensive summary in the following sections of non-structural BMPs (Section 5.1), structural BMPs (Section 5.2) and Parks and Recreation Facilities (Section 5.3).

Based on review of the results of the monitoring program, there are no additional non-structural or structural BMPs required to maintain natural ocean water quality (Section 6.0). Structural BMPs determined necessary to comply with the Special Protections are expected to become operational by March 2018 (Section 7.0).

## 5.1. Non-Structural BMPs

Non-structural BMPs involve operational, maintenance, regulatory (e.g., ordinances), or educational activities designed to reduce or eliminate increased flow/volume and pollutant-related impacts of stormwater runoff. Installing new physical structures is not involved.

### 5.1.1. Inspections

In accordance with the Special Protections, the County will implement inspection programs of the following types with the following minimum inspection frequencies

**Table 5.1.** Summary of Inspection Programs in the Duxbury Reef ASBS Watershed.

| Type | Responsible Party | Rainy Season Inspection Frequency |
|---|---|---|
| Construction Sites* (With Building or Grading Permits) | DPW Land Development* | Weekly |
| Stormwater Outfall | County Local Stormwater Program | Twice Annually (Once prior to start of rainy season, and once during rainy season) |
| Industrial Facilities** | County Local Stormwater Program** | Monthly** |
| Commercial Facilities (e.g. restaurants)*** | EHS*** | Twice Annually |
| Other Commercial Facilities (identified as potential threat to stormwater quality) | County Local Stormwater Program | Twice Annually |

* Inspections of construction sites associated with septic system repairs will be conducted by other County staff on a case-by-case basis.
** No Industrial Facilities currently exist in the Compliance Plan Area. In the unlikely event that one is identified in the future, the rainy season inspections will comply with the minimum frequency above.
***No restaurants are currently identified for inspection in the Compliance Plan Area. In the event that one is identified in the future, rainy season inspections will comply with the minimum frequency above.

- **Construction sites** – *weekly during rainy season*. All construction sites in the CPA will be flagged as high priority under Provision E.10.c of the Phase II permit. Inspections for compliance with County ordinances will be conducted prior to land disturbance, weekly during the rainy season, and at least once following active construction, including earth disturbing activities as well as outdoor activities that could result in a non-stormwater discharge. Tracking of construction

sites will be maintained through the County Land Development permit database developed as part of Phase II permit compliance and inspections will be managed through the Land Development Division's existing inspection program.

- **Industrial facilities -** *monthly during the rainy season*. There are no industrial facilities in the Duxbury Reef ASBS watershed. In the unlikely event that one is identified in the future, inspections would be carried out by the Marin County Local Stormwater Program or by the County's Certified Unified Program Agency (CUPA).
- **Commercial facilities** – *twice during the rainy season*. The only commercial facilities in the CPA are small sole proprietorships and do not include any restaurants. If any food service facilities are proposed in the CPA, they would be inspected by the County's existing Environmental Health Food Facility Inspection Program. County Environmental Health Services (EHS) routine inspectors look for stormwater violations during inspections and refer any issues to County stormwater staff. In addition, the County Local Stormwater Program maintains a list of businesses in the CPA and identifies specific facilities that are a potential threat to water quality. Those identified commercial facilities, aside from food facilities, will be inspected twice a year during the rainy season by County Stormwater Program staff. To date, only one commercial operation (a horse-boarding and equestrian facility) has been identified as necessitating these inspections.
- **Storm water outfall drains equal to or greater than 18 inches in diameter** – *twice annually, prior to and during the rainy season*. Of the four "storm drain outfalls" that discharge stormwater directly to the ASBS, for which the County is fully or partially responsible, only one exceeds 18 inches in diameter (DUX009). The County will inspect this culvert and remove trash and other anthropogenic debris at least once prior to and once during the wet season in conjunction with the inspection of commercial facilities or Illicit Discharge Detection and Elimination program activities in the area.

All inspections will be documented, reported and certified as required through the Phase II permit annual report.

### 5.1.2. New Development and Redevelopment

There are a number of policy-level controls on development and redevelopment in the CPA. There is a moratorium on new water meters within the service area of the BCPUD which includes the Bolinas Mesa. Additional connections are available for new development only if they are abandoned by previous owners, or if structures with existing connections are condemned. This fact means that there is very little development pressure within the Duxbury Reef ASBS watershed, and this will likely remain true for the foreseeable future. As described in section 4.2, the LCP and the 1984 Bolinas Gridded Mesa Plan together restrict development near the bluffs, along creeks and in areas with soils inappropriate for septic systems.

In addition, the Phase II permit, the LCP, and several County ordinances address storm water runoff from new and redevelopment projects. These measures are discussed above in Section 4 and below in Section 5.2.

### 5.1.3. Public Outreach

The County and MCSTOPPP implement a countywide public outreach and education program. Numerous publications covering stormwater related topics such as car care, erosion control, horse ownership, swimming pool and spa maintenance, landscaping, pet ownership, choosing least toxic pesticides, low impact development, rainwater management, etc. are developed and/or distributed by

MCSTOPPP. For example, MCSTOPPP partners with 16 stores in Marin to implement the Our Water – Our World (OWOW) program. The OWOW program helps consumers make informed decisions when purchasing pest control products for home or garden use and provides information on how to choose least toxic pest control alternatives. In addition, MCSTOPPP has trained over 140 Bay-Friendly landscape professionals that work throughout Marin.

MCSTOPPP also provides useful guidance for Horse facility owners with detailed BMPs for water quality protection. The County and MCSTOPPP were involved in the development of the www.myearthdaymarin.org website which promotes volunteer beach and creek cleanups and restoration events on Earth Day.

A considerable amount of storm water runoff from the residential area of the watersheds on the Bolinas Mesa originates on private property. Therefore, the County has developed public outreach materials targeted specifically to residents located within the Duxbury Reef ASBS watershed and will continue to use them in ongoing education. Existing outreach efforts have focused on educating residents about the significance of the Duxbury Reef ASBS and suggesting measures to prevent non-storm water discharges and storm water pollution, and protect the ASBS marine habitat. The MCSTOPPP 2013 Annual Wall Calendar was distributed on the Bolinas Mesa and included stormwater pollution messages and one month (December) that focused on protecting the Duxbury Reef ASBS and described the associated grant-funded storm water control project at Agate Beach (see Section 5.3.6). The MCSTOPPP 2014 and 2015 calendars contained water quality protection and pollution prevention messages and were also distributed to Bolinas residents. In January 2015, a newsletter was distributed to all of the postal customers in Bolinas and nearby Stinson Beach. The newsletter provided context for the ASBS Special Protections and described potential threats to ASBS water quality as well as ways residents and visitors could prevent pollution and protect this resource.

### 5.1.4. Trash Elimination

In addition to the Special Protections inspection program and consistent with the Phase II permit (Provision E.11.f), all storm drain system facilities in the CPA will be assessed and prioritized based on accumulation of sediment, trash, and/or debris by May 2015. High priority storm drains will be inspected and cleaned according to schedules developed during the prioritization process.

The small, rural residential nature, and values of the community of Bolinas results in relatively minor trash loads compared to more urbanized ASBS watersheds. To reinforce the existing community behavior, a community trash cleanup was held in September on California Coastal Cleanup Day 2014, 2015 and 2016 including trash pickup on Agate Beach and in the tributary drainages. The County will continue to host a Coastal Cleanup Day site in the watershed on an annual basis.

The State Board is in the process of developing a statewide policy for trash control in California. It is anticipated that the Trash Policy will establish methods to control trash pollution and that this policy will eventually be integrated into the Phase II permit and would include implementation within the CPA as needed for compliance.

### 5.1.5. Illicit Discharges

Consistent with the Phase II permit, the County prohibits illegal dumping and most non-storm water discharges. Non-storm water sources that are exempted by the permit are similar to those allowed under the Special Protections. However, the Phase II permit also does not prohibit water line flushing, residential car washing, discharges from potable water sources, air conditioning condensation, dechlorinated swimming pool discharges, and incidental runoff from landscaped areas. The control

measures required under the Phase II permit for these discharges would maintain natural ocean water quality in the ASBS. The Phase II permit requires that these discharges are identified and that appropriate control measures to minimize the impacts of such discharges are developed and implemented.

Through its Illicit Discharge Detection and Elimination (IDDE) Program, County stormwater staff will continue to respond to illicit discharge complaints on the Bolinas Mesa and will track complaints and follow up actions through an existing database. MCSTOPPP will continue to refer reports of illegal discharges (including non-storm water discharges) to appropriate County staff and will continue to encourage members of the public to report discharges through their webpage: http://www.marincounty.org/depts/pw/divisions/mcstoppp/illegal-discharge-contacts.

The MCSTOPPP Illegal Discharge Contacts webpage provides the public with a list of local storm water contacts and instructions on what to do in the event of an observed illegal discharge to a storm drain, creek, or wetland. In addition, the webpage provides information on what to do when other potential violations are observed, including: oil and chemical spills or potential spills occurring in or threatening storm drains and "open waters"; habitat destruction, fish kills, or poaching; pesticide misuse or contamination; and, littering on highways/freeways.

### 5.1.6. Herbicides and Pesticides

There appears to be a low likelihood of water quality impacts from any application of pesticides and herbicides in the CPA. The two special districts in Bolinas – BCPUD and the Bolinas Fire Protection District – both implement a "no pesticide or herbicide" approach to their activities. For example, none of the BCPUD water or wastewater facilities utilize any chemicals and BCPUD uses only mechanical means to control vegetation on district property. In addition, the County implements a "no spray" policy in Bolinas with respect to vegetation management. On the November 2005 ballot 86 percent of the Bolinas voters approved Measure E which endorsed the BCPUD efforts to negotiate a non-toxic protocol with the Marin/Sonoma Mosquito and Vector Control District (MSMVCD). The BCPUD and the MSMVCD signed a written agreement which provides that only mechanical and bacteriological means of mosquito control will be employed in West Marin; the only exception is if the MSMVCD, in conjunction with the Marin County Public Health Officer and California Department of Health Services – Vector Borne Disease Section, declares a state of emergency based on response levels as outlined in the Arbovirus Surveillance Response Plan. (Personal Communication, Jennifer Blackman, May 25, 2006).

Through MCSTOPPP the County participates in the OWOW program, described above in Section 5.1.3, which assists individual consumers in choosing least toxic and non-toxic pest management approaches to gardening, landscaping, and pest control. MCSTOPPP partners with two OWOW stores in Pt. Reyes Station, a community near Bolinas. The County's DPW and County Parks are both responsible for performing pest control in compliance with the County of Marin Integrated Pest Management (IPM) Policy and Marin County Code Chapter 23.19 – Integrated Pest Management Program. County Parks maintains an IPM website detailing policy, methods and implementation of the policy at: http://www.marincounty.org/depts/pk/our-work/parks-main-projects/integrated-pest-management

During the Core Discharge and the Receiving Waters Monitoring Programs there were no detections of pesticides either in the storm drain discharge, or in the receiving waters at Duxbury Reef.

### 5.1.7. Hazardous Materials

The County has a Hazardous Materials Area Plan (Marin County 2008) that describes the County's pre-incident planning and preparedness for hazardous materials releases. It clarifies the roles and

responsibilities of federal, state and local agencies during a hazardous materials incident. It describes the County's hazardous materials incident response program, training, communications and post-incident recovery procedures. The plan is available online at: http://www.marincounty.org/~/media/Files/Departments/FR/080722-16-PW-attach-REP-hazmatplan.pdf.

### 5.1.8. Permit Tracking System

Construction and development permits issued by the County for projects that could impact Duxbury Reef ASBS water quality are tracked using two related systems. The County DPW is responsible for issuing grading and encroachment permits and maintains a system to track applications, approvals, and follow-up activities (i.e., inspections). The County Community Development Agency (CDA) administers and enforces zoning and subdivision regulations and is responsible for issuing development and building permits and for maintaining a tracking system separate from DPW. The County DPW is now implementing a unified permit tracking system for earth-disturbing projects which has been updated to address requirements of the Phase II permit and include mechanisms to trigger enhanced construction site controls and increased inspection frequencies for projects draining to Duxbury Reef.

### 5.1.9. Street Sweeping and Road Maintenance

To comply with the Phase II Permit, County-maintained roads outside of the parking lot at Agate Beach County Park (see Section 5.3 for details related to County Parks and Recreation facilities) are swept annually. Regular maintenance of the paved roads in the watershed will be undertaken in a manner consistent with the ASBS Special Protections and an assessment of their activities in the watershed will occur through the Phase II permit provision E.11.h required assessment of Operations and Maintenance Activities. In addition to pavement or road repair, County Roads Division activities will include inspection by County Roads Division of all County-maintained road crossings and culverts in the CPA (at least twice during each rainy season) as well as maintenance of road-side drainages and ditches on an annual basis.

### 5.1.10. Construction BMPs

All construction projects, whether or not they trigger a requirement for a permit and/or a detailed Erosion and Sediment Control Plan from the County, must comply with the County's Stormwater Runoff Pollution Prevention ordinance (Chapter 23.18), including 23.18.093 Construction-Phase Best Management Practices. Projects that include significant earth disturbing activities and that trigger a permit from the County must also comply with Marin County Code Chapter 24.04.625 which requires Erosion and Sediment Control Plans. County permitted projects requiring erosion and sediment control are tracked on the DPW permit tracking system (see Section 5.1.8). New construction and alteration building permits issued by the County must also comply with the site development mandatory measures of the California Green Building Code (Section 4.106.2 – Storm Water Drainage and Retention During Construction for residential permits, and section 5.106.1 – Storm Water Pollution Prevention for non-residential permits).

The abovementioned codes require implementation of appropriate BMPs to prevent the discharge of construction wastes (including sediment) or contaminants from construction materials, tools, and equipment from entering a County storm drain. In order to receive a grading permit and other permits where a significant amount of soil will be disturbed during construction, a site-specific Erosion and Sediment Control Plan (ESCP) must be approved by the County and implemented by the project proponent. All disturbed surfaces must be protected against erosion by measures which the agency determines to be appropriate to the site and time of year. Minimum erosion and sediment control

measures are posted on the County's website. They include BMPs such as construction scheduling, use of straw wattles or erosion control blankets, concrete washout measures, drain inlet protection, and prevention of equipment fluid leaks onto the ground.

Construction projects that disturb more than one acre of land must also comply with the NPDES Construction General Permit (Order No. 2009-0009-DWQ, as amended by 2010-0014-DWQ and 2012-006-DWQ) which requires development and implementation of a Stormwater Pollution Prevention Plan (SWPPP). Within the County, the SWPPP takes the place of the ESCP and is approved by County staff. The SWPPP must describe the BMPs that will be used at the project.

In order to enforce implementation of SWPPPs and ESCPs, the County conducts inspections at priority construction sites prior to land disturbance, after major rain events, during active construction, and following active construction. Construction sites within the CPA are considered priority and will be inspected weekly during the wet season according to Attachment C of the Phase II permit (see Section 5.1.1 for details of the inspection program). All inspections are documented by the County. The County will report annual compliance to the State and Regional Water Boards per provision E.10 (Construction Site Management) and Attachment C of the new Phase II permit.

## 5.2. Structural Best Management Practices

Structural BMPs involve the installation of engineering solutions to the physical treatment or infiltration of runoff. The Special Protections require that "BMPs to control storm water runoff discharges (at the end-of-pipe) during a design storm shall be designed to achieve on average the following target levels:

(1) Table B Instantaneous Maximum Water Quality Objectives in Chapter II of the Ocean Plan; or
(2) A 90% reduction in pollutant loading during storm events, for the applicant's total discharges."

The structural BMPs described below include the existing stormwater drainage system, the newly-constructed stormwater treatment at the Agate Beach parking lot and a planned project for the Agate Beach trail, and structural requirements for new development from NPDES Phase II statewide stormwater permit.

### 5.2.1. Existing Storm Water Conveyance and LID

The structure and function of the existing stormwater drainage system on the Bolinas Mesa allows some of the stormwater to infiltrate (when implemented in urban areas this type of system is referred to as Low Impact Development design). The Bolinas Mesa stormwater drainage system consists mostly of open, vegetated, road-side ditches connected by a minimum of constructed infrastructure such as road and driveway culverts. The pervious sections of the drainage system are shown as light blue arrows in Figures 3.4, 3.5 and 3.6. The storm drain watersheds are small, and consist of mostly rural residential development with small houses, and most of the roads are unpaved. The consequence is that the watershed has a high percentage of pervious surfaces (over 80 percent), including the storm drain network itself. This network is an existing structural BMP that will continue to be maintained in its current form.

Section I.A.1.d of the Special Protections states that "only discharges from existing storm water outfalls are allowed. Any proposed or new stormwater runoff discharge shall be routed to existing stormwater discharge outfalls and shall not result in any new contribution of waste to an ASBS". This prohibition applies existing stormwater outfalls as of January 1, 2005, but does allow for re-location or alteration to existing outfalls.

### 5.2.2. Agate Beach Parking Lot

In the summer of 2013, using Proposition 84 grant funds, the County implemented structural BMPs in the Agate Beach County Park parking lot to address an identified potential stormwater threat to the ASBS. See Section 5.3.6 below for details of the structural BMPs implemented. The trail from the Agate Beach parking lot down to the beach was identified as a discharge (DUX008) by the state and is a priority discharge for the County. Improvements to the trailhead were implemented as part of the parking lot project, but an additional project implementing structural improvements to drainage features of the trail will be implemented by Marin County Parks depending on funding. See section 5.3.2 under County Parks and Recreation Facilities below for more details

### 5.2.3. Post-Construction BMPs

As of June 30, 2015, non-single family home projects that create and/or replace between 2,500 and 5,000 square feet of impervious surface, and detached single family home project that create and/or replace 2500 square feet or more impervious surface, must implement one or more of the site design measures described in Provision E.12.b of the Phase II permit. These include stream setbacks and buffers, soil quality improvement, tree planting and preservation, impervious area disconnection, porous pavement, green roofs, vegetated swales, and rain barrels. The projects must also implement an approved *Stormwater Control Plan Template for Small Projects/Single-Family Homes* (the *BASMAA Post Construction Manual* provides a template in Appendix C and can be downloaded from http://www.marincounty.org/depts/pw/divisions/mcstoppp/development/new-and-redevelopment-projects).

Larger new development and redevelopment projects meeting the criteria of Provision E.12.c of the Phase II permit must also implement the stormwater treatment standards described in Provisions E.12.d (source control measures), E.12.e (LID design standards), and E.12.f (hydromodification management). These "Regulated projects" create and/or replace 5,000 square feet or more of impervious surface and do not include detached single family homes that are not part of a larger plan of development. Due to the water service moratorium in BCPUD, it is unlikely that any projects regulated under E.12.c would occur within the Duxbury Reef ASBS watershed.

## 5.3. County Parks and Recreation Facilities

Agate Beach Park, which is within the CPA and directly adjacent to the Duxbury Reef ASBS, is a Marin County Parks facility. The subsections below detail the ways in which County Parks is addressing or will address storm water runoff from their facilities. The Agate Beach County Park facilities include a parking lot with less than forty spaces, an enclosure with two portable restroom facilities, benches and about a mile of trails. The County website detailing facilities and amenities at the park can be found at: http://www.marincounty.org/depts/pk/divisions/parks/agate-beach.

### 5.3.1. Pollutant Sources

Agate Beach County Park facilities, as described above, are limited in scope and extent, but do present *potential* pollutant sources to the ASBS watershed in the stormwater runoff from the parking lot, waste from the portable toilets, sediment from the trails, and/or trash from visitors. The following sections detail the BMPs or other management measures that will be implemented to address potential pollution from the County Park facilities.

### 5.3.2. Soil Erosion BMPs

The Agate Beach County Park includes approximately 1,000 linear feet of coastal bluffs which are subject to significant erosion (as much as 30-inches a year) through natural processes. However, soil erosion

from existing trails, culverts or other features within the park have the potential to contribute to the sediment load entering the ASBS. The trails in the park drain either to the parking lot area or, in the case of the beach access trail, to the unnamed stream flowing to DUX009 or to the beach via the trail itself (DUX008). Trails and the associated drainage features will be maintained by staff from County Parks who will inspect conditions and implement soil erosion BMPs as necessary to eliminate the discharge of sediment where such a discharge is contributing to an alteration of "natural water quality" in the ASBS. Soil erosion BMPs including straw wattles and vegetated areas to disperse runoff are currently in place along the trail to the beach. The Parks Department is developing potential permanent structural BMPs to address runoff from the lower portion of the beach access trail. The BMPs may include the installation of pervious stairs along the steepest lower section of the trail and the reconfiguration of the trail to integrate critical dips along the trail length to direct runoff through vegetation into the stream channel and discourage concentrated flow down the path and subsequent rill erosion. Although characterization monitoring did not indicate that sediment from the trial is affecting natural water quality in the ASBS, this structural BMP will be designed and installed in 2017.

### 5.3.3. Herbicide and Pesticide BMPs

The Core Discharge monitoring did not result in any detection of pesticides in the stormwater discharge or the receiving waters in the Duxbury Reef ASBS. The following BMPs will continue to be implemented to prevent municipal activities from contributing to pesticide loads.

Marin County Parks is responsible for performing pest control at their park facilities in compliance with the County of Marin Integrated Pest Management Policy and Marin County Code Chapter 23.19 – Integrated Pest Management Program. County Parks maintains an IPM website detailing policy, methods and implementation of the policy at: http://www.marincounty.org/depts/pk/our-work/parks-main-projects/integrated-pest-management.

The IPM policy and ordinance stipulates that it must be followed by all County Departments and that they must also require it be followed by any contractors providing pest management services to them. Some of the components of the IMP program are: reducing to the maximum extent the use of pesticides; review and consideration of available non-chemical options before using a chemical pesticide; pest identification and least toxic methods to control pests; and record keeping and reporting requirements. The program policy and ordinance will be followed at all times at the Agate Beach County Park as well as by County DPW who maintain the storm drain system within the CPA.

### 5.3.4. Public Education and Outreach

Marin County Parks has developed and installed new signage adjacent to the Agate Beach parking lot, at the trailhead leading to the beach and to the ASBS. This signage includes a description of the Area of Special Biological Significance and the Duxbury Reef State Marine Reserve and includes educating message to the public about the importance of preventing pollution and maintaining or restoring natural water quality in the ASBS. The new kiosk was installed in early 2015 as part of a Proposition 84 ASBS Source Control grant from the SWRCB. County Park's rangers will continue provide education to the public regarding the importance of good water quality to the health of the marine ecosystem. Pet waste bags and signage reminding pet owners to properly dispose of pet waste will be used to encourage pollution prevention.

### 5.3.5. Trash Prohibition

Marin County Parks currently maintains and will continue to maintain the park facilities, ensuring that there are adequate trash receptacles for visitor use and providing regular collection of trash from the

receptacles as needed. Maintenance visits will include the collection and proper disposal of any visible litter from Park facilities. In addition to these management measures, trash removal from the County's storm water outfalls greater than or equal to 18-inches diameter will occur according to the schedule in Section 5.1.1. The County will continue to host a California Coastal Cleanup Day site in the area to remove trash and debris from the beach and lower watersheds, though much of the litter collected in the past appears to have been deposited via the marine environment.

### 5.3.6. Parking Areas and Developed Features

The only developed feature of the Agate Beach County Park is the parking lot and the portable toilet facilities that serve the trailhead down to the beach. In addition, there are some wooden stairs and a few benches along the foot paths between the parking lot and the bluffs and beach. The lot is relatively small, holding fewer than 40 parking spots and experiencing relatively low use aside from occasional school groups or a few high-use days. Prior to installation of structural BMPs during the summer of 2013, most parking lot runoff drained down the entrance ramp, to a vegetated swale adjacent to the lot, and from there to the unnamed stream (DUX009), while a small amount of parking lot runoff drained down the trail to the beach at DUX008. In addition, the two portable toilets and trash can were formerly located off the right side of the trail to Agate Beach, near the top of bank of the unnamed stream.

The County was the recipient of a Proposition 84 grant from the State of California to implement source control projects in the Duxbury Reef and Point Reyes Headlands ASBSs with its grant partners at the National Park Service, Point Reyes National Seashore. The purpose of the grant funding was to implement surface water quality improvement and source control projects to address potential discharges identified within the ASBS watersheds. In addition to funding rangeland improvements on Federal agricultural park lands, the grant has allowed the County to retrofit the Agate Beach parking lot with structural stormwater BMPs.

The parking lot was cited as a potential threat to the Duxbury Reef ASBS in the 2003 reconnaissance report by SCCWRP (SCCWRP 2003). The parking lot was retrofitted during the summer of 2013 with pervious pavement and integrated storm water retention and infiltration structures. Improvements were also made to the adjacent drainage swale to create a series of check dams to encourage storm water filtration and infiltration during periods of heavy runoff when the parking lot BMPs may not be able to absorb the full volume of runoff. The impervious trailhead of the path from the parking lot to the beach was also replaced with pervious decomposed granite, and the portable toilets were relocated away from the top of the stream bank and placed in a covered enclosure to prevent spills.

Runoff from the new portable toilet area now flows through the new parking lot drainage system, rather than directly to the unnamed stream that carries flow to the outfall at DUX009.

Pre-construction monitoring of the structural BMP implementation area was conducted during the 2012-2013 winter and was compared to post-construction monitoring that was completed during the 2013-2014 winter. Results of the pre-, and post-construction monitoring are provided in the Summary of Baseline Water Quality Sampling report (Voeller and Carson 2014) and the Summary of Pre- and Post-Project Water Quality Sampling (Voeller and Carson 2014) prepared as part of reporting requirements for State Water Board funding Agreement # 10-403-550. Pre- and post-construction water quality monitoring of the parking lot project demonstrated a nearly 60% reduction in runoff volume as well as reductions in the concentrations of sediment, oil and grease and some trace metals resulting from the parking lot BMPs (Schiff and Brown, 2015; Voeller and Carson, 2015). The results of monitoring parking

lot runoff showed no samples exceeded a single instantaneous maximum water quality objective from the CA Ocean Plan in either pre- or post-project monitoring results.

### 5.3.7. Facility Maintenance and Repair

The grant-funded improvements to the parking lot and portable toilet facilities are meant to provide lasting water quality benefits for a period of at least twenty years. Pervious pavement can clog over time, leading to reduced infiltration rates. In order to maintain the water quality function of the pervious pavement, County Parks and Open Space will manage the annual cleaning of the lot with a vacuum street sweeper. The portable toilets will be serviced regularly, on a schedule commensurate with visitor use, to prevent any waste discharge from the facilities. Maintenance of the foot paths and trail will include regular inspections and identification and implementation of necessary repairs. Non-emergency repair of any facilities at the Park will occur during dry weather and all maintenance and facility repair activities will require that appropriate stormwater pollution prevention measures be in place.

# 6.0 MONITORING

## 6.1. Monitoring Program

Water quality and biological sampling of urban storm water discharges and receiving waters are a mandatory stipulation of the Special Protections for Areas of Special Biological Significance. In 2012, the County of Marin joined forces with ten (10) other ASBS permittees from the Central Coast of California to form a collaborative RMP to comply with the monitoring requirements of the Special Protections. The purposes of the RMP are to share monitoring program costs, to follow consistent monitoring design and data quality methods and to collect and analyze monitoring data that can be compared to or contrasted with data from other regional efforts along the California coastline.

The Central Coast ASBS Regional Monitoring Program (CCRMP) is a collaboration of various agencies and entities on the Coast, covering an area from Big Sur, in Monterey County, to Pt. Reyes, in Marin County. The program conducted water quality monitoring according to the requirements of the Core Discharge Monitoring Program (outfalls) as well as the Ocean Receiving Water and Reference Area Monitoring Program for the physical, chemical and biological characteristics specified in the Special Protections. The CCRMPs ten (10) participants are each designated as Responsible Parties including: The Counties of Marin, Monterey, San Mateo; the Cities of Carmel-by-the-Sea, Monterey, Pacific Grove; Caltrans, California State Parks, Hopkins Marine Station, Monterey Bay Aquarium and the Pebble Beach Company. The Scope of Work for the Central Coast ASBS RMP was developed through discussions with staff from State and Regional Water Boards, as well as the responsible parties discharging storm water into ASBS.

In early 2013, a RMP Memorandum of Agreement (MOA) was executed between all parties to perform a coordinated monitoring effort to investigate concentrations of pollutants of concern at particular freshwater reference sites, ocean receiving water sites, and urban storm water discharge sites. Additionally, the program includes biological and bioaccumulation monitoring. In April 2015, the County executed an extension of the MOA in order to complete the required Core Discharge and Receiving water monitoring during the 2015-16 winter season.

Applied Marine Sciences (AMS) was selected to direct and perform the scientific monitoring needs of the RMP members, including field and follow-up analytical and statistical work. Monterey Bay National Marine Sanctuary staff and volunteers also assist with portions of the ASBS monitoring program. The CCRMP contractor has developed a Quality Assurance Project Plan (QAPP; AMS 2014), a set of standard operating procedures (AMS 2013) to guide the monitoring effort.

In total, the RMP has 40 sampling locations. One (1) urban storm water discharge is sampled along the Duxbury Reef ASBS to assist in better understanding the relative health of this ASBS ecosystem and the effects of discharges entering it. A list of all sampling sites, including their respective sampling requirements and the overall sampling scheme is available in the contractor's Scope of Work.

The CCRMP includes a discharge station at DUX009 and a receiving water station in the surf zone near DUX009. In addition, the CCRMP monitors water quality at nine reference stations from Tunitas Creek in San Mateo County south to Big Creek in the Los Padres National Forest. Under agreement between the CCRMP and the SWRCB, monitoring of the reference water station at Salmon Creek, north of Point Reyes was to be conducted by the Air Force as part of their individual monitoring program. The results from the collective reference area monitoring is to be used to calculate the 85$^{th}$ percentile reference area "natural water quality". Our current understanding is that the Air Force was allowed by the State

and Regional Waterboards to select one of the CCRMP monitoring locations (Tunitas Creek) to use as a reference location. This results in reference area dataset that has a smaller geographic extent, and is less representative of the diverse conditions along the Central California coast. Rocky Intertidal biological monitoring, and bioaccumulation studies are also ongoing as part of the regional and statewide monitoring efforts. Those data were used to determine the existing relative health of near shore biological environment for this RMP effort.

Water quality and biological results from the RMP monitoring program including mussel bioaccumulation monitoring, toxicity testing, rocky intertidal monitoring for diversity and community composition, and nutrient monitoring do not indicate an impact by the discharges on the ASBS beneficial use at any of the RMP monitoring sites.

The first water quality sampling season was completed during the Winter 2013/2014, and included samples from three storm events from the discharge and receiving waters at Duxbury Reef. The preliminary results from season one sampling are included in an interim report from the CCRMP contractor. The second season of monitoring was initiated during the Winter 2014/15. Unfortunately, due to lack of storm events, only two storms were sampled from the discharge and receiving waters at Duxbury Reef. The final storm event required was sampled during the winter 2015/16.

The monitoring results for parameters required in the Special Protections indicate that there were no exceedances of instantaneous maximum Ocean Plan standards in receiving waters for the grab samples collected from six storms at Duxbury Reef. The reference area monitoring program provided the data necessary to evaluate reference water quality conditions both locally and regionally, and to calculate the most relevant 85$^{th}$ percentile reference condition to be applied to the receiving waters at Duxbury Reef ASBS.

The RMP efforts at Duxbury Reef ASBS sampling locations and all others in the region provided the scientific water quality and biological data necessary to comply with the monitoring requirements of the Special Protections. The study results provide insight to the local agencies, the regional and state waterboards in the evaluation of the current and relative health and quality of California ASBS.

### 6.1.1. Process for Addressing Water Quality Objective Exceedances

If, based upon the results of monitoring, it is determined that storm water runoff from the County's identified discharge may be causing or contributing to an alteration of natural ocean water quality in the ASBS, the County will report to the State and Regional Water Boards within thirty days. The report will identify which constituents were indicated and what BMPs are being implemented or planned to address the alteration of natural water quality. An exceedance report may also trigger an update of the County's ASBS Compliance Plan within thirty days, if additional BMPs are required.

The process for evaluating whether alterations of natural ocean water quality in the Duxbury Reef ASBS are the result of discharges from DUX009 and other ASBS drainage points is provided in the ASBS Flow Chart (Figure 2 in Appendix C of the NPDES Phase II General Permit . If exceedances of Ocean Plan WQOs are observed at DUX009, it does not necessarily imply that natural ocean water quality will be altered. Nor would observed alterations in natural ocean water quality necessarily be caused by discharges from the land-based watershed. Dilution processes are an important consideration as well as ocean influences that may not be detected at the reference station (see Section 2.2). The challenges in establishing these types of links will be considered in evaluating water quality monitoring results.

## 6.2. Additional Baseline and BMP Monitoring

### 6.2.1. Ocean Plan Exception Monitoring

In order to meet the State Water Board's requirements to apply for the Ocean Plan General Exception, the County and MCSTOPPP performed water quality monitoring in 2006 and 2007.

Samples were collected for chemical, physical and bacteriological constituents from discharge point (DUX009) and in the ambient marine water of the Duxbury Reef ASBS on April 24, 2006, within 24 hours of the most recent storm event. The water samples were analyzed for the following constituents: total Ocean Plan metals, polynuclear aromatic hydrocarbons (PAHs), oil and grease, ammonia nitrogen and bacterial indicators including total coliform, *E. coli* and Enterococcus. Two additional samples for bacterial indicators were collected from Alder Creek just above the confluence with DUX009, and along the small unnamed tributary adjacent to the Agate Beach trail.

Water chemistry results from the monitoring indicate total nickel concentrations exceeded the daily maximum (but not the instantaneous maximum) WQO for nickel listed in Table B of the Ocean Plan (State Water Board 2009) at discharge point DUX009. Total PAH levels in water samples from both the Agate Beach Parking lot discharge point (DUX009) and ambient marine water exceeded the 30-day average concentration limit; however, the sample did not represent a 30-day average (MCSTOPPP & Marin County 2008). None of the other detected constituents, such as nickel, copper or chromium, exceeded the instantaneous maximum limits listed in Table B of the California Ocean Plan.

For the bacterial indicators, the ambient marine water sample results did not exceed the Ocean Plan Single Sample Maximum Water Contact Standards. The sample from discharge point DUX009 exceeded the WQO for Water Contact Recreation for Total Coliform Bacteria and Enterococcus listed in the Regional Water Board's Basin Plan (see Regional Water Board 2010; Tables 3-1 & 3-2). However, because Duxbury Reef is outside the range of the Southern sea otter, there is no requirement in the Special Protections to analyze samples for indicator bacteria at Duxbury Reef.

Water samples were also collected for water toxicity testing from the runoff from discharge point DUX009 and from a Duxbury Reef ASBS receiving water sampling location on March 26, 2007. Statistical analysis of the bioassay data shows that significant toxic effects on the Giant Kelp endpoints relative to the control treatment were observed with dilutions over 25% in the Duxbury Reef ASBS receiving water sample, but not in the DUX009 discharge water sample. There were no significant effects on Giant Kelp exposed to the water collected from the discharge point (DUX009). Although the effects observed with the Kelp were statistically significant, the calculated LC50 and IC50 (Median Lethal and Inhibitory Effects Concentrations) values were all over 100%, indicating the observed effects were relatively slight (MCSTOPPP & Marin County 2008).

### 6.2.2. BMP Effectiveness Monitoring

The County completed project specific BMP effectiveness monitoring as part of the Proposition 84 Source Control grant implementing BMPs in the Duxbury Reef ASBS. The County projects included the summer 2013 installation of the structural stormwater BMP at the Agate Beach parking lot described above in Section 5.3.6. A water quality monitoring plan was developed to establish a short-term baseline prior to BMP implementation and to help evaluate the effectiveness of the BMPs at reducing pollutant loads in storm water (Voeller et al. 2012). The baseline sampling was conducted at DUX009 and two additional locations near the Agate Beach parking lot during the 2011-2012 and 2012-2013 rainy seasons.

The monitoring plan called for monthly samples (provided there is instream flow) between November and April plus three storm samples (for a total of nine samples/site) during the year of pre-construction monitoring. However, because of to the timing for review and approval of the monitoring plan, only a single monthly event and a single storm event were sampled in 2011-2012. In 2012-2013, three storm events were sampled and but no monthly events were sampled because the sites at the parking lot only flowed during rain events. Sample parameters included instantaneous core parameters (water temperature, salinity, dissolved oxygen, pH and specific conductance), discharge (flow rate, water depth and channel width), nutrients (nitrate and ammonia), sediments (turbidity and total suspended solids), and other parameters listed in the Ocean Plan (metals, polynuclear aromatic hydrocarbons and total oil and grease). Review of the data demonstrates that no Ocean Plan instantaneous maximum WQOs were exceeded. A report (Voeller and Carson, 2014) describing the results of the baseline monitoring was submitted in January 2014 to the State Water Board as part of the requirements of the Grant Agreement (#10-403-550). Post-construction water quality monitoring of the same locations at the parking lot project was conducted over the 2013-14 winter season and results were submitted as part of the grant project reporting during the spring of 2015 (Voeller and Carson, 2015). The analysis of pre- and post-project monitoring data demonstrated that no sample exceeded the instantaneous maximum from the CA Ocean Plan, and that the implementation of the structural BMPs at the parking lot was responsible for a nearly 60% reduction in runoff volume as well as reductions in the concentrations of sediment, oil and grease and some trace metals (Schiff and Brown, 2015; Voeller and Carson, 2015).

# 7.0 COMPLIANCE AND IMPLEMENTATION SCHEDULE

The County's ASBS Special Protections general implementation schedule is included as Table 7.1 and the Best Management Practices (BMP) Implementation schedule is included as Table 7.2.

**Table 7.1.** Marin County ASBS Special Protections Implementation Schedule

| Element | Timeline | Remarks |
|---|---|---|
| Prohibit all non-authorized non-storm water discharges and trash. | Mar. 20, 2012-Present | Completed through implementation of Phase II permit. Illicit discharge prevention and response BMPs are described in Section 5.1.5. Trash elimination BMPs are described in Sections 5.1.4 and 5.3.5. |
| Implement non-structural BMPs including inspection program. | Sep. 20, 2013-Present | Completed and ongoing consistent with the Phase II permit and this Compliance Plan.<br>• The construction, industrial, commercial, and storm drain outfall inspection program is described in Section 5.1.1.<br>• Other non-structural BMPs include ASBS-targeted public outreach (Sections 5.1.3 and 5.3.4), and permit tracking (Section 5.1.8).<br>• Marin County Code 23.18 –Stormwater Runoff Pollution Prevention and sections of the development code: 24.04.625 and 24.04.627 |
| Agate Beach parking lot was retrofitted with pervious pavement and integrated storm water retention and infiltration structures | Summer of 2013 | This structural BMP demonstrated nearly 60% reduction in annual runoff, as well as reductions in the concentrations of sediment, oil and grease and some trace metals |
| Submit Draft Compliance Plan to State and Regional Water Boards. | Sep. 20, 2014 | Completed with submittal of the draft Compliance Plan on September 19th, 2014. |
| Submit Final Compliance Plan to State and Regional Water Boards | Sep. 18, 2015 | Revisions in response to SWRCB comments on Draft Compliance Plan and preliminary discharge and receiving water monitoring results. |
| Submit Revised Final Compliance Plan to State and Regional Water Boards. | Sep. 20, 2016 | In response to final monitoring data and determinations of any exceedances of Natural Water Quality. |
| Any additional structural BMPs determined necessary to comply with Special Conditions are operational. | Mar. 20, 2018 | We anticipate no additional structural controls will be necessary to comply with the Special Protections. See Table 7.2 below for list of planned BMPs. |
| Compliance with Special Protections for Duxbury Reef | Mar. 20, 2018 | Reference and receiving water quality will be characterized by 2016 as part of CCRMP monitoring. Discharge monitoring conducted in 2013/14,2014/15 and 2015/16 by CCRMP. |

**Table 7.2.** Marin County ASBS Best Management Practices Implementation Schedule

| Compliance Action | Timeline/Frequency | Regulatory Reference | Compliance Plan Section | Responsible Party |
|---|---|---|---|---|
| ***Non-Structural BMPs*** | | | | |
| Prohibit illegal dumping and non-stormwater discharges through Illicit Discharge Detection and Elimination (IDDE) Program | IDDE Program since 1993 Revised ordinance in 2015 to specify exceptions to ASBS discharge prohibition. | Phase II Small MS4 General Permit Section E.9. and Marin County Code 23.18 | Section 5.1.5 | County Local Stormwater Program |
| Construction site pollution controls | Required by County Ordinance since 1996; Revised ordinance in 2015 | Phase II Permit Section E.10. and Marin County Code 23.18 | Section 5.1.10. | DPW Land Development (permitted projects) or Local Stormwater Program (small projects and IDDE) |
| Construction site inspections | Weekly during Rainy Season | Phase II Small MS4 General Permit Section E.10.c.; Section E.4 & Attachment C – A.2.c.(4) | Table 5.1 in Section 5.1.1. | DPW Land Development Division |
| Inspections of Stormwater Outfalls >18-inches | Twice annually (once prior to start of rainy season, once during rainy season | Phase II Small MS4 General Permit Section E.4 & Attachment C – A.2.c.(4) | Table 5.1 in Section 5.1.1. | County Local Stormwater Program |
| Inspection of stormdrain facilities (i.e. road-crossing culverts) in the watershed | Twice during rainy season | Phase II Permit Section E.11.g. | Section 5.1.9. | County DPW Roads Division |
| Street sweeping of County-maintained roads | Annually | | Section 5.1.9. | County DPW Roads Division |

| Compliance Action | Timeline/Frequency | Regulatory Reference | Compliance Plan Section | Responsible Party |
|---|---|---|---|---|
| Maintenance and repair of paved roads in the watershed | As needed | Phase II Permit Section E.11.h. | Section 5.1.9. | County DPW Roads Division |
| Maintain "no pesticide or herbicide" approach for Districts activities | Always | | Section 5.1.6. | Bolinas Community Public Utility District and Bolinas Fire Protection District |
| Implement Integrated Pest Management (IPM) Policy and Program – including "No Spray" policy in Bolinas | Always | Phase II Permit Section E.11.j. | Section 5.1.6. | County Parks, other County Departments and County contractors |
| Community watershed and marine debris clean up volunteer events | Annually in September | | Section 5.1.4. | County Parks or Local Stormwater Program |
| Educational signage at Agate Beach about ASBS water quality protections | Installed Spring 2015 | | Section 5.3.4. | Maintained by County Parks |
| Direct ASBS educational outreach to residents | Newsletter sent in January 2015; Targeted property stormwater self-assessment to be undertaken in 2017 | | Section 5.1.3. | County Local Stormwater Program |
| Public education through MCSTOPPP website. | ASBS webpage launched in 2015: http://www.marincounty.org/depts/pw/divisions/mcstoppp/ duxbury-reef-asbs | | Section 5.1.3. | County Local Stormwater Program |

| Compliance Action | Timeline/Frequency | Regulatory Reference | Compliance Plan Section | Responsible Party |
|---|---|---|---|---|
| Hazardous Materials Area Plan | Published in 2008 | Phase II Permit Section E.11.d. | Section 5.1.7. | Federal, State and Local Agency response during hazardous materials incident. |
| ***Structural BMPs*** | | | | |
| Existing LID Stormwater System Design | Will be maintained in its current form | | Section 5.2.1. | County DPW Roads and BCPUD |
| Post-Construction BMPs (i.e. permanent stormwater controls) for New and Redevelopment | As of July 1, 2015 | Phase II Permit Section E.12. | Section 5.2.3 | County DPW Land Development and CDA Planning |
| Agate Beach Parking Lot Stormwater Improvements | Retrofit with pervious pavement and stormwater infiltration and detention structures installed in Fall 2013 | | Section 5.3.6. | County Parks |
| Agate Beach Access Trail Improvements | Design planned for early 2017; Construction in summer of 2017. | | Section 5.3.2. | County Parks |

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