

# **Sewage Spill Reduction Action Plan Volume II**



On Behalf of:

**Almonte Sanitary District  
Homestead Valley Sanitary  
District**

**Alto Sanitary District  
Richardson Bay Sanitary  
District  
Tamalpais Community  
Services District**

**City of Mill Valley  
Sewerage Agency of Southern  
Marin**

In Response to  
Docket No.: CWA-309(a)-08-030

**April 2009**

## Certification and Signatures

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

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### **Appendices**

**Appendix A Amended Order for Compliance**

**Appendix B Pump Station Data Sheets - SASM**

**Appendix C Pump Station Data Sheets - Mill Valley**

**Appendix D Pump Station Data Sheets - RBSD**

**Appendix E Pump Station Data Sheets - TCSD**

**Appendix F Defect Coding System for Sewer Pipe Inspections Performed Prior to April 10, 2008 - SASM, and RBSD**

**Appendix G Sample SSO Response and Sewer Cleaning Contract**

## **List of Abbreviations**

Alto	Alto Sanitary District
Almonte	Almonte Sanitary District
BMP	Best Management Practice
CCTV	Closed Circuit Television
d/D	Depth/diameter
EDU	Equivalent Domicile (Dwelling) Units
EHS	County of Marin Environmental Health Services
EPA	U.S. Environmental Protection Agency
FOG	Fats, Oils, and Grease
FSE	Food Service Establishment
GI	Grease Interceptor
GRD	Grease Removal Device
GT	Grease Trap
GWDR	Statewide General Waste Discharge Requirements
HVSD	Homestead Valley Sanitary District
I/I	Infiltration and Inflow
MACP	Manhole Assessment and Certification Program
Mill Valley	City of Mill Valley
MH	Maintenance Hole
MMS	Maintenance Management System
NASSCO	National Association of Sewer Service Companies
NDPES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
Order	EPA Order for Compliance
PACP	Pipeline Assessment and Certification Program
PS	Pump Station
RBSD	Richardson Bay Sanitary District
SASM	Sewerage Agency of Southern Marin
SOP	Standard Operating Procedure
SSO	Sanitary Sewer Overflow
SSORP	Sanitary Sewer Overflow Response Plan
SSMP	Sewer System Management Plan
SSRAP	Sewage Spill Reduction Action Plan (Submitted October 15, 2008)
SSRAP – Volume II	Sewage Spill Reduction Action Plan – Volume II
SWRCB	State Water Resources Control Board
TCSD	Tamalpais Community Services District
WWTP	Wastewater Treatment Plant

## Section 1 Overview

### 1.1 Purpose of Document

#### 1.1.1 General

An Order for Compliance (Order), included in Appendix A, was issued by the U.S. Environmental Protection Agency (EPA) to compel the Sewerage Agency of Southern Marin (SASM), Almonte Sanitary District (Almonte), Alto Sanitary District (Alto), City of Mill Valley (Mill Valley), Homestead Valley Sanitary District (HVSD), Richardson Bay Sanitary District (RBSD), and Tamalpais Community Services District (TCSD), collectively known as SASM and its member agencies, to “consistently and substantially reduce the frequency and volume of sewage spills to waters of the United States” and to “complete improvements necessary to eliminate conditions in its collection system that cause or contribute to wastewater spills from SASM’s collection system or wastewater treatment plant.” In addition, the Order states that “SASM shall... achieve consistent compliance with its 2007 [NPDES] Permit”. (*CWA-309(a)-08-030*)

This Sewage Spill Reduction Action Plan – Volume II (SSRAP – Volume II) is the second of several submissions to the EPA and the San Francisco Regional Water Quality Control Board (RWQCB). This second submittal addresses the April 15, 2009 requirements of the Order.

The purpose of each section of the SSRAP – Volume II is further developed in the subsections below and throughout this submittal. Future submissions will move SASM and its member agencies closer to completely achieving the goals as stated in the Order.

#### 1.1.2 Sewer Cleaning and Root Control Program

Section III.A.1 of the Amended Order requires each agency to submit a Sewer Cleaning and Root Control Program by April 15, 2009. These plans were submitted in October of 2008 as part of the original SSRAP document.

#### 1.1.3 Maintenance Management Systems

Section 2 of this SSRAP – Volume II summarizes the status of implementation of each agency’s computerized maintenance management system (MMS) as required by Section III.B of the Order. Section 2 describes the capabilities of each system and shows how each system meets the requirements of the Order.

#### 1.1.4 Pump Station Reliability Certification

Section 3 of this SSRAP - Volume II submittal addresses Pump Station Reliability Certification (Section III.C of the Order). Section 3 describes the pump stations within the SASM and member agencies’ collection systems and provides an estimated time to overflow in the event of station failure during peak dry weather flow. Section 3 provides certification of each pump station for continuous operation during electrical and mechanical failure and power outage. Certification that each station is equipped for design peak wet weather flow is not addressed in this report because the Capacity Assessment (Section IV.B.3 of the Order) is scheduled for completion on October 15, 2010, and design peak wet weather flows to pump stations will be developed as part of the Capacity Assessment, using flow data collected during the winter of 2008-2009. After development of peak wet weather flows, the stations will be evaluated again for capacity.

Where an agency is unable to certify that a pump station is adequately equipped, a plan has been prepared, including a schedule and cost estimates for completing all repairs, renovations and upgrades to the pump station to ensure continuous operation during an electrical, mechanical or power failure. In conjunction with the Capacity Assessment as described above, the plan will be revised or amended to include repairs, upgrades or renovations required to ensure adequate capacity for peak wet weather flows.

### 1.1.5 Collection System Assessments

Section IV.A of the Order required that the agencies provide a condition rating for each pipe inspected during the five years prior to issuance of the Order. The original SSRAP included a summary of the pipes that had been previously inspected but did not summarize the condition of the pipes that had been previously inspected. Section 4 of this SSRAP - Volume II summarizes the condition of pipes inspected during the five years prior to issuance of the Order. Section 4 includes a more detailed schedule for inspection of the remainder of each agency's system as requested by the EPA's letter dated January 15, 2009.

### 1.1.6 Implementation Study and Report

The Implementation Study and Report was completed and submitted with the original SSRAP in October of 2008. In a comment letter dated January 15, 2009, the EPA asked for an update of progress related to this topic. Section 5 of this SSRAP – Volume II describes the areas where the agencies have successfully collaborated on wastewater collection system issues during recent months.

### 1.1.7 Contracts with Private Contractor(s)

Section II.A.7 of the Order requires each agency to provide copies of the contracts obligating the contractor(s) to fulfill the requirements of the SSO Response Plan implemented by each agency. Also, Section III.A.1.e of the Order requires each agency to provide copies of the contracts obligating the contractor(s) to fulfill the requirements of the sewer cleaning and root control program pursuant to the Order. Appendix G of this SSRAP – Volume II includes a sample contract for both SSO response and sewer cleaning services by contractors. Each agency will submit a copy of their signed contract(s) to the EPA under separate cover.

## 1.2 Administrative Order Background

### 1.2.1 History

This Sewage Spill Reduction Action Plan is the result of a collaborative effort between SASM and its member agencies. The EPA has ordered in *Docket No.: CWA-309(a)-08-030* that these organizations work together to reduce and eliminate collection system sewage spills. This section of the SSRAP - Volume II briefly outlines the history of events that led to this Order.

In August and October of 2007, the EPA conducted inspections of the collection systems owned and operated by SASM and five of its member agencies. The EPA inspected the sixth member agency, Mill Valley, in February 2008. Through these inspections, the EPA determined that the causes of the spills were sewer blockages, primarily from root intrusion and debris, and I/I in the collection systems. I/I occurs when water normally outside of the collection system, such as groundwater and surface water runoff, enters the collection systems. I/I increases peak wet weather flows which can cause overflows at constriction points in the collection system, at pump stations, and at downstream wastewater treatment plants (WWTP). The EPA also found that many of the pipes are aged and deteriorated. These conditions contribute to I/I flows.

Approximately 2.45 million gallons of wastewater bypassed the SASM treatment plant and discharged to Richardson Bay on January 25, 2008. The bypass occurred during wet weather flows, and the EPA found that it was caused “in part, by excessive inflow and infiltration to the member agencies’ collection systems that resulted in peak wet weather flows through the collection systems and to the wastewater treatment plant.” (*CWA-309(a)-08-030*)

The EPA issued the Order on April 10, 2008 and transmitted a copy of the Order to SASM and the member agencies and the San Francisco RWQCB. The EPA amended the Order on September 2, 2008.

## 1.2.2 Connection between Order for Compliance and SSRAP - Volume II

This document has been developed in response to the EPA's Order for Compliance. The Order outlines a number of components for the SSRAP - Volume II. The SSRAP - Volume II generally follows the Order outline but some changes were made to maximize the benefit to the named parties of compiling and documenting the procedures and information for the SSRAP - Volume II. Table 1-1 below will facilitate review of the SSRAP - Volume II by connecting the Order requirements with the SSRAP sections.

**Table 1-1: Connection between Order Requirements and SSRAP - Volume II Sections**

Order Section	Summary of Order Requirement	Corresponding SSRAP – Volume II Section <sup>a</sup>
<b>Sewer Cleaning and Root Control Program</b>		
III.A.1	Sewer Cleaning and Root Control Program	See October 2008 SSRAP
<b>Sewer Overflow Response and Sewer Cleaning Contracts</b>		
II.A.7	Provide Copy of Contract with Contractor for Sewer Overflow Response	See Appendix G for a sample contract scope of services; Signed contracts submitted by each agency under separate cover.
III.A.1.e	Provide Copy of Contract with Sewer Cleaning Contractor	See Appendix G for a sample contract scope of services; Signed contracts submitted by each agency under separate cover.
<b>Maintenance Management Systems</b>		
III.B.1	Obtain and Implement an MMS	2.2
III.B.2	MMS linked to a GIS map	2.2
<b>Pump Station Reliability Certification</b>		
III.C.1	Pump station descriptions	3.#
III.C.2	Pump station certification	3.#
III.C.3	Pump station plan	3.#
III.C.4	Facility renovation report	3.#
<b>Sewer Pipe and Maintenance Hole Inspection and Condition Assessment</b>		
IV.A.1.b	Inspection schedule	4.#.3
IV.A.1.c	Evaluation system	4.#.1.2
IV.A.2	Summary of previous inspections	4.#.1.1
<b>Implementation Study and Report</b>		
VII.A	Evaluates options for collaboration on efforts to implement and comply with the requirements of this Order	Collaboration options were documented in the October 2008 SSRAP. See Section 5 below for an update on implementation activities.
VII.B	Submit a progress report documenting activities conducted to complete the study and report.	See October 2008 SSRAP

Footnotes:

- a. “#” indicates agency-specific subsection.

### 1.3 Agency Descriptions

The following descriptions are provided in the Order:

- Almonte Sanitary District operates a sewage collection system that collects sewage from approximately 789 equivalent domicile units (EDUs), servicing a population of approximately 1,478 in southern Marin County. Almonte's collection system includes approximately 5.5 miles of sewage pipes. Sewage collected by Almonte's collection system is conveyed to the sewage collection system operated by Sewerage Agency of Southern Marin (SASM) and thereafter conveyed for treatment at the Sewerage Agency of Southern Marin Wastewater Treatment Plant.
- Alto Sanitary District operates a sewage collection system that collects sewage from approximately 508 EDUs, servicing a population of approximately 1,000 in southern Marin County. Alto's collection system includes approximately 14,874 LF or almost three miles of sewage pipes. Sewage collected by Alto's collection system is conveyed to the sewage collection system operated by SASM and thereafter conveyed for treatment at the Sewerage Agency of Southern Marin Wastewater Treatment Plant.
- City of Mill Valley operates a sewage collection system that collects sewage from approximately 7,140 EDUs, servicing a population of approximately 13,600 in southern Marin County. Mill Valley's collection system includes approximately 59 miles of sewage pipes, two pumping stations, and a half mile of force main. Sewage collected by Mill Valley's collection system is conveyed to the sewage collection system operated by SASM and thereafter conveyed for treatment at the Sewerage Agency of Southern Marin Wastewater Treatment Plant.
- Homestead Valley Sanitary District operates a sewage collection system that collects sewage from approximately 1,064 EDUs, servicing a population of approximately 2,354 in southern Marin County. Homestead Valley's collection system includes approximately 11 miles of sewage pipes. Sewage collected by Homestead Valley's collection system is conveyed to the sewage collection system operated by SASM and thereafter conveyed for treatment at the Sewerage Agency of Southern Marin Wastewater Treatment Plant.
- Richardson Bay Sanitary District operates a sewage collection system that collects sewage from approximately 4,664 EDUs, servicing a population of approximately 9,494 in southern Marin County. Richardson Bay's collection system includes approximately 40 miles of sewage pipes, four miles of force mains, 15 pump stations, and eight individual home pump stations. Sewage collected by Richardson Bay's collection system is conveyed to the sewage collection system operated by SASM and thereafter conveyed for treatment at the Sewerage Agency of Southern Marin Wastewater Treatment Plant.
- SASM operates a sewage collection system and the wastewater treatment plant known as the Sewerage Agency of Southern Marin Wastewater Treatment Plant. SASM's collection system includes approximately five miles of sewage pipes, ten miles of force mains, and six lift stations. SASM's collection system collects sewage from the Almonte, Alto, Mill Valley, Homestead Valley, Richardson Bay, and a portion of the Tamalpais collection systems. SASM discharges treated wastewater from the Sewerage Agency of Southern Marin Wastewater Treatment Plant to Raccoon Strait in San Francisco Bay.
- Tamalpais Community Services District operates a sewerage collection system that collects sewage from approximately 2,560 EDUs, servicing a population of approximately 5,851 in southern Marin County. Tamalpais' collection system includes approximately 27 miles of sewage pipes, less than one mile of force main, and two pump stations. Sewage collected by Tamalpais' collection system, except that from the area known as Kay Park, is pumped to a sewage collection system operated by Sausalito-Marín City Sanitary District and thereafter conveyed for treatment at the Sausalito-Marín City Sanitary District Wastewater Treatment Plant. Sewage from about

140 EDUs in Kay Park flows to the sewage collection system operated by SASM and thereafter conveyed for treatment at the Sewerage Agency of Southern Marin Wastewater Treatment Plant.

In the case of TCSD, this SSRAP - Volume II addresses only the portion of the collections system that is tributary to the SASM WWTP. **Figure 1-1** shows the location of the agencies in relation to one another and to the San Francisco Bay Area.

## 1.4 Relationship between Plan and Regulatory Documents

SASM and its member agencies are each responsible for adhering to the requirements of several regulatory agencies as well as their own internal policies and procedures. This SSRAP - Volume II submittal has been written solely to address the requirements of the EPA Order and is not intended to replace or supersede other policy and procedure documents. Some of the other regulatory documents, such as the Sewer System Management Plans (SSMPs) required by the RWQCB and by the State Water Resources Control Board (SWRCB) under the Statewide General Waste Discharge Requirements (GWDR) for Sanitary Sewer Systems, or the County of Marin Environmental Health Services (EHS) procedures, are directly relevant to the content of this document. In those cases, the content of those documents were used directly or adapted to fit the format of the SSRAP - Volume II. SASM and its member agencies will incorporate commitments made in the SSRAP - Volume II as appropriate into other regulatory agency required documents.

## Section 2 Maintenance Management Systems

### 2.1.1 Purpose

This section addresses Section III.B of the EPA Order requiring agencies to implement a computerized maintenance management system (CMMS) linked to a Geographical Information System (GIS).

### 2.1.2 Requirements of the EPA Amended Order for Compliance

The EPA Order, Section III.B includes the following requirements:

#### III. COLLECTION SYSTEM MAINTENANCE AND MANAGEMENT

##### B. Maintenance Management System

1. *By April 15, 2009 SASM and the member agencies shall obtain and implement a computerized sewer maintenance management system (MMS) capable of scheduling and tracking completion of sewer cleaning, maintenance, repairs, and SSOs. The MMS shall record information on sewer system inspections, condition ratings, and sewers repaired, rehabilitated and replaced. The MMS shall have the capability to be used to generate reports summarizing SSOs and identify hot spots.*
2. *By April 15, 2009 the MMS shall be linked to a Geographic Information System (GIS) map, or equivalent map system, of the sewage collection systems, which in turn shall be linked to an inventory of sewer system assets that includes information on asset age, material, dimensions and capacities.*
3. *By October 15, 2008, SASM and the member agencies each shall submit a progress report documenting activities conducted to implement the MMS by April 15, 2009.*

The agencies submitted their plans for implementation of an MMS in the original SSRAP that was submitted on October 15, 2008.

## 2.2 Implementation of an MMS linked to GIS

Almonte Sanitary District, Alto Sanitary District, the City of Mill Valley, Homestead Valley Sanitary District, Richardson Bay Sanitary District, Tamalpais Community Services District and SASM have all implemented the Sanitary Sewer Geographical Information System (SSGIS) computerized maintenance management system (MMS) for management of the collection system maintenance program. The SSGIS is an ArcView geographic information system (GIS)-based application with an interface consisting of a table of contents, a map display, menus, and toolbars.

The SSGIS MMS is capable of scheduling and tracking completion of customer complaints, sewer cleaning, maintenance, repairs, and SSOs. The system is capable of recording SSO data including location, date of discovery, estimated volume released, and overflow cause. The system is also capable of scheduling routine preventive maintenance activities including type of activity, location, frequency, and next scheduled date for maintenance.

The SSGIS MMS is also capable of recording information on sewer system inspections, condition ratings, and documenting which sewer pipes have been repaired, rehabilitated, or replaced. The system can track information related to structural and nonstructural defects, including type of defect, severity, location, and date of discovery. The system also tracks location, type of renewal, and cost of labor and material.

The SSGIS MMS software has the capability to generate reports summarizing SSOs and hot spots. Standard reporting can be performed within GIS using reporting user interface screens with report outputs on both a GIS map and a standard tabular report. User-defined queries can be created to analyze any data included in the SSGIS database using either ESRI ArcView or MS Access. The system can also be used to easily locate and zoom to manholes, pipes, and parcels. The SSGIS MMS software is an ESRI

ArcView-based application that is linked to a GIS map of the wastewater collection system. SSGIS is capable of supporting GIS updates. This includes capabilities for viewing and editing pipe and manhole attribute information such as age, capacity, dimensions, and material. It also includes the graphic capability to add, move, delete, and reconnect facilities. An update of the SASM GIS data was performed during the implementation of the SSGIS system to identify direction of flow and correct any inaccuracies in the data that were apparent.

The GIS data that is accessed by SSGIS includes available sewer pipe attribute information on sewer pipe age (year installed and year replaced), material, dimensions (size and length), and capacity (d/D). System attribute data can be accessed through queries using the SSGIS user interface or by using SSGIS to view attribute data directly within the data tables. Updates to attribute data can be performed through either the SSGIS user interface or by directly updating the data tables. Updates to manhole coordinates can be performed by loading GPS-collected data.

Implementation of the SSGIS system by all agencies ensures that all agencies have complied with the MMS requirements of section III.B of the Order.

## Section 3 Pump Station Reliability Certification

### 3.1 Introduction

#### 3.1.1 Purpose

This section addresses Pump Station Reliability Certification (Section III.C of the Order). SASM, the City of Mill Valley, Richardson Bay Sanitary District and Tamalpais Community Services District have pump stations in their collection systems. Almonte Sanitary District, Alto Sanitary District and Homestead Valley Sanitary District do not have pump stations in their collection systems.

By signing the SSRAP – Volume II document, the agencies have certified that the information in this section of the document is accurate to the best of their knowledge. This section addresses the requirements of III.C.1 of the Order by describing the pump stations within the SASM and member agencies' collection systems and by providing an estimated time to overflow in the event of station failure during peak dry weather flow. This section addresses III.C.2 of the Order by providing a review of each pump station's ability to continue operation during electrical and mechanical failures; however, certification that each station is equipped for peak wet weather flow is not addressed because the Capacity Assessment (Section IV.B.3 of the Order) is scheduled for completion on October 15, 2010. Peak wet weather flows to the pump stations will be developed as part of the Capacity Assessment using flow data collected during the winter of 2008-2009.

To comply with Section III.C.3 of the Order, where an agency is unable to certify that a pump station is adequately equipped, a plan has been prepared including a schedule and cost estimates for completing all repairs, upgrades and renovations to pump stations to ensure continuous operation during an electrical or mechanical failure or power outage. In conjunction with the Capacity Assessment as described above, the plan will be revised or amended to include repairs, upgrades or renovations to ensure adequate capacity for peak wet weather flows.

#### 3.1.2 Requirements of the EPA Amended Order for Compliance

#### 3.1.3 The EPA Order, Section III.C includes the following requirements:

### III. COLLECTION SYSTEM MAINTENANCE AND MANAGEMENT

#### C. Pump Station Reliability Certification

1. *By April 15, 2009, SASM and the member agencies each shall submit to the EPA a report describing the pump stations within its collection system, including number of primary and redundant pumps, pumping capacity emergency generators, alarm systems, and estimated time to overflow in the event of station failure during peak dry weather flow.*
2. *By April 15, 2009, SASM and the member agencies each shall certify to EPA that each pump station for which it is responsible is equipped for peak wet weather flows and continuous operation in the event of electrical failure, mechanical failure or power outage.*
3. *If an agency is unable to certify that a pump station is adequately equipped, the agency by April 15, 2009 shall submit a plan, including a schedule and financial plan, for completing all repairs, renovations, and upgrades on each pump station and force main to ensure adequate capacity for peak wet weather flows and to ensure continuous operation.*
4. *By October 15 of each year, SASM and the member agencies each shall submit an annual report to EPA documenting pump station and force main renovations, and*

*upgrades during the previous year and describing projects to be completed in the coming annual cycle.*

### 3.1.4 Evaluation Procedures

In March 2009, Nute Engineers prepared Pump Station Evaluation reports for SASM, Mill Valley, RBSD and TCSD using information obtained during physical examinations of each pump station, interviews with operations and maintenance (O&M) staff and review of available records. Copies of the Pump Station Evaluations prepared by Nute Engineering are provided in Appendix B through Appendix E. The objective of the evaluations was to provide the necessary information for each agency to make the required certifications to EPA and to identify and prepare an opinion of probable cost for required repairs, upgrades and renovations. All of the information in this section related is derived from information provided by Nute Engineering, with the exception of peak dry weather flow estimates for several pump stations, which were developed by RMC Water and Environment and are noted as such.

#### Methods for Determining Pump Station Capacity

Pump station firm capacity is defined as the stations capacity with the largest pump out of operation. Pump station firm capacity was estimated using one of the following techniques, depending on available data for a specific station:

**Flow Meter Reading:** If a permanent flow meter is connected to the station, or if a temporary flow meter was installed during the evaluation, the pump(s) was turned on at full speed, and an instantaneous flow reading was recorded. Instantaneous flow readings were then used as an estimate of the pump(s) capacity.

**Pump Down Test:** A pump down test is a timed pumping test performed by operations staff. The purpose of the test is to calculate the volume of fluid pumped over a measured time period to determine pumping capacity. The following is a brief description of the testing methodology:

- 1) The area (A) of the wet well is determined
- 2) All pumps are turned off and water level in the wet well ( $L_1$ ) and time ( $T_1$ ) is recorded
- 3) The wet well is allowed to fill with water, then water level ( $L_2$ ) and time ( $T_2$ ) are recorded, and the pump(s) being tested are immediately turned on.
- 4) After the water level draws down by a few feet or more, the pumps are turned off and the water level ( $L_3$ ) and time  $T_3$  is recorded.
- 5) Pump capacity (Q) is determined using the following equation:

$$Q = \left( \frac{(L_2 - L_1)(A)}{T_2 - T_1} \right) + \left( \frac{(L_2 - L_3)(A)}{T_3 - T_2} \right)$$

*Note: If influent flow to the station can be shut off via a plug or valve on the influent line(s), then flow can be shut down before the pumps are started and the fill volume and fill time can be disregarded. In this case, the first term in the equation will be zero (no inflow to the station during pumping).*

**Pump Curves:** Where flow meter readings were not available and pump down tests were difficult to perform, capacity was estimated using capacity-head curves for the installed pumps. One of two types of capacity-head curves were used, depending on availability.

**Manufacturers Certified Pump Test Curves:** Pump manufacturers often provide certified pump test curves, showing the results of a factory performed test of the pump before it is installed. The curve is developed by recording flow rate and head under various head

conditions. If available, manufacturer certified pump test curves were used, as they represent the actual pump installed.

**Catalog Pump Curves:** Catalog pump curves are provided in manufacturer's literature and represent the anticipated performance for a specific pump model with a certain impeller, speed, and horsepower under normal pumping conditions. Catalog pump curves were used when manufacturer certified factory test curves are not available.

Where possible, a pressure gauge was connected to the pump discharge line and pressure was read to determine pumping head based on measured discharge pressure and measured inlet pressure (based on water level in the wet well or by reading a pressure gauge connected to the pump inlet piping). The head was then correlated with the pump curves to determine approximate pumping rate. Where a pressure gauge was not connected, the pump design flow rate was used. Design flow rate was obtained from either the pump name plate, pump station record drawings, or from operations and maintenance manuals for a specific station. For stations using pump curves to estimate capacity, the method will identify whether manufacturers certified pump test curves (manufacturer) or catalog pump curves (catalog) are used, and whether a pressure gauge (gauge) or design capacity (design) was used to estimate pump capacity.

### **Methods for Determining Peak Dry Weather Flow (PDWF)**

Peak dry weather flows to each pump station were estimated using several techniques, depending on available data for a specific station.

The following is a summary of methods used to estimate peak dry weather flows to pump stations.

**Flow Monitoring**– Where available, flow monitoring data obtained between during the winter of 2008 - 2009 was used to estimate peak dry weather flow to each station. Peak dry weather flow under this method represents the highest flow meter reading during non-rainfall periods throughout the monitoring period. Flow meter readings were reported approximately every 15 minutes.

**Level** –Wet well area and records of wet well water level were used to estimate peak dry weather flow for stations that have a continuous level sensor and telemetry equipment that records water level. The calculation for this method is identical to the first term in the “Pump Down Test” calculation described above, but is performed using a wide range of data that is recorded digitally and averaged over the range of measurement.

**Pump Run Time Records** –Pump run time records (hour meter readings) were used in conjunction with pump capacity obtained from pump down tests to estimate average daily flow during dry weather periods. A peaking factor of 2 was then applied to average daily flow to estimate peak dry weather flow.

**Service Area and Parcel Data** – Under this method, average dry weather flow was estimated using GIS to extract parcel data. First, the lift station tributary area was identified and the number of single-family home parcels within the area was counted. Next, the area of commercial land in the tributary area was determined. The number of single-family dwellings was multiplied by 200 gpd/unit and the acreage of commercial land was multiplied by 1000 gpd/acre to determine average daily flow. Average daily flow was then multiplied by a peaking factor of 2 to determine peak dry weather flow.

### **Methods for Estimating Time to Overflow during PDWF**

The estimated time to overflow during a pump station failure under peak dry weather flow was estimated using several techniques, depending on available data for a specific station. The following is a summary of methods used to estimate time to overflow during a pump station failure under peak dry weather flow conditions.

**Timed Surge Event** –The lowest manhole upstream of the pump station was identified, the pump station was shut down, and the time to surcharge the system to below the rim of the manhole was recorded.

**Operator Estimate** –Operator experience was used to estimate the time to overflow based on previous station failures. This method is conservative, in that during these events, an overflow did not occur, but rather the station was brought back on line within the time period identified.

**Calculated Estimate** –The determined peak dry weather flow and storage volume in the wet well and upstream piping system was used to calculate an estimated time to overflow based on storage volume and flow.

### Methods for Determining Peak Wet Weather Flow

Peak wet weather flows will be determined using flow monitoring data collected during the winter of 2008-2009 in conjunction with the Capacity Assessment, due on October 15, 2010.

### Methods for Determining Condition, Reliability and Capacity Deficiencies

Condition deficiencies were identified during site visits as situations where the age or condition of a pump station component was determined to significantly increase risk of station failure or its ability to continuously operate during an electrical or mechanical failure or power outage.

Reliability deficiencies were identified by comparing the pump stations' redundancy systems with industry standards. In addition, where operator involvement is necessary to ensure continuous operation, operator response time was compared with estimated time to overflow during an outage under peak dry weather flow conditions. If the station's redundancy capabilities and operator response time met or exceeded industry standards and code requirements, then the station was determined to be adequately equipped for continuous operation during electrical or mechanical failure or power outage. Where the station was determined to have a deficiency in meeting these standards, requirements for upgrades were identified.

Capacity deficiencies for peak dry weather flow were identified by comparing the estimated peak dry weather flow to the station with the pump station firm capacity. If pump station firm capacity exceeded peak dry weather flow, then the station was determined to have adequate capacity for peak dry weather flow.

Deficiencies are categorized based on the following priority criteria:

**High**– The deficiency poses a significant risk of station failure or is required for continuous operation during an electrical or mechanical failure or power outage. A high priority deficiency should be corrected within one year.

**Medium**– The deficiency poses a moderate risk of contributing to station failure, but further deterioration over time is expected and will elevate that risk. A medium priority deficiency should be corrected within two to four years.

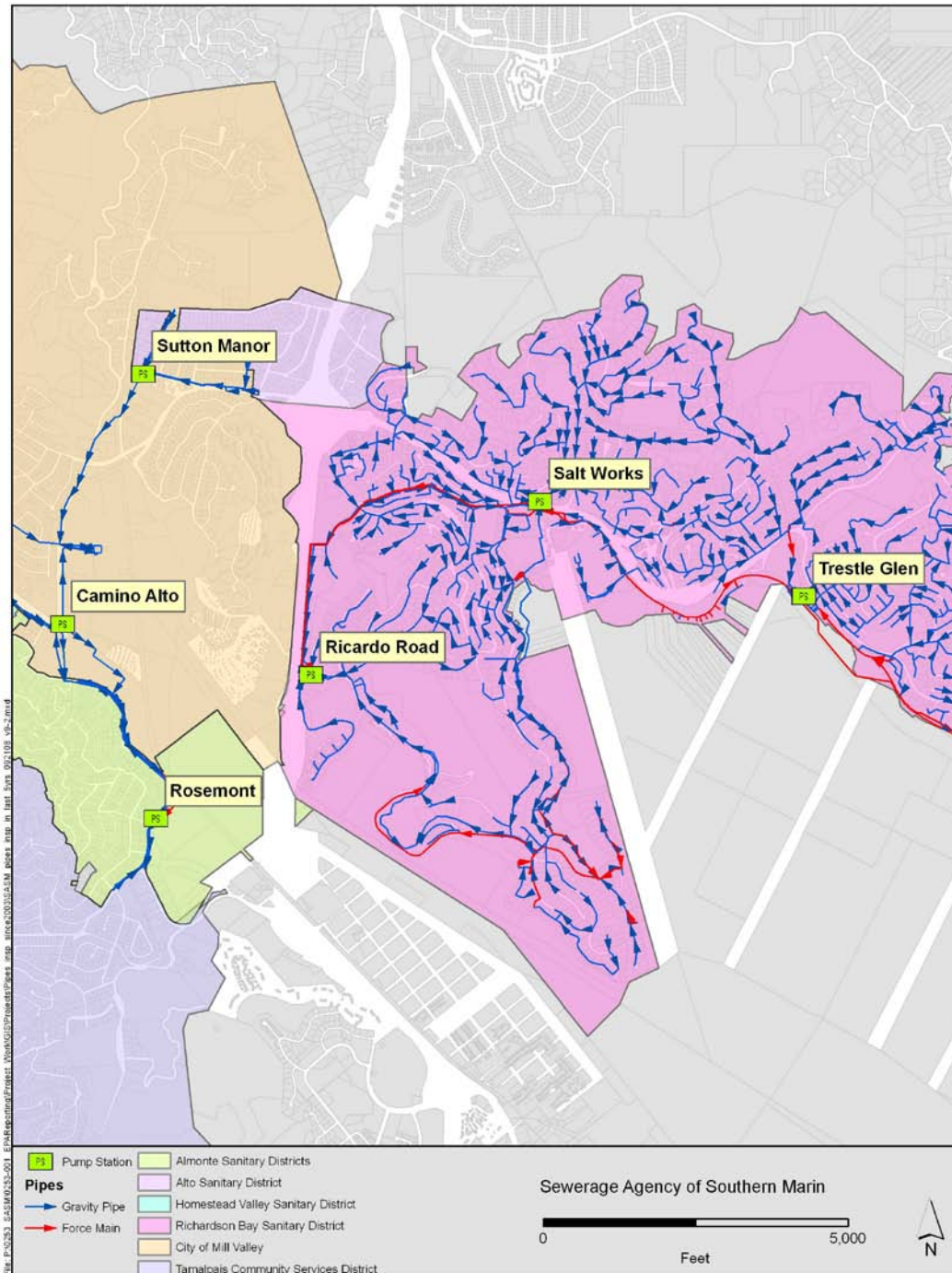
**Low** – The deficiency does not pose an immediate risk of station failure, but would ease operations and maintenance or increase reliability beyond that which is necessary by industry standard. If left unattended, low priority repairs/upgrades could lead to medium or high priority repairs in the future. Low priority recommendations should be monitored and addressed beyond four years.

## 3.2 SASM Pump Stations

SASM maintains six pump stations in their collection system. **Figure 3-1** shows the location of each pump station, shows the key characteristics associated with each pump station, **Table 3-2** shows a summary of peak dry weather and peak wet weather flow versus capacity, and **Table 3-3** is a summary of

station redundancy systems and operator response time. More information on each of SASM pump stations is provided in subsections below and in Appendix B.

Figure 3-1: Map of SASM Pump Stations



Source: MarinMAP, Sewerage Agency of Southern Marin, Almonte Sanitary District, Alto Sanitary District, City of Mill Valley, Homestead Valley Sanitary District, Richardson Bay Sanitary District, Tamalpais Community Services District

Table 3-1: Summary of SASM Pump Station Characteristics

Station Name	Year Constructed	Pump Station Type	No. of Primary Pumps	No. of Redundant Pumps	Emergency Generator	Alarms <sup>1</sup>	Alarm Notification <sup>2</sup>	Station Firm Capacity <sup>3</sup>	Capacity Calculation Technique
Salt Works	1962	Dry well non submersible	2	1	Yes	HW, LW, F, PF	A, V, LS	5,065 gpm <sup>4</sup>	Pump Down Test
Trestle Glenn	1982		2	1	Yes	HW, LW, F, PF	A, V, LS	2,619 gpm <sup>5</sup>	Pump Down Test
Ricardo Road	1964		2	1	Yes	HW, LW, F, PF	A, V, LS	2,300 gpm <sup>6</sup>	Pump Down Test
Camino Alto	1972		2	1	Yes	HW, LW, F, PF	V, LS	1,918 gpm	Pump Down Test
Sutton Manor	1981		1	1	No <sup>8</sup>	HW, LW, F, PF	V, LS	128 gpm (310 gpm) <sup>7</sup>	Pump Down Test
Rosemont	1952	Wet well submersible	2	1	Yes	HW, LW, F, PF	A, V, LS	1,146gpm	Flow Meter

1. HW = high water level; LW = Low Water Level; F = Pump Failure; PF = Power Failure (generator running or loss of power detected)
2. A = Audio; V = Visual; LD = Land Line Dialer; LS = Land Line SCADA or Telemetry; RS = Radio SCADA; CD = Cellular Dialer
3. Assumes largest pump is out of operation.
4. Two out of three pumps running with Trestle Glenn and Ricardo Road pump stations not pumping into the common force main.
5. Two of the smaller (50 hp) pumps running with Salt Works and Ricardo Road pump stations not pumping into the common force main.
6. Two of the three equal sized pumps running with Salt Works and Trestle Glenn pump stations not pumping into the common force main.
7. Both pumps running.
8. Sutton Manor station has a dedicated redundant power feed in lieu of a generator for backup power.

Table 3-2: Summary SASM Pump Station Capacity: PDWF and PWWF

Station Name	Station Firm Capacity	Estimated PDWF	Method of Estimated PDWF	Estimated PWWF	Method of Estimated PWWF	PDWF Capacity Deficiency (Y/N)	PWWF Capacity Deficiency (Y/N)
Salt Works	5,065 gpm	493 gpm <sup>(1)</sup>	Flow Monitoring	TBD <sup>2</sup>	TBD <sup>2</sup>	N	TBD <sup>2</sup>
Trestle Glenn	2,619 gpm	403 gpm <sup>(1)</sup>		TBD <sup>2</sup>	TBD <sup>2</sup>	N	TBD <sup>2</sup>
Ricardo Road	2,300 gpm	576 gpm <sup>(1)</sup>		TBD <sup>2</sup>	TBD <sup>2</sup>	N	TBD <sup>2</sup>

Camino Alto	1,918 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Sutton Manor	128 gpm	139 gpm <sup>(1)</sup>	Flow Monitoring	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Rosemont	1,146 gpm	47 gpm <sup>(1)</sup>		TBD <sup>2</sup>	TBD <sup>2</sup>	N	TBD <sup>2</sup>

1. Provided by RMC Water and Environment.
2. To be determined in conjunction with the Capacity Assessment due on October 15, 2010.

**Table 3-3: Summary of SASM Pump Station Redundancy Systems: Estimated Time to Overflow during PDWF and Response Time<sup>1</sup>**

Station Name	Electrical Failure Redundancy Systems	Mechanical Failure Redundancy Systems	Power Outage Redundancy Systems	Est. time to overflow during PDWF	Method Utilized to Calculate Est. Time to Overflow	Operator Response Time
Salt Works	AL, GEN(A), UPS	AL, RP, RLS	AL, GEN(A), UPS	1 hr 20 min	Operator Estimate	45 - 60 minutes
Trestle Glenn	AL, GEN(A), UPS	AL, RP, RLS	AL, GEN(A), UPS	> 1 hr 30 min		45 - 60 minutes
Ricardo Road	AL, GEN(A), UPS	AL, RP, RLS	AL, GEN(A), UPS	1 hr 30 min		45 - 60 minutes
Camino Alto	AL, GEN(A)	AL, RP, RLS	AL, GEN(A)	> 2 hr		45 - 60 minutes
Sutton Manor	AL, RPF	AL, RP, RLS,	AL, RPF	> 2 hr		45 - 60 minutes
Rosemont	AL, GEN(A), GEN(R)	AL, RP, RLS	AL, GEN(A), GEN(R)	> 8hr		45 - 60 minutes

1. UPS = Uninterruptible Power Supply for control panel and alarms; TVSS = Transient Voltage Surge Suppression; AL = Alarms (see **Figure 3-1**)
2. Table 3-1 for types of alarms and notifications for each station); RP = Redundant Pump(s); RLS = Redundant Level Sensors; GEN(A) = Backup Generator with auto-start/auto-transfer; GEN(M) Backup Generator with manual start/manual transfer; GEN(R) = Portable Generator Receptacle (requires manual start/manual transfer); PPC = Portable Pump Connection; RPF = Redundant Power Feed (from separate grid); GBP = Gravity Bypass.

### 3.2.1 Salt Works Pump Station

Salt Works Pump Station is a wet well/dry well pump station with three pumps, constructed in 1962. The station was remodeled in 1982 by SASM, which included installation of new pumps, motors, a new generator and odor control system. The station shares a common force main with the Trestle Glenn and Ricardo Road pump stations. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-3. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix B. A summary of identified deficiencies is provided in **Table 3-4**.

**Table 3-4: Salt Works Pump Station Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
No portable pump connection	High	Install tee or wye connection with plug valve and quick-disconnect coupling on force main to allow for connection of portable pump	\$25,000
No portable generator connection	High	Install portable generator connection and manual transfer switch to pump station	\$8,000
No redundant alarm notification	High	Install cellular or radio auto-dialer system	\$15,000
No TVSS	High	Install TVSS	\$2,500
No backup pump controls	High	Install back-up float type controls for pumps in case of PLC failure	\$6,000
Poor wet well access	High	Modify wet well access for cleaning and inspection	\$40,000
Aging Electronics	Medium	Replace motor control center and pump controls	\$350,000
Potential flooding in dry well/drive shaft problems	Medium	Raise motors above flood level, replace pump shafting.	\$200,000
Corroded door above wet well	Medium	Replace door	\$2,000

### 3.2.2 Trestle Glenn Pump Station

Trestle Glenn Pump Station is a wet well/dry well pump station with three pumps, constructed in 1982. One of the original 50 hp pumps was replaced with a new 100 hp pump in 2000 to improve the ability to handle wet weather flows. The station shares a common force main with the Salt Works and Ricardo Road pump stations. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-3. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix B. A summary of identified deficiencies is provided in **Table 3-5**.

**Table 3-5: Trestle Glenn Pump Station Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
No portable pump connection	High	Install tee or wye connection with plug valve and quick-disconnect coupling on force main to allow for connection of portable pump	\$20,000

No portable generator connection	High	Install portable generator connection and manual transfer switch to pump station	\$8,000
Old generator/Insufficient Power	High	Install new engine generator capable of powering all pumps	\$130,000
No backup pump controls	High	Install back-up float type controls for pumps in case of PLC failure	\$6,000
No redundant alarm notification	High	Install cellular or radio auto-dialer system	\$15,000
No TVSS	High	Install TVSS	\$2,500
Aging Electronics	Medium	Replace motor control center and pump controls	\$400,000
No wet well ventilation due to odor complaints	Medium	Install new odor control system and new ventilation	\$60,000
Poor wet well access	High	Modify wet well access for cleaning and inspection	\$40,000
Corroded door above wet well	Medium	Replace door	\$2,000
Aging flow meter	Medium	Test flow meter for accuracy and replace if necessary.	\$12,000

### 3.2.3 Ricardo Road Pump Station

Ricardo Road Pump Station is a wet well/dry well pump station with three pumps, constructed in 1982. That station was upgraded in 1993 with new pumps and generator. The station shares a common force main with the Salt Works and Trestle Glenn pump stations. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-3. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix B. A summary of identified deficiencies and priority is provided in **Table 3-6**.

**Table 3-6: Ricardo Road Pump Station Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
No portable pump connection	High	Install tee or wye connection with plug valve and quick-disconnect coupling on force main to allow for connection of portable pump	\$25,000
No portable generator connection	High	Install portable generator connection and manual transfer switch to pump station	\$8,000

No redundant alarm notification	High	Install cellular or radio auto-dialer system	\$15,000
No TVSS	High	Install TVSS	\$2,500
No backup pump controls	High	Install back-up float type controls for pumps in case of PLC failure	\$6,000
Aging Electronics	Medium	Replace motor control center and pump controls	\$350,000
Poor wet well access	High	Modify wet well access for cleaning and inspection	\$40,000

### 3.2.4 Camino Alto Pump Station

Camino Alto Pump Station is a wet well/dry well pump station with three pumps, constructed in 1972. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-3. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix B. A summary of identified deficiencies and priority is provided in **Table 3-7**.

**Table 3-7: Camino Alto Pump Station Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
No portable pump connection	High	Install tee or wye connection with plug valve and quick-disconnect coupling on force main to allow for connection of portable pump	\$25,000
No portable generator connection	High	Install portable generator connection and manual transfer switch to pump station	\$8,000
No redundant alarm notification	High	Install cellular or radio auto-dialer system	\$15,000
No TVSS	High	Install TVSS	\$2,500
No dry well level alarm	High	Add dry well alarm to station	\$3,000
No discharge pressure gauges	High	Install pressure gauge taps to allow for easier pump testing	\$2,000
No backup pump controls	High	Install back-up float type controls for pumps in case of PLC failure	\$6,000
Aging electronics/no detailed station alarms/potential flooding in dry well	Medium	Convert station to submersible type with new motor control center and pump controls	\$900,000

### 3.2.5 Sutton Manor Pump Station

Sutton Manor Pump Station is a below grade, self-priming package station with two pumps, constructed in 1981. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-3. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix B. A summary of identified deficiencies and priority is provided in **Table 3-8**.

**Table 3-8: Sutton Manor Pump Station Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
No portable generator connection	High	Install portable generator connection and manual transfer switch to pump station	\$8,000
No backup pump controls	High	Install back-up float type controls for pumps in case of PLC failure	\$6,000
No redundant alarm notification	High	Install cellular or radio auto-dialer system	\$15,000
No TVSS	High	Install TVSS	\$2,500
No discharge pressure gauges	High	Install pressure gauge taps to allow for easier pump testing	\$2,000
Potential flooding in dry well/Clogging pumps/Aging electronics/No detailed station alarms	Medium	Abandon dry well and convert to submersible type station. Replace motor control center and pump controls.	\$600,000

### 3.2.6 Rosemont Pump Station

Rosemont Pump Station is a submersible wet well station, constructed in 1951. The pump station was completely renovated in 1995, including conversion to the current submersible wet well station configuration and installation of the backup generator. The force main was replaced in 2007. Rosemont is the most modern of SASM's pump stations and does not have any reported maintenance issues. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-3. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix B. A summary of identified deficiencies and priority is provided in **Table 3-9**.

**Table 3-9: Rosemont Pump Station Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
No redundant alarm notification	High	Install cellular or radio auto-dialer system	\$15,000

Pressure gauge on discharge manifold broken	High	Replace pressure gauge	\$500
No TVSS	High	Install TVSS	\$2,500
Paint peeling off piping in valve vault	Low	Repaint piping	\$8,000

### 3.2.7 SASM Pump Station Upgrade Schedule and Financial Plan

The following budgets in Table 3-10 for repair and upgrades are based on capacity deficiencies for peak dry weather flow, condition-related deficiencies and deficiencies related to the ability to operate continuously during an electrical or mechanical failure or power outage.

**Table 3-10: SASM Pump Station Repair and Upgrade Plan**

Station Name	High Priority (1 year)	Medium Priority (2 to 4 years)	Low Priority (beyond 4 years)
Salt Works	\$96,500	\$552,000	\$0
Trestle Glenn	\$181,500	\$514,000	\$0
Ricardo Road	\$56,500	\$390,000	\$0
Camino Alto	\$61,500	\$900,000	\$0
Sutton Manor	\$33,500	\$600,000	\$0
Rosemont	\$18,000	\$0	\$8,000
<b>TOTAL</b>	<b>\$447,500</b>	<b>\$2,956,000</b>	<b>\$8,000</b>

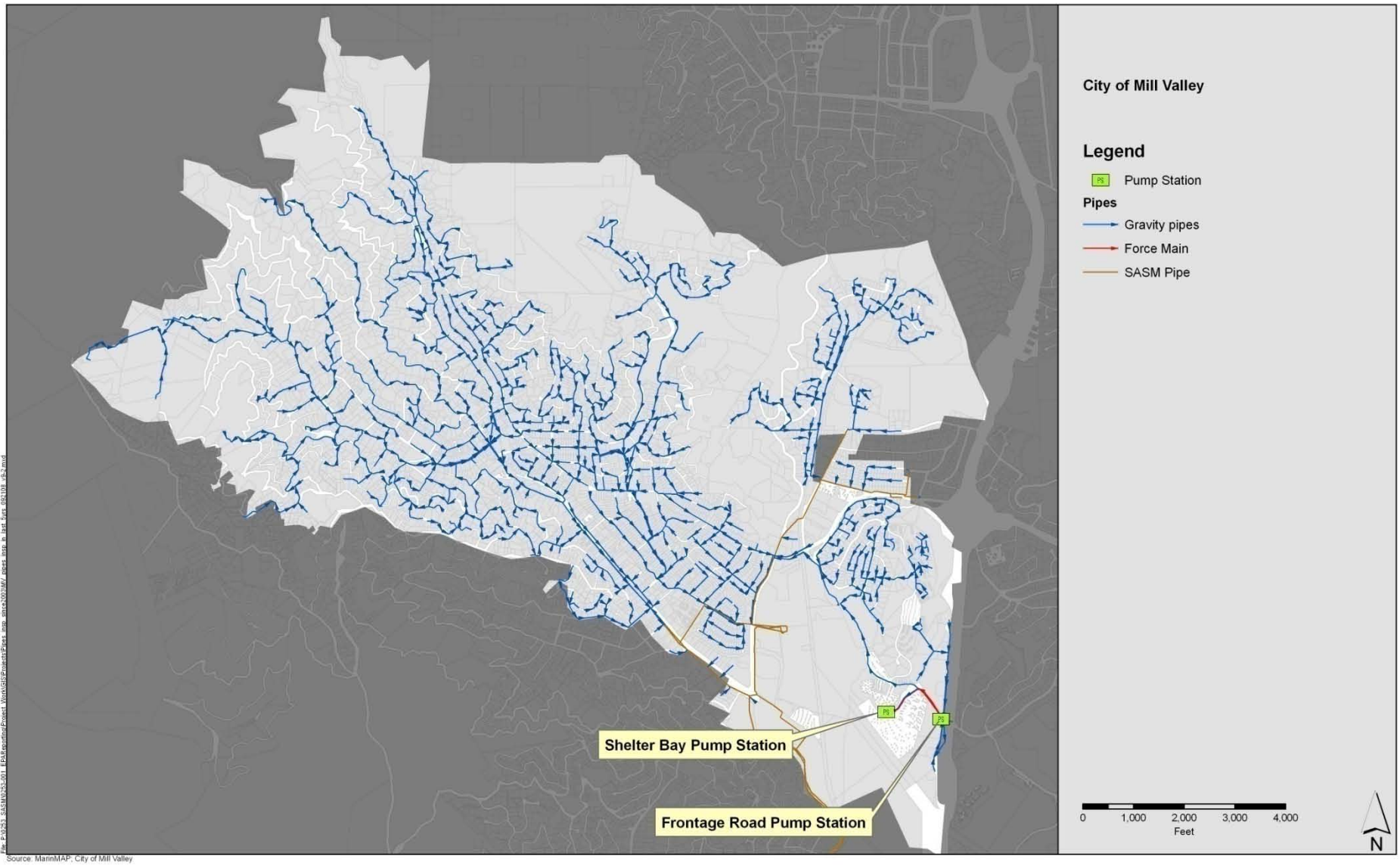
With regards to the financial plan for pump station upgrades, SASM will include funding in their capital budget for pump station capital improvements in the amounts provided above, beginning with fiscal year 2010 as year 1.

## 3.3 City of Mill Valley Pump Stations

The City of Mill Valley owns two pump stations that pump sewage to the SASM sewer system, Frontage Road Pump Station and Shelter Bay Pump Station. The City of Mill Valley's pump stations are maintained and operated by SASM.

**Figure 3-2** shows the location of each pump station, and **Table 3-11** shows the key characteristics associated with each pump station, **Table 3-12** shows a summary of peak dry weather and peak wet weather flow versus capacity, and **Table 3-13** is a summary of station redundancy systems and operator response time. More information on each of City of Mill valley pump stations is provided in subsections below and in Appendix C.

Figure 3-2: Map of Mill Valley Pump Stations



**Table 3-11: Summary of Mill Valley Pump Station Characteristics**

Station Name	Year Constructed	Pump Station Type	No. of Primary Pumps	No. of Redundant Pumps	Emergency Generator	Alarms <sup>1</sup>	Alarm Notification <sup>2</sup>	Station Firm Capacity <sup>3</sup>	Capacity Calculation Technique
Frontage Road	Unknown	Wet well submersible	1	1	Yes	HW, PF, LBP, GF	V, LS	210 gpm <sup>(5)</sup>	Pump down test
Shelter Bay	1972	Dry well non-submersible	1	1	Yes <sup>4</sup>	HW, LW, LBP	V, LS	178 gpm <sup>(5)</sup>	Pump down test

1. HW = high water level; LW = Low Water Level; F = Pump Failure; PF = Power Failure (generator running or loss of power detected), LBP = Low bubbler air pressure; GF = Generator Failure
2. A = Audio; V = Visual; LD = Land Line Dialer; LS = Land Line SCADA or Telemetry; RS = Radio SCADA; CD = Cellular Dialer
3. Assumes largest pump is out of operation.
4. Permanent generator recently failed. Portable rental generator is currently onsite and connected with manual start.
5. One of the equal-sized pumps running with the other Mill Valley Pump Station not pumping into the common force main.

**Table 3-12: Summary Mill Valley Pump Station Capacity: PDWF and PWWF**

Station Name	Station Capacity	Estimated PDWF	Method of Estimated PDWF	Estimated PWWF <sup>1</sup>	Method of Estimated PWWF	PDWF Capacity Deficiency (Y/N)	PWWF Capacity Deficiency (Y/N)
Frontage Road	210 gpm	76 gpm <sup>(2)</sup>	Service Area and Parcel Data	TBD <sup>1</sup>	TBD <sup>1</sup>	N	TBD <sup>1</sup>
Shelter Bay	178 gpm	48 gpm <sup>(2)</sup>		TBD <sup>1</sup>	TBD <sup>1</sup>	N	TBD <sup>1</sup>

1. To be determined in conjunction with the Capacity Assessment due on October 15, 2010.
2. Provided by RMC Water and Environment.

**Table 3-13: Summary of Mill Valley Pump Station Redundancy Systems: Estimated Time to Overflow during PDWF and Response Time<sup>1</sup>**

Station Name	Electrical Failure Redundancy Systems	Mechanical Failure Redundancy Systems	Power Outage Redundancy Systems	Est. time to overflow during PDWF	Method Utilized to Calculate Est. Time to Overflow	Operator Response Time
Frontage Road	AL, GEN(A)	AL, RP	AL, GEN(A)	1 hr	Operator Estimate	45 - 60 minutes
Shelter Bay	AL, GEN(M)	AL, RP	AL, GEN(M)	>2 hr		45 - 60 minutes

1. UPS = Uninterruptible Power Supply for control panel and alarms; TVSS = Transient Voltage Surge Suppression; AL = Alarms (see Table 3-11 for types of alarms and notifications for each station); RP = Redundant Pump(s); RLS = Redundant Level Sensors; GEN(A) = Backup Generator with auto-start/auto-transfer; GEN(M) Backup Generator with manual start/manual transfer; GEN(R) = Portable Generator

Receptacle (requires manual start/manual transfer); PPC = Portable Pump Connection; RPF = Redundant Power Feed (from separate grid); GBP = Gravity Bypass.

### 3.3.1 Frontage Road Pump Station

Frontage Road Pump Station is a submersible wet well station with two pumps. The original construction date is unknown; however, the pump station was completely renovated in 1998, including conversion to the current submersible wet well station configuration. The station shares a common force main with the Shelter Bay Pump Station. The pump station is in fair condition overall, but shows signs of deterioration. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in **Table 3-13**. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix C. A summary of deficiencies and priority is provided in **Table 3-14**.

**Table 3-14: Frontage Road Pump Station Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
No portable pump connection	High	Install tee or wye connection with plug valve and quick-disconnect coupling on force main to allow for connection of portable pump	\$5,000
No portable generator connection	High	Install portable generator connection and manual transfer switch to pump station	\$8,000
No backup pump controls	High	Install back-up float type controls for pumps in case of PLC failure	\$6,000
No redundant alarm notification	High	Install cellular or radio auto-dialer system	\$15,000
No TVSS	High	Install TVSS	\$2,500
No discharge pressure gauges	High	Install pressure gauge taps to allow for easier pump testing	\$2,000
Aging electronics/No detailed station alarms/Potential flooding in dry well	Medium	Rehabilitate pump station. Install new motor control center and pump controls. Construct external valve pit. Repair concrete surfaces	\$600,000
Aging backup generator	Medium	Replace backup generator	\$50,000

### 3.3.2 Shelter Bay Pump Station

Shelter Bay Pump Station is a wet well/dry well station with two pumps, originally constructed in 1972 and has apparently not been upgraded in the recent past. The station shares a common force main with the Frontage Road Pump Station. The pump station is in fair condition overall, but shows signs of deterioration. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power

failure as shown in **Table 3-13**. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix C.

**Table 3-15: Shelter Bay Pump Station Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
Non-operational backup generator	High	Replace backup generator	\$50,000
No portable pump connection	High	Install tee or wye connection with plug valve and quick-disconnect coupling on force main to allow for connection of portable pump	\$25,000
No portable generator connection	High	Install portable generator connection and manual transfer switch to pump station	\$8,000
No backup pump controls	High	Install back-up float type controls for pumps in case of PLC failure	\$6,000
No redundant alarm notification	High	Install cellular or radio auto-dialer system	\$15,000
No TVSS	High	Install TVSS	\$2,500
Aging electronics/No detailed station alarms/Potential flooding in dry well	Medium	Rehabilitate pump station. Install new motor control center and pump controls. Construct external valve pit.	\$650,000

### 3.3.3 City of Mill Valley Pump Station Upgrade Schedule and Financial Plan

The following budgets in Table 3-10 for repair and upgrades are based on capacity deficiencies for peak dry weather flow, condition-related deficiencies and deficiencies related to the ability to operate continuously during an electrical or mechanical failure or power outage.

**Table 3-16: Mill Valley Pump Station Repair and Upgrade Plan**

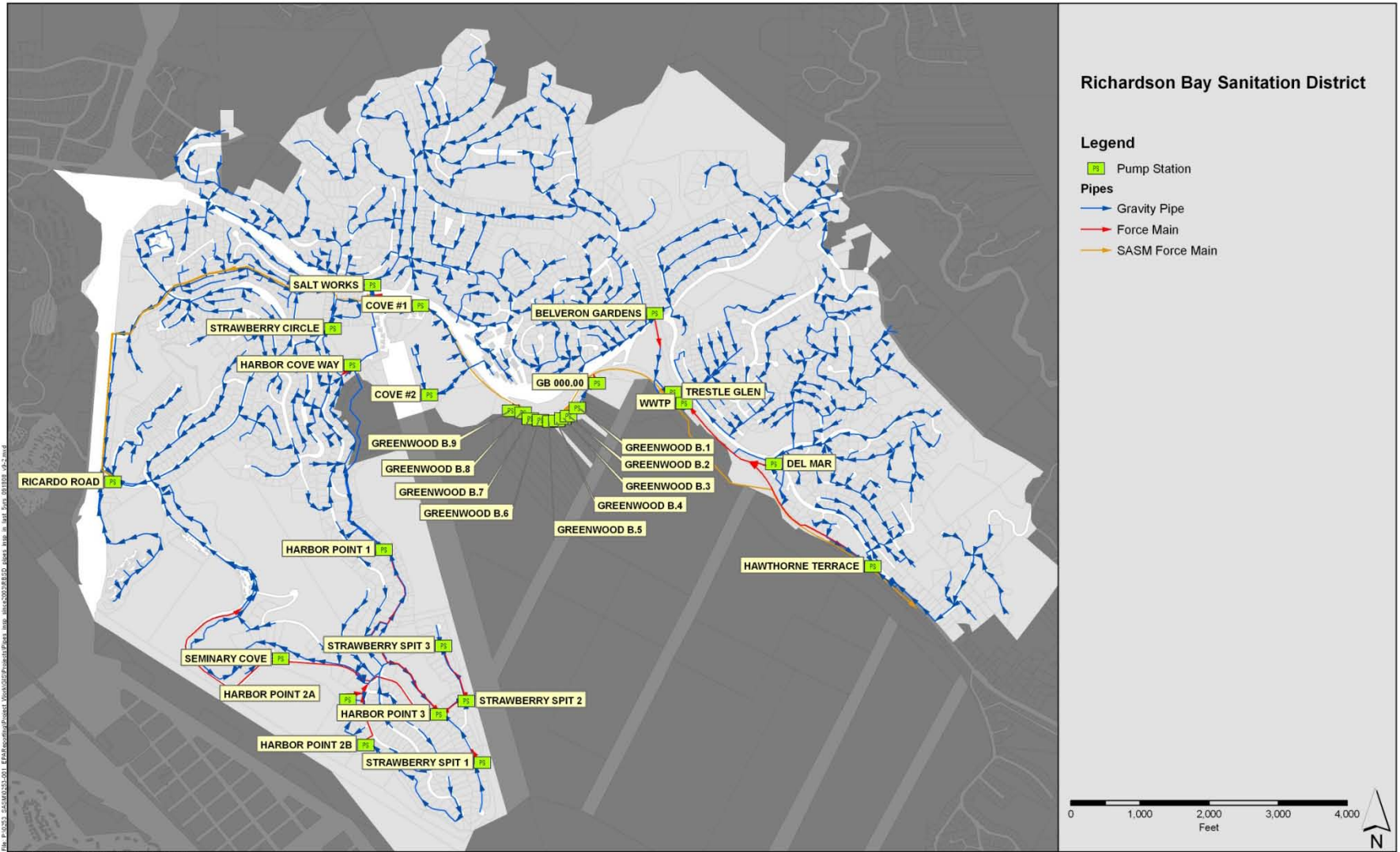
Station Name	High Priority (1 year)	Medium Priority (2 to 4 years)	Low Priority (beyond 4 years)
Frontage Road	\$38,500	\$650,000	\$0
Shelter Bay	\$106,500	\$650,000	\$0
<b>TOTAL</b>	<b>\$145,000</b>	<b>\$1,300,000</b>	<b>\$0</b>

With regards to the financial plan for pump station upgrades, Mill Valley will include funding in their capital budget for pump station capital improvements in the amounts provided above, beginning with fiscal year 2010 as year 1.

### 3.4 Richardson Bay Sanitary District

Richardson Bay Sanitary District maintains twenty-four pump stations that pump sewage to the SASM sewer system. **Figure 3-3** shows the location of each pump station, and **Table 3-17** shows the key characteristics associated with each pump station, **Table 3-18** shows a summary of peak dry weather and peak wet weather flow versus capacity, and **Table 3-19** is a summary of station redundancy systems and operator response time. More information on each of Richardson Bay pump stations is provided in subsections below and in Appendix D.

Figure 3-3: Map of Richardson Bay Pump Stations



**Table 3-17: Summary of Richardson Bay Pump Station Characteristics**

Station Name	Year Constructed	Pump Station Type	No. of Primary Pumps	No. of Redundant Pumps	Emergency Generator	Alarms <sup>1</sup>	Alarm Notification <sup>2</sup>	Station Capacity <sup>3</sup>	Capacity Calculation Technique
Belveron Gardens	1995	Wet Well Submersible	1	1	Y <sup>5</sup>	HW, LW, F, PF	A, V, LD	442 gpm	Pump down test
Cove #1	1962		1	1	Y <sup>5</sup>	HW, LW, F, PF	A, V, LD	191 gpm	
Cove #2	1964		1	1	Y <sup>5</sup>	HW, LW, F, PF	A, V, LD	242 gpm	
Del Mar	1961		1	1	Y <sup>5</sup>	HW, LW, F, PF	A, V, LD	748 gpm	
Greenwood Beach # 1	1982	Air Ejector	1	1	Y <sup>4</sup>	HW, LW, F, PF	V	94 gpm	
Greenwood Beach # 2	1982		1	0	Y <sup>4</sup>	HW, LW, F, PF	V	88 gpm	
Greenwood Beach # 3	1982		1	0	Y <sup>4</sup>	HW, LW, F, PF	V	91 gpm	
Greenwood Beach # 4	1982	Wet Well Submersible	1	0	Y <sup>4</sup>	HW, LW, F, PF	V	91 gpm	
Greenwood Beach # 5	1982	Air Ejector	1	0	Y <sup>4</sup>	HW, LW, F, PF	V	97 gpm	
Greenwood Beach # 6	1982		1	0	Y <sup>4</sup>	HW, LW, F, PF	V	100 gpm	
Greenwood Beach # 7	1982		1	0	Y <sup>4</sup>	HW, LW, F, PF	V	87 gpm	
Greenwood Beach # 8	1982		1	0	Y <sup>4</sup>	HW, LW, F, PF	V	93 gpm	
Greenwood Beach # 9	1982		1	0	Y <sup>4</sup>	HW, LW, F, PF	V	37 gpm	
Harbor Cove Way	1983	Wet Well Submersible	1	1	Y <sup>5</sup>	HW, LW, F, PF	A, V, LD	149 gpm	
Harbor Point #1	1954		1	1	Y <sup>5</sup>	HW, LW, F, PF	A, V, LD	248 gpm	
Harbor Point # 2A	1965		1	1	Y <sup>5</sup>	HW, LW, F, PF	A, V, LD	153 gpm	
Harbor Point # 2B	1966		1	1	Y <sup>5</sup>	HW, LW, F, PF	A, V, LD	196 gpm	
Harbor Point #3	1965		1	1	Y	HW, LW, F, PF	A, V, LD	496 gpm	
Hawthorne Terrace	1963	Wet Well Submersible	1	1	Y <sup>5</sup>	3.4.1 W, LW, F, PF	A, V, LD	593 gpm	
Seminary Cove	2000		1	1	Y <sup>5</sup>	3.4.2 W, LW, F, PF	A, V, LD	167 gpm	
Strawberry Circle	1983		1	1	Y <sup>5</sup>	3.4.3 W, LW, F, PF	A, V, LD	204 gpm	
Strawberry Spit #1	1988		1	1	Y <sup>6</sup>	HW, LW, F, PF	N/A	124 gpm	
Strawberry Spit #2	1988		1	1	Y <sup>6</sup>	HW, LW, F, PF	N/A	125 gpm	

Strawberry Spit #3	1988		1	1	Y <sup>6</sup>	HW, LW, F, PF	N/A	108 gpm	
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1. HW = high water level; LW = Low Water Level; F = Pump Failure; PF = Power Failure (generator running or loss of power detected)
2. A = Audio; V = Visual; LD = Land Line Dialer; LS = Land Line SCADA or Telemetry; RS = Radio SCADA; CD = Cellular Dialer
3. Pump station firm capacity. Assumes largest pump is out of operation.
4. Generator is located at the SASM Trestle Glenn Pump Station.
5. Portable generator is onsite.
6. Strawberry Spit #1, #2 and #3 are provided with emergency power from and have gravity bypass to Harbor Point 3 Pump Station.

Table 3-18 Summary Richardson Bay Pump Stations PDWF and PWWF

Station Name	Station Capacity	Estimated PDWF	Method of Estimated PDWF	Estimated PWWF	Method of Estimated PWWF	PDWF Capacity Deficiency	PWWF Capacity Deficiency
Belveron Gardens	442 gpm	129 gpm <sup>1</sup>	Level	TBD <sup>2</sup>	TBD <sup>2</sup>	N	TBD <sup>2</sup>
Cove #1	191 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Cove #2	242 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Del Mar	748 gpm	71 gpm <sup>1</sup>	Pump Logger Records	TBD <sup>2</sup>	TBD <sup>2</sup>	N	TBD <sup>2</sup>
Greenwood Beach # 1	94 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Greenwood Beach # 2	88 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Greenwood Beach # 3	91 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Greenwood Beach # 4	91 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Greenwood Beach # 5	97 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Greenwood Beach # 6	100 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Greenwood Beach # 7	87 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Greenwood Beach # 8	93 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Greenwood Beach # 9	37 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Harbor Cove Way	149 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Harbor Point #1	248 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Harbor Point # 2A	153 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Harbor Point # 2B	196 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Harbor Point #3	496 gpm	484 gpm <sup>1</sup>	Level	TBD <sup>2</sup>	TBD <sup>2</sup>	N	TBD <sup>2</sup>
Hawthorne Terrace	593 gpm	41 gpm <sup>1</sup>	Level	TBD <sup>2</sup>	TBD <sup>2</sup>	N	TBD <sup>2</sup>
Seminary Cove	167 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Strawberry Circle	204 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Strawberry Spit #1	124 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Strawberry Spit #2	125 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>
Strawberry Spit #3	108 gpm	NUTE	NUTE	TBD <sup>2</sup>	TBD <sup>2</sup>	NUTE	TBD <sup>2</sup>

1. ?TBD? Provided by RMC Water and Environment. HOW?
2. To be determined in conjunction with the Capacity Assessment due on October 15, 2010.

Table 3-19: Summary of RBSD Pump Station Redundancy Systems: Estimated Time to Overflow during PDWF and Response Time<sup>1</sup>

Station Name	Electrical Failure Redundancy Systems	Mechanical Failure Redundancy Systems	Power Outage Redundancy Systems	Est. time to Overflow during PDWF	Method Utilized to Calculate Est. Time to Overflow	Operator Response Time
Belveron Gardens	AL, GEN(A), UPS	AL, RP, RLS, PPC	AL, GEN(A), UPS	2 hr 52 min	Timed Surge Event	NUTE
Cove #1	AL, GEN(A), UPS	AL, RP, RLS, PPC	AL, GEN(A), UPS	6 hr 11 min		NUTE
Cove #2	AL, GEN(A), UPS	AL, RP, RLS, PPC	AL, GEN(A), UPS	6 hr 25 min		NUTE
Del Mar	AL, GEN(A), UPS	AL, RP, RLS, PPC	AL, GEN(A), UPS	2 hr 5 min		NUTE
Greenwood Beach # 1	AL, GEN(A)	AL	AL, GEN(A)	NUTE	NUTE	NUTE
Greenwood Beach # 2	AL, GEN(A)	AL	AL, GEN(A)	NUTE	NUTE	NUTE
Greenwood Beach # 3	AL, GEN(A)	AL	AL, GEN(A)	NUTE	NUTE	NUTE
Greenwood Beach # 4	AL, GEN(A)	AL	AL, GEN(A)	NUTE	NUTE	NUTE
Greenwood Beach # 5	AL, GEN(A)	AL	AL, GEN(A)	NUTE	NUTE	NUTE
Greenwood Beach # 6	AL, GEN(A)	AL	AL, GEN(A)	NUTE	NUTE	NUTE
Greenwood Beach # 7	AL, GEN(A)	AL	AL, GEN(A)	NUTE	NUTE	NUTE
Greenwood Beach # 8	AL, GEN(A)	AL	AL, GEN(A)	NUTE	NUTE	NUTE
Greenwood Beach # 9	AL, GEN(A)	AL	AL, GEN(A)	NUTE	NUTE	NUTE
Harbor Cove Way	AL, GEN(A), UPS	AL, RP, RLS, PPC	AL, GEN(A), UPS	>10 hr	Timed Surge Event	NUTE
Harbor Point #1	AL, GEN(A), UPS	AL, RP, RLS, PPC	AL, GEN(A), UPS	6 hr 17 min		NUTE
Harbor Point # 2A	AL, GEN(A), UPS	AL, RP, RLS, PPC	AL, GEN(A), UPS	8 hr 11 min		NUTE
Harbor Point # 2B	AL, GEN(A), UPS	AL, RP, RLS, PPC	AL, GEN(A), UPS	7 hr 2 min		NUTE
Harbor Point #3	AL, GEN(A), UPS	AL, RP, RLS, PPC	AL, GEN(A), UPS	7 hr 16 min		NUTE
Hawthorne Terrace	AL, GEN(A), UPS	AL, RP, RLS, PPC	AL, GEN(A), UPS	5 hr 17 min		NUTE
Seminary Cove	AL, GEN(A), UPS	AL, RP, RLS, PPC	AL, GEN(A), UPS	>10 hr		NUTE
Strawberry Circle	AL, GEN(A), UPS	AL, RP, RLS, PPC	AL, GEN(A), UPS	>10 hr		NUTE
Strawberry Spit #1	GEN(A), UPS, GBP	RP, RLS, PPC, GBP	GEN(A), UPS, GBP	>10 hr <sup>2</sup>		NUTE
Strawberry Spit #2	GEN(A), UPS, GBP	RP, RLS, PPC, GBP	GEN(A), UPS, GBP	>10 hr <sup>2</sup>		NUTE
Strawberry Spit #3	GEN(A), UPS, GBP	RP, RLS, PPC, GBP	GEN(A), UPS, GBP	>10 hr <sup>2</sup>	NUTE	

1. UPS = Uninterruptible Power Supply for control panel and alarms; TVSS = Transient Voltage Surge Suppression; AL = Alarms (see Table 3-17 for types of alarms and notifications for each station); RP = Redundant Pump(s); RLS = Redundant Level Sensors; GEN(A) = Backup Generator with auto-start/auto-transfer; GEN(M) Backup Generator with manual start/manual transfer; GEN(R) = Portable Generator Receptacle (requires manual start/manual transfer); PPC = Portable Pump Connection; RPF = Redundant Power Feed (from separate grid); GBP = Gravity Bypass.

### 3.4.4 Belveron Gardens Pump Station

Belveron Gardens Pump Station is a submersible wet well station with two pumps constructed in 1995. Pumps were replaced in 2007 to address wet weather capacity deficiencies. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-19. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix D. A summary of deficiencies is provided in **Table 3-20**.

**Table 3-20: Belveron Gardens Pump Station Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
NO UPGRADES REQUIRED			

### 3.4.5 Cove Pump Station No. 1

Cove Pump Station No. 1 is a submersible wet well station with two pumps constructed in 1962. The station was upgraded and converted to the current submersible configuration in 1990 and the force main was replaced in 1991. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-19. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix D. A summary of deficiencies is provided in **Table 3-21**.

**Table 3-21: Cove Pump Station No. 1 Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
NO UPGRADES REQUIRED			

### 3.4.6 Cove Pump Station No. 2

Cove Pump Station No. 2 is a submersible wet well station with two pumps constructed in 1964. The station was upgraded and converted to the current submersible configuration in 1990 and the force main was replaced in 1994. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-19. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix D. A summary of deficiencies is provided in **Table 3-22**.

**Table 3-22: Cove Pump Station No. 2 Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
NO UPGRADES REQUIRED			

### 3.4.7 Del Mar Pump Station

Del Mar Pump Station is a submersible wet well station with two pumps constructed in 1961. The station was upgraded and converted to the current submersible configuration in 1992, and pumps were upgraded to address wet weather capacity issues in 2007. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-19. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix D. A summary of deficiencies is provided in **Table 3-23**.

**Table 3-23: Del Mar Pump Station Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
NO UPGRADES REQUIRED			

### 3.4.8 Greenwood Beach Pump Stations No. 1 – No. 9

Eight of the Greenwood Beach Pump Stations are compressed air ejector stations with a common air compressor located at Trestle Glenn Pump Station with air lines running to each station for sewage pumping. The remaining station (Greenwood Beach Pump Station No. 4) is a submersible pump station with a single pump. The stations were constructed in 1982 to serve a total of 24 homes and share a common force main. Backup power for the stations is provided by a generator located at SASM's Trestle Glenn Pump Station. The primary and backup air compressors are located at SASM's Trestle Glenn Pump Station.

The stations have adequate capacity to pump peak dry weather flow and are equipped with backup power via a generator at Trestle Glenn pump station to continuously operate during a power outage. The stations each have visual alarms to notify the operator of an electrical or mechanical failure, via a high water alarm. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix D. A summary of deficiencies is provided in **Table 3-24**.

**Table 3-24: Greenwood Beach Pump Stations Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost

NO UPGRADES REQUIRED			

### 3.4.9 Harbor Cove Way Pump Station

Harbor Cove Way Pump Station is a submersible wet well station with two pumps constructed in 1983. The station was renovated in 1999, including replacement of the pumps. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-19. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix D. A summary of deficiencies is provided in **Table 3-25**.

**Table 3-25: Harbor Cove Way Pump Station Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
NO UPGRADES REQUIRED			

### 3.4.10 Harbor Point Pump Station No. 1

Harbor Point Pump Station No. 1 is a submersible wet well station with two pumps constructed in 1954. The station was upgraded and converted to the current submersible configuration in 1989. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-19. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix D. A summary of deficiencies is provided in **Table 3-26**.

**Table 3-26: Harbor Point Pump Station No. 1 Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
NO UPGRADES REQUIRED			

### 3.4.11 Harbor Point Pump Station No. 2A

Harbor Point Pump Station No.2A is a submersible wet well station with two pumps constructed in 1965. The station was upgraded and converted to the current submersible configuration in 1998. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-19. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity

Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix D. A summary of deficiencies is provided in **Table 3-27**.

**Table 3-27: Harbor Point Pump Station No. 2A Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
NO UPGRADES REQUIRED			

### 3.4.12 Harbor Point Pump Station No. 2B

Harbor Point Pump Station No.2B is a submersible wet well station with two pumps constructed in 1966. The station was upgraded and converted to the current submersible configuration in 1998. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-19. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix D. A summary of deficiencies is provided in **Table 3-28**.

**Table 3-28: Harbor Point Pump Station No. 2B Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
NO UPGRADES REQUIRED			

### 3.4.13 Harbor Point Pump Station No. 3

Harbor Point Pump Station No.3 is a submersible wet well station with two pumps constructed in 1965. The station was upgraded and converted to the current submersible configuration in 1998. The station shares a common force main with Seminary Cove Pump Station. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-19. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix D. A summary of deficiencies is provided in **Table 3-29**.

**Table 3-29: Harbor Point Pump Station No. 3 Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
NO UPGRADES REQUIRED			

### 3.4.14 Hawthorne Terrace Pump Station

Hawthorne Terrace Pump Station is a submersible wet well station with two pumps, originally constructed in 1963. The station was upgraded and converted to the current submersible configuration in 1996, and new pumps were installed in 2007 to address a wet weather capacity deficiency. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-19. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix D. A summary of deficiencies is provided in **Table 3-30**.

**Table 3-30: Hawthorn Terrace Pump Station Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
NO UPGRADES REQUIRED			

### 3.4.15 Seminary Cove Pump Station

Seminary Cove Pump Station is a submersible wet well station with two pumps constructed in 2000. The station shares a common force main with Harbor Point Pump Station No. 3. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-19. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix D. A summary of deficiencies is provided in **Table 3-31**.

**Table 3-31: Seminary Cove Pump Station Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
NO UPGRADES REQUIRED			

### 3.4.16 Strawberry Circle Pump Station

Strawberry Circle Pump Station is a submersible wet well station with two pumps, originally constructed in 1983. The station was renovated in 1999, including replacement of the pumps. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-19. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix D. A summary of deficiencies is provided in **Table 3-32**.

**Table 3-32: Strawberry Circle Pump Station Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
NO UPGRADES REQUIRED			

**3.4.17 Strawberry Spit Pump Station No. 1**

Strawberry Spit Pump Station No. 1 is a submersible wet well station with two pumps, originally constructed in 1988 and renovated in 2008. This station has is interconnected with Strawberry Spit Pump Station No. 2 and No. 3 to provide passive overflow protection. In addition, all three Strawberry Spit Stations are interconnected with Harbor Point Pump Station No. 3 to provide protection if all three stations are out of service. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-19. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix D. A summary of deficiencies is provided in **Table 3-33**.

**Table 3-33: Strawberry Spit Pump Station No. 1 Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
NO UPGRADES REQUIRED			

**3.4.18 Strawberry Spit Pump Station No. 2**

Strawberry Spit Pump Station No. 2 is a submersible wet well station with two pumps, originally constructed in 1988 and renovated in 2008. This station has is interconnected with Strawberry Spit Pump Station No. 2 and No. 3 to provide passive overflow protection. In addition, all three Strawberry Spit Stations are interconnected with Harbor Point Pump Station No. 3 to provide protection if all three stations are out of service. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-19. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix D. A summary of deficiencies is provided in **Table 3-34**.

**Table 3-34: Strawberry Spit Pump Station No. 2 Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost

NO UPGRADES REQUIRED			

### 3.4.19 Strawberry Spit Pump Station No. 3

Strawberry Spit Pump Station No. 2 is a submersible wet well station with two pumps, originally constructed in 1988 and renovated in 2008. This station has is interconnected with Strawberry Spit Pump Station No. 2 and No. 3 to provide passive overflow protection. In addition, all three Strawberry Spit Stations are interconnected with Harbor Point Pump Station No. 3 to provide protection if all three stations are out of service. The station has adequate capacity to pump peak dry weather flow and is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-19. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. More detailed information about the station is provided in Appendix D. A summary of deficiencies is provided in **Table 3-35**.

**Table 3-35: Strawberry Spit Pump Station No. 3 Deficiencies**

Deficiency	Priority	Action for Correction	Engineer's Opinion of Probable Cost
NO UPGRADES REQUIRED			

### 3.4.20 Richardson Bay Pump Station Upgrade Schedule and Financial Plan

The following budgets in Table 3-10 for repair and upgrades are based on capacity deficiencies for peak dry weather flow, condition-related deficiencies and deficiencies related to the ability to operate continuously during an electrical or mechanical failure or power outage.

**Table 3-36: Richardson Bay Pump Station Repair and Upgrade Plan**

Station Name	High Priority (1 year)	Medium Priority (2 to 4 years)	Low Priority (Beyond 4 years)
Belveron Gardens			
Cove #1			
Cove #2			
Del Mar			
Greenwood Beach # 1			
Greenwood Beach # 2			
Greenwood Beach # 3			
Greenwood Beach # 4			
Greenwood Beach # 5			

Greenwood Beach # 6			
Greenwood Beach # 7			
Greenwood Beach # 8			
Greenwood Beach # 9			
Harbor Cove Way			
Harbor Point #1			
Harbor Point # 2A			
Harbor Point # 2B			
Harbor Point #3			
Hawthorne Terrace			
Seminary Cove			
Strawberry Circle			
Strawberry Spit #1			
Strawberry Spit #2			
Strawberry Spit #3			
<b>TOTAL</b>			

With regards to the financial plan for pump station upgrades, Richardson Bay will include funding in their capital budget for pump station capital improvements in the amounts provided above, beginning with fiscal year 2010 as year 1.

### 3.5 TCSD Pump Stations

TCSD maintains two pump stations that pump sewage to the SASM sewer system, the Flamingo Road Pump Station No. 1 and Flamingo Road Pump Station No. 2. Both stations are relatively new construction (2003 and 2007 respectively). TCSD also maintains two pump stations that pump sewage to the Sausalito Marin City Sanitation District (SMCSD) sewer system (Bell Lane Pump Station and Tennessee Valley Road Pump Station No. 1), which are not discussed in this report.

**Figure 3-4** shows the location of each pump station, and **Table 3-37** shows the key characteristics associated with each pump station, **Table 3-38** shows a summary of peak dry weather and peak wet weather flow versus capacity, and **Table 3-39** is a summary of station redundancy systems and operator response time. More information on each of TCSD pump stations is also provided in subsections below and in Appendix E.

**Table 3-37: Summary of TCSD Pump Station Characteristics**

Station Name	Year Constructed	Pump Station Type	No. of Primary Pumps	No. of Redundant Pumps	Emergency Generator	Alarms <sup>1</sup>	Alarm Notification <sup>2</sup>	Station Firm Capacity <sup>3</sup>	Capacity Calculation Technique
Flamingo Road No. 1	2003	Wet well submersible	1	1	Yes <sup>4</sup>	HW,	V, LD	164 gpm	Pump down test
Flamingo Road No. 2	2007		1	1	Yes <sup>4</sup>	HW,	V, LD	198 gpm	Pump down test

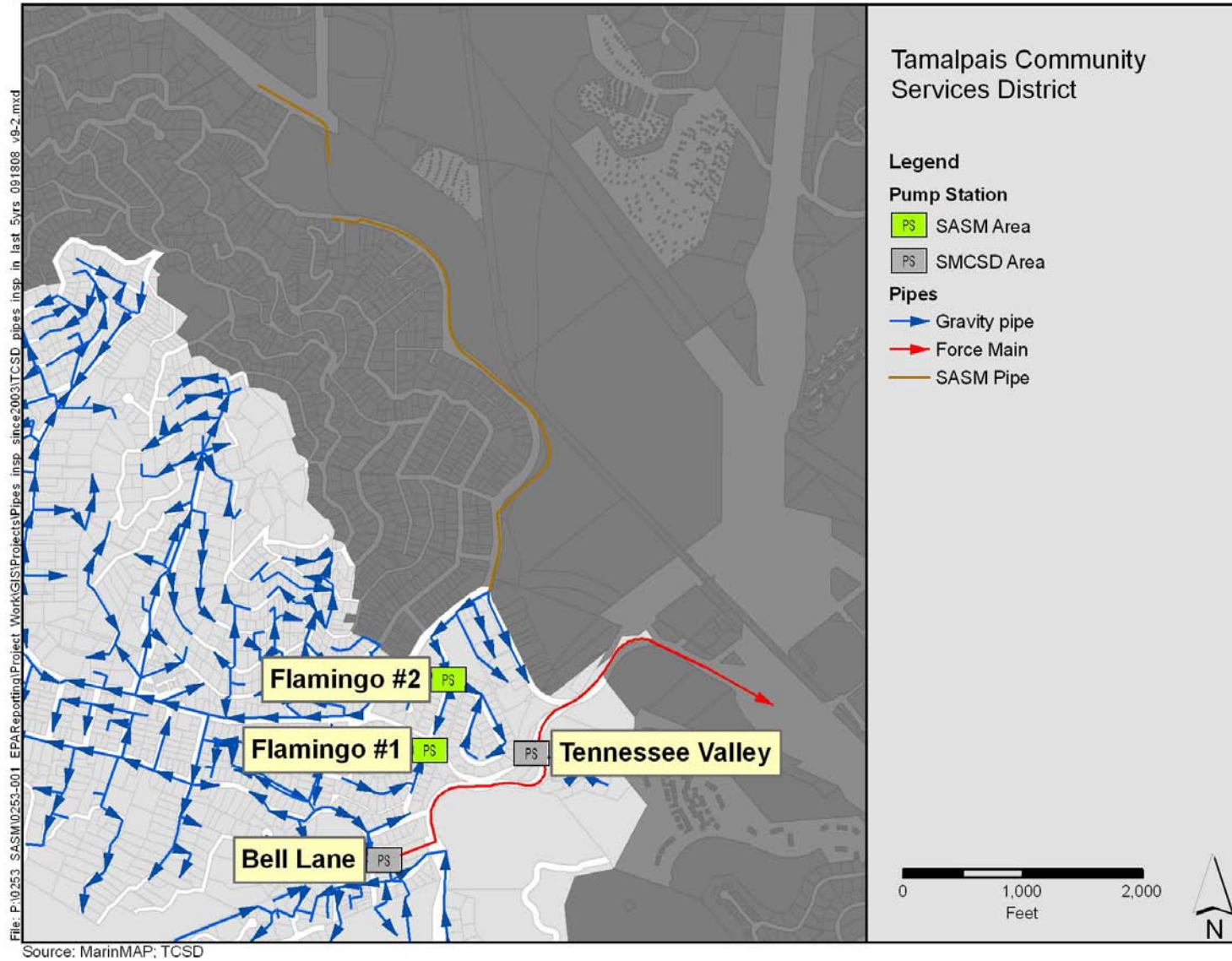
1. HW = high water level; LW = Low Water Level; F = Pump Failure; PF = Power Failure (generator running or loss of power detected)
2. A = Audio; V = Visual; LD = Land Line Dialer; LS = Land Line SCADA or Telemetry; RS = Radio SCADA; CD = Cellular Dialer
3. Assumes the largest pump is out of operation.
4. Generator is located at the District's Bell Lane Pump Station site and sized to power Bell Lane, Flamingo Road No. 1, Flamingo Road No. 2 and TCSD office and community center.

**Table 3-38: Summary TCSD Pump Station Capacity, PDWF and PWWF**

Station Name	Station Firm Capacity	Estimated PDWF	Method of Estimated PDWF	Estimated PWWF	Method of Estimated PWWF	PDWF Capacity Deficiency	PWWF Capacity Deficiency
Flamingo Road No. 1	164 gpm	N/A	Pump Hour Records	TBD <sup>1</sup>	TBD <sup>1</sup>	N <sup>3</sup>	TBD <sup>1</sup>
Flamingo Road No. 2	198 gpm	37 gpm <sup>(3)</sup>	Flow Monitoring	TBD <sup>1</sup>	TBD <sup>1</sup>	N	TBD <sup>1</sup>

1. To be determined in conjunction with the Capacity Assessment due on October 15, 2010.
2. Provided by RMC Water and Environment.
3. Pumps run only 3.4 hours during peak dry weather flow.

Figure 3-4: Map of TCSD Pump Stations



**Table 3-39: Summary of TCSD Pump Station Redundancy Systems: Estimated Time to Overflow during PDWF and Response Time<sup>1</sup>**

Station Name	Electrical Failure Redundancy Systems	Mechanical Failure Redundancy Systems	Power Outage Redundancy Systems	Est. time to overflow during PDWF	Method Utilized to Calculate Est. Time to Overflow	Operator Response Time
<b>Flamingo Road No. 1</b>	AL, GEN(A), UPS	AL, RP, RLS	AL, GEN(A), UPS	10 hr	Operator Estimate	20-60 minutes
<b>Flamingo Road No. 2</b>	AL, GEN(A), UPS, GBP	AL, RP, RLS, GBP	AL, GEN(A), UPS, GBP	N/A <sup>(2)</sup>	N/A	20-60 minutes

1. UPS = Uninterruptible Power Supply for control panel and alarms; TVSS = Transient Voltage Surge Suppression; AL = Alarms (see Table 3-37 for types of alarms and notifications for each station); RP = Redundant Pump(s); RLS = Redundant Level Sensors; GEN(A) = Backup Generator with auto-start/auto-transfer; GEN(M) Backup Generator with manual start/manual transfer; GEN(R) = Portable Generator Receptacle (requires manual start/manual transfer); PPC = Portable Pump Connection; RPF = Redundant Power Feed (from separate grid); GBP = Gravity Bypass.

2. Flamingo Road Pump Station No. 2 has a gravity bypass to the SASM Rosemont pump station.

### 3.5.1 Flamingo Road Pump Station No. 1

Flamingo Road Pump Station No. 1 is a submersible wet well station constructed in 2003. The station has two pumps that alternate as lead/lag, with one duty pump and one redundant pump. The station has adequate capacity to pump peak dry weather flow and the station is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-39. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. No upgrades are required for continuous operation during electrical, mechanical or power failure. Flamingo Road Pump Station No. 1 is a relatively new station; therefore, there are no condition-related repairs required. More information on the station is provided in Appendix E.

### 3.5.2 Flamingo Road Pump Station No. 2

Flamingo Road Pump Station No. 2 is a submersible wet well station constructed in 2007. The station has two pumps that alternate as lead/lag, with one duty pump and one redundant pump. The station has adequate capacity to pump peak dry weather flow, and has a gravity bypass to SASM's Rosemont station if an outage occurs. The station is equipped with several redundant systems to maintain continuous operation during an electrical, mechanical or power failure as shown in Table 3-39. The station's ability to pump peak wet weather flow will be evaluated in conjunction with the Capacity Assessment due on October 15, 2010. No upgrades are required for continuous operation during electrical, mechanical or power failure. Flamingo Road Pump Station No. 2 is a new station; therefore, there are no condition-related repairs required. More information on the station is provided in Appendix E.

### 3.5.3 TCSD Pump Station Repair and Upgrade Plan

No upgrades are required for the TCSD pump stations in the SASM service area.

## Section 4 Pipe and Maintenance Hole Inspection and Condition Assessment Plan

### 4.1 Introduction

#### 4.1.1 Purpose

In the Order, the agencies were required by section IV.1.2 to submit a report to EPA summarizing the inspections and condition assessments completed during the previous five years (from April 10, 2003 through April 10, 2008) by October 15, 2008. The agencies submitted a summary of the pipes that had been inspected, but did not summarize the condition ratings of the pipes that had been inspected in the October 15, 2008 SSRAP. Therefore the summary of condition ratings for the pipes inspected during the five years before the Order was issued (from April 10, 2003 through April 9, 2008) has been included in this SSRAP – Volume II.

#### 4.1.2 Requirements of the EPA Amended Order for Compliance

The EPA Order, Section IV.A. includes the following requirements:

#### IV. COLLECTION SYSTEM ASSESSMENTS

##### 1. Sewer Pipe and Maintenance Hole Inspection and Condition Assessment:

1. *By April 15, 2009, SASM and the member agencies each shall submit a plan to EPA for periodic inspection and assessment of the condition of gravity sewers and maintenance holes throughout the agency's collection system. The inspection and condition assessment program shall be sufficient to evaluate the condition of pipes following blockage-related spills, identify pipes in need of emergency repair, and provide a schedule for completion of a system-wide condition assessment no later than April 15, 2010. The requirements for system-wide condition assessment may be satisfied with reliable data obtained from an inspection and assessment conducted within the last five years. The plan shall describe:*
  - a. *Inspection methods to be used, including direct visual inspection, closed circuit television (CCTV) inspection, and whether SASM and the member agencies will purchase, lease or contract for CCTV inspection equipment;*
  - b. *An inspection schedule including an estimation of the miles of sewer pipe and number of maintenance holes that will be inspected each year for the next two years; and*
  - c. *A system for timely evaluation of inspection findings and documentation of the assessed condition.*
2. *By October 15, 2008, SASM and the member agencies each shall submit a report to EPA summarizing inspections and condition assessments completed during the previous five years. The report shall include activities conducted to complete an inspection and condition assessment plan by April 15, 2009.*
3. *By October 15, 2009, SASM and the member agencies each shall submit an annual progress report to EPA summarizing the inspection methods and findings of sewer pipe condition assessments conducted during the previous year and the estimated miles of sewer pipe and number of maintenance holes to be inspected during the current year.*

4. By October 15, 2010, SASM and the member agencies shall submit a final report summarizing the findings of the inspections and condition assessments required by Paragraph IV.A.1.

As noted above, this SSRAP – Volume II supplements the original SSRAP dated October 15, 2008 by adding a summary of condition ratings required by Section IV.1.2 of the Order for pipes that were inspected during the five years prior to the issuance of the original Order on April 10, 2008.

## 4.2 Sewerage Agency of Southern Marin

### 4.2.1 Recent Sewer Inspection and Condition Assessment Activities

#### Previously Inspected Areas

During the five years prior to issuance of the Order, SASM has collected a significant quantity of sewer inspection data. **Figure 4-1** summarizes which sewers have been previously inspected.

#### Evaluation Methods

SASM typically utilizes a defect coding system to identify the type and severity of each defect in each sewer pipe that has been inspected. The following section summarizes the defect coding system and the defect rating system that was utilized in the past.

#### **Defect Coding Systems**

SASM utilized a customized defect coding system utilized by several agencies in Northern California. This defect rating system identifies the type and severity of defects and also has a rating score associated with some defects. The defect coding system that will be utilized in the future was covered in the original SSRAP document submitted on October 15, 2008.

#### **Condition Rating Systems**

The condition rating system for sewer pipe inspections performed prior to April 10, 2008 is known as the fault ratio. The fault ratio is calculated by taking the sum of the rating scores for all defects found in one pipe segment divided by the lineal feet of pipe in the pipe segment, or:

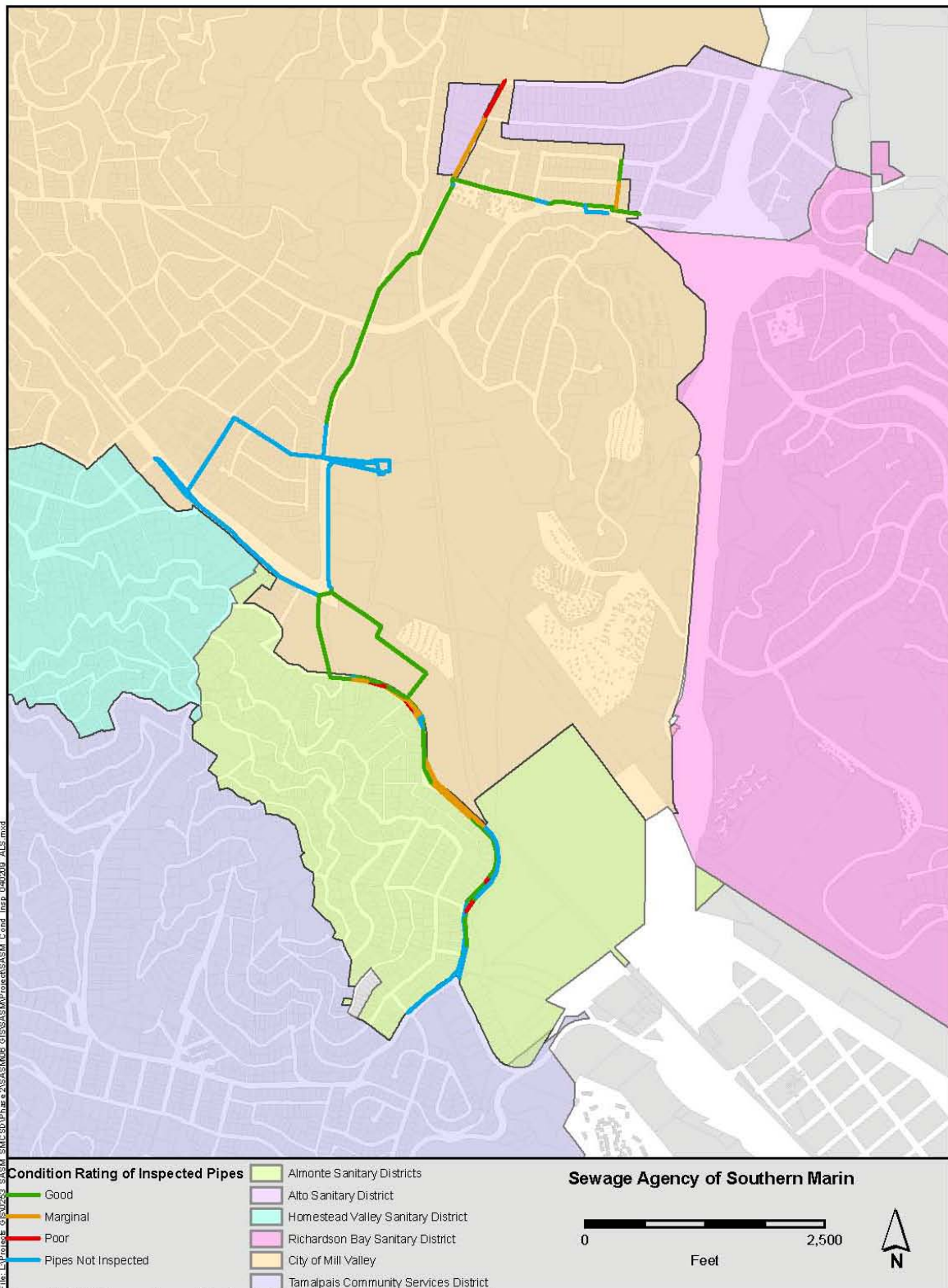
$$\text{Fault Ratio} = (\text{Sum of DEFECT RATING SCORES}) / (\text{LINEAL FEET OF PIPE SEGMENT})$$

The fault ratio system was designed to quickly determine the relative condition of each line segment that had been inspected. The following fault ratio ranges were developed to assign a condition rating:

- < 5                      Good condition
- ≥ 5 and ≤10          Marginal condition
- ≥10                      Poor condition

Utilizing this formula and these condition rating definitions, **Table 4-1** summarizes the condition ratings for the pipes in the SASM service area that have previously been inspected.

Figure 4-1: SASM Pipes Inspected after April 10, 2003 and prior to April 10, 2008



Source: MarinMAP, Sewerage Agency of Southern Marin, Almonte Sanitary District, Alto Sanitary District, City of Mill Valley, Homestead Valley Sanitary District, Richardson Bay Sanitary District, Tamalpais Community Services District

**Table 4-1: Condition Rating Summary – Pipes Inspected April 10, 2003 to April 10, 2008**

Condition Rating	Rating Description	# of Pipe Segments	Lineal Feet of Sewer Mains
Good	Does not require repair or rehabilitation.	56	11,175
Marginal	Some deterioration but should not require rehabilitation in the near future.	9	3,289
Poor	Significant deterioration. Should be considered for rehabilitation in the Rehabilitation and Replacement Plan.	5	988
	<b>Totals</b>	<b>70</b>	<b>15,453</b>

The condition rating system that will be utilized for inspection data collected after April 10, 2008 was documented in the original SSRAP document submitted on October 15, 2008. Also, a more detailed method to identify non-emergency sewer repair, rehabilitation and replacement projects will be documented in the plan for short-term and long-term repair, rehabilitation and replacement of sewers that will be submitted to EPA by October 15, 2010.

#### 4.2.2 Documentation and Recordkeeping

All defects observed have been documented. A copy of all defect code data and the video will be retained for evaluation and to support preparation of the plan for short-term and long-term repair, rehabilitation and replacement of sewers that will be submitted to EPA by October 15, 2010.

#### 4.2.3 Inspection and Condition Assessment Program

The details for SASM's inspection and condition assessment program that will be implemented between April 10, 2008 and April 15, 2010 were documented in the original SSRAP document. The original SSRAP was submitted on October 15, 2008. This document updated the original SSRAP by adding a more detailed schedule for future sewer inspections.

In summary, SASM plans to inspect the remaining gravity sewer pipes and manholes that have not been recently inspected. These remaining sewers will be inspected prior to April 15, 2010. **Table 4-2** summarizes the quantity of sewers that have been inspected and the quantity of pipes in the planned inspection program.

**Table 4-2: Inspection and Condition Assessment Program Summary**

SASM Sewer Mains	Lineal Feet of Sewer Mains
Pipes Database	61,850
Agency Force Mains (Remove)	(33,767)
Gravity Pipes Subtotal	28,083
Inspected between April 13, 2003 and April 10, 2008	(15,453)
Total Lineal Feet to be Inspected Prior to April 15, 2010	<b>12,630</b>

**Table 4-3** summarizes the schedule for future sewer inspections through April 15, 2010.

**Table 4-3: Inspection Schedule through April 15, 2010**

Planned Inspection	Lineal Feet of Sewer Mains
Between April 10, 2008 and April 15, 2009	0
Between April 16, 2009 and April 15, 2010	12,630
<b>Totals</b>	<b>12,630</b>

## 4.3 Almonte Sanitary District

### 4.3.1 Recent Sewer Inspection and Condition Assessment Activities

#### Previously Inspected Areas

During the five years prior to issuance of the Order, Almonte collected some sewer inspection data. However, when the inspections were performed, Almonte's contractor was primarily visually inspecting the sewers to identify and repair defects. When major defects were found, a repair was performed. However, detailed defect code data and condition rating data was not collected during these inspections. Therefore, Almonte has elected to re-inspect the entire gravity sewer system after the Order was issued on April 10, 2008 and prior to the April 15, 2010 deadline for completion of the inspection program as stated in the Order.

#### Evaluation Methods

##### **Defect Coding Systems**

The defect coding system that will be utilized in the future was covered in the original SSRAP document submitted on October 15, 2008.

##### **Condition Rating Systems**

The condition rating system that will be utilized for inspection data collected after April 10, 2008 was documented in the original SSRAP document submitted on October 15, 2008. Also, a more detailed method to identify non-emergency sewer repair, rehabilitation and replacement projects will be documented in the plan for short-term and long-term repair, rehabilitation and replacement of sewers that will be submitted to EPA by October 15, 2010.

### 4.3.2 Documentation and Recordkeeping

A copy of all defect code data and the video will be retained for evaluation and to support preparation of the plan for short-term and long-term repair, rehabilitation and replacement of sewers that will be submitted to EPA by October 15, 2010.

### 4.3.3 Inspection and Condition Assessment Program

The details for Almonte's inspection and condition assessment program that will be implemented between April 10, 2008 and April 15, 2010 were documented in the original SSRAP document. The original SSRAP was submitted on October 15, 2008. This document updates the original SSRAP by adding a more detailed schedule for future sewer inspections. In summary, Almonte plans to inspect the entire gravity sewer system prior to April 15, 2010. **Table 4-4** summarizes the schedule for future sewer inspections through April 15, 2010.

**Table 4-4: Inspection Schedule through April 15, 2010**

Planned Inspection	Lineal Feet of Sewer Mains
Between April 10, 2008 and April 15, 2009	34,303
Between April 16, 2009 and April 15, 2010	0
<b>Totals</b>	<b>34,303</b>

## 4.4 Alto Sanitary District

### 4.4.1 Recent Sewer Inspection and Condition Assessment Activities

#### Previously Inspected Areas

During the five years prior to issuance of the Order, Alto did not collect detailed sewer inspection data. Therefore, Alto has elected to inspect the entire system between April 10, 2008 and April 15, 2010, the deadline for completion of the inspection program as stated in the Order.

#### Evaluation Methods

##### **Defect Coding Systems**

The defect coding system that will be utilized in the future was covered in the original SSRAP document submitted on October 15, 2008.

##### **Condition Rating Systems**

The condition rating system that will be utilized for inspection data collected after April 10, 2008 was documented in the original SSRAP document submitted on October 15, 2008. Also, a more detailed method to identify non-emergency sewer repair, rehabilitation and replacement projects will be documented in the plan for short-term and long-term repair, rehabilitation and replacement of sewers that will be submitted to EPA by October 15, 2010.

### 4.4.2 Documentation and Recordkeeping

A copy of all defect code data and the video will be retained for evaluation and to support preparation of the plan for short-term and long-term repair, rehabilitation and replacement of sewers that will be submitted to EPA by October 15, 2010.

### 4.4.3 Inspection and Condition Assessment Program

The details for Alto's inspection and condition assessment program that will be implemented between April 10, 2008 and April 15, 2010 were documented in the original SSRAP document. The original SSRAP was submitted on October 15, 2008. This document updates the original SSRAP by adding a more detailed schedule for future sewer inspections. In summary, Alto plans to inspect the entire gravity sewer system prior to April 15, 2010. **Table 4-5** summarizes the schedule for future sewer inspections through April 15, 2010.

**Table 4-5: Inspection Schedule through April 15, 2010**

Planned Inspection	Lineal Feet of Sewer Mains
Between April 10, 2008 and April 15, 2009	14,874
Between April 16, 2009 and April 15, 2010	0
<b>Totals</b>	14,874

## 4.5 City of Mill Valley

### 4.5.1 Recent Sewer Inspection and Condition Assessment Activities

#### Previously Inspected Areas

During the five years prior to issuance of the Order, Mill Valley has collected a significant quantity of sewer inspection data. **Figure 4-2** summarizes which sewers have been previously inspected.

## Evaluation Methods

Rather than collecting defect coding data in the past, Mill Valley had each inspection video reviewed by a qualified consultant to determine the condition of each pipe segment and to recommend future action to correct the deficiencies found in each pipe segment. The recommendations are documented in the City's current Clean and CCTV Sanitary Sewer Records. The following section summarizes how these decisions have been adapted to generate sewer condition ratings.

### **Defect Coding Systems**

As noted above, Mill Valley did not utilize a formal defect coding system for past sewer inspections.

The defect coding system that will be utilized in the future was described in the original SSRAP document submitted on October 15, 2008.

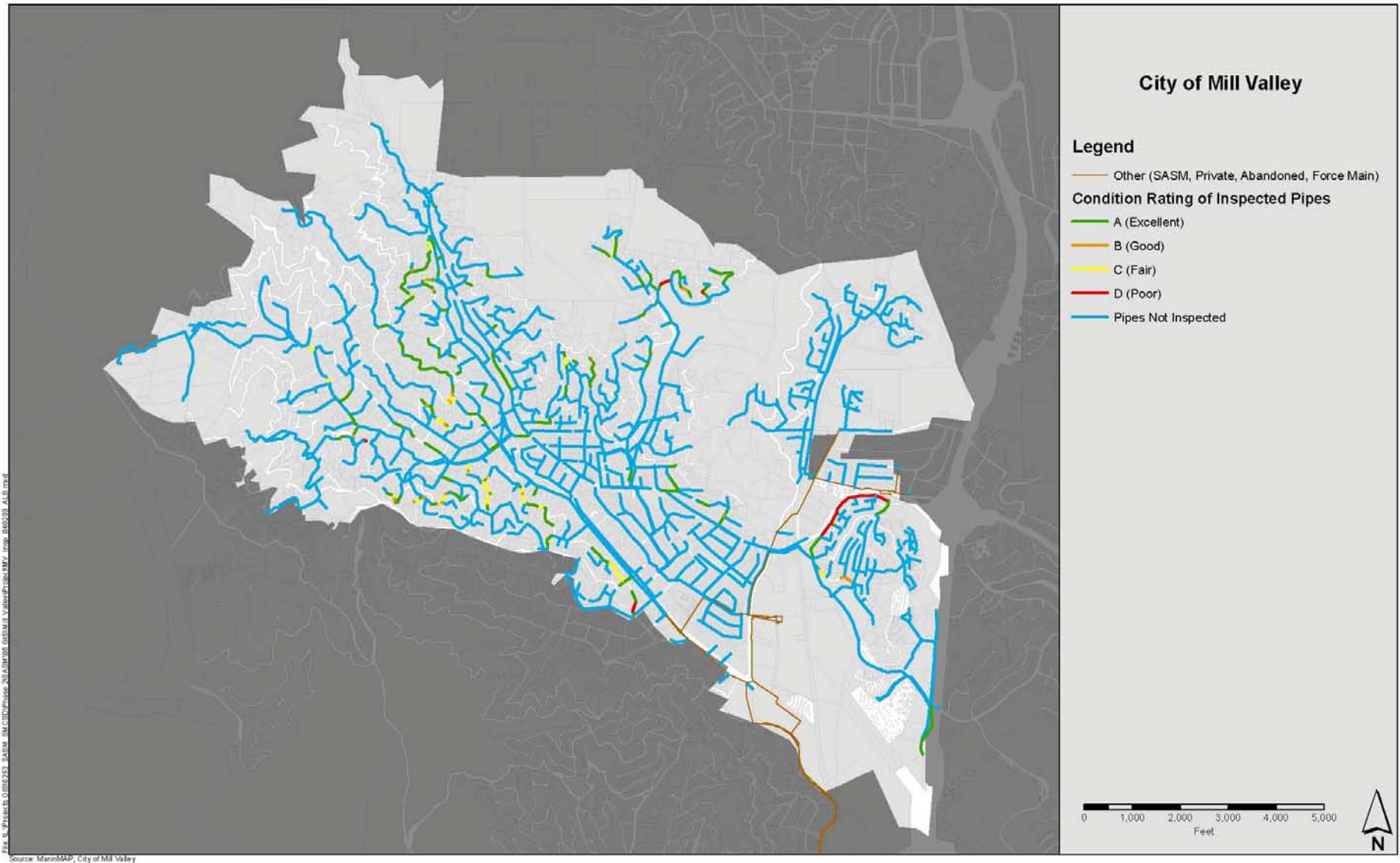
### **Condition Rating Systems**

The condition rating system selected for sewer pipe inspections performed prior to April 10, 2008 is as follows:

- **A (Excellent):** Has been recently removed and replaced via open trench or pipe bursting, or if the pipe is newly installed.
- **B (Good):** Generally good condition but required one or more point repairs.
- **C (Fair):** Some deterioration and has been referred for cleaning, root cutting or chemical root treatment.
- **D (Poor):** Indicates that the pipe has significant deterioration and that the pipe requires further analysis to determine whether a rehabilitation project is needed. These pipes have the following comment "rehabilitation to be determined" in the CCTV database.

Utilizing these condition rating definitions, **Table 4-6** summarizes the condition ratings for the pipes in the Mill Valley service area that have previously been inspected.

Figure 4-2: Mill Valley Pipes Inspected after April 10, 2003 and prior to April 10, 2008



**Table 4-6: Condition Rating Summary – Pipes Inspected April 10, 2003 to April 10, 2008**

Condition Rating	Rating Description	# of Pipe Segments	Lineal Feet of Sewer Mains
A	Excellent	194	24,675
B	Good	31	949
C	Fair	36	4,106
D	Poor	12	2,465
<b>Totals</b>		<b>273</b>	<b>32,195</b>

The condition rating system that will be utilized for inspection data collected after April 10, 2008 was documented in the original SSRAP document submitted on October 15, 2008. Also, a more detailed method to identify non-emergency sewer repair, rehabilitation and replacement projects will be documented in the plan for short-term and long-term repair, rehabilitation and replacement of sewers that will be submitted to EPA by October 15, 2010.

#### 4.5.2 Documentation and Recordkeeping

A copy of all future defect code data and the video will be retained for evaluation and to support preparation of the plan for short-term and long-term repair, rehabilitation and replacement of sewers that will be submitted to EPA by October 15, 2010.

#### 4.5.3 Inspection and Condition Assessment Program [UPDATE]

The details for Mill Valley's inspection and condition assessment program were documented in the original SSRAP document. The original SSRAP was submitted on October 15, 2008.

## 4.6 Homestead Valley Sanitary District

### 4.6.1 Recent Sewer Inspection and Condition Assessment Activities

#### Previously Inspected Areas

During the five years prior to issuance of the Order, Homestead Valley collected sewer inspection data. **Figure 4-3** summarizes which sewers have been previously inspected.

#### Evaluation Methods

Homestead Valley typically utilizes a defect coding system to identify the type and severity of each defect in each sewer pipe that has been inspected. The following section summarizes the defect coding system and the defect rating system that was utilized in the past.

#### **Defect Coding Systems**

Homestead Valley utilized a customized defect coding system utilized by several agencies in Northern California. This defect rating system identifies the type and severity of defects and also has a rating score associated with some defects.

The defect coding system that will be utilized in the future was covered in the original SSRAP document submitted on October 15, 2008.

#### **Condition Rating Systems**

The condition rating system for sewer pipe inspections performed prior to April 10, 2008 is known as the fault ratio. The fault ratio is calculated by taking the sum of the rating scores for all defects found in one pipe segment divided by the lineal feet of pipe in the pipe segment, or:

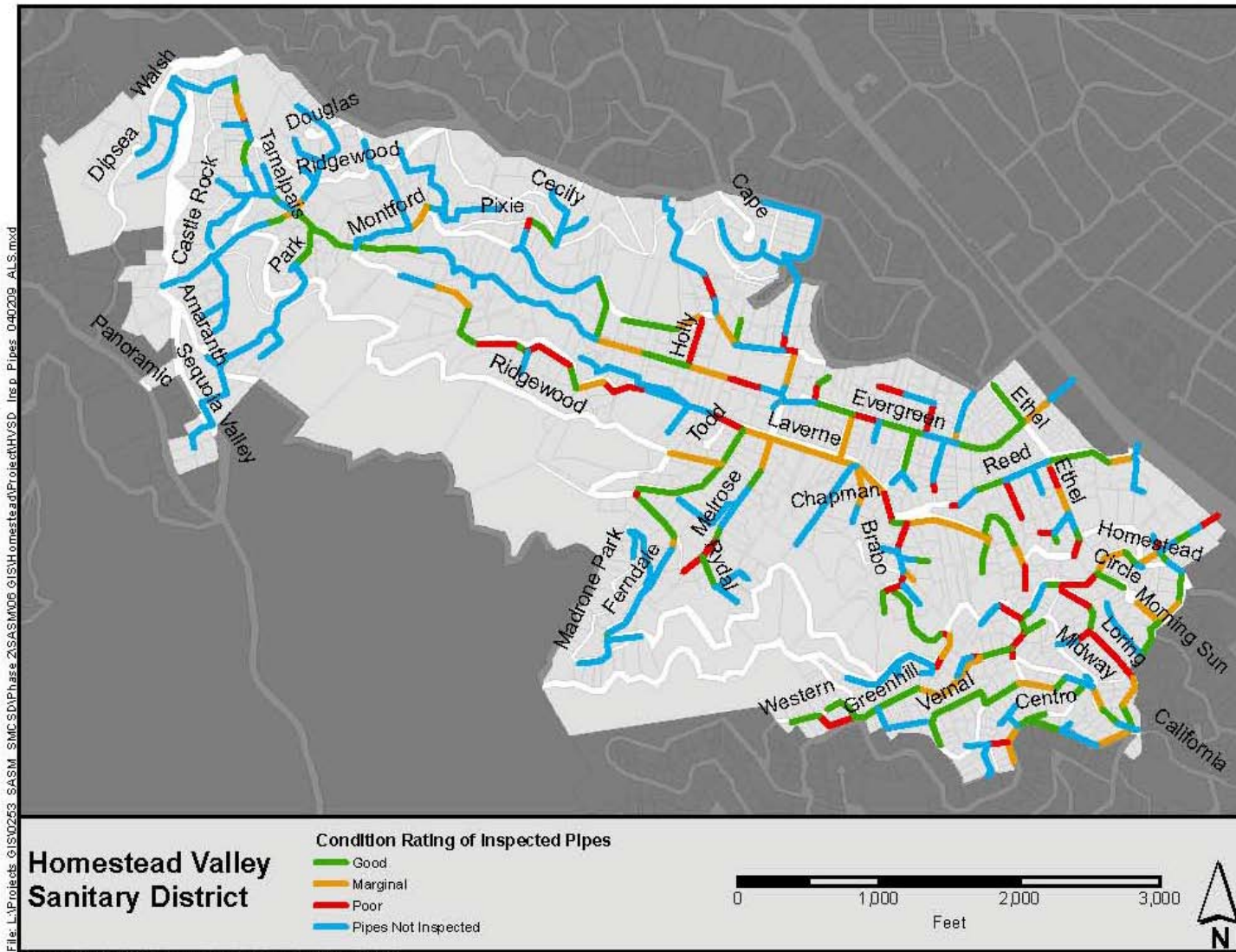
$$\text{Fault Ratio} = (\text{Sum of DEFECT RATING SCORES}) / (\text{LINEAL FEET OF PIPE SEGMENT})$$

The fault ratio system was designed to quickly determine the relative condition of each line segment that had been inspected. The following fault ratio ranges were developed to assign a condition rating:

- < 5                      Good condition
- $\geq 5$  and  $\leq 10$       Marginal condition
- $\geq 10$                     Poor condition

Utilizing this formula and these condition rating definitions, **Table 4-7** summarizes the condition ratings for the pipes in the SASM service area that have previously been inspected.

Figure 4-3: Homestead Valley Sanitary District Pipes Inspected after April 10, 2003 and prior to April 10, 2008



**Table 4-7: Condition Rating Summary – Pipes Inspected April 10, 2003 to April 10, 2008**

Condition Rating	Rating Description	# of Pipe Segments	Lineal Feet of Sewer Mains
Good	Does not require repair or rehabilitation.	102	17,194
Marginal	Some deterioration but should not require rehabilitation in the near future.	61	11,791
Poor	Significant deterioration. Should be considered for rehabilitation in the Rehabilitation and Replacement Plan.	64	9,214
	<b>Totals</b>	<b>227</b>	<b>38,199</b>

The condition rating system that will be utilized for inspection data collected after April 10, 2008 was documented in the original SSRAP document submitted on October 15, 2008.

Also, a more detailed method to identify non-emergency sewer repair, rehabilitation and replacement projects will be documented in the plan for short-term and long-term repair, rehabilitation and replacement of sewers that will be submitted to EPA by October 15, 2010.

#### 4.6.2 Documentation and Recordkeeping

All defects observed have been documented. A copy of all defect code data and the video will be retained for evaluation and to support preparation of the plan for short-term and long-term repair, rehabilitation and replacement of sewers that will be submitted to EPA by October 15, 2010.

#### 4.6.3 Inspection and Condition Assessment Program

The details for Homestead Valley's inspection and condition assessment program that will be implemented between April 10, 2008 and April 15, 2010 were documented in the original SSRAP document. The original SSRAP was submitted on October 15, 2008. This document updated the original SSRAP by adding a more detailed schedule for future sewer inspections.

In summary, Homestead Valley plans to inspect the remaining gravity sewer pipes and manholes that have not been recently inspected. These remaining sewers will be inspected prior to April 15, 2010. **Table 4-8** summarizes the quantity of sewers that have been inspected and the quantity of pipes in the planned inspection program:

**Table 4-8: Inspection and Condition Assessment Program Summary**

HVSD Sewer Mains	Lineal Feet of Sewer Mains
Gravity Pipes Subtotal	66,478
Inspected between April 13, 2003 and April 10, 2008	(35,415)
Total Lineal Feet to be Inspected Prior to April 15, 2010	<b>31,063</b>

**Table 4-9** summarizes the schedule for future sewer inspections through April 15, 2010.

**Table 4-9: Inspection Schedule through April 15, 2010**

Planned Inspection	Lineal Feet of Sewer Mains
Between April 10, 2008 and April 15, 2009	0
Between April 16, 2009 and April 15, 2010	31,063
<b>Totals</b>	<b>31,063</b>

## 4.7 Richardson Bay Sanitary District

### 4.7.1 Recent Sewer Inspection and Condition Assessment Activities

#### Previously Inspected Areas

During the five years prior to issuance of the Order, Richardson Bay has collected a significant quantity of sewer inspection data. **Figure 4-4** summarizes which sewers have been previously inspected.

#### Evaluation Methods

Richardson Bay had two methods for evaluation of sewer inspection data collected during the period between April 10, 2003 and April 10, 2008. Early in the inspection program, Richardson Bay inspected pipes but did not record detailed defect code data. However, every time a serious defect was found, the defect was corrected through a sewer repair and rehabilitation program. Therefore, if a pipe was inspected during this time period and was not repaired or rehabilitated, the pipe was in generally good condition.

Later in the program, Richardson Bay began to utilize a more structured defect coding system to identify the type and severity of each defect in each sewer pipe that has been inspected. The following section summarizes the defect coding system and the defect rating system that was utilized in the past.

#### **Defect Coding Systems**

For the inspections where defect codes were collected, Richardson Bay utilized a customized defect coding and rating system utilized by several agencies in Northern California. This defect coding and rating system identifies the type and severity of defects and also has a rating score associated with some defects. The defect coding system has been included in **Appendix F**, and the condition rating system that utilizes these defect codes is described below.

The defect coding system and the defect rating system that will be utilized in the future was covered in the original SSRAP document submitted on October 15, 2008.

#### **Condition Rating Systems**

The condition rating system for sewer pipe inspections performed prior to April 10, 2008 is known as the fault ratio. The fault ratio is calculated by taking the sum of the rating scores for all defects found in one pipe segment divided by the lineal feet of pipe in the pipe segment, or:

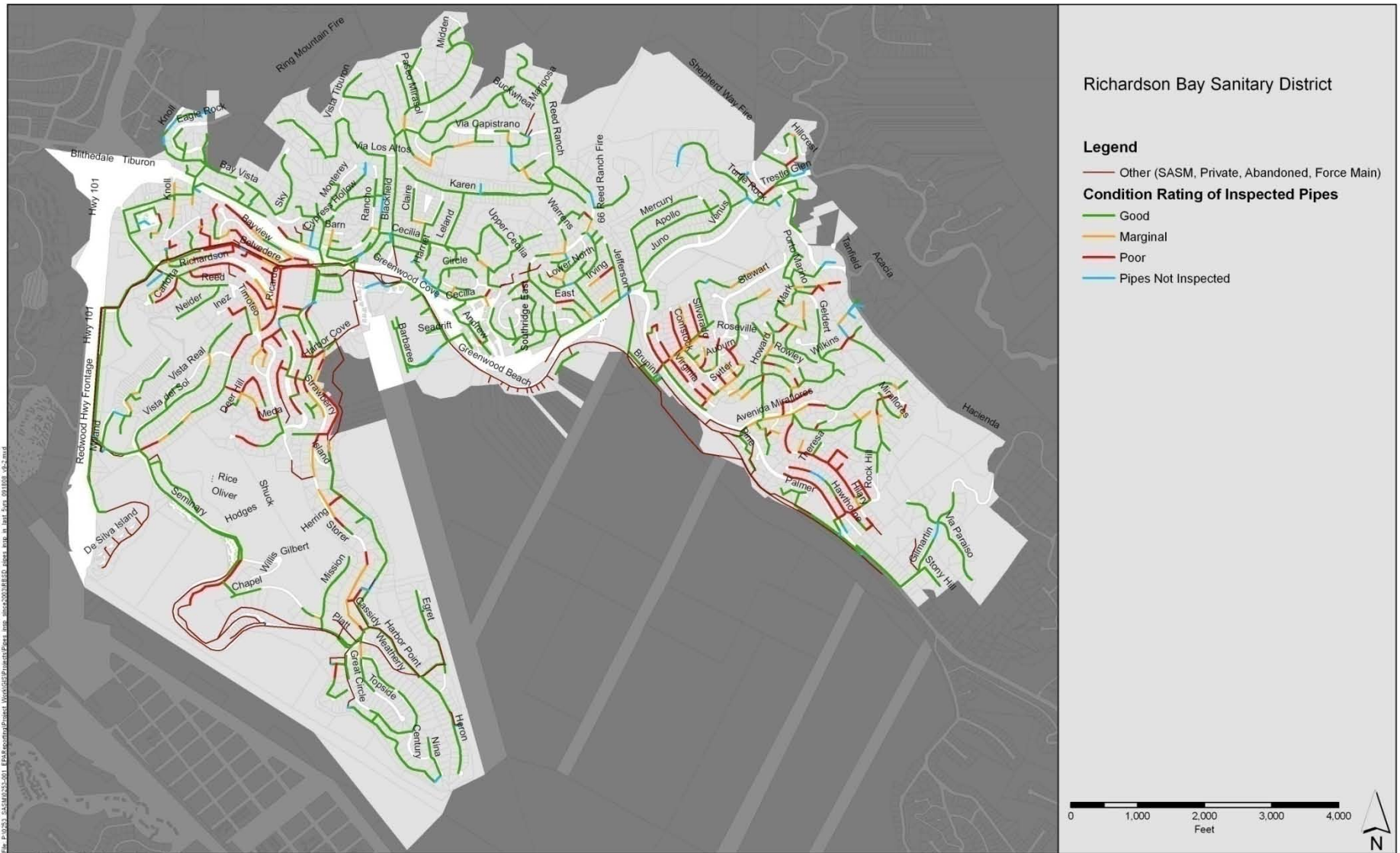
$$\text{Fault Ratio} = (\text{Sum of DEFECT RATING SCORES}) / (\text{LINEAL FEET OF PIPE SEGMENT})$$

The fault ratio system was designed to quickly determine the relative condition of each line segment that had been inspected. The following fault ratio ranges were developed to assign a condition rating:

- < 5                      Good condition
- ≥ 5 and ≤10          Marginal condition
- ≥10                      Poor condition

Utilizing this formula and these condition rating definitions, **Table 4-10** summarizes the condition ratings for the pipes in the SASM service area that have previously been inspected.

Figure 4-4: Richardson Bay Sanitary District Pipes Inspected after April 10, 2003 and prior to April 10, 2008



**Table 4-10: Condition Rating Summary – Pipes Inspected April 10, 2003 to April 10, 2008**

Condition Rating	Rating Description	# of Pipe Segments	Lineal Feet of Pipe
Good	Does not require repair or rehabilitation.	941	160,724
Marginal	Some deterioration but should not require rehabilitation in the near future.	116	20,506
Poor	Significant deterioration. Should be considered for rehabilitation in the Rehabilitation and Replacement Plan.	193	33,447
	<b>Totals</b>	<b>1,250</b>	<b>214,677</b>

The condition rating system that will be utilized for inspection data collected after April 10, 2008 was documented in the original SSRAP document submitted on October 15, 2008. Also, a more detailed method to identify non-emergency sewer repair, rehabilitation and replacement projects will be documented in the plan for short-term and long-term repair, rehabilitation and replacement of sewers that will be submitted to EPA by October 15, 2010.

#### 4.7.2 Documentation and Recordkeeping

All defects observed have been documented. A copy of all defect code data and the video will be retained for evaluation and to support preparation of the plan for short-term and long-term repair, rehabilitation and replacement of sewers that will be submitted to EPA by October 15, 2010.

#### 4.7.3 Inspection and Condition Assessment Program

The details for Richardson Bay's inspection and condition assessment program that will be implemented between April 10, 2008 and April 15, 2010 were documented in the original SSRAP document. The original SSRAP was submitted on October 15, 2008. This document updated the original SSRAP by adding a more detailed schedule for future sewer inspections.

In summary, Richardson Bay plans to inspect the remaining gravity sewer pipes and manholes that have not been recently inspected. These remaining sewers will be inspected prior to April 15, 2010. **Table 4-11** summarizes the quantity of sewers that have been inspected and the quantity of pipes in the planned inspection program.

**Table 4-11: Inspection and Condition Assessment Program Summary**

RBSD Sewer Mains	Lineal Feet of Sewer Mains
Pipes Database (excludes any abandoned or private lines)	242,630
Agency Force Mains	(18,118)
Gravity Pipes Subtotal	224,512
Inspected between April 13, 2003 and April 10, 2008	(214,677)
Total Lineal Feet to be Inspected Prior to April 15, 2010	<b>9,835</b>

**Table 4-12** summarizes the schedule for future sewer inspections through April 15, 2010.

**Table 4-12: Inspection Schedule through April 15, 2010**

Planned Inspection	Lineal Feet of Sewer Mains
Between April 10, 2008 and April 15, 2009	0
Between April 16, 2009 and April 15, 2010	9,835
<b>Totals</b>	<b>9,835</b>

## 4.8 Tamalpais Community Services District

This section addresses collection system maintenance and management for the portion of TCSD that is tributary to the SASM system. The past and proposed programs and procedures described in this section apply to the entire District, but the inspection schedules presented in this section are specific to the portion of TCSD, known as the Kay Park area, that is part of SASM.

### 4.8.1 Recent Sewer Inspection and Condition Assessment Activities

#### Previously Inspected Areas

During the 5 years prior to issuance of the Order, TCSD collected some sewer inspection data had already been collected. However, the entire Kay Park sewer system has recently been replaced and therefore is not scheduled for re-inspection prior to April 15, 2010

#### Evaluation Methods

##### **Defect Coding Systems**

The defect coding system that will be utilized in the future was covered in the original SSRAP document submitted on October 15, 2008.

##### **Condition Rating Systems**

The condition rating system that will be utilized for inspection data collected after April 10, 2008 was documented in the original SSRAP document submitted on October 15, 2008.

### 4.8.2 Documentation and Recordkeeping

A copy of all defect code data and the video will be retained for evaluation and to support preparation of the plan for short-term and long-term repair, rehabilitation and replacement of sewers that will be submitted to EPA by October 15, 2010.

### 4.8.3 Inspection and Condition Assessment Program

The details for TCSD's inspection and condition assessment program that will be implemented between April 10, 2008 and April 15, 2010 were documented in the original SSRAP document. The original SSRAP was submitted on October 15, 2008. **Table 4-13** summarizes the quantity of sewers that have been inspected and the quantity of pipes in the planned inspection program. In summary, TCSD does not plan to inspect the gravity sewer pipes and manholes as they were recently rehabilitated or replaced.

**Table 4-13: Inspection and Condition Assessment Program Summary**

TCSD Sewer Mains	Lineal Feet of Sewer Mains
Pipes Database	7,915
Inspected between April 13, 2003 and April 10, 2008	7,915
Total Lineal Feet to be Inspected Prior to April 15, 2010	--

## Section 5 Implementation Study and Report

### 5.1 Purpose

The purpose of the Implementation Study and Report section was to evaluate options for collaboration among the agencies. The original Implementation Study and Report was completed and submitted with the original SSRAP in October of 2008. Therefore, the purpose of this section of the SSRAP – Volume II is to summarize progress towards the implementation of collaboration initiatives among the agencies.

### 5.2 Requirements of the EPA Amended Order for Compliance

The EPA Order, Section VII.A includes the following requirements:

#### *VII. IMPLEMENTATION STUDY AND REPORT*

- A. By April 15, 2009, SASM and the member agencies shall complete a study and submit a report that evaluates options for collaboration among the member agencies on efforts to implement and comply with the requirements of this Order. This evaluation shall consider:*
- 1. Options for deploying staff, equipment, and other resources, where possible, to minimize costs to each agency and provide for efficient implementation of collection system maintenance and spill response;*
  - 2. Measures to reduce energy use within the collection systems and the wastewater treatment plant, such as energy audits, of pump stations and efforts to increase water conservation (see [http://www.epa.gov/waterinfrastructure/bettermanagement\\_energy.html](http://www.epa.gov/waterinfrastructure/bettermanagement_energy.html));*
  - 3. Coordination among the agencies and SASM on completing the condition and capacity assessments;*
  - 4. Coordination among the agencies on reaching sound engineering decisions on the most cost-effective means for ensuring adequate capacity throughout the collection systems and at the SASM Wastewater Treatment Plant;*
  - 5. Collaboration among the agencies to ensure the most cost-effective and efficient delivery of the capital improvements needed to renew the aging sewer systems and complete the capacity improvements required by this Order ; and*
  - 6. Collaboration among the agencies to develop financial plans and secure funding needed to complete the requirements of this Order.*

In the original SSRAP that was submitted on October 15, 2008, the agencies submitted an Implementation Study and Report. In a letter dated January 15, 2009, the EPA requested an update on areas where the agencies have successfully collaborate. The agencies have made significant progress since the submittal of the original SSRAP in the following areas:

- Implementation of a common computerized maintenance management system (MMS) known as SSGIS. Every agency is utilizing the same system to allow for efficiency in purchasing, implementation, and training on use of the system. This system is described in Section 2 of this report.
- For water quality sampling, SASM has prepared a standardized SSO sampling kit for use by all agencies. This kit will allow each agency to take required water quality samples for any SSOs that reach a waterway.

- For contracted services for SSO response, sewer cleaning and sewer inspection, the agencies have developed a common baseline scope of services for use in contracting. This scope of services has been included as Appendix G of this document.

The agencies will continue to consider other possible opportunities for collaboration with respect to wastewater collection system issues in the future.

## **Appendix A Amended Order for Compliance**

## **Appendix B Pump Station Data Sheets - SASM**

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**Appendix C Pump Station Data Sheets - Mill Valley**

## **Appendix D Pump Station Data Sheets - RBSD**

**Appendix E Pump Station Data Sheets - TCSD**

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**Appendix F Defect Coding System for Sewer Pipe  
Inspections Performed Prior to April 10, 2008 - SASM,  
and RBSD**

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**Appendix G Sample SSO Response and Sewer  
Cleaning Contract**

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**TECHNICAL SPECIFICATIONS  
CLEANING SERVICES FOR GRAVITY SEWERS  
AND SEWER OVERFLOW RESPONSE SERVICES**

**PART 1 GENERAL**

1.1 THE REQUIREMENT

- A. The work described herein includes those measures and activities required to clean gravity sewer lines to remove foreign materials. The work described herein also included activities for CONTRACTOR'S response to a sewer overflow in accordance with the Agency's Sanitary Sewer Overflow Response Plan.
- B. The goal of the sewer cleaning is to remove all foreign materials so that the cross section of the gravity sewer is restored to approximately 95% of the original cross sectional area of the sewer when it was new at all points along its length.
- C. Sewers shall remain in service during the cleaning process.

1.2 SCOPE OF WORK

- A. There are approximately \_\_\_\_\_ sewer line segments ranging in diameter from \_\_\_\_\_ inches to \_\_\_\_\_ inches that are to be cleaned in this Project. The total length of cleaning is approximately \_\_\_\_\_ lineal feet.
- B. A list of each pipe included in the project is included in Attachment 1 to this specification. It is the CONTRACTOR's responsibility to obtain and comply with all work restrictions. A map of the individual gravity sewer line segments to be cleaned can be obtained upon request from the Agency.

1.3 DEFINITIONS

- A. CCTV means closed circuit television.
- B. Cleaning Group means a collection of gravity sewers identified by the Agency to be included in one contract work packet.
- C. Cleaning Routes means a collection of gravity sewers that are to be cleaned from the upstream line segment to the downstream line segment.
- D. Combination cleaner means a high velocity sewer cleaner with an integral vacuum system for removing materials from the downstream structure during the sewer cleaning operation.
- E. Foreign materials means materials found in the gravity sewers such as sewage solids, sludge, dirt, soil, sand, rocks, bricks, grease, roots, rags, construction debris, pieces of broken pipe, and any other materials that may inhibit or interfere with free flow in the sewer.

- F. Hydroflushing means sewer cleaning using a high velocity sewer cleaner.
- G. Low Flow Hours means the hours when the flows in the gravity sewers are at their lowest level of the day, typically 1:00 a.m. to 5:00 a.m.
- H. Project refers the contents of this Bid Package.
- I. Normal Working Hours means Monday through Friday between the hours of 7:00 a.m. and 5:00 p.m.
- J. Sewer Line Segment means a single gravity sewer between two structures.
- K. Structure means a manhole, cleanout or other gravity sewer access structure.
- L. Cleaning Nozzle means a controlled-speed, rotating, sewer cleaning nozzle designed to clean 6 to 21 inch diameter gravity sewers. The only cleaning nozzles that will be allowed under this specification are the Bulldog Nozzle manufactured by Enz Technik AG and the Warthog Nozzle manufactured by Stone Age Tools. Other nozzles may be utilized if approved by Agency prior to the submittal of bids.
- M. Agency means the Agency or the Agency's representative.
- N. The Agency's Sanitary Sewer Overflow Response Plan is the Agency's approved sewer overflow response manual. A copy of this document is included as Attachment 2.

#### 1.4 ACCESS TO PRIVATE PROPERTY

The majority of inspection of existing sewer pipelines and manholes included in this project are located within public rights of way. In order to complete the Work, the CONTRACTOR may be required to enter onto private property. Where entry onto private property is required, the CONTRACTOR shall obtain a right-of-entry and/or right-of-access agreement from the private property owner.

- A. Private property access forms are only required when there is no public access to the sewer. This means that if the sewer line runs through the parking lot of a business, is located in roads and alleys within condominium or apartment complexes, or other publicly accessible area, the agreement is not required. If the area has no public access, then the agreement is required (e.g. residential yards, fenced in lots, etc).
- B. The right-of-entry and/or the right-of-access agreement shall be in writing, signed by the private property owner and the CONTRACTOR, and shall include the following:
  1. Date of agreement
  2. Terms and conditions of the agreement
  3. Extent of work to be performed on the private property
  4. Duration of the work to be performed

5. Requirement for a signed release from the private property owner upon completion of the work
  6. Emergency contact information for the private property owner and the CONTRACTOR.
- C. A signed agreement shall be obtained before entry onto private property. A copy of the signed release from the private property owner shall be provided to the OWNER'S REPRESENTATIVE and OWNER prior to Final Completion of the Work.
- D. The CONTRACTOR is responsible for ensuring that any work requiring access to private property does not cause delays or interfere with the overall work schedule.

#### 1.5 LOCATING MANHOLES/COVERED MANHOLES

The CONTRACTOR shall make a reasonable effort, up to approximately 20 minutes each, to locate manholes required for access and observation. A reasonable effort includes using maps, measuring the distance from other manholes, and using a magnetic locator. The OWNER will locate the missing manhole or raise or repair the manhole and notify the CONTRACTOR when it can be used for access or observation. If, in the opinion of the OWNER, the CONTRACTOR failed to make a reasonable effort to locate or open the manhole, the OWNER will deduct the cost of its response from any payments due the CONTRACTOR.

The CONTRACTOR shall notify the OWNER within 24 hours in the event that a manhole cannot be located or the manhole cannot be opened using a pry bar and sledge hammer.

#### 1.6 INCOMPLETE LINE SEGMENTS

In the event that the CONTRACTOR encounters conditions that prevent it from cleaning the entire length of a sewer line segment. CONTRACTOR will ensure no potential overflow condition exists. If a potential overflow condition does exist, the CONTRACTOR will contact OWNER Representative immediately. If no potential overflow condition exists then the CONTRACTOR shall move to the next sewer line segment and shall notify the Agency by the Agency's next work day.

#### 1.7 DAMAGE TO SEWERS DURING CLEANING

- A. The CONTRACTOR shall take precautions to avoid damaging the sewer. Any damage to the sewer system resulting from the CONTRACTOR's operations shall be repaired to the satisfaction of the Agency and at no cost to the Agency.
- B. If any gravity sewer lines are damaged during normal cleaning operations due to preexisting or unforeseen conditions, the CONTRACTOR will not be held responsible provided that the CONTRACTOR followed the precautions normally employed in the cleaning of gravity sewers.
- C. In the instance that the CONTRACTOR's equipment becomes lodged in the sewer, the CONTRACTOR shall notify the Agency as soon as practicable. The

CONTRACTOR shall take all steps necessary to remove the lodged equipment as quickly as possible, but not longer than 24 hours. If the lodged equipment must be removed by excavation of the sewer line, the CONTRACTOR shall be responsible for all costs and shall follow the Agency's standard provisions for such excavations and repairs. Additionally, the CONTRACTOR will be responsible for any extra costs incurred for the retrieval of any lodged equipment.

- D. The CONTRACTOR shall respond to and mitigate any overflows caused by the actions of the CONTRACTOR following the procedures in the Sanitary Sewer Overflow Response Plan (including payment of claims for property damage caused by actions of the CONTRACTOR).

#### 1.8 QUALITY ASSURANCE

- A. The CONTRACTOR shall use trained and experienced personnel to operate the sewer cleaning equipment.
- B. The CONTRACTOR shall use quality equipment that is in reliable condition.
- C. The CONTRACTOR shall supply its field crews with information and tools (if needed) to ensure that they are cleaning the correct sewer line segments.
- D. The CONTRACTOR shall provide field supervision that is adequate to ensure that the work is being completed in compliance with these specifications.
- E. The CONTRACTOR shall review all Sewer Cleaning Logs to ensure that the information included is complete and accurate.

#### 1.9 TRAINING

- A. The CONTRACTOR shall train its personnel on Chapters 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 4.1, 4.2, 6.1 and 6.3 of the approved Sanitary Sewer Overflow Response Plan procedures prior to commencing work.

#### 1.10 SUBMITTALS

- A. Prior to Mobilization, the CONTRACTOR shall submit the following to the Agency for approval:
  - 1. Flow control methods that will be employed to clean sewers with high flows where the depth of flow is greater than 20% of the diameter of the sewer.
  - 2. Plan for containing and removing sludge, dirt, sand, rocks, grease, roots, and any other foreign materials from the manhole during cleaning activities.
  - 3. Plan for the disposal of liquid and solid wastes.
  - 4. List of proposed disposal sites for the disposal of materials removed from the sewers during the cleaning operations.
  - 5. A letter on company letterhead and signed by a company officer indicating receipt and review of the Sanitary Sewer Overflow Response Plan and

completion of training on Chapters 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 4.1, 4.2, 6.1 and 6.3 for all personnel potentially involved in sewer overflow response activities.

6. A confined space entry plan that includes testing equipment, entry equipment, emergency response, and a list of certified personnel.
  7. CONTRACTOR shall prepare a right-of-entry and/or right-of-access agreement to be used by the CONTRACTOR in obtaining access to private property. The agreement shall include the following:
    - a. Date of Agreement
    - b. Extent of work to be performed on the private property.
    - c. Duration of the work to be performed.
    - d. Approval of property owner prior to entry.
    - e. Requirement for a signed release from the property owner upon completion of the work.
    - f. Emergency contact information for the private property owner and the CONTRACTOR.
- B. CONTRACTOR shall submit the following items monthly after Mobilization:
1. Monthly sewer cleaning schedules with adequate detail to provide the Agency with the opportunity to observe the sewer cleaning operation.
  2. Sewer Cleaning Logs in electronic and hardcopy format for each of the sewer line segments that were cleaned during the previous week. A sample Sewer Cleaning Log form is included in Attachment 3 to these specifications. The electronic format will be provided by the Agency.
  3. Right-of-entry and/or right-of-access agreements approved by property owners.
  4. Progress meeting with Agency's Representative, if deemed necessary.

## **PART 2 PRODUCTS**

### **2.1 SEWER OVERFLOW RESPONSE**

- A. Cleaning vehicle and chase vehicle equipment shall be equipped for working safely at night.
- B. Removal of blockages causing a sewer backup or sewer overflow may be removed using either a rodding machine or combination sewer cleaning unit.
- C. The CONTRACTOR may use cleaning nozzles, other than those identified in Section 1.3, that are appropriate for clearing a blockage during this activity.

### **2.2 SEWER OVERFLOW CONTAINMENT**

- A. The CONTRACTOR shall use an inflatable plug when feasible to plug storm drain inlets as described in Chapter 3.6 of the Sanitary Sewer Overflow Response Plan.
- B. The CONTRACTOR shall use sandbags or appropriate containment equipment to contain and direct spilled sewage as discussed in Chapter 3.6 of the Sanitary Sewer Overflow Response Plan.
- C. When directed by the Agency, the CONTRACTOR shall use a pump to bypass sewage flow to a manhole downstream of the blocked sewer pipe.

### 2.3 SEWER OVERFLOW CLEAN UP

- A. The CONTRACTOR shall disinfect areas contaminated by the sewer overflow using the disinfectant solution of household bleach diluted 10:1 with water or other disinfectant approved by the Agency. Disinfectant solution shall not be introduced into a storm drain or surface water body, and any residual disinfectant solution should be removed by CONTRACTOR with a vacuum unit.
- B. The CONTRACTOR is responsible for obtaining all water necessary for the performance of the work.

### 2.4 SEWER CLEANING

- A. Sewer cleaning shall be performed by the hydroflushing method. Methods that employ buckets, porcupines, kites, scooters, balls, pigs, snakes, or other winch or rod-propelled devices or tools shall not be used.
- B. The CONTRACTOR shall have equipment equipped with traffic controls.
- C. The CONTRACTOR shall use a combination sewer cleaning equipment and cleaning tools suitable for use in gravity sewers from 6 to 21 inches in diameter. The allowable sewer cleaning nozzle shall be a Bulldog or a Warthog rotating nozzle as specified in 1.3. Use of other nozzles or cleaning tools requires the advance approval of the Agency.
- D. The CONTRACTOR will be responsible for obtaining all water necessary for the performance of the work.

## **PART 3 EXECUTION**

### 3.1 SEWER OVERFLOW EMERGENCY RESPONSE

- A. In the event of a sewer overflow, the CONTRACTOR shall implement Chapters 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 4.1, 4.2, 6.1 and 6.3 of Sanitary Sewer Overflow Response Plan to respond to, contain, mitigate, and document the overflow.

- B. The CONTRACTOR shall take all reasonable steps to respond to the site of the sewer overflow within 60 minutes after the Agency receives the initial notification of the spill.
- C. Upon arrival at the sewer overflow site, the CONTRACTOR shall note the arrival time at sewer overflow site, verify the existence of a sewer overflow, verify the sewer overflow is occurring on the Agency sewer system, assess the affected area and extent of the spill, and determine if additional support is needed for line cleaning, repair, containment, recovery, or site cleanup. The CONTRACTOR shall immediately contact the Agency and request additional resources when necessary.
- D. Sewer overflow blockage removal operations shall be conducted from a manhole downstream of the blockage causing the sewer overflow. If blockage removal using a downstream manhole is not possible, the sewer crew shall proceed to perform blockage removal from an upstream manhole only with the approval of the Agency.
- E. The CONTRACTOR shall employ a debris trapping system in the outlet of the downstream manhole during the removal of a blockage causing a sewer overflow only if directed by the Agency. If a debris trap is used, the CONTRACTOR shall remove trapped materials from the manhole prior to removal of the debris trapping system.
- F. The CONTRACTOR shall conduct work to prevent any further blockage or failure and minimize surcharging in the sewer structures, connecting pipelines, and service laterals. Damage to existing facilities as a result of the CONTRACTOR's work shall be promptly repaired in kind at no additional cost to the Agency.
- G. The CONTRACTOR shall be thoroughly familiar with all phases of emergency response and blockage removal to ensure the completion of this Contract without causing a health hazard or damage to the sewage system, public, and private properties.
- H. At the direction of the Agency, the CONTRACTOR shall initiate containment and/or bypass pumping as described in Chapter 3.5 and Chapter 3.6 of the Sanitary Sewer Overflow Response Plan.
- I. The CONTRACTOR shall perform clean up of areas contaminated by sewage. The CONTRACTOR shall collect all signs of sewage solids and sewage-related material by hand or with the use of rakes and brooms. All reasonable steps shall be taken to contain and vacuum up the wastewater as discussed in Chapter 4.2 of the Sanitary Sewer Overflow Response Plan.
- J. The CONTRACTOR shall disinfect all hard surface areas contaminated by the overflow by applying minimal amounts of a disinfectant solution using a hand sprayer. The volume and application method of the disinfectant employed shall be documented by the CONTRACTOR.

- K. If sewage has reached the storm drain system, the CONTRACTOR shall use a combination sewer cleaning truck to vacuum/pump out the catch basin and any other portion of the storm drain that may contain sewage.
- L. The CONTRACTOR shall complete Collection System Service Call and Overflow Field Report Form included as Appendix 4 of the Agency's Sanitary Sewer Overflow Response Plan. If an SSO has occurred in a residence or building, the CONTRACTOR shall complete a Sewer Backup Summary Report included as Appendix 7 of the Agency's Sanitary Sewer Overflow Response Plan.
- M. At the direction of the Agency, the CONTRACTOR shall perform a thorough cleaning of the blocked sewer pipe using the methods described in Section 3.2 – SEWER CLEANING.

### 3.2 SEWER CLEANING

- A. Sewer cleaning operations shall be conducted from the downstream manhole. Sewer cleaning shall not be performed using an upstream manhole for access unless necessitated by the inability to gain access to the downstream manhole or inability to perform sewer cleaning from the downstream manhole due to steep sewer slope.
- B. The CONTRACTOR shall employ a debris trapping system in the outlet of the downstream manhole prior to cleaning any sewer line to prevent sludge, dirt, sand, rocks, grease, roots, and any other foreign materials from entering the downstream sewer. The CONTRACTOR shall remove trapped materials from the manhole prior to removal of the debris trapping system.
- C. Hydroflushing of all sewer lines shall include a minimum of two passes (each pass consists of running the cleaning nozzle all the way to the next upstream manhole and returning it to the entry manhole). The CONTRACTOR shall verify that the hydroflush cleaning tool reaches the upstream manhole on each pass.
- D. If any sewer line shows evidence of being more than one-half full with debris or if there is excessive root intrusion that would render hydroflushing an ineffective method of cleaning, the CONTRACTOR shall notify the Agency by the Agency's next work day.
- E. All material resulting from the sewer line cleaning shall be removed from the sewer lines and associated structures prior to moving to the next sewer line segment.
- F. The CONTRACTOR may decant liquid from the vacuum tank into the sewer provided that there is a trap in place at the outlet to the manhole and that the CONTRACTOR monitors the manhole for the presence of materials being discharged during the decanting process. In the event there is material other than water being discharged, the CONTRACTOR shall immediately cease decanting and remove any materials that have collected in the manhole.
- G. The CONTRACTOR shall at all times conduct work to prevent any blockage or failure and minimize surcharging in the sewer structures, connecting pipelines,

and service laterals. Damage to existing facilities as a result of the CONTRACTOR's work shall be promptly repaired in kind at no additional cost to the Agency.

- H. The CONTRACTOR shall be thoroughly familiar with all phases of sewer pipe and structure cleaning to ensure the completion of this Contract without causing a health hazard or damage to the sewage system, public, and private properties.

### 3.3 CLEANING AND BLOCKAGE REMOVAL PRECAUTIONS

- A. The CONTRACTOR shall take precautions to ensure that the sewer cleaning and blockage removal activities do not cause damage or flooding of private property being served by the sewer.
- B. The CONTRACTOR shall not dispose of or allow any liquid or solid waste from the sewer cleaning operation to enter the storm drain system.
- C. In the instance that the CONTRACTOR's equipment becomes lodged in the sewer, the CONTRACTOR will notify the Agency as soon as practicable. The CONTRACTOR shall take all steps necessary to remove the lodged equipment in a timely manner. The CONTRACTOR shall take precautions to avoid damaging the sewer or causing an overflow. If the lodged equipment must be removed by excavation of the sewer line, the CONTRACTOR will be responsible for following the Agency's standard provisions for such excavations and repairs. Additionally, the CONTRACTOR will be responsible for any extra costs incurred for the retrieval of any lodged equipment.
- D. It shall be the sole responsibility of the CONTRACTOR to provide for the safety of the public within the limits of the project and on private property. CONTRACTOR shall indemnify and hold harmless the Agency and the Agency's representatives for any safety violation, or noncompliance with governing bodies and their regulations, and for accidents, deaths, injuries, or damage at the site during occupancy or partial occupancy of the site by CONTRACTOR's workforce or equipment while performing any part of the work. During sewer line cleaning, the CONTRACTOR shall implement temporary traffic control measures.
- E. In the event that there is a vehicle accident at or in the vicinity of the CONTRACTOR's temporary traffic control, then the CONTRACTOR shall immediately notify the Agency.
- F. In the event that the CONTRACTOR's activities cause a sewer overflow or a backup into private property, then the CONTRACTOR shall immediately notify the Agency. The CONTRACTOR shall implement the Sanitary Sewer Overflow Response Plan to respond to, contain, and mitigate the overflow.

### 3.4 REMOVAL AND DISPOSAL OF MATERIALS REMOVED FROM SEWERS

- A. All materials resulting from the sewer cleaning or sewer overflow emergency response operation shall be prevented from passing the downstream manhole in order to prevent causing downstream stoppages or the accumulation of debris in downstream gravity sewers or pump station wet wells.

- B. All materials resulting from the sewer cleaning operation shall be removed from the worksite by the CONTRACTOR on a daily basis and disposed of at a facility that is permitted to receive the materials.
- C. All materials resulting from the sewer cleaning or sewer overflow emergency response operation shall be removed from the worksite no less often than at the end of each workday. Under no circumstances shall CONTRACTOR be allowed to accumulate materials on the site of work beyond the end of the workday.
- D. The CONTRACTOR shall report on the Sewer Cleaning Log the predominant type and quantity of material removed from each sewer line segment.

### 3.5 ACCEPTANCE OF COMPLETED SEWER CLEANING WORK

- A. The Agency may perform a quality control inspection of CONTRACTOR sewer cleaning by inspecting a random sample of the sewer line segments cleaned by the CONTRACTOR within one month of completion of the cleaning of the line segment. The expense of this portion of the quality control inspection will be borne by the Agency.
- B. The Agency will review the video inspection results for quality control inspections performed. Sewer line segments with less than 90% of the cross sectional area free from foreign materials at any point along its length at the time of the inspection will be deemed to have failed the quality control inspection. All failed sections must be re-cleaned at the expense of the CONTRACTOR.
- C. Acceptance of sewer line cleaning shall be made upon the successful completion of the quality control inspection and approval by the Agency.
- D. The Agency shall not be liable for payments to the CONTRACTOR for cleaning of sewer line segments that have not met the criteria for acceptance.

## **PART 4 MEASUREMENT AND PAYMENT**

- 4.1 Measurement and payment for sewer overflow response services shall be performed on a time plus materials and equipment basis.
- 4.2 Measurement for cleaning of sanitary sewer pipelines will be based on the unit price per linear feet, regardless of diameter, as documented in the Agency's Geographical Information System (GIS), and in accordance with the requirements of the Contract Documents. If the CONTRACTOR measures a cleaning length that is 10% or greater than the Agency GIS length using a measurement method approved by the Agency, the CONTRACTOR may invoice for the longer cleaning length.
- 4.2 Payment for sewer cleaning shall be made at the unit price per linear foot, regardless of pipeline diameter, indicated in the Bid Form for which price shall constitute full compensation for furnishing all materials, labor, and equipment for cleaning of the existing sanitary sewer pipelines including, but not limited to, traffic control, permitting, debris disposal, and all other incidental work not specifically described in any other item of the specifications, complete-in-place, as specified and/or shown.

- 4.3 If the CONTRACTOR is unable to clean the entire length of a pipe segment, the actual length cleaned should be used for invoicing purposes. The actual length is the distance that the CONTRACTOR was able to clean in lineal feet from the wall of the downstream manhole, where the cleaning equipment was placed into the pipe, to the farthest point along the pipe segment that cleaning was conducted with a maximum length being up to the wall of the upstream manhole.
- 4.4 If a certain pipe is only able to be partially cleaned (cleaning equipment does not reach the manhole at the end of the pipe segment) due to an obstruction, the CONTRACTOR should immediately alert the Agency. The Agency will then conduct a CCTV investigation to determine the cause of the obstruction. If the obstruction is found to be debris that could have been removed by the CONTRACTOR cleaning equipment, the CONTRACTOR shall be allowed to complete the cleaning of this pipe. The CONTRACTOR shall then be able to invoice for the full length of the pipe.
- 4.5 If the obstruction is found to be a physical defect which did not allow the cleaning to take place, then the CONTRACTOR may invoice for the amount actually cleaned by the CONTRACTOR.

\*\*\* END \*\*\*



## **Attachment 2**

# **Sanitary Sewer Overflow Response Plan**

# Attachment 3

## Sewer Cleaning Log Form

**Work Order Date:** \_\_\_\_\_ **Work Order #:** \_\_\_\_\_

**Crew Members:** \_\_\_\_\_ **Vehicle #:** \_\_\_\_\_

**Reason for Maintenance:** PM  **Service Call**  **Other:** \_\_\_\_\_

**Upstream Manhole:** \_\_\_\_\_ **Downstream Manhole:** \_\_\_\_\_  
 USMH Depth: \_\_\_\_\_ feet DSMH Depth: \_\_\_\_\_ feet

**Indicated:** Length: \_\_\_\_\_ feet Size: \_\_\_\_\_ inches Material: \_\_\_\_\_  
**Actual:** Length: \_\_\_\_\_ feet Size: \_\_\_\_\_ inches Material: \_\_\_\_\_

Nearest Address: \_\_\_\_\_ (Downstream Structure)

Location Notes: \_\_\_\_\_ (e.g. Alley, Easement, Traffic)

Other Notes: \_\_\_\_\_

**Crew Arrival Time:** \_\_\_\_\_ **Crew Departure Time:** \_\_\_\_\_

**Cleaning Results: (Circle Applicable Result(s))**

Type of Material	Clear (no material)	Light	Moderate	Heavy
Debris (sand, grit, rock)	CL	DL	DM	DH
Grease	CL	GL	GM	GH
Roots	CL	RL	RM	RH
Other	CL	OL	OM	OH

**Recommended Actions:**

Cleaning Frequency _____ months	Video Inspect? : Yes <input type="checkbox"/> No <input type="checkbox"/>
Repair? : Yes <input type="checkbox"/> No <input type="checkbox"/>	Manhole Inspect? : Yes <input type="checkbox"/> No <input type="checkbox"/>
Root Control? : Yes <input type="checkbox"/> No <input type="checkbox"/>	

**Comments:**

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**Completed by:** \_\_\_\_\_ **Date Completed:** \_\_\_\_\_ **Signature:** \_\_\_\_\_

Supervisor Review:	Date:	Data Entry:	Date:
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