City of Mill Valley Sewer Capital Improvement Plan 2012 – 2016

I. BACKGROUND

Between December 2004 and February 2008, the United States Environmental Protection Agency (EPA) conducted inspections of the SASM and member-agency systems. During this period, 110 sewage overflows occurred. The largest overflow occurred on January 25, 2008 and discharged approximately 2.45 million gallons of screened wastewater from the SASM treatment plant into the Pickleweed Inlet of Richardson Bay.

The EPA determined that the unpermitted discharge was caused in part by excessive inflow and infiltration from the member agencies' that resulted in peak flows to the wastewater treatment plant. (Inflow is water into the collection system from unauthorized connections like yard drains for example. Infiltration is groundwater seepage into the collection system through defective pipe joints). The EPA also concluded that the aging and deteriorated condition of many of the sewer pipes had contributed to the overflow.

The 2008 incident resulted in an Order of Compliance (Order) issued in April 2008 by the EPA to compel SASM and its member agencies to "consistently and substantially reduce the frequency and volume of sewage of 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 spill from SASM's collection system or wastewater treatment plant." CWA-309(a)-08-030

This Order requires SASM and its member agencies to work together to implement a Sewage Spill Reduction Action Plan (SSRAP) with the goal to reduce and eliminate collection system sewage spills. The components of the SSRAP include the following:

- 1. Elimination of Collection System Spills
- 2. Spill Response, Recordkeeping, Notification & Reporting
- 3. Collection System Maintenance and Management
- 4. Collection System Assessments
- 5. Capacity Assurance
- 6. Infrastructure Renewal
- 7. Implementation Study and Report

The Sewer Capital Improvement Plan (CIP) has been developed to address the requirement of the SSRAP listed as Item 6. Infrastructure Renewal. The Preliminary Sewer CIP can be found attached as EXHIBIT A.

II. CAPITAL IMPROVEMENT PLAN DEVELOPMENT

A. SEWER CCTV INSPECTION and EVALUATION. As one of the first steps in developing the Sewer CIP, the City undertook a sewer pipeline Closed-circuit Television (CCTV) Inspection and Evaluation program. This program, which started in 2009, also addresses one of the requirements of SSRAP, listed above as Item 4. Collection System Assessments. This component of the SSRAP requires the City to perform a system-wide condition assessment. However, due to the City's limited budget, the City committed to starting the program with inspection of 10 miles of sewers located in

elevated risk zones by April 15, 2010.

The "elevated risk zones" were identified by running a risk analysis of the sewer system. The analysis started with identifying the low risk zones, which include areas that were constructed with modern PVC or HDPE sewer pipes, pipes that have been recently rehabilitated, and areas with fewer households and very low flows. The remaining areas were then considered the moderate/elevated risk zones.

Table 1 summarizes the findings of the risk analysis and also the current status of CCTV Inspection and Evaluation Program:

No.	Sewer Mains in GIS Database	Lineal Feet of Mains	Miles of Mains
1.	Mill Valley Gravity Pipes*	292,123	55.33
2.	Remove: Recently Rehabilitated/Replaced	(8,709)	1.65
3.	Remove: Previously Rehabilitated/Replaced	(24,464)	4.63
4.	Remaining Pipes in Mill Valley System	258,949	49.04
5.	Remove: Pipes in Low Risk Zones	(111,008)	21.02
6.	Pipes in Elevated Risk Zones = $(5 - 6)$	147,941	28.02
7.	Pipes inspected prior to April 10, 2010. <i>City exceeded the 10 miles as committed to the EPA</i> .	(60,047)	(11.37)
8.	Additional pipes inspected in previous studies	(7,356)	(1.39)
9.	Total Pipes recently inspected and evaluated = $(7 + 8)$ These pipes have been incorporated into the CIP.	67,403	12.77
10.	Remaining Pipes in Elevated Risk Zones to be Inspected prior to June 30, $2013 = (6-9)$	80,538	15.58

TABLE 1.

*Note that other pipes exist in the system, such as force mains, pipes owned by others and private lines

The first batch of the inspected pipes (*No. 7 in Table 1*) are located within the neighborhoods listed below:

- Enchanted Knolls
- Scott Valley/Alto
- Warner Canyon/Kite Hill

Pipe Condition Evaluation Process. The inspection and evaluation process utilized the Pipeline Assessment and Certification Program (PACP) defect rating systems developed by National Association of Sewer Service Companies (NASSCO). Grades were assigned to defects falling under

City of Mill Valley | Preliminary Sewer Capital Improvement Plan 2012-2016

two types of categories: (1) Structural and (2) Operational and Maintenance. Below is a list of defects under the two categories:

Structural

- Cracks
- Fractures
- Break in pipe/Holes
- Collapse
- Deformation
- Defective Joints
- Surface Damage/Corrosion

Operational & Maintenance

- Settled deposits
- Root intrusion
- Defective taps / laterals
- Infiltration
- Sags
- Obstacles/Obstructions
- Vermin
- Angled alignments

All defects are assigned a grade of 1 to 5, with 1 being minor defects and 5 being defects requiring immediate attention. An overall grade is calculated based on the two types of defects (Structural and Operational/Maintenance), which can be used as a quick identification of pipe segments that have significant defects.

The pipeline evaluations are based only on visual pipe structural condition. No flow analysis has been performed to analyze pipe capacities.

B. RANKING

After grading the pipes, the Overall Pipe Rating Score for each pipe segment were used to prioritize the pipe repairs. Pipes with high PACP rating scores received priority over pipes that have lower PACP rating scores.

There are a few exceptions to the ranking order of the pipes. Certain pipes have been placed at the top of the priority list due to various reasons explained in Table 2 below.

No.	Sewers moved to top of CIP	Reasons
1.	Miller Avenue	The Miller Avenue Streetscape project is currently in its planning phase. Upgrading the sewers along this street, prior to the construction of the streetscape project, is necessary to avoid cutting of newly paved streets.
2.	Urgent Sewers	Although the PACP scores for some of these pipes are not the highest of all the pipes, these sewers were identified to have major defects that are in need of immediate attention. This includes large holes, collapses, large joint offsets, sever root intrusions, large sags, highly corroded, etc.
3.	Mountain View Avenue	This sewer was identified to be in need of repair a few years ago. However, the City has had to put this project on hold due to budget constraints.

TABLE 2.

C. Assigning REHABILITATION/REPAIR METHOD (RENEWAL PLAN). The next step in developing the CIP was to assign the rehabilitation or repair method based on the findings from the condition evaluation process.

There are many types of rehabilitation methods for repair or replacement of sewer. Below are the types of methods that past City of Mill Valley projects have utilized to rehabilitate sewers and that were considered for sewer rehabilitation or renewal in this plan.

- 1. **Point Repair**: A point repair replaces up to ten (10) feet of the existing pipe with new pipe having approximately the same internal diameter and made of PVC and reconnects live laterals, if any. Replacement greater than ten (10) feet is considered to be replacement by open cut trenching as described below. Point repair locations and lengths are indicated by approximate distances from manholes/cleanouts.
- 2. Lining (Trenchless): Trenchless rehabilitation (lining) includes Cured-In-Place-Pipe (CIPP), Fold-n-Form pipe, and other similar rehabilitation lining methods that do not require extensive excavation.

Based on our past experience with lining pipes in Mill Valley, we do not recommend lining pipes less than 8-inch diameter.

- 3. **Replacement**: There are two types of methods for pipe replacement:
 - *a. Open cut trenching* The traditional excavating method to replace a pipe. Pipe replacement ten (10) feet or less is considered a Point Repair as mentioned above.
 - **b.** *Replacement* (*Trenchless*) Trenchless replacement includes Pipe Bursting, Pipe Reaming, and other similar rehabilitation methods that replace the pipe without extensive excavation.
- 4. Lateral Reinstatement Lateral reinstatement is required for Trenchless Rehabilitation locations.

Lateral reinstatements for open cut trenching replacement or at point repair locations are considered incidental to the pipeline replacement work, therefore were not counted separately.

- 5. **Replace Lateral Connection**: Lateral connection replacement is needed for laterals with poor connection to the main or which are fractured at the tie-in of the main.
- **D.** Assigning COSTS associated with Rehabilitation/Repair (Renewal Plan). After determining the rehabilitation methods, the costs associated with the rehabilitation methods were applied.

A Construction Unit Price analysis was performed to determine the costs for the various rehabilitation methods. Below are the steps that were taken in conducting the analysis.

- 1. Obtained tabulations of past bids from Mill Valley and other Bay Area construction projects.
- 2. Selected bid prices based on relevance to the project and proximity to the City.
- 3. Utilized Harris & Associates past projects and Ebidboard.com to obtain unit prices.
- 4. Utilized Engineering News-Record (ENR) to obtain ENR Construction Cost Index to inflate past bid prices to determine 2010 unit prices.
- 5. Adjusted prices for each pipe size so that unit prices incrementally increase with pipe size.

- 6. Applied contingencies to the unit prices:
 - Planning Level Construction Costs include: Mobilization, Traffic Control, Sheeting and Shoring
 - Capital Costs include: Engineering, Overhead

Table 3 summarizes the part of construction unit price analysis that determines the 2010 unit prices.

		2010 Unit	2010 Unit Price					
Description/ Pipe Size	Unit	Price Based on Past Bid Tabs	Adjusted 2010 Unit Prices	Planning Level Construction Costs (30% contingency)	Capital Costs (includes 20% for engineering and overhead)	Projected 2010 Unit Cost		
Point Repair								
6-inch	EA	\$3,400.00	\$3,400.00	\$4,420.00	\$5,304.00	\$5,300.00		
8-inch	EA	\$3,415.00	\$3,415.00	\$4,440.00	\$5,328.00	\$5,330.00		
10-inch	EA	\$3,430.00	\$3,430.00	\$4,459.00	\$5,351.00	\$5,350.00		
12-inch	EA	\$3,445.00	\$3,445.00	\$4,479.00	\$5,375.00	\$5,375.00		
15-inch	EA	\$3,460.00	\$3,460.00	\$4,498.00	\$5,398.00	\$5,400.00		
21-inch	EA	\$3,500.00	\$3,500.00	\$4,550.00	\$5,460.00	\$5,460.00		
Lining (Trenchle	ss)							
8-inch	LF	\$70.00	\$70.00	\$91.00	\$110.00	\$110.00		
10-inch	LF	\$65.00	\$80.00	\$104.00	\$125.00	\$125.00		
15-inch	LF	\$67.00	\$100.00	\$130.00	\$156.00	\$160.00		
21-inch	LF	\$195.00	\$200.00	\$260.00	\$312.00	\$315.00		
30-inch	LF \$300.00 \$300.00		\$390.00	\$468.00	\$470.00			
Replacement (Tr	enchless) – Pipe Bursting						
6-inch	inch LF \$120.00 \$120.00		\$120.00	\$156.00	\$188.00	\$190.00		
8-inch	LF	\$140.00	\$140.00	\$182.00	\$219.00	\$220.00		
Replacement (Op	oen Tren	ch)						
6-inch	LF	\$190.00	\$190.00	\$247.00	\$297.00	\$300.00		
8-inch	LF	\$210.00	\$210.00	\$273.00	\$328.00	\$330.00		
10-inch	LF	\$365.00	\$250.00	\$325.00	\$390.00	\$390.00		
12-inch	LF	\$230.00	\$280.00	\$364.00	\$437.00	\$440.00		
15-inch	LF	\$320.00	\$350.00	\$455.00	\$546.00	\$550.00		
18-inch	LF	\$283.00	\$380.00	\$494.00	\$593.00	\$600.00		
21-inch	LF	\$430.00	\$400.00	\$520.00	\$624.00	\$625.00		
30-inch	LF	\$360.00	\$450.00	\$585.00	\$702.00	\$700.00		
Replace Lateral Connection								
All Pipe Sizes	EA	\$550.00	\$550.00	\$715.00	\$858.00	\$860.00		

TABLE 3.

As part of the construction unit price analysis, the projected unit prices from 2011 and later were calculated. These projections are summarized in Table 4. 3.5% increase factor was applied each year based on the ENR construction cost index average from 2000-2010.

City of Mill Valley | Preliminary Sewer Capital Improvement Plan 2012-2016

TABLE 4.

Description/ Pipe Size	Unit	2011 Projected Unit Price	2012 Projected Unit Price	2013 Projected Unit Price	2014 Projected Unit Price	2015 Projected Unit Price	2016 Projected Unit Price	2017 Projected Unit Price	2018 Projected Unit Price	2019 Projected Unit Price	2020 Projected Unit Price	2021 Projected Unit Price	2022 Projected Unit Price
Point Repair													
6-inch	EA	\$5,486	\$5,679	\$5,878	\$6,084	\$6,297	\$6,518	\$6,747	\$6,984	\$7,229	\$7,483	\$7,745	\$8,017
8-inch	EA	\$5,517	\$5,711	\$5,911	\$6,118	\$6,333	\$6,555	\$6,785	\$7,023	\$7,269	\$7,524	\$7,788	\$8,061
10-inch	EA	\$5,538	\$5,732	\$5,933	\$6,141	\$6,356	\$6,579	\$6,810	\$7,049	\$7,296	\$7,552	\$7,817	\$8,091
12-inch	EA	\$5,564	\$5,759	\$5,961	\$6,170	\$6,386	\$6,610	\$6,842	\$7,082	\$7,330	\$7,587	\$7,853	\$8,128
15-inch	EA	\$5,589	\$5,785	\$5,988	\$6,198	\$6,415	\$6,640	\$6,873	\$7,114	\$7,363	\$7,621	\$7,888	\$8,165
21-inch	EA	\$5,652	\$5,850	\$6,055	\$6,267	\$6,487	\$6,715	\$6,951	\$7,195	\$7,447	\$7,708	\$7,978	\$8,258
Lining (Trenchle	ss)					•						•	
8-inch	LF	\$114	\$118	\$123	\$128	\$133	\$138	\$143	\$149	\$155	\$161	\$167	\$173
10-inch	LF	\$130	\$135	\$140	\$145	\$151	\$157	\$163	\$169	\$175	\$182	\$189	\$196
15-inch	LF	\$166	\$172	\$179	\$186	\$193	\$200	\$207	\$215	\$223	\$231	\$240	\$249
21-inch	LF	\$327	\$339	\$351	\$364	\$377	\$391	\$405	\$420	\$435	\$451	\$467	\$484
30-inch	LF	\$487	\$505	\$523	\$542	\$561	\$581	\$602	\$624	\$646	\$669	\$693	\$718
Replacement (Tr	enchless)	– Pipe Burst	ing			•						•	
6-inch	LF	\$197	\$204	\$212	\$220	\$228	\$236	\$245	\$254	\$263	\$273	\$283	\$293
8-inch	LF	\$228	\$236	\$245	\$254	\$263	\$273	\$283	\$293	\$304	\$315	\$327	\$339
Replacement (Op	en Trenc	h)											
6-inch	LF	\$311	\$322	\$334	\$346	\$359	\$372	\$386	\$400	\$414	\$429	\$445	\$461
8-inch	LF	\$342	\$354	\$367	\$380	\$394	\$408	\$423	\$438	\$454	\$470	\$487	\$505
10-inch	LF	\$404	\$419	\$434	\$450	\$466	\$483	\$500	\$518	\$537	\$556	\$576	\$597
12-inch	LF	\$456	\$472	\$489	\$507	\$525	\$544	\$564	\$584	\$605	\$627	\$649	\$672
15-inch	LF	\$570	\$590	\$611	\$633	\$656	\$679	\$703	\$728	\$754	\$781	\$809	\$838
18-inch	LF	\$621	\$643	\$666	\$690	\$715	\$741	\$767	\$794	\$822	\$851	\$881	\$912
21-inch	LF	\$647	\$670	\$694	\$719	\$745	\$772	\$800	\$828	\$857	\$887	\$919	\$952
30-inch	LF	\$725	\$751	\$778	\$806	\$835	\$865	\$896	\$928	\$961	\$995	\$1,030	\$1,067
Replace Lateral Connection													
All Pipe Sizes	EA	\$891	\$923	\$956	\$990	\$1,025	\$1,061	\$1,099	\$1,138	\$1,178	\$1,220	\$1,263	\$1,308



E. Determining the required ANNUAL BUDGET for the CIP. The City's existing budget for sewer rehabilitation is \$550,000. This budget will remain to cover the costs of rehabilitation of sewers under the Street Rehabilitation Program. A separate budget will be necessary to cover the costs of the new sewer CIP program.

In October 2010, the City submitted to the EPA (as part of the requirements of the SSRAP) a CIP or Infrastructure Renewal plan with an annual budget of \$550,000. The EPA had directed the City to conduct a more aggressive CIP plan to expedite the mitigation of the sewage spill problems in the system.

A sewer CIP cost evaluation was performed to determine the required Annual Budget. This involved calculating the approximate total costs for sewer capital improvements to address the system-wide pipe deficiencies. Data from the Inspection and Evaluation Program was utilized for the cost evaluation. Below is the methodology used for calculating the approximate total costs for sewer capital improvements:

1. Estimate length of pipe requiring more immediate repair for the entire system.

The 12.77 miles of pipe (*see Table 1, Item No. 9*) were used as a sample set to estimate the percentage of pipes deficient in the system.

Pipes from this sample having a PACP score of 50 and greater were considered pipes to be moderately to severely poor, therefore require more immediate attention. Roughly 23% of the 12.77 miles of pipes fall into this category.

Applying this percentage to the Remaining Elevated Risk Zone pipes (*see Table 1, Item No. 10*), yields approximately 3.6 miles of pipe in the remaining Elevated Risk Zones estimated to be deficient.

For the Low Risk Zones (*see Table 1, Item No. 5*), it was assumed 10% of the pipes require immediate attention. This yields approximately 2.1 miles of deficient pipes in the Low Risk Zones.

2. Determine average unit cost.

Based on the cumulative costs of pipes having a PACP score of 50 and greater, which is roughly \$4.5 million, an average unit cost per foot for rehabilitation was calculated to be \$290/LF.

3. Calculating Total Cost for Capital Improvement.

The average unit cost was applied to the deficient pipes of both the Remaining Elevated Risk Zone and the Low Risk Zones. Table 5 breaks down of the approximate costs for the Total CIP:

No.	Moderate to Severely Deficient Pipes in Various Zones	Length (miles)	Approximate Costs (in millions)
1.	Total Pipes recently inspected and evaluated (Elevated Risk Zones) with PACP score of 50 and greater	2.9	\$4.5
2.	Remaining Elevated Risk Zones	3.6	\$5.5
3.	Low Risk Zones	2.1	\$3.2
	APPROXIMATE TOTAL COSTS FOR SEWER CIP	8.6	\$13.2

Calculating ANNUAL BUDGET. Based on the calculated Total costs for the sewer CIP, the Annual Budget in a 5-year period will be \$2.6 million/year.

With the effort to minimize the impact to customers, yet still comply with the EPA's direction to accelerate capital improvements, the City reduced the annual budgets for the sewer CIP as shown in TABLE 6 below:

TABLE 6.				
Year	Annual Budget (in millions)			
2012	\$1.5			
2013	\$1.8			
2014	\$1.8			
2015	\$1.8			
2016	\$2.0			
2017 - later	\$2.0			

III. PRELIMINARY CAPITAL IMPROVEMENT PLAN

With the Annual Budgets mentioned above, the preliminary Capital Improvement Plan has been developed and is shown attached as Exhibit A.

This plan will be updated after the completion of the CCTV Inspection and Evaluation Program.