

**NOTICE AND AGENDA  
Regular Board Meeting  
Sanitary District No. 5 of Marin County  
Thursday, March 18, 2021**

**5:00 P.M. REGULAR BOARD MEETING**

**CORONA VIRUS (COVID-19) ADVISORY NOTICE**

Consistent with Executive Orders No. N-25-20 and No. N-29-20 from the Executive Department of the State of California, the Meeting will not be physically open to the public and all Board Members and Staff will be teleconferencing into the meeting.

**How to Submit Public Comments:**

Comments submitted prior to the commencement of the meeting will be presented to the Board and included in the public record for the meeting.

**Public Comments are to be submitted via email to [rdohrmann@sani5.org](mailto:rdohrmann@sani5.org).**

In addition, members of the public who are calling in, will have the opportunity to provide public comments by following the steps below:

**How to Participate in the Meeting:**

**Join Zoom Meeting by clicking on the following link:**

**<https://us02web.zoom.us/j/6230620778>**

**Meeting ID: 623 062 0778**

**or join by phone:**

**Call in number: (669) 900-9128   Participant Code: 623 062 0778**

**ROLL CALL**

**PUBLIC COMMENTS:** The public is invited to address the Board on items that do not appear on the agenda and that are within the subject matter jurisdiction of the Board. The Brown Act does not allow the Board to take action on any public comment. Please limit public comments to no more than three minutes.

**DIRECTORS' COMMENTS AND/OR AGENDA REQUESTS:**

**CONSENT CALENDAR:**

1. Approval of February 18, 2021 Regular Board Meeting Minutes (Dohrmann)
2. Review and receive all electronic fund transfers (EFTs) and approve warrants from February 10<sup>th</sup> through March 9<sup>th</sup>, 2021 (JP Morgan Chase Bank, check no. 8080 through check no. 8138, all transactions totaling \$671,873.80) and receive February 2021 payroll, in the sum of \$120,615.99 (Dohrmann)
3. Receipt of financial reports for February 2020 (Dohrmann)

**MANAGEMENT REPORTS:**

4. District Management Summary Report (Rubio)

**NEW BUSINESS:**

5. Discuss posting SD5 Board Meetings online in lieu of transcribed "action-item minutes" – Discussion only (Rubio)

6. Review and accept SD5 Collection System Master Plan, presented by Mary Martis & Allan Scott of HDR, Inc. (Rubio) - Action

**UNFINISHED BUSINESS:**

**COMMITTEE REPORTS:**

7. Capital Improvement Program Committee (Moody/Arias-Montez)
8. Finance & Fiscal Oversight Committee (Benediktsson/Arias-Montez)
9. Governance Committee (Moody/Carapiet)
10. Personnel Committee (Benediktsson/Snyder)

**OTHER BUSINESS:**

**ENVIRONMENTAL:**

**CORRESPONDENCE:**

**INFORMATIONAL ITEMS:**

**ADJOURNMENT**

The Board will be asked to adjourn the meeting to a Regular Board Meeting on April 15, 2021, at 5:00 P.M.

*The Board of Directors may, at its discretion, consider agenda items out of the order in which they appear above.*  
*Accessible public meetings: Upon request, the District will provide written agenda materials in appropriate alternate formats, or disability-related modification or accommodation, including auxiliary aids or services to enable individual with disabilities to participate in public meetings. Please submit written requests to the District at P.O. Box 227, Tiburon, CA 94920 or rdohrmann@sani5.org at least two days prior to the meeting.*

**Minutes of a Regular Board Meeting  
Sanitary District No. 5 of Marin County  
Thursday, February 18, 2021**

**5:00 P.M. REGULAR BOARD MEETING**

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**Meeting ID: 623 062 0778**

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**Call in number: (669) 900-9128    Participant Code: 623 062 0778**

**CALL TO ORDER** by President Richard Snyder at 5:00 P.M.

**ROLL CALL**

Directors present: Richard Snyder, President  
John Carapiet, Vice President  
Omar Arias-Montez, Secretary  
Catharine Benediktsson, Director (5:08p.m.)  
Tod Moody, Director

Staff present: Tony Rubio, District Manager  
Robin Dohrmann, Office Manager

Others in attendance: Benjamin Stock, Burke, Williams, & Sorensen, LLC  
Mark Wilson, Nute Engineering, Inc.  
Steve "O" – TBD

**PUBLIC COMMENTS:** The public is invited to address the Board on items that do not appear on the agenda and that are within the subject matter jurisdiction of the Board. The Brown Act does not allow the Board to take action on any public comment. Please limit public comments to no more than three minutes.

There were no public comments at this time.

**DIRECTORS' COMMENTS AND/OR AGENDA REQUESTS:**

- Director Moody requested Finance Committee review & discuss SD5's CalPERS' Ca. Employers' Retiree Benefit Trust (CERBT) (retiree health benefits) strategy
- Director Benediktsson requested SD5 Standard Operating Procedures (SOP) be reviewed and updated re protocol for SD5-hired General Contractors working for multiple employers at once
- Director Moody inquired into video recording SD5 Board Meetings (via Zoom options) in lieu of creating written minutes, requiring signatures
- Secretary Arias-Montez inquired into possible changes re SD5's upcoming submission to Ca. State Water Resources Control Board (SWRCB) reporting

**CONSENT CALENDAR:**

1. Approval of January 25, 2021 Regular Board Meeting Minutes (Dohrmann)
2. Review and Receive all Electronic Fund Transfers (EFT) and Approve Warrants for January 8 through February 9, 2021; JP Morgan Chase Bank Check No. 8018 through Check No. 8079, all transactions totaling in the amount of \$376,987.70; and Receive January 2021 Payroll, in the amount of \$120,615.99 (Dohrmann)
3. Receipt of Financial Reports for January 2020 (Dohrmann)

Discussion by the Board. Motion (Moody/Carapiet) to approve Items No. 1 through No. 3 on the Consent Calendar. Passed unanimously.

President Snyder moved to New Business, Item #6 (5:03 p.m.), for consideration, as described on the agenda to this time.

**NEW BUSINESS:**

6. Review and discuss the status of Cove Rd. Force Main Project, and approve change order No. 10 re additional excavation and placement of 12" reinforced cement pipe (RCP), in the amount of \$12,500 (twelve thousand, five hundred dollars only), change order No. 11 re multiple miscellaneous items in the amount of \$38,813.00 (thirty-eight thousand, eight hundred thirteen dollars only), and progress payment No. 9., in the amount of \$331,315.20 (three hundred thirty thousand, three hundred fifteen dollars and twenty cents - Action (Rubio)

District Manager, Tony Rubio, and Mark Wilson of Nute Engineering, provided verbal reports on the progress of the project, reviewing change orders No. 10 and No. 11, and responding to questions from the Board.

Discussion by the Board. Motion (Arias-Montez/Moody) to approve Cove Rd. Force Main Project, and approve change order No. 10 re additional excavation and placement of 12" reinforced cement pipe (RCP), in the amount of \$12,500 (twelve thousand, five hundred dollars only), change order No. 11 re multiple miscellaneous items in the amount of \$38,813.00 (thirty-eight thousand, eight hundred thirteen dollars only), and progress payment No. 9., in the amount of \$331,315.20 (three hundred thirty thousand, three hundred fifteen dollars and twenty cents. Passed (4-0-1-0).

COVE ROAD FORCE MAIN REPLACEMENT PROJECT\*

Total original contract price:	<u>\$1,971,971.00</u>
Change orders (thru C.O. #11):	<u>\$ 377,280.17</u>
Over/under budget to date:	<u>19.13%</u>

\* Construction is to continue thru February 2021

President Snyder returned to Management Reports, Item #4 (5:20 p.m.), for consideration, as described on the agenda to this time.

**MANAGEMENT REPORTS:**

4. District Management Summary Report (Rubio)

District Manager, Tony Rubio, presented a written and verbal report on current District issues, responding to questions from the Board. Discussion by the Board.

**NEW BUSINESS:**

5. Review & discuss “Town of Tiburon Mutual Cooperation Agreement between the Town of Tiburon and Marin Sanitary District No. 5” of 2014 (“Agreement”), and possible renegotiation of that Agreement with regard (a) to the District’s employee recruitment efforts, (b) the lack of a specified term for the Agreement and failure to state a “termination date,” as referenced in Paragraph 2.a. of the Agreement, and (c) the priority afforded Sanitary District No. 5 of Marin County for housing under the Agreement – Action (Rubio)

D.A. Stock recused himself from this actionable item. Discussion by the Board. Direction given. Motion (Benediktsson/Carapiet) to renegotiate the Town of Tiburon Mutual Cooperation Agreement between the Town of Tiburon and Marin Sanitary District No. 5 with regard (a) to the District’s employee recruitment efforts, (b) the lack of a specified term for the Agreement and failure to state a “termination date,” as referenced in Paragraph 2.a. of the Agreement, and (c) the priority afforded Sanitary District No. 5 of Marin County for housing under the Agreement. Passed unanimously.

7. Discussion of having a 3rd party audit of our current IT (information technology) security re article, “The Risks of DDoS Attacks for the public sector” – Action (Rubio)

Discussion by the Board. Direction given. Motion to (Benediktsson/Arias-Montez) have Capital Improvement Project (CIP) Committee review proposals for 3<sup>rd</sup> party audit of SD5 current IT security system for a second opinion. Passed unanimously.

8. Review, discuss and nominate a California Special District Association (CSDA) Board Director for Seat A – Action (Rubio)

Discussion by the Board. Motion (Arias-Montez/Benediktsson) to table Item #8 to the March 18<sup>th</sup>, regular Board Meeting. Passed unanimously.

**UNFINISHED BUSINESS:** None

**COMMITTEE REPORTS:**

9. Capital Improvement Program Committee (Moody/Arias-Montez) – brief verbal report + action item log provided
10. Finance & Fiscal Oversight Committee (Benediktsson/Arias-Montez) – brief verbal report
11. Governance Committee (Moody/Carapiet) – none
12. Personnel Committee (Benediktsson/Snyder) – brief verbal report

**OTHER BUSINESS:** None

**ENVIRONMENTAL:**

13. “Bay Area Sewage Systems at Risk as Seas Rise,” published on February 2, 2021, by Stephen Stock, Robert Campos, Mark Villarreal, Michael Horn and Sean Myers; (<https://www.nbcbayarea.com/news/local/climate-in-crisis/bay-area-sewage-systems-at-risk-as-seas-rise/2456669/>)

**CORRESPONDENCE:** None

**INFORMATIONAL ITEMS:**

14. The audited GASB 75 Schedule of Changes in Fiduciary Net Position by Employer for Fiscal Year Ending (FYE) June 30, 2020. The audited GASB 75 Schedule of Changes in Fiduciary Net Position (FNP) by Employer Report supports our organization’s compliance with Governmental Accounting Standards Board (GASB) Statement No. 75, as it provides audited assets to be used in the calculation of Net Other Postemployment Benefits (OPEB) Liability

**CONVENE TO CLOSED SESSION**

15. Convene to Closed Session (the public may provide comments regarding the closed session item(s) just prior to the Board beginning the Closed Session. Closed Sessions are not open to the public).

- a) Conference with Legal Counsel – Anticipated Litigation  
Initiation of litigation pursuant to Government Code section 54956.9(d)(4): (1 potential case)

16. Report out of Closed Session (6:07 p.m.)

No action taken, direction given.


**ADJOURNMENT**

The Board adjourned at 6:15 p.m. to a Regular Board Meeting on March 18<sup>th</sup> 2021, at 5:00 p.m.

Approved:

Attest:

  
\_\_\_\_\_  
Richard Snyder  
President, Board of Directors

  
\_\_\_\_\_  
Omar Arias-Montez  
Secretary, Board of Directors

**Sanitary Distr. No.5 of Marin Co.  
Warrant List Summary  
February 10 through March 9, 2021**

03/08/21

Date	Num	Name	Memo	Amount
<b>JP Morgan Chase - Primary 7399</b>				
03/01/21	EFT	PERS	EFT PERS Retirement, February 2021	-18,644.49
03/02/21	EFT	CalPERS	EFT Health Premium, March 2021, Cust #4163206459	-16,369.23
02/10/21	8080	California State Disbursement Unit	CSE Case# 200000002184580; Court Case# SFL 81271,	-600.00
02/10/21	8081	Mill Valley Refuse Service, Inc.	Acct #032945, SLUDGE TRANSPORT, January 2021	-1,440.00
02/10/21	8082	Pacific Gas & Electric	Acct #2908031411-4, Utilities, January 2020	-21,816.40
02/10/21	8083	Waste Management of Redwood Landfill	Acct #507-0000190-1507-2, Sludge Disposal, January 2021	-355.24
02/18/21	8084	Comcast Business	Acct# 8155 30 011 0149465, Bus. Voice, Internet & Cable, Jan - Feb, 2021	-530.03
02/18/21	8085	Home Depot Credit Services	Acct #6035 3220 0516 4334, M.P. Supplies, March 2021	-416.15
02/18/21	8086	Maggiore & Ghilotti, Inc.	M&G Project #7716 - Cove Rd. Force Main Replacement Project, January 2021	-343,815.20
02/18/21	8087	Mill Valley Refuse Service, Inc.	Acct #032945, Garbage Service + 1 yd rental, February 2021	-255.20
02/18/21	8088	Ram Print and Communications	Admin/Off Supplies, Refill+ new SD5 date stamp, January 2021	-202.99
02/18/21	8089	Special District Risk Management Authorit	Member #7665, Life, Vision, DDS & LTD Ins., March 2021	-1,634.39
02/18/21	8090	Staples, Inc.	Acct #60111000714, Office Supplies, January 2021	-171.89
02/18/21	8091	Town of Tiburon	Fuel, January 2021	-836.28
02/18/21	8092	Verizon Wireless	Acct #0342125502-00001: iPhones, January 2021	-351.42
02/18/21	8093	Triola, Joseph	Reimb. for SD5 supplies, February 2021	-122.22
03/09/21	8094	Access Answering Service	Acct #4080C, Answering Service, March 2021	-60.00
03/09/21	8095	Alhambra	Acct #547945611762129, Water, Jan - Feb 2021	-117.79
03/09/21	8096	AT&T	Acct #960732-76375559, February 2021	-815.64
03/09/21	8097	Banshee Networks, Inc.	Computer/IT Support, January & February 2021	-4,474.63
03/09/21	8098	Brelje and Race Laboratories, Inc.	M.P./P.C. Plant Samples, January 2021	-1,500.00
03/09/21	8099	California State Disbursement Unit	CSE Case# 200000002184580; Court Case# SFL 81271,	-300.00
03/09/21	8100	Caltest Analytical Laboratory	M.P./P.C. Lab Sampling, February 2021	-8,463.30
03/09/21	8101	Caltronics Business Systems, Inc.	Acct #SD15, Multi-purpose Copier Contract, February 2021	-130.40
03/09/21	8102	Code Publishing, Inc.	Project#:329170, Web Hosting, March 2021	-183.60
03/09/21	8103	Cummins Pacific Power Systems	Cust. #: 266183, BPS#2 Parts Rplcmt, February 2021	-54.98
03/09/21	8104	CWEA	Certificate Renewals, March 2021	-182.00
03/09/21	8105	CWEA	Extension of On-Line Job Posting, March 2021	-290.00
03/09/21	8106	D&K Auto Service	SD5 Truck Maint., February 2021	-1,857.47
03/09/21	8107	DKF Solutions Group, LLC	My Safety Officer Monthly Subscription, March 2021	-350.00
03/09/21	8108	Goodman Building Supply Co.	Acct #20070, BP&L, February 2021	-169.36
03/09/21	8109	HDR Engineering, Inc.	Consulting, MCSD5 Clxn Sys Mstr Plan, January 2021	-21,451.35
03/09/21	8110	Jackson's Hardware, Inc.	Acct #7601, M.P. supplies, February 2021	-168.57
03/09/21	8111	JM Integration, LLC	M.P. Parts & Service, February 2021	-2,798.96
03/09/21	8112	Larry Walker Associates, Inc.	Tech Support for M.P. NPDES Reg. Assistance, August 2020 & February 2021	-4,484.00
03/09/21	8113	Linscott Engineering Contractors Inc.	P.C. P&L, February 2021	-15,097.72
03/09/21	8114	Lystek Int'l, LTD	Biosolids Transport, February 2021	-769.25
03/09/21	8115	Maltby Electric Supply Co., Inc.	Cust No.15953, BPS P&L, February 2021	-468.44
03/09/21	8116	Marin Municipal Water District	Water, Dec 2020 - February 2021	-1,549.90
03/09/21	8117	MidAmerica Administrative & Retirement...	HRA Retiree Health Reimb. Admin Fees, 4Q20, February 2021	-225.00
03/09/21	8118	Nevada Seal & Pump	P&L Srvc & Maint, December 2020	-3,000.00
03/09/21	8119	Nute Engineering Corp.	Consulting & Engr. Svcs., January 2021	-13,202.25
03/09/21	8120	Perotti & Carrade	Client #1901 - FY19-20 Audit Services, PP#8, March 2021	-1,680.00
03/09/21	8121	Peterson	Cust #:5656305, P.C. P&L, February 2021	-3,455.20
03/09/21	8122	Ray Morgan Company	Acct#: TS27, LaserFishe Annual Software Support, April 2021 (FY21-22 AJE)	-2,725.00
03/09/21	8123	Robert L Talavera, LLC	SSGIS ArcView Support, February 2021	-600.00
03/09/21	8124	Roy's Sewer Service, Inc.	P&L, January - February 2021	-12,193.01
03/09/21	8125	Solenis, LLC	Pyr #: 441488, M.P. Chemicals, February 2021	-4,095.58
03/09/21	8126	Terminix Processing Center	Acct #327163, Pest Control, February 2021	-411.40
03/09/21	8127	U.S. Bank	Acct#:4246-0441-0158-3635, January - February 2021	-1,238.48
03/09/21	8128	Univar	Cust ID #STDT001, Chemicals, February 2021	-11,460.06
03/09/21	8129	USA BlueBook	Cust #933682, Safety/PPE Supplies, December 2020 - February 2021	-6,246.07
03/09/21	8130	Waste Management of Redwood Landfill	Acct #507-0000190-1507-2, Sludge Disposal, February 2021	-1,589.34
03/09/21	8131	Weco Industries	Acct #MARINC, Vactor Truck Parts, February 2021	-3,025.71
03/09/21	8132	Wintersun Chemical	M.P. Chemicals, January 2021	-30.00
03/09/21	8133	WorkSmart Automation, Inc.	SD5 Comm System Maintenance, February 2021	-21,422.50
03/09/21	8135	Rosser, John	S/B Mi. Reimb., January - February 2021	-343.31
03/09/21	8136	Swett, Drake	Reimb. for CalPERS 457 Contribution, February 2021	-40.00
03/09/21	8137	Pacific Gas & Electric	Acct #2908031411-4, Utilities, January 2020	-21,816.40
03/09/21	8138	Zions Bank Corporation, N.A.	CB&T: #000140000098948, MPR Refi, March 2021	-89,776.00
Total JP Morgan Chase - Primary 7399				-671,873.80
<b>TOTAL</b>				<b>-671,873.80</b>

Sanitary Distr. No.5 of Marin Co.

Warrant List Detail

February 10 through March 9, 2021

03/08/21

Date	Num	Name	Memo	Account	Class	Paid Amount
03/01/21	EFT	PERS	<b>EFT PERS Retirement, February 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Retirement January 2021(Classic 1600 Rate): ER @ 14.194 %; EE @ 3.0%	8019.05 - PERS Retirement	Belvedere	-4,756.40
			Retirement January 2021(Classic 1600 Rate)	8019.05 - PERS Retirement	Tiburon:Paradise Cove	-342.67
			Retirement January 2021(Classic 1600 Rate)	8019.05 - PERS Retirement	Tiburon	-8,131.54
			Retirement January 2021(PEPRA Rates: ER @ 7.732%; EE @ 6.75%	8019.05 - PERS Retirement	Belvedere	-1,917.09
			Retirement January 2021(PEPRA Rate)	8019.05 - PERS Retirement	Tiburon:Paradise Cove	-138.12
			Retirement January 2021(PEPRA Rate)	8019.05 - PERS Retirement	Tiburon	-3,277.45
			Spec. Comp for Holiday Worked on 2.15.2021 (CB)	8019.05 - PERS Retirement	Belvedere	-29.20
			Spec. Comp for Holiday Worked on 2.15.2021 (CB)	8019.05 - PERS Retirement	Tiburon:Paradise Cove	-2.10
			Spec. Comp for Holiday Worked on 2.15.2021 (CB)	8019.05 - PERS Retirement	Tiburon	-49.92
TOTAL						-18,644.49
03/02/21	EFT	CalPERS	<b>EFT Health Premium, March 2021, Cust #4163206459</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Active Employee Health Premium - March 2021	8020.05 - Employee Health	Belvedere	-5,557.56
			Active Employee Health Premium - March 2021	8020.05 - Employee Health	Tiburon:Paradise Cove	-400.39
			Active Employee Health Premium - March 2021	8020.05 - Employee Health	Tiburon	-9,501.19
			Retiree Health Premium - March 2021	8022.05 - Reitree Health	Belvedere	-308.45
			Retiree Health Premium - March 2021	8022.05 - Reitree Health	Tiburon:Paradise Cove	-22.22
			Retiree Health Premium - March 2021	8022.05 - Reitree Health	Tiburon	-527.33
			Active Employee Health Premium - March 2021 - Admin Fee	8020.05 - Employee Health	Belvedere	-13.34
			Active Employee Health Premium - March 2021 - Admin Fee	8020.05 - Employee Health	Tiburon:Paradise Cove	-0.96
			Active Employee Health Premium - March 2021 - Admin Fee	8020.05 - Employee Health	Tiburon	-22.80
			Retiree Health Premium - March 2021 - Admin Fee	8022.05 - Reitree Health	Belvedere	-5.39
			Retiree Health Premium - March 2021 - Admin Fee	8022.05 - Reitree Health	Tiburon:Paradise Cove	-0.39
			Retiree Health Premium - March 2021 - Admin Fee	8022.05 - Reitree Health	Tiburon	-9.21
TOTAL						-16,369.23
02/10/21	8080	California State Disbursement Unit	<b>CSE Case# 20000002184580; Court Case# SFL 81271,</b>	<b>JP Morgan Chase - Primary 7399</b>		
			CSE Case# 20000002184580	8012 - Wage Garnishments	Tiburon	-600.00
TOTAL						-600.00
02/10/21	8081	Mill Valley Refuse Service, Inc.	<b>Acct #032945, SLUDGE TRANSPORT, January 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Sludge Transport/Exchange only, 1.5.21, 1.14.21, 1.26.21	7029 - Main Plant Sludge Disposal	Belvedere	-531.50
			Sludge Transport/Exchange only, 1.5.21, 1.14.21, 1.26.21	7029 - Main Plant Sludge Disposal	Tiburon	-908.50
TOTAL						-1,440.00
02/10/21	8082	Pacific Gas & Electric	<b>Acct #2908031411-4, Utilities, January 2020</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Acct #2908031411-4, Main Plant Utilities, January 2020	8542 - Main Plant Utilities	Belvedere	-5,702.74
			Acct #2908031411-4, P.C. Plant Utilities, January 2020	8543 - Paradise Cove Utilities	Tiburon:Paradise Cove	-2,068.85
			Acct #2908031411-4, Main Plant Utilities, January 2020	8542 - Main Plant Utilities	Tiburon	-9,747.65
			Acct #2908031411-4, Belv Pump St Utilities, January 2020	8544 - Pump Station Utilities	Belvedere	-1,834.34
			Acct #2908031411-4, P.C. Pump St Utilities, January 2020	8544 - Pump Station Utilities	Tiburon:Paradise Cove	-372.84
			Acct #2908031411-4, Tib Pump St Utilities, January 2020	8544 - Pump Station Utilities	Tiburon	-2,089.98
TOTAL						-21,816.40
02/10/21	8083	Waste Management of Redwood La...	<b>Acct #507-0000190-1507-2, Sludge Disposal, January 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Inv #0101829-1507-3, Sludge Disposal - 1 Drop-offs, 8.87 tons, January 2021	7029 - Main Plant Sludge Disposal	Belvedere	-131.12
			Inv #0101829-1507-3, Sludge Disposal - 1 Drop-offs, 8.87 tons, January 2021	7029 - Main Plant Sludge Disposal	Tiburon	-224.12
TOTAL						-355.24



**Sanitary Distr. No.5 of Marin Co.**

**Warrant List Detail**

February 10 through March 9, 2021

03/08/21

Date	Num	Name	Memo	Account	Class	Paid Amount
02/18/21	8084	Comcast Business	<b>Acct# 8155 30 011 0149465, Bus. Voice, Internet &amp; Cable, Jan - Feb, 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Bundle: Cable (\$84.90), 2.12.2021 - 3.11.2021	8510 · Data/Alarms/IT Supp & Licensing	Belvedere	-35.91
			Bundle: Cable (\$84.90), 2.12.2021 - 3.11.2021	8510 · Data/Alarms/IT Supp & Licensing	Tiburon:Paradise Cove	-2.59
			Bundle: Cable (\$84.90), 2.12.2021 - 3.11.2021	8510 · Data/Alarms/IT Supp & Licensing	Tiburon	-61.40
			Bundle: Internet (\$134.85), 2.12.2021 - 3.11.2021	8510 · Data/Alarms/IT Supp & Licensing	Belvedere	-53.87
			Bundle: Internet (\$134.85), 2.12.2021 - 3.11.2021	8510 · Data/Alarms/IT Supp & Licensing	Tiburon:Paradise Cove	-3.88
			Bundle: Internet (\$134.85), 2.12.2021 - 3.11.2021	8510 · Data/Alarms/IT Supp & Licensing	Tiburon	-92.10
			Bundle: Land Line Phones (\$243.00), 2.12.2021 - 3.11.2021	8531 · Main Plant Telephones	Belvedere	-92.75
			Bundle: Land Line Phones (\$243.00), 2.12.2021 - 3.11.2021	8532 · Paradise Cove Telephones	Tiburon:Paradise Cove	-6.68
			Bundle: Land Line Phones (\$243.00), 2.12.2021 - 3.11.2021	8531 · Main Plant Telephones	Tiburon	-158.57
			Bundle: Taxes & Fees (+/- \$5 - varies/mo), 2.12.2021 - 3.11.2021	8510 · Data/Alarms/IT Supp & Licensing	Belvedere	-4.00
			Bundle: Taxes & Fees (+/- \$5 - varies/mo), 2.12.2021 - 3.11.2021	8510 · Data/Alarms/IT Supp & Licensing	Tiburon:Paradise Cove	-0.29
			Bundle: Taxes & Fees (+/- \$5 - varies/mo), 2.12.2021 - 3.11.2021	8510 · Data/Alarms/IT Supp & Licensing	Tiburon	-6.85
			Bundle: Taxes & Fees (+/- \$5 - varies/mo), 2.12.2021 - 3.11.2021	8531 · Main Plant Telephones	Belvedere	-4.00
			Bundle: Taxes & Fees (+/- \$5 - varies/mo), 2.12.2021 - 3.11.2021	8532 · Paradise Cove Telephones	Tiburon:Paradise Cove	-0.29
			Bundle: Taxes & Fees (+/- \$5 - varies/mo), 2.12.2021 - 3.11.2021	8531 · Main Plant Telephones	Tiburon	-6.85
TOTAL						-530.03
02/18/21	8085	Home Depot Credit Services	<b>Acct #6035 3220 0516 4334, M.P. Supplies, March 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			M.P. Misc. Supplies replenishment, February 2021	7021 · Plant Maintenance Supplies	Belvedere	-153.60
			M.P. Misc. Supplies replenishment, February 2021	7021 · Plant Maintenance Supplies	Tiburon	-262.55
TOTAL						-416.15
02/18/21	8086	Maggiora & Ghilotti, Inc.	<b>M&amp;G Project #7716 - Cove Rd. Force Main Replacement Project, January 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Inv #11601, Progress Payment #9, Force Main Valve Vault Connection (100.0% ...	9311.2 · Cove Rd FM - Const, Ph I	Belvedere	-15,200.00
			Inv #11601, Change Order #7 - Juanita Corner, Belv (61%), Nov '2020	9311.2 · Cove Rd FM - Const, Ph I	Belvedere	42,260.80
			Retention Withheld re PP#9 & CO#7 (100.0% Belv), thru December 2020	Retainage Payable	Belvedere	1,353.04
			Inv #11601, Progress Payment #9, Segment bends + new manholes (100.0% Bel...	9311.2 · Cove Rd FM - Const, Ph I	Tiburon	-425,750.00
			Inv #11601, Change Order #7 - CalTrans ROW + Misc Items, Tib (39.0%), Nov '2...	9311.2 · Cove Rd FM - Const, Ph I	Tiburon	27,019.20
			Inv #11601, Change Order #8 - Bore+Jack @ 14" Steel; Casing & 6.625 HDPE ...	9311.2 · Cove Rd FM - Const, Ph I	Tiburon	22,931.00
			Retention Withheld re PP#9 & CO#7 & CO#8 (100.0% Belv), thru December 2020	Retainage Payable	Tiburon	16,070.76
			Inv #11569, Change Order #11 - Excavate, remove, grade replace, grout, back fil...	9311.2 · Cove Rd FM - Const, Ph I	Tiburon	-12,500.00
TOTAL						-343,815.20
02/18/21	8087	Mill Valley Refuse Service, Inc.	<b>Acct #032945, Garbage Service + 1 yd rental, February 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Garbage Service, Including 1 yd trash + 1 yd cardboard rental, February 2021	7023 · Janitorial Supplies & Service	Belvedere	-94.19
			Garbage Service, Including 1 yd trash + 1 yd cardboard rental, February 2021	7023 · Janitorial Supplies & Service	Tiburon	-161.01
TOTAL						-255.20
02/18/21	8088	Ram Print and Communications	<b>Admin/Off Supplies, Refill+ new SD5 date stamp, January 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Inv #288981 - Refill+ new SD5 date stamp, January 2021	6047 · Office Supplies	Belvedere	-72.97
			Inv #288981 - Refill+ new SD5 date stamp, January 2021	6047 · Office Supplies	Tiburon:Paradise Cove	-5.26
			Inv #288981 - Refill+ new SD5 date stamp, January 2021	6047 · Office Supplies	Tiburon	-124.76
TOTAL						-202.99

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Date	Num	Name	Memo	Account	Class	Paid Amount
02/18/21	8089	Special District Risk Management ...	Member #7665, Life, Vision, DDS & LTD Ins., March 2021	JP Morgan Chase - Primary 7399		
			Employee Life Insurance - Inv #34786 - March 2021	8020.05 - Employee Health	Belvedere	-48.89
			Employee Life Insurance - Inv #34786 - March 2021	8020.05 - Employee Health	Tiburon:Paradise Cove	-3.52
			Employee Life Insurance - Inv #34786 - March 2021	8020.05 - Employee Health	Tiburon	-83.59
			Employee LTD Insurance - Inv #34786 - March 2021	8020.05 - Employee Health	Belvedere	-350.10
			Employee LTD Insurance - Inv #34786 - March 2021	8020.05 - Employee Health	Tiburon:Paradise Cove	-25.22
			Employee LTD Insurance - Inv #34786 - March 2021	8020.05 - Employee Health	Tiburon	-598.53
			Employee DDS Insurance - Inv #34786 - March 2021	8020.05 - Employee Health	Belvedere	-127.22
			Employee DDS Insurance - Inv #34786 - March 2021	8020.05 - Employee Health	Tiburon:Paradise Cove	-9.17
			Employee DDS Insurance - Inv #34786 - March 2021	8020.05 - Employee Health	Tiburon	-217.49
			Employee Vision Insurance - Inv #34786 - March 2021	8020.05 - Employee Health	Belvedere	-61.36
			Employee Vision Insurance - Inv #34786 - March 2021	8020.05 - Employee Health	Tiburon:Paradise Cove	-4.42
			Employee Vision Insurance - Inv #34786 - March 2021	8020.05 - Employee Health	Tiburon	-104.88
TOTAL						-1,634.39
02/18/21	8090	Staples, Inc.	Acct #60111000714, Office Supplies, January 2021	JP Morgan Chase - Primary 7399		
			Inv #2754906501, Office supplies, January 2021	6047 - Office Supplies	Belvedere	-48.49
			Inv #2754906501, Office supplies, January 2021	6047 - Office Supplies	Tiburon:Paradise Cove	-3.49
			Inv #2754906501, Office supplies, January 2021	6047 - Office Supplies	Tiburon	-82.90
			Inv #2764718851, Business cards (JA,RC,RD,DL,JR), January 2021	6047 - Office Supplies	Belvedere	-35.00
			Inv #2764718851, Business cards (JA,RC,RD,DL,JR), January 2021	6047 - Office Supplies	Tiburon:Paradise Cove	-2.52
			Inv #2764718851, Business cards (JA,RC,RD,DL,JR), January 2021	6047 - Office Supplies	Tiburon	-59.84
			Returned Office Supplies, January 20201	6047 - Office Supplies	Belvedere	21.70
			Returned Office Supplies, January 20201	6047 - Office Supplies	Tiburon:Paradise Cove	1.56
			Returned Office Supplies, January 20201	6047 - Office Supplies	Tiburon	37.09
TOTAL						-171.89
02/18/21	8091	Town of Tiburon	Fuel, January 2021	JP Morgan Chase - Primary 7399		
			Fuel, January 2021	7071 - Fuel	Belvedere	-300.64
			Fuel, January 2021	7071 - Fuel	Tiburon:Paradise Cove	-21.66
			Fuel, January 2021	7071 - Fuel	Tiburon	-513.98
TOTAL						-836.28
02/18/21	8092	Verizon Wireless	Acct #0342125502-00001: iPhones, January 2021	JP Morgan Chase - Primary 7399		
			Inv #9870632747: Monthly Charges (\$342.40) - January 2021	8531 - Main Plant Telephones	Belvedere	-123.09
			Inv #9870632747: Monthly Charges (\$342.40) - January 2021	8532 - Paradise Cove Telephones	Tiburon:Paradise Cove	-8.87
			Inv #9870632747: Monthly Charges (\$342.40) - January 2021	8531 - Main Plant Telephones	Tiburon	-210.44
			Inv #9870632747: Taxes, Gov't Surcharges & Fees - January 2021	8531 - Main Plant Telephones	Belvedere	-3.24
			Inv #9870632747: Taxes, Gov't Surcharges & Fees - January 2021	8532 - Paradise Cove Telephones	Tiburon:Paradise Cove	-0.23
			Inv #9870632747: Taxes, Gov't Surcharges & Fees - January 2021	8531 - Main Plant Telephones	Tiburon	-5.55
TOTAL						-351.42
02/18/21	8093	Triola, Joseph	Reimb. for SD5 supplies, February 2021	JP Morgan Chase - Primary 7399		
			Reimb. re M.P. Electrical Closet rewiring materials (Royal Wholesale, CED, Inc.) ...	7027 - Electrical & Instrument	Belvedere	-40.14
			Reimb. re M.P. Electrical Closet rewiring materials (Royal Wholesale, CED, Inc.) ...	7027 - Electrical & Instrument	Tiburon	-68.61
			Reimb. re M.P. Hardware materials (Rafael Lumber, CED, Inc.) - February 2021	7021 - Plant Maintenance Supplies	Belvedere	-4.97
			Reimb. re M.P. Hardware materials (Rafael Lumber, CED, Inc.) - February 2021	7021 - Plant Maintenance Supplies	Tiburon	-8.50
TOTAL						-122.22

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Date	Num	Name	Memo	Account	Class	Paid Amount
03/09/21	8094	Access Answering Service	<b>Acct #4080C, Answering Service, March 2021</b> Inv #23919, Answering Service, March 2021- SSO & Alarm Notifications Inv #23919, Answering Service, March 2021- SSO & Alarm Notifications Inv #23919, Answering Service, March 2021- SSO & Alarm Notifications	<b>JP Morgan Chase - Primary 7399</b> 8510 · Data/Alarms/IT Supp & Licensing 8510 · Data/Alarms/IT Supp & Licensing 8510 · Data/Alarms/IT Supp & Licensing	Belvedere Tiburon:Paradise Cove Tiburon	-21.57 -1.55 -36.88
TOTAL						-60.00
03/09/21	8095	Alhambra	<b>Acct #547945611762129, Water, Jan - Feb 2021</b> Inv #12012314 020521 Water, 1.07.2021 - 2.03.2021 Inv #12012314 020521 Water, 1.07.2021 - 2.03.2021 Inv #12012314 020521 Water, 1.07.2021 - 2.03.2021	<b>JP Morgan Chase - Primary 7399</b> 7023 · Janitorial Supplies & Service 7042 · Paradise Supplies & Chemicals 7023 · Janitorial Supplies & Service	Belvedere Tiburon:Paradise Cove Tiburon	-42.35 -3.05 -72.39
TOTAL						-117.79
03/09/21	8096	AT&T	<b>Acct #960732-76375559, February 2021</b> PC Plant Telephones, February 2021 PC Pumps & Lines Telephones, February 2021 Tib Pumps & Lines Telephones, February 2021	<b>JP Morgan Chase - Primary 7399</b> 8532 · Paradise Cove Telephones 8533 · Pumps & Lines Telephones 8533 · Pumps & Lines Telephones	Tiburon:Paradise Cove Tiburon:Paradise Cove Tiburon	-332.38 -175.07 -308.19
TOTAL						-815.64
03/09/21	8097	Banshee Networks, Inc.	<b>Computer/IT Support, January &amp; February 2021</b> Inv #14769 + #14770, Troubleshooting, IT & security renewals + maintenance of ... Inv #14769 + #14770, Troubleshooting, IT & security renewals + maintenance of ... Inv #14769 + #14770, Troubleshooting, IT & security renewals + maintenance of ...	<b>JP Morgan Chase - Primary 7399</b> 8510 · Data/Alarms/IT Supp & Licensing 8510 · Data/Alarms/IT Supp & Licensing 8510 · Data/Alarms/IT Supp & Licensing	Belvedere Tiburon:Paradise Cove Tiburon	-1,608.63 -115.89 -2,750.11
TOTAL						-4,474.63
03/09/21	8098	Breije and Race Laboratories, Inc.	<b>M.P./P.C. Plant Samples, January 2021</b> Inv #132617, M.P. Samples for January 2021 Inv #132617, P.C. Samples for January 2021 Inv #132617, M.P. Samples for January 2021	<b>JP Morgan Chase - Primary 7399</b> 7051 · Main Plant Lab Monitoring 7052 · Paradise Cove Monitoring 7051 · Main Plant Lab Monitoring	Belvedere Tiburon:Paradise Cove Tiburon	-428.16 -340.00 -731.84
TOTAL						-1,500.00
03/09/21	8099	California State Disbursement Unit	<b>CSE Case# 200000002184580; Court Case# SFL 81271,</b> CSE Case# 200000002184580	<b>JP Morgan Chase - Primary 7399</b> 8012 · Wage Garnishments	Tiburon	-300.00
TOTAL						-300.00
03/09/21	8100	Caltest Analytical Laboratory	<b>M.P./P.C. Lab Sampling, February 2021</b> M.P. - B: #8374, #8407, #8645, #8775, #9047, #9050, #9197, #9241, February 20... P.C.: Inv #9195, #8016, February 2021 M.P. - B: #8374, #8407, #8645, #8775, #9047, #9050, #9197, #9241, February 20...	<b>JP Morgan Chase - Primary 7399</b> 7051 · Main Plant Lab Monitoring 7052 · Paradise Cove Monitoring 7051 · Main Plant Lab Monitoring	Belvedere Tiburon:Paradise Cove Tiburon	-1,904.63 -3,303.10 -3,255.57
TOTAL						-8,463.30
03/09/21	8101	Caltronics Business Systems, Inc.	<b>Acct #SD15, Multi-purpose Copier Contract, February 2021</b> Inv #3206323, Konica Multi-purpose copier (C308) contract, February 2021 Inv #3206323, Konica Multi-purpose copier (C308) contract, February 2021 Inv #3206323, Konica Multi-purpose copier (C308) contract, February 2021	<b>JP Morgan Chase - Primary 7399</b> 6047 · Office Supplies 6047 · Office Supplies 6047 · Office Supplies	Belvedere Tiburon:Paradise Cove Tiburon	-46.88 -3.38 -80.14
TOTAL						-130.40

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Date	Num	Name	Memo	Account	Class	Paid Amount
03/09/21	8102	Code Publishing, Inc.	<b>Project#:329170, Web Hosting, March 2021</b> Inv #69030, SD5 Web Hosting, March 2021 Inv #69030, SD5 Web Hosting, March 2021 Inv #69030, SD5 Web Hosting, March 2021	<b>JP Morgan Chase - Primary 7399</b> 6017 · Consulting Fees 6017 · Consulting Fees 6017 · Consulting Fees	Belvedere Tiburon:Paradise Cove Tiburon	-66.00 -4.76 -112.84
TOTAL						-183.60
03/09/21	8103	Cummins Pacific Power Systems	<b>Cust. #: 266183, BPS#2 Parts Rplcmnt, February 2021</b> Inv #X5-73020, P&L - BPS#2, replacement parts, February 2021	<b>JP Morgan Chase - Primary 7399</b> 9307 · PS Generator Replacement	Belvedere	-54.98
TOTAL						-54.98
03/09/21	8104	CWEA	<b>Certificate Renewals, March 2021</b> R Cottrell (ID#58912), Lab Analyst (G1), 4.1.21 - 6.30.21 R Cottrell (ID#58912), Lab Analyst (G1), 4.1.21 - 6.30.21 R Cottrell (ID#58912), Lab Analyst (G1), 4.1.21 - 6.30.21 R Cottrell (ID#58912), Lab Analyst (G1), 7.1.2021 - 3.31.2022 (AJE FY21-22) R Cottrell (ID#58912), Lab Analyst (G1), 7.1.2021 - 3.31.2022 (AJE FY21-22) R Cottrell (ID#58912), Lab Analyst (G1), 7.1.2021 - 3.31.2022 (AJE FY21-22) T Rubio (ID#39532), Lab Analyst (G1), 4.1.21 - 6.30.21 T Rubio (ID#39532), Lab Analyst (G1), 4.1.21 - 6.30.21 T Rubio (ID#39532), Lab Analyst (G1), 4.1.21 - 6.30.21 T Rubio (ID#39532), Lab Analyst (G1), 7.1.2021 - 3.31.2022 (AJE FY21-22) T Rubio (ID#39532), Lab Analyst (G1), 7.1.2021 - 3.31.2022 (AJE FY21-22) T Rubio (ID#39532), Lab Analyst (G1), 7.1.2021 - 3.31.2022 (AJE FY21-22) T Rubio (ID#39532), Lab Analyst (G1), 7.1.2021 - 3.31.2022 (AJE FY21-22)	<b>JP Morgan Chase - Primary 7399</b> 6025 · Dues & Subscriptions 6025 · Dues & Subscriptions 6025 · Dues & Subscriptions 6025 · Dues & Subscriptions 6025 · Dues & Subscriptions 6025 · Dues & Subscriptions 6025 · Dues & Subscriptions 6025 · Dues & Subscriptions 6025 · Dues & Subscriptions 6025 · Dues & Subscriptions 6025 · Dues & Subscriptions 6025 · Dues & Subscriptions 6025 · Dues & Subscriptions 6025 · Dues & Subscriptions 6025 · Dues & Subscriptions 6025 · Dues & Subscriptions	Belvedere Tiburon:Paradise Cove Tiburon Belvedere Tiburon:Paradise Cove Tiburon Belvedere Tiburon:Paradise Cove Tiburon Belvedere Tiburon:Paradise Cove Tiburon Belvedere Tiburon:Paradise Cove Tiburon	-8.18 -0.59 -13.97 -24.54 -1.77 -41.95 -8.18 -0.59 -13.97 -24.54 -1.77 -41.95
TOTAL						-182.00
03/09/21	8105	CWEA	<b>Extension of On-Line Job Posting, March 2021</b> CWEA Job Listing for WWTP M&C Tech, 2.25.2021 - 3.11.2021 CWEA Job Listing for WWTP M&C Tech, 2.25.2021 - 3.11.2021 CWEA Job Listing for WWTP M&C Tech, 2.25.2021 - 3.11.2021	<b>JP Morgan Chase - Primary 7399</b> 6001 · Advertising 6001 · Advertising 6001 · Advertising	Belvedere Tiburon:Paradise Cove Tiburon	-104.26 -7.51 -178.23
TOTAL						-290.00
03/09/21	8106	D&K Auto Service	<b>SD5 Truck Maint., February 2021</b> Inv #67084, #67201, 2004 Ford Ranger, February 2021 Inv #67084, #67201, 2004 Ford Ranger, February 2021 Inv #67084, #67201, 2004 Ford Ranger, February 2021	<b>JP Morgan Chase - Primary 7399</b> 7072 · Truck Maintenance 7072 · Truck Maintenance 7072 · Truck Maintenance	Belvedere Tiburon:Paradise Cove Tiburon	-667.76 -48.11 -1,141.60
TOTAL						-1,857.47
03/09/21	8107	DKF Solutions Group, LLC	<b>My Safety Officer Monthly Subscription, March 2021</b> Inv #10696, My Safety Officer Monthly Subscription Fee, March 2021 Inv #10696, My Safety Officer Monthly Subscription Fee, March 2021 Inv #10696, My Safety Officer Monthly Subscription Fee, March 2021	<b>JP Morgan Chase - Primary 7399</b> 8515 · Safety 8515 · Safety 8515 · Safety	Belvedere Tiburon:Paradise Cove Tiburon	-125.83 -9.07 -215.10
TOTAL						-350.00

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Date	Num	Name	Memo	Account	Class	Paid Amount
03/09/21	8108	Goodman Building Supply Co.	<b>Acct #20070, BP&amp;L, February 2021</b> Inv #817786, M.P. Supplies, Feburay 2021 Inv #817786, M.P. Supplies, Feburay 2021 Inv #818113, PPE, Feburay 2021 Inv #818113, PPE, Feburay 2021 Inv #818113, PPE, Feburay 2021 Inv #818246, Truck Maintenance Supplies, February 2021 Inv #818246, Truck Maintenance Supplies, February 2021 Inv #818246, Truck Maintenance Supplies, February 2021	<b>JP Morgan Chase - Primary 7399</b> 7021 · Plant Maintenance Supplies 7021 · Plant Maintenance Supplies 8520 · Personal Protection/Safety Wear 8520 · Personal Protection/Safety Wear 8520 · Personal Protection/Safety Wear 7072 · Truck Maintenance 7072 · Truck Maintenance 7072 · Truck Maintenance	Belvedere Tiburon Belvedere Tiburon:Paradise Cove Tiburon Belvedere Tiburon:Paradise Cove Tiburon	-34.47 -58.92 -5.19 -0.52 -12.29 -20.84 -1.50 -35.63
TOTAL						-169.36
03/09/21	8109	HDR Engineering, Inc.	<b>Consulting, MCS D5 Cllxn Sys Mstr Plan, January 2021</b> Inv #1200325732, HDR Collection System Master Plan, January 2021 Inv #1200325732, HDR Collection System Master Plan, January 2021 Inv #1200325732, HDR Collection System Master Plan, January 2021	<b>JP Morgan Chase - Primary 7399</b> 6017 · Consulting Fees 6017 · Consulting Fees 6017 · Consulting Fees	Belvedere Tiburon:Paradise Cove Tiburon	-7,711.76 -555.59 -13,184.00
TOTAL						-21,451.35
03/09/21	8110	Jackson's Hardware, Inc.	<b>Acct #7601, M.P. supplies, February 2021</b> Inv #75463, Wiring & supplies for SCADA2 telephone line, February 2021 Inv #75463, Wiring & supplies for SCADA2 telephone line, February 2021 Inv #75463, Wiring & supplies for SCADA2 telephone line, February 2021 Inv #75463, Wiring & supplies for SCADA2 telephone line, February 2021	<b>JP Morgan Chase - Primary 7399</b> 8531 · Main Plant Telephones 8531 · Main Plant Telephones 8510 · Data/Alarms/IT Supp & Licensing 8510 · Data/Alarms/IT Supp & Licensing	Belvedere Tiburon Belvedere Tiburon	-31.11 -53.17 -31.11 -53.18
TOTAL						-168.57
03/09/21	8111	JM Integration, LLC	<b>M.P. Parts &amp; Service, February 2021</b> Inv #21045, Troubleshoot @ watering pumps to work w SCADA, February 2021 Inv #21045, Troubleshoot @ watering pumps to work w SCADA, February 2021 Inv #21045, Troubleshoot @ watering pumps to work w SCADA, February 2021 Inv #21045, Troubleshoot @ watering pumps to work w SCADA, February 2021 Inv #21045, Troubleshoot @ watering pumps to work w SCADA, February 2021 Inv #21045, Troubleshoot @ watering pumps to work w SCADA, February 2021 Inv #21045, Troubleshoot @ watering pumps to work w SCADA, February 2021 Inv #21044, Troubleshoot @ hypotank (#3), wiring/control/levels, February 2021 Inv #21044, Troubleshoot @ hypotank (#3), wiring/control/levels, February 2021	<b>JP Morgan Chase - Primary 7399</b> 7022 · Plant Maint. Parts & Service 7022 · Plant Maint. Parts & Service 7011 · Pumps & Lines Maintenance 7011 · Pumps & Lines Maintenance 7011 · Pumps & Lines Maintenance 8510 · Data/Alarms/IT Supp & Licensing 8510 · Data/Alarms/IT Supp & Licensing 7022 · Plant Maint. Parts & Service 7022 · Plant Maint. Parts & Service	Belvedere Tiburon Belvedere Tiburon Belvedere Tiburon Belvedere Tiburon	-143.37 -245.07 -143.37 -245.07 -143.37 -245.07 -602.98 -1,030.66
TOTAL						-2,798.96
03/09/21	8112	Larry Walker Associates, Inc.	<b>Tech Support for M.P. NPDES Reg. Assistance, August 2020 &amp; February 2021</b> Inv #00113.10-14 & Inv #00113.10-14, M. P. Regulatory Assistance, thru August ... Inv #00113.10-14 & Inv #00113.10-14, M. P. Regulatory Assistance, thru August ... Inv #00113.10-14 & Inv #00113.10-17, P.C. Regulatory Assistance, thru Februar...	<b>JP Morgan Chase - Primary 7399</b> 7061 · Main Plant NPDES Renewal 7061 · Main Plant NPDES Renewal 7061 · Main Plant NPDES Renewal	Belvedere Tiburon Tiburon:Paradise Cove	-73.64 -125.86 -4,284.50
TOTAL						-4,484.00
03/09/21	8113	Linscott Engineering Contractors L...	<b>P.C. P&amp;L, February 2021</b> Inv #3634, 98 Beach Rd. Rod Hole Installation, 2.9.2021 - 2.12.2021	<b>JP Morgan Chase - Primary 7399</b> 7011 · Pumps & Lines Maintenance	Belvedere	-15,097.72
TOTAL						-15,097.72
03/09/21	8114	Lystek Int'l, LTD	<b>Biosolids Transport, February 2021</b> Inv #153-374, Biosolids Transport to Lystek Facility, February 2021 Inv #153-374, Biosolids Transport to Lystek Facility, February 2021	<b>JP Morgan Chase - Primary 7399</b> 7029 · Main Plant Sludge Disposal 7029 · Main Plant Sludge Disposal	Belvedere Tiburon	-283.93 -485.32
TOTAL						-769.25

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Date	Num	Name	Memo	Account	Class	Paid Amount
03/09/21	8115	Maltby Electric Supply Co., Inc.	<b>Cust No.15953, BPS P&amp;L, February 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Inv #S1937540.001+.002, #S1937050.001, BPS#1 & BPS#2 wiring, February 2021	7011 · Pumps & Lines Maintenance	Belvedere	-180.50
			Inv #S1937540.001+.002, #S1937050.001, BPS#1 & BPS#2 wiring, February 2021	7027 · Electrical & Instrument	Belvedere	-180.50
			inv #S193654.001, M.P. SCADA2 Connxn, February 2021	8510 · Data/Alarms/IT Supp & Licensing	Belvedere	-19.83
			inv #S193654.001, M.P. SCADA2 Connxn, February 2021	8510 · Data/Alarms/IT Supp & Licensing	Tiburon	-33.89
			inv #S193654.001, M.P. SCADA2 Connxn, February 2021	7027 · Electrical & Instrument	Belvedere	-19.83
			inv #S193654.001, M.P. SCADA2 Connxn, February 2021	7027 · Electrical & Instrument	Tiburon	-33.89
TOTAL						-468.44
03/09/21	8116	Marin Municipal Water District	<b>Water, Dec 2020 - February 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Cust #:424793, Golden Gate BPS - Water, Dec 2020 - February 2021	8541 · Water	Belvedere	-77.20
			Cust #:424791, Cove Rd. BPS - Water, Dec 2020 - February 2021	8541 · Water	Belvedere	-77.20
			Cust #138856, Mar West TPS - Water, Dec 2020 - February 2021	8541 · Water	Tiburon	-77.20
			Cust #100098, M.P. - Water, 2020 - Dec 2020 - February 2021	8541 · Water	Belvedere	-486.58
			Cust #100098, M.P. - Water, 2020 - Dec 2020 - February 2021	8541 · Water	Tiburon	-831.72
TOTAL						-1,549.90
03/09/21	8117	MidAmerica Administrative & Retir...	<b>HRA Retiree Health Reimb. Admin Fees, 4Q20, February 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			inv #MAR15455, HRA Retiree Health Reimburs. Administration Fees, 4Q20, Feb...	8022.05 · Reitree Health	Belvedere	-80.89
			inv #MAR15455, HRA Retiree Health Reimburs. Administration Fees, 4Q20, Feb...	8022.05 · Reitree Health	Tiburon:Paradise Cove	-5.83
			inv #MAR15455, HRA Retiree Health Reimburs. Administration Fees, 4Q20, Feb...	8022.05 · Reitree Health	Tiburon	-138.28
TOTAL						-225.00
03/09/21	8118	Nevada Seal & Pump	<b>P&amp;L Srvc &amp; Maint, December 2020</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Inv #NSP4294, M.P. Service at supports tanks and fittings + inspect leaking mec...	7022 · Plant Maint. Parts & Service	Belvedere	-1,107.30
			Inv #NSP4294, M.P. Service at supports tanks and fittings + inspect leaking mec...	7022 · Plant Maint. Parts & Service	Tiburon	-1,892.70
TOTAL						-3,000.00
03/09/21	8119	Nute Engineering Corp.	<b>Consulting &amp; Engr. Svcs., January 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Inv #21339, Cove Rd Force Main Project - Belv, January 2021 (20%)	6017 · Consulting Fees	Belvedere	-2,350.05
			Inv #21339, Cove Rd Force Main Project - Tib, January 2021 (80%)	6017 · Consulting Fees	Tiburon	-9,400.20
			Inv #21328, CAD Drafting re Sewer Rehab Project, January 2021	6017 · Consulting Fees	Belvedere	-535.93
			Inv #21328, CAD Drafting re Sewer Rehab Project, January 2021	6017 · Consulting Fees	Tiburon	-916.07
TOTAL						-13,202.25
03/09/21	8120	Perotti & Carrade	<b>Client #1901 - FY19-20 Audit Services, PP#8, March 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Inv #94830, FY19-20 Audit Services, PP#8, March 2021	6008 · Audit & Accounting	Belvedere	-603.96
			Inv #94830, FY19-20 Audit Services, PP#8, March 2021	6008 · Audit & Accounting	Tiburon:Paradise Cove	-43.51
			Inv #94830, FY19-20 Audit Services, PP#8, March 2021	6008 · Audit & Accounting	Tiburon	-1,032.53
TOTAL						-1,680.00
03/09/21	8121	Peterson	<b>Cust #:5656305, P.C. P&amp;L, February 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Inv #SW270052689, (back-up) replacement Paco Pump (for any/all zones), Febr...	7011 · Pumps & Lines Maintenance	Belvedere	-1,242.14
			Inv #SW270052689, (back-up) replacement Paco Pump (for any/all zones), Febr...	7011 · Pumps & Lines Maintenance	Tiburon:Paradise Cove	-89.49
			Inv #SW270052689, (back-up) replacement Paco Pump (for any/all zones), Febr...	7011 · Pumps & Lines Maintenance	Tiburon	-2,123.57
TOTAL						-3,455.20

Sanitary Distr. No.5 of Marin Co.

Warrant List Detail

February 10 through March 9, 2021

03/08/21

Date	Num	Name	Memo	Account	Class	Paid Amount
03/09/21	8122	Ray Morgan Company	<b>Acct#: TS27, LaserFishe Annual Software Support, April 2021 (FY21-22 AJE)</b> LF Annual Software Support, 4.21.2021- 6.30.2021 LF Annual Software Support, 4.21.2021- 6.30.2021 LF Annual Software Support, 4.21.2021- 6.30.2021 LF Annual Software Support, 4.21.2021- 6.30.2021 (FY21-22 AJE) LF Annual Software Support, 4.21.2021- 6.30.2021 (FY21-22 AJE) LF Annual Software Support, 4.21.2021- 6.30.2021 (FY21-22 AJE)	<b>JP Morgan Chase - Primary 7399</b> 8510 · Data/Alarms/IT Supp & Licensing 8510 · Data/Alarms/IT Supp & Licensing 8510 · Data/Alarms/IT Supp & Licensing 8510 · Data/Alarms/IT Supp & Licensing 8510 · Data/Alarms/IT Supp & Licensing 8510 · Data/Alarms/IT Supp & Licensing	Belvedere Tiburon:Paradise Cove Tiburon Belvedere Tiburon:Paradise Cove Tiburon	-204.09 -14.70 -348.91 -775.55 -55.87 -1,325.88
TOTAL						-2,725.00
03/09/21	8123	Robert L Talavera, LLC	<b>SSGIS ArcView Support, February 2021</b> Inv #RLT02210F1, SSGIS ArcView Support - Upload pipe history data, install, tra... Inv #RLT02210F1, SSGIS ArcView Support - Upload pipe history data, install, tra... Inv #RLT02210F1, SSGIS ArcView Support - Upload pipe history data, install, tra...	<b>JP Morgan Chase - Primary 7399</b> 8510 · Data/Alarms/IT Supp & Licensing 8510 · Data/Alarms/IT Supp & Licensing 8510 · Data/Alarms/IT Supp & Licensing	Belvedere Tiburon:Paradise Cove Tiburon	-215.70 -15.54 -368.76
TOTAL						-600.00
03/09/21	8124	Roy's Sewer Service, Inc.	<b>P&amp;L, January - February 2021</b> Inv #210978, Cleared line at Marinero Cir., Tiburon, as directed, 1.6.21 Inv #211615, Cleared line at 116 Lyford Dr., as directed, 2.6.21 Inv #211343, Cleared line at 242 Beach Rd., as directed, 2.3.21 Inv #211616, Night work: Cleaned SD5 M.P. Grit Chamber, as directed, 2.4.21 Inv #211616, Night work: Cleaned SD5 M.P. Grit Chamber, as directed, 2.4.21	<b>JP Morgan Chase - Primary 7399</b> 7011 · Pumps & Lines Maintenance 7011 · Pumps & Lines Maintenance 7011 · Pumps & Lines Maintenance 7011 · Pumps & Lines Maintenance 7011 · Pumps & Lines Maintenance	Tiburon Tiburon Belvedere Belvedere Tiburon	-1,194.00 -1,750.00 -199.00 -3,340.36 -5,709.65
TOTAL						-12,193.01
03/09/21	8125	Solenis, LLC	<b>Pyr #: 441488, M.P. Chemicals, February 2021</b> Inv #131767855, M.P. Maint, Chemicals - Praestol for Screwpress & Rotary Dru... Inv #131767855, M.P. Maint, Chemicals - Praestol for Screwpress & Rotary Dru...	<b>JP Morgan Chase - Primary 7399</b> 7024 · Main Plant Chemicals 7024 · Main Plant Chemicals	Belvedere Tiburon	-1,511.68 -2,583.90
TOTAL						-4,095.58
03/09/21	8126	Terminix Processing Center	<b>Acct #327163, Pest Control, February 2021</b> Inv #405173210, Pest (Rodent) Control @ all SD5 Belv PS - February 2020 Inv #405173210, Pest (Rodent) Control @ all SD5 Tib PS - February 2020	<b>JP Morgan Chase - Primary 7399</b> 7028 · Grounds Maintenance 7028 · Grounds Maintenance	Belvedere Tiburon	-151.85 -259.55
TOTAL						-411.40
03/09/21	8127	U.S. Bank	<b>Acct#:4246-0441-0158-3635, January - February 2021</b> #0822/9545: #0822/9545: #0822/9545: #0822/9545: #0822/9545: #0822/9545: #0822/9545: Stamps, 12.24.2020 #0822/9545: Stamps, 12.24.2020 #0822/9545: Stamps, 12.24.2020 #0822/9545: Stamps, 12.24.2020 #0822/9545:M.P. Supplies, Harbor Freight & Amazon, 12.28.2020, 1.9.2021 #0822/9545:M.P. Supplies, Harbor Freight & Amazon, 12.28.2020, 1.9.2021 #0822/9545: Anitbiotic Kleenex, 1.6.2020 #0822/9545: Anitbiotic Kleenex, 1.6.2020 #0822/9545: Napa Auto Parts + Federal Signal Safety, 12.6.2020, 12.30.2020 #0822/9545: Napa Auto Parts + Federal Signal Safety, 12.6.2020, 12.30.2020 #0822/9545: Napa Auto Parts + Federal Signal Safety, 12.6.2020, 12.30.2020	<b>JP Morgan Chase - Primary 7399</b> 6001 · Advertising 6001 · Advertising 6001 · Advertising 6018.1 · Meetings & Travel 6018.1 · Meetings & Travel 6018.1 · Meetings & Travel 6056 · Postage 6056 · Postage 6056 · Postage 6056 · Postage 7021 · Plant Maintenance Supplies 7021 · Plant Maintenance Supplies 7023 · Janitorial Supplies & Service 7023 · Janitorial Supplies & Service 7072 · Truck Maintenance 7072 · Truck Maintenance 7072 · Truck Maintenance	Belvedere Tiburon:Paradise Cove Tiburon Belvedere Tiburon:Paradise Cove Tiburon Belvedere Tiburon:Paradise Cove Tiburon Belvedere Tiburon Belvedere Tiburon Belvedere Tiburon:Paradise Cove Tiburon	-131.22 -9.45 -224.33 -59.48 -4.28 -101.68 -5.43 -0.39 -9.28 -143.18 -244.74 -10.31 -17.61 -99.62 -7.18 -170.30
TOTAL						-1,238.48

**Sanitary Distr. No.5 of Marin Co.**

**Warrant List Detail**

February 10 through March 9, 2021

03/08/21

Date	Num	Name	Memo	Account	Class	Paid Amount
03/09/21	8128	Univar	<b>Cust ID #STDT001, Chemicals, February 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Inv #48980269, Sodium Bisulfite 25% (\$1.1630/Gal), February 2021	7024 · Main Plant Chemicals	Belvedere	-2,012.95
			Inv #48980269, Sodium Bisulfite 25% (\$1.1630/Gal), February 2021	7042 · Paradise Supplies & Chemicals	Tiburon:Paradise Cove	-145.02
			Inv #48980269, Sodium Bisulfite 25% (\$1.1630/Gal), February 2021	7024 · Main Plant Chemicals	Tiburon	-3,441.34
			Inv #48949992, Sodium Bisulfite 25% (\$1.1630/Gal), February 2021	7024 · Main Plant Chemicals	Belvedere	-2,106.94
			Inv #48949992, Sodium Bisulfite 25% (\$1.1630/Gal), February 2021	7042 · Paradise Supplies & Chemicals	Tiburon:Paradise Cove	-151.79
			Inv #48949992, Sodium Bisulfite 25% (\$1.1630/Gal), February 2021	7024 · Main Plant Chemicals	Tiburon	-3,602.02
TOTAL						-11,460.06
03/09/21	8129	USA BlueBook	<b>Cust #933682, Safety/PPE Supplies, December 2020 - February 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Inv ##450774, 489096, #488833, Inv #933682, SD5 Chemicals (all zones), Janu...	7024 · Main Plant Chemicals	Belvedere	-1,093.02
			Inv #489096, #488833, Inv #933682, Inv #503871, SD5 Chemicals (all zones), J...	7042 · Paradise Supplies & Chemicals	Tiburon	-485.51
			Inv #489096, #488833, Inv #933682, SD5 Chemicals (all zones), January - Febru...	7024 · Main Plant Chemicals	Tiburon	-1,868.54
			Inv #450774, Safety/PPE/COVID Supplies, December 2020	8515 · Safety	Belvedere	-1,006.24
			Inv #450774, Safety/PPE/COVID Supplies, December 2020	8515 · Safety	Tiburon:Paradise Cove	-72.49
			Inv #450774, Safety/PPE/COVID Supplies, December 2020	8515 · Safety	Tiburon	-1,720.27
TOTAL						-6,246.07
03/09/21	8130	Waste Management of Redwood La...	<b>Acct #507-0000190-1507-2, Sludge Disposal, February 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Inv #0102076-1507-0, Sludge Disposal - 4 Drop-offs, 28.51 tons, February 2021	7029 · Main Plant Sludge Disposal	Belvedere	-586.63
			Inv #0102076-1507-0, Sludge Disposal - 4 Drop-offs, 28.51 tons, February 2021	7029 · Main Plant Sludge Disposal	Tiburon	-1,002.71
TOTAL						-1,589.34
03/09/21	8131	Weco Industries	<b>Acct #·MARINC, Vactor Truck Parts, February 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Inv #0047055-IN, removal of old & installation of new rodder equipment - Februar...	7072 · Truck Maintenance	Belvedere	-1,087.74
			Inv #0047055-IN, removal of old & installation of new rodder equipment - Februar...	7072 · Truck Maintenance	Tiburon:Paradise Cove	-78.37
			Inv #0047055-IN, removal of old & installation of new rodder equipment - Februar...	7072 · Truck Maintenance	Tiburon	-1,859.60
TOTAL						-3,025.71
03/09/21	8132	Wintersun Chemical	<b>M.P. Chemicals, January 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Inv #2008547-04 M.P. Odor Control - Ferrous Chloride Solution, January 2021 - r...	7024 · Main Plant Chemicals	Belvedere	-11.07
			Inv #2008547-04 M.P. Odor Control - Ferrous Chloride Solution, January 2021 - r...	7024 · Main Plant Chemicals	Tiburon	-18.93
TOTAL						-30.00
03/09/21	8133	WorkSmart Automation, Inc.	<b>SD5 Comm System Maintenance, February 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Inv #5074 & Inv #5081, Add'l SCADA Upgrade: Install, set-up, configure + test ne...	8510 · Data/Alarms/IT Supp & Licensing	Belvedere	-7,701.39
			Inv #5074 & Inv #5081, Add'l SCADA Upgrade: Install, set-up, configure + test ne...	8510 · Data/Alarms/IT Supp & Licensing	Tiburon:Paradise Cove	-554.84
			Inv #5074 & Inv #5081, Add'l SCADA Upgrade: Install, set-up, configure + test ne...	8510 · Data/Alarms/IT Supp & Licensing	Tiburon	-13,166.27
TOTAL						-21,422.50
03/09/21	8135	Rosser, John	<b>S/B Mi. Reimb., January - February 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Belv P&L, Standby Mi. Reimb., thru 2.13.2021	6018.2 · Standby Mileage Expense Reimb	Belvedere	-220.70
			Tib P&L, Standby Mi. Reimb., thru 2.13.2021	6018.2 · Standby Mileage Expense Reimb	Tiburon	-122.61
TOTAL						-343.31
03/09/21	8136	Swett, Drake	<b>Reimb. for CalPERS 457 Contribution, February 2021</b>	<b>JP Morgan Chase - Primary 7399</b>		
			Reimb. for CalPERS 457 Contribution w/h at 2.26.2021 PR check	8008 · Deferred Comp 457	Tiburon	-40.00
TOTAL						-40.00



Sanitary Distr. No.5 of Marin Co.

Warrant List Detail

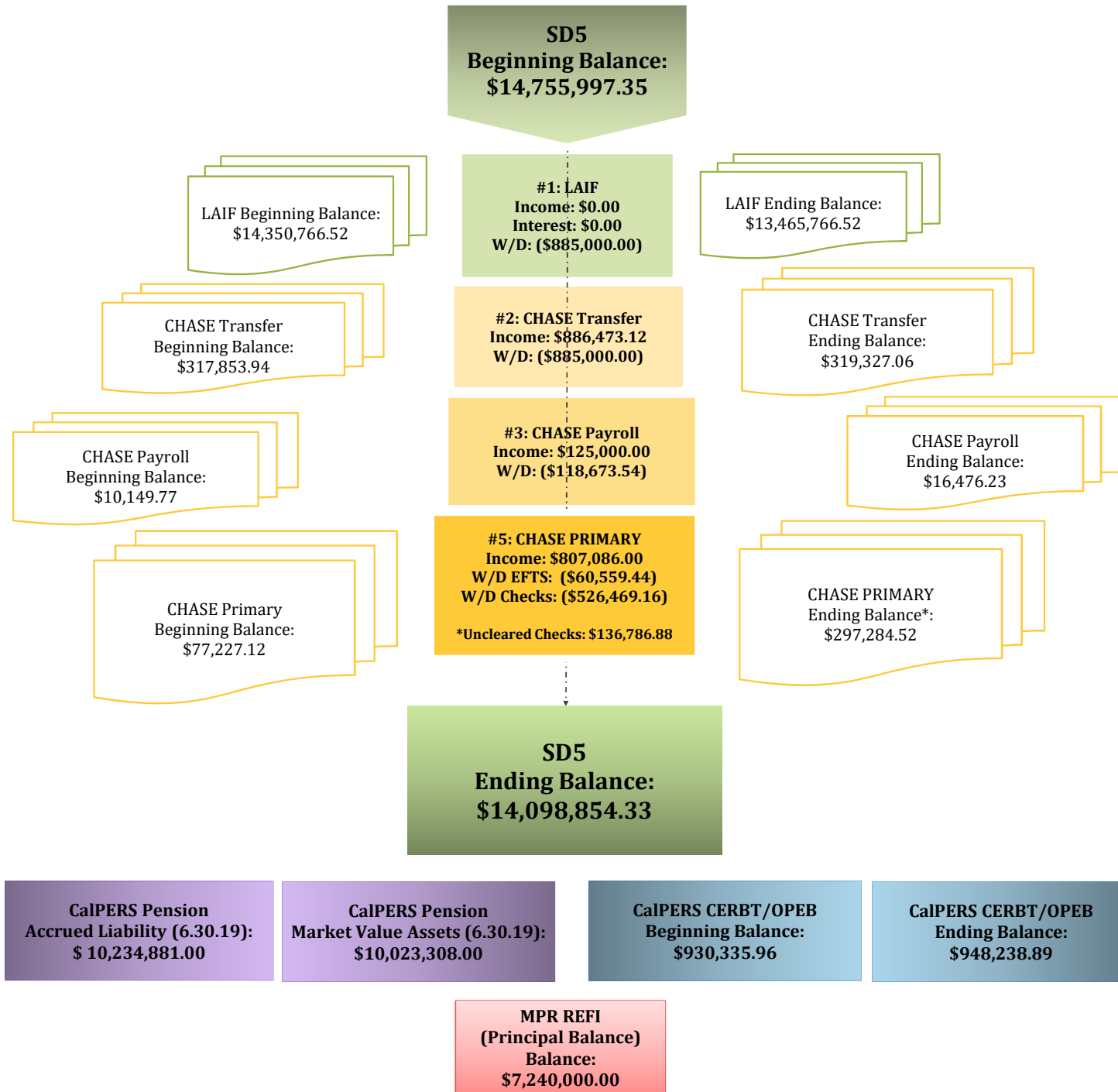
February 10 through March 9, 2021

03/08/21

Date	Num	Name	Memo	Account	Class	Paid Amount
03/09/21	8137	Pacific Gas & Electric	Acct #2908031411-4, Utilities, January 2020	JP Morgan Chase - Primary 7399		
			Acct #2908031411-4, Main Plant Utilities, January 2020	8542 · Main Plant Utilities	Belvedere	-5,702.74
			Acct #2908031411-4, P.C. Plant Utilities, January 2020	8543 · Paradise Cove Utilities	Tiburon:Paradise Cove	-2,068.85
			Acct #2908031411-4, Main Plant Utilities, January 2020	8542 · Main Plant Utilities	Tiburon	-9,747.65
			Acct #2908031411-4, Belv Pump St Utilities, January 2020	8544 · Pump Station Utilities	Belvedere	-1,834.34
			Acct #2908031411-4, P.C. Pump St Utilities, January 2020	8544 · Pump Station Utilities	Tiburon:Paradise Cove	-372.84
			Acct #2908031411-4, Tib Pump St Utilities, January 2020	8544 · Pump Station Utilities	Tiburon	-2,089.98
TOTAL						-21,816.40
03/09/21	8138	Zions Bank Corporation, N.A.	CB&T: #000140000098948, MPR Refi, March 2021	JP Morgan Chase - Primary 7399		
			#000140000098948 - MPR Refi Pmt - Interest due 4/1/21 (B: 35.22%)	9735 · MPR Refi - Interest	Belvedere	-31,619.11
			#000140000098948 - MPR Refi Pmt - Interest due 4/1/21 (T: 64.78%)	9735 · MPR Refi - Interest	Tiburon	-58,156.89
TOTAL						-89,776.00

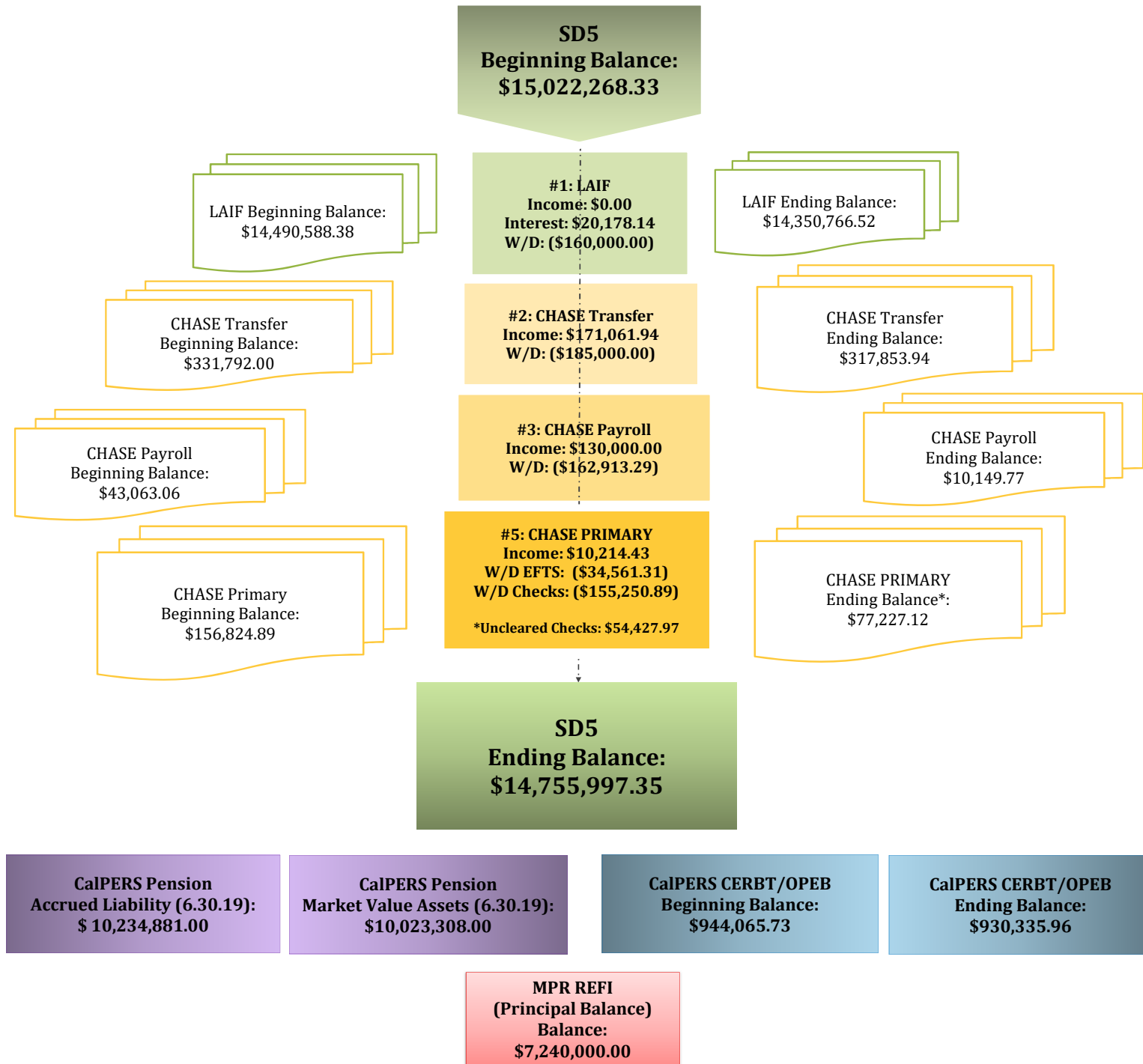
# CASH FLOW CHART

SANITARY DISTRICT NO. 5 OF MARIN COUNTY: FEBRUARY 2021



# CASH FLOW CHART

SANITARY DISTRICT NO. 5 OF MARIN COUNTY: JANUARY 2021



FEB 10, 2021

SANITARY DISTRICT NO 5 - 0400-2116  
PO BOX 227  
BELVEDERE TIBURON, CA 94920

CHECK DATE : 02/12/2021 WEEK 7  
PERIOD BEGIN : 02/01/2021  
PERIOD END : 02/15/2021

Dear Paychex Preview Client,

Enclosed are your payroll reports and checks. Please verify that all information is accurate and correct. If there are any questions or concerns, please contact us immediately.

If you have tax deposits due, ensure the deposits are initiated at least one banking day prior to the due date to avoid penalties. We will assume that these deposits were made on the due dates and they will be reflected on your returns accordingly.

This is a summary of your payroll transactions of the check date of 02/12/2021. It does not reflect miscellaneous administrative charges. Please refer to your Paychex Human Resource Services invoice(s) for any additional cash required for this check date.

**PAYROLL TOTALS**

DIRECT DEPOSIT DEBITED FROM YOUR ACCOUNT	38240.44		
READYCHEX DEBITED FROM YOUR ACCOUNT	0.00	NUMBER OF PAYROLL CHECKS	17
<b>TOTAL NET PAYROLL</b>	<b>38240.44</b>		

BILLING PAYMENT	254.90 ✓	Withdrawal made by PAYCHEX INC. on above check date.
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AMOUNT DEBITED FROM TAX ACCOUNT	20126.54		
TOTAL TAX LIABILITY DUE BY CLIENT	0.00	NUMBER OF CHECKS PRINTED	17
<b>TOTAL TAX LIABILITY</b>	<b>20126.54 ✓</b>		

**ADJUSTMENTS TO TAX LIABILITY**

<b>TOTAL ADJUSTMENTS</b>	-0.00		
<b>TOTAL NET PAYROLL, TAX LIABILITY, AND SERVICES</b>	<b>58366.98</b>		
<b>TOTAL COST OF PAYROLL</b>	<b>58621.88</b>	NUMBER OF MANUAL/VOID TRANSACTIONS	0

RECEIVED  
FEB 11 2021  
Sanitary District No. 5  
of Marin County

*Signature*

Important: If you filed Form 7200, Advance Payment of Employer Credits Due to COVID-19, please notify your Paychex representative so that credits are accurately reported on Form 941.

**TAX DEPOSITS DUE**

TAX AGENCY	TAXPAY	NON-TAXPAY	DUE DATE	
FEDERAL	16953.41		02/18/2021	Deposit made by PAYCHEX INC. on your behalf.
STATE - CA	2904.76		02/18/2021	Deposit made by PAYCHEX INC. on your behalf.

FEB 24, 2021

SANITARY DISTRICT NO 5 - 0400-2116  
PO BOX 227  
BELVEDERE TIBURON, CA 94920

CHECK DATE : 02/26/2021 WEEK 9  
PERIOD BEGIN : 02/16/2021  
PERIOD END : 02/28/2021

Dear Paychex Preview Client,

Enclosed are your payroll reports and checks. Please verify that all information is accurate and correct. If there are any questions or concerns, please contact us immediately.

If you have tax deposits due, ensure the deposits are initiated at least one banking day prior to the due date to avoid penalties. We will assume that these deposits were made on the due dates and they will be reflected on your returns accordingly.

This is a summary of your payroll transactions of the check date of 02/26/2021. It does not reflect miscellaneous administrative charges. Please refer to your Paychex Human Resource Services invoice(s) for any additional cash required for this check date.

**PAYROLL TOTALS**

DIRECT DEPOSIT DEBITED FROM YOUR ACCOUNT	35857.02		
READYCHEX DEBITED FROM YOUR ACCOUNT	0.00	NUMBER OF PAYROLL CHECKS	15
<b>TOTAL NET PAYROLL</b>	<b>35857.02</b>		

BILLING PAYMENT	245.20	X	Withdrawal made by PAYCHEX INC. on above check date.
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AMOUNT DEBITED FROM TAX ACCOUNT	18665.14	/	
TOTAL TAX LIABILITY DUE BY CLIENT	0.00		
<b>TOTAL TAX LIABILITY</b>	<b>19399.15</b>	<b>NUMBER OF CHECKS PRINTED</b>	<b>15</b>

**ADJUSTMENTS TO TAX LIABILITY**

FFCRA CREDIT APPLIED			
FEDERAL WITHHOLDING	-734.01		
EE/ER MEDICARE	-0.00		
EE/ER OASDI	-0.00		
<b>TOTAL ADJUSTMENTS</b>	<b>-734.01</b>	/	
<b>TOTAL NET PAYROLL, TAX LIABILITY, AND SERVICES</b>	<b>54522.16</b>		
<b>TOTAL COST OF PAYROLL</b>	<b>54767.36</b>		NUMBER OF MANUAL/VOID TRANSACTIONS 0

**Important: If you filed Form 7200, Advance Payment of Employer Credits Due to COVID-19, please notify your Paychex representative so that credits are accurately reported on Form 941.**

Sanitary Distr. No.5 of Marin Co.  
Comparative Balance Sheet  
As of February 28, 2021

	Feb 28, 21	Jan 31, 21	\$ Change
<b>ASSETS</b>			
Current Assets			
Checking/Savings			
Local Agency Investment Fund			
Belvedere			
Belvedere Operating	3,225,155.72	3,352,408.12	-127,252.40
Belvedere Operating Reserve	516,923.05	516,923.05	0.00
Belvedere Capital & CIP Reserve	1,895,862.39	1,816,226.34	79,636.05
Belvedere PERS Retirement Trust	366,215.00	366,215.00	0.00
Belvedere Disaster Recovery Fnd	356,250.00	356,250.00	0.00
<b>Total Belvedere</b>	<b>6,360,406.16</b>	<b>6,408,022.51</b>	<b>-47,616.35</b>
Tiburon			
Tiburon Operating	1,537,662.95	1,913,243.21	-375,580.26
Tiburon Operating Reserve	683,930.00	683,930.00	0.00
Tiburon Capital & CIP Reserve	3,226,277.41	3,688,080.80	-461,803.39
Tiburon PERS Retirement Trust	661,740.00	661,740.00	0.00
Tiburon Disaster Recovery Fund	643,750.00	643,750.00	0.00
<b>Total Tiburon</b>	<b>6,753,360.36</b>	<b>7,590,744.01</b>	<b>-837,383.65</b>
Local Agency Investment Fund - Other	352,000.00	352,000.00	0.00
<b>Total Local Agency Investment Fund</b>	<b>13,465,766.52</b>	<b>14,350,766.52</b>	<b>-885,000.00</b>
JP Morgan Chase - Primary 7399	160,497.64	19,799.15	140,698.49
JP Morgan Chase - Payroll 7506	16,476.23	10,149.77	6,326.46
JP Morgan Chase - Transfer 7522	319,327.06	317,853.94	1,473.12
<b>Total Checking/Savings</b>	<b>13,962,067.45</b>	<b>14,698,569.38</b>	<b>-736,501.93</b>
Accounts Receivable			
Accounts Receivable	19,120.43	18,595.43	525.00
<b>Total Accounts Receivable</b>	<b>19,120.43</b>	<b>18,595.43</b>	<b>525.00</b>
Other Current Assets			
Petty Cash	881.92	881.92	0.00
<b>Total Other Current Assets</b>	<b>881.92</b>	<b>881.92</b>	<b>0.00</b>
<b>Total Current Assets</b>	<b>13,982,069.80</b>	<b>14,718,046.73</b>	<b>-735,976.93</b>
Fixed Assets	19,228,004.19	19,228,004.19	0.00
Other Assets			
Debt Issuance Cost	93,188.00	93,188.00	0.00
<b>Total Other Assets</b>	<b>93,188.00</b>	<b>93,188.00</b>	<b>0.00</b>
<b>TOTAL ASSETS</b>	<b>33,303,261.99</b>	<b>34,039,238.92</b>	<b>-735,976.93</b>
<b>LIABILITIES &amp; EQUITY</b>			
Liabilities			
Current Liabilities			
Other Current Liabilities			
Deferred Income for Permits	2,300.00	2,300.00	0.00
Compensated Absences Current	133,202.91	133,202.91	0.00
Retainage Payable	147,512.77	130,088.97	17,423.80
MPR Rev Bond Interest Payable	50,341.00	50,341.00	0.00
MPR Rev Bonds Payable Current	660,000.00	660,000.00	0.00
<b>Total Other Current Liabilities</b>	<b>993,356.68</b>	<b>975,932.88</b>	<b>17,423.80</b>
<b>Total Current Liabilities</b>	<b>993,356.68</b>	<b>975,932.88</b>	<b>17,423.80</b>
Long Term Liabilities			
2061 · OPEB Related Liability	809,282.00	809,282.00	0.00
Pension-related Liabilities	-484,265.00	-484,265.00	0.00
MPR Revenue Bonds Payable	7,240,000.00	7,240,000.00	0.00
<b>Total Long Term Liabilities</b>	<b>7,565,017.00</b>	<b>7,565,017.00</b>	<b>0.00</b>
<b>Total Liabilities</b>	<b>8,558,373.68</b>	<b>8,540,949.88</b>	<b>17,423.80</b>
Equity			
3900 · Net Assets	26,485,416.11	26,485,416.11	0.00
Net Income	-1,740,527.80	-987,127.07	-753,400.73
<b>Total Equity</b>	<b>24,744,888.31</b>	<b>25,498,289.04</b>	<b>-753,400.73</b>
<b>TOTAL LIABILITIES &amp; EQUITY</b>	<b>33,303,261.99</b>	<b>34,039,238.92</b>	<b>-735,976.93</b>

## Sanitary Distr. No.5 of Marin Co. Annual Budget vs Actual Expenses July 2020 through February 2021

	Jul '20 - Feb 21	Budget	\$ Over Budget	% of Bu...
<b>Ordinary Income/Expense</b>				
<b>Income</b>				
<b>5000 · Property Taxes</b>				
5001.2 · TEETER	479,514.16	700,000.00	-220,485.84	68.5%
5002 · UNSEC	16,276.23	13,000.00	3,276.23	125.2%
5003 · PUNS / PRIOR UNSECURED	493.50	0.00	493.50	100.0%
5004 · REDEMPTION / RDMPT	474.53	500.00	-25.47	94.9%
5006 · SPLU	332.41	100.00	232.41	332.4%
5041 · SUPSEC	8,619.08	15,000.00	-6,380.92	57.5%
5043 · SECU	86.54	0.00	86.54	100.0%
5046 · Excess ERAF	228,132.83	250,000.00	-21,867.17	91.3%
5280 · HOPTR	1,844.73	3,333.00	-1,488.27	55.3%
5483 · Other tax	3,691.39			
<b>Total 5000 · Property Taxes</b>	<b>739,465.40</b>	<b>981,933.00</b>	<b>-242,467.60</b>	<b>75.3%</b>
<b>5007 · Sewer Service Charge</b>				
5007.1 · Sewer Service - Tiburon Ops	1,358,301.61	2,523,700.00	-1,165,398.39	53.8%
5007.5 · Sewer Service - Tiburon Cap	65,285.72	121,313.00	-56,027.28	53.8%
5007.2 · Sewer Service-Belv Ops	775,841.78	1,400,843.00	-625,001.22	55.4%
5007.3 · Sewer Service-Belv Cap	506,541.33	914,600.00	-408,058.67	55.4%
5007.4 · Other User Fees	0.00	24,826.00	-24,826.00	0.0%
<b>Total 5007 · Sewer Service Charge</b>	<b>2,705,970.44</b>	<b>4,985,282.00</b>	<b>-2,279,311.56</b>	<b>54.3%</b>
<b>5201 · Interest</b>				
5201.1 · Interest County of Marin	136.53			
5201.2 · Interest LAIF	51,298.07	156,402.00	-105,103.93	32.8%
<b>Total 5201 · Interest</b>	<b>51,434.60</b>	<b>156,402.00</b>	<b>-104,967.40</b>	<b>32.9%</b>
<b>5900.3 · Connection Fees</b>				
5900.30 · Connection Permit Fees	5,375.00	11,062.00	-5,687.00	48.6%
5900.31 · Collection	58,545.50	100,000.00	-41,454.50	58.5%
5900.34 · Treatment	56,909.50	100,000.00	-43,090.50	56.9%
<b>Total 5900.3 · Connection Fees</b>	<b>120,830.00</b>	<b>211,062.00</b>	<b>-90,232.00</b>	<b>57.2%</b>
5900.4 · Inspection Permit Fees	14,978.00	11,062.00	3,916.00	135.4%
5900.5 · SASM Expense Reimb.	35,240.86	101,680.00	-66,439.14	34.7%
5900.9 · Other Income	0.00	100.00	-100.00	0.0%
5900.10 · Paradise Sewer Line Ext. Fees	0.00	13,806.00	-13,806.00	0.0%
<b>Total Income</b>	<b>3,667,919.30</b>	<b>6,461,327.00</b>	<b>-2,793,407.70</b>	<b>56.8%</b>
<b>Gross Profit</b>	<b>3,667,919.30</b>	<b>6,461,327.00</b>	<b>-2,793,407.70</b>	<b>56.8%</b>
<b>Expense</b>				
<b>6000 · Administrative Expenses</b>				
6001 · Advertising	0.00	1,000.00	-1,000.00	0.0%
6008 · Audit & Accounting	26,670.03	35,000.00	-8,329.97	76.2%
6017 · Consulting Fees	265,144.84	200,000.00	65,144.84	132.6%
<b>6018 · Travel &amp; Meetings</b>				
6018.1 · Meetings & Travel	1,903.11	7,000.00	-5,096.89	27.2%
6018.2 · Standby Mileage Expense Reimb	5,343.33	8,000.00	-2,656.67	66.8%
<b>Total 6018 · Travel &amp; Meetings</b>	<b>7,246.44</b>	<b>15,000.00</b>	<b>-7,753.56</b>	<b>48.3%</b>
6020 · Continuing Education	3,001.78	10,000.00	-6,998.22	30.0%
6021 · County Fees	10,358.00	16,500.00	-6,142.00	62.8%
6024 · Director Fees	2,700.00	9,000.00	-6,300.00	30.0%
6025 · Dues & Subscriptions	24,548.78	34,000.00	-9,451.22	72.2%
6026 · Elections	0.00	9,000.00	-9,000.00	0.0%
<b>6033 · Insurance Property &amp; Liability</b>				
6033.1 · PLP Public Entity Phys Damage	15,456.00	23,301.00	-7,845.00	66.3%
6033.2 · General Liability	68,348.00	43,291.00	25,057.00	157.9%
6033.3 · Physical Property Damage - Auto	3,730.00	1,435.00	2,295.00	259.9%
<b>Total 6033 · Insurance Property &amp; Liability</b>	<b>87,534.00</b>	<b>68,027.00</b>	<b>19,507.00</b>	<b>128.7%</b>

## Sanitary Distr. No.5 of Marin Co. Annual Budget vs Actual Expenses July 2020 through February 2021

	Jul '20 - Feb 21	Budget	\$ Over Budget	% of Bu...
6039 · Legal	11,106.00	50,000.00	-38,894.00	22.2%
6047 · Office Supplies	7,483.05	13,000.00	-5,516.95	57.6%
6056 · Postage	300.66	1,000.00	-699.34	30.1%
6059 · Pollution Prevention/Public Edu	3,526.19	5,000.00	-1,473.81	70.5%
6065 · Miscellaneous Expense	59.95			
<b>Total 6000 · Administrative Expenses</b>	<b>449,679.72</b>	<b>466,527.00</b>	<b>-16,847.28</b>	<b>96.4%</b>
<b>7000 · Ops &amp; Maintenance Expenses</b>				
7010 · Pumps & Lines Maintenance				
7011 · Pumps & Lines Maintenance	67,252.78	50,000.00	17,252.78	134.5%
7013 · Emergency Line Repair	-18,991.09	50,000.00	-68,991.09	-38.0%
<b>Total 7010 · Pumps &amp; Lines Maintenance</b>	<b>48,261.69</b>	<b>100,000.00</b>	<b>-51,738.31</b>	<b>48.3%</b>
7020 · Main Plant Maintenance				
7021 · Plant Maintenance Supplies	19,809.22	15,000.00	4,809.22	132.1%
7022 · Plant Maint. Parts & Service	49,104.70	100,000.00	-50,895.30	49.1%
7023 · Janitorial Supplies & Service	4,037.04	9,000.00	-4,962.96	44.9%
7024 · Main Plant Chemicals	49,877.73	105,000.00	-55,122.27	47.5%
7025 · Lab Supplies & Chemicals	6,392.62	15,000.00	-8,607.38	42.6%
7027 · Electrical & Instrument	2,536.59	5,000.00	-2,463.41	50.7%
7028 · Grounds Maintenance	279.36	5,000.00	-4,720.64	5.6%
7029 · Main Plant Sludge Disposal	22,702.32	40,000.00	-17,297.68	56.8%
<b>Total 7020 · Main Plant Maintenance</b>	<b>154,739.58</b>	<b>294,000.00</b>	<b>-139,260.42</b>	<b>52.6%</b>
7040 · Paradise Cove Plant Maint				
7041 · Paradise Parts & Service	9,555.84	10,000.00	-444.16	95.6%
7042 · Paradise Supplies & Chemicals	5,830.57	5,000.00	830.57	116.6%
7043 · Paradise Sludge Disposal	2,645.00	8,000.00	-5,355.00	33.1%
<b>Total 7040 · Paradise Cove Plant Maint</b>	<b>18,031.41</b>	<b>23,000.00</b>	<b>-4,968.59</b>	<b>78.4%</b>
7050 · Monitoring				
7051 · Main Plant Lab Monitoring	21,799.60	50,000.00	-28,200.40	43.6%
7052 · Paradise Cove Monitoring	6,795.10	15,000.00	-8,204.90	45.3%
7053 · Chronic Toxicity Program Eval	1,974.50			
<b>Total 7050 · Monitoring</b>	<b>30,569.20</b>	<b>65,000.00</b>	<b>-34,430.80</b>	<b>47.0%</b>
7060 · Permits/Fees				
7061 · Main Plant NPDES Renewal	8,569.50			
7062 · Permits/Fees - General	39,061.18	41,000.00	-1,938.82	95.3%
7063 · Paradise Cove Permits/Fees	7,667.94	8,000.00	-332.06	95.8%
7064 · Paradise Cove NPDES Renewal	0.00	40,000.00	-40,000.00	0.0%
<b>Total 7060 · Permits/Fees</b>	<b>55,298.62</b>	<b>89,000.00</b>	<b>-33,701.38</b>	<b>62.1%</b>
7070 · Truck Maintenance				
7071 · Fuel	5,900.15	8,000.00	-2,099.85	73.8%
7072 · Truck Maintenance	17,843.83	8,000.00	9,843.83	223.0%
<b>Total 7070 · Truck Maintenance</b>	<b>23,743.98</b>	<b>16,000.00</b>	<b>7,743.98</b>	<b>148.4%</b>
<b>Total 7000 · Ops &amp; Maintenance Expenses</b>	<b>330,644.48</b>	<b>587,000.00</b>	<b>-256,355.52</b>	<b>56.3%</b>
<b>8000 · Salaries and Benefits Expenses</b>				
8001 · Salaries	782,991.17	1,143,549.00	-360,557.83	68.5%
8003 · Overtime	73,373.46	100,000.00	-26,626.54	73.4%
8004 · Standby Pay	47,846.39	72,450.00	-24,603.61	66.0%
8005 · Employee Incentives	12,000.00	45,000.00	-33,000.00	26.7%
8006 · Vacation Buyout	23,319.89	25,000.00	-1,680.11	93.3%
8013 · Payroll Taxes	62,132.23	98,212.00	-36,079.77	63.3%
8015 · Payroll/Bank Fees	4,366.36	5,500.00	-1,133.64	79.4%
8016 · Car Allowance	6,000.01	6,000.00	0.01	100.0%
8019 · PERS Retirement				
8019.05 · PERS Retirement	86,479.22	253,061.00	-166,581.78	34.2%
8019.08 · PERS Retirement - CalPERS UAL	96,367.00	20,000.00	76,367.00	481.8%
8019.10 · PERS Retirement Trust	0.00	313,250.00	-313,250.00	0.0%
8019 · PERS Retirement - Other	950.00			
<b>Total 8019 · PERS Retirement</b>	<b>183,796.22</b>	<b>586,311.00</b>	<b>-402,514.78</b>	<b>31.3%</b>



## Sanitary Distr. No.5 of Marin Co. Annual Budget vs Actual Expenses July 2020 through February 2021

	Jul '20 - Feb 21	Budget	\$ Over Budget	% of Bu...
<b>8020 · Employee Health</b>				
8020.05 · Employee Health	130,814.86	200,653.00	-69,838.14	65.2%
8021 · Employee Health Deductions	-1,985.28			
<b>Total 8020 · Employee Health</b>	128,829.58	200,653.00	-71,823.42	64.2%
<b>8022 · Retiree Health</b>				
8022.05 · Retiree Health	53,721.02	80,994.00	-27,272.98	66.3%
8022.10 · CERBT/OPEB Annual Arc Contribtn	0.00	72,400.00	-72,400.00	0.0%
<b>Total 8022 · Retiree Health</b>	53,721.02	153,394.00	-99,672.98	35.0%
<b>8023 · Workers Comp Insurance</b>	41,318.00	50,250.00	-8,932.00	82.2%
<b>Total 8000 · Salaries and Benefits Expenses</b>	1,419,694.33	2,486,319.00	-1,066,624.67	57.1%
<b>8500 · Other Operating Expenses</b>				
8510 · Data/Alarms/IT Supp & Licensing	101,335.55	80,000.00	21,335.55	126.7%
8515 · Safety	20,156.33	20,000.00	156.33	100.8%
8520 · Personal Protection/Safety Wear	5,294.58	15,000.00	-9,705.42	35.3%
8530 · Telephone				
8531 · Main Plant Telephones	5,267.92	11,000.00	-5,732.08	47.9%
8532 · Paradise Cove Telephones	2,444.95	4,000.00	-1,555.05	61.1%
8533 · Pumps & Lines Telephones	3,362.20	7,000.00	-3,637.80	48.0%
<b>Total 8530 · Telephone</b>	11,075.07	22,000.00	-10,924.93	50.3%
8540 · Utilities				
8541 · Water	4,400.21	5,000.00	-599.79	88.0%
8542 · Main Plant Utilities	112,904.24	180,000.00	-67,095.76	62.7%
8543 · Paradise Cove Utilities	10,692.66	13,500.00	-2,807.34	79.2%
8544 · Pump Station Utilities	28,077.95	35,000.00	-6,922.05	80.2%
<b>Total 8540 · Utilities</b>	156,075.06	233,500.00	-77,424.94	66.8%
<b>Total 8500 · Other Operating Expenses</b>	293,936.59	370,500.00	-76,563.41	79.3%
<b>Total Expense</b>	2,493,955.12	3,910,346.00	-1,416,390.88	63.8%
<b>Net Ordinary Income</b>	1,173,964.18	2,550,981.00	-1,377,016.82	46.0%
<b>Other Income/Expense</b>				
<b>Other Expense</b>				
9100 · Capital Expenditures				
9200 · Main Plant Equipment Capital				
9209 · Screw Press Blend Redundancy	0.00	15,000.00	-15,000.00	0.0%
9212 · Headworks Grinder Replacement	23,486.90	15,000.00	8,486.90	156.6%
9218 · Generator Control Panel	0.00	35,000.00	-35,000.00	0.0%
9219 · Cl2 Flash Mixer	0.00	15,000.00	-15,000.00	0.0%
9220 · M.P. Office + Bath Flooring	0.00	15,000.00	-15,000.00	0.0%
9221 · Portable Fuel Storage Tank	0.00	15,000.00	-15,000.00	0.0%
9229.8 · Vehicle Replacement	3,000.00			
<b>Total 9200 · Main Plant Equipment Capital</b>	26,486.90	110,000.00	-83,513.10	24.1%
9300 · Pumps & Lines Capital				
9303 · Lateral Camera	362.71			
9306 · PS Pump & Valve Replacements	0.00	50,000.00	-50,000.00	0.0%
9307 · PS Generator Replacement	90,017.71			
9311 · Cove Rd Force Main Project				
9311.2 · Cove Rd FM - Const, Ph I	1,913,957.10	1,200,000.00	713,957.10	159.5%
<b>Total 9311 · Cove Rd Force Main Project</b>	1,913,957.10	1,200,000.00	713,957.10	159.5%
9312 · Force Main Rehab - Mltpl Sites	0.00	700,000.00	-700,000.00	0.0%
9313 · Manholes/Rodholes	0.00	70,000.00	-70,000.00	0.0%
9314 · Portable Emergency Generators	5,570.18	75,000.00	-69,429.82	7.4%
9227.8 · Rodder/Vactor Truck	8,370.41			
<b>Total 9300 · Pumps &amp; Lines Capital</b>	2,018,278.11	2,095,000.00	-76,721.89	96.3%

**Sanitary Distr. No.5 of Marin Co.**  
**Annual Budget vs Actual Expenses**  
**July 2020 through February 2021**

	<u>Jul '20 - Feb 21</u>	<u>Budget</u>	<u>\$ Over Budget</u>	<u>% of Bu...</u>
<b>9400 · Paradise Cove Capital</b>				
9401 · P.C. Sewer Line Rehab Prog	0.00	500,000.00	-500,000.00	0.0%
9402 · P.C. Flow Meter Replacement	19,501.62			
9404 · P.C. Infl WWI Access Replcmnt	0.00			
9406 · P.C. Plant Grating Replacement	0.00	20,000.00	-20,000.00	0.0%
9415 · P.C. Paint @ Treatment Plant	52,759.00			
<b>Total 9400 · Paradise Cove Capital</b>	<u>72,260.62</u>	<u>520,000.00</u>	<u>-447,739.38</u>	<u>13.9%</u>
<b>9500 · Undesignated Capital</b>				
9510 · Undesignated Cap - M.P.	0.00	25,000.00	-25,000.00	0.0%
9520 · Undesignated Cap - P.C. Plant	0.00	10,000.00	-10,000.00	0.0%
9530 · Undesignated Cap - P & L	0.00	50,000.00	-50,000.00	0.0%
<b>Total 9500 · Undesignated Capital</b>	<u>0.00</u>	<u>85,000.00</u>	<u>-85,000.00</u>	<u>0.0%</u>
<b>Total 9100 · Capital Expenditures</b>	<u>2,117,025.63</u>	<u>2,810,000.00</u>	<u>-692,974.37</u>	<u>75.3%</u>
<b>9700 · Debt Service</b>				
9730 · Debt Service - MPR Project				
9734 · MPR Refi - Principal	660,000.00	660,000.00	0.00	100.0%
9735 · MPR Refi - Interest	100,656.26	190,457.00	-89,800.74	52.8%
<b>Total 9730 · Debt Service - MPR Project</b>	<u>760,656.26</u>	<u>850,457.00</u>	<u>-89,800.74</u>	<u>89.4%</u>
<b>Total 9700 · Debt Service</b>	<u>760,656.26</u>	<u>850,457.00</u>	<u>-89,800.74</u>	<u>89.4%</u>
<b>Total Other Expense</b>	<u>2,877,681.89</u>	<u>3,660,457.00</u>	<u>-782,775.11</u>	<u>78.6%</u>
<b>Net Other Income</b>	<u>-2,877,681.89</u>	<u>-3,660,457.00</u>	<u>782,775.11</u>	<u>78.6%</u>
<b>Net Income</b>	<u><b>-1,703,717.71</b></u>	<u><b>-1,109,476.00</b></u>	<u><b>-594,241.71</b></u>	<u><b>153.6%</b></u>

**Sanitary Distr. No.5 of Marin Co.  
Zone Report  
February 2021**

03/08/21

	Paradise C... (Tiburon)	Tiburon - Ot... (Tiburon)	Total Tiburon	Belvedere	TOTAL
<b>Ordinary Income/Expense</b>					
<b>Income</b>					
5000 · Property Taxes					
5004 · REDEMPTION / RDMPT	0.51	12.18	12.69	0.00	12.69
5041 · SUPSEC	59.00	1,401.43	1,460.43	0.00	1,460.43
<b>Total 5000 · Property Taxes</b>	<b>59.51</b>	<b>1,413.61</b>	<b>1,473.12</b>	<b>0.00</b>	<b>1,473.12</b>
5900.3 · Connection Fees					
5900.30 · Connection Permit Fees	0.00	500.00	500.00	300.00	800.00
5900.31 · Collection	0.00	2,709.00	2,709.00	0.00	2,709.00
5900.34 · Treatment	0.00	3,745.00	3,745.00	0.00	3,745.00
<b>Total 5900.3 · Connection Fees</b>	<b>0.00</b>	<b>6,954.00</b>	<b>6,954.00</b>	<b>300.00</b>	<b>7,254.00</b>
5900.4 · Inspection Permit Fees	0.00	1,781.00	1,781.00	2,650.00	4,431.00
5900.9 · Other Income	0.00	0.00	0.00	0.00	0.00
<b>Total Income</b>	<b>59.51</b>	<b>10,148.61</b>	<b>10,208.12</b>	<b>2,950.00</b>	<b>13,158.12</b>
<b>Gross Profit</b>	<b>59.51</b>	<b>10,148.61</b>	<b>10,208.12</b>	<b>2,950.00</b>	<b>13,158.12</b>
<b>Expense</b>					
6000 · Administrative Expenses					
6001 · Advertising	0.00	0.00	0.00	0.00	0.00
6008 · Audit & Accounting	26.42	626.91	653.33	366.70	1,020.03
6017 · Consulting Fees	1,853.81	55,769.03	57,622.84	28,676.11	86,298.95
6018 · Travel & Meetings					
6018.1 · Meetings & Travel	0.00	0.00	0.00	0.00	0.00
6018.2 · Standby Mileage Expense Reimb	0.00	280.18	280.18	814.82	1,095.00
<b>Total 6018 · Travel &amp; Meetings</b>	<b>0.00</b>	<b>280.18</b>	<b>280.18</b>	<b>814.82</b>	<b>1,095.00</b>
6020 · Continuing Education	4.40	104.48	108.88	61.12	170.00
6025 · Dues & Subscriptions	13.54	321.42	334.96	188.03	522.99
6033 · Insurance Property & Liability					
6033.1 · PLP Public Entity Phys Damage	-269.39	-6,392.45	-6,661.84	-3,739.16	-10,401.00
6033.2 · General Liability	1,295.58	30,743.52	32,039.10	17,982.90	50,022.00
6033.3 · Physical Property Damage - Auto	0.36	8.61	8.97	5.03	14.00
<b>Total 6033 · Insurance Property &amp; Liability</b>	<b>1,026.55</b>	<b>24,359.68</b>	<b>25,386.23</b>	<b>14,248.77</b>	<b>39,635.00</b>
6047 · Office Supplies	20.49	486.21	506.70	284.38	791.08
6056 · Postage	0.73	17.30	18.03	10.12	28.15
6065 · Miscellaneous Expense	0.00	0.00	0.00	0.00	0.00
<b>Total 6000 · Administrative Expenses</b>	<b>2,945.94</b>	<b>81,965.21</b>	<b>84,911.15</b>	<b>44,650.05</b>	<b>129,561.20</b>
7000 · Ops & Maintenance Expenses					
7010 · Pumps & Lines Maintenance					
7011 · Pumps & Lines Maintenance	1,222.48	11,371.87	12,594.35	1,409.58	14,003.93
7010 · Pumps & Lines Maintenance - Other	0.00	16.92	16.92	0.00	16.92
<b>Total 7010 · Pumps &amp; Lines Maintenance</b>	<b>1,222.48</b>	<b>11,388.79</b>	<b>12,611.27</b>	<b>1,409.58</b>	<b>14,020.85</b>
7020 · Main Plant Maintenance					
7021 · Plant Maintenance Supplies	20.20	-13,889.56	-13,869.36	-7,984.46	-21,853.82
7022 · Plant Maint. Parts & Service	378.54	9,686.92	10,065.46	5,888.67	15,954.13
7023 · Janitorial Supplies & Service	0.00	264.75	264.75	154.88	419.63
7024 · Main Plant Chemicals	0.00	8,412.16	8,412.16	4,920.99	13,333.15
7025 · Lab Supplies & Chemicals	0.00	322.39	322.39	188.61	511.00
7027 · Electrical & Instrument	0.00	144.38	144.38	84.46	228.84
7029 · Main Plant Sludge Disposal	0.00	1,602.39	1,602.39	937.45	2,539.84
<b>Total 7020 · Main Plant Maintenance</b>	<b>398.74</b>	<b>6,543.43</b>	<b>6,942.17</b>	<b>4,190.60</b>	<b>11,132.77</b>
7040 · Paradise Cove Plant Maint					
7041 · Paradise Parts & Service	675.49	1,030.66	1,706.15	602.98	2,309.13
7042 · Paradise Supplies & Chemicals	181.04	0.00	181.04	0.00	181.04
<b>Total 7040 · Paradise Cove Plant Maint</b>	<b>856.53</b>	<b>1,030.66</b>	<b>1,887.19</b>	<b>602.98</b>	<b>2,490.17</b>

**Sanitary Distr. No.5 of Marin Co.**  
**Zone Report**  
**February 2021**

	Paradise C... (Tiburon)	Tiburon - Ot... (Tiburon)	Total Tiburon	Belvedere	TOTAL
<b>7050 · Monitoring</b>					
7051 · Main Plant Lab Monitoring	0.00	2,469.81	2,469.81	1,444.94	3,914.75
7052 · Paradise Cove Monitoring	2,304.50	0.00	2,304.50	0.00	2,304.50
<b>Total 7050 · Monitoring</b>	2,304.50	2,469.81	4,774.31	1,444.94	6,219.25
<b>7060 · Permits/Fees</b>					
7061 · Main Plant NPDES Renewal	0.00	559.29	559.29	327.21	886.50
<b>Total 7060 · Permits/Fees</b>	0.00	559.29	559.29	327.21	886.50
<b>7070 · Truck Maintenance</b>					
7071 · Fuel	21.66	513.98	535.64	300.64	836.28
7072 · Truck Maintenance	10.34	245.25	255.59	143.46	399.05
7070 · Truck Maintenance - Other	0.80	18.93	19.73	11.08	30.81
<b>Total 7070 · Truck Maintenance</b>	32.80	778.16	810.96	455.18	1,266.14
<b>Total 7000 · Ops &amp; Maintenance Expenses</b>	4,815.05	22,770.14	27,585.19	8,430.49	36,015.68
<b>8000 · Salaries and Benefits Expenses</b>					
8001 · Salaries	2,548.08	60,465.24	63,013.32	35,368.13	98,381.45
8003 · Overtime	224.76	5,333.46	5,558.22	3,119.72	8,677.94
8004 · Standby Pay	179.12	4,250.37	4,429.49	2,486.18	6,915.67
8006 · Vacation Buyout	151.08	3,585.14	3,736.22	2,097.07	5,833.29
8007 · Voluntary Deductions	0.00	0.00	0.00	0.00	0.00
8008 · Deferred Comp 457	0.00	-5,284.30	-5,284.30	0.00	-5,284.30
8012 · Wage Garnishments	0.00	0.00	0.00	0.00	0.00
8013 · Payroll Taxes	223.74	5,309.21	5,532.95	3,105.53	8,638.48
8015 · Payroll/Bank Fees	12.95	307.36	320.31	179.79	500.10
8019 · PERS Retirement					
8019.05 · PERS Retirement	389.80	9,249.27	9,639.07	5,410.21	15,049.28
<b>Total 8019 · PERS Retirement</b>	389.80	9,249.27	9,639.07	5,410.21	15,049.28
8020 · Employee Health					
8020.05 · Employee Health	443.68	10,528.48	10,972.16	6,158.47	17,130.63
8021 · Employee Health Deductions	-6.42	-152.52	-158.94	-89.22	-248.16
<b>Total 8020 · Employee Health</b>	437.26	10,375.96	10,813.22	6,069.25	16,882.47
8022 · Retiree Health					
8022.05 · Retiree Health	22.61	536.54	559.15	313.84	872.99
<b>Total 8022 · Retiree Health</b>	22.61	536.54	559.15	313.84	872.99
8023 · Workers Comp Insurance	43.87	1,041.14	1,085.01	608.99	1,694.00
<b>Total 8000 · Salaries and Benefits Expenses</b>	4,233.27	95,169.39	99,402.66	58,758.71	158,161.37
<b>8500 · Other Operating Expenses</b>					
8510 · Data/Alarms/IT Supp & Licensing	623.94	14,806.03	15,429.97	8,660.51	24,090.48
8515 · Safety	108.47	3,061.84	3,170.31	1,791.04	4,961.35
8520 · Personal Protection/Safety Wear	10.90	258.91	269.81	151.44	421.25
8530 · Telephone					
8531 · Main Plant Telephones	0.00	381.41	381.41	223.08	604.49
8532 · Paradise Cove Telephones	348.91	0.00	348.91	0.00	348.91
8533 · Pumps & Lines Telephones	175.07	308.19	483.26	0.00	483.26
<b>Total 8530 · Telephone</b>	523.98	689.60	1,213.58	223.08	1,436.66
8540 · Utilities					
8542 · Main Plant Utilities	0.00	9,747.65	9,747.65	5,702.74	15,450.39
8543 · Paradise Cove Utilities	2,068.85	0.00	2,068.85	0.00	2,068.85
8544 · Pump Station Utilities	372.84	2,089.98	2,462.82	1,834.34	4,297.16
<b>Total 8540 · Utilities</b>	2,441.69	11,837.63	14,279.32	7,537.08	21,816.40
<b>Total 8500 · Other Operating Expenses</b>	3,708.98	30,654.01	34,362.99	18,363.15	52,726.14
<b>Total Expense</b>	15,703.24	230,558.75	246,261.99	130,202.40	376,464.39
<b>Net Ordinary Income</b>	-15,643.73	-220,410.14	-236,053.87	-127,252.40	-363,306.27

03/08/21

**Sanitary Distr. No.5 of Marin Co.  
Zone Report  
February 2021**

	Paradise C... (Tiburon)	Tiburon - Ot... (Tiburon)	Total Tiburon	Belvedere	TOTAL
Other Income/Expense					
Other Expense					
9100 · Capital Expenditures					
9200 · Main Plant Equipment Capital					
9212 · Headworks Grinder Replacement	0.00	14,817.89	14,817.89	8,669.01	23,486.90
Total 9200 · Main Plant Equipment Capital	0.00	14,817.89	14,817.89	8,669.01	23,486.90
9300 · Pumps & Lines Capital					
9307 · PS Generator Replacement	0.00	0.00	0.00	189.69	189.69
9311 · Cove Rd Force Main Project					
9311.2 · Cove Rd FM - Const, Ph I	0.00	454,912.62	454,912.62	-88,494.75	366,417.87
Total 9311 · Cove Rd Force Main Project	0.00	454,912.62	454,912.62	-88,494.75	366,417.87
Total 9300 · Pumps & Lines Capital	0.00	454,912.62	454,912.62	-88,305.06	366,607.56
Total 9100 · Capital Expenditures	0.00	469,730.51	469,730.51	-79,636.05	390,094.46
Total Other Expense	0.00	469,730.51	469,730.51	-79,636.05	390,094.46
Net Other Income	0.00	-469,730.51	-469,730.51	79,636.05	-390,094.46
Net Income	<b>-15,643.73</b>	<b>-690,140.65</b>	<b>-705,784.38</b>	<b>-47,616.35</b>	<b>-753,400.73</b>

9:50 AM

## Sanitary Distr. No.5 of Marin Co.

03/08/21

## Monthly O.T. Report

Accrual Basis

February 2021

Type	Date	Num	Name	Memo	Amount	Balance
<b>Alvarez, Joel</b>						
Check	02/26/21	0571-3897	Alvarez, Joel	1.0 Hrs. O.T. @ 1.5x	56.08	56.08
Total Alvarez, Joel					56.08	56.08
<b>Bilsborough, Chad</b>						
Check	02/26/21	0571-3898	Bilsborough, Chad	10.0 Hrs. O.T. @ 1.5x	560.82	560.82
Total Bilsborough, Chad					560.82	560.82
<b>Cottrell, Rulon</b>						
Check	02/26/21	0571-3900	Cottrell, Rulon	6.5 Hrs. O.T. @ 1.5x	565.51	565.51
Check	02/26/21	0571-3900	Cottrell, Rulon	2.5 Hrs. O.T. @ 2.0x	290.00	855.51
Total Cottrell, Rulon					855.51	855.51
<b>Dohrmann, Robin</b>						
Check	02/12/21	0431-3885	Dohrmann, Robin	15.5 Hrs. O.T. @ 1.5x	1,348.52	1,348.52
Check	02/26/21	0571-3902	Dohrmann, Robin	18.75 Hrs. O.T. @ 1.5x	1,631.28	2,979.80
Total Dohrmann, Robin					2,979.80	2,979.80
<b>Driscoll, Stephen</b>						
Check	02/12/21	0431-3888	Driscoll, Stephen	10.0 Hrs. O.T. @ 1.5x	304.50	304.50
Check	02/12/21	0431-3888	Driscoll, Stephen	1.0 Hrs O.T. @ 2.0x	522.01	826.51
Check	02/26/21	0571-3904	Driscoll, Stephen	6.5 O.T. @ 1.5x	565.51	1,392.02
Check	02/26/21	0571-3904	Driscoll, Stephen	3.0 Hrs. O.T. @ 2.0x	348.01	1,740.03
Total Driscoll, Stephen					1,740.03	1,740.03
<b>Rosser, John</b>						
Check	02/26/21	0571-3908	Rosser, John	19.0 Hrs. O.T. @ 1.5x	1,499.34	1,499.34
Check	02/26/21	0571-3907	Rosser, John	3.0 Hrs. @ 2.0x	315.65	1,814.99
Total Rosser, John					1,814.99	1,814.99
<b>Swett, Drake</b>						
Check	02/12/21	0431-3895	Swett, Drake	16.62 Hrs. Comp Buy-back (Close-out of PTO)	591.80	591.80
Total Swett, Drake					591.80	591.80
<b>Triola, Joseph</b>						
Check	02/26/21	0571-3911	Triola, Joseph	1.0 Hrs. O.T. @ 1.5x	78.91	78.91
Total Triola, Joseph					78.91	78.91
<b>TOTAL</b>					<b>8,677.94</b>	<b>8,677.94</b>

# Sanitary District No. 5 of Marin County



## District Management Report February 2021

### Contents:

- Transmittal Memo
- Financial/Budgetary
- HR & Personnel
- Business Administration
- Collection System Performance
- Treatment Plant Performance – Paradise Cove
- Treatment Plant Performance – Main Plant
- Pollution Prevention Activities
- Continuing Education & Safety Training
- Capital Improvement Projects

## **Transmittal Memo**

**Date:** February 18, 2021  
**To:** Board of Directors  
**From:** Tony Rubio, District Manager/ Chief Plant Operator  
**Subject:** Management Report for February 2021

### **Fiscal Status**

Period Covered: July 1, 2020 –February 28, 2021  
Percent of Fiscal Year: 66 %  
Percent of Budgeted Income to Date: 56.8%  
Percent of Budgeted Expenditures to Date: 63.8% (operating only)

### **Personnel**

Separations: None  
New Hires: None  
Promotions: None  
Recruitment Activities: 1

### **Regulatory Compliance**

MP Collection System WDR Compliance: Full Compliance with all regulations  
PC Collection System WDR Compliance: Full Compliance with all regulations  
MP NPDES Permit Compliance: Full Compliance with all regulations  
PC NPDES Permit Compliance: Full Compliance with all regulations  
BAAQMD Compliance: Full Compliance with all regulations  
Bio-Solids Compliance: Full Compliance with all regulations  
Significant Comments: None

*Summary of Operational Highlights are on the following pages.*



## ***Significant Events for the Month of February 2021 Include:***

### **Financial/Budgetary/Business Administration**

- Scanning project underway as time allows- 1980's Main Plant upgrade documents being scanned
- Meetings with HDR regarding Collection System Master Plan work - final report ready for acceptance.
- Preparing for fiscal year 2021-2022 budget making. Staff providing input on Ops and Maintenance activities for upcoming fiscal year.

### **HR and Personnel**

- Office remains closed to the public through the end of February
- Job opening/recruitment taking place for WWTP Maintenance/Collection System Technician position

### **Continuing Education and Safety Training**

- Water and Wastewater sector moved into phase 1B for COVID-19 vaccinations – Emergency Services sector

### **Collection System Performance**

#### **Main Plant Tiburon/Belvedere:**

- Rodding and Vactor work continues in the Tiburon Zone
- Annual Pump station pump and electrical PM's being performed

#### **Paradise Cove:**

- Submitted No Spill report for month of January to RWQCB on CIWQS

### **Treatment Plant Performance**

#### **Paradise Cove:**

- Submitted Annual P2 (Pollution Prevention) Report RWQCB

#### **Main Plant:**

- Submitted January 2021 SMR and DMR and P2 Report to the RWQCB
- New SCADA server upgrade completed – need to transfer HACH Wims to new server and all work will be done on upgrade
- Wastewater samples continue to be collected and sent to the University of California Berkeley for Covid-19 study

### **Pollution Prevention Activities**

- Submitted Annual Pollution Prevention Report for submission to RWQCB

### **Capital Improvement Projects**

- Cove Road Force Main Project substantially complete - final paving remains
- Working with staff to finalize the line-segment priority list for the upcoming small pipe burst project in Paradise Cove service area and Tiburon.
- Start-up and testing of Belvedere pump station #2 generator installation completed

## Glossary of Terms

- **B.O.D. (Biochemical Oxygen Demand):** Measurement of the effluent's capacity to consume dissolved oxygen to stabilize all remaining organic matter. The permit limits for our effluent for discharge into San Francisco bay require that we remove 85% influent B.O.D. and meet a weekly average of less than 45mg/l and a monthly average of less than 30 mg/l B.O.D.
- **TSS (Total Suspended Solids):** Measurement of suspended solids in the effluent. Our permit requires that we remove at least 85% of the influent TSS and that the effluent limit is less than 45 mg/l as a weekly average and less than 30 mg/l as a monthly average.
- **Chlorine Residual:** The plant effluent is disinfected with hypochlorite (chlorine "bleach") and then the residual chlorine is neutralized with sodium bisulfite to protect the bay. The effluent chlorine residual limit is 0.0 mg/l which we monitor continuously.
- **pH:** pH is a measurement of acidity with pH 7.0 being neutral and higher pH values being basic and lower pH values being acidic. Our permit effluent pH must stay within the range of 6.0-9.0, which we monitor continuously.
- **Coliform:** Coliform bacteria are the indicator organism for determination of the efficiency of the disinfection process. The lab culture samples of our effluent and the presence of coliform is an indication that pathogenic organisms may be present. This is reported as MPN/100 (number of coliform bacteria in 100 milliliters sample).
- **Flow Through Bioassay:** A 96 hour test in which we test the toxicity of our effluent to tiny fish (sticklebacks) in a flow through tank to determine the survivability under continuous exposure to our effluent. Our permit requires that we maintain a 90<sup>th</sup> percentile survival of at least 70% and an 11 sample median survival of at least 90%. In layman's terms, this means that out of the last 11 samples only one bioassay may fall below 70% survival and the middle value when all 11 samples are placed in numerical order must be at least 90%.
- **Metals Analysis:** Our permit requires that we analyze our effluent for many different metals on a monthly basis. We have permit limits for some metals. The metals are stated as a daily max and a monthly average limit. The daily max limit is the number we cannot exceed on any sample and the monthly average applies to all samples collected in any month. (although usually we are only required to take one).
- **F.O.G. (Fats, oils and grease):** Quarterly we are required to monitor our effluent for Fats, Oils and Grease.
- **Headworks:** The point where all raw wastewater enters the treatment plant. In this building wastewater goes through 3 grinders to grind up all large objects that could possibly damage our influent and sludge pumps further down the treatment process.
- **Primary Sedimentation:** The next treatment process is a physical treatment process where solids that settle or float are removed and sent to the digesters for further processing.
- **Activated Sludge:** Next is the activate sludge process. This process is a biological wastewater treatment process that uses microorganisms to speed up the decomposition of wastes. When activated sludge is added to wastewater, the microorganisms feed and grow on waste particles in the wastewater. As the organisms grow and reproduce, more and more waste is removed, leaving the wastewater partially cleaned. To function efficiently, the mass of organisms needs a steady balance of food and oxygen. These tasks are closely monitored by the operations staff.

## Glossary of terms continued...

- **Secondary Clarification:** Next is secondary clarification, like primary sedimentation/clarification, this also is a physical treatment process where solids that settle or float are removed and sent to the next treatment process. The difference between Secondary Clarification and primary sedimentation is that the solids removed from the secondary clarifiers goes to 2 places. Some goes to waste to the DAFT and some goes back to the activated sludge process for further treatment. (*Microorganisms must be returned to the activated sludge process to keep an equal balance of food and microorganisms*).
- **DAFT (dissolved air floatation thickener):** Next is the DAFT. The dissolved air floatation thickening process uses air bubbles to thicken WAS(waste active sludge) solids removed from the secondary clarifier, by floating solids to the tank surface, where they are removed and sent to the digesters for final processing.
- **Sludge Digestion:** In the anaerobic digestion process, all the organic material removed from the primary sedimentation tanks and DAFT's are digested by anaerobic bacteria. The end products are methane, carbon dioxide, water and neutralized organic matter.
- **Solids Handling:** This is the process where all the neutralized sludge from the digester is finally treated. Sludge from the digester is pumped to the screw press where it is conditioned with a polymer (chemical that reacts with the sludge to remove the water from the sludge and bind the sludge particles together) in order to dewater the sludge and produce a dry cake for final disposal to the Redwood landfill.
- **Disinfection:** This is the end point for the wastewater- at this point wastewater flows through the chlorine contact tank. This contact tank allows for enough contact time for chlorine solution to disinfect the wastewater. Sodium bisulfite is introduced at the end of the tank to neutralize any residual chlorine to protect the bay.
- **MLSS (mixed liquor suspended solids):** Suspended solids in the mixed liquor of an aeration tank measured in mg/l
- **MCRT (mean cell resident time):** An expression of the average time that a microorganism will spend in the activated sludge process.
- **SVI (sludge volume index):** This is a calculation used to indicate the settling ability of activated sludge in the secondary clarifier.
- **RAS (return activated sludge):** The purpose of returning activated sludge, is to maintain a sufficient concentration of activated sludge in the aeration tank.
- **WAS (waste activated sludge):** To maintain a stable process, the amount of solids added each day to the activated sludge process are removed as WAS. We track this by our MCRT which averages 3 days
- **TWAS (thickened waste activated sludge):** The WAS is thickened in the DAFT and the thickened sludge is then pumped to the digester.
- **MPN (most probable number):** Concentrations of total coliform bacteria are reported as the most probable number. The MPN is not the absolute count of the bacteria but a statistical estimate of their concentration.

## Glossary of terms continued...

- **Bio-solids:** Anaerobic digested sludge is pumped to a screw press where excess water is removed to reduce the volume (and weight) thus producing an end result called bio-solids.
- **Polymer:** Organic polymers are added to digested sludge to bring out the formation of larger particles by bridging to improve processing.

## Wastewater Acronyms

<b>ACWA</b>	Assoc of California Water Agencies	<b>APWA</b>	American Public Works Association
<b>AWWA</b>	American Water Works Association	<b>BAAQMD</b>	Bay Area Air Quality Management District
<b>BACWA</b>	Bay Area Clean Water Agencies	<b>BAPPG:</b>	Bay Area Pollution Prevention Group
<b>CASA</b>	California Association of Sanitation Agencies	<b>CSDA</b>	California Special Districts Association
<b>CSRMA:</b>	California Sanitation Risk Management Authority	<b>CAAQS</b>	California Ambient Air Quality Standard
<b>CalARP</b>	California Accidental Release Prevention Program	<b>CARB</b>	California Air Resources Board
<b>CDO</b>	Cease and Desist Order	<b>CECs</b>	Constituents of Emerging Concern
<b>CEQA</b>	California Environmental Quality Act	<b>CIWQS</b>	California Integrated Water Quality System
<b>CFR</b>	Code of Federal Regulations	<b>CMOM</b>	Capacity, Management, Operation and Maintenance
<b>CIWMB</b>	California Integrated Waste Management Board	<b>CPUC</b>	California Public Utilities Commission
<b>CSO</b>	Combined Sewer Overflow	<b>CTR</b>	California Toxics Rule
<b>CWA</b>	Clean Water Act	<b>CWAP</b>	Clean Water Action Plan
<b>CWARA</b>	Clean Water Authority Restoration Act	<b>CWEA</b>	California Water Environment Association
<b>DHS</b>	Dept of Health Services	<b>DTSC</b>	Dept of Toxic Substances Control
<b>EBEP</b>	Enclosed Bays and Estuaries Plan	<b>EDW</b>	Effluent Dominated Water body
<b>EIS/EIR</b>	Environmental Impact Statement/Report	<b>EPA</b>	Environmental Protection Agency
<b>ERAF</b>	Educational Reserve Augmentation Fund	<b>ESMP</b>	Electronic Self-Monitoring Report
<b>FOG</b>	Fats, Oils and Grease	<b>GASB</b>	Government Accounting Standards Board
<b>ISWP</b>	Inland Surface Waters Plan	<b>JPA</b>	Joint Powers Authority
<b>LAFCO</b>	Local Agency Formation Commission	<b>LOCC</b>	League of California Cities
<b>MACT</b>	Maximum Achievable Control Technology (air controls)	<b>MCL</b>	Maximum Contaminant Level
<b>MMP</b>	Mandatory Minimum Penalty	<b>MOU</b>	Memorandum of Understanding
<b>MUN</b>	Municipal Drinking Water Use	<b>NACWA</b>	National Association of Clean Water Agencies
<b>NGOs</b>	Non Governmental Organizations	<b>NOX</b>	Nitrogen Oxides
<b>NPDES</b>	Nat'l Pollutant Discharge Elimination System	<b>NRDC</b>	Natural Resources Defense Council
<b>NTR</b>	National Toxics Rule	<b>OWP:</b>	Office of Water Programs
<b>OSHA:</b>	Occupational Safety and Health Administration	<b>PCBs</b>	Poly Chlorinated Biphenyls
<b>POTWs</b>	Publicly Owned Treatment Works	<b>PPCPs</b>	Pharmaceutical and personal Care Products
<b>QA/QC</b>	Quality Assurance / Quality Control	<b>Region</b>	IX Western Region of EPA (CA, AZ, NV & HI)
<b>RFP</b>	Request For Proposals	<b>RMP</b>	Risk Management Program
<b>RFQ</b>	Request For Qualifications	<b>RWQCB</b>	Regional Water Quality Control Board
<b>SEP</b>	Supplementary Environmental Projects	<b>SIP</b>	State Implementation Policy (CTR/NTR criteria)
<b>SFEI:</b>	San Francisco Estuary Institute	<b>SRF</b>	State Revolving Fund
<b>SSO</b>	Sanitary Sewer Overflow	<b>SSMP</b>	Sewer System Management Plan
<b>SWRCB</b>	State Water Resources Control Board	<b>TMDL</b>	Total Maximum Daily Load
<b>WDR</b>	Waste Discharge Requirements	<b>WEF</b>	Water Environment Federation
<b>WERF</b>	Water Environment Research Foundation	<b>WET</b>	Whole Effluent Toxicity or Waste Extraction Test
<b>WMI</b>	Watershed Management Initiative	<b>WRFP</b>	Water Recycling Funding Program
<b>WRDA</b>	Water Resource Development Act	<b>WWTP</b>	Wastewater Treatment Plant
<b>WQBEL</b>	Water Quality Based Effluent Limitation	<b>WWWIFA</b>	Water and Wastewater Infrastructure Financing Agency



# Collection System Master Plan

Sanitation District No.5 of Marin County

**Sanitary District no 5**

Tiburon & Belvedere, California



March 5, 2021



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# Executive Summary

## Introduction

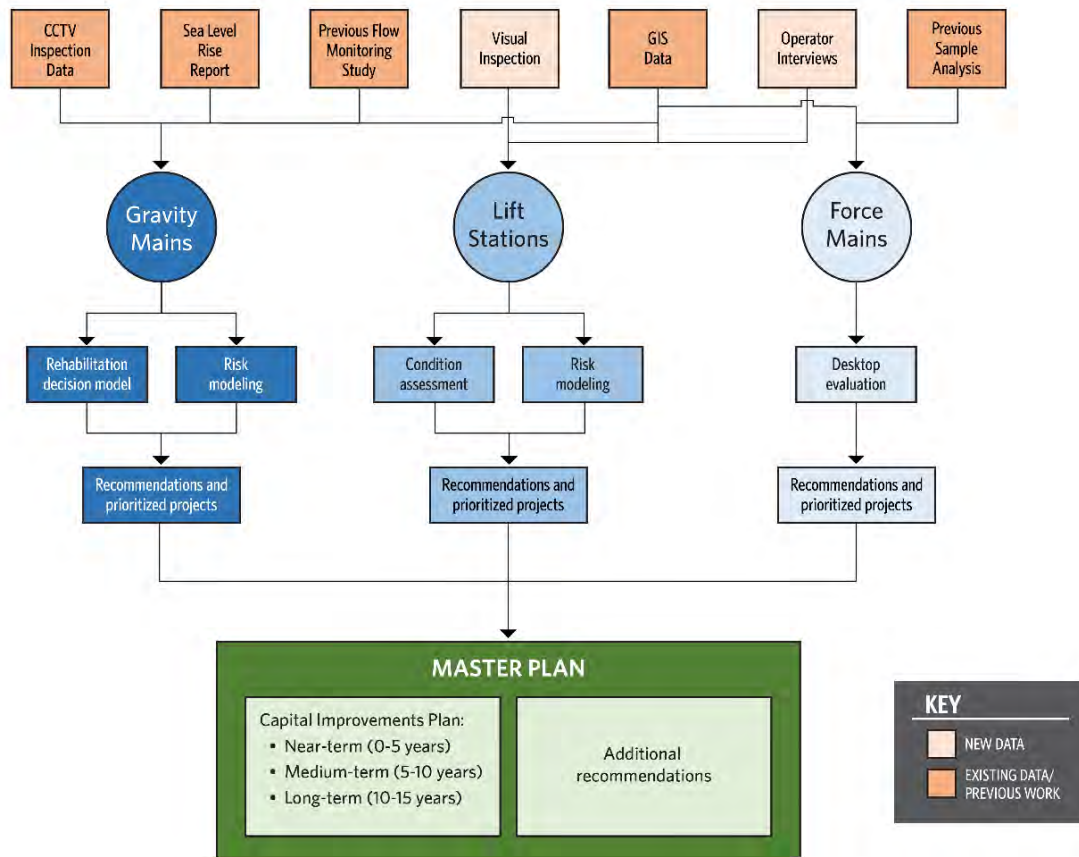
Located on the Tiburon Peninsula north of San Francisco, Sanitary District No. 5 of Marin County (SD5) provides wastewater services to Tiburon, Belvedere, and the surrounding unincorporated areas. The population in SD5's service area is about 8,400, has stabilized, and significant future growth is not anticipated. Land use changes and additional build-out development is unlikely because of stringent building and planning requirements. Most of SD5's current service area is expected to remain unchanged into the future, except for continued low-level expansion in the unincorporated northeastern part of its service area.

SD5 completed a sanitary sewer investigation study in 2005 (Harris and Associates, 2005) that produced a set of recommendations for capital improvements to its collection systems (i.e., pipelines) and supporting facilities (i.e., lift stations). Since that time, SD5 has implemented many of the recommendations and made considerable investment in its wastewater collection system infrastructure. SD5 believes that it is time to reassess its collection system infrastructure to determine its current condition and identify rehabilitation priorities.

HDR Engineering, Inc. (HDR) was retained by SD5 to develop a Collection System Master Plan (Master Plan) that will support its objectives of continuing to meet regulatory requirements and service-level goals for the communities it serves. Prior engineering reports and studies, including CCTV inspection videos, construction as-built drawings, and GIS database information, served as the basis for developing the Master Plan. Data collected during recent in-field inspections/assessments, along with the prior work, were used to develop recommendations for system performance improvements, as well as a list of recommended capital improvements (i.e., 15-year Capital Improvement Plan or CIP), recommended timing or prioritization of the improvements, and estimated costs of the improvements.

## Approach and Workflow

Figure 1 provides the approach to developing the Master Plan. The three primary components of the collection system - gravity mains, lift stations, and force mains - were each evaluated using existing information from SD5 and new data developed for this study. Evaluation of the gravity mains consisted of developing a risk model from the available CCTV inspection data and a rehabilitation decision model that also incorporated findings from the evaluation of the 2010-2011 flow monitoring study (E2 Consulting Engineers Inc., 2011) and sea level rise assessment (BVB Consulting LLC, 2017). The lift station evaluation incorporated existing data from SD5 as well as new data from physical inspections and interviews of operations staff. The force mains were evaluated using available data from the GIS and sample analysis results of four pipe samples from 2018 Visual Condition Assessment Report (V&A Consulting Engineers, 2018). Each of these three primary components was evaluated separately to identify prioritized recommendations, which were then integrated into a comprehensive 15-year capital improvement plan (CIP).



**Figure 1. Master plan project approach**

## Key conclusions

The primary findings from these analyses are as follows:

- Gravity Mains (Section 4.1.5)
  - The collection system is relatively old and has not been inspected recently and will need additional inspection.
  - Depending upon the addition inspection results, more rehabilitation actions may be identified for the near term (0-5 years).
  - Based on the available data, 2.2 miles of mains should be rehabilitated within the next 5 years (approximately 7 percent of system).
  - Some areas of the system have significant I&I issues that allow excess stormwater and ground water (and possibly tidal flow) to enter the system, which may cause odor, capacity problems, and impacts wastewater treatment plant operations (Section 4.2.11). The previous study evaluated approximately 50 percent of the SD5 collection system and there may be more areas that have not been evaluated that are significant contributors of excess flow to the system. This issue could be magnified by medium- and long-term (greater than 30 years) sea level rise.

- Lift Stations (Section 4.3.5)
  - 50 percent of the 24 lift stations evaluated are found to be in fair to poor condition.
  - Four of these stations should be rehabilitated within the next 5 years and another four in 5 to 10 years.
- Force Mains (Section 5.3)
  - Based on desktop review of available force main information, 4 of the 28 force mains should have a detailed condition assessment within the next 5 years.
  - Depending upon the results of these assessment, additional assessments and capital projects may be needed.

A summary of each of the analyses is provided below, followed by a discussion of the 15-year CIP.

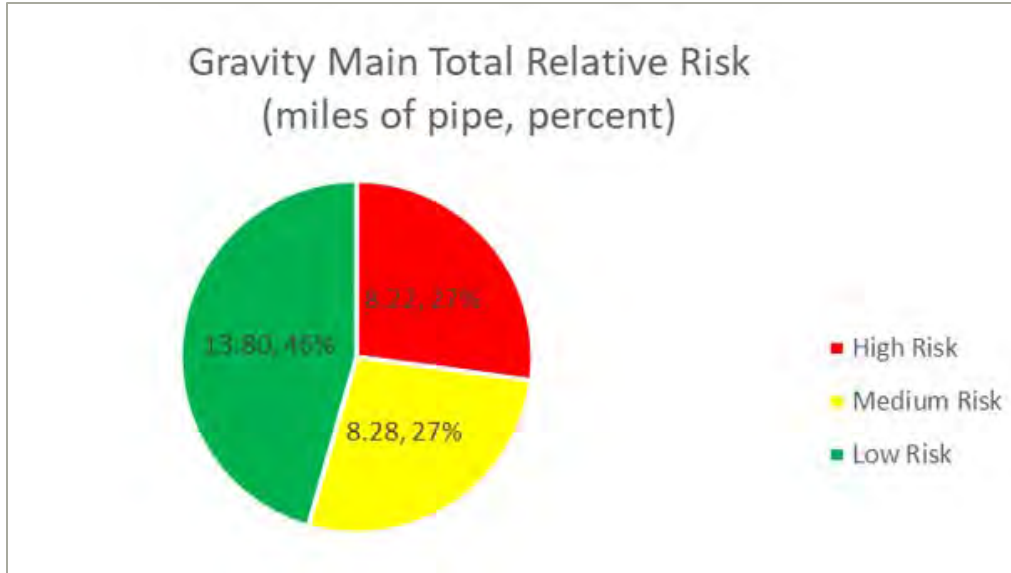
## Gravity Mains

The main objective of the gravity main analysis was to identify and prioritize rehabilitation and reinspection actions based on available inspection data. This analysis also included evaluation of the 2010-2011 flow monitoring study (E2 Consulting Engineers Inc., 2011) to characterize inflow and infiltration issues within the system, and incorporation of findings from the regional Marin Shoreline Sea Level Rise Vulnerability Assessment (BVB Consulting LLC, 2017).

### Gravity Main Risk Modeling

To develop rehabilitation recommendations for the collection system, a risk model was constructed to calculate a relative risk score for every sewer main (e.g., gravity pipeline) based on likelihood of failure (LoF) and consequence of failure (CoF) criteria. The relative risk score was used to prioritize rehabilitation and reinspection recommendations for the gravity mains.

The LoF and CoF scores are comprised of several components based on physical characteristics of the system, CCTV inspection results, regulatory history and customer service. These were tabulated for every gravity main to develop the final risk score. The risk model for the system, summarized in Figure 2, shows that about 27 percent (8.22 miles) of the gravity mains have a relatively high risk compared to the rest of the system. However, these pipes do not all require rehabilitation.



**Figure 2. Risk modeling results for gravity mains**

**Inflow and Infiltration**

The 2010-2011 flow monitoring study (E2 Consulting Engineers Inc., 2011) was then analyzed to identify additional factors that should be considered when developing rehabilitation recommendations for the gravity mains. This previous study was reviewed and analyzed to determine which of the basins studied were the largest contributors to excess flow that enters the system from groundwater or stormwater events. The analysis revealed that Peninsula Road in Belvedere and the basin at the south end of the Tiburon Peninsula along Paradise Drive are the biggest contributors to inflow and infiltration (I&I) and should be further investigated to identify and eliminate specific I&I sources. There are other basins that may be significant contributors to I&I as well. In addition, the gravity mains in these areas are given additional consideration when prioritizing and planning annual rehabilitation work.

**Rehabilitation Decision Model**

Each of the sewer mains was then processed through a rehabilitation decision support model that identified the most appropriate rehabilitation or reinspection action for each gravity main depending on its physical characteristics, previous CCTV inspection results (SD5 2020a), and additional input from a prior I&I evaluation (E2 Consulting Engineers Inc., 2011). This model uses the risk model results as well as additional parameters to select the best rehabilitation or reinspection options for each pipe according to SD5 decision criteria. By applying unit cost information derived from previous SD5 construction bid tables and regional experience, costs for each of the rehabilitation actions was calculated for each pipe.

**Recommendations**

The results from the modeling and prioritization are summarized in Table 1 below.

**Table 1. Gravity main capital improvement recommendations**

Tier	Timeframe	Number of gravity mains	Sum of miles	Percent of system	Gravity main costs
1	0–5 years	57	2.2	7%	\$3,069,814
2	5–10 years	56	2.3	8%	\$2,749,981
3	10–15 years	32	1.5	5%	\$2,324,530
4	15+ years	13	0.6	2%	\$592,900
<b>Grand total</b>		<b>158</b>	<b>6.6</b>	<b>22%</b>	<b>\$8,737,225</b>

## Lift Stations

A visual condition assessment of the lift stations was conducted as part of the planning effort. The assessment included review of available documentation and reference material, visual inspection of the lift stations, and interviews of SD5 staff. The information collected was analyzed to develop recommendations for needed improvements, which were considered in the development of the overall CIP. To prioritize the recommendations, a risk analysis was conducted to determine the relative criticality of each lift station.

### Condition Assessment

Overall, the condition of the lift stations varied, with the Tiburon and Seafirth lift stations generally being in better overall condition than the Belvedere lift stations. Actual station age and capacity assessment were not determined because of limited data; therefore, the assessments relied on interviews with SD5 staff for historical knowledge, visual condition assessment based on experience evaluating similar assets evaluated at other utilities, and comparison to industry best practices. None of the stations received a very poor rating. The most significant issues were identified at Tiburon PS-4, Tiburon PS-9, Belvedere PS-1, and Belvedere PS-7. These results are summarized in Table 2.



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**Table 2. Lift station condition assessment results**

Service area	Lift station criticality	Lift station location	Description	Very good (New or excellent condition)	Good (Minor defects only)	Fair (Moderate deterioration)	Poor (Significant deterioration)	Very poor (Virtually unserviceable)
Tiburon	1	PS-5	Mar W St.	✓				
Tiburon	2	PS-3	Paradise Dr. & Solano St.			✓		
Tiburon	3	PS-2	Mar E St. near Agreste Way			✓		
Tiburon	3	PS-6	Tiburon Blvd. and Beach Rd.			✓	✓	
Tiburon	3	PS-8	Beach Rd. and Lagoon Vista Rd.			✓		
Tiburon	4	PS-1	Mar E St. near Mar E Dr.			✓		
Tiburon	4	PS-4	Paradise Dr. near Lyford's Tower				✓	
Tiburon	4	PS-7	Tiburon Blvd. near Ned's Way			✓		
Tiburon	4	PS-9	Paradise Dr. near Shoreline Park				✓	
Belvedere	1	PS-1	Cove Rd. & Barn Rd.				✓	
Belvedere	2	PS-3	San Rafael Ave. and Golden Gate Ave.			✓	✓	
Belvedere	2	PS-9	Lagoon Rd. (south)			✓	✓	
Belvedere	3	PS-5	San Rafael Ave. and Windward Rd.			✓	✓	
Belvedere	3	PS-10	Lagoon Rd. near Maybridge Rd.			✓	✓	
Belvedere	3	PS-13	West Shore Rd. (north)			✓		
Belvedere	4	PS-2	San Rafael Ave. & Teal Rd.			✓	✓	
Belvedere	4	PS-7	Peninsula Rd. and Beach Rd.			✓	✓	
Belvedere	4	PS-15	Beach Rd. near Embarcadero Dr.			✓		
Belvedere	4	PS-14	West Shore Rd. (south)			✓		
Belvedere	4	PS-8	Windward Rd.			✓		
Belvedere	4	PS-11	Lagoon Rd. (north)			✓	✓	
Belvedere	4	PS-12	San Rafael Ave. & Edgewater Rd.			✓	✓	
Seafirth	1	CF-PS1	Seafirth Pl.		✓			
Seafirth	2	CF-PS2	Seafirth Rd.		✓			

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The outcome of each assessment was a list of rehabilitation and repair recommendations for each lift station. Costs for these recommendations was calculated using an industry standard cost estimating database (RS Means).

### **Lift Station Risk Modeling**

Risk assessment was also used to prioritize lift station rehabilitation and develop the prioritized CIP. Risk was determined based on each lift stations pumping capacities, impact on the District if it fails and is taken out of service, and the potential for flooding or causing environmental damage. Based on these characteristics, four of the pump stations were identified to be the most critical (Tiburon LS-5, Belvedere LS-1, Seafirth LS-1, and Seafirth LS-2) and five others have been determined to be the next highest priority (Tiburon LS-3, Tiburon LS-4, Tiburon LS-6, Tiburon LS-9 and Belvedere LS-7). These criticality ratings were used to prioritize the rehabilitation recommendations.

### **Recommendations**

The capital improvement recommendations and priorities for SD5 lift stations is provided in Table 3.

**Table 3. Lift station capital improvement recommendations**

Service area	Lift station number	Lift station location	Rehabilitation schedule			
			0-5 years	5-10 years	10-15 years	15+ years
Tiburon	PS-1	Mar E St. near Mar E Dr.				\$11,154
Tiburon	PS-2	Mar E St. near Agreste Way			\$99,725	
Tiburon	PS-3	Paradise Dr. and Solano St.			\$129,910	
Tiburon	PS-4	Paradise Dr. near Lyford's Tower	\$386,515			
Tiburon	PS-5	Mar W St.				\$50,833
Tiburon	PS-6	Tiburon Blvd. and Beach Rd.		\$431,013		
Tiburon	PS-7	Tiburon Blvd. near Ned's Way			\$91,464	
Tiburon	PS-8	Beach Rd. and Lagoon Vista Rd.			\$40,631	
Tiburon	PS-9	Paradise Dr. near Shoreline Park	\$400,747			
Belvedere	PS-1	Cove Rd. and Barn Rd.	\$668,323			
Belvedere	PS-2	San Rafael Ave. and Teal Rd.		\$498,934		
Belvedere	PS-3	San Rafael Ave. and Golden Gate Av		\$500,590		
Belvedere	PS-5	San Rafael Ave. and Windward Rd.			\$418,832	
Belvedere	PS-7	Peninsula Rd. and Beach Rd.	\$411,031			
Belvedere	PS-8	Windward Rd.				\$53,473
Belvedere	PS-9	Lagoon Rd. (south)		\$83,478		
Belvedere	PS-10	Lagoon Rd. near Maybridge Rd.			\$48,632	
Belvedere	PS-11	Lagoon Rd. (north)			\$48,632	
Belvedere	PS-12	San Rafael Ave. and Edgewater Rd.			\$36,050	
Belvedere	PS-13	West Shore Rd. (north)				\$70,896
Belvedere	PS-14	West Shore Rd. (south)				\$31,165
Belvedere	PS-15	Beach Rd. near Embarcadero Dr.				\$58,054
Seafirth	CF-PS1	Seafirth Pl.				\$50,833
Seafirth	CF-PS2	Seafirth Rd.				\$0
<b>Total</b>			<b>\$1,866,617</b>	<b>\$1,514,016</b>	<b>\$913,877</b>	<b>\$326,408</b>

## Force Mains

A detailed assessment of SD5's force mains was not part of the master plan scope however available information was reviewed to develop recommendations for further evaluation. From the information available, the Tiburon force mains PS-5-14 and PS-6-621, and Belvedere force mains PS1-TIB and the PS3 force mains (PS3-ND5 - PS3-ND5.1 and PS3-ND5.1.1) should be prioritized first for condition assessment. This is mostly due to their lengths, their associated pump station criticality, and their ages.

The most common assessment technologies for these force mains range between \$12 thousand and \$60 thousand per force main depending upon the technology used. These costs are based on

previous project experience but would need to be refined with a quote from each vendor. For the purposes of this analysis, middle-range cost estimates were applied, which total approximately \$215 thousand to assess all four pipelines.

### Capital Improvement Plan

Table 4 provides a summary of the gravity main, lift station and force main recommendations and costs prioritized for the CIP. These recommendations have been divided into near-term (0-5 years), mid-term (5-10 years), and long-term (10-15 years) actions. These actions include additional condition assessments as well as rehabilitations, which could identify additional rehabilitation actions to these identified costs and could also impact CIP priorities. A similar budget was planned for additional force main assessment in the long-term CIP (10-15 year range).

**Table 4. Summary of SD5 capital improvement plan**

	Total	Tiburon	Paradise Cove	Belvedere	Yearly average
<b>Short-term (0-5 years)</b>					
Gravity main rehabilitation and inspection	\$ 3,159,575	\$ 2,236,717	\$ -	\$ 922,858	\$ 631,915
Lift station rehabilitation	\$ 1,896,617	\$ 817,263	\$ -	\$ 1,079,354	\$ 379,323
Force main inspection	\$ 216,000	\$ 108,000	\$ -	\$ 108,000	\$ 43,200
<b>Short-term total</b>	<b>\$ 5,272,192</b>	<b>\$ 3,161,980</b>	<b>\$ -</b>	<b>\$ 2,110,212</b>	<b>\$ 1,054,438</b>
<b>Mid-term (5-10 years)</b>					
Gravity main rehabilitation and inspection	\$ 2,847,083	\$ 1,847,183	\$ 115,933	\$ 883,967	\$ 569,417
Lift station rehabilitation	\$ 1,514,016	\$ 431,013	\$ -	\$ 1,083,002	\$ 302,803
Force main inspection	\$ -	\$ -	\$ -	\$ -	\$ -
<b>Mid-term total</b>	<b>\$ 4,361,099</b>	<b>\$ 2,278,196</b>	<b>\$ 115,933</b>	<b>\$ 1,966,969</b>	<b>\$ 872,220</b>
<b>Long-term (10-15 years)</b>					
Gravity main rehabilitation and inspection	\$ 2,474,083	\$ 1,614,805	\$ 315,363	\$ 543,915	\$ 494,817
Lift station rehabilitation	\$ 913,877	\$ 361,730	\$ -	\$ 552,147	\$ 182,775
Force main inspection	\$ 216,000	\$ 108,000	\$ -	\$ 108,000	\$ 43,200
<b>Long-term total</b>	<b>\$ 3,603,960</b>	<b>\$ 2,084,535</b>	<b>\$ 315,363</b>	<b>\$ 1,204,062</b>	<b>\$ 720,792</b>

Figure 3 shows a graph of the expected CIP expenditures over time for the next 15 fiscal years. Each of the bars represents a specific type of activity on either the gravity mains, lift stations, or force mains, while the total cost by fiscal year is shown as the green line. Annual expenditures are expected to average about \$1 million over the next 10 years.

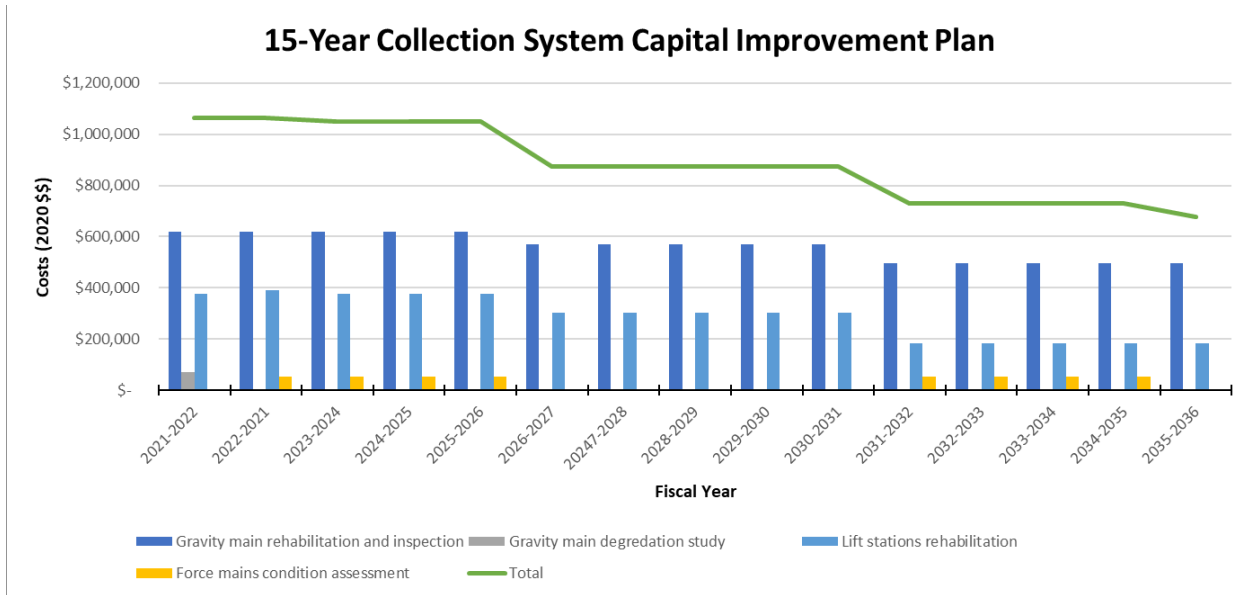


Figure 3. Recommended 15-year CIP

Figure 4 compares the existing SD5 capital plan as provided in the FY 2020-2021 Final Budget report (SD5, 2020b) to the recommendations from this master plan. The planned budget averages approximately \$1.2 million whereas the recommended projects from this Master Plan average approximately \$1.0 million over the same time period.

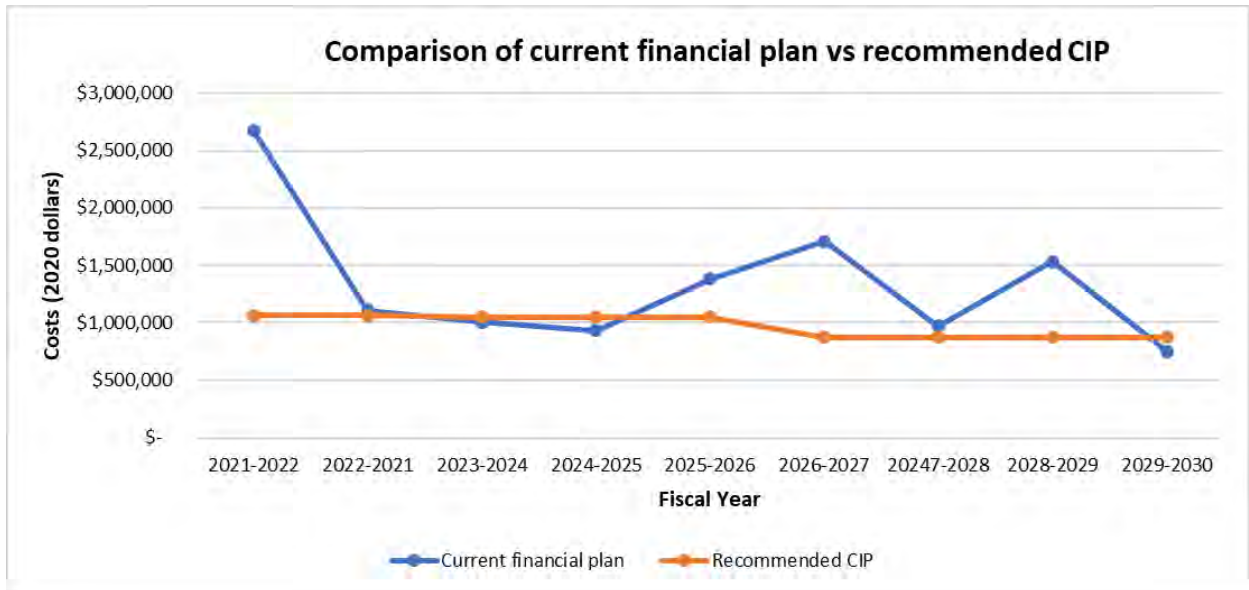


Figure 4. Comparison of the recommended CIP and the SD5 financial plan

# 1.0 Introduction

This section provides an overview of the project and describes the goals and objectives.

## 1.1 Project Background

Sanitary District No. 5 of Marin County (SD5) has developed this Collection System Master Plan (Master Plan) to better understand the current conditions of its collection systems, anticipate future needs, and identify potential items for operational improvement and capital investment. This Master Plan covers both the Main Treatment Plant collection system, which consists of 28.8 miles of gravity sewer line, 2.6 miles of force mains, and 22 pump stations, and the Paradise Cove collection system, which consists of 1.5 miles of gravity sewer line, 2.3 miles of force mains, and two pump stations within its service area. The Master Plan describes the assessment of these facilities, provides a 15-year capital improvement plan (CIP), and presents other system performance improvement recommendations.

SD5 previously completed a study in 2005 that produced a set of recommendations for capital improvements (Harris and Associates, 2005). Since that time, SD5 has implemented many of the recommendations and made considerable investment in the wastewater collection system infrastructure. SD5 believes that it is time to reassess the system to determine its current condition and identify rehabilitation priorities. This master planning effort provides an updated road map for capital investment and operational improvements that accounts for anticipated growth and demographic changes and identifies rehabilitation and renewal needs that will enable SD5 to continue to meet regulatory and service-level goals for the community.

## 1.2 Goals and Objectives

This Master Plan is intended to achieve the following goals and objectives:

- Assess the current condition of the sewer gravity system and lift stations
- Provide recommendations for capital improvement and infiltration and inflow (I&I) reduction
- Review available information on force mains and provide condition assessment recommendations
- Identify operational improvements for odor control
- Develop a 15-year collection system CIP
- Discuss potential system vulnerabilities, such as sea level rise (SLR), and support other potential changes including environmental, social and economic conditions that could present challenges to SD5.

SD5 is a special district that serves a small population with a limited rate payer base. This Master Plan is structured to align with SD5's needs and must balance out prioritized strategic capital investment with affordability.

## 1.3 Report Purpose and Organization

SD5 will use this Master Plan as a reference and baseline for implementing capital improvements and other recommendations necessary to continue to meet expected service levels to the community and regulatory requirements for the next 15 years.



The following sections are included in the Master Plan:

1. Introduction: documents the project background, goals and objectives, the purpose and structure of the Master Plan, assumptions and dependencies, acronyms and abbreviations and a summary of data sources used or reviewed.
2. Service Area Description: describes the service areas served by SD5 and specific characteristics including geography, climate, land use, and population; both current and anticipated in the future.
3. Existing System Description: presents the physical and operational characteristics for SD5’s Main Treatment Plant and Paradise Cove collection systems.
4. Facility and Infrastructure Assessment: discusses the assessments completed for SD5s assets, including the gravity mains and lift stations including the need to reduce I&I.
5. Capital Improvement Plan: lists the specific capital improvement recommendations and describes the methodology for establishing implementation priorities and costs.

### 1.4 Assumptions and Dependencies

The analyses and recommendations in this Master Plan are based on the following assumptions and dependencies:

- The information, data and interpretations obtained from the data sources and reports provided are assumed to be accurate and correct. No attempt has been made to verify these sources of information.
- Rehabilitation decision modeling used to evaluate the closed-circuit television (CCTV) inspection results (Harris and Associates, 2005) is based on existing models used at other utilities. Only minor customizations have been made specific to SD5’s needs.
- This Master Plan also relies on institutional knowledge from Nute Engineering based on its history of capital improvement and design work for SD5

### 1.5 Abbreviations and Definitions

The following abbreviations and definitions are used in this report:

<b>ADWF</b>	Average dry weather flow.
<b>BSF</b>	Base sanitary flow.
<b>CCTV</b>	Closed-circuit television video. Used to inspect gravity sewer pipe.
<b>CIP</b>	Capital improvement plan.
<b>CIPP</b>	Cured-in-place pipe. A pipe rehabilitation method.
<b>CIWQS</b>	California Integrated Water Quality System. Website used for reporting sewer system overflows.
<b>CoF</b>	Consequence of failure. A measure indicating the impact if an asset fails.
<b>District</b>	Sanitary District No. 5 of Marin County
<b>EUL</b>	Estimated useful life. The average service life of an asset.
<b>Flow monitoring hydrograph</b>	A graph that shows the rate of flow over time for a specific location in the sewer system.
<b>FOG</b>	Fats, oils, and grease.

<b>Force main</b>	A pressurized sewer pipe that conveys wastewater under pressure from the discharge side of a pump.
<b>FY</b>	Fiscal year.
<b>GIS</b>	Geographic information system.
<b>gpm</b>	Gallon(s) per minute.
<b>Gravity main</b>	A sewer main that conveys wastewater via gravity.
<b>GWI</b>	Groundwater infiltration.
<b>H<sub>2</sub>S</b>	Hydrogen sulfide.
<b>HDR</b>	HDR Engineering, Inc.
<b>hp</b>	Horsepower.
<b>I&amp;C</b>	Instrumentation and controls.
<b>I&amp;I</b>	Inflow and infiltration. Non-wastewater-related flow in a sewer pipe that causes excess flow and dilution.
<b>in.</b>	inch(es).
<b>Infiltration</b>	Water entering a sewer pipe through defects in the pipe or joints.
<b>Inflow</b>	Water entering a sewer pipe from inappropriate connections.
<b>InfoAsset Planner</b>	Spatial software that is used to model risk in the collection system and to plan for and estimate rehabilitation actions.
<b>KPI</b>	Key performance indicator.
<b>lb</b>	Pound(s).
<b>LF</b>	Linear foot/feet.
<b>Lift station</b>	A pumping station in the collection system used to move wastewater from a lower elevation to a higher elevation.
<b>LoF</b>	Likelihood of failure. A measure indicating how soon an asset is likely to fail.
<b>Master Plan</b>	Collection System Master Plan
<b>mi</b>	Mile(s).
<b>MWLS</b>	Miscellaneous water level sag.
<b>N/A</b>	Not applicable.
<b>NASSCO</b>	National Association of Sewer Service Companies. NASSCO provides the standard for inspection and assessment of gravity mains using CCTV.
<b>NPDES</b>	National Pollutant Discharge Elimination System.
<b>O&amp;M</b>	Operations and maintenance.
<b>PACP</b>	Pipeline Assessment and Certification Program. Defines standards and conventions for assessing sewer pipe.
<b>Peak structural defect score</b>	The highest (most severe) score identified on a pipe segment.
<b>Rainfall hyetograph</b>	A graphical representation of the distribution of rainfall over time.

<b>RDI/I</b>	Rain-dependent infiltration and inflow.
<b>Risk score</b>	The numeric score calculated for a pipe segment based on the likelihood of failure and consequence of failure grading.
<b>SLR</b>	Sea level rise.
<b>Smoke testing</b>	An assessment method using smoke that is pumped into the sewer system to determine locations where the system could be leaking to determine connectivity and potential problems in the system. Used to identify I&I vulnerabilities.
<b>SSMP</b>	Sewer System Management Plan. A plan required of all organizations that manage collections systems that defines how the system is managed and maintained, and how the organization responds to overflows.
<b>SSO</b>	Sewer system overflow.
<b>TDH</b>	Total dynamic head.
<b>V</b>	Volt(s).
<b>WWTP</b>	Wastewater treatment plant.

## 1.6 Data Sources and Review

Many data sources were reviewed and analyzed during the development of this Master Plan. The following key data sources and documents used were:

1. BVB Consulting LLC (2017). Marin Shoreline Sea Level Rise Vulnerability Assessment
2. E2 Consulting Engineers Inc. (2011). Sanitary District No. 5 of Marin County Flow Monitoring Report
3. Harris and Associates (2005). City of Belvedere Sanitary Sewer Investigation and GIS Program Report
4. Nute Engineering (2017). Pump Station No. 5 Improvements – Phase 2
5. Nute Engineering (2016a). Belvedere Pump Station Assessment Project
6. Nute Engineering (2016b). Tiburon Pump Station Assessment Project
7. Nute Engineering (2014). Pump Station No. 5 Improvements – Phase 1
8. Sanitary District No. 5 of Marin County (2020a). Geodatabases for Tiburon and Belvedere, including previous CCTV inspection results.
9. Sanitary District No. 5 of Marin County (2020b). FY 2020 – 2021 Final Budget,
10. Sanitary District No. 5 of Marin County (2020c). Updated Strategic Plan
11. Sanitary District No. 5 of Marin County (2018a). Main Plant Sewer System Management Plan
12. Sanitary District No. 5 of Marin County (2018b). Paradise Cove Sewer System Management Plan
13. Sanitary District No. 5 of Marin County (2018c). Succession Plan
14. Sanitary District No. 5 of Marin County (2017). Emergency Response Plan
15. Sanitary District No. 5 of Marin County (2015). Minimum Staffing Requirements
16. US Environmental Protection Agency (2017). Effective Utility Management: A Primer for Water and Wastewater Utilities
17. V&A Consulting Engineers (2018). Sanitary District No.5 of Marin County Four Pipe Samples Visual Condition Assessment Letter Report

Additional information was obtained from various websites including the Town of Tiburon, City of Belvedere, US Census Bureau, the California State Water Resources Control Board, and the National Oceanic and Atmospheric Administration.

## 2.0 Service Area Description

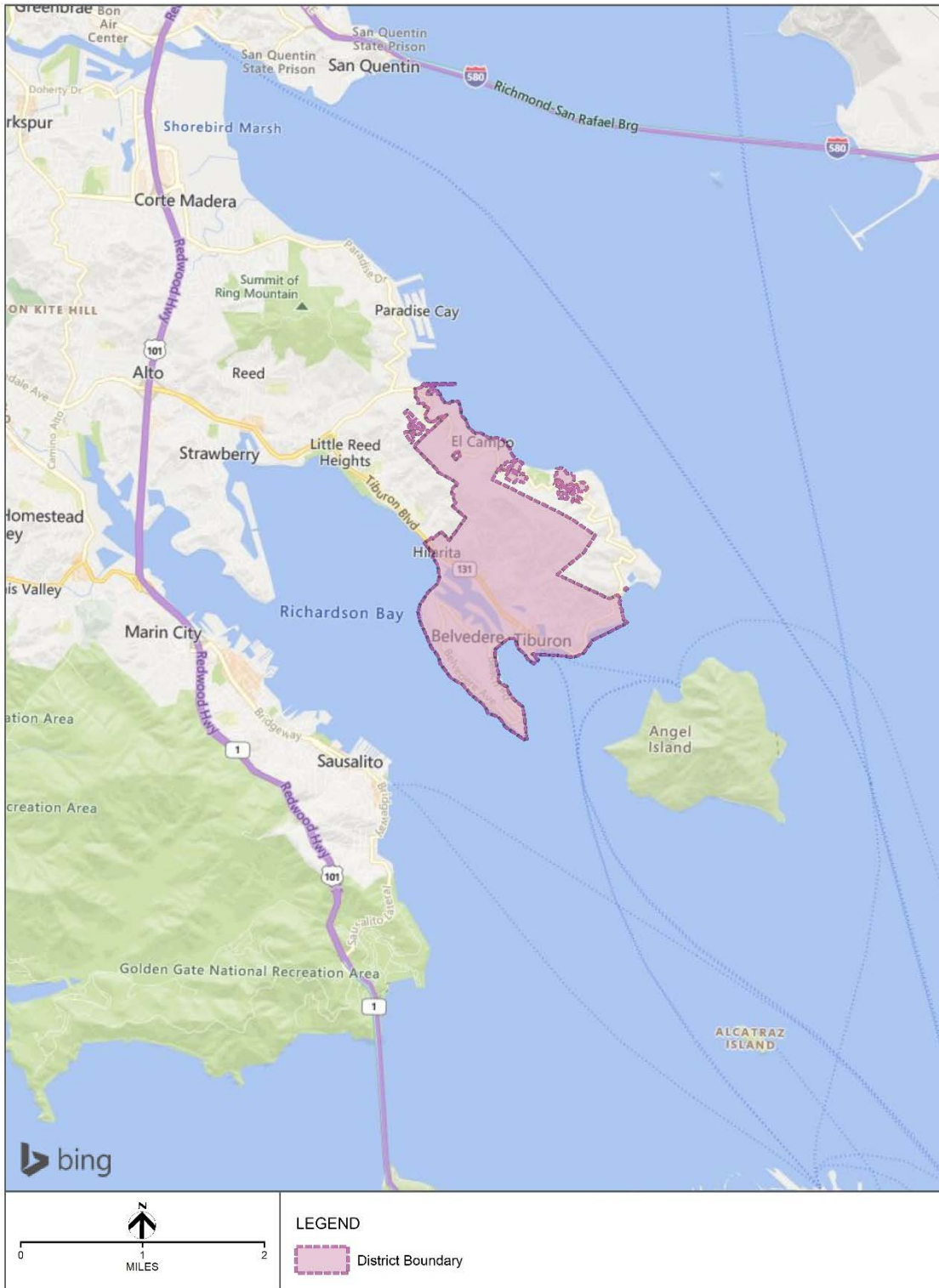
Sanitary District No. 5 of Marin County is a special district established in 1922 that has been providing wastewater collection and treatment services to parts of the Tiburon Peninsula and the City of Belvedere since the early 1940s (SD5, 2020c). It currently provides services to more than 3,500 households and covers approximately 2,550 acres. Commercial interests include downtown Tiburon, which is composed mostly of small boutiques, hotels, marinas, and restaurants supporting local tourism, and commuter ferry services to San Francisco.

SD5 has consistently been in compliance with state and federal regulations under a National Pollutant Discharge Elimination System (NPDES) Permit that regulates sanitary agencies (SD5, 2020c). SD5's mission as stated on the District website is as follows:

*Sanitary District No.5 of Marin County is a special District, which while meeting or exceeding all applicable local, state and federal laws and regulations, is dedicated to the protection of public health and the environment through effective and economical collection, conveyance, treatment and disposal of wastewater*

### 2.1 Service Area and Population Served

Located on the Tiburon Peninsula north of the city of San Francisco and on the San Francisco Bay, SD5 serves a population of approximately 8,400 people in the town of Tiburon, the city of Belvedere, and the surrounding, unincorporated areas (Figure 5). SD5's Main Treatment Plant collection system consists of 28.8 miles of gravity sewer line, 2.6 miles of force main, and 22 pump stations. The treatment plant provides secondary treatment of residential and commercial wastewater. The Paradise Cove collection system has an additional 1.5 miles of gravity sewer line, 2.3 miles of force mains and two pump stations that direct wastewater flow to the Paradise Cove treatment plant.



**Figure 5. Location map showing SD5 service area**

The Town of Tiburon, which was incorporated in 1964, had an estimated population of 9,084 in 2019 (www.census.gov). It is bordered on the south-west by the City of Belvedere and Corte Madera to the

north, but otherwise is surrounded by San Francisco Bay. It has a total area of about 13.2 square miles of which about 66 percent is water. SD5 serves approximately the southern half of the town.

The City of Belvedere, which was incorporated in 1896, had an estimated population of 2,104 in 2019 ([www.census.gov](http://www.census.gov)). It consists of two islands and is connected to the Town of Tiburon by two causeways. It is an entirely residential community of about 2.42 square miles of which about 78 percent is water. SD5 provides wastewater collection and treatment for the entire city.

The remaining District service area on the Tiburon Peninsula is unincorporated serving residences and small communities throughout the hills and along the peninsula coastline. Topography within the service area ranges from sea level to about 740 feet above sea level along the peninsula ridgeline.

## 2.2 Climate

The weather in the service area is very moderate with average temperatures ranging from the mid-70's in summer to the low 40's in winter. Rainfall averages about 29 inches per year, with most of it falling in the winter months. Monthly averages range from 6.2 inches per month in January to less than 1 inch of rain in July. On average, it rains only 80 days throughout the year.

## 2.3 Land Use

The land use in SD5's service area is designated predominantly as low-density residential and open space or parklands. Commercial property makes up a very small percentage and is concentrated primarily in downtown Tiburon. The city of Belvedere is almost entirely built out and future changes in its land use designations are not likely. Future development will primarily be renovations or replacement of existing homes. The town of Tiburon has more undeveloped land and could continue to build out based on the current land use designations; however, General Plan policies on open space, safety, and conservation make it unlikely that significant changes will occur in the future. Land use and development in the unincorporated areas that SD5 services fall under the Town of Tiburon's sphere of influence and are also unlikely to change in the future. There are no current or anticipated industrial activities within SD5's service area.

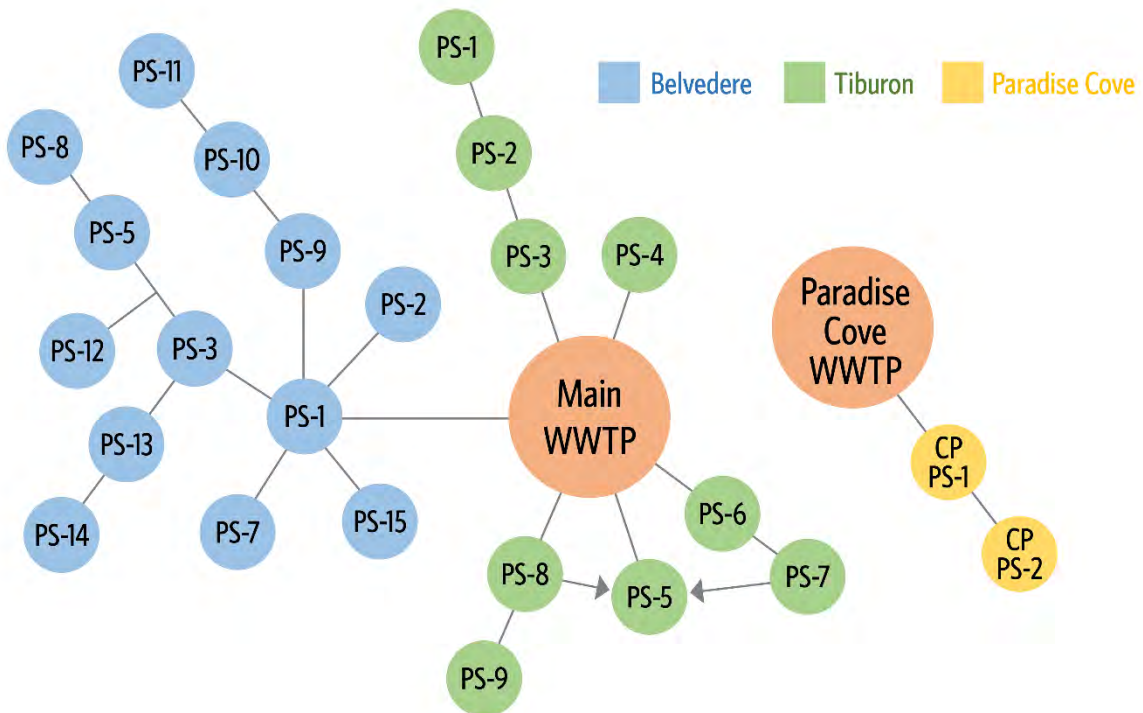
SD5's service area is bordered on its northern side by Richardson Bay Sanitary District and Sanitary District No. 2 and is unlikely to spread farther to the north. The remainder of the service area is surrounded by water. Some parts of the unincorporated areas, mostly within SD5 boundaries, are still on individual septic systems.

## 2.4 Future Conditions

As discussed previously, the population within the service area has stabilized and significant future increases are not anticipated. Land use changes and additional build-out development is unlikely because of stringent building and planning requirements. Therefore, most of the current service area is expected to remain unchanged into the future. However, SD5 will likely continue to incorporate the individual residences that are currently on stand-alone septic systems and development projects in the eastern and northern unincorporated areas as the individual septic systems fail or the properties get developed. Currently another 25 to 50 connections are expected between residential conversions and new development. In addition, the San Francisco State Estuary and Ocean Science Center is connected to SD5 collection system in this area through a special outside service agreement. This property has potential for significant development and increased wastewater flows. These impacts may be able to be accommodated with the existing infrastructure, but additional expansion and improvements could be required in the future. Studies or assessments have not currently been completed and are not part of the scope of this Master Plan as they are typically performed during the property development process.

### 3.0 Existing System Description

SD5 collection system infrastructure is divided into two systems as shown in Figure 6: (1) the Main Treatment Plant collection system, which services all of the City of Belvedere and the southeastern and central portion of the Tiburon peninsula and (2) the Paradise Cove collection system, which services the northern portion of the Tiburon peninsula along the coast. In these two systems, SD5 manages about 30 miles of gravity pipelines, which include 772 manholes, 98 rod holes, and 19 cleanouts (Figure 7). Where gravity flow is not viable, SD5 pumps wastewater to its treatment plants through 24 lift stations and about 4.5 miles of force mains. Each of these systems is described in more detail in the following paragraphs. Information provided is based on SD5s geographic information system (GIS) database (SD5, 2020a).



**Figure 6. SD5 collection system schematic. Tiburon PS-7 and PS-8 flows can be diverted to PS-5 during non-normal flows scenarios.**

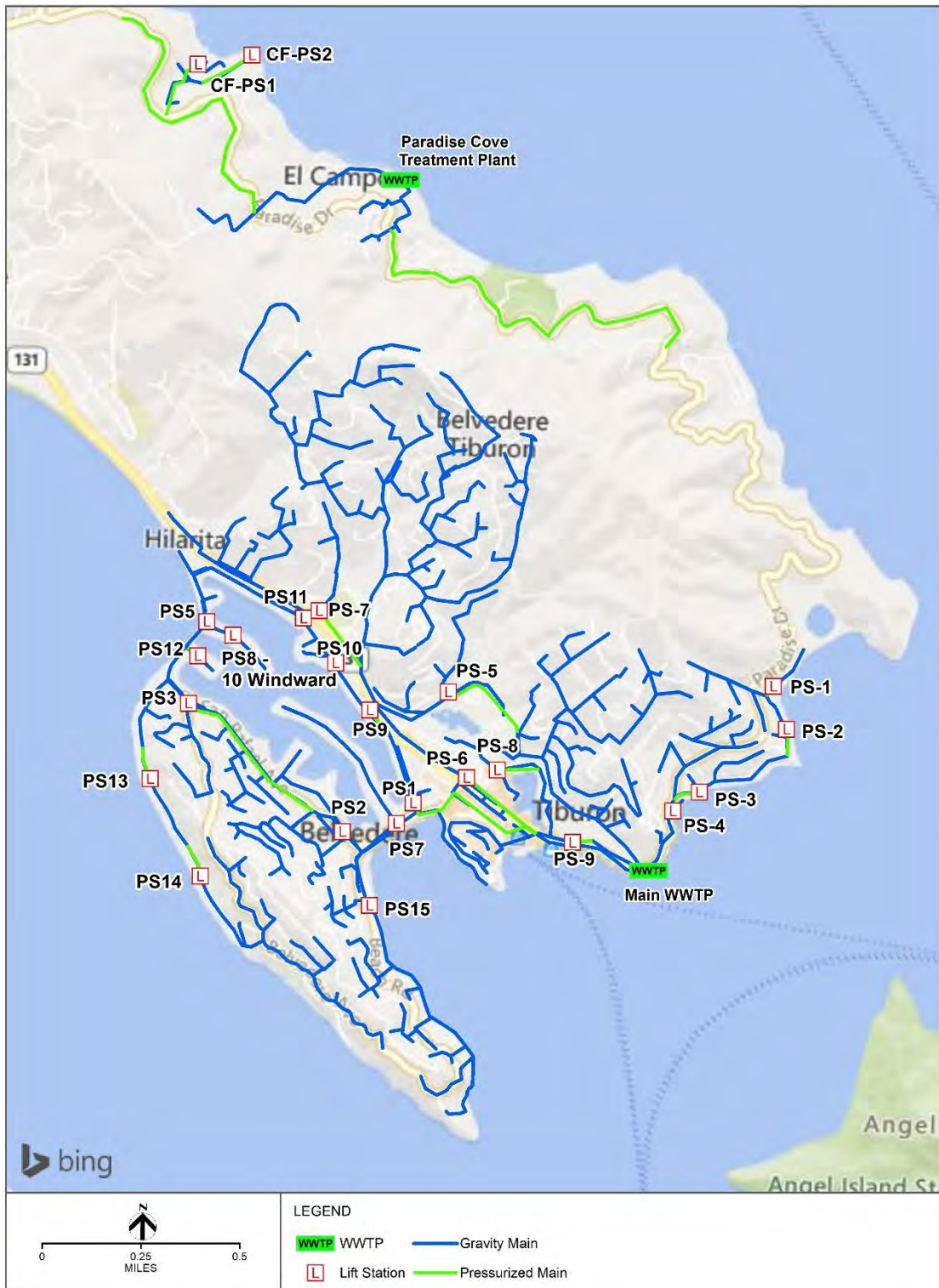


Figure 7. District 5 collection system



### 3.1 Collection System Gravity Pipelines

The collection system gravity pipelines consist of various diameters and materials installed at various times since the 1940's. Fifty-seven percent of the systems is comprised of 6-inch diameter vitrified clay pipe; pipe diameters range from 4 inches to 18 inches and the remaining portion of the system is comprised of pipes made from a variety of materials. Pipeline sizes are shown in Table 5, and material characteristics are provided in Table 6. The system has been constructed over the past 70 years based on the data provided in the GIS. System installation data are shown in Table 7. Almost 80 percent of the collection system pipes are over 50 years old, as shown in Figure 8.

**Table 5. Pipe diameters and lengths in SD5's service areas**

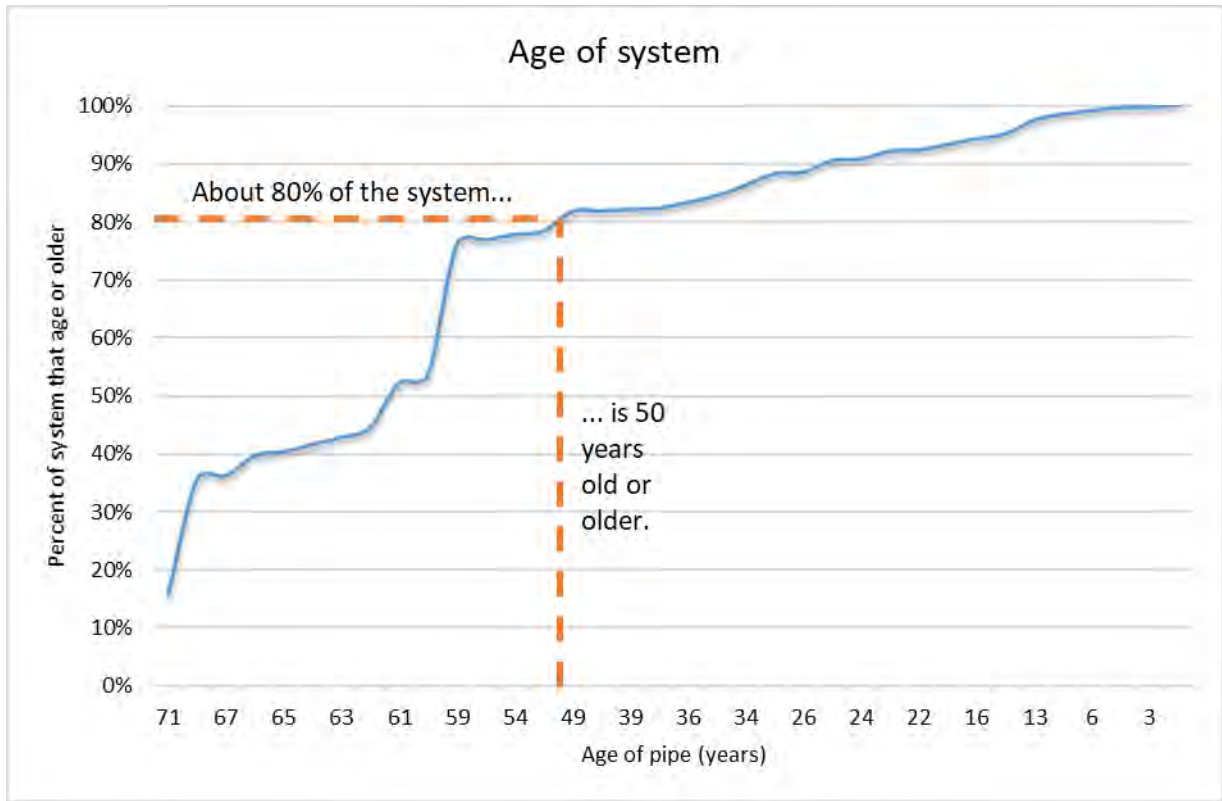
Diameter (in.)	Belvedere (mi.)	Tiburon (mi.)	Paradise Cove (mi.)	Grand Total (mi.)	Percent of length
4	0.5	0.1	0.0	0.6	2%
5	0.0	0.0	0.0	0.0	0%
6	8.6	14.8	1.4	24.8	82%
8	1.7	1.2	0.1	3.0	10%
10	0.2	0.2	0.0	0.4	1%
12	0.1	0.6	0.0	0.7	2%
14	0.0	0.0	0.0	0.0	0%
15	0.2	0.2	0.0	0.4	1%
18	0.0	0.3	0.0	0.3	1%
Unknown	0.1	0.0	0.0	0.1	0%
<b>Grand total</b>	<b>11.5</b>	<b>17.3</b>	<b>1.5</b>	<b>30.3</b>	<b>100%</b>

**Table 6. Summary of collection system pipe material**

Material	Belvedere (mi.)	Tiburon (mi.)	Paradise Cove (mi.)	Grand Total (mi.)	Percent of length
Asbestos Cement	0.1	0.1	0.4	0.6	2%
Cast Iron	0.2	0.0	0.0	0.2	1%
Corrugated Metal Pipe	0.0	0.0	0.0	0.0	0%
Corrugated High Density Polyethylene Pipe	0.4	1.0	0.0	1.4	4%
Orangeburg Fiber	0.0	0.1	0.0	0.1	0%
Polyethylene	2.5	2.0	0.0	4.5	15%
Polypropylene	0.0	0.1	0.0	0.1	0%
Polyvinyl Chloride	0.5	0.9	0.9	2.3	8%
Transite	0.0	0.0	0.0	0.0	0%
Vitrified Clay Pipe	7.7	13.1	0.2	21.0	69%
Unknown	0.1	0.0	0.0	0.1	0%
<b>Grand Total</b>	<b>11.5</b>	<b>17.3</b>	<b>1.5</b>	<b>30.3</b>	<b>100%</b>

**Table 7. Installation decade of collection system pipes**

Installation decade	Belvedere (mi.)	Tiburon (mi.)	Paradise Cove (mi.)	Grand Total (mi.)	Percent of length
Unknown	0.5	0.1	0.2	0.8	3%
1950-1959	8.3	4.1	0.2	12.6	42%
1960-1969	1.4	8.7	0.0	10.1	33%
1970-1979	0.0	1.0	0.3	1.3	4%
1980-1989	0.0	1.1	0.2	1.3	4%
1990-1999	0.9	0.4	0.6	1.9	6%
2000-2009	0.4	1.5	0.0	1.9	6%
2010-2019	0.0	0.4	0.0	0.4	1%
<b>Grand Total</b>	<b>11.5</b>	<b>17.3</b>	<b>1.5</b>	<b>30.3</b>	<b>100%</b>



**Figure 8. Age as a percentage of collection system pipes**

Since the previous collection system assessment, SD5 has replaced or rehabilitated 2.2 miles of gravity main in its service area. The District maintains a regular gravity main cleaning program and purchased new rodder and vactor equipment in 2020 to increase sewer main cleaning and maintenance performance.

### 3.2 Force Mains

There are about 4.8 miles of force main throughout the collection system. The Tiburon and Belvedere service areas contain about 2.6 miles and the Paradise Cove service area has about 2.3 miles. Force main sizes are shown in Table 8 and force main materials are provided in Table 9.

**Table 8. Force mains by diameter**

Diameter	Belvedere (mi.)	Tiburon (mi.)	Paradise Cove (mi.)	Grand Total
4	0.3	0.2	1.2	1.6
6	0.1	0.3	1.1	1.6
8	0.4	0.5	-	0.8
10	0.4	0.1	-	0.4
Unknown	-	0.4	-	0.4
<b>Grand Total</b>	<b>1.2</b>	<b>1.4</b>	<b>2.3</b>	<b>4.8</b>

**Table 9. Force mains by material**

Material	Belvedere (mi.)	Tiburon (mi.)	Paradise Cove (mi.)	Grand Total
Asbestos cement	0.6	0.2	-	0.8
Cast iron	0.5	0.6	-	1.1
Polyethylene	0.1	0.4	2.0	2.4
Polyvinyl chloride	0.1	0.1	0.1	0.3
Steel pipe	-	0.0	-	0.0
Clay Pipe	0.0	-	0.2	0.2
<b>Grand total</b>	<b>1.2</b>	<b>1.4</b>	<b>2.3</b>	<b>4.8</b>

### 3.3 Lift Stations

SD5 operates 24 lift stations that convey wastewater flow from the collection system to the treatment plants. These lift stations and their known characteristics are provided in Table 10 and their locations are shown in Figure 9. Overall lift station capacities and total dynamic head (TDH), which are typical attributes to describe lift stations, were not available, so other key characteristics are shown. The Tiburon service area has nine lift stations that pump wastewater to the Main Treatment Plant. In the Belvedere service area, SD5 operates 13 lift stations that also convey wastewater into the Main Treatment Plant. The Paradise Cove treatment plant receives wastewater from the two Seafirth lift stations. Each of these service areas operate independently of each other.

SD5 has an ongoing pump replacement program to replace lift station pumps that have reached the end of their useful life. Pumps are replaced on approximately 15-year intervals. The District has also recently upgraded most of the electrical systems, installed generators on raised pads and purchased portable generators to supply as-needed emergency backup power and to make the system more resilient to sea level rise. The raised electrical panels and generators at Belvedere PS-3, and Tiburon PS-5, PS-6, and PS-7 are likely to keep these components away from the effects of rising sea level throughout their service life for the near-term and medium-term (i.e. to 2050). To protect against long-term sea level rise as defined in the Marine Shoreline Sea Level Rise Vulnerability Assessment (BVB Consulting LLC, 2017),

these components should be raised again when they are replaced. The predicted effects of sea level rise are discussed in Section 4.2.12.

All of the lift stations except for Tiburon PS-1 contain multiple pumps to achieve pumping capacity and for redundancy. These pumps generally range from 3 hp to 5 horsepower (hp), however Tiburon PS-5 and Belvedere PS-1 have larger pumps as they convey water from about 25 percent and 37 percent of the collection system mains in the service area (by linear miles) respectively.

**Table 10. Summary of District lift stations**

Service Area	Lift station number	Lift station location	Number of pumps	Largest motor (hp)	Collection system serviced (mi of main)	Collection of system serviced (percentage of main)
Tiburon	PS-1	Mar E St. near Mar E Dr.	1	3	0.1	1%
Tiburon	PS-2	Mar E St. near Agreste Way	2	3	0.7	6%
Tiburon	PS-3	Paradise Dr. and Solano St.	2	5	1.2	10%
Tiburon	PS-4	Paradise Dr. near Lyford's Tower	2	5	0	0%
Tiburon	PS-5	Mar W St.	2	60	7.7	62%
Tiburon	PS-6	Tiburon Blvd. and Beach Rd.	2	5	2.3	19%
Tiburon	PS-7	Tiburon Blvd near Ned's Way	2	5	1.6	13%
Tiburon	PS-8	Beach Rd. & Lagoon Vista Rd.	2	3	1.2	10%
Tiburon	PS-9	Paradise Dr. near Shoreline Park	2	5	0.8	6%
Belvedere	PS-1	Cove Rd. and Barn Rd.	2	10/15	11.1	100%
Belvedere	PS-2	San Rafael Ave. and Teal Rd.	2	3	5.1	13%
Belvedere	PS-3	San Rafael Ave. and Golden Gate Ave.	3	5	3.7	33%
Belvedere	PS-5	San Rafael Ave and Windward Rd.	2	5	0.6	5%
Belvedere	PS-7	Peninsula Rd. and Beach Rd.	2	3	7.3	4 %
Belvedere	PS-8	Windward Rd.	2	3	0.1	1%
Belvedere	PS-9	Lagoon Rd. (south)	2	3	0.9	4%
Belvedere	PS-10	Lagoon Rd. near Maybridge Rd.	2	3	0.4	4%
Belvedere	PS-11	Lagoon Rd. (north)	2	3	0.2	2%
Belvedere	PS-12	San Rafael Ave. & Edgewater Rd.	2	3	0.1	1%
Belvedere	PS-13	West Shore Rd. (north)	2	3	1.8	16%
Belvedere	PS-14	West Shore Rd (south)	2	3	1.6	14%
Belvedere	PS-15	Beach Rd. near Embarcadero Dr.	2	3	1.8	16%
Seafirth	CF-PS1	Seafirth Pl.	2	25	0.3	11%
Seafirth	CF-PS2	Seafirth Rd.	2	3	0.1	7%

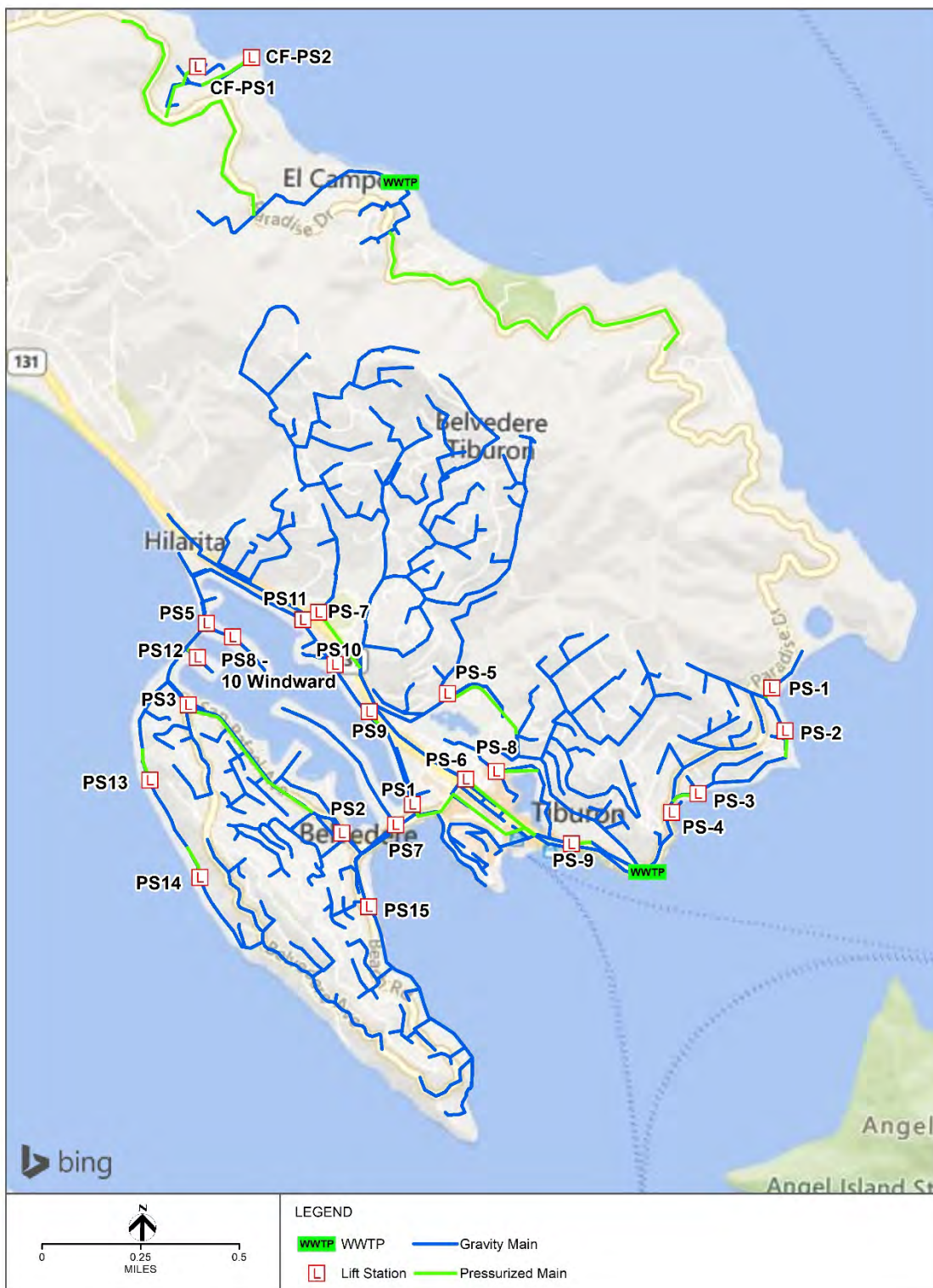


Figure 9. Approximate locations of Tiburon and Belvedere lift stations

A schematic of the lift stations and how they pump water to the treatment plants is shown on Figure 6. Tiburon lift stations PS-3, PS-5, PS-6, and PS-8 are main collection points in the Tiburon service areas, receiving all wastewater from other lift stations and the remaining parts of the collection system (Table 10). In the Belvedere service area, all flows are received at PS-1, which pumps directly to the Main treatment plant. Other important Belvedere lift stations include PS-2, PS-3, and PS-7 which collect wastewater from 13 percent, 33 percent, and 4 percent of SD5's system by miles respectively.

## 4.0 Facility and Infrastructure Assessment

An assessment of SD5's collection system infrastructure was performed to identify repair, replacement, and rehabilitation actions that will help SD5 continue to provide reliable wastewater collection and conveyance and meet customer and stakeholder expectations. The following activities were performed as part of this planning effort:

- Condition assessment of the gravity mains using existing CCTV data (SD5 2020a), collected over the last 15 years to identify and prioritize structural improvements to the gravity mains and recommendations for future CCTV inspections
- Analysis of the 2010 Flow Monitoring Study (E2 Consulting Engineers Inc., 2011) results to determine recommendations to reduce I&I in selected drainage basins
- Evaluation of the Marin Shoreline Sea Level Rise Vulnerability Assessment report (BVB Consulting LLC, 2017) (<https://www.marinwatersheds.org/sites/default/files/2019-04/BAYWAVE%20final.pdf>) to assess the potential impact and provide recommendations to mitigate future SLR within the SD5's services area
- Visual inspection of SD5's 24 lift stations to develop capital improvement recommendations
- Evaluation of odor control issues occurring at some of the lift stations and recommendations for mitigation

This section describes how these analyses were conducted and the recommended actions identified.

### 4.1 Condition Assessment of Gravity Mains

The available CCTV inspection information was completed using the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) inspection standard for coding defects observed. NASSCO PACP is the North American standard for pipeline defect identification and assessment, which provides standard codes for conditions and defects observed through televised pipe inspection (i.e., CCTV). Approximately 85 percent of the system was inspected. SD5 has used these data to guide its gravity main rehabilitation program and repair many of the defective pipes. Since 2006, about 20,500 linear feet (LF) of pipe have been replaced or rehabilitated and SD5 has added more than 200 additional inspections to its database. These data have been used as the basis for the new assessment.

The assessment was performed using InfoAsset Planner from Innovyze. The software uses readily available sewer system data extracted from SD5's GIS database, applies risk modeling to calculate a relative risk score for each pipe, and identifies rehabilitation and/or inspection recommendations based on inspection data, pipe characteristics, and spatial analysis.

The risk model (i.e., InfoAsset Planner) considers two major factors:

- Likelihood of failure (LoF): a numerical score related to the condition of the pipe and a determination of how soon it may fail, and
- Consequence of failure (CoF): a numerical score that quantifies the impact on SD5 and the community if the pipe does fail.

Both the LoF and CoF scores are a product of calculation using additional scoring criteria. These criteria and how they are applied are described in Section 4.1.3. The LoF and CoF scores are then added together to produce the relative risk score for the pipe. This relative risk score is used to prioritize rehabilitation and reinspection actions.



InfoAsset Planner also processes each pipe through a rehabilitation decision support model to determine appropriate actions based on pipe characteristics. This model, which is based on SD5’s criteria (described in Section 4.1.4), uses a decision tree to determine the most appropriate action and assigns it to each respective pipe. The end result is a rehabilitation or reinspection recommendation for every pipe based on its unique characteristics and risk profile. The model also applies planning-level cost factors to develop estimated costs, which can then be used as input into a CIP. The outcomes of these models have been verified through workshops and discussions with SD5 to make sure that the actions assigned are appropriate.

The remainder of this section describes the details the data used and the assessment itself. The findings of the assessment are provided in Section 4.1.5. For the assessment details, please refer to the following:

- Summary of data from the previous inspection: Section 4.1.1
- Characteristics of the inspection results: Section 4.1.2
- Development of the risk model formula and factors used: Section 4.1.3
- Discussion of the rehabilitation decision support analysis: Section 4.1.4

#### 4.1.1 Previous Inspection

The InfoAsset Planner analysis was performed using sewer and inspection data provided by SD5, as well as other published local and regional data sources. The provided data were reviewed, processed, and mapped as InfoAsset Planner facility types. GIS data were provided in geodatabase format. Two geodatabase files, FacilityBelvedere.mdb and FacilityTiburon.mdb, were copied and converted into an InfoAsset Planner database. By using the existing database, all of the required information could be provided from SD5’s GIS data fields and feature classes to perform the InfoAsset Planner analysis. The GIS feature classes representing the sewer mains and how they were assigned in InfoAsset Planner’s Facility and Asset Type Manager Tool are shown in Table 11.

**Table 11. GIS data – feature classes**

Feature class	Source	Application
SS_LINK	FacilityBelvedere.mdb	InfoAsset Planner Gravity Main
SS_LINK	FacilityTiburon.mdb	InfoAsset Planner Gravity Main

The sewer main feature class in both of these geodatabases contained both force mains and gravity mains. Table 12 summarizes the sanitary sewer collection system pipe type breakdown. For the purposes of this facility assessment, the force mains were removed from the analysis.

**Table 12. GIS data – gravity main breakdown**

Area	Type	Count	Total length (mi)
Belvedere	Force Main	17	1.2
	Gravity Main	337	11.4
Tiburon	Force Main	21	3.7
	Gravity Main	548	18.9
Total	Force Main	38	4.9
	Gravity Main	885	30.3

The previous gravity main CCTV inspection data were also provided in the “FacilityBelvedere.mdb” and “FacilityTiburon.mdb” geodatabases. In both databases, the “PACP\_Inspections” table contains the general CCTV inspection data and the “PACP\_Conditions” table contains the defect data.

Table 13 shows the number of records provided in each geodatabase. Of the total 1,104 records, 1,034 of them could be imported into InfoAsset Planner. The 80 records that were not imported into InfoAsset Planner failed to import because of a geocoding mapping failure. The inspection’s Pipe Segment Reference and Upstream Manhole and Downstream Manhole references do not match the pipe data and therefore could not be used.

**Table 13. CCTV inspection data summary**

Source	Source CCTV inspections	Imported CCTV inspections
FacilityBelvedere.mdb	416	378
FacilityTiburon.mdb	688	656
<b>Total</b>	<b>1,104</b>	<b>1,034</b>

The 1,034 imported CCTV inspections were successfully linked to 795 gravity mains with a unique CCTV inspection, as shown in Table 14. Roughly 90 percent of the gravity main system has been inspected. Only 90 of the 885 gravity main segments have not been inspected since 2004. These mains will be recommended for CCTV inspection during the modeling and scheduled based on risk score.

**Table 14. Gravity mains with CCTV data**

Area	Type	Total gravity mains	Gravity mains w/ CCTV	Percent CCTV
Belvedere	Gravity main	337	285	85%
Tiburon	Gravity main	548	510	93%
<b>Total</b>		<b>885</b>	<b>795</b>	<b>90%</b>

Table 15 shows the number of inspections completed each year. Only the most recent inspection for any given pipe is counted. Most of the CCTV inspections were completed in 2004 and 2005 as part of the comprehensive Sewer System Evaluation by Harris & Associates (Harris and Associates, 2005).

**Table 15. Most recent CCTV inspection**

Most recent inspection year	Count of gravity mains
Not Inspected	90
2004	198
2005	387
2006	1
2008	22
2009	8
2010	53
2011	67
2013	2
2014	37
2015	2
2017	13
2018	3
2019	2
<b>Grand total</b>	<b>885</b>

#### 4.1.2 Characterization of Existing CCTV Findings

A review of the existing CCTV findings was performed to understand the primary issues found during the CCTV inspections. These findings were not verified against the actual CCTV videos as part of this study. It is assumed that the coding provided by SD5 is accurate and complete. A list of the top 10 structural or operational (O&M) PACP defects and the number of times that they occur in the data are shown in Table 16. This indicates that the primary defects found in the gravity main system are roots, sags, joint offsets, cracks, and fractures. The defect codes were used to develop the decision logic to identify rehabilitation and reinspection recommendations.

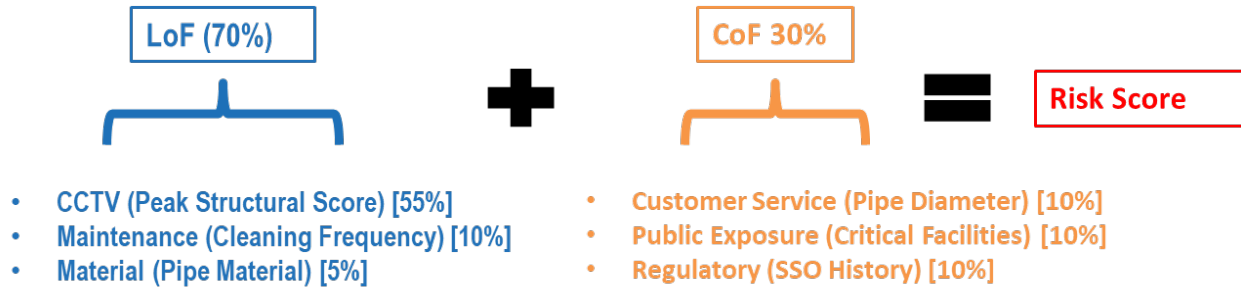
**Table 16. PACP defect code summary for SD5's CCTV database**

PACP defect code	Description	Count
RFJ	Roots fine joint	1842
MWLS	Sag	453
RMJ	Roots medium joint	406
JOM	Joint offset medium	372
CL	Longitudinal crack	288
CC	Circumferential crack	278
FC	Circumferential fracture	153
FL	Longitudinal fracture	123
JOL	Joint offset large	89
RBJ	Root ball joint	79

#### 4.1.3 Risk Model Development

Risk is the combination of an asset's LoF and CoF. It is a numerical score that gets calculated for each asset to quantify the assets relative risk. Both the LoF and CoF components are based on other factors used for scoring. To develop a risk model, it is critical to understand all of the LoF and CoF factors that contribute to risk. Risk scoring was developed and reviewed with SD5 both graphically and spatially on a map, to enable District staff to understand the model results and determine if it makes sense based on what has been experienced in the field. This understanding of the risk model will help SD5 evaluate and communicate the tradeoffs of various investment options and to gain consensus amongst staff, stakeholders, and decision-makers during the capital improvement planning process.

The risk score is calculated as the weighted summation of the LoF and CoF values. The formula used is shown in Figure 10. For each pipe, numerical values assigned for each of the CoF and LoF categories are multiplied by the weighting factor shown in parentheses. The LoF scores are summed together, the CoF scores are summed together, and the total values for each are added together to obtain the final risk score. The LoF represents the majority of the risk score (70 percent) to identify pipes that can be rehabilitated to drive down the risk. In other words, if more emphasis is placed on CoF values, pipes that are in good condition that have a high CoF (e.g., large pipes next to schools or hospitals with no structural problems) may consistently show higher risk scores than pipes that are more likely to fail (e.g., smaller-diameter pipes with structural problems that could cause a sewer system overflow [SSO]).



**Figure 10. Gravity main risk formula**

The components and the scoring for the CoF and LoF values are described below.

**4.1.3.1 Consequences of Failure**

CoF refers to the relative magnitude of the impact that the failure of a gravity main would have on the system or the community. For example, pipes that potentially produce larger spills or are close to schools will likely have a greater consequence if they fail compared to a smaller pipe that services a small cul-de-sac. The consequences evaluated for this analysis consider customer service, public exposure, and regulatory components.

The CoF criteria makes up 30 percent of the overall Risk Score and the breakdown of the weighting for each criterion is shown in Table 17 and discussed below.

**Table 17. CoF criteria weighting**

CoF criterion	Risk weighting
Customer Service (diameter)	10%
Public Exposure (critical facilities)	10%
Regulatory (SSO category)	10%

**4.1.3.2 Customer Service**

Customer service represents the relative impact on customers if a given pipe experiences an SSO. In general, larger diameter sewer pipes that have an SSO will potentially cause larger spills, in busier areas of the community and will be more difficult to clean up and repair. Therefore, larger diameter pipes will receive a higher score than smaller diameter pipes. This criterion uses diameter data from the SS\_Link feature class with criteria and scoring developed by HDR for use in the risk analysis. Table 18 shows how this CoF was created and scored.

**Table 18. CoF1: customer service**

Category	Data source	Target field	Criteria	Score
Customer Service	SS_Link Feature Class	Diameter	> 15"	10
			12" < x <= 15"	9
			10" < x <= 12"	7
			8" < x <= 10"	6
			6" < x <= 8" or null	5
			4" < x <= 6"	4
			<= 4"	2

4.1.3.3 Public Exposure

Public Exposure represents the potential impact on critical facilities around SD5 should a given sewer pipe experience an SSO. Critical facilities represent locations where an SSO may have a greater safety impact on the community. This category uses the distance from the pipe to the closest critical facility to assign a score. Proximity to Schools, Fire Stations, and Park data from the various Marin County shapefiles was used and the criteria and scoring developed by HDR for the risk analysis. Table 19 shows how this CoF was created and scored.

**Table 19. CoF2: public exposure**

Category	Data Source	Target Field	Criteria	Score
Public Exposure	Marin County School Shapefile, Marin County Park Shapefile, and Marin County Fire Station Shapefile	School, fire station, park	<= 200'	10
			200' < x <= 500'	7
			500' < x <= 1000'	5
			1000' < x <= 2000' or Null	3
			> 2000'	0

4.1.3.4 Regulatory

The Regulatory category considers previous spill information as an indicator of the size of potential future SSOs. Historically, if a previous spill on a given pipe was large, was difficult to clean up, or reached the storm system it is reasonable to assume that future spills could have the same impact. This category uses the SSO category criteria provided by the California State Water Resources Control Board and generally applies as defined in SD5’s Sewer System Management Plan (SSMP)[SD5, 2018a]:

- Category 1: any spill that reaches a surface water body or the storm system and is not fully recovered and disposed of properly
- Category 2: spills of over 1000 gallons that do not reach a surface water body or the storm system that are not fully recovered and disposed of properly
- Category 3: all other discharges from the sanitary sewer system

The higher the category is, the greater the score is for this criterion. The analysis for SD5 uses the designated SSO category from the SSO data reported to the California Integrated Water Quality System (CIWQS) website with criteria and scoring developed by HDR for use in the risk analysis. Table 20 shows how this consequence of failure was created and scored.

**Table 20. CoF3: regulatory**

Category	Data source	Target field	Criteria	Score
Regulatory	CIWQS	SSO Category	Category 1	10
			Category 2	8
			Category 3	6
			No historical SSOs	0

4.1.3.5 Likelihoods of Failure

LoF represents an estimate of how soon a given sewer main may fail based on evidence of its condition, its maintenance requirements, and expected useful life. For this analysis, failure represents the likelihood that a sewer main could cause an SSO. Typically, sewer pipes that are likely to fail sooner should be rehabilitated or replaced sooner than pipes that do not show evidence of potential failure.

A higher importance has been placed on the LoF score than the CoF because of the high confidence in SD5’s condition data. Therefore, it was determined that the LoF criteria would make up 70 percent of the overall risk score. The LoF criterion makes up 70 percent of the overall risk score and the breakdown of the weighting for each criterion is shown in Table 21. Each of these criteria are discussed below.

**Table 21. LoF criteria weighting**

LoF criterion	Risk weighting
CCTV observed defects (peak structural defect score)	55%
Maintenance (cleaning frequency)	10%
Material (pipe material)	5%

4.1.3.6 CCTV-Observed Defects

CCTV-observed defects uses the peak structural defect score assigned to each sewer main from the most recent PACP CCTV inspection. Each of the defect scores is based on condition grades assigned using NASSCO PACP methodology. These grades range from 1 to 5, with 5 being the most severe. The peak structural defect score represents the highest-grade structural defect observed on the pipe during the inspection. For this analysis, the higher the peak structural defect score for a given sewer pipe, the higher the score is for this LoF category. Table 22 shows how these scores were assigned.

**Table 22. LoF1: CCTV**

Category	Data source	Target field	Criterion	Score
CCTV	PACP CCTV inspections	Peak structural defect score	Grade 5	10
			Grade 4	8
			Grade 3 or no CCTV	6
			Grade 2	4
			Grade 1	2
			No structural defects	0

4.1.3.7 Maintenance

The Maintenance category uses SD5’s cleaning history for a given pipe to identify pipes that require higher maintenance to prevent SSOs. In general, pipes that require more frequent cleaning tend to more quickly build up conditions that cause blockages and potentially SSOs. In addition, more frequent cleaning can cause more rapid pipe deterioration depending on pipe materials and cleaning techniques. SD5 assigns each sewer pipe to a cleaning frequency and schedule based on how quickly buildup has historically been observed in the pipe and other factors. This analysis uses the current cleaning frequency assigned for each pipe from the GIS data with criteria and scoring developed by HDR. Higher cleaning frequencies have received higher scores for this category. Table 23 shows how this LoF was created and scored.

**Table 23. LoF2: maintenance**

Category	Data source	Target field	Criterion	Score
Maintenance	SS_Link Feature Class	MaintFreq	4 months or more	10
			Semi-annual	8
			Yearly	6
			Two years	4
			None	0

#### 4.1.3.8 Material

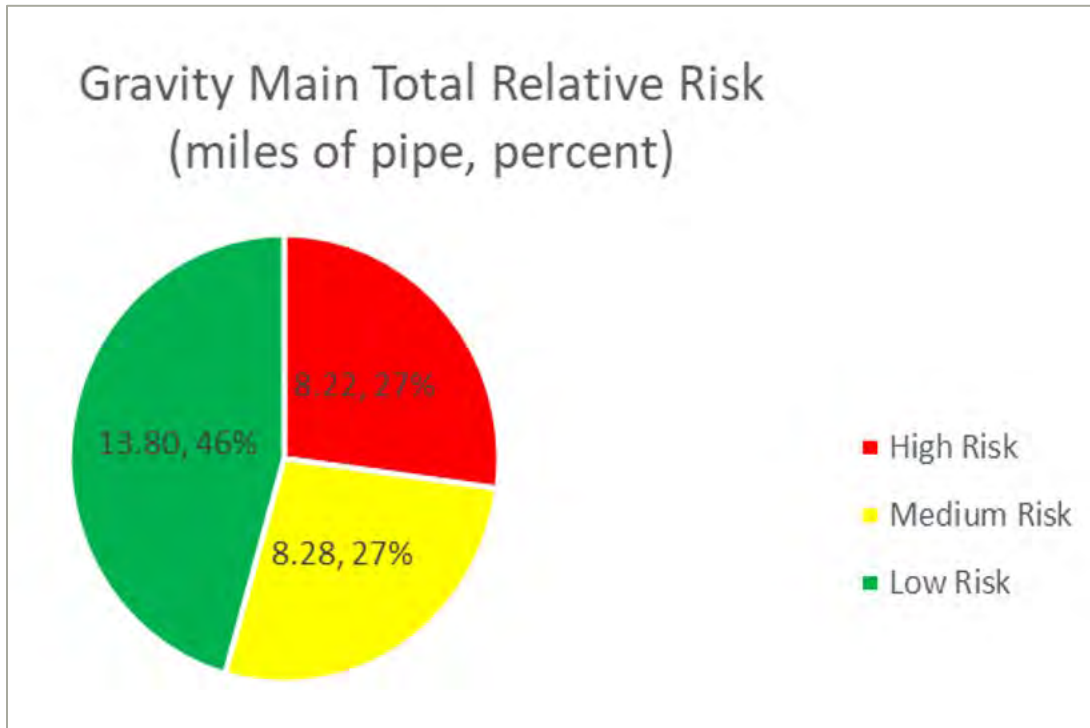
The Material category represents the manufactured characteristics of a given pipe. Some types of pipe are expected to last longer than others before they begin to degrade. Material uses the pipe material information for each pipe from the GIS data with criteria and scoring developed by HDR for use in the Risk analysis. Table 24 shows how this LoF was created and scored.

**Table 24. LoF3: material**

Category	Data source	Target field	Criterion	Score
Maintenance	SS_Link Feature Class	Material	Cast Iron, Concrete, or Fiber (CAS, CMP, or OB)	10
			Clay, Transite, Asbestos, or no value (VCP, CT, TTE, AC, or null)	8
			Polyvinyl chloride (PVC)	5
			Plastic, Polyethylene, or Polypropylene (CPP, PE, PLP, or PP)	2

#### 4.1.3.9 Relative Risk Scoring

The focus of this analysis is assessment and mitigation of risk in order to prevent SSOs. Risk was calculated using the formula shown in Figure 10, above, which yielded a relative risk score for each gravity sewer main. The risk scores are relative to SD5's collection system as a whole, meaning that they are used to determine priorities within the system, not to quantify potential failure. The risk results are shown on the pie chart in Figure 7 which shows the percentage in each category by linear footage. For the gravity pipes in SD5, the risk scores ranged from 5 to 78 out of a total possible score of 100. A risk score of 100 represents the highest possible risk (e.g., the maximum scores for each category assigned to a given pipe). A risk score of 0 represents the lowest possible risk. The risk scores represent a score relative to the calculated risk for other pipes in the system and not an absolute risk score and is a general indication of which pipes should be rehabilitated or replaced first according to the criteria.



**Figure 11. Risk results showing percentage of relative risk categories**

The risk scores have been divided into “high,” “medium,” and “low” categories based on discussions with SD5 and natural cutoff points in some of the risk categories (e.g., structural defects). Approximately eight miles (27 percent) of SD5’s pipes fall into the high category, while almost 14 miles (46 percent) are considered relatively low risk. Figure 12 shows the general risk for each of the gravity sewer mains in SD5. Green gravity mains are considered “low risk” and red gravity mains are considered “high risk.” Appendix A provides a listing of each pipe and its respective LoF, CoF, and total risk scores.

These relative risk scores are used for prioritizing replacement or rehabilitation actions during the capital improvement planning process, which is described in more detail in the sections below.



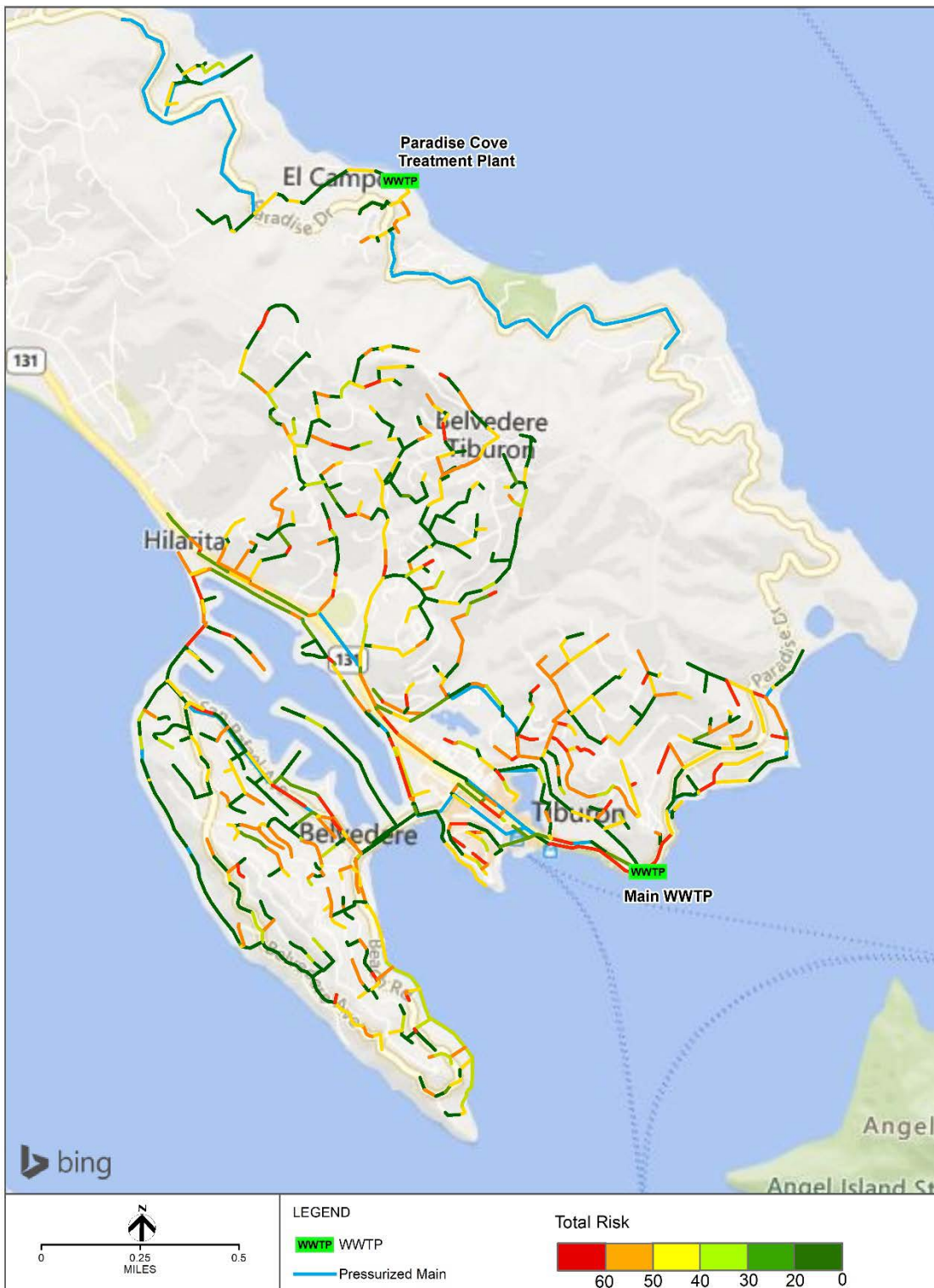


Figure 12. Risk model results

#### 4.1.4 Rehabilitation Decision Support Analysis

This section summarizes the methodology for determining the appropriate rehabilitation recommendation for each gravity main. This was performed by developing a decision support model and rehabilitation plan based on industry experience, input from District and Nute Engineering staff, and the gravity sewer main risk modeling. Once the decision logic and initial rehabilitation plan were generated, a sensitivity analysis was performed to calibrate the model and verify that the actions identified in the model reflect what SD5 would normally do given the information provided.

The model will be provided to SD5 so that it can be updated and maintained by District staff or other consultants who use the Innovyze InfoAsset Planer software. The risk score thresholds that trigger specific risk mitigation actions may be adjusted by SD5 over time to balance budget and level-of-service targets, as additional condition assessment data are gathered, and the program is refined.

##### 4.1.4.1 Rehabilitation Methods

The model is based on a decision tree that uses data developed for each gravity main to determine a rehabilitation or replacement action. The path that a given pipe follows in the model is based on specific data thresholds in the decision logic. A workshop was held with SD5 to review and edit the initial decision logic. The decision logic aggregates the information from the inspections and risk score and provides an automated identification of a primary action to address the identified risks within the gravity mains. The primary action documents the primary risk management action for the gravity mains. The following primary actions were included in the decision logic:

- **Replacement:** complete open-trench replacement of the pipe
- **Pipe bursting:** a trenchless method of sewer construction that uses the path of the existing pipe as a guide for constructing the new pipe
- **Full CIPP lining:** a trenchless construction process that installs a cured-in-place-pipe (CIPP) liner within an existing pipe that repairs structural defects
- **Point repair:** a trenchless process that uses a liner to repair a small section of pipe
- **CCTV inspections:** if no repairs are required, a future-scheduled reinspection of the entire pipe using a CCTV camera

##### 4.1.4.2 Recently Replaced Pipes

One of the first steps in the decision logic is to remove pipes that have their most recent inspection date prior to the date it was replaced. The related CCTV video for these pipes is for the original pipe and do not apply to the replacement pipe. These pipes are considered new and therefore do not need rehabilitation.

There are 69 pipes that have been recently replaced and can be seen in Figure 13.

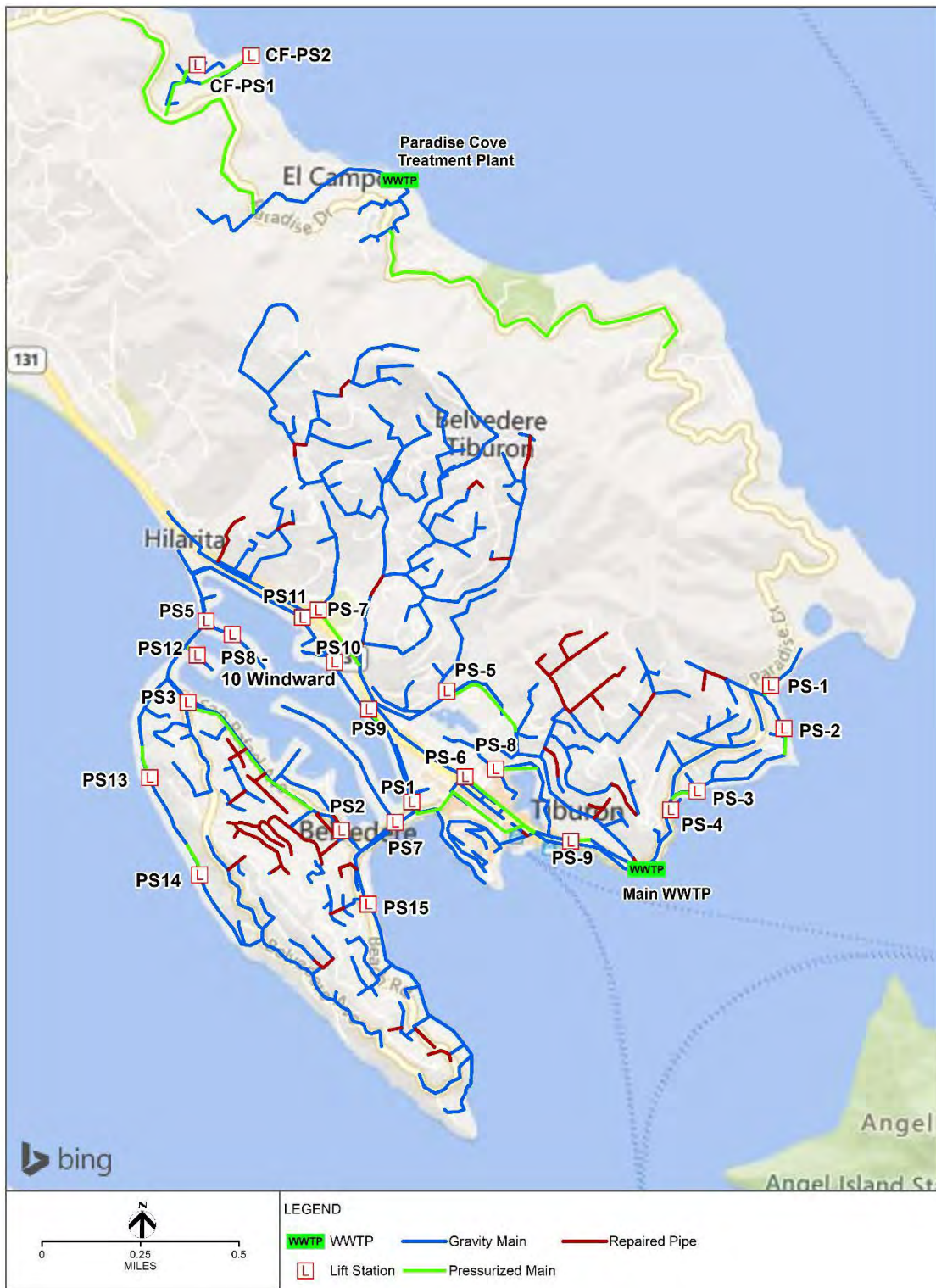


Figure 13. Recently Replaced Pipes

#### 4.1.4.3 Decision Logic Development

The decision logic is modeled in a flow chart that shows the basic planning strategy for identifying defects and the subsequent recommended action. The flow chart for SD5 was first modeled in Microsoft Visio to capture accurate decision points and actions and was then converted into a decision logic algorithm in Innovyze’s InfoAsset Planner software. This enables the software to automate the process of recommending rehabilitation and reinspection actions for each gravity main.

This method provides a transparent, defensible, and repeatable approach that decision makers can use to consistently develop recommended actions and timing for capital planning. The process makes it easy to correlate desired level-of-service goals to justify actions, determine priorities, communicate risk, and identify anticipated costs to stakeholders. The logic is used to develop highly confident and defensible renewal forecasts.

The gravity main rehabilitation decision logic flow chart developed for SD5 is shown in Figure 14. The process starts in the upper left corner of the figure and first identifies if the given pipe has the potential to improve I&I issues identified during the I&I analysis (discussed in detail in Section 4.2), which can be used for additional prioritization if a repair action can help mitigate known areas of I&I. Note that the I&I mitigation potential does not determine a specific rehabilitation method but it can be used as additional background information to determine final priorities during the last stages of capital planning. Therefore, the potential impact is noted for each pipe. Next, if the miscellaneous water level sag (MWLS) is greater than 50 percent, this indicates the presence of one or more sags on the pipe, which is applied as another note for planning purposes (e.g., does not dictate the rehabilitation method). If the pipe does not have any CCTV inspection data, it is routed to be scheduled for an inspection with the priority determined by the pipe relative risk score. If the pipe does contain inspection results and shows at least one structural defect related to rehabilitation, it is routed to the main section of the decision process.

The PACP defects that have been selected for rehabilitation are shown in Table 25.

**Table 25. Significant defects identified in SD5 CCTV inspections**

Defect code	Description	Severity (5 = worst)	Count of occurrences
BVV	Broken void visible	5	28
SRP	Surface reinforcement projecting	5	27
SMWM	Surface missing wall mechanical	5	17
BSV	Broken soil visible	5	11
HVV	Hole void visible	5	10
SMW	Surface damage missing wall	5	9
HSV	Hole soil visible	5	9
XP	Collapsed pipe sewer	5	5
SRC	Surface damage reinforcement cement	5	2
DI	Dropped invert	5	2
OBI	Obstruction intruding through wall	5	1
IG	Infil gusher	5	1
SRVM	Surface reinforcement visible mechanical	5	1
RBB	Roots ball barrel	5	1
MCU	Miscellaneous camera underwater	4	99
JOL	Joint offset large	4	89
RBJ	Roots ball joint	4	79

Defect code	Description	Severity (5 = worst)	Count of occurrences
FM	Fracture multiple	4	68
B	Broken	4	47
JSL	Joint separated large	4	28
IR	Infil runner	4	16
RBL	Roots ball lateral	4	6
RMB	Roots medium barrel	4	5
JAL	Joint angular large	4	3
RPRD	Point repair replacement defective	4	1
RBC	Roots ball connection	4	1
RMJ	Roots medium joint	3	406
JOM	Joint offset medium	3	369
FL	Fracture longitudinal	3	116
JSM	Joint separated medium	3	57
ID	Infil dripper	3	44
JAM	Joint angular medium	3	23
CM	Crack multiple	3	20
SAVC	Surface aggregate visible chemical	3	18
SCP	Surface corrosion metal pipe	3	16
TBD	Tap break-in defective	3	13
RMC	Roots medium connection	3	6
FH2	Fracture longitudinal hinge, 2	3	5
RML	Roots medium lateral	3	5
LFB	Lining feature blistered	3	4
MMM	Missing mortar medium	3	2
SRPM	Surface reinforcement projecting	3	2
FS	Fracture spiral	3	1
SAP	Surface damage aggregate projecting	3	1

Each of the rehabilitation methods that SD5 may perform are shown as colored columns in the flow chart. Depending upon the characteristics of the defect, the configuration of the pipe, the relative risk score, and the repair history on the pipe the type of rehabilitation will be identified. These results can be used to plan capital improvement actions discussed in more detail below.

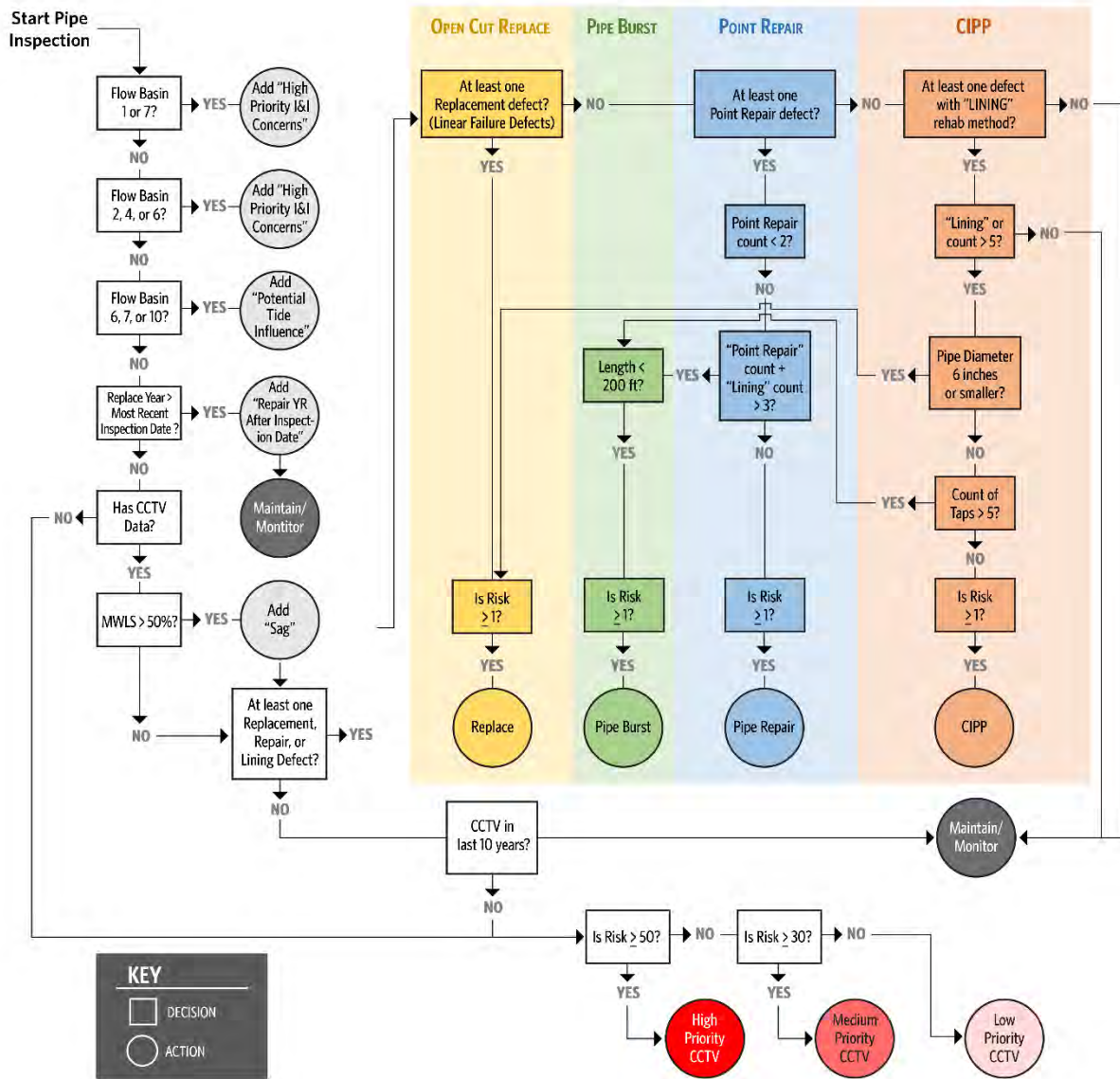


Figure 14. Gravity main decision logic

#### 4.1.5 Assessment and Recommendations

Based on the risk model, decision logic, and rehabilitation unit costs, a rehabilitation or condition assessment recommendation was assigned to each gravity main in the Tiburon and Belvedere systems. A summary of the rehabilitation recommendations is shown in Figure 15. This figure summarizes the results of the different recommended actions showing total estimated cost and length of pipe for each alternative. This view includes all the pipes in the collection system for SD5; however, it is unlikely that all of these actions will need to take place in the next 15 years. SD5 can select the amount of work that is appropriate to do based on the pipe risk scores, available budgets, and consideration of other necessary capital work. The capital planning section of this Master Plan discusses these topics in more detail. A listing of each District gravity main and the recommended rehabilitation action is provided in Appendix B. The cost basis for developing the rehabilitation estimates is provided in Appendix C.

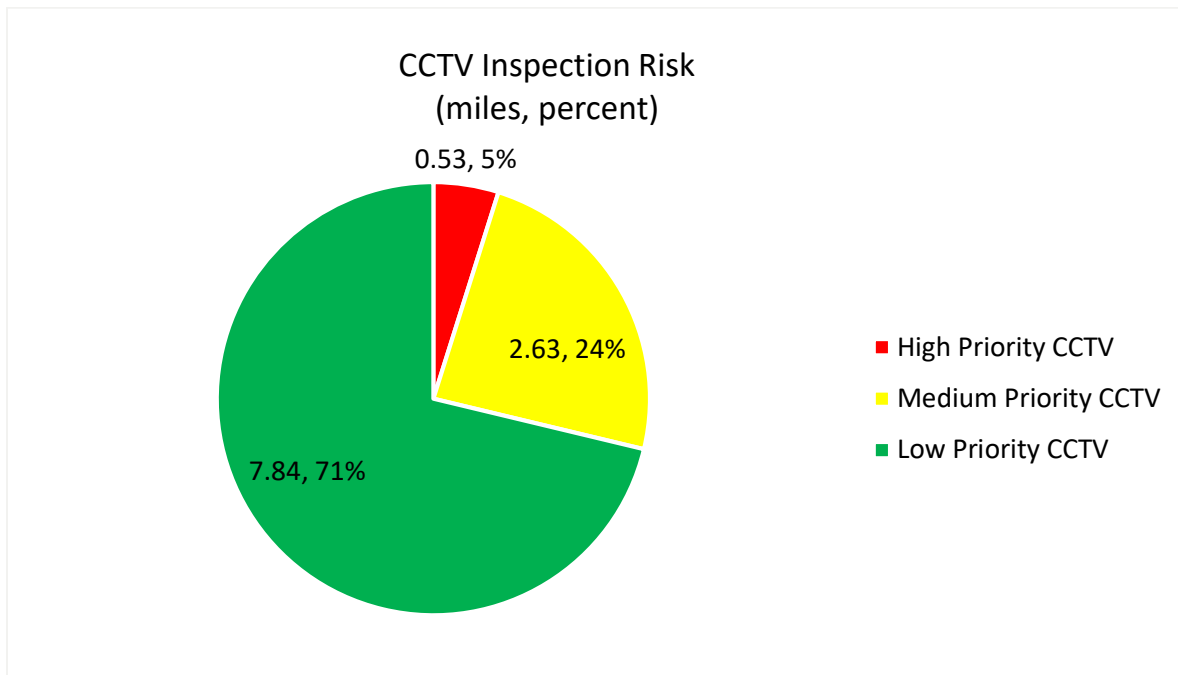
## Collection System Replacement Actions (all risk levels)



**Figure 15. Rehabilitation model results: no risk threshold**

Figure 16 provides a similar summary for all future pipe inspections identified in the model. These inspections are categorized as high, medium, and low priority based on pipe risk scores and the established cutoff values. The cost and total sewer main length is provided for each category, as well as category percentages (shown in the pie chart). Gravity mains are identified for future inspections if they meet one of the following criteria:

- No historical CCTV data
- No structural PACP defects on the most recent CCTV
- Does not meet the required criteria to receive a rehabilitation recommendation



**Figure 16. CCTV model results – no risk threshold**

A breakdown of the previously uninspected gravity mains based on their risk is shown in Table 26. It is recommended that the high-priority uninspected pipes to be inspected as soon as possible.

**Table 26. Uninspected gravity main recommendations**

CCTV recommendations	Count of uninspected pipes
High priority CCTV	10
Medium priority CCTV	79
Low priority CCTV	1
<b>Grand total</b>	<b>90</b>

Based on the risk modeling only a relatively small amount of gravity main has been identified as high priority for reinspection, even though the last inspection for most of the system is over 15 years old. However, it is important for SD5 to determine if additional deterioration has occurred in the lower risk pipes over that time period. In order to verify that these lower-grade issues have not become more urgent repairs, a degradation analysis is recommended. The degradation analysis selects several pipes for another CCTV inspection. By comparing the current CCTV results with the original results, SD5 will be able to determine the amount of degradation that has occurred, which types of defects degrade the fastest, and if there are any additional pipes that require urgent rehabilitation.

#### 4.1.5.1 Rehabilitation

SD5 can use the pipe risk scores to select the highest-risk rehabilitation recommendations that fit within its resource constraints. To demonstrate this, three scenarios are presented here corresponding to different risk levels calculated for each pipe. An overview of the three scenarios is provided in Table 27, below.



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**Table 27. Summary rehabilitation scenarios for collection system pipes**

Scenario number	Risk level	Percentage of system	Total		Replacement		Point repair		Pipe bursting		CIPP	
			Cost (\$ thousands)	Length (mi)	Cost (\$ thousands)	Length (mi)	Cost (\$ thousands)	Length (mi)	Cost (\$ thousands)	Length (mi)	Cost (\$ thousands)	Length (mi)
0	All risk levels	22%	\$8,737	6.6	\$6,849	3.7	\$650	1.7	\$1,145	1.0	\$92	0.3
1	50 or greater	14%	\$5,568	4.3	\$4,140	2.3	\$379	1.0	\$967	0.8	\$81	0.2
2	60 or greater	7%	\$2,755	2.0	\$2,037	1.1	\$153	0.5	\$515	0.4	\$48	0.1
3	70 or greater	3%	\$1,037	0.8	\$628	0.3	\$82	0.3	\$327	0.2	\$0	0.0

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Scenario 0 shows all rehabilitation recommendations regardless of risk. This is shown for comparison purposes. Scenario 1 is the most conservative rehabilitation strategy of the remaining three scenarios. It selects rehabilitation actions on pipes that have a risk level of 50 or greater. It addresses rehabilitation on 15 percent of the system for a total of \$5.9 million. Scenario 2 provides rehabilitation for pipes with a risk score of 60 or greater, or about 7 percent of the system. Total cost for Scenario 2 is \$2.8 million. The highest-risk scenario is Scenario 3, which addresses rehabilitation on pipes with a risk level of 70 or greater. This comprises only 3 percent of the pipes and will cost approximately 1.0 million.

The amount of sewer main rehabilitation and reinspection that SD5 desires to accomplish in the coming years will depend on funding availability, competition with other capital needs, and SD5's strategy on mitigating risk. These are discussed in detail in the Section 5.0 below.

## 4.2 Inflow and Infiltration Analysis

This section describes the I&I analysis of the 2012-2011 flow monitoring study (E2 Consulting Engineers Inc., 2011) and provides a discussion of the potential impacts of sea level rise based on the analysis from the Marin Shoreline Sea Level Rise Vulnerability Assessment report (BVB Consulting LLC, 2017). The results of these analyses have been incorporated into the gravity main rehabilitation decision support analysis described in Section 4.1.4, as well as additional recommendations described in more detail in Sections 4.2.11 and 4.2.12 below. The detailed analysis is described here in Sections 4.2.1 through 4.2.10.

### 4.2.1 Background and Previous Study

I&I is excess water that flows into the collection system from groundwater, stormwater, and other non-sewage sources. I&I causes dilution at the treatment plant, which makes the treatment process less efficient and may even damage some of the treatment processes. Excess flow in the system may cause surcharging and lead to SSOs.

I&I has been recognized as a problem for SD5 and was studied during the 2010–2011 wet season to determine where it might be originating from. A flow monitoring study was performed in selected areas to measure wet weather and dry weather flows for a 3-month period. As part of this Master Plan, HDR was asked to review the report and evaluate the data provided to determine the impact on I&I on the basins monitored and develop recommendations for mitigation. This section summarizes SD5's current system conditions and anticipated future needs from an I&I perspective. Recommendations are provided to help improve the system, inform the capital improvement planning process, and ensure a resilient sewer system for present and future customers.

Infiltration is extraneous flow that enters the sanitary sewer through cracks and holes in sewer pipe below the ground and can take many forms. Infiltration can occur from groundwater when the water table rises above the level of the sewer because of storms or other factors, including rising tidewater. Stormwater can also cause infiltration when rainwater percolates into the ground and enters the sewer through pipe cracks and other structural defects where the sewer is located above the groundwater table. Stormwater infiltration begins during storm events and may continue for several days after the rain event ends.

Inflow occurs where rainwater runs directly into the sewer from other direct connections such as catch basins, street inlets, roof downspouts, yard drains, foundation drains, and manhole lids. Typically, inflow enters the system rapidly during rain events and ceases quickly once the rain event ends. Once located, inflow sources can be disconnected at usually a relatively low cost. Inflow can be recognized by a sharp increase in flow during and immediately after a rain event.

#### 4.2.2 The Impact of I&I

During dry weather, the impact of I&I is usually less of an issue while wet weather conditions produce a much larger problem by introducing stormwater into the system from existing I&I sources. As the wet season progresses, soils become saturated and the groundwater table rises, further magnifying the problem. Available flow capacity for sewage is reduced during storms and during the wet season, which can lead to damaging and costly SSOs when the combined I&I and sewage flows can exceed conveyance capacity, resulting in overflows from low-lying manholes or backups into basements of low-lying homes.

I&I can also impact a treatment plant's ability to treat domestic and industrial wastewater. During periods of high I&I, wastewater treatment processes are forced to process higher flows, which can exceed design capacity and potentially upset the treatment process. As a result, wastewater agencies may also face violation of their regulatory discharge limits because the extraneous flow stress treatment units and processes and degrades their performance.

#### 4.2.3 Inflow and Infiltration Mitigation

Efforts to mitigate I&I vary depending upon the causes. Inflow can be relatively easy to mitigate by locating and disconnecting inappropriate connections to the system (in the case of private sector sources) or repairing or improving the system at the point of inflow (in the case of public sector sources). . Infiltration is more difficult to eliminate because it can potentially travel through any defects in the system and thus may not be eliminated until all the defects are repaired (often including repairs on private sewer laterals).

A key differentiator between infiltration and inflow is that peak wet weather flow can take several days to return to dry weather state if the increased flow is caused by infiltration, while inflow-related flow increase will likely return to dry weather levels within a couple of days of the end of a storm event.

#### 4.2.4 Summary of 2010-2011 Study

SD5 previously conducted a flow monitoring program to measure the magnitude and components of flow that enter into the sewer collection system. The flow monitoring program lasted from December 21, 2010, to March 31, 2011. Flow monitors were installed at the lowest point in 10 sewer basins in the system. In addition, four rain gauges were installed to continuously record rainfall data for the monitoring period. This program was conducted only on the selected basins within SD5's collection system and approximately 50 percent of the system was evaluated as measured by miles of pipe. Figure 17 shows the rain gauge and flow meter locations and Figure 18 shows the basins monitored. It is important to note that, because the I&I study was limited, a significant portion of the collection system was not monitored. The logic for selecting the I&I basins for the study is unknown; however, there may be additional I&I issues in some of the unmonitored low-lying areas where larger-diameter pipe is present. These areas may also contain undetected significant I&I issues.

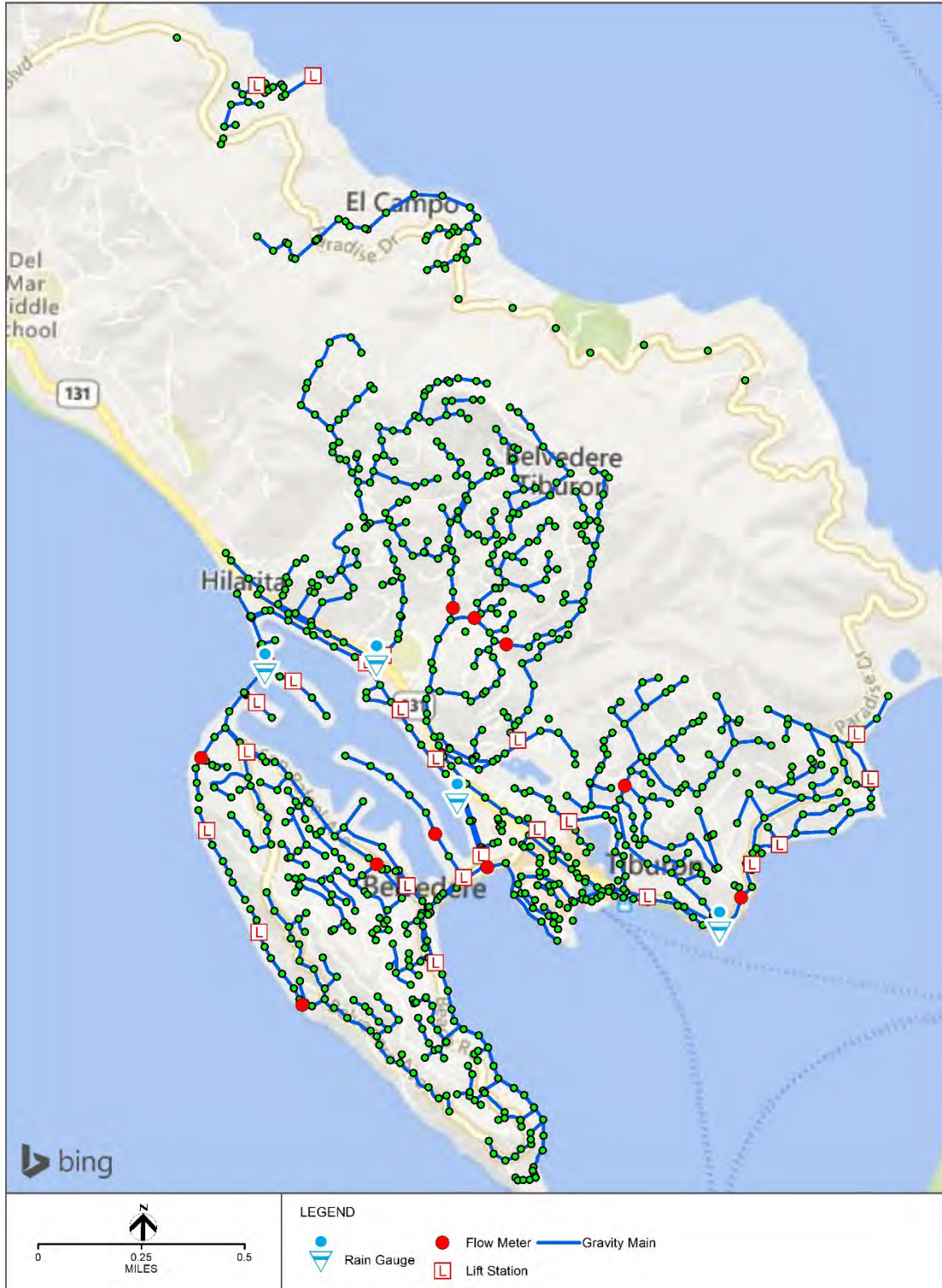


Figure 17. Rain gauge and flow meter locations

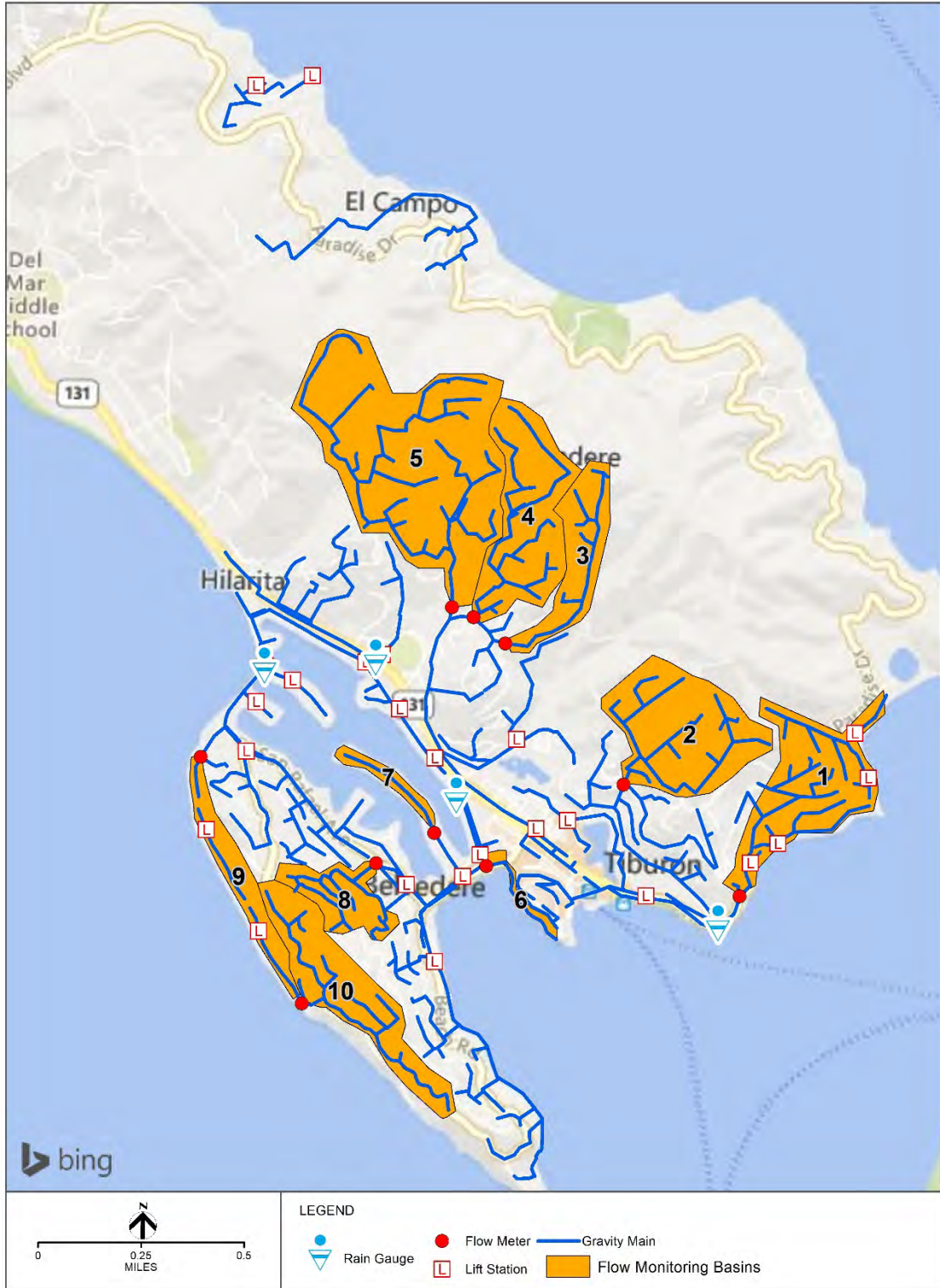


Figure 18. Flow monitoring basins established for the study

During the 93 days of the study, rainfall occurred on 40 of those days totaling 17 inches. The study provided hydrographs for the 10 flow monitors and rainfall data at each of the rain gauges. The study identified four of the basins with high rain-dependent infiltration and inflow (RDI/I), and offered recommendations on additional flow monitoring, smoke testing, and CCTV inspection.

#### 4.2.5 Current evaluation

For this Master Plan HDR analyzed the results of the previous study to further refine the results and identify specific mitigation actions. Although the raw data were unavailable, the hydrographs produced from the work were used as well as the summary tables for each basin in the report. The primary analyses performed included:

- Comparison of the flow monitoring hydrographs to rainfall hyetographs to try to distinguish between inflow and infiltration contributions in each basin
- Comparison of flow monitoring metrics between basins to determine which are most impacted by I&I and to further understand inflow versus infiltration impacts
- Analysis of tide fluctuations during the study period in comparison to the hydrographs to determine if there was evidence of tidal influence on infiltration occurring in the near-shore basins
- Evaluation of the flow monitoring hydrographs to identify unusual flow anomalies not explained by wet weather events and to determine if there are any potential pipe capacity issues

Through these analyses, HDR has provided recommendations for mitigation of I&I in the system as well as actions for further study to better understand how I&I is impacting the system. These analyses have been completed assuming that the data and calculations provided in the original report are accurate and representative of the original study. Analytical quality review of the original analysis or confirmation of calculations has not been performed.

In addition to the evaluation of the previous flow monitoring study, an analysis of the potential impacts of SLR on SD5 were evaluated by reviewing the Tiburon and Belvedere sections of the Marin Shoreline Sea Level Rise Vulnerability Assessment. This report, prepared by the Marin County Department of Public Works in 2017, modeled several SLR scenarios and their impacts around the county. This Master Plan also provides a summary of potential impacts to SD5 based on the scenarios modeled and offers recommendations for mitigation.

#### 4.2.6 Flow Basin Data Analysis

The following definitions are used for this analysis:

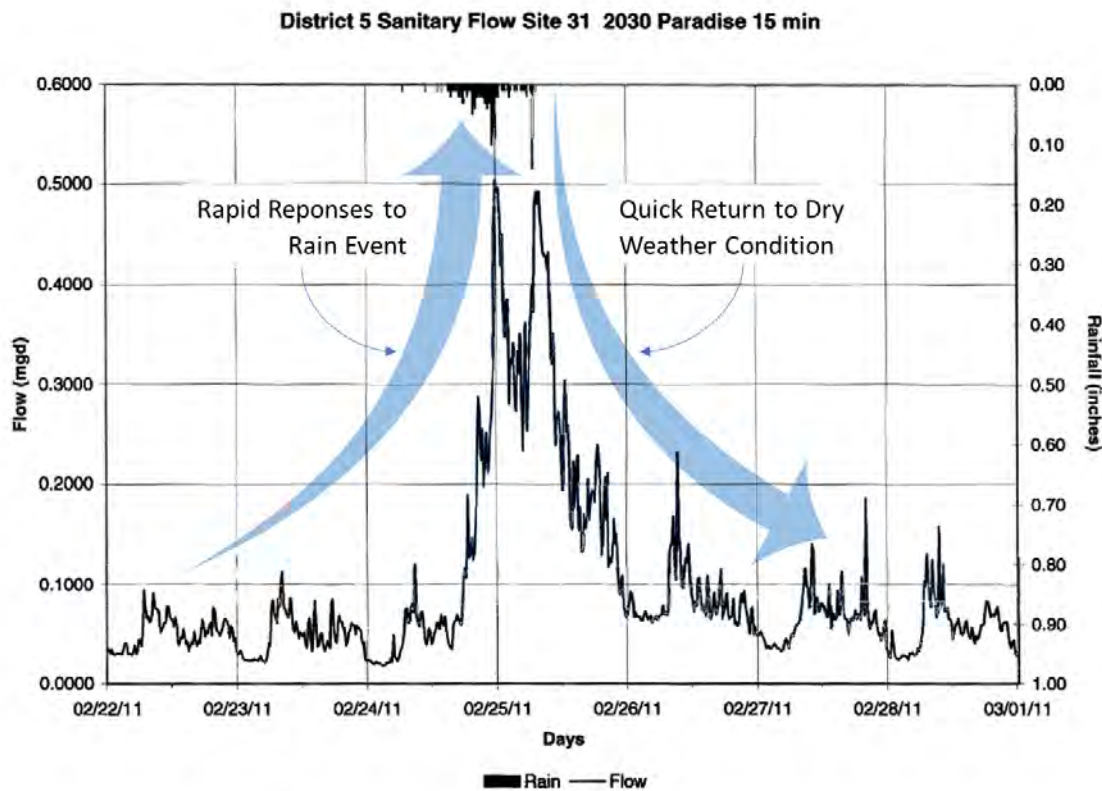
- Base sanitary flow (BSF): the contribution of sewer flow that is composed of sewage (i.e. not inflow or infiltration). BSF can be calculated by subtracting groundwater infiltration from the average dry weather flow.
- Groundwater Infiltration (GWI): the contribution of sewer flow that is due to infiltration by groundwater. This is usually determined from the average low nighttime flows measured during dry periods.
- Average dry weather flow (ADF): the portion of sewer flow not related to RDI/I primarily composed of both BSF and GWI. This is usually calculated by averaging flow data measured during dry periods.
- Rain dependent inflow and infiltration (RDI/I): extraneous flow that enters the sewer system in response to intensive rainfall events. RDI/I is calculated by subtracting the ADF from the total measured flows.
- Peak I&I flow: the largest RDI/I flow each basin experiences throughout the monitoring period

These values are used to calculate the basin performance metrics described below.



#### 4.2.7 Inflow vs. Infiltration

Review of the flow monitoring results and hydrographs from the study (E2 Consulting Engineers Inc, 2011) suggest that the system is predominantly impacted by inflow as opposed to infiltration. Evaluation of flow monitoring hydrographs during storm events throughout the monitored basins show that the flow mostly returns to dry weather conditions within one to two days after each of the recorded rain events. Figure 19 shows a typical example of this behavior during the February 24, 2011, storm event. The rainfall throughout the storm is depicted by the bar hyetograph shown at the top, and the response in the system is shown by the flow line below. As shown, the measured flow increased sharply upon initiation of the storm event, then dropped significantly within a day after the rainfall stopped, indicating that inflow has more influence on the system than infiltration. Flow predominantly impacted by RDI/I would show a prolonged period after the wet weather event where the flow level gradually returns to pre-storm levels only after several days. There is some infiltration influence observed in the graph in the somewhat higher peaks after the end of the storm event, but these are relatively small.



**Figure 19. Typical example of the system response to rain events**

The flow patterns during and after rain events materially increases peak flow in other flow monitoring basins as well. Some areas are impacted severely while others show only a minor increase. The nearly instantaneous increase in peak flow is indicative of inflow rather than RDI/I as driving the storm-related flow response. In addition, the other flow hydrographs typically show a rapid decline in flow after each storm ends, indicating that water is quickly entering the sewer system rather than slowly filtering through the soil and entering the system through defects in sewer pipes.

Groundwater infiltration does not appear to be significant within SD5 sewer system. However, summer dry weather flow measurements were not obtained during the study. It is possible that the actual dry weather flow is even lower during the driest times of the year. The difference between summer dry

weather flow and the observed dry weather flow during the study would be a good indicator of groundwater (seasonal) infiltration. In addition, no groundwater level data were provided in the study, which can be used to determine if the water table is high enough to cause groundwater infiltration. If all the sewers are located above the ground-water table, the groundwater infiltration can be eliminated as an infiltration source. If SD5 observes evidence of water leakage into manholes during dry flow periods, it is likely that the sewer is below the water table.

#### 4.2.8 Basin Comparisons

To understand how each basin responded to rainfall, flow data from the monitoring program were used to calculate four key performance indicators (KPIs). Each of the flow monitoring basins differs in characteristics such as area served, length of pipe, and size of pipe. This makes it difficult to compare flow results between the basins to understand how well they are performing related to I&I. These KPIs provide normalized metrics that enable a more consistent comparison to help SD5 prioritize where to focus its I&I reduction efforts. In addition, the four KPIs can be used to provide additional insight on the influence of inflow versus infiltration in each basin. The KPIs calculated are:

- R-factor: This number represents the percentage of rainfall by volume that enters each basin during rainstorms. These values were calculated for each basin during the original study. It is one measure of the impact of rainfall-induced flow increase and is a good indicator of where the system is leaking. The R-factor reflects the percentage of rainfall getting into the system and does not convert directly to the actual amount of I&I entering the system.
- Peak I&I per acre served: This metric calculates the peak I&I flow divided by the number of acres in the basin.
- Peak I&I per mile of pipe: This is the calculation of the peak I&I flow divided by the number of miles of sewer main contained in the basin
- Peak I&I per inch diameter mile of pipe: This measurement is the calculation of the peak I&I flow divided by the surface area of the sewer mains contained in the basin

The R-factor and the peak I&I per acre served are better indicators of inflow while the peak I&I per mile of pipe and the peak I&I per inch diameter mile of pipe are better indicators of infiltration.

The abovementioned four KPIs were calculated for each monitored basin as shown in Table 28. Figure 18 above shows the flow monitoring basins area and their number.

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Table 28. Flow data metrics by basin

Basin no.	Monitor site	Basin name	Basin area (acres)	Length of gravity main (miles)	R-factor	Peak I&I per gross acre (gallon/acre/day)	Peak I&I per mile of pipe (gallon/mile/day)	Peak I&I per inch diameter mile of pipe (gallon/inch-mile/day)
<b>1</b>	31	2030 Paradise Dr.	52.3	2.60	<b>20%</b>	<b>14,000</b>	<b>282,000</b>	<b>48,000</b>
<b>2</b>	73	Raccoon at Central	57.0	1.62	5%	<b>10,000</b>	<b>351,000</b>	<b>58,000</b>
3	132	80 Lyford Dr.	27.5	0.84	9%	8,000	262,000	43,000
<b>4</b>	129	Marinero Circle	52.0	2.24	<b>11%</b>	5,000	116,000	19,000
5	215	Round Hill at Lyford	127.0	3.66	3%	3,000	104,000	17,000
<b>6</b>	NA2	Beach at Cove	3.5	0.87	<b>11%</b>	<b>29,000</b>	117,000	15,000
<b>7</b>	H2	17 Peninsula	6.4	0.30	<b>60%</b>	<b>52,000</b>	<b>1,100,000</b>	<b>183,000</b>
8	ND5	Laurel Ave. and San Rafael	19.8	1.16	6%	3,000	51,000	8,000
9	CA2	15 West Shore	19.9	0.96	4%	<b>10,000</b>	208,000	31,000
10	F7	End of West Shore	45.6	1.59	4%	6,000	172,000	27,000

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***Based on the calculated KPIs, the following two sewer basins warrant further inflow investigation and remediation:***

- **Basin 7 – 17 Peninsula:** This basin has substantially higher metrics in all categories than the other basins. Because it covers a very small area and has a low pipe mileage, it is potentially the most cost-effective opportunity to reduce a significant amount of inflow into the system.
- **Basin 1 – 2030 Paradise Dr.:** This is one of the larger basins monitored. It has the second highest R-factor and has high numbers in every category. This basin likely contributes a significant amount of I&I to the system because of its large size and high metrics.

***The following sewer basins should also be considered due to unusual metrics:***

- **Basin 6 – Beach at Cove:** This is the smallest basin in the study but produced a notable R-factor and very high peak I&I per gross acre. Because of its small size, it may be very cost-effective to target inflow reduction; however, the total volume reduction to the system will be much lower than for Basins 1 or 7.
- **Basin 2 – Raccoon at Central:** Even though this basin has a low R-factor, it has significantly high numbers in all categories and could provide significant reduction in I&I in the system.
- **Basin 4 – Marinero Circle:** This basin also has a notable R-Factor and could provide some reduction in overall I&I, but would not make as large an impact as the other basins because of comparably lower peak I&I numbers.

In general, basins with R-factors below 10 percent or that have I&I rates under 5,000 gallons per acre per day are not likely to show significant improvement in I&I reduction in the system. Among the basins described above, the actual conditions for Basins 6 and 7 may be worse than what the metrics indicate as they may possibly be having capacity issues during peak flow periods. This is discussed in more detail below.

***The investigation and remediation should concentrate on inflow rather than infiltration as inflow is likely the bigger issue, as shown on the hydrographs.*** Inflow is usually easier to identify and more cost-effective to remediate than infiltration (however it can be more challenging politically). By identifying and eliminating illicit connections to the system, a significant impact on I&I can be achieved. In contrast, it is possible that SD5 may not achieve a material reduction in infiltration until many of the sewer main, service laterals, manholes, and other structures are rehabilitated or replaced.

#### 4.2.9 Tidal Impacts on Flow

Tides are the sea level changes caused by the combined effects of the gravitational forces exerted by the moon and the sun, and the rotation of the earth. The tidal change in sea level can also temporarily elevate the groundwater table near shorelines, which increases the amount of groundwater infiltration as more of the sewer infrastructure is covered by groundwater. When sea water gets into the sanitary sewer system, it not only reduces collection system capacity to carry sanitary flow, but it also disrupts wastewater treatment process because of the higher-than-normal wastewater salinity.

Tide level could have a significant impact on the collection system because much of SD5 is located adjacent to the coastline where tidal fluctuations would be observed. Tide analyses were performed on basins located near the coastline (i.e., Basins 1, 6, 7, 8, 9, and 10). Basins 2, 3, 4, and 5 are located farther inland along the spine of the Tiburon Peninsula and are thus far enough away from the coastline to not be affected by the tides.

To analyze tidal influence, tidal data were compared to the flow captured on the flow monitoring hydrographs to determine if there was any correlation between measured flow and tide level. Two approaches were evaluated: (1) an hourly tidal analysis to determine if measured flow levels fluctuate under the influence of tide on an hourly basis and (2) a daily tidal analysis where the normalized daily

peak flow is compared to normalized daily peak tide level to determine if there are any longer-term correlations or trends.

### 7.1 Hourly Tide Analysis

In basins monitored near the bay, the flow data generally do not show an increase that corresponds to the time of high tide during non-rain days. Figure 20 below presents an example of flow data from Basin 10 compared to tide level changes on an hourly basis (E2 Consulting Engineers Inc, 2011). The example period is chosen as there were no wet weather events to influence the data. As shown, measured flows are at the minimum level around midnight and gradually increase after around 6 a.m. Measured flows fluctuate through the daytime and gradually decrease after around 11 p.m. Such a flow pattern is typical for most monitored basins and is an indication that the hourly flow is driven mainly by diurnal sanitary flow when dry weather conditions are present. High tides in the bay occur approximately every 12 hours and 25 minutes and are shown on the graph in the bottom of the figure. The daily changes in flow do not appear to correlate with the tidal fluctuations shown for the same period. The lowest flow periods are consistently in the early morning hours of each day whereas the lowest tides are occurring around sunrise and sunset. There may be a daily contribution from tidal changes; however, it is not significant enough to be reflected in the flow monitoring hydrographs. Similar results were also observed in other basins reviewed.

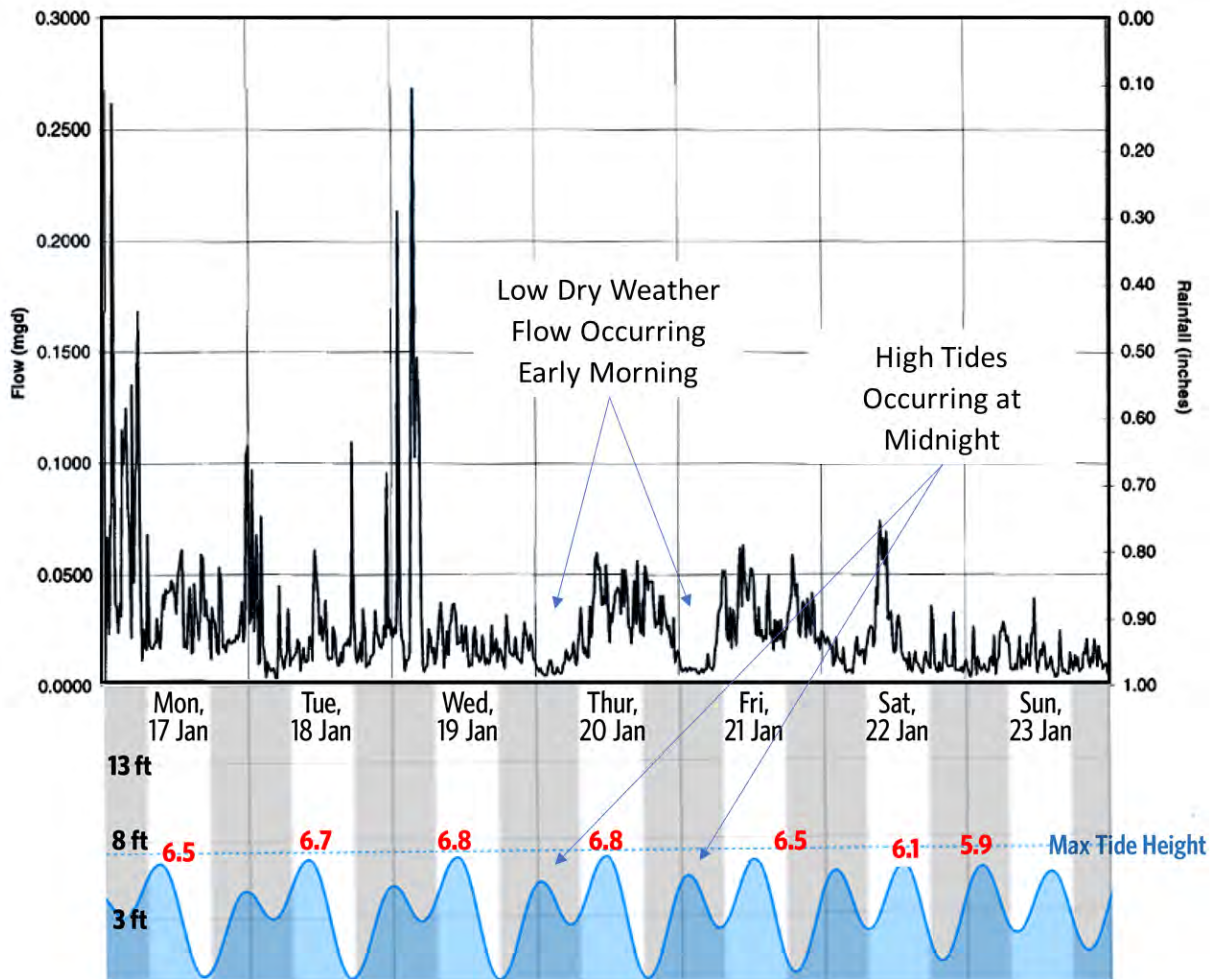
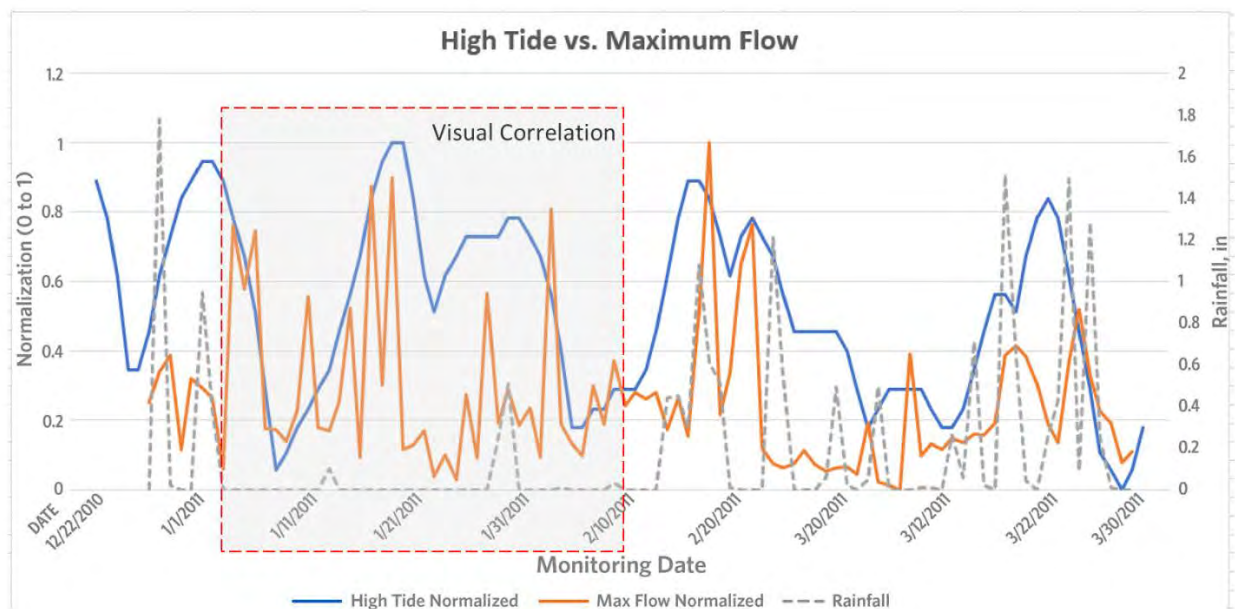


Figure 20. Measured flow correlated to hourly tides

## 7.2 Daily Tide Analysis

Tidal changes occur not only daily; they also change in magnitude over longer periods in response to many factors including weather and the relative positions of the sun and moon. This results in variations in the high- and low-water levels over time. To determine if there were any long-term tidal impacts from the highest tides during the study, an additional analysis was conducted. Daily high tide data along with daily peak flow data were normalized to a 0–1 scale and plotted against monitoring dates to observe longer-term trends. Rainfall data were also plotted into the graph to indicate when storm events occurred. To better understand the correspondence between flow and tide and avoid interference from storm events, the analysis considered the period between early January and mid-February 2011 when storm events were at a minimum.

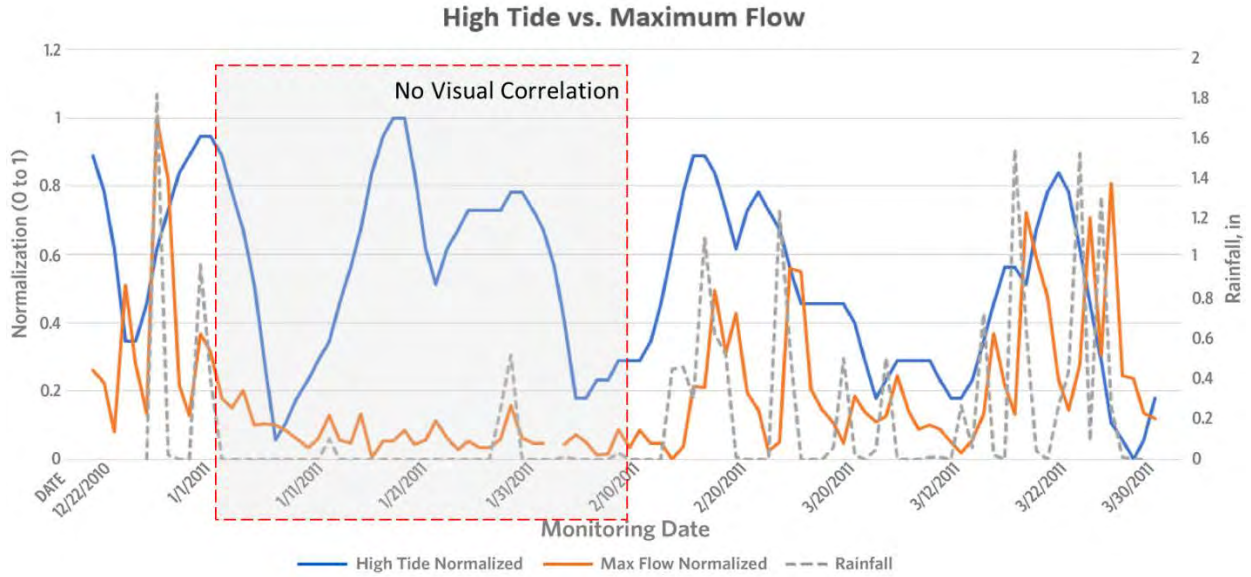
Observations in Basin 10, as shown in Figure 21, indicate a consistency between normalized high flow data and normalized high tide data from early January to mid-February 2011. This suggests that Basin 10 flow may be influenced by high tides that exceed a certain height which cause infiltration or inflow. Smaller high tides may not be sufficient to enter the system. **This is not likely to be a major impact on I&I overall; however, it could become worse as sea level rises.**



**Figure 21. Peak flow data correlated to maximum tides in Basin 10**

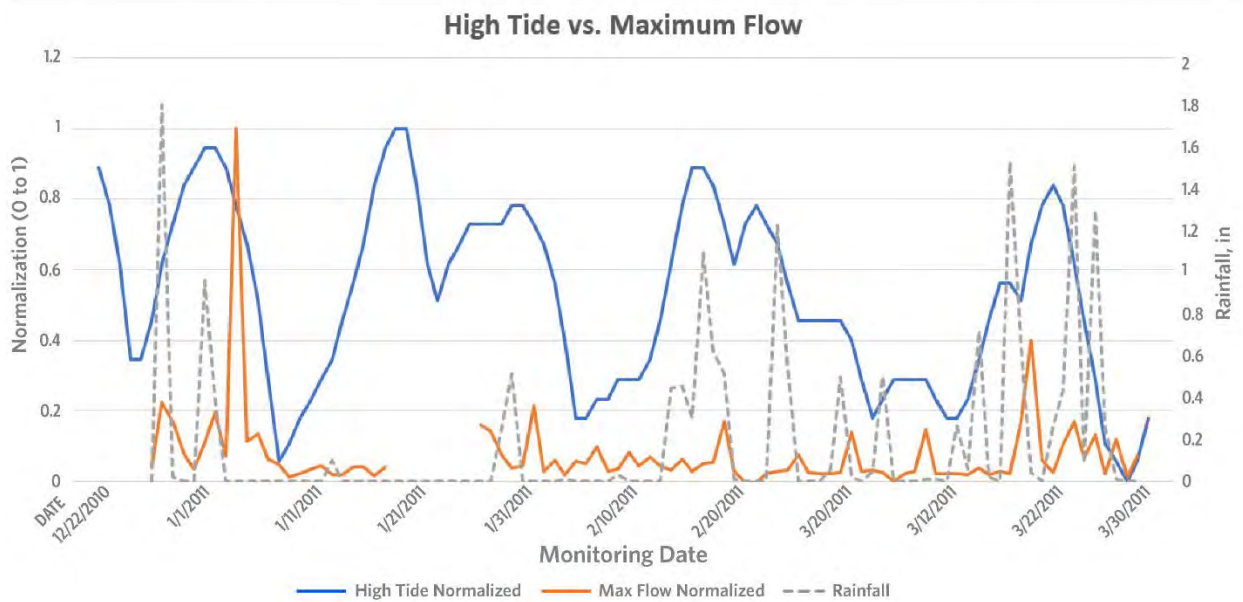
For comparison, Figure 22 shows a similar plot for Basin 1, where most of the basin collection area is sufficiently far from or higher than the coastline and is thus not impacted by high tides. The normalized peak flow value remains at a low level from early January to mid-February 2011 despite the high tide event occurring at the same time.



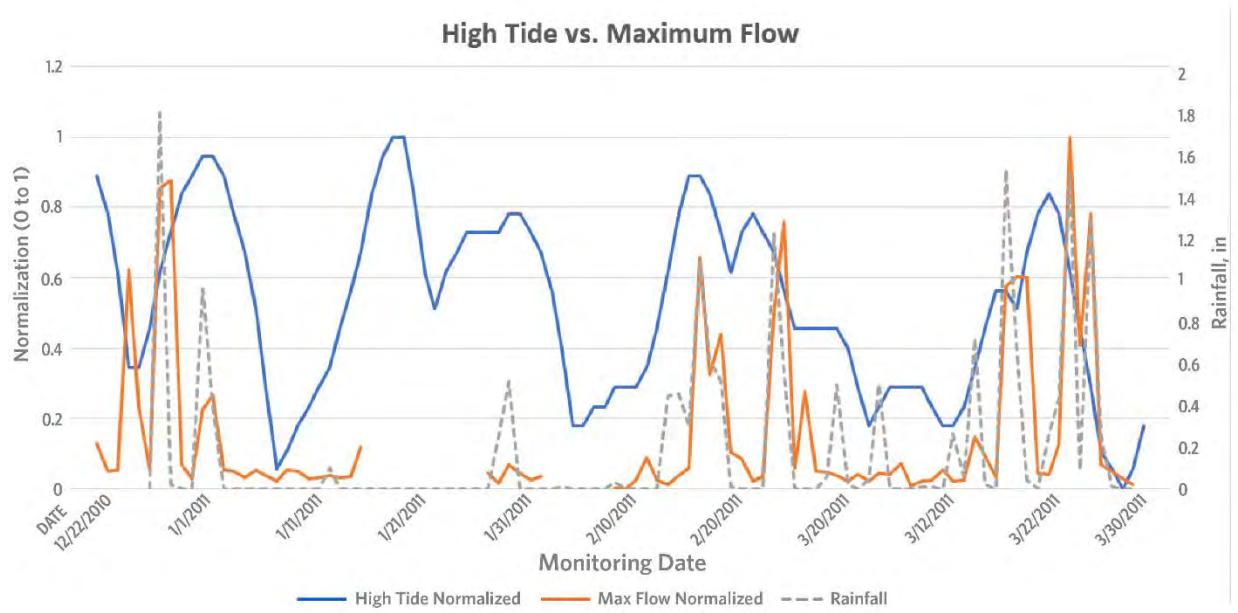


**Figure 22. Peak flow data correlated to maximum tides in Basin 1**

Other basins suspected to be influenced by longer-term high tide trends are Basin 6 and Basin 7. However, their correlations cannot be confirmed because of missing flow data in part of January 2011. Basin 6 and 7 peak flow versus high tide charts are presented in Figure 23 and Figure 24, respectively.



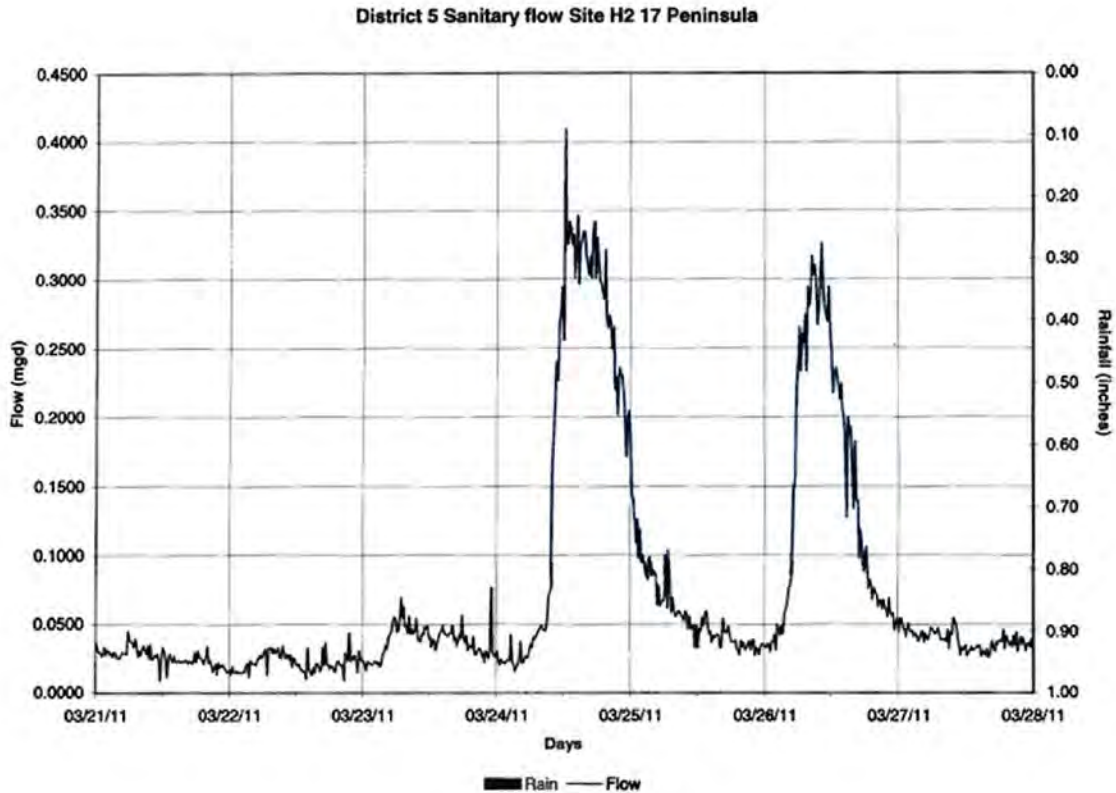
**Figure 23. Peak flow data correlated to maximum tides in Basin 6**



**Figure 24. Peak flow data correlated to maximum tides in Basin 7**

#### 4.2.10 Flow Anomalies

In reviewing the monitoring program flow data, large flows were observed that were not correlated to rainfall events. These anomalies indicate that unusual flow is entering the system from an unknown source. Two examples occurred on March 24 and March 26, 2011 in Basin 7 as shown in Figure 25 (E2 Consulting Engineers Inc, 2011). This basin along Peninsula Road contains a single sewer main about 1,500 feet long in a residential area. No commercial activities are occurring in this basin; therefore, the expected flow pattern in this basin should reflect typical diurnal residential flow. These anomalies are difficult to explain without additional data; however, the two most likely causes are that (1) a swimming pool or other large water body was drained into the system or (2) I&I provided contributions from tidal changes.



**Figure 25. Anomalous flow surges without rainfall in Basin 7**

There are other unexplained flow surges not related to rainfall observed in other basins throughout the flow monitoring period. A summary of these instances is recorded in Table 29 below.

**Table 29. Counts of flow surges without correlated rain events by basin**

Basin No.	Basin name	No. of flow surge events without rainfall
10	End of West Shore	13
6	Beach at Cove	13
7	17 Peninsula	9
1	2030 Paradise Dr.	0
2	Raccoon at Central	0
3	80 Lyford Dr.	0
4	Marinero Circle	0
5	Round Hill at Lyford	0
8	Laurel Ave and San Rafael	0
9	15 West Shore	0

Basins 6, 7, and 10 all show several of these anomalous flows. These basins could be good candidates for further I&I investigation. They are also the basins that potentially show long-term tidal influence, which could indicate that larger high tides are causing these flows.

The hydrographs were also reviewed to determine if the height of any of the wet weather flow surges exceeded the pipe diameter. ***This may indicate a potential capacity issue at the monitoring site. This condition was observed in Basins 6 and 7.*** Two examples are shown in Figure 26, which captures two storm events that occurred on March 24 and 26, 2011 in Basin 7 (E2 Consulting Engineers Inc, 2011). The count of these instances observed by basin is recorded in Table 30 below. The peaks of these flow surges are sharp, which suggests that they did not overflow the manhole. SD5 can estimate the surge elevation in the manhole if the total depth from the top of the manhole to the bottom of the pipe is known; however, this information was not available for this analysis. It is also not possible to determine the behavior of the flow in upstream or downstream manholes that were unmonitored, which could be experiencing worse surcharging. ***It is recommended that SD5 monitor Basins 6 and 7 manholes during peak storm events to determine capacity risks and consider installing remote sewer monitoring (e.g., SmartCovers) if necessary.***

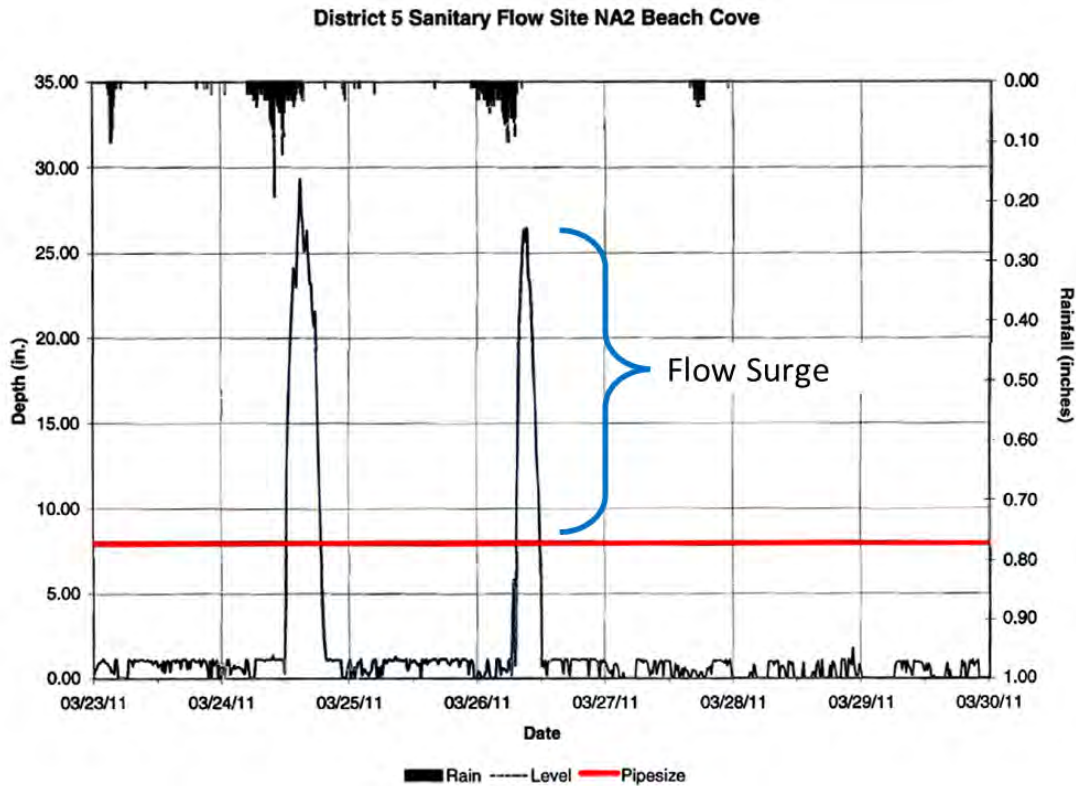


Figure 26. Example of flow surges larger than pipe diameter in Basin 7

**Table 30. Count of flow surges larger than pipe diameter by basin**

Basin no.	Basin name	No. of flow surge height larger than pipe diameter
7	17 Peninsula	11
6	Beach at Cove	6
1	2030 Paradise Dr.	0
2	Raccoon at central	0
3	80 Lyford Dr.	0
4	Marinero Circle	0
5	Round Hill at Lyford	0
8	Laurel Ave and San Rafael	0
9	15 West Shore	0
10	End of West Shore	0

The exact mechanism causing these dry weather flow surges and wet weather surcharges is unknown and could be related to either inflow or infiltration. However, this excess flow appears to be contributing to capacity issues in Basins 6 and 7, which could potentially lead to SSOs during stronger high tides or rain events. It is also possible that the anomalous flows are being caused by other factors (e.g., draining a swimming pool). Additional insight may be gained by checking the salinity of the wastewater flowing through these basins to determine if it indicates that sea water is getting into the sewer system.

#### 4.2.11 Recommendations for I&I Mitigation

Table 31 summarizes the key concerns observed in the analysis of the 2010–2011 flow monitoring study. **The most problematic basins are Basin 7 along Peninsula Road and Basin 1 along the southern portion of Paradise Drive, which exhibit very high values in all of the categories evaluated.** Overall, the predominant issue within these study areas appears to be inflow. The most direct evidence for this comes from the flow monitoring hydrographs, which show that generally flows from wet weather events quickly return to dry level conditions once the event ends. I&I mitigation in Basins 2, 4, and 6 may also reduce excess flow in the system, but not to the extent that improvements in Basins 1 and 7 will likely have because of performance metrics and system configuration. This section discusses recommendations for inflow mitigation as well as additional options for addressing the other concerns.

**Table 31. Summary of I&I findings**

Basin no.	Basin name	High priority I&I concerns	Medium priority I&I concerns	Tidal correlations	Anomalous flow surges	Potential capacity issues
1	2030 Paradise Dr.	✓				
2	Raccoon at Central		✓			
3	80 Lyford Dr.					
4	Marinero Circle		✓			
5	Round Hill @ Lyford					
6	Beach at Cove		✓	g	✓	✓
7	17 Peninsula	✓		g	✓	✓
8	Laurel Ave and San Rafael					
9	15 West Shore					
10	End of West Shore			✓	✓	

g Insufficient information available

Addressing these concerns falls into two types of mitigation for the purposes of this Master Plan: inflow control and infiltration control. Tidal-related flow and anomalous flow surges are addressed as either inflow or infiltration problems and will therefore be covered under those mitigation types. The capacity issues observed in the flow monitoring graphs may be able to be addressed by removing I&I from the flow as well or through monitoring (either physical inspection or remote monitoring) if SD5 determines that there is sufficient risk for an SSO in these areas. This would be more cost-effective than system modifications to accommodate extraneous flow. If I&I reduction measures do not sufficiently reduce the flow in the system, then it may be appropriate to consider more costly system modifications to increase capacity.

#### 4.2.11.1 Inflow Control

When attempting to reduce I&I from a collection system, focusing on inflow as a first step is usually very cost-effective and can produce immediate, tangible results. Disconnecting the flow source and directing elsewhere will likely solve the problem. For instance, flow from roof downspouts can be directed to the yard. The challenge with inflow is finding sources. Controlling and eliminating inflow sources is also more cost-effective than developing additional sewer system capacity and treatment plant capacity. The following outlines specific steps to start an inflow control program:

- Manhole inspection:** Manhole inspection is probably the most cost-effective I&I reduction activity that SD5 can do since the manholes are directly in its control. Inspect all manholes in the system that could be inundated. Look for holes in the sides of the structures and manhole frames and lids that could allow water to flow in. Manhole frame and lid testing at other utilities shows that some frames and lids can leak up to 70 gallons per minute (gpm) with only 3 inches of water covering the lid while well-performing frames and lids leak less than 1 gpm. Manholes in creek corridors or

near gutters in streets should be inspected regularly to identify candidates for frame and lid replacement. Consider replacing or rehabilitating the frame and lid on leaky manholes.

- **Pipeline inspection:** Inspect any sewer that are laid in a creek channel where erosion could have exposed the pipe or pulled pipe joints apart. Repair pipes and make improvements as necessary.
- **Smoke testing:** Consider smoke testing the four target basins (Basins 1, 4, 6, and 7). Follow up on inflow sources identified. Disconnect sources where possible. Smoke testing is effective in locating inflow sources as the smoke comes out at the source. Smoke testing is conducted by blowing smoke from a smoke generator into the sewer with a blower and then following the smoke through the system. This inexpensive process can be done quickly. The entire District could be possibly smoke tested within 2 or 3 months.
- **Flow analysis:** Conduct an analysis for the plant influent flow to see how the system is performing as a whole. This could lead to the identification of other areas outside of the flow monitoring study where inflow control strategies could mitigate I&I in the system.

After inflow sources are identified, remediation options are available to disconnect them. Table 32 lists the types of sources and ways to remediate.

**Table 32. Remediation options for various inflow sources**

Source	Remediation
Downspouts	Redirect flow to yards, storm system, or other safe discharge point
Yard drains	Remove and plug the connection and regrade the yard so that drain is not needed Connect yard drain to storm system
Inundated manholes	Replace lids with watertight lids
Holes in manholes and structures	Rehabilitate the manhole and structure so it is watertight
Foundation drains	Redirect flow to the storm system or street, if possible
Other sources	Redirect flow to the storm system or street
Street catch basins	Disconnect and direct flow to storm system or other surface water discharge point

Many of these remediation actions can be easily accomplished while some of them may be more difficult, especially for those connections on private properties. However, the benefits in reduced peak flow can be significant. Downspout and yard drain disconnection requires property owner cooperation to complete. The City of Portland, Oregon, conducted an extensive downspout disconnection program that was quite successful in reducing peak flow from its combined storm/sanitary system that it was separating. Portland offered property owners a discount on their sewer bills if they disconnected. The City provided materials and engaged Boy Scout troops to help property owners complete the disconnection. Citizens were very supportive of the program because they understood that it would help reduce sewage discharges to the river.

***SD5 may want to consider an outreach effort to work with property owners to generate their support. This has been found to be effective in other communities where the agency funds the work but allows the property owner to direct it.*** SD5 will need to be able to explain the problem, the choices and the benefits in financial terms so that customers will be able to understand the situation. The community will be more motivated to work with SD5 if they understand why it is necessary, what will be saved, and the impacts if they do not collaborate. The most difficult position for SD5 to take is to mandate the property owners improve their system at their cost, which will generate the least amount of motivation in the community.

#### 4.2.11.2 Infiltration Control

The primary method of reducing infiltration is to repair all cracks, holes, and other defects in the basin. However, this may not be cost-effective if taken as the primary objective. Although rehabilitation of old sewers can reduce infiltration in the defective pipe, overall infiltration reduction is not usually found because the groundwater level may just rise and find other defects in adjacent mains or in-service lines and still get in. Some agencies have not achieved a material reduction in infiltration until most or all of the pipe, manholes, and structures have been substantially rehabilitated or replaced including service lines all the way to the building they serve. One public utility replaced its existing system with a new sanitary sewer system and service line to the property line. The work resulted in cutting the infiltration rate from extremely high values to about 3,000 gallons per acre served per day, which is about the best that can be expected from a watertight system (this is the current performance of Basins 5 and 6 in SD5's I&I study). Additionally, spending public dollars replacing the pipe owned by a property owner can be difficult to justify to stakeholders and the community, and it is intrusive to the property. Therefore, work on privately owned sewers is difficult to accomplish. However, without it, infiltration becomes very difficult to reduce.

However, it is always recommended to repair, rehabilitate, or replace sewers that are structurally failing even though the work may not materially reduce infiltration. As part of the CCTV investigation, defective pipes have been selected and prioritized for rehabilitation and replacement. The general results of this I&I evaluation were incorporated into the decision-support modeling. The recommendations identified for each basin in Table 32 above, were annotated to each of the basin pipes so that pipe repairs that would impact infiltration issues can be more effectively planned and prioritized.

While it may not be practical to spend District resources on repairs on private laterals, it may be possible to identify poor laterals through smoke testing or by leveraging SD5's sewer lateral inspection program. Smoke testing is a low-cost method to identify problematic issues in most cases with minimal impact to the customer. SD5's lateral inspection program will produce more direct evidence of lateral problems. SD5's Sanitary Sewer Code authorizes SD5 to require property owners to conduct a sewer lateral inspection whenever the significant property improvements, property transfer, road surfacing, or sewer main repairs occur (Section 3.05.350, Events requiring a lateral sewer inspection – All properties). SD5 may consider putting more focus on reviewing inspection results and required lateral repairs in areas where it believes that infiltration issues exist.

#### 4.2.11.3 Flow Metering

SD5 may wish to consider implementing a flow metering program to monitor changes in flow through their lift stations and collection system. This can serve the dual purpose of identifying areas where I&I may be getting worse over time as well as monitor the efficiency and changes in the performance of the lift station pumps which can signal the need for replacement.

Flow metering can be done by installing flow meters along selected force mains or it can be indirectly measured by recording wet well levels and pump run times on locations with constant speed pumps. The installation of flow meters requires the ability to install the meter along the force main, including a valve vault and bypass pumping which was not assessed as part of this study.

Priority locations for flow metering are:

- **Belvedere PS-7:** Monitor changes in I&I flow along Peninsula Road (Basin 7) and the pump performance at PS-7
- **Tiburon PS-3:** Monitor changes in I&I flow from Basin 1 and monitor the pump performance of PS-3
- **Tiburon PS-5:** Monitor changes in I&I flow in Basins 3, 4 and 5 and monitor the pump performance at PS-5
- **Belvedere PS-3:** Monitor changes in I&I flow in Basins 9 and 10 as well as in the collection system up-gradient of PS-5, PS-8, PS-12, PS-13, and PS14. Monitor the pump station performance at PS-3



Flow metering at other lift stations would be beneficial as well and help the District isolate more specifically where I&I is originating. For example, if flow metering is added at Tiburon PS-2 above PS-3, the District would be able to determine if I&I is getting worse between PS-1 and PS2, or PS-2 and PS-3.

4.2.12 Potential Impacts of Sea Level Rise

To understand the potential impacts of SLR on SD5, the Tiburon and Belvedere sections of the Marin Shoreline Sea Level Rise Vulnerability Assessment were reviewed (BVB Consulting LLC, 2017). This report used a statewide SLR model developed by the United States Geological Survey that modeled several SLR scenarios and their impacts around the county. Six scenarios were modeled to determine the near-, medium-, and long-term impacts of projected SLR and the combined impact of these conditions with a 100-year storm (Table 33).

**Table 33. The six sea level rise scenarios modeled in the vulnerability assessment**

Term	Timeframe	Sea level rise	Sea level rise with a 100-year storm
Near term	By 2030	10 inches	46 inches
Medium term	By 2050	20 inches	56 inches
Long term	By 2100	60 inches	96 inches

The report described significant potential impacts across the county to transportation, emergency services, water, sewer, and other utilities, as well as many neighborhoods, commercial areas, and public areas (e.g., beaches, wetlands, and access to the water). A summary of potential impacts to SD5 based on the scenarios modeled is presented here and recommendations for mitigation are provided.

Based on the modeling analysis, the bay shoreline is vulnerable to SLR and intensifying storm patterns with the projected range of SLR of 4.7 to 24.0 inches by 2050 and 16.6 to 65.8 inches by 2100. Therefore, it is critical for SD5 to understand the impact from SLR to ensure a resilient sewer system for present and future generations.

4.2.12.1 Potential District Impacts

SLR could potentially affect multiple components of SD5’s sanitary system including the lift stations, collection system, treatment plant, and utility users. General vulnerabilities are increased flow and water quality, which could lead to SSOs; damaged infrastructure, which could potentially cause SSOs; and system accessibility, which can delay emergency response, repairs, and maintenance. The following are specific vulnerabilities identified in the report that SD5 may experience:

- The wastewater treatment plant (WWTP) could be impacted from flooding. However, direct flooding is unlikely because the WWTP is at a slightly higher elevation than downtown Tiburon. There will more likely be indirect impacts from higher head in effluent pumps.
- Flow into the WWTP could be subject to increasing saltwater infiltration which may cause capacity and treatment problems.
- Lift stations could be overburdened by increased flow from saltwater infiltration into the collection system if influent flows exceed pump capacities. Equipment corrosion may also be accelerated. Lift stations located within the impacted SLR zone (e.g., Tiburon Lift Stations PS-4 and PS-6) may be inundated from high tides.
- Metallic force mains could be corroded at a faster pace because of increased saltwater exposure.
- Subsidence could cause underlying sewer pipes in low-lying areas to sag and settle in the near and medium terms, creating alignment issues, maintenance problems, and possibly SSOs.
- Increased I&I from SLR and larger storm events may cause an increase in SSOs and potentially additional regulatory actions.

- Downtown Tiburon and marine facilities can be flooded in the near term, creating accessibility problems, increased I&I, and increased maintenance.
- The steep shoreline bluffs around the Tiburon Peninsula may be subject to increased erosion and collapse during storm events, which could destroy utility infrastructure and damage homes.
- Access to Belvedere could be compromised or blocked because of flooding of access roads in the near and medium terms.
- The ability of utility works to access infrastructure and maintain the system may become difficult and may be blocked at times.
- U.S. Highway 101 and other primary access roads into the SD5 service area may be subject to increased flooding, which may delay or prevent critical services and supplies needed by SD5.

#### 4.2.12.2 Vulnerable Assets

According to the Marin Shoreline Sea Level Rise Vulnerability Assessment, the Paradise Cove WWTP would be minorly impacted under the storm-related long-term SLR scenario (a sea level increase of 60 inches plus a 100-year storm surge). **The most vulnerable asset owned by SD5 according to the SLR report is Lift Station PS-6 in Tiburon and the nearby manholes around Beach Road and Tiburon Boulevard, where flooding already occurs occasionally** (Figure 27). The electrical system has already been upgraded to prevent flood damage and it is recommended that structural repairs be completed as described in the capital improvement recommendations. **Tiburon Lift Station PS-4 is also currently subjected to tidal flooding, although it is not identified in the SLR report.** As discussed in Section 5.2, this lift station will need significant structural improvements, which should incorporate flooding resilience when these improvements are designed. Other sewer main and manhole assets may also be vulnerable; however, further investigation will be needed to identify them. A study of the groundwater table and the elevation of manhole lids and other buried infrastructure should be completed to identify these additional vulnerabilities.

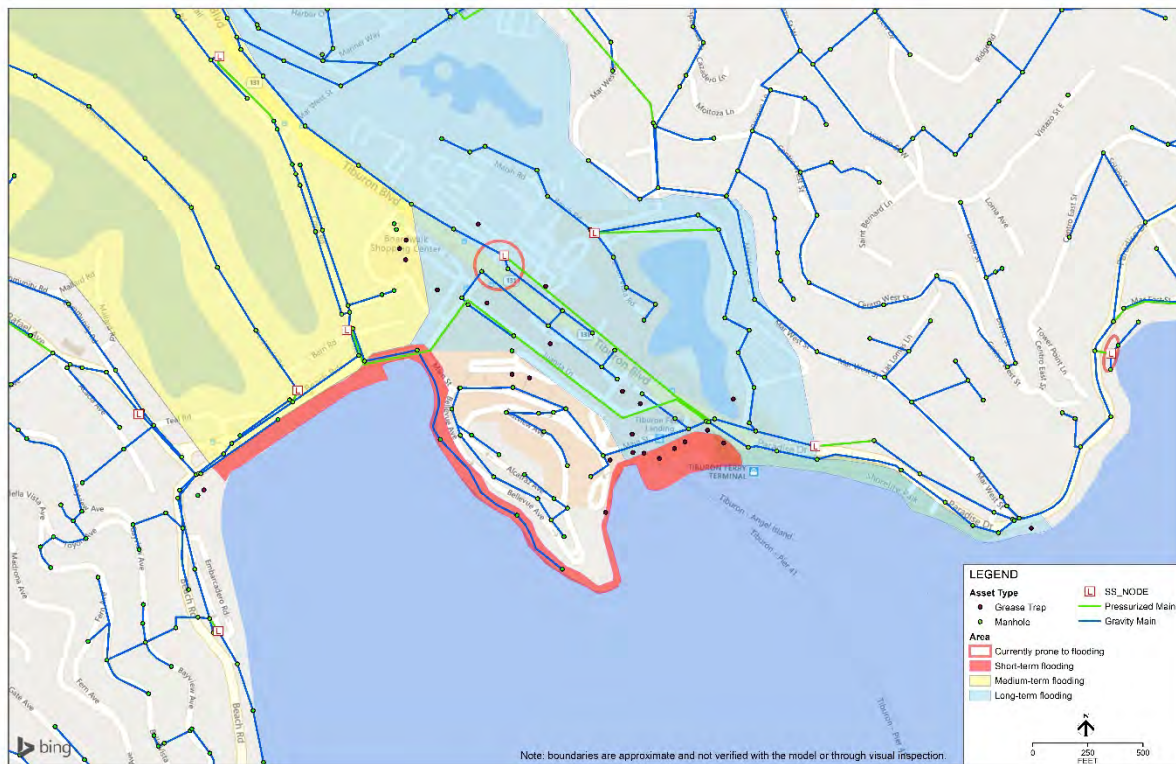


Figure 27. Tiburon vulnerable utility assets

It is also noted in the report that flooding during this scenario could reach the parking lot at the main treatment facility during storm surges, which may create access issues for employees and accelerate wear and tear on facility vehicles and equipment. The installation of berms may help mitigate this, but proper design and installation may not be cost-effective because of the potential geotechnical issues with managing the impacts of berm installation to overland and groundwater flow.

Table 34 provides a summary of vulnerabilities and recommendations based on the short-term, medium-term, and long-term modeled scenarios.

**Table 34. Summary of sea level vulnerabilities and recommendations**

Time period	Projected range	Key vulnerabilities	SLR mitigation recommendations
By 2030	1.6 – 11.8 inches	<ul style="list-style-type: none"> <li>• Main street shoreline, hotels, shops and restaurants</li> <li>• Manholes and infrastructure near Tiburon Blvd and Beach Rd subject to flooding, including Tiburon Lift Station 6</li> <li>• I&amp;I along West Shore and Beach roads</li> <li>• Residential flooding along Beach Rd</li> <li>• Tidal flooding at Tiburon Lift Station 4 already occurring (through local knowledge)</li> </ul>	<ul style="list-style-type: none"> <li>• Incorporate SLR into decision-making process Keep up to date with science and policy to identify additional recommendations regarding SLR-related activities and threats as new information develops</li> <li>• Review standard District planning level assumptions and design guidelines to consider SLR</li> <li>• Rehabilitate Tiburon Lift Stations PS-4 and PS-6 to minimize environmental impact from flooding</li> <li>• Address high-priority I&amp;I mitigation recommendations, especially those subjected to tidal influence and coastal flooding</li> <li>• Conduct a District-specific Sea Level Rise Vulnerability Assessment toward end of period that includes a detailed study of tidal influence on the groundwater table</li> </ul>
By 2050	4.7 – 24 inches	<ul style="list-style-type: none"> <li>• Yacht Club storm damage and flooding</li> <li>• Flooding and compromised access to town of Tiburon and Cove Shopping Center</li> <li>• San Rafael Ave access to Belvedere may be blocked</li> <li>• Residences in flat areas and the lagoon could be vulnerable to flooding</li> </ul>	<ul style="list-style-type: none"> <li>• Implement priority capital improvements as a result of Sea Level Rise Vulnerability Assessment</li> <li>• Continue collection system and lift station CIP, incorporating SLR mitigation strategies and design improvements</li> <li>• Phased adaptation to address groundwater, hydraulic impacts, and storm surge as required</li> </ul>

Time period	Projected range	Key vulnerabilities	SLR mitigation recommendations
By 2100	16.6 – 65.8 inches	<ul style="list-style-type: none"> <li>• Vehicular access along Tiburon Blvd and downtown</li> <li>• Municipal buildings flooding</li> <li>• Minor flooding and erosion during storm surge at Paradise Cove Treatment Plant</li> <li>• Saltwater intrusion along sewer lines that run along the beach</li> <li>• Possible flooding in parking lot of Main WWTP during storm surges</li> <li>• Access roads to Belvedere flooded</li> <li>• Erosion and bluff collapse during storm surges damaging residences and infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Incorporate effects of SLR and storm surges on emergency operations planning as required</li> <li>• Phased adaptation to address groundwater, hydraulic impacts, and storm surge as required</li> </ul>

### 4.3 Lift Stations

A condition assessment was performed on each of SD5’s lift stations to evaluate current conditions and identify rehabilitation recommendations to maintain service levels and to identify operational recommendations to reduce odor complaints. The assessment included a review of available documentation and reference material on the lift stations, visual inspection of the stations, and interviews with District operations staff. This information was analyzed to develop recommendations to be incorporated into the CIP. To prioritize these recommendations, a risk analysis was conducted to determine the relative criticality of each lift station in terms of area served, pumping capacity, potential environmental impacts, and likelihood of flooding.

#### 4.3.1 Information Review

To start the assessment, SD5 provided available documentation and reference materials to describe the configuration and operations of the lift stations. Additional data were provided by Nute Engineering, which has historically performed many of the previous lift station upgrades and repairs. Key documents evaluated are described in the introduction of this report.

There were limited available lift station as-built documents or other documents stating lift station flow rates and TDHs with the exception of Tiburon Lift Station 5.

#### 4.3.2 Site Visit and Visual Condition Assessment

HDR visited each of SD5’s lift stations to perform an inspection and visual condition assessment on October 14 and 15, 2020. SD5 provided a lead operator to guide the HDR engineer through the stations. All 24 lift stations were visited and assessed over these 2 days.

During the field visit, the following potential issues were visually assessed:

- Condition of the wet well lining
- Condition of the wet well concrete
- Fats, oils, and grease (FOG) accumulation
- Inlet and outlet pipe configuration
- Electrical panel

- Telemetry panel
- Condition of pumps, valves, and other components, including estimating remaining useful life
- General lift station condition

The condition of each of the stations was documented and photographs were taken to note key features observed. These are provided in Appendix E.

#### 4.3.3 Operations Interviews

During the site visits, the lead operator provided additional insight and commentary on the history, performance, and operation of each facility. Topics addressed included:

- Recent lift station upgrades
- Odor and other operational concerns
- Facility configuration and design issues encountered
- Operation and condition history
- Discussion of necessary rehabilitation or operational improvements identified by O&M staff

Additional details and context have been provided through discussions with the District Manager. This information has been documented and incorporated into the analysis.

#### 4.3.4 Approach to Assessing Criticality

The criticality of each lift station needs to be determined to understand how to prioritize rehabilitation work through the 15-year capital planning horizon. Criticality can then be combined with the condition of each station to make objective decisions about which repairs to make first and which can be scheduled further in the future.

Criticality is mainly a function of the impact of the failure of each of the facilities. To assess criticality each lift station needs to be evaluated based on the impact to SD5 and the community if it were unable to function. The lift station criticalities have been determined by the following:

- **Pumping capacities of each station:** Each of the lift stations is responsible for pumping wastewater from different parts of SD5's service area. The greater the amount of water that flows through a given lift station, the greater the impact to SD5 and the community if it cannot perform its function. Because flow data were not readily available for all the lift stations, the total length of system pipe that contributes flow to each lift station was used. This factor combined with the contribution from other lift stations that also convey flow to each station were used as an indicator of flow.
- **Impact on SD5's service area:** Some lift stations can be more critical than others, depending upon their location and the amount of wastewater that must flow through them. For example, a lift station serving downtown businesses and restaurants is usually more critical than a lift station serving a small residential area because the loss of the downtown lift station is likely to have a greater impact on the community through citizen inconveniences and business revenue loss. Also, lift stations that convey water from other stations would have a greater impact should they fail.
- **Potential for environmental damage:** Environmental damage can be caused by a lift station pump or power failure if the flow to the station exceeds its storage capacity before bypass pumping or other mitigations can be put into place. This may cause SSOs. A lift station more prone to pump or power failure will be more critical than a lift station less prone to pump or power failure. In general, SD5's vulnerabilities to overflows at the lift station are generally low and lift station failure can be addressed by standby pumps, on-site or portable backup power generation, and portable backup pumps.

- Potential for lift station flooding due to tides and storms:** Flooding is the likelihood of a lift station being flooded by high or king tides and storm surges. This factor was considered to be for current conditions and did not incorporate the potential impacts of future SLRs because SLR impacts are anticipated to be minimal during the capital planning period.

Of these four criteria, the most significant related to criticality are the pumping capacities of each station and the impact on SD5’s service area. These two components had the most influence on the criticality level assignment and analyses of these components are described in more detail below. Only one station in SD5 exhibited relatively high vulnerability to cause environmental damage or station flooding (Tiburon PS-4). This station is located directly adjacent to the shoreline, is already prone to tidal flooding, and has difficult accessibility to implement repairs or bypass pumping should the facility fail. These concerns were incorporated into the analysis and increased the station’s criticality level assignment.

4.3.4.1 Station Pumping Capacities

The pumping capacity is the design flow rate and TDH of the lift station. For example, Belvedere PS-1 conveys much higher wastewater flows than Belvedere PS-11 and thus would be considered more critical. Design flow rates and TDH for each lift station were unavailable for analysis; therefore, available electrical service sizes and collection system pipe length contributing to the station were used for comparing the lift station capacities instead. Table 35 shows the electrical service characteristics for each lift station. The lift stations are all 240-volt (V) services with mostly three-phase power and two pumps. Because the lift stations’ electrical service sizes are very similar, additional metrics have been considered.

**Table 35. Lift station electrical service sizes for capacity comparison**

Service area	Lift station number	Number of pumps	Voltage (V)	Phase	Largest motor (hp)
Tiburon	PS-1	1	240	1	3
Tiburon	PS-2	2	240	3	3
Tiburon	PS-3	2	240	3	5
Tiburon	PS-4	2	240	3	5
Tiburon	PS-5	2	240	3	60
Tiburon	PS-6	2	240	3	5
Tiburon	PS-7	2	240	3	5
Tiburon	PS-8	2	240	3	3
Tiburon	PS-9	2	240	3	5
Belvedere	PS-1	2	208	3	10/15
Belvedere	PS-2	2	240	3	3
Belvedere	PS-3	3	240	3	5
Belvedere	PS-5	2	240	3	5
Belvedere	PS-7	2	Unk.	Unk.	3
Belvedere	PS-8	2	220	1	3
Belvedere	PS-9	2	240	3	3
Belvedere	PS-10	2	240	1	3
Belvedere	PS-11	2	240	1	3
Belvedere	PS-12	2	240	1	3
Belvedere	PS-13	2	240	3	3
Belvedere	PS-14	2	240	3	3

Service area	Lift station number	Number of pumps	Voltage (V)	Phase	Largest motor (hp)
Belvedere	PS-15	2	240	1	3
Seafirth	CF-PS-1	2	240	3	25
Seafirth	CF-PS-2	2	240	1	3

Table 36 shows the system sewer main pipe lengths associated with each pipe in the system. This metric uses the pipe length as an indicator of the size of flow conveyed through each station. In general, the greater the length of sewer mains that contribute wastewater to the lift station, the more flow will be received. This can be generally applied because SD5's service area land use is almost entirely residential, which indicates that almost all parts of the system will exhibit similar flow characteristics.

**Table 36. Lift station collection system pipeline lengths for capacity comparison**

Service Area	Lift station number	Collection length (mi.)
Tiburon	PS-1	0.1
Tiburon	PS-2	0.6
Tiburon	PS-3	0.5
Tiburon	PS-4	0
Tiburon	PS-5	7.7
Tiburon	PS-6	0.7
Tiburon	PS-7	1.6
Tiburon	PS-8	0.4
Tiburon	PS-9	0.8
Belvedere	PS-1	2.9
Belvedere	PS-2	1.4
Belvedere	PS-3	1.2
Belvedere	PS-5	0.5
Belvedere	PS-7	0.4
Belvedere	PS-8	0.1
Belvedere	PS-9	0.5
Belvedere	PS-10	0.2
Belvedere	PS-11	0.2
Belvedere	PS-12	0.1
Belvedere	PS-13	0.2
Belvedere	PS-14	1.6
Belvedere	PS-15	1.8
Seafirth	CF-PS-1	0.3
Seafirth	CF-PS-2	0.1

#### 4.3.4.2 Impact on SD5's Service Area

For this part of the assessment, each station was ranked based on impact to the service area if the station was taken out of service. In general, lift stations that receive wastewater conveyed from other lift stations upstream in the collection system will have a greater impact if they are unable to pump water. Table 37 shows the assessment of impact based on the number of lift stations linked to each station. The

lift stations are sorted in descending order within each of the three service areas. These relationships can be seen in detail in the lift station schematic diagram in Figure 6, above, and in Table 37, below.

**Table 37. Lift station hierarchy showing the number of stations that convey wastewater to each station**

Service area	Lift station number	Lift station location	Number of stations
Tiburon	PS-5	Mar W St.	3
Tiburon	PS-3	Paradise Dr. and Solano St.	2
Tiburon	PS-6	Tiburon Blvd. and Beach Rd.	1
Tiburon	PS-2	Mar E St. near Agreste Way	1
Tiburon	PS-8	Beach Rd. and Lagoon Vista Rd.	1
Tiburon	PS-9	Paradise Dr. near Shoreline Park	0
Tiburon	PS-4	Paradise Dr. near Lyford's Tower	0
Tiburon	PS-7	Tiburon Blvd. near Ned's Way	0
Tiburon	PS-1	Mar E St. near Mar E Dr.	0
Belvedere	PS-1	Cove Rd. and Barn Rd.	12
Belvedere	PS-3	San Rafael Ave. And Golden Gate Av.	5
Belvedere	PS-9	Lagoon Rd. (south)	2
Belvedere	PS-5	San Rafael Ave. and Windward Rd.	1
Belvedere	PS-10	Lagoon Rd. near Maybridge Rd.	1
Belvedere	PS-13	West Shore Rd. (north)	1
Belvedere	PS-2	San Rafael Ave. and Teal Rd.	0
Belvedere	PS-7	Peninsula Rd. and Beach Rd.	0
Belvedere	PS-15	Beach Rd. near Embarcadero Dr.	0
Belvedere	PS-14	West Shore Rd. (south)	0
Belvedere	PS-8	Windward Rd.	0
Belvedere	PS-11	Lagoon Rd. (north)	0
Belvedere	PS-12	San Rafael Ave. and Edgewater Rd.	0
Seafirth	CF-PS1	Seafirth Pl.	1
Seafirth	CF-PS2	Seafirth Rd.	0

4.3.4.3 *Criticality Ranking*

Table 38 shows a summary of the criticality ranking information and the interpreted ranking. Rather than developing an individual ranking for each station, the stations were grouped into criticality levels to indicate repair priorities. Each of the service areas – Tiburon, Belvedere, and Paradise Cove – was ranked individually because each area operates independently from the others.



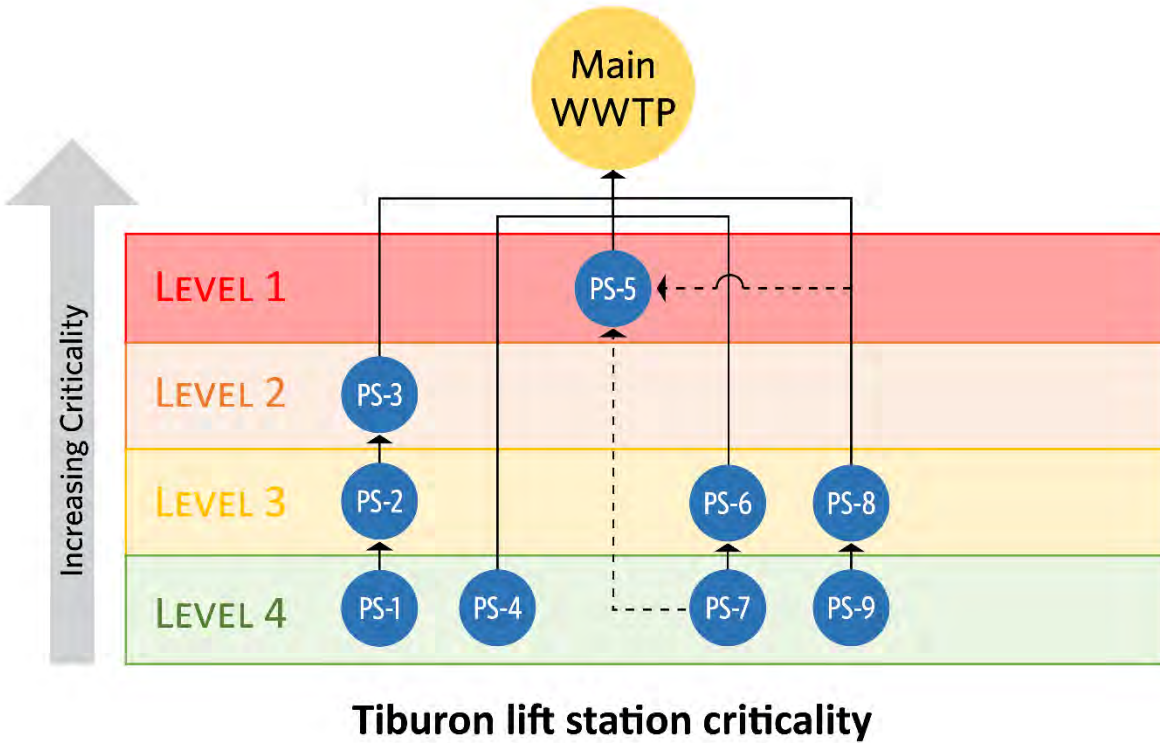
**Table 38. Summary of criticality ranking data**

Service area	Lift station number	Lift station location	Pipeline lengths	Lift station hierarchy (no. of linked)	Environmental	Flooding	Criticality level
Tiburon	PS-5	Mar W St.	7.7	3	No	No	L1
Tiburon	PS-3	Paradise Dr. and Solano St.	0.5	2	No	No	L2
Tiburon	PS-2	Mar E St. near Agreste Way	0.6	1	No	No	L3
Tiburon	PS-6	Tiburon Blvd and Beach Rd.	0.7	1	No	No	L3
Tiburon	PS-8	Beach Rd. and Lagoon Vista Rd.	0.4	1	No	No	L3
Tiburon	PS-1	Mar E St. near Mar E Dr.	0.1	0	No	No	L4
Tiburon	PS-4	Paradise Dr. near Lyford's Tower	0	0	Yes	Yes	L4
Tiburon	PS-7	Tiburon Blvd. near Ned's Way	1.6	0	No	No	L4
Tiburon	PS-9	Paradise Dr. near Shoreline Park	0.8	0	No	No	L4
Belvedere	PS-1	Cove Rd. and Barn Rd.	2.9	12	No	No	L1
Belvedere	PS-3	San Rafael Ave. & Golden Gate Ave.	1.2	5	No	No	L2
Belvedere	PS-9	Lagoon Rd. (south)	0.5	2	No	No	L2
Belvedere	PS-5	San Rafael Ave. & Windward Rd.	0.5	1	No	No	L3
Belvedere	PS-10	Lagoon Rd. near Maybridge Rd.	0.2	1	No	No	L3
Belvedere	PS-13	West Shore Rd. (north)	0.2	1	No	No	L3
Belvedere	PS-2	San Rafael Ave. & Teal Rd	1.4	0	No	No	L4
Belvedere	PS-7	Peninsula Rd. and Beach Rd.	0.4	0	No	No	L4
Belvedere	PS-15	Beach Rd. near Embarcadero Dr.	1.8	0	No	No	L4
Belvedere	PS-14	West Shore Rd. (south)	1.6	0	No	No	L4
Belvedere	PS-8	Windward Rd.	0.1	0	No	No	L4
Belvedere	PS-11	Lagoon Rd. (north)	0.2	0	No	No	L4
Belvedere	PS-12	San Rafael Ave. & Edgewater Rd.	0.1	0	No	No	L4
Seafirth	CF-PS1	Seafirth Pl.	0.3	1	No	No	L1
Seafirth	CF-PS2	Seafirth Rd.	0.1	0	No	No	L2

The lift station priority is shown in the criticality level column, which was interpreted based on the information provided in the other columns in the table.

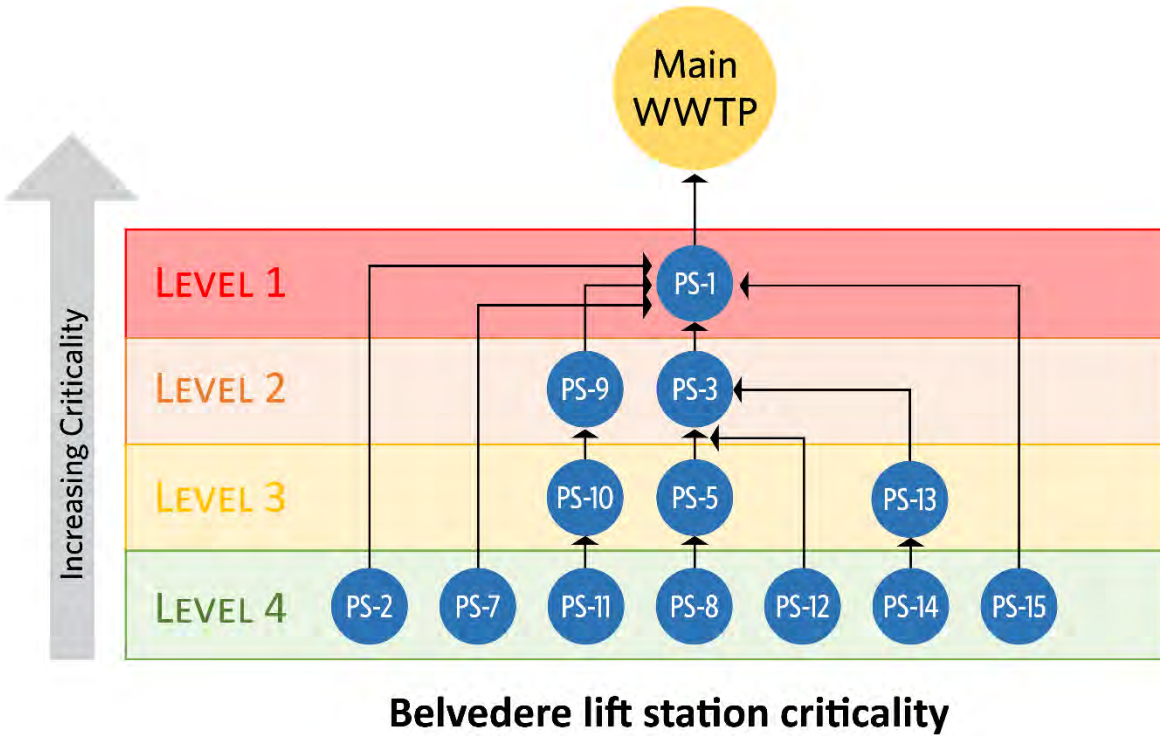
Figure 29 shows a graphical view of this determination for the Tiburon service area. Based on the information provided, Tiburon PS-5 is the most critical lift station. Even though there are no other lift

stations dependent upon it, it captures wastewater from 62 percent of the Tiburon service area by linear miles of sewer main. PS-3 is the second-most critical since it pumps water from other stations and has no bypass alternatives. The third level includes PS-2, PS-6, and PS-8 which also receive water from other stations. Finally, PS-1, PS-4, PS-7, and PS-9 are all at the fourth criticality level.



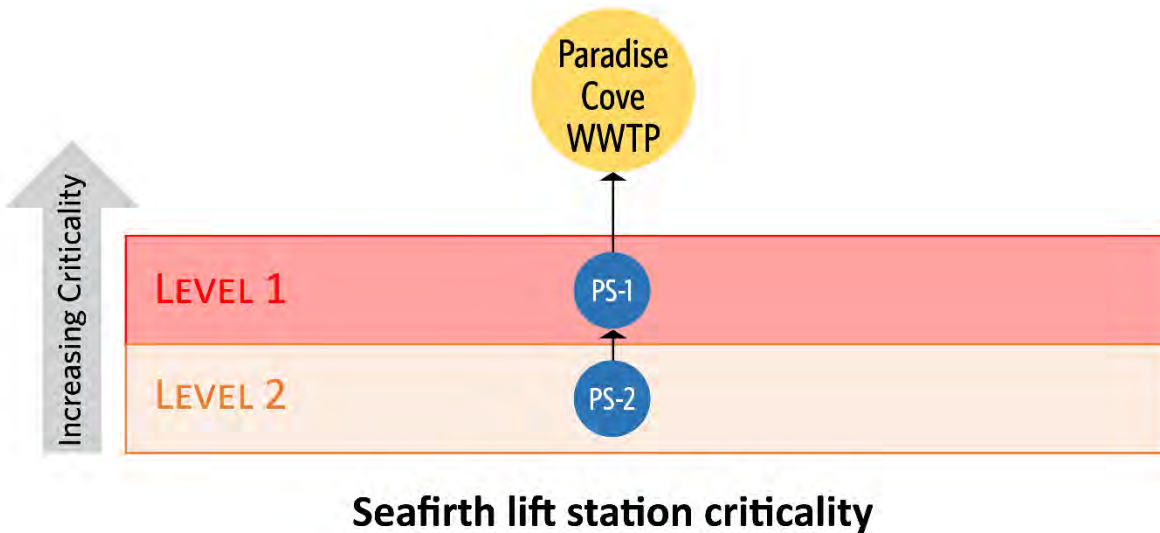
**Figure 28. Tiburon lift station assigned criticality levels (Arrows illustrate flow path to the WWTP. Dashed arrow indicates bypass flow.)**

Figure 30 shows the lift station priority levels for the Belvedere service area. Lift Station PS-1 is the highest-ranking lift station as the entire service area flows into it. Lift Stations PS-3 and PS-9 are assigned to the second-level priority because they receive wastewater from seven other stations and collects water from about 41 percent of the Belvedere system. Next in priority are Lift Stations PS-5, PS-10, and PS-13, which capture 25 percent of the system. The remaining Belvedere list stations are assigned to the fourth level.



**Figure 29. Belvedere lift station criticality**  
(Arrows illustrate flow path to the WWTP)

Figure 31 shows the criticality of the Seafirth lift stations. PS-1 is at a higher criticality level than PS-2 because it receives flow from PS-2 and collects water from a larger area.



**Figure 30. Seafirth lift stations criticality**

#### 4.3.5 Condition Assessment

This section summarizes the visual condition assessment of the lift stations. Each lift station was assigned an overall condition rating based on the summary of conditions observed. Table 44 summarizes these ratings.

**Table 39. Visual condition assessment rating terminology**

CR	Condition	EUL	Description	General recommendation
1	Very good	100% of EUL	New or excellent condition	Normal preventive maintenance
2	Good	75% of EUL	Minor defects only	Normal preventive maintenance, minor corrective maintenance
3	Fair	50% of EUL	Moderate deterioration	Normal preventive maintenance, major corrective maintenance
4	Poor	25% of EUL	Significant deterioration	Rehabilitation, if possible
5	Very poor	5% of EUL	Virtually unserviceable	Replace

Notes: EUL = estimated useful life

Table 40 presents a summary of the condition assessment findings for each station sorted by criticality.

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**Table 40. Summary of condition assessment findings**

Service area	Criticality level	Lift station number	Lift station location	Overall condition	Recent upgrades	Odor issues	Backup power	Notes
Tiburon	1	PS-5	Mar W St.	Very good	Completely upgraded in 2019. Electrical and I&C upgraded in 2015.		Backup power provided by fixed mount diesel powered emergency generator	No significant issues observed or reported.
Tiburon	2	PS-3	Paradise Dr. and Solano St.	Fair	Electrical and I&C upgraded in 2015.		Backup power provided by fixed mount diesel powered emergency generator	Wet well is in adjacent private property driveway. Some access issues. Generator had several radiator failures and provides backup power to Tiburon 3 and 4.
Tiburon	3	PS-2	Mar E St. near Agreste Way	Fair	Electrical and I&C upgraded recently.		Backup power provided by fixed mount natural gas-powered emergency generator	Wet well concrete and hatch in fair conditions. Check valves have not been upgraded.
Tiburon	3	PS-6	Tiburon Blvd. and Beach Rd.	Fair-poor	Natural gas generator, electrical, and I&C upgraded in 2018.		Backup power provided by fixed mount natural gas-powered emergency generator	Wet well concrete in poor condition with exposed aggregate and H <sub>2</sub> S attack.
Tiburon	3	PS-8	Beach Rd. and Lagoon Vista Rd.	Fair	Electrical and I&C upgraded in 2018.		Backup power provided by Main Plant fixed mount diesel powered emergency generator	Hatch and wet well concrete in fair condition. Check and isolation valve in fair to poor condition.
Tiburon	4	PS-1	Mar E St. near Mar E Dr.	Good	Electrical and I&C upgraded in 2014.		Backup power provided by Tiburon PS-2	Serves only several residential homes.
Tiburon	4	PS-4	Paradise Dr. near Lyford's Tower	Poor			Backup power provided by Tiburon 3.	There is no dedicated or adjacent street parking. Lift station accessed through private property narrow stairs. Stairs are cracked and with uneven rises and runs. Access difficult. Susceptible to high tides and overflows into the bay. Deteriorated concrete. Corrosion and deterioration in wet well.
Tiburon	4	PS-7	Tiburon Blvd. near Ned's Way	Fair	Electrical and I&C upgraded in 2017. Recently upgraded natural gas backup generator.		Backup power provided by fixed mount natural gas-powered emergency generator	Heavy FOG exhibited during inspection.
Tiburon	4	PS-9	Paradise Dr. near Shoreline Park	Poor	The check valves were recently replaced because of failure. Electrical and I&C upgraded in 2015.		Backup power provided by Main Plant fixed mount diesel powered emergency generator	Wet well concrete with exposed aggregate and H <sub>2</sub> S corrosion and in poor condition. Wet well upper concrete cylinder sections leaning toward shoreline. Offset cylinders show evidence of sealing. Submersible pumps are difficult to remove because of leaning. Standing water was pumped out with manually operated sump pump.
Belvedere	1	PS-1	Cove Rd. and Barn Rd.	Poor	New parallel force main was being installed during inspection.	Odor issues reported.	Backup power provided by fixed mount natural gas-powered emergency generator	Wet well access hatches in fair condition. High ground water exhibited in the new parallel force main trench. Wet well lined with membrane sealant. It was reported that the membrane is delaminating near the floor. Heavy FOG exhibited during inspection. Older electrical, I&C, and backup generator beyond their useful life. Odor control disconnected. Building roof in very poor condition.

Service area	Criticality level	Lift station number	Lift station location	Overall condition	Recent upgrades	Odor issues	Backup power	Notes
Belvedere	2	PS-3	San Rafael Ave. and Golden Gate Ave.	Fair-poor	Natural gas backup generator, electrical and I&C upgraded in 2017 and in very good condition.	Odor issues reported.	Backup power provided by fixed mount natural gas-powered emergency generator	Currently utilizing manhole odor control inserts. Wet well access hatches in fair condition exhibiting corrosion. Wet well concrete in poor condition/corrosion. Isolation and check valves are in fair to poor condition.
Belvedere	2	PS-9	Lagoon Rd. (south)	Fair-poor	Electrical and I&C recently upgraded.		Backup power provided by portable generator	Wet well concrete top cracked and in poor condition. Standing water in valve vault causing piping surface corrosion. Isolation and check valves are in fair and poor conditions, respectively.
Belvedere	3	PS-5	San Rafael Ave. and Windward Rd.	Fair-poor	Electrical and I&C recently upgraded.		Backup power provided by portable generator	Wet well hatch, wet well concrete in poor condition and exhibiting exposed aggregate and H <sub>2</sub> S corrosion. Isolation and check valves in fair and poor conditions, respectively. Check valves were stuck.
Belvedere	3	PS-10	Lagoon Rd. near Maybridge Rd.	Fair-poor	Electrical and I&C recently upgraded.		Backup power provided by portable generator	Wet well concrete top cracked and in poor condition. Wet well grout cracking and in fair condition. Isolation and check valves are in fair and poor conditions, respectively.
Belvedere	3	PS-13	West Shore Rd. (north)	Fair	Electrical and I&C recently upgraded.		Backup power provided by portable generator.	Wet well grout cracking and is in fair condition. Isolation and check valves are in fair and poor conditions, respectively
Belvedere	4	PS-2	San Rafael Ave. and Teal Rd	Fair-poor	New generator, electrical, I&C, and automatic transfer switch are being upgraded during the time of the inspection.		Backup power provided by fixed mount natural gas-powered emergency generator	Access hatches to wet well in fair condition. Wet well in fair condition and appeared to be coated with coal tar.
Belvedere	4	PS-7	Peninsula Rd. and Beach Rd.	Fair-poor	Electrical and I&C recently upgraded.	Odor issues reported.	Backup power provided by Belvedere PS-1	Pipeline settling issues reported. Wet well concrete aggregate exposed, exhibiting softness, and H <sub>2</sub> S corrosion. Check valves in poor condition with operational issues reported.
Belvedere	4	PS-15	Beach Rd. near Embarcadero Dr.	Fair			Backup power provided by portable generator.	Electrical and I&C recently upgraded and in very good condition.
Belvedere	4	PS-14	West Shore Rd. (south)	Fair	Electrical and I&C upgraded in 2018.		Backup power provided by portable generator.	Wet well concrete is in fair condition. Access ladder is in very poor condition, extremely corroded, and should not be used
Belvedere	4	PS-8	Windward Rd.	Fair	Older I&C scheduled to be upgraded.		Backup power provided by portable generator	Wet well access hatch in very poor condition. Excessive corrosion might be caused by brackish water. Wet well concrete in poor condition; exposed aggregate, softness and corrosion. Check valve issues reported.
Belvedere	4	PS-11	Lagoon Rd. (north)	Fair-poor	Electrical and I&C recently upgraded.		Backup power provided by portable generator.	Wet well concrete top cracked and in poor condition. Isolation and check valves are in fair and poor conditions, respectively.
Belvedere	4	PS-12	San Rafael Ave. and Edgewater Rd.	Fair-poor	Electrical and I&C recently upgraded.		Backup power provided by portable generator.	Wet well grout exhibiting cracking.

Service area	Criticality level	Lift station number	Lift station location	Overall condition	Recent upgrades	Odor issues	Backup power	Notes
Seafirth	1	CF-PS1	Seafirth Pl.	Good	Natural gas backup generator, electrical and I&C upgraded in 2009.	Odor issues reported.	Backup power provided by fixed mount natural gas-powered emergency generator	
Seafirth	2	CF-PS2	Seafirth Rd.	Good		Odor issues reported.	Electrical and I&C upgraded in 2009 and is in good condition	



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#### 4.3.5.1 Overall

**Overall, the condition of the lift stations varied, with the Tiburon and Seafirth lift stations generally being in better overall condition than the Belvedere lift stations.** Actual station age and capacity assessment were not determined because of limited data; therefore, the assessments relied on interviews with District staff for historical knowledge, visual condition assessment based on experience evaluating similar assets evaluated at other utilities, and comparison to industry best practices.

**In general, the lift stations were well maintained. None of the stations received a very poor rating. The most significant issues identified were as follows:**

- **Tiburon PS-4:** Access to the lift station is difficult. Access is on private property down steep, narrow, and degrading stairs. This lift station is also subject to tidal flooding and bay contamination. The Tiburon PS-4 force main may not lie within the dedicated easement, but instead could be on adjacent private property. However, the evaluation, legality, relocation, or replacement of force mains were not within the scope of this study.
- **Tiburon PS-9:** This station is in poor condition. The wet well upper concrete cylinder sections are leaning toward the shoreline, making it difficult to remove or maintain the submersible pumps.
- **Belvedere PS-1:** This station is in poor condition overall, with high groundwater infiltration likely. Poor structural condition of the facilities and the electrical, instrumentation and controls (I&C) and backup generator are beyond their useful life.
- **Belvedere PS-7:** This station is in poor condition. Wet well concrete is in poor condition and exhibiting exposed aggregate and hydrogen sulfide (H<sub>2</sub>S) corrosion. The station check valve is in poor condition with operational issues reported.

In most cases, lift stations in poor or fair-poor condition exhibited significant corrosion or degradation of the wet well concrete. Station improvements to improve the grade of these stations must address repairing the concrete to a structurally sound condition. There are a variety of technologies that may be able to achieve this, however evaluation of these technologies was not part of the scope of this study.

#### 4.3.5.2 Operational Issues

Odor issues were reported in several lift stations in the Belvedere and Seafirth service areas as shown in Table 40, above. Options for odor control include the following:

1. Install passive airtight and watertight gasketed access hatches and manholes that prevent foul air from escaping uncontrolled and infiltration water flow from entering the system. However, this eliminates the wet wells and manholes ability to breathe and might adversely affect hydraulic performance. The trapped foul air will escape at the exit unsealed upstream or downstream opening.
2. Install a passive a 10 to 12 foot high gooseneck pipe, 4 to 6 inches in diameter, that connects the annular space to the exterior. The height of the pipe may allow for air dispersal.
3. Install passive manhole inserts with activated carbon units, as shown in Figure 31.
4. Install passive external activated carbon units, as shown in Figure 32.
5. Implement active chemical injection such as Bioxide® calcium nitrate solution to control H<sub>2</sub>S or other similar chemical injection methods.
6. Install a combination of airtight and watertight gasketed access hatches and gooseneck piping described in alternative 2.
7. Install an active exhaust fan with odor control unit.
8. Eliminate upstream pipeline belly, sag, and low area causing stagnation and putrefaction. This strategy would eliminate the cause of the odor, however, it is also the costliest.



Figure 31. The Mole™ manhole insert with 20 lb. activated carbon to eliminate odors or equivalent device

200 Lbs. Carbon  
in each canister

1

High Quality Carbon  
Virgin granular with activity Iodine  
No. 1100.

2

Separate "No Leak" Plastic  
Liner  
Semi-Rigid polyethylene  
construction. Eliminates "Pin-Hole"  
leaks

3

Large Internal Piping  
1 1/4" For low pressure drop  
through canister. Only 1.25 psi at  
10 GPM.

4

Bung Fitting  
For ease of draining.

5

Special Inlet Diffuser  
Prevents rat holing.

6

All Fittings In Cover

- Preserves Integrity of Drum
- Easy to Connect
- No Protrusions on Sides

7

Air Bleed Fitting

"No Leak" Cover Gasket. Special 75  
durometer soft rubber gasket for  
tight seal.

8

Steel Drum

Heavy Duty, Epoxy Phenolic Lining.  
Test Pressure 15 psi.

9

Underdrain Design

Eliminates Channeling.

10

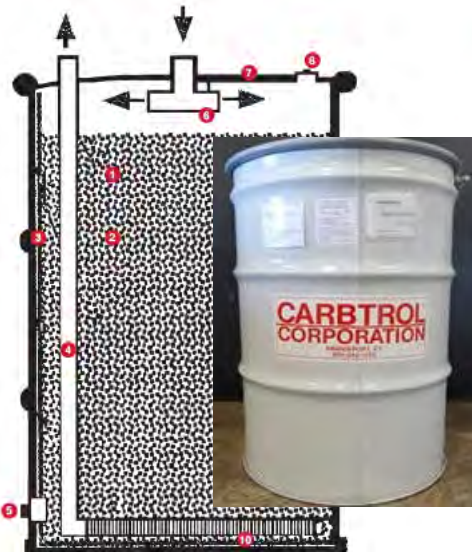


Figure 32. The Carbtrol® L-1 Canister with 200 lb. activated carbon to eliminate odors or equivalent device

## 5.0 Capital Improvement Plan

This section summarizes of the results of the gravity main and lift station assessments and presents SD5's 15-year CIP and planning-level cost estimates for each project.

### 5.1 Summary of Gravity Main Recommendations

The analysis of the gravity mains generated rehabilitation recommendations for all designated rehabilitation-related defects observed in the CCTV inspection data and other characteristics as defined in the rehabilitation decision logic in the previous section. Addressing all of these recommendations is both impractical and unnecessary because of District resource constraints and because some of the defects observed do not present a risk for SSOs or pipe failure at their current condition level. This CIP focuses on the most severe defects and highest-risk pipes for near-term capital improvements. However, because the inspections of many of these pipes were completed more than 15 years ago, it is assumed that many of the pipes with moderate defects (grades 3 and 4) continued to degrade and may currently be in worse physical condition. Therefore, these pipes (or a representative sample) should be re-inspected soon to determine if continued deterioration has occurred.

#### 5.1.1 Rehabilitation

SD5's approach to selecting pipes for rehabilitation is based on the risk values calculated for each pipe and the overall severity of defects observed. Calculation of the risk values has been described in detail in the Section 4.1.3 above. The severity of the defects observed is based on the highest PACP defect grade observed on each pipe.

The PACP inspection process assigns a grade number for each defect observed. This grade is a 1 through 5 score that identifies the severity:

- **5:** immediate attention needed
- **4:** poor; will become Grade 5 in near future
- **3:** fair; moderate
- **2:** good; has not begun to deteriorate
- **1:** excellent; minor defects

It is common industry practice to use these defect grades to determine remaining useful life of the pipe. The most common application is:

- **5:** pipe has failed or will likely fail within 5 years
- **4:** pipe will probably fail in 5 to 10 years
- **3:** pipe may fail in 10 to 20 years
- **2:** pipe unlikely to fail for at least 20 years
- **1:** failure unlikely in foreseeable future

This is a general guideline and is applicable for SD5 based on the information available. However, NASSCO has revised the grading of its defects since the original District inspections were completed based in lessons learned in the industry (which could reclassify some of the original observations) and other PACP defect studies have shown that some defects deteriorate at a faster rate than others. Therefore, it is recommended that the pipes with grade 5 defects be addressed as soon as possible (e.g., within 5 years) and that pipes with grade 4 and grade 3 defects be reevaluated to determine the amount of degradation that has taken place since the original inspection. Some of these may now be grade 5 defects. Re-inspection is discussed further, below.

SD5 pipeline rehabilitation plan has been divided into the following four tiers for prioritization:

- 1 – Peak structural grade 5 defects or risk score greater than or equal to 58
- 2 – Peak structural grade 4 defects or risk score between 50 and 57.5
- 3 – Peak structural grade 3 defects or risk score between 36 and 49.5
- 4 – Others

Table 41 shows a summary of rehabilitation recommendations and costs per tier.

**Table 41. Summary of pipeline rehabilitation recommendations**

Tier	Timeframe	Number of gravity mains	Sum of miles	Percent of system	Gravity main costs
1	0–5 years	57	2.2	7%	\$3,069,814
2	5–10 years	56	2.3	8%	\$2,749,981
3	10–15 years	32	1.5	5%	\$2,324,530
4	15+ years	13	0.6	2%	\$592,900
<b>Grand total</b>		<b>158</b>	<b>6.6</b>	<b>22%</b>	<b>\$8,737,225</b>

Within the Tier 1 collection of pipes, additional refinement and prioritization can be applied by considering I&I and road paving. Based on the I&I study, pipes that fall within a basin that has I&I issues is noted in the model. While this does not impact the quantitative analysis, it can influence the annual priorities for rehabilitation. Road paving information from the Town of Tiburon (and any other data available) may also be used to determine the schedule for rehabilitation over the next five years.

5.1.2 Reinspection

***The gravity mains recommended for CCTV inspection are a combination of pipes that have never been inspected, pipes that have inspection results showing inconsequential or no PACP defects, and pipes that have been previously inspected that should be reevaluated.***

The decision support model relies on CCTV captured for analysis from about 15 years ago and therefore, it is likely that the system has continued to age and degrade after the analysis was completed, which is not accounted for in the model. In order to verify that these lower-grade issues have not become more urgent repairs, a degradation analysis is recommended. For the analysis, several pipes should be selected for another CCTV inspection. By comparing the current CCTV results with the original results, SD5 will be able to determine the amount of degradation that has occurred, which types of defects degrade the fastest, and if there are any that require urgent rehabilitation. SD5 can use this information to prioritize additional work for the remaining lower priority defects as well as more effectively plan future inspections.

***There is approximately 45,000 feet of pipe in the system that has grade 4 and grade 3 defects. A degradation analysis can be performed on about 10 to 15 percent of these pipes, preferably selecting pipes with more than one defect.*** This analysis would cost between \$50,000 and \$75,000 to complete.

A breakdown of these gravity mains and their prioritized CCTV inspection recommendations by timeframe is shown in Table 42. Risk priority thresholds were assigned qualitatively based on the distribution of the results and represent relative priorities. Roughly 40 percent of the gravity main system is being

recommended for CCTV inspections with varying priorities and time frames based on current information. However, this may drop significantly if it is determined that the system is deteriorating at a slower rate after completion of the Tier 1 inspections. This is discussed further in Section 5.6.1 under Additional Recommendations.

**Table 42. Summary of prioritized CCTV inspection recommendations**

Tier	Timeframe	Strategy	Count of gravity mains	Sum of miles	Percent of system	Follow up CCTV costs
1	0–5 years	Decision model	19	0.53	2%	\$19,761
		Degradation analysis		1.0 - 1.5	3% - 5%	\$75,000 (approx.)
2	5–10 years	Decision model	99	2.63	9%	\$97,102
3	10–15 years	Decision model	111	4.05	13%	\$149,553
4	15+ years	Decision model	111	3.78	12%	\$139,531
<b>Grand total</b>			<b>340</b>	<b>12.00(approx.)</b>	<b>40%</b>	<b>\$405,947</b>

## 5.2 Summary of Lift Station Recommendations

This section describes the aggregation of the condition assessment findings into recommended improvement projects. Key assumptions that were considered to develop the lift station recommendations were applied based on industry knowledge and District-specific considerations. These are:

- Generators have fifteen (15) year estimated useful life based on District experience because of deterioration from sea air corrosion, usage, and age. Although Tiburon 5, Belvedere 3, and other standby generators were recently upgraded, they will still require one replacement cycle within the next 15 years. Therefore, all standby generators will require one replacement cycle within the next 15 years.
- SD5 has an ongoing pump preventive maintenance replacement program for the lift stations which is tracked in their maintenance management database, If there is no record in the database for replacement of a given pump and its age unknown, then it will be assumed that the it will require one replacement cycle within the next 15 years. The pumps estimated useful life is assumed to be 30 years.

Overall, the lift stations were in varying condition with Tiburon and Seafirth lift stations in better overall condition than the Belvedere lift stations. **Three of the stations that are in poor condition will require additional investigation to determine the best alternatives to fully address issues observed:**

- **Tiburon PS-4** requires additional investigation because of its sensitive location and force main easement issues. The resulting redesign, repairs, upgrades, and costs are not accounted for in this Master Plan.
- **Tiburon PS-9** requires additional investigation because of the leaning wet well concrete sections. The investigation and technical memorandum to provide recommended repairs and upgrades is estimated at approximately \$15,000. The resulting repairs, upgrades, and costs are not accounted for in this document.

- **Belvedere PS-1** requires additional investigation because of its system criticality, age, and conditions. The resulting redesign, repairs, upgrades, and costs are not accounted for in this Master Plan.

***Odor control will be required for Belvedere Lift Stations PS-1, PS-3, and PS-7.*** Belvedere PS-1 and PS-3 are generally not near residential or public spaces and can apply odor controls that focus on efficiency and familiarity of operation. Chemical injection is recommended for these stations. Belvedere PS-7 is located next to residential property and will need a solution that is both aesthetic and functional. It is recommended that this station incorporate an exterior activated carbon odor control unit.

The overall condition summary of each lift station is shown in Table 43.

**Table 43. Condition assessment summary for lift stations sorted by criticality level**

Service area	Lift station criticality	Lift station location	Description	Very good (New or excellent condition)	Good (Minor defects only)	Fair (Moderate deterioration)	Poor (Significant deterioration)	Very poor (Virtually unserviceable)
Tiburon	1	PS-5	Mar W St.	✓				
Tiburon	2	PS-3	Paradise Dr. & Solano St.			✓		
Tiburon	3	PS-2	Mar E St. near Agreste Way			✓		
Tiburon	3	PS-6	Tiburon Blvd. and Beach Rd.			✓	✓	
Tiburon	3	PS-8	Beach Rd. and Lagoon Vista Rd.			✓		
Tiburon	4	PS-1	Mar E St. near Mar E Dr.			✓		
Tiburon	4	PS-4	Paradise Dr. near Lyford's Tower				✓	
Tiburon	4	PS-7	Tiburon Blvd. near Ned's Way			✓		
Tiburon	4	PS-9	Paradise Dr. near Shoreline Park				✓	
Belvedere	1	PS-1	Cove Rd. & Barn Rd.				✓	
Belvedere	2	PS-3	San Rafael Ave. and Golden Gate Ave.			✓	✓	
Belvedere	2	PS-9	Lagoon Rd. (south)			✓	✓	
Belvedere	3	PS-5	San Rafael Ave. and Windward Rd.			✓	✓	
Belvedere	3	PS-10	Lagoon Rd. near Maybridge Rd.			✓	✓	
Belvedere	3	PS-13	West Shore Rd. (north)			✓		
Belvedere	4	PS-2	San Rafael Ave. & Teal Rd.			✓	✓	
Belvedere	4	PS-7	Peninsula Rd. and Beach Rd.			✓	✓	
Belvedere	4	PS-15	Beach Rd. near Embarcadero Dr.			✓		
Belvedere	4	PS-14	West Shore Rd. (south)			✓		
Belvedere	4	PS-8	Windward Rd.			✓		
Belvedere	4	PS-11	Lagoon Rd. (north)			✓	✓	
Belvedere	4	PS-12	San Rafael Ave. & Edgewater Rd.			✓	✓	
Seafirth	1	CF-PS1	Seafirth Pl.		✓			
Seafirth	2	CF-PS2	Seafirth Rd.		✓			



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### 5.2.1 Lift Station Improvement Projects

Recommended improvements for the SD5 lift stations fall into the following categories:

- **Additional investigation:** A few stations have unique issues that require a more detailed engineering analysis as described previously.
- **Concrete repair:** Repair of the wet well and other concrete structures is needed.
- **Epoxy coating:** Application of an epoxy coating to the wet well should be applied to slow down observed corrosion and extend the wet well useful life.
- **Epoxy coating (optional):** Optional epoxy coatings are recommended on stations where minor concrete deterioration or wear in the existing coating has been observed. The cost to recoat these structures is relatively low; however, the cost of mobilization and required bypass pumping is significant. Therefore, these recommendations should be applied as cost-effective opportunities allow.
- **Check valve:** Poor check valve condition is one of the more predominant issues observed in the lift stations. These should be replaced.
- **Pump replacement:** Pump replacement program in effect—\$25,000 each zone. Replace as needed. Most pumps are 5 years old or newer.
- **Standby backup generator:** Generator replacement is assumed to be required every 15 years because of the corrosive marine conditions on the Tiburon Peninsula.
- **Access hatch replacement:** Replacement of access hatches that are in poor condition.
- **Access hatch repair:** Rehabilitation of access hatches in fair condition.
- **Fall protection safety grate:** Many of the older fall protection nets are deteriorated or approaching the end of their expected lives.
- **Odor control:** Odor control recommendations as described earlier.
- **Preventive maintenance:** Current preventive maintenance procedures and frequencies are sufficient and appropriate for proper maintenance and continued implementation is recommended. Note that these costs are considered operational and are not incorporated into the CIP.

Tables 49, 50, and 51 summarize the lift station recommended improvements for Tiburon, Belvedere, and Seafirth within the next 15 years, respectively.

**Table 44. Tiburon lift station recommended improvements within the next 15 years**

		Tiburon lift stations								
Improvements		PS-1	PS-2	PS-3	PS-4	PS-5	PS-6	PS-7	PS-8	PS-9
1	Additional investigation				✓					✓
2	Concrete repair				✓					✓
3	Epoxy coating				✓		✓			✓
4	Epoxy coating (optional)	✓	✓	✓				✓	✓	
5	Check valve	✓	✓	✓			✓	✓	✓	
6	Pump replacement		✓	✓	✓					✓
7	Standby backup generator		✓	✓		✓	✓	✓	✓	
8	Access hatch replacement			✓	✓		✓	✓	✓	✓
9	Access hatch repair									



		Tiburon lift stations								
Improvements		PS-1	PS-2	PS-3	PS-4	PS-5	PS-6	PS-7	PS-8	PS-9
10	Fall protection safety grate		✓	✓	✓		✓	✓	✓	
11	Odor control									
12	Preventive maintenance	✓	✓	✓	✓	✓	✓	✓	✓	✓

**Table 45. Belvedere lift station recommended improvements within the next 15 years**

		Belvedere lift stations												
Improvements		PS-1	PS-2	PS-3	PS-5	PS-7	PS-8	PS-9	PS-10	PS-11	PS-12	PS-13	PS-14	PS-15
1	Additional investigation	✓												
2	Concrete repair	✓	✓	✓	✓	✓		✓	✓	✓	✓			
3	Epoxy coating	✓	✓	✓	✓	✓								
4	Epoxy coating (optional)						✓	✓	✓	✓	✓	✓	✓	✓
5	Check valve	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
6	Pump replacement	✓	✓						✓	✓	✓			
7	Standby backup generator	✓		✓										
8	Access hatch replacement	✓	✓	✓	✓	✓		✓	✓	✓				✓
9	Access hatch repair						✓				✓	✓	✓	
10	Fall protection safety grate	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
11	Odor control	✓	✓	✓		✓								
12	Preventive maintenance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

**Table 46. Seafirth lift station recommended improvements within the next 15 years**

	Improvements	Seafirth lift stations	
		PS-1	PS-2
1	Additional investigation		
2	Concrete repair		
3	Epoxy coating		
4	Epoxy coating (optional)	✓	✓
5	Check valve		
6	Pump replacement		
7	Standby backup generator	✓	
8	Access hatch replacement		
9	Access hatch repair		
10	Fall protection safety grate		
11	Odor control		
12	Preventive maintenance	✓	✓

These recommended rehabilitations have been prioritized into the same tier structure used for prioritizing pipeline replacements and is based on the criticality analysis described above. **Table 47 provides the recommended schedule and opinion of costs for each lift station.** Detailed cost basis for these estimates can be found in Appendix D.

**Table 47. Recommended lift station schedule and rehabilitation costs**

Service area	Lift station number	Lift station location	Rehabilitation schedule			
			0-5 years	5-10 years	10-15 years	15+ years
Tiburon	PS-1	Mar E St. near Mar E Dr.				\$11,154
Tiburon	PS-2	Mar E St. near Agreste Way			\$99,725	
Tiburon	PS-3	Paradise Dr. and Solano St.			\$129,910	
Tiburon	PS-4	Paradise Dr. near Lyford's Tower	\$386,515			
Tiburon	PS-5	Mar W St.				\$50,833
Tiburon	PS-6	Tiburon Blvd. and Beach Rd.		\$431,013		
Tiburon	PS-7	Tiburon Blvd. near Ned's Way			\$91,464	
Tiburon	PS-8	Beach Rd. and Lagoon Vista Rd.			\$40,631	
Tiburon	PS-9	Paradise Dr. near Shoreline Park	\$400,747			
Belvedere	PS-1	Cove Rd. and Barn Rd.	\$668,323			
Belvedere	PS-2	San Rafael Ave. and Teal Rd.		\$498,934		
Belvedere	PS-3	San Rafael Ave. and Golden Gate Av		\$500,590		
Belvedere	PS-5	San Rafael Ave. and Windward Rd.			\$418,832	
Belvedere	PS-7	Peninsula Rd. and Beach Rd.	\$411,031			
Belvedere	PS-8	Windward Rd.				\$53,473
Belvedere	PS-9	Lagoon Rd. (south)		\$83,478		
Belvedere	PS-10	Lagoon Rd. near Maybridge Rd.			\$48,632	
Belvedere	PS-11	Lagoon Rd. (north)			\$48,632	
Belvedere	PS-12	San Rafael Ave. and Edgewater Rd.			\$36,050	
Belvedere	PS-13	West Shore Rd. (north)				\$70,896
Belvedere	PS-14	West Shore Rd. (south)				\$31,165
Belvedere	PS-15	Beach Rd. near Embarcadero Dr.				\$58,054
Seafirth	CF-PS1	Seafirth Pl.				\$50,833
Seafirth	CF-PS2	Seafirth Rd.				\$0
<b>Total</b>			<b>\$1,866,617</b>	<b>\$1,514,016</b>	<b>\$913,877</b>	<b>\$326,408</b>

**Notes:**

Costs are in 2020 dollars from RS Means (a publication and database for construction industry materials, equipment, labor, etc. cost estimating).

Detailed cost basis for these estimates can be found in Appendix D.

### 5.3 Force Main Recommendations

A detailed assessment of SD5's force mains was not part of the master plan scope, however available information was reviewed to develop recommendations on further evaluation. This analysis considered both prioritizing the force mains to determine which ones should be evaluated first and identifying appropriate technologies to be used for the condition assessment. To simplify the analysis, the force main segments in the GIS were aggregated based on the upstream and downstream connectivity with

other segments, similar materials, and similar diameters. The resulting force main records are provided in Table 48, below. There are six pipe materials found in the SD5 force mains. Those include: asbestos cement (AC), vitrified clay pipe (VCP), cast iron (CAS), polyethylene (PE), poly-vinyl chloride (PVC), and steel. The pipe diameters in this system range from 4 inches to 10 inches.

Accurately prioritizing SD5's force mains would require a full risk analysis with LoF and CoF scoring for each pipe to determine the criticality of each (similar to what was performed on the gravity mains). Lacking such a study but based on experience and information available in the SD5's GIS database, the following recommendations are provided. It should be noted that a full risk analysis may identify different priorities.

***From the information available, the Tiburon force mains PS-5-14 and PS-6-621, and Belvedere force mains PS1-TIB and the PS3 force mains (PS3-ND5 - PS3-ND5.1 and PS3-ND5.1.1) should be prioritized first for condition assessment.*** This is mostly due to their lengths, their associated pump station criticality, and their ages.

The possible assessment technologies for each force main is also shown in Table 48. The available technologies and vendors for assessment of these pipes is provided in Table 49. A more detailed description of each assessment technology can be found in Appendix F. The estimated cost for different assessment tools for each higher priority force main is provided in Table 50. These costs are based on previous project experience but would need to be refined with a quote from each vendor.

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**Table 48. Summary of District force mains and recommendations including sample results from V&A Consulting Engineers, 2018**

Force main ID	Pump station	Pump station priority	Percent service area of collection system covered	Diameter (in.)	Material	Length (ft.)	Installation year	GIS comment	Sample material	Vanda rating	Metal loss	Possible assessment technologies
PS1-TIB	(B)PS1 <sup>1</sup>	1	100%	10	AC	2,107	1950	FORCEMAIN 10"				Acoustic
PS3-ND5 - PS3-ND5.1	(B)PS3	4	33%	6	PE	285.4	1950	FORCEMAIN 7.5" NEAR CURB				Acoustic
PS3-ND5.1.1	(B)PS3	4	33%	8	CAS	1973	1950		Steel	2 (minor)	23.68%	Acoustic, electromagnetic
PS9-N7	(B)PS9	4	4%	4	PVC	397	1952	FORCEMAIN 4"				Acoustic
PS5-C5	(B)PS5	5	5%	6	CAS	72	1952	FORCEMAIN				Acoustic
PS10-M5	(B)PS10	5	4%	6	CAS	35	1950	FORCEMAIN				Acoustic
PS13-CA5.1	(B)PS13	5	16%	4	AC	438	1956	FORCEMAIN 4"				Acoustic
PS2-ND2	(B)PS2	3	13%	6	CAS	16		FORCEMAIN				Acoustic
PS7-NB2	(B)PS7	2	4%	4	CAS	57	1950	FORCEMAIN 4"				Acoustic
PS15-NF3	(B)PS15	6	16%	6	CAS	69	1959	FORCEMAIN				Acoustic
PS14-E6.1	(B)PS14	6	14%	4	AC	458	1950	FORCEMAIN 4"				Acoustic
PS8 - 10 Windward-A7A	(B)PS8	6	1%	6	CAS	53	1952	FORCEMAIN 6" VC				Acoustic
PS11-K4	(B)PS11	6	2%	6	CAS	49	1950	FORCEMAIN 4"				Acoustic
PS12-C6	(B)PS12	6	1%	6	CAS	179	1955	FORCEMAIN				Acoustic
PS-5-14	(T)PS5 <sup>2</sup>	1	62%	8	CAS	1,303	1960		Cast iron	3 (moderate to significant)	18.95%	Acoustic, electromagnetic
PS-3-33	(T)PS3	2	10%	6	CAS	379	1952					Acoustic
PS-2-38	(T)PS2	3	6%	6	CAS	357	1952		Cast iron	4 (severe)	22.12%	Acoustic
PS-6-621	(T)PS6	2	19%	8	AC	1,168	1960					Acoustic
PS-8-808	(T)PS8	3	10%	4	PVC	565	1987					Acoustic
PS-1-41	(T)PS1	4	1%	4	CAS	140	1970					Acoustic
PS-4-608	(T)PS4	2	0%	4	SP	100	1960					Acoustic
PS-7-121	(T)PS7	3	13%	6	CAS	903	1962		Cast iron	2 (minor)	11.95%	Acoustic, electromagnetic
PS-9-642	(T)PS9	2	6%	10	CAS	235	1962					Acoustic
4185 Paradise Dr.-Valve Box - End of Sewer Line Extension	PDE <sup>3</sup>	N/A	23%	4	PE	4,603	2008					Acoustic
473-474, 626-473, 627-626, 630-627, 628-630, 629-628	SE <sup>4</sup>	N/A	23%	6	PE	4634	2003					Acoustic
629-630	VE <sup>5</sup>	N/A	3%	6	PE	562	2003					Acoustic
CF-PS1-	(SF)PS1 <sup>6</sup>	1	11%	4	VCP	870	NA					Acoustic
SF5-CF-PS2	(SF)PS2	2	7%	4	PVC	772	NA					Acoustic

<sup>1</sup>(B) – Belvedere service area<sup>2</sup>(T) – Tiburon service area<sup>3</sup>PDE – Paradise Drive extension<sup>4</sup>SE – Shaw extension<sup>5</sup>VE – Vogt extension<sup>6</sup>(SF) – Seafirth lift stations



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**Table 49. Possible condition assessment technologies and vendors**

Technology description	Vendor	Name
<b>Acoustic</b> <ul style="list-style-type: none"> <li>Leak detection</li> <li>Gas pocket detection</li> <li>Any pipe material</li> <li>Pipe diameters 4" and up</li> <li>Free-swimming</li> <li>Pipe online</li> </ul>	Pure	SmartBall <sup>1</sup>
	PICA	Recon + <sup>1</sup>
<b>Electromagnetic</b> <ul style="list-style-type: none"> <li>Wall loss</li> <li>Metallic pipes</li> <li>Pipe diameters 4" and up</li> <li>Free-swimming or tethered</li> <li>Pipe online or offline</li> </ul>	Pure	PipeDiver <sup>1</sup>
	PICA	SeeSnake <sup>1</sup>
<b>Multi-sensor attachments</b> <ul style="list-style-type: none"> <li>CCTV</li> <li>LIDAR</li> <li>3D scanning</li> <li>Elevation profiling</li> </ul>	Various	Robotic Surveyor <sup>2</sup>

<sup>1</sup>Suitability of these tools for this system is contingent upon a review of the pipeline records by the vendor, and possible access improvements and cleaning.

<sup>2</sup>Not likely to be suitable for these force mains as the line needs to be offline, drained, and cleaned.

**Table 50. Estimated assessment cost**

Force main	Diameter (in.)	Length (ft.)	Pipe material	Possible assessment tools	Estimated cost
PS1-TIB	10	2,107	AC	Recon +	\$12,000
				SmartBall <sup>1</sup>	\$60,000
PS3-ND5 - PS3-ND5.1, PS3-ND5.1.1	6	2,258	PE	Recon +	\$12,000
				SmartBall <sup>1</sup>	\$60,000
PS-5-14	8	1,303	CAS	Recon +	\$12,000
				SmartBall <sup>1</sup>	\$55,000
				SeeSnake	\$250,000
PS-6-621	8	1,168	AC	Recon +	\$12,000
				SmartBall <sup>1</sup>	\$55,000

<sup>1</sup>There is potential cost savings if all the force mains are inspected under a single mobilization and single inspection report, about \$140,000 deduction.

## 5.4 CIP Budgeting

SD5's overall income is around \$6.5 million based on information from the fiscal year (FY) 2020-2021 Budget Report. Previous capital expenditures have ranged between \$1.3 million and \$2.6 million over the past 5 years, which include collection system, lift station, and WWTP improvements and upgrades, as well as current debt service. Because significant improvements have already been completed on the SD5 WWTPs it is assumed that priorities can be shifted to the collection system and lift stations.

Planned capital expenditures for the next 9 years average about \$1.2 million per year totaling approximately \$11 million for the lift stations and gravity mains based on SD5's financial plan. This CIP is structured to conform to this target budget.

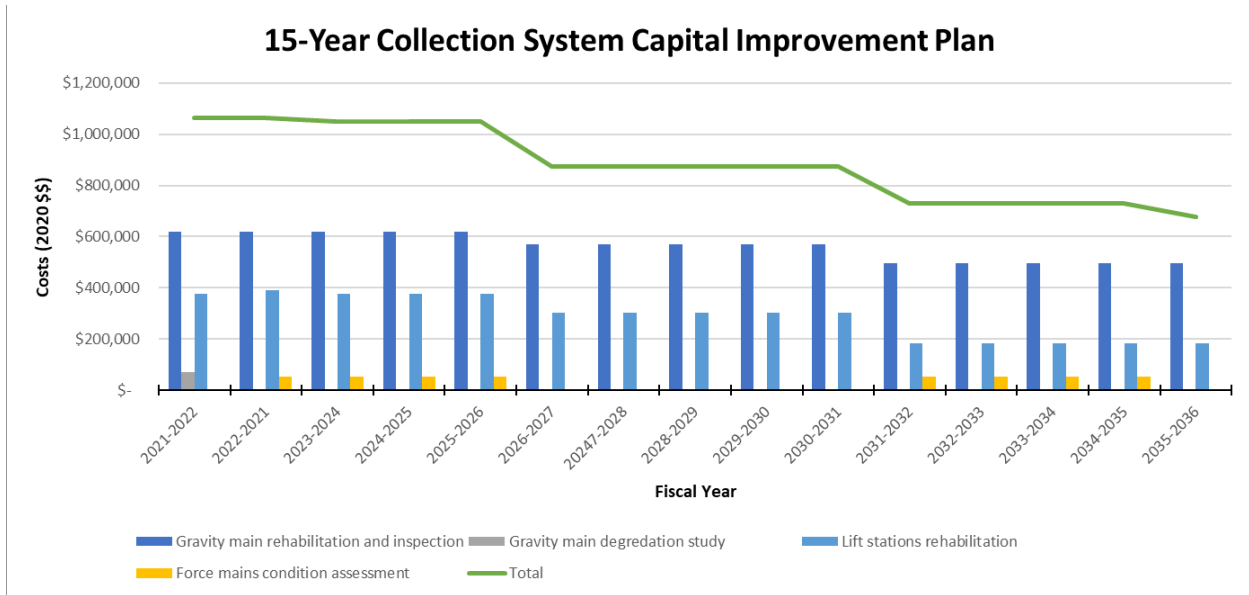
## 5.5 CIP Summary

This section provides a summary of the comprehensive CIP for the collection system. Table 51 shows the expenditures by asset category: gravity mains, pump stations, and force mains. These expenditures are categorized into near-term, mid-term, and long-term expenses covering the next 15 to 20 years. Each of the categories is further divided by service area and finally, a 5-year annual average cost is calculated.

**Table 51. Summary of CIP expenses for gravity mains and lift stations**

	Total	Tiburon	Paradise Cove	Belvedere	Yearly average
<b>Short-term (0-5 years)</b>					
Gravity main rehabilitation and inspection	\$ 3,159,575	\$ 2,236,717	\$ -	\$ 922,858	\$ 631,915
Lift station rehabilitation	\$ 1,896,617	\$ 817,263	\$ -	\$ 1,079,354	\$ 379,323
Force main inspection	\$ 216,000	\$ 108,000	\$ -	\$ 108,000	\$ 43,200
<b>Short-term total</b>	<b>\$ 5,272,192</b>	<b>\$ 3,161,980</b>	<b>\$ -</b>	<b>\$ 2,110,212</b>	<b>\$ 1,054,438</b>
<b>Mid-term (5-10 years)</b>					
Gravity main rehabilitation and inspection	\$ 2,847,083	\$ 1,847,183	\$ 115,933	\$ 883,967	\$ 569,417
Lift station rehabilitation	\$ 1,514,016	\$ 431,013	\$ -	\$ 1,083,002	\$ 302,803
Force main inspection	\$ -	\$ -	\$ -	\$ -	\$ -
<b>Mid-term total</b>	<b>\$ 4,361,099</b>	<b>\$ 2,278,196</b>	<b>\$ 115,933</b>	<b>\$ 1,966,969</b>	<b>\$ 872,220</b>
<b>Long-term (10-15 years)</b>					
Gravity main rehabilitation and inspection	\$ 2,474,083	\$ 1,614,805	\$ 315,363	\$ 543,915	\$ 494,817
Lift station rehabilitation	\$ 913,877	\$ 361,730	\$ -	\$ 552,147	\$ 182,775
Force main inspection	\$ 216,000	\$ 108,000	\$ -	\$ 108,000	\$ 43,200
<b>Long-term total</b>	<b>\$ 3,603,960</b>	<b>\$ 2,084,535</b>	<b>\$ 315,363</b>	<b>\$ 1,204,062</b>	<b>\$ 720,792</b>

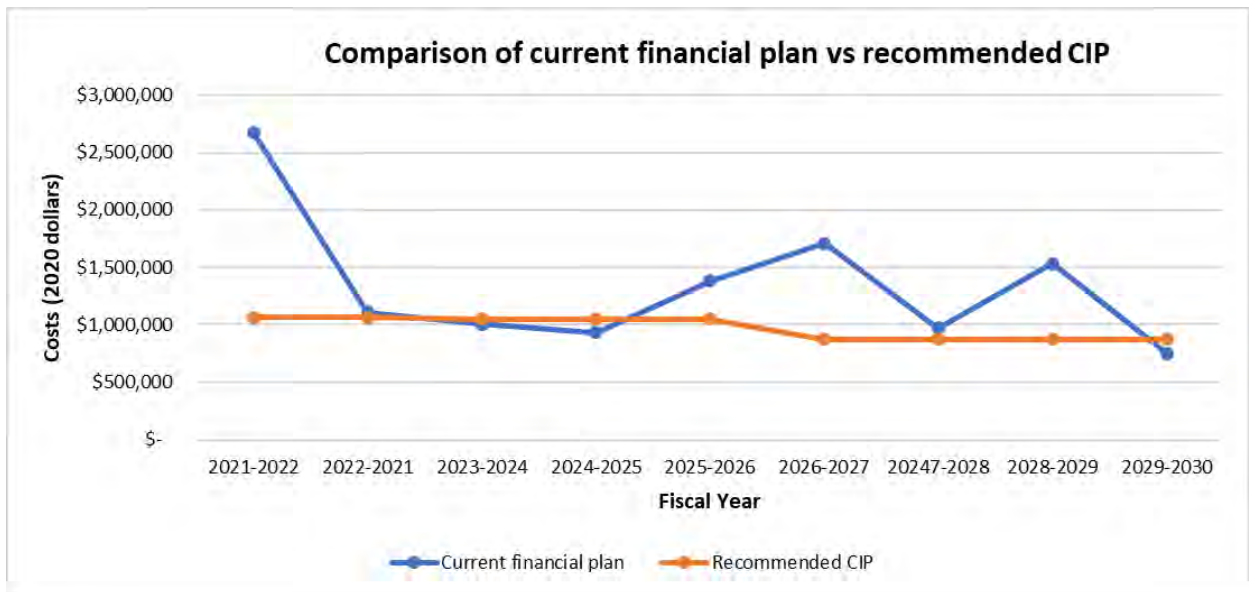
These costs and schedule are also shown on the graph in Figure 33. This graph shows the average expenditures annually by fiscal year. The gravity main rehabilitation and inspection category is further broken out into gravity main rehabilitation (dark blue bars), gravity main inspection (orange bars), and gravity main degradation study (grey bars). The gravity main degradation study is described in more detail in the additional recommendations in Section 5.6, below.



**Figure 33. Collection system capital improvement plan**

The proposed CIP is also compared to SD5’s planned capital expenditures as provided in the FY 2020–2021 Final Budget report (Figure 34) [SD2, 2020b]. The blue line represents the capital budget planned in the Budget Report and the orange line represents the planned expenditures from the proposed CIP.

***The total planned budget from FY 2020–2021 to FY 2028–2029 is \$11 million and the proposed budget for the same period is approximately \$9 million, which shows strong alignment between the planned budget in the Budget Report and the proposed CIP.***



**Figure 34. Comparison of planned capital expenditures in comparison to the proposed CIP**

Figure 35, Figure 36, and Figure 37 provide maps of the proposed capital improvement projects in the near-term, mid-term, and long-term respectively.

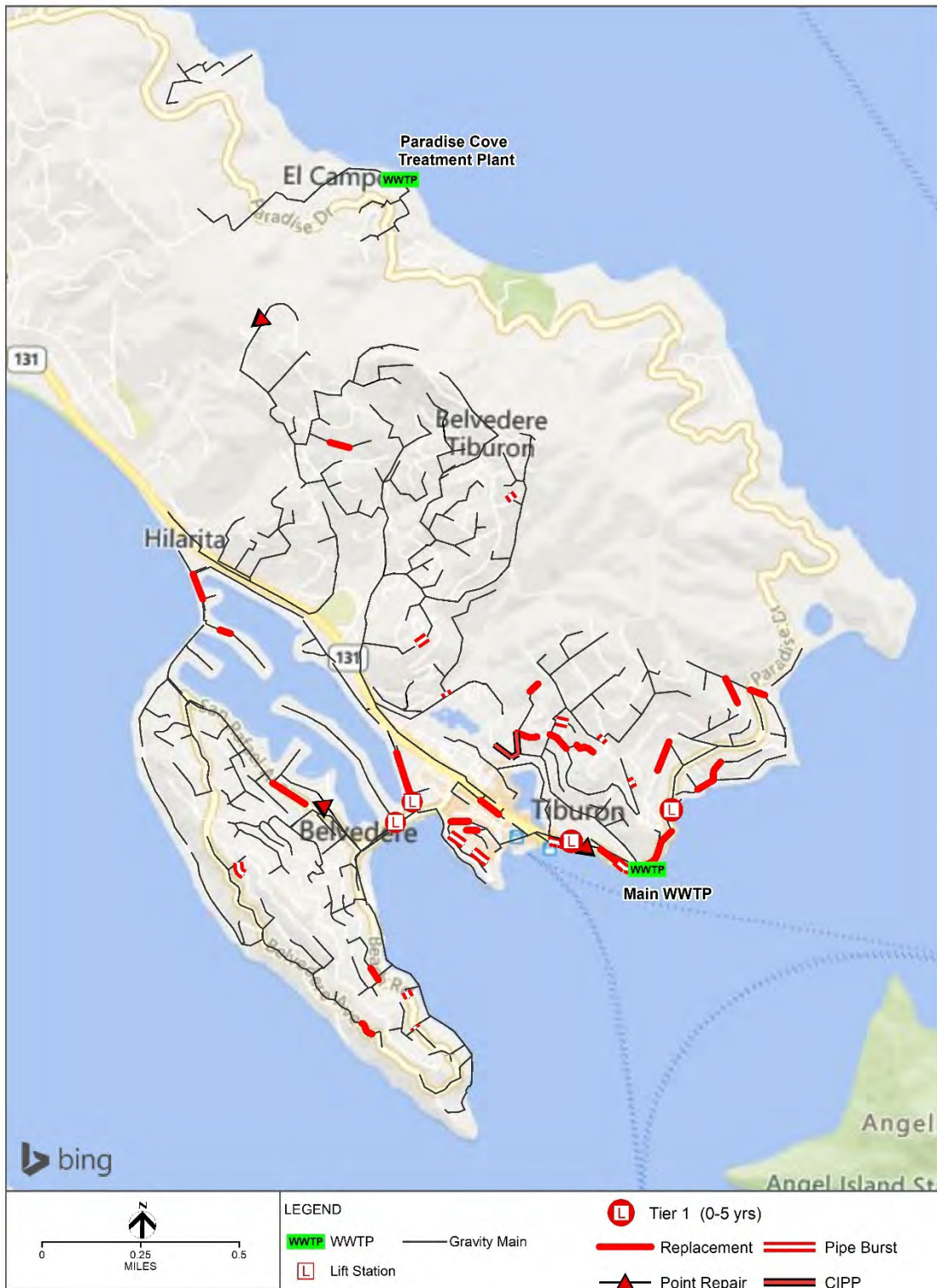


Figure 35. Near-term collection system capital plan

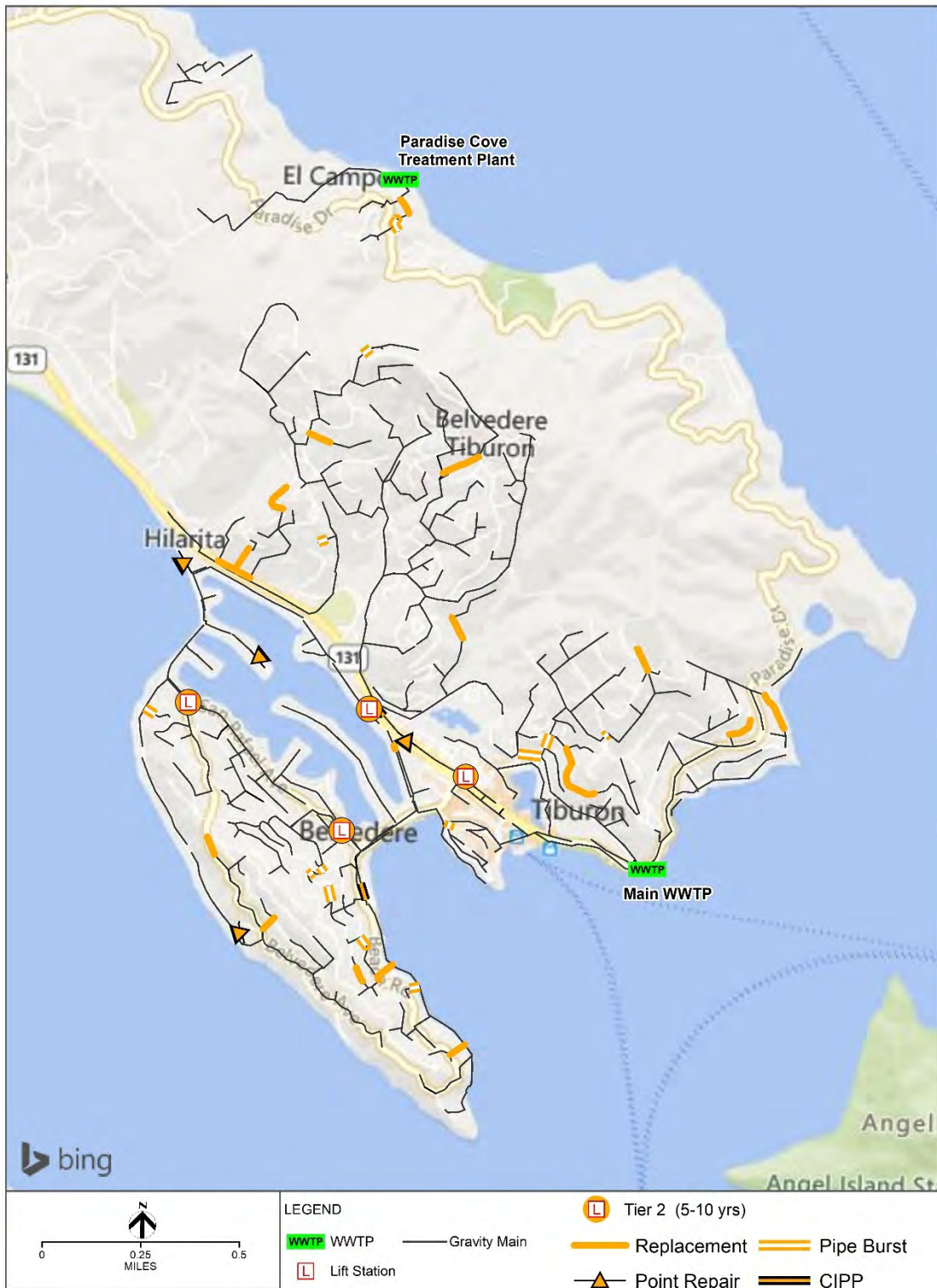


Figure 36. Mid-term collection system capital plan

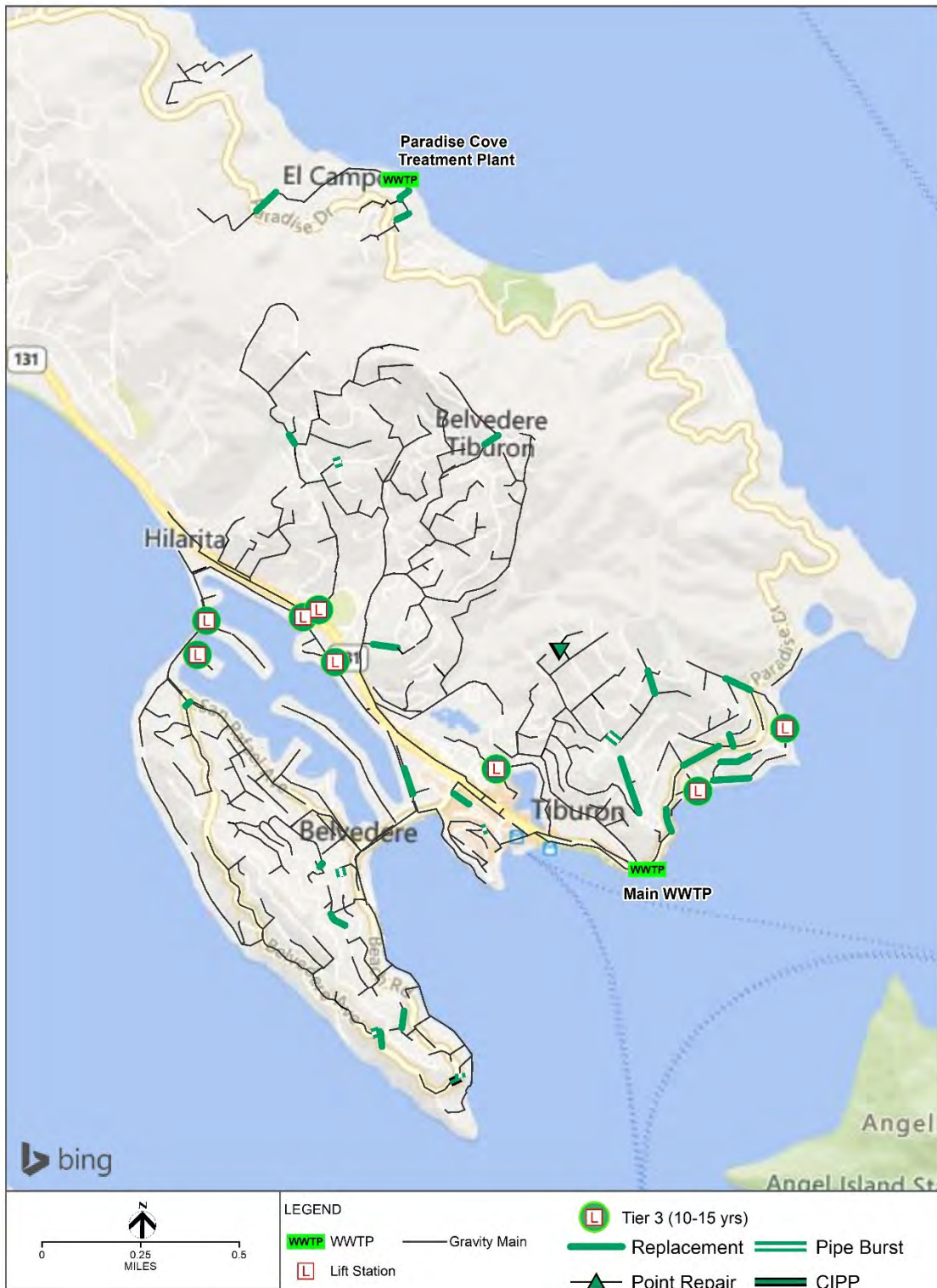


Figure 37. Long-term collection system capital plan

## 5.6 Additional Recommendations

Recommendations identified in this Master Plan that were not incorporated into the capital plan area summarized below.

### 5.6.1 Gravity Mains

The capital plan identifies specific rehabilitation and reinspection actions based on the CCTV data collected previously. In general, grade 5 defects should be addressed in the next 5 years and are incorporated into the capital plan. Grade 4 and grade 3 defects typically do not require immediate attention and therefore have been designated to be repaired between 5 and 15 years, which assumes that they will continue to degrade.

However, most of the CCTV captured for analysis is about 15 years old and therefore, it is expected that the system continued to age and degrade after the analysis was completed. ***In order to verify that these lower-grade issues have not become more urgent repairs, a degradation analysis is recommended.*** For the analysis, several pipes will be selected for another CCTV inspection. By comparing the current CCTV results with the original results, SD5 will be able to determine the amount of degradation that has occurred, which types of defects degrade the fastest, and if there are any that require urgent rehabilitation. SD5 can use this information to prioritize additional work for the remaining lower priority defects as well as more effectively plan future inspections.

There is approximately 40,000 feet of pipe in the system that has grade 4 and grade 3 defects. A degradation analysis can be performed on about 10% of these pipes, preferably selecting pipes with more than one defect. This analysis would cost between \$75,000 and \$100,000 to complete.

### 5.6.2 Inflow and Infiltration

The 2010-2011 flow monitoring study captured flow information for about 50 percent of SD5's collection system. ***A general qualitative review of the available data indicates that there may be additional areas where I&I are significant.*** From the information available in the flow monitoring study and flow data for the Main WWTP during that time period, it appears that the average daily dry weather flow from the monitored basins makes up about 50 percent of the flow to the plant, but only about 30 to 40 percent during wet weather events. For example, average flow on February 3, 2011 totaled about 0.32 MGD from the monitored basins and 0.62 MGD at the plant. This accounts for about half the flow. During a rain event on February 24, 2011, the average daily flow from the monitored area averaged about 0.51 MGD, and the average daily flow at the plant ranged from 0.69 MGD to 1.61 MGD over the following three days. This suggests that the flow contributed from the monitored areas contributed about 30 to 40 percent of the total flow to the plant instead of the expected 50 percent, therefore additional analysis is recommended. Areas to monitor may be prioritized by additional inspection of manholes and pipes that could be susceptible to surface flow or potential damage in creek channels.

***General investigation for inflow reduction is recommended for Basins 1 and 7, and possibly for Basins 2, 4, and 6.*** SD5 may consider a variety of strategies for identifying and removing illicit connections including smoke testing, public outreach, offering of rebates, and community assistance from local organizations (e.g. Scout troops helping residence disconnect downspouts from the sewer system), and augmenting the sewer lateral inspection program to prioritize higher I&I areas.

***SD5 may wish to consider other options for Peninsula Road which has the greatest issues related to I&I.*** Because this line has many sags and is located in the lagoon, it may become a bigger issue if additional settling occurs or sea level continues to rise. Options for addressing the line itself are varied and the most cost-effective solution depends upon the impacts of I&I, need for odor control, amount of



regular and emergency maintenance required and other factors. Table 52 summarizes potential options, their advantages and disadvantages

**Table 52. Summary of options to address Peninsula Road I&I**

Option	Advantages	Disadvantages
Maintain the line as is	Low capital cost	Won't improve I/I. costly for maintenance.
CIPP the main line	May reduce callouts for blockages. May reduce I/I slightly.	Does not remedy the sags, will likely not reduce I/I significantly
Pipe Burst Main line	May reduce callouts for blockages. May reduce I/I slightly.	May reduce some sags. Will not improve the grade of the line.
Open cut main replacement	Sags are fixed. May reduce I/I slightly. Could improve grade of the main.	Services lines may need to be replaced because the new main may be higher in elevation. Susceptible to sagging in the future. Capital cost would be high. Excavation would be extensive.
Replace main line and services	I/I would be reduced. Sags could be fixed. Maintenance cost would be reduced	Costly for construction. Requires cooperation from property owners. Excavation is extensive.
Replace the main in the street with a vacuum sewer system.	Future settlement would not affect the system. Excavation could be minimized. I/I from the public system would be eliminated.	Need a site for the vacuum system/lift station. Capital cost would be high. I/I from private property would not be reduced. Maintenance activities would be new and require training.
Construct vacuum system and replace services	The greatest reduction in I/I. fixes the system so that future settlement does not harm the system.	Capital cost would be high. Excavation would be extensive. Private property owner support is required. Maintenance activities would be new and require training.

### 5.6.3 Sea Level Rise

SD5 currently experiences local impacts from the bay, storm surges, and high tides, and it is likely that these will become a greater issue in the next 20 to 30 years. It is difficult to determine how great these current impact are and therefore difficult to predict how much they significant they will be in the future. ***SD5 has done a good job of improving its lift stations to be more resilient to flooding or SLR and should continue to evaluate Tiburon lift stations PS-4 and PS-6 as they appear to be the most susceptible to current flooding and future SLR impacts.***

***Over the next 10 to 15 years, it would be useful for SD5 to conduct a Sea Level Rise Vulnerability Assessment to determine how and where the most significant SLR impacts will occur.*** This should include further evaluation of tidal influences and the behavior of the local groundwater table to identify areas where additional I&I could be introduced. This will enable SD5 to develop system design, maintenance and emergency response plans that account for future SLR impacts.

#### 5.6.4 Current Process Recommendations

Based on the information reviewed during development of this master plan and discussions with SD5 staff, the District has a good foundation for collecting and utilizing system data to make strategic and tactical operational decisions. The documents reviewed and data received were mostly up to date and provided a strong foundation for the analysis and development of this master plan.

The following recommendations are provided in order to streamline future analysis, efficiently leverage all information previously created by prior analyses, and avoid extra work correcting errors or filling in missing data. Note that these recommendations represent industry best practices and may already be in place but were not verified as part of this effort.

**Establish data management best practices to maintain complete, accurate, and up-to-date data in SD5's enterprise data management systems (e.g. GIS and CMMS).** Determine what the minimum set of data that should be maintained for all of the SD5 assets and identify the official location where that data will be managed. Develop change management procedures that trigger data updates (e.g. when a pump is replaced at a lift station, what information should be collected and where should it be stored?). Develop a quality control process to assure that the data managed is accurate and complete.

**Establish document management standards to maintain source control on documents produced for the District.** Documents produced should be in editable electronic format and organized in a logical filing/document management system for easy location and retrieval. The latest version of each document should be identified. Supporting data associated with the documents should be provided in electronic-database or spreadsheet format for future use. Lift station as-built drawings should also be incorporated, if available. These requirements can be incorporated into both internal and external future document deliverables.

**Define data management standards for the GIS.** These include standardized naming conventions, identification of required data, and data accuracy requirements. Procedures for updating data should be established (e.g. what happens to historical data when an asset is replaced or retired?). Typically, GIS manages asset information that is relatively static (e.g. asset physical characteristics, installation details, current status, etc.) and should be updated when assets are improved, replaced, or retired.

**Track all maintenance activity in the CMMS.** The CMMS should be the central repository of all maintenance and repair activity that is performed on the system. The CMMS should track work performed on pipes, and appurtenances, as well as on pump stations and the treatment plants. The CMMS should have a set of data management and quality control requirements to ensure accurate, up-to-date information and complete asset history. Other key activities that should be recorded in the CMMS include:

- Warranty requirements should be tracked so that they can be leveraged to replace or repair poorly performing new assets.
- Preventive maintenance should be established and scheduled through the CMMS. This will help maximize the useful life of assets and measure the effectiveness of preventive maintenance strategies.
- Record gravity main cleaning events and results in CMMS to look for trends and optimize cleaning frequencies and schedules for each pipe
- Develop a process for establishing the next inspection date for each gravity main using the gravity main rehabilitation decision logic flow chart provided in Figure 14 in this report as a guide. As CCTV results come in, determine and document needed rehabilitation, cleaning schedule adjustments, and the next scheduled inspection date in the CMMS so that there is an ongoing inspection plan for the collection system.

- Document manhole inspections during pipe cleaning or CCTV inspection activities. Manhole condition can provide key information to help identify locations that are contributing to I&I flow and where groundwater may be entering the system.
- Equipment replacement schedules can be setup based on run time, age, and/or other specific metrics. The pump station equipment information (makes, models, capacities, speeds, voltages, amps, etc.) should be entered for easy and quick reference for in kind equipment replacement.

The GIS and the CMMS should be integrated. Several CMMS and GIS systems have this capability built in; however it is also possible to develop manual processes for combining GIS and CMMS data for effective operational decision-making. If the CMMS is recording maintenance activities throughout the collection system, the GIS provides an excellent tool to see the results and to plan future work. Ideally, the field crews would be able to view the maintenance history, interact with electronic maps, and record maintenance work through mobile devices directly in the field (although this may not be cost effective for SD5 given its size and resource needs).

#### 5.6.5 Utility Performance

SD5 is a very small utility, with a small amount of infrastructure to manage and a small staff to manage it. Because of its size, it has different challenges and different advantages than larger systems. Comparison to other utilities may not be very beneficial because of the unique characteristics of the District.

One objective measure of utility performance is comparison to the ten attributes of effectively managed utilities provided by the US Environmental Protection Agency (USEPA, 2017) . This resource provides a comprehensive framework that water and wastewater utilities can use to identify and prioritize areas to systematically evaluate and improve their performance. More details about this framework can be found in the following link:

<https://www.epa.gov/sustainable-water-infrastructure/effective-utility-management-primer-water-and-wastewater-utilities>

The ten attributes are shown in Figure 38 below.



**Figure 38. The ten attributes of effectively managed utilities and five keys to management success (USEPA, 2017)**

A complete assessment using this framework is beyond the scope of this effort, however there are a few key areas that can be discussed:

**Operational Optimization** – Operational Optimization “Ensures ongoing, timely, cost-effective, reliable, and sustainable performance improvements in all facets of its operations in service to public health and environmental protection.” (USEPA, 2017). Based on the work completed, SD5 is performing adequately in this area. One primary metric to consider is the annual SSOs performance. Over the past 10 years, SD5 has shown consistent progress in reducing both the number and volume of SSOs which demonstrates continual improvement in management of the collection system. The current performance of the utility is better than both the state and regional averages (California Environmental Protection Agency CIWQS Collection System Operational Report from 1/1/2019 to 1/1/2021).

The work coming out of this master plan can provide additional improvements in I&I mitigation. If resources and time allow, the District would benefit from additional data management procedures and specifications as described in the section above to further optimize their operations. SD5 would further improve their SSO reduction efforts through periodic or on-going adjustment of their pipe cleaning program based on the latest cleaning results (also described in the section above) if these are not being done already.

**Infrastructure Strategy and Performance** – Infrastructure Strategy and Performance demonstrates that the utility “Understands the condition of and costs associated with critical infrastructure assets.” (USEPA, 2017). Based on the work completed, the SD5 collection system is in fairly good shape, although there are some gravity mains that scored greater than 70 out of 100 points as their relative risk score, which

likely indicates that their condition should be improved. These are identified and prioritized in the CIP as part of this study. Additional condition assessment of the gravity mains should continue to be performed on an ongoing basis to identify emerging rehabilitation needs which will further improve system performance when completed. The ongoing maintenance of pump stations is very good, and the District is maximizing its investment in these assets and the knowledge base to maintain them. The recent upgrades to the electrical and I&C, emergency generators, and pumps have also addressed the critical aspects of pump station performance. Implementation of the recommendations provided in this plan should keep all the pump stations at an acceptable level of service (or better) over the next 15 years.



## **Appendix A**

Table of Sewer Main  
Risk Modeling Results

Asset ID	Diameter	Material	Install Date	Length	Consequence of Failure	Likelihood of Failure	Total Risk	Location
306-305	6	VCP	1/1/1962	82	14	63	77	Tiburon
624-637	18	CPP	1/1/2005	133	20	56	76	Tiburon
640-703	18	CPP	1/1/2005	120	20	56	76	Tiburon
646-640	18	CPP	1/1/2005	160	20	56	76	Tiburon
637-635	18	CPP	1/1/2005	185	20	56	76	Tiburon
635-634	18	CPP	1/1/2005	382	20	56	76	Tiburon
634-646	18	CPP	1/1/2005	250	20	56	76	Tiburon
703-794	18	CPP	1/1/2005	90	20	56	76	Tiburon
799-345	8	VCP	1/1/1962	300.4	12	63	75	Tiburon
71-73	6	VCP	1/1/1952	258	15	59	74	Tiburon
19A-19	6	VCP	1/1/1952	108	14	59	73	Tiburon
215-127	6	VCP	1/1/1962	233	14	59	73	Tiburon
36-35	6	VCP	1/1/1952	210	13	59	72	Tiburon
800-801	8	VCP	1/1/1987	140.460558	15	56	71	Tiburon
109B-109A	6	VCP	1/1/1962	240.8	11	59	70	Tiburon
203A-203	6	VCP	1/1/1967	71	11	59	70	Tiburon
116-115	6	VCP	1/1/1962	158	11	59	70	Tiburon
636-PS-9	6	VCP	1/1/1962	279	14	56	70	Tiburon
BT-611	6	VCP	1/1/1960	282	14	56	70	Tiburon
360-643	6	VCP	1/1/1960	223	9	59	68	Tiburon
74B-74	6	VCP	1/1/1952	165	9	59	68	Tiburon
209-208	6	VCP	1/1/1962	243	9	59	68	Tiburon
176B-176	6	VCP	1/1/1962	163	9	59	68	Tiburon
243-242	6	VCP	1/1/1962	138	9	59	68	Tiburon
72A-72	6	VCP	1/1/1952	206.4	8	59	67	Tiburon
66A-66	6	VCP	1/1/1952	105	8	59	67	Tiburon
264-263	6	VCP	1/1/1962	245	8	59	67	Tiburon
32-31	6	VCP	1/1/1952	201	8	59	67	Tiburon
82C-82	6	VCP	1/1/1952	167	7	59	66	Tiburon
78-76	6	VCP	1/1/1952	115	7	59	66	Tiburon
51A-51	6	VCP	1/1/1952	257	7	59	66	Tiburon
60A-60	6	VCP	1/1/1952	250	7	59	66	Tiburon
66C-66A	6	VCP		34.4522494	7	59	66	Tiburon
359A-359B	6	VCP	1/1/1960	240	9	56	65	Tiburon
11-10	12	VCP	1/1/1984	96	17	48	65	Tiburon
316-315	6	VCP	1/1/1961	171	17	48	65	Tiburon
7A-7	6	PE	1/1/1952	160.5	8	56	64	Tiburon
280-279	6	VCP	1/1/1972	209	15	48	63	Tiburon
14-10	8	VCP	1/1/1960	308	15	48	63	Tiburon
35-34	6	PE	1/1/2006	246	7	56	63	Tiburon
58-41	6	VCP	1/1/1952	205	4	59	63	Tiburon
30B-30	6	VCP	1/1/1952	178	4	59	63	Tiburon
676-677	6	VCP		18	9	54	63	Tiburon
818-806	8	VCP	1/1/1987	140.025188	15	48	63	Tiburon
15B-15	6	VCP	1/1/1952	275	14	48	62	Tiburon
312-499	6	VCP	1/1/1961	28	14	48	62	Tiburon
31-JCT_BOX	6	VCP	1/1/1952	474	14	48	62	Tiburon
440-439	6	VCP	1/1/1986	293	14	48	62	Tiburon
651-311	6	VCP	1/1/1961	71	14	48	62	Tiburon
323-322	6	PVC	1/1/2008	140	14	46.5	60.5	Tiburon
111-504	6	PVC	1/1/1986	46.1	14	46.5	60.5	Tiburon
12-11	12	VCP	1/1/1984	290	23	37	60	Tiburon
86A-86	6	PE	1/1/1952	185	14	45	59	Tiburon
86-85	6	PE	1/1/1952	263	14	45	59	Tiburon
643-359C	6	VCP	1/1/1960	145	11	48	59	Tiburon
330A-330	6	PE	1/1/1962	150.4	14	45	59	Tiburon
148A-148	6	VCP	1/1/1962	110	11	48	59	Tiburon
165-163	6	VCP	1/1/1962	167	11	48	59	Tiburon
142-141	8	VCP	1/1/1960	243	21	37	58	Tiburon
812-813	8	VCP	1/1/1987	173.54655	10	48	58	Tiburon

Asset ID	Diameter	Material	Install Date	Length	Consequence of Failure	Likelihood of Failure	Total Risk	Location
113-112	6	VCP	1/1/1962	255	14	43	57	Tiburon
353A-BT	6	VCP		92	14	43	57	Tiburon
171-130	6	VCP	1/1/1962	198.7	9	48	57	Tiburon
212A-212	6	AC	1/1/1962	180	9	48	57	Tiburon
327A-327	6	VCP	1/1/1962	212	9	48	57	Tiburon
327-324	6	VCP	1/1/1962	270	9	48	57	Tiburon
69-70	6	VCP	1/1/1952	327	9	48	57	Tiburon
654A-654	6	VCP	1/1/1962	90.9	9	48	57	Tiburon
18-17	6	VCP	1/1/1952	84	20	37	57	Tiburon
177-175	6	VCP	1/1/1962	183	9	48	57	Tiburon
BT-353	6	VCP		169	14	43	57	Tiburon
101-504	6		1/1/1962	130.4	20	37	57	Tiburon
653-652	6	VCP	1/1/1962	340.6	20	37	57	Tiburon
347-348	6	VCP	1/1/1960	257	15	41	56	Tiburon
235-234	6	VCP	1/1/1962	178	8	48	56	Tiburon
82B-82	6	VCP	1/1/1952	329	8	48	56	Tiburon
233A-233	6	VCP	1/1/1962	97.7	8	48	56	Tiburon
67-68	6	VCP	1/1/1952	568	8	48	56	Tiburon
70-71	6	VCP	1/1/1952	245	8	48	56	Tiburon
604-330A	6	PE	1/1/1962	59.7	11	45	56	Tiburon
31B-31A	6	VCP	1/1/1962	64	8	48	56	Tiburon
206-205	6	VCP	1/1/1962	241	8	48	56	Tiburon
205-195	6	VCP	1/1/1962	94	8	48	56	Tiburon
303-302	8	VCP	1/1/1962	74.3	15	41	56	Tiburon
177B-177A	6	VCP	1/1/1962	10	8	48	56	Tiburon
13B-13A	6	PVC	1/1/1993	96.5	9	46.5	55.5	Tiburon
81A-81	6	VCP	1/1/1952	322	7	48	55	Tiburon
307-306	6	VCP	1/1/1962	305	14	41	55	Tiburon
78A-78	6	VCP	1/1/1952	57.5	7	48	55	Tiburon
431-433	6	VCP	1/1/1972	221	7	48	55	Paradise Cove
301-300	6	VCP	1/1/1962	100	14	41	55	Tiburon
51-50	6	VCP	1/1/1952	375	7	48	55	Tiburon
120-119	6	VCP	1/1/1962	201	14	41	55	Tiburon
450-472	6	VCP	1/1/1962	101	7	48	55	Paradise Cove
450A-450	6	VCP	1/1/1962	87	7	48	55	Paradise Cove
119-119A	6	VCP	1/1/1972	119.3	14	41	55	Tiburon
119A-118	6	VCP	1/1/1972	153.7	14	41	55	Tiburon
478A-478	6	PVC	1/1/1985	153	8	46.5	54.5	Paradise Cove
87-85	6	PE	1/1/1998	360	20	34	54	Tiburon
350-351	6	VCP	1/1/1960	143	9	45	54	Tiburon
677-113	6	VCP	1/1/1962	328	11	43	54	Tiburon
92A-92	6	PE	1/1/1952	220	9	45	54	Tiburon
7-4	6	PE	1/1/1952	175	9	45	54	Tiburon
118a-799	8	VCP	1/1/1962	157.4	12	41	53	Tiburon
197-205	6	PE	1/1/2000	533	8	45	53	Tiburon
345-347	8	AC	1/1/1960	326	12	41	53	Tiburon
639-622	12	PVC	1/1/1985	93	17	35.5	52.5	Tiburon
73-13	6	VCP	1/1/1952	179	15	37	52	Tiburon
74-73	6	VCP	1/1/1952	217	15	37	52	Tiburon
75-74	6	VCP	1/1/1952	255	15	37	52	Tiburon
242-241	6	VCP	1/1/1962	168	15	37	52	Tiburon
274-273	6	VCP	1/1/1962	201	15	37	52	Tiburon
263-262	6	VCP	1/1/1962	260	15	37	52	Tiburon
56-55	6	VCP	1/1/1952	73	4	48	52	Tiburon
57-55	6	VCP	1/1/1952	275	4	48	52	Tiburon
49A-49	6	VCP	1/1/1952	401	4	48	52	Tiburon
41-40	6	VCP	1/1/1952	522	4	48	52	Tiburon
68A-69	6	VCP	1/1/1952	400.1	15	37	52	Tiburon
801-802	8	VCP	1/1/1987	74.206403	15	37	52	Tiburon
806-PS-8	8	VCP	1/1/1987	3.32770839	15	37	52	Tiburon



Asset ID	Diameter	Material	Install Date	Length	Consequence of Failure	Likelihood of Failure	Total Risk	Location
106-105	6	VCP	1/1/1962	255	14	37	51	Tiburon
108-107	6	VCP	1/1/1962	229	14	37	51	Tiburon
259B-259	6	VCP	1/1/1962	224	14	37	51	Tiburon
254-253	6	VCP	1/1/1962	169	14	37	51	Tiburon
314B-314C	6	VCP	1/1/2017	11	14	37	51	Tiburon
314A-314B	6	VCP	1/1/1961	122.7	14	37	51	Tiburon
311-PS-7	6	VCP	1/1/1961	259	14	37	51	Tiburon
202-201	6	VCP	1/1/1967	301	14	37	51	Tiburon
147-146	6	VCP	1/1/1962	214	14	37	51	Tiburon
85-75	6	VCP	1/1/1952	480	14	37	51	Tiburon
15-10	6	VCP	1/1/1960	280	14	37	51	Tiburon
10-9A	12	VCP	1/1/1952	308	14	37	51	Tiburon
292-291	6	VCP	1/1/1972	165	14	37	51	Tiburon
288-287	6	VCP	1/1/1972	177	14	37	51	Tiburon
216-215	6	VCP	1/1/1962	209	14	37	51	Tiburon
248-246	6	VCP	1/1/1962	90.1	14	37	51	Tiburon
107-106	6	VCP	1/1/1962	316	14	37	51	Tiburon
652A-BT2	6	VCP	1/1/1962	28.6	14	37	51	Tiburon
330-BT2	6	VCP	1/1/1962	228	14	37	51	Tiburon
330-BT2	6	VCP	1/1/1962	252	14	37	51	Tiburon
499-651	6	VCP	1/1/1961	214	24	26	50	Tiburon
289A-289	6	PVC	1/1/1972	53	14	35.5	49.5	Tiburon
664-665	6	PVC	1/1/1993	40	14	35.5	49.5	Paradise Cove
444-444A	6	PVC		72.5	14	35.5	49.5	Tiburon
444A-445	6	PVC		218.5	14	35.5	49.5	Tiburon
641-500	15	VCP	1/1/1962	543	19	30	49	Tiburon
252-251	6	PE	1/1/1962	107	15	34	49	Tiburon
126-125	8	CPP	1/1/2008	260	15	34	49	Tiburon
125-124	8	VCP	1/1/1962	146	12	37	49	Tiburon
127-126	8	CPP	1/1/2008	214	15	34	49	Tiburon
253-252	6	VCP	1/1/1962	202	11	37	48	Tiburon
321-320	6	PE	1/1/2000	331	14	34	48	Tiburon
359C-359	6	VCP	1/1/1960	125.7	11	37	48	Tiburon
151-150	6	VCP	1/1/1962	179	11	37	48	Tiburon
189-188	6	PE	1/1/1962	152	14	34	48	Tiburon
122-121	6	VCP	1/1/1962	318	11	37	48	Tiburon
290-289	6	PLP	1/1/1972	191	14	34	48	Tiburon
133-132	6	VCP	1/1/1962	286	11	37	48	Tiburon
632-617	6	VCP	1/1/1960	226.3	11	37	48	Tiburon
253A-253	6	VCP	1/1/1962	102	11	37	48	Tiburon
653-652A	6	PP	1/1/1962	3	14	34	48	Tiburon
200-199	6	PVC	1/1/1967	181	11	35.5	46.5	Tiburon
103-102	6	VCP	1/1/1962	152	9	37	46	Tiburon
116A-116	6	VCP	1/1/1962	216	9	37	46	Tiburon
259A-259	6	VCP	1/1/1962	186	9	37	46	Tiburon
281-280	6	VCP	1/1/1972	163	9	37	46	Tiburon
279-278	6	VCP	1/1/1972	176	9	37	46	Tiburon
212-211	6	VCP	1/1/1962	145	9	37	46	Tiburon
210-209	6	VCP	1/1/1962	172	9	37	46	Tiburon
199-198	6	VCP	1/1/1967	204	9	37	46	Tiburon
198-197	6	TTE	1/1/1967	193	9	37	46	Tiburon
154B-154A	6	VCP	1/1/1962	72.9	9	37	46	Tiburon
13-9A	6	VCP	1/1/1952	125	9	37	46	Tiburon
5-4	12	CPP	1/1/2008	332.2	12	34	46	Tiburon
182A-182	6	VCP	1/1/1962	133.8	9	37	46	Tiburon
176-175	6	VCP	1/1/1962	239	9	37	46	Tiburon
170-798	6	VCP	1/1/1962	371.3	9	37	46	Tiburon
278-277	6	VCP	1/1/1972	66	9	37	46	Tiburon
272-271	6	VCP	1/1/1962	185	9	37	46	Tiburon
218-217	6	VCP	1/1/1962	173	9	37	46	Tiburon

Asset ID	Diameter	Material	Install Date	Length	Consequence of Failure	Likelihood of Failure	Total Risk	Location
217-216	6	VCP	1/1/1962	250	9	37	46	Tiburon
167-170	6	VCP	1/1/1962	95	9	37	46	Tiburon
166-167	6	VCP	1/1/1962	162	9	37	46	Tiburon
164A-164	6	VCP	1/1/1962	119	9	37	46	Tiburon
102-101	6	VCP	1/1/1962	204	9	37	46	Tiburon
656A-242	6	VCP	1/1/1962	34.3	9	37	46	Tiburon
325A-325	6	VCP	1/1/1962	140.7	9	37	46	Tiburon
8-3	6	CT		250	9	37	46	Tiburon
360C-360	6	VCP	1/1/1952	0.4	9	37	46	Tiburon
360B-360C	6	VCP	1/1/1952	191.6	9	37	46	Tiburon
248A-248	6	VCP	1/1/1962	91.9	8	37	45	Tiburon
304-303	8	VCP	1/1/1962	266	15	30	45	Tiburon
237-236	6	VCP	1/1/1962	49	8	37	45	Tiburon
221A-221	6	VCP	1/1/1962	217	8	37	45	Tiburon
234-233B	6	VCP	1/1/1962	77.7	8	37	45	Tiburon
88-87	6	PE	1/1/1952	370	11	34	45	Tiburon
74A-74B	6	VCP	1/1/1952	325	8	37	45	Tiburon
233B-233A	18	VCP	1/1/2005	5	8	37	45	Tiburon
207-206	6	VCP	1/1/1962	224	8	37	45	Tiburon
195-194	6	VCP	1/1/1962	215	8	37	45	Tiburon
72-71	6	VCP	1/1/1952	186	8	37	45	Tiburon
66B-66	6	VCP	1/1/1952	358	8	37	45	Tiburon
66-65	6	VCP	1/1/1952	409	8	37	45	Tiburon
65-67	6	VCP	1/1/1952	44	8	37	45	Tiburon
181-180	6	VCP	1/1/1962	321	8	37	45	Tiburon
178-177B	6	VCP	1/1/1962	58	8	37	45	Tiburon
193-192	6	VCP	1/1/1962	170	8	37	45	Tiburon
221-220	6	VCP	1/1/1962	191	8	37	45	Tiburon
220-219	6	VCP	1/1/1962	178	8	37	45	Tiburon
123-122	10	CPP	1/1/1962	115	11	34	45	Tiburon
608-32	6	VCP	1/1/1952	311	8	37	45	Tiburon
239B-239A	18	VCP	1/1/2005	96	8	37	45	Tiburon
82E-82A	6		1/1/1962	20	8	37	45	Tiburon
90-89A	6	VCP	1/1/1972	103.6	8	37	45	Tiburon
89A-89	6	VCP	1/1/1972	265.4	8	37	45	Tiburon
607-607A	6	VCP	1/1/1960	142.5	8	37	45	Tiburon
498-467	6	PVC	1/1/1993	360	9	35.5	44.5	Paradise Cove
497A-498	6	PVC	1/1/1993	31	9	35.5	44.5	Paradise Cove
231-230	6	VCP	1/1/1962	311	7	37	44	Tiburon
82-81	6	VCP	1/1/1952	296	7	37	44	Tiburon
242A-656A	4	VCP	1/1/1950	83.9	7	37	44	Tiburon
472-431	6	VCP	1/1/1972	238	7	37	44	Paradise Cove
228A-228	6	VCP	1/1/1962	132	7	37	44	Tiburon
194-193	6	VCP	1/1/1962	161	7	37	44	Tiburon
447-Paradise	6	VCP	1/1/1970	180	7	37	44	Paradise Cove
SF1-SF3	6	AC	1/1/1954	312.01	7	37	44	Paradise Cove
36A-36	6	VCP	1/1/1952	712	7	37	44	Tiburon
451-433	6	VCP	1/1/1979	121	7	37	44	Paradise Cove
79-78A	6	VCP	1/1/1952	186	7	37	44	Tiburon
433-447	6	VCP	1/1/1972	230	7	37	44	Paradise Cove
Paradise Cove	6		1/1/1960	60	7	37	44	Paradise Cove
81B-81A	6	VCP	1/1/1952	103	7	37	44	Tiburon
SF2-SF1	6	AC	1/1/1954	151.15	7	37	44	Paradise Cove
34-PS-3	6	VCP		15	7	37	44	Tiburon
79A-79B	18	VCP	1/1/2005	112.3	7	37	44	Tiburon
816-817	8	VCP	1/1/1987	152.124238	18	26	44	Tiburon
54A-54	6	VCP		150	7	37	44	Tiburon
466-465	6	PVC	1/1/1993	95	8	35.5	43.5	Paradise Cove
458-457	8	PVC	1/1/1993	362	8	35.5	43.5	Paradise Cove
477-474	6	PVC	1/1/1985	221	8	35.5	43.5	Paradise Cove

Asset ID	Diameter	Material	Install Date	Length	Consequence of Failure	Likelihood of Failure	Total Risk	Location
478-477	6	PVC	1/1/1985	96	8	35.5	43.5	Paradise Cove
605-604	6	PE	1/1/1962	103.2	9	34	43	Tiburon
649-649A	6	PE	1/1/1962	193.7	9	34	43	Tiburon
649A-684	6	PE	1/1/1962	144.1	9	34	43	Tiburon
92-87A	18	PE	1/1/2005	86.4	9	34	43	Tiburon
87A-87	18	PE	1/1/2005	325.6	9	34	43	Tiburon
91C-91A	6	PE	1/1/1952	56	9	34	43	Tiburon
284-283	6	PE	1/1/1972	47.6	9	34	43	Tiburon
283-282	6	PE	1/1/1972	155.4	9	34	43	Tiburon
60-58	6	PVC	1/1/1999	366	7	35.5	42.5	Tiburon
90A-90	6	PE	1/1/1952	253	8	34	42	Tiburon
36B-36A	6	VCP	1/1/1952	188	4	37	41	Tiburon
30A-30	6	VCP	1/1/1952	148	4	37	41	Tiburon
43-PS-1	6	VCP	1/1/1954	117	4	37	41	Tiburon
37-35	6	PE	1/1/2006	479	7	34	41	Tiburon
53-52	6	CPP	1/1/2009	194	7	34	41	Tiburon
52-50	6	CPP	1/1/2009	540	7	34	41	Tiburon
49-53	6	VCP	1/1/1952	166	4	37	41	Tiburon
SF9-SF10B	6	AC		191	4	37	41	Paradise Cove
57C-57B	6	VCP		47.4492456	4	37	41	Tiburon
79B-79	18	PE	1/1/2005	203.8	7	34	41	Tiburon
804-805	8	VCP	1/1/1987	245.349328	15	26	41	Tiburon
814-636	8	VCP	1/1/1987	46.7439876	15	26	41	Tiburon
815-816	8	VCP	1/1/1987	89.3971903	15	26	41	Tiburon
58A-58B	6	VCP	1/1/1972	215.1	4	37	41	Tiburon
58B-58	6	VCP	1/1/1972	307.9	4	37	41	Tiburon
109-108	6	VCP	1/1/1962	153	14	26	40	Tiburon
682-JCT_BOX	12	CPP	1/1/1952	79	17	23	40	Tiburon
149-147	6	VCP	1/1/1962	231	14	26	40	Tiburon
148-147	6	VCP	1/1/1962	122	14	26	40	Tiburon
17-16	6	VCP	1/1/1952	166	14	26	40	Tiburon
315-314	6	VCP	1/1/1961	148	14	26	40	Tiburon
143-142	6	VCP	1/1/1960	351	14	26	40	Tiburon
249-245B	6	VCP	1/1/1972	252	14	26	40	Tiburon
802-803	6	VCP	1/1/1987	259.131185	14	26	40	Tiburon
SF16-SF11	6	PVC	1/1/1952	92.6644468	4	35.5	39.5	Paradise Cove
SF17-SF16	6	PVC	1/1/1952	60	4	35.5	39.5	Paradise Cove
SF18-SF17	6	PVC	1/1/1952	71	4	35.5	39.5	Paradise Cove
SF19-SF18	6	PVC	1/1/1952	128	4	35.5	39.5	Paradise Cove
SF20-SF19	6	PVC	1/1/1952	43	4	35.5	39.5	Paradise Cove
277-275	6	PE	1/1/2019	242	15	23	38	Tiburon
817-818	8	VCP	1/1/1987	149.343114	12	26	38	Tiburon
259-258	6	VCP	1/1/1962	242	11	26	37	Tiburon
114-113	6	VCP	1/1/1962	22.9	11	26	37	Tiburon
797-253A	6	VCP		129.2	11	26	37	Tiburon
136-135	8	PVC	1/1/1962	239	12	24.5	36.5	Tiburon
808-809	8	VCP		209.801128	10	26	36	Tiburon
360A-360B	5	VCP	1/1/1960	195	9	26	35	Tiburon
171A-171	6	VCP	1/1/1962	218	9	26	35	Tiburon
164-160	6	VCP	1/1/1962	175	9	26	35	Tiburon
175-129	6	VCP	1/1/1962	30	9	26	35	Tiburon
611A-BT	6	VCP	1/1/1960	98	14	21	35	Tiburon
8A-8	6	VCP	1/1/1952	82	8	26	34	Tiburon
124-123	10	VCP	1/1/1962	177	19	15	34	Tiburon
68-68A	6	VCP	1/1/1952	258	8	26	34	Tiburon
13D-13C	6	PVC	1/1/1993	102.4	9	24.5	33.5	Tiburon
300-PS-7	6	VCP	1/1/1962	53	14	19	33	Tiburon
266-265	6	VCP	1/1/1962	208	7	26	33	Tiburon
261-252	6	PE	1/1/1962	100	9	23	32	Tiburon
40-PS-2	6	VCP	1/1/1952	43	4	26	30	Tiburon

Asset ID	Diameter	Material	Install Date	Length	Consequence of Failure	Likelihood of Failure	Total Risk	Location
30-40	6	VCP	1/1/1952	85	4	26	30	Tiburon
621-356	10	VCP	1/1/1960	40	16	12	28	Tiburon
308-307	6	VCP	1/1/1962	224	20	8	28	Tiburon
620-639	6	PVC	1/1/1985	379	14	13.5	27.5	Tiburon
112-680	15	VCP	1/1/1962	65	19	8	27	Tiburon
500-112	15	VCP	1/1/1962	72	19	8	27	Tiburon
631-621	10	PVC	1/1/2000	87	16	10.5	26.5	Tiburon
797A-797	6	VCP	1/1/1962	39.1	11	15	26	Tiburon
355-631	10	CPP	1/1/2005	78	16	9	25	Tiburon
358-631	6	PVC	1/1/2000	536	14	10.5	24.5	Tiburon
256-255	6	VCP	1/1/1962	123	20	4	24	Tiburon
324-323	6	VCP	1/1/1961	287	20	4	24	Tiburon
118-641	15	VCP	1/1/1962	238	16	8	24	Tiburon
156-154	6	VCP	1/1/1962	100	9	15	24	Tiburon
680-681	10	VCP	1/1/1962	122	16	8	24	Tiburon
117-676	12	VCP	1/1/1972	201	14	10	24	Tiburon
445-259B	6	VCP	1/1/1962	214	20	4	24	Tiburon
118-118a	15	VCP	1/1/1962	59	16	8	24	Tiburon
681-111	10	VCP	1/1/1962	197	16	8	24	Tiburon
611-353	6	VCP	1/1/1952	70.6	11	12	23	Tiburon
355A-355	6	VCP	1/1/1960	167	11	12	23	Tiburon
793-301	8	VCP	1/1/1962	436	15	8	23	Tiburon
356-636	6	PE	1/1/1962	195	14	9	23	Tiburon
225-224	6	VCP	1/1/1972	153	8	15	23	Tiburon
245-244	6	VCP	1/1/1962	235	19	4	23	Tiburon
302-793	8	VCP	1/1/1962	73.7	15	8	23	Tiburon
351-611	6	VCP	1/1/1960	390	11	12	23	Tiburon
308A-308	6	VCP	1/1/1962	140	14	8	22	Tiburon
305-304	6	VCP	1/1/1962	517	14	8	22	Tiburon
121-120	6	VCP	1/1/1962	60	14	8	22	Tiburon
55-54	6	VCP	1/1/1952	300	7	15	22	Tiburon
109A-109	6	VCP	1/1/1962	254	17	4	21	Tiburon
353-349	6	VCP	1/1/1960	313	11	10	21	Tiburon
794-JCT_BOX	18	CPP	1/1/2005	20	20	1	21	Tiburon
359-358	6	PE	1/1/1998	253	11	9	20	Tiburon
357-624	14	CPP	1/1/2005	163	19	1	20	Tiburon
359B-359	6	PE	1/1/1998	258	11	9	20	Tiburon
326-324	6	VCP	1/1/1962	184	15	4	19	Tiburon
349-PS-6	6	VCP	1/1/1952	27	9	10	19	Tiburon
287-286	6	OB	1/1/1972	46	14	5	19	Tiburon
286-285	6	OB	1/1/1972	122	14	5	19	Tiburon
262-261	6	VCP	1/1/1962	153	15	4	19	Tiburon
141-111	8	VCP	1/1/1960	318	15	4	19	Tiburon
803-804	8	VCP	1/1/1987	127.045035	15	4	19	Tiburon
805-806	8	VCP	1/1/1987	25.4128224	15	4	19	Tiburon
807-806	8	VCP	1/1/1987	473.813153	15	4	19	Tiburon
621-357	10	PVC	1/1/1960	7	16	2.5	18.5	Tiburon
258-257	6	VCP	1/1/1962	135	14	4	18	Tiburon
257-256	6	VCP	1/1/1962	50	14	4	18	Tiburon
255-254	6	VCP	1/1/1962	115	14	4	18	Tiburon
289-288	6	VCP	1/1/1972	137	14	4	18	Tiburon
320-303	6	VCP	1/1/1961	98	14	4	18	Tiburon
192-683	6	VCP	1/1/1962	150	14	4	18	Tiburon
683-191	6	VCP	1/1/1962	114	14	4	18	Tiburon
622-JCT_BOX	12	PLP	1/1/1952	26	17	1	18	Tiburon
314C-314	6	VCP	1/1/1962	119	14	4	18	Tiburon
504-505	6	VCP	1/1/1962	13.3	14	4	18	Tiburon
201-200	6	VCP	1/1/1967	307	14	4	18	Tiburon
224-223	6	VCP	1/1/1972	167	14	4	18	Tiburon
152-151	6	PE	1/1/1962	184	17	1	18	Tiburon

Asset ID	Diameter	Material	Install Date	Length	Consequence of Failure	Likelihood of Failure	Total Risk	Location
150-149	6	VCP	1/1/1962	107	14	4	18	Tiburon
146-145	6	VCP	1/1/1962	49	14	4	18	Tiburon
19-18	6	VCP	1/1/1952	103	14	4	18	Tiburon
145-138	6	VCP	1/1/1962	333	14	4	18	Tiburon
138-137	6	VCP	1/1/1962	151	14	4	18	Tiburon
314-313	6	VCP	1/1/1961	303	14	4	18	Tiburon
313-312	6	VCP	1/1/1961	204	14	4	18	Tiburon
76-89	6	VCP	1/1/1952	543	14	4	18	Tiburon
16-15A	6	VCP	1/1/1960	58	14	4	18	Tiburon
291-290	6	VCP	1/1/1972	256	14	4	18	Tiburon
129-127	6	VCP	1/1/1962	378	14	4	18	Tiburon
105-104	6	VCP	1/1/1962	110	14	4	18	Tiburon
15A-15	6	VCP	1/1/1960	210	14	4	18	Tiburon
439-444	6	VCP	1/1/1986	288	14	4	18	Tiburon
137-610	6	VCP	1/1/1962	98.3	14	4	18	Tiburon
610-136	6	VCP	1/1/1962	257.7	14	4	18	Tiburon
348-795	6	VCP	1/1/1960	222	9	8	17	Tiburon
642-620	6	PVC	1/1/1985	264	14	2.5	16.5	Tiburon
662-664	6	PVC	1/1/1993	185	14	2.5	16.5	Paradise Cove
441-440	6	PVC	1/1/1986	246	14	2.5	16.5	Tiburon
665-497A	6	PVC	1/1/1993	344	14	2.5	16.5	Paradise Cove
154-150	6	CMP	1/1/1962	43.5	11	5	16	Tiburon
285-278	6	OB	1/1/1972	217	11	5	16	Tiburon
809-810	8	VCP	1/1/1987	211.006234	12	4	16	Tiburon
810-811	8	VCP	1/1/1987	123.469057	12	4	16	Tiburon
813-814	8	VCP	1/1/1987	162.148214	12	4	16	Tiburon
795-PS-6	6	PVC	1/1/1960	270	9	6.5	15.5	Tiburon
322-321	6	PLP	1/1/1995	353	14	1	15	Tiburon
203-202	6	VCP	1/1/1967	287	11	4	15	Tiburon
153A-153	6	VCP	1/1/1962	86	11	4	15	Tiburon
140-137	6	PE	1/1/2015	284	14	1	15	Tiburon
638-682	12	CPP	1/1/1952	47	14	1	15	Tiburon
2-638	12	CPP	1/1/2008	219.5	14	1	15	Tiburon
134-133	6	VCP	1/1/1962	167	11	4	15	Tiburon
163-162	6	VCP	1/1/1962	156	11	4	15	Tiburon
162-161	6	VCP	1/1/1962	216	11	4	15	Tiburon
115-113	6	VCP		65	11	4	15	Tiburon
143A-143	6	VCP	1/1/1950	130	11	4	15	Tiburon
654-653A	6	VCP		102.2	11	4	15	Tiburon
653A-653	6	VCP		52.9	11	4	15	Tiburon
807-808	8	VCP	1/1/1987	114.752593	10	4	14	Tiburon
811-812	8	VCP	1/1/1987	112.622804	10	4	14	Tiburon
617-350	6	VCP	1/1/1952	40	9	4	13	Tiburon
358A-358	6	VCP	1/1/1960	114	9	4	13	Tiburon
281A-281	6	VCP	1/1/1972	132	9	4	13	Tiburon
326A-326	6	VCP	1/1/1962	183	9	4	13	Tiburon
798-123	6	VCP	1/1/1962	154.7	9	4	13	Tiburon
438-436	6	VCP	1/1/1986	245	9	4	13	Tiburon
211-210	6	AC	1/1/1962	54	9	4	13	Tiburon
207A-207	6	VCP	1/1/1962	153	9	4	13	Tiburon
153B-153	6	VCP	1/1/1962	96	9	4	13	Tiburon
154A-154	6	VCP	1/1/1962	40.1	9	4	13	Tiburon
244-243	6	VCP	1/1/1962	213	9	4	13	Tiburon
89-75	6	VCP	1/1/1952	81	9	4	13	Tiburon
9-6	12	CPP	1/1/2008	504.8	12	1	13	Tiburon
6-5	12	CPP	1/1/2008	367	12	1	13	Tiburon
140A-140	6	VCP	1/1/1962	108	9	4	13	Tiburon
176A-176	6	VCP	1/1/1962	71	9	4	13	Tiburon
316A-316	6	VCP	1/1/1961	160	9	4	13	Tiburon
241-240	6	VCP	1/1/1962	173	9	4	13	Tiburon

Asset ID	Diameter	Material	Install Date	Length	Consequence of Failure	Likelihood of Failure	Total Risk	Location
4-3	12	CPP	1/1/2008	163.7	12	1	13	Tiburon
3-2	12	CPP	1/1/2008	396.4	12	1	13	Tiburon
275-274	6	VCP	1/1/1962	195	9	4	13	Tiburon
273-272	6	VCP	1/1/1962	177	9	4	13	Tiburon
271-270	6	VCP	1/1/1962	109	9	4	13	Tiburon
270-262	6	VCP	1/1/1962	173	9	4	13	Tiburon
251-250	6	VCP	1/1/1962	300	9	4	13	Tiburon
8B-8	6	VCP	1/1/1952	150	9	4	13	Tiburon
135-134	6	VCP	1/1/1962	204	9	4	13	Tiburon
132-131	6	VCP	1/1/1962	158	9	4	13	Tiburon
161-160	6	VCP	1/1/1962	150	9	4	13	Tiburon
160-131	6	VCP	1/1/1962	89	9	4	13	Tiburon
131-130	6	VCP	1/1/1962	120	9	4	13	Tiburon
130-129	6	VCP	1/1/1962	270	9	4	13	Tiburon
104-102	6	VCP	1/1/1962	105	9	4	13	Tiburon
103A-103	6	VCP	1/1/1962	62	9	4	13	Tiburon
438A-438	6	VCP	1/1/1986	60	9	4	13	Tiburon
324A-324	6	VCP	1/1/1962	15	9	4	13	Tiburon
9A-9	6	VCP	1/1/1952	3	9	4	13	Tiburon
156A-156	6	VCP	1/1/1962	232	9	4	13	Tiburon
177A-177	6	VCP	1/1/1962	300	9	4	13	Tiburon
223-221	6	VCP	1/1/1972	105	8	4	12	Tiburon
284A-284	6	PE	1/1/1972	153	11	1	12	Tiburon
239A-239	6	VCP	1/1/1962	303	8	4	12	Tiburon
239-238	6	VCP	1/1/1962	132	8	4	12	Tiburon
238-237	6	VCP	1/1/1962	153	8	4	12	Tiburon
236-232	6	VCP	1/1/1962	123	8	4	12	Tiburon
230-221	6	VCP	1/1/1962	132	8	4	12	Tiburon
235A-235	6	VCP	1/1/1962	125	8	4	12	Tiburon
233-232	6	VCP	1/1/1962	232	8	4	12	Tiburon
245A-245	6	VCP	1/1/1962	174	8	4	12	Tiburon
245B-245	6	VCP	1/1/1962	192	8	4	12	Tiburon
205A-205	6	VCP	1/1/1962	221	8	4	12	Tiburon
208-207	6	VCP	1/1/1962	180	8	4	12	Tiburon
195A-195	6	VCP	1/1/1962	138	8	4	12	Tiburon
227-226	6	VCP	1/1/1972	161	8	4	12	Tiburon
226-225	6	VCP	1/1/1972	115	8	4	12	Tiburon
153-152	6	PE	1/1/1962	238	11	1	12	Tiburon
249B-249A	6	VCP	1/1/1962	36	8	4	12	Tiburon
88A-88	6	PE	1/1/1952	176	11	1	12	Tiburon
182B-182	6	VCP	1/1/1962	207	8	4	12	Tiburon
182-181	6	VCP	1/1/1962	124	8	4	12	Tiburon
180-179	6	VCP	1/1/1962	223	8	4	12	Tiburon
179-178	6	VCP	1/1/1962	138	8	4	12	Tiburon
188-187	6	VCP	1/1/1962	189	8	4	12	Tiburon
187-186	6	VCP	1/1/1962	128	8	4	12	Tiburon
186-185	6	VCP	1/1/1962	230	8	4	12	Tiburon
185A-185	6	VCP	1/1/1962	145	8	4	12	Tiburon
185-184	6	VCP	1/1/1962	83	8	4	12	Tiburon
184-183	6	VCP	1/1/1962	242	8	4	12	Tiburon
191-183	6	VCP	1/1/1962	168	8	4	12	Tiburon
183-179	6	VCP	1/1/1962	165	8	4	12	Tiburon
240-219	6	VCP	1/1/1962	102	8	4	12	Tiburon
265-264	6	VCP	1/1/1962	144	8	4	12	Tiburon
250-249	6	VCP	1/1/1962	70	8	4	12	Tiburon
249A-249	6	VCP	1/1/1962	77	8	4	12	Tiburon
219-218	6	VCP	1/1/1962	133	8	4	12	Tiburon
271A-271	6	VCP	1/1/1962	157	8	4	12	Tiburon
246-245B	6	VCP	1/1/1962	101	8	4	12	Tiburon
33-608	6	VCP	1/1/1952	158	8	4	12	Tiburon

Asset ID	Diameter	Material	Install Date	Length	Consequence of Failure	Likelihood of Failure	Total Risk	Location
180A-180		6 CT		150	8	4	12	Tiburon
663-661		6 PVC	1/1/1993	195	9	2.5	11.5	Paradise Cove
437-259A		6 PVC	1/1/1962	120	9	2.5	11.5	Tiburon
436-437		6 PVC	1/1/1986	227	9	2.5	11.5	Tiburon
661-662		6 PVC	1/1/1993	33	9	2.5	11.5	Paradise Cove
443-441		6 PVC	1/1/1986	143	9	2.5	11.5	Tiburon
666-663		6 PVC	1/1/1993	275	9	2.5	11.5	Paradise Cove
13C-13B		6 PVC	1/1/1993	68	9	2.5	11.5	Tiburon
232-231		6 VCP	1/1/1962	35	7	4	11	Tiburon
679-34		6 VCP	1/1/1952	314	7	4	11	Tiburon
31A-31		4 VCP	1/1/1952	305	7	4	11	Tiburon
228-227		6 VCP	1/1/1972	183	7	4	11	Tiburon
223A-223		6 VCP	1/1/1972	299	7	4	11	Tiburon
50-33		6 VCP	1/1/1952	483	7	4	11	Tiburon
34A-34		6 VCP	1/1/1952	212	7	4	11	Tiburon
54-52		6 VCP	1/1/1952	384	7	4	11	Tiburon
61B-61		6 VCP	1/1/1952	228	7	4	11	Tiburon
82A-82		6 VCP	1/1/1952	162	7	4	11	Tiburon
467-609		6 PVC	1/1/1993	251	8	2.5	10.5	Paradise Cove
465-464		6 PVC	1/1/1993	98	8	2.5	10.5	Paradise Cove
464-463		6 PVC	1/1/1993	253	8	2.5	10.5	Paradise Cove
457-Paradise		8 PVC	1/1/1972	342	8	2.5	10.5	Paradise Cove
609-466		6 PVC	1/1/1993	181	8	2.5	10.5	Paradise Cove
477A-477		6 PVC	1/1/1985	46	8	2.5	10.5	Paradise Cove
282-280		6 PE	1/1/1972	174	9	1	10	Tiburon
684-605		6 PE	1/1/1962	79.6	9	1	10	Tiburon
13A-13		6 PE	1/1/1952	96	9	1	10	Tiburon
325-324		6 PE	1/1/2017	234	9	1	10	Tiburon
484A-484		6 PVC	1/1/1982	61	7	2.5	9.5	Paradise Cove
480A-480		6 PVC	1/1/1985	52	7	2.5	9.5	Paradise Cove
669-480		6 PVC	1/1/1985	170	7	2.5	9.5	Paradise Cove
463-458		6 PVC	1/1/1993	295	7	2.5	9.5	Paradise Cove
479-451		6 PVC	1/1/1982	64	7	2.5	9.5	Paradise Cove
474-450		6 PVC	1/1/1985	94	7	2.5	9.5	Paradise Cove
480-479		6 PVC	1/1/1982	114	7	2.5	9.5	Paradise Cove
484-669		6 PVC	1/1/1982	178	7	2.5	9.5	Paradise Cove
80-79A		6 PVC	1/1/2015	171.9	7	2.5	9.5	Tiburon
188A-189		6 PE	1/1/1962	184	8	1	9	Tiburon
7B-7		6 PE	1/1/1952	199	8	1	9	Tiburon
91A-91		6 PE	1/1/1952	98	8	1	9	Tiburon
613-PS-4		6 PLP	1/1/1960	76	8	1	9	Tiburon
91-91B		6 PE	1/1/1952	165.3	8	1	9	Tiburon
91B-90B		6 PE	1/1/1952	81.2	8	1	9	Tiburon
90B-90		6 PE	1/1/1952	154.5	8	1	9	Tiburon
607A-PS-4		6 PLP	1/1/1960	49.6	8	1	9	Tiburon
81-80		6 PE	1/1/2015	330	7	1	8	Tiburon
80A-80		6 PE	1/1/2018	173	7	1	8	Tiburon
61-60		6 PE	1/1/2017	279	7	1	8	Tiburon
61C-61A		6 PE	1/1/2017	184	7	1	8	Tiburon
45-44		6 VCP	1/1/1970	180	4	4	8	Tiburon
SF3-SF4		6 AC	1/1/1954	187.43	4	4	8	Paradise Cove
53A-53		6 VCP	1/1/1952	425	4	4	8	Tiburon
56A-56		6 VCP	1/1/1952	142	4	4	8	Tiburon
57A-57		6 VCP	1/1/1952	180	4	4	8	Tiburon
61A-61		6 PE	1/1/2017	190	7	1	8	Tiburon
57B-57		6 VCP	1/1/1952	253	4	4	8	Tiburon
648-37		6 PE	1/1/2006	331	7	1	8	Tiburon
SF6-SF7		6 AC	1/1/1954	66.55	4	4	8	Paradise Cove
SF4-SF9		6 AC	1/1/1954	130.4	4	4	8	Paradise Cove
SF14-SF9		6 AC	1/1/1954	146.44	4	4	8	Paradise Cove

Asset ID	Diameter	Material	Install Date	Length	Consequence of Failure	Likelihood of Failure	Total Risk	Location
SF7-SF8A	6	AC		427.663861	4	4	8	Paradise Cove
SF8A-CF-PS2	6	AC		9	4	4	8	Paradise Cove
SF5-SF4	6	AC		158	4	4	8	Paradise Cove
SF15-SF11	6	AC		59	4	4	8	Paradise Cove
SF11-SF10B	6	AC		64	4	4	8	Paradise Cove
SF10B-CF-PS	6	AC		8	4	4	8	Paradise Cove
44-43	6	PVC	1/1/1970	390	4	2.5	6.5	Tiburon
38-648	6	PE	1/1/2006	270	4	1	5	Tiburon



Asset ID	Diameter	Material	Install Date	Length	Consequence of Failure	Likelihood of Failure	Total Risk	Location
N5A-N4	6	VCP	1/1/1952	224	15	63	78	Belvedere
P9-P8	4	VCP	1/1/1950	172	13	59	72	Belvedere
G3-G2	8	VCP	1/1/1952	372	15	56	71	Belvedere
ND3-ND2	8	VCP	1/1/1950	253	15	56	71	Belvedere
N4-N3	6	VCP	1/1/1960	393	18	52	70	Belvedere
R25-R24	6	VCP	1/1/1957	95	10	59	69	Belvedere
G15-G5	6	VCP	1/1/1952	516	14	54	68	Belvedere
K2-K1	6	VCP	1/1/1950	137	14	52	66	Belvedere
P10-BT	4	VCP	1/1/1950	108	7	59	66	Belvedere
P8-P7	4	VCP	1/1/1950	75	7	59	66	Belvedere
P11-P10	4	VCP	1/1/1950	61	7	59	66	Belvedere
FA15-FA16	6	VCP	1/1/1950	197	7	59	66	Belvedere
A4-A3	8	VCP	1/1/1950	357	10	54	64	Belvedere
FB11-FB6	6	VCP		112	4	59	63	Belvedere
RB2-RB1	6	VCP	1/1/1958	211	4	59	63	Belvedere
RC8A-RC1	6	VCP		33	4	59	63	Belvedere
A7-A7B	6	VCP	1/1/1952	151	8	54	62	Belvedere
C5-C4	6	VCP	1/1/1955	376	8	54	62	Belvedere
G10-G9	8	VCP	1/1/1952	366	8	54	62	Belvedere
N6-N5	6	VCP	1/1/1952	231.31	9	52	61	Belvedere
G2-G1	8	VCP	1/1/1950	221	15	45	60	Belvedere
N3-N2	6	VCP	1/1/1952	30	8	52	60	Belvedere
ND9-ND8	6	PE	1/1/1950	462	15	45	60	Belvedere
ND4-ND3.1	8	VCP	1/1/1950	117.4	15	45	60	Belvedere
RD2-RD1	6	PE	1/1/1957	69.2	4	56	60	Belvedere
ND7A-ND7	6	PE		150	14	45	59	Belvedere
A5-A4	8	VCP	1/1/1955	248	15	43	58	Belvedere
FB9A-FB8	6	VCP	1/1/1955	205	10	48	58	Belvedere
RD3-RD1	4	PE	1/1/1957	1.7	2	56	58	Belvedere
GB9-GB3	6	VCP	1/1/1952	285	9	48	57	Belvedere
P2-P1	6	VCP	1/1/1950	112	9	48	57	Belvedere
NE11-NE10	6	VCP	1/1/1952	205	8	48	56	Belvedere
RD1-BT	4	VCP	1/1/1957	238	8	48	56	Belvedere
ND12-ND11	6	VCP	1/1/1950	109	8	48	56	Belvedere
ND10-ND10A	6	VCP	1/1/1950	104	8	48	56	Belvedere
R24-R24A	4	VCP	1/1/1957	71	8	48	56	Belvedere
RA5-RA4	6	VCP		189	8	48	56	Belvedere
RB13-RB4				138	8	48	56	Belvedere
FA12-FA11	6	VCP	1/1/1950	257	7	48	55	Belvedere
J2-J1	6	VCP	1/1/1950	161	14	41	55	Belvedere
RA7-RA2	6	VCP	1/1/1959	89	7	48	55	Belvedere
FA13-FA4	6	VCP	1/1/1950	238	7	48	55	Belvedere
RA4-RA3	6	VCP	1/1/1959	162	7	48	55	Belvedere
G16-G8	6	VCP	1/1/1950	244	7	48	55	Belvedere
F9-F8	6	VCP	1/1/1950	290	7	48	55	Belvedere
RB10-RB10A	6	VCP	1/1/1958	160	7	48	55	Belvedere
M3-M2	6	VCP	1/1/1950	252	24	30	54	Belvedere
A10-A9	6	VCP	1/1/1950	314	11	43	54	Belvedere
P7-P6	6	CPP	1/1/1950	91	9	45	54	Belvedere
ND1A-ND1	6	VCP		363	11	43	54	Belvedere
NE10-NE3	6	PE	1/1/1952	234	8	45	53	Belvedere
B3-B2	6	VCP	1/1/1952	301	8	45	53	Belvedere
NE9-NE2	6	PE	1/1/1952	544	8	45	53	Belvedere
NE4-NE3	6	PE	1/1/1952	253	8	45	53	Belvedere

Asset ID	Diameter	Material	Install Date	Length	Consequence of Failure	Likelihood of Failure	Total Risk	Location
ND2-NB6	8	VCP	1/1/1950	100	10	43	53	Belvedere
NE8A-NE7	6	PE	1/1/1952	332	8	45	53	Belvedere
NC4A-NC4B	6	PE	1/1/1959	157.6	8	45	53	Belvedere
NF3-NF2	10	VCP	1/1/1959	236	9	43	52	Belvedere
RE8-RE7	6	VCP	1/1/1960	180	4	48	52	Belvedere
N2-N1	8	VCP	1/1/1952	64	9	43	52	Belvedere
FA15-FA10	6	PE	1/1/1950	162	7	45	52	Belvedere
M1-PS9	6	VCP	1/1/1950	9	11	41	52	Belvedere
CA6A-CA2	6	VCP	1/1/1950	168	4	48	52	Belvedere
RB10A-RB9	6	VCP	1/1/1958	244	4	48	52	Belvedere
A2A-A1	8	VCP	1/1/2008	256	9	43	52	Belvedere
A2-A2A	8	VCP	1/1/2008	73	9	43	52	Belvedere
GB10-GB5	6	VCP	1/1/1952	230	14	37	51	Belvedere
NC2-NC1	6	VCP	1/1/1950	188	8	43	51	Belvedere
NC3-NC2	6	VCP	1/1/1959	286	8	43	51	Belvedere
B1-PS8 - 10 V	8	VCP	1/1/1950	22	8	43	51	Belvedere
A1-PS5	6	VCP	1/1/1950	9	8	43	51	Belvedere
A7A-A1	6	VCP	1/1/1952	46	8	43	51	Belvedere
RB1-BT	6	VCP	1/1/1958	304	14	37	51	Belvedere
NF4-NF3	8	VCP	1/1/1955	66	7	43	50	Belvedere
N10-N9	6	VCP	1/1/1960	315	9	41	50	Belvedere
FA10-FA9	6	VCP	1/1/1950	150	13	37	50	Belvedere
RA6-BT	6	VCP	1/1/1952	130	13	37	50	Belvedere
R24A-BT	4	VCP	1/1/1957	122	2	48	50	Belvedere
N5-N5B	6	VCP	1/1/1952	42.1	9	41	50	Belvedere
NA5-NA4	6	PE	1/1/1950	500	15	34	49	Belvedere
ND4-ND3	8	VCP	1/1/1950	43.6	15	34	49	Belvedere
NC4-NC4A	6	PE	1/1/1959	117	14	34	48	Belvedere
G11-C2	6	VCP	1/1/1960	276	7	41	48	Belvedere
ND4-ND7	6	PE		85	14	34	48	Belvedere
FB7-FB6	6	VCP	1/1/1955	251	10	37	47	Belvedere
A11-A9A	8	VCP	1/1/1955	194	15	32	47	Belvedere
A3-A3A	6	VCP	1/1/1960	153	10	37	47	Belvedere
ND1-G1	4		1/1/1957	84.442809	10	37	47	Belvedere
N11-N8	6	CPP	1/1/2009	163	8	38	46	Belvedere
P5-P4	6	VCP	1/1/1950	223	9	37	46	Belvedere
P12-P6	6	VCP	1/1/1957	96	9	37	46	Belvedere
N11A-N11	4	VCP	1/1/1957	58.185798	9	37	46	Belvedere
GB6-GB5	6	VCP	1/1/1952	34	8	37	45	Belvedere
GB2A-BT	6	VCP	1/1/1952	120	8	37	45	Belvedere
GB3-GB2	6	VCP		380	8	37	45	Belvedere
G10A-C1	6		1/1/1958	231.29472	8	37	45	Belvedere
RA10-RA3	6	VCP	1/1/1959	254	7	37	44	Belvedere
RB5-BT	8	VCP	1/1/1955	12	7	37	44	Belvedere
M5-M4	6	VCP	1/1/1950	263	14	30	44	Belvedere
CA6-CA6A	6	VCP	1/1/1950	59	7	37	44	Belvedere
RE5-RE4	12	VCP	1/1/1960	150	7	37	44	Belvedere
RE4-RE3	12	VCP	1/1/1960	59	7	37	44	Belvedere
G6-G5	8	VCP	1/1/1965	542	12	32	44	Belvedere
E1-PS13	6	VCP	1/1/1950	8	7	37	44	Belvedere
CB5-CB4	6	VCP	1/1/1960	306	7	37	44	Belvedere
CB7-CB6	6	VCP	1/1/1960	175	7	37	44	Belvedere
ND10A-ND9	6	PVC	1/1/1950	64	8	35.5	43.5	Belvedere
NA6-NA5	6	PE	1/1/1950	327	9	34	43	Belvedere

Asset ID	Diameter	Material	Install Date	Length	Consequence of Failure	Likelihood of Failure	Total Risk	Location
NE15-NE 15A	6	PE	1/1/1958	100	9	34	43	Belvedere
C1-PS3	6	PVC	1/1/1950	11	7	35.5	42.5	Belvedere
CB2-G10	6	PVC	1/1/1960	85.4	7	35.5	42.5	Belvedere
A9A-A4	8	VCP	1/1/1955	26	10	32	42	Belvedere
NE6-NE5	6	PE	1/1/1952	95	8	34	42	Belvedere
NE14-NE5	6	PE	1/1/1952	91	8	34	42	Belvedere
NF2-NF1	10	VCP	1/1/1959	334	10	32	42	Belvedere
NE3-NE2	6	PE	1/1/1952	151	8	34	42	Belvedere
A9-A9A	8	VCP	1/1/1950	23	10	32	42	Belvedere
NE15-NE6	4	PE	1/1/1950	50	8	34	42	Belvedere
BT-NE8	4	PE	1/1/1959	89	8	34	42	Belvedere
NE8-NE8A	4	PE	1/1/1959	59	8	34	42	Belvedere
NC4B-NC2	6	PE	1/1/1950	123.4	8	34	42	Belvedere
R20-R19	6	VCP	1/1/1952	80	4	37	41	Belvedere
FB9-FB9A	6	VCP	1/1/1955	100	4	37	41	Belvedere
D4-D1	6	VCP	1/1/1955	201	7	34	41	Belvedere
RE2-BT	6	VCP	1/1/1950	223	4	37	41	Belvedere
FB8-FB7	6	VCP	1/1/1955	294	4	37	41	Belvedere
R19-R18	4	VCP	1/1/1957	57	4	37	41	Belvedere
G7-G6	8	VCP	1/1/1965	44	9	32	41	Belvedere
R3-R2	6	PLP	1/1/1950	240	7	34	41	Belvedere
R4-R3	6	PE	1/1/1959	151	7	34	41	Belvedere
RB12-RB8	6	VCP	1/1/1959	155	4	37	41	Belvedere
D1-PS12	6	VCP	1/1/1955	22	7	34	41	Belvedere
A3-A2	6	VCP	1/1/1950	28	9	32	41	Belvedere
R1-PS15	6	PE	1/1/1955	173	7	34	41	Belvedere
R2-R1	6	PE	1/1/1955	223	7	34	41	Belvedere
RC10-RC5	6	VCP	1/1/1952	165	4	37	41	Belvedere
FA1-F8	6	VCP	1/1/1950	48	4	37	41	Belvedere
FB10-FB9	6	VCP	1/1/1955	209	4	37	41	Belvedere
RB8-RB8A.1	6	VCP	1/1/1958	141.9	4	37	41	Belvedere
H6-H5	6	VCP	1/1/1950	278	8	32	40	Belvedere
NC1-NB6	6	VCP	1/1/1960	103	8	32	40	Belvedere
R17-R16	6	PVC	1/1/1952	46	4	35.5	39.5	Belvedere
R18-R17	6	PVC	1/1/1950	40	4	35.5	39.5	Belvedere
FC8-FC7	6	VCP	1/1/1955	198	13	26	39	Belvedere
RC6-RC5	4	VCP	1/1/1957	238	2	37	39	Belvedere
ND13-ND12	4	CAS	1/1/1950	154	12	27	39	Belvedere
N5B-N5A	6	VCP	1/1/1952	49.9	9	30	39	Belvedere
R16-R15	6	PE	1/1/1959	259	4	34	38	Belvedere
N9-N8	6	VCP	1/1/1960	362	8	30	38	Belvedere
CA5-CA4	8	VCP	1/1/1956	190	8	30	38	Belvedere
R5-R4	6	PE	1/1/1959	163	4	34	38	Belvedere
R6-R5	6	PE	1/1/1959	211	4	34	38	Belvedere
R8-R7	6	PE	1/1/1959	247	4	34	38	Belvedere
R9-R8	6	PE	1/1/1959	167	4	34	38	Belvedere
R10-R9	6	PE	1/1/1959	239	4	34	38	Belvedere
R11-R10	6	PE	1/1/1959	160	4	34	38	Belvedere
R12-R11	6	PE	1/1/1959	201	4	34	38	Belvedere
R13-R12	6	PE	1/1/1959	196	4	34	38	Belvedere
R14-R13	6	PE	1/1/1959	204	4	34	38	Belvedere
R15-R14	6	PE	1/1/1959	189	4	34	38	Belvedere
R7-R6	6	PE	1/1/1952	194	4	34	38	Belvedere
RD2-RD1.1	6	PE	1/1/1957	1.6	4	34	38	Belvedere

Asset ID	Diameter	Material	Install Date	Length	Consequence of Failure	Likelihood of Failure	Total Risk	Location
RD2-RD1.1.1	6	PE	1/1/1957	174.2	4	34	38	Belvedere
RC1-BT	4	PE	1/1/1957	260	2	34	36	Belvedere
RD3-RD1.1	4	PE	1/1/1957	58.3	2	34	36	Belvedere
CA3-CA2	8	VCP	1/1/1956	149	5	30	35	Belvedere
P6-P5	6	VCP	1/1/1950	114	9	26	35	Belvedere
CB13-CB12	6	VCP	1/1/1960	264	7	26	33	Belvedere
FA6-FA4	6	VCP	1/1/1950	294	7	26	33	Belvedere
FC3-FC2	6	VCP	1/1/1955	181	7	26	33	Belvedere
FA4-FA3	6	VCP	1/1/1950	138	7	26	33	Belvedere
ND16-ND15	6	PE	1/1/1950	278	9	23	32	Belvedere
ND8-ND8B	6	PE	1/1/1952	55	9	23	32	Belvedere
RE6-RE5	6	VCP	1/1/1960	119	4	26	30	Belvedere
ND6-ND5	6	VCP		242	24	4	28	Belvedere
NE7-NE6	6	PE	1/1/1952	479	14	12	26	Belvedere
J6/A6-A5	8	VCP	1/1/1950	271	15	10	25	Belvedere
G5-G4	8	VCP	1/1/1952	153	12	12	24	Belvedere
ND5-ND4		PVC		95	15	8.5	23.5	Belvedere
F7-F6	6	VCP	1/1/1950	76	4	19	23	Belvedere
NB5-NB4	15	VCP	1/1/1960	64	13	10	23	Belvedere
NB1-N1	15	VCP	1/1/1952	137	13	10	23	Belvedere
N1-PS1	15	VCP	1/1/1950	19	13	10	23	Belvedere
J6/A6-J5	8	VCP	1/1/1950	264	15	8	23	Belvedere
K4-K3	6	VCP	1/1/1950	290	14	8	22	Belvedere
M4-M3	6	VCP	1/1/1950	264	14	8	22	Belvedere
J5-J4	6	VCP	1/1/1950	104	14	8	22	Belvedere
J4-J3	6	VCP	1/1/1950	301	14	8	22	Belvedere
J3-J2	6	VCP	1/1/1950	304	14	8	22	Belvedere
K1-PS10	6	VCP	1/1/1950	10	14	8	22	Belvedere
J1-PS11	6	VCP	1/1/1950	10	14	8	22	Belvedere
G4-G3	8	CPP	1/1/2008	544.7	15	7	22	Belvedere
NF1-NB6	12	VCP	1/1/1950	135	11	10	21	Belvedere
G14-G4	6	CPP	1/1/2008	413.1	11	9	20	Belvedere
A8-A3	8	VCP	1/1/1950	174	10	10	20	Belvedere
CA2-CA1	8	VCP	1/1/1956	320	8	12	20	Belvedere
CA1-C2	8	VCP	1/1/1956	178	8	12	20	Belvedere
NB6-NB5	10	VCP	1/1/1960	156	10	10	20	Belvedere
NB4-NB2	15	CPP	1/1/2009	333	13	7	20	Belvedere
NB2-NB1	15	CPP	1/1/2009	370	13	7	20	Belvedere
K3-K2	6	VCP	1/1/1950	260	11	8	19	Belvedere
M6-M2	6	VCP	1/1/1952	241	11	8	19	Belvedere
M2-M1	6	VCP	1/1/1950	28	11	8	19	Belvedere
D2-D1	6	VCP	1/1/1955	28	7	12	19	Belvedere
D3-D2	6	VCP	1/1/1955	223	7	12	19	Belvedere
G8-G7	8	VCP	1/1/1965	402	9	10	19	Belvedere
NA3-NA2	6	VCP	1/1/1950	244	9	10	19	Belvedere
C2-C1	6	VCP	1/1/1950	403	7	12	19	Belvedere
K6-K3	6	VCP	1/1/1950	198	11	8	19	Belvedere
K5-K2	6	VCP	1/1/1950	332	11	8	19	Belvedere
B2-B1	6	VCP	1/1/1952	298	8	10	18	Belvedere
A7B-A7A	6	VCP	1/1/1952	201	8	10	18	Belvedere
H7-H6	6	VCP	1/1/1950	353	8	10	18	Belvedere
H5-H4	6	VCP	1/1/1950	350	8	10	18	Belvedere
H4-H3	6	VCP	1/1/1950	303	8	10	18	Belvedere
H3-H2	6	VCP	1/1/1950	301	8	10	18	Belvedere

Asset ID	Diameter	Material	Install Date	Length	Consequence of Failure	Likelihood of Failure	Total Risk	Location
H2-H1	6	VCP	1/1/1950	335	8	10	18	Belvedere
H1-PS7	6	VCP	1/1/1950	332	8	10	18	Belvedere
NB8-NB7	6	VCP	1/1/1960	10	8	10	18	Belvedere
NB7-NB6	6	VCP	1/1/1960	12	8	10	18	Belvedere
NB12-NB11	6	VCP	1/1/1960	370	8	10	18	Belvedere
NA2-NA1	8	PVC	1/1/1965	162	9	8.5	17.5	Belvedere
NA1-N1	8	PVC	1/1/1952	7	9	8.5	17.5	Belvedere
FA9-FA8	6	VCP	1/1/1950	134	13	4	17	Belvedere
C4-C3	6	VCP	1/1/1955	314	7	10	17	Belvedere
FA14-FA13	6	VCP	1/1/1950	306	13	4	17	Belvedere
G9-G8	6	VCP	1/1/1952	254	7	10	17	Belvedere
FC7-FC6	6	VCP	1/1/1955	205	13	4	17	Belvedere
C6-C4	6	VCP	1/1/1955	23	7	10	17	Belvedere
C3-C2	6	VCP	1/1/1955	210	7	10	17	Belvedere
N7-N6	6	VCP	1/1/1952	40	9	8	17	Belvedere
FB2-FB1	8	PVC	1/1/1955	219	14	2.5	16.5	Belvedere
NB9-NB8	6	PVC	1/1/1960	431	8	8.5	16.5	Belvedere
N8-N2	6	VCP	1/1/1952	32	8	8	16	Belvedere
F4-F3	8	VCP	1/1/1950	246	8	8	16	Belvedere
F3-F2	8	VCP	1/1/1950	171	8	8	16	Belvedere
F2-F1	8	VCP	1/1/1950	202	8	8	16	Belvedere
E6-E5	8	VCP	1/1/1950	277	8	8	16	Belvedere
E5-E4	8	VCP	1/1/1950	135	8	8	16	Belvedere
E4-E3	8	VCP	1/1/1950	165	8	8	16	Belvedere
E3-E2	8	VCP	1/1/1950	252	8	8	16	Belvedere
E2-E1	8	VCP	1/1/1950	198	8	8	16	Belvedere
FC5-FC4	4	CAS	1/1/1955	104	11	5	16	Belvedere
NB11-NB2	6	VCP	1/1/1950	12	8	8	16	Belvedere
F6-F5	6	VCP	1/1/1950	159	7	8	15	Belvedere
F5-F4	6	VCP	1/1/1950	241	7	8	15	Belvedere
F12-F11	6	VCP	1/1/1950	167	7	8	15	Belvedere
F11-F1	6	VCP	1/1/1950	155	7	8	15	Belvedere
E7-E1	6	AC	1/1/1950	280	7	8	15	Belvedere
ND10B-ND10	6	PE		105	14	1	15	Belvedere
FC1-BT	6	VCP	1/1/1955	173	4	10	14	Belvedere
RA3-RA2	6	PE	1/1/1959	209	13	1	14	Belvedere
FB3-FB3A	8	PVC	1/1/1955	109	11	2.5	13.5	Belvedere
ND8A-ND6	6	VCP	1/1/1950	145	9	4	13	Belvedere
CA4-CA3	8	VCP	1/1/1956	194	5	8	13	Belvedere
NE1A-ND6	6	VCP	1/1/1950	157	9	4	13	Belvedere
P4-P3	6	VCP	1/1/1950	241	9	4	13	Belvedere
P3-P2	6	VCP	1/1/1950	126	9	4	13	Belvedere
G1-PS2	6	VCP	1/1/1950	23	9	4	13	Belvedere
F8-F7	6	VCP	1/1/1950	42	4	8	12	Belvedere
CB9-CB8	6	VCP	1/1/1960	224	8	4	12	Belvedere
FA3-FA2	6	CAS	1/1/1950	187	7	5	12	Belvedere
CB8-CB7	6	VCP	1/1/1960	190	8	4	12	Belvedere
GB11-GB5	6	VCP	1/1/1952	224	8	4	12	Belvedere
ND11-ND10	6	VCP	1/1/1950	213	8	4	12	Belvedere
RC7-RC6	4	VCP	1/1/1957	120	8	4	12	Belvedere
RB11-RB11A	4	VCP	1/1/1950	137	8	4	12	Belvedere
CB11-CB10	6	VCP	1/1/1960	303	7	4	11	Belvedere
FA11-FA10	6	VCP	1/1/1950	280	7	4	11	Belvedere
FA8-FA7	6	VCP	1/1/1950	217	7	4	11	Belvedere

Asset ID	Diameter	Material	Install Date	Length	Consequence of Failure	Likelihood of Failure	Total Risk	Location
FA7-FA6	6	VCP	1/1/1950	220	7	4	11	Belvedere
CB12-CB3	6	VCP	1/1/1960	591	7	4	11	Belvedere
RA8-RA7	6	VCP	1/1/1959	86	7	4	11	Belvedere
CB4-CB3	6	VCP	1/1/1960	108	7	4	11	Belvedere
RB6-RB6A	6	VCP	1/1/1958	30	7	4	11	Belvedere
CB14-CB4	6	VCP	1/1/1960	185	7	4	11	Belvedere
G17-G16	6	VCP	1/1/1952	239	7	4	11	Belvedere
CB2-C1	6	VCP	1/1/1960	62	7	4	11	Belvedere
CB6-CB5	6	VCP	1/1/1960	167	7	4	11	Belvedere
CB10-CB9	6	VCP	1/1/1960	233	7	4	11	Belvedere
RB4-RB3	6	VCP	1/1/1958	188	7	4	11	Belvedere
RA9-RA2	6	VCP	1/1/1959	173	7	4	11	Belvedere
CA7-CA6	6	VCP	1/1/1950	157	7	4	11	Belvedere
F1-PS14	6	VCP	1/1/1950	8	7	4	11	Belvedere
RB6A-RB5	6	VCP	1/1/1958	135.9	7	4	11	Belvedere
FB1-FA3	8	PVC	1/1/1955	162	8	2.5	10.5	Belvedere
GA1-GA1A	6	PE	1/1/1952	66	9	1	10	Belvedere
GA5-GA1	6	PE	1/1/1952	128	9	1	10	Belvedere
GA1A-BT	6	PE	1/1/1952	107	9	1	10	Belvedere
ND8B-ND8A	6	PE	1/1/1952	175	9	1	10	Belvedere
NA4-NA3	6	PE	1/1/1998	442	9	1	10	Belvedere
FC4-FC3	4	CAS	1/1/1955	166	5	5	10	Belvedere
GA2-GA1	6	PE	1/1/1952	181	9	1	10	Belvedere
GA3-GA2	6	PE	1/1/1952	306	9	1	10	Belvedere
NE1-NE1A	6	PE	1/1/1952	243	9	1	10	Belvedere
NE2-NE1	6	PE	1/1/1952	145	9	1	10	Belvedere
GA4-GA3	6	PE	1/1/1952	113	9	1	10	Belvedere
FC2-FC1	6	PVC	1/1/1955	155	7	2.5	9.5	Belvedere
RA1-NF3	6	PVC	1/1/1959	84	7	2.5	9.5	Belvedere
FB6-FB5	8	VCP	1/1/1955	123	5	4	9	Belvedere
R21-R20	6	CAS	1/1/1996	182	4	5	9	Belvedere
R22-R21	6	CAS	1/1/1996	26	4	5	9	Belvedere
NE5-NE4	6	PE	1/1/1952	93	8	1	9	Belvedere
GB2-GB1	6	PE	1/1/1952	133	8	1	9	Belvedere
R23-R22	6	CAS	1/1/1996	44	4	5	9	Belvedere
RE3-RE2	6	CAS	1/1/1960	82	4	5	9	Belvedere
GB1-G7	6	PE	1/1/1952	129	8	1	9	Belvedere
GB4-GB3	6	PE	1/1/1952	150	8	1	9	Belvedere
NE12-NE8A	6	PE	1/1/1952	192	8	1	9	Belvedere
GB5-GB4	6	PE	1/1/1952	117	8	1	9	Belvedere
RB7-RB6	4	VCP	1/1/1958	52	5	4	9	Belvedere
GB8-GB1	6	PE	1/1/1952	193	8	1	9	Belvedere
GC7-GB1	6	PE	1/1/1950	67.1	8	1	9	Belvedere
GB7-GC7	6	PE	1/1/1950	173.9	8	1	9	Belvedere
RE9-RE8	6	VCP	1/1/1960	168	4	4	8	Belvedere
RC9-RC3	6	VCP	1/1/1957	98	4	4	8	Belvedere
RE7-RE6	6	VCP	1/1/1960	134	4	4	8	Belvedere
RC2-RC1	6	VCP	1/1/1957	33	4	4	8	Belvedere
RC4-RC3	6	VCP	1/1/1957	73	4	4	8	Belvedere
RC3-RC2	6	VCP	1/1/1957	186	4	4	8	Belvedere
FC6-FC1	6	PE	1/1/1955	211	7	1	8	Belvedere
CB3-CB2	6	CPP	1/1/2008	287.1	7	1	8	Belvedere
FA17-FA15	6	PE	1/1/1950	134	7	1	8	Belvedere
RA1A-RA1	6	PE	1/1/1959	150	7	1	8	Belvedere

Asset ID	Diameter	Material	Install Date	Length	Consequence of Failure	Likelihood of Failure	Total Risk	Location
RB9-RB8	6	VCP	1/1/1958	121	4	4	8	Belvedere
RC5-RC4	6	VCP	1/1/1957	67	4	4	8	Belvedere
NE13-NE12	6	PE		33	7	1	8	Belvedere
FA1-F7	6	VCP	1/1/1950	51	4	4	8	Belvedere
RB3-RB2	6	VCP	1/1/1958	160	4	4	8	Belvedere
ND15-ND1	4	PE	1/1/1950	161	7	1	8	Belvedere
RB8-RB8A	6	VCP	1/1/1958	59.1	4	4	8	Belvedere
FB5-FB4	8	PVC	1/1/1955	246	5	2.5	7.5	Belvedere
FB3A-FB2	8	PVC	1/1/1955	349	5	2.5	7.5	Belvedere
FB4-FB3	8	PVC	1/1/1955	121	5	2.5	7.5	Belvedere
RB8A-RB1	6	PVC		8	4	2.5	6.5	Belvedere
RA2-RA1A	4	PE	1/1/1959	152.1	5	1	6	Belvedere
RC8-RC8A	6	PE	1/1/1950	356	4	1	5	Belvedere



## **Appendix B**

Gravity Main  
Rehabilitation and  
Reinspection  
Recommendations



Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
306-305	82	6	1/1/1962	VCP	\$574.00	77	High Priority CCTV	Tiburon		2/9/2005	0	1
624-637	133	18	1/1/2005	CPP	\$57,722.00	76	Pipe Burst	Tiburon		6/8/2005	5	1
640-703	120	18	1/1/2005	CPP	\$52,080.00	76	Pipe Burst	Tiburon		6/8/2005	5	1
646-640	160	18	1/1/2005	CPP	\$69,440.00	76	Pipe Burst	Tiburon		6/8/2005	5	1
637-635	185	18	1/1/2005	CPP	\$80,290.00	76	Pipe Burst	Tiburon		6/8/2005	5	1
635-634	382	18	1/1/2005	CPP	\$16,000.00	76	Point Repair	Tiburon		6/8/2005	5	1
634-646	250	18	1/1/2005	CPP	\$118,750.00	76	Replace	Tiburon		6/8/2005	5	1
703-794	90	18	1/1/2005	CPP	\$39,060.00	76	Pipe Burst	Tiburon		6/8/2005	5	1
799-345	300.4	8	1/1/1962	VCP	\$0.00	75	No Action	Tiburon		12/15/2010	4	None
71-73	258	6	1/1/1952	VCP	\$89,010.00	74	Replace	Tiburon		3/14/2005	5	1
19A-19	108	6	1/1/1952	VCP	\$37,260.00	73	Replace	Tiburon		3/14/2005	5	1
215-127	233	6	1/1/1962	VCP	\$16,000.00	73	Point Repair	Tiburon		1/27/2005	5	1
36-35	210	6	1/1/1952	VCP	\$72,450.00	72	Replace	Tiburon	High Priority I&I Concerns	3/16/2005	5	1
800-801	140.46056	8	1/1/1987	VCP	\$0.00	71	No Action	Tiburon		10/7/2014	4	None
109B-109A	240.8	6	1/1/1962	VCP	\$0.00	70	No Action	Tiburon	Sag	12/10/2010	3	None
203A-203	71	6	1/1/1967	VCP	\$497.00	70	High Priority CCTV	Tiburon	Medium Priority I&I Concerns	1/31/2005	5	1
116-115	158	6	1/1/1962	VCP	\$24,000.00	70	Point Repair	Tiburon		4/18/2005	5	1
636-PS-9	279	6	1/1/1962	VCP	\$10,000.00	70	Point Repair	Tiburon		4/20/2005	4	1
BT-611	282	6	1/1/1960	VCP	\$97,290.00	70	Replace	Tiburon	Sag	12/14/2010	0	1
360-643	223	6	1/1/1960	VCP	\$76,935.00	68	Replace	Tiburon		5/23/2005	5	1
74B-74	165	6	1/1/1952	VCP	\$31,020.00	68	Pipe Burst	Tiburon	Medium Priority I&I Concerns	12/17/2010	4	1
209-208	243	6	1/1/1962	VCP	\$16,000.00	68	Point Repair	Tiburon	Medium Priority I&I Concerns	1/31/2005	5	1
176B-176	163	6	1/1/1962	VCP	\$0.00	68	No Action	Tiburon	Medium Priority I&I Concerns	2/2/2005	3	None
243-242	138	6	1/1/1962	VCP	\$0.00	68	No Action	Tiburon		1/27/2005	0	None
72A-72	206.4	6	1/1/1952	VCP	\$71,208.00	67	Replace	Tiburon		12/17/2010	5	1
66A-66	105	6	1/1/1952	VCP	\$19,740.00	67	Pipe Burst	Tiburon		8/17/2015	5	1
264-263	245	6	1/1/1962	VCP	\$84,525.00	67	Replace	Tiburon		4/28/2005	5	1
32-31	201	6	1/1/1952	VCP	\$69,345.00	67	Replace	Tiburon	High Priority I&I Concerns	4/19/2005	5	1
82C-82	167	6	1/1/1952	VCP	\$1,169.00	66	High Priority CCTV	Tiburon	Medium Priority I&I Concerns	3/7/2005	5	1
78-76	115	6	1/1/1952	VCP	\$21,620.00	66	Pipe Burst	Tiburon	Medium Priority I&I Concerns	5/2/2005	4	1
51A-51	257	6	1/1/1952	VCP	\$88,665.00	66	Replace	Tiburon		3/9/2005	5	1
60A-60	250	6	1/1/1952	VCP	\$86,250.00	66	Replace	Tiburon	High Priority I&I Concerns	4/4/2005	5	1

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
66C-66A	34.452249	6		VCP	\$6,477.02	66	Pipe Burst	Tiburon		8/17/2015	5	1
359A-359B	240	6	1/1/1960	VCP	\$82,800.00	65	Replace	Tiburon		3/17/2005	4	1
11-10	96	12	1/1/1984	VCP	\$7,104.00	65	CIPP	Tiburon		3/15/2005	4	1
316-315	171	6	1/1/1961	VCP	\$0.00	65	No Action	Tiburon		5/10/2005	4	None
7A-7	160.5	6	1/1/1952	PE	\$0.00	64	No Action	Tiburon	Repair Date >= Inspection Date	12/16/2010	4	None
280-279	209	6	1/1/1972	VCP	\$15,000.00	63	Point Repair	Tiburon		1/24/2005	4	1
14-10	308	8	1/1/1960	VCP	\$19,712.00	63	CIPP	Tiburon		3/14/2005	4	1
35-34	246	6	1/1/2006	PE	\$84,870.00	63	Replace	Tiburon	High Priority I&I Concerns	5/11/2005	5	1
58-41	205	6	1/1/1952	VCP	\$70,725.00	63	Replace	Tiburon	High Priority I&I Concerns	4/20/2005	5	1
30B-30	178	6	1/1/1952	VCP	\$0.00	63	No Action	Tiburon	High Priority I&I Concerns	5/23/2005	4	None
676-677	18	6		VCP	\$0.00	63	No Action	Tiburon		8/31/2010	4	None
818-806	140.02519	8	1/1/1987	VCP	\$0.00	63	No Action	Tiburon		10/8/2014	4	None
15B-15	275	6	1/1/1952	VCP	\$94,875.00	62	Replace	Tiburon		3/16/2005	4	1
312-499	28	6	1/1/1961	VCP	\$0.00	62	No Action	Tiburon		5/4/2005	4	None
31-JCT_BOX	474	6	1/1/1952	VCP	\$163,530.00	62	Replace	Tiburon		4/19/2005	4	1
440-439	293	6	1/1/1986	VCP	\$24,000.00	62	Point Repair	Tiburon		1/26/2005	3	1
651-311	71	6	1/1/1961	VCP	\$0.00	62	No Action	Tiburon		5/4/2005	4	None
323-322	140	6	1/1/2008	PVC	\$0.00	60.5	No Action	Tiburon		5/10/2005	4	None
111-504	46.1	6	1/1/1986	PVC	\$8,666.80	60.5	Pipe Burst	Tiburon		12/10/2010	4	1
12-11	290	12	1/1/1984	VCP	\$21,460.00	60	CIPP	Tiburon		3/15/2005	3	1
86A-86	185	6	1/1/1952	PE	\$0.00	59	No Action	Tiburon	Repair Date >= Inspection Date	5/3/2005	4	None
86-85	263	6	1/1/1952	PE	\$0.00	59	No Action	Tiburon	Repair Date >= Inspection Date	2/15/2005	4	None
643-359C	145	6	1/1/1960	VCP	\$0.00	59	No Action	Tiburon		5/23/2005	4	None
330A-330	150.4	6	1/1/1962	PE	\$0.00	59	No Action	Tiburon	Repair Date >= Inspection Date	12/7/2010	4	None
148A-148	110	6	1/1/1962	VCP	\$20,680.00	59	Pipe Burst	Tiburon		4/18/2005	4	1
165-163	167	6	1/1/1962	VCP	\$31,396.00	59	Pipe Burst	Tiburon		2/2/2005	4	1
142-141	243	8	1/1/1960	VCP	\$0.00	58	No Action	Tiburon		2/3/2005	0	None
812-813	173.54655	8	1/1/1987	VCP	\$0.00	58	No Action	Tiburon		10/8/2014	4	None
113-112	255	6	1/1/1962	VCP	\$0.00	57	No Action	Tiburon		3/29/2005	4	None
353A-BT	92	6		VCP	\$16,000.00	57	Point Repair	Tiburon		12/13/2010	3	2
171-130	198.7	6	1/1/1962	VCP	\$0.00	57	No Action	Tiburon		12/15/2010	4	None
212A-212	180	6	1/1/1962	AC	\$0.00	57	No Action	Tiburon	Medium Priority I&I Concerns	5/9/2005	4	None

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
327A-327	212	6	1/1/1962	VCP	\$73,140.00	57	Replace	Tiburon		12/8/2010	4	2
327-324	270	6	1/1/1962	VCP	\$0.00	57	No Action	Tiburon		5/10/2005	4	None
69-70	327	6	1/1/1952	VCP	\$112,815.00	57	Replace	Tiburon		3/10/2005	4	2
654A-654	90.9	6	1/1/1962	VCP	\$0.00	57	No Action	Tiburon		12/8/2010	4	None
18-17	84	6	1/1/1952	VCP	\$0.00	57	No Action	Tiburon		3/14/2005	0	None
177-175	183	6	1/1/1962	VCP	\$0.00	57	No Action	Tiburon	Medium Priority I&I Concerns	2/2/2005	2	None
BT-353	169	6	1/1/1960	VCP	\$1,183.00	57	High Priority CCTV	Tiburon	No CCTV Data		No CCTV Data	1
101-504	130.4	6	1/1/1962		\$0.00	57	No Action	Tiburon		12/9/2010	3	None
653-652	340.6	6	1/1/1962	VCP	\$117,507.00	57	Replace	Tiburon		12/10/2010	3	2
347-348	257	6	1/1/1960	VCP	\$1,799.00	56	High Priority CCTV	Tiburon		2/8/2005	0	1
235-234	178	6	1/1/1962	VCP	\$0.00	56	No Action	Tiburon		4/25/2005	4	None
82B-82	329	6	1/1/1952	VCP	\$113,505.00	56	Replace	Tiburon	Medium Priority I&I Concerns	3/31/2005	4	2
233A-233	97.7	6	1/1/1962	VCP	\$0.00	56	No Action	Tiburon		12/16/2010	4	None
67-68	568	6	1/1/1952	VCP	\$0.00	56	No Action	Tiburon	Repair Date >= Inspection Date	3/10/2005	4	None
70-71	245	6	1/1/1952	VCP	\$84,525.00	56	Replace	Tiburon		3/10/2005	4	2
604-330A	59.7	6	1/1/1962	PE	\$0.00	56	No Action	Tiburon	Repair Date >= Inspection Date	12/7/2010	4	None
31B-31A	64	6	1/1/1962	VCP	\$0.00	56	No Action	Tiburon	High Priority I&I Concerns	5/9/2005	4	None
206-205	241	6	1/1/1962	VCP	\$16,000.00	56	Point Repair	Tiburon	Medium Priority I&I Concerns	2/10/2005	4	2
205-195	94	6	1/1/1962	VCP	\$10,000.00	56	Point Repair	Tiburon	Medium Priority I&I Concerns	4/26/2005	4	2
303-302	74.3	8	1/1/1962	VCP	\$520.10	56	High Priority CCTV	Tiburon		2/8/2005	0	1
177B-177A	10	6	1/1/1962	VCP	\$0.00	56	No Action	Tiburon	Medium Priority I&I Concerns	2/2/2005	4	None
13B-13A	96.5	6	1/1/1993	PVC	\$0.00	55.5	No Action	Tiburon	Repair Date >= Inspection Date	12/14/2010	4	None
81A-81	322	6	1/1/1952	VCP	\$0.00	55	No Action	Tiburon	Medium Priority I&I Concerns	4/28/2005	4	None
307-306	305	6	1/1/1962	VCP	\$0.00	55	No Action	Tiburon		2/9/2005	2	None
78A-78	57.5	6	1/1/1952	VCP	\$10,810.00	55	Pipe Burst	Tiburon	Medium Priority I&I Concerns	12/16/2010	4	2
431-433	221	6	1/1/1972	VCP	\$76,245.00	55	Replace	Paradise Cove		2/14/2011	4	2
301-300	100	6	1/1/1962	VCP	\$0.00	55	No Action	Tiburon		2/9/2005	3	None
51-50	375	6	1/1/1952	VCP	\$0.00	55	No Action	Tiburon	High Priority I&I Concerns	5/11/2005	4	None
120-119	201	6	1/1/1962	VCP	\$1,407.00	55	High Priority CCTV	Tiburon		2/7/2005	0	1
450-472	101	6	1/1/1962	VCP	\$18,988.00	55	Pipe Burst	Paradise Cove		4/4/2005	4	2
450A-450	87	6	1/1/1962	VCP	\$16,356.00	55	Pipe Burst	Paradise Cove		2/14/2011	4	2
119-119A	119.3	6	1/1/1962	VCP	\$835.10	55	High Priority CCTV	Tiburon	No CCTV Data	1/0/1900	No CCTV Data	1

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
119A-118	153.7	6	1/1/1962	VCP	\$1,075.90	55	High Priority CCTV	Tiburon	No CCTV Data		No CCTV Data	1
478A-478	153	6	1/1/1985	PVC	\$0.00	54.5	No Action	Paradise Cove		5/24/2005	4	None
87-85	360	6	1/1/1998	PE	\$0.00	54	No Action	Tiburon	Repair Date >= Inspection Date	3/28/2005	3	None
350-351	143	6	1/1/1960	VCP	\$0.00	54	No Action	Tiburon		5/26/2005	0	None
677-113	328	6	1/1/1962	VCP	\$0.00	54	No Action	Tiburon		8/31/2010	3	None
92A-92	220	6	1/1/1952	PE	\$0.00	54	No Action	Tiburon	Repair Date >= Inspection Date	3/4/2005	3	None
7-4	175	6	1/1/1952	PE	\$0.00	54	No Action	Tiburon	Repair Date >= Inspection Date	3/28/2005	4	None
118a-799	157.4	8	1/1/1962	VCP	\$10,073.60	53	CIPP	Tiburon		12/15/2010	4	2
197-205	533	6	1/1/2000	PE	\$183,885.00	53	Replace	Tiburon	Medium Priority I&I Concerns	2/10/2005	4	2
345-347	326	8	1/1/1960	AC	\$16,000.00	53	Point Repair	Tiburon		2/8/2005	3	2
639-622	93	12	1/1/1985	PVC	\$6,882.00	52.5	CIPP	Tiburon		2/14/2011	3	2
73-13	179	6	1/1/1952	VCP	\$33,652.00	52	Pipe Burst	Tiburon		3/28/2005	3	2
74-73	217	6	1/1/1952	VCP	\$0.00	52	No Action	Tiburon	Medium Priority I&I Concerns	3/16/2005	3	None
75-74	255	6	1/1/1952	VCP	\$0.00	52	No Action	Tiburon	Medium Priority I&I Concerns	2/15/2005	3	None
242-241	168	6	1/1/1962	VCP	\$1,176.00	52	High Priority CCTV	Tiburon		1/27/2005	0	1
274-273	201	6	1/1/1962	VCP	\$0.00	52	No Action	Tiburon		1/25/2005	0	None
263-262	260	6	1/1/1962	VCP	\$89,700.00	52	Replace	Tiburon		1/26/2005	5	1
56-55	73	6	1/1/1952	VCP	\$0.00	52	No Action	Tiburon	High Priority I&I Concerns	3/9/2005	4	None
57-55	275	6	1/1/1952	VCP	\$0.00	52	No Action	Tiburon	High Priority I&I Concerns	3/9/2005	4	None
49A-49	401	6	1/1/1952	VCP	\$138,345.00	52	Replace	Tiburon	High Priority I&I Concerns	3/16/2005	4	2
41-40	522	6	1/1/1952	VCP	\$180,090.00	52	Replace	Tiburon	High Priority I&I Concerns	7/2/2013	4	2
68A-69	400.1	6	1/1/1952	VCP	\$138,034.50	52	Replace	Tiburon		12/15/2010	3	2
801-802	74.206403	8	1/1/1987	VCP	\$0.00	52	No Action	Tiburon		10/7/2014	3	None
806-PS-8	3.3277084	8	1/1/1987	VCP	\$23.29	52	High Priority CCTV	Tiburon	No CCTV Data		No CCTV Data	1
106-105	255	6	1/1/1962	VCP	\$0.00	51	No Action	Tiburon		4/21/2005	3	None
108-107	229	6	1/1/1962	VCP	\$0.00	51	No Action	Tiburon		4/7/2005	5	None
259B-259	224	6	1/1/1962	VCP	\$16,000.00	51	Point Repair	Tiburon		1/25/2005	3	2
254-253	169	6	1/1/1962	VCP	\$0.00	51	No Action	Tiburon		4/5/2005	0	None
314B-314C	11	6	1/1/1962	VCP	\$77.00	51	High Priority CCTV	Tiburon	No CCTV Data		No CCTV Data	1
314A-314B	122.7	6	1/1/1961	VCP	\$23,067.60	51	Pipe Burst	Tiburon		12/9/2010	3	2
311-PS-7	259	6	1/1/1961	VCP	\$0.00	51	No Action	Tiburon		8/31/2010	3	None
202-201	301	6	1/1/1967	VCP	\$2,107.00	51	High Priority CCTV	Tiburon	Medium Priority I&I Concerns	4/28/2005	3	1

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
147-146	214	6	1/1/1962	VCP	\$1,498.00	51	High Priority CCTV	Tiburon		4/6/2005	0	1
85-75	480	6	1/1/1952	VCP	\$0.00	51	No Action	Tiburon	Repair Date >= Inspection Date	2/15/2005	3	None
15-10	280	6	1/1/1960	VCP	\$0.00	51	No Action	Tiburon		3/14/2005	3	None
10-9A	308	12	1/1/1952	VCP	\$90,244.00	51	Pipe Burst	Tiburon		8/31/2010	3	2
292-291	165	6	1/1/1972	VCP	\$0.00	51	No Action	Tiburon		5/3/2005	3	None
288-287	177	6	1/1/1972	VCP	\$33,276.00	51	Pipe Burst	Tiburon		5/2/2005	3	2
216-215	209	6	1/1/1962	VCP	\$0.00	51	No Action	Tiburon		1/27/2005	0	None
248-246	90.1	6	1/1/1962	VCP	\$0.00	51	No Action	Tiburon		5/26/2005	3	None
107-106	316	6	1/1/1962	VCP	\$109,020.00	51	Replace	Tiburon		4/7/2005	3	2
652A-BT2	28.6	6	1/1/1962	VCP	\$0.00	51	No Action	Tiburon		12/10/2010	3	None
330-BT2	228	6	1/1/1962	VCP	\$78,660.00	51	Replace	Tiburon		2/9/2005	3	2
330-BT2	252	6	1/1/1962	VCP	\$86,940.00	51	Replace	Tiburon		2/9/2005	3	2
499-651	214	6	1/1/1961	VCP	\$0.00	50	No Action	Tiburon		5/4/2005	2	None
289A-289	53	6	1/1/1972	PVC	\$371.00	49.5	Medium Priority CCT	Tiburon	No CCTV Data		No CCTV Data	2
664-665	40	6	1/1/1993	PVC	\$280.00	49.5	Medium Priority CCT	Paradise Cove		5/25/2005	0	2
444-444A	72.5	6	1/1/1986	PVC	\$507.50	49.5	Medium Priority CCT	Tiburon	No CCTV Data		No CCTV Data	2
444A-445	218.5	6	1/1/1986	PVC	\$1,529.50	49.5	Medium Priority CCT	Tiburon	No CCTV Data		No CCTV Data	2
641-500	543	15	1/1/1962	VCP	\$0.00	49	No Action	Tiburon		2/7/2005	2	None
252-251	107	6	1/1/1962	PE	\$0.00	49	No Action	Tiburon	Repair Date >= Inspection Date	4/5/2005	0	None
126-125	260	8	1/1/2008	CPP	\$0.00	49	No Action	Tiburon		2/3/2005	0	None
125-124	146	8	1/1/1962	VCP	\$1,022.00	49	Medium Priority CCT	Tiburon		2/3/2005	0	2
127-126	214	8	1/1/2008	CPP	\$0.00	49	No Action	Tiburon	Repair Date >= Inspection Date	3/19/2009	3	None
253-252	202	6	1/1/1962	VCP	\$69,690.00	48	Replace	Tiburon		4/7/2005	0	3
321-320	331	6	1/1/2000	PE	\$0.00	48	No Action	Tiburon		5/11/2005	4	None
359C-359	125.7	6	1/1/1960	VCP	\$23,631.60	48	Pipe Burst	Tiburon		12/14/2010	3	3
151-150	179	6	1/1/1962	VCP	\$1,253.00	48	Medium Priority CCT	Tiburon		3/8/2005	0	2
189-188	152	6	1/1/1962	PE	\$0.00	48	No Action	Tiburon	Repair Date >= Inspection Date	2/10/2005	3	None
122-121	318	6	1/1/1962	VCP	\$0.00	48	No Action	Tiburon		3/20/2009	3	None
290-289	191	6	1/1/1972	PLP	\$10,000.00	48	Point Repair	Tiburon		5/3/2005	3	3
133-132	286	6	1/1/1962	VCP	\$2,002.00	48	Medium Priority CCT	Tiburon		2/1/2005	0	2
632-617	226.3	6	1/1/1960	VCP	\$78,073.50	48	Replace	Tiburon		12/13/2010	3	3
253A-253	102	6	1/1/1962	VCP	\$0.00	48	No Action	Tiburon		4/7/2005	3	None

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
653-652A	3	6	1/1/1962	PP	\$21.00	48	Medium Priority CCT	Tiburon	No CCTV Data		No CCTV Data	2
200-199	181	6	1/1/1967	PVC	\$0.00	46.5	No Action	Tiburon	Medium Priority I&I Concerns	1/31/2005	3	None
103-102	152	6	1/1/1962	VCP	\$10,000.00	46	Point Repair	Tiburon		3/29/2005	3	3
116A-116	216	6	1/1/1962	VCP	\$0.00	46	No Action	Tiburon		3/29/2005	3	None
259A-259	186	6	1/1/1962	VCP	\$0.00	46	No Action	Tiburon		3/8/2005	3	None
281-280	163	6	1/1/1972	VCP	\$0.00	46	No Action	Tiburon		1/24/2005	3	None
279-278	176	6	1/1/1972	VCP	\$1,232.00	46	Medium Priority CCT	Tiburon		1/24/2005	0	2
212-211	145	6	1/1/1962	VCP	\$1,015.00	46	Medium Priority CCT	Tiburon	Medium Priority I&I Concerns	5/9/2005	0	2
210-209	172	6	1/1/1962	VCP	\$1,204.00	46	Medium Priority CCT	Tiburon	Medium Priority I&I Concerns	5/9/2005	0	2
199-198	204	6	1/1/1967	VCP	\$70,380.00	46	Replace	Tiburon	Medium Priority I&I Concerns	1/31/2005	4	2
198-197	193	6	1/1/1967	TTE	\$0.00	46	No Action	Tiburon	Medium Priority I&I Concerns	5/12/2005	0	None
154B-154A	72.9	6	1/1/1962	VCP	\$0.00	46	No Action	Tiburon		12/16/2010	3	None
13-9A	125	6	1/1/1952	VCP	\$16,000.00	46	Point Repair	Tiburon		3/28/2005	3	3
5-4	332.2	12	1/1/2008	CPP	\$0.00	46	No Action	Tiburon		1/17/2008	0	None
182A-182	133.8	6	1/1/1962	VCP	\$0.00	46	No Action	Tiburon	Medium Priority I&I Concerns	12/16/2010	3	None
176-175	239	6	1/1/1962	VCP	\$0.00	46	No Action	Tiburon	Medium Priority I&I Concerns	2/2/2005	1	None
170-798	371.3	6	1/1/1962	VCP	\$128,098.50	46	Replace	Tiburon		2/16/2011	3	3
278-277	66	6	1/1/1972	VCP	\$462.00	46	Medium Priority CCT	Tiburon		1/24/2005	0	2
272-271	185	6	1/1/1962	VCP	\$16,000.00	46	Point Repair	Tiburon		2/14/2005	3	3
218-217	173	6	1/1/1962	VCP	\$0.00	46	No Action	Tiburon		1/27/2005	3	None
217-216	250	6	1/1/1962	VCP	\$0.00	46	No Action	Tiburon		1/27/2005	3	None
167-170	95	6	1/1/1962	VCP	\$16,000.00	46	Point Repair	Tiburon		2/2/2005	3	3
166-167	162	6	1/1/1962	VCP	\$0.00	46	No Action	Tiburon		2/2/2005	3	None
164A-164	119	6	1/1/1962	VCP	\$0.00	46	No Action	Tiburon		2/10/2005	3	None
102-101	204	6	1/1/1962	VCP	\$0.00	46	No Action	Tiburon		4/18/2005	3	None
656A-242	34.3	6	1/1/1962	VCP	\$0.00	46	No Action	Tiburon		12/9/2010	3	None
325A-325	140.7	6	1/1/1962	VCP	\$0.00	46	No Action	Tiburon		5/11/2005	3	None
8-3	250	6		CT	\$1,750.00	46	Medium Priority CCT	Tiburon	No CCTV Data		No CCTV Data	2
360C-360	0.4	6	1/1/1960	VCP	\$2.80	46	Medium Priority CCT	Tiburon	No CCTV Data		No CCTV Data	2
360B-360C	191.6	6	1/1/1960	VCP	\$1,341.20	46	Medium Priority CCT	Tiburon	No CCTV Data		No CCTV Data	2
248A-248	91.9	6	1/1/1962	VCP	\$17,277.20	45	Pipe Burst	Tiburon		5/26/2005	3	3
304-303	266	8	1/1/1962	VCP	\$0.00	45	No Action	Tiburon		2/8/2005	2	None

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
237-236	49	6	1/1/1962	VCP	\$343.00	45	Medium Priority CCT	Tiburon		4/25/2005	0	2
221A-221	217	6	1/1/1962	VCP	\$0.00	45	No Action	Tiburon		2/14/2005	3	None
234-233B	77.7	6	1/1/1962	VCP	\$543.90	45	Medium Priority CCT	Tiburon		4/25/2005	0	2
88-87	370	6	1/1/1952	PE	\$0.00	45	No Action	Tiburon	Repair Date >= Inspection Date	3/7/2005	4	None
74A-74B	325	6	1/1/1952	VCP	\$0.00	45	No Action	Tiburon	Medium Priority I&I Concerns	4/18/2005	3	None
233B-233A	5	6	1/1/1962	VCP	\$35.00	45	Medium Priority CCT	Tiburon	No CCTV Data		No CCTV Data	2
207-206	224	6	1/1/1962	VCP	\$1,568.00	45	Medium Priority CCT	Tiburon	Medium Priority I&I Concerns	1/31/2005	0	2
195-194	215	6	1/1/1962	VCP	\$1,505.00	45	Medium Priority CCT	Tiburon	Medium Priority I&I Concerns	4/26/2005	0	2
72-71	186	6	1/1/1952	VCP	\$0.00	45	No Action	Tiburon		5/12/2005	3	None
66B-66	358	6	1/1/1952	VCP	\$123,510.00	45	Replace	Tiburon		3/17/2009	3	3
66-65	409	6	1/1/1952	VCP	\$141,105.00	45	Replace	Tiburon		3/10/2005	3	3
65-67	44	6	1/1/1952	VCP	\$0.00	45	No Action	Tiburon		3/10/2005	3	None
181-180	321	6	1/1/1962	VCP	\$2,247.00	45	Medium Priority CCT	Tiburon	Medium Priority I&I Concerns	2/14/2005	0	2
178-177B	58	6	1/1/1962	VCP	\$0.00	45	No Action	Tiburon	Medium Priority I&I Concerns	2/2/2005	3	None
193-192	170	6	1/1/1962	VCP	\$1,190.00	45	Medium Priority CCT	Tiburon	Medium Priority I&I Concerns	4/27/2005	0	2
221-220	191	6	1/1/1962	VCP	\$0.00	45	No Action	Tiburon		4/26/2005	0	None
220-219	178	6	1/1/1962	VCP	\$0.00	45	No Action	Tiburon		4/26/2005	3	None
123-122	115	10	1/1/1962	CPP	\$0.00	45	No Action	Tiburon	Repair Date >= Inspection Date	2/3/2005	4	None
608-32	311	6	1/1/1952	VCP	\$107,295.00	45	Replace	Tiburon	High Priority I&I Concerns	4/19/2005	3	3
239B-239A	96	6	1/1/1962	VCP	\$672.00	45	Medium Priority CCT	Tiburon	No CCTV Data		No CCTV Data	2
82E-82A	20				\$140.00	45	Medium Priority CCT	Tiburon	Medium Priority I&I Concerns; No CCTV Data		No CCTV Data	2
90-89A	103.6	6	1/1/1952	VCP	\$725.20	45	Medium Priority CCT	Tiburon	Medium Priority I&I Concerns; No CCTV Data		No CCTV Data	2
89A-89	265.4	6	1/1/1952	VCP	\$1,857.80	45	Medium Priority CCT	Tiburon	Medium Priority I&I Concerns; No CCTV Data		No CCTV Data	2
607-607A	142.5	6	1/1/1960	VCP	\$997.50	45	Medium Priority CCT	Tiburon	High Priority I&I Concerns; No CCTV Data		No CCTV Data	2
498-467	360	6	1/1/1993	PVC	\$124,200.00	44.5	Replace	Paradise Cove		5/25/2005	3	3
497A-498	31	6	1/1/1993	PVC	\$217.00	44.5	Medium Priority CCT	Paradise Cove		5/25/2005	0	2
231-230	311	6	1/1/1962	VCP	\$2,177.00	44	Medium Priority CCT	Tiburon		4/21/2005	0	2
82-81	296	6	1/1/1952	VCP	\$102,120.00	44	Replace	Tiburon	Medium Priority I&I Concerns	3/7/2005	5	1
242A-656A	83.9	4	1/1/1950	VCP	\$0.00	44	No Action	Tiburon		12/9/2010	3	None
472-431	238	6	1/1/1972	VCP	\$82,110.00	44	Replace	Paradise Cove		4/4/2005	3	3
228A-228	132	6	1/1/1972	VCP	\$924.00	44	Medium Priority CCT	Tiburon	No CCTV Data		No CCTV Data	2
194-193	161	6	1/1/1962	VCP	\$1,127.00	44	Medium Priority CCT	Tiburon	Medium Priority I&I Concerns	4/27/2005	0	2

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
447-Paradise	180	6	1/1/1970	VCP	\$10,000.00	44	Point Repair	Paradise Cove		5/24/2005	3	3
SF1-SF3	312.01	6	1/1/1954	AC	\$0.00	44	No Action	Paradise Cove		3/18/2008	3	None
36A-36	712	6	1/1/1952	VCP	\$245,640.00	44	Replace	Tiburon	High Priority I&I Concerns	3/31/2005	3	3
451-433	121	6	1/1/1979	VCP	\$16,000.00	44	Point Repair	Paradise Cove		5/24/2005	3	3
79-78A	186	6	1/1/1952	VCP	\$34,968.00	44	Pipe Burst	Tiburon	Medium Priority I&I Concerns	5/2/2005	4	2
433-447	230	6	1/1/1972	VCP	\$79,350.00	44	Replace	Paradise Cove		5/24/2005	3	3
Paradise Cove	60	6	1/1/1972		\$420.00	44	Medium Priority CCT	Paradise Cove	No CCTV Data		No CCTV Data	2
81B-81A	103	6	1/1/1952	VCP	\$721.00	44	Medium Priority CCT	Tiburon	Medium Priority I&I Concerns; No CCTV Data		No CCTV Data	2
SF2-SF1	151.15	6	1/1/1954	AC	\$0.00	44	No Action	Paradise Cove		3/18/2008	3	None
34-PS-3	15	6		VCP	\$105.00	44	Medium Priority CCT	Tiburon	High Priority I&I Concerns; No CCTV Data		No CCTV Data	2
79A-79B	112.3	6	1/1/1952	VCP	\$786.10	44	Medium Priority CCT	Tiburon	Medium Priority I&I Concerns; No CCTV Data		No CCTV Data	2
816-817	152.12424	8	1/1/1987	VCP	\$0.00	44	No Action	Tiburon		10/7/2014	2	None
54A-54	150	6	1/1/1952	VCP	\$1,050.00	44	Medium Priority CCT	Tiburon	High Priority I&I Concerns; No CCTV Data		No CCTV Data	2
466-465	95	6	1/1/1993	PVC	\$665.00	43.5	Medium Priority CCT	Paradise Cove		5/25/2005	0	2
458-457	362	8	1/1/1993	PVC	\$0.00	43.5	No Action	Paradise Cove		5/25/2005	3	None
477-474	221	6	1/1/1985	PVC	\$0.00	43.5	No Action	Paradise Cove		5/24/2005	3	None
478-477	96	6	1/1/1985	PVC	\$0.00	43.5	No Action	Paradise Cove		5/24/2005	3	None
605-604	103.2	6	1/1/1962	PE	\$0.00	43	No Action	Tiburon	Repair Date >= Inspection Date	12/7/2010	3	None
649-649A	193.7	6	1/1/1962	PE	\$0.00	43	No Action	Tiburon	Repair Date >= Inspection Date	12/7/2010	3	None
649A-684	144.1	6	1/1/1962	PE	\$0.00	43	No Action	Tiburon	Repair Date >= Inspection Date	12/7/2010	3	None
92-87A	86.4	6	1/1/1952	PE	\$604.80	43	Medium Priority CCT	Tiburon	Medium Priority I&I Concerns; No CCTV Data		No CCTV Data	2
87A-87	325.6	6	1/1/1952	PE	\$2,279.20	43	Medium Priority CCT	Tiburon	Medium Priority I&I Concerns; No CCTV Data		No CCTV Data	2
91C-91A	56		1/1/1952	PE	\$392.00	43	Medium Priority CCT	Tiburon	Medium Priority I&I Concerns; No CCTV Data		No CCTV Data	2
284-283	47.6	6	1/1/1972	PE	\$333.20	43	Medium Priority CCT	Tiburon		5/4/2005	0	2
283-282	155.4	6	1/1/1972	PE	\$1,087.80	43	Medium Priority CCT	Tiburon	No CCTV Data		No CCTV Data	2
60-58	366	6	1/1/1999	PVC	\$126,270.00	42.5	Replace	Tiburon	High Priority I&I Concerns	4/4/2005	3	3
90A-90	253	6	1/1/1952	PE	\$0.00	42	No Action	Tiburon	Repair Date >= Inspection Date	3/7/2005	3	None
36B-36A	188	6	1/1/1952	VCP	\$0.00	41	No Action	Tiburon	High Priority I&I Concerns	3/16/2005	3	None
30A-30	148	6	1/1/1952	VCP	\$0.00	41	No Action	Tiburon	High Priority I&I Concerns	5/23/2005	3	None
43-PS-1	117	6	1/1/1970	VCP	\$819.00	41	Medium Priority CCT	Tiburon	High Priority I&I Concerns; No CCTV Data		No CCTV Data	2
37-35	479	6	1/1/2006	PE	\$165,255.00	41	Replace	Tiburon	High Priority I&I Concerns	4/20/2005	3	3
53-52	194	6	1/1/2009	CPP	\$0.00	41	No Action	Tiburon	High Priority I&I Concerns	3/26/2009	3	None



Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
52-50	540	6	1/1/2009	CPP	\$186,300.00	41	Replace	Tiburon	High Priority I&I Concerns	3/26/2009	3	3
49-53	166	6	1/1/1952	VCP	\$57,270.00	41	Replace	Tiburon	High Priority I&I Concerns	3/16/2005	3	3
SF9-SF10B	191	6		AC	\$0.00	41	No Action	Paradise Cove		3/18/2008	3	None
57C-57B	47.449246	6		VCP	\$332.14	41	Medium Priority CCT	Tiburon	High Priority I&I Concerns; No CCTV Data		No CCTV Data	2
79B-79	203.8	6	1/1/2015	PE	\$1,426.60	41	Medium Priority CCT	Tiburon	Medium Priority I&I Concerns; No CCTV Data		No CCTV Data	2
804-805	245.34933	8	1/1/1987	VCP	\$0.00	41	No Action	Tiburon		10/7/2014	0	None
814-636	46.743988	8	1/1/1987	VCP	\$0.00	41	No Action	Tiburon		10/8/2014	0	None
815-816	89.39719	8	1/1/1987	VCP	\$0.00	41	No Action	Tiburon		10/7/2014	0	None
58A-58B	215.1	6	1/1/1952	VCP	\$1,505.70	41	Medium Priority CCT	Tiburon	High Priority I&I Concerns; No CCTV Data		No CCTV Data	2
58B-58	307.9	6	1/1/1952	VCP	\$2,155.30	41	Medium Priority CCT	Tiburon	High Priority I&I Concerns; No CCTV Data		No CCTV Data	2
109-108	153	6	1/1/1962	VCP	\$0.00	40	No Action	Tiburon		4/7/2005	2	None
682-JCT_BOX	79	12	1/1/1952	CPP	\$0.00	40	No Action	Tiburon		2/16/2011	2	None
149-147	231	6	1/1/1962	VCP	\$0.00	40	No Action	Tiburon		4/6/2005	2	None
148-147	122	6	1/1/1962	VCP	\$0.00	40	No Action	Tiburon		4/18/2005	2	None
17-16	166	6	1/1/1952	VCP	\$0.00	40	No Action	Tiburon		3/14/2005	2	None
315-314	148	6	1/1/1961	VCP	\$0.00	40	No Action	Tiburon		5/10/2005	2	None
143-142	351	6	1/1/1960	VCP	\$0.00	40	No Action	Tiburon		2/7/2005	2	None
249-245B	252	6	1/1/1972	VCP	\$0.00	40	No Action	Tiburon		2/14/2005	2	None
802-803	259.13118	6	1/1/1987	VCP	\$0.00	40	No Action	Tiburon		10/7/2014	0	None
SF16-SF11	92.664447	6		PVC	\$648.65	39.5	Medium Priority CCT	Paradise Cove	No CCTV Data		No CCTV Data	2
SF17-SF16	60	6		PVC	\$420.00	39.5	Medium Priority CCT	Paradise Cove	No CCTV Data		No CCTV Data	2
SF18-SF17	71	6		PVC	\$497.00	39.5	Medium Priority CCT	Paradise Cove	No CCTV Data		No CCTV Data	2
SF19-SF18	128	6		PVC	\$896.00	39.5	Medium Priority CCT	Paradise Cove	No CCTV Data		No CCTV Data	2
SF20-SF19	43	6		PVC	\$301.00	39.5	Medium Priority CCT	Paradise Cove	No CCTV Data		No CCTV Data	2
277-275	242	6	1/1/2019	PE	\$0.00	38	No Action	Tiburon	Repair Date >= Inspection Date	2/14/2005	2	None
817-818	149.34311	8	1/1/1987	VCP	\$0.00	38	No Action	Tiburon		10/8/2014	0	None
259-258	242	6	1/1/1962	VCP	\$0.00	37	No Action	Tiburon		1/25/2005	2	None
114-113	22.9	6	1/1/1962	VCP	\$0.00	37	No Action	Tiburon		12/9/2010	0	None
797-253A	129.2	6		VCP	\$0.00	37	No Action	Tiburon		12/9/2010	0	None
136-135	239	8	1/1/1962	PVC	\$0.00	36.5	No Action	Tiburon		2/1/2005	2	None
808-809	209.80113	8		VCP	\$0.00	36	No Action	Tiburon		10/8/2014	0	None
360A-360B	195	5	1/1/1960	VCP	\$36,660.00	35	Pipe Burst	Tiburon		5/23/2005	2	4

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
171A-171	218	6	1/1/1962	VCP	\$0.00	35	No Action	Tiburon		2/10/2005	2	None
164-160	175	6	1/1/1962	VCP	\$0.00	35	No Action	Tiburon		2/10/2005	2	None
175-129	30	6	1/1/1962	VCP	\$0.00	35	No Action	Tiburon	Medium Priority I&I Concerns	2/2/2005	2	None
611A-BT	98	6	1/1/1960	VCP	\$0.00	35	No Action	Tiburon		12/14/2010	1	None
8A-8	82	6	1/1/1952	VCP	\$0.00	34	No Action	Tiburon		5/23/2005	2	None
124-123	177	10	1/1/1962	VCP	\$0.00	34	No Action	Tiburon		2/3/2005	1	None
68-68A	258	6	1/1/1952	VCP	\$89,010.00	34	Replace	Tiburon		12/14/2010	2	4
13D-13C	102.4	6	1/1/1993	PVC	\$0.00	33.5	No Action	Tiburon		12/14/2010	0	None
300-PS-7	53	6	1/1/1962	VCP	\$0.00	33	No Action	Tiburon		8/31/2010	1	None
266-265	208	6	1/1/1962	VCP	\$0.00	33	No Action	Tiburon		4/28/2005	2	None
261-252	100	6	1/1/1962	PE	\$0.00	32	No Action	Tiburon	Repair Date >= Inspection Date	3/8/2005	2	None
40-PS-2	43	6	1/1/1952	VCP	\$0.00	30	No Action	Tiburon	High Priority I&I Concerns	4/20/2005	2	None
30-40	85	6	1/1/1952	VCP	\$0.00	30	No Action	Tiburon	High Priority I&I Concerns	4/20/2005	2	None
621-356	40	10	1/1/1960	VCP	\$280.00	28	Low Priority CCTV	Tiburon		3/30/2005	0	3
308-307	224	6	1/1/1962	VCP	\$0.00	28	No Action	Tiburon		2/9/2005	3	None
620-639	379	6	1/1/1985	PVC	\$2,653.00	27.5	Low Priority CCTV	Tiburon		3/30/2005	1	3
112-680	65	15	1/1/1962	VCP	\$0.00	27	No Action	Tiburon		2/7/2005	0	None
500-112	72	15	1/1/1962	VCP	\$504.00	27	Low Priority CCTV	Tiburon		2/7/2005	0	3
631-621	87	10	1/1/2000	PVC	\$609.00	26.5	Low Priority CCTV	Tiburon		3/31/2005	0	3
797A-797	39.1	6	1/1/1962	VCP	\$0.00	26	No Action	Tiburon		12/10/2010	1	None
355-631	78	10	1/1/2005	CPP	\$546.00	25	Low Priority CCTV	Tiburon		3/30/2005	0	3
358-631	536	6	1/1/2000	PVC	\$3,752.00	24.5	Low Priority CCTV	Tiburon		3/30/2005	0	3
256-255	123	6	1/1/1962	VCP	\$0.00	24	No Action	Tiburon		4/5/2005	0	None
324-323	287	6	1/1/1961	VCP	\$0.00	24	No Action	Tiburon		5/5/2005	0	None
118-641	238	15	1/1/1962	VCP	\$1,666.00	24	Low Priority CCTV	Tiburon		2/7/2005	0	3
156-154	100	6	1/1/1962	VCP	\$0.00	24	No Action	Tiburon		3/9/2005	1	None
680-681	122	10	1/1/1962	VCP	\$0.00	24	No Action	Tiburon		12/10/2010	0	None
117-676	201	12	1/1/1972	VCP	\$1,407.00	24	Low Priority CCTV	Tiburon		3/29/2005	0	3
445-259B	214	6	1/1/1962	VCP	\$1,498.00	24	Low Priority CCTV	Tiburon		1/26/2005	0	3
118-118a	59	15	1/1/1962	VCP	\$413.00	24	Low Priority CCTV	Tiburon		2/7/2005	0	3
681-111	197	10	1/1/1962	VCP	\$0.00	24	No Action	Tiburon		2/7/2005	0	None
611-353	70.6	6	1/1/1952	VCP	\$0.00	23	No Action	Tiburon		12/13/2010	0	None

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
355A-355	167	6	1/1/1960	VCP	\$24,000.00	23	Point Repair	Tiburon		3/31/2005	0 4	
793-301	436	8	1/1/1962	VCP	\$3,052.00	23	Low Priority CCTV	Tiburon		2/9/2005	0 3	
356-636	195	6	1/1/1962	PE	\$1,365.00	23	Low Priority CCTV	Tiburon		3/30/2005	0 3	
225-224	153	6	1/1/1972	VCP	\$0.00	23	No Action	Tiburon		4/26/2005	1 None	
245-244	235	6	1/1/1962	VCP	\$1,645.00	23	Low Priority CCTV	Tiburon		1/27/2005	0 3	
302-793	73.7	8	1/1/1962	VCP	\$515.90	23	Low Priority CCTV	Tiburon		2/9/2005	0 3	
351-611	390	6	1/1/1960	VCP	\$134,550.00	23	Replace	Tiburon		4/4/2005	0 4	
308A-308	140	6	1/1/1962	VCP	\$0.00	22	No Action	Tiburon		3/17/2005	0 None	
305-304	517	6	1/1/1962	VCP	\$3,619.00	22	Low Priority CCTV	Tiburon		2/8/2005	0 3	
121-120	60	6	1/1/1962	VCP	\$420.00	22	Low Priority CCTV	Tiburon		2/3/2005	0 3	
55-54	300	6	1/1/1952	VCP	\$0.00	22	No Action	Tiburon	High Priority I&I Concerns	3/9/2005	1 None	
109A-109	254	6	1/1/1962	VCP	\$10,000.00	21	Point Repair	Tiburon		4/7/2005	0 4	
353-349	313	6	1/1/1960	VCP	\$2,191.00	21	Low Priority CCTV	Tiburon		3/17/2005	0 3	
794-JCT_BOX	20	18	1/1/2005	CPP	\$0.00	21	No Action	Tiburon		7/10/2013	0 None	
359-358	253	6	1/1/1998	PE	\$0.00	20	No Action	Tiburon		3/30/2005	0 None	
357-624	163	14	1/1/2005	CPP	\$1,141.00	20	Low Priority CCTV	Tiburon		6/8/2005	0 3	
359B-359	258	6	1/1/1998	PE	\$0.00	20	No Action	Tiburon		3/17/2005	0 None	
326-324	184	6	1/1/1962	VCP	\$0.00	19	No Action	Tiburon		5/5/2005	0 None	
349-PS-6	27	6	1/1/1952	VCP	\$189.00	19	Low Priority CCTV	Tiburon		3/17/2005	0 3	
287-286	46	6	1/1/1972	OB	\$322.00	19	Low Priority CCTV	Tiburon		4/28/2005	0 3	
286-285	122	6	1/1/1972	OB	\$854.00	19	Low Priority CCTV	Tiburon		4/28/2005	0 3	
262-261	153	6	1/1/1962	VCP	\$1,071.00	19	Low Priority CCTV	Tiburon		1/25/2005	0 3	
141-111	318	8	1/1/1960	VCP	\$0.00	19	No Action	Tiburon		2/3/2005	0 None	
803-804	127.04504	8	1/1/1987	VCP	\$0.00	19	No Action	Tiburon		10/7/2014	0 None	
805-806	25.412822	8	1/1/1987	VCP	\$0.00	19	No Action	Tiburon		10/7/2014	0 None	
807-806	473.81315	8	1/1/1987	VCP	\$0.00	19	No Action	Tiburon		10/8/2014	0 None	
621-357	7	10	1/1/1960	PVC	\$0.00	18.5	No Action	Tiburon		2/14/2011	0 None	
258-257	135	6	1/1/1962	VCP	\$945.00	18	Low Priority CCTV	Tiburon		3/8/2005	0 3	
257-256	50	6	1/1/1962	VCP	\$350.00	18	Low Priority CCTV	Tiburon		4/5/2005	0 3	
255-254	115	6	1/1/1962	VCP	\$805.00	18	Low Priority CCTV	Tiburon		4/5/2005	0 3	
289-288	137	6	1/1/1972	VCP	\$959.00	18	Low Priority CCTV	Tiburon		5/3/2005	0 3	
320-303	98	6	1/1/1961	VCP	\$686.00	18	Low Priority CCTV	Tiburon		2/9/2005	0 3	

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
192-683	150	6	1/1/1962	VCP	\$0.00	18	No Action	Tiburon	Medium Priority I&I Concerns	4/27/2005	0	None
683-191	114	6	1/1/1962	VCP	\$0.00	18	No Action	Tiburon	Medium Priority I&I Concerns	4/27/2005	0	None
622-JCT_BOX	26	12	1/1/1952	PLP	\$0.00	18	No Action	Tiburon	Repair Date >= Inspection Date	3/30/2005	0	None
314C-314	119	6	1/1/1962	VCP	\$0.00	18	No Action	Tiburon		5/5/2005	0	None
504-505	13.3	6	1/1/1962	VCP	\$0.00	18	No Action	Tiburon		12/9/2010	0	None
201-200	307	6	1/1/1967	VCP	\$2,149.00	18	Low Priority CCTV	Tiburon	Medium Priority I&I Concerns	1/31/2005	0	3
224-223	167	6	1/1/1972	VCP	\$1,169.00	18	Low Priority CCTV	Tiburon		4/26/2005	0	3
152-151	184	6	1/1/1962	PE	\$0.00	18	No Action	Tiburon	Repair Date >= Inspection Date	9/14/2017	0	None
150-149	107	6	1/1/1962	VCP	\$749.00	18	Low Priority CCTV	Tiburon		4/6/2005	0	3
146-145	49	6	1/1/1962	VCP	\$343.00	18	Low Priority CCTV	Tiburon		4/6/2005	0	3
19-18	103	6	1/1/1952	VCP	\$721.00	18	Low Priority CCTV	Tiburon		3/14/2005	0	3
145-138	333	6	1/1/1962	VCP	\$2,331.00	18	Low Priority CCTV	Tiburon		4/18/2005	0	3
138-137	151	6	1/1/1962	VCP	\$0.00	18	No Action	Tiburon		4/6/2005	0	None
314-313	303	6	1/1/1961	VCP	\$0.00	18	No Action	Tiburon		5/5/2005	0	None
313-312	204	6	1/1/1961	VCP	\$0.00	18	No Action	Tiburon		5/4/2005	0	None
76-89	543	6	1/1/1952	VCP	\$0.00	18	No Action	Tiburon	Medium Priority I&I Concerns	2/15/2005	0	None
16-15A	58	6	1/1/1960	VCP	\$406.00	18	Low Priority CCTV	Tiburon		3/14/2005	0	3
291-290	256	6	1/1/1972	VCP	\$1,792.00	18	Low Priority CCTV	Tiburon		5/3/2005	0	3
129-127	378	6	1/1/1962	VCP	\$2,646.00	18	Low Priority CCTV	Tiburon	Medium Priority I&I Concerns	2/2/2005	0	3
105-104	110	6	1/1/1962	VCP	\$0.00	18	No Action	Tiburon		4/18/2005	0	None
15A-15	210	6	1/1/1960	VCP	\$1,470.00	18	Low Priority CCTV	Tiburon		3/14/2005	0	3
439-444	288	6	1/1/1986	VCP	\$2,016.00	18	Low Priority CCTV	Tiburon		1/26/2005	0	3
137-610	98.3	6	1/1/1962	VCP	\$0.00	18	No Action	Tiburon		7/14/2014	0	None
610-136	257.7	6	1/1/1962	VCP	\$1,803.90	18	Low Priority CCTV	Tiburon		2/1/2005	0	3
348-795	222	6	1/1/1960	VCP	\$1,554.00	17	Low Priority CCTV	Tiburon		2/8/2005	0	3
642-620	264	6	1/1/1985	PVC	\$1,848.00	16.5	Low Priority CCTV	Tiburon		3/30/2005	0	3
662-664	185	6	1/1/1993	PVC	\$1,295.00	16.5	Low Priority CCTV	Paradise Cove		5/25/2005	0	3
441-440	246	6	1/1/1986	PVC	\$1,722.00	16.5	Low Priority CCTV	Tiburon		1/26/2005	0	3
665-497A	344	6	1/1/1993	PVC	\$2,408.00	16.5	Low Priority CCTV	Paradise Cove		5/25/2005	0	3
154-150	43.5	6	1/1/1962	CMP	\$0.00	16	No Action	Tiburon		12/16/2010	0	None
285-278	217	6	1/1/1972	OB	\$0.00	16	No Action	Tiburon		5/2/2005	0	None
809-810	211.00623	8	1/1/1987	VCP	\$0.00	16	No Action	Tiburon		10/8/2014	0	None

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
810-811	123.46906	8	1/1/1987	VCP	\$0.00	16	No Action	Tiburon		10/8/2014	0	None
813-814	162.14821	8	1/1/1987	VCP	\$0.00	16	No Action	Tiburon		10/8/2014	0	None
795-PS-6	270	6	1/1/1960	PVC	\$0.00	15.5	No Action	Tiburon		12/13/2010	0	None
322-321	353	6	1/1/1995	PLP	\$15,000.00	15	Point Repair	Tiburon		5/10/2005	0	4
203-202	287	6	1/1/1967	VCP	\$2,009.00	15	Low Priority CCTV	Tiburon	Medium Priority I&I Concerns	1/31/2005	5	3
153A-153	86	6	1/1/1962	VCP	\$602.00	15	Low Priority CCTV	Tiburon		1/31/2005	0	3
140-137	284	6	1/1/2015	PE	\$0.00	15	No Action	Tiburon	Repair Date >= Inspection Date	7/14/2014	0	None
638-682	47	12	1/1/1952	CPP	\$0.00	15	No Action	Tiburon	Repair Date >= Inspection Date	3/15/2005	0	None
2-638	219.5	12	1/1/2008	CPP	\$1,536.50	15	Low Priority CCTV	Tiburon		1/18/2008	0	3
134-133	167	6	1/1/1962	VCP	\$1,169.00	15	Low Priority CCTV	Tiburon		2/1/2005	0	3
163-162	156	6	1/1/1962	VCP	\$1,092.00	15	Low Priority CCTV	Tiburon		2/2/2005	0	3
162-161	216	6	1/1/1962	VCP	\$1,512.00	15	Low Priority CCTV	Tiburon		2/2/2005	0	3
115-113	65	6		VCP	\$0.00	15	No Action	Tiburon		4/18/2005	0	None
143A-143	130	6	1/1/1950	VCP	\$910.00	15	Low Priority CCTV	Tiburon		2/3/2005	0	3
654-653A	102.2	6		VCP	\$0.00	15	No Action	Tiburon		12/8/2010	0	None
653A-653	52.9	6		VCP	\$0.00	15	No Action	Tiburon		12/8/2010	0	None
807-808	114.75259	8	1/1/1987	VCP	\$0.00	14	No Action	Tiburon		10/8/2014	0	None
811-812	112.6228	8	1/1/1987	VCP	\$0.00	14	No Action	Tiburon		10/8/2014	0	None
617-350	40	6	1/1/1952	VCP	\$280.00	13	Low Priority CCTV	Tiburon		5/26/2005	0	3
358A-358	114	6	1/1/1960	VCP	\$0.00	13	No Action	Tiburon		12/15/2010	0	None
281A-281	132	6	1/1/1972	VCP	\$0.00	13	No Action	Tiburon		1/24/2005	3	None
326A-326	183	6	1/1/1962	VCP	\$1,281.00	13	Low Priority CCTV	Tiburon		5/5/2005	0	3
798-123	154.7	6	1/1/1962	VCP	\$0.00	13	No Action	Tiburon		2/10/2005	0	None
438-436	245	6	1/1/1986	VCP	\$1,715.00	13	Low Priority CCTV	Tiburon		1/26/2005	0	3
211-210	54	6	1/1/1962	AC	\$0.00	13	No Action	Tiburon	Medium Priority I&I Concerns	5/9/2005	0	None
207A-207	153	6	1/1/1962	VCP	\$1,071.00	13	Low Priority CCTV	Tiburon	Medium Priority I&I Concerns	1/31/2005	0	3
153B-153	96	6	1/1/1962	VCP	\$0.00	13	No Action	Tiburon		1/31/2005	0	None
154A-154	40.1	6	1/1/1962	VCP	\$0.00	13	No Action	Tiburon		12/16/2010	0	None
244-243	213	6	1/1/1962	VCP	\$1,491.00	13	Low Priority CCTV	Tiburon		1/27/2005	0	3
89-75	81	6	1/1/1952	VCP	\$0.00	13	No Action	Tiburon	Repair Date >= Inspection Date	2/15/2005	0	None
9-6	504.8	12	1/1/2008	CPP	\$0.00	13	No Action	Tiburon		1/17/2008	0	None
6-5	367	12	1/1/2008	CPP	\$2,569.00	13	Low Priority CCTV	Tiburon		1/17/2008	0	3

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
140A-140	108	6	1/1/1962	VCP	\$0.00	13	No Action	Tiburon		3/8/2005	0	None
176A-176	71	6	1/1/1962	VCP	\$497.00	13	Low Priority CCTV	Tiburon	Medium Priority I&I Concerns	2/2/2005	0	3
316A-316	160	6	1/1/1961	VCP	\$1,120.00	13	Low Priority CCTV	Tiburon		5/10/2005	0	3
241-240	173	6	1/1/1962	VCP	\$1,211.00	13	Low Priority CCTV	Tiburon		1/27/2005	0	3
4-3	163.7	12	1/1/2008	CPP	\$1,145.90	13	Low Priority CCTV	Tiburon		1/17/2008	0	3
3-2	396.4	12	1/1/2008	CPP	\$2,774.80	13	Low Priority CCTV	Tiburon		1/18/2008	0	4
275-274	195	6	1/1/1962	VCP	\$1,365.00	13	Low Priority CCTV	Tiburon		1/25/2005	0	4
273-272	177	6	1/1/1962	VCP	\$0.00	13	No Action	Tiburon		2/14/2005	0	None
271-270	109	6	1/1/1962	VCP	\$763.00	13	Low Priority CCTV	Tiburon		1/25/2005	0	4
270-262	173	6	1/1/1962	VCP	\$1,211.00	13	Low Priority CCTV	Tiburon		1/25/2005	0	4
251-250	300	6	1/1/1962	VCP	\$0.00	13	No Action	Tiburon		4/5/2005	0	None
8B-8	150	6	1/1/1952	VCP	\$1,050.00	13	Low Priority CCTV	Tiburon		5/3/2005	0	4
135-134	204	6	1/1/1962	VCP	\$1,428.00	13	Low Priority CCTV	Tiburon		2/1/2005	0	4
132-131	158	6	1/1/1962	VCP	\$1,106.00	13	Low Priority CCTV	Tiburon		2/1/2005	0	4
161-160	150	6	1/1/1962	VCP	\$0.00	13	No Action	Tiburon		2/2/2005	0	None
160-131	89	6	1/1/1962	VCP	\$623.00	13	Low Priority CCTV	Tiburon		2/2/2005	0	4
131-130	120	6	1/1/1962	VCP	\$840.00	13	Low Priority CCTV	Tiburon		2/1/2005	0	4
130-129	270	6	1/1/1962	VCP	\$1,890.00	13	Low Priority CCTV	Tiburon	Medium Priority I&I Concerns	2/1/2005	0	4
104-102	105	6	1/1/1962	VCP	\$735.00	13	Low Priority CCTV	Tiburon		4/18/2005	0	4
103A-103	62	6	1/1/1962	VCP	\$434.00	13	Low Priority CCTV	Tiburon		3/29/2005	0	4
438A-438	60	6	1/1/1986	VCP	\$420.00	13	Low Priority CCTV	Tiburon		1/26/2005	0	4
324A-324	15	6	1/1/1962	VCP	\$105.00	13	Low Priority CCTV	Tiburon		5/5/2005	0	4
9A-9	3	6	1/1/1952	VCP	\$21.00	13	Low Priority CCTV	Tiburon		3/28/2005	0	4
156A-156	232	6	1/1/1962	VCP	\$0.00	13	No Action	Tiburon		3/28/2005	0	None
177A-177	300	6	1/1/1962	VCP	\$2,100.00	13	Low Priority CCTV	Tiburon	Medium Priority I&I Concerns	2/2/2005	0	4
223-221	105	6	1/1/1972	VCP	\$735.00	12	Low Priority CCTV	Tiburon		4/26/2005	0	4
284A-284	153	6	1/1/1972	PE	\$1,071.00	12	Low Priority CCTV	Tiburon		5/4/2005	0	4
239A-239	303	6	1/1/1962	VCP	\$2,121.00	12	Low Priority CCTV	Tiburon		4/25/2005	0	4
239-238	132	6	1/1/1962	VCP	\$0.00	12	No Action	Tiburon		4/25/2005	0	None
238-237	153	6	1/1/1962	VCP	\$0.00	12	No Action	Tiburon		4/25/2005	0	None
236-232	123	6	1/1/1962	VCP	\$861.00	12	Low Priority CCTV	Tiburon		4/25/2005	0	4
230-221	132	6	1/1/1962	VCP	\$924.00	12	Low Priority CCTV	Tiburon		4/21/2005	0	4

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
235A-235	125	6	1/1/1962	VCP	\$0.00	12	No Action	Tiburon		4/25/2005	0	None
233-232	232	6	1/1/1962	VCP	\$0.00	12	No Action	Tiburon		4/25/2005	0	None
245A-245	174	6	1/1/1962	VCP	\$60,030.00	12	Replace	Tiburon		2/14/2005	0	4
245B-245	192	6	1/1/1962	VCP	\$1,344.00	12	Low Priority CCTV	Tiburon		1/27/2005	0	4
205A-205	221	6	1/1/1962	VCP	\$1,547.00	12	Low Priority CCTV	Tiburon	Medium Priority I&I Concerns	5/11/2005	0	4
208-207	180	6	1/1/1962	VCP	\$1,260.00	12	Low Priority CCTV	Tiburon	Medium Priority I&I Concerns	1/31/2005	0	4
195A-195	138	6	1/1/1962	VCP	\$0.00	12	No Action	Tiburon	Medium Priority I&I Concerns	4/26/2005	0	None
227-226	161	6	1/1/1972	VCP	\$1,127.00	12	Low Priority CCTV	Tiburon		5/11/2005	0	4
226-225	115	6	1/1/1972	VCP	\$805.00	12	Low Priority CCTV	Tiburon		4/26/2005	0	4
153-152	238	6	1/1/1962	PE	\$0.00	12	No Action	Tiburon	Repair Date >= Inspection Date	9/14/2017	0	None
249B-249A	36	6	1/1/1962	VCP	\$0.00	12	No Action	Tiburon		2/15/2011	0	None
88A-88	176	6	1/1/1952	PE	\$0.00	12	No Action	Tiburon	Repair Date >= Inspection Date	5/23/2005	0	None
182B-182	207	6	1/1/1962	VCP	\$0.00	12	No Action	Tiburon	Medium Priority I&I Concerns	2/14/2005	0	None
182-181	124	6	1/1/1962	VCP	\$0.00	12	No Action	Tiburon	Medium Priority I&I Concerns	2/14/2005	0	None
180-179	223	6	1/1/1962	VCP	\$1,561.00	12	Low Priority CCTV	Tiburon	Medium Priority I&I Concerns	4/27/2005	0	4
179-178	138	6	1/1/1962	VCP	\$966.00	12	Low Priority CCTV	Tiburon	Medium Priority I&I Concerns	4/27/2005	0	4
188-187	189	6	1/1/1962	VCP	\$0.00	12	No Action	Tiburon	Medium Priority I&I Concerns	2/10/2005	0	None
187-186	128	6	1/1/1962	VCP	\$896.00	12	Low Priority CCTV	Tiburon	Medium Priority I&I Concerns	5/10/2005	0	4
186-185	230	6	1/1/1962	VCP	\$1,610.00	12	Low Priority CCTV	Tiburon	Medium Priority I&I Concerns	5/10/2005	0	4
185A-185	145	6	1/1/1962	VCP	\$1,015.00	12	Low Priority CCTV	Tiburon	Medium Priority I&I Concerns	2/14/2005	0	4
185-184	83	6	1/1/1962	VCP	\$581.00	12	Low Priority CCTV	Tiburon	Medium Priority I&I Concerns	2/14/2005	0	4
184-183	242	6	1/1/1962	VCP	\$0.00	12	No Action	Tiburon	Medium Priority I&I Concerns	2/14/2005	0	None
191-183	168	6	1/1/1962	VCP	\$0.00	12	No Action	Tiburon	Medium Priority I&I Concerns	4/27/2005	0	None
183-179	165	6	1/1/1962	VCP	\$0.00	12	No Action	Tiburon	Medium Priority I&I Concerns	4/27/2005	0	None
240-219	102	6	1/1/1962	VCP	\$714.00	12	Low Priority CCTV	Tiburon		5/26/2005	0	4
265-264	144	6	1/1/1962	VCP	\$1,008.00	12	Low Priority CCTV	Tiburon		4/28/2005	0	4
250-249	70	6	1/1/1962	VCP	\$490.00	12	Low Priority CCTV	Tiburon		1/27/2005	0	4
249A-249	77	6	1/1/1962	VCP	\$0.00	12	No Action	Tiburon		2/15/2011	0	None
219-218	133	6	1/1/1962	VCP	\$931.00	12	Low Priority CCTV	Tiburon		4/26/2005	0	4
271A-271	157	6	1/1/1962	VCP	\$0.00	12	No Action	Tiburon		1/26/2005	0	None
246-245B	101	6	1/1/1962	VCP	\$707.00	12	Low Priority CCTV	Tiburon		1/27/2005	0	4
33-608	158	6	1/1/1952	VCP	\$1,106.00	12	Low Priority CCTV	Tiburon	High Priority I&I Concerns	4/19/2005	0	4

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
180A-180	150	6		CT	\$1,050.00	12	Low Priority CCTV	Tiburon	Medium Priority I&I Concerns	4/27/2005	0 4	
663-661	195	6	1/1/1993	PVC	\$1,365.00	11.5	Low Priority CCTV	Paradise Cove		5/25/2005	0 4	
437-259A	120	6	1/1/1962	PVC	\$840.00	11.5	Low Priority CCTV	Tiburon		1/26/2005	0 4	
436-437	227	6	1/1/1986	PVC	\$1,589.00	11.5	Low Priority CCTV	Tiburon		1/26/2005	0 4	
661-662	33	6	1/1/1993	PVC	\$231.00	11.5	Low Priority CCTV	Paradise Cove		5/25/2005	0 4	
443-441	143	6	1/1/1986	PVC	\$1,001.00	11.5	Low Priority CCTV	Tiburon		1/26/2005	0 4	
666-663	275	6	1/1/1993	PVC	\$1,925.00	11.5	Low Priority CCTV	Paradise Cove		5/25/2005	0 4	
13C-13B	68	6	1/1/1993	PVC	\$0.00	11.5	No Action	Tiburon		12/14/2010	0 None	
232-231	35	6	1/1/1962	VCP	\$245.00	11	Low Priority CCTV	Tiburon		4/25/2005	0 4	
679-34	314	6	1/1/1952	VCP	\$2,198.00	11	Low Priority CCTV	Tiburon	High Priority I&I Concerns	5/11/2005	0 4	
31A-31	305	4	1/1/1952	VCP	\$2,135.00	11	Low Priority CCTV	Tiburon	High Priority I&I Concerns	5/9/2005	0 4	
228-227	183	6	1/1/1972	VCP	\$1,281.00	11	Low Priority CCTV	Tiburon		4/26/2005	0 4	
223A-223	299	6	1/1/1972	VCP	\$0.00	11	No Action	Tiburon		4/21/2005	0 None	
50-33	483	6	1/1/1952	VCP	\$0.00	11	No Action	Tiburon	High Priority I&I Concerns	4/19/2005	0 None	
34A-34	212	6	1/1/1952	VCP	\$0.00	11	No Action	Tiburon	High Priority I&I Concerns	3/16/2005	0 None	
54-52	384	6	1/1/1952	VCP	\$2,688.00	11	Low Priority CCTV	Tiburon	High Priority I&I Concerns	3/9/2005	0 4	
61B-61	228	6	1/1/1952	VCP	\$1,596.00	11	Low Priority CCTV	Tiburon	High Priority I&I Concerns	3/30/2005	0 4	
82A-82	162	6	1/1/1952	VCP	\$1,134.00	11	Low Priority CCTV	Tiburon	Medium Priority I&I Concerns	3/7/2005	0 4	
467-609	251	6	1/1/1993	PVC	\$1,757.00	10.5	Low Priority CCTV	Paradise Cove		5/25/2005	0 4	
465-464	98	6	1/1/1993	PVC	\$686.00	10.5	Low Priority CCTV	Paradise Cove		5/25/2005	0 4	
464-463	253	6	1/1/1993	PVC	\$1,771.00	10.5	Low Priority CCTV	Paradise Cove		5/25/2005	0 4	
457-Paradise	342	8	1/1/1972	PVC	\$2,394.00	10.5	Low Priority CCTV	Paradise Cove		5/25/2005	0 4	
609-466	181	6	1/1/1993	PVC	\$1,267.00	10.5	Low Priority CCTV	Paradise Cove		5/25/2005	0 4	
477A-477	46	6	1/1/1985	PVC	\$322.00	10.5	Low Priority CCTV	Paradise Cove		5/24/2005	0 4	
282-280	174	6	1/1/1972	PE	\$1,218.00	10	Low Priority CCTV	Tiburon		5/4/2005	0 4	
684-605	79.6	6	1/1/1962	PE	\$0.00	10	No Action	Tiburon	Repair Date >= Inspection Date	12/7/2010	0 None	
13A-13	96	6	1/1/1952	PE	\$0.00	10	No Action	Tiburon	Repair Date >= Inspection Date	9/19/2017	0 None	
325-324	234	6	1/1/2017	PE	\$0.00	10	No Action	Tiburon	Repair Date >= Inspection Date	9/14/2017	0 None	
484A-484	61	6	1/1/1982	PVC	\$427.00	9.5	Low Priority CCTV	Paradise Cove		5/24/2005	0 4	
480A-480	52	6	1/1/1985	PVC	\$364.00	9.5	Low Priority CCTV	Paradise Cove		5/24/2005	0 4	
669-480	170	6	1/1/1985	PVC	\$1,190.00	9.5	Low Priority CCTV	Paradise Cove		5/24/2005	0 4	
463-458	295	6	1/1/1993	PVC	\$2,065.00	9.5	Low Priority CCTV	Paradise Cove		5/25/2005	0 4	



Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
479-451	64	6	1/1/1982	PVC	\$448.00	9.5	Low Priority CCTV	Paradise Cove		5/24/2005	0 4	
474-450	94	6	1/1/1985	PVC	\$0.00	9.5	No Action	Paradise Cove		4/4/2005	0 None	
480-479	114	6	1/1/1982	PVC	\$798.00	9.5	Low Priority CCTV	Paradise Cove		5/24/2005	0 4	
484-669	178	6	1/1/1982	PVC	\$1,246.00	9.5	Low Priority CCTV	Paradise Cove		5/24/2005	0 4	
80-79A	171.9	6	1/1/2015	PVC	\$0.00	9.5	No Action	Tiburon	Medium Priority I&I Concerns	7/15/2014	0 None	
188A-189	184	6	1/1/1962	PE	\$0.00	9	No Action	Tiburon	Repair Date >= Inspection Date	2/10/2005	0 None	
7B-7	199	6	1/1/1952	PE	\$0.00	9	No Action	Tiburon	Repair Date >= Inspection Date	5/12/2005	0 None	
91A-91	98	6	1/1/1952	PE	\$0.00	9	No Action	Tiburon	Repair Date >= Inspection Date	3/7/2005	3 None	
613-PS-4	76	6	1/1/1960	PLP	\$0.00	9	No Action	Tiburon	High Priority I&I Concerns	4/12/2018	0 None	
91-91B	165.3	6	1/1/1952	PE	\$0.00	9	No Action	Tiburon	Repair Date >= Inspection Date	7/14/2014	0 None	
91B-90B	81.2	6	1/1/1952	PE	\$0.00	9	No Action	Tiburon	Repair Date >= Inspection Date	7/14/2014	0 None	
90B-90	154.5	6	1/1/1952	PE	\$0.00	9	No Action	Tiburon	Repair Date >= Inspection Date	7/14/2014	0 None	
607A-PS-4	49.6	6	1/1/1960	PLP	\$0.00	9	No Action	Tiburon	High Priority I&I Concerns	4/12/2018	0 None	
81-80	330	6	1/1/2015	PE	\$0.00	8	No Action	Tiburon	Repair Date >= Inspection Date	7/15/2014	0 None	
80A-80	173	6	1/1/2018	PE	\$0.00	8	No Action	Tiburon	Medium Priority I&I Concerns	9/19/2017	0 None	
61-60	279	6	1/1/2017	PE	\$0.00	8	No Action	Tiburon	Repair Date >= Inspection Date	9/19/2017	0 None	
61C-61A	184	6	1/1/2017	PE	\$0.00	8	No Action	Tiburon	Repair Date >= Inspection Date	9/19/2017	0 None	
45-44	180	6	1/1/1970	VCP	\$1,260.00	8	Low Priority CCTV	Tiburon	High Priority I&I Concerns	5/26/2005	0 4	
SF3-SF4	187.43	6	1/1/1954	AC	\$1,312.01	8	Low Priority CCTV	Paradise Cove		3/18/2008	0 4	
53A-53	425	6	1/1/1952	VCP	\$2,975.00	8	Low Priority CCTV	Tiburon	High Priority I&I Concerns	4/19/2005	0 4	
56A-56	142	6	1/1/1952	VCP	\$994.00	8	Low Priority CCTV	Tiburon	High Priority I&I Concerns	3/31/2005	0 4	
57A-57	180	6	1/1/1952	VCP	\$1,260.00	8	Low Priority CCTV	Tiburon	High Priority I&I Concerns	3/9/2005	0 4	
61A-61	190	6	1/1/2017	PE	\$0.00	8	No Action	Tiburon	Repair Date >= Inspection Date	9/19/2017	0 None	
57B-57	253	6	1/1/1952	VCP	\$1,771.00	8	Low Priority CCTV	Tiburon	High Priority I&I Concerns	3/9/2005	0 4	
648-37	331	6	1/1/2006	PE	\$2,317.00	8	Low Priority CCTV	Tiburon	High Priority I&I Concerns	4/20/2005	0 4	
SF6-SF7	66.55	6	1/1/1954	AC	\$465.85	8	Low Priority CCTV	Paradise Cove		3/19/2008	0 4	
SF4-SF9	130.4	6	1/1/1954	AC	\$912.80	8	Low Priority CCTV	Paradise Cove		3/18/2008	0 4	
SF14-SF9	146.44	6	1/1/1954	AC	\$1,025.08	8	Low Priority CCTV	Paradise Cove		3/18/2008	0 4	
SF7-SF8A	427.66386	6		AC	\$2,993.65	8	Low Priority CCTV	Paradise Cove		3/19/2008	0 4	
SF8A-CF-PS2	9	6		AC	\$0.00	8	No Action	Paradise Cove		3/19/2008	0 None	
SF5-SF4	158	6		AC	\$1,106.00	8	Low Priority CCTV	Paradise Cove		3/18/2008	0 4	
SF15-SF11	59	6		AC	\$0.00	8	No Action	Paradise Cove		3/19/2008	0 None	

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
SF11-SF10B	64	6		AC	\$0.00	8	No Action	Paradise Cove		3/19/2008	0	None
SF10B-CF-PS	8	6		AC	\$56.00	8	Low Priority CCTV	Paradise Cove		3/18/2008	0	4
44-43	390	6	1/1/1970	PVC	\$2,730.00	6.5	Low Priority CCTV	Tiburon	High Priority I&I Concerns	5/26/2005	0	4
38-648	270	6	1/1/2006	PE	\$1,890.00	5	Low Priority CCTV	Tiburon	High Priority I&I Concerns	4/20/2005	0	4

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
N5A-N4	224	6	1/1/1952	VCP	\$77,280.00	78	Replace	Belvedere		3/23/2011	5	1
P9-P8	172	4	1/1/1950	VCP	\$28,380.00	72	Pipe Burst	Belvedere		3/2/2011	5	1
G3-G2	372	8	1/1/1952	VCP	\$16,000.00	71	Point Repair	Belvedere		5/18/2004	0	1
ND3-ND2	253	8	1/1/1950	VCP	\$0.00	71	No Action	Belvedere		5/18/2004	4	None
N4-N3	393	6	1/1/1960	VCP	\$135,585.00	70	Replace	Belvedere		5/3/2004	2	1
R25-R24	95	6	1/1/1957	VCP	\$17,860.00	69	Pipe Burst	Belvedere		3/9/2011	5	1
G15-G5	516	6	1/1/1952	VCP	\$178,020.00	68	Replace	Belvedere		5/24/2004	4	1
K2-K1	137	6	1/1/1950	VCP	\$0.00	66	No Action	Belvedere		5/4/2004	0	None
P10-BT	108	4	1/1/1950	VCP	\$17,820.00	66	Pipe Burst	Belvedere		3/1/2011	5	1
P8-P7	75	4	1/1/1950	VCP	\$12,375.00	66	Pipe Burst	Belvedere		3/2/2011	4	1
P11-P10	61	4	1/1/1950	VCP	\$10,065.00	66	Pipe Burst	Belvedere		3/1/2011	5	1
FA15-FA16	197	6	1/1/1950	VCP	\$37,036.00	66	Pipe Burst	Belvedere	Potential Tide Influence	3/17/2011	5	1
A4-A3	357	8	1/1/1950	VCP	\$133,518.00	64	Replace	Belvedere		5/24/2004	0	1
FB11-FB6	112	6		VCP	\$0.00	63	No Action	Belvedere	Potential Tide Influence	3/1/2011	5	None
RB2-RB1	211	6	1/1/1958	VCP	\$72,795.00	63	Replace	Belvedere		3/10/2011	5	1
RC8A-RC1	33	6		VCP	\$6,204.00	63	Pipe Burst	Belvedere		3/9/2011	5	1
A7-A7B	151	6	1/1/1952	VCP	\$52,095.00	62	Replace	Belvedere		3/23/2011	4	1
C5-C4	376	6	1/1/1955	VCP	\$0.00	62	No Action	Belvedere		5/13/2004	4	None
G10-G9	366	8	1/1/1952	VCP	\$0.00	62	No Action	Belvedere		5/19/2004	2	None
N6-N5	231.31	6	1/1/1952	VCP	\$16,000.00	61	Point Repair	Belvedere		6/23/2004	0	1
G2-G1	221	8	1/1/1950	VCP	\$0.00	60	No Action	Belvedere	Repair YR after Inspection Date	5/18/2004	3	None
N3-N2	30	6	1/1/1952	VCP	\$0.00	60	No Action	Belvedere		3/23/2011	4	None
ND9-ND8	462	6	1/1/1950	PE	\$0.00	60	No Action	Belvedere	Repair YR after Inspection Date	6/22/2004	2	None
ND4-ND3.1	117.4	8	1/1/1950	VCP	\$821.80	60	High Priority CCTV	Belvedere	No CCTV Data		No CCTV Data	1
RD2-RD1	69.2	6	1/1/1957	PE	\$0.00	60	No Action	Belvedere	Repair YR after Inspection Date	3/10/2011	5	None
ND7A-ND7	150	6		PE	\$0.00	59	No Action	Belvedere		2/28/2011	4	None
A5-A4	248	8	1/1/1955	VCP	\$0.00	58	No Action	Belvedere		5/5/2004	3	None
FB9A-FB8	205	6	1/1/1955	VCP	\$70,725.00	58	Replace	Belvedere	Potential Tide Influence	3/14/2011	4	1
RD3-RD1	1.7	4	1/1/1957	PE	\$280.50	58	Pipe Burst	Belvedere		3/10/2011	5	1
GB9-GB3	285	6	1/1/1952	VCP	\$16,000.00	57	Point Repair	Belvedere		5/13/2004	4	2
P2-P1	112	6	1/1/1950	VCP	\$21,056.00	57	Pipe Burst	Belvedere		3/2/2011	4	2
NE11-NE10	205	6	1/1/1952	VCP	\$0.00	56	No Action	Belvedere	Repair YR after Inspection Date	5/17/2004	4	None
RD1-BT	238	4	1/1/1957	VCP	\$74,970.00	56	Replace	Belvedere		3/10/2011	4	2
ND12-ND11	109	6	1/1/1950	VCP	\$20,492.00	56	Pipe Burst	Belvedere		6/29/2004	4	2
ND10-ND10A	104	6	1/1/1950	VCP	\$19,552.00	56	Pipe Burst	Belvedere		3/17/2011	4	2

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
R24-R24A	71	4	1/1/1957	VCP	\$0.00	56	No Action	Belvedere		3/9/2011	4	None
RA5-RA4	189	6		VCP	\$35,532.00	56	Pipe Burst	Belvedere		3/8/2011	4	2
RB13-RB4	138				\$22,770.00	56	Pipe Burst	Belvedere		6/29/2004	4	2
FA12-FA11	257	6	1/1/1950	VCP	\$88,665.00	55	Replace	Belvedere	Potential Tide Influence	5/12/2004	4	2
J2-J1	161	6	1/1/1950	VCP	\$0.00	55	No Action	Belvedere		5/21/2004	4	None
RA7-RA2	89	6	1/1/1959	VCP	\$0.00	55	No Action	Belvedere		6/22/2004	0	None
FA13-FA4	238	6	1/1/1950	VCP	\$82,110.00	55	Replace	Belvedere	Potential Tide Influence	6/28/2004	4	2
RA4-RA3	162	6	1/1/1959	VCP	\$0.00	55	No Action	Belvedere		6/21/2004	0	None
G16-G8	244	6	1/1/1950	VCP	\$16,000.00	55	Point Repair	Belvedere		5/24/2004	3	2
F9-F8	290	6	1/1/1950	VCP	\$24,000.00	55	Point Repair	Belvedere	Potential Tide Influence	5/12/2004	4	2
RB10-RB10A	160	6	1/1/1958	VCP	\$0.00	55	No Action	Belvedere		6/21/2004	0	None
M3-M2	252	6	1/1/1950	VCP	\$0.00	54	No Action	Belvedere		5/4/2004	2	None
A10-A9	314	6	1/1/1950	VCP	\$16,000.00	54	Point Repair	Belvedere		6/23/2004	3	2
P7-P6	91	6	1/1/1950	CPP	\$0.00	54	No Action	Belvedere	Medium Priority I&I Concerns; Potential Tide Influence	3/2/2011	3	None
ND1A-ND1	363	10	1/1/1950	VCP	\$2,541.00	54	High Priority CCTV	Belvedere	No CCTV Data		No CCTV Data	1
NE10-NE3	234	6	1/1/1952	PE	\$0.00	53	No Action	Belvedere	Repair YR after Inspection Date	5/17/2004	4	None
B3-B2	301	6	1/1/1952	VCP	\$16,000.00	53	Point Repair	Belvedere		5/5/2004	3	2
NE9-NE2	544	6	1/1/1952	PE	\$0.00	53	No Action	Belvedere	Repair YR after Inspection Date	6/29/2004	0	None
NE4-NE3	253	6	1/1/1952	PE	\$0.00	53	No Action	Belvedere	Repair YR after Inspection Date	5/17/2004	4	None
ND2-NB6	100	8	1/1/1950	VCP	\$0.00	53	No Action	Belvedere		8/14/2019	0	None
NE8A-NE7	332	6	1/1/1952	PE	\$0.00	53	No Action	Belvedere	Repair YR after Inspection Date	6/30/2004	3	None
NC4A-NC4B	157.6	6	1/1/1959	PE	\$0.00	53	No Action	Belvedere	Repair YR after Inspection Date	3/17/2011	4	None
NF3-NF2	236	10	1/1/1959	VCP	\$16,048.00	52	CIPP	Belvedere		5/18/2004	3	2
RE8-RE7	180	6	1/1/1960	VCP	\$16,000.00	52	Point Repair	Belvedere		5/19/2004	4	2
N2-N1	64	8	1/1/1952	VCP	\$0.00	52	No Action	Belvedere		5/3/2004	4	None
FA15-FA10	162	6	1/1/1950	PE	\$0.00	52	No Action	Belvedere	Repair YR after Inspection Date	6/28/2004	4	None
M1-PS9	9	6	1/1/1950	VCP	\$0.00	52	No Action	Belvedere		4/19/2011	3	None
CA6A-CA2	168	6	1/1/1950	VCP	\$31,584.00	52	Pipe Burst	Belvedere		6/29/2004	4	2
RB10A-RB9	244	6	1/1/1958	VCP	\$84,180.00	52	Replace	Belvedere		6/21/2004	2	2
A2A-A1	256	6	1/1/1950	VCP	\$1,792.00	52	High Priority CCTV	Belvedere	No CCTV Data		No CCTV Data	1
A2-A2A	73	6	1/1/1950	VCP	\$511.00	52	High Priority CCTV	Belvedere	No CCTV Data		No CCTV Data	1
GB10-GB5	230	6	1/1/1952	VCP	\$0.00	51	No Action	Belvedere		5/25/2004	4	None
NC2-NC1	188	6	1/1/1950	VCP	\$16,000.00	51	Point Repair	Belvedere		5/20/2004	3	2
NC3-NC2	286	6	1/1/1959	VCP	\$0.00	51	No Action	Belvedere		5/20/2004	3	None
B1-PS8 - 10 V	22	6	1/1/1952	VCP	\$154.00	51	High Priority CCTV	Belvedere	No CCTV Data		No CCTV Data	1

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
A1-PS5	9	6	1/1/1950	VCP	\$1,692.00	51	Pipe Burst	Belvedere		3/22/2011	3 2	
A7A-A1	46	6	1/1/1952	VCP	\$16,000.00	51	Point Repair	Belvedere		3/22/2011	3 2	
RB1-BT	304	6	1/1/1958	VCP	\$104,880.00	51	Replace	Belvedere		3/11/2011	3 2	
NF4-NF3	66	6	1/1/1959	VCP	\$462.00	50	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
N10-N9	315	6	1/1/1960	VCP	\$0.00	50	No Action	Belvedere		5/3/2004	4 None	
FA10-FA9	150	6	1/1/1950	VCP	\$16,000.00	50	Point Repair	Belvedere	Potential Tide Influence	5/12/2004	4 2	
RA6-BT	130	6	1/1/1952	VCP	\$910.00	50	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
R24A-BT	122	4	1/1/1957	VCP	\$20,130.00	50	Pipe Burst	Belvedere		3/9/2011	4 2	
N5-N5B	42.1	6	1/1/1952	VCP	\$14,524.50	50	Replace	Belvedere		3/23/2011	3 2	
NA5-NA4	500	6	1/1/1998	PE	\$3,500.00	49	Medium Priority CCT	Belvedere	Medium Priority I&I Concerns; Potential Tide Influence;		No CCTV Data	2
ND4-ND3	43.6	8	1/1/1950	VCP	\$0.00	49	No Action	Belvedere		5/21/2004	2 None	
NC4-NC4A	117	6	1/1/1959	PE	\$0.00	48	No Action	Belvedere	Repair YR after Inspection Date	3/17/2011	3 None	
G11-C2	276	6	1/1/1950	VCP	\$1,932.00	48	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
ND4-ND7	85	6		PE	\$0.00	48	No Action	Belvedere	Repair YR after Inspection Date	3/1/2011	5 None	
FB7-FB6	251	6	1/1/1955	VCP	\$16,000.00	47	Point Repair	Belvedere	Potential Tide Influence	5/11/2004	4 2	
A11-A9A	194	8	1/1/1955	VCP	\$16,000.00	47	Point Repair	Belvedere		3/22/2011	0 3	
A3-A3A	153	8	1/1/1950	VCP	\$1,071.00	47	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
ND1-G1	84.442809				\$591.10	47	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
N11-N8	163	6	1/1/2009	CPP	\$1,141.00	46	Medium Priority CCT	Belvedere		3/20/2009	0 2	
P5-P4	223	6	1/1/1950	VCP	\$0.00	46	No Action	Belvedere	Medium Priority I&I Concerns; Potential Tide Influence	3/2/2011	3 None	
P12-P6	96	6	1/1/1950	VCP	\$672.00	46	Medium Priority CCT	Belvedere	Medium Priority I&I Concerns; Potential Tide Influence;		No CCTV Data	2
N11A-N11	58.185798			VCP	\$407.30	46	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
GB6-GB5	34	6	1/1/1952	VCP	\$0.00	45	No Action	Belvedere		2/28/2011	4 None	
GB2A-BT	120	6		VCP	\$840.00	45	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
GB3-GB2	380	6		VCP	\$0.00	45	No Action	Belvedere		5/13/2004	4 None	
G10A-C1	231.29472				\$1,619.06	45	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
RA10-RA3	254	6	1/1/1959	VCP	\$87,630.00	44	Replace	Belvedere		6/21/2004	3 3	
RB5-BT	12	6	1/1/1950	VCP	\$84.00	44	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
M5-M4	263	6	1/1/1950	VCP	\$0.00	44	No Action	Belvedere		5/4/2004	2 None	
CA6-CA6A	59	6	1/1/1950	VCP	\$0.00	44	No Action	Belvedere		5/13/2004	3 None	
RE5-RE4	150	12	1/1/1960	VCP	\$11,100.00	44	CIPP	Belvedere		5/19/2004	4 2	
RE4-RE3	59	12	1/1/1960	VCP	\$17,287.00	44	Pipe Burst	Belvedere		5/19/2004	4 2	
G6-G5	542	8	1/1/1965	VCP	\$0.00	44	No Action	Belvedere		5/19/2004	2 None	
E1-PS13	8	6	1/1/1950	VCP	\$0.00	44	No Action	Belvedere		4/19/2011	3 None	
CB5-CB4	306	6	1/1/1960	VCP	\$0.00	44	No Action	Belvedere		5/27/2004	3 None	

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
CB7-CB6	175	6	1/1/1960	VCP	\$0.00	44	No Action	Belvedere		5/27/2004	3	None
ND10A-ND9	64	6	1/1/1950	PVC	\$22,080.00	43.5	Replace	Belvedere		3/17/2011	3	3
NA6-NA5	327	6	1/1/1998	PE	\$2,289.00	43	Medium Priority CCT	Belvedere	Medium Priority I&I Concerns; Potential Tide Influence;		No CCTV Data	2
NE15-NE 15A	100			PE	\$700.00	43	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
C1-PS3	11	6	1/1/1950	PVC	\$77.00	42.5	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
CB2-G10	85.4	6	1/1/1960	PVC	\$29,463.00	42.5	Replace	Belvedere		4/19/2011	3	3
A9A-A4	26	8	1/1/1955	VCP	\$0.00	42	No Action	Belvedere		3/22/2011	1	None
NE6-NE5	95	6	1/1/1952	PE	\$0.00	42	No Action	Belvedere	Repair YR after Inspection Date	5/17/2004	3	None
NE14-NE5	91	6	1/1/1952	PE	\$0.00	42	No Action	Belvedere	Repair YR after Inspection Date	5/17/2004	3	None
NF2-NF1	334	10	1/1/1959	VCP	\$0.00	42	No Action	Belvedere		5/18/2004	2	None
NE3-NE2	151	6	1/1/1952	PE	\$0.00	42	No Action	Belvedere	Repair YR after Inspection Date	5/17/2004	3	None
A9-A9A	23	8	1/1/1950	VCP	\$0.00	42	No Action	Belvedere		3/22/2011	0	None
NE15-NE6	50	6	1/1/1952	PE	\$350.00	42	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
BT-NE8	89	6	1/1/1952	PE	\$623.00	42	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
NE8-NE8A	59	6	1/1/1952	PE	\$413.00	42	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
NC4B-NC2	123.4	6	1/1/1959	PE	\$863.80	42	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
R20-R19	80	6	1/1/1996	VCP	\$560.00	41	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
FB9-FB9A	100	6	1/1/1955	VCP	\$18,800.00	41	Pipe Burst	Belvedere	Potential Tide Influence	3/14/2011	3	3
D4-D1	201	6	1/1/1955	VCP	\$0.00	41	No Action	Belvedere		5/5/2004	2	None
RE2-BT	223	6	1/1/1960	VCP	\$1,561.00	41	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
FB8-FB7	294	6	1/1/1955	VCP	\$0.00	41	No Action	Belvedere	Potential Tide Influence	5/11/2004	4	None
R19-R18	57	6	1/1/1996	VCP	\$399.00	41	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
G7-G6	44	8	1/1/1965	VCP	\$0.00	41	No Action	Belvedere		5/19/2004	2	None
R3-R2	240	6	1/1/1996	PLP	\$1,680.00	41	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
R4-R3	151	6	1/1/1996	PE	\$1,057.00	41	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
RB12-RB8	155	6	1/1/1958	VCP	\$1,085.00	41	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
D1-PS12	22	6	1/1/1955	VCP	\$0.00	41	No Action	Belvedere		4/19/2011	0	None
A3-A2	28	6	1/1/1950	VCP	\$0.00	41	No Action	Belvedere		3/22/2011	0	None
R1-PS15	173	6	1/1/1997	PE	\$1,211.00	41	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
R2-R1	223	6	1/1/1997	PE	\$1,561.00	41	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
RC10-RC5	165	6	1/1/1957	VCP	\$1,155.00	41	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
FA1-F8	48	6	1/1/1950	VCP	\$336.00	41	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
FB10-FB9	209	6	1/1/1955	VCP	\$72,105.00	41	Replace	Belvedere	Potential Tide Influence	5/11/2004	3	3
RB8-RB8A.1	141.9	6	1/1/1958	VCP	\$993.30	41	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
H6-H5	278	6	1/1/1950	VCP	\$0.00	40	No Action	Belvedere	High Priority I&I Concerns; Potential Tide Influence	5/10/2004	2	None

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
NC1-NB6	103	6	1/1/1960	VCP	\$0.00	40	No Action	Belvedere		5/20/2004	2	None
R17-R16	46	6	1/1/1996	PVC	\$322.00	39.5	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
R18-R17	40	6	1/1/1996	PVC	\$280.00	39.5	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
FC8-FC7	198	6	1/1/1955	VCP	\$0.00	39	No Action	Belvedere	Potential Tide Influence	5/25/2004	2	None
RC6-RC5	238	4	1/1/1957	VCP	\$74,970.00	39	Replace	Belvedere		6/21/2004	3	3
ND13-ND12	154	4	1/1/1950	CAS	\$0.00	39	No Action	Belvedere		6/29/2004	2	None
N5B-N5A	49.9	6	1/1/1952	VCP	\$0.00	39	No Action	Belvedere		3/23/2011	0	None
R16-R15	259	6	1/1/1996	PE	\$1,813.00	38	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
N9-N8	362	6	1/1/1960	VCP	\$124,890.00	38	Replace	Belvedere		5/3/2004	2	3
CA5-CA4	190	8	1/1/1956	VCP	\$0.00	38	No Action	Belvedere		5/7/2004	2	None
R5-R4	163	6	1/1/1996	PE	\$1,141.00	38	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
R6-R5	211	6	1/1/1996	PE	\$1,477.00	38	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
R8-R7	247	6	1/1/1996	PE	\$1,729.00	38	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
R9-R8	167	6	1/1/1996	PE	\$1,169.00	38	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
R10-R9	239	6	1/1/1996	PE	\$1,673.00	38	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
R11-R10	160	6	1/1/1996	PE	\$1,120.00	38	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
R12-R11	201	6	1/1/1996	PE	\$1,407.00	38	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
R13-R12	196	6	1/1/1996	PE	\$1,372.00	38	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
R14-R13	204	6	1/1/1996	PE	\$1,428.00	38	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
R15-R14	189	6	1/1/1996	PE	\$1,323.00	38	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
R7-R6	194	6	1/1/1996	PE	\$1,358.00	38	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
RD2-RD1.1	1.6	6	1/1/1957	PE	\$11.20	38	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
RD2-RD1.1.1	174.2	6	1/1/1957	PE	\$1,219.40	38	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
RC1-BT	260	4	1/1/1957	PE	\$0.00	36	No Action	Belvedere		3/9/2011	3	None
RD3-RD1.1	58.3	4	1/1/1957	PE	\$408.10	36	Medium Priority CCT	Belvedere	No CCTV Data		No CCTV Data	2
CA3-CA2	149	8	1/1/1956	VCP	\$0.00	35	No Action	Belvedere		5/7/2004	2	None
P6-P5	114	6	1/1/1950	VCP	\$0.00	35	No Action	Belvedere	Medium Priority I&I Concerns; Potential Tide Influence	3/2/2011	0	None
CB13-CB12	264	6	1/1/1960	VCP	\$0.00	33	No Action	Belvedere		5/13/2004	2	None
FA6-FA4	294	6	1/1/1950	VCP	\$0.00	33	No Action	Belvedere	Potential Tide Influence	5/12/2004	2	None
FC3-FC2	181	6	1/1/1955	VCP	\$0.00	33	No Action	Belvedere	Potential Tide Influence	6/28/2004	2	None
FA4-FA3	138	6	1/1/1950	VCP	\$0.00	33	No Action	Belvedere	Potential Tide Influence	5/12/2004	2	None
ND16-ND15	278	6	1/1/1950	PE	\$0.00	32	No Action	Belvedere	Repair YR after Inspection Date	6/29/2004	2	None
ND8-ND8B	55	6	1/1/1952	PE	\$0.00	32	No Action	Belvedere	Repair YR after Inspection Date	6/22/2004	2	None
RE6-RE5	119	6	1/1/1960	VCP	\$0.00	30	No Action	Belvedere		5/19/2004	2	None
ND6-ND5	242	6		VCP	\$0.00	28	No Action	Belvedere		6/22/2004	0	None

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
NE7-NE6	479	6	1/1/1952	PE	\$0.00	26	No Action	Belvedere	Repair YR after Inspection Date	6/30/2004	1	None
J6/A6-A5	271	8	1/1/1950	VCP	\$0.00	25	No Action	Belvedere		6/23/2004	0	None
G5-G4	153	8	1/1/1952	VCP	\$24,000.00	24	Point Repair	Belvedere		5/18/2004	0	4
ND5-ND4	95			PVC	\$665.00	23.5	Low Priority CCTV	Belvedere		5/21/2004	0	3
F7-F6	76	6	1/1/1950	VCP	\$0.00	23	No Action	Belvedere		5/5/2004	1	None
NB5-NB4	64	15	1/1/1960	VCP	\$448.00	23	Low Priority CCTV	Belvedere		5/26/2004	0	3
NB1-N1	137	15	1/1/1952	VCP	\$959.00	23	Low Priority CCTV	Belvedere		5/26/2004	0	3
N1-PS1	19	15	1/1/1950	VCP	\$0.00	23	No Action	Belvedere		5/26/2004	0	None
J6/A6-J5	264	8	1/1/1950	VCP	\$0.00	23	No Action	Belvedere		6/23/2004	0	None
K4-K3	290	6	1/1/1950	VCP	\$0.00	22	No Action	Belvedere		5/4/2004	0	None
M4-M3	264	6	1/1/1950	VCP	\$1,848.00	22	Low Priority CCTV	Belvedere		5/4/2004	0	3
J5-J4	104	6	1/1/1950	VCP	\$728.00	22	Low Priority CCTV	Belvedere		6/23/2004	0	3
J4-J3	301	6	1/1/1950	VCP	\$0.00	22	No Action	Belvedere		5/21/2004	0	None
J3-J2	304	6	1/1/1950	VCP	\$0.00	22	No Action	Belvedere		5/21/2004	0	None
K1-PS10	10	6	1/1/1950	VCP	\$0.00	22	No Action	Belvedere		4/19/2011	0	None
J1-PS11	10	6	1/1/1950	VCP	\$0.00	22	No Action	Belvedere		4/19/2011	0	None
G4-G3	544.7	8	1/1/2008	CPP	\$0.00	22	No Action	Belvedere		1/22/2008	0	None
NF1-NB6	135	12	1/1/1950	VCP	\$0.00	21	No Action	Belvedere		8/14/2019	0	None
G14-G4	413.1	6	1/1/2008	CPP	\$2,891.70	20	Low Priority CCTV	Belvedere		1/22/2008	0	3
A8-A3	174	8	1/1/1950	VCP	\$16,000.00	20	Point Repair	Belvedere		5/5/2004	0	4
CA2-CA1	320	8	1/1/1956	VCP	\$2,240.00	20	Low Priority CCTV	Belvedere		5/7/2004	0	3
CA1-C2	178	8	1/1/1956	VCP	\$1,246.00	20	Low Priority CCTV	Belvedere		5/7/2004	0	3
NB6-NB5	156	10	1/1/1960	VCP	\$1,092.00	20	Low Priority CCTV	Belvedere		5/26/2004	0	3
NB4-NB2	333	15	1/1/2009	CPP	\$2,331.00	20	Low Priority CCTV	Belvedere		3/25/2009	0	3
NB2-NB1	370	15	1/1/2009	CPP	\$2,590.00	20	Low Priority CCTV	Belvedere		3/25/2009	0	3
K3-K2	260	6	1/1/1950	VCP	\$1,820.00	19	Low Priority CCTV	Belvedere		5/4/2004	0	3
M6-M2	241	6	1/1/1952	VCP	\$0.00	19	No Action	Belvedere		5/4/2004	0	None
M2-M1	28	6	1/1/1950	VCP	\$196.00	19	Low Priority CCTV	Belvedere		5/4/2004	0	3
D2-D1	28	6	1/1/1955	VCP	\$196.00	19	Low Priority CCTV	Belvedere		5/5/2004	0	3
D3-D2	223	6	1/1/1955	VCP	\$1,561.00	19	Low Priority CCTV	Belvedere		5/5/2004	0	3
G8-G7	402	8	1/1/1965	VCP	\$2,814.00	19	Low Priority CCTV	Belvedere		5/19/2004	0	3
NA3-NA2	244	6	1/1/1950	VCP	\$1,708.00	19	Low Priority CCTV	Belvedere	Medium Priority I&I Concerns; Potential Tide Influence	5/21/2004	0	3
C2-C1	403	6	1/1/1950	VCP	\$2,821.00	19	Low Priority CCTV	Belvedere		3/13/2006	0	3
K6-K3	198	6	1/1/1950	VCP	\$1,386.00	19	Low Priority CCTV	Belvedere		5/4/2004	0	3
K5-K2	332	6	1/1/1950	VCP	\$2,324.00	19	Low Priority CCTV	Belvedere		5/4/2004	0	3



Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
B2-B1	298	6	1/1/1952	VCP	\$2,086.00	18	Low Priority CCTV	Belvedere		5/5/2004	0	3
A7B-A7A	201	6	1/1/1952	VCP	\$1,407.00	18	Low Priority CCTV	Belvedere	No CCTV Data		No CCTV Data	3
H7-H6	353	6	1/1/1950	VCP	\$0.00	18	No Action	Belvedere	High Priority I&I Concerns; Potential Tide Influence	5/10/2004	0	None
H5-H4	350	6	1/1/1950	VCP	\$0.00	18	No Action	Belvedere	High Priority I&I Concerns; Potential Tide Influence	5/10/2004	0	None
H4-H3	303	6	1/1/1950	VCP	\$0.00	18	No Action	Belvedere	High Priority I&I Concerns; Potential Tide Influence	5/10/2004	0	None
H3-H2	301	6	1/1/1950	VCP	\$16,000.00	18	Point Repair	Belvedere	High Priority I&I Concerns; Potential Tide Influence	5/10/2004	0	4
H2-H1	335	6	1/1/1950	VCP	\$24,000.00	18	Point Repair	Belvedere		5/13/2004	0	4
H1-PS7	332	6	1/1/1950	VCP	\$0.00	18	No Action	Belvedere		5/13/2004	0	None
NB8-NB7	10	6	1/1/1960	VCP	\$0.00	18	No Action	Belvedere		5/26/2004	0	None
NB7-NB6	12	6	1/1/1960	VCP	\$84.00	18	Low Priority CCTV	Belvedere		5/26/2004	0	3
NB12-NB11	370	6	1/1/1960	VCP	\$127,650.00	18	Replace	Belvedere		6/30/2004	0	4
NA2-NA1	162	8	1/1/1965	PVC	\$1,134.00	17.5	Low Priority CCTV	Belvedere	Medium Priority I&I Concerns; Potential Tide Influence	5/21/2004	0	3
NA1-N1	7	8	1/1/1952	PVC	\$49.00	17.5	Low Priority CCTV	Belvedere		5/26/2004	0	3
FA9-FA8	134	6	1/1/1950	VCP	\$938.00	17	Low Priority CCTV	Belvedere	Potential Tide Influence	5/12/2004	0	3
C4-C3	314	6	1/1/1955	VCP	\$2,198.00	17	Low Priority CCTV	Belvedere		5/13/2004	0	3
FA14-FA13	306	6	1/1/1950	VCP	\$2,142.00	17	Low Priority CCTV	Belvedere	Potential Tide Influence	1/1/2005	0	3
G9-G8	254	6	1/1/1952	VCP	\$1,778.00	17	Low Priority CCTV	Belvedere		5/19/2004	0	3
FC7-FC6	205	6	1/1/1955	VCP	\$1,435.00	17	Low Priority CCTV	Belvedere	Potential Tide Influence	5/25/2004	0	3
C6-C4	23	6	1/1/1955	VCP	\$161.00	17	Low Priority CCTV	Belvedere		5/26/2004	0	3
C3-C2	210	6	1/1/1955	VCP	\$0.00	17	No Action	Belvedere		5/24/2004	0	None
N7-N6	40	6	1/1/1952	VCP	\$280.00	17	Low Priority CCTV	Belvedere		6/23/2004	0	3
FB2-FB1	219	8	1/1/1955	PVC	\$1,533.00	16.5	Low Priority CCTV	Belvedere	Potential Tide Influence	5/11/2004	0	3
NB9-NB8	431	6	1/1/1960	PVC	\$3,017.00	16.5	Low Priority CCTV	Belvedere		5/26/2004	0	3
N8-N2	32	6	1/1/1952	VCP	\$224.00	16	Low Priority CCTV	Belvedere		5/3/2004	0	3
F4-F3	246	8	1/1/1950	VCP	\$1,722.00	16	Low Priority CCTV	Belvedere		5/6/2004	0	3
F3-F2	171	8	1/1/1950	VCP	\$1,197.00	16	Low Priority CCTV	Belvedere		5/6/2004	0	3
F2-F1	202	8	1/1/1950	VCP	\$1,414.00	16	Low Priority CCTV	Belvedere		5/6/2004	0	3
E6-E5	277	8	1/1/1950	VCP	\$1,939.00	16	Low Priority CCTV	Belvedere		5/6/2004	0	3
E5-E4	135	8	1/1/1950	VCP	\$945.00	16	Low Priority CCTV	Belvedere		5/6/2004	0	3
E4-E3	165	8	1/1/1950	VCP	\$1,155.00	16	Low Priority CCTV	Belvedere		5/6/2004	0	3
E3-E2	252	8	1/1/1950	VCP	\$1,764.00	16	Low Priority CCTV	Belvedere		5/6/2004	0	3
E2-E1	198	8	1/1/1950	VCP	\$0.00	16	No Action	Belvedere		5/6/2004	0	None
FC5-FC4	104	4	1/1/1955	CAS	\$728.00	16	Low Priority CCTV	Belvedere	Potential Tide Influence	6/28/2004	0	3
NB11-NB2	12	6	1/1/1950	VCP	\$0.00	16	No Action	Belvedere		6/30/2004	0	None
F6-F5	159	6	1/1/1950	VCP	\$1,113.00	15	Low Priority CCTV	Belvedere		5/5/2004	0	3

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
F5-F4	241	6	1/1/1950	VCP	\$1,687.00	15	Low Priority CCTV	Belvedere		5/5/2004	0 3	
F12-F11	167	6	1/1/1950	VCP	\$1,169.00	15	Low Priority CCTV	Belvedere		5/6/2004	0 3	
F11-F1	155	6	1/1/1950	VCP	\$0.00	15	No Action	Belvedere		5/6/2004	0 None	
E7-E1	280	6	1/1/1950	AC	\$0.00	15	No Action	Belvedere		5/6/2004	0 None	
ND10B-ND10	105	6		PE	\$0.00	15	No Action	Belvedere		12/5/2017	0 None	
FC1-BT	173	6	1/1/1955	VCP	\$16,000.00	14	Point Repair	Belvedere	Potential Tide Influence	2/28/2011	0 4	
RA3-RA2	209	6	1/1/1959	PE	\$0.00	14	No Action	Belvedere	Repair YR after Inspection Date	6/21/2004	0 None	
FB3-FB3A	109	8	1/1/1955	PVC	\$763.00	13.5	Low Priority CCTV	Belvedere	Potential Tide Influence	5/11/2004	0 3	
ND8A-ND6	145	6	1/1/1950	VCP	\$1,015.00	13	Low Priority CCTV	Belvedere		6/22/2004	0 3	
CA4-CA3	194	8	1/1/1956	VCP	\$1,358.00	13	Low Priority CCTV	Belvedere		5/7/2004	0 3	
NE1A-ND6	157	6	1/1/1950	VCP	\$29,516.00	13	Pipe Burst	Belvedere		3/21/2011	3 3	
P4-P3	241	6	1/1/1950	VCP	\$0.00	13	No Action	Belvedere	Medium Priority I&I Concerns; Potential Tide Influence	3/2/2011	0 None	
P3-P2	126	6	1/1/1950	VCP	\$0.00	13	No Action	Belvedere		3/2/2011	0 None	
G1-PS2	23	6	1/1/1950	VCP	\$161.00	13	Low Priority CCTV	Belvedere		6/23/2004	0 3	
F8-F7	42	6	1/1/1950	VCP	\$294.00	12	Low Priority CCTV	Belvedere		5/5/2004	0 4	
CB9-CB8	224	6	1/1/1960	VCP	\$0.00	12	No Action	Belvedere		6/22/2004	0 None	
FA3-FA2	187	6	1/1/1950	CAS	\$1,309.00	12	Low Priority CCTV	Belvedere	Potential Tide Influence	5/12/2004	0 4	
CB8-CB7	190	6	1/1/1960	VCP	\$1,330.00	12	Low Priority CCTV	Belvedere		5/27/2004	0 4	
GB11-GB5	224	6	1/1/1952	VCP	\$1,568.00	12	Low Priority CCTV	Belvedere		5/25/2004	0 4	
ND11-ND10	213	6	1/1/1950	VCP	\$1,491.00	12	Low Priority CCTV	Belvedere		6/29/2004	0 4	
RC7-RC6	120	4	1/1/1957	VCP	\$0.00	12	No Action	Belvedere		6/21/2004	0 None	
RB11-RB11A	137	4	1/1/1950	VCP	\$0.00	12	No Action	Belvedere		6/21/2004	0 None	
CB11-CB10	303	6	1/1/1960	VCP	\$2,121.00	11	Low Priority CCTV	Belvedere		5/7/2004	0 4	
FA11-FA10	280	6	1/1/1950	VCP	\$1,960.00	11	Low Priority CCTV	Belvedere	Potential Tide Influence	5/12/2004	0 4	
FA8-FA7	217	6	1/1/1950	VCP	\$1,519.00	11	Low Priority CCTV	Belvedere	Potential Tide Influence	5/12/2004	0 4	
FA7-FA6	220	6	1/1/1950	VCP	\$1,540.00	11	Low Priority CCTV	Belvedere	Potential Tide Influence	1/1/2005	0 4	
CB12-CB3	591	6	1/1/1960	VCP	\$4,137.00	11	Low Priority CCTV	Belvedere		6/23/2004	0 4	
RA8-RA7	86	6	1/1/1959	VCP	\$0.00	11	No Action	Belvedere		6/22/2004	0 None	
CB4-CB3	108	6	1/1/1960	VCP	\$756.00	11	Low Priority CCTV	Belvedere		5/27/2004	0 4	
RB6-RB6A	30	6	1/1/1958	VCP	\$0.00	11	No Action	Belvedere		6/21/2004	0 None	
CB14-CB4	185	6	1/1/1960	VCP	\$0.00	11	No Action	Belvedere		6/23/2004	0 None	
G17-G16	239	6	1/1/1952	VCP	\$1,673.00	11	Low Priority CCTV	Belvedere		6/22/2004	0 4	
CB2-C1	62	6	1/1/1960	VCP	\$0.00	11	No Action	Belvedere		4/19/2011	0 None	
CB6-CB5	167	6	1/1/1960	VCP	\$1,169.00	11	Low Priority CCTV	Belvedere		5/27/2004	0 4	
CB10-CB9	233	6	1/1/1960	VCP	\$1,631.00	11	Low Priority CCTV	Belvedere		5/7/2004	0 4	

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
RB4-RB3	188	6	1/1/1958	VCP	\$0.00	11	No Action	Belvedere		6/22/2004	0	None
RA9-RA2	173	6	1/1/1959	VCP	\$0.00	11	No Action	Belvedere		6/29/2004	0	None
CA7-CA6	157	6	1/1/1950	VCP	\$1,099.00	11	Low Priority CCTV	Belvedere		5/13/2004	0	4
F1-PS14	8	6	1/1/1950	VCP	\$0.00	11	No Action	Belvedere		4/19/2011	0	None
RB6A-RB5	135.9	6	1/1/1958	VCP	\$0.00	11	No Action	Belvedere		4/5/2018	0	None
FB1-FA3	162	8	1/1/1955	PVC	\$1,134.00	10.5	Low Priority CCTV	Belvedere	Potential Tide Influence	5/12/2004	0	4
GA1-GA1A	66	6	1/1/1952	PE	\$0.00	10	No Action	Belvedere	Repair YR after Inspection Date	7/16/2014	0	None
GA5-GA1	128	6	1/1/1952	PE	\$0.00	10	No Action	Belvedere	Repair YR after Inspection Date	7/16/2014	0	None
GA1A-BT	107	6	1/1/1952	PE	\$0.00	10	No Action	Belvedere	Repair YR after Inspection Date	7/16/2014	0	None
ND8B-ND8A	175	6	1/1/1952	PE	\$0.00	10	No Action	Belvedere	Repair YR after Inspection Date	6/22/2004	0	None
NA4-NA3	442	6	1/1/1998	PE	\$3,094.00	10	Low Priority CCTV	Belvedere	Medium Priority I&I Concerns; Potential Tide Influence	7/1/2004	0	4
FC4-FC3	166	4	1/1/1955	CAS	\$1,162.00	10	Low Priority CCTV	Belvedere	Potential Tide Influence	6/28/2004	0	4
GA2-GA1	181	6	1/1/1952	PE	\$0.00	10	No Action	Belvedere	Repair YR after Inspection Date	7/16/2014	0	None
GA3-GA2	306	6	1/1/1952	PE	\$0.00	10	No Action	Belvedere	Repair YR after Inspection Date	7/16/2014	0	None
NE1-NE1A	243	6	1/1/1952	PE	\$0.00	10	No Action	Belvedere	Repair YR after Inspection Date	3/21/2011	5	None
NE2-NE1	145	6	1/1/1952	PE	\$0.00	10	No Action	Belvedere	Repair YR after Inspection Date	6/29/2004	0	None
GA4-GA3	113	6	1/1/1952	PE	\$0.00	10	No Action	Belvedere	Repair YR after Inspection Date	7/16/2014	0	None
FC2-FC1	155	6	1/1/1955	PVC	\$0.00	9.5	No Action	Belvedere	Repair YR after Inspection Date	6/28/2004	0	None
RA1-NF3	84	6	1/1/1959	PVC	\$0.00	9.5	No Action	Belvedere		6/30/2004	0	None
FB6-FB5	123	8	1/1/1955	VCP	\$0.00	9	No Action	Belvedere	Potential Tide Influence	5/11/2004	0	None
R21-R20	182	6	1/1/1996	CAS	\$0.00	9	No Action	Belvedere		6/28/2004	0	None
R22-R21	26	6	1/1/1996	CAS	\$182.00	9	Low Priority CCTV	Belvedere		6/28/2004	0	4
NE5-NE4	93	6	1/1/1952	PE	\$0.00	9	No Action	Belvedere	Repair YR after Inspection Date	6/30/2004	0	None
GB2-GB1	133	6	1/1/1952	PE	\$0.00	9	No Action	Belvedere	Repair YR after Inspection Date	7/16/2014	0	None
R23-R22	44	6	1/1/1996	CAS	\$308.00	9	Low Priority CCTV	Belvedere		5/21/2004	0	4
RE3-RE2	82	6	1/1/1960	CAS	\$574.00	9	Low Priority CCTV	Belvedere		6/29/2004	0	4
GB1-G7	129	6	1/1/1952	PE	\$0.00	9	No Action	Belvedere	Repair YR after Inspection Date	7/16/2014	0	None
GB4-GB3	150	6	1/1/1952	PE	\$0.00	9	No Action	Belvedere	Repair YR after Inspection Date	9/14/2017	0	None
NE12-NE8A	192	6	1/1/1952	PE	\$0.00	9	No Action	Belvedere	Repair YR after Inspection Date	6/30/2004	0	None
GB5-GB4	117	6	1/1/1952	PE	\$0.00	9	No Action	Belvedere	Repair YR after Inspection Date	9/14/2017	0	None
RB7-RB6	52	4	1/1/1958	VCP	\$364.00	9	Low Priority CCTV	Belvedere		6/21/2004	0	4
GB8-GB1	193	6	1/1/1952	PE	\$0.00	9	No Action	Belvedere	Repair YR after Inspection Date	7/15/2014	0	None
GC7-GB1	67.1	6	1/1/1950	PE	\$0.00	9	No Action	Belvedere	Repair YR after Inspection Date	7/15/2014	0	None
GB7-GC7	173.9	6	1/1/1950	PE	\$0.00	9	No Action	Belvedere	Repair YR after Inspection Date	7/15/2014	0	None
RE9-RE8	168	6	1/1/1960	VCP	\$1,176.00	8	Low Priority CCTV	Belvedere		5/19/2004	0	4

Asset ID	Length	Diameter	Install Date	Material	Total Cost	Total Risk	Rehab Actions	Location	Comments	Most Recent Inspection Date	Peak Structural Defect Score	Tier
RC9-RC3	98	6	1/1/1957	VCP	\$0.00	8	No Action	Belvedere		6/21/2004	0	None
RE7-RE6	134	6	1/1/1960	VCP	\$938.00	8	Low Priority CCTV	Belvedere		5/19/2004	0	4
RC2-RC1	33	6	1/1/1957	VCP	\$0.00	8	No Action	Belvedere		3/9/2011	0	None
RC4-RC3	73	6	1/1/1957	VCP	\$511.00	8	Low Priority CCTV	Belvedere		5/21/2004	0	4
RC3-RC2	186	6	1/1/1957	VCP	\$1,302.00	8	Low Priority CCTV	Belvedere		6/21/2004	0	4
FC6-FC1	211	6	1/1/1955	PE	\$0.00	8	No Action	Belvedere	Repair YR after Inspection Date	9/14/2017	0	None
CB3-CB2	287.1	6	1/1/2008	CPP	\$2,009.70	8	Low Priority CCTV	Belvedere		1/22/2008	0	4
FA17-FA15	134	6	1/1/1950	PE	\$0.00	8	No Action	Belvedere	Repair YR after Inspection Date	6/28/2004	0	None
RA1A-RA1	150	6	1/1/1959	PE	\$0.00	8	No Action	Belvedere		3/14/2011	0	None
RB9-RB8	121	6	1/1/1958	VCP	\$0.00	8	No Action	Belvedere		6/21/2004	0	None
RC5-RC4	67	6	1/1/1957	VCP	\$469.00	8	Low Priority CCTV	Belvedere		6/21/2004	0	4
NE13-NE12	33	6		PE	\$0.00	8	No Action	Belvedere		6/30/2004	0	None
FA1-F7	51	6	1/1/1950	VCP	\$0.00	8	No Action	Belvedere		3/14/2011	0	None
RB3-RB2	160	6	1/1/1958	VCP	\$0.00	8	No Action	Belvedere		6/22/2004	0	None
ND15-ND1	161	4	1/1/1950	PE	\$0.00	8	No Action	Belvedere		6/29/2004	0	None
RB8-RB8A	59.1	6	1/1/1958	VCP	\$0.00	8	No Action	Belvedere		6/21/2004	0	None
FB5-FB4	246	8	1/1/1955	PVC	\$1,722.00	7.5	Low Priority CCTV	Belvedere	Potential Tide Influence	5/11/2004	0	4
FB3A-FB2	349	8	1/1/1955	PVC	\$2,443.00	7.5	Low Priority CCTV	Belvedere	Potential Tide Influence	5/11/2004	0	4
FB4-FB3	121	8	1/1/1955	PVC	\$0.00	7.5	No Action	Belvedere	Potential Tide Influence	5/11/2004	0	None
RB8A-RB1	8	6		PVC	\$0.00	6.5	No Action	Belvedere		3/10/2011	0	None
RA2-RA1A	152.1	4	1/1/1959	PE	\$0.00	6	No Action	Belvedere		3/14/2011	0	None
RC8-RC8A	356	6	1/1/1950	PE	\$0.00	5	No Action	Belvedere	Repair YR after Inspection Date	9/19/2017	0	None



## Appendix C

Cost Basis for Gravity  
Main Rehabilitation  
Estimates

# 1.0 Appendix C: Gravity Main Rehabilitation Method Unit Costs

In addition to determining the rehabilitation actions for each gravity main, planning level costs for each action are calculated by the model. Rehabilitation cost information was developed using local industry costs data and District bid tabulations for previous projects. This cost information, which was incorporated in the rehabilitation decision logic and is documented in Table 26 through Table 30. In most cases the unit costs are applied based on pipe diameter so that the total length of the pipe can be used to calculate the full cost.

**Table 1. Replacement unit costs**

Rehabilitation method	Diameter (in.)	Unit	Unit cost
Replacement	4	\$/LF	\$315
	6	\$/LF	\$345
	8	\$/LF	\$374
	10	\$/LF	\$385
	12	\$/LF	\$400
	15	\$/LF	\$429
	18	\$/LF	\$475
	20	\$/LF	\$559
	24	\$/LF	\$
	>24	\$/LF	650

The pipe bursting rehabilitation unit costs by diameter are shown in Table 27.

**Table 2. Pipe bursting unit costs**

Rehabilitation method	Diameter (in.)	Unit	Unit cost
Pipe bursting	4	\$/unit length	\$165
	6	\$/unit length	\$188
	8	\$/unit length	\$228
	10	\$/unit length	\$268
	12	\$/unit length	\$293
	16	\$/unit length	\$394
	18	\$/unit length	\$434
	20	\$/unit length	\$485

The full CIPP lining rehabilitation unit costs by diameter are shown in Table 24.

**Table 3. Full CIPP lining unit costs**

Rehabilitation method	Diameter (in.)	Unit	Unit cost
Full CIPP lining	6	\$/unit length	\$62
	8	\$/unit length	\$64
	10	\$/unit length	\$68
	12	\$/unit length	\$74
	15	\$/unit length	\$84
	18	\$/unit length	\$95
	21	\$/unit length	\$107

Rehabilitation method	Diameter (in.)	Unit	Unit cost
	24	\$/unit length	\$125

The point repair rehabilitation unit cost is shown in Table 29. These have been divided into repairs on the street and repairs off the street (e.g. in easements) because of the difference in cost.

**Table 4. Point repair unit costs**

Rehabilitation method	Diameter (in.)	Unit	Unit cost
Point repair (off Street)	N/A	\$/unit	\$5,000
Point repair (on Street)	N/A	\$/unit	\$8,000

The CCTV condition assessment unit costs by diameter are shown in Table 30.

**Table 5 – CCTV unit costs**

Rehabilitation method	Diameter (in.)	Unit	Unit cost
CCTV	4	\$/unit length	\$7.00
	6	\$/unit length	\$7.00
	8	\$/unit length	\$7.00
	10	\$/unit length	\$7.00
	12	\$/unit length	\$7.00
	15	\$/unit length	\$7.00
	18	\$/unit length	\$7.00
	21	\$/unit length	\$7.00
	24	\$/unit length	\$7.00
	27	\$/unit length	\$7.00
	30	\$/unit length	\$7.00
	33	\$/unit length	\$7.00
	36	\$/unit length	\$7.00





## Appendix D

### Cost Basis for Pump Station Rehabilitation Estimates

Tiburon Lift Station No. 1					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					\$0
	Concrete finishing, walls, sandblast, light penetration	SF	\$5		
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15		
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					\$0
	Fall protection grating	EA	\$3,564		
<b>6-Wood, Plastics and Composites</b>					\$0
	Wooden roof repair and asphalt shingles	LS	\$12,452		
<b>7-Thermal and Moisture Protection</b>					\$0
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564		
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					\$4,339
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	1	\$2,612
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	1	\$1,728
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					\$0
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		
<b>26-Electrical</b>					\$0
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776		
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					\$0
	Pumps, 3 HP, 4" submersible	EA	\$6,778		
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516		
<b>Subtotal Construction Cost</b>					<b>\$4,339</b>
	General Conditions, Bonds and Insurance	10%			\$434
	Contractor OH&P	12%			\$521
	Mobilization/Demobilization	4%			\$174
<b>Subtotal</b>					<b>\$5,468</b>
	Contingency (Class 5: +30% to 100%)	50%			\$2,734
<b>Total Construction Cost</b>					<b>\$8,201</b>
	Engineering Design	12%			\$984
	Engineering Services During Construction	6%			\$492
	Construction Management	12%			\$984
	Environmental and Permitting	6%			\$492
<b>Total Capital Cost</b>					<b>\$11,154</b>
High End of Range		+50%			\$16,731
Low End of Range		-30%			\$7,808

Tiburon Lift Station No. 2					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					\$0
	Concrete finishing, walls, sandblast, light penetration	SF	\$5		
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15		
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					\$3,564
	Fall protection grating	EA	\$3,564	1	\$3,564
<b>6-Wood, Plastics and Composites</b>					\$0
	Wooden roof repair and asphalt shingles	LS	\$12,452		
<b>7-Thermal and Moisture Protection</b>					\$0
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564		
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					\$8,679
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	2	\$5,223
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	2	\$3,455
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					\$0
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		
<b>26-Electrical</b>					\$19,776
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776	1	\$19,776
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					\$6,778
	Pumps, 3 HP, 4" submersible	EA	\$6,778	1	\$6,778
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516		
<b>Subtotal Construction Cost</b>					<b>\$38,798</b>
	General Conditions, Bonds and Insurance	10%			\$3,880
	Contractor OH&P	12%			\$4,656
	Mobilization/Demobilization	4%			\$1,552
<b>Subtotal</b>					<b>\$48,885</b>
	Contingency (Class 5: +30% to 100%)	50%			\$24,442
<b>Total Construction Cost</b>					<b>\$73,327</b>
	Engineering Design	12%			\$8,799
	Engineering Services During Construction	6%			\$4,400
	Construction Management	12%			\$8,799
	Environmental and Permitting	6%			\$4,400
<b>Total Capital Cost</b>					<b>\$99,725</b>
High End of Range		+50%			\$149,588
Low End of Range		-30%			\$69,808

Tiburon Lift Station No. 3					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					\$0
	Concrete finishing, walls, sandblast, light penetration	SF	\$5		
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15		
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					\$3,564
	Fall protection grating	EA	\$3,564	1	\$3,564
<b>6-Wood, Plastics and Composites</b>					\$0
	Wooden roof repair and asphalt shingles	LS	\$12,452		
<b>7-Thermal and Moisture Protection</b>					\$3,564
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564	1	\$3,564
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					\$8,679
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	2	\$5,223
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	2	\$3,455
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					\$0
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		
<b>26-Electrical</b>					\$19,776
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776	1	\$19,776
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					\$14,957
	Pumps, 3 HP, 4" submersible	EA	\$6,778		
	Pumps, 5 HP, 4" submersible	EA	\$7,479	2	\$14,957
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516		
<b>Subtotal Construction Cost</b>					<b>\$50,541</b>
	General Conditions, Bonds and Insurance	10%			\$5,054
	Contractor OH&P	12%			\$6,065
	Mobilization/Demobilization	4%			\$2,022
<b>Subtotal</b>					<b>\$63,682</b>
	Contingency (Class 5: +30% to 100%)	50%			\$31,841
<b>Total Construction Cost</b>					<b>\$95,522</b>
	Engineering Design	12%			\$11,463
	Engineering Services During Construction	6%			\$5,731
	Construction Management	12%			\$11,463
	Environmental and Permitting	6%			\$5,731
<b>Total Capital Cost</b>					<b>\$129,910</b>
High End of Range		+50%			\$194,866
Low End of Range		-30%			\$90,937

Tiburon Lift Station No. 4					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					
	Concrete finishing, walls, sandblast, light penetration	SF	\$5		
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13	110	\$1,406
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21	110	\$2,364
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15		
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					
	Fall protection grating	EA	\$3,564	1	\$3,564
<b>6-Wood, Plastics and Composites</b>					
	Wooden roof repair and asphalt shingles	LS	\$12,452		
<b>7-Thermal and Moisture Protection</b>					
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564	1	\$3,564
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612		
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728		
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		
<b>26-Electrical</b>					
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776		
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					
	Pumps, 3 HP, 4" submersible	EA	\$6,778		
	Pumps, 5 HP, 4" submersible	EA	\$7,479	2	\$14,957
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516	1	\$124,516
<b>Subtotal Construction Cost</b>					<b>\$150,372</b>
	General Conditions, Bonds and Insurance	10%			\$15,037
	Contractor OH&P	12%			\$18,045
	Mobilization/Demobilization	4%			\$6,015
<b>Subtotal</b>					<b>\$189,468</b>
	Contingency (Class 5: +30% to 100%)	50%			\$94,734
<b>Total Construction Cost</b>					<b>\$284,202</b>
	Engineering Design	12%			\$34,104
	Engineering Services During Construction	6%			\$17,052
	Construction Management	12%			\$34,104
	Environmental and Permitting	6%			\$17,052
<b>Total Capital Cost</b>					<b>\$386,515</b>
High End of Range		+50%			\$579,773
Low End of Range		-30%			\$270,561

Tiburon Lift Station No. 5					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					\$0
	Concrete finishing, walls, sandblast, light penetration	SF	\$5		
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15		
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					\$0
	Fall protection grating	EA	\$3,564		
<b>6-Wood, Plastics and Composites</b>					\$0
	Wooden roof repair and asphalt shingles	LS	\$12,452		
<b>7-Thermal and Moisture Protection</b>					\$0
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564		
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					\$0
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612		
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728		
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					\$0
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		
<b>26-Electrical</b>					\$19,776
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776	1	\$19,776
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					\$0
	Pumps, 3 HP, 4" submersible	EA	\$6,778		
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516		
<b>Subtotal Construction Cost</b>					<b>\$19,776</b>
	General Conditions, Bonds and Insurance	10%			\$1,978
	Contractor OH&P	12%			\$2,373
	Mobilization/Demobilization	4%			\$791
<b>Subtotal</b>					<b>\$24,918</b>
	Contingency (Class 5: +30% to 100%)	50%			\$12,459
<b>Total Construction Cost</b>					<b>\$37,377</b>
	Engineering Design	12%			\$4,485
	Engineering Services During Construction	6%			\$2,243
	Construction Management	12%			\$4,485
	Environmental and Permitting	6%			\$2,243
<b>Total Capital Cost</b>					<b>\$50,833</b>
	High End of Range	+50%			\$76,249
	Low End of Range	-30%			\$35,583

Tiburon Lift Station No. 6					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					
	Concrete finishing, walls, sandblast, light penetration	SF	\$5	396	\$1,842
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15	396	\$5,742
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					
	Fall protection grating	EA	\$3,564	1	\$3,564
<b>6-Wood, Plastics and Composites</b>					
	Wooden roof repair and asphalt shingles	LS	\$12,452		
<b>7-Thermal and Moisture Protection</b>					
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564	1	\$3,564
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	2	\$5,223
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	2	\$3,455
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		
<b>26-Electrical</b>					
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776	1	\$19,776
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					
	Pumps, 3 HP, 4" submersible	EA	\$6,778		
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516	1	\$124,516
<b>Subtotal Construction Cost</b>					<b>\$167,683</b>
	General Conditions, Bonds and Insurance	10%			\$16,768
	Contractor OH&P	12%			\$20,122
	Mobilization/Demobilization	4%			\$6,707
<b>Subtotal</b>					<b>\$211,281</b>
	Contingency (Class 5: +30% to 100%)	50%			\$105,641
<b>Total Construction Cost</b>					<b>\$316,922</b>
	Engineering Design	12%			\$38,031
	Engineering Services During Construction	6%			\$19,015
	Construction Management	12%			\$38,031
	Environmental and Permitting	6%			\$19,015
<b>Total Capital Cost</b>					<b>\$431,013</b>
High End of Range		+50%			\$646,520
Low End of Range		-30%			\$301,709

Tiburon Lift Station No. 7					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					\$0
	Concrete finishing, walls, sandblast, light penetration	SF	\$5		
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15		
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					\$3,564
	Fall protection grating	EA	\$3,564	1	\$3,564
<b>6-Wood, Plastics and Composites</b>					\$0
	Wooden roof repair and asphalt shingles	LS	\$12,452		
<b>7-Thermal and Moisture Protection</b>					\$3,564
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564	1	\$3,564
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					\$8,679
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	2	\$5,223
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	2	\$3,455
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					\$0
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		
<b>26-Electrical</b>					\$19,776
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776	1	\$19,776
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					\$0
	Pumps, 3 HP, 4" submersible	EA	\$6,778		
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516		
<b>Subtotal Construction Cost</b>					<b>\$35,583</b>
	General Conditions, Bonds and Insurance	10%			\$3,558
	Contractor OH&P	12%			\$4,270
	Mobilization/Demobilization	4%			\$1,423
<b>Subtotal</b>					<b>\$44,835</b>
	Contingency (Class 5: +30% to 100%)	50%			\$22,418
<b>Total Construction Cost</b>					<b>\$67,253</b>
	Engineering Design	12%			\$8,070
	Engineering Services During Construction	6%			\$4,035
	Construction Management	12%			\$8,070
	Environmental and Permitting	6%			\$4,035
<b>Total Capital Cost</b>					<b>\$91,464</b>
High End of Range		+50%			\$137,196
Low End of Range		-30%			\$64,025



Tiburon Lift Station No. 8					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					\$0
	Concrete finishing, walls, sandblast, light penetration	SF	\$5		
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15		
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					\$3,564
	Fall protection grating	EA	\$3,564	1	\$3,564
<b>6-Wood, Plastics and Composites</b>					\$0
	Wooden roof repair and asphalt shingles	LS	\$12,452		
<b>7-Thermal and Moisture Protection</b>					\$3,564
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564	1	\$3,564
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					\$8,679
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	2	\$5,223
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	2	\$3,455
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					\$0
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		
<b>26-Electrical</b>					\$0
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776		
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					\$0
	Pumps, 3 HP, 4" submersible	EA	\$6,778		
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516		
<b>Subtotal Construction Cost</b>					<b>\$15,807</b>
	General Conditions, Bonds and Insurance	10%			\$1,581
	Contractor OH&P	12%			\$1,897
	Mobilization/Demobilization	4%			\$632
<b>Subtotal</b>					<b>\$19,917</b>
	Contingency (Class 5: +30% to 100%)	50%			\$9,959
<b>Total Construction Cost</b>					<b>\$29,876</b>
	Engineering Design	12%			\$3,585
	Engineering Services During Construction	6%			\$1,793
	Construction Management	12%			\$3,585
	Environmental and Permitting	6%			\$1,793
<b>Total Capital Cost</b>					<b>\$40,631</b>
	High End of Range	+50%			\$60,946
	Low End of Range	-30%			\$28,442

Belvedere Lift Station No. 1					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					
	Concrete finishing, walls, sandblast, light penetration	SF	\$5	1,000	\$4,654
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15	1000	\$14,506
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					
	Fall protection grating	EA	\$3,564	4	\$14,257
<b>6-Wood, Plastics and Composites</b>					
	Wooden roof repair and asphalt shingles	LS	\$12,452	1	\$12,452
<b>7-Thermal and Moisture Protection</b>					
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564	4	\$14,257
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	4	\$10,447
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	4	\$6,911
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386	30	\$11,580
<b>26-Electrical</b>					
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776		
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429	1	\$46,429
<b>33-Utilities</b>					
	Pumps, 3 HP, 4" submersible	EA	\$6,778		
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516	1	\$124,516
<b>Subtotal Construction Cost</b>					<b>\$260,007</b>
	General Conditions, Bonds and Insurance	10%			\$26,001
	Contractor OH&P	12%			\$31,201
	Mobilization/Demobilization	4%			\$10,400
<b>Subtotal</b>					<b>\$327,609</b>
	Contingency (Class 5: +30% to 100%)	50%			\$163,805
<b>Total Construction Cost</b>					<b>\$491,414</b>
	Engineering Design	12%			\$58,970
	Engineering Services During Construction	6%			\$29,485
	Construction Management	12%			\$58,970
	Environmental and Permitting	6%			\$29,485
<b>Total Capital Cost</b>					<b>\$668,323</b>
High End of Range		+50%			\$1,002,485
Low End of Range		-30%			\$467,826

Belvedere Lift Station No. 2					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					
	Concrete finishing, walls, sandblast, light penetration	SF	\$5	1,000	\$4,654
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15	1000	\$14,506
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					
	Fall protection grating	EA	\$3,564	2	\$7,129
<b>6-Wood, Plastics and Composites</b>					
	Wooden roof repair and asphalt shingles	LS	\$12,452		\$0
<b>7-Thermal and Moisture Protection</b>					
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564	2	\$7,129
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	2	\$5,223
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	2	\$3,455
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386	20	\$7,720
<b>26-Electrical</b>					
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776	1	\$19,776
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					
	Pumps, 3 HP, 4" submersible	EA	\$6,778		
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516	1	\$124,516
<b>Subtotal Construction Cost</b>					<b>\$194,107</b>
	General Conditions, Bonds and Insurance	10%			\$19,411
	Contractor OH&P	12%			\$23,293
	Mobilization/Demobilization	4%			\$7,764
<b>Subtotal</b>					<b>\$244,575</b>
	Contingency (Class 5: +30% to 100%)	50%			\$122,288
<b>Total Construction Cost</b>					<b>\$366,863</b>
	Engineering Design	12%			\$44,024
	Engineering Services During Construction	6%			\$22,012
	Construction Management	12%			\$44,024
	Environmental and Permitting	6%			\$22,012
<b>Total Capital Cost</b>					<b>\$498,934</b>
	High End of Range	+50%			\$748,401
	Low End of Range	-30%			\$349,254

Belvedere Lift Station No. 3					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					
	Concrete finishing, walls, sandblast, light penetration	SF	\$5	600	\$2,792
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15	600	\$8,704
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					
	Fall protection grating	EA	\$3,564	1	\$3,564
<b>6-Wood, Plastics and Composites</b>					
	Wooden roof repair and asphalt shingles	LS	\$12,452		
<b>7-Thermal and Moisture Protection</b>					
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564	1	\$3,564
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	3	\$7,835
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	3	\$5,183
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386	10	\$3,860
<b>26-Electrical</b>					
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776	1	\$19,776
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					
	Pumps, 3 HP, 4" submersible	EA	\$6,778		
	Pumps, 5 HP, 4" submersible	EA	\$7,479	2	\$14,957
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516	1	\$124,516
<b>Subtotal Construction Cost</b>					<b>\$194,752</b>
	General Conditions, Bonds and Insurance	10%			\$19,475
	Contractor OH&P	12%			\$23,370
	Mobilization/Demobilization	4%			\$7,790
<b>Subtotal</b>					<b>\$245,387</b>
	Contingency (Class 5: +30% to 100%)	50%			\$122,694
<b>Total Construction Cost</b>					<b>\$368,081</b>
	Engineering Design	12%			\$44,170
	Engineering Services During Construction	6%			\$22,085
	Construction Management	12%			\$44,170
	Environmental and Permitting	6%			\$22,085
<b>Total Capital Cost</b>					<b>\$500,590</b>
High End of Range		+50%			\$750,885
Low End of Range		-30%			\$350,413

Belvedere Lift Station No. 5					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					
	Concrete finishing, walls, sandblast, light penetration	SF	\$5	400	\$1,862
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15	400	\$5,802
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					
	Fall protection grating	EA	\$3,564	1	\$3,564
<b>6-Wood, Plastics and Composites</b>					
	Wooden roof repair and asphalt shingles	LS	\$12,452		
<b>7-Thermal and Moisture Protection</b>					
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564	1	\$3,564
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	2	\$5,223
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	2	\$3,455
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		
<b>26-Electrical</b>					
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776		
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					
	Pumps, 3 HP, 4" submersible	EA	\$6,778		
	Pumps, 5 HP, 4" submersible	EA	\$7,479	2	\$14,957
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516	1	\$124,516
<b>Subtotal Construction Cost</b>					<b>\$162,944</b>
	General Conditions, Bonds and Insurance	10%			\$16,294
	Contractor OH&P	12%			\$19,553
	Mobilization/Demobilization	4%			\$6,518
<b>Subtotal</b>					<b>\$205,310</b>
	Contingency (Class 5: +30% to 100%)	50%			\$102,655
<b>Total Construction Cost</b>					<b>\$307,965</b>
	Engineering Design	12%			\$36,956
	Engineering Services During Construction	6%			\$18,478
	Construction Management	12%			\$36,956
	Environmental and Permitting	6%			\$18,478
<b>Total Capital Cost</b>					<b>\$418,832</b>
High End of Range		+50%			\$628,248
Low End of Range		-30%			\$293,182

Belvedere Lift Station No. 7					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					
	Concrete finishing, walls, sandblast, light penetration	SF	\$5	400	\$1,862
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15	400	\$5,802
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					
	Fall protection grating	EA	\$3,564		\$0
<b>6-Wood, Plastics and Composites</b>					
	Wooden roof repair and asphalt shingles	LS	\$12,452		\$0
<b>7-Thermal and Moisture Protection</b>					
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564	1	\$3,564
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	2	\$5,223
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	2	\$3,455
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386	5	\$1,930
<b>26-Electrical</b>					
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776		
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					
	Pumps, 3 HP, 4" submersible	EA	\$6,778	2	\$13,557
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516	1	\$124,516
<b>Subtotal Construction Cost</b>					<b>\$159,909</b>
	General Conditions, Bonds and Insurance	10%			\$15,991
	Contractor OH&P	12%			\$19,189
	Mobilization/Demobilization	4%			\$6,396
<b>Subtotal</b>					<b>\$201,486</b>
	Contingency (Class 5: +30% to 100%)	50%			\$100,743
<b>Total Construction Cost</b>					<b>\$302,229</b>
	Engineering Design	12%			\$36,267
	Engineering Services During Construction	6%			\$18,134
	Construction Management	12%			\$36,267
	Environmental and Permitting	6%			\$18,134
<b>Total Capital Cost</b>					<b>\$411,031</b>
High End of Range		+50%			\$616,546
Low End of Range		-30%			\$287,722

Belvedere Lift Station No. 8					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					\$0
	Concrete finishing, walls, sandblast, light penetration	SF	\$5		
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15		
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					\$3,564
	Fall protection grating	EA	\$3,564	1	\$3,564
<b>6-Wood, Plastics and Composites</b>					\$0
	Wooden roof repair and asphalt shingles	LS	\$12,452		
<b>7-Thermal and Moisture Protection</b>					\$1,782
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564		
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782	1	\$1,782
<b>22-Plumbing</b>					\$8,679
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	2	\$5,223
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	2	\$3,455
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					\$0
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		
<b>26-Electrical</b>					\$0
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776		
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					\$6,778
	Pumps, 3 HP, 4" submersible	EA	\$6,778	1	\$6,778
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516		
<b>Subtotal Construction Cost</b>					<b>\$20,803</b>
	General Conditions, Bonds and Insurance	10%			\$2,080
	Contractor OH&P	12%			\$2,496
	Mobilization/Demobilization	4%			\$832
<b>Subtotal</b>					<b>\$26,212</b>
	Contingency (Class 5: +30% to 100%)	50%			\$13,106
<b>Total Construction Cost</b>					<b>\$39,319</b>
	Engineering Design	12%			\$4,718
	Engineering Services During Construction	6%			\$2,359
	Construction Management	12%			\$4,718
	Environmental and Permitting	6%			\$2,359
<b>Total Capital Cost</b>					<b>\$53,473</b>
High End of Range		+50%			\$80,210
Low End of Range		-30%			\$37,431

Belvedere Lift Station No. 9					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					
	Concrete finishing, walls, sandblast, light penetration	SF	\$5		
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15		
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113	1	\$3,113
<b>5-Metals</b>					
	Fall protection grating	EA	\$3,564	1	\$3,564
<b>6-Wood, Plastics and Composites</b>					
	Wooden roof repair and asphalt shingles	LS	\$12,452		\$0
<b>7-Thermal and Moisture Protection</b>					
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564	1	\$3,564
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	2	\$5,223
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	2	\$3,455
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		\$0
<b>26-Electrical</b>					
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776		
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					
	Pumps, 3 HP, 4" submersible	EA	\$6,778	2	\$13,557
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516		
<b>Subtotal Construction Cost</b>					<b>\$32,477</b>
	General Conditions, Bonds and Insurance	10%			\$3,248
	Contractor OH&P	12%			\$3,897
	Mobilization/Demobilization	4%			\$1,299
<b>Subtotal</b>					<b>\$40,921</b>
	Contingency (Class 5: +30% to 100%)	50%			\$20,460
<b>Total Construction Cost</b>					<b>\$61,381</b>
	Engineering Design	12%			\$7,366
	Engineering Services During Construction	6%			\$3,683
	Construction Management	12%			\$7,366
	Environmental and Permitting	6%			\$3,683
<b>Total Capital Cost</b>					<b>\$83,478</b>
High End of Range		+50%			\$125,218
Low End of Range		-30%			\$58,435



Belvedere Lift Station No. 10					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					
	Concrete finishing, walls, sandblast, light penetration	SF	\$5		
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15		
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113	1	\$3,113
<b>5-Metals</b>					
	Fall protection grating	EA	\$3,564	1	\$3,564
<b>6-Wood, Plastics and Composites</b>					
	Wooden roof repair and asphalt shingles	LS	\$12,452		\$0
<b>7-Thermal and Moisture Protection</b>					
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564	1	\$3,564
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	2	\$5,223
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	2	\$3,455
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		\$0
<b>26-Electrical</b>					
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776		
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					
	Pumps, 3 HP, 4" submersible	EA	\$6,778		
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516		
<b>Subtotal Construction Cost</b>					<b>\$18,920</b>
	General Conditions, Bonds and Insurance	10%			\$1,892
	Contractor OH&P	12%			\$2,270
	Mobilization/Demobilization	4%			\$757
<b>Subtotal</b>					<b>\$23,839</b>
	Contingency (Class 5: +30% to 100%)	50%			\$11,920
<b>Total Construction Cost</b>					<b>\$35,759</b>
	Engineering Design	12%			\$4,291
	Engineering Services During Construction	6%			\$2,146
	Construction Management	12%			\$4,291
	Environmental and Permitting	6%			\$2,146
<b>Total Capital Cost</b>					<b>\$48,632</b>
High End of Range		+50%			\$72,949
Low End of Range		-30%			\$34,043

Belvedere Lift Station No. 11					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					
	Concrete finishing, walls, sandblast, light penetration	SF	\$5		
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15		
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113	1	\$3,113
<b>5-Metals</b>					
	Fall protection grating	EA	\$3,564	1	\$3,564
<b>6-Wood, Plastics and Composites</b>					
	Wooden roof repair and asphalt shingles	LS	\$12,452		\$0
<b>7-Thermal and Moisture Protection</b>					
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564	1	\$3,564
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	2	\$5,223
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	2	\$3,455
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		\$0
<b>26-Electrical</b>					
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776		
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					
	Pumps, 3 HP, 4" submersible	EA	\$6,778		
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516		
<b>Subtotal Construction Cost</b>					<b>\$18,920</b>
	General Conditions, Bonds and Insurance	10%			\$1,892
	Contractor OH&P	12%			\$2,270
	Mobilization/Demobilization	4%			\$757
<b>Subtotal</b>					<b>\$23,839</b>
	Contingency (Class 5: +30% to 100%)	50%			\$11,920
<b>Total Construction Cost</b>					<b>\$35,759</b>
	Engineering Design	12%			\$4,291
	Engineering Services During Construction	6%			\$2,146
	Construction Management	12%			\$4,291
	Environmental and Permitting	6%			\$2,146
<b>Total Capital Cost</b>					<b>\$48,632</b>
	High End of Range	+50%			\$72,949
	Low End of Range	-30%			\$34,043

Belvedere Lift Station No. 12					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					\$0
	Concrete finishing, walls, sandblast, light penetration	SF	\$5		
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15		
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					\$3,564
	Fall protection grating	EA	\$3,564	1	\$3,564
<b>6-Wood, Plastics and Composites</b>					\$0
	Wooden roof repair and asphalt shingles	LS	\$12,452		
<b>7-Thermal and Moisture Protection</b>					\$1,782
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564		
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782	1	\$1,782
<b>22-Plumbing</b>					\$8,679
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	2	\$5,223
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	2	\$3,455
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					\$0
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		
<b>26-Electrical</b>					\$0
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776		
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					\$0
	Pumps, 3 HP, 4" submersible	EA	\$6,778		
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516		
<b>Subtotal Construction Cost</b>					<b>\$14,025</b>
	General Conditions, Bonds and Insurance	10%			\$1,403
	Contractor OH&P	12%			\$1,683
	Mobilization/Demobilization	4%			\$561
<b>Subtotal</b>					<b>\$17,672</b>
	Contingency (Class 5: +30% to 100%)	50%			\$8,836
<b>Total Construction Cost</b>					<b>\$26,508</b>
	Engineering Design	12%			\$3,181
	Engineering Services During Construction	6%			\$1,590
	Construction Management	12%			\$3,181
	Environmental and Permitting	6%			\$1,590
<b>Total Capital Cost</b>					<b>\$36,050</b>
High End of Range		+50%			\$54,075
Low End of Range		-30%			\$25,235

Belvedere Lift Station No. 13					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					\$0
	Concrete finishing, walls, sandblast, light penetration	SF	\$5		
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15		
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					\$3,564
	Fall protection grating	EA	\$3,564	1	\$3,564
<b>6-Wood, Plastics and Composites</b>					\$0
	Wooden roof repair and asphalt shingles	LS	\$12,452		
<b>7-Thermal and Moisture Protection</b>					\$1,782
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564		
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782	1	\$1,782
<b>22-Plumbing</b>					\$8,679
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	2	\$5,223
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	2	\$3,455
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					\$0
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		
<b>26-Electrical</b>					\$0
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776		
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					\$13,557
	Pumps, 3 HP, 4" submersible	EA	\$6,778	2	\$13,557
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516		
<b>Subtotal Construction Cost</b>					<b>\$27,582</b>
	General Conditions, Bonds and Insurance	10%			\$2,758
	Contractor OH&P	12%			\$3,310
	Mobilization/Demobilization	4%			\$1,103
<b>Subtotal</b>					<b>\$34,753</b>
	Contingency (Class 5: +30% to 100%)	50%			\$17,377
<b>Total Construction Cost</b>					<b>\$52,130</b>
	Engineering Design	12%			\$6,256
	Engineering Services During Construction	6%			\$3,128
	Construction Management	12%			\$6,256
	Environmental and Permitting	6%			\$3,128
<b>Total Capital Cost</b>					<b>\$70,896</b>
High End of Range		+50%			\$106,344
Low End of Range		-30%			\$49,627

Belvedere Lift Station No. 14					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					\$0
	Concrete finishing, walls, sandblast, light penetration	SF	\$5		
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15		
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					\$3,564
	Fall protection grating	EA	\$3,564	1	\$3,564
<b>6-Wood, Plastics and Composites</b>					\$0
	Wooden roof repair and asphalt shingles	LS	\$12,452		
<b>7-Thermal and Moisture Protection</b>					\$1,782
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564		
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782	1	\$1,782
<b>22-Plumbing</b>					\$0
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612		
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728		
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					\$0
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		
<b>26-Electrical</b>					\$0
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776		
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					\$6,778
	Pumps, 3 HP, 4" submersible	EA	\$6,778	1	\$6,778
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516		
<b>Subtotal Construction Cost</b>					<b>\$12,125</b>
	General Conditions, Bonds and Insurance	10%			\$1,212
	Contractor OH&P	12%			\$1,455
	Mobilization/Demobilization	4%			\$485
<b>Subtotal</b>					<b>\$15,277</b>
	Contingency (Class 5: +30% to 100%)	50%			\$7,639
<b>Total Construction Cost</b>					<b>\$22,916</b>
	Engineering Design	12%			\$2,750
	Engineering Services During Construction	6%			\$1,375
	Construction Management	12%			\$2,750
	Environmental and Permitting	6%			\$1,375
<b>Total Capital Cost</b>					<b>\$31,165</b>
High End of Range		+50%			\$46,748
Low End of Range		-30%			\$21,816

Belvedere Lift Station No. 15					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					\$0
	Concrete finishing, walls, sandblast, light penetration	SF	\$5		
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15		
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					\$3,564
	Fall protection grating	EA	\$3,564	1	\$3,564
<b>6-Wood, Plastics and Composites</b>					\$0
	Wooden roof repair and asphalt shingles	LS	\$12,452		
<b>7-Thermal and Moisture Protection</b>					\$3,564
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564	1	\$3,564
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					\$8,679
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612	2	\$5,223
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728	2	\$3,455
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					\$0
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		
<b>26-Electrical</b>					\$0
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776		
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					\$6,778
	Pumps, 3 HP, 4" submersible	EA	\$6,778	1	\$6,778
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516		
<b>Subtotal Construction Cost</b>					<b>\$22,586</b>
	General Conditions, Bonds and Insurance	10%			\$2,259
	Contractor OH&P	12%			\$2,710
	Mobilization/Demobilization	4%			\$903
<b>Subtotal</b>					<b>\$28,458</b>
	Contingency (Class 5: +30% to 100%)	50%			\$14,229
<b>Total Construction Cost</b>					<b>\$42,687</b>
	Engineering Design	12%			\$5,122
	Engineering Services During Construction	6%			\$2,561
	Construction Management	12%			\$5,122
	Environmental and Permitting	6%			\$2,561
<b>Total Capital Cost</b>					<b>\$58,054</b>
High End of Range		+50%			\$87,081
Low End of Range		-30%			\$40,638

Seafirth Lift Station No. 1					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					\$0
	Concrete finishing, walls, sandblast, light penetration	SF	\$5		
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15		
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					\$0
	Fall protection grating	EA	\$3,564		
<b>6-Wood, Plastics and Composites</b>					\$0
	Wooden roof repair and asphalt shingles	LS	\$12,452		
<b>7-Thermal and Moisture Protection</b>					\$0
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564		
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					\$0
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612		
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728		
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					\$0
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		
<b>26-Electrical</b>					\$19,776
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776	1	\$19,776
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					\$0
	Pumps, 3 HP, 4" submersible	EA	\$6,778		
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516		
<b>Subtotal Construction Cost</b>					<b>\$19,776</b>
	General Conditions, Bonds and Insurance	10%			\$1,978
	Contractor OH&P	12%			\$2,373
	Mobilization/Demobilization	4%			\$791
<b>Subtotal</b>					<b>\$24,918</b>
	Contingency (Class 5: +30% to 100%)	50%			\$12,459
<b>Total Construction Cost</b>					<b>\$37,377</b>
	Engineering Design	12%			\$4,485
	Engineering Services During Construction	6%			\$2,243
	Construction Management	12%			\$4,485
	Environmental and Permitting	6%			\$2,243
<b>Total Capital Cost</b>					<b>\$50,833</b>
	High End of Range	+50%			\$76,249
	Low End of Range	-30%			\$35,583

Seafirth Lift Station No. 2					
Item	Description	Unit	Adj Unit Cost	Qt	Total Cost (\$)
<b>3-Concrete</b>					
	Concrete finishing, walls, sandblast, light penetration	SF	\$5		
	Concrete finishing, walls, sandblast, heavy penetration	SF	\$13		
	Wall coating, exposed aggregate, troweled on, water based, 1" aggregate size	SF	\$21		
	Wall coating, exposed aggregate, troweled on, water based, 1/2" to 5/8"	SF	\$15		
	Manhole, cover, precast concrete, 8" thick top	EA	\$3,113		
<b>5-Metals</b>					
	Fall protection grating	EA	\$3,564		
<b>6-Wood, Plastics and Composites</b>					
	Wooden roof repair and asphalt shingles	LS	\$12,452		
<b>7-Thermal and Moisture Protection</b>					
	Hatch, galvanized steel frame and aluminum cover	EA	\$3,564		
	Hatch, galvanized steel frame and cover, Repair	EA	\$1,782		
<b>22-Plumbing</b>					
	Valves, bronze, silent check, globe type, flanged, 150 lb., 4"	EA	\$2,612		
	Valves, semi-steel, lubricated plug valve, flanged, 150 psi, 4"	EA	\$1,728		
<b>23-Heating, Ventilation, and Air Conditioning (HVAC)</b>					
	Air filter, activated charcoal type, full flow, impregnated media 12" deep	MCFM	\$386		
<b>26-Electrical</b>					
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 7.5kW, steel enclosure	EA	\$19,776		
	Generator set, natural gas/LP, liquid cooled, 3 ph 4 wire, 120/240 V, 25kW, steel enclosure	EA	\$46,429		
<b>33-Utilities</b>					
	Pumps, 3 HP, 4" submersible	EA	\$6,778		
	Pumps, 5 HP, 4" submersible	EA	\$7,479		
	Pumps, 10 HP, 6" submersible	EA	\$11,090		
	Pumps, 15 HP, 6" submersible	EA	\$13,191		
	Bypass pumping	LS	\$124,516		
<b>Subtotal Construction Cost</b>					<b>\$0</b>
	General Conditions, Bonds and Insurance	10%			\$0
	Contractor OH&P	12%			\$0
	Mobilization/Demobilization	4%			\$0
<b>Subtotal</b>					<b>\$0</b>
	Contingency (Class 5: +30% to 100%)	50%			\$0
<b>Total Construction Cost</b>					<b>\$0</b>
	Engineering Design	12%			\$0
	Engineering Services During Construction	6%			\$0
	Construction Management	12%			\$0
	Environmental and Permitting	6%			\$0
<b>Total Capital Cost</b>					<b>\$0</b>
	High End of Range	+50%			\$0
	Low End of Range	-30%			\$0







## Appendix E

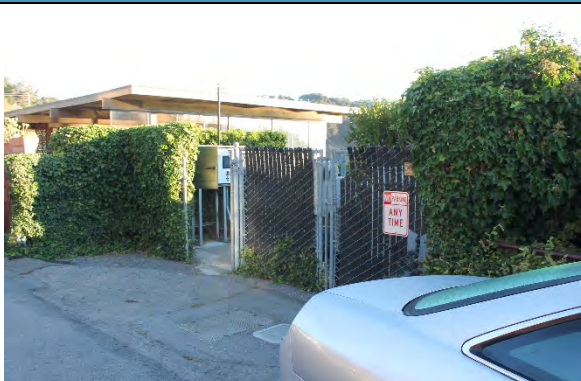

### Photographs of Lift Station Assessments

**Table D-1. Tiburon 1 lift station visual condition assessment summary**

Tiburon 1 Lift Station	
	
<p>Lift station in good condition. Serves only several residential homes. No access issues.</p>	<p>Electrical and I&amp;C upgraded in 2014. Backup power provided by Tiburon 2.</p>

Tiburon 1 Lift Station						
Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	01-01a	Flygt	1340016	3085.19	1/1/2017	4/17/2017

**Table D-2. Tiburon 2 lift station visual condition assessment summary**

Tiburon 2 Lift Station	
	
<p>Lift station in fair condition. No access issues.</p>	<p>Wet well concrete and hatch in fair condition.</p>

Tiburon 2 Lift Station



Check valves have not been upgraded.



Electrical and I&C upgraded recently.



Generator upgraded recently and provides backup power to Tiburon 1 and 2.

Tiburon 2 Lift Station

Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	01-02a	Flygt	1910118	3085.070	6/30/2019	11/7/2019
2	01-02d	Flygt	Unk	Unk	Unk	Unk

**Table D-3. Tiburon 3 lift station visual condition assessment summary**

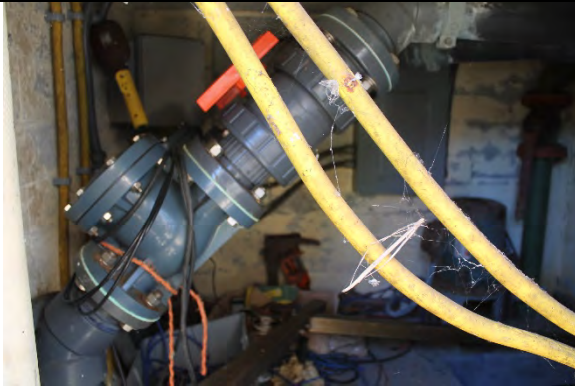
Tiburon 3 Lift Station	
 <p>Lift station in fair condition. Wet well is in adjacent private property driveway. Some access issues.</p>	 <p>Lift station in fair condition. Wet well is in adjacent private property driveway. Some access issues.</p>
 <p>Generator had several radiator failures and provides backup power to Tiburon 3 and 4.</p>	 <p>Electrical and I&amp;C upgraded in 2015.</p>

Tiburon 3 Lift Station						
Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	01-03a	Flygt	0620110	3102.090	Unk	Unk
2	01-03d	Flygt	0050031	3102.090	Unk	Unk

**Table D-4. Tiburon 4 lift station visual condition assessment summary**

Tiburon 4 Lift Station	
 <p>Lift station access from street. There is no dedicated or adjacent street parking.</p>	 <p>Lift station accessed through private property narrow stairs. Stairs are cracked and with uneven rises and runs.</p>
 <p>Lift station difficult to access through narrow stairs, susceptible to high tides, and overflows into the bay.</p>	 <p>Existing lift station (1) adjacent to older abandon lift station (2). Exterior concrete exhibiting spalling, exposed rebar, and rebar jacking.</p>
 <p>Wet well concrete with exposed aggregate, spalling, and H<sub>2</sub>S corrosion and in poor condition.</p>	 <p>Wet well aluminum hatch cover moderately to heavily corroded and in poor condition.</p>

Tiburon 4 Lift Station



Newer effluent check and isolation valves and in very good condition.



Electrical and I&C upgraded in 2015. Backup power provided by Tiburon 3 generator.



Old lift station wet well.









Old lift station.

Tiburon 4 Lift Station


Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	01-04a	Flygt	Unk	Unk	Unk	Unk
2	01-04d	Flygt	Unk	Unk	Unk	Unk

**Table D-5. Tiburon 5 lift station visual condition assessment summary**

Tiburon 5 Lift Station	
	
<p>Lift station in very good condition. No access issues. Completely upgraded in 2019.</p>	<p>Lift station in very good condition. No access issues.</p>
	
<p>Access hatches and fall protection safety grates in very good condition. Submersible pumps in wet well.</p>	<p>Effluent check and isolation valves and manifold in very good condition.</p>
	
<p>MCC located in electrical building and in very good condition.</p>	<p>Generator in very good condition.</p>

Tiburon 5 Lift Station						
Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	01-05a	Flygt	Unk	Unk	11/2014	11/2014
2	01-05b	Flygt	Unk	Unk	11/2014	11/2014

**Table D-6. Tiburon 6 lift station visual condition assessment summary**

Tiburon 6 Lift Station	
 <p>Lift station in good to fair condition.</p>	 <p>Wet well access hatch in fair condition.</p>
 <p>Wet well concrete in poor condition with exposed aggregate and H<sub>2</sub>S attack.</p>	 <p>Electrical and I&amp;C upgraded in 2018 and is in very good condition.</p>



Tiburon 6 Lift Station



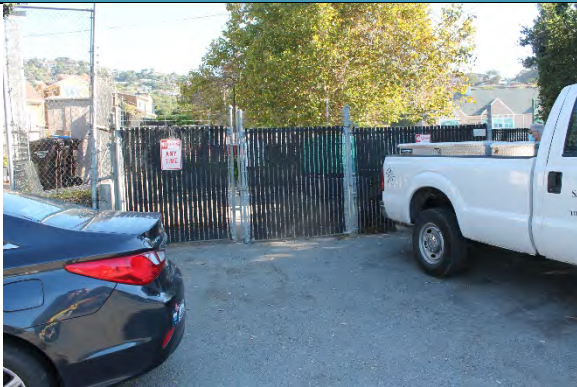
Natural gas backup generator upgraded in 2018 and is in very good condition.

Tiburon 6 Lift Station

Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	01-06a	Flygt	1730011	3102.090	1/1/2017	11/2/2017
2	01-06d	Flygt	1730013	3102.090	1/1/2017	11/2/2017

**Table D-7. Tiburon 7 lift station visual condition assessment summary**

Tiburon 7 Lift Station



Lift station in good to fair condition. No access issues.



Electrical and I&C upgraded in 2017 and in very good condition.

Tiburon 7 Lift Station



Wet well hatch in fair condition.



Wet well concrete in good condition.



Wet well concrete and submersible pump rails in good condition. Heavy FOG exhibited during inspection.



Recently upgraded natural gas backup generator.

Tiburon 7 Lift Station





Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	01-07a	Flygt	1730010	3102.090	1/1/2017	1/1/2017
2	01-07d	Flygt	1830024	3102.090	6/30/2019	3/29/2020

**Table D-8. Tiburon 8 lift station visual condition assessment summary**

Tiburon 8 Lift Station	
	
Lift station in fair condition. No access issues.	Wet well hatch in fair condition.
	
Wet well concrete in fair condition.	Electrical and I&C upgraded in 2018. Backup power provided by portable generator.
	
Valve vault concrete and hatches are in fair condition.	Check and isolation valve fair to poor condition.

Tiburon 8 Lift Station						
Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	01-08a	Flygt	1930013	3085.090	6/30/2019	8/22/2019
2	01-08d	Flygt	1820038	3085.092	6/30/2019	8/22/2019

**Table D-9. Tiburon 9 lift station visual condition assessment summary**

Tiburon 9 Lift Station	
 <p>Lift station in fair to poor condition. There are no access issues.</p>	 <p>Wet well hatch in fair condition.</p>
 <p>Wet well concrete with exposed aggregate and H<sub>2</sub>S corrosion and in poor condition.</p>	 <p>Wet well upper concrete cylinder sections leaning toward shoreline. Offset cylinders show evidence of sealing. Submersible pumps are difficult to remove because of leaning.</p>

Tiburon 9 Lift Station



Valve vault concrete and hatch in fair condition. Standing water was pumped out with manually operated sump pump. The check valves were recently replaced because of failure.



Electrical and I&C upgraded in 2015. Backup power provided by portable generator.

Tiburon 9 Lift Station

Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	01-09a	Flygt	Unk	Unk	Unk	Unk
2	01-09d	Flygt	1830023	3102.090	6/30/2019	11/19/2019

Table D-10. Belvedere 1 lift station visual condition assessment summary

Belvedere 1 Lift Station



Lift station in fair to poor condition. All Belvedere lift stations pump to Belvedere 1. No access issues.



Lift station building in fair to poor condition.

Belvedere 1 Lift Station



Wet well access hatches in fair condition. New parallel force main was being installed during inspection. High groundwater exhibited in the new parallel force main trench. There are no current plans to upgrade the lift station.



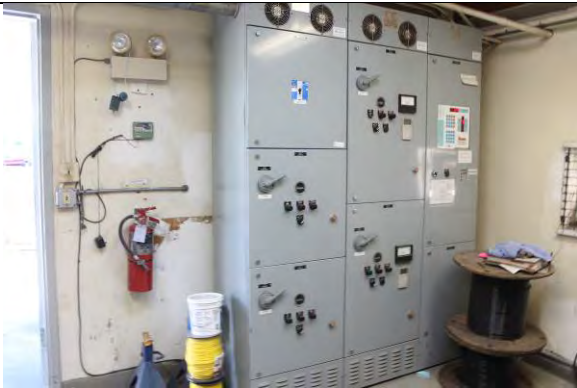
Wet well lined with membrane sealant. It was reported that the membrane is delaminating near the floor. Heavy FOG exhibited during inspection.



Valve vault concrete and hatches in fair condition.



Check and insulation valves reported to be in fair to poor condition.



Belvedere 1 Lift Station

Older electrical and I&C beyond their useful life.



Older backup generator beyond its useful life.

Older electrical and I&C.



Odor issues reported. Odor control injection system currently disconnected.



Lift station building roof in poor to very poor condition.









Lift station building roof in poor to very poor condition.

Belvedere 1 Lift Station

Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	00-01a	Flygt	9720025	3140.090	1/1/2008	1/1/2008
2	00-01d	Flygt	9720026	3140.090	1/1/2008	1/1/2008
3	00-01g	Flygt	0980106	3127.090	3/2/2011	3/16/2011
4	00-01k	Flygt	1340016	3127.095	1/1/2015	1/1/2015

**Table D-11. Belvedere 2 lift station visual condition assessment summary**

Belvedere 2 Lift Station	
	
Lift station in fair condition. No access issues.	Access hatches to wet well and in fair condition.
	
Wet well in fair condition and appeared to be coated with coal tar.	Wet well at access hatch experiencing exposed aggregate and H <sub>2</sub> S corrosion.
	
Wet well at access hatch experiencing exposed aggregate and H <sub>2</sub> S corrosion.	Electrical, I&C, and automatic transfer switch are being upgraded during the time of the inspection.



Belvedere 2 Lift Station



New electrical and I&C being installed during time of the inspection.



New backup generator being installed during time of the inspection.

Belvedere 2 Lift Station

Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	00-02a	Flygt	9750072	3085.092	1/1/2010	1/1/2010
2	00-02d	Flygt	9750071	3085.092	1/1/2010	1/1/2010

Table D-12. Belvedere 3 lift station visual condition assessment summary

Belvedere 3 Lift Station



Lift station in good to poor condition. Odor issues reported. Previously had Bioxide odor control injection but was removed during the new backup generator installation. Instead currently using manhole odor control inserts for odor control. However, the Bioxide system is preferred.



Access hatches to wet well and valve vault.

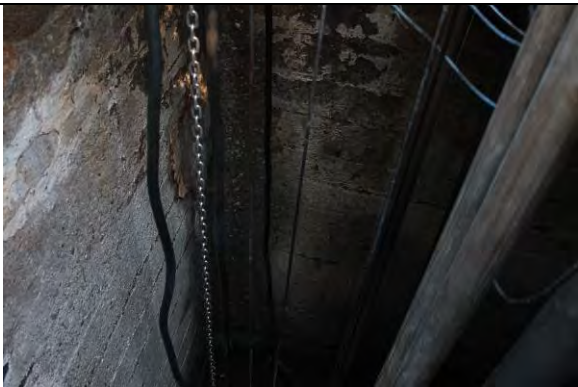
Belvedere 3 Lift Station



Wet well access hatches in fair condition exhibiting corrosion.



Wet well concrete in poor condition and exhibiting exposed aggregate and H<sub>2</sub>S corrosion.



Wet well concrete in fair to poor condition and exhibiting concrete softness and H<sub>2</sub>S corrosion.



Valve vault concrete and hatches in fair condition. Isolation and check valves are in fair to poor condition.



Electrical and I&C upgraded in 2017 and in very good condition.



Electrical and I&C upgraded in 2017 and in very good condition.

Belvedere 3 Lift Station



Natural gas backup generator upgraded in 2017 and in very good condition.

Belvedere 3 Lift Station

Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	00-03a	Flygt	Unk	Unk	Unk	Unk
2	00-03d	Flygt	1530016	3102.090	1/1/2017	10/26/2017
3	00-03g	Flygt	Unk	Unk	Unk	Unk

Table D-13. Belvedere 5 lift station visual condition assessment summary

Belvedere 5 Lift Station



Lift station in fair to poor condition. No access issues.



Wet well and valve vault hatches.

Belvedere 5 Lift Station



Wet well hatch in poor condition.



Wet well concrete in poor condition and exhibiting exposed aggregate and H<sub>2</sub>S corrosion. Previously painted.



Wet well concrete in poor condition and exhibiting exposed aggregate and H<sub>2</sub>S corrosion. Previously painted.



Valve vault in fair condition.







Isolation and check valves in fair and poor condition, respectively. Check valves were stuck.



Electrical and I&C recently upgraded. Backup power provided by portable generator.

Belvedere 5 Lift Station						
Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	00-05a	Flygt	Unk	Unk	Unk	Unk
2	00-05d	Flygt	Unk	Unk	Unk	Unk

**Table D-14. Belvedere 7 lift station visual condition assessment summary**

Belvedere 7 Lift Station	
 <p>Lift station in poor condition. Odor and pipeline settling issues reported. Electrical and I&amp;C recently upgraded.</p>	 <p>Wet well access hatch in very poor condition.</p>
 <p>Wet well access hatch in very poor condition. Excessive corrosion might be caused by brackish water.</p>	 <p>Wet well concrete in poor condition and exhibiting exposed aggregate and H<sub>2</sub>S corrosion.</p>

Belvedere 7 Lift Station



Wet well concrete in poor condition and exhibiting exposed aggregate, softness, and H<sub>2</sub>S corrosion.



Isolation and check valves in fair and poor condition, respectively. Check valve issues reported.

Belvedere 7 Lift Station

Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	00-07a	Flygt	Unk	Unk	Unk	Unk
2	00-07b	Flygt	Unk	Unk	Unk	Unk

Table D-15. Belvedere 8 lift station visual condition assessment summary

Belvedere 8 Lift Station



Lift station in fair condition. No access issues.



Valve vault (foreground) and wet well (background) access hatches.

Belvedere 8 Lift Station



Painted wet well steel access hatch is in good condition and exhibiting light surface corrosion.



Wet well concrete in fair condition.



Valve vault steel access hatch is in fair condition and exhibiting moderate surface corrosion.



Valve vault concrete in fair condition. Isolation and check valves in fair to poor condition, respectively.



Lift station in fair condition. No access issues.



Older I&C scheduled to be upgraded.

Belvedere 8 Lift Station



PG&E meter and circuit breaker panel.



Pigtail for portable backup generator.

Belvedere 8 Lift Station

Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	00-08a	Flygt	Unk	Unk	Unk	Unk
2	00-08d	Flygt	1730084	3085.092	1/1/2017	10/26/2017

Table D-16. Belvedere 9 lift station visual condition assessment summary

Belvedere 9 Lift Station



Lift station in fair condition. No access issues.



Wet well concrete top cracked and in poor condition.



Belvedere 9 Lift Station



Wet well access hatch in fair condition and concrete top cracked and in poor condition.



Wet well concrete in fair condition.



Wet well grout cracking and in fair condition.



Valve vault concrete and access hatches in fair condition.







Standing water in valve vault causing piping surface corrosion. Isolation and check valves are in fair and poor condition, respectively.



Electrical and I&C recently upgraded. Backup power provided by portable generator.

Belvedere 9 Lift Station						
Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	00-09a	Flygt	Unk	Unk	Unk	Unk
2	00-09d	Flygt	Unk	Unk	Unk	Unk

**Table D-17. Belvedere 10 lift station visual condition assessment summary**

Belvedere 10 Lift Station	
 <p>Lift station in fair condition. No access issues.</p>	 <p>Wet well concrete top cracked and in poor condition. Access hatch in fair condition.</p>
 <p>Wet well concrete in fair condition.</p>	 <p>Wet well grout cracking and in fair condition.</p>

Belvedere 10 Lift Station



Valve vault concrete and access hatches in fair condition.



Isolation and check valves are in fair and poor condition, respectively.



Electrical and I&C recently upgraded.

Belvedere 10 Lift Station

Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	00-10a	Flygt	1930014	3085.092	6/306/2019	8/22/2019
2	00-10d	Flygt	1830065	3085.092	1/1/2019	5/24/2019

**Table D-18. Belvedere 11 lift station visual condition assessment summary**

Belvedere 11 Lift Station	
	
Lift station in fair condition. No access issues.	Wet well access hatch in fair condition.
	
Wet well concrete top cracked and in poor condition.	Wet well concrete in fair condition.
	
Wet well concrete in fair condition.	Valve vault concrete and access hatches are in fair condition.

Belvedere 11 Lift Station



Isolation and check valves are in fair and poor condition, respectively.



Electrical and I&C recently upgraded. Backup power provided by portable generator.

Belvedere 11 Lift Station

Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	00-11a	Flygt	1730087	3085.092	1/1/2017	11/8/2017
2	00-11d	Flygt	1730085	3085.092	1/1/2017	11/26/2017

Table D-19. Belvedere 12 lift station visual condition assessment summary

Belvedere 12 Lift Station



Lift station in fair condition. No access issues.



Painted wet well steel access hatch is in fair condition and exhibiting moderate surface corrosion.

Belvedere 12 Lift Station



Painted wet well steel access hatch is in fair condition and exhibiting moderate surface corrosion.



Wet well concrete in fair condition.



Wet well grout exhibiting cracking.



Electrical and I&C recently upgraded. Backup power provided by portable generator.

Belvedere 12 Lift Station

Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	00-12a	Flygt	1830064	3085.092	6/30/2018	9/6/2018
2	00-12d	Flygt	1830066	3085.092	6/30/2017	9/6/2018

**Table D-20. Belvedere 13 lift station visual condition assessment summary**

Belvedere 13 Lift Station	
 <p>Lift station in good condition. No access issues. Electrical and I&amp;C recently upgraded. Backup power provided by portable generator.</p>	 <p>Painted wet well steel access hatch is in good condition and exhibiting light surface corrosion.</p>
 <p>Wet well grout cracking and is in fair condition.</p>	 <p>Wet well concrete in fair condition.</p>
 <p>Wet well concrete in fair condition.</p>	 <p>Fall protection safety grate in very good condition.</p>

Belvedere 13 Lift Station



Isolation and check valves are in fair and poor condition, respectively.

Belvedere 13 Lift Station

Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	00-13a	Flygt	Unk	Unk	Unk	Unk
2	00-13d	Flygt	Unk	Unk	Unk	Unk

**Table D-21. Belvedere 14 lift station visual condition assessment summary**

Belvedere 14 Lift Station



Lift station in good condition. No access issues. Electrical and I&C upgraded in 2018. Backup power provided by portable generator.



Valve and wet well vaults are in foreground and background, respectively.



Belvedere 14 Lift Station



Painted wet well steel access hatch is in good condition and exhibiting light surface corrosion.



Wet well grout cracking and is in fair condition.



Wet well concrete is in fair condition.



Wet well concrete is in fair condition. Access ladder is in very poor condition, extremely corroded, and should not be used.

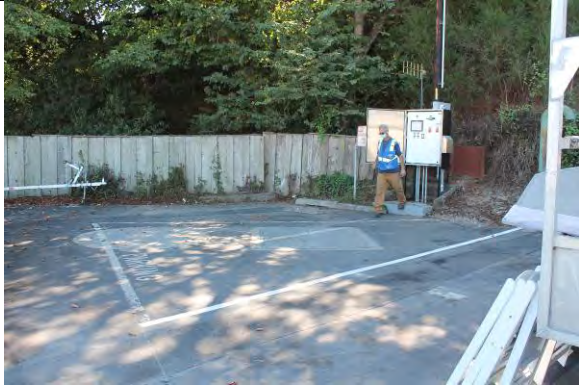






Wet well concrete is in fair condition.



Fall protection safety grate in very good condition. Isolation and check valves are in good condition.

**Table D-22. Belvedere 15 lift station visual condition assessment summary**



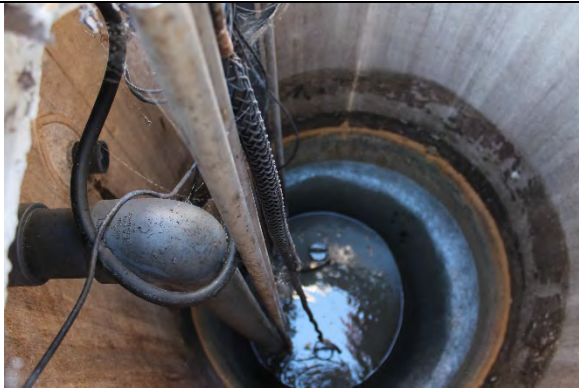

Belvedere 15 Lift Station	
	
Lift station in good to fair condition. No access issues.	Wet well access hatch is in good condition.
	
Wet well concrete is in fair condition.	Wet well concrete is in fair condition.
	
Valve vault concrete and access hatches are in fair and good condition, respectively. The isolation and check valves are in fair condition.	Electrical and I&C recently upgraded and in very good condition. Backup power provided by portable generator.

**Table D-23. Seafirth 1 lift station visual condition assessment summary**

Seafirth 1 Lift Station	
	
Lift station is in good condition. No access issues.	Lift station is in good condition.
	
Wet well access hatch, fall protection safety grate, and concrete are in good condition. Odor issues reported.	Natural gas backup generator (background) upgraded in 2009.
	
Electrical and I&C upgraded in 2009 and is in good condition.	Electrical and I&C upgraded in 2009 and is in good condition.

Seafirth 1 Lift Station						
Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	02-01a	Flygt	Unk	Unk	2009	2009
2	02-01d	Flygt	Unk	Unk	2009	2009

**Table D-24. Seafirth 2 lift station visual condition assessment summary**

Seafirth 2 Lift Station	
 <p>Lift station in good condition. No access issues.</p>	 <p>Wet well access hatch and fall protection safety grate are in good condition. Odor issues reported.</p>
 <p>Wet well concrete in good condition.</p>	 <p>Wet well concrete in good condition.</p>

Seafirth 2 Lift Station



Electrical and I&C upgraded in 2009 and is in good condition.



Electrical and I&C upgraded in 2009 and is in good condition.

Seafirth 2 Lift Station

Pump no.	Equip no.	Manufacturer	Serial no.	Model no.	Purchased date	Installed date
1	02-02a	Flygt	Unk	Unk	2009	2009
2	02-02d	Flygt	Unk	Unk	2009	2009



## **Appendix F**

### **Pipeline Condition Assessment Technologies**

# Pressure Pipe and Force Mains

METHOD	CORROSION SURVEY	ACOUSTIC	REMOTE FIELD ELECTROMAGNETIC	ULTRASONIC	MAGNETIC FLUX LEAKAGE	BROADBAND ELECTROMAGNETIC	OTHER	TYPICAL RECOMMENDED APPROACH
<b>DESCRIPTION</b>	Various electromagnetic, electrical, and laboratory methods characterize the corrosivity of soils, measure corrosion activity, and assess corrosion protection and cathodic protection.	Acoustic velocity: pipe wall stiffness is calculated from the speed of sound transmission.  Acoustic monitoring: alerts and pinpoints the location of wire breaks.  Leak detection.  (Access requirements vary widely according to type of pipe and technology provider.)	Changes in electromagnetic signals indicate broken wires, corrosion pits, and changes in wall thickness.  Tool must be proportionally sized for the pipe. Works through coatings, linings, and scale.  (Access requirements vary widely according to type of pipe and technology provider.)	Reflection of sound waves is used to measure the thickness of various types of materials. Tool must have direct contact with material being measured.	Changes in magnetic fields are used to detect corrosion pits and other defects. Tool must be at a constant, close distance from pipe wall.	Changes in electromagnetic signals indicate corrosion pits and changes in thickness. Scanner works through coatings, linings, and scale when held near pipe.	Sampling of pipes for various physical tests.  Manned entry for visual and sounding (delamination testing).  Petrographic (microscopic) examinations of concretes and mortars.	<b>GENERAL APPROACH</b> (all pipe types): 1) Records review (leak/break repairs, drawings, specs, reports, soil info) 2) Statistical analysis of available data 3) Risk prioritization (likelihood and consequence of failure) 4) Site reconnaissance (accessibility, traffic conditions, other utilities) 5) Inspection planning (shut downs, bypass, permits, alternatives) 6) Leak detection and/or field condition assessment inspection
<b>Asbestos Cement (AWWA C402)</b>	Assess potential for concrete deterioration (pH and sulfates).	Acoustic velocity has been used with moderate success.	n/a	n/a	n/a	n/a	Testing of samples: • Phenolphthalein stain • SEM/EDS • Petrography	1) Tests of opportunity samples from repairs and service taps 2) GIS mapping of soil data, breaks, and condition assessment data 3) Targeted condition assessment of high-consequence pipes
<b>Prestressed Concrete Cylinder Pressure Pipe (AWWA C301 and C304)</b>	Assess potential for metal and concrete deterioration.  Monitor corrosion activity.	Acoustic monitoring for detection of wire breaks.	Used to detect broken wires.	n/a	n/a	n/a	Internal sounding to detect delamination.  Internal visual (manned entry or CCTV).	1) Risk analysis based on pipe type, manufacturer, wire type, year of manufacturer, and corrosivity 2) Manned entry for visual and sounding inspection 3) Electromagnetic scanning
<b>Non-Prestressed Concrete Pressure Pipe (AWWA C300, C302, and C303)</b>	Assess potential for metal and concrete deterioration.  Monitor corrosion activity.	Has been tried with limited success with AWWA C303.	Has been used to detect broken bars.	n/a	n/a	n/a	External direct assessment.  Petrographic analysis of mortar/concrete.	1) Alignment corrosivity survey 2) External direct assessment where corrosion risk is highest 3) Manned entry for visual inspection
<b>Ductile Iron Cast Iron (AWWA C150 &amp; C153)</b>	Assess corrosivity to iron.  Monitor corrosion activity.	Acoustic velocity may be able to detect gross deterioration.	Used for detailed internal scan of pipes. Works with cement mortar and tuberculation.	Used for external spot assessments.	Internal scanning of non-CML lined pipes. External spot assessments.	External spot assessments. Emerging method for internal scanning.	Petrographic analysis of mortar.	1) Alignment corrosivity survey 2) Remote field electromagnetic
<b>Steel (AWWA C200)</b>	Assess potential for metal and concrete deterioration.  Monitor corrosion activity.	Acoustic velocity may be able to detect gross deterioration.	Used for detailed internal scan of pipes. Works with cement mortar and tuberculation.	Used for external spot assessments.	Internal and external scanning of both CML and non-CML pipes.	External spot assessments. Emerging method for internal scanning.	Forensic analysis (polyethylene bag).	1) Pipe-to-soil potential; cathodic protection assessment 2) Alignment corrosivity survey 3) Remote field electromagnetic or magnetic flux leakage
<b>Copper</b>	Assess potential for metal deterioration.	n/a	n/a	n/a	n/a	n/a	Forensic examinations of failed pipes.  Electrochemical noise monitoring.	1) Evaluate construction methods and standards 2) Evaluate soil corrosivity 3) Forensic exams of failures
<b>Plastic Pipes (HDPE - AWWA C906) (PVC - AWWA C900)</b>	n/a	n/a	n/a	n/a	n/a	n/a	Forensic examinations of failed pipes, using laboratory and mechanical tests.	1) Forensic examination, if early or frequent failures have occurred

**LEAK DETECTION METHODS** apply to all pipes. Leak noise correlation is most effective on small diameter, metallic pipes. Internal leak detection tools apply on large diameter pipes with few appurtenances. Leak detection methods can also detect gas/air pockets.

**VISUAL INSPECTION METHODS** apply to all pipes. Where manned entry is impractical, CCTV may be used.

**DECISION/ACTION ITEM LOG**  
**CIP Committee: March 9, 2021**  
 Sanitary District No. 5 of Marin County  
**ACTIVE ITEMS SHEET**

Item #7

No.	Item	Submission Date	Responsible Party	DECISION ONLY		ACTION REQUIRED		Comment/Reference Document
				Due	Completed	Due	Completed	
29	Cove Rd. Force Main Replacement Project	3.12.19	Nute/TR/CIP					Nute Preparing Bid Docs, as of 3.12.19; Waiting for CalTrans response re horizontal drilling, as of 5.14.19; Still working w/ CalTrans, waiting for approval, as of 11.12.19; Design Review from Nute, 12.10.19, 1.14.19, 2.11.20; Received Caltrans Permit, 3.9.2020; Notice for Sealed Bid @ Marin IJ on 4.28.2020 w/ Bids due 5.19.2020; Posted RFP at SD5 Wesbite, ( <a href="http://www.sani5.org/about/contracts-proposals-bidding">http://www.sani5.org/about/contracts-proposals-bidding</a> ), 5.5.2020; Project granted to Maggiora & Ghilotti, Inc.; Work to begin on 7.27.2020; Job well underway and progressing smoothly, as of 10.13.2020; <del>Job is 70% complete, as of 11.10.2020;</del> <del>Job is 95% complete, as of 2.9.2021;</del> <b>Job is 98%</b>
31	FY2020-2021 Sewer Rehab Project		CIP/TR					Small project for Paradise Cove; Enginnering to begin in <del>Dec 2020, as of 7.14.2020; Jan 2021, as of 12.8.2020;</del> <b>March, 2021</b>
32	SD5 Collection Sytsem Master Plan		CIP/TR					Posted RFP at SD5 Wesbite, ( <a href="http://www.sani5.org/about/contracts-proposals-bidding">http://www.sani5.org/about/contracts-proposals-bidding</a> ), 5.5.2020; Revised RFP from HDR, as of 7.14.2020; <del>Underway, as of 11.10.2020;</del> <del>CIP asking final questions, tweaking reports, etc., as of 2.9.2021;</del> <b>Presenting Final Draft @ 3.9.2021 Regular Board Mtg</b>