



CITY COUNCIL AGENDA PACKET

CITY COUNCIL CHAMBERS, CITY HALL
7351 ROSANNA STREET, GILROY, CA
95020

REGULAR MEETING | 6:00 PM
MONDAY, APRIL 3, 2023

MAYOR
Marie Blankley

COUNCIL MEMBERS
Rebeca Armendariz
Dion Bracco
Tom Cline
Zach Hilton
Carol Marques
Fred Tovar

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AGENDA CLOSING TIME IS 5:00 P.M. THE TUESDAY PRIOR TO THE MEETING

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COMMENTS BY THE PUBLIC WILL BE TAKEN ON AGENDA ITEMS BEFORE ACTION IS TAKEN BY THE CITY COUNCIL. Public testimony is subject to reasonable regulations, including but not limited to time restrictions for each individual speaker. [Please limit your comments to 3 minutes.](#) The amount of time allowed per speaker may vary at the Mayor's discretion depending on the number of speakers and length of the agenda.

Written comments on any agenda item may be emailed to the City Clerk's Office at cityclerk@cityofgilroy.org or mailed to the Gilroy City Clerk's Office at City Hall, 7351 Rosanna Street, Gilroy, CA 95020. Comments received by the City Clerk's Office by 1 p.m. on the day of a Council meeting will be distributed to the City Council prior to or at the meeting and available for public inspection with the agenda packet located in the lobby of Administration at City Hall, 7351 Rosanna Street prior to the meeting. Any correspondence received will be incorporated into the meeting record. Items received after the 1 p.m. deadline will be provided to the City Council as soon as practicable. Written comments are also available on the City's Public Records Portal at bit.ly/3NuS1IN.



In compliance with the Americans with Disabilities Act, the City will make reasonable arrangements to ensure accessibility to this meeting. If you need special assistance to participate in this meeting, please contact the City Clerk's Office at least 72 hours prior to the meeting at (408) 846-0204 or cityclerk@cityofgilroy.org to help ensure that reasonable arrangements can be made.



If you challenge any planning or land use decision made at this meeting in court, you may be limited to raising only those issues you or someone else raised at the public hearing held at this meeting, or in written correspondence delivered to the City Council at, or prior to, the public hearing. Please take notice that the time within which to seek judicial review of any final administrative determination reached at this meeting is governed by Section 1094.6 of the California Code of Civil Procedure.

A Closed Session may be called during this meeting pursuant to Government Code Section 54956.9 (d)(2) if a point has been reached where, in the opinion of the legislative body of the City on the advice of its legal counsel, based on existing facts and circumstances, there is a significant exposure to litigation against the City.

Materials related to an item on this agenda submitted to the City Council after distribution of the agenda packet are available with the agenda packet on the City website at www.cityofgilroy.org subject to the Staff's ability to post the documents before the meeting.

KNOW YOUR RIGHTS UNDER THE GILROY OPEN GOVERNMENT ORDINANCE

Government's duty is to serve the public, reaching its decisions in full view of the public. Commissions, task forces, councils and other agencies of the City exist to conduct the people's business. This ordinance assures that deliberations are conducted before the people and that City operations are open to the people's review.

FOR MORE INFORMATION ON YOUR RIGHTS UNDER THE OPEN GOVERNMENT ORDINANCE, TO RECEIVE A FREE COPY OF THE ORDINANCE OR TO REPORT A VIOLATION OF THE ORDINANCE, CONTACT THE OPEN GOVERNMENT COMMISSION STAFF AT (408) 846-0204.

If you need assistance with translation and would like to speak during public comment, please contact the City Clerk a minimum of 72 hours prior to the meeting at 408-846-0204 or e-mail the City Clerk's Office at cityclerk@cityofgilroy.org.

Si necesita un intérprete durante la junta y gustaría dar un comentario público, comuníquese con el Secretario de la Ciudad un mínimo de 72 horas antes de la junta al 408-846-0204 o envíe un correo electrónico a la Oficina del Secretario de la Ciudad a cityclerk@cityofgilroy.org.



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The agenda for this regular meeting is as follows:

1. **OPENING**
 - 1.1. **Call to Order**
 - 1.2. **Pledge of Allegiance**
 - 1.3. **Invocation**
 - 1.4. **City Clerk's Report on Posting the Agenda**
 - 1.5. **Roll Call**
 - 1.6. **Orders of the Day**

1.7. **Employee Introductions**

2. **CEREMONIAL ITEMS - Proclamations and Awards**

3. **PRESENTATIONS TO THE COUNCIL**

3.1. **Annual Presentation from Visit Gilroy/California Welcome Center**

3.2. **PUBLIC COMMENT BY MEMBERS OF THE PUBLIC ON ITEMS NOT ON THE AGENDA BUT WITHIN THE SUBJECT MATTER JURISDICTION OF THE CITY COUNCIL**

This portion of the meeting is reserved for persons desiring to address the Council on matters within the Gilroy City Council's jurisdiction but not on the agenda. Persons wishing to address the Council are requested to complete a Speaker's Card located at the entrances and handed to the City Clerk. Speakers are limited to 1 to 3 minutes each, varying at the Mayor's discretion depending on the number of speakers and length of the agenda. The law does not permit Council action or extended discussion of any item not on the agenda except under special circumstances. If Council action is requested, the Council may place the matter on a future agenda.

Written comments to address the Council on matters not on this agenda may be e-mailed to the City Clerk's Office at cityclerk@cityofgilroy.org or mailed to the Gilroy City Clerk's Office at City Hall, 7351 Rosanna Street, Gilroy, CA 95020. Comments received by the City Clerk's Office by 1:00pm on the day of a Council meeting will be distributed to the City Council prior to or at the meeting and available for public inspection with the agenda packet located in the lobby of Administration at City Hall, 7351 Rosanna Street, prior to the meeting. Any correspondence received will be incorporated into the meeting record. Items received after the 1:00pm deadline will be provided to the City Council as soon as practicable. Written material provided by public members under this section of the agenda will be limited to 10 pages in hard copy. An unlimited amount of material may be provided electronically.

4. **REPORTS OF COUNCIL MEMBERS**

Council Member Bracco – Cities Association Santa Clara County Board of Directors (*alternate*), Santa Clara County Library Joint Powers Authority, Santa Clara Valley Water Commission, Santa Clara Valley Water Joint Water Resources Commission, SCRWA

Council Member Armendariz – Santa Clara County Library Joint Powers Authority, Santa Clara Valley Habitat Agency Governing Board, Santa Clara Valley Habitat Agency Implementation Board, Silicon Valley Clean Energy Authority JPA Board (*alternate*), South County United for Health

Council Member Marques – ABAG, Gilroy Gardens Board of Directors, Santa Clara Valley Habitat Agency Governing Board, Santa Clara Valley Habitat Agency Implementation Board, SCRWA (*alternate*)

Council Member Hilton – CalTrain Policy Group (*alternate*), Silicon Valley Clean Energy Authority JPA Board, South County United for Health (*alternate*), VTA Policy Advisory Committee

Council Member Cline – Gilroy Economic Development Partnership (*alternate*), Gilroy Sister Cities Association, Gilroy Youth Task Force, Silicon Valley Regional Interoperability

Authority Board, VTA Policy Advisory Committee (*alternate*), Visit Gilroy California Welcome Center Board

Council Member Tovar – Gilroy Youth Task Force (*alternate*), Santa Clara County Expressway Plan 2040 Advisory Board, Santa Clara Valley Water Commission, SCRWA, South County Youth Task Force Policy Team, VTA Mobility Partnership

Mayor Blankley – ABAG (*alternate*), CalTrain Policy Group, Cities Association Santa Clara County Board of Directors, Gilroy Economic Development Partnership, Gilroy Sister Cities Association (*alternate*), Gilroy Youth Task Force, Santa Clara Valley Water Joint Water Resources Commission, SCRWA, South County Youth Task Force Policy Team, VTA Board of Directors, VTA Mobility Partnership

5. COUNCIL CORRESPONDENCE

- 5.1. Letter of Support – California High Speed Rail Authority Application for Federal-State Partnership for Intercity Passenger Rail Program Grant**

6. FUTURE COUNCIL INITIATED AGENDA ITEMS

7. CONSENT CALENDAR

All matters listed under the Consent Calendar are considered by the City Council to be routine and will be enacted by one motion. There will be no separate discussion of these items unless a request is made by a member of the City Council or a member of the public. Any person desiring to speak on any item on the consent calendar should ask to have that item removed from the consent calendar prior to the time the Council votes to approve. If removed, the item will be discussed in the order in which it appears.

- 7.1. Approval of the Action Minutes of the March 20, 2023 City Council Regular Meeting**
- 7.2. Resolution of The City Council of The City of Gilroy Proclaiming April 2023 as Arts, Culture, and Creativity Month**
- 7.3. Approval of the Updated Purchasing Policy Inclusive of Wage Theft Policy Statement**
- 7.4. Approval of the Gilroy Tourism Business Improvement District (GTBID) Annual Report as Submitted by Visit Gilroy/California Welcome Center Gilroy for the Period of January 1, 2022 Through December 31, 2022**

8. BIDS AND PROPOSALS (NONE)

9. PUBLIC HEARINGS

9.1. Adopt the 2022 Sewer System Master Plan

1. Staff Report: Daryl Jordan, Public Works Director
2. Open Public Hearing
3. Close Public Hearing
4. Possible Action:

Approve a resolution to adopt the 2022 Sewer System Master Plan.

9.2. Adopt the 2022 Water Master Plan

1. Staff Report: Daryl Jordan, Public Works Director
2. Open Public Hearing
3. Close Public Hearing
4. Possible Action:

Adopt a resolution approving the 2022 Water System Master Plan.

9.3. Adopt the 2022 Storm Drainage System Master Plan

1. Staff Report: Daryl Jordan, Public Works Director
2. Open Public Hearing
3. Close Public Hearing
4. Possible Action:

Approve a resolution to adopt the 2022 Storm Drainage System Master Plan.

10. UNFINISHED BUSINESS

10.1. Appointment to City Boards, Commissions, and Committees with Open Vacancies

1. Staff Report: Thai Nam Pham, City Clerk
2. Public Comment
3. Possible Action:

Appoint members to Boards, Commissions, and Committees with open vacancies.

11. INTRODUCTION OF NEW BUSINESS

11.1. Enhancing the Access to the Internet and Technology for Gilroy's Youth

1. Staff Report: Bryce Atkins, Assistant to the City Administrator
2. Public Comment
3. Possible Action:

Council provide direction.

11.2. Consideration of Creating a Job Protection Policy

1. Staff Report: Bryce Atkins, Assistant to the City Administrator
2. Public Comment
3. Possible Action:

Council provide direction.

11.3. Review and Approve an Extension to the Memorandum of Understanding and Related Salary Schedules for the Gilroy Police Officers Association for the Period Ending June 30, 2025

1. Staff Report: LeeAnn McPhillips, Administrative Services and Human Resources Director / Risk Manager
2. Public Comment
3. Possible Action:
 1. Approve the Extension and Supplemental Agreement to the Memorandum of Understanding with the Gilroy Police Officers Association for the Period Ending June 30, 2025.
 2. Adopt by Resolution the Salary Schedules Associated with the Gilroy Police Officers Association Memorandum of Understanding/Supplemental Agreement for the Period July 1, 2023 - June 30, 2025.

11.4. Updates to Employment Agreement for City Administrator Jimmy Forbis

1. Staff Report: Marie Blankley, Mayor
2. Public Comment
3. Possible Action:

Approve updates to City Administrator's Employment Agreement effective April 3, 2023 and authorize the Mayor to sign the Employment Agreement on behalf of the City/City Council.

11.5. Report on Potential Temporary/Emergency Housing at Gilroy Transit Center

1. Staff Report: Jimmy Forbis, City Administrator
2. Public Comment
3. Possible Action:

Receive report.

12. CITY ADMINISTRATOR'S REPORTS

13. CITY ATTORNEY'S REPORTS

14. ADJOURNMENT

FUTURE MEETING DATES

April 2023

17 Regular Meeting - 6:00 p.m

May 2023

1 Regular Meeting - 6:00 p.m

3 Capital Improvement Plan Workshop - 6:00 p.m – 8:00 p.m.

15 Regular Meeting - 6:00 p.m

22 Recommend Operating Budget Workshop - 6:00 p.m – 8:00 p.m.

June 2023

5 Regular Meeting - 6:00 p.m

19 Regular Meeting - 6:00 p.m

Meetings are webstreamed on the City of Gilroy's website at gilroy.city/meetings.

April 17, 2023

The Honorable Pete Buttigieg, Secretary
U.S. Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590

RE: Support for California High-Speed Rail Authority Applications for Federal-State Partnership for Intercity Passenger Rail Program (FSP-National) Grant Funding for Fiscal Years 2022 and 2023

Dear Secretary Buttigieg:

On behalf of **name of organization, we are/ am** pleased to express support for the application submitted by the California High-Speed Rail Authority (Authority) for funding from the **Federal-State Partnership for Intercity Passenger Rail Grant Program** for projects outside the Northeast Corridor (**FSP-National**).

The Authority's first application for the **California Inaugural High-Speed Service** (Project) is to fund early elements of a two-track, electrified high-speed passenger rail line of up to 171 miles connecting the cities of Merced, Fresno and Bakersfield.

The Authority is requesting about **\$2.8 billion** from the FSP-National Program for fiscal years 2002 and 2023 (to be combined with about **\$706 million** of state Cap-and-Trade funds) for a total Project cost of about **\$3.5 billion**. These federal funds are needed to support areas of critical need in advancing the State's first intercity passenger service operating at high speeds. Project details are below:

- Procure six electric trains for testing and use for passenger service at speeds up to 220 mph;
- Construct the second track on the 119-mile high-speed Central Valley Segment (CVS) currently under construction from Madera to Poplar Avenue;
- Construct the Fresno Station; and
- Complete final design and early works including right-of-way acquisition on the following two extensions *beyond* the current 119-mile CVS:
 - Merced Extension – from Madera to Merced – about 34 miles; and
 - Bakersfield Extension – from Poplar Avenue in Shafter to Bakersfield – about 18 miles

With the above work, the 119-mile Central Valley Segment would be completed, with trains and track and system elements tested and certified. This segment would be ready to demonstrate high-speed passenger operations. This requested funding will improve the health, safety, access, connectivity, and economic vitality of underserved communities in California's Central Valley.

This Project is a key part of the State's rail modernization plan, linking key regional passenger rail systems and completing a vital milestone toward the future Phase 1 High-Speed Rail Corridor from San Francisco to Los Angeles and Anaheim, of which the Project is a critical component. The projected ridership for the California Phase 1 Corridor would make it the most traveled intercity passenger service in the nation.

The Authority's second application for the **California Phase 1 Corridor Configuration Design** (Design Project) is to fund configuration-level design (to 30 percent) for two critical high-speed rail program sections – San José to Merced and Bakersfield to Palmdale. These vital program sections

The Honorable Pete Buttigieg, Secretary
 U.S. Department of Transportation
 April 12, 2023
 Page 2

have completed environmental reviews, and both entail time-consuming and complex tunneling design challenges. They will require extensive geotechnical studies, critical to support the design of the long-lead-time tunnel sections through the Pacheco Pass and the Tehachapi Mountains that will be required to connect the major regions of the State.

The requested federal grant funds of **\$193.6 million** from the FSP-National Program for fiscal years 2022 and 2023 are proposed to be matched by state Cap-and-Trade funds of **\$48.4 million**.

The Authority's FSP-National Program grant applications are part of an on-going federal-state partnership that, to-date, has provided approximately \$25.2 billion in funding for California High-Speed Rail: \$21.7 billion (or 85%) from state funds and \$3.5 billion (or 15%) from federal funds. ***California is the only state in the country to have committed this level of funding and advanced electrified, 220 mph high-speed rail this far.***

This historic state-federal partnership also has resulted in significant job and economic opportunities including:

- Creating 10,000 construction jobs since the start of high-speed rail construction (as of February 2023), with most of these jobs going to Central Valley residents and men and women from disadvantaged communities;
- Employing 761 small, disadvantaged, and disabled veteran businesses through December 2022; and
- Generating up to 80,000 job-years of employment, yielding nearly \$6.0 billion in labor income and \$16.0 billion in total economic output across the State from 2006 through fiscal year 2021-22

These improvements are a part of California's strategic transportation network investment to address climate concerns and to relieve existing highway and rail capacity constraints. They will achieve both state and federal goals to improve safety, expand economic strength and global competitiveness, address equity issues, and implement sustainability practices to confront climate change. These investments will continue to support living wage jobs, provide small business opportunities, and equitably enhance the mobility of communities in need – including disadvantaged agricultural communities – all while reducing greenhouse gas emissions. The scope, scale and momentum of the California High-Speed Rail Program is unmatched in the United States.

Please consider the enormous value that funding California High-Speed Rail will provide. With work well underway throughout the State, **we/I** urge you to award funds to further advance the California High-Speed Rail project by supporting the Authority's continued progress towards completing construction of the Inaugural High-Speed Service between Merced – Fresno – Bakersfield and advancing critical geotechnical studies and configuration-level design needed to complete the California Phase 1 Corridor.

Sincerely,

City of Gilroy
City Council Regular Meeting Minutes
Monday, March 20, 2023 | 6:00 PM

1. OPENING

1.1. Call to Order

The meeting was called to order by Mayor Blankley at 6:00 PM.

1.2. Pledge of Allegiance

Council Member Armendariz led the Pledge of Allegiance.

1.3. Invocation

Trevor Van Laar from Gilroy Presbyterian Church provided the Invocation.

1.4. City Clerk's Report on Posting the Agenda

City Clerk Pham reported on the Posting of the Agenda.

1.5. Roll Call

Attendance	Attendee Name
Present	Rebeca Armendariz, Council Member Dion Bracco, Mayor Pro Tempore Tom Cline, Council Member Zach Hilton, Council Member Carol Marques, Council Member Fred Tovar, Council Member Marie Blankley, Mayor
Absent	None

1.6. Orders of the Day

There were none.

1.7. Employee Introductions

Community Development Director Goei introduced Rens Boorsma, Building Inspector.

2. CEREMONIAL ITEMS - Proclamations and Awards

2.1. Proclamation – Proclaiming April 2023 as Fair Housing Month

Mayor Blankley read aloud the proclamation and presented it to Ana Andrade from Project Sentinel Fair Housing.

3. PRESENTATIONS TO THE COUNCIL

3.1. PUBLIC COMMENT BY MEMBERS OF THE PUBLIC ON ITEMS NOT ON THE AGENDA BUT WITHIN THE SUBJECT MATTER JURISDICTION OF THE CITY COUNCIL

Mayor Blankley opened Public Comment.

The following speakers spoke on items that were not on the agenda.

Alan Espinoza thanked Council for assisting with his issue.

There being no further speakers, Mayor Blankley closed Public Comment.

4. **REPORTS OF COUNCIL MEMBERS**

Council Member Bracco thanked the lineman who worked during the storms.

Council Member Armendariz reported on Santa Clara Valley Habitat Agency Governing Board.

Council Member Marques had nothing to report.

Council Member Hilton reported on Silicon Valley Clean Energy Authority JPA Board.

Council Member Cline had nothing to report.

Council Member Tovar reported on South County Youth Task Force Policy Team.

Mayor Blankley reported on South County Youth Task Force Policy Team. The mayor gave an update on the parking lot ribbon-cutting ceremony has been postponed to March 28, 2023, at 4 PM. She also announced that the State of the City event will be held Saturday, April 1, 2023, and encouraged members of the public to attend.

5. **COUNCIL CORRESPONDENCE**

5.1. **Letter of Support for SB 48 (Behavioral Health) and SB 363 (Mental Health/Substance Abuse Facilities)**

Mayor Blankley asked Council if they would like to sign off on the letter. Her request received majority support.

6. **FUTURE COUNCIL INITIATED AGENDA ITEMS**

There were none.

7. **BOARD AND COMMISSION INTERVIEWS**

7.1. **Interviews for Open Seats on Boards, Commissions, and Committees with Terms Expired or Vacant as of March 20, 2023, for Future Appointment Scheduled for April 3, 2023**

Council accepted applicant Terrence Fugazzi's application which was received after the March 10, 2023 application deadline.

Council interviewed applicants Vincent Saso and Terrence Fugazzi for the Parks and Recreation Commission seats expiring December 31, 2023, and December 31, 2025.

8. **CONSENT CALENDAR**

Mayor Blankley opened Public Comment. There being no speakers, Mayor Blankley closed Public Comment.

Motion: Approve the Consent Calendar

RESULT: Pass

MOVER: Fred Tovar, Council Member

SECONDER: Rebeca Armendariz, Council Member

AYES: Council Member Armendariz, Mayor Pro Tempore Bracco, Council Member Cline, Council Member Hilton, Council Member Marques, Council Member Tovar, Mayor Blankley

8.1. Approval of the Action Minutes of the March 6, 2023 City Council Regular Meeting

A motion was made to approve the minutes.

8.2. Approval of the Action Minutes of the March 13, 2023 City Council Goal / Priority Setting Workshop

A motion was made to approve the minutes.

8.3. Acceptance of the City Fiscal Year 2021-22 Federal Single Audit

A motion was made to accept the Fiscal Year 2021-22 Federal Single Audit report.

8.4. Accept and File Quarterly Cash and Investment Report as of December 31, 2022

A motion was made to accept and file quarterly cash and investment report as of December 31, 2022.

8.5. Approval of Parcel Map and Property Improvement Agreement No. 2023-01 for Plaza Allium (Evergreen) 10th & Chestnut Commercial Development, APN's 841-66-036, 037, 038, 039

A motion was made to approve the Parcel Map and Property Improvement Agreement No. 2023-01 for Plaza Allium (Evergreen) 10th & Chestnut Commercial Development.

8.6. Award of Contract to Kimley-Horn for the Update of the Traffic Circulation Master Plan and Transportation Impact Fee Program in the Amount of \$360,590 with a 10% Contingency for a Total of \$396,649

A motion was made to award the contract and adopt the budget amendment resolution.

Enactment No.: Resolution No. 2023-13.

8.7. Award a Contract to J.J.R. Construction, Inc. for the FY23 Annual Citywide Curb Ramp Project No. 23-PW-280 for a Total Project Expenditure of \$174,565

A motion was made to award the contract.

8.8. Adopt a Resolution of the City Council of the City of Gilroy Approving the City of Gilroy (Applicant) to Apply for Grant Funds Under the Safe, Clean Water and Natural Flood Protection Program

A motion was made to adopt the resolution.

Enactment No.: Resolution No. 2023-14.

9. BIDS AND PROPOSALS

There were none.

10. PUBLIC HEARINGS

10.1. **Appeal of Planning Commission Decision to Deny an Application Proposing Changes to City Code to Allow Up to Two Electronic Billboards in the City of Gilroy [This is a De Novo Hearing at Which the Council Will Decide if the Environmental Review is Adequate, and if so, Whether or not to Introduce the Ordinance.]**

Mayor Blankley asked Council Members if they have any ex-parte communications to disclose.

Council Member Bracco disclosed that he met with Connie Rogers. No new information was gained.

Council Member Armendariz disclosed that she spoke with Mike Conrotto, Connie Rogers, and Pete Carrillo from Outdoor Communications. She learned more information about the lighting distance of the electronic billboards.

Council Member Marques disclosed that she spoke with Mike Conrotto and Connie Rogers. No new information was gained.

Council Member Hilton disclosed that he engaged with various members of the community. No new information was gained.

Council Member Cline disclosed that he spoke with Mike Conrotto, Connie Rogers, and several managers from the car dealerships. No new information was gained.

Council Member Tovar disclosed that he spoke with Mike Conrotto, Connie Rogers, and Pete Carrillo. No new information was gained.

Mayor Blankley disclosed that she spoke with Mike Conrotto, Connie Rogers, and Brian Verdin from Nissan of Gilroy. No new information was gained.

Customer Services Manager McCormick provided staff presentation and responded to Council Member questions.

Mayor Blankley opened the Public Hearing at 6:48 PM.

Appellant Sean Marciniak provided the appellant's presentation to Council and responded to Council Member questions.

The following speakers spoke in favor of adopting the ordinance:

Danny Mitchell
 Ron Kirkish
 Gregory Bumb
 Brian Verdin
 Gary Gordon
 Marucio Leon
 Eduardo Martinez
 Javier Leon
 Fiesta Depot
 Jose Martinez
 Clair P. Braga
 Tom Chavez

The following speakers spoke against the approval of the ordinance:

Terence Fugazzi
 Les Levitt
 Dr. Paul Lynam
 Jason Hemp
 Connie Rogers
 Mar Yates
 Michelle Nelson
 Juan Estrada
 Rani Fischer

There being no further public speakers, Appellants Sean Marciniak and Ron Conrotto provided the appellant's rebuttal to Council.

Mayor Blankley closed the Public Hearing at 7:19 PM.

Motion: Adopt the resolution finding that the Final IS/MND was completed in compliance with the California Environmental Quality Act (CEQA); there is no substantial evidence that the project will have a significant effect on the environment due to mitigations agreed to by the applicant; and the Final IS/MND reflects the City's independent judgment and analysis.

RESULT: Pass

MOVER: Fred Tovar, Council Member

SECONDER: Carol Marques, Council Member

AYES: Mayor Pro Tempore Bracco, Council Member Cline, Council Member Marques, Council Member Tovar, Mayor Blankley

NAYS: Council Member Armendariz, Council Member Hilton

Enactment No.: Resolution No. 2023-15.

Motion: Uphold the appeal and motion to read the ordinance by title only and waive further reading of the ordinance.

RESULT: Fail

MOVER: Dion Bracco, Mayor Pro Tempore

SECONDER: Fred Tovar, Council Member

AYES: Mayor Pro Tempore Bracco, Council Member Marques, Council Member Tovar

NAYS: Council Member Armendariz, Council Member Cline, Council Member Hilton, Mayor Blankley

Motion: Deny the appeal and uphold the Planning Commission's decision.

RESULT: Pass

MOVER: Rebeca Armendariz, Council Member

SECONDER: Zach Hilton, Council Member

AYES: Council Member Armendariz, Council Member Cline, Council Member Hilton, Mayor Blankley

NAYS: Mayor Pro Tempore Bracco, Council Member Marques, Council Member Tovar

11. UNFINISHED BUSINESS

There were none.

12. INTRODUCTION OF NEW BUSINESS

12.1. 2022 General Plan and Housing Element Annual Progress Report

Community Development Director Goei provided staff presentation and responded to Council Member questions.

Mayor Blankley opened Public Comment. There being no speakers, Mayor Blankley closed Public Comment.

Council accepted the report and directed staff to submit the 2022 Annual Progress Report to the California Department of Housing and Community Development and the Governor's Office of Planning and Research.

12.2. Unhoused Camping Ban Near Schools and Critical Infrastructure

Assistant to City Administrator Atkins provided staff presentation and responded to Council Member questions.

Mayor Blankley opened Public Comment. There being no further speakers, Mayor Blankley closed Public Comment.

Council directed staff to continue further analysis on draft key policy points 1 through 7 as laid out in the staff report, along with adding creeks in its analysis. Council further directed staff to return with a map of areas affected by the potential ordinance and to further analyze the concerns brought forth by Council.

13. CITY ADMINISTRATOR'S REPORTS

City Administrator Forbis provided brief report and responded to Council Member questions.

14. CITY ATTORNEY'S REPORTS

There were none.

15. CLOSED SESSION

Mayor Blankley opened Public Comment. There being no speakers, Mayor Blankley closed Public Comment.

The Mayor recessed the City Council at 8:41 PM.

The Mayor reconvened the Council to Closed Session at 8:46 PM. The motion to stay in Closed Session was unanimous.

15.1. Conference with Negotiator – Pursuant to Government Code Section 54957.6, Gilroy City Code Section 17A.11 (4)

City Employee: Jimmy Forbis, City Administrator;

City Negotiator: Marie Blankley, Mayor;

**Anticipated Issue(s) Under Negotiation: Employment Contract:
Employment Contract Between City of Gilroy & Jimmy Forbis**

No reportable action.

16. ADJOURN TO OPEN SESSION

Mayor Blankley reported out of Closed Session as shown above.

17. ADJOURNMENT

The meeting was adjourned by Mayor Blankley at 8:47 PM.

I HEREBY CERTIFY that the foregoing minutes were duly and regularly adopted at a regular meeting of the City Council of the City of Gilroy.

Thai Nam Pham, CMC, CPMC
City Clerk

DRAFT



City of Gilroy

STAFF REPORT

Agenda Item Title: Resolution of The City Council of The City of Gilroy Proclaiming April 2023 as Arts, Culture, and Creativity Month

Meeting Date: April 3, 2023

From: Jimmy Forbis, City Administrator

Department: City Clerk

Submitted By: Thai Nam Pham, City Clerk

Prepared By: Thai Nam Pham, City Clerk

STRATEGIC PLAN GOALS

Not Applicable

RECOMMENDATION

Staff recommends Council adopt the resolution.

BACKGROUND

At the March 6, 2023 City Council Regular Meeting, Council Member Hilton requested Council to consider adopting a resolution proclaiming April 2023 as Arts, Culture, and Creativity Month at a future meeting. The item received unanimous support. Attached is the draft resolution for Council's adoption.

Attachments:

1. Draft Resolution

RESOLUTION 2023-XX**RESOLUTION OF THE CITY COUNCIL OF THE CITY OF
GILROY PROCLAIMING APRIL 2023 AS ARTS, CULTURE,
AND CREATIVITY MONTH**

WHEREAS, the City of Gilroy celebrates and highlights the power of the arts and creativity to change our lives for the better; and

WHEREAS, the Gilroy Arts & Culture Commission and SV Creates work in partnership to support the arts and creativity in Gilroy as an essential part of our thriving community; and

WHEREAS, the Gilroy Arts & Culture Commission, SV Creates and the Gilroy Arts Roundtable work together to promote the value of the arts and to elevate Santa Clara County's creative culture; and

WHEREAS, Arts, Culture, and Creativity Month of April is the 5th annual statewide awareness and advocacy event that recognizes the crucial role of arts, culture, and creativity in the lives of everyone in California; and

WHEREAS, the City of Gilroy appreciates our relationship with SV Creates and recognizes that the arts and creativity support student success and life-long learning, provide key job skills, and bring joy to our community.

NOW, THEREFORE, BE IT RESOLVED THAT the City Council of the City of Gilroy hereby proclaims April 2023 as Arts, Culture, and Creativity Month, and encourages everyone to celebrate the power of the arts in our community.

PASSED AND ADOPTED by the City Council of the City of Gilroy at a regular meeting duly held on the 3rd day of April 2023 by the following roll call vote:

AYES: COUNCIL MEMBERS:

NOES: COUNCIL MEMBERS:

ABSTAIN: COUNCIL MEMBERS:

ABSENT: COUNCIL MEMBERS:

APPROVED:

Marie Blankley, Mayor

ATTEST:

Thai Nam Pham, City Clerk



City of Gilroy

STAFF REPORT

Agenda Item Title:	Approval of the Updated Purchasing Policy Inclusive of Wage Theft Policy Statement
Meeting Date:	April 3, 2023
From:	Jimmy Forbis, City Administrator
Department:	Finance
Submitted By:	Harjot Sangha, Finance Director
Prepared By:	Harjot Sangha, Finance Director

STRATEGIC PLAN GOALS

Develop a Financially Resilient Organization

RECOMMENDATION

Council approve the updated Purchasing Policy.

EXECUTIVE SUMMARY

Staff is returning an updated Purchasing Policy for Council approval incorporating a wage theft policy statement for all parties contracting with the City.

BACKGROUND

At the March 6, 2023 City Council Regular Meeting, staff presented an updated Purchasing Policy incorporating the voter-approved City Charter changes to procure public projects.

The March 6th approval from Council included directing staff to bring back the policy with a proposed statement on wage theft. The proposed statement required an additional completed and signed form that the project owner, contractor, and any subcontractors certify compliance with wage theft protection laws and that there are no unpaid wage theft judgments.

ANALYSIS

After further review, research, and discussion with the Public Works Department and the City Attorney's Office, staff has proposed a new subsection, 7.6 - Wage Theft Policy Statement, within Section 7 - Special Policies and Program, of the Purchasing Policy.

It includes a general policy statement that all parties contracting with the City must comply with the applicable federal, state, and local wage and hour laws. Further, it contains the following elements for disclosure, disqualification, and contract termination:

- Disclosure – As part of City's solicitation for goods and/or services, including public works projects, bidders are required complete a certification that requires contractor to disclose whether they have outstanding court or final administrative action for violation of federal, state, or local wage and hours laws within the past five (5) years. For each disclosed violation, contractor is required to further provide documents demonstrating either the order/judgement to be satisfied, or a written and signed description of contractor's efforts to date to satisfy the order/judgment.
- Disqualification – the City may disqualify a contractor based on the disclosed violation of wage theft laws on more than one (1) occasion or has one (1) unpaid wage judgment. Instead of an automatic debarment or disqualification, the City will take into consideration the following when considering the disqualification:
 - o The amount of the judgment or final administrative decision.
 - o The number of employees impacted by the prior violations.
 - o The size of the company and history of compliance with wage and hours laws.
 - o The impact to the City.
 - o Other factors that may be deemed appropriate.
- Contract Termination – if an existing, or current, contractor is found by a court or by final administrative action of an investigatory government agency to have violated applicable wage and hour laws in the five (5) years prior to or during the term of the contract with the City, the contractor may be in material breach if the violation is not fully disclosed and/or satisfied. Such breach may serve as a basis for contract termination.

Changes from the Proposed Policy Statement

Two key components are different from the Council's proposed wage theft policy statement:

1. The proposed policy statement implied an automatic disqualification. The City Attorney's Office advised against this as it could be considered an automatic debarment. Instead, it is recommended that City have a process to take into consideration the factors outlined above when considering the disqualification.

This allows the City to evaluate the breadth of the violation further and not limit the pool of contractors that may be able to submit bids and proposals.

2. The proposed policy statement included subcontractors in the scope. After further review and discussion, it is recommended, from a practical perspective, that the scope includes the party entering into an agreement with the City. Any issues with the subcontractor are generally addressed directly with the prime contractor with whom the City has entered into an agreement.

ALTERNATIVES

Council can amend or reject the proposed wage theft policy statement.

FISCAL IMPACT/FUNDING SOURCE

There is no direct fiscal impact to updating the Purchasing Policy. The effort was accommodated within the Finance Department's existing work plan.

NEXT STEPS

The Policy will be posted on the City's website and communicated internally to the organization upon approval. Related training will be provided to City staff on the requirements of certification to be included in the solicitations.

Attachments:

1. Updated Purchasing Policy - April 3, 2023



City of Gilroy

Purchasing Policy

Updated: ~~March 6~~April 3, 2023

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Section 1 – Purchasing Policy Overview

1.1 Purchasing Policy Overview

The purpose of this manual is to provide basic information for procuring goods and services consistent with adopted policies and procedures, and best practices. This manual is intended to provide sufficient information and reference detail to enable City employees to be fully aware of, and comply with, City purchasing policies, and to effectively participate in the purchasing program.

This section of the purchasing policies and procedures manual establishes the legal requirements of the procurement function within the City organization and establishes procurement expectations to safeguard fairness, system integrity and ethical practices.

1. Legal Requirements. The legal bases for the purchasing system are established below.

- Several sections of the [City Charter](#) enumerate authorities relative to purchasing-related functions:
 - **Section 703.** Establishes that the City Administrator:
 - Can enter into contracts on behalf of the city involving Council-appropriated expenditures and bid or proposals approved by Council.
 - Will implement a citywide purchasing system.
 - **Section 800.** Requires in paragraph 4 that purchasing rules and regulations be included in the administrative code which shall be amended by ordinance as necessary.
 - **Section 1104.** Specifies in paragraph 3 that during any fiscal year city employees cannot spend or incur any obligations to spend money for any purpose without a budgeted appropriation.
 - **Section 1109.** Contains requirements for letting public works construction projects, including best value and design-build contracting
 - **Section 1110.** Contains certain requirements that bidders must follow when bidding on city projects.

Purchasing Policy
Section 1 – Purchasing Policy Overview

- The [City Code Section 2.43\(c\)](#) establishes the responsibilities of the purchasing function.

2. Expectations of Fair and Open Procurement.

- Secure goods and services at the lowest possible cost commensurate with the quality needed.
- Endeavor to obtain the most open competition possible for all purchases.
- Encourage competitive pricing from responsive and responsible business providers that are qualified, capable and willing to meet the city's requirements.
- Fulfill the requirements of Charter and City Code in the procurement of goods and services.

Safeguard the city's reputation for fairness, integrity and ethical practices.

Section 2 – Code of Conduct and Ethics

2.1 Code of Conduct Overview

All employees are responsible for impartially assuring fair competitive access to city procurement opportunities by responsible suppliers and contractors. In addition, all employees shall conduct themselves in a manner that avoids any impropriety, or appearance of impropriety, and that fosters the highest level of public confidence in the integrity of Gilroy's purchasing system.

2.2 Conflict of Interest

No employee shall participate in a city procurement when the employee knows that:

1. The employee or the employee's spouse, domestic partner, child, stepchild, parent or stepparent will benefit financially from the procurement; and/or
2. The employee or the employee's spouse, domestic partner, child, stepchild, parent or stepparent is negotiating or has an employment arrangement contingent on or will be affected by the procurement.

Upon discovery of an actual or potential conflict of interest, an employee shall immediately withdraw from further participation in the procurement.

2.3 No Gratuities

No city employee shall solicit, demand, accept or agree to accept a gift of goods or services, payment, loan, advance, deposit of money, or employment offer presented, promised in return for, or in anticipation of favorable consideration in a city procurement.

2.4 Conduct with Vendors

Conduct with vendors who provide goods or services to the city shall be fair, open and transparent. City employees shall:

1. Refrain from showing favoritism to vendors or being unduly influenced.
2. Safeguard confidentiality when required to do so.
3. Select vendors on the basis of meeting appropriate and fair criteria.

2.5 Disciplinary Actions for Policy Violations

City employees shall abide by and be accountable for the codes of conduct established in this section. Policy violations may result in disciplinary actions in accordance with the city's established procedures, consistent with state law.

Section 3 – Purchasing System Authorities and Responsibilities

3.1 Decentralized Purchasing System Overview

The city has adopted a decentralized purchasing system. This means that for most purchases, requesting departments can directly solicit bids or proposals and place orders with suppliers, subject to the limitations established in policy and subject to the approval of the appropriate award authority. Nothing precludes staff from seeking procurement assistance from the finance director or purchasing coordinator, especially to clarify policies, processes and procedures.

In a decentralized purchasing system, it is very important that all employees understand and abide by the city's procurement rules/policies and ensure their fair and consistent application.

3.2 General Categories of Purchases

City purchase categories generally consist of the following categories, for which different procurement methods may apply (see Section 4, Procurement Methods, page 11):

1. **Goods.** The purchase of goods consists of materials, equipment and supplies needed by any department.
2. **Services.** City staff may require contracts for services, which fall into two categories:
 - a. **General Services.** Services rendered such as custodial services, building/equipment maintenance, and machinery/equipment rental, excluding contracts for public works projects or professional services.
 - b. **Professional Services.** Services provided by a person or firm engaged in a profession based on highly specialized and/or technical knowledge or skill, such as the professions of accountant, attorney, artist, architect, landscape architect, construction manager, engineer, environmental consultant, dentist, physician, training or educational consultant, or land surveyor, and whose services are considered distinct and unique to such a degree that bidding of such services may not be feasible, if appropriately justified and documented (see Subsection 4.9, Exemptions from Competitive Bidding, page 22).
3. **Public Works Projects.** Public works pertain to the construction, alteration, repair, or improvement of any public structure, building, road, or other public improvement of any kind, including demolitions, and the construction and installation of drainage systems, lighting and signaling systems, sewer and water systems, and park and recreational facilities. Maintenance required to preserve a public improvement is not considered a public work.

3.3 Authority to Award Contracts

The following section outlines the various contract award authorities established under the decentralized Purchasing System.

Purchasing Policy
Section 3 – Purchasing System Authorities and Responsibilities

1. **Award Authority.** Contract award authority is established by dollar threshold for each of the following entities:
 - a. **City Council.** Purchases or contracts for goods and services, including public works construction contracts, of \$100,000 or more, must be awarded by the City Council.
 - b. **City Administrator.** Purchases or contracts, including public works construction contracts, up to \$99,999 may be awarded by the City Administrator.
 - c. **Department Heads.** As authorized by the City Administrator, department heads may make purchases and enter into contracts for goods and services, including public works construction contracts, up to \$49,999.
 - d. **Staff.** Purchases up to \$4,999 may be made at the staff level as designated by department directors.
2. **Authority to Legally Bind City.** *Unless specifically authorized as established in this section or elsewhere in adopted and written City policy, staff other than the City Administrator and department heads cannot enter into contractual arrangements to purchase goods or services or otherwise legally bind the City for such purchases.*
3. **Award Authority Determined by One Transaction.** For the purpose of determining the appropriate award authority, contract amounts are defined by what constitutes a single or one transaction. This rule also applies to competitive bidding (the estimate of dollar value of the transaction dictates the level of bidding required).
 - a. **One-time Purchases.** Each discrete, one-time purchase is a single transaction.
 - b. **Blanket Purchase Orders.** The contract term of a blanket purchase order is generally considered a single transaction, subject to total contract length requirements established in a competitive bidding process. See also Subsection 3.7.6.b on page 9.

Examples: A blanket order in the amount of \$10,000 that is issued for vehicle parts for a one-year period is a single transaction. Subsequent annual renewals of the blanket order are considered separate, single transactions.

A five-year blanket order for on-call maintenance work in the amount of \$25,000 each year (for a total of \$125,000) requires Council approval.
 - c. **Contract Amendments.** Dollar increases to existing contracts require the sum of the original contract to be added to the amount of the amendment to determine the single transaction value.

Example: The City Administrator awards a contract for \$75,000 and a \$30,000 amendment is required. The resulting transaction is \$105,000, now requiring Council approval.

3.4 Responsibilities of Purchasing Division

1. **Purchasing Function.** As established in [Section 2.43\(c\) of the City Code](#), the purchasing division is responsible for:
 - a. Purchasing materials, supplies, and equipment (goods) and services for use by all departments when appropriate.
 - b. Preparing standard specifications for goods and services wherever possible.
 - c. Maintaining a purchase order system and issuing purchase orders as required.
 - d. Verifying that all bids and proposals are in accordance with policy requirements.
 - e. Establishing and operating a system of stores for the bulk purchase of commonly used items.
 - f. Selling surplus personal property of the City, subject to the determinations and approval of department heads, the City Administrator and the City Council.

3.5 Responsibilities of City Staff

1. **Responsibilities of all employees.** As keepers of the public trust, all City employees are required to discharge their duties fairly, impartially and with the highest degree of integrity. In support of these concepts as they apply to the purchase of goods and services, City staff shall:
 - a. Clearly identify procurement needs and the availability of funding.
 - b. Work with the purchasing coordinator to develop suitable competitive specifications.
 - c. Participate in the evaluation of bids and proposals as required.
 - d. Inspect goods delivered and services performed to determine conformity with established requirements and contractual obligations.
 - e. Authorize payment for conforming goods and services.
 - f. Notify the purchasing coordinator of non-conforming goods or services.
 - g. Document tangible or intangible value to the city when requisitioning goods or services without competition.
 - h. Recognize that fair and open competition results in better value to the city.
 - i. Understand and be accountable for the policies and procedures established for purchasing goods and services.
2. **Purchasing Requisition Required.** Goods and services purchases that will require a contract, purchase order, or blanket purchase order, including public works construction, must be initiated with a properly documented and approved purchase requisition which includes:
 - a. Concise description of the purchase which adequately communicates need.
 - b. Actual or estimated dollar amount.
 - c. Valid charge/project and object number.
 - d. Verification of available funding or identification that funding is needed.

- e. Price quotes with recommended vendor selection and appropriate award justification.
- f. Bid exemption documentation as required.

3.6 Authorized and Unauthorized Purchases

This section defines authorized and unauthorized purchases and how they are memorialized and establishes that employees can be held responsible for unauthorized purchases that are not ratified by the appropriate award authority.

1. **Authorized Purchases.** Purchases are authorized only when the appropriate award authority has approved the purchase. Only the City Council, City Administrator, and department heads, or authorized designee in writing from the City Administrator, may legally bind the city to a contract.
2. **Unauthorized Purchases.** Purchases approved by anyone other than the designated award authorities are unauthorized. It is the responsibility of every employee to understand the policy requirements and avoid unauthorized purchases to the greatest extent possible.
3. **Ratification Process Required.** Unauthorized purchases can be validated only if ratified by the appropriate award authority, in its sole and absolute discretion. For unauthorized purchases to be considered for ratification, the following steps must occur:
 - a. The employee making the unauthorized purchase must provide a written explanation of why the purchase was made.
 - b. The written explanation must be reviewed and approved by the appropriate award authority.
4. **Restitution.** In the event that a vendor has been paid and the unauthorized purchase is not subsequently ratified, the employee may be held responsible for reimbursing the city.

3.7 Contracting Requirements

The following section explains the various contracting requirements associated with making purchases with City funds.

1. **Contract Award.** A contract is not considered to be awarded until it is approved by the appropriate award authority, i.e., the City Council, City Administrator or authorized department head as described in Section 3.6 above.
2. **Standard Contract Terms and Conditions.** Use of the city's standard contracts (or terms and conditions for purchase orders) provided by the City Attorney are preferable to using vendor-provided contracts. If presented with a vendor-provided agreement, staff should attempt to replace it with the city's standard agreement or standard terms

Purchasing Policy
Section 3 – Purchasing System Authorities and Responsibilities

and conditions for purchase orders. The purchasing coordinator can assist with the negotiation process as necessary.

3. **Written Contract Requirement.** Written contracts on city templates provided by the City Attorney are required for *services* with a value of \$10,000 or more. Services with a value of less than \$10,000 should be put on purchase orders with standard terms and conditions, unless compelling factors such as liability or risk dictate the use of a written agreement.
4. **City-provided Scope of Work Requirement.** Contracts should include well-defined scopes of work provided by city staff and the use of consultant or vendor-provided work scopes should be minimized to the greatest extent possible.
5. **No Contract Splitting.** Under no circumstances can *any* contract be split or separated into smaller components to determine the appropriate award authority or for any other purpose.
6. **Contract Types.** The city utilizes several different types of contracts depending on the nature of the purchase and requirements of the City Attorney's Office.
 - a. **Purchase Orders.** Purchase orders are used to make discrete, non-recurring purchases of goods and/or services. Depending on the cost and complexity of the purchase, a written agreement may be required. Purchase orders are required for most city transactions.
 - b. **Blanket Purchase Orders.** Blanket purchase orders are term contracts, usually established for one-year periods for routine, recurring or as-needed purchases of goods and/or services. Blanket purchase orders can be renewed annually according to the terms established through competitive bidding or negotiation, or as approved by the appropriate award authority. Blanket purchase orders may also be established for multi-year periods and/or as master goods/services agreements.

Blanket purchase orders may be established for as-needed small construction or maintenance projects and/or for urgent or emergency repairs where time is of the essence. These types of arrangements are referred to as **Job Order Contracts** (JOCs) and are bid on a unit cost basis with contracts awarded based on not-to-exceed amounts approved by the appropriate award authority.

- c. **Service Agreements.** Depending on the cost and complexity, agreements may be required for general or professional services. These are referred to as General Services Agreements (GSAs), Professional Services Agreements (PSAs), Master Service Agreements (MSAs) or Master Professional Service Agreements (MPSA).
- d. **Confirming Orders.** Confirming orders are written purchase orders that confirm previously placed verbal orders. This form of contract may be utilized

for urgent or emergency purchases but requesting departments must use prudent judgment.

7. **Key Contracting Prerequisites.** Contractors or vendors conducting business in the city or working on city property or in city rights-of-way must be properly licensed, insured, and otherwise comply with all lawful requirements such as obtaining a business license as required by the Finance Department and having appropriate insurance coverage as required by the risk manager. The contractor or vendor must include the City of Gilroy as an “additional insured” on their insurance policy and provide up-to-date insurance certificates with required policy endorsements. *These requirements must be met before any work can commence.*

Section 4 – Procurement Methods

4.1 Procurement Methods Overview

This section outlines the various methods of procurement to be used by employees who have authority and/or responsibility for procurement processes and procedures.

Below are guiding principles by which staff participating in procurement processes must abide:

- Purchases shall be based on competitive bidding processes whenever possible, unless otherwise exempt in accordance with Subsection 4.9, Purchases Exempt from Competitive Bidding on page 22.
- The complexity of the bidding process, and the applicable requirements, increase with the dollar value of the procurement.
- Under no circumstances shall purchases be artificially split to use a more simplified process.
- In situations where goods and/or services can be defined with a high degree of specificity, then a contract will be awarded to the lowest responsive and responsible bidder through a bid process.
- If the purchase is solution-based and cannot be exactly defined, then a best-value process may be used where the city can pay a higher price for a good and/or service if the overall value can be justified.
- Measured use of cooperative purchasing programs and piggyback agreements, which leverage volume purchases, secure value pricing and reduce administrative overhead, is encouraged.
- Staff must take into account the city's special policies and procedures for many procurements. These include environmental procurement, application of the 5% local purchasing preference (except for public works construction and professional services), disadvantaged business enterprises and purchases using federal grant funds (see Section 7, Special Policies and Programs, page 31).

4.2 Selecting the Appropriate Procurement Method

To select an appropriate procurement method, employees should know the category of purchase (type of goods, services or public works project) and have an estimated cost in mind.

For goods and services purchases, competitive bidding and approval thresholds are determined by each transaction.

1. **Goods and services transactions \$4,999 or less.** Goods and services \$4,999 or less may be made without a competitive process. This amount is consistent with the threshold established for purchases utilizing federal funding (see Subsection 7.5, Policies and Procedures for Purchases Utilizing Federal Grant Funding, page 31). However, staff are encouraged to price shop whenever possible to ensure the city is receiving the best value in exchange for public funds.
2. **Goods and services transactions between \$5,000 and \$99,999.** Goods and services with an estimated value between \$5,000 and \$99,999 in a single transaction must be procured using the methods established in the Informal Procurement Procedures in Subsection 4.4 below.
3. **Goods and services purchases \$100,000 or more.** Goods and services purchases with an estimated value of \$100,000 or more in a single transaction must be procured using formal bidding or proposal procedures established in Subsection 4.5, Formal Bidding Procedures on page 15.
4. **Public works projects.** In accordance with Section 1109 of the [City Charter](#), Public works projects anticipated to cost equal to or less than the amount allowed for informal bidding pursuant to section 22032 of the California Public Contract Code, currently \$200,000, as the same may be amended from time to time, may be let using Informal Bidding Procedures outlined in section 4.4, on page 14.

In accordance with Section 1109 of the [City Charter](#), Public works projects anticipated to exceed the amount allowed for informal bidding pursuant to section 22032 of the California Public Contract Code, currently \$200,000 or less, as the same may be amended from time to time, must be conducted through sealed bidding and shall be let by contract to the lowest responsive and responsible bidder, or through best value contracting, in further accordance with the bidding procedures established in Subsection 4.5, Formal Bidding Procedures, on page 15.

- a. **Design-Build public works projects.** For public works projects with contracts equal to or in excess of \$1,000,000, the City Council may negotiate and award a Design-Build Contract without formal sealed public bidding if the Council finds that such a contract would save money or result in faster project completion. The process for competitively selecting a design-build contract shall be consistent with the California Public Contract Code. The procurement shall be made in accordance with the bidding procedures established in subsection 4.6, Request for Proposals on page 19, and shall include the following:
 - i. Bridging documents shall be prepared by a design professional designated by the City, identifying the scope and estimated price or cost of the public works project

- and including additional requirements or information necessary to adequately describe the City's needs for the project. This may include, not limited to, the size, type, and design character of the project, the performance specifications covering the quality of the supplies, materials, equipment, and workmanship, or preliminary plans or building layout plans. The design professional, which prepares the bridging documents, may not subsequently submit or participate in the proposal submitted for an award of design-build contract, or have any financial interest in any design-build entity or team which submits a design-build contract construction proposal or which provides the design-build services.
- ii. A formal request for proposal shall include the bridging documents described in section 4.2.4.a.(i) above, a request for qualification, and the design-build contract documents approved by the City Attorney.
 - iii. Design-build entities may be required to pre-qualify in order to be eligible to submit a proposal for the design-build project by responding to the request for qualifications in advance of the date set for the submission of the proposals. A standard template for statement of qualification shall be established and provided in the request outlining the qualification criteria consistent with, but not limited to, section 22164(b) of the California Public Contract Code. The City may establish and maintain a qualified list of design-build entities based on the qualification process for soliciting proposals on future new design-build projects.
 - iv. The design-build contract may be awarded to a responsive, responsible design-build entity on the basis of either the lowest lump-sum price or the "best value" provided, as defined in the formal request for proposals. A design-build contract that is awarded on the best value basis shall be evaluated based solely on the selection criteria and procedures set forth in the formal request for proposals.
 - v. The design-build contract shall require the design-build entity and its subcontractors to comply with the requirements of Section 22164(c) of the California Public Contract Code, as amended from time to time.

4.3 Purchasing Card Program

As an alternative, efficient method of making small dollar purchases, a purchasing card program has been established for use by employees based on operational need. In many instances, purchasing cards can be used to buy needed materials and supplies, rather than using purchase orders.

Purchasing cards are approved by department heads and issued by the purchasing coordinator, to be used in strict accordance with the Purchasing Card Policy.

4.4 Informal Procurement Procedures

Informal procurement procedures apply to purchases of goods and services anticipated to be less than \$100,000, and for public works project anticipated to cost equal to or less than the amount allowed for informal bidding pursuant to Section 22032 of the California Public Contract Code, currently \$200,000, as the same may be amended from time to time. Such purchases may be made by staff in accordance with this section.

1. **Purchases \$4,999 or less.** Purchases of goods and services less than \$5,000 may be made by staff without obtaining price quotes. However, staff are encouraged to price shop whenever possible to ensure the city is receiving the best value in exchange for public funds.
2. **Purchases between \$5,000 and \$24,999.** Purchases in this estimated price range may be made by staff with department director approval and based, to the best extent possible, on at least three written price quotes. Contracts are typically awarded to the lowest responsive and responsible provider, but best value determinations can be made on factors in addition to pricing if the justification is properly documented and in the best interest of the City.
3. **Purchases between \$25,000 and \$99,999.** Purchases of goods and services in this estimated price range may be made using informal bid and/or request for proposal documents, as follows:
 - a. **Invitation to Quote.** Use this template for goods and/or services with an estimated cost at or below \$49,999 (or for a lower threshold amount if required by a department head or the purchasing coordinator). If a contract is not being awarded to the lowest responsive and responsible bidder, the purchasing requisition must contain a concise explanation to justify the selection, including evaluation factors if appropriate or requested by the purchasing coordinator.
 - b. **Informal Request for Proposals (RFP).** Use this template for services (or in some cases specialized goods or a mix of goods and services) between \$50,000 and \$99,999 that are procured through a **best value**, rather than low bid, process. Informal RFPs may also be required for professional services less than \$50,000 as required by department heads.

Best value procurements are awarded based on factors in addition to price (e.g., the city may pay more for a solution if the overall value can be justified), and are conducted through an evaluation process similar to but less formal than that required for formal competitive proposals (see Subsection 4.6, Request for Proposals, on page 19).

4. **Public works projects equal to or less than the amount allowed for informal bidding pursuant to California Public Contract Code.** Procurement of public works projects estimated to cost equal to or less than the amount allowed for informal bidding pursuant to Section 22032 of the California Public Contract Code, currently \$200,000, as the same may be

amended from time to time, may be made using the informal bid, subject to the appropriate award authority outlined in section 3.3 and contracting requirements outlined in section 3.7:

- a. **Invitation to Quote.** Use this template for public works construction contracts with an estimated cost at or below \$200,000, and to the best extent possible, with at least three written price quotes. If a contract is not being awarded to the lowest responsive and responsible bidder, the designee shall provide a written statement or report of the procurement to the appropriate award authority and must contain a concise explanation to justify the selection, including evaluation factors as appropriate.
5. **Prevailing Wage Requirements.** The payment of prevailing wages is required for maintenance contracts over \$15,000 and construction contracts over \$25,000. Additionally, such contracts must follow [California Department of Industrial Relations \(DIR\)](#) contractor registration requirements for contractors and their subcontractors (see also Subsection 4.5.3.h on page 17). Suitable language regarding this requirement should be in all such contracts.

4.5 Formal Bidding Procedures

Formal sealed bidding using an Invitation for Bids (IFB) is required for purchases anticipated to be more than \$100,000, including materials and equipment (goods), certain services, and public works construction projects greater than \$200,000. Contracts associated with formal bids are awarded to the lowest responsive and responsible bidder with the exception of public works construction projects that may be awarded by using the best value contracting per Section 1109 of City Charter. The requirements detailed below apply.

1. **Coordination with Purchasing.** These actions must be coordinated with Purchasing before conducting a formal bid process:
 - a. **Obtain a Bid Number.** The purchasing coordinator will assign a bid number that will be used to track the project throughout its life cycle.
 - b. **Request Bid Opening Date.** The purchasing coordinator will determine availability of Council chambers to conduct the public bid opening.
 - c. **Creation of Bid File.** All bidding documents created in conjunction with each bid must be sent to the purchasing coordinator so that a bid file constituting the city's official record can be kept in strict accordance with the records retention schedule.
2. **Advertising the Bid Opportunity.** All formal bids should be publicly noticed by the purchasing coordinator or designated staff for at least 14 calendar days, (except for public works construction projects governed by section 1109 of the City charter) prior to the date and time set for receiving bids, either in a newspaper of general circulation in the City or on the City's website, unless a shorter timeframe is warranted.

For public works construction projects, the notice shall be given by one or more of the following methods per Section 1109 of the City Charter:

- Publication in newspaper of general circulation in the City by one or more insertions, the first of which shall be at least (7) days before the time of opening bids. This method of publication shall be used if available;
 - Publication electronically so that the notice is publicly available to the general community of potential bidders;
 - Publication in a trade journal specified by the Uniform Cost Accounting Act Commission by one or more insertions, the first of which shall be at least (7) days before the time of opening bids; or
 - By using a list of qualified contractors, which includes responsible contractors who have bid in the past and qualified contractors who ask to be included on the list.
- a. **Notice Inviting Bids.** The Notice Inviting Bids (NIB) specifies:
- i. The date, time and place where and when bids will be received, publicly opened and the bids of each bidder read out loud.
 - ii. The name of the staff member to whom bids must be addressed.
 - iii. General description of the goods, services or construction work required.
3. **Invitation for Bids (IFB).** An Invitation for Bids (IFB) is the bid template required for use with formal bids. The IFB must include at least the following elements:
- a. **Notice Inviting Bids.** The IFB must include the bid notice that was used to advertise the bid.
 - b. **Instructions to Bidders.** Bid documents must include instructions to bidders to explain the bidding process, and explain the city's requirements (see also Subsection 8.3, Instructions to Bidders, page 33).

For public works construction projects, the bid document must identify the process by which the award will be made, either exclusively based on lowest responsive and responsible bidder, or best value contracting based on objective criteria to determine the best combination of price and qualifications.
 - c. **Bid Specifications.** Detailed specifications that provide technical design and/or performance requirements are required for all IFBs.
 - d. **Subcontractor Listing.** Contractors bidding on city projects must include a listing of subcontractors.

- e. **Non-collusion Affidavit.** Contractors bidding on city projects must provide a notarized affidavit certifying that they have not colluded with any other entity in providing a bid.
 - f. **Bid Forms and Schedules.** The bid document must include applicable bid forms and schedules necessary for determining the lowest responsive and responsible bidders.
 - g. **Bond Forms as Required.** Many awarded projects will require that contractors provide executed faithful performance bonds (to guarantee their work) and payment bonds (to guarantee payments to subcontractors).
 - h. **Contractor/Subcontractor DIR Registration Section.** Bids for construction and maintenance work must include a form for contractors to provide their Department of Industrial Relations (DIR) contractor registration numbers (applies to contractors and their subcontractors) to ensure prevailing wage compliance. This information must be provided by City staff to the DIR on the PWC-100 Form following contract award.
 - i. **Draft Contract if required.** The bid documents must include a draft contract with the city's terms and conditions.
 - j. **Instructions for Bid Addenda.** Questions received within 10 business days of the due date will be answered in the form of a properly issued bid addendum. No change or modification to the plans or specifications can be made without such notification. Bid addenda must be provided to all holders of official bid documents and posted to the city's website.
4. **Bid Security.** A bid security in the form of a bid bond, cash, certified check or other acceptable instrument, in an amount not exceeding 10% of the bid price, may be required. If a bid security is required, it must be stated in the bid documents.
5. **Public Bid Opening.** Sealed bids will be publicly opened in the presence of at least one witness (typically the purchasing coordinator) at the time and location specified. If members of the public are present, the names of each bidder and their total bid pricing will be read aloud, and the apparent low bidder will be announced.
- For public works construction projects, if the best value procurement option is utilized, there shall be no public bid opening until the experience and qualifications information is evaluated by a designated evaluation panel. The pricing information shall remain sealed until the panel completes the evaluation to ensure the panel's evaluations are not influenced by the pricing information.
6. **Late Bids.** Under no circumstances can late bids be accepted.
7. **Bid Summary.** Following the bid opening a bid summary will be prepared by the user department and posted to the city's website.

8. Evaluating Bids and Awarding a Contract. The contract award process includes steps detailed below.

- a. **Bid Analysis.** Each bidder will be evaluated by designated staff to determine whether their bid is *responsive* (complies with all material requirements of the bid) and if they are *responsible* (have the skill and ability necessary to complete the work).
- b. **Council Report.** The user department will prepare a report to Council recommending contract award to the lowest responsive and responsible bidder and/or a recommendation for bid rejection.

If best value procurement option is utilized for public works construction projects, the report shall include the justification for the selection including the evaluation factors utilized to making the determination.

- c. **Bid Rejection.** The finance director will issue any notice of rejection of any and all bids, or any non-responsive bids, and the bid may be re-advertised at the city's discretion, except that Council is the rejecting authority for all public works bids deemed excessive or unsatisfactory, per Section 1109 of the [City Charter](#). If a contractor provides more than one bid for the same work, those bids must be rejected by the appropriate rejection authority (Section 1110 of the City Charter).
- d. **Determining Bidder's Responsiveness and/or Responsibility.** Bids determined to be non-responsive at the bid opening shall not be accepted. Subsequent determinations of bid responsiveness and bidder responsibility during the due diligence period must be carefully considered, with the latter requiring a much higher level of due process for contractors.
- e. **Bid Protest Procedures.** In the event of a protest by a contractor who has submitted a timely bid, the protesting party must be afforded the opportunity to voice their concerns through the formal process outlined in Section 8, Purchasing-related Instructions and Procedures on page 32.
- f. **Contract Execution.** Upon Council approval, designated staff will prepare and send a contract package, including performance and payment bonds and identification of any other requirements such as insurance, business license, etc., to the awarded contractor.

If the contractor fails to enter into the contract, their bid bond will be forfeited and deposited in the general fund. If a bid bond was not required (in the case of goods or services purchases), then the contractor who fails to execute the contract will be liable for the difference between its bid and the next lowest bid, plus administrative expenses and any required legal costs.

9. **Prevailing Wage Requirements.** Maintenance contracts exceeding \$15,000 and construction contracts exceeding \$25,000 can only be awarded to contractors who are registered with the DIR (including any subcontractors) for the purpose of determining prevailing wage compliance. Suitable language regarding this requirement should be in all such contracts. Awarded contracts must be registered with the DIR by designated staff within 30 days of award. Awarding a contract to a contractor who is not registered with the DIR can result in penalties to the City.
10. **Return of Bid Securities.** Once a contract has been executed, the security accompanying the accepted bids, and the unsuccessful bids, must be returned.
11. **Submit Purchasing Requisition.** Following contract approval by Council, a requisition must be submitted to the purchasing coordinator so a purchase order can be generated.

4.6 Request for Proposals

Competitive sealed proposals using a Request for Proposals (RFP) process are used when contracting for services estimated to be more than \$100,000, or for solutions where procurement needs cannot be determined with a high degree of specificity, unless otherwise exempt from competition as described in Subsection 4.9, Purchases Exempt from Competitive Bidding on page 22. Such procurements are conducted by **competitive negotiation** processes, rather than awarding a contract to the lowest responsive and responsible bidder, as follows:

1. **Coordination with Purchasing.** These actions must be coordinated with the purchasing coordinator before conducting a formal proposal process:
 - a. **Obtain an RFP Number.** The purchasing coordinator will assign an RFP number that will be used to track the project throughout its life cycle.
 - b. **Creation of an RFP File.** All proposal documents created in conjunction with each RFP must be sent to the purchasing coordinator so that a file constituting the city's official record can be kept in strict accordance with records retention policies.
2. **Request for Proposals.** An RFP using the city's standard template(s) must be prepared and advertised.
3. **Best Value.** RFPs are awarded based on the best overall value to the city, as opposed to lowest responsive and responsible bid, and include evaluation of qualitative and/or quantitative factors in addition to price.
4. **Advertising the RFP Opportunity.** RFPs will be publicly noticed by the purchasing coordinator at least 14 calendar days prior to the date and time set for receiving proposals, either in a newspaper of a general circulation in the City (if available) or on the city's website, unless a shorter timeframe is warranted.

5. **RFP Document Contents.** The RFP document shall include, at minimum, a Notice Inviting Proposals; instructions to proposers, including protest procedures if warranted; evaluation factors and their relative importance; specifications, requirements or scope(s) of work describing the required goods and/or services; proposal forms and schedules; any required bond forms; insurance requirements; and contract terms and conditions.
6. **Evaluation Program.** Once RFP responses are received, the proposals will be confidentially evaluated and scored in accordance with criteria and procedures established by the user department with input of the purchasing coordinator as necessary. Interviews, presentations, site visits, etc., may be conducted depending on the nature of the procurement.

Once a top-rated proposer is identified, good faith negotiations will commence. If an agreement cannot be reached in consideration of cost and/or scope, the next highest-rated proposer will be engaged, and so on, until a mutually acceptable agreement is reached.

7. **Qualifications-Based Selection Procedures.** RFPs for certain professional or specialized services may, by law, require Qualifications-Based Selection (QBS) procedures where consultants or consulting firms are evaluated on their demonstrated competence and professional qualifications before pricing can be considered. The QBS selection process is typically associated with architectural, engineering, environmental, land surveying and construction management firms in accordance with [Section 4525 et. seq. of the California Government Code](#) or its federal counterpart, the [Brooks Act](#). However, nothing shall preclude staff from utilizing a QBS process for other types of RFPs if in the best interest of the city.

Once a top-rated proposer is identified, then scope and fee negotiations commence. If an acceptable contract cannot be finalized in consideration of scope and/or cost, then the purchasing coordinator may commence scope and fee discussions with the next highest-rated proposer, and so on, until a mutually acceptable agreement is reached. This type of process is also referred to as a Request for Qualifications (RFQL) or Request for Statements of Qualifications (RSQ).

8. **Process Integrity.** To protect the identity of the proposers and safeguard the integrity of the evaluation process, all City employees participating in the evaluation of competitively sealed proposals shall maintain strict confidentiality as well as disclose any real or perceived conflicts of interest that may arise.

The Finance Director and/or City Attorney will review any disclosed potential conflicts of interest and make a determination about the evaluator's continued participation in the procurement.

9. **One Response Received.** If only one RFP response is received and staff wishes to proceed with the procurement (rather than rejecting the proposal), the purchasing

coordinator will document the effort used to generate proposal responses prior contract negotiations.

- 10. Rejection of proposals.** The finance director will issue any notice of rejection of any and all proposals, or any non-responsive proposals, and the RFP may then be re-advertised at the City's discretion. If a proposer provides more than one RFP response for the same work, those responses must be rejected (Section 1110 of the City Charter).
- 11. Late Proposals Refused.** RFP responses received after the designated closing date and time cannot be accepted and must be returned unopened unless opening is required for identification purposes.
- 12. Awarding a Contract.** The contract award process includes the following steps:
 - a. Council Report.** Following the technical evaluation and competitive negotiation processes, the user department will prepare a report to Council recommending contract award to the firm whose solution provides the best value to the city.
 - b. Determining Proposer Responsiveness and/or Responsibility.** Determinations of proposer responsiveness and responsibility must be carefully considered, and any determination of non-responsibility should be reviewed by the City Attorney.
 - c. Proposal Protest Procedures.** In the event of a protest by a proposer who has submitted a timely RFP response, the protesting party must be afforded the opportunity to voice their concerns through the formal process outlined in Section 8, Purchasing-related Instructions and Procedures on page 32.
 - d. Contract Execution.** Prior to Council approval, staff can begin the contract execution process by obtaining signature(s) from the awardee. Upon Council approval, the contract execution process can be completed.
- 13. Submit Purchasing Requisition.** Following contract approval by Council, a requisition must be submitted to the purchasing coordinator so that a purchase order can be generated.

4.7 Two-step Competitive Bidding Processes

For some procurements, it may be advantageous to conduct a two-step competitive process where the first step is used to "shortlist" or prequalify interested firms. This type of procurement begins with a Request for Qualifications (RFQ or RFQL) process, followed by either an Invitation for Bids (IFB) or a Request for Proposals (RFP) process, depending on the situation.

The **RFQ/IFB process (RFQ/B)** can be utilized to contract for important construction projects or maintenance service contracts for which detailed specifications can be articulated. At the outset, the prequalification process utilizes minimum threshold requirements that prospective bidders

must meet (determined by an evaluation process) to provide a sealed bid, to be awarded to the lowest responsive and responsible bidder.

The **RFQ/RFP process (RFQ/P)** can be an effective way to contract for services or system solutions where professional or technical expertise or complex functional requirements, are critical and overriding considerations. In this type of procurement, submitting firms are evaluated based on their qualifications (which can include minimum threshold requirements), followed by a competitive negotiation.

4.8 Emergency Procurement

This section establishes the fundamental elements required for emergency procurements.

1. **Emergency Procurements Defined.** Emergency procurements are those purchases defined as immediately necessary for the preservation of life, health or property, or for the continued operation of a department. Emergency procurements required as the result full or partial activations of the Emergency Organization shall be conducted in conjunction with [Chapter 9 of the City Code \(Emergency Organization and Functions\)](#).
2. **Authority and Responsibility.** The City Administrator or their designee may make or authorize others to make emergency procurements, regardless of cost.
3. **Competitive Bidding.** Emergency procurements shall be made with such competition as is practical under the circumstances, or that is required for reimbursement funding, and shall be limited to those goods and services necessary to satisfy the emergency need.
4. **Written Report and Ratification Required.** In such circumstances where emergency procurements are required, the department head or designee shall provide a written report of the procurement to the appropriate award authority, including a description of the emergency and the basis for selection of the contractor. A copy of this report shall be included in the procurement records maintained by the purchasing coordinator.

4.9 Purchases Exempt from Competitive Bidding

This section describes the types of purchases that may be exempted from competitive bidding requirements, subject to the appropriate approvals.

1. **Enumerated Bid Exemptions.** The following may be appropriately justified as exemptions to the competitive bidding requirement:
 - a. Emergency procurements as defined herein.
 - b. Situations where solicitations of bids or proposals would for any reason be unavailing or impossible.
 - c. Professional or specialized services as defined in Subsection 3.2, General Categories of Purchases on page 5.
 - d. Public library collection materials.

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- e. Insurance, bonds or financial services.
 - f. Single or sole source goods or services as defined herein.
 - g. Highly specialized equipment developed or designed for a special activity or function or whose purpose is in the best interests of the City due to compatibility with existing equipment or training of personnel.
 - h. Procurements funded by grants, donations or gifts when any special conditions require the purchase of particular materials and/or services.
 - i. Purchase of surplus property owned by another public entity, or payment to other public entities or utilities.
 - j. Membership dues, conventions, training, travel arrangements, or advertisements in magazines, newspapers, or other media.
 - k. Works of art, entertainment or performance.
 - l. Goods procured for resale to the public.
 - m. Where competitive bids or proposals have been solicited and no bid or proposal has been received. In such situations the City Administrator may proceed to have the goods procured or services performed without further competitive bidding.
 - n. Computer software license or subscription renewals.
 - o. Human Resources investigation, legal services, and medical services, including but not limited to, fitness for duty evaluations, expert witnesses, and other employment related medical services.
 - p. Regulatory permits.
 - q. Subscriptions.
 - r. Reimbursements and/or refunds of payments made to the City.
 - s. In other cases when specifically authorized by the Council (if over \$100,000) after a finding and determination that it is in the best interests of the city.
2. **Negotiations.** The purchasing coordinator or designated staff can conduct negotiations, if/as appropriate, as to price, delivery and terms and may require the submission of cost or price data in connection with the award of a contract that does not require competitive bidding.
3. **Competitive Bidding When Possible.** Nothing in this section shall preclude the solicitations of competitive bids or proposals, when possible.
4. **Documentation and Approval Required.** Goods or services proposed to be exempt from a competitive bidding process must be appropriately documented and approved before a transaction can be conducted, as follows:
- a. Purchases greater than \$50,000 require City Administrator approval that must accompany a purchase requisition before a purchase is made.
 - b. Purchases between \$5,000 and \$49,999 require approval by the Finance Director or designee that must accompany a purchase requisition before a purchase is made.

4.10 Cooperative Purchases

This section discusses fundamental elements of cooperative purchasing programs. Use of purchasing cooperatives is encouraged as a way of obtaining goods and services by aggregating volume, securing value pricing, and reducing administrative overhead. Measured use of purchasing cooperatives can significantly reduce the time and resources needed to competitively bid goods and services contracts.

1. **Authority to Use Cooperative Purchasing Programs.** The purchase of goods and/or services made under cooperative purchase programs, leveraging purchasing agreements maintained or utilized by the state, county or other public or quasi-public agencies, is authorized under [Section 703 of the City Charter](#), Powers and Duties of the City Administrator. Cooperative purchasing contracts must be approved by the appropriate award authority.
2. **Competitive Bidding.** Cooperative purchasing programs should be based on competitively awarded contracts whenever possible, and documentation as to the advantage of the cooperative purchase will be retained by the purchasing coordinator in conjunction with the value analysis requirements listed below.
3. **Purchasing Cooperatives.** There are numerous purchasing cooperatives the staff can evaluate for use. Some leading cooperatives include state contracts such as [California Multiple Award Schedules \(CMAS\)](#) of the Department of General Services (DGS); [U.S. Communities Cooperative Purchasing](#); [National Joint Powers Alliance \(NJPA\)](#); [NASPO ValuePoint](#) (formerly WSCA-NASPO, or the Western States Contracting Alliance-National Association of State Procurement Officials); and federal General Services Administration (GSA) procurements ([GSA Advantage for State and Local Governments](#)).
4. **Value Analysis.** The determination to make a purchase using a purchasing cooperative agreement requires an analysis to determine whether the procurement represents the best value to the city. Purchases using any given cooperative need not be based on the absolute lowest pricing and may consider factors in addition to price such as the time and/or resources needed to competitively bid the good or service. The analysis will be performed and documented by user departments, with assistance provided by the purchasing coordinator.
5. **Piggyback Contracting.** Subject to the appropriate approval authority, authorized staff may enter into contracts for goods and services purchases, the pricing and terms of which have been previously established by another public agency. The following requirements apply to piggyback contracts, and must be verified by the purchasing coordinator prior to contract award:
 - a. The parties to the original contract agree to the piggyback.

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- b. The contract is for identical or nearly identical goods and/or services.
- c. The original contract resulted from competitive bidding or proposal procedures similar to those required by the city.
- d. The original contract was awarded within two years of the city's purchase, or written justification is provided to support the use of an older solicitation.
- e. The price of the purchase is comparable to that estimated by the requesting department.

Provided that the above conditions are met and the purchase is approved by the appropriate award authority, the purchasing coordinator will issue a purchase order and/or execute (or cause to be executed) a separate contract with the vendor selected by the originating agency which incorporates by reference the original solicitation, terms, conditions and prices.

Section 5 – Specification Development

5.1 Specifications for Competitive Bidding – Overview

Specifications define precise requirements for the solicitation of goods and/or services. Writing specifications is a collaborative process between user departments and the purchasing coordinator to translate specific needs into detailed requirements.

1. **Definition.** A specification is a precise description of the physical characteristics, quality, or desired outcomes of a commodity to be procured, which a supplier must be able to produce or deliver to be considered for contract award.
2. **Collaborative Process.** Writing bids or proposal specifications is a collaborative process between user department and purchasing to develop specifications with the goal of promoting competition.
3. **Clear Language.** Specifications should use plain language that is relevant to and understood by the bidding community.
4. **Promote Competition.** Good specifications should promote and not unduly restrict competition. Use of restrictive specifications must be properly justified in accordance with the provisions of this section.
5. **Specification Attributes.** There are essentially two types of specifications: design and performance. Specifications typically contain elements of design and performance and may be viewed as a continuum with each element on opposing ends.
 - a. **Design Specifications.** Design specifications establish the characteristics that a commodity must possess, and may include manufacturing details such as engineered plans, drawings or blueprints.
 - b. **Performance Specifications.** Performance specifications describe a commodity's desired outcome.
 - i. **Functional Descriptions or Requirements.** Performance specifications may utilize functional descriptions of defined tasks or desired results. Functional requirements are typically used for solutions such as software systems.
 - ii. **Brand Name Specifications.** In areas where the city has standardized a particular product such as fleet vehicles, staff may use one brand name manufacturer, subject to approval by a department head (see also Section 6, Sourcing and Standardization on page 28). Brand name specifications are restrictive, limit competition, and can result in increased cost. Use of brand name specifications must be carefully evaluated before using them in competitive bid documents.

iii. **Brand Name or Approved Equal.** Specifications that contain “brand name or approved equal” are based on functional equivalency and should be used whenever possible to promote competition and reduce pricing.

6. **Specification Development.** Specification development is a critical part of the competitive bidding process. In many cases specifications can be highly complex and technical and require subject-matter expertise beyond that of city staff. The following steps should be considered when developing specifications.

- a. **Collaborate.** Meet with stakeholders of the procurement to formulate and understand needs, and to internally peer review the specifications.
- b. **Conduct Market Research and Analysis.** Research and analysis help inform product design and/or performance and create understanding of market and supply chain trends.
- c. **Contact Other Public Agencies.** Other public agencies may have conducted a similar procurement and can share information and valuable insight.
- d. **Seek Professional Assistance.** In some instances, contractors or consultants must be engaged to create complex or highly technical specifications.

Note: NEVER obtain or accept specifications directly from a potential bidder. This will give the bidder an unfair competitive advantage, require that the bidder be disqualified, and may result in protest actions or legal challenges.

Section 6 – Sourcing and Standardization

6.1 Sourcing and Standardization Overview

It is city policy that purchases be based on competitive bidding whenever possible to maximize the best value in the expenditure of public funds. Competition tends to be limited when goods or services are sourced to one entity or standardized to one particular brand or manufacturer. Careful consideration must be given before a decision is made to standardize products and/or to request single or sole sourced procurements.

6.2 Single and Sole Sourcing

1. **Single Source.** Single source is defined as the selection of a good or service that may be available from two or more sources, but there is compelling reason to select one particular vendor.
2. **Sole Source.** Sole source is defined as the selection of a good or service that can only be obtained from one supplier or manufacturer because of its specialized, proprietary or unique in character.

Single and sole source procurements must be properly documented and approved in accordance with city policies and procedures.

6.3 Standardization

1. **Standardization.** Standardization is an organized process to adopt one product or group of products to be used by the city, such as particular computer hardware or software. Product standardization may be utilized to create efficiencies, enhance safety, increase productivity, promote brand consistency, or to foster interoperability.

Product standardization decisions are made by consensus of the executive team after careful consideration and review of recommendations from staff.

Section 7 – Special Policies and Programs

7.1 Special Programs and Policies Overview

Depending on the amount and/or type of purchase, there are several policies and programs that must be considered. These include:

- Application of Local Purchasing Preference;
- Minority, Disabled and Woman Owned Business Policy Statement;
- Environmentally Preferable Products; ~~and~~
- Policies and Procedures for Purchases Utilizing Federal Grant Funds; ~~and~~
- Wage Theft

Each is described below.

7.2 Local Purchasing Preference

The City Council has established a 5% local purchasing preference to be given to local businesses who respond to bidding opportunities or otherwise contract with the city (excluding public works construction and professional services), under the following guidelines and conditions.

1. **Definition of Local Business.** A local business is defined as a vendor or contractor who:
 - a. Has a fixed place of business in the city limits and the point of sale (for the business's sales tax reporting purposes) occurs within the city limits,
 - b. Is current in the payment of their business license tax, and
 - c. Is in compliance with city laws and does not owe money to the city.
2. **Applicable Purchasing Methods.** The local preference will be applied to competitive bidding or letting contracts for the purchase of goods and applicable/associated services, whether by formal bid, informal bid, or competitive proposal processes.
3. **Making the Calculation.** The local preference calculation will be determined as follows:
 - a. The purchasing coordinator will apply a 5% discount to the total bid pricing provided by the local business for the purpose of calculating the lowest responsive and responsible bidder.

- b. If a competitive negotiation process is used, then the local business will be assigned 5% of the total evaluation points.
- 4. **Inapplicability.** Application of the local business preference does not apply in the following situations:
 - a. Purchases of goods and services through legal contracts of other governmental jurisdictions or public agencies, or cooperative purchasing agreements;
 - b. Contracts for professional or legal services;
 - c. Purchases or contracts which are funded, in whole or in part, by a governmental entity, or private and public grants and the laws, regulations or policies governing such funding prohibit application of the local preference; and
 - d. Purchases made under emergency situations.
- 5. **Reserved Rights.** The local purchasing preference does not prohibit the Council or purchasing coordinator from comparing quality or basing purchasing decisions on the quality of goods and/or services.
- 6. **Notification.** Information regarding the local purchasing preference should be provided to prospective bidders to the best extent possible, but failure to do so will not be grounds for invalidation of any purchase order or contract awarded under the city's purchasing policies.

7.3 Minority, Disabled and Woman Owned Business Policy Statement

It is the policy of the City to ensure full and equitable opportunities for minority business enterprises, women business enterprises, disabled business enterprises, and local small businesses.

To assure equitable opportunities for participation, the purchasing coordinator or designated staff carry out the following programs:

- Contractors must sign a certification that they and their subcontractors are in compliance with the City's Fair Employment Practices Policy
- City staff works to actively develop vendors in these disadvantaged classifications on a day-to-day basis.
- Bidding opportunities will be provided to known vendors in targeted groups.
- The purchasing coordinator will assist in the development of technical assistance programs for these disadvantaged classifications.

7.4 Environmentally Preferable Purchasing Policy

Purchases for goods and services shall ascribe, wherever and whenever possible, to the Environmentally Preferable Purchasing Policy. The current policy can be found at the below link.

<https://www.cityofgilroy.org/DocumentCenter/View/13566/Reso-2007-50-Environmental-Preferable-Purchasing-Policy>

7.5 Policies and Procedures for Purchases Utilizing Federal Grant Funding

When purchasing goods and services under a federal grant award, the city is required to follow the provisions of 2 CFR Part 200 Subpart A §200.318 General Procurement Standards through §200.326 Contract Provisions.

7.6 Wage Theft Prevention Policy Statement

It is the policy of the City that all parties contracting with the City must comply with all applicable federal, state and local wage and hour laws including but not limited to the Federal Fair Labor Standards Act ("FLSA") and the California Labor Code. Suitable language regarding this requirement should be in all contracts.

1. **Disclosure.** As a part of any City solicitation for goods and/or services, including public works projects, contractor shall complete a "Bid Certification" ("Certification") that requires each potential contractor to disclose whether the contractor has been found by a court or final administrative action of an investigatory government agency to have violated federal, state, or local wage and hour laws within the past five (5) years from the date of the submitted bid or proposal. For each disclosed violation, the potential contractor shall provide a copy of (i) the court order and judgment and/or final administrative decision; and (ii) documents demonstrating either that the order/judgment has been satisfied, or if the order/judgment has not been fully satisfied, a written and signed description of potential contractor's efforts to date to satisfy the order/judgment. The completed Certification shall be submitted by the potential contractor to the City as a part of its bid or proposal.
2. **Disqualification.** The City may disqualify a potential contractor based on the disclosed violation if the potential contractor has been found by a court or by final administrative action of an investigatory government agency to have violated applicable wage and hour laws on more than one (1) occasion or has one (1) unpaid wage judgment.

In evaluating whether to disqualify a potential contractor, the City should evaluate (i) the amount of the judgment or final administrative decision; (ii) the number of employees impacted by the prior violations; (iii) the size of the company and history of

compliance with wage and hour laws; (iv) the impact to the City; and (v) other factors that may be appropriate.

3. **Contract Termination.** A current contractor found by a court or by final administrative action of an investigatory government agency to have violated applicable wage and hour laws, in the five (5) years prior to or during the term of the contract with the City, may be in material breach of its contract with the City if the violation is not fully disclosed and/or satisfied per City contract requirements. Such breach may serve as a basis for contract termination and/or any other remedies available under law, including a stipulated remediation plan.

Section 8 – Purchasing-related Instructions and Procedures

This section contains several purchasing-related instructions and procedures.

8.1 Bid/Proposal Protest Procedures

Contractors who have submitted timely bids or proposals may wish to protest or appeal a contracting decision or procurement made by the appropriate award authority. Protest actions must follow the procedures provided below. Protests of appeals, which are not submitted in accordance with these procedures, will not be considered.

1. **Protesting Party.** Only bidders or proposers who have submitted timely bids or proposals can initiate a protest action or appeal.
2. **Protest Procedures.** The following procedural steps must be followed to consider a protest:
 - a. The protest must be in writing and hand delivered or sent by registered mail. Once received, it will be date stamped at the Finance Department counter.
 - b. The protest must be received within five working days after the announced decision to award a contract.
 - c. Copies of the protest and all supporting documentation must be concurrently transmitted to all other parties with a direct financial interest that may be adversely impacted by the outcome of the protest. Such parties shall include all other bidders who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.
 - d. The protesting party must bear all of its own costs and fees in conjunction with protest or appeals processes.
3. **Protest Filing.** The written protest shall:
 - a. Include the name, street address, business phone number and email address of the protestor.
 - b. Identify the project under protest by name, IFB, RFP or quotation number.
 - c. Contain a concise statement of the grounds for protest.
 - d. Include all supporting documentation.
4. **Protest Review Prior to Award.** The purchasing coordinator or designated staff will withhold contract award pending disposition of the protest unless it is determined that an emergency exists. Upon review with the City Attorney, the purchasing coordinator or designee will respond in writing to the material issues raised in the protest no later than ten working days after receipt of the protest.
5. **Right of Appeal.** The protestor may appeal the initial determination to the finance director in writing within five working days after notification of the purchasing

coordinator's decision. The finance director will review the submitted information and render a final decision within ten working days.

6. **Protest Received and Reviewed After Contract Award.** Protests after award will not be considered unless the protest concerns a matter which arises after the award or could not have been discovered or reasonably known prior to award.

8.2 Certificates of Insurance and Coverage Requirements

To minimize the city's exposure to loss, all contractors must be appropriately insured and must include the city as an "additional insured" on their insurance policy. Contractors are also responsible for up-to-date insurance certificates with required policy endorsements that provide the city with required insurance coverage and indemnity provisions.

The Human Resources/Risk Management Department maintains current insurance requirements. Please refer to the insurance requirements in effect at the time of procurement.

8.3 Instructions to Bidders

Clear, concise and consistent instructions to bidders and proposers (hereafter "bidders") are a key part of the bidding process and help to enhance process clarity and ensure that prospective offerors are informed of all city requirements.

The instructions inform bidders how to prepare and submit bids, establish mandatory requirements, cover the bid addendum process, and how to withdraw or protest bids, among many other items. The instructions for IFBs and RFPs are similar but contain important differences due to the way contracts are awarded (low bid versus best value). The instructions for each type of competitive process are contained in the bidding templates.

In some cases, modifications can be made to the instructions, but this must be done in consultation with the purchasing coordinator and/or City Attorney's Office.

8.5 Lease, Rental and Lease-to-Purchase Procurements

In some cases it may be beneficial to rent or lease equipment rather than purchasing it due to funding availability, length of time the equipment is needed, etc. Under certain circumstances it may be optimal to purchase the equipment at the end of the lease period. Equipment rentals or leasing may make the best economic sense in these situations:

- Week-to-week or month-to-month **rentals** of short duration (less than one year).
- **Leasing** for short timeframes (more than six months but less than three years).
- **Renting/leasing** to evaluate equipment suitability prior to purchase. In these instances, a "no-cost" purchase order may be a better option if the vendor is willing.
- **Leasing** equipment when a new or improved design is imminent and the leasing charges can be applied to the purchase cost of the new item.

- Securing a **lease to purchase** because the purchase price exceeds the current appropriation.

When considering equipment rental, lease or lease-to-purchase agreements, it is highly recommended that the following provisions be negotiated and included in the agreement:

- **Lease and lease-to-purchase agreements** should include a non-appropriation clause for multi-year financing.
- Agreements under any scenario should include a “cancellation for convenience” clause.
- A percentage of payments should be applied to an eventual purchase.
- **Leasing** agreements must include the annual interest rate, along with a payment schedule that shows each principal and interest payment (to be forwarded to the Accounting Division).
- A **lease-to-purchase** agreement for capital equipment should have a minimum life expectancy of five years.

Equipment leasing must be carefully considered. Leased equipment costs more than purchasing outright, and if the equipment is not purchased, the city cannot take advantage of any residual value.

8.5 Life Cycle Cost Analysis

Life cycle analysis, or total cost of ownership (TCO), considers the long-term cost of equipment assets and citywide systems such as the financial system. Costs include acquisition, installation, ongoing maintenance and end of life disposal.

8.6 Service Provider Evaluation

When preparing to contract for services, it is important to evaluate service providers to determine whether they are independent contractors or if they are more appropriately characterized as temporary employees.

8.7 Surplus Property Disposal

All city equipment, supplies, and vehicles (“personal property” or “property”) will eventually reach the end of their useful life and must be disposed of, and to the best extent possible, generate revenue through sale or traded-in when new equipment is purchased. The following procedures apply to the disposal of surplus property:

- **Surplus Disposal.** It is the responsibility of department heads to determine when an item is obsolete or excess surplus property. After such determination is made, the surplus property may be transferred to another department or used as a trade-in for new equipment. Surplused items may be donated, sold through a competitive sealed bid process, or sold at public auction to another governmental or non-profit entity. For final disposal, City Council shall approve of items to be surplused.

Purchasing Policy
Section 8 – Purchasing-related Instructions and Procedures

- **Sale of Surplus Property.** As required by [Section 2.43\(c\)\(6\) of the City Code](#), the sale of surplus property is subject the approval of the City Administrator except that sale of property having a value consistent with those classified as fixed assets by the fixed asset accounting rules in effect at the time of the request must be approved by Council.
- **Property List.** The department surplusing an item shall submit a list of property items, the current value, and the asset number, if applicable, to the purchasing coordinator. The purchasing coordinator will periodically compile a list of excess items and provide it to all departments for review, and will subsequently obtain approval from the City Administrator and/or City Council. Upon approval, the following three options are available to dispose of the items:
 - o **Sale to Another Governmental Entity.** Surplus personal property may be sold at *fair market value* to another governmental entity (or non-profit organization). Such entity will have no more than 3 weeks to accept or reject the offer. If accepted, the entity will be invoiced by Accounts Receivable. All applicable sales tax shall be included. **Note:** The receiving entity is responsible for transportation and liability of the item
 - o **Auction.** This option provides a convenient and efficient means of disposing surplus. After an item has been declared surplus, the purchasing coordinator will coordinate with the surplusing department to arrange for pickup by the auction company.
 - o **Competitive Bids.** The purchasing coordinator may require that sealed bids be obtained for certain surplus equipment, such as vehicles with considerable resale value. Sealed bids shall be advertised in a newspaper of general circulation (if available), and on the City's website, 10 days prior to the bid opening. Prospective bidders shall have the opportunity to evaluate the equipment prior to bid opening as prescribed by the purchasing coordinator. Award will be made to the bidder most responsive to the City's needs.

The equipment shall be bid upon in "as-is" condition with no warranty, and a 10% deposit in the form of a money order or cashier's check must be submitted at the time of bid opening, with a balance due within 7 calendar days. Deposits will be returned to unsuccessful bidders within 14 calendar days.
- **Donations of Surplus and Preferred Recipients.** In order of preference, surplus items may be donated to: 1) the Gilroy Unified School District; 2) the Gilroy Chamber of Commerce. Surplus property unlikely to generate significant revenue and that are not transferred to other departments may be donated to other public agencies, to Gilroy's sister cities, or to non-profit organizations.

Any donation of surplus property to a non-profit organization shall be approved by the City Council upon findings that the non-profit is qualified under section 501(c)(3) of the Internal Revenue Code and that the donation will benefit the City and its constituents.

All donations pursuant to this section shall be without warranty, express or implied, and the transferee shall agree to defend, indemnify and hold harmless the City, its officers and employees, from any claim, cause of action, damage, loss or liability arising out of the condition of the property or its use by the organization or subsequent transferee.

- **Specialized Police Department Surplus.** Upon the request of the Gilroy Police Chief and with City Council approval, surplus items of a unique nature, i.e., guns, vests, and other protective equipment may be disposed of in an appropriate manner to suitable recipients. Disposal shall incorporate the Range Master's Policy in regard to the sale of guns to a Gilroy police officer or other law enforcement officer.
- **Stolen Property.** All stolen property shall be held by the police department for a period of 6 months. Periodic lists shall be prepared by the police department and submitted to the purchasing coordinator, to be agendized and declared surplus. Items will be disposed of in the most equitable manner. The only exception is **Bicycles**, which shall only be sold at public auction once declared surplus.
- **Tracking Surplus.** Regardless of the value established in policy, departments shall furnish a memorandum to the purchasing coordinator for tracking low value items. Broken or unrepairable items considered trash need not be listed in the memorandum.
- **Revenue.** The revenue received for the sale of surplus property shall be deposited in the General Fund or other appropriate fund for certain equipment sales.

8.8 Used Automobile Purchases

For efficiency purposes, the Council has waived formal bidding procedures for purchasing used vehicles under the following conditions:

- A budgeted appropriation exists.
- A determination is made by the fleet manager that purchasing a used vehicle is in the city's best interest.
- All Gilroy used-car vendors are notified of the city's intent to purchase.

The following procedures and requirements must be followed to purchase a used vehicle:

- The fleet manager will develop specifications based on the user department's needs.
- The fleet manager will solicit at least three written quotes utilizing informal procurement procedures; two of which must be solicited from Gilroy vendors.
- The used vehicle must have less than 25,000 miles and be less than 2 years old.
- A thorough inspection of each vehicle under consideration will be performed by Fleet Division staff, who will make a recommendation for purchase.

Purchasing Policy

Section 8 – Purchasing-related Instructions and Procedures

- The fleet manager will submit a purchasing requisition for department head authorization.
- After the issuance of a purchase order, Fleet Division staff will arrange for transportation to the city and ensure vehicle registration. They are also responsible for submitting sale documentation to accounts payable in a timely manner.
- The fleet manager will prepare a report for Council review.

Section 9 – Glossary of Terms

9.1 Definitions

This section defines relevant purchasing terms and terminology in use by the City of Gilroy.

Agreement. A mutual, written understanding between two or more competent parties, whereby one party agrees to perform as defined in the agreement and the other party agrees to compensation for the performance rendered in accordance with the agreement conditions. Agreement and contract may be used synonymously.

Amendment. An agreed upon modification to an existing contract.

Appropriation. Authorization by the City Council to expend budgeted funding for city operations and infrastructure, or other designated purposes.

Award. The acceptance of a bid or proposal; the presentation of a purchase agreement by the award authority to a bidder or offeror.

Award Authority. The governing body or staff person authorized to approve the purchase of goods and services on behalf of the city; the staff person(s) authorized to approve or execute procurement contracts and otherwise legally bind the city.

Best Value Procurement. A procurement that is awarded based on factors in addition to price. Best value procurements are mainly conducted through the competitive proposal process.

Bid Addendum. A bid addendum is a document issued to all known participants (“planholders”) in a competitive bid process that makes a change to the bid documents/project (i.e., changes to specifications), or process (like a bid due date extension).

Bid Opening. The process in which sealed bids are publicly opened, in the presence of at least one witness, at the time and place specified in the invitation for bids.

Blanket Purchase Order (BPO). A limited-term contract for goods and/or services based on unit pricing, typically for one-year renewable periods. BPOs may be established with indefinite quantities, allowing end users flexibility to order products when needed, or for on-call services.

Change Order. A contract modification consisting of additions or reductions in work or materials approved by the City Council or purchasing coordinator.

Commodity. Goods consisting of supplies, materials and equipment.

Competitive Bidding. The process of soliciting and obtaining formal and informal bids, including price quotations, from competing sources, by which an award is made to the lowest responsive and responsible bidder.

Competitive Proposals. The process of soliciting and obtaining formal and informal proposals from competing sources, by which an award is made to the proposer whose solution provides the best value to the city. The award may be made based on factors in addition to price, e.g., a higher price can be paid for goods and/or services if the value can be justified.

Conflict of Interest. A conflict of interest in conjunction with a city purchase is a situation where an employee or a member of the employee's family stands to benefit financially from the procurement.

Contract. See Agreement.

Cooperative Procurements. A variety of arrangements whereby two or more public entities purchase goods and/or services from the same supplier or multiple suppliers using a single competitive bid or proposal; the combining of the requirements of two or more public entities to leverage the benefits of volume purchases, including administrative savings and other demonstrable advantages.

Design-build. A public works contracts procurement method in which both the design and construction of a project are procured from a single entity.

Design-build contract. A public works contracts equal to or in excess of one million dollars (\$1,000,000) for a project to be constructed using a design-build process.

Design-build entity. A partnership, corporation or other legal entity that provides licensed contracting, architectural or engineering services for a design-build contract.

Design professional. A professional, either City staff or an outside consultant licensed by the State of California, who develops the criteria package which may include, but is not limited to, facility program, design criteria, performance specifications and other project-specific technical materials.

Encumbrance. An accounting entry that commits an appropriated dollar amount to be spent.

Formal Sealed Bid. A procurement method for goods and/or services anticipated to be greater than \$100,000 whereby sealed Invitations for Bids (IFBs) are submitted and publicly opened, with a contract awarded to the lowest responsive and responsible bidder.

Formal Sealed Proposal. A procurement method for goods and/or services anticipated to be greater than \$100,000 whereby sealed Requests for Proposals (RFPs) or similar proposal documents are submitted and reviewed by an evaluation committee based on established criteria, with a contract awarded to the responsive and responsible proposer whose solution provides the best overall value to the city.

General Services. Work performed or services rendered by independent contractors such as custodial services, building and equipment maintenance, machinery and equipment rental, and utility services, excluding contracts for public works.

Goods. Supplies, materials and equipment to be furnished or used by any department of the city, including items purchased by the city and furnished to contractors for use in public works projects.

Informal Bid or Proposal. Competitive bids or proposals anticipated to be \$100,000 or less conducted under informal procurement procedures.

Invitation for Bids (IFB). The type of bid document typically used in a competitive (formal) sealed bidding process. Components include but may not be limited to a bid invitation, instructions to bidders, bid schedule(s), terms and conditions and technical specifications.

Job Order Contract. As-needed contracts for small construction or maintenance projects and/or for urgent or emergency repairs where time is of the essence. These types of contracts are bid on a unit cost basis and awarded based on not-to-exceed amounts approved by the appropriate award authority. Job Order Contracts may be established as Master Agreements.

Local Purchasing Preference. A 5% bid preference granted to local bidders whose principal place of business is located within city limits, subject to policy limitations.

Lowest Responsive and Responsible Bidder. The bidder to be awarded a contract who fully complies with all material bid requirements, whose past performance and financial capacity is determined to be acceptable and has offered the lowest price.

Master Agreement. A contract that is awarded to multiple qualified providers pursuant to a primary agreement with a standard set of terms and conditions, typically created under a competitive proposal process. Once established, services are distributed among providers with discrete project work negotiated through task orders; also referred to as Master Service Agreements (MSA) or Master Professional Service Agreements (MPSA).

Piggybacking. A form of intergovernmental cooperative purchasing whereby the city utilizes the contract pricing and terms of another government agency.

Prevailing Wages. The wage rates, including fringe benefits, paid to a majority of workers in a geographic area for the same type of work on similar projects as established by the California Department of Industrial Relations.

Professional Services. Services provided by a person or firm engaged in a profession based on highly specialized and/or technical knowledge or skill; services considered distinct and unique to such a degree that bidding may not be feasible, if appropriately justified and documented. Some examples include accountants, attorneys, artists, architects, engineers and physicians.

Public Works. The construction, alteration, repair, or improvement of any public structure, building, road, or other public improvement of any kind, including demolitions, and the construction and installation of drainage systems, lighting and signaling systems, sewer and water systems, and park and recreational facilities.

Purchasing Coordinator. Designated finance staff responsible for issuing bid #s, coordinating the issuance and opening of bids and proposals, reviewing requisitions, and issuing purchasing orders.

Purchase Order. A legally binding contract issued by purchasing staff to a vendor which includes the terms and conditions of a transaction.

Purchase Requisition. The document required to be submitted through the financial system to begin the procurement process. Purchase requisitions must be properly documented and approved for the procurement process to proceed.

Qualified list of design-build entities. A list of design-build entities selected based on a competitive selection process and who are determined to be qualified to act as a design-build entity for the City on public works projects equal to or in excess of one million dollars (\$1,000,000).

Ratification. The process by which an unauthorized purchase is approved or ratified by the appropriate award authority after-the-fact.

Request for Proposals (RFP). The solicitation document used to solicit proposals for goods and/or services from potential providers.

Request for Qualifications (RFQL). Also referred to as Requests for Statements of Qualifications (RSQ), this type of solicitation seeks to establish qualified applicants or pools of applicants for as-needed services, sometimes under Master Professional Service Agreements (MPSA); most commonly used for architectural and engineering services or other highly specialized consultants.

Request for Quotations (RFQ). The type of bid document used for obtaining competitive quotes through the informal procurement procedures.

Responsible Bidder. A bidder is considered responsible if they possess the demonstrated ability, capacity, experience and skill to provide the goods and/or services in accordance with the city's requirements; has a record of satisfactory or better performance under prior contracts with the city and other entities; and has complied with laws, regulations and guidelines governing prior or existing contracts.

Responsive Bidder. A person or entity who has submitted a bid which conforms in all material respects to a bid or proposal solicitation.

Single Source. A good or service that may be available from more than one source, but a compelling justification can be made to obtain the good or service from one particular vendor.

Sole Source. A situation where a good or service can only be obtained from one source due to its proprietary or specialized nature.

Specification. A precise description of the physical characteristics, quality, or desired outcomes of a commodity to be procured, which a supplier must be able to produce or deliver to be considered for award of a contract. There are two types of specifications: design and performance.

Standardization. The process to adopt one product or group of products to be used by the city, such as particular computer hardware or software.

Surplus Property. Supplies, materials, and equipment that is no longer used or has become obsolete, to be sold, exchanged or donated by the purchasing coordinator in accordance with policy provisions covering surplus property donations.

Wage Theft. Wage theft occurs when employers do not pay workers according to the law. Examples of wage theft include paying less than minimum wage, not paying workers overtime, not allowing workers to take meal and rest breaks, requiring off-the-clock work, or taking workers' tips.



City of Gilroy

STAFF REPORT

Agenda Item Title:

Approval of the Gilroy Tourism Business Improvement District (GTBID) Annual Report as Submitted by Visit Gilroy/California Welcome Center Gilroy for the Period of January 1, 2022 Through December 31, 2022

Meeting Date:

April 3, 2023

From:

Jimmy Forbis, City Administrator

Department:

Administration

Submitted By:

Bryce Atkins, Assistant to the City Administrator

Prepared By:

Bryce Atkins, Assistant to the City Administrator

STRATEGIC PLAN GOALS

Promote Economic Development Activities

RECOMMENDATION

Approve the Gilroy Tourism Business Improvement District (GTBID) annual report as submitted by Visit Gilroy/California Welcome Center Gilroy for the period of January 1, 2022 through December 31, 2022.

BACKGROUND

Visit Gilroy/California Welcome Center (VG/CWC) Gilroy Board of Directors representing the Gilroy Tourism Business Improvement District (GTBID) has submitted the attached report pursuant to Section 36650 of the Street and Highway Code. Effective in 2013, GTBID provides a steady and dedicated funding source to the (VG/CWC) through an assessment levied on lodging businesses within the GTBID boundaries.

ALTERNATIVES

None – This is an informational item.

Approval of the Gilroy Tourism Business Improvement District (GTBID) Annual Report as Submitted by Visit Gilroy/California Welcome Center Gilroy for the Period of January 1, 2022 Through December 31, 2022.

FISCAL IMPACT/FUNDING SOURCE

None – This is an informational item.

PUBLIC OUTREACH

This item was included in the publicly posted agenda for this meeting.

Attachments:

1. GTBID Annual Report for the Period of January 1, 2022 Through December 31, 2022.



To: Gilroy City Council

From: Gilroy Visitors Bureau, dba Visit Gilroy Board of Directors
representing Gilroy Tourism Business Improvement District (GTBID)

Date: April 3, 2023

Subject: Gilroy Tourism Business Improvement District (GTBID) Report
for January 1, 2022 – December 31, 2022

Pursuant to Section 36650 of the Street and Highway Code, the Gilroy Tourism Business Improvement District (GTBID) is submitting the following report to the Gilroy City Council for approval and to be filed with the City Clerk.

The Management District Plan identifies the Gilroy Visitors Bureau, dba Visit Gilroy Board of Directors to serve as the Owner's Association for GTBID. The Owner's Association serves as a private, nonprofit entity that administers and implements the improvements, services, and activities of GTBID as specified in the Management District Plan.

Items 1 – 7 as identified in the Management District Plan Reporting Requirements:

1. Proposed changes in the boundaries, benefit zones or classification of business of GTBID	None.
2. Services, improvements, and activities provided for the period January 1, 2021 – December 31, 2021	Public relations, print ads, google adwords, social media campaigns, online marketing, trade shows, website support, research and google analytics
3. Cost of providing the services for this reporting period	Advertising and Marketing - \$295,335 Administration - \$63,458 City Collection Fee - \$7,181 Reserve/Renewal - \$2,500 Total Amount - \$368,474
4. Any proposed changes to basis and method of levying the assessments	None. The GTBID annual assessment rate is 2% of Taxable Rates, as stated



	on the City's Quarterly Transient Occupancy Tax Reporting Form.
5. Method and basis of levying assessments collected for the reporting period	The city receives the assessment revenue along with the quarterly TOT collections from each business located in the boundaries of the GTBID. The city then forwards the assessments to Gilroy Visitors Bureau, dba Visit Gilroy to manage and implement the GTBID programs.
6. Amount of any surplus revenues to be carried over from reporting period	\$79,00
7. Amount of any contributions to be made from sources other than the assessments levied	None.

2022 Strategic Marketing Plan Results

Smart Targets	2021 Actual	2022 Goals	2022 Actual
Website Pageviews	249,584	232,996	247,064
Website Total Sessions	172,207	158,623	160,267
Website Users	138,681	132,113	135,827
Hotels Page Pageviews	15,792	16,895	19,304
Hotel Page Conversions	35.80%	54.82%	30.57%
Collateral Downloads	3,577	3,333	3,945



Submissions to CCTC	16	16	17
Submissions to Visit CA	25	20	24

Gilroy Tourism Business Improvement District (GTBID)

Business Assessee Listing

<i>Hotel</i>	<i>Address</i>
Days Inn	8292 Murray Avenue Gilroy, CA 95020
Budget Motels/Whiterock	8897 Monterey Road Gilroy, CA 95020
Garlic Farm Inn	5920 Travel Park Circle Gilroy, CA 95020
Gilroy Inn	611 Leavesley Road Gilroy, CA 95020
Hilton Garden Inn	6070 Monterey Road Gilroy, CA 95020
Kings Rest Motel	8175 Monterey Road Gilroy, CA 95020
Best Western Plus Forest Park Inn	375 Leavesley Rd, Gilroy, CA 95020
Motel 6	6110 Monterey Road Gilroy, CA 95020
Travel Inn	5530 Monterey Road Gilroy, CA 95020
Oaks Motel	8065 Monterey Road Gilroy, CA 95020
Pacheco Pass	570 Old Gilroy Street Gilroy, CA 95020
Quality Inn & Suites	8430 Murray Avenue



	Gilroy, CA 95020
Hampton Inn	5975 Travel Park Cir, Gilroy, CA 95020
Comfort Inn	8435 San Ysidro Avenue Gilroy, CA 95020
Econo Lodge	360 Leavesley Rd, Gilroy, CA 95020

Gilroy Visitors Bureau dba Visit Gilroy P & L Budget Performance - TBID

	December 2022						Annual
	Dec 22	Budget	% of Budget	Jan - Dec 22	Budget	% of Budget	Budget
Ordinary Income/Expense							
Income							
80000 · TBID Income	92,614.71	81,250.00	113.99%	359,063.15	325,000.00	110.48%	325,000.00
Total Income	92,614.71	81,250.00	113.99%	359,063.15	325,000.00	110.48%	325,000.00
Gross Profit	92,614.71	81,250.00	113.99%	359,063.15	325,000.00	110.48%	325,000.00
Expense							
97010 · TBID Personnel/Administration							
97011 · TBID Executive Director	7,389.70	3,333.35	221.69%	54,090.42	40,000.00	135.23%	40,000.00
97014 · P/R Taxes & Simple IRA	334.05	366.65	91.11%	3,906.66	4,400.00	88.79%	4,400.00
97015 · Workers Compensation Ins	34.17	33.35	102.46%	384.20	400.00	96.05%	400.00
97019 · Auto/Mileage Expense	0.00	100.00	0.0%	526.69	1,200.00	43.89%	1,200.00
97016 · Accounting/Legal Expenses	258.50	200.00	129.25%	3,213.06	2,400.00	133.88%	2,400.00
97017 · Office Supplies	747.20	125.00	597.76%	1,337.03	1,500.00	89.14%	1,500.00
97018 · Miscellaneous Expenses	0.00	25.00	0.0%	0.00	300.00	0.0%	300.00
Total 97010 · TBID Personnel/Administration	8,763.62	4,183.35	209.49%	63,458.06	50,200.00	126.41%	50,200.00
97020 · TBID Collection Costs/City of G	1,852.29	1,625.00	113.99%	7,181.26	6,500.00	110.48%	6,500.00
97030 · TBID Reserve	625.00	1,625.00	38.46%	2,500.00	6,500.00	38.46%	6,500.00
97040 · TBID Advertising/Marketing							
97056 · Tourism Coordinator	2,870.10	2,708.35	105.97%	26,166.60	32,500.00	80.51%	32,500.00
97041 · Public Relations	587.92	1,500.00	39.2%	19,680.82	18,000.00	109.34%	18,000.00
97043 · Social Media/SEO Mgmt/Website	7,784.27	4,000.00	194.61%	78,900.58	48,000.00	164.38%	48,000.00
97044 · Collateral	0.00	833.35	0.0%	8,192.05	10,000.00	81.92%	10,000.00
97046 · Advertising	6,834.45	7,333.35	93.2%	107,454.48	88,000.00	122.11%	88,000.00
97047 · Research & Measurement	0.00	833.35	0.0%	2,231.10	10,000.00	22.31%	10,000.00
97048 · Marketing Services	991.13	1,500.00	66.08%	22,067.77	18,000.00	122.6%	18,000.00
97050 · Postage-VG Fullfillment Request	15.48	300.00	5.16%	1,366.04	3,600.00	37.95%	3,600.00
97052 · Conferences & Travel	0.00	416.65	0.0%	2,011.00	5,000.00	40.22%	5,000.00
97057 · Payroll Taxes	219.58	325.00	67.56%	2,104.30	3,900.00	53.96%	3,900.00
97058 · Health Insurance	0.00	400.00	0.0%	0.00	4,800.00	0.0%	4,800.00
97059 · Sales & Event Marketing	0.00	1,666.65	0.0%	25,160.84	20,000.00	125.8%	20,000.00
Total 97040 · TBID Advertising/Marketing	19,302.93	21,816.70	88.48%	295,335.58	261,800.00	112.81%	261,800.00
Total Expense	30,543.84	29,250.05	104.42%	368,474.90	325,000.00	113.38%	325,000.00

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**Gilroy Visitors Bureau dba Visit Gilroy
P & L Budget Performance - TBID**

	December 2022						Annual
	Dec 22	Budget	% of Budget	Jan - Dec 22	Budget	% of Budget	Budget
Net Ordinary Income	62,070.87	51,999.95	119.37%	(9,411.75)	0.00	100.0%	
Other Income/Expense							
Other Income							
89990 - TBID Interest Income	99.55			190.34			0.00
Total Other Income	99.55			190.34			0.00
Net Other Income	99.55			190.34			0.00
Net Income	<u>62,170.42</u>	<u>51,999.95</u>	<u>119.56%</u>	<u>(9,221.41)</u>	<u>0.00</u>	<u>100.0%</u>	<u>0.00</u>
Carried Forward from 2021				88,640.00			
Cumulative Net Income				<u>79,418.59</u>			

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City of Gilroy

STAFF REPORT

Agenda Item Title:	Adopt the 2022 Sewer System Master Plan
Meeting Date:	April 3, 2023
From:	Jimmy Forbis, City Administrator
Department:	Public Works
Submitted By:	Daryl Jordan, Public Works Director
Prepared By:	Michael Lewis, Management Analyst

STRATEGIC PLAN GOALS

Maintain and Improve City Infrastructure

RECOMMENDATION

Approve a resolution to adopt the 2022 Sewer System Master Plan.

BACKGROUND

Cities rely on sewer master plans to evaluate system capacity and conditions to provide comprehensive recommendations for replacements and improvements to their sewer system. The City last developed a Sewer System Master Plan in 2004 (2004 Master Plan) which identified capacity deficiencies in the existing sewer system and recommended improvements to alleviate existing deficiencies and serve future developments in the Gilroy Planning Area.

The City operates and maintains the sewer system covering most of the area within the City Limits, including the system that carries flows from the City of Morgan Hill to the regional South County Regional Water Authority (SCRWA) wastewater treatment plant (SCRWA WWTP). The City provides sewer collection services for approximately 17,000 residential, commercial, industrial, and institutional accounts. The City's collection system consists of approximately 167 miles of up to 60-inch gravity sewer pipes that convey flows toward the SCRWA WWTP. The City's sewer system consists of 163.13 miles of gravity sewers, 4,026 manholes, 0.16 miles of force mains, three (3) lift stations, and one (1) pump station.

The SCRWA WWTP is an 8.5 million gallons per day (MGD) Average Dry Weather Flow (ADWF) primary, secondary, and tertiary treatment facility. The treatment facility is

located at the end of Southside Dr. The original plant was completed in 1990 with a plant expansion in 2007 to provide the plant with current capacity and technology. The plant is currently operating at an average flow of 6.54 MGD with a low of approximately 4.78 MGD and a peak of approximately 10 MGD in 2019. The current expansion project will increase the current capacity of 6.54 MGD to 8.5 MGD.

The City Council approved Akel Engineering Group, Inc. to prepare the 2022 Master Plan and a concurrent Water System Master Plan and Storm Drainage Master Plan in August 2019. These documents were coordinated for consistency with the development of the City's 2040 General Plan.

The 2022 Master Plan includes detailed mapping of the sewer system and the development of a digital hydraulic model that can be used to project and evaluate the impacts of development and population growth.

ANALYSIS

The 2022 Master Plan evaluated the City's sewer collection system and recommended capacity improvements necessary to service the needs of existing users and the future growth of the City. This 2022 Master Plan is intended to serve as a tool for planning and phasing the construction of future sewer collection system infrastructure for the projected buildout of the City's service area. The area and horizon for this 2022 Master Plan is based on the City's 2040 General Plan.

The City Council authorized Akel Engineering Group, Inc. to perform the following tasks:

1. Summarize the City's existing sewer collection system facilities.
2. Document growth planning assumptions and known future developments.
3. Summarize the sewer system performance criteria and design storm event.
4. Project future sewer flows.
5. Update and validate the City's hydraulic model based on the City's Geographic Information Systems (GIS).
6. Evaluate the adequacy of capacity for the sewer collection system facilities to meet existing and projected peak dry weather flows and peak wet weather flows.
7. Recommend a Capital Improvement Program (CIP) with an opinion of probable construction costs.
8. Perform a capacity allocation analysis for cost sharing purposes.
9. Develop a 2022 Sewer System Master Plan Report.

RESULTS

The 2022 Sewer System Master Plan provided recommendations for improvements needed to mitigate existing deficiencies and expand the system to service future growth

identified in the 2040 General Plan. The recommended capital improvement program (Table 8.2) is attached as Attachment 1.

The Master Plan indicates that overall that the City's sewer system is in good condition but in need of improvements to mitigate some specific deficiencies and that future capacity projects will be development driven. Sixteen segments out of 34 potential projects of the previous master plan were constructed, totaling over \$2,530,000. Many of these projects were for the shared trunk line passing through the city with Morgan Hill. In total, the 2022 Master Plan recommends 15 pipeline improvement and replacement projects in six (6) sub-trunk systems. The list includes projects from the 2004 Master Plan that were not completed and new projects needed to accommodate future growth based on the updated Sewer System modeling. The projects identified will be added to the City's Capital Improvement Program and budget.

In total, the plan recommends seven capacity projects totaling nearly \$7.84 million and eight projects totaling \$4.88 million that will need to be constructed as the City adds more residential units. The cost allocation of the projects is broken up between Existing and Future users based on existing capacity needs and capacity need as more development occurs.

Sub-Trunk	Number of Replacement Projects	Number of New Projects	Cost Allocation to Existing Users	Cost Allocation to Future Users
Santa Teresa – Long Meadow	1	0	\$689,302	\$445,498
Welburn	2	0	\$1,246,051	\$127,049
Forest-Swanston	2	0	\$1,695,122	\$90,478
Old Gilroy	2	0	\$457,674	\$55,126
Uvas Park	5	1	\$1,858,470	\$3,019,230
Thomas	2	0	\$1,897,061	\$1,142,739
Total Cost			\$7,843,681	\$4,880,119

The master plan also includes a section identifying needed repairs to the Morgan Hill-Gilroy joint trunk line resulting from a recently completed condition assessment. The cost of the repairs that are needed will be split 50%/50% between the two cities. The priority repairs will be added to the Capital Improvement Program. The repairs identified for the trunk line include:

- Five Immediate Projects on Pipelines for a total of \$1,082,000
- Forty Immediate Projects on Manholes for a total of \$2,417,900
- Various Intermediate Projects on Pipelines for a total of \$16,916,800

ALTERNATIVES

Council may reject or modify the Adoption of the 2022 Sewer Master Plan. This option is not recommended due to the requirements to maintain the citywide sanitary sewer system.

FISCAL IMPACT/FUNDING SOURCE

The City has two sewer funds utilized to fund the capital improvements and the annual operational and maintenance needs. The Sewer Impact Fund, which collects revenues in the form of impact fees from developments that impact future growth, primarily funds infrastructure/capital costs attributable to future users for future capacity needs. The Sewer Operations fund funds the current annual operational, maintenance, and capital costs to repair and maintain existing infrastructure. The Sewer Impact (future users) and Sewer Operation (existing users) funds have a projected FY23 ending fund balance of \$15.7 million and \$20.0 million, respectively.

Of the total \$12.7 million capital improvements identified in the master plan, approximately \$7.8 million are attributable to existing users – to be funded by Sewer Operations Fund, and \$4.9 million are attributable to future users - to be funded by the Sewer Impact Fund. The 2024 Master Plan capital improvements are in addition to the existing capital improvements identified by staff.

While both funds have fund balances to fund the 2022 Master Plan's identified capital needs, a typical next step after the Master Plans are updated is to review and update the utility user fees, and the development impact fees to incorporate the identified existing and future growth capital improvements and adjust the fees accordingly to ensure capital and operational needs are adequately funded for a period. The City is undergoing a rate study for sewer user fees and will consider the projects contemplated in this Master Plan and the CIP to help determine the rate proposals in the next few months. Staff will plan to review and update the sewer impact fee as a project in the departmental workplan in the upcoming fiscal year.

NEXT STEPS

With Council adoption of the 2022 Master Plan, staff will incorporate the projects into the Capital Improvement Program and plan for delivering the proposed projects. State approval is not required.

Attachments:

1. Sewer System Master Plan – Attachment 1
2. Sewer System Master Plan Capital Improvement Program List
3. Sewer System Master Plan Draft Resolution



City of Gilroy

APRIL 2023

2023 Sewer System Master Plan



CITY OF GILROY

2023

SEWER SYSTEM MASTER PLAN

Final

March 2023

A K E L
ENGINEERING GROUP, INC.



Smart Planning Our Water Resources

March 28, 2023

City of Gilroy
7351 Rosanna Street
Gilroy, CA 95020

Attention: Gary Heap, P.E.
City Engineer

Subject: 2023 Sewer System Master Plan – Final Report

Dear Gary:

We are pleased to submit the final report for the City of Gilroy Sewer System Master Plan. This master plan is a standalone document, though it was prepared as part of the integrated infrastructure master plans for the water, sewer, and storm drainage master plans. The master plan documents the following:

- Existing collection system facilities, acceptable hydraulic performance criteria, and projected wastewater flows consistent with the Urban Planning Area
- Development and calibration of the City's GIS-based hydraulic sewer collection system model.
- Capacity evaluation of the existing sewer system with improvements to mitigate existing deficiencies and to accommodate future growth.
- Capital improvement program (CIP) with an opinion of probable construction costs and suggestions for cost allocations to meet AB 1600.

We extend our thanks to you, Sharon Goei, Community Development Director; Daryl Jordan, Director of Public Works; and other City staff whose courtesy and cooperation were valuable components in completing this study.

Sincerely,

AKEL ENGINEERING GROUP, INC.

Tony Akel, P.E.
Principal

Enclosure: Report



Acknowledgements

City Council

Marie Blankley, Mayor

Dion Bracco, Mayor Pro Tempore

Rebeca Armendariz

Tom Cline

Zach Hilton

Carol Marques

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Jorge Duran, P.E., Senior City Engineer

Sharon Goei, Community Development Director

Matt Jones, Deputy Director of Public Works

Other City Engineering, Planning, and Operations Staff

City of Gilroy Sewer System Master Plan

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- Appendix A Sanitary Sewer Flow Monitoring and Inflow/Infiltration Study, 2014 (V&A)
- Appendix B Hydraulic Model Calibration Exhibits
- Appendix C Joint Trunk Condition Assessment Report

EXECUTIVE SUMMARY

This executive summary presents a brief background of the City of Gilroy's (City) sewer collection system, the planning area characteristics, the planning and design criteria, and the hydraulic model development.

The hydraulic model was used to evaluate the capacity adequacy of the existing sewer collection system and for recommending improvements to mitigate existing deficiencies and for servicing future growth. The prioritized capital improvement program accounts for growth through the Gilroy Planning Area.

ES.1 STUDY OBJECTIVES

Recognizing the importance of planning, developing, and financing system facilities to provide reliable sewer collection system service to existing customers and for servicing anticipated growth within the sphere of influence, the City initiated the 2023 Sewer System Master Plan.

The City of Gilroy authorized Akel Engineering Group Inc. to complete the following tasks:

- Summarize the City's existing sewer collection system facilities.
- Document growth planning assumptions and known future developments.
- Summarize the sewer system performance criteria and design storm event.
- Project future sewer flows.
- Update and validate the City's hydraulic model based on the City's Geographic Information Systems (GIS).
- Evaluate the adequacy of capacity for the sewer collection system facilities to meet existing and projected peak dry weather flows and peak wet weather flows.
- Recommend a capital improvement program (CIP) with an opinion of probable construction costs.
- Perform a capacity allocation analysis for cost sharing purposes.
- Develop a 2023 Sewer System Master Plan Report.

ES.2 INTEGRATED APPROACH TO MASTER PLANNING

The City implemented an integrated master planning approach and contracted the services of Akel Engineering Group to prepare the following documents:

- 2023 Water System Master Plan

- 2023 Sewer System Master Plan
- 2023 Storm Drainage System Master Plan

While each of these reports is published as a standalone document, it has been coordinated for consistency with the City's General Plan. Additionally, each document has been cross referenced to reflect relevant analysis results with the other documents.

ES.3 STUDY AREA DESCRIPTION

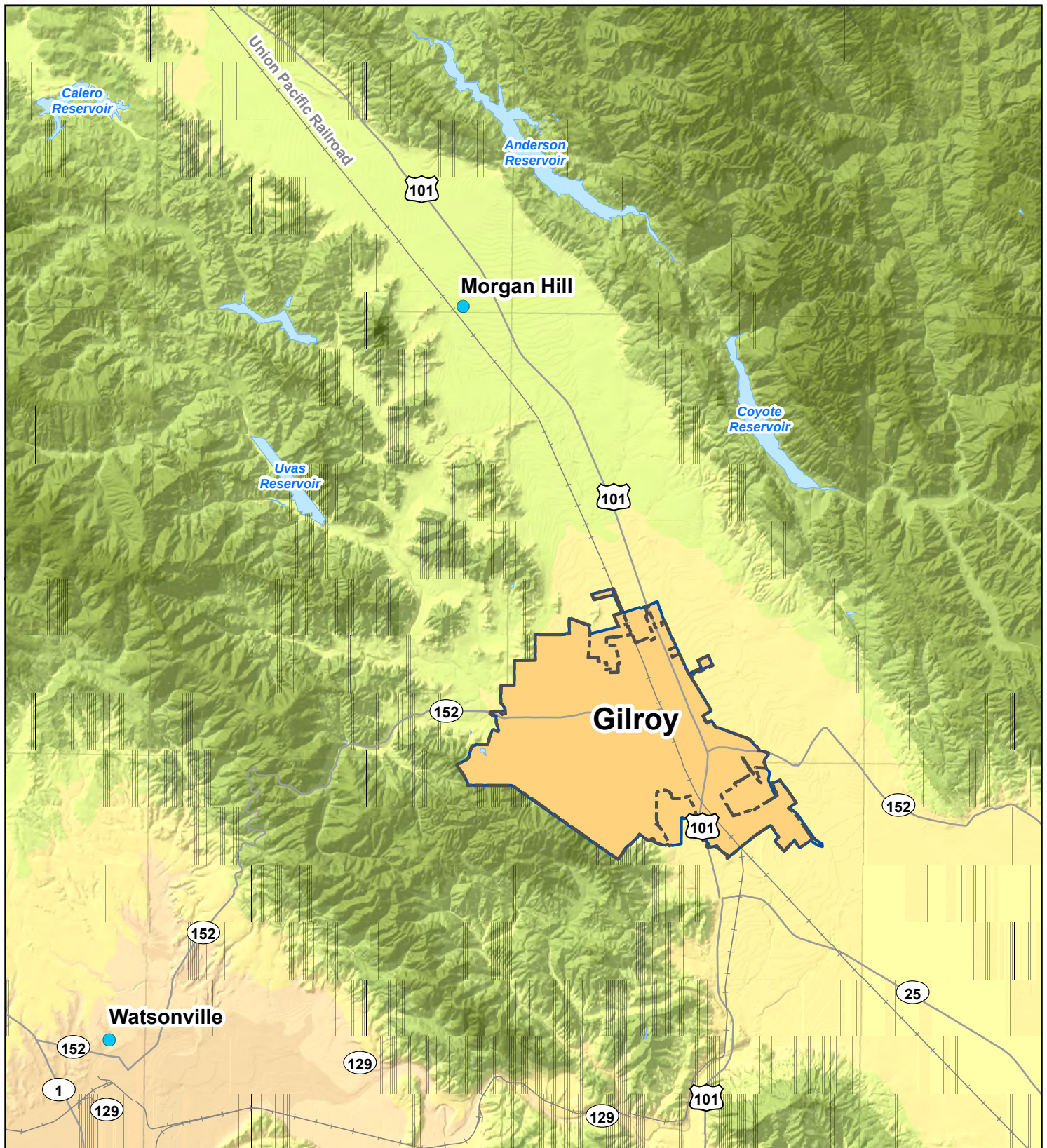
The City of Gilroy is located in Santa Clara County near the west coast of California, south of City of San Francisco. The City of Gilroy lies within the seismically active region of San Francisco Bay. The City of Gilroy lies in the southern portion of the Santa Clara County and is the most southern City located within the county. The City is located approximately 32 miles southeast of the City of San Jose, 8 miles southeast of Morgan Hill, 25 miles east of City of Santa Cruz, and 16 miles northwest of City of Hollister. The City limits currently encompass 16.5 square miles, with an approximate population of 56,599 residents, according to Department of Finance as of January 2021. [Figure ES.1](#) displays the City's location.

The City's service area is generally bound to the north by Fitzgerald Avenue, to the northeast by San Ysidro Avenue, to the southeast by Camino Arroyo, to the west by Burchell Road and Rancho Vista Drive, and to the south by Carnadero Avenue. U.S. Route 101 divides the City in a southeast to northwest direction and the California State Route 152 (Hecker Pass Hwy) runs east-west direction in the northern half of the City. The topography is generally flat in the middle of the service area, with increasing slopes in the east and west side of the City due to the Santa Cruz Mountains to the west and the Diablo Range to the east. [Figure ES.2](#) displays the planning area showing City limits, the Urban Growth Boundary (UGB) of the City and Planning Area / Sphere of Influence (SOI).

The City operates and maintains a sewer collection system that covers the majority of the area within the City Limits and the City of Morgan Hill. Currently, the sewer flows are conveyed to the South County Regional Wastewater Authority (SCRWA) Wastewater Treatment Plant (WWTP).

ES.4 SYSTEM PERFORMANCE AND DESIGN CRITERIA

Gravity sewer capacities depend on several factors including: material and roughness of the pipe, the limiting velocity and slope, and the maximum allowable depth of flow. The hydraulic modeling software used for evaluating the capacity adequacy of the City's sewer collection system, InfoSWMM by Innovyze Inc., utilizes the fully dynamic St. Venant's equation which has a more accurate engine for simulating backwater and surcharge, in addition to manifolded force mains. The software also incorporates the use of the Manning Equation in other calculations including upstream pipe flow conditions.



Legend

- Cities
 - Study Area
 - City Limits
 - Urban Growth Boundary
 - Highway
 - Railroads
- | Elevation (ft) | |
|----------------|---------------|
| | 9 - 50 |
| | 51 - 100 |
| | 101 - 250 |
| | 251 - 500 |
| | 501 - 1,000 |
| | 1,001 - 2,000 |
| | 2,001 - 3,000 |
| | 3,001 - 3,792 |
- ~ Waterbodies

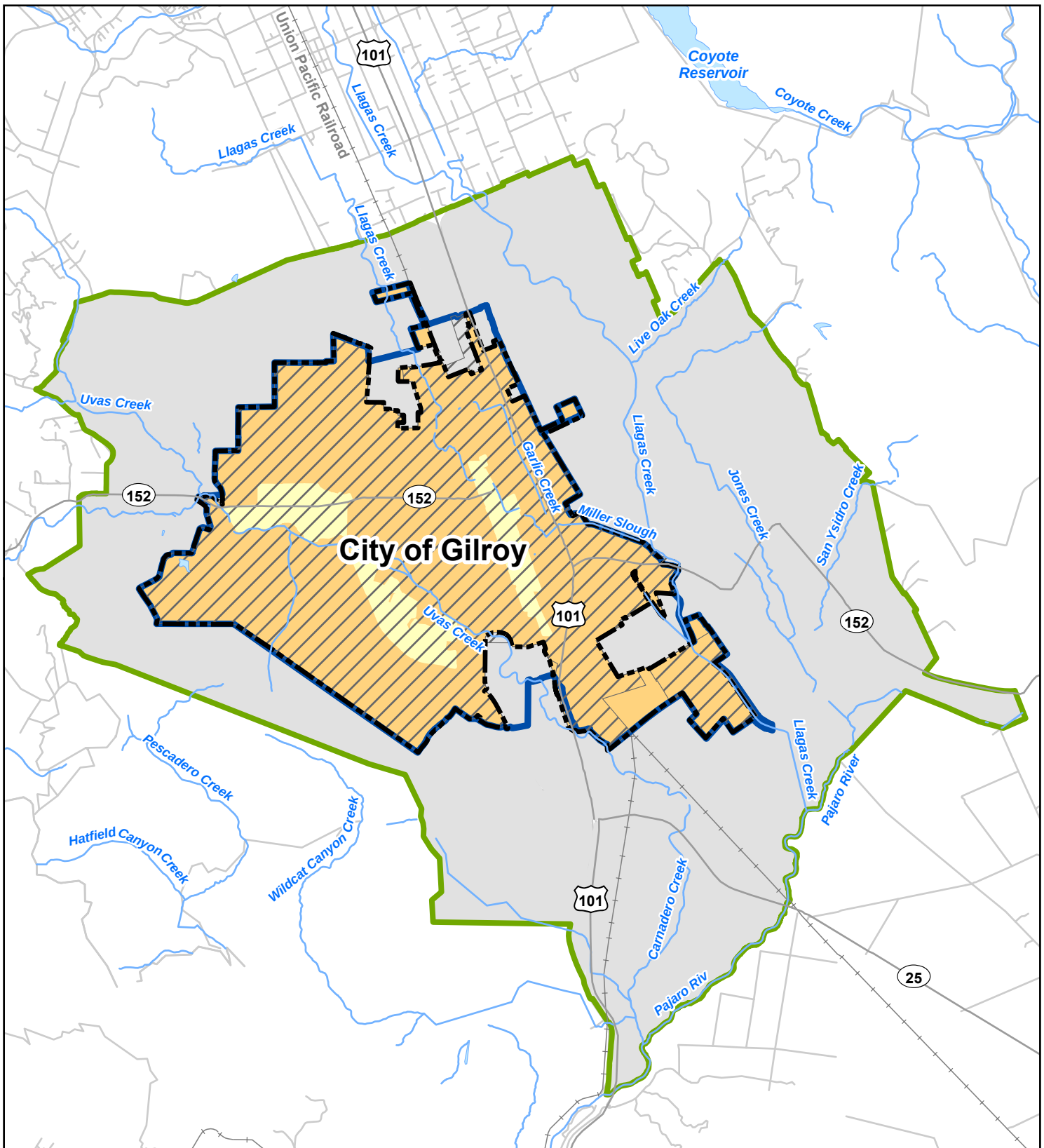
Updated: September 21, 2020

0 0.5 1 2 Miles



Figure ES.1
Regional Location Map
 Sewer System Master Plan
 City of Gilroy





Legend

- | | | | |
|--|------------------------------|---|-------------------|
|  | City Limits |  | General Plan Area |
|  | City Limits Area | | Roads |
|  | Specific Plan Areas | | Highways |
|  | Urban Service Area |  | Railroads |
|  | Urban Growth Boundary |  | Rivers & Creeks |
|  | Sphere of Influence Boundary |  | Waterbodies |

Updated: September 21, 2020

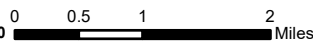


Figure ES.2
Planning Area
Sewer System Master Plan
City of Gilroy



Partial Flow Criteria (d/D)

Partial flow in gravity sewers is expressed as a depth of flow to pipe diameter ratio (d/D). For circular gravity conduits, the maximum capacity is generally reached at 92 percent of the full height of the pipe (d/D ratio of 0.92). This is due to the additional wetted perimeter and increased friction of a gravity pipe.

When designing sewer pipelines, it is common practice to use variable flow depth criteria that allow higher safety factors in larger sizes. Thus, design d/D ratios may range between 0.5 and 0.92, with the lower values used for pipes with smaller diameters. These smaller pipes may experience flow peaks greater than planned or may experience blockages from debris. The City's design standards pertaining to the d/D criteria are summarized in [Table ES.1](#).

During peak dry weather flows (PDWF), the maximum allowable d/D ratio for proposed pipes (all diameters) is 0.75. The maximum allowable d/D ratio for all existing pipes (all diameters) is 0.90. The criterion for existing pipes is relaxed in order to maximize the use of the existing pipes before costly pipe improvements are needed.

During peak wet weather flows (PWPF), to avoid premature or unnecessary trunk line replacements, the capacity analysis allowed the d/D ratio to exceed the dry weather flow criteria and surcharge. This condition is evaluated using the dynamic hydraulic model and the criteria listed on [Table ES.1](#), which stipulates that the hydraulic grade line (HGL), even during a surcharged condition, should be at least three feet below the manhole rim elevation.

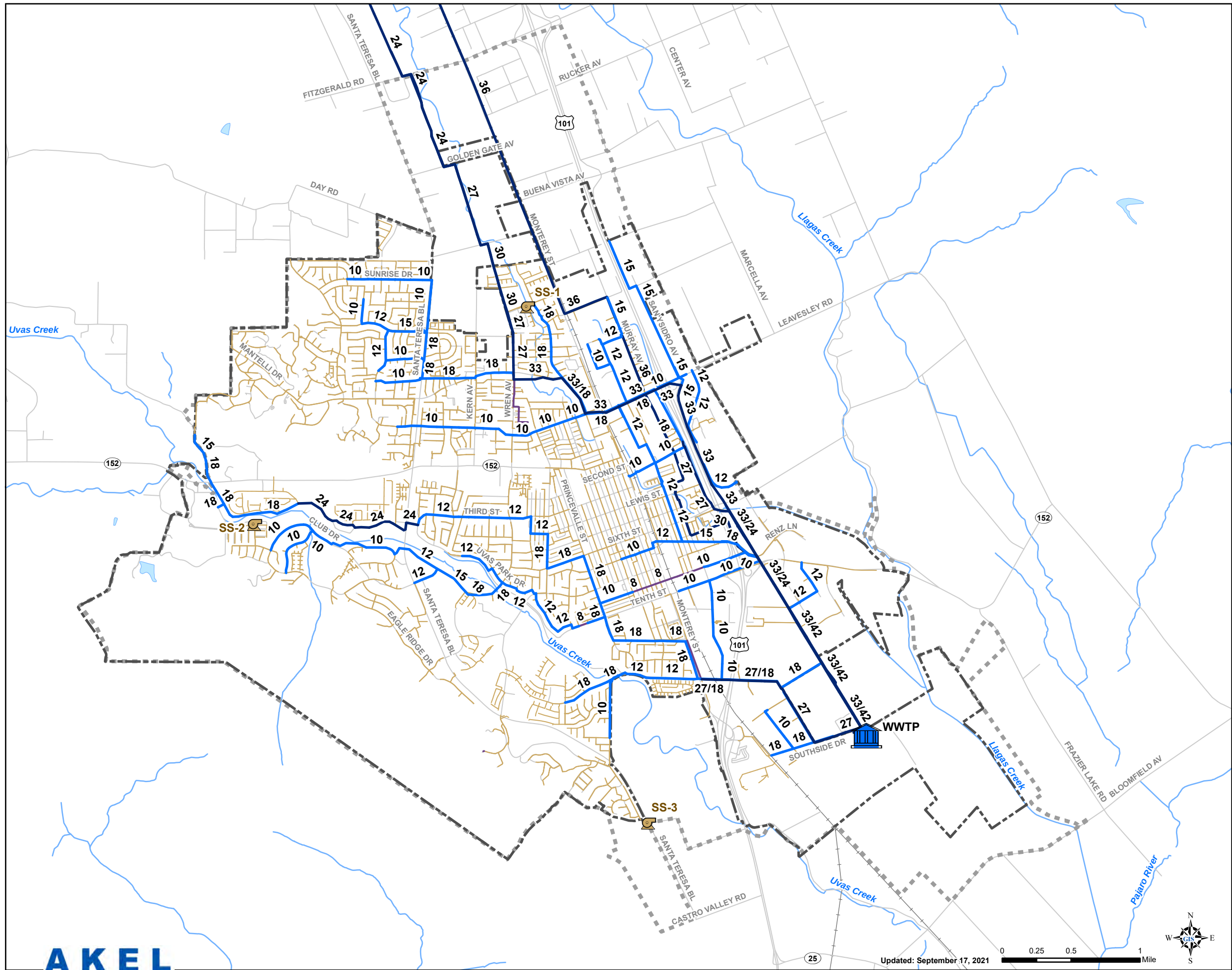
ES.5 EXISTING SEWER COLLECTION SYSTEM OVERVIEW

The City provides sewer collection services to approximately 17,000 residential, commercial, industrial, and institutional accounts. The City's collection system consists of approximately 167 miles of up to 60-inch gravity sewer pipes that convey flows towards the SCRWA WWTP, on Southside Drive, as shown on [Figure ES.3](#).

A system-wide pipe inventory, listing the total length by pipe diameter, is shown on [Table ES.2](#). This table is based on information extracted from the City's GIS and was updated to reflect the review of construction drawings provided by City Staff. The 8-inch and 12-inch diameter pipes account for 68 percent of the total sewer pipe lengths.

ES.6 SEWER FLOWS

The sewer flows collected and treated at the SCRWA WWTP vary monthly, daily, and hourly. While the dry weather flows are influenced by customer uses, the wet weather flows are influenced by the severity and length of storm events and the condition of the system.



Legend

Modeled Gravity Pipes by Size

- 8" or Smaller
- 10" - 18"
- 24" or Greater

Non-Modeled System

- Lift Station
- Non-Modeled Pipes
- Roads
- Railroads
- City Limits
- Urban Growth Boundary
- Rivers & Creeks
- Waterbodies

Figure ES.3
Existing Sewer
Collection System
Sewer System Master Plan
City of Gilroy



Table ES.1 Sewer System Performance and Design Criteria
 Sewer System Master Plan
 City of Gilroy

Pipeline Criteria				
Peak Dry Weather Flow Criteria				
Existing Sewer Trunks: Maximum allowable d/D of 0.90				
Proposed Sewer Trunks: Maximum allowable d/D of 0.75				
Peak Wet Weather Flow Criteria				
Hydraulic Grade Line (HGL) should be at least 3 foot below the manhole rim				
Pipe Size	Suggested Master Plan Criteria		City of Gilroy General Guidelines ¹	
	Minimum Grade (Velocity = 2.0 ft/s)	Minimum Capacity (n= 0.013)	Minimum Grade (Velocity = 2.5 ft/s)	Minimum Capacity (n= 0.013)
	(in)	(ft/ft)	cfs	(ft/ft)
8	0.0026	0.55	0.0077	0.00
10	0.0019	0.87	0.0057	0.82
12	0.0015	1.23	0.0022	1.29
15	0.0011	1.98	0.0015	1.58
18	0.0009	2.75	0.0012	2.46
21	0.0007	3.76	0.0010	3.54
24	0.0006	5.05	0.0008	4.82
27	0.0005	6.47		
30	0.0004	7.94		
33	0.0004	9.34		
36	0.0004	11.78		
42	0.0003	15.90		
Lift Station Criteria				
Lift Stations: When permitted by City Engineer. Firm Capacity to meet Peak Wet Weather Flow.				

Notes:

1. Source: City of Gilroy General Guidelines, August 2014.

Table ES.2 Existing Sewer Pipe Inventory
 Sewer System Master Plan
 City of Gilroy

Pipe Size (in)	Length	
	(feet)	(miles)
City Pipes		
≤6 ²	154,358	29.2
8	463,234	87.7
10	81,809	15.5
12	58,195	11.0
14	327	0.1
15	16,330	3.1
16	136	0.03
18	43,284	8.2
24	13,447	2.5
27	12,542	2.4
30	914	0.2
42	5,810	1.1
48	375	0.1
Total	850,760	161.1
Joint Trunk Pipes³		
21	202	< 0.1
24	5,679	1.1
27	4,407	0.8
30	2,776	0.5
33	22,132	4.2
42	246	< 0.1
60	96	< 0.1
Total	35,537	6.7
		

5/20/2021

Notes:

1. Source: GIS Received from City staff on September 10, 2020.
2. Includes pipelines of unknown diameter.
3. Indicates Joint Trunk pipelines south of intersection at Fitzgerald Avenue and Monterey Road.

Flow data influent to the SCRWA WWTP was obtained from City operation staff. The flow data covered a period from 2010 to 2019. From this data monthly, daily, and peak daily flows, were determined.

The land use methodology was used to estimate the buildout flows from the City's Planning Area and to be consistent with the General Plan. The undeveloped lands were multiplied by the corresponding unit flow factor to estimate the sewer flows. The buildout average daily flows were calculated at 7.06 MGD.

ES.7 HYDRAULIC MODEL DEVELOPMENT AND CALIBRATION

The City's hydraulic model combines information on the physical characteristics of the sewer collection system (pipelines, manholes, and diversions) and operational characteristics (how they operate). The hydraulic model then performs calculations and solves series of equations to simulate flows in pipes, including backwater calculations for surcharged conditions.

There are several network analysis software products released by different manufacturers that can equally perform the hydraulic analysis satisfactorily. The selection of a particular software depends on user preferences, the sewer collection system's unique requirements, and the costs for purchasing and maintaining the software.

The hydraulic modeling software used for evaluating the capacity adequacy of the City's sewer collection system, InfoSWMM by Innovyze Inc., utilizes the fully dynamic St. Venant's equation which has a more accurate engine for simulating backwater and surcharge conditions, in addition to having the capability for simulating manifolded force mains. The software also incorporates the use of the Manning Equation in other calculations including upstream pipe flow conditions. The St Venant's and Manning's equations are discussed in the System Performance and Design Criteria chapter.

Model Development

The hydraulic model for the City of Gilroy was skeletonized to include the pipelines essential to the hydraulic analysis.

Skeletonizing the model refers to the process where pipes not essential to the hydraulic analysis of the system are stripped from the model. Skeletonizing the model is useful in creating a system that accurately reflects the hydraulics of the pipes within the system. In addition, skeletonizing the model will reduce both the complexities of large models and the time of analysis while maintaining accuracy, but will also comply with the limitations imposed by the computer program.

In the City of Gilroy's case, skeletonizing was necessary to reduce the model from approximately 4,529 pipes extracted from the GIS to 657 pipes. The modeled pipes included pipes 8-inches in diameter and larger, in addition to some critical smaller gravity sewer pipes. The inventory pipelines included in the hydraulic model are approximately 23.5 percent of the overall system.

Model Calibration

Calibration can be performed for steady state conditions, which model the peak hour flows, or for dynamic conditions (24 hours or more). Dynamic calibration consists of comparing the model predictions to diurnal operational changes in the wastewater flows. The City's hydraulic model was calibrated for dynamic conditions.

In sewer collection systems, and when using dynamic hydraulic modeling to evaluate the impact of wet weather flows, it is common practice to calibrate the model to the following three conditions:

- Peak dry weather flows on a weekday and a weekend.
- Peak wet weather flows from storm rainfall Event No. 1 (February 26 2014 – February 27 2014)
- Peak wet weather flows from storm rainfall Event No. 2 (February 28 2014 – March 1 2014).

After the model is calibrated to these conditions, it is benchmarked and used for evaluating the capacity adequacy of the sewer collection system, under dry and wet weather conditions.

The hydraulic model is a valuable investment that will continue to prove its worth to the City as future planning issues or other operational conditions surface. It is recommended that the model be maintained and updated with new construction projects to preserve its integrity.

ES.8 CAPACITY EVALUATION

The system performance and design criteria were used as a basis to judge the adequacy of capacity for the existing sewer collection system. The design flows simulated in the hydraulic model for existing conditions are listed as follows:

- Existing PDWF = 8.79 MGD
- Existing PWWF = 13.81 MGD

During the peak dry weather simulations, the maximum allowable pipe d/D criteria for new pipes (d/D ratio of 0.75) was used. For existing pipes, the criteria was relaxed to allow a maximum d/D ratio of 0.90 (full pipe capacity) to prevent unnecessary pipe replacements. During the peak wet weather simulations, capacity deficiencies included pipe segments with a hydraulic grade line (HGL) that rises within three feet of the manhole rim elevation.

In general, the hydraulic model indicated that the sewer collection system exhibited acceptable performance to service the existing customers during peak dry weather flows and peak wet weather flows. Future flows were then added to the hydraulic model and the existing system was

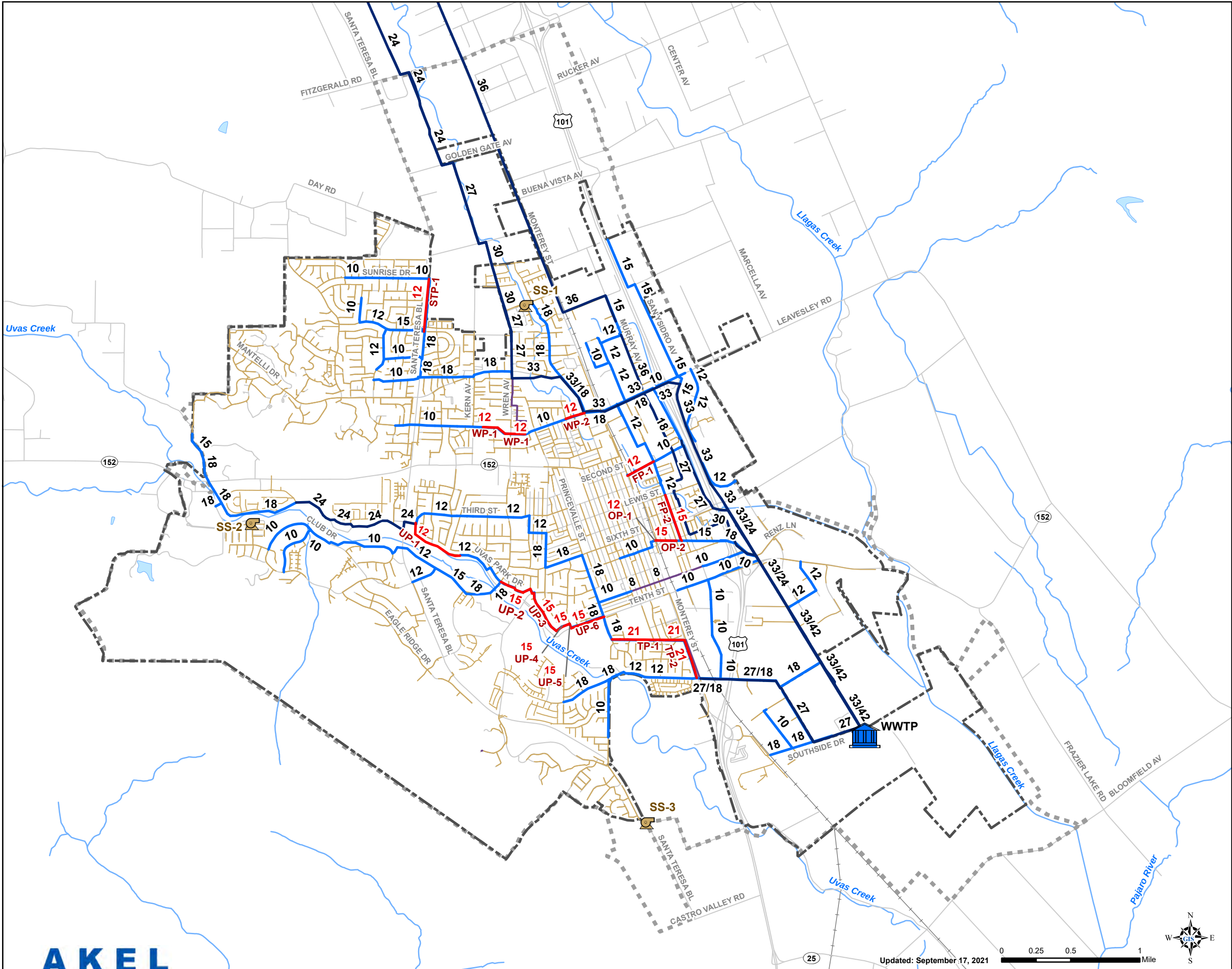
expanded in order to serve these future customers. The proposed improvements for the future system are shown with pipe sizes on an overall exhibit on [Figure ES.4](#).

ES.9 CAPITAL IMPROVEMENT PROGRAM

The Capital Improvement Program includes pipeline improvements recommended in this master plan ([Table ES.4](#)). Each improvement was assigned a uniquely coded identifier associated with its tributary area. The baseline costs for pipelines and lift stations are shown in [Table ES.2](#). Improvements are shown in [Figure ES.4](#).

The estimated costs include the baseline costs plus 30 percent contingency allowance to account for unforeseen events and unknown field conditions. Capital improvement costs include the estimated construction costs plus 30 percent project related costs (engineering design, project administration, construction management and inspection, and legal costs).

The costs in this Sewer System Master Plan were benchmarked using a 20-City national average ENR CCI of 13,176, reflecting a date of March 2023. In total, the CIP includes approximately 3.9 miles of gravity main improvements with a cost totaling over 12.7 million dollars.



Legend

Improvement Pipes

Modeled Gravity Pipes by Size

- 8" or Smaller
- 10" - 18"
- 24" or Greater

Non-Modeled System

- Lift Station
- Non-Modeled Pipes
- Roads
- Railroads
- City Limits
- Urban Growth Boundary
- Rivers & Creeks
- Waterbodies

Note:
WP-1 and WP-2 should be completed at the same time, the existing 10-inch in the middle may be reassessed and replaced depending on pipeline condition and age.

Figure ES.4
Capital Improvement Program
Sewer System Master Plan
City of Gilroy



Table ES.3 Unit Costs

Sewer System Master Plan
City of Gilroy

Pipelines	
Pipe Size	Improvement Type Unit Cost
	New/Parallel/Replacement
(in)	(\$/unit length)
8	259
10	289
12	332
15	360
18	389
21	418
24	475
27	535
30	594
36	713
Pipeline Casings	
23\$ per inch diameter per linear foot	

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3/28/2023

Notes :

1. Unit costs are based on an ENR CCI Index Value of 13,176 (March 2023).

Table ES.4 Capital Improvement Program
Sewer System Master Plan
City of Gilroy

Improv. No.	Type of Improvement	Alignment	Limits	Pipeline Improvements		Infrastructure Costs				Baseline Constr. Costs ¹	Estimated Const. Costs ²	Capital Improv. Cost ³	Construction Trigger	Suggested Cost Allocation		Cost Allocation	
				Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost					Existing Users	Future Users	Existing Users	Future Users
				(in)		(in)	(ft)	(\$)	(\$)	(\$)	(\$)	(\$)	(ppm)	(%)	(%)	(\$)	(\$)
Gravity Main Improvements																	
Santa Teresa - Long Meadow Subtrunk																	
SLP-1	Gravity Main	Santa Teresa Blvd	From Sunrise Dr to Longmeadow Dr	10	Replacement	12	2,025	332	671,321	671,400	872,900	1,134,800	954 EDU	61%	39%	689,302	445,498
Subtotal - Santa Teresa - Long Meadow Subtrunk										671,400	872,900	1,134,800				689,302	445,498
Welburn Subtrunk																	
WP-1	Gravity Main	Welburn Ave	From Chiesa Dr to Aspen Wy	10	Replacement	12	1,700	332	563,578	563,600	732,700	952,600	Existing Deficiency	90%	10%	861,520	91,080
WP-2	Gravity Main	Welburn Ave	From Church St to Hanna St	10	Replacement	12	750	332	248,637	248,700	323,400	420,500	Existing Deficiency	91%	9%	384,531	35,969
Subtotal - Welburn Subtrunk										812,300	1,056,100	1,373,100				1,246,051	127,049
Forest-Swanston Subtrunk																	
FP-1	Gravity Main	loof Ave	From Monterey Rd to Forest Ave	10	Replacement	12	1,150	332	381,244	381,300	495,700	644,500	Existing Deficiency	93%	7%	601,483	43,017
FP-2	Gravity Main	Forest St	From Lewis St to Old Gilroy St	12	Replacement	15	1,875	360	675,064	675,100	877,700	1,141,100	Existing Deficiency	96%	4%	1,093,639	47,461
Subtotal - Forest-Swanston Subtrunk										1,056,400	1,373,400	1,785,600				1,695,122	90,478
Old Gilroy Subtrunk																	
OP-1	Gravity Main	Old Gilroy St	From 75' w/o Railroad St to Railroad St	10	Replacement	12	100	332	33,152	33,200	43,200	56,200	Existing Deficiency	89%	11%	50,159	6,042
OP-2	Gravity Main	Old Gilroy St	From Railroad St to Forest St	12	Replacement	15	750	360	270,026	270,100	351,200	456,600	Existing Deficiency	89%	11%	407,516	49,085
Subtotal - Old Gilroy Subtrunk										303,300	394,400	512,800				457,674	55,126
Uvas Park Subtrunk																	
UP-1	Gravity Main	Uvas Park Dr	From 3rd St to 350 ft e/o Santa Barbara Dr	-	New	12	2,375	332	787,352	787,400	1,023,700	1,330,900	Existing Deficiency	39%	61%	517,772	813,128
UP-2	Gravity Main	Hoxett St / ROW	From Wren Ave to Miller Ave	12	Replacement	18	1,550	389	602,255	602,300	783,000	1,017,900	2,020 EDU	36%	64%	370,355	647,545
UP-3	Gravity Main	Yorktown Dr	From Miller Ave to Greenwich Dr	12	Replacement	18	1,725	389	670,252	670,300	871,400	1,132,900	1,923 EDU	38%	62%	427,260	705,640
UP-4	Gravity Main	Greenwich Dr	From Yorktown Dr to Orchard Dr	12	Replacement	18	575	389	223,417	223,500	290,600	377,800	2,152 EDU	38%	62%	145,055	232,745
UP-5	Gravity Main	Orchard Dr	From Greenwich Dr to W 10th St	12	Replacement	18	200	389	77,710	77,800	101,200	131,600	2,401 EDU	39%	61%	51,307	80,293
UP-6	Gravity Main	W 10th St	From Orchard Dr to Princeville St	12	Replacement	18	1,350	389	524,545	524,600	682,000	886,600	3,085 EDU	39%	61%	346,721	539,879
Subtotal - Uvas Park Subtrunk										2,885,900	3,751,900	4,877,700				1,858,470	3,019,230
Thomas Subtrunk																	
TP-1	Gravity Main	London Pl	From Monterey Rd to Princeville St	18	Replacement	21	2,775	418	1,160,665	1,160,700	1,509,000	1,961,700	5,873 EDU	62%	38%	1,224,966	736,734
TP-2	Gravity Main	Monterey Rd	From Luchessa Ave to London Pl	18	Replacement	21	1,525	418	637,843	637,900	829,300	1,078,100	5,303 EDU	62%	38%	672,095	406,005
Subtotal - Thomas Subtrunk										1,798,600	2,338,300	3,039,800				1,897,061	1,142,739
Total Costs																	
Subtotal - Santa Teresa - Long Meadow Subtrunk										671,400	872,900	1,134,800				689,302	445,498
Subtotal - Welburn Subtrunk										812,300	1,056,100	1,373,100				1,246,051	127,049
Subtotal - Forest-Swanston Subtrunk										1,056,400	1,373,400	1,785,600				1,695,122	90,478
Subtotal - Old Gilroy Subtrunk										303,300	394,400	512,800				457,674	55,126
Subtotal - Uvas Park Subtrunk										2,885,900	3,751,900	4,877,700				1,858,470	3,019,230
Subtotal - Thomas Subtrunk										1,798,600	2,338,300	3,039,800				1,897,061	1,142,739
Total Improvement Costs										7,527,900	9,787,000	12,723,800				7,843,681	4,880,119



3/28/2023

Notes :

1. Cost estimates are based on the Engineering News Record (ENR) construction cost index (CCI) of 13,176 (March 2023).
2. Baseline construction costs plus 30% to account for unforeseen events and unknown conditions.
3. Estimated construction cost plus 30% to cover other costs including: engineering design, project administration (developer and City staff), construction management and inspection, and legal costs.

CHAPTER 1 - INTRODUCTION

This chapter provides a brief background of the City of Gilroy's (City) sewer collection system (also known as a wastewater collection system), the need for this master plan, and the objectives of the study. Unit conversions, abbreviations, and definitions are also provided in this chapter.

1.1 BACKGROUND

The City of Gilroy is located approximately 32 miles southeast of the City of San Jose, 8 miles southeast of Morgan Hill, 25 miles east of the City of Santa Cruz, and 16 miles northwest of City of Hollister ([Figure 1.1](#)). The City provides sewer collection services to approximately 17,000 residential, commercial, industrial, and institutional accounts. The City owns, operates, and maintains the sewer collection system, which consists of over 167 miles of gravity trunks and force mains, with up to 42-inch pipe sizes, which convey the flow to the South County Wastewater Authority (SCRWA) Wastewater Treatment Plant (WWTP). The WWTP has an average daily capacity rating of 8.5 million gallons per day (MGD).

In 2004, the City of Gilroy developed a Sewer System Master Plan that identified capacity deficiencies in the existing sewer system and recommended improvements to alleviate existing deficiencies and serve future developments in the Gilroy Planning Area.

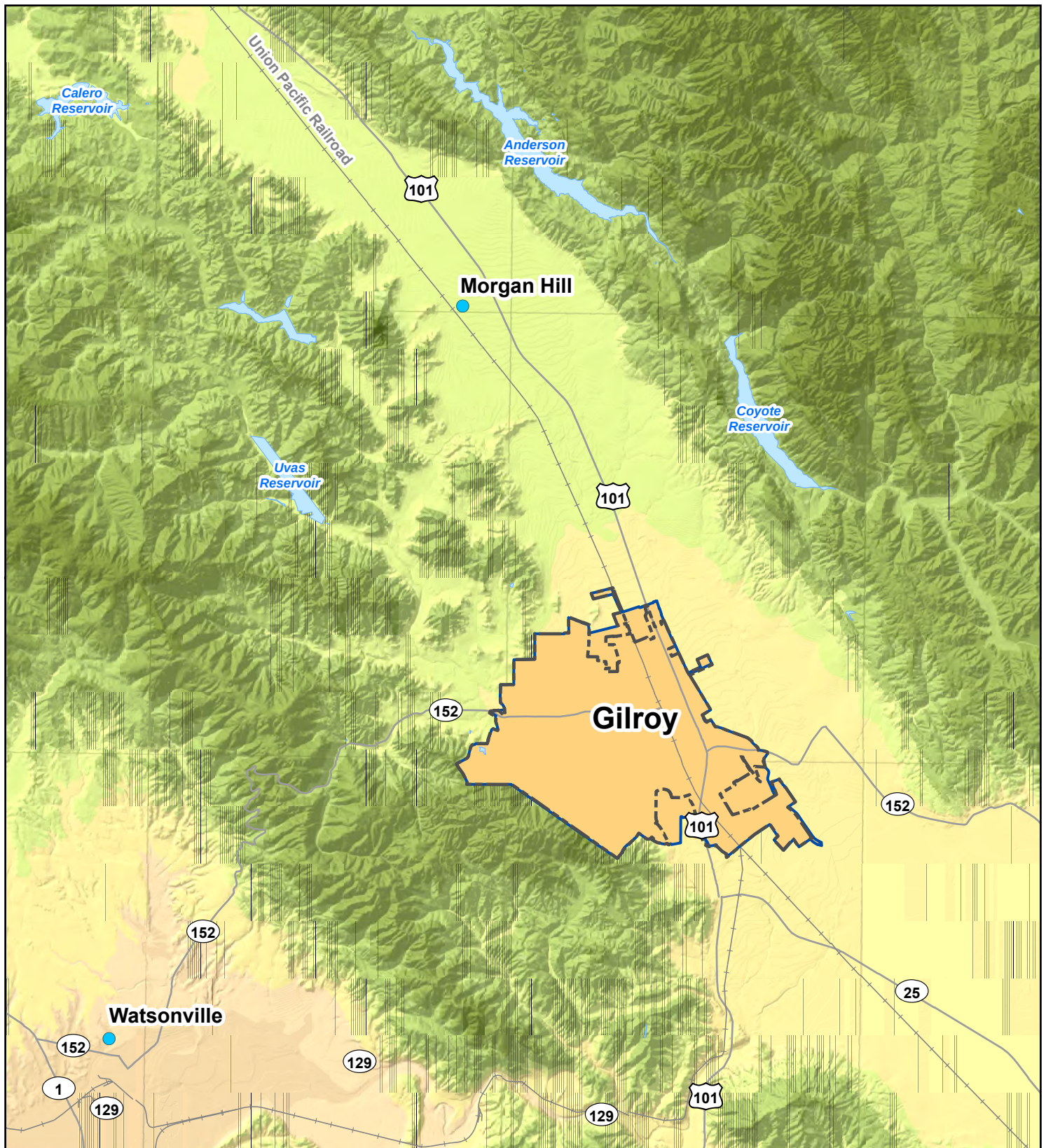
Recognizing the importance of planning, developing, and financing system facilities to provide reliable sewer collection service to existing customers and for servicing anticipated growth within the Gilroy Planning Area, the City initiated updating elements of the 2004 Sanitary Sewer Master Plan, to reflect current land use conditions and General Plan updates.

1.2 SCOPE OF WORK

City Council approved Akel Engineering Group to prepare this 2023 Sewer System Master Plan (SSMP) and a concurrent Water System Master Plan and Storm Drainage System Master Plan in August 2019. The 2023 SSMP evaluates the City's sewer collection system and recommends capacity improvements necessary to service the needs of existing users and for servicing the future growth of the City. This 2023 SSMP is intended to serve as a tool for planning and phasing the construction of future sewer collection system infrastructure for the projected buildout of the City's service area. The area and horizon for this master plan is based on the City's General Plan. Should planning conditions change, and depending on their magnitude, adjustments to the master plan recommendations might be necessary.

The master plan included the following tasks:

- Summarizing the City's existing sewer collection system facilities.
- Documenting growth planning assumptions and known future developments.



Legend

- Cities
 - Study Area
 - City Limits
 - Urban Growth Boundary
 - Highway
 - Railroads
- | Elevation (ft) | |
|----------------|---------------|
| | 9 - 50 |
| | 51 - 100 |
| | 101 - 250 |
| | 251 - 500 |
| | 501 - 1,000 |
| | 1,001 - 2,000 |
| | 2,001 - 3,000 |
| | 3,001 - 3,792 |
- ~ Waterbodies



0 0.5 1 2 Miles

Updated: September 21, 2020

Figure 1.1
Regional Location Map
 Sewer System Master Plan
 City of Gilroy



- Summarizing the sewer system performance criteria and design storm event.
- Projecting future sewer flows.
- Updating and validating the City's hydraulic model based on the City's Geographic Information Systems (GIS).
- Evaluating the adequacy of capacity for the sewer collection system facilities to meet existing and projected peak dry weather flows and peak wet weather flows.
- Recommending a capital improvement program (CIP) with an opinion of probable construction costs.
- Performing a capacity allocation analysis for cost sharing purposes.
- Developing a 2023 Sewer System Master Plan Report.

1.3 INTEGRATED APPROACH TO MASTER PLANNING

This City implemented an integrated master planning approach and contracted the services of Akel Engineering Group to prepare the following documents:

- 2023 Water System Master Plan
- 2023 Sewer System Master Plan
- 2023 Storm Drainage System Master Plan

While each of these reports is published as a standalone document, it has been coordinated for consistency with the City's General Plan. Additionally, each document has been cross referenced to reflect relevant analysis results with the other documents.

1.4 PREVIOUS MASTER PLANS

The City's most recent sewer master plan was completed in 2004. This master plan included evaluation of servicing growth to the planning area, evaluated existing sewer flows and projected future flows and recommended phased improvements to the sewer system for a horizon year of 2040. Additionally, the 2004 master plan included the development of the hydraulic model which was used for evaluating the sewer system. Improvements were recommended for servicing existing and future growth areas, and a corresponding Capital Improvement Program was developed to quantify the corresponding costs.

1.5 RELEVANT REPORTS

The City has completed several special studies intended to evaluate localized growth. These reports were referenced and used during this capacity analysis. The following lists relevant reports that were used in the completion of this master plan, as well as a brief description of each document:

- **City of Gilroy 2040 General Plan, November 2020 (2040 GP).** The City's 2040 General Plan provides future land use planning, and growth assumptions for the Planning Area. Additionally, this report establishes the planning horizon for improvements in this master plan.
- **City of Gilroy Sewer System Master Plan, February 2004 (2004 SSMP).** This report documents the planning and performance criteria, evaluates the sewer system, recommends improvements, and provides an estimate of costs.
- **City of Morgan Hill Sewer System Master Plan, January 2002 (2002 SSMP).** This report documents the planning and performance criteria, evaluates the sewer system, recommends improvements, and provides an estimate of costs.
- **City of Morgan Hill Sewer System Master Plan, February 2016 (2016 SSMP).** This report documents the planning and performance criteria, evaluates the sewer system, recommends improvements, and provides an estimate of costs. This document was used to quantify the existing and future sewer flows in the Morgan Hill – Gilroy Joint Trunk.

1.6 REPORT ORGANIZATION

The Sewer System Master Plan report contains the following chapters:

Chapter 1 – Introduction. This chapter provides a brief background of the City of Gilroy's (City) sewer collection system (also known as a wastewater collection system), the need for this master plan, and the objectives of the study. Unit conversions, abbreviations, and definitions are also provided in this chapter.

Chapter 2 – Planning Area Characteristics. This chapter presents a discussion of planning area characteristics and defines the land use classification.

Chapter 3 – System Performance and Design Criteria. This chapter presents the City's performance and design criteria which was used in this analysis for identifying current system capacity deficiencies and for sizing proposed collection mains and lift stations.

Chapter 4 – Existing Sewer Collection Facilities. This chapter provides a description of the City's existing sewer collection system facilities including gravity trunks, force mains, lift stations, and sewer collection basins. The chapter also includes a brief description of the SCRWA WWTP, which treats and disposes of the wastewater for the City.

Chapter 5 – Sewer Flows. This chapter summarizes historical sewer flows experienced at the South County Regional Wastewater Authority (SCRWA) WWTP and defines flow terminologies relevant to this evaluation. This chapter discusses the design flows used in the hydraulic modeling effort and capacity evaluation. The design flows include the existing condition (existing customers) and buildout development conditions.

Chapter 6 – Hydraulic Model Development. This chapter describes the development and calibration of the City’s sewer collection system hydraulic model. The City’s hydraulic model was used to evaluate the capacity adequacy of the existing system and to plan its expansion to service anticipated future growth.

Chapter 7 – Evaluation and Proposed Improvements. This section presents a summary of the sewer collection system capacity evaluation during peak dry weather flows and peak wet weather flows for the existing and buildout development conditions. The recommended sewer collection system improvements needed to mitigate capacity deficiencies are also discussed in this chapter.

Chapter 8 – Capital Improvement Program. This chapter provides a summary of the recommended sewer collection system improvements to mitigate existing capacity deficiencies and service future growth. This chapter also presents the cost criteria and methodologies for developing the capacity improvement costs. Finally, a cost allocation analysis, usually used for cost sharing purposes, is also included.

1.7 ACKNOWLEDGEMENTS

Obtaining the necessary information to successfully complete the analysis presented in this report, and developing the long-term strategy for mitigating the existing system deficiencies and for accommodating future growth, was accomplished with the strong commitment and very active input from dedicated team members including:

- Daryl Jordan, P.E.; Director of Public Works
- Gary Heap, P.E.; City Engineer
- Jorge Duran, P.E.; Senior City Engineer
- Matt Jones, Deputy Public Works Director

1.8 UNIT CONVERSIONS AND ABBREVIATIONS

Engineering units were used in reporting flow rates and volumes pertaining to the design and operation of various components of the sewer collection system. Where it was necessary to report values in smaller or large quantities, different sets of units were used to describe the same parameter. Values reported in one set of units can be converted to another set of units by applying a multiplication factor. A list of multiplication factors for units used in this report are shown on [Table 1.1](#).

Various abbreviations and acronyms were also used in this report to represent relevant sewer collection system terminologies and engineering units. A list of abbreviations and acronyms is included in [Table 1.2](#).

Table 1.1 Unit Conversions
 Sewer System Master Plan
 City of Gilroy

Volume Unit Calculations		
To Convert From:	To:	Multiply by:
acre feet	gallons	325,857
acre feet	cubic feet	43,560
acre feet	million gallons	0.3259
cubic feet	gallons	7.481
cubic feet	acre feet	2.296×10^{-5}
cubic feet	million gallons	7.481×10^{-6}
gallons	cubic feet	0.1337
gallons	acre feet	3.069×10^{-6}
gallons	million gallons	1×10^{-6}
million gallons	gallons	1,000,000
million gallons	cubic feet	133,672
million gallons	acre feet	3.069
Flow Rate Calculations		
To Convert From:	To:	Multiply By:
ac-ft/yr	mgd	8.93×10^{-4}
ac-ft/yr	cfs	1.381×10^{-3}
ac-ft/yr	gpm	0.621
ac-ft/yr	gpd	892.7
cfs	mgd	0.646
cfs	gpm	448.8
cfs	ac-ft/yr	724
cfs	gpd	646300
gpd	mgd	1×10^{-6}
gpd	cfs	1.547×10^{-6}
gpd	gpm	6.944×10^{-4}
gpd	ac-ft/yr	1.12×10^{-3}
gpm	mgd	1.44×10^{-3}
gpm	cfs	2.228×10^{-3}
gpm	ac-ft/yr	1.61
gpm	gpd	1,440
mgd	cfs	1.547
mgd	gpm	694.4
mgd	ac-ft/yr	1,120
mgd	gpd	1,000,000

Table 1.2 Abbreviations and Acronyms
Sewer System Master Plan
City of Gilroy

Abbreviation	Expansion	Abbreviation	Expansion
2016 SSMP	2016 Sewer System Master Plan	HGL	Hydraulic Grade Line
10Yr-24Hr	10-Year 24-Hour	in/hr	Inch per Hour
ADWF	Average Dry Weather Flow	I&I	Infiltration and Inflow
AAF	Annual Average Flow	LF	Linear Feet
Akel	Akel Engineering Group, Inc.	MDDWF	Maximum Day Dry Weather Flow
AWWF	Average Wet Weather Flow	MDWWF	Maximum Day Wet Weather Flow
BWF	Base Wastewater Flow	MGD	Million Gallons per Day
CCI	Construct Cost Index	MMDWF	Maximum Month Dry Weather Flow
CCTV	Closed Circuit Television	MMWWF	Maximum Month Wet Weather Flow
CDP	Census Designated Place	NOAA	National Oceanic and Atmospheric Administration
CIP	Capital Improvement Program	PWSS	Public Water System Statistics
City	City of Gilroy	PDWF	Peak Dry Weather Flow
DDF	Depth Duration Frequency	PWWF	Peak Wet Weather Flow
d/D	depth of flow to pipe diameter	ROW	Right of Way
EDUs	Equivalent Dwelling Units	SCADA	Supervisory Control and Data Acquisition
ENR	Engineering News Record	SCRWA	South County Regional Wastewater Authority
fps	Feet per Second	SCVWD	Santa Clara Valley Water District
FY	Fiscal Year	VCP	Vitrified Clay Pipe
GIS	Geographic Information Systems	V&A	Villalobos and Associates
gpd	Gallons per Day	WWTP	Wastewater Treatment Plant
gpm	Gallons per Minute		

1.9 GEOGRAPHIC INFORMATION SYSTEMS

This master planning effort made extensive use of Geographic Information Systems (GIS) technology, for completing the following tasks:

- Develop the physical characteristics of the hydraulic model (gravity mains, force mains, and lift stations).
- Allocate existing sewer loads, as calculated using the developed sewer unit factors.
- Calculate and allocate future sewer loads, based on the future developments' land use.
- Extract ground elevations along the gravity and force mains from available contour maps and digital elevation models.
- Generate maps and exhibits used in this master plan.

CHAPTER 2 – PLANNING AREA CHARACTERISTICS

This chapter presents a discussion of planning area characteristics and defines the land use classification.

2.1 STUDY AREA DESCRIPTION

The City of Gilroy is located in Santa Clara County near the west coast of California, south of City of San Francisco. The City of Gilroy lies within the seismically active region of San Francisco Bay. The City of Gilroy lies in the southern portion of the Santa Clara County and is the most southern City located within the county. The City is located approximately 32 miles southeast of the City of San Jose, 8 miles southeast of Morgan Hill, 25 miles east of City of Santa Cruz, and 16 miles northwest of City of Hollister. The City limits currently encompass 16.5 square miles, with an approximate population of 56,599 residents, according to Department of Finance as of January 2021. [Figure 1.1](#) displays the City's location.

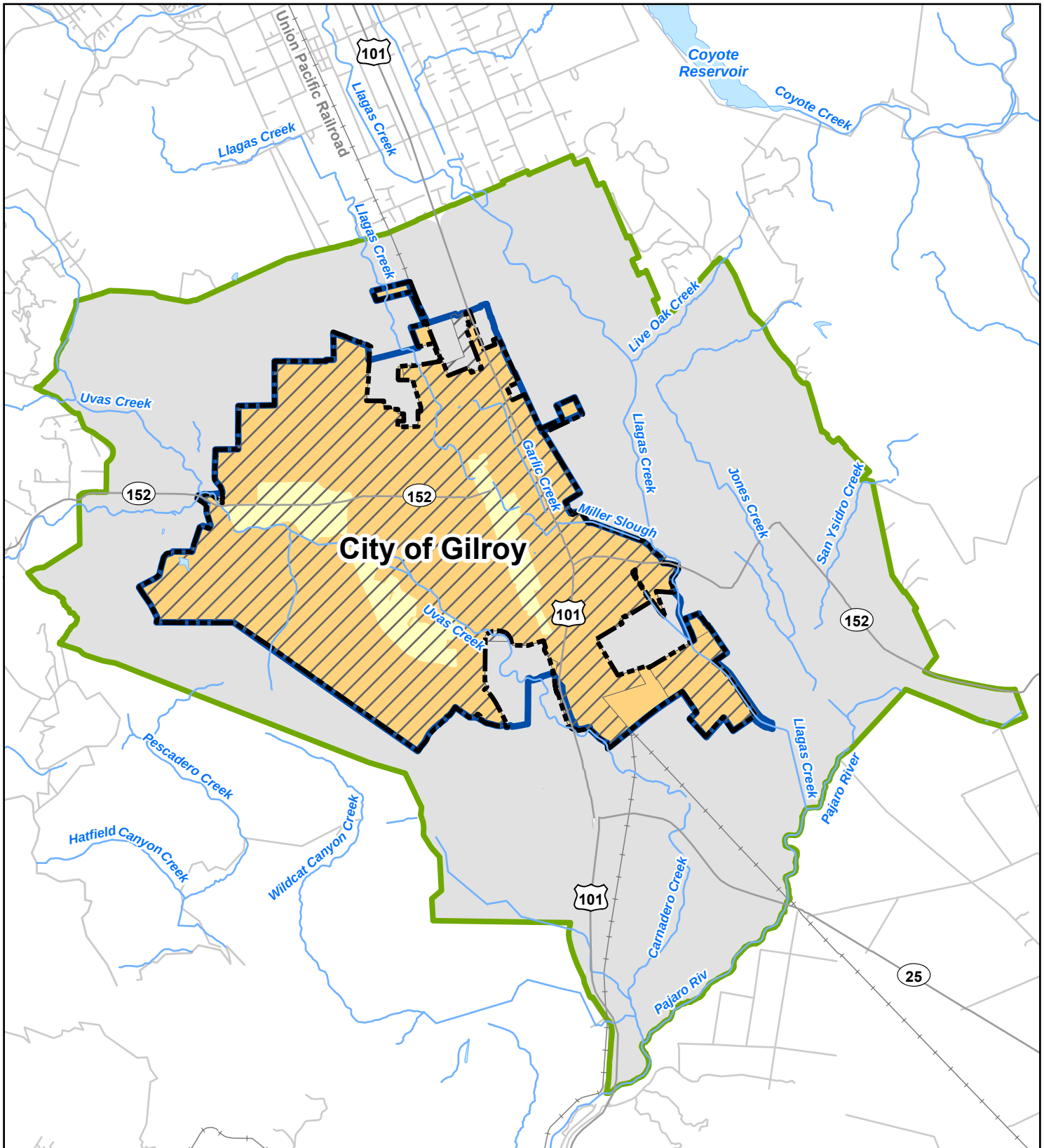
The City's service area is generally bound to the north by Fitzgerald Avenue, to the northeast by San Ysidro Avenue, to the southeast by Camino Arroyo, to the west by Burchell Road and Rancho Vista Drive, and to the south by Carnadero Avenue. U.S. Route 101 divides the City in a southeast to northwest direction and the California State Route 152 (Hecker Pass Hwy) runs east-west direction in the northern half of the City. The topography is generally flat in the middle of the service area, with increasing slopes in the east and west side of the City due to the Santa Cruz Mountains to the west and the Diablo Range to the east. [Figure 2.1](#) displays the planning area showing City limits, the Urban Growth Boundary (UGB) of the City and Planning Area / Sphere of Influence (SOI).

The City operates and maintains a sewer collection system that covers the majority of the area within the City Limits and the City of Morgan Hill. Currently, the sewer flows are conveyed to the South County Regional Wastewater Authority (SCRWA) Wastewater Treatment Plant (WWTP).

2.2 SEWER SERVICE AREAS AND LAND USE

The City's sewer system services residential and non-residential lands within the City limits, as summarized on [Table 2.1](#) and shown graphically on [Figure 2.2](#). Areas within the City's existing service area include:

- 5,429 acres of developed lands inside the City limits.
- 3,673 acres of undeveloped lands inside the City limits.



Legend

- | | |
|------------------------------|-------------------|
| City Limits | General Plan Area |
| City Limits Area | Roads |
| Specific Plan Areas | Highways |
| Urban Service Area | Railroads |
| Urban Growth Boundary | Rivers & Creeks |
| Sphere of Influence Boundary | Waterbodies |

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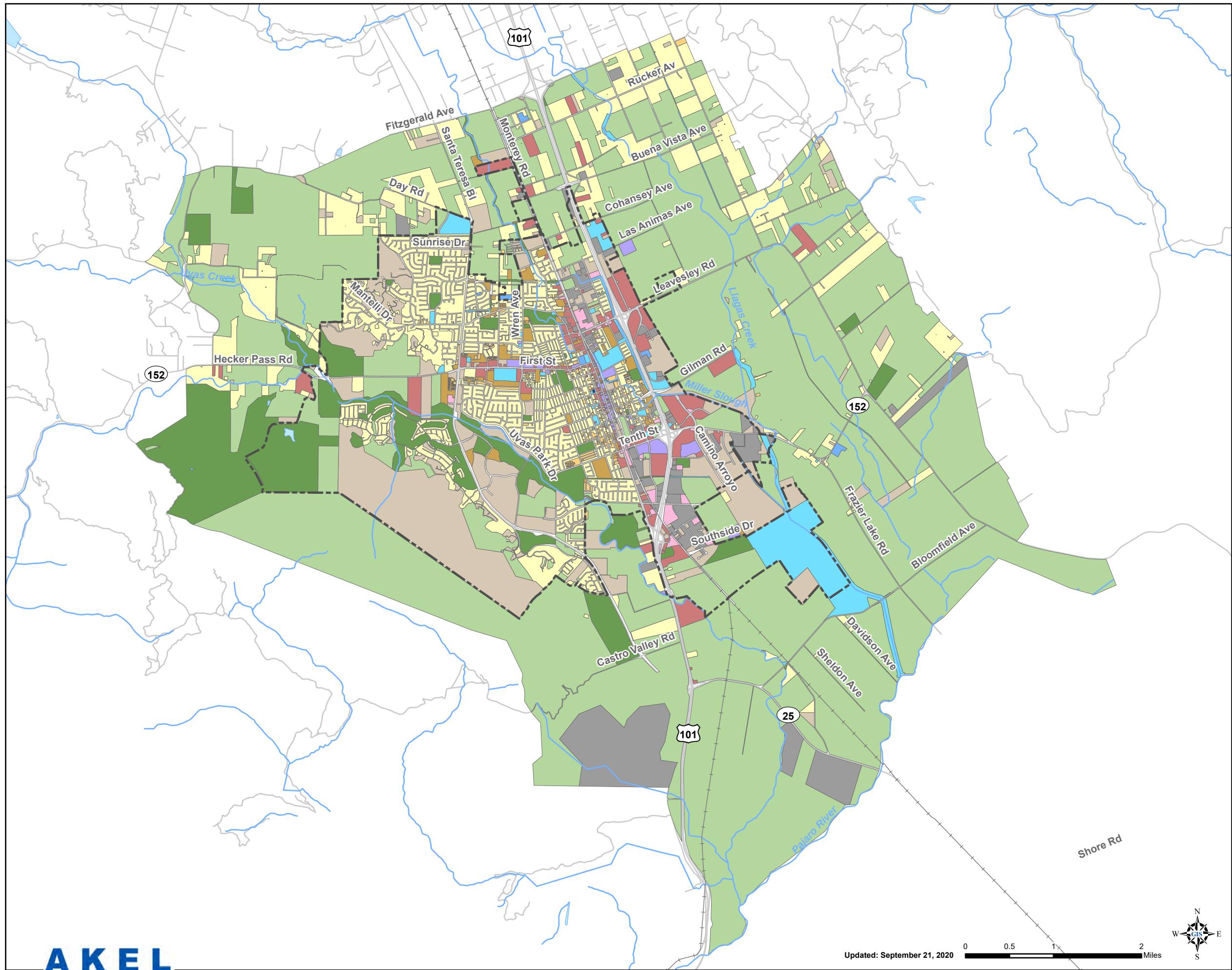
Updated: September 21, 2020

0 0.5 1 2 Miles



Figure 2.1
Planning Area
Sewer System Master Plan
City of Gilroy





Legend

Existing Land Use

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Neighborhood District
- Public/Quasi-Public Facility
- Educational Facility
- Professional Office
- General Services Commercial
- Visitor-Serving Commercial
- Industrial
- Open Space
- Park and Recreation Facility
- Vacant
- City Limits
- Roads
- Railroads
- Rivers & Creeks
- Waterbodies

Figure 2.2
Existing Land Use
Sewer System Master Plan
City of Gilroy



Table 2.1 General Plan Land Use
Sewer System Master Plan
City of Gilroy

General Plan Land Use Classification	Existing Land Use Classification	Existing Development			Future Development				Total Development	
		Within City Limits		Subtotal Existing Development - Unchanged	Within City Limits		Urban Growth Boundary	Subtotal Future Development	Urban Growth Boundary	Sphere of Influence
		Existing	Existing Lands - Redeveloping		New Lands - Redevelopment	New Development				
1	2	(acre) 3	(acre) 4	(acre) 5	(acre) 6	(acre) 7	(acre) 8	(acre) 9	(acre) 10	(acre) 11
Residential										
Rural Residential	-	0	0	0	0	0	0	0	0	0
Hillside Residential	Hillside Residential	444	-1	442	112	344	8	464	907	913
Low Density Residential	Low Density Residential	1,704	-121	1,583	122	45	44	211	1,794	4,221
Medium Density Residential	Medium Density Residential	100	-42	58	177	4	2	183	240	248
High Density Residential	High Density Residential	249	-182	67	18	15	3	36	104	111
	Subtotal - Residential	2,496	-346	2,151	429	408	58	895	3,045	5,493
Non-Residential										
Visitor Serving Commercial	Visitor Serving Commercial	99	-67	32	176	0	0	176	208	208
General Services Commercial	General Services Commercial	524	-91	432	106	55	44	205	637	837
	Professional Office	1	0	1	0	0	0	0	1	1
General Industrial	General Industrial	320	-71	249	213	255	389	856	1,105	2,036
	Campus Industrial	56	-12	44	0	0	0	0	44	44
Educational Facility	Educational Facility	12	-5	7	1	0	0	1	8	22
Public/Quasi-Public Facility	Public/Quasi-Public Facility	596	-44	552	152	102	28	281	833	1,013
Neighborhood District	Neighborhood District	94	-94	0	38	22	336	395	395	428
City Gateway District	-	0	0	0	20	7	0	27	27	27
Downtown Specific Plan Area	-	0	0	0	57	32	0	89	89	89
Mixed Use Corridor High	-	0	0	0	25	7	0	33	33	33
Hecker Pass Special Use District	-	0	0	0	328	88	0	416	416	416
Glen Loma Ranch	-	0	0	0	103	237	0	341	341	341
Industrial Park	-	0	0	0	43	40	0	83	83	83
Employment Center	-	0	0	0	279	30	222	530	530	530
	Subtotal - Non-Residential	1,701	-384	1,317	1,541	876	1,017	3,434	4,750	6,109
Other										
Agriculture	-	0	0	0	0	0	0	0	0	0
Park and Recreation Facility	Park and Recreation Facility	1,232	-238	995	0	66	88	154	1,149	2,392
Vacant	Vacant	2,391	-2,391	0	0	0	0	0	0	0
Open Space	Open Space	1,282	-1,030	253	0	1,041	4	1,045	1,298	2,897
Rural County		0	0	0	28	0	3	30	30	17,726
	Subtotal - Other	4,905	-3,658	1,247	28	1,107	95	1,230	2,477	23,015
Total										
	Total Developed Area	9,102	-4,388	4,714	1,997	2,391	1,170	5,558	10,272	34,616

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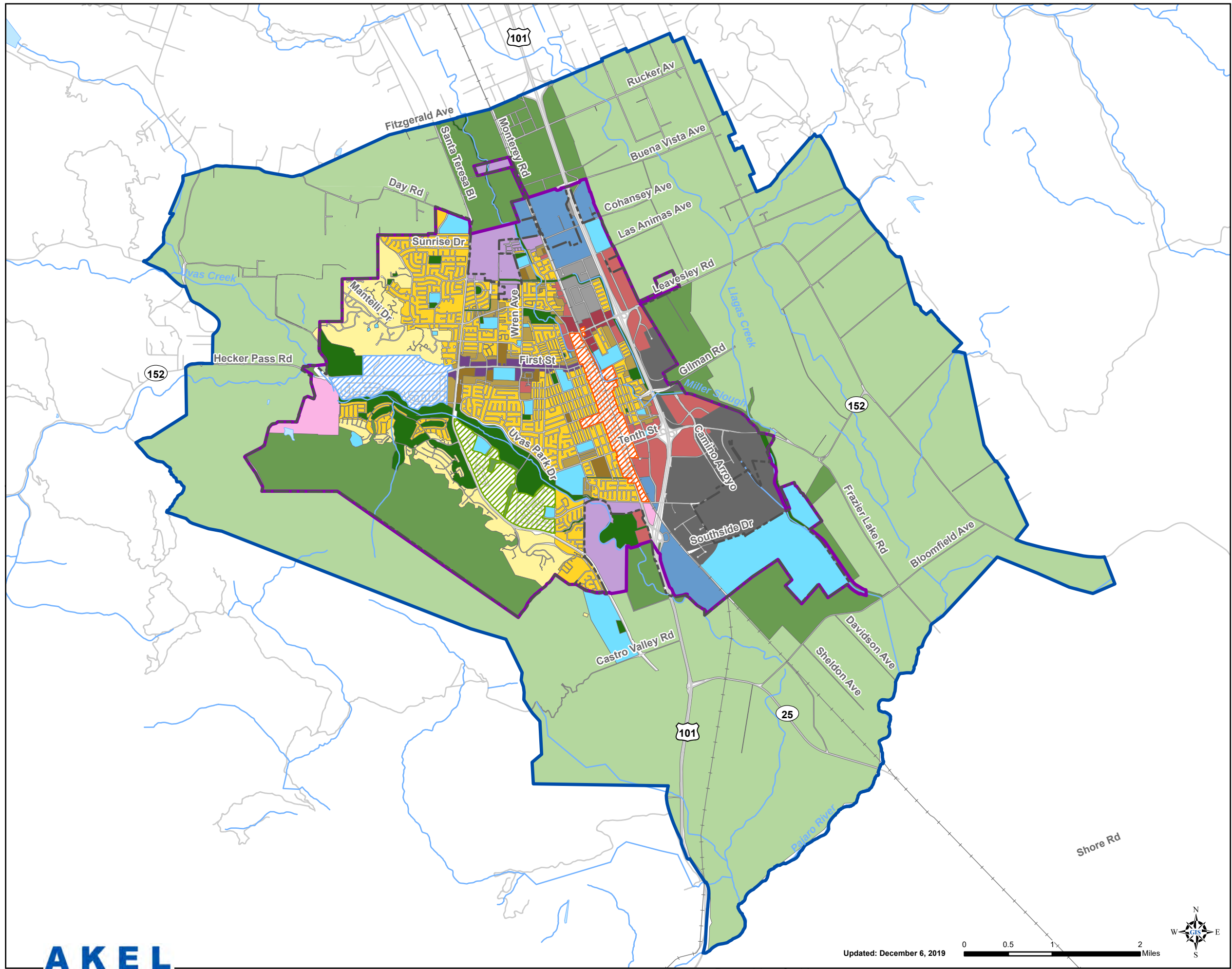
Notes:

1. Source: City of Gilroy General Plan Alternatives Report, Public Review Draft July 2019.

At ultimate development of the General Plan, the City's sewer system is anticipated to service approximately 3,045 acres of residential land use, 4,750 acres of non-residential land use, and 2,477 acres of non-flow generating land use, for a total of 10,272 acres inside the City's Urban Growth Boundary ([Table 2.1](#)). The land use designations utilized in this master plan are consistent with the Land Use Element of the City's 2040 General Plan, and as received from the City's planning division and shown on [Figure 2.3](#).

In addition to the General Plan Land Use documented on [Figure 2.3](#), there are multiple areas of known development, which are defined by Specific Plans or other development planning information. These known development areas provide a more refined definition of planned land uses, which is used for estimating future flows. The known development areas are summarized on [Figure 2.3](#), with the land use information shown on [Table 2.1](#). Based on a review of aerial imagery and existing land use information, some known development areas are partially developed or completely developed. The known development areas are summarized in the following sections.

- **Hecker Pass Specific Plan:** This development area includes approximately 416 acres, which includes 164 acres of residential, 154 acres of non-residential, and 98 acres of other non-flow generating land use as documented in [Table 2.2](#).
- **Glen Loma Specific Plan:** This development area includes approximately 341 acres, which includes 210 acres of residential, 35 acres of non-residential, and 96 acres of other non-flow generating land use as documented in [Table 2.2](#).
- **Downtown Specific Plan:** This development area includes approximately 202 acres, which includes 108 acres of residential and 94 acres of non-residential land use as documented in [Table 2.3](#). This development area is comprised of multiple land use districts as summarized in the following sections.
 - **Historic Land Use District:** This development area includes approximately 18 acres, which includes 7.9 acres of residential and 10.0 acres of non-residential land use.
 - **MTA Transit-Oriented Development:** This development area includes approximately 8 acres, which includes 7.5 acres of residential and 0.3 acres of non-residential land use.
 - **Expansion Land Use District:** This development area includes approximately 48 acres, which includes 21 acres of residential and 27 acres of non-residential land use.
 - **Cannery Land Use District:** This development area includes approximately 37 acres, which includes 11 acres of residential and 26 acres of non-residential land use.



Legend

- Planning Area/Sphere of Influence
- Urban Growth Boundary
- City Limits

General Plan Land Use

- Hillside Residential
- Low Density Residential
- Medium Density Residential
- High Density Residential
- General Services Commercial
- City Gateway District
- Visitor Serving Commercial
- General Industrial
- Employment Center
- Industrial Park
- Public and Quasi-Public Facility
- Neighborhood District
- Mixed Use
- Rural County
- Open Space
- Park and Recreation Facility

Specific Plan Areas

- Downtown
- Glen Loma Ranch
- Hecker Pass
- Roads
- Railroads
- Rivers & Creeks
- Waterbodies

Figure 2.3
2040 General Plan
Land Use
Sewer System Master Plan
City of Gilroy



Table 2.2 Glen Loma and Hecker Pass Specific Plans, Remaining Development Sewer Flow

Sewer System Master Plan
City of Gilroy

Specific Plan Units		Land Use Types									
		Residential				Non-Residential			Other		Total
		Hillside	Low Density	Medium Density	High Density	Office and Commercial	Public Facility / Institution	Park and Recreation Facility	Agriculture	Open Space	
Total Development ¹											
Hecker Pass	Acres	46.2	16.3	99.1	2.2	58.0	0.0	95.7	51.7	46.8	416.0
Glen Loma	Acres	0.0	112.9	70.3	26.5	0.0	26.9	8.7	0.0	95.7	341.0
Subtotal		46.2	129.2	169.5	28.7	58.0	26.9	104.3	51.7	142.5	757.0
Existing Development ²											
Hecker Pass	Acres	11.2	7.6	89.3	0.0	36.8	0.0	95.7	16.6	0.1	257.1
Glen Loma	Acres	0.0	33.7	70.3	0.3	0.0	24.5	3.9	0.0	22.0	154.7
Subtotal		11.2	41.2	159.6	0.3	36.8	24.5	99.6	16.6	22.1	411.9
Remaining Development ³											
Hecker Pass	Acres	35.0	8.8	9.9	2.2	21.2	0.0	0.0	35.1	46.7	158.8
Glen Loma	Acres	0.0	79.2	0.0	26.2	0.0	2.3	4.8	0.0	73.8	186.3
Subtotal		35.0	88.0	9.9	28.4	21.2	2.3	4.8	35.1	120.5	345.1
Existing Average Daily Flow											
		(560 gpd/acre)	(1,150 gpd/acre)	(2,020 gpd/acre)	(3,000 gpd/acre)	(870 gpd/acre)	(360 gpd/acre)	(0 gpd/acre)	(0 gpd/acre)	(0 gpd/acre)	
Hecker Pass	gpd	6,261	8,689	180,294	14	31,992	0	0	0	0	227,250
Glen Loma	gpd	0	38,706	142,106	979	0	8,834	0	0	0	190,625
Subtotal		6,261	47,395	322,400	993	31,992	8,834	0	0	0	417,875
Remaining Average Daily Flow											
		(560 gpd/acre)	(1,150 gpd/acre)	(2,020 gpd/acre)	(3,000 gpd/acre)	(870 gpd/acre)	(360 gpd/acre)	(0 gpd/acre)	(0 gpd/acre)	(0 gpd/acre)	
Hecker Pass	gpd	19,624	10,078	19,915	6,573	18,433	0	0	0	0	74,622
Glen Loma	gpd	0	91,127	0	78,496	0	836	0	0	0	170,460
Subtotal		19,624	101,205	19,915	85,069	18,433	836	0	0	0	245,082

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Notes:

1. Unless noted otherwise, development information shown based on *Final Hecker Pass Specific Plan (May 2015)* and *Glen Loma Ranch Specific Plan (May 2014)*.
2. Existing development area based on a combination of City of Gilroy General Plan Land Use and aerial imagery review.
3. Remaining development area based on a combination of City of Gilroy General Plan Land Use and aerial imagery review.

Table 2.3 Downtown Specific Plan, Redevelopment and New Development Sewer Flow
Sewer System Master Plan
City of Gilroy

Land Use Properties ¹					Estimated Land Use Breakdown ²		Development and Land Use Assumptions			Unit Factors			Additional Sewer Flow for Redevelopment and New Development ⁸
Land Use District	Existing Development (acres)	Re-Development (acres)	New Development (acres)	Total Buildout (acres)	Residential %	Commercial %	Total Dwelling Units ² DU	Residential Density ³ DU/acre	Commercial Density ² FAR	Residential ⁴ gpd/acre	Commercial ^{5,6} gpd/acre	Weighted ⁷ gpd/acre	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Historic	5.4	0.8	11.7	17.9	44%	56%	115	6.4	2.5	930	2,175	1,627	20,347
VTA Transit-Oriented Development	-	7.8	0.0	7.8	96%	4%	320	41.0	2.5	5,934	2,175	5,783	45,110
Expansion	33.2	5.6	9.0	47.7	44%	56%	448	9.4	2.5	1,357	2,175	1,815	26,464
Cannery District	8.4	17.4	11.4	37.2	29%	71%	760	20.4	2.0	2,953	1,740	2,092	60,201
Transitional	20.1	0.28	0.0	20.4	69%	31%	79	3.9	1.5	560	1,305	791	218
Civic/Residential Only	14.8	1.3	1.0	17.0	40%	60%	14	0.8	1.5	119	1,305	831	1,863
Gateway	31.2	11.7	11.4	54.3	73%	27%	159	2.9	0.75	424	653	485	11,192
Total	113.1	44.8	44.4	202.4			1,895						165,394

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Notes:

1. Development area based on a combination of City of Gilroy General Plan Land Use, Downtown Gilroy Specific Plan, and aerial imagery review.
2. Source: Downtown Gilroy Specific Plan.
3. Residential Density calculated based on Total Dwelling Units and Total Buildout Acres.
4. Residential Unit Factor based on assumed residential density and a per dwelling unit consumption of 145 gpd/DU, which is estimated based on total High Density Residential consumption and number of dwelling units
5. Factors adjusted to account for increase in FAR.
6. SSMP Commercial Unit Factor of 870 gpd/acre assumes a FAR of 1.0.
7. Weighted unit factor based on Estimated Land Use Breakdown and Master Plan Unit Factors.
8. Additional sewer demand for new development and redevelopment estimated using weighted water unit factor.
9. VTA Transit-Oriented Development information based on Gilroy Station Area Visioning Project community presentation. This development plans to develop approximately 7.8 acres of land in the Downtown Historic district into residential housing, retail space, and transit terminal.

- **Transitional Land Use District:** This development area includes approximately 20 acres, which includes 14 acres of residential and 6 acres of non-residential land use.
- **Civic/Residential Only Land Use District:** This development area includes approximately 17 acres, which includes 7 acres of residential and 10 acres of non-residential land use.
- **Gateway Land Use District:** This development area includes approximately 54 acres, which includes 39 acres of residential and 15 acres of non-residential land use.

2.3 HISTORICAL AND PROJECTED POPULATION

According to California Department of Finance (DOF) population estimates, the 2021 City population is approximately 56,559 people. From 2015 to present, the City's service area has observed an average annual growth rate of approximately 0.7%. This 2023 SSMP is consistent with the City's 2020 Urban Water Management Plans (UWMP's) annual growth rate factor of 1.5%. The current and projected service area population is summarized in [Table 2.4](#).

Estimates of future sewer flows were not based on population, but rather on gross acreage for residential and non-residential land uses. Future population was used as a means for estimating the planning horizon of the sewer system.

Table 2.4 Historical and Projected Population

Sewer System Master Plan
City of Gilroy

Year	Population ^{1,2}	Percent Growth (%)
Historical		
2000	41,464	-
2001	42,436	2.3%
2002	43,144	1.6%
2003	43,866	1.6%
2004	45,026	2.6%
2005	45,782	1.7%
2006	46,446	1.4%
2007	47,047	1.3%
2008	48,353	2.7%
2009	48,627	0.6%
2010	48,821	0.4%
2011	49,622	1.6%
2012	50,716	2.2%
2013	52,475	3.4%
2014	53,325	1.6%
2015	54,233	1.7%
2016	54,849	1.1%
2017	55,811	1.7%
2018	56,030	0.4%
2019	56,635	1.1%
2020	56,704	0.1%
Projected		
2021	57,555	1.9%
2022	58,418	1.9%
2023	59,294	1.9%
2024	60,184	1.9%
2025	61,086	1.9%
2026	62,003	1.9%
2027	62,933	1.9%
2028	63,877	1.9%
2029	64,835	1.9%
2030	65,807	1.9%
2031	66,794	1.9%
2032	67,796	1.9%
2033	68,813	1.9%
2034	69,845	1.9%
2035	70,893	1.9%
2036	71,957	1.9%
2037	73,036	1.9%
2038	74,131	1.9%
2039	75,243	1.9%
2040	76,372	1.9%

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Notes:

1. Historical populations taken from California Department of Finance Population Estimates E-4.
2. Projected population assuming medium annual growth rate of 1.9% by using values from ADE, City of Gilroy July 2019 General Plan Alternatives Report.

CHAPTER 3 – SYSTEM PERFORMANCE AND DESIGN CRITERIA

This chapter presents the City's performance and design criteria which was used in this analysis for identifying current system capacity deficiencies and for sizing proposed collection mains and lift stations.

3.1 HYDRAULIC CAPACITY CRITERIA

In addition to applying the City design standards for evaluating hydraulic capacities; this master plan included dynamic hydraulic modeling. The dynamic modeling was a critical and essential element in identifying surcharge conditions resulting from downstream bottlenecks in the gravity sewers.

3.1.1 Gravity Sewers

Gravity sewer capacities depend on several factors including: material and roughness of the pipe, the limiting velocity and slope, and the maximum allowable depth of flow. The hydraulic modeling software used for evaluating the capacity adequacy of the City's sewer collection system, InfoSWMM by Innovyze Inc., utilizes the fully dynamic St. Venant's equation which has a more accurate engine for simulating backwater and surcharge, in addition to manifolded force mains. The software also incorporates the use of the Manning Equation in other calculations including upstream pipe flow conditions.

Manning's Equation for Pipe Capacity

The Continuity equation and the Manning equation for steady-state flow are used for calculating pipe capacities in open channel flow. Open channel flow can consist of either open conduits or, in the case of gravity sewers, partially full closed conduits. Gravity full flow occurs when the conduit is flowing full but has not reached a pressure condition.

- Continuity Equation: $Q = V A$

Where:

Q = peak flow, in cubic feet per second (cfs)

V = velocity, in feet per second (fps)

A = cross-sectional area of pipe, in square feet (sq. ft.)

- Manning Equation: $V = (1.486 R^{2/3} S^{1/2})/n$

Where:

V = velocity, fps

n = Manning's roughness coefficient

R = hydraulic radius (area divided by wetted perimeter), ft

S = slope of pipe, in feet per foot

St. Venant's Equation for Pipe Capacity

Dynamic modeling facilitates the analysis of unsteady and non-uniform flows (dynamic flows) within a sewer collection system. Some hydraulic modeling programs have the ability to analyze these types of flows using the St. Venant equation, which take into account unsteady and non-uniform conditions that occur over changes in time and cross-section within system pipes.

The St. Venant equation is a set of two equations, a continuity equation and a dynamic equation, that are used to analyze dynamic flows within a system. The first equation, the continuity equation, relates the continuity of flow mass within the system pipes in terms of: (A) the change in the cross-sectional area of flow at a point over time and (B) The change of flow over the distance of piping in the system. The continuity equation is provided as follows:

- Continuity Equation:
$$\frac{\partial A}{\partial t} + \frac{\partial Q}{\partial x} = 0$$

(A)
(B)

Where:

t = time

x = distance along the longitudinal direction of the channel

Q = discharge flow

A = flow cross-sectional area perpendicular to the x directional axis

The second equation, the dynamic equation, relates changes in flow to fluid momentum in the system using: (A) Changes in acceleration at a point over time, (B) Changes in convective flow acceleration, (C) Changes in momentum due to fluid pressure at a given point, (D) Changes in momentum from the friction slope of the pipe and (E) Fluid momentum provided by gravitational forces. The dynamic equation is provided as follows:

- Dynamic Equation:
$$\frac{\partial Q}{\partial t} + \frac{\partial}{\partial t} \left(\beta \frac{Q^2}{A} \right) + gA \frac{\partial y}{\partial x} + gAS_f - gAS_o = 0$$

(A)
(B)
(C)
(D)
(E)

Where:

t = time

x = distance along the longitudinal direction of the channel

Q = discharge flow

A = flow cross-sectional area perpendicular to the x directional axis

y = flow depth measured from the channel bottom and normal to the x directional axis

S_f = friction slope

S_o = channel slope

β = momentum

g = gravitational acceleration

Use of this method of analysis provides a more accurate and precise analysis of flow conditions within the system compared to steady state flow analysis methods. It must be noted that two

assumptions are made for use of St. Venant equations in the modeling software. First, flow is one dimensional. This means it is only necessary to consider velocities in the downstream direction and not in the transverse or vertical directions. Second, the flow is gradually varied. This means the vertical pressure distribution increases linearly with depth within the pipe.

Manning's Roughness Coefficient (n)

The Manning roughness coefficient 'n' is a friction coefficient that is used in the Manning formula for flow calculation in open channel flow. In sewer systems, the coefficient can vary between 0.009 and 0.017 depending on pipe material, size of pipe, depth of flow, root intrusion, smoothness of joints, and other factors.

For the purpose of this evaluation, and in accordance with City standards, an "n" value of 0.013 was used for both existing and proposed gravity sewer pipes unless directed otherwise by City staff based on pipe structural condition. This "n" value is an acceptable practice in planning studies.

Partial Flow Criteria (d/D)

Partial flow in gravity sewers is expressed as a depth of flow to pipe diameter ratio (d/D). For circular gravity conduits, the highest capacity is generally reached at 92 percent of the full height of the pipe (d/D ratio of 0.92). This is due to the additional wetted perimeter and increased friction of a gravity pipe.

When designing sewer pipelines, it is common practice to use variable flow depth criteria that allow higher safety factors in larger sizes. Thus, design d/D ratios may range between 0.5 and 0.92, with the lower values used for smaller pipes. The smaller pipes may experience flow peaks greater than planned or may experience blockages from debris. The City's design standards pertaining to the d/D criteria are summarized in [Table 3.1](#).

During peak dry weather flows (PDWF), the maximum allowable d/D ratio for proposed pipes (all diameters) is 0.75. The maximum allowable d/D ratio for all existing pipes (all diameters) is 0.90. The criterion for existing pipes is relaxed in order to maximize the use of the existing pipes before costly pipe improvements are needed.

During peak wet weather flows (PWWF), to avoid premature or unnecessary trunk line replacements, the capacity analysis allowed the d/D ratio to exceed the dry weather flow criteria and surcharge. This condition is evaluated using the dynamic hydraulic model and the criteria listed on [Table 3.1](#), which stipulates that the hydraulic grade line (HGL), even during a surcharged condition, should be at least three feet below the manhole rim elevation.

Table 3.1 Sewer System Performance and Design Criteria
 Sewer System Master Plan
 City of Gilroy

Pipeline Criteria				
Peak Dry Weather Flow Criteria				
Existing Sewer Trunks: Maximum allowable d/D of 0.90				
Proposed Sewer Trunks: Maximum allowable d/D of 0.75				
Peak Wet Weather Flow Criteria				
Hydraulic Grade Line (HGL) should be at least 3 foot below the manhole rim				
Pipe Size	Suggested Master Plan Criteria		City of Gilroy General Guidelines ¹	
	Minimum Grade (Velocity = 2.0 ft/s)	Minimum Capacity (n= 0.013)	Minimum Grade (Velocity = 2.5 ft/s)	Minimum Capacity (n= 0.013)
(in)	(ft/ft)	cfs	(ft/ft)	(cfs)
8	0.0026	0.55	0.0077	0.00
10	0.0019	0.87	0.0057	0.82
12	0.0015	1.23	0.0022	1.29
15	0.0011	1.98	0.0015	1.58
18	0.0009	2.75	0.0012	2.46
21	0.0007	3.76	0.0010	3.54
24	0.0006	5.05	0.0008	4.82
27	0.0005	6.47		
30	0.0004	7.94		
33	0.0004	9.34		
36	0.0004	11.78		
42	0.0003	15.90		
Lift Station Criteria				
Lift Stations: When permitted by City Engineer. Firm Capacity to meet Peak Wet Weather Flow.				

Notes:

1. Source: City of Gilroy General Guidelines, August 2014.

Minimum Pipe Sizes and Design Velocities

In order to minimize the settlement of sewage solids, it is standard practice in the design of gravity sewers to specify that a minimum velocity of 2 feet per second (fps) be maintained when the pipeline is half-full. At this velocity, the sewer flow will typically result with self-cleaning of the pipe.

Due to the hydraulics of a circular conduit, velocity of half-full flows approaches the velocity of nearly full flows. [Table 3.1](#) lists the minimum slopes, varying by pipe size, in accordance with the City's design standards. The design standards also specify minimum pipe sizes, depending on the peak dry weather flows, as shown on [Table 3.1](#).

Changes in Pipe Size

When a smaller gravity sewer pipe joins a larger pipe, the invert of the larger pipe is generally to maintain the same energy gradient. One of the methods used to approximate this condition includes placing the 80 percent depth point (d/D at 0.8) from both sewers at the same elevation. For master planning purposes, and in the absence of known field data, sewer crowns were matched at the manholes.

3.1.2 Force Mains and Lift Stations

The Hazen-Williams formula is commonly used for the design of force mains as follows:

- Hazen Williams Velocity Equation: $V = 1.32 C R^{0.63} S^{0.54}$

Where:

V = mean velocity, fps

C = roughness coefficient

R = hydraulic radius, ft

S = slope of the energy grade line, ft/ft

The value of the Hazen-Williams 'C' varies and depends on the pipe material and is also influenced by the type of construction and pipe age. A 'C' value of 110 was used in this analysis.

The minimum recommended velocity in force mains is at 2 feet per second. The economical pumping velocity in force mains ranges between 3 and 5 fps. A maximum desired velocity is typically around 7 fps and a maximum not-to-exceed velocity is at 10 fps.

The capacities of pump stations are evaluated and designed to meet the peak wet weather flows with one standby pump having a capacity equal to the largest operating unit. The standby pump provides a safety factor in case the duty pump malfunctions during operations and allows for maintenance.

3.2 DRY WEATHER FLOW CRITERIA

Sewer unit flow factors are coefficients commonly used in planning level analysis to estimate future average daily sewer flows for areas with predetermined land uses. The unit factors are multiplied by the number of dwelling units or gross acreages for residential categories, and by the gross acreages for non-residential categories, to yield the average daily sewer flow projections.

3.2.1 Unit Flow Factors Methodology

Sewer unit factors are developed by using water consumption records and applying a return to sewer ratio for each land use to estimate sewer flow coefficients. There are several methods for developing the unit factors. This analysis relied on the use of the City's water consumption billing records, which lists the monthly water consumption per customer account, by land use type, to estimate the unit factors within the service area.

3.2.2 Average Daily Sewer Unit Flow Factors

Sewer flow factors were based on water demands as extracted from the City's water consumption billing records. A return to sewer ratio was applied to each unadjusted water demand factor for individual land uses, and sewer flows were balanced to WWTP flows. Generally, non-residential land uses return the majority of the water demand to the sewer collection system. These unit factors were estimated at 90 percent return to sewer ratio. The same concept can be applied to low-, medium, and high-density residential lots, which were estimated to range from 65 percent to 80 percent return to sewer ratio, respectively. Low density rural residential lots, such as the Hillside residential lots often have the lowest return to sewer ratio. This is largely due to water loss for landscape irrigation. Hillside residential lots were estimated at 50 percent return to sewer ratio. Lastly, unit factors were adjusted to 100 percent occupancy and rounded.

This analysis generally indicates that existing residential land uses have higher flow generation factors than that of non-residential land uses. The existing unit factor analysis is shown on [Table 3.2](#), the unit factors are shown on [Table 3.3](#).

3.2.3 Peaking Factors

The sewer collection system is evaluated based on its ability to convey peak sewer flows. Peaking factors represent the increase in sewer flows experienced above the average dry weather flows (ADWF). The various peaking conditions are numerical values obtained from a review of historical data and, at times, tempered by engineering judgement.

The peaking conditions that are significant to hydraulic analysis of the sewer collection system include:

- Peak Dry Weather Flows (PDWF)
- Peak Wet Weather Flows (PWWF)

Typical values for peaking factors of 2.0 or less are generally used to estimate peak flows at treatment facilities where flow fluctuations are smoothed out during the time of travel in the sewer collection system, while peaking factors between 3.0 and 4.0 are used to estimate peak flows in the smaller upstream areas of the system where low flow conditions are prone to greater fluctuations.

Table 3.2 Sewer Flow Unit Fator Analysis
Sewer System Master Plan
City of Gilroy

Existing Land Use Classification	Existing Development within City Limits	Existing Average Daily Wastewater Unit Factors										
		Consumption ¹			Return to Sewer Ratio	Wastewater Flows		Wastewater Flows at 100% Occupancy			Recommended Wastewater Unit Factor	
		Unadjusted Water Unit Factors	Annual Consumption			Unadjusted Wastewater Unit Factor	Balance to 2019 Average Dry Weather Flows ²	Vacancy Rate ^{3,4,5}	Projected Flows at 100% Occupancy		Recommended Factor	Balance Using Recommended Unit Factor
			(gpd/acres)	(kgal/year)					(gpd)	(gpd/acres)		
Residential												
Hillside Residential	444	1,074	173,798	476,159	0.500	537	238,079	3.5%	556	246,412	560	248,387
Low Density Residential	1,704	1,699	1,056,612	2,894,827	0.650	1,104	1,881,638	3.5%	1,143	1,947,495	1,150	1,959,704
Medium Density Residential	100	2,782	101,072	276,910	0.700	1,948	193,837	3.5%	2,016	200,621	2,020	201,044
High Density Residential	249	3,616	328,708	900,570	0.800	2,893	720,456	3.5%	2,994	745,672	3,000	747,193
Subtotal - Residential	2,496		1,660,190	4,548,466			3,034,010			3,140,200		3,156,329
Non-Residential												
Office and Commercial ⁶	623	893	203,171	556,633	0.900	804	500,970	7.5%	864	538,542	870	542,280
Industrial ⁷	376	849	116,593	319,433	0.900	764	287,490	2.0%	779	293,239	780	293,518
Public Facility / Institution ^{8,9}	237	388	33,560	91,945	0.900	349	82,751	2.0%	356	84,406	360	85,345
Neighborhood District	94	966	33,023	90,474	0.900	869	81,427	3.5%	900	84,277	900	84,295
Subtotal - Non-Residential	1,330		386,347	1,058,485			952,636			1,000,464		1,005,438
Other												
Park and Recreation Facility	1,232	356	159,972	438,279	0.000	0	0	0.0%	0	0	0	0
Vacant	2,391	73	64,109	175,641	0.000	0	0	0.0%	0	0	0	0
Open Space	1,282	101	47,417	129,910	0.000	0	0	0.0%	0	0	0	0
Subtotal - Other	4,905		271,498	743,830			0			0		0
Total Developed Area	8,731		2,318,035	6,350,781			3,986,646			4,140,664		4,161,767

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11/6/2020

Notes:

1. 2019 Water Consumption provided by City staff on August 12, 2020.
2. Recorded 2019 Average Dry Weather Flow equal to 3.94 mgd according to 2019 flows from Influent Flow Data provided by City staff on June 3, 2020.
3. Residential vacancy rate extracted from California Department of Finance Sheet E-5 published 2020.
4. Office and Commercial vacancy rate extracted from Cushman & Wakefield Silicon Valley Retail MarketBeat report published Q2 2020.
5. Industrial vacancy rate extracted from Cushman & Wakefield Silicon Valley Industrial MarketBeat report published Q2 2020.
6. "Office and Commercial" contains development and consumption for "Visitor Serving Commercial", "General Services Commercial", and "Profesional Office".
7. "Industrial" contains development and consumption for "General Industrial" and "Campus Industrial".
8. "Public Facility / Institution" contains development and consumption for "Public/Quasi-Public Facility" and "Educational Facility".
9. Existing acreage of Public Facility land use excludes City's Wastewater Treatment Plant.

Table 3.3 Recommended Sewer Unit Factors
 Sewer System Master Plan
 City of Gilroy

Land Use Classification	Recommended Factor (gpd/net acre)
Residential	
Hillside Residential	560
Low Density Residential	1,150
Medium Density Residential	2,020
High Density Residential	3,000
Non-Residential	
Office and Commercial	870
Industrial	780
Public Facility / Institution	360
Neighborhood District	900

This master plan used 24-hour diurnal patterns for dry weather flows tributary to each flow monitor, as shown on [Figure 3.1](#), [Figure 3.2](#), and [Figure 3.3](#). These diurnal patterns are comprised on peaking factors meant to simulate the hourly change in MDDWF within the system, averaging a factor of 1.0 over 24 hours. The PDWF is used for evaluating the capacity adequacy of the sewer system, and to meet the criteria set forth in the City standards.

3.3 WET WEATHER FLOW CRITERIA

The wet weather flow criteria accounts for the infiltration and inflows (I&I) that seep into the City's sewer system during storm events.

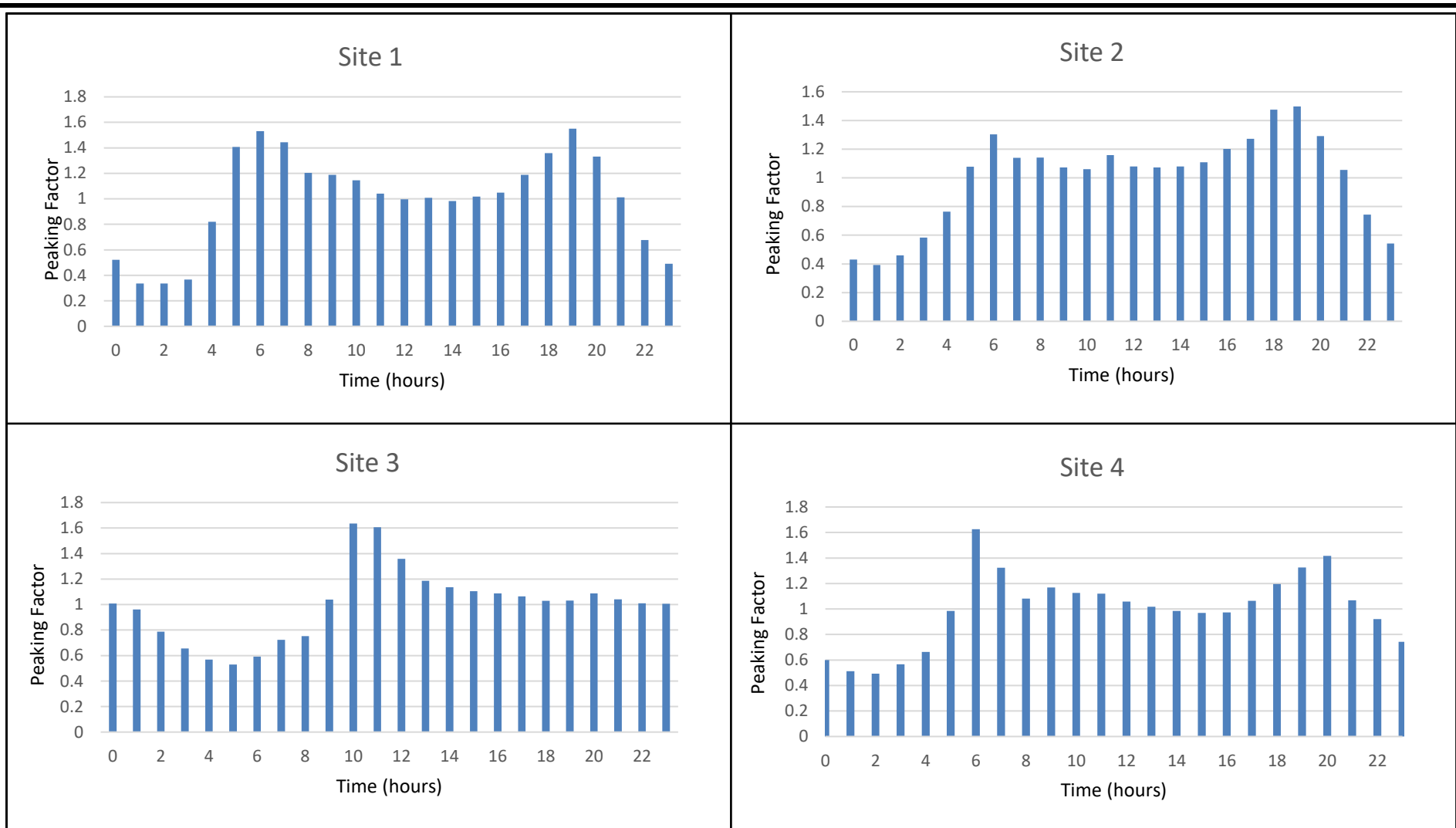
3.3.1 Infiltration and Inflow

Groundwater infiltration and inflow is associated with extraneous water entering the sewer through defects in pipelines and manholes. Infiltration occurs when groundwater rises or the soil is saturated due to seasonal factors such as a storm event which causes an increase in flows in the sewer system. The ground water will enter the sewer system through cracks in the pipes or deteriorating manholes. Inflow occurs when surface water enters the sewer collection system from storm drain cross connections, manhole covers, or roof/footing drains. [Figure 3.4](#) was developed by King County, Washington and was included in this chapter to illustrate the typical causes of infiltration and inflow.

There are several accepted methodologies for estimating infiltration and inflows (I&I). These include:

- **Methodology 1.** Based on Acreages. In this methodology, factors that may range between 400 and 1,500 gallons per day (gpd) or more are applied to acreages for estimating the I&I component.
- **Methodology 2.** Based on Linear Feet of Pipe. In this methodology, factors that may range between 12 and 30 or more gallons per day per inch diameter per 100 linear feet (gpd/inch diameter/100LF) are applied to linear feet of gravity sewers.
- **Methodology 3.** Based on a percentage of Average Dry Weather Flows. In this methodology, Infiltration and Inflows (I&I) are calculated based on a percentage of the average dry weather flow.
- **Methodology 4.** Based on flow monitoring data. In this methodology, infiltration and inflows are determined by analyzing flow monitoring data of current and past flow monitoring efforts.

This capacity analysis and master plan based the infiltration and inflow on specific flow monitoring data from the Villalobos and Associates (V&A) 2014 Flow Monitoring Program ([Appendix A](#)). Thus, the infiltration and inflows are reasonable and reflect the actual behavior of the sewer collection system.

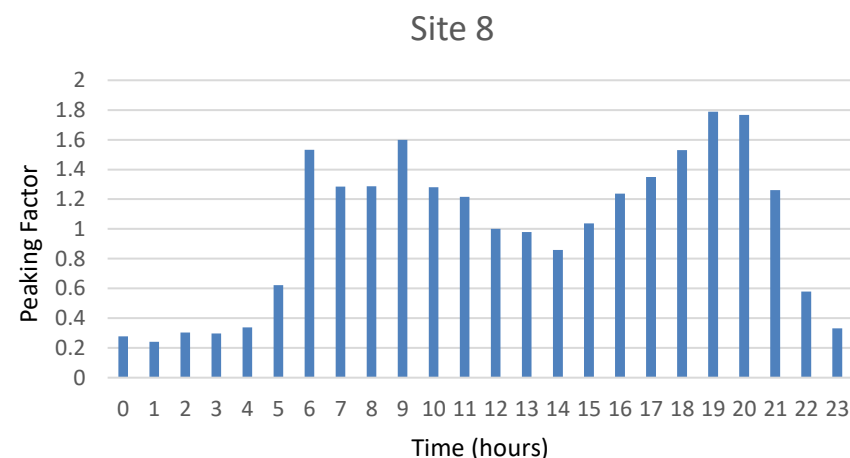
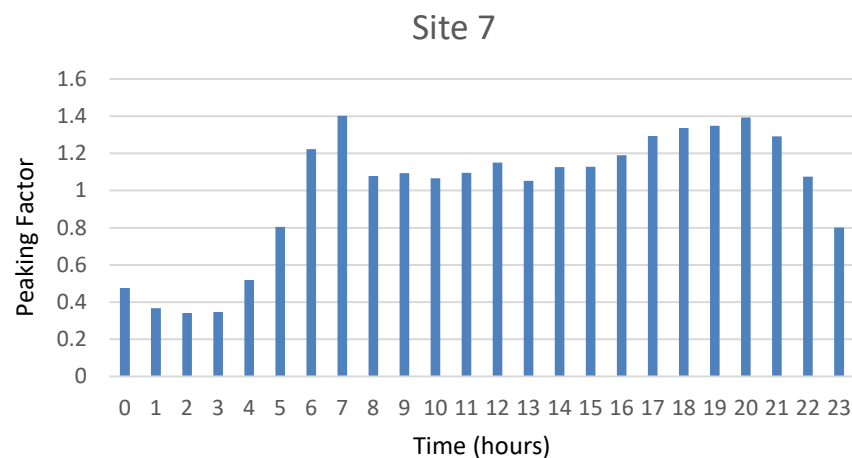
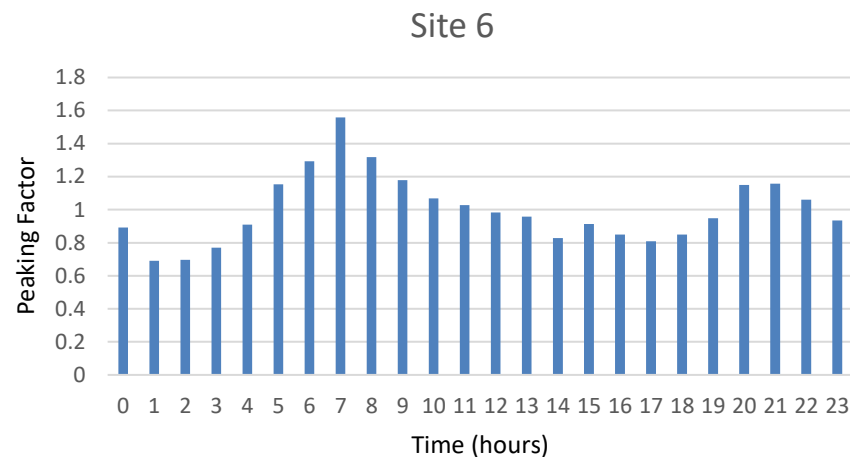
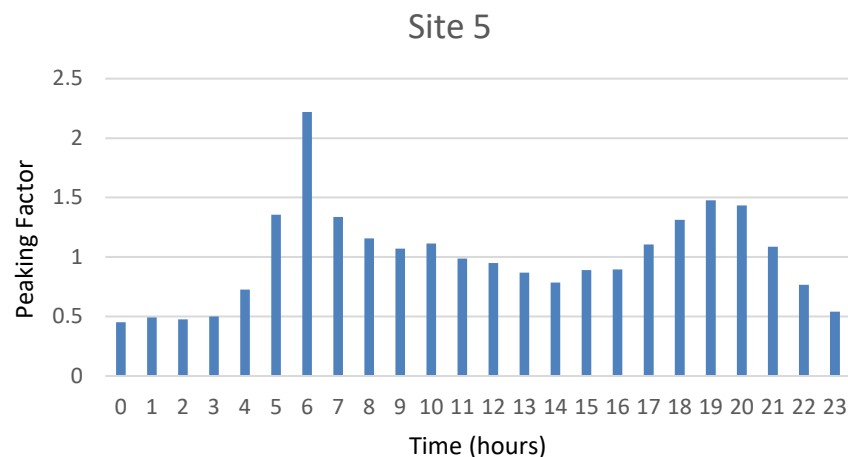


LEGEND

— Peaking Factor

Figure 3.1
Hydraulic Model Diurnals
 Sewer System Master Plan
 City of Gilroy



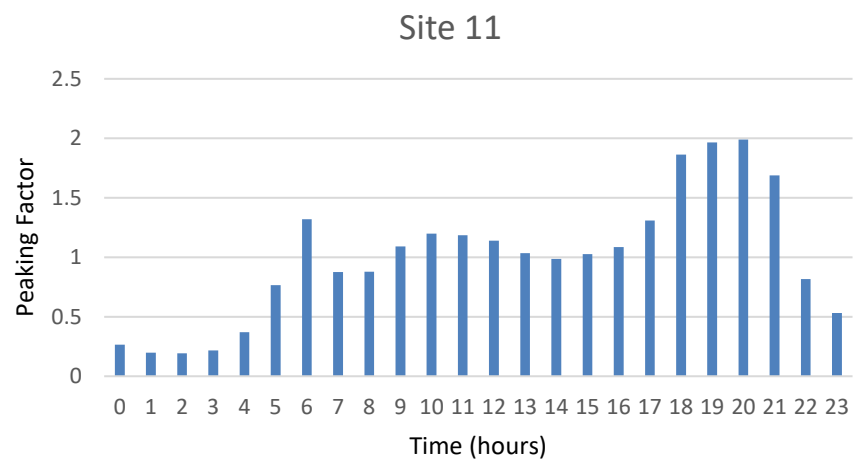
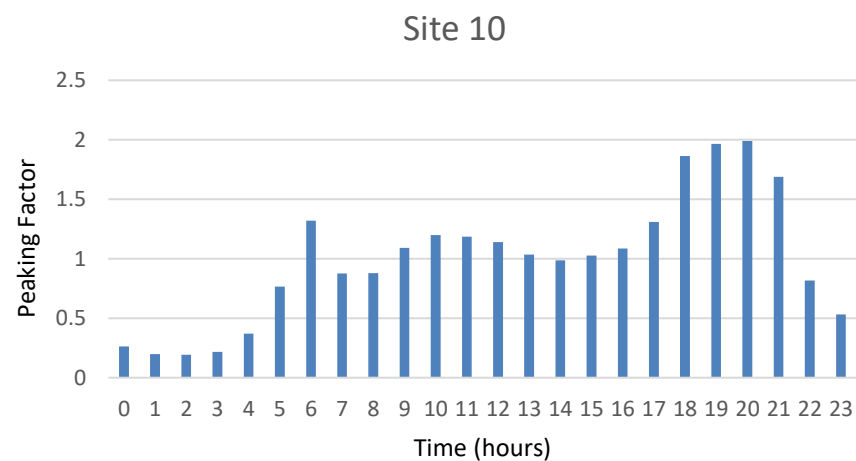
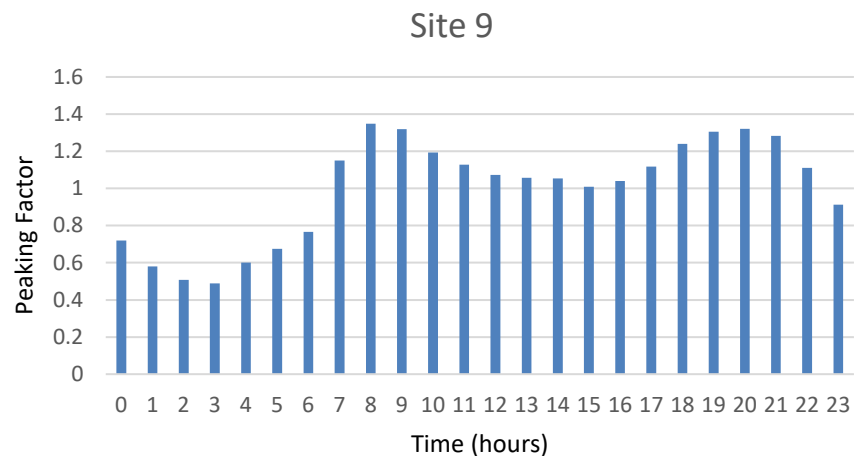


LEGEND

— Peaking Factor

Figure 3.2
Hydraulic Model Diurnals
Sewer System Master Plan
City of Gilroy





LEGEND

 Peaking Factor

Figure 3.3
Hydraulic Model Diurnals
 Sewer System Master Plan
 City of Gilroy





LEGEND

Inflow Sources
(Black Text)

Infiltration Sources
(White Text)

Figure 3.4
Infiltration and Inflow
Sources

Sewer System Master Plan
City of Gilroy



Source: King County, WA
<http://www.kingcounty.gov/environment/wastewater/II/What.aspx?print=1>

3.3.2 Sewer System Flow Monitoring

In 2014 V&A's services were used for a temporary flow monitoring program to capture eleven sites during dry and wet weather flows. These locations V&A monitored are documented on [Table 3.4](#) and shown graphically on [Figure 3.5](#). The rain gauge data for the V&A flow monitoring period was obtained from V&A. There were three rain gauges used for the wet weather analysis. The V&A rain gauges, were located in the North-East, West and South-West portion of the City. The north-east rain gauge was located near Dryden Ave and New Ave, the west rain gauge was located near Santa Teresa Blvd and Lerma Way, and the south-west rain gauge was located in the western foothills near Santa Teresa Blvd and Ballybunion Ct. The flow monitoring and rain data was used in this analysis to calibrate the computer hydraulic model to average dry weather flow and wet weather flow conditions.

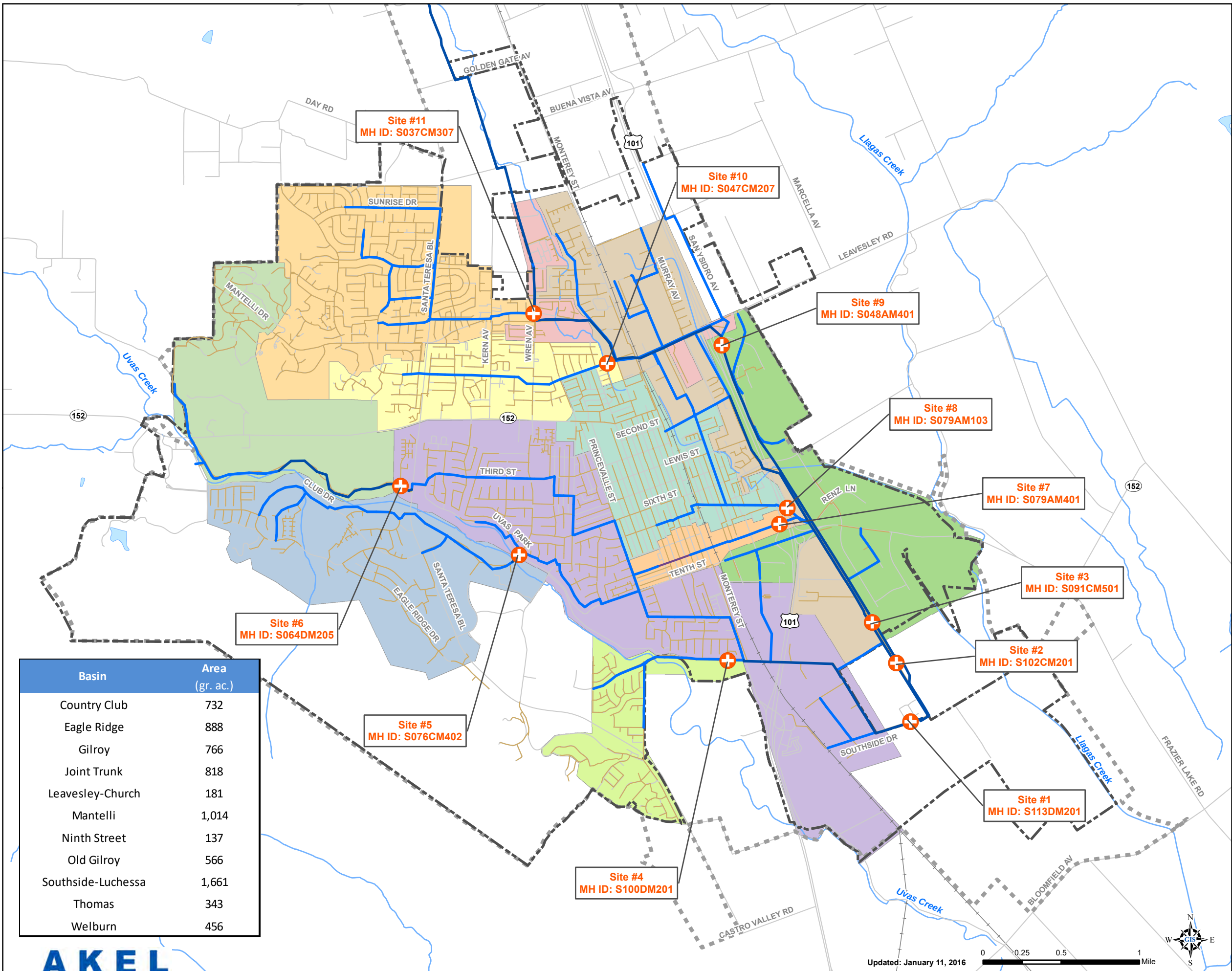
The City also provided flow data from the South County Regional Wastewater Authority WWTP. This flow data was used to analyze the seasonal flow patterns the City's sewer system experiences and to gauge the effects the wet weather season has on the sewer system.

3.3.3 10-Year 24-Hour Design Storm

A synthetic design storm is typically used to evaluate the sewer collection system's response during wet weather flow conditions. The design storm information was collected from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 Volume 6 ([Table 3.5](#)).

- **10-Year Frequency.** Industry standards include design storms that range between 5-year and 20-year events. Based on current regulatory trends, a 10-year storm event was chosen for the City of Gilroy to evaluate the capacity adequacy of the sewer collection system.
- **24-Hour Duration.** Peak flows from a storm event are usually caused by brief intense rains, that can happen as part of an individual event or as a portion of a larger storm. The 24-hour storm duration is longer than needed to determine peak flow but aids in identifying infiltration and inflows a sewer system may experience during a storm event.
- **Balanced Rainfall Centered Distribution.** The National Resources Conservation Service, previously known as the Soil Conservation Service, has developed rainfall distributions for wide geographic regions based on traditional Depth-Duration-Frequency (DDF) rainfall data. In this methodology, the highest rainfall intensity is placed at the center of the storm. Incrementally lower intensities are placed on alternating sides of the peak.

Thus, the NOAA Atlas 14 Depth Duration Frequency (DDF), 10-year 24-hour (10yr-24hr) design storm, with a balanced rainfall distribution, was used to evaluate the capacity adequacy of the City's sewer collection system during wet weather flow conditions.



Legend

⊕ Flow Meters

Modeled Gravity Pipes by Size

8" and Smaller

10" - 21"

24" and Larger

Non-Modeled Pipes

Flow Meter Basins

Country Club

Eagle Ridge

Gilroy

Joint Trunk

Leavesley-Church

Mantelli

Ninth Street

Old Gilroy

Southside-Luchessa

Thomas

Welburn

Roads

Railroads

City Limits

Urban Growth Boundary

Rivers & Creeks

Waterbodies

Figure 3.5
Flow Meter Locations
Sewer System Master Plan
City of Gilroy



Table 3.4 Flow Monitoring Locations

Sewer System Master Plan

City of Gilroy

Site No.	GIS Manhole ID	Location	Pipe Information		Tributary Areas	
			Size	Upstream Pipe Slope	Metered Basins	Area
			(in)	(ft/ft)		(gr. ac.)
1	S113DM201	Southside Dr east of Rossi Ln	27	0.0029	Southside-Luchessa, Thomas, Eagle Ridge, Country Club	3,624
2	S102CM201	ROW north of Southside Drive	24	0.0006	Gilroy, Old Gilroy, Ninth Street, Welburn	1,925
3	S091CM501	ROW north of Southside Drive	33	0.0014	Joint Trunk, Leavesley-Church, Mantelli	2,013 + Morgan Hill
4	S100DM201	West of Luchessa Ave and Monterey St	12 from W	0.0065	Thomas	343
5	S076CM402	Uvas Park Dr and Wren Ave	10 from SW	0.0030	Eagle Ridge	888
6	S064DM205	ROW west of 3rd St and Santa Teresa Blvd	24	0.0012	Country Club	732
7	S079AM401	ROW east of 9th St and Crocker Ln	10	0.0026	Ninth Street	137
8	S079AM103	Renz Ln north of HWY 101 and 10th St interchange	14	0.0015	Old Gilroy	566
9	S048AM401	Leavesley Rd off 101N Ramp	33	0.0015	Leavesley-Church, Mantelli	1,195 + Morgan Hill
10	S047CM207	Southwest of Welburn Ave and Church St	10 from SW	0.0053	Welburn	456
11	S037CM307	Mantelli Dr and Wren Ave	18 from W	0.0021	Mantelli	1,014

Table 3.5 Precipitation Depth-Duration-Frequency

Sewer System Master Plan

City of Gilroy

Duration	2-Year		5-Year		10-Year		25-Year		100-Year	
	(in)	(in/hr)	(in)	(in/hr)	(in)	(in/hr)	(in)	(in/hr)	(in)	(in/hr)
5-min	0.17	1.98	0.22	2.59	0.26	3.10	0.32	3.82	0.41	4.97
10-min	0.24	1.42	0.31	1.85	0.37	2.22	0.46	2.73	0.59	3.56
15-min	0.29	1.14	0.37	1.50	0.45	1.79	0.55	2.20	0.72	2.87
30-min	0.40	0.79	0.52	1.03	0.62	1.24	0.76	1.52	0.99	1.98
1-hr	0.56	0.56	0.73	0.73	0.87	0.87	1.07	1.07	1.40	1.40
2-hr	0.84	0.42	1.11	0.56	1.33	0.67	1.63	0.82	2.14	1.07
3-hr	1.06	0.35	1.40	0.47	1.68	0.56	2.07	0.69	2.71	0.90
6-hr	1.49	0.25	1.98	0.33	2.39	0.40	2.96	0.49	3.86	0.64
12-hr	2.04	0.17	2.79	0.23	3.40	0.28	4.22	0.35	5.46	0.46
24-hr	2.73	0.11	3.83	0.16	4.69	0.20	5.83	0.24	7.51	0.31



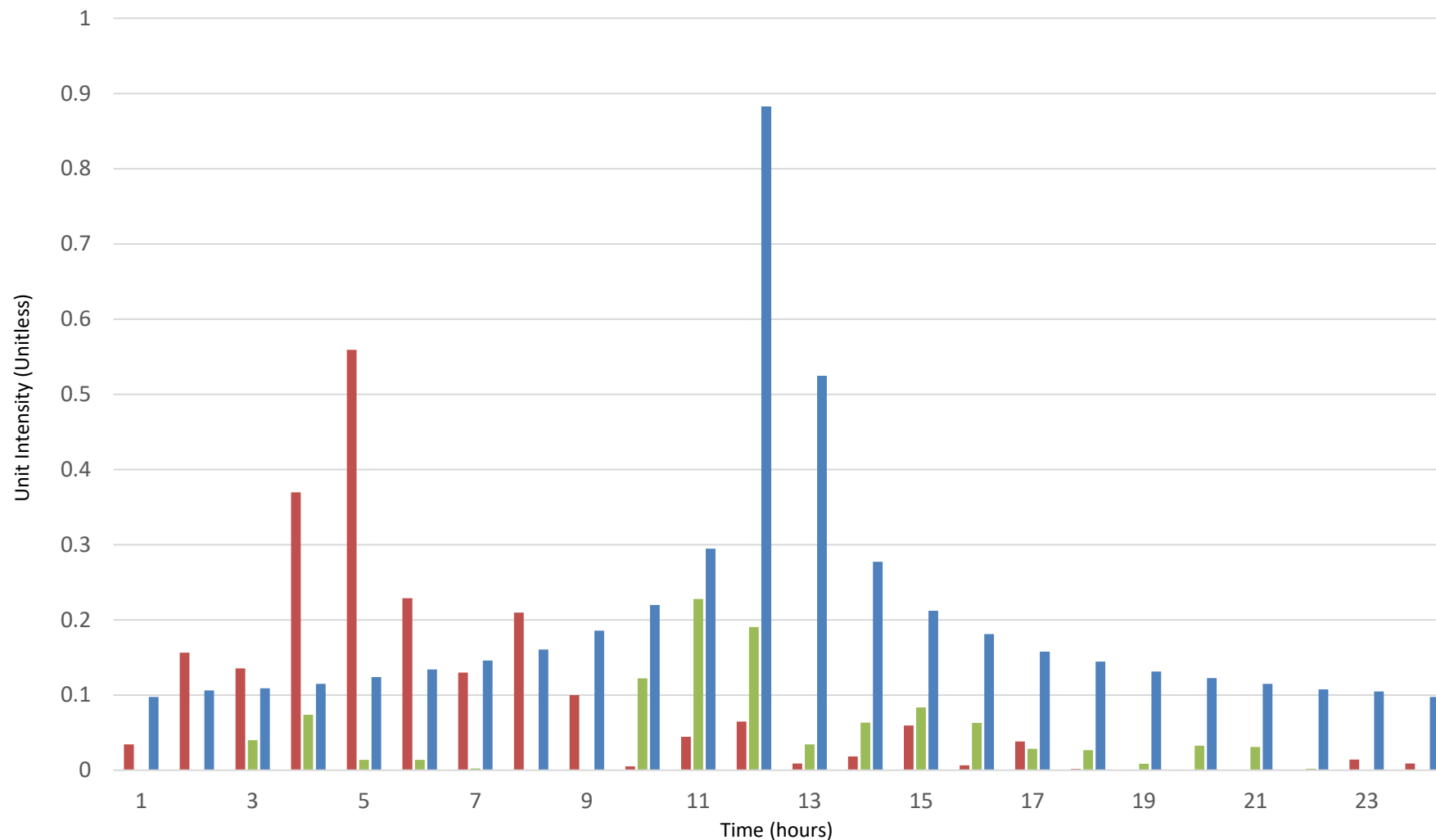
9/28/2020

Note:

1. Source: NOAA Atlas 14 Volume 6 Version 2 for Gilroy.

The selected 10-year 24-hour design storm was further compared to historical storm events, between February 2014 and March 2014, as documented on [Table 3.6](#) and shown graphically on [Figure 3.6](#). The table lists the total rainfall volume, duration, peak hour intensity, and total monthly rainfall (if available) for each storm event.

[Figure 3.6](#) is intended to show the diurnal comparison between the design storm and the two storm events experienced during February and March of 2014. The comparison indicates that, based on the balanced centered hyetograph, the design storm's peak hour value is at 0.89 inches per hour (in/hr), while the February 26th and March 1st storms' peak values are 0.23 and 0.56 in/hr respectively. This comparison illustrates the more conservative nature of the design storm and the relatively small storm events experienced in February and March 2014.



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■ Historical Storm Event: February 28, 2014 (2.20 in) ■ Historical Storm Event: February 26, 2014 (1.06 in) ■ Design Storm (4.69 in)

Figure 3.6
10-Year 24-Hour Storm
(Design vs Historical Storm)
 Sewer System Master Plan
 City of Gilroy



October 27, 2016

Table 3.6 Storm Events Analysis
 Sewer System Master Plan
 City of Gilroy

Storm Event	Estimated Return Interval	Single Rainfall Event Volume and Intensity	
		Volume (in)	Peak Intensity (in//hr)
February 26- February 27, 2014	< 1-year	1.06	0.23
February 28 - March 1, 2014	2-Year 6 Hour	2.19	0.56
Design Storm	10-Year 24-Hour	4.69	0.89

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CHAPTER 4 – EXISTING SEWER COLLECTION FACILITIES

This chapter provides a description of the City's existing sewer collection system facilities including gravity trunks, force mains, lift stations, and sewer collection basins. The chapter also includes a brief description of the SCRWA WWTP, which treats and disposes of the wastewater for the City.

4.1 SEWER COLLECTION SYSTEM OVERVIEW

The City provides sewer collection services to approximately 17,000 residential, commercial, industrial, and institutional accounts. The City's collection system consists of approximately 167 miles of up to 60-inch gravity sewer pipes that convey flows towards the SCRWA WWTP, on Southside Drive, as shown on [Figure 4.1](#).

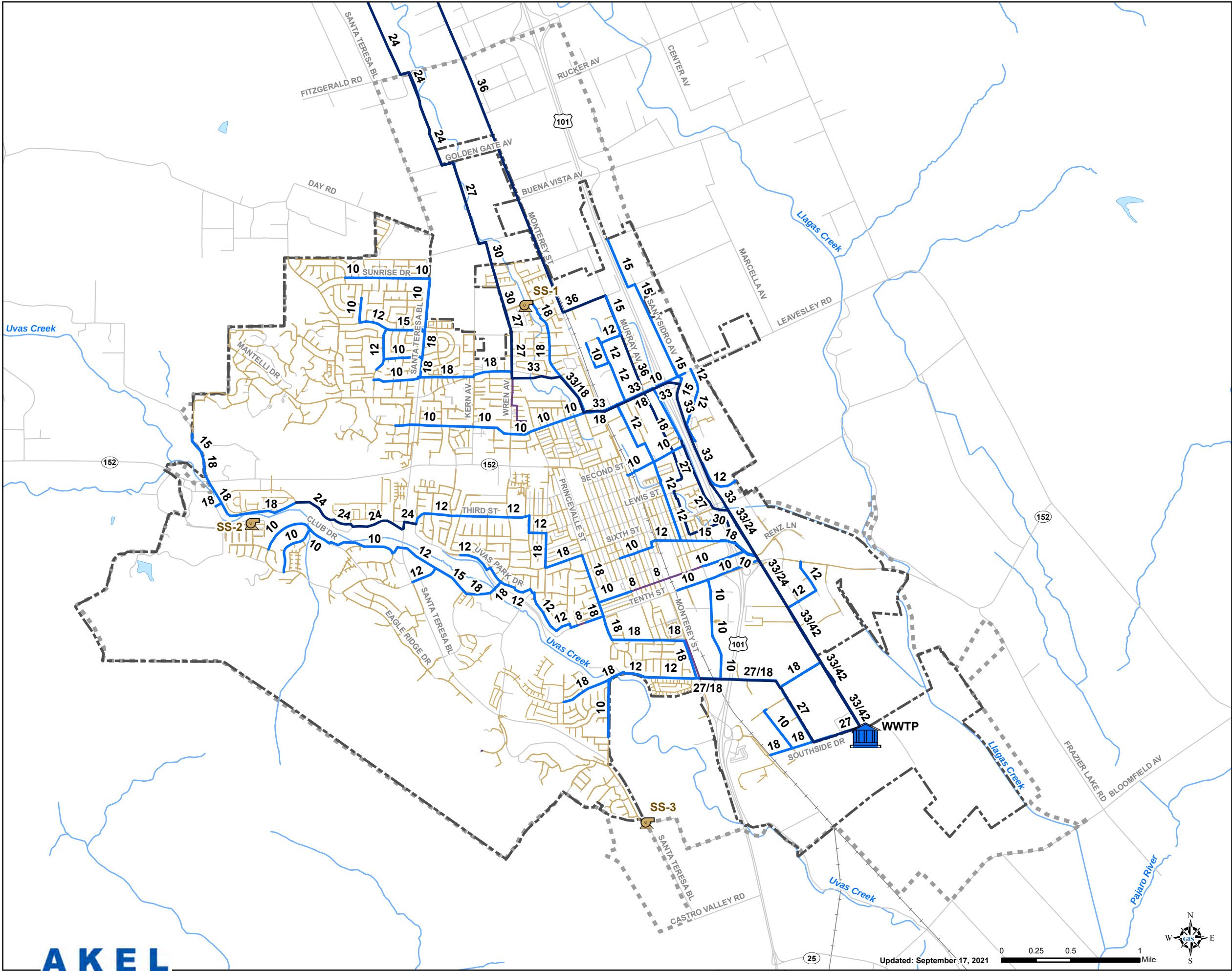
A system-wide pipe inventory, listing the total length by pipe diameter, is shown on [Table 4.1](#). This table is based on information extracted from the City's GIS and was updated to reflect the review of construction drawings provided by City Staff. The 8-inch and 12-inch diameter pipes account for 68 percent of the total sewer pipe lengths.

4.2 SEWER COLLECTION BASINS AND TRUNKS

Due to topography, the sewer collection system is divided into four separate dendritic sewer collection basins, each defining the boundaries of a sewer collection trunk system. The following sixteen sewer collection trunks were created, Gilroy Trunk, Southside-Luchessa Trunk, Third-Princevalle Subtrunk, Country Club Subtrunk, Thomas Subtrunk, Uvas Park Subtrunk, Eagle Ridge Subtrunk, Ninth Street Subtrunk, Old Gilroy Subtrunk, Forest-Swanston Subtrunk, San Ysidro Subtrunk, Forest-Murray Subtrunk, Leavesley-Church Subtrunk, Welburn Subtrunk, Mantelli Subtrunk, and Saint Teresa-Long Meadow Subtrunk. The sewer trunk system for each collection basin is shown on [Figure 4.2](#).

4.2.1 Gilroy Trunk

The Gilroy trunk discharges into the SCRWA WWTP as a 42-inch gravity pipe. The trunk begins as an 18-inch pipeline on Leavesley Road approximately 400 feet east of the Murray Ave and Leavesley Road intersection. Beginning from Leavesley Road, the trunk parallels the west side US HWY 101 to I.O.O.F. Ave where it increases to a 27-inch pipeline and continues its path to E Sixth St. From E Sixth St, the pipeline increases to a 30-inch pipe and siphons under US HWY 101 to the east side of the highway. Across the highway, the pipeline decreases to a 24-inch pipe and follows frontage of the commercial building space to E 10th St. From E 10th St, continuing the alignment, the pipe crosses through parking space and under other commercial buildings via Right-Of-Way to approximately 500 feet west of the intersection of Camino Arroyo and Holloway Rd where it increases to a 42-inch pipeline. Then the pipeline follows the dirt path in the south-



Legend

Modeled Gravity Pipes by Size

- 8" or Smaller
- 10" - 18"
- 24" or Greater

Non-Modeled System

- Lift Station
- Non-Modeled Pipes
- Roads
- Railroads
- City Limits
- Urban Growth Boundary
- Rivers & Creeks
- Waterbodies

Figure 4.1
Existing Sewer
Collection System
Sewer System Master Plan
City of Gilroy



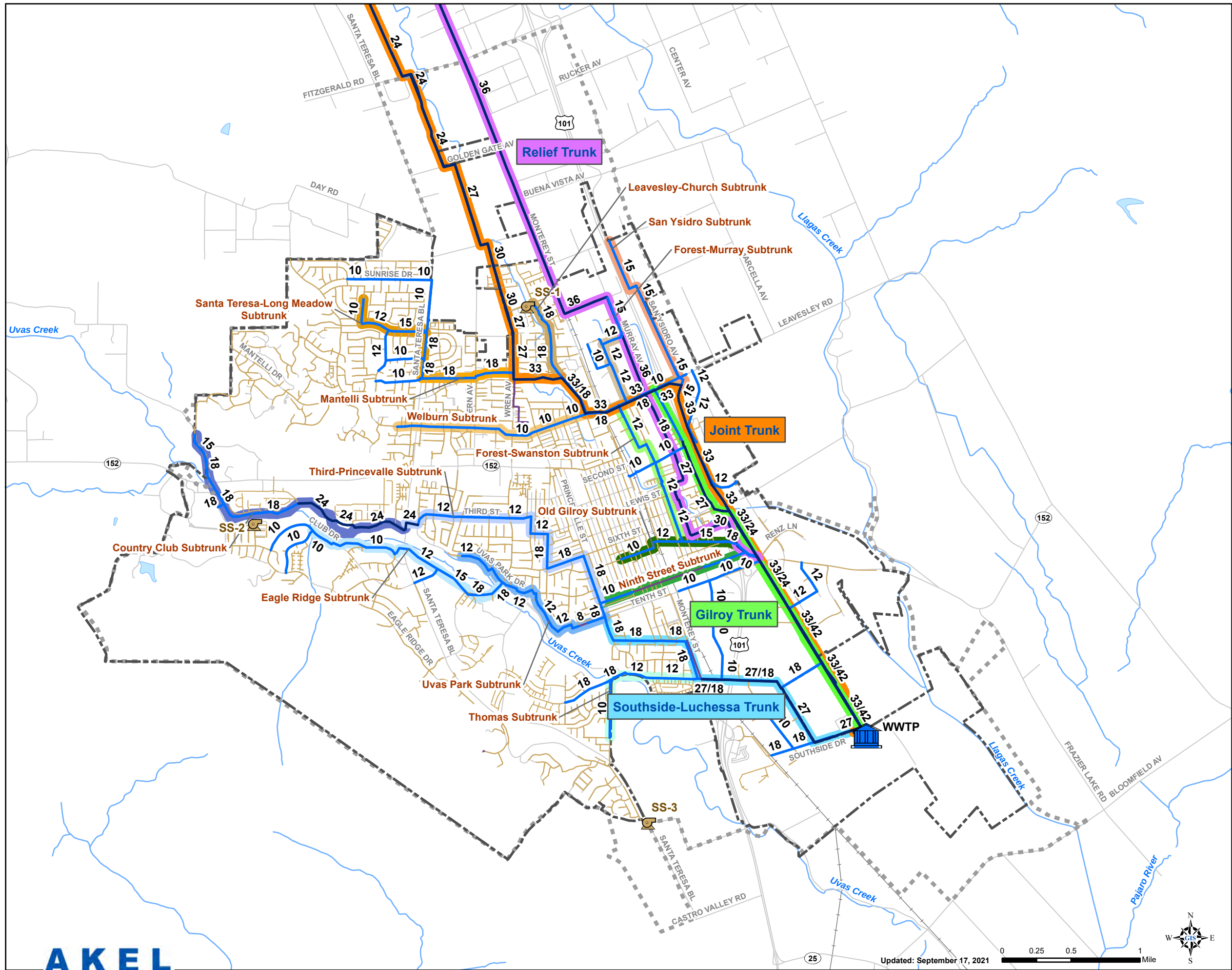


Table 4.1 Existing Sewer Pipe Inventory

Sewer System Master Plan

City of Gilroy

Pipe Size (in)	Length	
	(feet)	(miles)
City Pipes		
≤6 ²	154,358	29.2
8	463,234	87.7
10	81,809	15.5
12	58,195	11.0
14	327	0.1
15	16,330	3.1
16	136	0.03
18	43,284	8.2
24	13,447	2.5
27	12,542	2.4
30	914	0.2
42	5,810	1.1
48	375	0.1
Total	850,760	161.1
Joint Trunk Pipes³		
21	202	< 0.1
24	5,679	1.1
27	4,407	0.8
30	2,776	0.5
33	22,132	4.2
42	246	< 0.1
60	96	< 0.1
Total	35,537	6.7
		

5/20/2021

Notes:

1. Source: GIS Received from City staff on September 10, 2020.
2. Includes pipelines of unknown diameter.
3. Indicates Joint Trunk pipelines south of intersection at Fitzgerald Avenue and Monterey Road.

easterly fashion to Southside Dr. At Southside Dr, the 42-inch gravity pipe discharges into the SCRWA WWTP.

4.2.2 Southside-Luchessa Trunk

The Southside-Luchessa Trunk discharges into the WWTP via the 42-inch gravity pipe of Gilroy Trunk. The trunk begins at the intersection of W Luchessa Ave and Monterey as a 27-inch gravity main. From the intersection, the trunk follows W Luchessa Ave in the eastward direction to Rossi Ln. From Rossi Ln, the trunk flows south-east to Southside Dr, turns east, and discharges into the 42-inch Gravity Main near SCRWA WWTP as a 27-inch pipeline.

4.2.3 Third-Princevalle Subtrunk

The Third-Princevalle Subtrunk discharges into the Southside-Luchessa Trunk, at the intersection of Monterey Rd and W Luchessa Ave, as a 18-inch pipeline. The trunk begins at the Santa Teresa Blvd and Third St intersection as a 12-inch pipeline. Flowing eastward on Third St, the pipeline turns south on Santa Theresa Dr, then east on Fourth St, increases to a 18-inch pipe on Miller Ave and flows south to W Sixth St. Keeping its size at 18-inch, the pipeline flows north-east on W Sixth St to Princevalle St, turns south-east on Princevalle St and flows to the Princevalle Channel easement. Here, the trunk turns east and flows under the Princevalle Channel easement to Monterey St. At Monterey St, the trunk follows the street alignment in the south-east direction and flows into the Southside-Luchessa Subtrunk as an 18-inch pipe.

4.2.4 Country Club Subtrunk

The Country Club Subtrunk discharges into the Third-Princevalle Subtrunk, at the intersection of Santa Teresa Blvd and Third St, as a 24-inch pipeline. The trunk begins as a 15-inch pipe approximately 300 feet south of the intersection of Burchell Rd and Bluebell Dr on Burchell Rd. Flowing on Burchell Rd, the pipe increases to an 18-inch and flows south to Hecker Pass Hwy. After crossing Hecker Pass Hwy, the trunk follows the eastern and then northern banks of Uvas Creek, increases in size to a 24-inch, flows to Santa Teresa Blvd and Third St where it discharges into the Third-Princevalle Subtrunk as a 24-inch.

4.2.5 Thomas Subtrunk

The Thomas Subtrunk discharges into the Southside-Luchessa Trunk, at the intersection of Monterey Rd and W Luchessa Ave, as an 18-inch pipeline. The pipeline begins on Thomas Rd and Alder St intersection as a 10-inch pipeline. From the intersection, the pipe flows northward on Thomas Rd to W Luchessa Ave. At the intersection the trunk increases in size to a 15-inch pipeline for approximately 300 feet, then decreases down to a 12-inch and flows eastward following the alignment of W Luchessa Ave to Monterey Rd. At Monterey Rd, the trunk flows into the Southside-Luchessa Trunk.

4.2.6 Uvas Park Subtrunk

The Uvas Park Subtrunk discharges into the Third-Princevalle Subtrunk, at the intersection of W Tenth St and Princevalle St, as a 12-inch pipeline. The pipeline begins on Uvas Park Dr, approximately 450 feet south-east of the intersection of Santa Barbara Dr and Hersman Dr, as a 12-inch size. Following Uvas Park Dr, the trunk jogs over to Crawford Dr at the extended alignment of Crawford St. On Crawford Dr, the trunk flows south-easterly as a 12-inch pipe to Wren Ave. From Wren Ave, the trunk extends under residential property lines to Hoxley St. At the south-east corner of Hoxley St, the trunk jogs over to W Eighth St, flows south on Yorktown Dr to Greenwich Dr. Keeping at the size of 12-inches the trunk flows north-east on Greenwich Dr to Orchard Dr, then south to W Tenth St, where it flows north-east on W Tenth St to Princevalle St. At the intersection, the trunk flows into the Third-Princevalle Subtrunk as a 12-inch pipeline.

4.2.7 Eagle Ridge Subtrunk

The Eagle Ridge Subtrunk discharges into the Uvas Park Subtrunk, at the intersection of Wren Ave and Crawford Dr, as an 18-inch pipeline. The pipeline begins at the intersection of Muirfield Way and Club Dr as a 10-inch pipeline. From the intersection the trunk flows in the south-east direction on Club Dr, jogs north of property line at the intersection of Club Dr and St Andrews Cir, then follows the alignment of St Andrews Cir for 1,600 ft. From here, the trunk jogs to Santa Teresa Blvd, increases in size to a 12-inch and follows the bike trail to Grenache Way. At Grenache Way, the trunk increases to a 15-inch pipeline, flows to the intersection of Syrah Ct, further increases to an 18-inch pipe and flows north-east to the intersection of Wren Ave and Crawford Dr. At the intersection, the trunk flows into the Uvas Park Subtrunk.

4.2.8 Ninth Street Subtrunk

The Ninth Street Subtrunk discharges into the Gilroy Trunk, on Renz Ln approximately 300 feet north-west of the entrance from Pacheco Pass Hwy to US HWY 101, as a 10-inch pipeline. The trunk begins approximately 45 feet east of W Ninth St and Princevalle St intersection. Flowing north-east on Ninth St, the trunk crosses under US HWY 101, follows the Renz Ln and flows into Gilroy Trunk.

4.2.9 Old Gilroy Subtrunk

The Old Gilroy Subtrunk discharges into the Joint Morgan Hill – Gilroy Trunk, on Renz Ln approximately 300 feet north-west of the entrance from Pacheco Pass Hwy to US HWY 101, as an 18-inch pipeline. The trunk begins as a 10-inch pipeline approximately 200 feet south-west of the intersection of Rosanna St and W Seventh St. Flowing north-east on W Seventh St, the trunk turns north on Monterey St, then east on Hornlein Ct, increases to a 12-inch pipe and flows under the railroad tracks to Old Gilroy St. Following the alignment of Old Gilroy St, the pipeline increases to a 15-inch on Forest St, then to an 18-inch on Crocker Ln where it crosses under US HWY 101, and then flows to Renz Ln. Here, the trunk follows the alignment of Renz Ln to Joint Morgan Hill – Gilroy Trunk where it discharges as an 18-inch.

4.2.10 Forest Subtrunk

The Forest Subtrunk discharges into the Old Gilroy Subtrunk, at the intersection of Forest St and Old Gilroy St, as a 12-inch pipeline.

The pipeline begins on the southern side of the intersection of Swanston St and Leavesley Rd as a 12-inch pipeline and flows south-east on Swanston Ln, turns north-east on Swanston Ln, then turns south-east on Forest Ave. The pipeline follows the Forest Avenue alignment south-east where it flows into the Old Gilroy Subtrunk.

4.2.11 San Ysidro Subtrunk

The San Ysidro Subtrunk discharges into the Joint Morgan Hill – Gilroy Trunk, near the southern side of the intersection of Leavesley Rd and San Ysidro Ave, as a 15-inch pipeline. The pipeline begins at the intersection of Cohansey Ave and Noname Uno as a 12-inch pipeline, increases to a 15-inch pipeline as it flows on Noname Uno, turns north-east on E Las Animas Ave, then turns south-east on San Ysidro Ave. The pipeline follows the San Ysidro Ave alignment as a 15-inch pipeline to Leavesley Rd, and flows into the Joint Morgan Hill – Gilroy Trunk just south of the intersection.

4.2.12 Forest Murray Subtrunk

The Forest Murray Subtrunk discharges into the Joint Morgan Hill – Gilroy Trunk, at the intersection of Forest St and Leavesley Rd, as a 15-inch pipeline. The trunk begins at the intersection of E Las Animas Ave and Murray Ave as a 15-inch pipeline. From the intersection, the trunk flows south-east on Murray Ave to Tomkins Ct. Approximately 400 feet, on Murray Ave, from the intersection of Tomkins Ct, the trunk decreases in size to an 8-inch, then increases to a 12-inch before it turns west on Kishimura Dr. Flowing westward on Kishimura Dr to Forest St, the trunk turns south-east on Forest St where it flows to Leavesley Rd. Approximately 100 feet north of the intersection of Forest St and Leavesley Rd, the pipeline increases to 15-inch in size and flows into the Joint Morgan Hill – Gilroy Trunk.

4.2.13 Leavesley-Church Subtrunk

The Leavesley-Church Subtrunk discharges into the Gilroy Trunk, approximately 400 feet north-west of the intersection of Leavesley Rd and Murray Ave on Leavesley Rd, as an 18-inch pipe. The pipeline begins at the intersection of Farrell Ave and Church St as an 18-inch pipe and follows the south-easterly alignment of Church St to Welburn Ave. On Welburn Ave, the gravity main turns east and flow towards Monterey St. At Monterey St, the street alignment changes from Welburn Ave to Leavesley Rd. The trunk follows the Leavesley Rd alignment to Murray Ave where the pipe flows into the Gilroy Trunk just north-west of the intersection.

4.2.14 Welburn Subtrunk

The Welburn Subtrunk discharges into the Leavesley-Church Subtrunk, at the intersection of Church St and Welburn Ave, as a 10-inch pipeline. The trunk begins at the Taryn Ln and Welburn

Ave intersection as a 10-inch pipe. Flowing eastward on Welburn Ave, the pipeline crosses under Santa Teresa Blvd, Kern Ave, and Wren Ave before it flows into the Leavesley-Church Subtrunk on Church St as the same 10-inch pipeline.

4.2.15 Mantelli Subtrunk

The Mantelli Subtrunk discharges into the Joint Morgan Hill – Gilroy Trunk, at the intersection of Wren Ave and Mantelli Dr, as an 18-inch pipeline. The trunk begins at the western cul-de-sac of Bay Tree Dry near Calle Del Rey as a 10-inch pipeline. The trunk follows the Bay Tree Dr alignment eastward to Santa Teresa Blvd, increases in size to an 18-inch pipe, then follows the channel easement, parallel to Zinnia St, to Mantelli Dr. Here the trunk follows the Mantelli Dr alignment to Joint Morgan Hill – Gilroy Trunk where it discharges as an 18-inch pipe.

4.2.16 Santa Teresa-Long Meadow Subtrunk

The Santa Teresa-Long Meadow Subtrunk discharges into the Mantelli Subtrunk, on Santa Teresa Blvd near the eastern cul-de-sac of Bay Tree Dr, as an 18-inch pipeline. The trunk begins just north of Quail Walk Dr on Eagle View Way as a 10-inch pipeline. Flowing south on Eagle View Way, the trunk turns into a 12-inch pipe on Longmeadow Dr and follows the Longmeadow Dr alignment. Flowing on Longmeadow Dr, the trunk increases to a 15-inch pipeline at Calle Del Rey, continues on Longmeadow Dr to Santa Teresa Blvd where it decreases to a 14-inch pipeline. Flowing south on Santa Teresa Blvd, the trunk increases in size to an 18-inch at the intersection of Lerma Way. Continuing south, the pipeline discharges into the Mantelli Subtrunk as a 18-inch pipe.

4.2.17 Morgan Hill – Gilroy Joint Sewer Trunk

Some of the sewer flows for City of Gilroy from the collection basins, their trunks and subtrunks discharge into the joint Morgan Hill – Gilroy sewer trunk, also known as the Joint Trunk. The Joint Trunk begins at the intersection of Monterey Rd and California Ave. From the intersection, the trunk flows south-east to the City of Gilroy where it discharges into the South County Regional Wastewater Authority WWTP, located south of the City on Southside Dr.

The Joint Trunk is maintained by a Joint Exercise of Powers Agreement between the City of Gilroy and the City of Morgan Hill and dated May 19th, 1992. This agreement establishes the formation of the South County Regional Wastewater Authority (SCRWA), and includes an exhibit that documents the pipeline capacities and the capacity allocation for each segment of the Joint Trunk. The agreement stipulates that a 4.0 MGD capacity allocation exists in the Joint Trunk up to Farrell Avenue, and a 7.7 MGD capacity reservation up to the WWTP, to accommodate Morgan Hill's flows. In the current agreement, the City of Morgan Hill is responsible for all maintenance of the Trunk up to Highland Avenue in San Martin. Additional maintenance costs incurred south of Highland Avenue are shared with Gilroy per the JPA capacity allocated for each section of the trunk. Design information on the Joint Trunk, which is approximately 5.8 miles in length, were obtained from City records, and summarized in [Table 4.1](#).

4.3 LIFT STATIONS

When routing flows by gravity is not possible due to adverse grades, lift stations are used to pump flows. The City currently maintains three lift stations in the sewer collection system, as summarized on [Table 4.2](#).

[Table 4.2](#) lists each pump station with relevant information obtained from the City's records such as location, wet well capacity, number of pumps, pump capacity, and controls, if data was available. The pump stations are operated to turn "on" or "off" based on their levels in their wet wells.

The City's lift stations were not included in the hydraulic model and capacity analysis as they were not along the modeled sewer collection system.

4.4 FLOW DIVERSIONS

The sewer collection system contains diversion structures that are intended to provide opportunities to route flow to various sewer pipelines that may have excess capacity.

City of Gilroy's sewer collection system contains diversion structures that are intended to provide opportunities to route flow away from sewer trunks with capacity limitations to sewer pipelines that may have excess capacity. The City's sewer system includes the following active diversions along the trunk sewer system:

Rossi Lane Diversion. The Rossi Lane diversion is located just south-east of the intersection of E Luchessa Ave and Rossi Ln. Sewer flows from the western portion of the City near foothills and downstream, flow into the E. Luchessa Ave and Rossi Ln intersection to this diversion. Most of the flow continues south along the Rossi Ln alignment but the City has the option to divert flow north-east from the diversion to Gilroy Trunk if needed. For the purposes of the hydraulic model, the flow is only diverted to the Gilroy Trunk if there are adverse backup conditions.

I.O.O.F. Diversion. The I.O.O.F. diversion is located at the intersection of Forest St and I.O.O.F. Ave. Sewer flows from the northern and western area of this intersection flow into this diversion. From here, the flow can either continue southwardly on Forest St or flow east to the Gilroy Trunk. In the existing system, the flow continues on I.O.O.F. Ave towards the Gilroy Trunk where it discharges via a 10-inch pipeline.

4.5 SOUTH COUNTY REGIONAL WASTEWATER AUTHORITY WASTEWATER TREATMENT PLANT

The South County Regional Wastewater Authority WWTP is an 8.5 million gallons per day (MGD) ADWF primary, secondary and tertiary treatment facility. The treatment facility is located at the

Table 4.2 Existing System Lift Station Inventory

Sewer System Master Plan

City of Gilroy

Lift Station Information ^{1,2}			Pump Information ²		Wet Well Dimensions		Capacity		Holding Time
Station	Location	Construction Year	No. of Pumps	Pump Capacity (gpm)	Diameter (ft)	Depth (ft)	Per Tank (gal)	Total (gal)	
Lift Stations									
SS-1	Desiderio Wy / Farrell Ave	2004	-	-	-	-	-	-	-
SS-2	Roundstone Dr / Strath Pl	2005	-	-	-	-	-	-	-
SS-3	Santa Teresa Blvd (Gavilan College)	1966	2	420	-	-	-	-	-
SS-4	Miller Ave/ Uvas Pkwy (Private Lift Station)	-	-	-	-	-	-	-	-


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Notes:

1. Source: GIS Received from City staff on September 10, 2020.
2. Source: 2019 Sewer System Management Plan

end of Southside Dr. The original plant was completed in 1990 with a plant expansion occurring in 2007 to provide the plants current capacity and technology. The SCRWA WWTP has a design capacity of 9 MGD, but is limited to 8 mgd due to the chlorine contact basin capacity and it can accommodate a design peak dry weather flow of up to 15.1 MGD. The plant is currently operating at an average flow of 6.65 MGD with a low of approximately 4.78 MGD and a peak of approximately 10 MGD in 2019.

CHAPTER 5 –SEWER FLOWS

This chapter summarizes historical sewer flows experienced at the South County Regional Wastewater Authority (SCRWA) WWTP and defines flow terminologies relevant to this evaluation. This chapter discusses the design flows used in the hydraulic modeling effort and capacity evaluation. The design flows include the existing condition (existing customers) and buildout development conditions.

5.1 FLOWS AT THE SCRWA WWTP

The sewer flows collected and treated at the SCRWA WWTP vary monthly, daily, and hourly. While the dry weather flows are influenced by customer uses, the wet weather flows are influenced by the severity and length of storm events and the condition of the system.

Flow data influent to the SCRWA WWTP was obtained from City operation staff. The flow data covered a period from 2010 to 2019. From this data monthly, daily, and peak daily flows, were determined as summarized on [Table 5.1](#).

The following definitions are intended to document relevant terminologies shown on [Table 5.1](#):

- **Average Annual Flow (AAF).** The average annual flow is the total annual flow, or average monthly flow, for a given year, expressed in daily or other time units. This flow includes the combined average of the average dry weather flow (ADWF) and average wet weather flow (AWWF).
- **Average Dry Weather Flow (ADWF).** The average dry weather flow occurs on a daily basis during the dry weather season, with no evident reaction to rainfall. The ADWF also includes the Base Wastewater Flow (BWF). The base wastewater flow is the average flow that is generated by residential, commercial, and industrial users. The flow pattern from these users varies depending on land use types.
- **Average Wet Weather Flow (AWWF).** This average wet weather flow occurs on a daily basis during the wet weather season. In addition to the flow components in the ADWF, the AWWF includes infiltration and inflow from storm rainfall events.
- **Maximum Month Dry Weather Flow (MMDWF).** This maximum month flow occurs during the dry weather season.
- **Maximum Month Wet Weather Flow (MMWWF).** This maximum month flow occurs during the wet weather season.
- **Maximum Day Dry Weather Flow (MDDWF).** This is the highest measured daily flow that occurs during a dry weather season.

Table 5.1 Historical Flow Data and Peaking Factors
Sewer System Master Plan
City of Gilroy

Year	Population	Average Annual Flow ¹			Seasonal Average		Maximum Month		Maximum Day		Total SCRWA Plant Flow ²	
		AAF (MGD)	Per Capita Flow (GPCD)	Percentage Change	ADWF (MGD)	AWWF (MGD)	MMDWF (MGD)	MMWWF (MGD)	MDDWF (MGD)	MDWWF (MGD)	MDDWF (MGD)	MDWWF (MGD)
2010	48,821	3.60	74	-	3.62	3.59	3.83	3.89	4.05	4.38	7.19	8.99
2011	49,611	3.91	79	9%	3.76	4.07	4.13	4.76	4.27	6.17	7.37	11.98
2012	50,698	3.70	73	-5%	3.66	3.74	3.81	3.97	4.36	5.07	7.13	9.68
2013	52,378	3.58	68	-3%	3.55	3.61	3.68	3.83	4.28	4.58	7.18	7.67
2014	53,208	3.50	66	-2%	3.49	3.50	3.58	3.77	3.76	4.76	6.57	8.45
2015	54,123	3.48	64	-1%	3.44	3.50	3.48	3.61	3.60	4.47	6.02	8.24
2016	54,916	3.76	68	8%	3.72	3.79	3.81	3.99	4.67	5.67	6.99	8.97
2017	55,932	4.88	87	30%	4.23	6.04	5.04	7.31	6.30	10.06	8.34	16.46
2018	56,198	3.79	67	-22%	3.80	3.79	3.90	4.15	4.77	5.36	7.08	8.58
2019	56,854	4.15	73	9%	3.94	4.31	4.34	5.38	5.49	5.96	7.97	10.00
Historical Peaking Factors (Applied to ADWF)												
2010	-	0.99	-	-	1.00	0.99	1.06	1.07	1.12	1.21	-	-
2011	-	1.04	-	-	1.00	1.08	1.10	1.27	1.14	1.64	-	-
2012	-	1.01	-	-	1.00	1.02	1.04	1.08	1.19	1.39	-	-
2013	-	1.01	-	-	1.00	1.02	1.04	1.08	1.21	1.29	-	-
2014	-	1.00	-	-	1.00	1.00	1.03	1.08	1.08	1.36	-	-
2015	-	1.01	-	-	1.00	1.02	1.01	1.05	1.05	1.30	-	-
2016	-	1.01	-	-	1.00	1.02	1.02	1.07	1.26	1.52	-	-
2017	-	1.15	-	-	1.00	1.43	1.19	1.73	1.49	2.38	-	-
2018	-	1.00	-	-	1.00	1.00	1.03	1.09	1.26	1.41	-	-
2019	-	1.05	-	-	1.00	1.10	1.10	1.37	1.39	1.51	-	-
Recommended Peaking Fator												
					3 Year Average		1.40	1.38				

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Notes:

1. Source:

2010 and 2011 flows from South County Regional WasteWater Authority Community Development Report
2012 - 2015 flows from South County Regional WasteWater Authority Public Works Report
2016 - 2019 flows from Influent Flow Data provided by City staff on June 3, 2020.

2. Total SCRWA Plant Flow Represents combined flow of cities of Morgan Hill and Gilroy.

3. Definitions are as follows:

AAF - Average Annual Flow (annual flow, expressed in daily or other time units)
ADWF - Average Dry Weather Flow (average flow that occurs on a daily basis during the dry weather season)
AWWF - Average Wet Weather Flow (average flow that occurs on a daily basis during the wet weather season)
MMDWF - Maximum Month Dry Weather Flow (maximum month flow during the dry weather season)
MMWWF - Maximum Month Wet Weather Flow (maximum month flow during the wet weather season)
MDDWF - Maximum Day Dry Weather Flow (highest measured daily flow that occurs during a dry weather season)
MDWWF - Maximum Day Wet Weather Flow (highest measured daily flow that occurs during a wet weather season)
PDWF - Peak Dry Weather Flow (highest measured hourly flow that occurs during a dry weather flow)
PWWF - Peak Hour Wet Weather Flow (highest measured hourly flow that occurs during wet weather)

- **Maximum Day Wet Weather Flow (MDWWF).** This is the highest measured daily flow that occurs during a wet weather season.

Table 5.1 shows the City of Gilroy's average annual flows (AAF) experienced at the SCRWA WWTP increased from 3.6 MGD in 2010 to 4.15 MGD in 2019, which is an increase of approximately 15 percent. In general, the AAF flows have decreased from 2010 to 2015, and increased by approximately 19 percent between 2015 and 2019.

In addition to listing the 2010-2019 flows, and for comparison purposes, the table calculates the peaking factors applied to the corresponding average annual flows for each year. During wet weather flows, the maximum daily volume (MDWWF) contributed by the City at the SCRWA WWTP was 2.38 times higher than the average annual flow.

5.2 EXISTING SEWER FLOWS

The existing sewer flows represented in this Master Plan were based on the City's water consumption billing records. The number of acres and corresponding sewer flows are summarized on **Table 5.2**.

5.3 BUILDOUT SEWER FLOWS

The land use methodology was used to estimate the buildout flows from the City's Planning Area and to be consistent with the General Plan. **Table 5.2** documents the total acreages for residential and non-residential land use, and the undeveloped lands designated for urbanization. The undeveloped lands were multiplied by the corresponding unit flow factor to estimate the sewer flows. The buildout average daily flows were calculated at 7.07 MGD.

5.4 SEWER COLLECTION SYSTEM DESIGN FLOWS

The design flows most relevant in this capacity analysis of the sewer collection system, in addition to the Maximum Day Dry Weather Flows (MDDWF), include the peak dry weather flow (PDWF) and peak wet weather flow (PWWF).

- **Peak Dry Weather Flow (PDWF).** The PDWF is used for evaluating the capacity adequacy of the sewer collection system, and to meet the criteria set forth in the previous chapter and in the City standards.
- **Peak Wet Weather Flow (PWWF).** The PWWF is used for designing the capacity of the sewer collection system, while allowing acceptable amounts of surcharging in the system. During PWWF a relaxed criteria was used compared to PDWFs. The hydraulic analysis allowed surcharging to occur during wet weather conditions with the hydraulic grade line (HGL) rising up to three feet below the manhole rim. If the HGL at any time was less than three feet from the manhole rim, the pipe was considered deficient.

Table 5.2 Future Sewer Flows
Sewer System Master Plan
City of Gilroy

Land Use Classification	Sewer Unit Factor	Total Sewer Flow			Buildout of Service Area	
		Existing Unchanged	Redeveloped Area	New Development	Total Area	Average Daily Flow
	(gpd/acre)	(acres)	(acres)	(acres)	(acres)	(gpd)
Residential						
Hillside Residential	560	442	112	353	907	507,789
Low Density Residential	1,150	1,583	122	89	1,793.95	2,063,041
Medium Density Residential	2,020	58	177	6	240.47	485,750
High Density Residential	3,000	67	18	18	103.89	311,678
Subtotal - Residential		2,151	429	466	3,045	3,368,258
Non-Residential						
Office and Commercial ¹	870	465	281	100	846	736,013
Industrial ²	780	293	213	643	1,149	896,113
Public Facility / Institution	360	559	153	129	841	302,621
Neighborhood District	900	0	38	358	395	355,920
City Gateway District	900	0	20	7	27	24,570
Downtown Specific Plan Area ³	Varies	0	57	32	89	165,683
Mixed Use Corridor High	870	0	25	7	33	28,454
Hecker Pass Special Use District ⁴	-	0	328	88	416	301,873
Glen Loma Ranch ⁴	-	0	103	237	341	361,085
Industrial Park	780	0	43	40	83	65,069
Employment Center	870	0	279	251	530	461,164
Subtotal - Non-Residential		1,317	1,541	1,893	4,750	3,698,565
Other						
Park and Recreation Facility	0	995	0	154	1,149	0
Vacant	0	0	0	0	0	0
Open Space	0	253	0	1,045	1,298	0
Rural County	0	0	28	3	30	0
Subtotal - Other		1,247	28	1,202	2,477	0
Total						
		4,714	1,997	3,561	10,272	7,066,823

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Notes:

1. Office and Commercial accounts for Visitor Serving Commercial and General Services Commercial Land Use types.
2. Industrial accounts for General Industrial and Campus Industrial Land Use types
3. Downtown Specific Plan Water Unit Factors vary based on land use.
4. Glen Loma and Hecker Pass sewer flow estimated separately, based on itemized land use plan and associated land use factors

The design flows used in evaluating the capacity adequacy of the sewer collection system are summarized on [Table 5.3](#). The table lists the peak hour flows for dry and wet weather conditions. PDWF and PWWF used for evaluating the existing collection system were estimated at 8.79 MGD and 13.81 MGD, respectively. The PDWF and PWWF used for designing the General Plan buildout system, including growth, were estimated at 14.66 MGD and 18.95 MGD, respectively.

Table 5.3 Design FlowsSewer System Master Plan
City of Gilroy

Description	Peak Dry Weather Flow	Peak Wet Weather Flow
	(mgd)	(mgd)
Existing	8.79	13.81
Buildout	14.66	18.95

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Notes:

1. Flows shown are extracted from sewer system hydraulic model and reflect diurnal flow variations and flow attenuation.

CHAPTER 6 – HYDRAULIC MODEL DEVELOPMENT

This chapter describes the development and calibration of the City's sewer collection system hydraulic model. The City's hydraulic model was used to evaluate the capacity adequacy of the existing system and to plan its expansion to service anticipated future growth.

6.1 HYDRAULIC MODEL SOFTWARE SELECTION

The City's hydraulic model combines information on the physical characteristics of the sewer collection system (pipelines, manholes, and diversions) and operational characteristics. The hydraulic model then performs calculations and solves series of equations to simulate flows in pipes, including backwater calculations for surcharged conditions.

There are several network analysis software products released by different manufacturers that can equally perform the hydraulic analysis satisfactorily. The selection of a particular software depends on user preferences, the sewer collection system's unique requirements, and the costs for purchasing and maintaining the software.

The hydraulic modeling software used for evaluating the capacity adequacy of the City's sewer collection system, InfoSWMM by Innovyze Inc., utilizes the fully dynamic St. Venant's equation which has a more accurate engine for simulating backwater and surcharge conditions, in addition to having the capability for simulating manifolded force mains. The software also incorporates the use of the Manning Equation in other calculations including upstream pipe flow conditions. The St. Venant's and Manning's equations are discussed in the System Performance and Design Criteria chapter.

6.2 HYDRAULIC MODEL DEVELOPMENT

Developing the hydraulic model included system skeletonization, digitizing and quality control, developing pipe and manhole databases, and sewer loading allocation.

6.2.1 Skeletonization

Skeletonizing the model refers to the process where pipes not essential to the hydraulic analysis of the system are stripped from the model. Skeletonizing the model is useful in creating a system that accurately reflects the hydraulics of the pipes within the system. In addition, skeletonizing the model will reduce complexities of large models, which will also reduce the time of analysis while maintaining accuracy, but will also comply with the limitations imposed by the computer program.

In the City of Gilroy's case, skeletonizing was necessary to reduce the model from approximately 4,529 pipes extracted from the GIS to 657 pipes. The modeled pipes included pipes 8-inches in diameter and larger, in addition to some critical smaller gravity sewer pipes.

Table 4.1 lists the sewer collection system total length of pipes at 167.8 miles, compared to **Table 6.1** listing the total length of modeled pipes at 39.4 miles. Thus, approximately 23.5 percent of the total length of gravity sewers was modeled. The modeled sewer system is shown on **Figure 4.1**.

6.2.2 Digitizing and Quality Control

The City's existing sewer collection system was digitized in GIS using several sources of data and various levels of quality control. The quality control program included the following:

- Sewer System GIS data
- Supplemental field surveys
- Verification figures
- Schematics provided by City staff

After reviewing the available data sources, the hydraulic model was built and verified by City staff. Using the available sewer collection system data this master plan developed the Sewer collection system in GIS. Resolving discrepancies in data sources was accomplished by graphically identifying identified discrepancies and submitting it to City staff for review and comments. City comments were incorporated in the verified model.

6.2.3 Pipes and Manholes

Computer modeling requires the compilation of large numerical databases that enable data input into the model. Detailed physical aspects, such as pipe size, ground elevation, invert elevations, and pipe lengths contribute to the accuracy of the model.

Pipes and manholes represent the physical aspect of the system within the model. A manhole is a computer representation of a place where sewer flows may be allocated into the hydraulic system, while a pipe represents the conveyance aspect of the sewer flows. In addition, lift station capacity and design head settings were not included into the hydraulic model.

6.2.4 Load Allocation

Load allocation consists of assigning sewer flow to the appropriate manholes (nodes) in the model. The goal is to distribute the loads throughout the model to best represent actual system response.

Allocating loads to manholes within the hydraulic model required multiple steps, incorporating the efficiency and capabilities of GIS and the hydraulic modeling software. Determining the sewer loads was accomplished by using the sewer flow factors developed for this master plan and presented in chapter 3, and parcel data including acreage and land use. The calculated loads were allocated to the nearest manhole that serves the corresponding parcel using the capabilities the hydraulic model has for allocating loads.

Table 6.1 Modeled Sewer Pipe Inventory
 Sewer System Master Plan
 City of Gilroy

Pipe Size	Length	
	(feet)	(miles)
City Pipes		
8"	1,317	0.2
10"	50,278	9.5
12"	38,328	7.3
14"	123	< 0.1
15"	13,686	2.6
18"	43,284	8.2
24"	9,694	1.8
27"	9,847	1.9
30"	914	0.2
42"	5,277	1.0
Total	172,748	32.7
Joint Trunk Pipes¹		
21"	202	< 0.1
24"	5,679	1.1
27"	4,407	0.8
30"	2,776	0.5
33"	22,132	4.2
42"	246	< 0.1
60"	96	< 0.1
Total	35,537	6.7

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Notes: ENGINEERING GROUP, INC.

1. Indicates Joint Trunk pipelines south of intersection at Fitzgerald Avenue and Monterey Road.

6.3 MODEL CALIBRATION

Calibration is intended to instill a level of confidence in the flows that are simulated, and it generally consists of comparing model predictions to the 2014 V&A flow monitoring program, and making necessary adjustments.

6.3.1 Calibration Plan

Calibration can be performed for steady state conditions, which model the peak hour flows, or for dynamic conditions (24 hours or more). Dynamic calibration consists of comparing the model predictions to diurnal operational changes in the wastewater flows. The City's hydraulic model was calibrated for dynamic conditions.

In sewer collection systems, and when using dynamic hydraulic modeling to evaluate the impact of wet weather flows, it is common practice to calibrate the model to the following three conditions:

- Peak dry weather flows on a weekday and a weekend.
- Peak wet weather flows from storm rainfall Event No. 1 (February 26 2014 – February 27 2014).
- Peak wet weather flows from storm rainfall Event No. 2 (February 28 2014 – March 1 2014).

After the model is calibrated to these conditions, it is benchmarked and used for evaluating the capacity adequacy of the sewer collection system, under dry and wet weather conditions.

The hydraulic model is a valuable investment that will continue to prove its worth to the City as future planning issues or other operational conditions surface. It is recommended that the model be maintained and updated with new construction projects to preserve its integrity.

6.3.2 2014 V&A Temporary Flow Monitoring Program

A temporary flow monitoring program was included in this project to validate the existing dry and wet weather flows from each sewer collection basin. The program consisted of installing 11 flow meters, for a period of 20 days, from February 24, 2014 to March 16, 2014. Villalobos and Associates (V&A) was retained to install the flow meters, monitor rainfall, and perform an Infiltration and Inflow analysis. The selected flow monitoring sites are listed on [Table 3.4](#) and shown on [Figure 3.5](#).

The 2014 V&A Flow Monitoring Program captured two rainfall events and included a summary report identifying areas of the City that were most affected by rain dependent infiltration and inflows. The two rainfall events experienced during the flow monitoring period varied in duration and intensity ([Table 3.6](#)), and provided an insight into the sewer system response to storm conditions.

During the V&A flow monitoring program; three rain gauges were set up in the City to record storm events during the monitoring period shown on [Figure 3.5](#). Data from the V&A flow monitoring effort, as documented in the 2014 V&A Flow Monitoring Program, was used in this analysis to calibrate the computer hydraulic model to average dry weather flow (ADWF) and peak wet weather flow (PWWF) conditions.

6.3.3 Dynamic Model Calibration

The calibration process was iterative as it involved calibrating each of the 11 flow monitored sites and for three calibration conditions: 1) peak dry weather flow, 2) peak wet weather flows from storm rainfall Event No. 1, and 3) peak wet weather flows from storm rainfall Event No. 2.

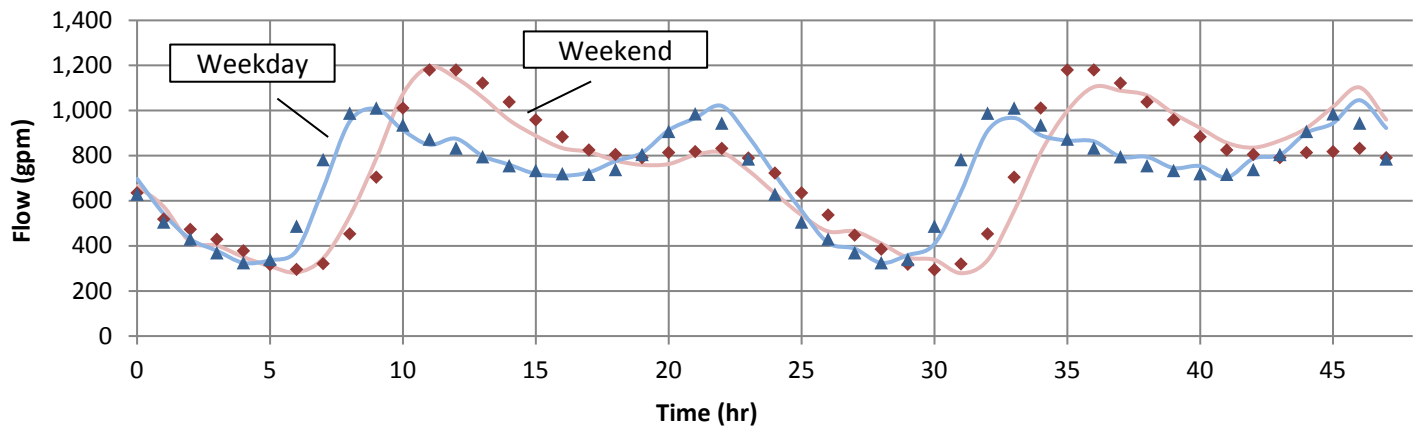
The rain events of February 26, 2014 and February 27, 2014 (Event No. 1) and February 28, 2014 and March 01, 2014 (Event No. 2), as listed on [Table 3.6](#), were used to calibrate the hydraulic model to the wet weather conditions. The diurnal curves for each of the 11 sites were extracted from the 2014 V&A Flow Monitoring Program and the data was used for comparison purposes with the hydraulic model predictions. The calibration effort continued until it yielded acceptable results for each site and for each of the three calibration conditions.

The calibration results for each flow monitoring site are documented in [Appendix B](#). These results indicate the calibration effort yielded reasonable comparisons between the flow monitoring data and the hydraulic model predictions at the 11 sites. The calibration results were reviewed and approved by City staff, and representative extracts from [Appendix B](#) are shown on [Figure 6.1](#) and [Figure 6.2](#). After the calibration process, the hydraulic model was benchmarked for further analysis and evaluation.

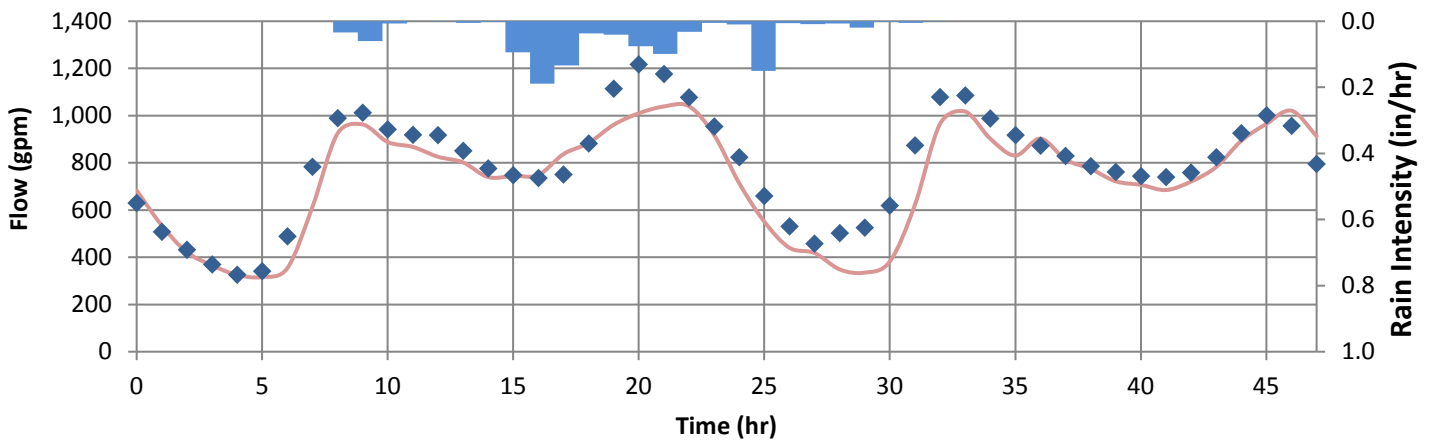
6.3.4 Use of the Calibrated Model

The calibrated hydraulic model was used as an established benchmark in the capacity evaluation of the existing sewer collection system. The model was also used to identify improvements necessary for mitigating existing system deficiencies and for accommodating future growth. The hydraulic model is a valuable investment that will continue to prove its worth to the City as future planning issues or other operational conditions surface. It is recommended that the model be maintained and updated with new construction projects to preserve its integrity.

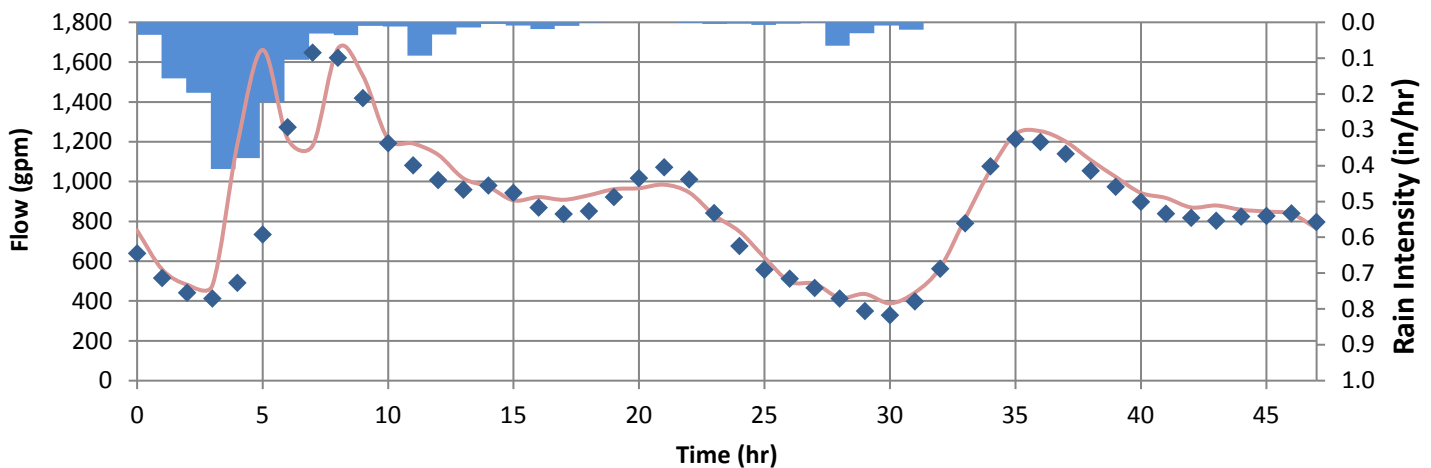
Dry Weather Flow



Wet Weather Event 1 (02/26/14 - 02/27/14)



Wet Weather Event 2 (02/28/14 - 03/01/14)



LEGEND

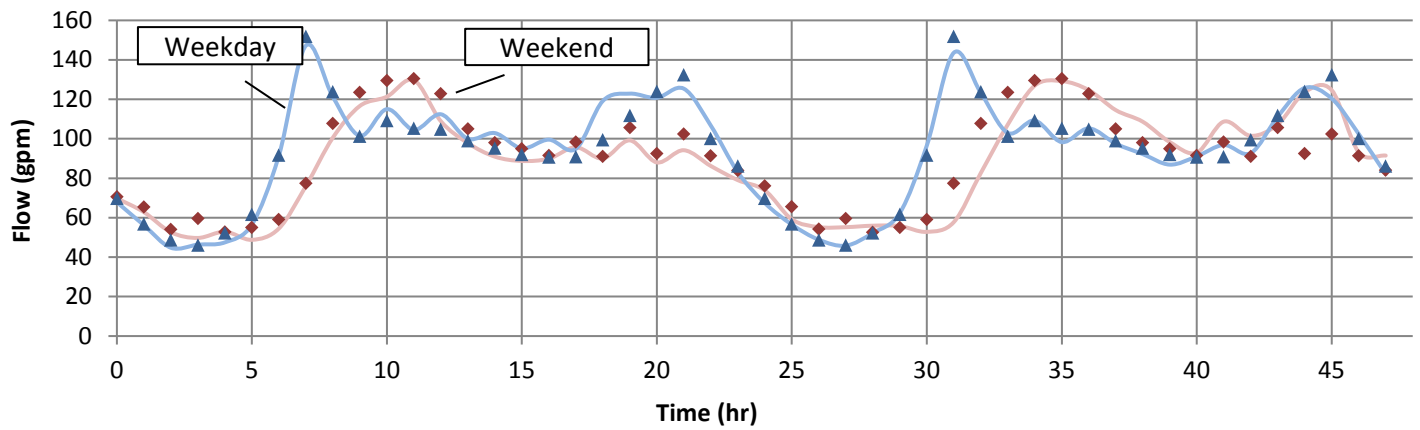
- Rain Event
- Hydraulic Model
- V&A Flow Monitoring
- V&A Flow Monitoring

Figure 6.1

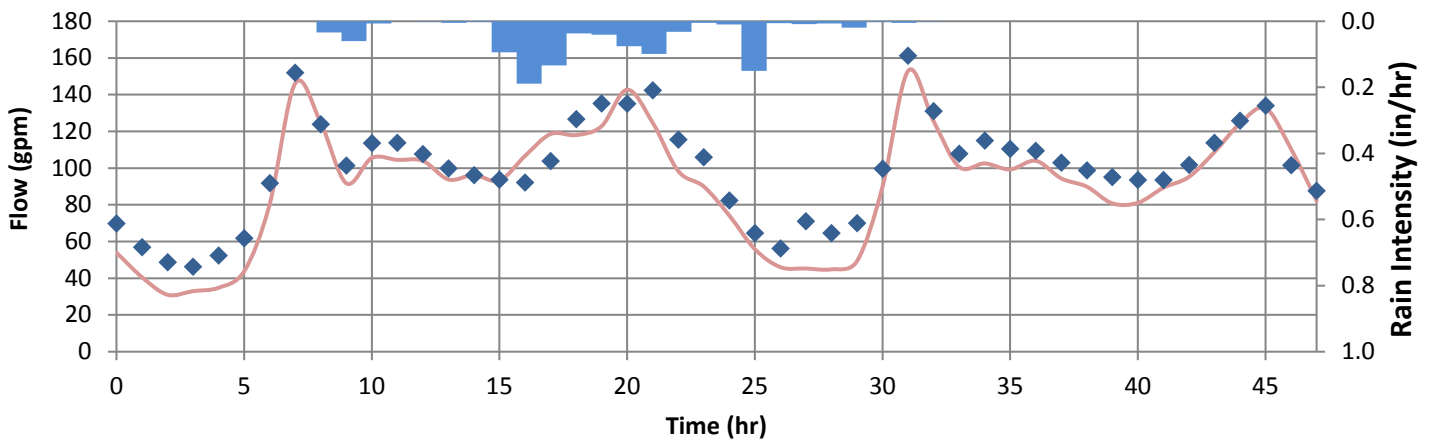
Site 1 Calibration
 Inside WWTP
 Sewer System Master Plan
 City of Gilroy



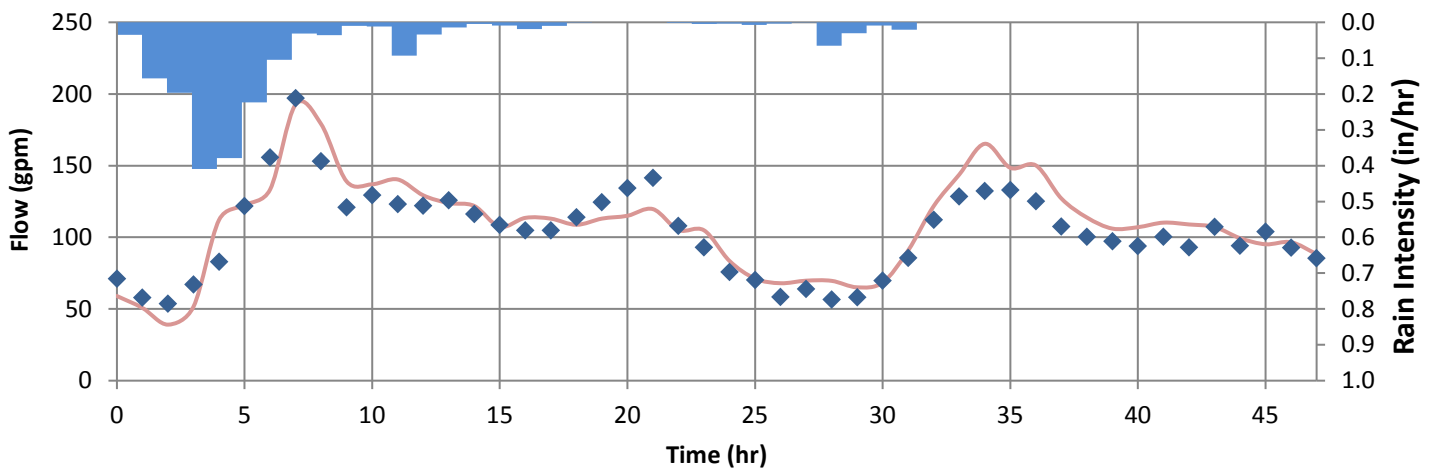
Dry Weather Flow



Wet Weather Event 1 (02/26/14 - 02/27/14)



Wet Weather Event 2 (02/28/14 - 03/01/14)



LEGEND

- Rain Event
- Hydraulic Model
- V&A Flow Monitoring
- V&A Flow Monitoring

Figure 6.2

Site 4 Calibration

W. Luchessa Ave. and Hyde Park Dr.
Sewer System Master Plan
City of Gilroy

CHAPTER 7 - EVALUATION AND PROPOSED IMPROVEMENTS

This section presents a summary of the sewer collection system capacity evaluation during peak dry weather flows and peak wet weather flows for the existing and buildout development conditions. The recommended sewer collection system improvements needed to mitigate capacity deficiencies are also discussed in this chapter.

7.1 OVERVIEW

The calibrated hydraulic model was used for evaluating the sewer collection system for capacity deficiencies during maximum day dry weather flows (MDDWF) and maximum day wet weather flows (PWWF). Since the hydraulic model was calibrated for dynamic modeling, the analysis duration was established at 24 hours for most analyses.

The criteria used for evaluating the capacity adequacy of the sewer collection system facilities (gravity mains, force mains, and lift stations) were discussed and summarized in the System Performance and Design Criteria chapter.

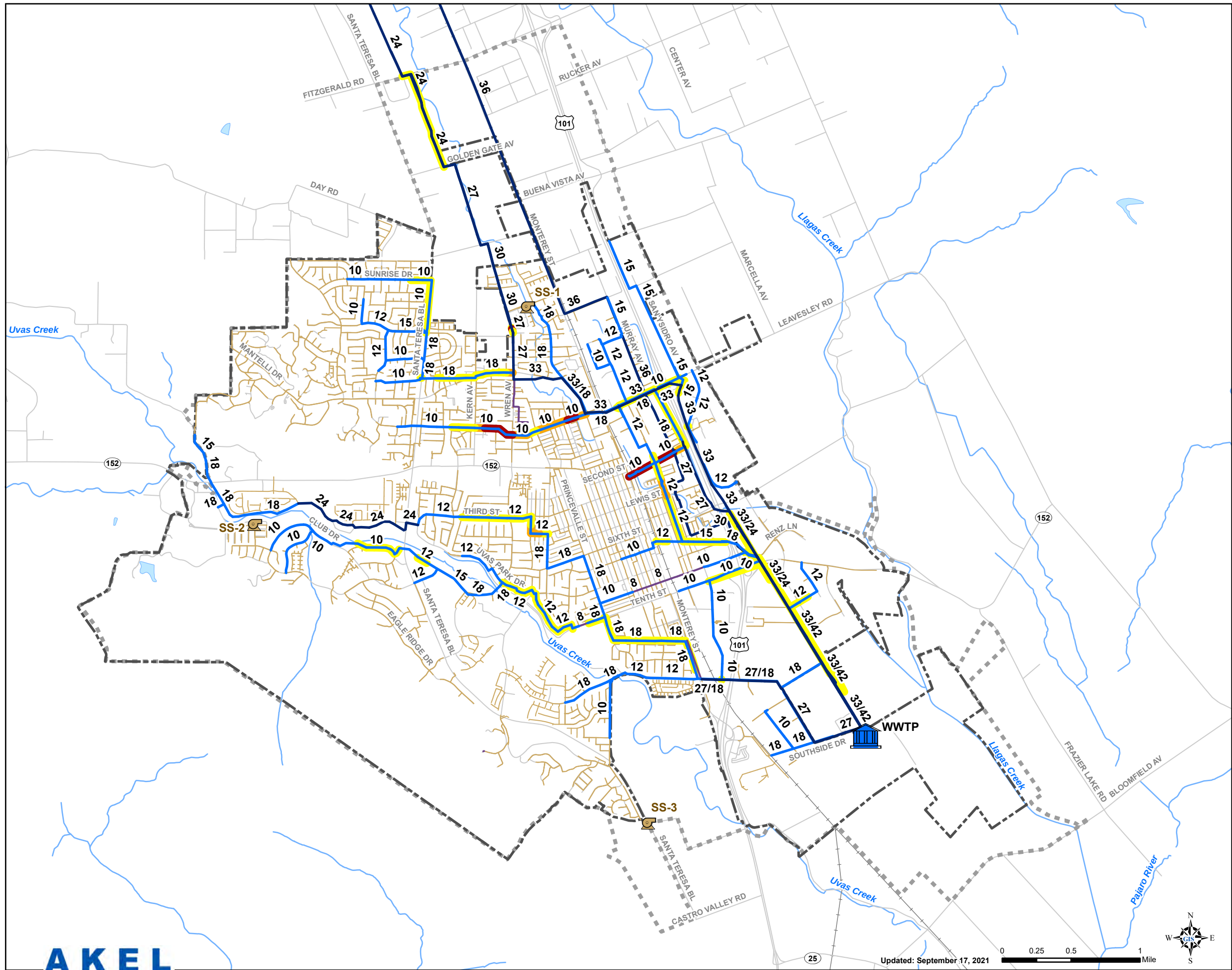
7.2 EXISTING SEWER SYSTEM CAPACITY EVALUATION

The system performance and design criteria summarized, on [Table 3.1](#), was used as a basis to judge the adequacy of capacity for the existing sewer collection system. The design flows simulated in the hydraulic model for existing conditions were summarized on [Table 5.3](#) and they include:

- Existing PDWF = 8.79 MGD
- Existing PWWF = 13.81 MGD

During the peak dry weather simulations, the maximum allowable pipe d/D criteria for new pipes (d/D ratio of 0.75) was used. For existing pipes, the criteria was relaxed to allow a maximum d/D ratio of 0.90 (full pipe capacity) to prevent unnecessary pipe replacements. During the peak wet weather simulations, capacity deficiencies included pipe segments with a hydraulic grade line (HGL) that rises within three feet of the manhole rim elevation.

In general, the hydraulic model indicated that the sewer collection system exhibited acceptable performance to service the existing customers during peak dry weather flows ([Figure 7.1](#)) and peak wet weather flows ([Figure 7.2](#)), with exceptions noted in the following sections.



Legend

Pipe d/D

- d/D > 0.9
- d/D 0.75 - 0.9
- d/D 0.5 - 0.75

Modeled Gravity Pipes by Size

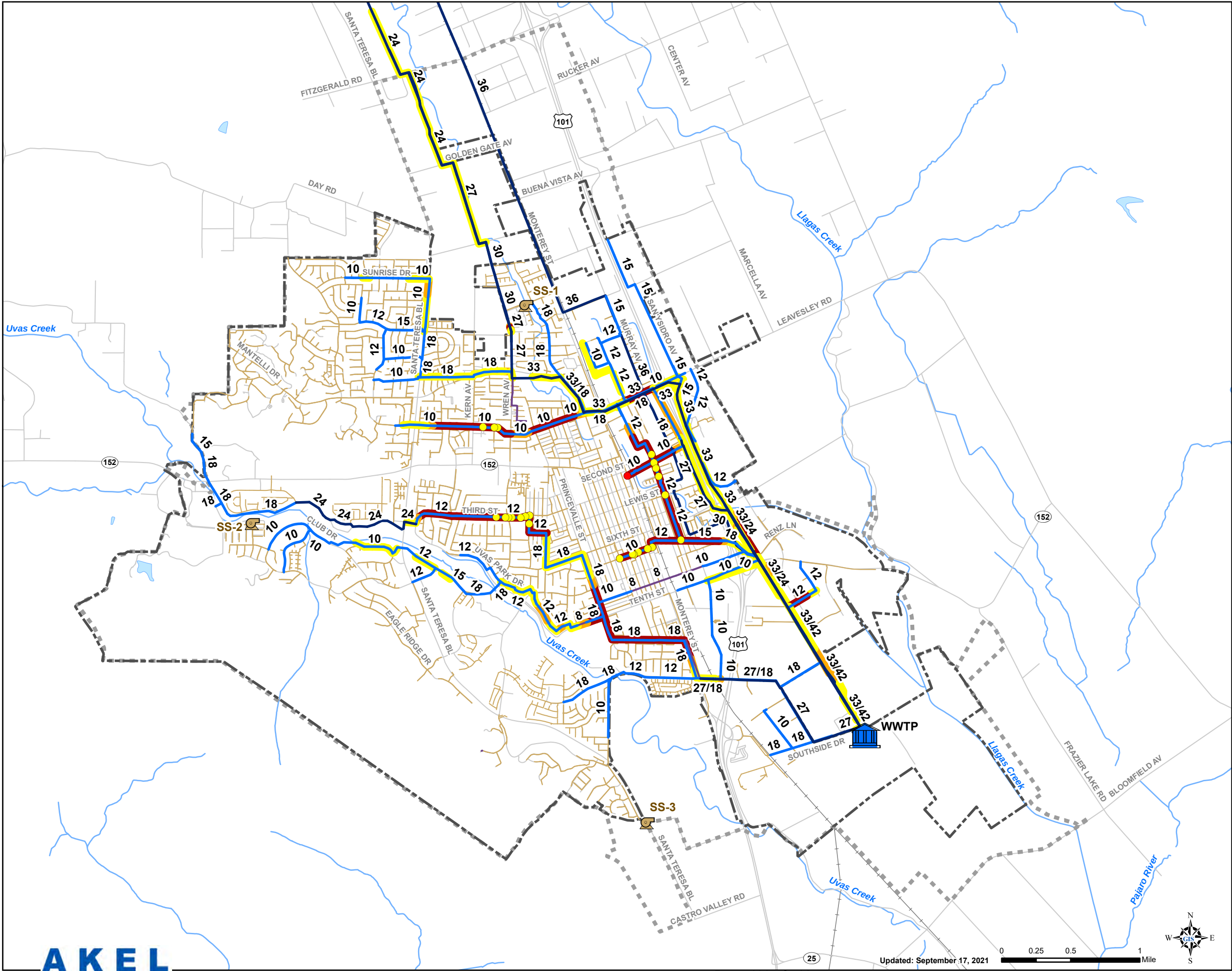
- 8" or Smaller
- 10" - 18"
- 24" or Greater

Non-Modeled System

- Lift Station
- Non-Modeled Pipes
- Roads
- Railroads
- City Limits
- Urban Growth Boundary
- Rivers & Creeks
- Waterbodies

Figure 7.1
Existing Modeled Sewer
System Analysis for PDWF
Sewer System Master Plan
City of Gilroy





Legend
Surcharging Manholes

- Surcharging
- HGL within 3ft of Ground Elevation

Pipe d/D

- d/D > 0.9
- d/D 0.75 - 0.9
- d/D 0.5 - 0.75

Modeled Gravity Pipes by Size

- 8" or Smaller
- 10" - 18"
- 24" or Greater

Non-Modeled System

- Lift Station
- Non-Modeled Pipes
- Roads
- Railroads
- City Limits
- Urban Growth Boundary
- Rivers & Creeks
- Waterbodies

Figure 7.2
Existing Modeled Sewer
System Analysis for PWWF
Sewer System Master Plan
City of Gilroy



7.2.1 Existing Maximum Dry Weather Flows Capacity Evaluation

The existing dry weather flow analysis indicated that the existing sewer collection system exhibited acceptable performance to service the existing customers during peak dry weather flows, as documented in [Figure 7.1](#), with the following exceptions:

- Welburn Avenue, from Kern Avenue to Wren Avenue. This segment experiences d/D ratios over 0.9.
- Welburn Avenue, from Hannah Street to Church Street. This segment experiences d/D ratios over 0.9.
- Loof Avenue, from Monterey Road to Murray Avenue. This segment experiences d/D ratio between 0.9 and 1.

7.2.2 Existing Maximum Day Wet Weather Flows Capacity Evaluation

The wet weather analysis is intended to document the impact of significant rainfall events on the existing system, and to identify the improvements necessary to limit sewer overflows. The design criteria for wet weather events allows pipeline surcharging into the manhole to within three feet of the rim elevation. The existing wet weather flow analysis indicated that the existing sewer collection system exhibited acceptable performance to service the existing customers during peak wet weather flows, as documented in [Figure 7.2](#), with the following exceptions:

- Loof Avenue, from Monterey Road to Forest Street. This segment experiences manhole flooding.
- Welburn Avenue, from Kern Avenue to Wren Avenue. This segment experiences surcharging into the manhole within three feet of the rim elevation.
- Forest Street, from Polk Court to Old Gilroy Street. This segment experiences surcharging into the manhole within three feet of the rim elevation.
- Old Gilroy Street, from Hanna Street to Monterey Road. This segment experiences surcharging into the manhole within three feet of the rim elevation.
- Third Street, from Los Padres Court to Santa Theresa Drive. This segment experiences surcharging into the manhole within three feet of the rim elevation.
- Santa Theresa Drive, from Third Street to Fourth Street. This segment experiences surcharging into the manhole within three feet of the rim elevation.

7.3 ULTIMATE BUILDOUT CAPACITY IMPROVEMENTS

The system performance and design criteria summarized on [Table 3.1](#), was used as a basis to judge the capacity adequacy of the existing sewer collection system. The design flows simulated

in the hydraulic model for the General Plan buildout were summarized on [Table 5.3](#) and they include:

- Buildout PDWF = 14.66 MGD
- Buildout PWWF = 18.95 MGD

Sewer pipelines are recommended to serve future growth inside the City and increase the reliability of the sewer collection system as well. The proposed improvements for the sewer system are listed on [Table 7.1](#). This table lists the master plan assigned improvement number (e.g., WP-1) by different collection basins, along with other relevant information including alignment descriptions, pipe size, and pipe length. The improvement number is further defined in the Capital Improvement Program chapter (Chapter 8). The improvements are described in detail on the following pages and shown of [Figure 7.3](#).

7.3.1 Gravity Main Improvements

This section documents the gravity main improvements. This section documents pipeline improvements within the City of Gilroy sewer collection system service area.

7.3.1.1 Santa Teresa – Long Meadow Subtrunk

This section documents pipeline improvements within the Santa Teresa – Long Meadow Subtrunk.

- **SLP-1:** Replace existing 10-inch gravity main with a new 12-inch gravity main on Santa Teresa Boulevard, from Sunrise drive to Long Meadow Drive.

7.3.1.2 Welburn Subtrunk

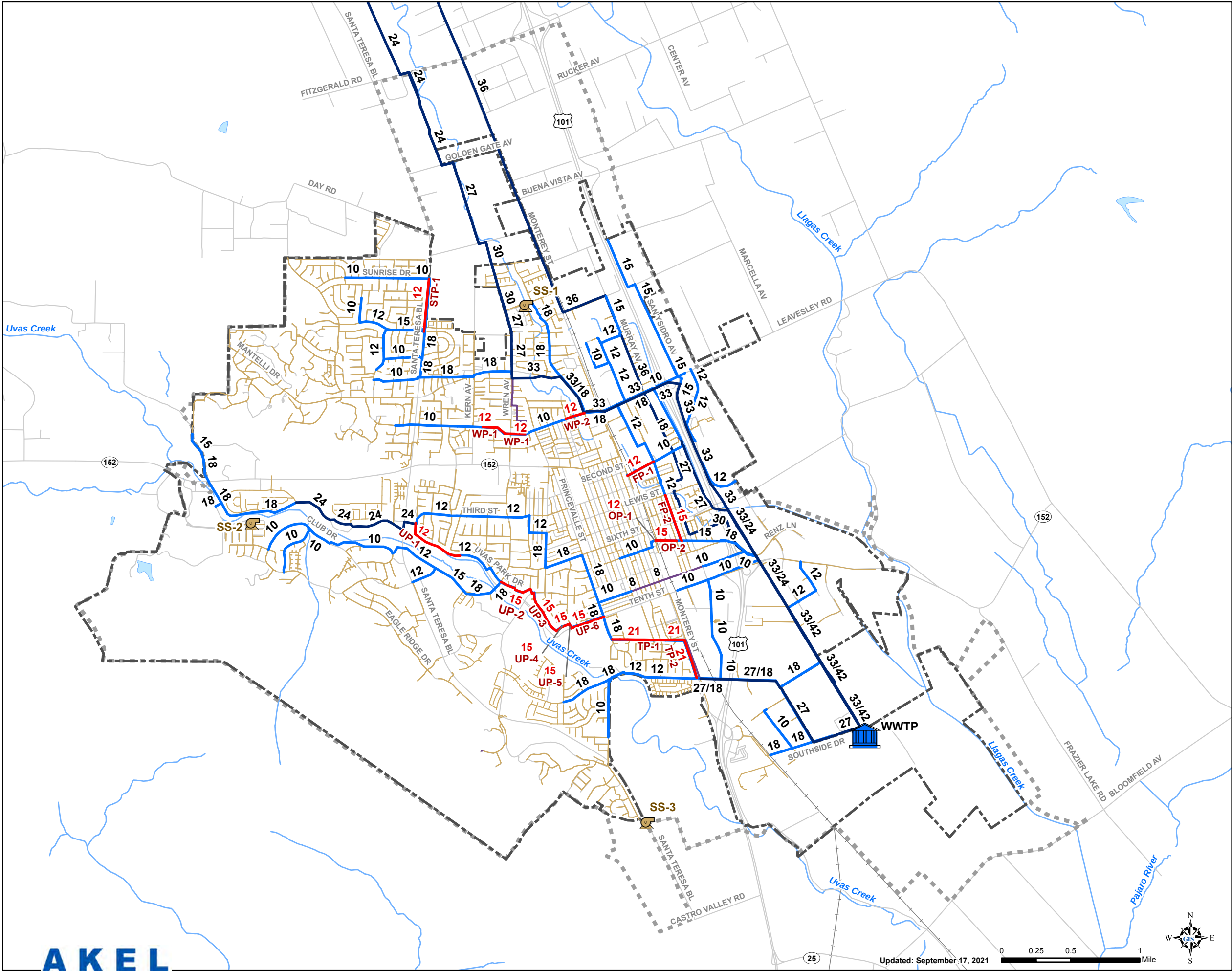
This section documents pipeline improvements within the Welburn Subtrunk.

- **WP-1:** Replace existing 10-inch gravity main with a new 12-inch gravity main on Welburn Avenue, from Chisea Drive to Aspen Way.
- **WP-2:** Replace existing 10-inch gravity main with a new 12-inch gravity main on Welburn Avenue, from Church Street to Hanna Street.

7.3.1.3 Forest-Swanston Subtrunk

This section documents pipeline improvements within the Forest Swanston Subtrunk.

- **FP-1:** Replace existing 10-inch gravity main with a new 12-inch gravity main on Loof Avenue, from Monterey Road to Forest Avenue.
- **FP-2:** Replace existing 12-inch gravity main with a new 15-inch gravity main on Forest Street, from Lewis Street to Old Gilroy Street.



Legend

- Improvement Pipes
- Modeled Gravity Pipes by Size
 - 8" or Smaller
 - 10" - 18"
 - 24" or Greater
- Non-Modeled System
 - Lift Station
 - Non-Modeled Pipes
 - Roads
 - Railroads
 - City Limits
 - Urban Growth Boundary
 - Rivers & Creeks
 - Waterbodies

Note:
WP-1 and WP-2 should be completed at the same time, the existing 10-inch in the middle may be reassessed and replaced depending on pipeline condition and age.

Figure 7.3
Existing Modeled Sewer System Improvements
Sewer System Master Plan
City of Gilroy



Table 7.1 Schedule of Improvements

Sewer System Master Plan
City of Gilroy

Improv. No.	Improv. Type	Alignment	Limits	Existing Diameter	Pipeline Improvements			
					New/Parallel/ Replace	Diameter	Length	
(in) (in) (ft)								
Gravity Main Improvements								
Santa Teresa - Long Meadow Subtrunk								
SLP-1	Future Growth	Gravity Main	Santa Teresa Blvd	From Sunrise Dr to Longmeadow Dr	10	Replacement	12	2,025
Welburn Subtrunk								
WP-1	Existing Deficiency	Gravity Main	Welburn Ave	From Chiesa Dr to Aspen Wy	10	Replacement	12	1,700
WP-2	Existing Deficiency	Gravity Main	Welburn Ave	From Church St to Hanna St	10	Replacement	12	750
Forest-Swanston Subtrunk								
FP-1	Existing Deficiency	Gravity Main	loof Ave	From Monterey Rd to Forest Ave	10	Replacement	12	1,150
FP-2	Existing Deficiency	Gravity Main	Forest St	From Lewis St to Old Gilroy St	12	Replacement	15	1,875
Old Gilroy Subtrunk								
OP-1	Existing Deficiency	Gravity Main	Old Gilroy St	From 75' w/o Railroad St to Railroad St	10	Replacement	12	100
OP-2	Existing Deficiency	Gravity Main	Old Gilroy St	From Railroad St to Forest St	12	Replacement	15	750
Uvas Park Subtrunk								
UP-1	Existing Deficiency	Gravity Main	Uvas Park Dr	From 3rd St to 350 ft e/o Santa Barbara Dr	-	New	12	2,375
UP-2	Future Growth	Gravity Main	Hoxett St / ROW	From Wren Ave to Miller Ave	12	Replacement	18	1,550
UP-3	Future Growth	Gravity Main	Yorktown Dr	From Miller Ave to Greenwich Dr	12	Replacement	18	1,725
UP-4	Future Growth	Gravity Main	Greenwich Dr	From Yorktown Dr to Orchard Dr	12	Replacement	18	575
UP-5	Future Growth	Gravity Main	Orchard Dr	From Greenwich Dr to W 10th St	12	Replacement	18	200
UP-6	Future Growth	Gravity Main	W 10th St	From Orchard Dr to Princeville St	12	Replacement	18	1,350
Thomas Subtrunk								
TP-1	Future Growth	Gravity Main	London Pl	From Monterey Rd to Princeville St	18	Replacement	21	2,775
TP-2	Future Growth	Gravity Main	Monterey Rd	From Luchessa Ave to London Pl	18	Replacement	21	1,525

7.3.1.4 Old Gilroy Subtrunk

This section documents pipeline improvements within the Old Gilroy Subtrunk.

- **OP-1:** Replace existing 10-inch gravity main with a new 12-inch gravity main on Old Gilroy Street, from approximately 75 feet west of Railroad Street to Railroad Street.
- **OP-2:** Replace existing 12-inch gravity main with a new 15-inch gravity main on Old Gilroy Street, from Railroad Street to Forest Street.

7.3.1.5 Uvas Park Subtrunk

This section documents pipeline improvements within the Uvas Park Subtrunk.

- **UP-1:** Construct a new 12-inch gravity main along Uvas Park Drive, from Third Street to approximately 350 feet east of Santa Barbara Drive.
- **UP-2:** Replace existing 12-inch gravity main with a new 18-inch gravity main on Hoxett Street and Right of Way, from Wren Avenue to Miller Avenue.
- **UP-3:** Replace existing 12-inch gravity main with a new 18-inch gravity main on Yorktown Drive, from Miller Avenue to Greenwich Drive.
- **UP-4:** Replace existing 12-inch gravity main with a new 18-inch gravity main on Greenwich Drive, from Yorktown Drive to Orchard Drive.
- **UP-5:** Replace existing 12-inch gravity main with a new 18-inch gravity main on Orchard Drive, from Greenwich Drive to West Tenth Street.
- **UP-6:** Replace existing 12-inch gravity main with a new 18-inch gravity main on West Tenth Street, from Orchard Drive to Princevalle Street.

7.3.1.6 Thomas Subtrunk

This section documents pipeline improvements within the Thomas Subtrunk.

- **TP-1:** Replace existing 18-inch gravity main with a new 21-inch gravity main on London Place, from Monterey Road to Princevalle Street.
- **TP-2:** Replace existing 18-inch gravity main with a new 21-inch gravity main on Monterey Road, from Luchessa Avenue to London Place.

CHAPTER 8 - CAPITAL IMPROVEMENT PROGRAM

This chapter provides a summary of the recommended sewer collection system improvements to mitigate existing capacity deficiencies and service future growth. This chapter also presents the cost criteria and methodologies for developing the capacity improvement costs. Finally, a cost allocation analysis, usually used for cost sharing purposes, is also included.

8.1 COST ESTIMATE ACCURACY

Cost estimates presented in the capacity improvement costs were prepared for general master planning purposes and, where relevant, for further project evaluation. Final costs of a project will depend on several factors including the final project scope, costs of labor and material, and market conditions during construction.

The Association for the Advancement of Cost Engineering (AACE International), formerly known as the American Association of Cost Engineers, has defined three classifications. These classifications are presented in order of increasing accuracy: Order of Magnitude, Budget, and Definitive.

- **Order of Magnitude Estimate.** This classification is also known as an “original estimate”, “study estimate”, or “preliminary estimate”, and is generally intended for master plans and studies.

This estimate is not supported with detailed engineering data about the specific project, and its accuracy is dependent on historical data and cost indices. It is generally expected that this estimate would be accurate within -30 percent to +50 percent.

- **Budget Estimate.** This classification is also known as an “official estimate” and generally intended for pre-design studies. This estimate is prepared to include flow sheets and equipment layouts and details. It is generally expected that this estimate would be accurate within -15 percent to +30 percent.
- **Definitive Estimate.** This classification is also known as a “final estimate” and prepared during the time of contract bidding. The data includes complete plot plans and elevations, equipment data sheets, and complete specifications. It is generally expected that this estimate would be accurate within -5 percent to +15 percent.

Costs developed in this study should be considered “Order of Magnitude” and have an expected accuracy range of **-30 percent** and **+50 percent**.

8.2 COST ESTIMATE METHODOLOGY

Cost estimates presented in this chapter are opinions of probable construction and other relevant costs developed from several sources including cost curves, Akel experience on other master planning projects, and input from City staff on the development of public and private cost sharing. Where appropriate, costs were escalated to reflect the more current Engineering News Records (ENR) Construction Cost Index (CCI).

This section documents the unit costs used in developing the opinion of probable construction costs, the Construction Cost Index, the land acquisition costs, and markups to account for construction contingency and other project related costs.

8.2.1 Unit Costs

The unit cost estimates used in developing the Capital Improvement Program are summarized on [Table 8.1](#). Sewer pipeline unit costs are based on length of pipe per chosen diameter. The unit costs are intended for developing the Order of Magnitude estimate, and do not account for site specific conditions, labor or material costs during the time of construction, final project scope, implementation schedule, detailed utility and topography surveys, investigation of alternative routings for pipelines, and other various factors. The capital improvement program included in this report accounts for construction and project-related contingencies as described in this chapter.

8.2.2 Construction Cost Index

Costs estimated in this study are adjusted utilizing the Engineering News Record (ENR) Construction Cost Index (CCI), which is widely used in the engineering and construction industries.

The costs in this Storm Drainage System Master Plan were benchmarked using a 20-City national average ENR CCI of 13,176, reflecting a date of March 2023.

8.2.3 Construction Contingency Allowance

Knowledge about site-specific conditions for each proposed project is limited at the master planning stage; therefore, construction contingencies were used. The estimated construction costs in this master plan include a **30 percent** contingency allowance to account for unforeseen events and unknown field conditions.

8.2.4 Project Related Costs

The capital improvement costs also account for project-related costs, comprising of engineering design, project administration (developer and City staff), construction management and inspection, and legal costs. The project related costs in this master plan were estimated by applying an additional **30 percent** to the estimated construction costs.

Table 8.1 Unit Costs

Sewer System Master Plan
City of Gilroy

Pipelines	
Pipe Size	Improvement Type Unit Cost
	New/Parallel/Replacement
(in)	(\$/unit length)
8	259
10	289
12	332
15	360
18	389
21	418
24	475
27	535
30	594
36	713
Pipeline Casings	
23\$ per inch diameter per linear foot	

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3/28/2023

Notes :

1. Unit costs are based on an ENR CCI Index Value of 13,176.3 (March 2023).

8.3 CAPITAL IMPROVEMENT PROGRAM

This section documents the capital improvement program, including estimated costs and recommended construction phasing.

8.3.1 Capital Improvement Costs

The Capacity Improvement Program costs for the projects identified in this master plan for mitigating existing deficiencies and for servicing future growth throughout the City are summarized on [Table 8.2](#).

Each improvement was assigned a unique code identifier associated with the improvement pipelines tributary collection basin, and is summarized graphically on [Figure 8.1](#). The estimated construction costs include the baseline costs plus **30 percent** contingency allowance to account for unforeseen events and unknown field conditions, as described in a previous section. Capital Improvement Costs include the estimated construction costs plus **30 percent** project-related costs (engineering design, project administration, construction management and inspection, and legal costs).

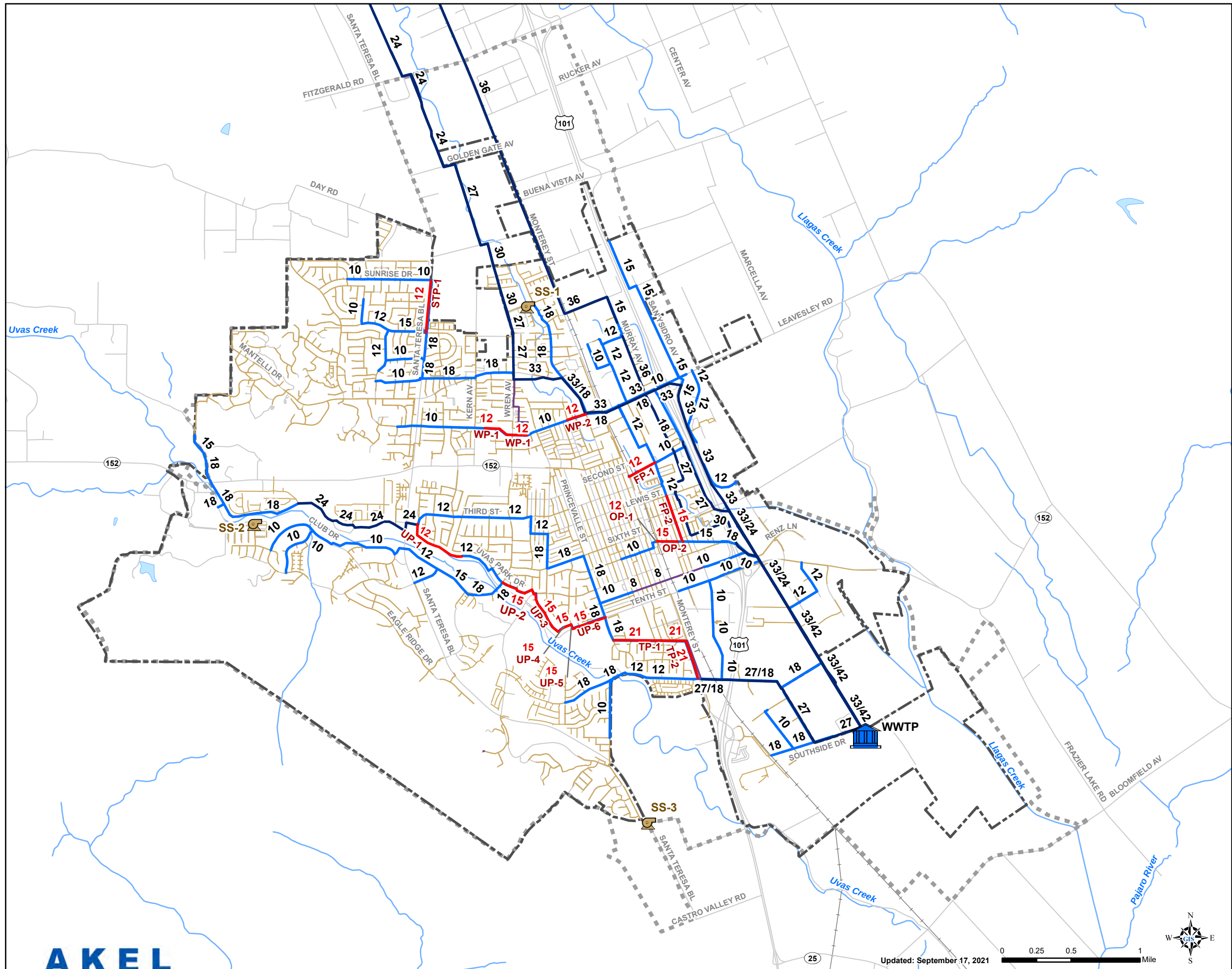
8.3.2 Pipelines

The recommended pipeline improvements are grouped by collection basin and listed on [Table 8.2](#). Each improvement includes a general description of the street alignment and limits as well as existing pipe diameter and length.

The Capital Improvement Program generally includes the following three types of improvements:

- **Replacement Pipeline, Existing Capacity Deficiency.** An existing pipe is recommended for replacement to mitigate an existing system deficiency. This type of improvement is listed as *Existing Capacity Deficiency* on [Table 8.2](#). The recommended sizes for these improvements are based on buildout flow requirements.
- **Replacement Pipeline, Capacity Deficiency Triggered by Future Development.** An existing pipe is recommended for replacement where additional flow due to future development will create a capacity deficiency. This type of improvement is listed as *Future Capacity Increase* on [Table 8.2](#).
- **New Pipeline, Triggered by an Existing Capacity Deficiency.** A new pipeline is proposed to mitigate an existing system deficiency. This type of improvement is listed as *New – Existing Capacity Deficiency* on [Table 8.2](#).

The opinion of probable construction costs, for the projects included in this master plan, are based on the pipe unit costs summarized on [Table 8.1](#).



Legend

- Improvement Pipes
- Modeled Gravity Pipes by Size
 - 8" or Smaller
 - 10" - 18"
 - 24" or Greater
- Non-Modeled System
 - Lift Station
 - Non-Modeled Pipes
 - Roads
 - Railroads
 - City Limits
 - Urban Growth Boundary
 - Rivers & Creeks
 - Waterbodies

Note:
WP-1 and WP-2 should be completed at the same time, the existing 10-inch in the middle may be reassessed and replaced depending on pipeline condition and age.

Figure 8.1
Capital Improvement Program
Sewer System Master Plan
City of Gilroy



Table 8.2 Capital Improvement Program
Sewer System Master Plan
City of Gilroy

Improv. No.	Type of Improvement	Alignment	Limits	Pipeline Improvements		Infrastructure Costs				Baseline Constr. Costs ¹	Estimated Const. Costs ²	Capital Improv. Cost ³	Construction Trigger	Suggested Cost Allocation		Cost Allocation	
				Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost					Existing Users	Future Users	Existing Users	Future Users
				(in)		(in)	(ft)	(\$)	(\$)	(\$)	(\$)	(\$)	(gpm)	(%)	(%)	(\$)	(\$)
Gravity Main Improvements																	
Santa Teresa - Long Meadow Subtrunk																	
SLP-1	Gravity Main	Santa Teresa Blvd	From Sunrise Dr to Longmeadow Dr	10	Replacement	12	2,025	332	671,321	671,400	872,900	1,134,800	954 EDU	61%	39%	689,302	445,498
Subtotal - Santa Teresa - Long Meadow Subtrunk										671,400	872,900	1,134,800				689,302	445,498
Welburn Subtrunk																	
WP-1	Gravity Main	Welburn Ave	From Chiesa Dr to Aspen Wy	10	Replacement	12	1,700	332	563,578	563,600	732,700	952,600	Existing Deficiency	90%	10%	861,520	91,080
WP-2	Gravity Main	Welburn Ave	From Church St to Hanna St	10	Replacement	12	750	332	248,637	248,700	323,400	420,500	Existing Deficiency	91%	9%	384,531	35,969
Subtotal - Welburn Subtrunk										812,300	1,056,100	1,373,100				1,246,051	127,049
Forest-Swanston Subtrunk																	
FP-1	Gravity Main	loof Ave	From Monterey Rd to Forest Ave	10	Replacement	12	1,150	332	381,244	381,300	495,700	644,500	Existing Deficiency	93%	7%	601,483	43,017
FP-2	Gravity Main	Forest St	From Lewis St to Old Gilroy St	12	Replacement	15	1,875	360	675,064	675,100	877,700	1,141,100	Existing Deficiency	96%	4%	1,093,639	47,461
Subtotal - Forest-Swanston Subtrunk										1,056,400	1,373,400	1,785,600				1,695,122	90,478
Old Gilroy Subtrunk																	
OP-1	Gravity Main	Old Gilroy St	From 75' w/o Railroad St to Railroad St	10	Replacement	12	100	332	33,152	33,200	43,200	56,200	Existing Deficiency	89%	11%	50,159	6,042
OP-2	Gravity Main	Old Gilroy St	From Railroad St to Forest St	12	Replacement	15	750	360	270,026	270,100	351,200	456,600	Existing Deficiency	89%	11%	407,516	49,085
Subtotal - Old Gilroy Subtrunk										303,300	394,400	512,800				457,674	55,126
Uvas Park Subtrunk																	
UP-1	Gravity Main	Uvas Park Dr	From 3rd St to 350 ft e/o Santa Barbara Dr	-	New	12	2,375	332	787,352	787,400	1,023,700	1,330,900	Existing Deficiency	39%	61%	517,772	813,128
UP-2	Gravity Main	Hoxett St / ROW	From Wren Ave to Miller Ave	12	Replacement	18	1,550	389	602,255	602,300	783,000	1,017,900	2,020 EDU	36%	64%	370,355	647,545
UP-3	Gravity Main	Yorktown Dr	From Miller Ave to Greenwich Dr	12	Replacement	18	1,725	389	670,252	670,300	871,400	1,132,900	1,923 EDU	38%	62%	427,260	705,640
UP-4	Gravity Main	Greenwich Dr	From Yorktown Dr to Orchard Dr	12	Replacement	18	575	389	223,417	223,500	290,600	377,800	2,152 EDU	38%	62%	145,055	232,745
UP-5	Gravity Main	Orchard Dr	From Greenwich Dr to W 10th St	12	Replacement	18	200	389	77,710	77,800	101,200	131,600	2,401 EDU	39%	61%	51,307	80,293
UP-6	Gravity Main	W 10th St	From Orchard Dr to Princeville St	12	Replacement	18	1,350	389	524,545	524,600	682,000	886,600	3,085 EDU	39%	61%	346,721	539,879
Subtotal - Uvas Park Subtrunk										2,885,900	3,751,900	4,877,700				1,858,470	3,019,230
Thomas Subtrunk																	
TP-1	Gravity Main	London Pl	From Monterey Rd to Princeville St	18	Replacement	21	2,775	418	1,160,665	1,160,700	1,509,000	1,961,700	5,873 EDU	62%	38%	1,224,966	736,734
TP-2	Gravity Main	Monterey Rd	From Luchessa Ave to London Pl	18	Replacement	21	1,525	418	637,843	637,900	829,300	1,078,100	5,303 EDU	62%	38%	672,095	406,005
Subtotal - Thomas Subtrunk										1,798,600	2,338,300	3,039,800				1,897,061	1,142,739
Total Costs																	
Subtotal - Santa Teresa - Long Meadow Subtrunk										671,400	872,900	1,134,800				689,302	445,498
Subtotal - Welburn Subtrunk										812,300	1,056,100	1,373,100				1,246,051	127,049
Subtotal - Forest-Swanston Subtrunk										1,056,400	1,373,400	1,785,600				1,695,122	90,478
Subtotal - Old Gilroy Subtrunk										303,300	394,400	512,800				457,674	55,126
Subtotal - Uvas Park Subtrunk										2,885,900	3,751,900	4,877,700				1,858,470	3,019,230
Subtotal - Thomas Subtrunk										1,798,600	2,338,300	3,039,800				1,897,061	1,142,739
Total Improvement Costs										7,527,900	9,787,000	12,723,800				7,843,681	4,880,119

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Notes :

1. Cost estimates are based on the Engineering News Record (ENR) construction cost index (CCI) of 13,176 (March 2023).
2. Baseline construction costs plus 30% to account for unforeseen events and unknown conditions.
3. Estimated construction cost plus 30% to cover other costs including: engineering design, project administration (developer and City staff), construction management and inspection, and legal costs.

It is assumed that any replacement pipes will be in the same alignment and at the same slope as the existing pipe. However, this study recommends an investigation of the alignment during the pre-design stage of each project.

8.3.3 Construction Triggers

As a part of this Master Planning process, construction triggers were developed in an effort to plan the expansion of the sewer collection system in an orderly manner. The construction triggers for multiple improvements are based on mitigating an existing system deficiency, increasing hydraulic reliability, or continuing improvements currently planned by the City. Other improvements replace existing infrastructure that is not currently deficient but will violate master plan criteria with future development. The construction triggers quantify the amount of additional development that may occur before the improvement becomes necessary.

8.3.4 Construction Phasing

The Capacity Improvement Program was divided into the following phases:

- **Near Term – Fiscal Year:** This short-term phase consists of improvements for the fiscal years (FY) 2022 through 2023 for improvements that are required to resolve existing deficiencies and other critical pipes in the sewer collection system.
- **Intermediate Term – Equivalent Dwelling Unit:** An equivalent dwelling unit (EDU) construction trigger is provided for improvements designated as capacity increases for future development. This trigger is based on remaining capacity in the existing facility planned for future improvement. The remaining capacity is converted to EDUs assuming 210 gpd/EDU.

8.3.5 Recommended Cost Allocation Analysis

Capacity allocation analysis is needed to identify improvement funding sources, and to establish a nexus between development impact fees and improvements needed to service growth. In compliance with the provisions of Assembly Bill AB 1600, the analysis differentiates between the project needs of servicing existing users and for those required to service anticipated future developments. **Table 8.2** lists each improvement and separates the cost by responsibility between existing and future users. The cost responsibility is based on model parameters for existing and future land use, and may change depending on the nature of development.

8.4 JOINT TRUNK CONDITION ASSESSMENT IMPROVEMENTS

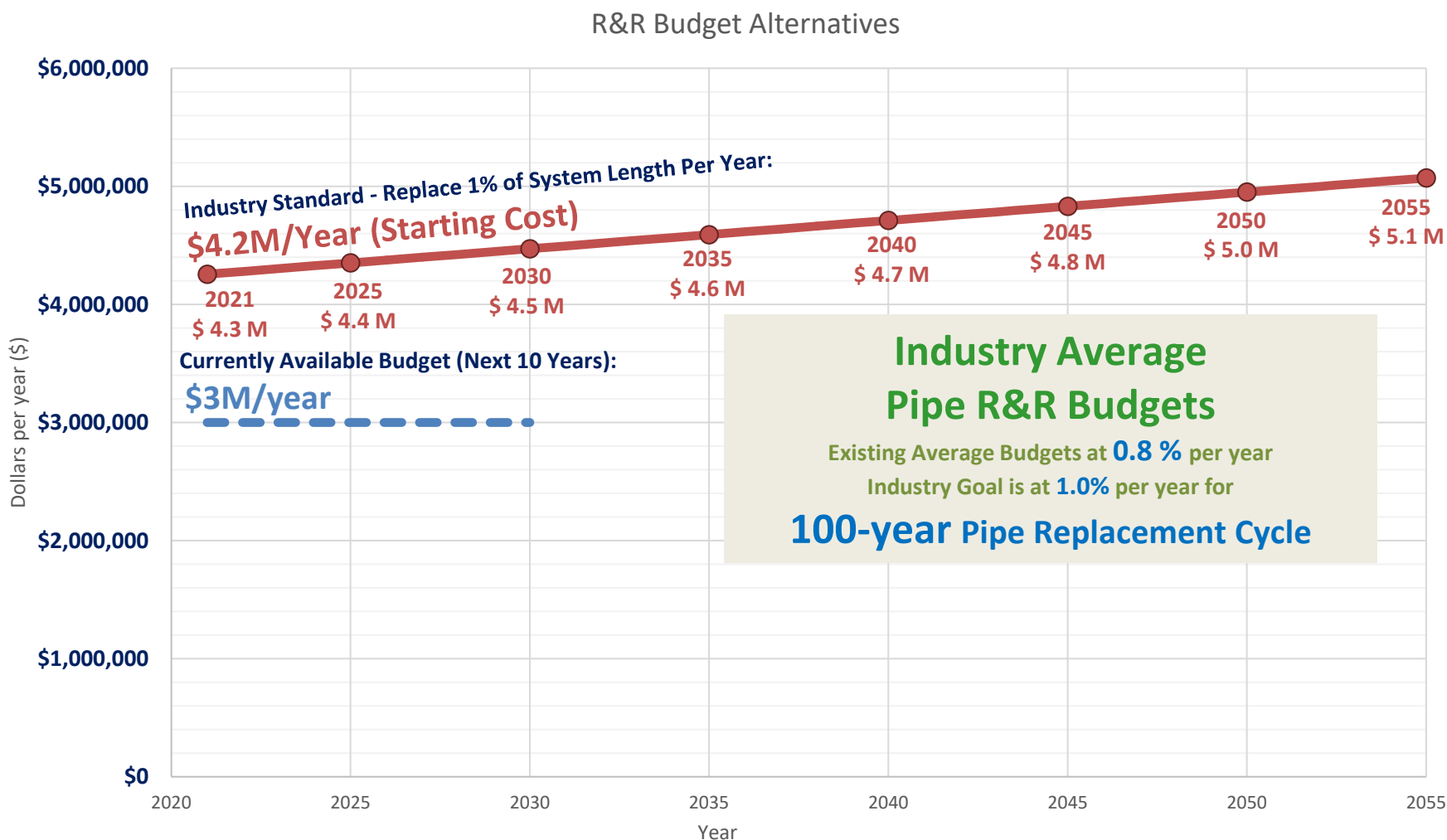
The City of Morgan Hill initiated a *Joint Trunk Pipeline Condition Assessment Report* completed in January 2021 (**Appendix C**). This Condition Assessment Report was prepared by Water Works Engineers on behalf of the City of Morgan Hill, and summarizes the recommendations for the Joint Trunk sewer main. Improvements within the City of Gilroy's planning boundaries have been

extracted from the report and are documented on [Table 8.3](#) and shown graphically in [Appendix C](#).

The recommended projects were designated as either Emergency condition assessment projects or Intermediate condition assessment projects depending on their specific renewal choice; their costs were provided in the Report prepared by Water Works Engineers and are summarized on [Table 8.3](#). These recommendations were determined as a result of the risk assessment and are intended to mitigate or determine the condition of extreme or high-risk sewer infrastructure within the City's service area. In order to facilitate the prioritization of the projects included in the risk analysis, each project has been prioritized based on its risk score and condition. Suggested cost allocation between the City of Morgan Hill and City of Gilroy are based on the Morgan Hill – Gilroy Joint Trunk Agreement for multi-segments.

8.5 SUGGESTED PIPELINE REPLACEMENT BUDGET

The suggested pipeline replacement budget alternatives are shown on [Figure 8.2](#), and includes the estimated costs for replacing pipelines by 5-year fiscal periods through the year 2055. The industry recommended goal of pipeline R&R budgets is at 1.0 percent of system pipeline length for 100-year pipeline replacement cycle. The cost estimates are starting from a base rate of 4.2 million dollars per year, with a pipeline replacement rate of 1.0 percent of system length per year, the future costs in 2055 are expected to be approximately 5.1 million dollars per year.



LEGEND

- Industry Standard Replacement Schedule
- - - Currently Available Budget

Assumptions:

1. System Growth: 1 miles of new construction per year (based on historical construction)
2. All costs in 2021 dollars
3. Weighted average pipeline unit cost = \$269/foot
4. 30% contingency added for estimated construction cost
5. 30% contingency added for capital improvement cost

Figure 8.2
Pipeline Replacement
Budget Alternatives
 Sewer System Master Plan
 City of Gilroy



Table 8.3 Joint Trunk Condition Assessment, Cost Estimates
Sewer System Master Plan
City of Gilroy

Improvement ID ¹	Type of Improvement	Alignment	Limits	Pipeline Improvements ¹		Infrastructure Costs ¹				Baseline Constr. Costs ¹	Capital Improv. Cost ^{2,3,4}	Suggested Cost Allocation ^{5,6}		Cost Allocation	
				Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost			Gilroy	Morgan Hill	Gilroy	Morgan Hill
				(in)		(in)	(ft)	(\$)	(\$)			(\$)	(\$)	(%)	(%)
Emergency/Immediate Projects - Pipelines ^{3,5}															
E-1 MH-116 to MH-116A	Gravity Main	Leavesley Rd	Intersection of South Valley Fwy	33	Open Cut Point Repair	33	35	1,133	39,664	39,700	55,600	50%	50%	27,800	27,800
E-2 MH-145 to MH-146	Gravity Main	Camino Arroyo	From 1000' n/o Mayock Rd to Mayock Rd	33	Structural CIPP Lining	33	561	493	276,553	276,600	387,200	50%	50%	193,600	193,600
E-3 MH-146 to MH-147	Gravity Main	Camino Arroyo	From Mayock Rd to 150' ne/o Camino Arroyo	33	Structural CIPP Lining	33	206	493	101,551	101,600	142,200	50%	50%	71,100	71,100
E-4 MH-152 to MH-153	Gravity Main	Camino Arroyo	From 650' n/o Southside Dr to 325 n/o Southside Dr	33	Structural CIPP Lining	33	393	493	193,735	193,800	271,300	50%	50%	135,650	135,650
E-5 MH-153 to MH-154	Gravity Main	Camino Arroyo	From 325' n/o Southside Dr to 100' n/o Southside Dr	33	Structural CIPP Lining	33	327	493	161,199	161,200	225,700	50%	50%	112,850	112,850
Subtotal - Emergency Pipeline Projects										772,900	1,082,000			541,000	541,000
Emergency/Immediate Projects - Manholes ^{3,6}															
E-6	Manhole	Various	-	-	Repair Raising Buried Manholes	8 Manholes		4,533	36,264	36,300	50,800	49%	51%	24,956	25,845
E-7	Manhole	Various	-	-	Rehabilitation Cementitious Liners	32 Manholes		4,533	145,056	145,100	203,100	45%	55%	91,788	111,312
Subtotal - Emergency Manhole Projects										1,727,200	2,417,900			1,198,744	1,219,156
Intermediate Projects - Pipelines ^{4,6}															
I-1	Gravity Main	Various	-	-	Structural CIPP Lining	-	24,807	470	11,666,703	11,666,800	16,916,800	50.3%	49.7%	8,502,173	8,414,627
Subtotal - intermediate Pipeline Projects										11,666,800	16,916,800			8,502,173	8,414,627
Total Costs															
						Subtotal - Emergency Pipeline Projects		772,900	1,082,000					541,000	541,000
						Subtotal - Emergency Manhole Projects		1,727,200	2,417,900					1,198,744	1,219,156
						Subtotal - intermediate Pipeline Projects		11,666,800	16,916,800					8,502,173	8,414,627
						Total Improvement Costs		13,394,000	19,334,700					9,700,917	9,633,783

AKEL
ENGINEERING GROUP, INC.

3/28/2023

- Notes :
- Source of all identified projects, recommended costs, and contingencies are based on *City of Morgan Hill, Joint Trunk Pipeline Condition Assessment Report* completed by Water Works Engineers on January 2021. The units were escalated to reflect the current ENR CCI of March 2023.
 - To ensure consistency with the *Joint Trunk Pipeline Condition Assessment Report* , Capital Improvement Costs include a singular contingency markup of 45% for Emergency Projects and 40% for Intermediate Projects.
 - Contingency for Emergency Projects: Baseline construction costs plus 15% general contingency, plus 15% design contingency, plus 15% construction contingency.
 - Contingency for Intermediate Projects: Baseline construction costs plus 10% general contingency, plus 15% design contingency, plus 15% construction contingency.
 - Suggested Cost Allocation based on Morgan Hill-Gilroy Joint Trunk Agreement.
 - Suggested Cost Allocation based on Morgan Hill-Gilroy Joint Trunk Agreement for multi-segments.

2023
City of Gilroy

APPENDICES

APPENDIX A

Sewer Flow Monitoring and Inflow/Infiltration Study, 2014 (V&A)



SANITARY SEWER FLOW MONITORING AND INFLOW / INFILTRATION STUDY

City of Gilroy, CA

May 2014



SANITARY SEWER FLOW MONITORING AND INFLOW / INFILTRATION STUDY



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Prepared by



May 2014

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APPENDIX

Appendix A: Flow Monitoring Sites: Data, Graphs, Information

ABBREVIATIONS, TERMS AND DEFINITIONS USED IN THIS REPORT

Table i. Abbreviations

Abbreviation	Term
ADWF	average dry weather flow
CCTV	closed-circuit television
CIP	capital improvement plan
CO	carbon monoxide
d/D	depth/diameter ratio
FM	flow monitor
gpd	gallons per day
gpm	gallons per minute
GW	groundwater infiltration
H ₂ S	hydrogen sulfide
I/I	inflow and infiltration
IDM	inch-diameter-mile (miles of pipeline multiplied by the diameter of the pipeline in inches)
IDW	inverse distance weighting
LEL	lower explosive limit
mgd	million gallons per day
NOAA	National Oceanic and Atmospheric Administration
PS	pump station
Q	flow rate
QA/QC	quality assurance/quality control
RDI	rainfall-dependent infiltration
ROW	right of way
RRI	rainfall-responsive infiltration
RG	rain gauge
SSO	sanitary sewer overflow
WEF	Water Environment Federation
WRCC	Western Regional Climate Center
WWTP	wastewater treatment plant

Table ii. Terms and Definitions

Term	Definition
Attenuation	Flow attenuation in a sewer collection system is the natural process of the reduction of the peak flow rate through redistribution of the same volume of flow over a longer period of time. This occurs as a result of friction (resistance), internal storage and a tendency to reach a steady state along the sewer pipes. As the flows from the basins combine within the trunk sewer lines, (a) the peaks from each basin will not necessary coincide at the same time, and (b) due to the length and time of travel through the trunk sewers, peak flows will attenuate as the peak flows move downstream. The sum of the peak flows of individual basins upstream will generally be greater than the measured peak flows observed at points downstream.
Average dry weather flow (ADWF)	Average flow rate or pattern from days without noticeable inflow or infiltration response. ADWF usage patterns for weekdays and weekends differ and must be computed separately. ADWF can be expressed as a numeric average or as a curve showing the variation in flow over a day. ADWF includes the influence of normal groundwater infiltration (not related to a rain event).
Basin	Sanitary sewer collection system upstream of a given location (often a flow meter), including all pipelines, inlets, and appurtenances. Also refers to the ground surface area near and enclosed by the pipelines. A basin may refer to the entire collection system upstream from a flow meter or exclude separately monitored basins upstream.
Depth/diameter (d/D) ratio	Depth of water in a pipe as a fraction of the pipe's diameter. A measure of fullness of the pipe used in capacity analysis.
Design storm	A theoretical storm event of a given duration and intensity that aligns with historical frequency records of rainfall events. For example, a 10-year, 24-hour design storm is a storm event wherein the volume of rain that falls in a 24-hour period would historically occur once every 10 years. Design storm events are used to predict I/I response and are useful for modeling how a collection system will react to a given set of storm event scenarios.
Infiltration and inflow	Infiltration and inflow (I/I) rates are calculated by subtracting the ADWF flow curve from the instantaneous flow measurements taken during and after a storm event. Flow in excess of the baseline consists of inflow, rainfall-responsive infiltration, and rainfall-dependent infiltration. Combined I/I is the total sum in gallons of additional flow attributable to a storm event.
Infiltration, groundwater	Groundwater infiltration (GWI) is groundwater that enters the collection system through pipe defects. GWI depends on the depth of the groundwater table above the pipelines as well as the percentage of the system submerged. The variation of groundwater levels and subsequent groundwater infiltration rates is seasonal by nature. On a day-to-day basis, groundwater infiltration rates are relatively steady and will not fluctuate greatly.
Infiltration, rainfall-dependent	Rainfall-dependent infiltration (RDI) is similar to groundwater infiltration but occurs as a result of storm water. The storm water percolates into the soil, submerges more of the pipe system, and enters through pipe defects. RDI is the slowest component of storm-related infiltration and inflow, beginning gradually and often lasting 24 hours or longer. The response time depends on the soil permeability and saturation levels.
Infiltration, rainfall-responsive	Rainfall-responsive infiltration (RRI) is storm water that enters the collection system through pipe defects, but normally in sewers constructed close to the ground surface such as private laterals. RRI is independent of the groundwater table and reaches defective sewers via the pipe trench in which the sewer is constructed, particularly if the pipe is placed in impermeable soil and bedded and

Term	Definition
	backfilled with a granular material. In this case, the pipe trench serves as a conduit similar to a French drain, conveying storm drainage to defective joints and other openings in the system.
Inflow	Inflow is defined as water discharged into the sewer system, including private sewer laterals, from direct connections such as downspouts, yard and area drains, holes in manhole covers, cross-connections from storm drains, or catch basins. Inflow creates a peak flow problem in the sewer system and often dictates the required capacity of downstream pipes and transport facilities to carry these peak instantaneous flows. Overflows are often attributable to high inflow rates.
Normalization	To run an “apples-to-apples” comparison amongst different basins, calculated metrics must be normalized. Individual basins will have different runoff areas, pipe lengths and sanitary flows. There are three common methods of normalization. Depending on the information available, one or all methods can be applied to a given project: ❖ <u>Pipe Length</u>: The metric is divided by the length of pipe in the upstream basin expressed in units of inch-diameter-mile (IDM). ❖ <u>Basin Area</u>: The metric is divided by the estimated drainage area of the basin in acres. ❖ <u>ADWF</u>: The metric is divided by the average dry weather sanitary flow (ADWF).
Normalization, <i>inflow</i>	The peak I/I flow rate is used to quantify inflow. Although the instantaneous flow monitoring data will typically show an inflow peak, the inflow response is measured from the I/I flow rate (in excess of baseline flow). This removes the effect of sanitary flow variations and measures only the I/I response: ❖ <u>Pipe Length</u>: The peak I/I flow rate is divided by the length of pipe (IDM) in the upstream basin. The result is expressed in gallons per day (gpd) per IDM (gpd/IDM). ❖ <u>Basin Area</u>: The peak I/I flow rate is divided by the geographic area of the upstream basin. The result is expressed in gpd per acre. ❖ <u>ADWF</u>: The peak I/I flow rate is divided by the average dry weather flow (ADWF). This is a ratio and is expressed without units.
Normalization, <i>GW</i>	The estimated GWI rates are compared to acceptable GWI rates, as defined by the Water Environment Federation, and used to identify basins with high GWI: ❖ <u>Pipe Length</u>: The GWI flow rate is divided by the length of pipe (IDM) in the upstream basin. The result is expressed in gallons per day (gpd) per IDM (gpd/IDM). ❖ <u>Basin Area</u>: The GWI flow rate is divided by the geographic area of the upstream basin. The result is expressed in gpd per acre. ❖ <u>ADWF</u>: The GWI flow rate is divided by the average dry weather flow (ADWF). This is a ratio and is expressed without units.
Normalization, <i>RDI</i>	The estimated RDI rates at a period 24 hours or more after the conclusion of a storm event are used to identify basins with high RDI:

Term	Definition
	❖ <u>Pipe Length</u>: The RDI flow rate is divided by the length of pipe (IDM) in the upstream basin. The result is expressed in gallons per day (gpd) per IDM (gpd/IDM). ❖ <u>Basin Area</u>: The RDI flow rate is divided by the geographic area of the upstream basin. The result is expressed in gpd per acre. ❖ <u>ADWF</u>: The RDI flow rate is divided by the average dry weather flow (ADWF). This is a ratio and is expressed without units.
Normalization, total I/I	The estimated totalized I/I in gallons attributable to a particular storm event is used to identify basins with high total I/I. Because this is a totalized value rather than a rate and can be attributable solely to an individual storm event, the volume of the storm event is also taken into consideration. This allows for a comparison not only between basins but also between storm events: ❖ <u>Pipe Length</u>: Total gallons of I/I is divided by the length of pipe (IDM) in the upstream basin and the rainfall total (inches) of the storm event. The result is expressed in gallons per IDM per inch of rain. ❖ <u>Basin Area (R-Value)</u>: Total gallons of I/I is divided by total gallons of rainfall water that fell within the acreage of the basin area. This is a ratio and expressed as a percentage. R-value is described as “the percentage of rainfall that enters the collection system.” Systems with R-values less than 5%¹ are often considered to be performing well. ❖ <u>ADWF</u>: Total gallons of I/I is divided by the ADWF and the rainfall total of the storm event. The result is expressed in million gallons per mgd of ADWF per inch of rain.
Peaking factor	Ratio of peak measured flow to average dry weather flow. This ratio expresses the degree of fluctuation in flow rate over the monitoring period and is used in capacity analysis.
Surcharge	When the flow level is higher than the crown of the pipe, then the pipeline is said to be in a surcharged condition. The pipeline is surcharged when the <i>d/D</i> ratio is greater than 1.0.
Synthetic hydrograph	A set of algorithms developed to approximate the actual I/I hydrograph. The synthetic hydrograph is developed strictly using rainfall data and response parameters representing response time, recession coefficient and soil saturation.
Weekend/weekday ratio	The ratio of weekend ADWFs to weekday ADWFs. In residential areas, this ratio is typically slightly higher than 1.0. In business districts, depending on type of service, this ratio can be significantly less than 1.0.

¹ Keefe, P.N. “Test Basins for I/I Reduction and SSO Elimination.” 1998 WEF Wet Weather Specialty Conference, Cleveland.

EXECUTIVE SUMMARY

Scope and Purpose

V&A was retained by Akel Engineering Group to perform sanitary sewer flow monitoring, rainfall monitoring, and inflow and infiltration (I/I) analysis within the City of Gilroy, California (City). Flow and rainfall monitoring was performed over a three-week period at eleven open-channel flow monitoring sites within the City. The flow monitoring period began on February 24, 2014, and ended on March 16, 2014. The purpose of this study was to measure sanitary sewer flows at the flow monitoring sites and estimate available sewer capacity and infiltration and inflow (I/I) occurring in the basins upstream from the flow monitoring sites.

Site Flow Monitoring and Capacity Results

Peak measured flows and the corresponding flow levels (depths) are important to understand the capacity limitations of a collection system. Table 1 summarizes the peak recorded flows, levels, d/D ratios, and peaking factors per site during the flow monitoring period. Capacity analysis data is presented on a site-by-site basis and represents the hydraulic conditions only at the site locations; hydraulic conditions in other areas of the collection system will differ.

Table 1. Capacity Analysis Summary

Metering Site	ADWF (mgd)	Peak Measured Flow (mgd)	Peaking Factor	Diameter (in)	Peak Level (in)	Peak d/D Ratio	Level Surcharged above Crown (ft)
Site 1	1.04	2.82	2.70	27	12.80	0.47	-
Site 2	1.24	2.21	1.79	25	15.92	0.64	-
Site 3	3.66	6.69	1.83	33	18.22	0.55	-
Site 4	0.13	0.31	2.42	12	2.86	0.24	-
Site 5	0.12	0.41	3.43	10.5	7.10	0.68	-
Site 6	0.07	0.15	2.15	24	3.82	0.16	-
Site 7	0.15	0.26	1.78	10	13.27	1.33	0.3
Site 8	0.29	0.91	3.09	14	6.51	0.47	-
Site 9	3.30	6.49	1.96	33	14.51	0.44	-
Site 10	0.31	0.58	1.88	10.5	6.88	0.66	-
Site 11	0.54	1.11	2.07	17.75	11.39	0.64	-

The following capacity analysis results are noted:

- ❖ **Peaking Factor:** Sites 5 and 8 had peaking factors that exceeded typical design threshold limits for the ratio of peak flow to average dry weather flow.
- ❖ **d/D Ratio:** Site 7 had a d/D ratio that exceeded the common design threshold for d/D ratio. It should be noted that the peak level that was recorded was not a result of a rainfall event. It was also observed that several sites had recorded peak levels that were not related to rainfall events.

Figure 1 shows bar graphs of the capacity results. Figure 2 shows a schematic diagram of the peak measured flows with peak flow levels.

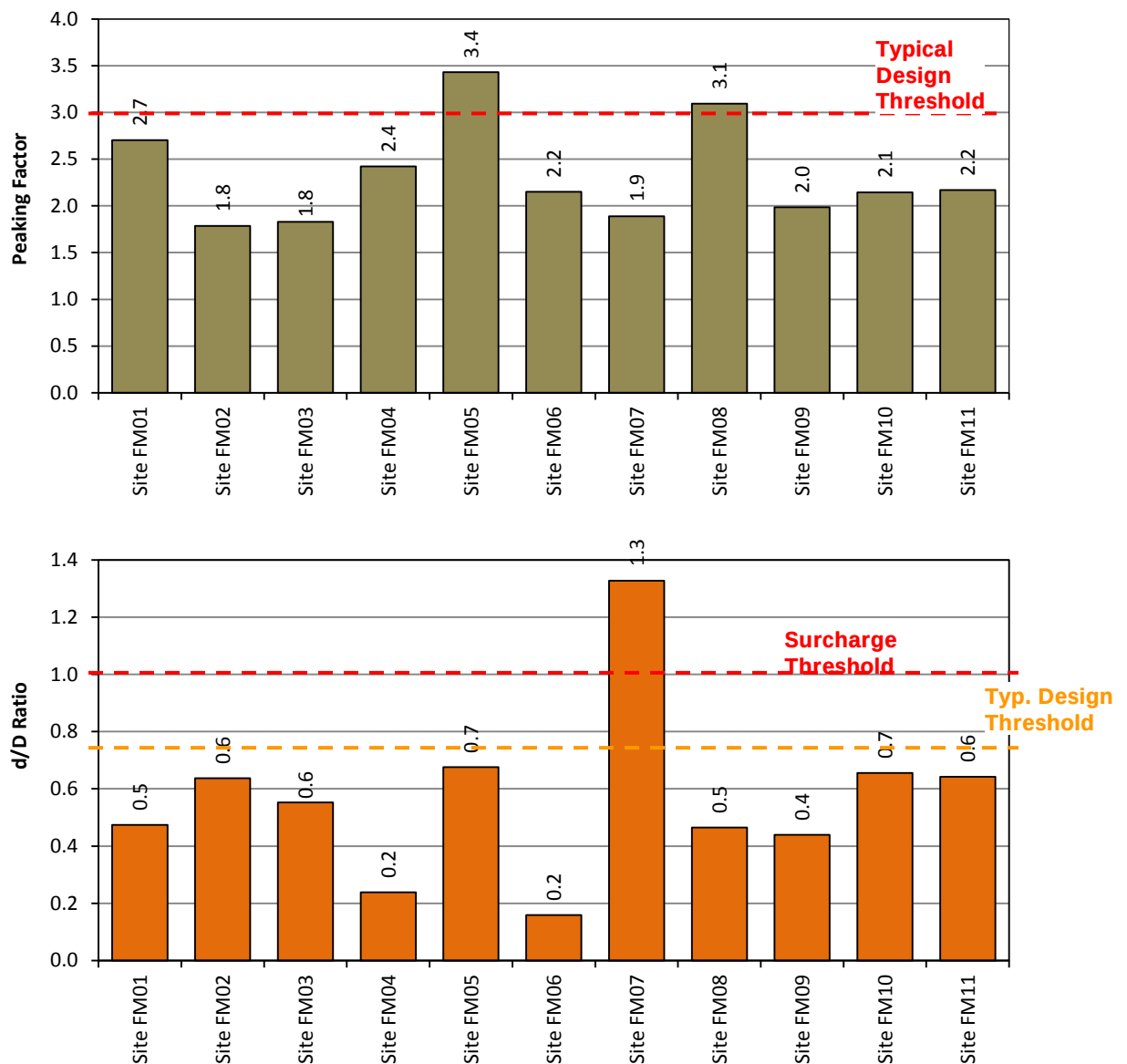


Figure 1. Capacity Summary Bar Graphs: Peaking Factors and Peak d/D Ratios

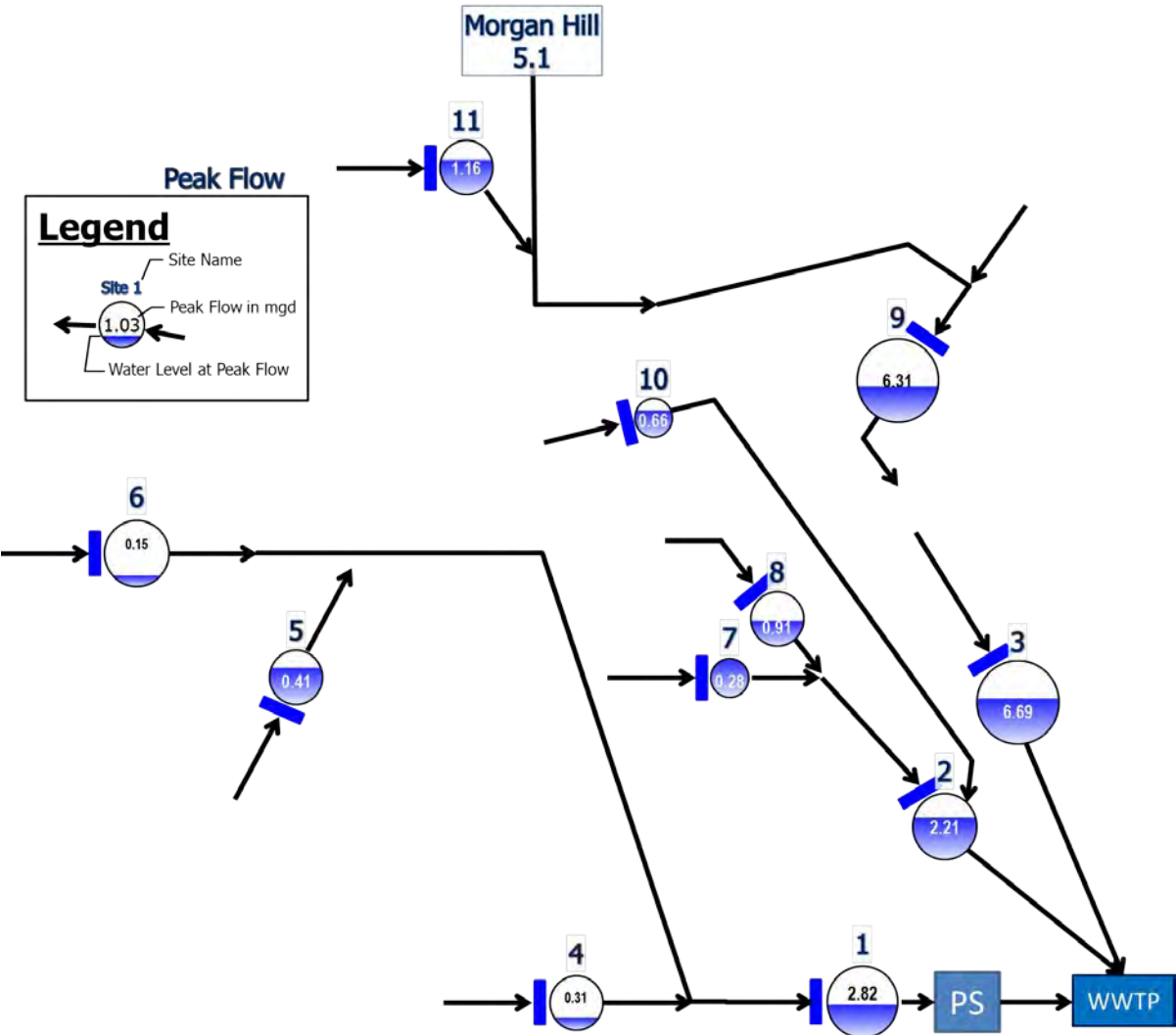


Figure 2. Peak Measured Flow (Flow Schematic)

Basin Inflow and Infiltration Analysis Results

Table 2 summarizes the flow monitoring and I/I results for the 11 flow monitoring basins that were isolated during this study. Infiltration and inflow rankings are shown such that 1 represents the highest infiltration or inflow contribution and 11 represents the least. Basins that ranked 1, 2 or 3 in a category are color coded red. Please refer to the *I/I Methods* section for more information on inflow and infiltration analysis methods and ranking methods.

Table 2. I/I Analysis Summary

Metering Basin	ADWF (mgd)	Peak I/I Rate (mgd)	Combined I/I (gallons)	Inflow Ranking	RDI Ranking	Evidence of High GWI?	Combined I/I Ranking
Basin 1	1.04	1.98	334,600	2	8	No	6
Basin 2	1.24	0.35	153,000	8	T10	No	7
Basin 3	3.66	0.00	483,500	10	1	No	1
Basin 4	0.13	0.14	71,000	6	3	Yes	4
Basin 5	0.12	0.22	135,200	5	4	Yes	3
Basin 6	0.07	0.10	41,700	7	7	Yes	8
Basin 7	0.15	0.20	19,800	3	T10	No	10
Basin 8	0.29	0.84	166,700	1	2	No	2
Basin 9	3.30	n/a	38,400	n/a	5	No	5
Basin 10	0.31	0.40	40,700	4	9	No	11
Basin 11	0.54	0.39	132,700	9	6	No	9

The following inflow/infiltration analysis results are noted:

- ❖ **Inflow:** Basins 1, 7 and 8 ranked highest for normalized inflow contribution.
- ❖ **Rainfall-Dependent Infiltration:** Basins 3, 4 and 8 ranked highest for normalized RDI contribution.
- ❖ **Groundwater Infiltration:** Basins 4, 5 and 6 had GWI rates that were **above** the WEF typical low-to-average ratio, indicating excessive groundwater infiltration.
- ❖ **Combined I/I:** Basins 3, 5 and 8 ranked highest for normalized combined I/I contribution.

Figure 3 through Figure 6 show temperature maps of the overall rankings for each inflow and infiltration component.

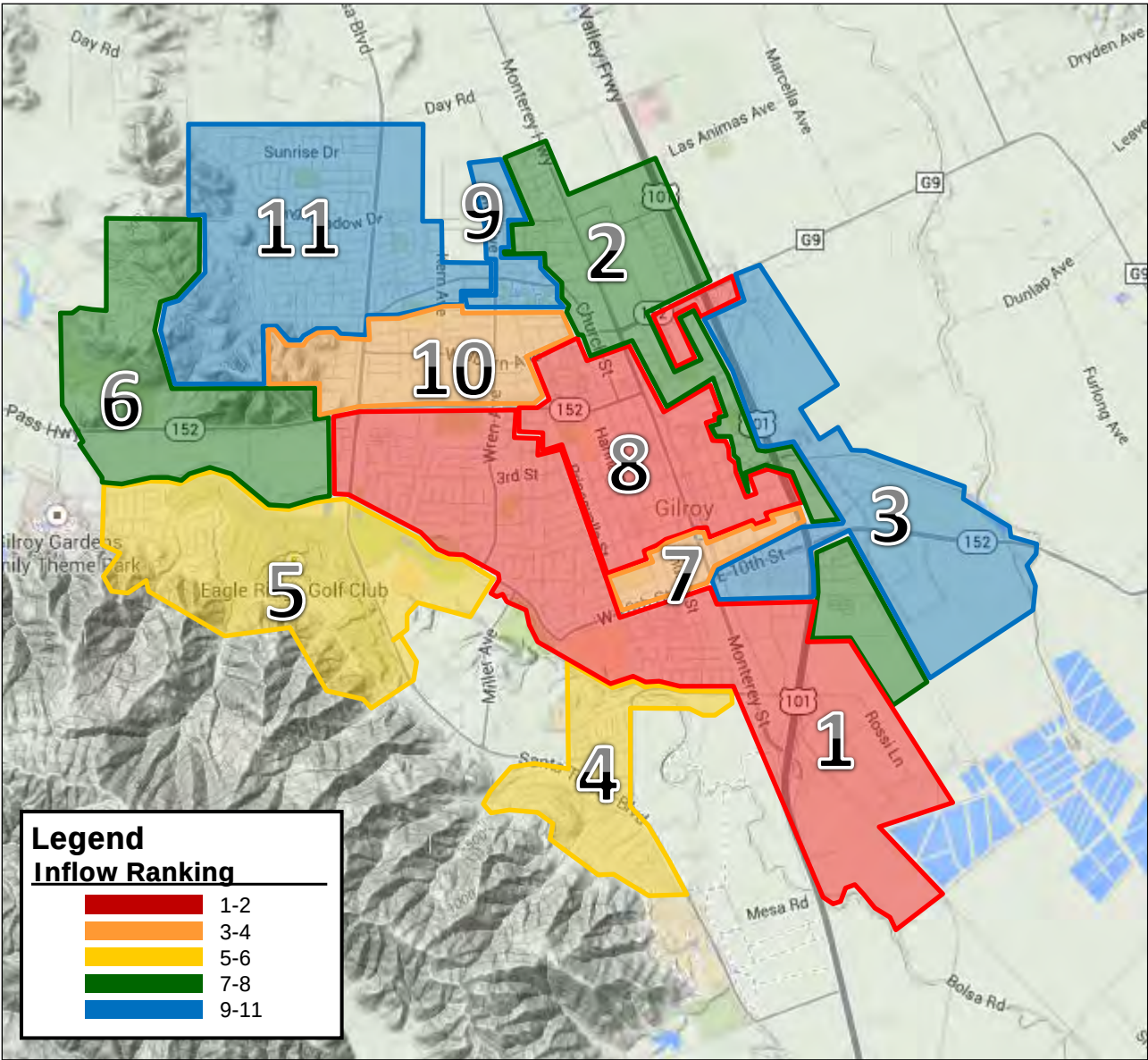


Figure 3. Inflow Temperature Map (by Rank)

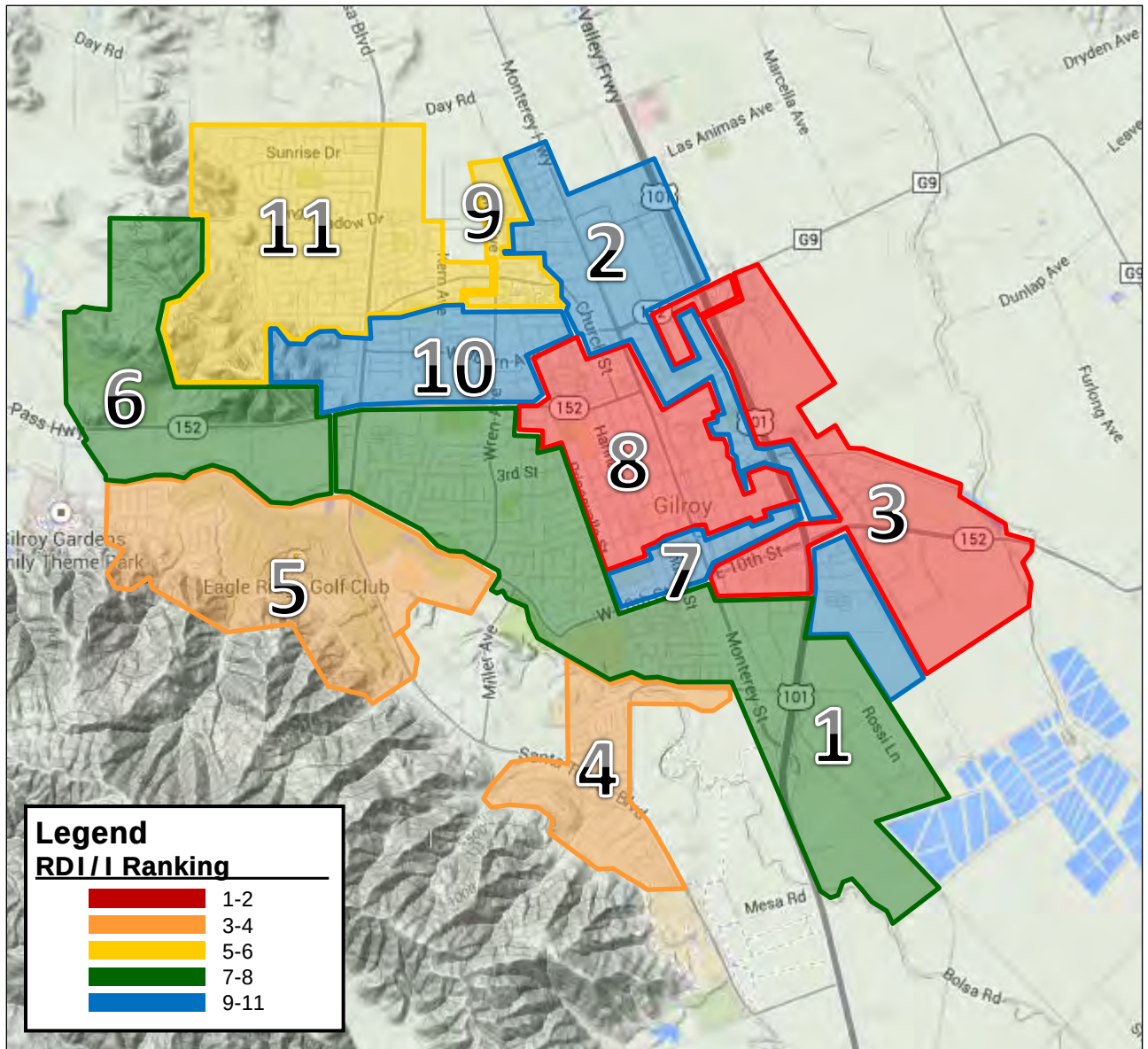


Figure 4. RDI Temperature Map (by Rank)

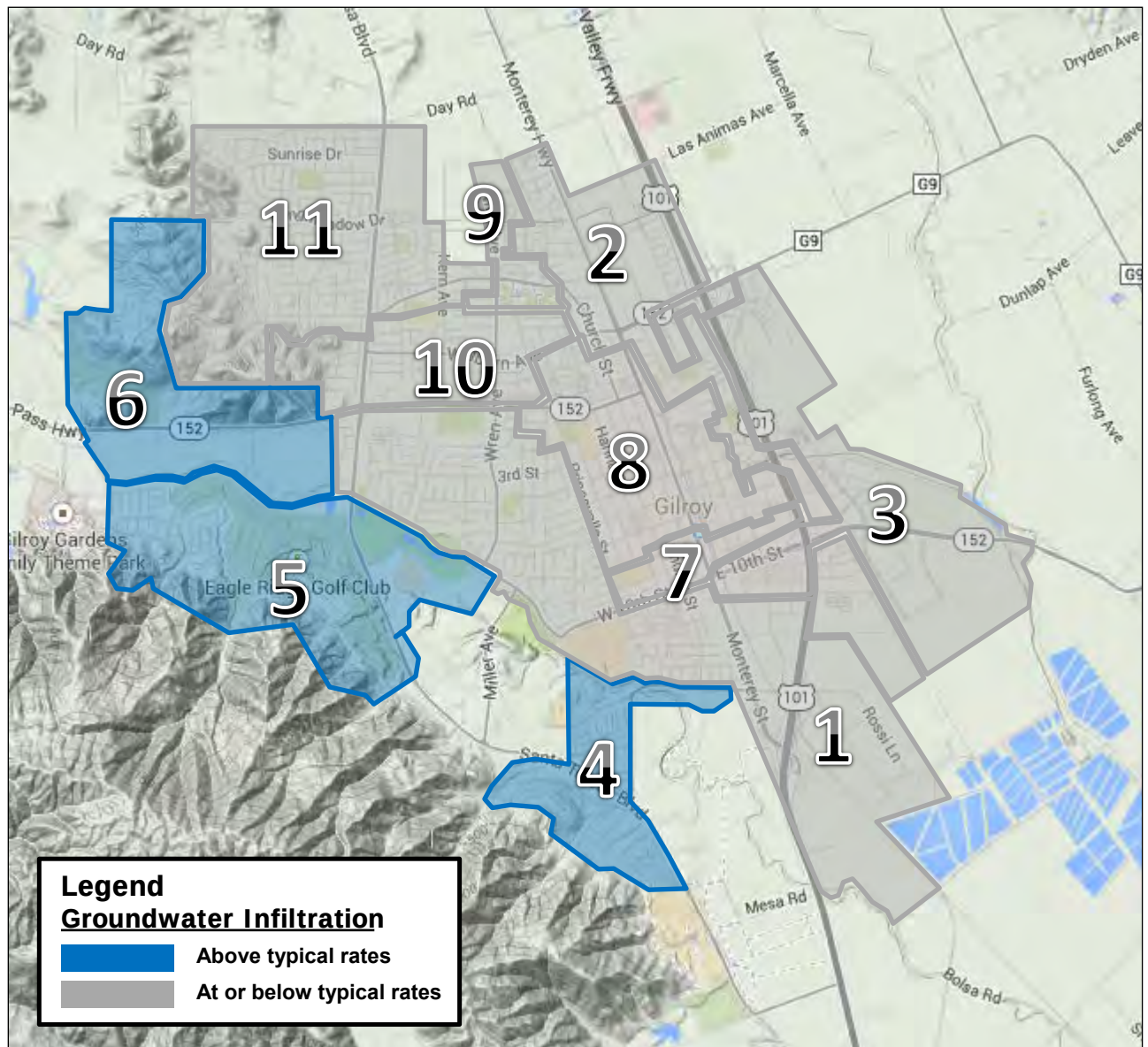


Figure 5. Basins with Groundwater Infiltration

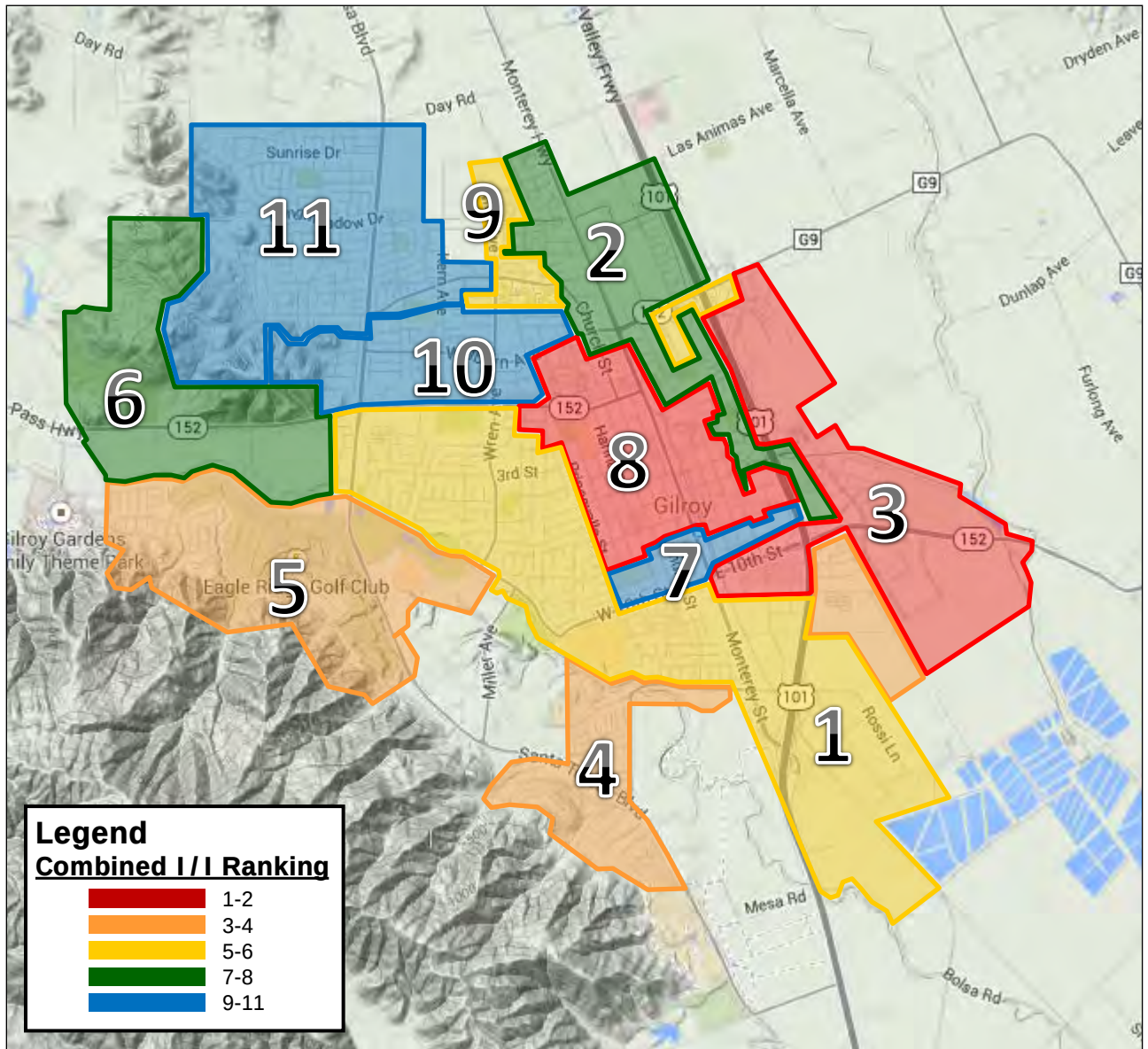


Figure 6. Combined I/I Temperature Map (by Rank)

Recommendations

V&A advises that future I/I reduction plans consider the following recommendations:

1. **Determine I/I Reduction Program:** The City should examine its I/I reduction needs to determine a future I/I reduction program.
 - a. If peak flows, sanitary sewer overflows, and pipeline capacity issues are of greater concern, then priority can be given to investigate and reduce sources of inflow within the basins with the greatest inflow problems. The highest inflow occurred in Basins 1, 7 and 8.
 - b. If total infiltration and general pipeline deterioration are of greater concern, then the program can be weighted to investigate and reduce sources of infiltration within the basins with the greatest infiltration problems.
 - i. The highest normalized rainfall-dependent infiltration occurred in Basins 3, 4 and 8.
 - ii. The highest groundwater infiltration occurred in Basins 4, 5 and 6.
2. **I/I Investigation Methods:** Potential I/I investigation methods include the following:
 - a. Smoke testing.
 - b. Mini-basin flow monitoring.
 - c. Nighttime reconnaissance work to (1) investigate and determine direct point sources of inflow and (2) determine the areas and pipe reaches responsible for high levels of infiltration contribution.
3. **I/I Reduction Cost-Effectiveness Analysis:** The City should conduct a study to determine which is more cost-effective: (1) locating the sources of inflow and infiltration and systematically rehabilitating or replacing the faulty pipelines or (2) continued treatment of the additional rainfall-dependent I/I flow.

INTRODUCTION

Scope and Purpose

V&A was retained by Akel Engineering Group to perform sanitary sewer flow monitoring, rainfall monitoring, and inflow and infiltration (I/I) analysis within the City of Gilroy, California (City). Flow and rainfall monitoring was performed over a three-week period at eleven open-channel flow monitoring sites within the City. The flow monitoring period began on February 24, 2014, and ended on March 16, 2014. The purpose of this study was to measure sanitary sewer flows at the flow monitoring sites and estimate available sewer capacity and infiltration and inflow (I/I) occurring in the basins upstream from the flow monitoring sites, as shown in Figure 8.

Flow Monitoring Sites

Flow monitoring sites are the manholes where the flow monitors were placed. Flow monitoring site data may include the flows of one or many drainage basins. To isolate a flow monitoring basin, an addition or subtraction of flows may be required². One issue of note is that the flow for the City of Morgan Hill flows south into Gilroy and enters the system through Basin 9. The flow data for this portion of the study was obtained from a flow meter on Harding Way that captures all of Morgan Hill's flow, is owned by the City of Morgan Hill and is maintained by V&A. Capacity and flow rate information is presented on a site-by-site basis. The locations and other information for the flow monitoring sites are shown in Table 3.

Flow Monitoring Basins

Flow monitoring basins are localized areas of a sanitary sewer collection system upstream of a given location (often a flow meter), including all pipelines, inlets, and appurtenances (Figure 8). The basin refers to the ground surface area near and enclosed by the pipelines³. A basin may refer to the entire collection system upstream from a flow meter or may exclude separately monitored basins upstream. I/I analysis in this report will be conducted on a basin-by-basin basis. For this study subtraction of flows was required to isolate the drainage areas of some flow monitoring basins. Shown in Table 4 are the equations (in which Q refers to flow rate) used to calculate the flow rate results for each basin from the flow rates recorded at the monitoring sites. Detailed descriptions of the individual flow monitoring sites, including photographs, are included in *Appendix A*.

² There is error inherent in flow monitoring. Adding and subtracting flows increases error on an additive basis. For example, if Site A has an error of $\pm 10\%$ and Site B has an error of $\pm 10\%$, then the resulting flow when subtracting Site A from Site B would have an error of up to $\pm 20\%$.

³ The basin areas (in acres) were provided by Akel Engineering Group.

Table 3. List of Flow Monitoring Sites

Metering Site	Pipe Dia. (in)	City GIS Manhole Number	Location
Site 1	27	S113DM201	Inside WWTP property 100 ft. west of Influent Pump Station
Site 2	25	S102CM201	ROW southeast of Holloway Rd.
Site 3	33	S091CM501	ROW southeast of Holloway Rd.
Site 4	12	S100DM201	W. Luchessa Ave. near Hyde Park Dr.
Site 5	18	S076CM402	Wren Ave. and Uvas Park Dr.
Site 6	24	S064DM205	100 ft. south of west end of 3rd St. on bike path
Site 7	10	S079AM401	East end of E. 9th St. near Hwy. 101 offramp
Site 8	14	S079AM103	Near northwest end of Renz Ln.
Site 9	33	S048AM401	Behind Nike Outlet Store off Arroyo Circle
Site 10	10.5	S047CM207	Welburn Ave. west of Church St.
Site 11	17.75	S037CM307	Intersection of Wren Ave. and Mantelli Dr.

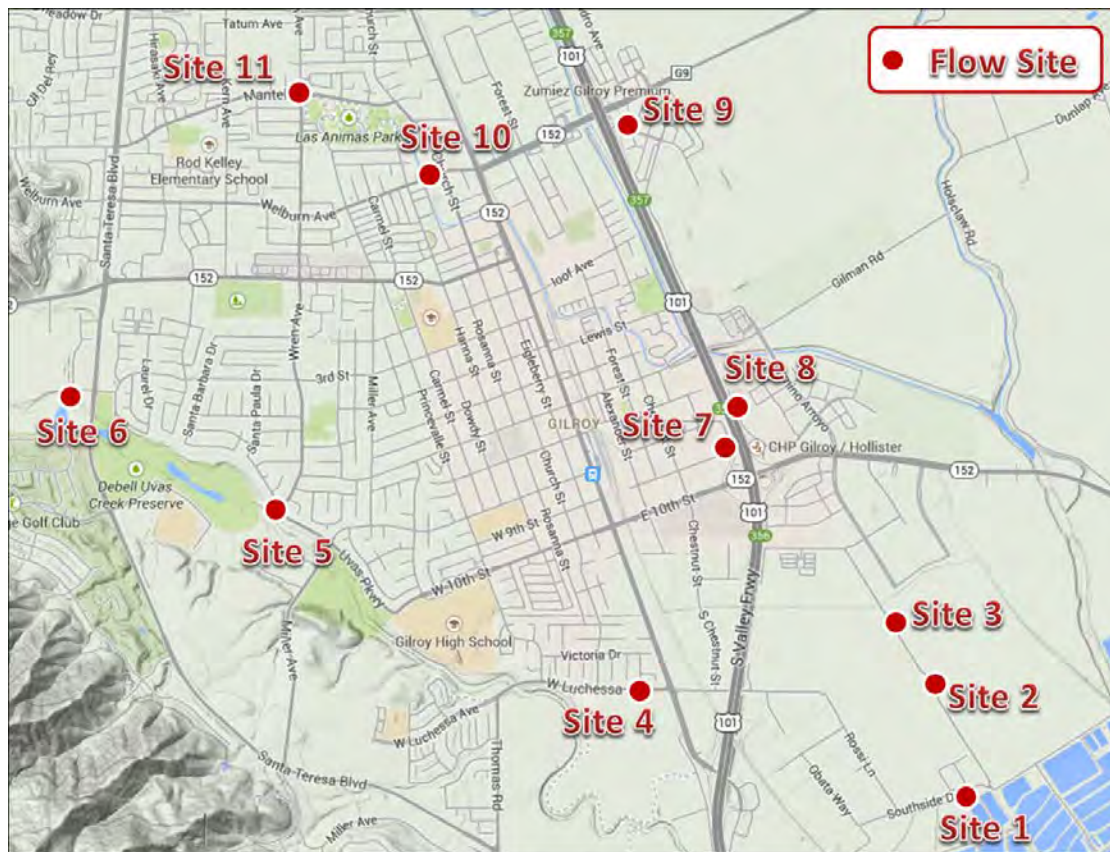


Figure 7. Site Location Map

Table 4. Flow Monitoring Basin Information

Flow Metering Basin	Metering Basin Size (acres)	Basin Flow Calculation
Basin 1	1,661	$Q_{1(\text{Basin})} = Q_{1(\text{Site})} - Q_{4(\text{Site})} - Q_{5(\text{Site})} - Q_{6(\text{Site})}$
Basin 2	766	$Q_{2(\text{Basin})} = Q_{2(\text{Site})} - Q_{7(\text{Site})} - Q_{8(\text{Site})} - Q_{10(\text{Site})}$
Basin 3	818	$Q_{3(\text{Basin})} = Q_{3(\text{Site})} - Q_{9(\text{Site})}$
Basin 4	343	$Q_{4(\text{Basin})} = Q_{4(\text{Site})}$
Basin 5	888	$Q_{5(\text{Basin})} = Q_{5(\text{Site})}$
Basin 6	732	$Q_{6(\text{Basin})} = Q_{6(\text{Site})}$
Basin 7	137	$Q_{7(\text{Basin})} = Q_{7(\text{Site})}$
Basin 8	566	$Q_{8(\text{Basin})} = Q_{8(\text{Site})}$
Basin 9	181	$Q_{9(\text{Basin})} = Q_{9(\text{Site})} - Q_{11(\text{Site})} - Q_{\text{Morgan Hill}}$
Basin 10	456	$Q_{10(\text{Basin})} = Q_{10(\text{Site})}$
Basin 11	1,014	$Q_{11(\text{Basin})} = Q_{11(\text{Site})}$

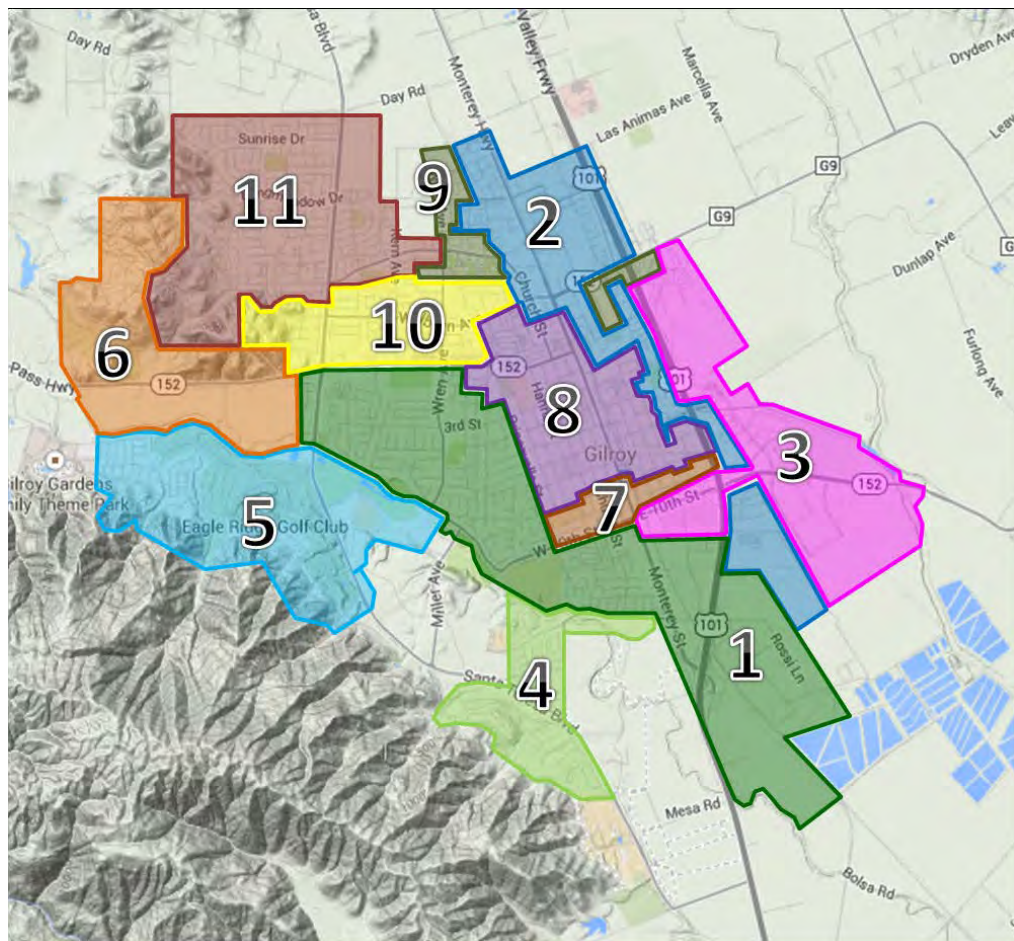


Figure 8. Basin Location Map

METHODS AND PROCEDURES

Confined Space Entry

A confined space (Photo 1) is defined as any space that is large enough and so configured that a person can bodily enter and perform assigned work, has limited or restricted means for entry or exit and is not designed for continuous employee occupancy. In general, the atmosphere must be constantly monitored for sufficient levels of oxygen (19.5% to 23.0%) and the absence of hydrogen sulfide (H_2S) gas, carbon monoxide (CO) gas, and lower explosive limit (LEL) levels. A typical confined space entry crew has members with OSHA-defined responsibilities of Entrant, Attendant and Supervisor. The Entrant is the individual performing the work. He or she is equipped with the necessary personal protective equipment needed to perform the job safely, including a personal four-gas monitor (Photo 2). If it is not possible to maintain line-of-sight with the Entrant, then more Entrants are required until line-of-sight can be maintained. The Attendant is responsible for maintaining contact with the Entrants to monitor the atmosphere on another four-gas monitor and maintaining records of all Entrants, if there are more than one. The Supervisor develops the safe work plan for the job at hand prior to entering.



Photo 1. Confined Space Entry



Photo 2. Typical Personal Four-Gas Monitor

Flow Meter Installation

V&A installed eleven Isco 2150 area-velocity flow meters at the metering locations referenced in Table 3. Isco 2150 meters use submerged sensors with a pressure transducer to collect depth readings and an ultrasonic Doppler sensor to determine the average fluid velocity. The ultrasonic sensor emits high-frequency (500 kHz) sound waves, which are reflected by air bubbles and suspended particles in the flow. The sensor receives the reflected signal and determines the Doppler frequency shift, which indicates the estimated average flow velocity. The sensor is typically mounted at a manhole inlet to take advantage of smoother upstream flow conditions. The sensor may be offset to one side to lessen the chances of fouling and sedimentation where these problems are expected to occur. Manual level and velocity measurements were taken during installation of the flow meters and again when they were removed and compared to simultaneous level and velocity readings from the flow meters to ensure proper calibration and accuracy. Figure 9 shows a typical installation for a flow meter with a submerged sensor.

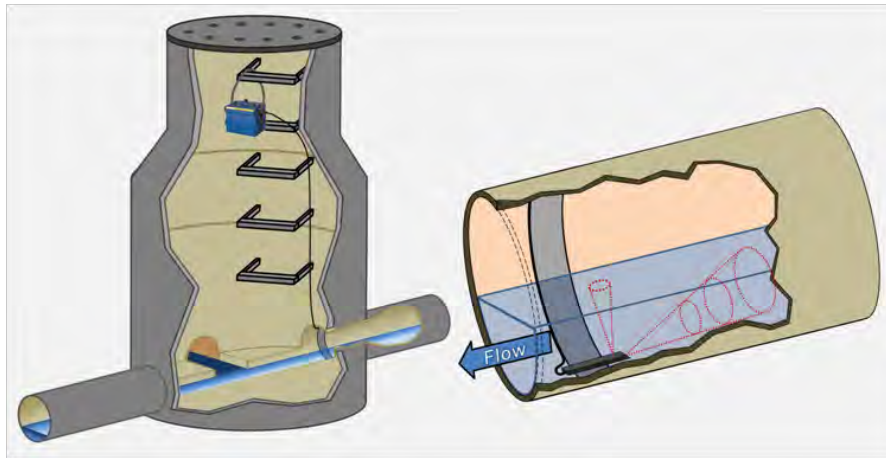


Figure 9. Typical Installation for Flow Meter with Submerged Sensor

Flow Calculation

Data retrieved from the flow meter was placed into a spreadsheet program for analysis. Data analysis includes data comparison to field calibration measurements, as well as necessary geometric adjustments as required for sediment (sediment reduces the pipe's wetted cross-sectional area available to carry flow). Area-velocity flow metering uses the continuity equation,

$$Q = V \cdot A$$

where Q is the volume flow rate, V is the average velocity as determined by the ultrasonic sensor, and A is the cross-sectional area of flow as determined from the depth of flow. For circular pipe,

$$A = \left[\frac{D^2}{4} \cos^{-1} \left(1 - \frac{2d}{D} \right) \right] - \left[\left(\frac{D}{2} - d \right) \left(\frac{D}{2} \right) \sin \left(\cos^{-1} \left(1 - \frac{2d}{D} \right) \right) \right], \quad \text{where } D \text{ is the pipe diameter and } d \text{ is the depth of flow.}$$

RESULTS AND ANALYSIS

Rainfall: Rain Gauge Data

V&A utilized rain data from three rain gauges maintained by local weather enthusiasts. While V&A performed QA/QC analysis to ensure, to the extent possible, the quality of the rainfall data, it is noted that V&A has no direct control over these gauges.

There was one primary rainfall event spread over several days that was used for infiltration and inflow analysis for this study, as summarized in Table 5. Figure 10 graphically displays the rainfall activity recorded over the flow monitoring period (average of rain gauges). Figure 11 shows the rain accumulation plot of the period rainfall, as well as the historical average rainfall⁴ in Gilroy during this project duration. Rainfall totals for Gilroy were 121%, 113% and 110% per gauge of historical normal levels during this time period.

Table 5. Rainfall Events Used for I/I Analysis

Rainfall Event	GILRO2 Event Rainfall (in)	GILRO7 Event Rainfall (in)	GILRO17 Event Rainfall (in)
Event 1: February 26, 2014 – March 2, 2014	3.39	3.27	3.59
<i>Total over Monitoring Period</i>	<i>3.58</i>	<i>3.48</i>	<i>3.82</i>

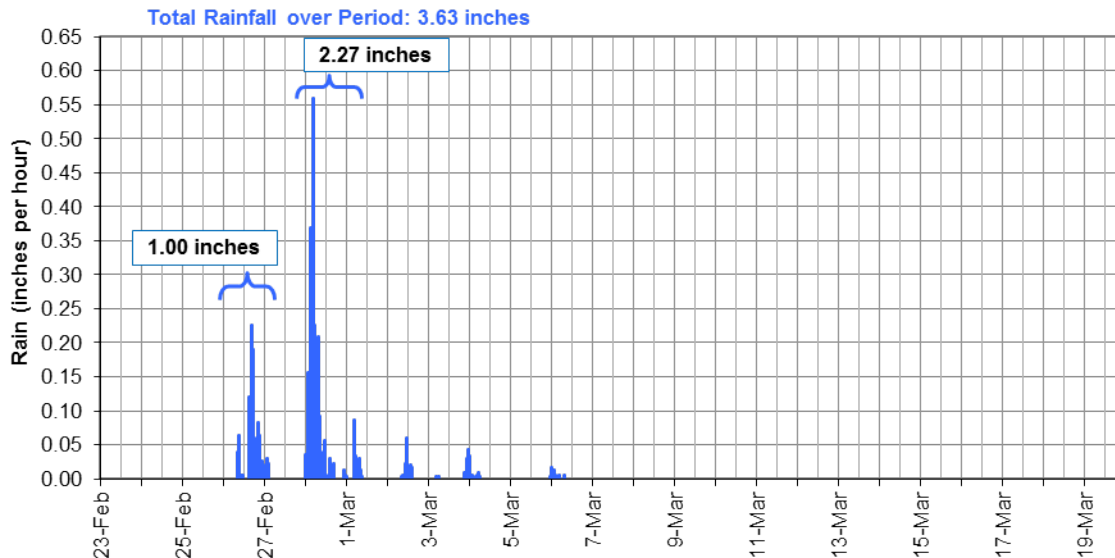


Figure 10. Rainfall Activity over Flow Monitoring Period

⁴ Historical data taken from the WRCC (Station 043417 in Gilroy): <http://www.wrcc.dri.edu/summary/climsmnca.html>

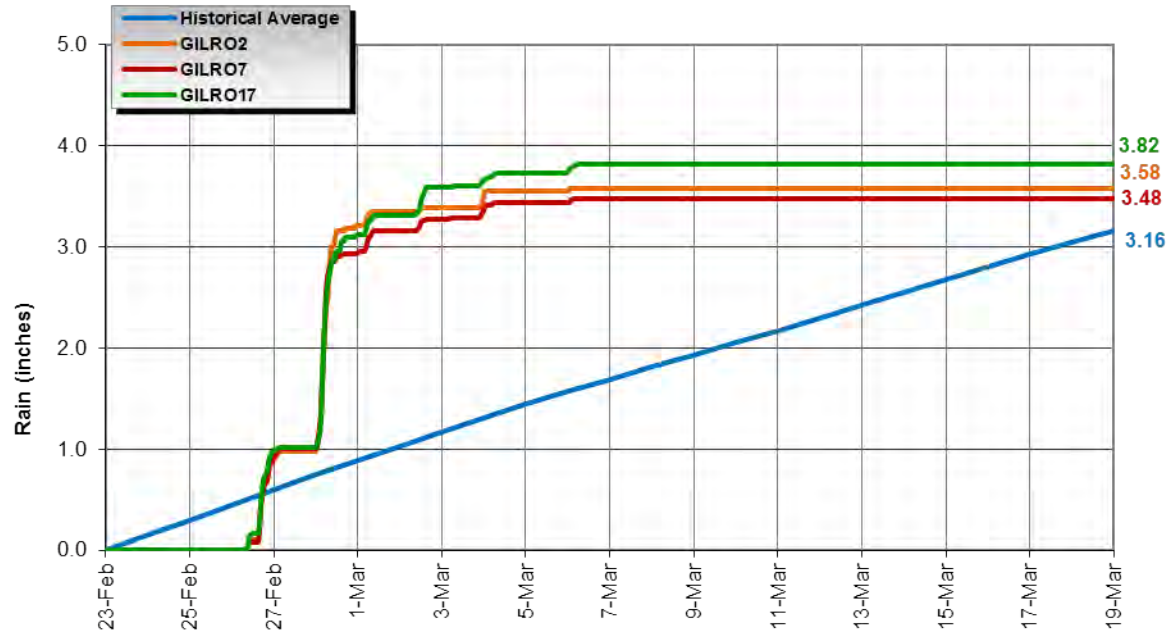


Figure 11. Rainfall Accumulation Plot

Rain Gauge Triangulation Distribution

The rainfall affecting the sanitary sewer collection system basins must be calculated based on the proximity to the rain gauge locations. The mean precipitation for each site was calculated by taking data from the rain gauges and using the inverse distance weighting (IDW) method. IDW is an interpolation method that assumes the influence of each rain gauge location diminishes with distance. The approximate geographic coordinates of each site were determined and a weighted average was taken of the precipitation data from nearby rain gauge locations.

IDW is performed using the equation

$$w = \frac{1/d^p}{\sum 1/d^p}$$

where the weight, w , depends on the distance, d , from the rain gauge to the monitoring site and p , a user-selected power ($p > 0$). The most common choice of p in hydrological studies of watershed areas is 2. Figure 12 illustrates the IDW method with sample data.

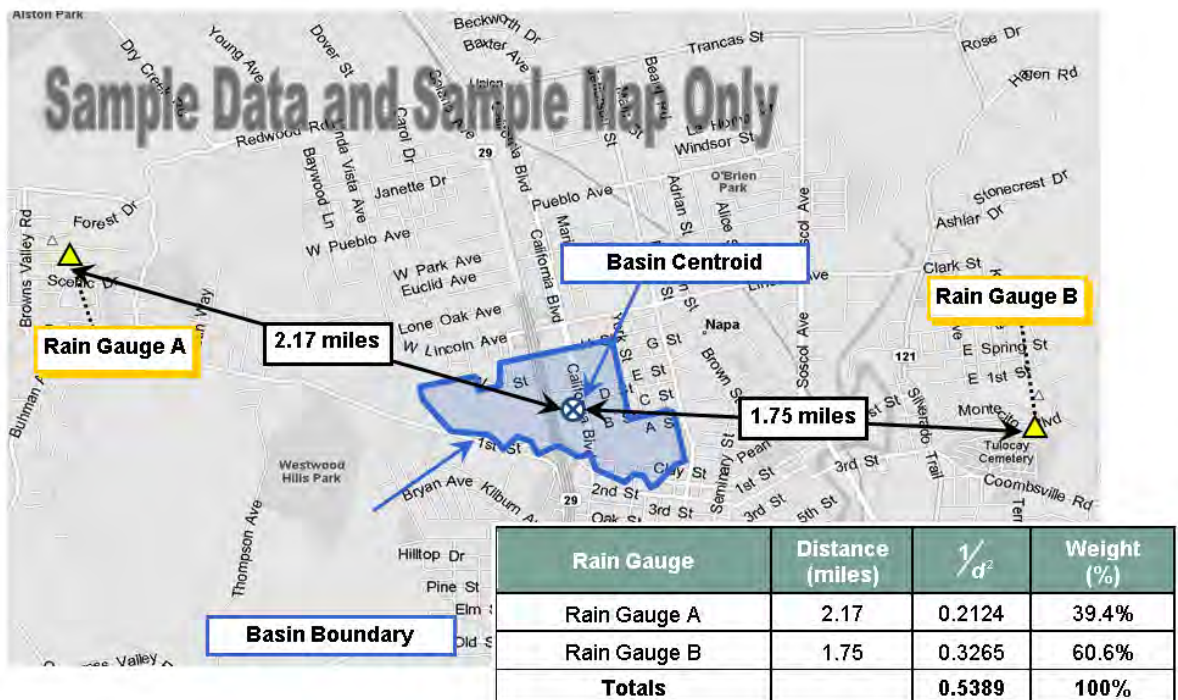


Figure 12. Rainfall Inverse Distance Weighting Method

The rain gauge distribution as calculated for each metering site for this project is shown in Table 6.

Table 6. Rain Gauge Distribution by Basin

Metering Basin	GILRO2 (%)	GILRO7 (%)	GILRO17 (%)
Basin 1	10.7%	18.8%	70.4%
Basin 2	35.5%	37.3%	27.2%
Basin 3	45.4%	26.1%	28.5%
Basin 4	9.6%	15.4%	75.0%
Basin 5	2.4%	15.1%	82.5%
Basin 6	5.5%	59.4%	35.1%
Basin 7	23.8%	29.6%	46.6%
Basin 8	20.2%	43.2%	36.6%
Basin 9	13.5%	72.2%	14.3%
Basin 10	4.7%	79.3%	15.9%
Basin 11	0.6%	98.0%	1.4%

Rainfall: Storm Event Classification

It is important to classify the relative size of the major storm event that occurs over the course of a flow monitoring period⁵. Storm events are classified by intensity and duration. Based on historical data, frequency contour maps for storm events of given intensity and duration have been developed by the National Oceanic and Atmospheric Administration (NOAA) for all areas within the continental United States. For example, the NOAA Rainfall Frequency Atlas⁶ classifies a 10-year, 24-hour storm event in Gilroy (at the location of the GILRO7 rain gauge) as 4.42 inches (Figure 13). This means that in any given year, there is a 10% chance that 4.42 inches of rain will fall in any 24-hour period.



Figure 13. NOAA Northern California Rainfall Frequency Map

From the NOAA frequency maps, for a specific latitude and longitude, the rainfall densities for period durations ranging from 15 minutes to 60 days are known for rain events ranging from 1-year to 100-year

⁵ Sanitary sewers are often designed to withstand I/I contribution to sanitary flows for “design” storm events of specific sizes.

⁶ NOAA Western U.S. Precipitation Frequency Maps Atlas 2, 1973: <http://www.wrcc.dri.edu/pcpnfreq.html>

intensities. These are plotted to develop a rain event frequency map specific to each rainfall monitoring site. Superimposing the peak measured densities for Event 1 on the rain event frequency plot determines the classification of the storm event, as shown in Figure 14. The rain event that occurred during the flow-monitoring period was classified as a 1-year, 24-hour rainfall event at the GILRO2 and GILRO7 rain gauges. The event actually approached 5-year, 6-hour status at the GILRO2 gauge.

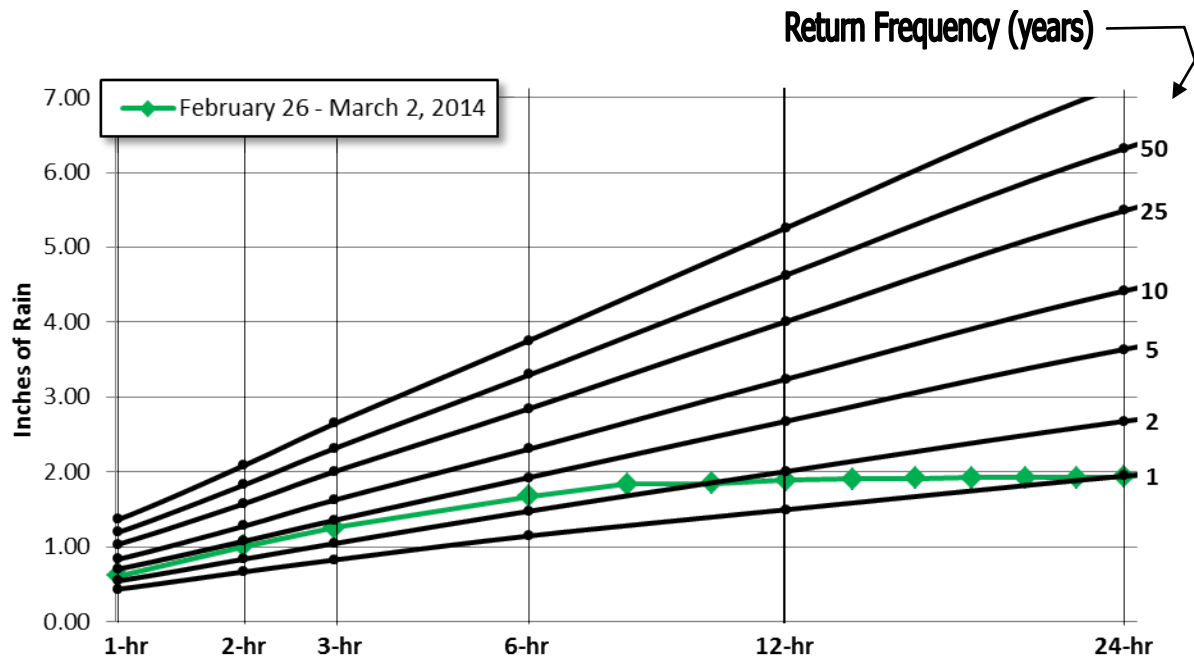


Figure 14. Storm Event Classification (GILRO7)

Flow Monitoring: Average Dry Weather Flows

Weekday and weekend diurnal flow patterns differ and can be separated when establishing average dry weather flow rates. Within weekdays, the average dry weather flow (ADWF) patterns for Friday will vary from the Monday through Thursday patterns, particularly in the evening hours as people prepare for the weekend. Similarly, Sunday flow patterns typically vary in the evenings from Saturday flow patterns as people prepare for the work week. Figure 15 illustrates the varying flow patterns within a work week (Site 2 shown).

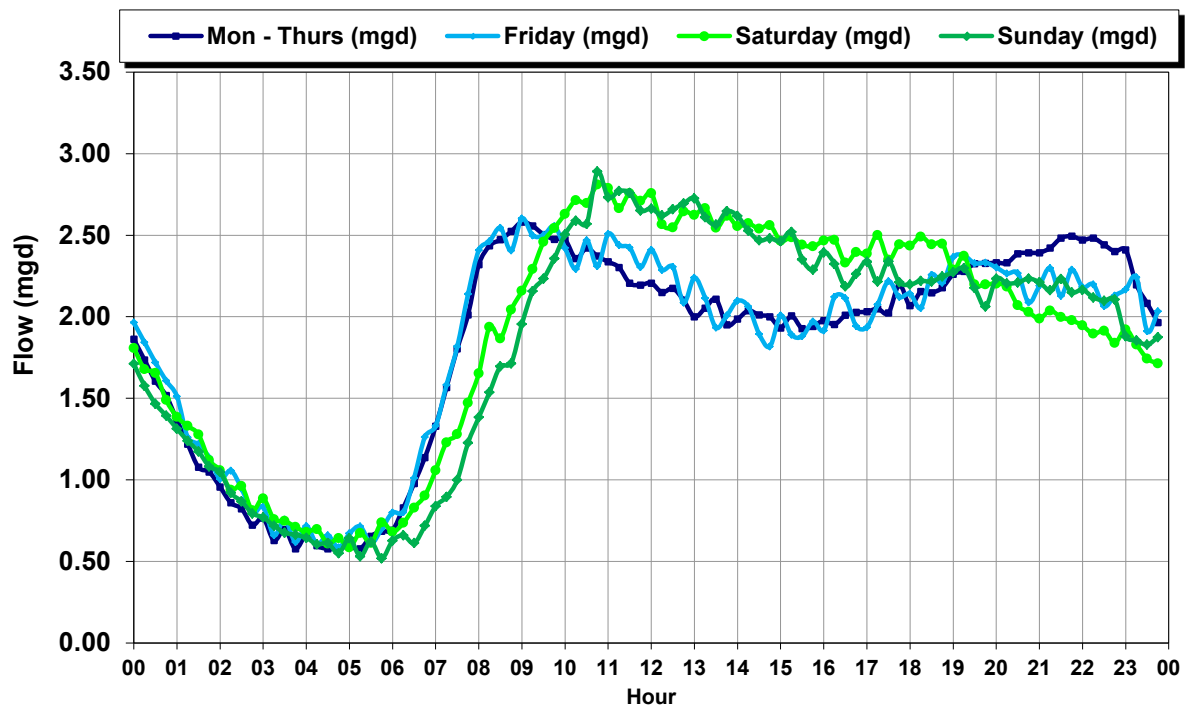


Figure 15. Sample ADWF Diurnal Flow Patterns

Graphs of the ADWF flow patterns for each site may be found in *Appendix A*. The overall average dry weather flow (ADWF) is calculated per the following equation:

$$ADWF = \left(ADWF_{Mon-Thu} \times \frac{4}{7} \right) + \left(ADWF_{Fri} \times \frac{1}{7} \right) + \left(ADWF_{Sat} \times \frac{1}{7} \right) + \left(ADWF_{Sun} \times \frac{1}{7} \right),$$

Table 7 lists the average dry weather flow (ADWF) recorded during this study for the flow monitoring sites. Figure 16 shows a schematic diagram of the average dry weather flows and flow levels.

Table 7. Dry Weather Flow Summary

Monitoring Site	Mon-Thu ADFW (mgd)	Friday ADFW (mgd)	Saturday ADFW (mgd)	Sunday ADFW (mgd)	Overall ADFW (mgd)
Site 1	1.04	1.01	1.03	1.07	1.04
Site 2	1.23	1.23	1.27	1.24	1.24
Site 3	3.69	3.58	3.60	3.68	3.66
Site 4	0.13	0.12	0.12	0.13	0.13
Site 5	0.12	0.12	0.12	0.13	0.12
Site 6	0.07	0.06	0.07	0.07	0.07
Site 7	0.15	0.14	0.16	0.13	0.15
Site 8	0.28	0.27	0.29	0.36	0.29
Site 9	3.15	3.11	3.24	3.30	3.18
Site 10	0.31	0.30	0.31	0.31	0.31
Site 11	0.52	0.52	0.55	0.58	0.54

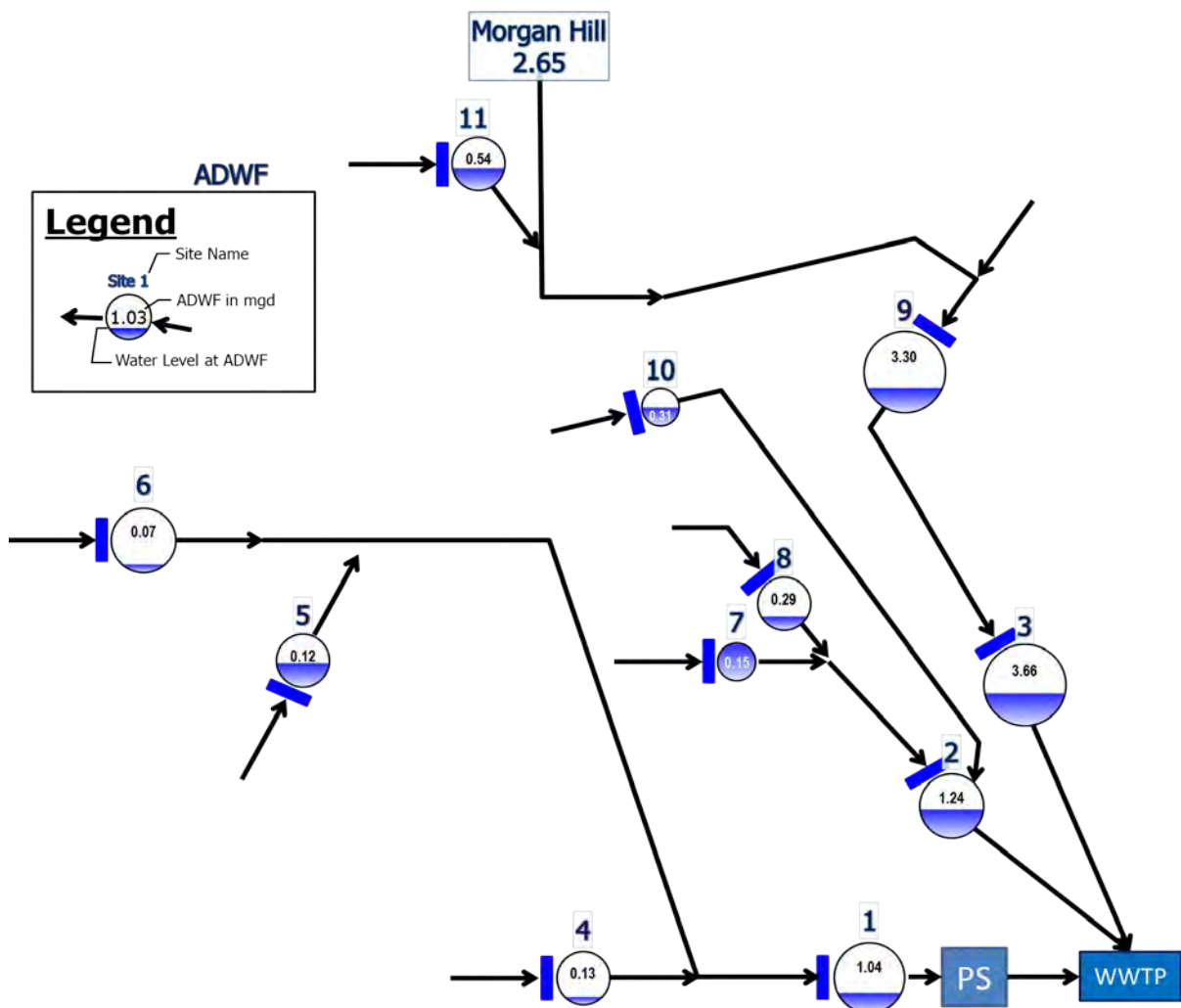


Figure 16. Average Dry Weather Flow (Flow Schematic)

Flow Monitoring: Peak Measured Flows and Pipeline Capacity Analysis

Peak measured flows and the corresponding flow levels (depths) are important to understand the capacity limitations of a collection system. The peak flows and flow levels reported are from the peak measurements as taken across the entirety of the flow monitoring period. Peak flows and levels may not correspond to a rainfall event, but instead may be caused due to blockages, grease or roots that cause a backflow condition.

Two key capacity analysis terms are defined as follows:

- ❖ **Peaking Factor:** Peaking factor is defined as the peak measured flow divided by the average dry weather flow (ADWF). A peaking factor threshold value of 3.0 is commonly used for sanitary sewer design.
- ❖ **d/D Ratio:** The d/D ratio is the peak measured depth of flow (d) divided by the pipe diameter (D). A d/D ratio of 0.75 is a common maximum threshold value used for pipe design. The d/D ratio for each site was computed based on the maximum depth of flow from the flow monitoring study.

Table 8 summarizes the peak recorded flows, levels, d/D ratios, and peaking factors per site during the flow monitoring period. Capacity analysis data is presented on a site-by-site basis and represents the hydraulic conditions only at the site locations; hydraulic conditions in other areas of the collection system will differ.

Table 8. Capacity Analysis Summary

Metering Site	ADWF (mgd)	Peak Measured Flow (mgd)	Peaking Factor	Diameter (in)	Peak Level (in)	Peak d/D Ratio	Level Surcharged above Crown (ft)
Site 1	1.04	2.82	2.70	27	12.80	0.47	-
Site 2	1.24	2.21	1.79	25	15.92	0.64	-
Site 3	3.66	6.69	1.83	33	18.22	0.55	-
Site 4	0.13	0.31	2.42	12	2.86	0.24	-
Site 5	0.12	0.41	3.43	10.5	7.10	0.68	-
Site 6	0.07	0.15	2.15	24	3.82	0.16	-
Site 7	0.15	0.26	1.78	10	13.27	1.33	0.3
Site 8	0.29	0.91	3.09	14	6.51	0.47	-
Site 9	3.30	6.49	1.96	33	14.51	0.44	-
Site 10	0.31	0.58	1.88	10.5	6.88	0.66	-
Site 11	0.54	1.11	2.07	17.75	11.39	0.64	-

The following capacity analysis results are noted:

- ❖ **Peaking Factor:** Sites 5 and 8 had peaking factors that exceeded typical design threshold limits for the ratio of peak flow to average dry weather flow.
- ❖ **d/D Ratio:** Site 7 had a d/D ratio that exceeded the common design threshold for d/D ratio. It should be noted that the peak level that was recorded was not a result of a rainfall event. It was also observed that several sites had recorded peak levels that were not related to rainfall events.

Figure 17 shows bar graphs of the capacity results. Figure 18 shows a schematic diagram of the peak measured flows with peak flow levels.

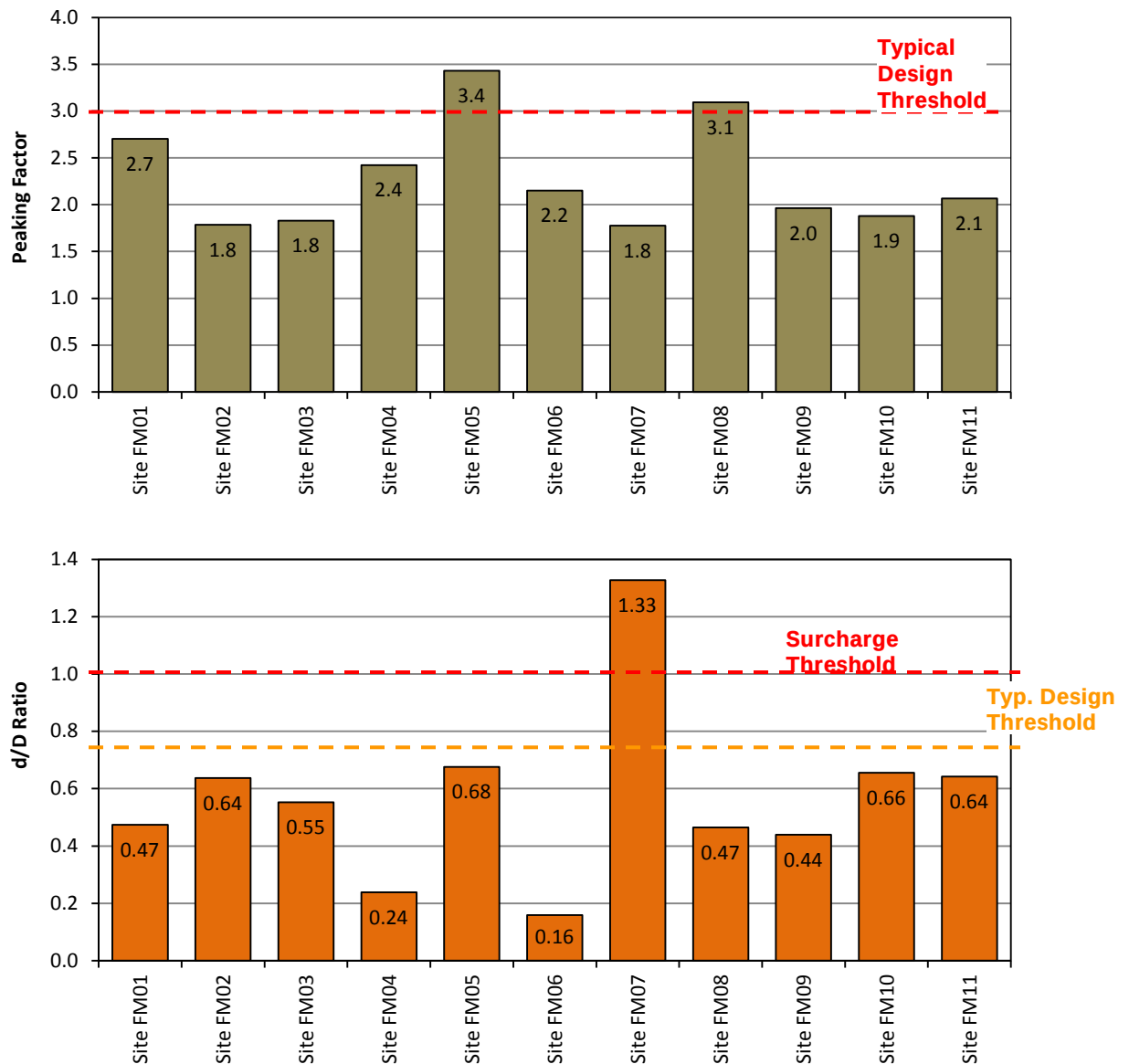
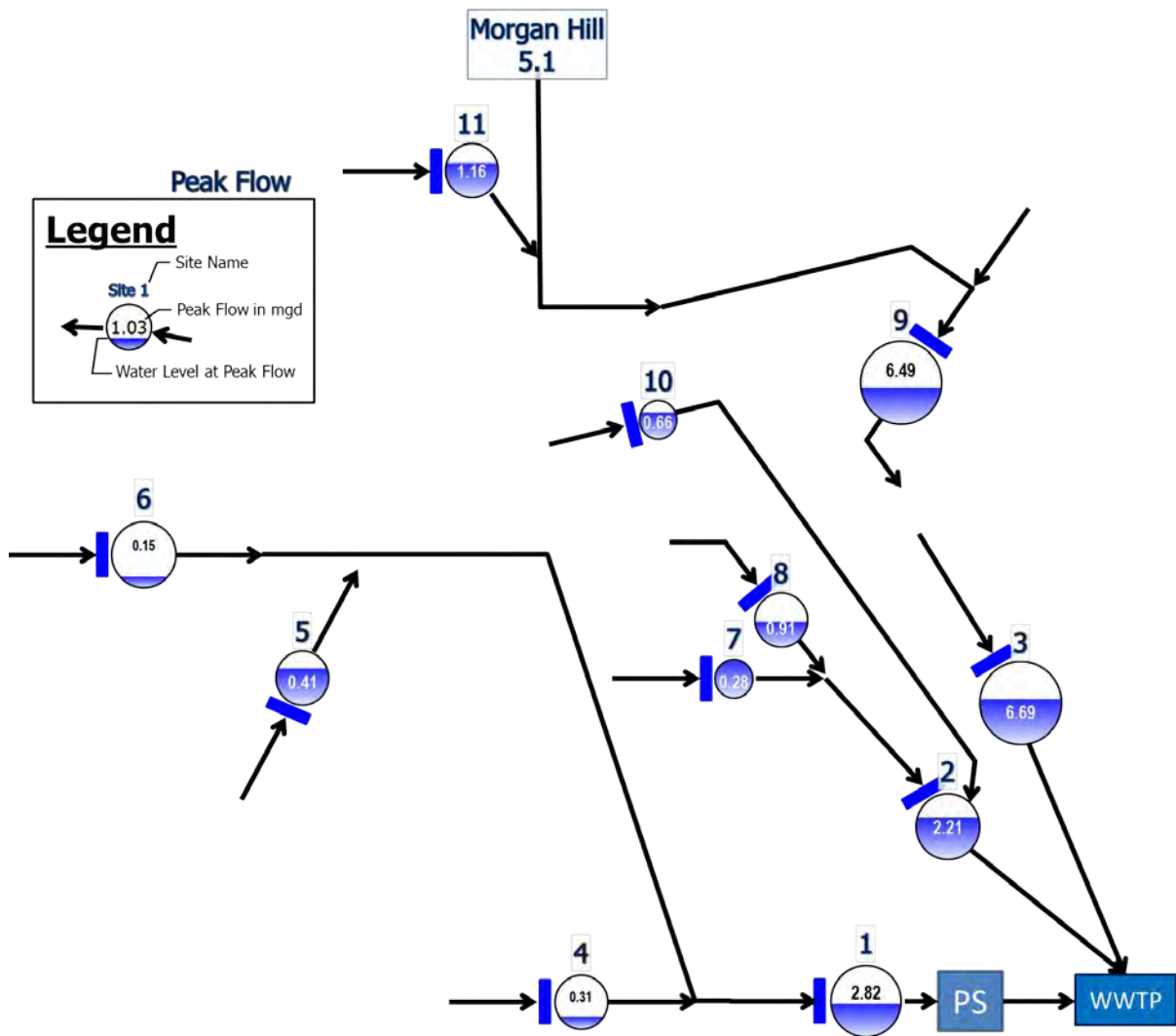


Figure 17. Capacity Summary Bar Graphs: Peaking Factors and Peak d/D Ratios



Inflow / Infiltration Analysis: Definitions and Identification

Inflow and infiltration (I/I) consists of storm water and groundwater that enter the sewer system through pipe defects and improper storm drainage connections and is defined as follows:

Inflow

- ❖ **Definition:** Storm water inflow is defined as water discharged into the sewer system, including private sewer laterals, from direct connections such as downspouts, yard and area drains, holes in manhole covers, cross-connections from storm drains, or catch basins.
- ❖ **Impact:** This component of I/I creates a peak flow problem in the sewer system and often dictates the required capacity of downstream pipes and transport facilities to carry these peak instantaneous flows. Because the response and magnitude of inflow is tied closely to the intensity of the storm event, the short-term peak instantaneous flows may result in surcharging and overflows within a collection system. Severe inflow may result in sewage dilution, resulting in upsetting the biological treatment (secondary treatment) at the treatment facility.
- ❖ **Cost of Source Identification and Removal:** Inflow locations are usually less difficult to find and less expensive to correct. These sources include direct and indirect cross-connections with storm drainage systems, roof downspouts, and various types of surface drains. Generally, the costs to identify and remove sources of inflow are low compared to potential benefits to public health and safety or the costs of building new facilities to convey and treat the resulting peak flows.
- ❖ **Graphical Identification:** Inflow is usually recognized graphically by large-magnitude, short-duration spikes in flow immediately following a rain event.

Infiltration

- ❖ **Definition:** Infiltration is defined as water entering the sanitary sewer system through defects in pipes, pipe joints, and manhole walls, which may include cracks, offset joints, root intrusion points, and broken pipes.
- ❖ **Impact:** Infiltration typically creates long-term annual volumetric problems. The major impact is the cost of pumping and treating the additional volume of water, and of paying for treatment (for municipalities that are billed strictly on flow volume).
- ❖ **Cost of Source Detection and Removal:** Infiltration sources are usually harder to find and more expensive to correct than inflow sources. Infiltration sources include defects in deteriorated sewer pipes or manholes that may be widespread throughout a sanitary sewer system.
- ❖ **Graphical Identification:** Infiltration is often recognized graphically by a gradual increase in flow after a wet-weather event. The increased flow typically sustains for a period after rainfall has stopped and then gradually drops off as soils become less saturated and as groundwater levels recede to normal levels.

Figure 19 shows sample graphs indicating the typical graphical response patterns for inflow and infiltration.

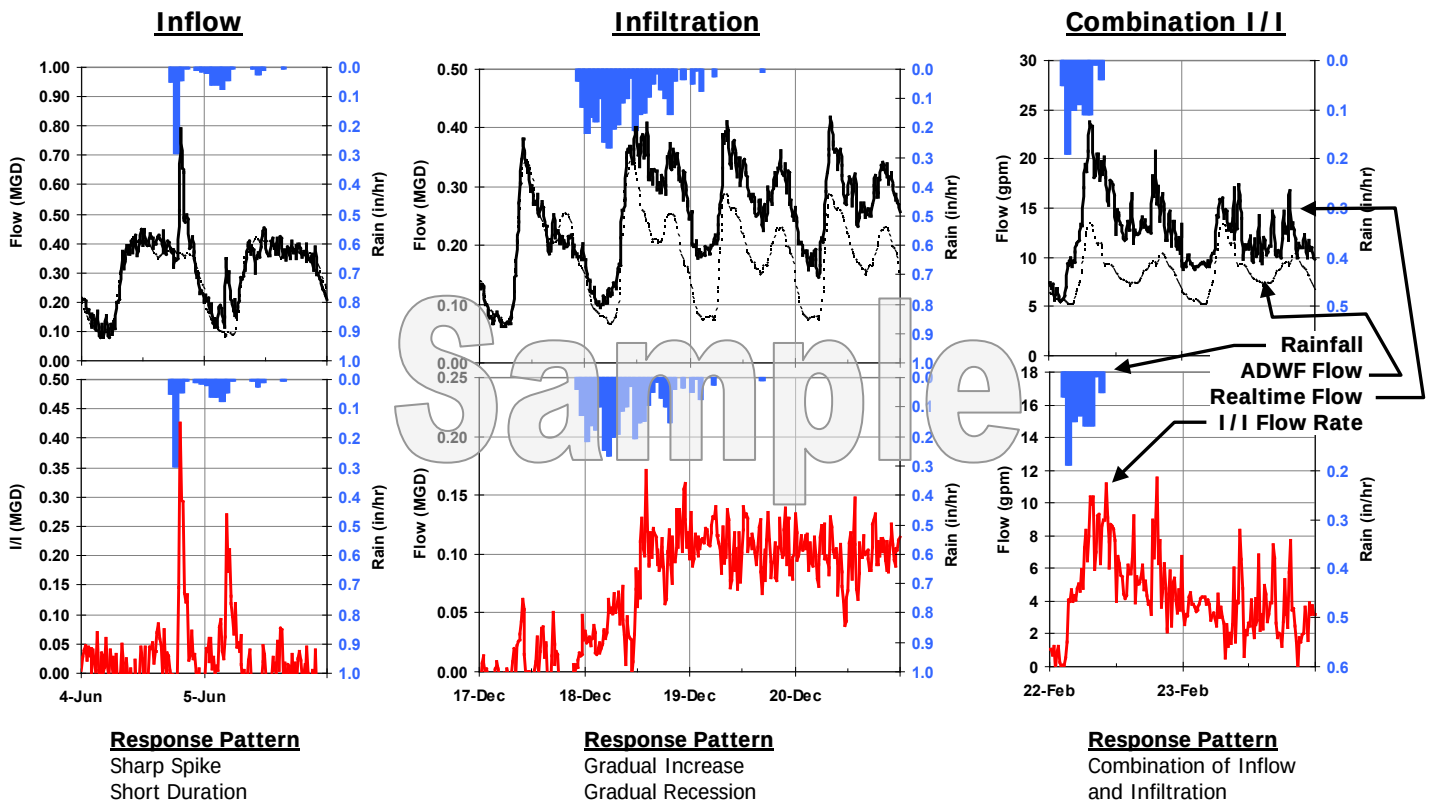


Figure 19. Inflow and Infiltration: Graphical Response Patterns

Infiltration Components

Infiltration can be further subdivided into components as follows:

- ❖ **Groundwater Infiltration:** Groundwater infiltration depends on the depth of the groundwater table above the pipelines as well as the percentage of the system submerged. The variation of groundwater levels and subsequent groundwater infiltration rates is seasonal by nature. On a day-to-day basis, groundwater infiltration rates are relatively steady and will not fluctuate greatly.
- ❖ **Rainfall-Dependent Infiltration:** This component occurs as a result of storm water and enters the sewer system through pipe defects, as with groundwater infiltration. The storm water first percolates directly into the soil and then migrates to an infiltration point. Typically, the time of concentration for rainfall-related infiltration may be 24 hours or longer, but this depends on the soil permeability and saturation levels.
- ❖ **Rainfall-Responsive Infiltration** is storm water which enters the collection system indirectly through pipe defects, but normally in sewers constructed close to the ground surface such as private laterals. Rainfall-responsive infiltration is independent of the groundwater table and reaches defective sewers via the pipe trench in which the sewer is constructed, particularly if the pipe is placed in impermeable soil and bedded and backfilled with a granular material. In this case, the pipe trench serves as a conduit similar to a French drain, conveying storm drainage to defective joints and other openings in the system. This type of infiltration can have a quick response and graphically can look very similar to inflow.

Figure 20 illustrates the possible sources and components of I/I.

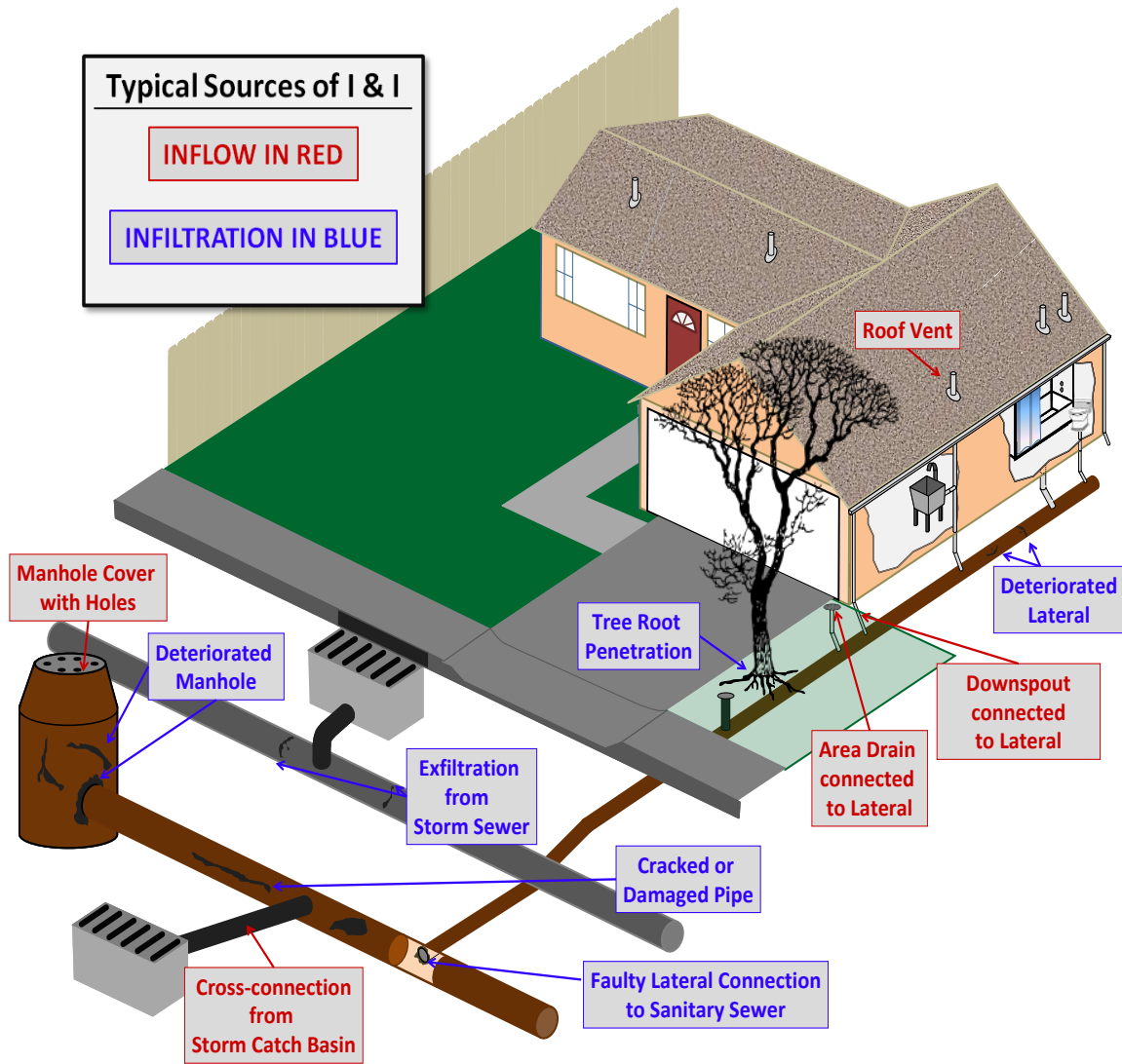


Figure 20. Typical Sources of Infiltration and Inflow

Inflow / Infiltration: Analysis Methods

After differentiating I/I flows from ADWF flows, various calculations can be made to determine which I/I component (inflow or infiltration) is more prevalent at a particular site and to compare the relative magnitudes of the I/I components between drainage basins and between storm events, as follows:

Inflow Indicators

Peak I/I Flow Rate: Inflow is characterized by sharp, direct spikes occurring during a rainfall event. Peak I/I rates are used for inflow analysis⁷. After determining the peak I/I flow rate for a given site, and for a given storm event, there are three ways to *normalize* the peak I/I rates for an “apples-to-apples” comparison amongst the different drainage basins:

- ❖ **Peak I/I Flow Rate per IDM:** Peak measured I/I rate divided by length of pipe within the drainage basin, expressed in units of inch-diameter-mile (IDM, miles of pipeline multiplied by the diameter of the pipeline in inches). Final units are gallons per day (gpd) per IDM.
- ❖ **Peak I/I Flow Rate per Acre:** Peak measured I/I rate divided by the geographic area of the upstream basin in acres. Units are gpd per acre.
- ❖ **Peak I/I Flow Rate to ADWF Ratio:** Peak measured I/I rate divided by average dry weather flow (ADWF). This is a ratio and is expressed without units.

Infiltration Indicators

Dry Weather Groundwater Infiltration: GWI analysis is conducted by looking at minimum dry weather flow to average dry weather flow ratios and comparing them to established standards to quantify the rate of excess groundwater infiltration. As with inflow, GWI infiltration rates can be normalized by means of pipe length (IDM), basin area (acres), and dry weather flow rates (ADWF). These methods are discussed in further detail in the *Groundwater Analysis* section later in this report.

Rainfall-Dependent Infiltration: Infiltration occurring after the conclusion of a storm event is classified as rainfall-dependent infiltration. Analysis is conducted by looking at the infiltration rates at set periods after the conclusion of a storm event. Depending on the particular collection system and the time required for flows to return to ADWF levels, different set periods may be examined to determine the basins with the greatest or most sustained rainfall-dependent infiltration rates.

Combined I/I Indicators

Total Infiltration: The total inflow and infiltration is measured in gallons per site and per storm event. Because it is based on total I/I volume, it is an indicator of combined inflow and infiltration and is used to identify the overall volumetric influence of I/I within the monitoring basin. As with inflow, pipe length, basin area, and dry weather flow are used to normalize combined I/I for basin comparison:

- ❖ **Combined I/I Flow Rate per IDM:** Total infiltration (gallons) divided by length of pipe (IDM) and divided by storm event rainfall (inches of rain). Final units are gallons per day (gpd) per IDM per inch of rain.

⁷ I/I flow rate is the realtime flow less the estimated average dry weather flow rate. It is an estimate of flows attributable to rainfall. By using peak measured flow rates (inclusive of ADWF), the I/I flow rate would be skewed higher or lower depending on whether the storm event I/I response occurs during low-flow or high-flow hours.

- ❖ **R-Value:** Total infiltration (gallons) divided by the total rainfall that fell within the acreage of that basin (gallons of rainfall). This is expressed as a percentage and is explained as “the percentage of rain that enters the sanitary sewer collection system.” Systems with R-values less than 5%⁸ are often considered to be performing well.
- ❖ **Combined I/I Flow Rate per ADWF:** Total infiltration (gallons) divided by the ADWF (gpd) and divided by storm event rainfall (inches of rain). Final units are million gallons per mgd of ADWF per inch of rain.

Instantaneous flows were plotted against ADWF flows to analyze the I/I response to rainfall events. Figure 21 illustrates a sample of how this analysis is conducted and some of the measurements that are used to distinguish infiltration and inflow. Similar graphs were generated for the individual flow monitoring sites and can be found in *Appendix A*.

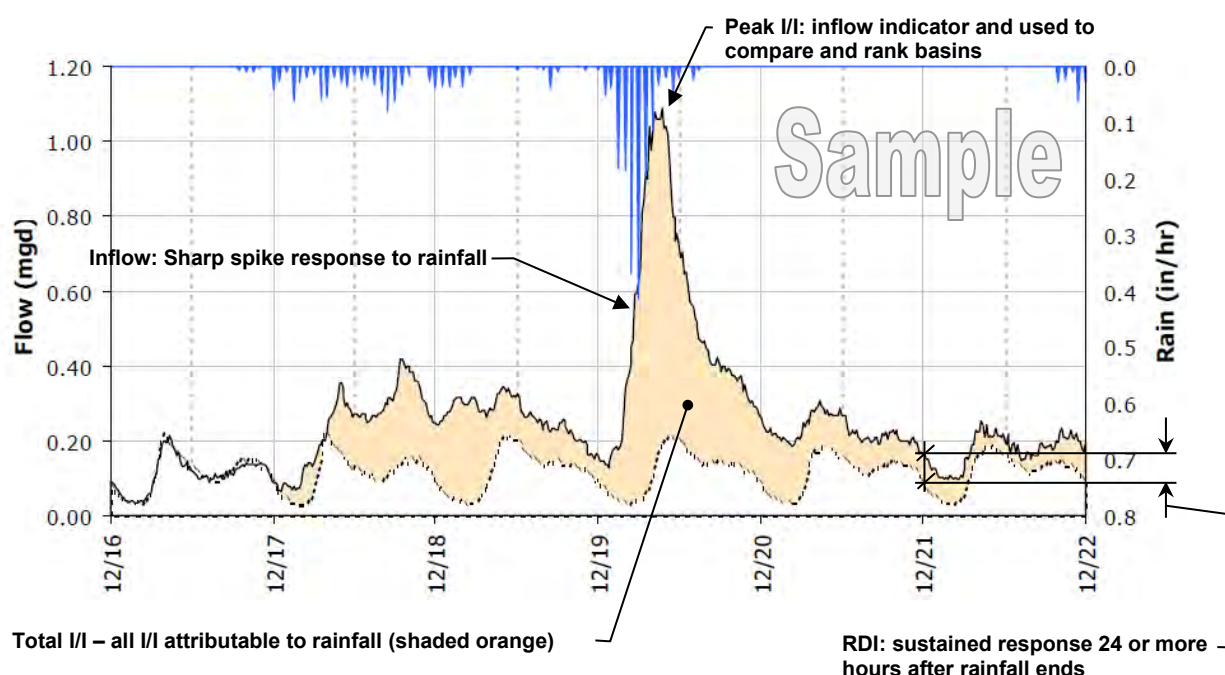


Figure 21. Sample Infiltration and Inflow Isolation Graph

The infiltration and inflow indicators were normalized by basin area and by ADWF in this report. Final rankings were determined by weighting the normalization methods by 51% for ADWF, and 49% for basin area, with ties broken by ADWF. The per-ADWF method is given the tie-break because it is normalized by actual sanitary waste usage. The per-acre method was given the lower weighting because the catchment area per each flow monitoring basin is estimated but requires a thorough hydrologic study to determine the true watershed.

⁸ Keefe, P.N. “Test Basins for I/I Reduction and SSO Elimination.” 1998 WEF Wet Weather Specialty Conference, Cleveland.

Inflow / Infiltration: Results

Inflow Results Summary

Table 9 summarizes the peak measured I/I flows and inflow analysis results for Storm Event 1, which elicited the highest peak I/I response (refer to the *I/I Methods* section for more information on inflow analysis methods and ranking procedures). Basins that ranked 1, 2 or 3 in a category are color coded red.

Table 9. Basin Inflow Analysis Summary

Metering Basin	ADWF (mgd)	Peak I/I Rate (mgd)	Peak I/I per Acre (gpd/acre)	Peak I/I per ADWF	Overall Inflow Ranking ^A
Basin 1	0.72	1.98	1,195 (3) ^B	2.74 (2)	2
Basin 2	0.49	0.35	453 (5)	0.71 (9)	8
Basin 3	0.36	0.00	0 (10)	0.00 (10)	10
Basin 4	0.13	0.14	410 (6)	1.11 (7)	6
Basin 5	0.12	0.22	248 (8)	1.84 (3)	5
Basin 6	0.07	0.10	130 (9)	1.34 (5)	7
Basin 7	0.15	0.20	1,488 (1)	1.38 (4)	3
Basin 8	0.29	0.84	1,483 (2)	2.85 (1)	1
Basin 9 ⁹	0.12	n/a	n/a	n/a	n/a
Basin 10	0.31	0.40	870 (4)	1.28 (6)	4
Basin 11	0.54	0.39	386 (7)	0.73 (8)	9

^A Ranking of 1 represents most inflow after normalization.

^B The number in parenthesis shows the ranking within the individual Category.

The following inflow analysis results are noted:

- ❖ Basins 1, 7 and 8 ranked highest for normalized inflow contribution.

Figure 22 shows bar graph summaries of the inflow analysis. Figure 23 shows a temperature map summary of the inflow analysis results per basin.

⁹ Basin 9 was excluded from this analysis. The size of Basin 9 is very small compared to the size of the other basins that are measured through Site 9, most notably the entirety of the City of Morgan Hill collection system. Due to attenuation and dilution occurring, a true peak I/I rate specific for Basin 9 cannot be calculated with any degree of confidence.

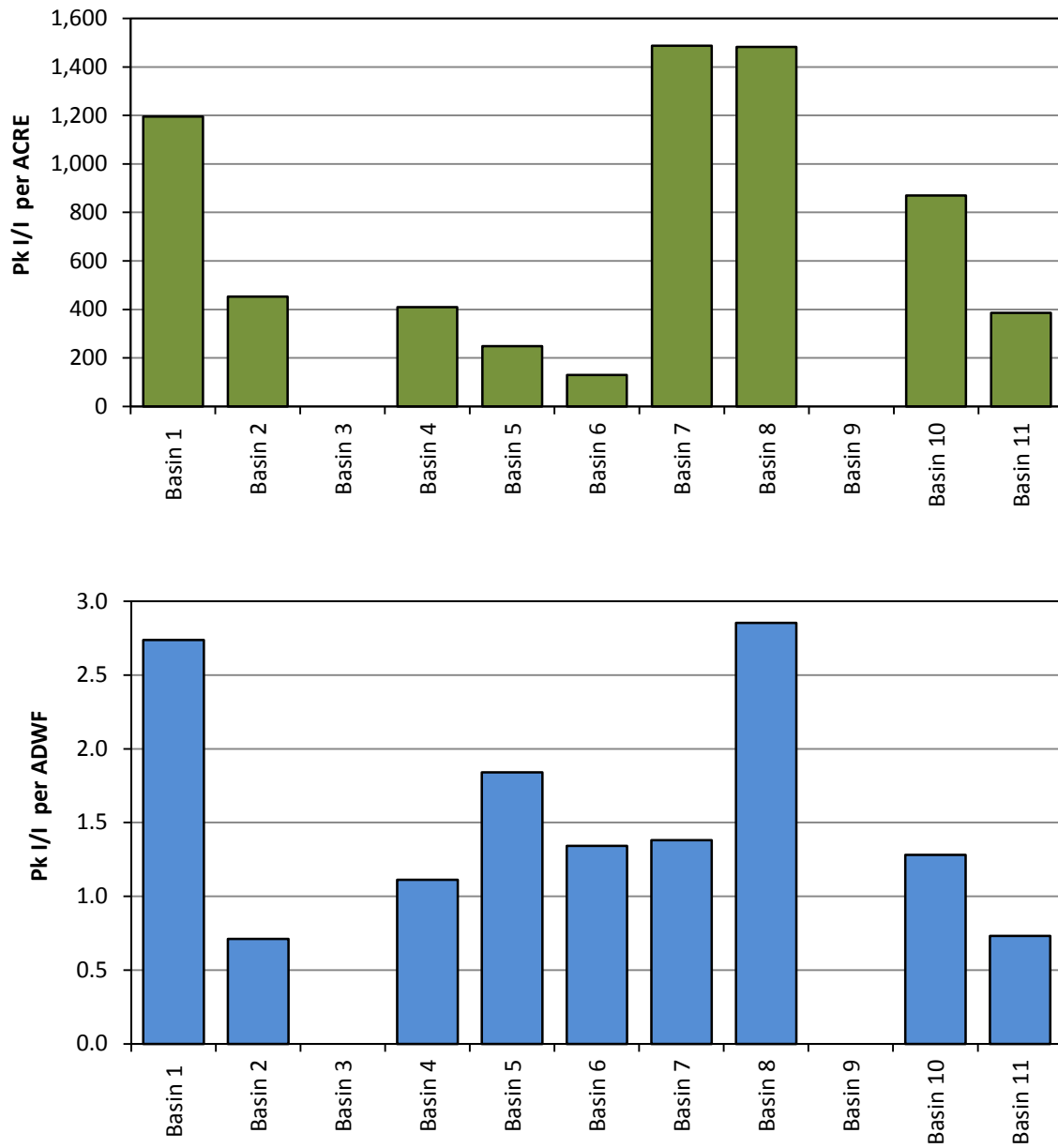


Figure 22. Bar Graphs: Inflow Analysis Summary

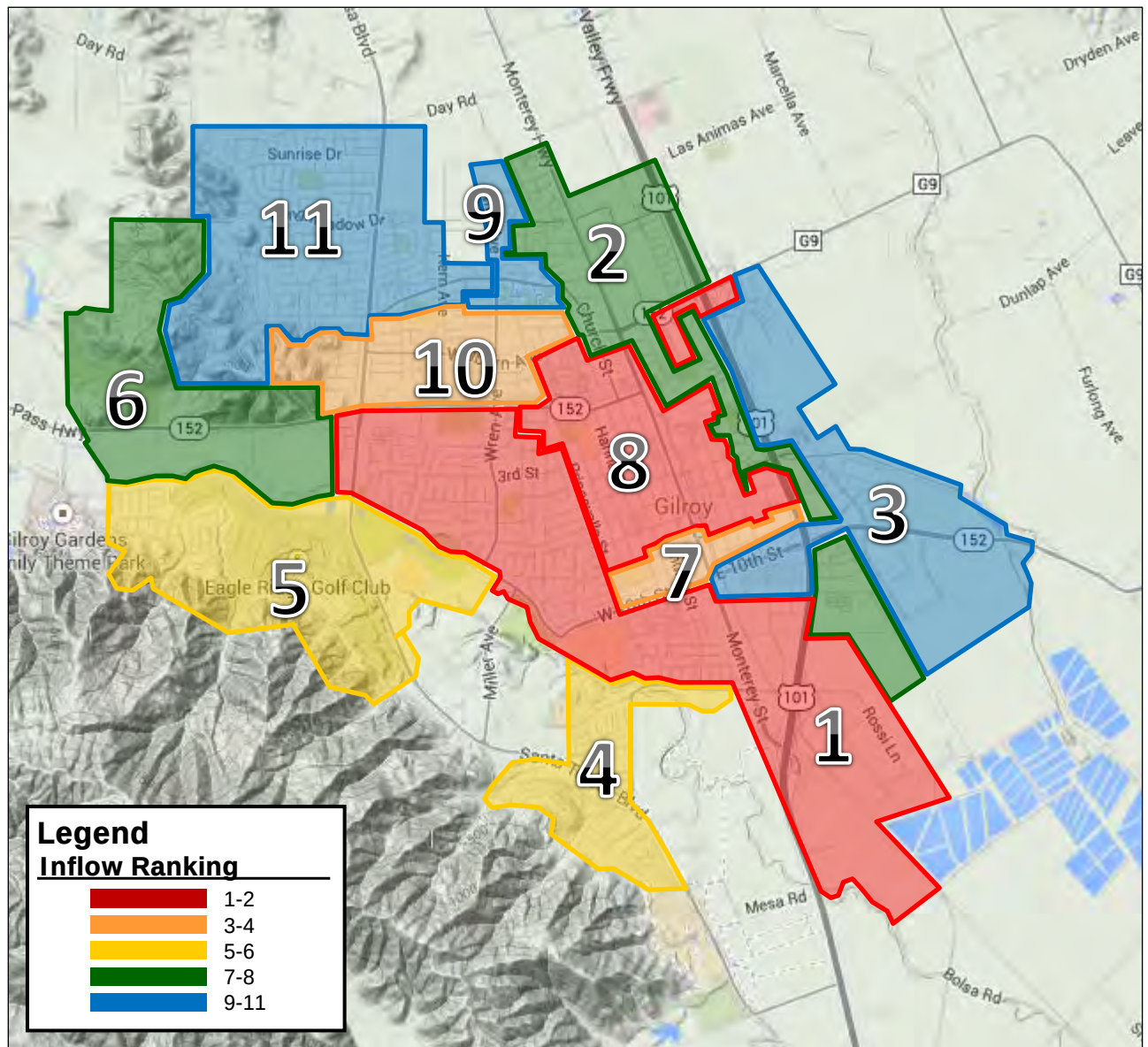


Figure 23. Inflow Temperature Map (by Rank)

Rainfall-Dependent Infiltration Results Summary

Table 10 summarizes the calculated average RDI flow rate during the low-flow hours immediately following the rainfall event (refer to the *III Methods* section for more information on RDI analysis methods and ranking methods). Basins that ranked 1, 2 or 3 in a category are color coded red.

Table 10. Basin RDI Analysis Summary

Metering Basin	ADWF (mgd)	RDI Rate (mgd)	RDI per Acre (GPAD)	RDI per ADWF	RDI Ranking ^A
Basin 1	0.72	0.048	29 (8) ^B	7% (8)	8
Basin 2	0.49	0.000	0 (T10)	0% (T10)	T10
Basin 3	0.36	0.181	222 (1)	51% (1)	1
Basin 4	0.13	0.028	82 (3)	22% (4)	3
Basin 5	0.12	0.045	50 (6)	37% (2)	4
Basin 6	0.07	0.011	15 (9)	16% (5)	7
Basin 7	0.15	0.000	0 (T10)	0% (T10)	T10
Basin 8	0.29	0.096	169 (2)	33% (3)	2
Basin 9	0.12	0.014	79 (4)	12% (6)	5
Basin 10	0.31	0.019	42 (7)	6% (9)	9
Basin 11	0.54	0.064	63 (5)	12% (7)	6

^A Ranking of 1 represents most RDI after normalization.

^B The number in parenthesis shows the ranking within the individual Category.

The following RDI analysis results are noted:

- ❖ Basins 3, 4 and 8 ranked highest for normalized RDI contribution.

Figure 24 shows bar graph summaries of the RDI analysis. A temperature map by overall ranking is shown in Figure 25.

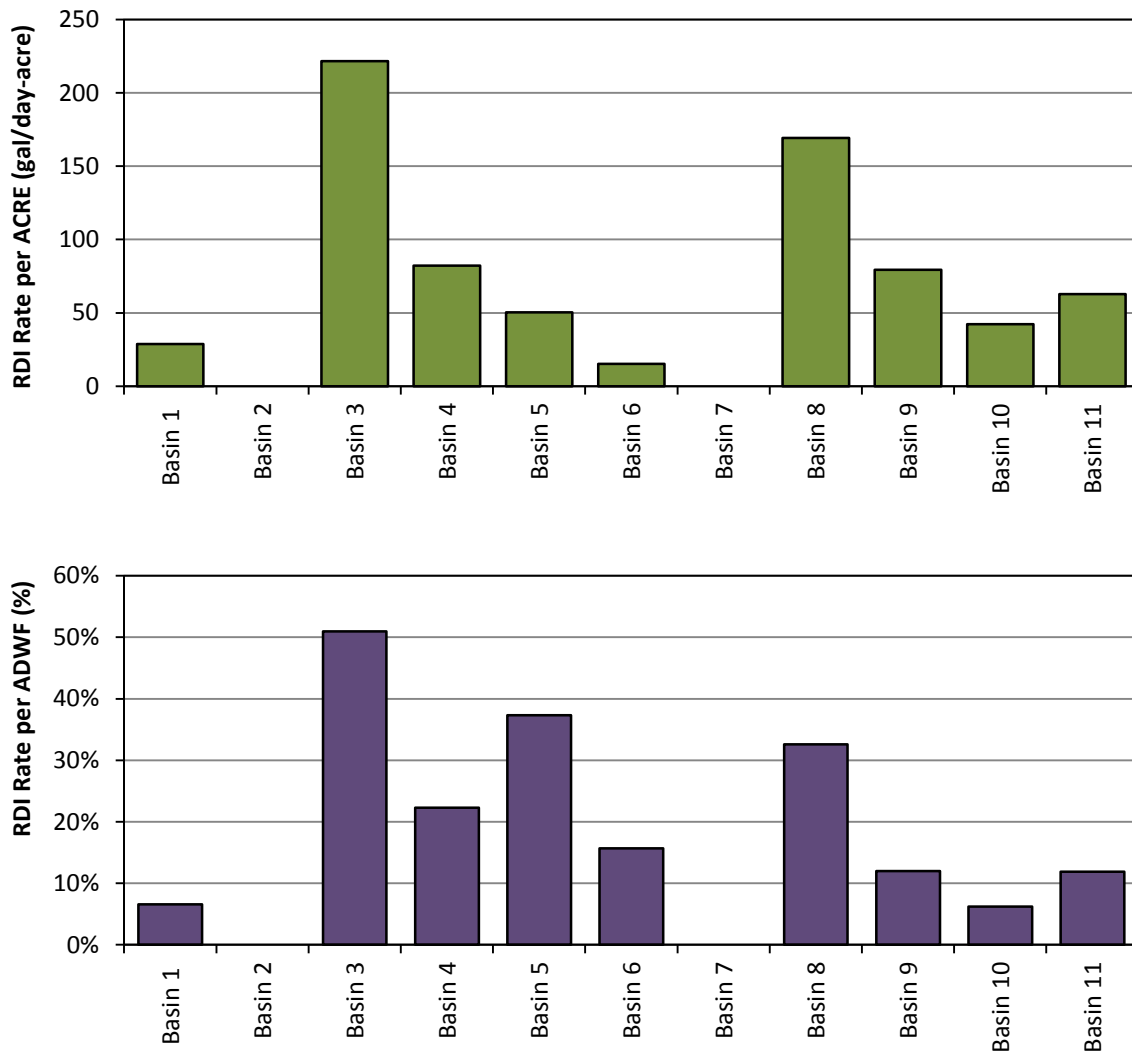


Figure 24. Bar Graphs: RDI Analysis Summary

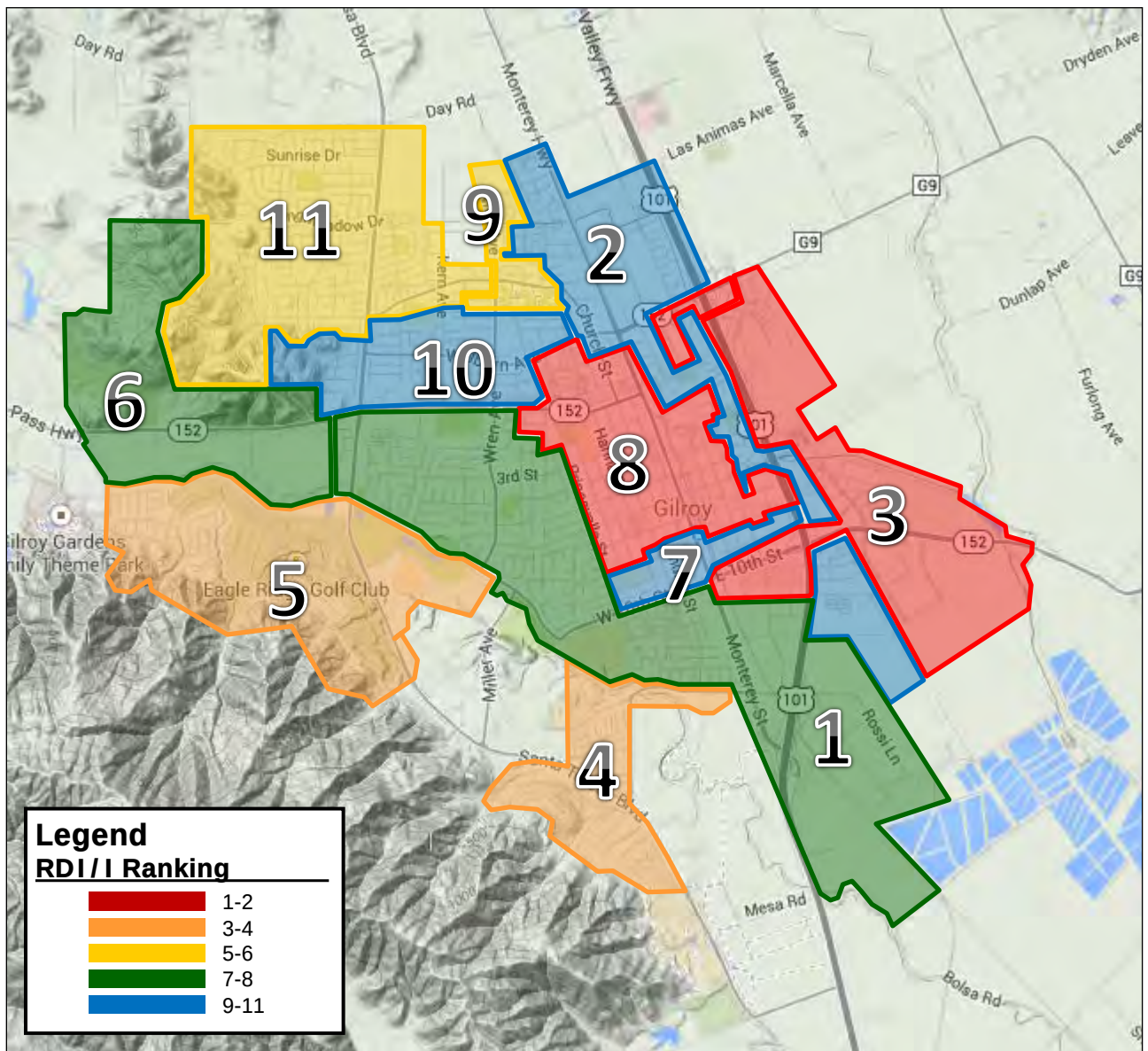


Figure 25. RDI Temperature Map (by Rank)

Groundwater Infiltration Results Summary

Dry weather (ADWF) flow can be expected to have a predictable diurnal flow pattern. While each site is unique, experience has shown that, given a reasonable volume of flow and typical loading conditions, the daily flows fall into a predictable range when compared to the daily average flow. If a site has a large percentage of groundwater infiltration occurring during the periods of dry weather flow measurement, the amplitudes of the peak and low flows will be dampened¹⁰. Figure 26 shows a sample of two flow monitoring sites, both with nearly the same average daily flow, but with considerably different peak and low flows. In this *sample* case, Site B1 may have a considerable volume of groundwater infiltration.

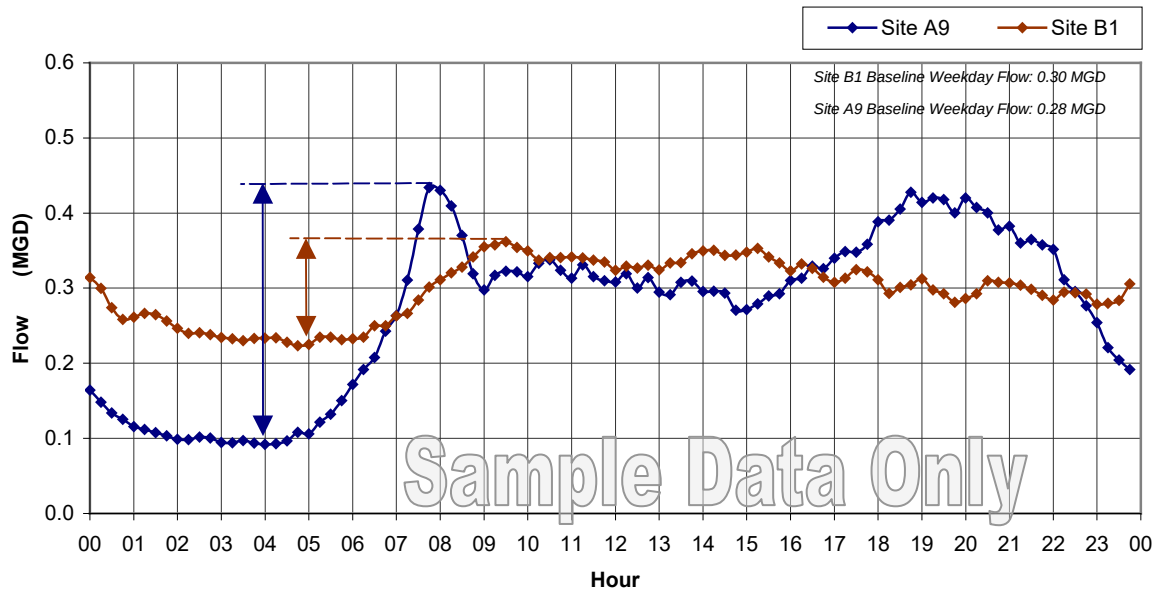


Figure 26. Groundwater Infiltration Sample Figure

It can be useful to compare the low-to-ADWF flow ratios for the flow metering sites. A site with abnormal ratios, and with no other reasons to suspect abnormal flow patterns (such as proximity to a pump station, treatment facilities, etc.), has a possibility of higher levels of groundwater infiltration in comparison to the rest of the collection system. Figure 27 plots the low-to-ADWF flow ratios against the ADWF flows for the sites monitored during this study. The dotted line shows “typical” low-to-ADWF ratios per the Water Environment Federation (WEF)¹¹. The following GWI results are noted:

- ❖ Basins 4, 5 and 6 had GWI rates that were **above** the WEF typical low-to-average ratio, indicating excessive groundwater infiltration.

Figure 28 shows a color-coded map of the basins with rates of groundwater infiltration considerably above typical groundwater infiltration standards (as set forth by WEF).

¹⁰ In an extreme case, perhaps 0.2 mgd of ADWF flow and 2.0 mgd of groundwater infiltration, the peaks and lows would be barely recognizable; the ADWF flow would be nearly a straight line.

¹¹ WEF Manual of Practice No. 9, “Design and Construction of Sanitary and Storm Sewers.”

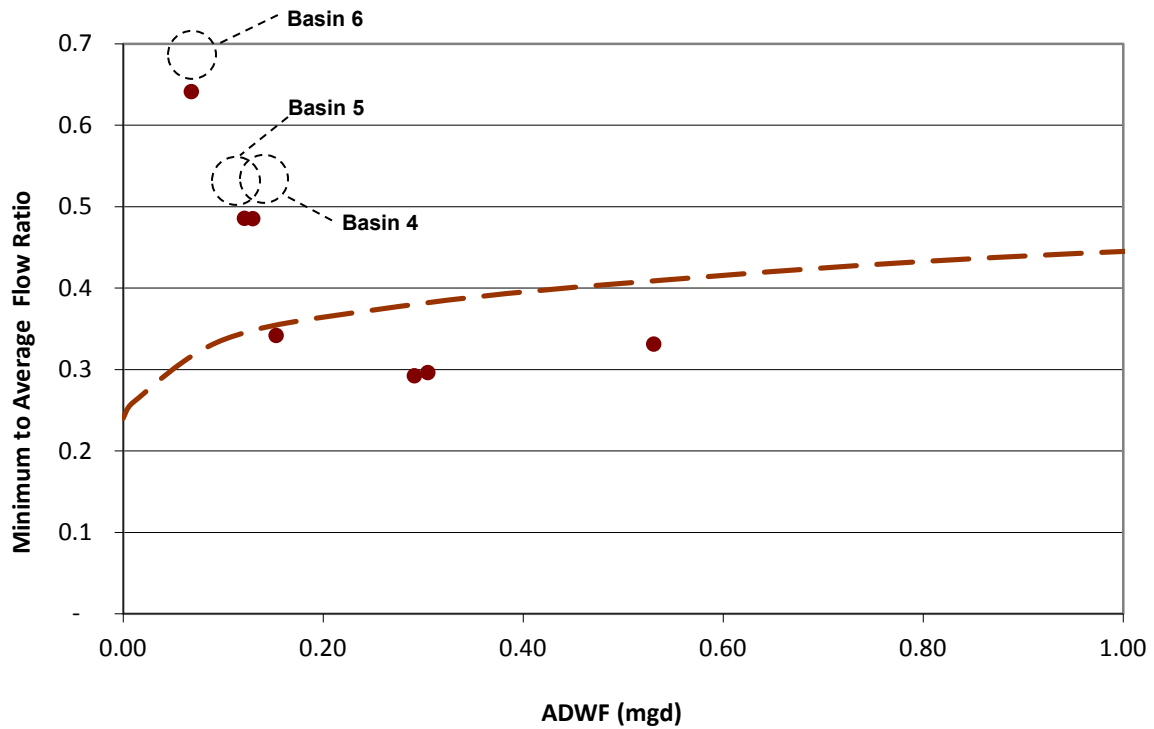


Figure 27. Minimum Flow Ratios vs. ADWF¹²

¹² Due to attenuation, it should be expected that sites with larger flow volumes should not have quite the peak-to-average and low-to-average flow ratios as sites with lesser flow volumes, which is why the WEF typical trend lines slope closer to 1.0 as the ADWF increases, as shown in the figure.

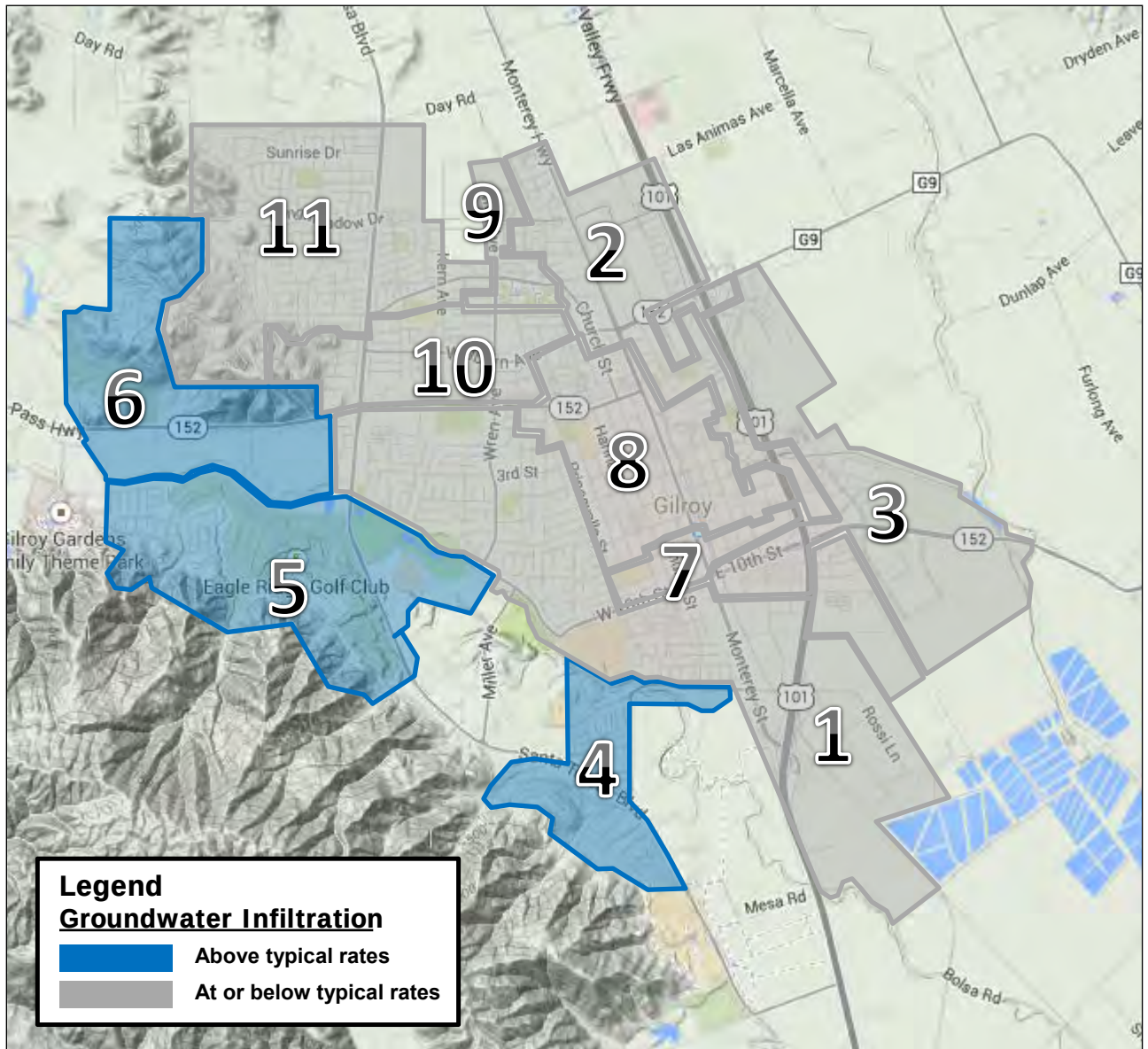


Figure 28. Basins with Groundwater Infiltration

Combined I/I Results Summary

Combined I/I analysis considers the totalized volume (in gallons) of both inflow and rainfall-dependent infiltration over the course of the storm event. Table 11 summarizes the combined I/I results (refer to the *I/I Methods* section for more information on combined I/I analysis methods and ranking methods). Basins that ranked 1, 2 or 3 in a category are color coded red.

Table 11. Basin Combined I/I Analysis Summary

Metering Basin	ADWF (mgd)	Combined I/I (gallons)	R-Value (%)	Combined I/I per ADWF	Combined I/I Ranking ^A
Basin 1	0.72	334,600	0.32% (6) ^B	0.202 (6)	6
Basin 2	0.49	153,000	0.33% (5)	0.140 (8)	7
Basin 3	0.36	483,500	1.01% (1)	0.633 (1)	1
Basin 4	0.13	71,000	0.33% (4)	0.246 (5)	4
Basin 5	0.12	135,200	0.25% (7)	0.496 (2)	3
Basin 6	0.07	41,700	0.09% (11)	0.267 (3)	8
Basin 7	0.15	19,800	0.23% (8)	0.059 (11)	10
Basin 8	0.29	166,700	0.48% (2)	0.252 (4)	2
Basin 9	0.12	38,400	0.36% (3)	0.146 (7)	5
Basin 10	0.31	40,700	0.15% (10)	0.060 (10)	11
Basin 11	0.54	132,700	0.22% (9)	0.116 (9)	9

^A Ranking of 1 represents most combined I/I after normalization.

^B The number in parenthesis shows the ranking within the individual Category

The following combined I/I analysis results are noted:

- ❖ Basins 3, 5 and 8 ranked highest for normalized combined I/I contribution.

Figure 29 shows bar graph summaries of the combined I/I analysis. A temperature map by overall ranking is shown in Figure 30.

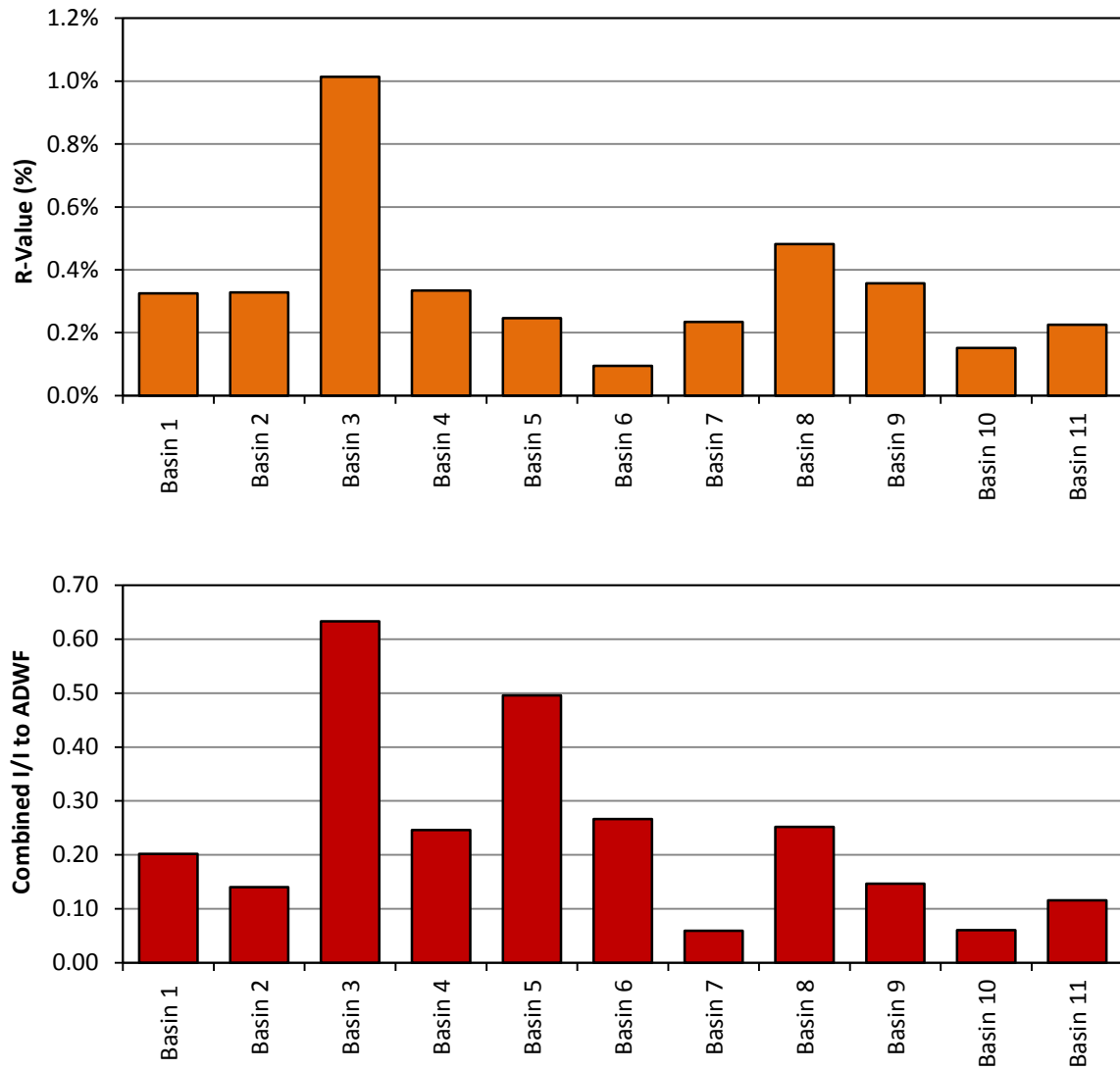


Figure 29. Bar Graphs: Combined I/I Analysis Summary

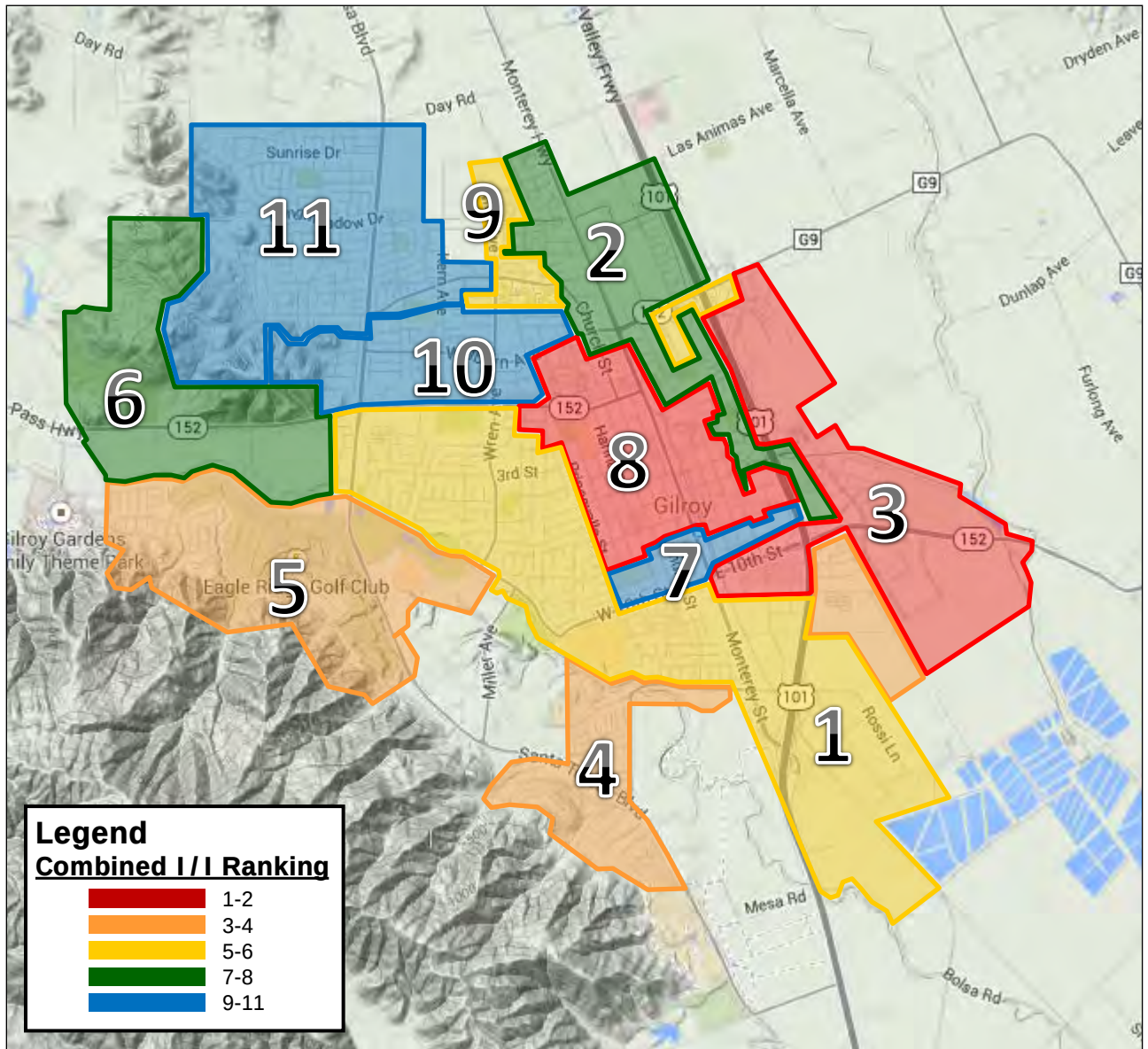


Figure 30. Combined I/I Temperature Map (by Rank)

Inflow / Infiltration: Synthetic Hydrographs

In order to model design storms, synthetic hydrographs were developed to approximate the actual RDI hydrograph shape in terms of the time to the peak and the recession coefficient. The actual RDI hydrograph was best matched with a synthetic hydrograph by separating the synthetic hydrograph into seven volume components (R1 through R7). The seven components represent different response times to the rainfall event and, therefore, different infiltration or inflow paths into the sewer system. R1 is characterized by a short response time and is assumed to consist of mainly inflow. R7 represents slower response and longer recession times and consists of mostly infiltration. Levels of soil saturation are also considered. Using synthetic hydrograph analysis, appropriate time and recession parameters were estimated by a trial-and-error procedure until a good match was obtained. For example, the hydrograph and its component hydrographs for Storm Event 1, for Site 3 is shown in Figure 31.

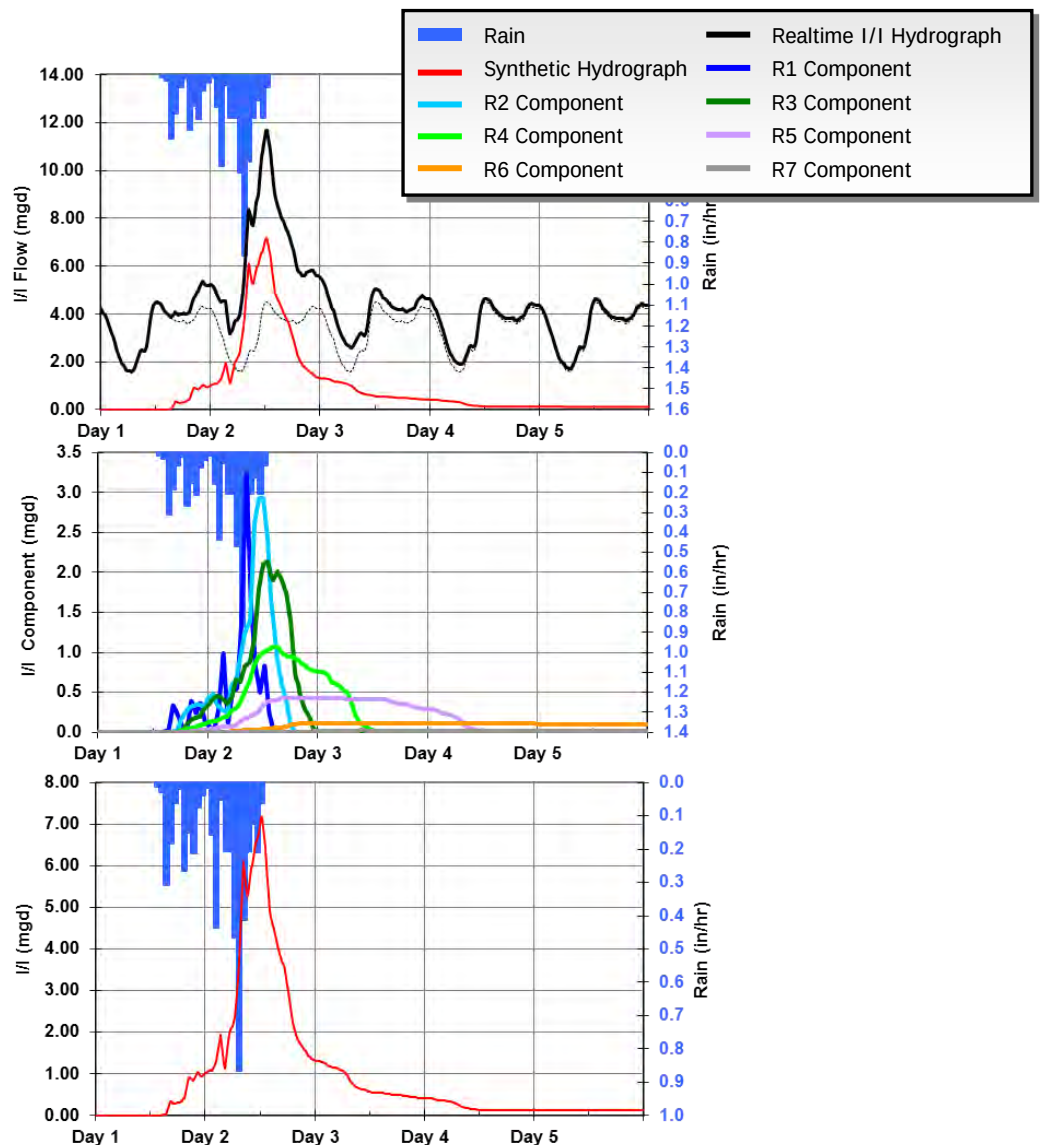


Figure 31. Site 3, Storm Event 1: Synthetic Hydrograph

Design Storm Development

With the I/I response modeled by a synthetic hydrograph, design storms can be applied. This serves two functions: (a) predicted flows are based on the same storm event and are therefore normalized to each other, making for easier and better comparisons, and (b) the resulting I/I flows can be predicted for a design storm event. This helps to calibrate modeling efforts that will determine if the collection system has adequate capacity to handle very large storm events.

V&A used a 10-year, 24-hour design storm for this analysis. Storm events were taken from the NOAA Precipitation-Frequency Atlas of the Western United States. Figure 32 summarizes the design storm magnitude and profile. This particular profile distribution also fits the NOAA criterion for 2-hour and 6-hour durations, in addition to the 24-hour duration.

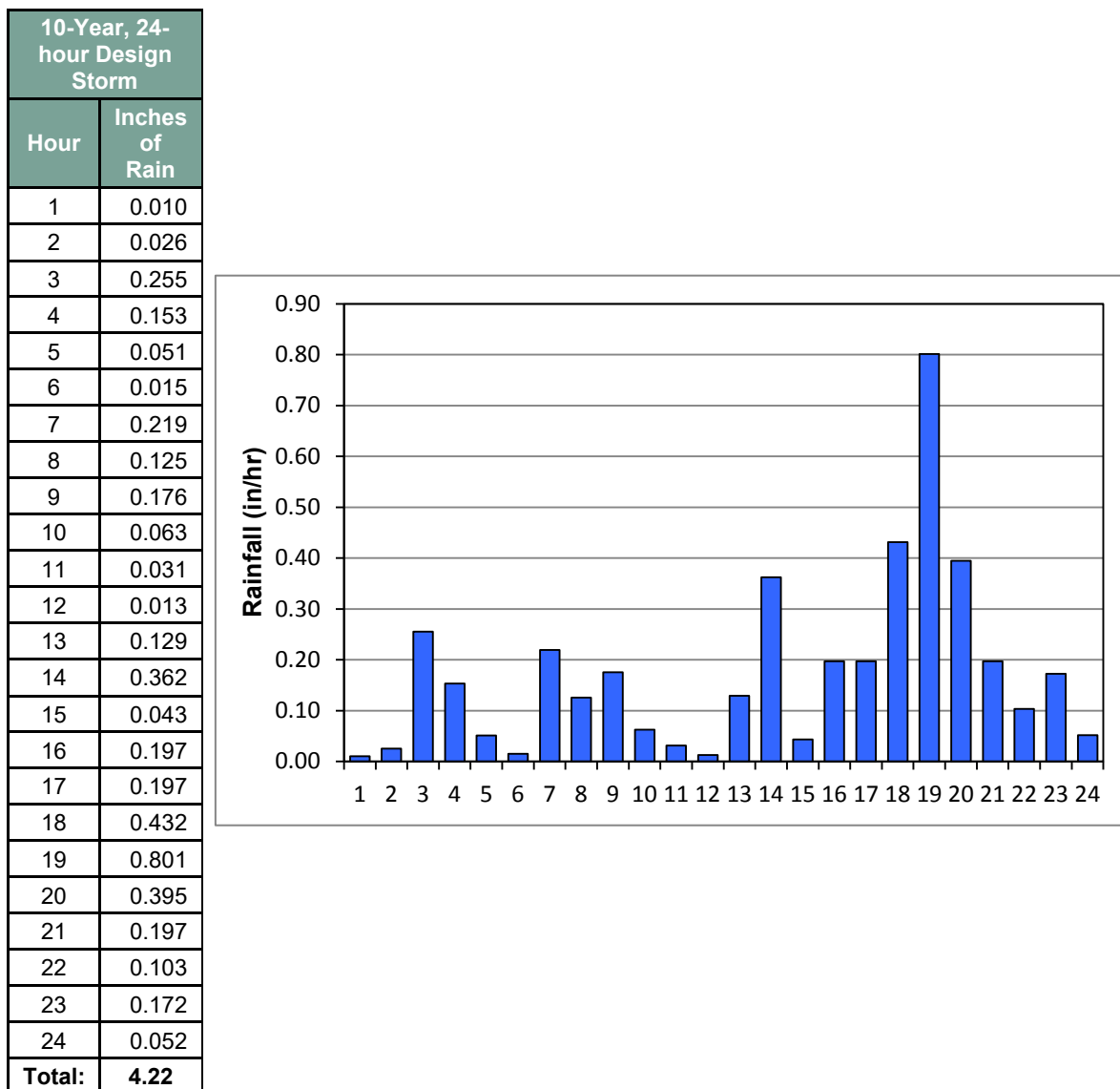


Figure 32. 10-Year, 24-Hour Design Storm Values and Profile

Design Storm Response Summary

The 10-year, 24-hour storm event was applied to the synthetic I/I hydrograph components developed for each flow monitoring site. This method produces the best estimated response to the design storm events. These results assume full ground saturation and that the peak I/I flows from the design storm coincide with peak sanitary flows to produce a “worst-case” scenario of peak wet weather flows. Table 12 summarizes the final results for the design storm on a site-by-site basis.

Table 12. Design Storm I/I Analysis Summary

Metering Site	Predicted Peak Dry Weather Flow (mgd)	Predicted Peak I/I Rate (mgd)	Predicted Peak Flow (mgd)	Predicted Total I/I (gallons)
Site 1	1.50	6.74	8.24	2,251,000
Site 2	1.77	4.01	5.77	1,514,000
Site 3	4.50	7.16	11.67	4,598,000
Site 4	0.21	0.42	0.63	145,000
Site 5	0.21	0.71	0.92	467,000
Site 6	0.11	0.23	0.33	104,000
Site 7	0.23	0.45	0.67	91,000
Site 8	0.53	1.69	2.22	358,000
Site 9	4.31	7.98	12.29	4,080,000
Site 10	0.53	0.70	1.24	153,000
Site 11	0.93	0.78	1.72	290,000

RECOMMENDATIONS

V&A advises that future I/I reduction plans consider the following recommendations:

4. **Determine I/I Reduction Program:** The City should examine its I/I reduction needs to determine a future I/I reduction program.
 - a. If peak flows, sanitary sewer overflows, and pipeline capacity issues are of greater concern, then priority can be given to investigate and reduce sources of inflow within the basins with the greatest inflow problems. The highest inflow occurred in Basins 1, 7 and 8.
 - b. If total infiltration and general pipeline deterioration are of greater concern, then the program can be weighted to investigate and reduce sources of infiltration within the basins with the greatest infiltration problems.
 - i. The highest normalized rainfall-dependent infiltration occurred in Basins 3, 4 and 8.
 - ii. The highest groundwater infiltration occurred in Basins 4, 5 and 6.
5. **I/I Investigation Methods:** Potential I/I investigation methods include the following:
 - a. Smoke testing.
 - b. Mini-basin flow monitoring.
 - c. Nighttime reconnaissance work to (1) investigate and determine direct point sources of inflow and (2) determine the areas and pipe reaches responsible for high levels of infiltration contribution.
6. **I/I Reduction Cost-Effectiveness Analysis:** The City should conduct a study to determine which is more cost-effective: (1) locating the sources of inflow and infiltration and systematically rehabilitating or replacing the faulty pipelines or (2) continued treatment of the additional rainfall-dependent I/I flow.

APPENDIX A

FLOW MONITORING SITES: DATA, GRAPHS, INFORMATION



City of Gilroy

Sanitary Sewer Flow Monitoring

Temporary Monitoring: February and March, 2014

Monitoring Site: Site 1

Location: Inside WWTP property 100' west of Influent Pump Station

Data Summary Report



Vicinity Map: Site 1



SITE 1

Site Information

Location: Inside WWTP property 100' west of Influent Pump Station

Coordinates: 121.5425° W, 36.9860° N

Rim Elevation: 175 feet

Pipe Diameter: 27 inches

Baseline Flow: 1.042 mgd

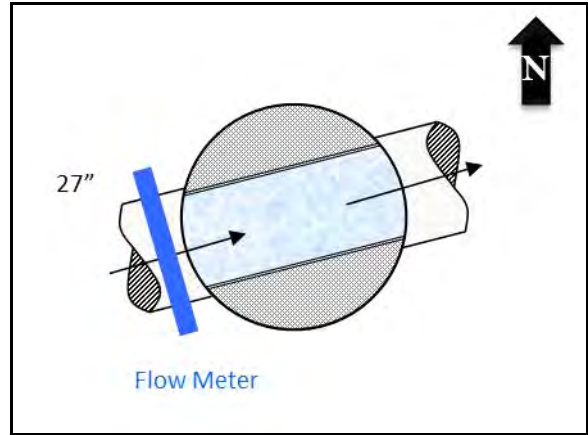
Peak Measured Flow: 2.816 mgd



Satellite Map



Sewer Map



Flow Sketch



Street View



Plan View



SITE 1

Additional Site Photos

Effluent Pipe



Influent Pipe



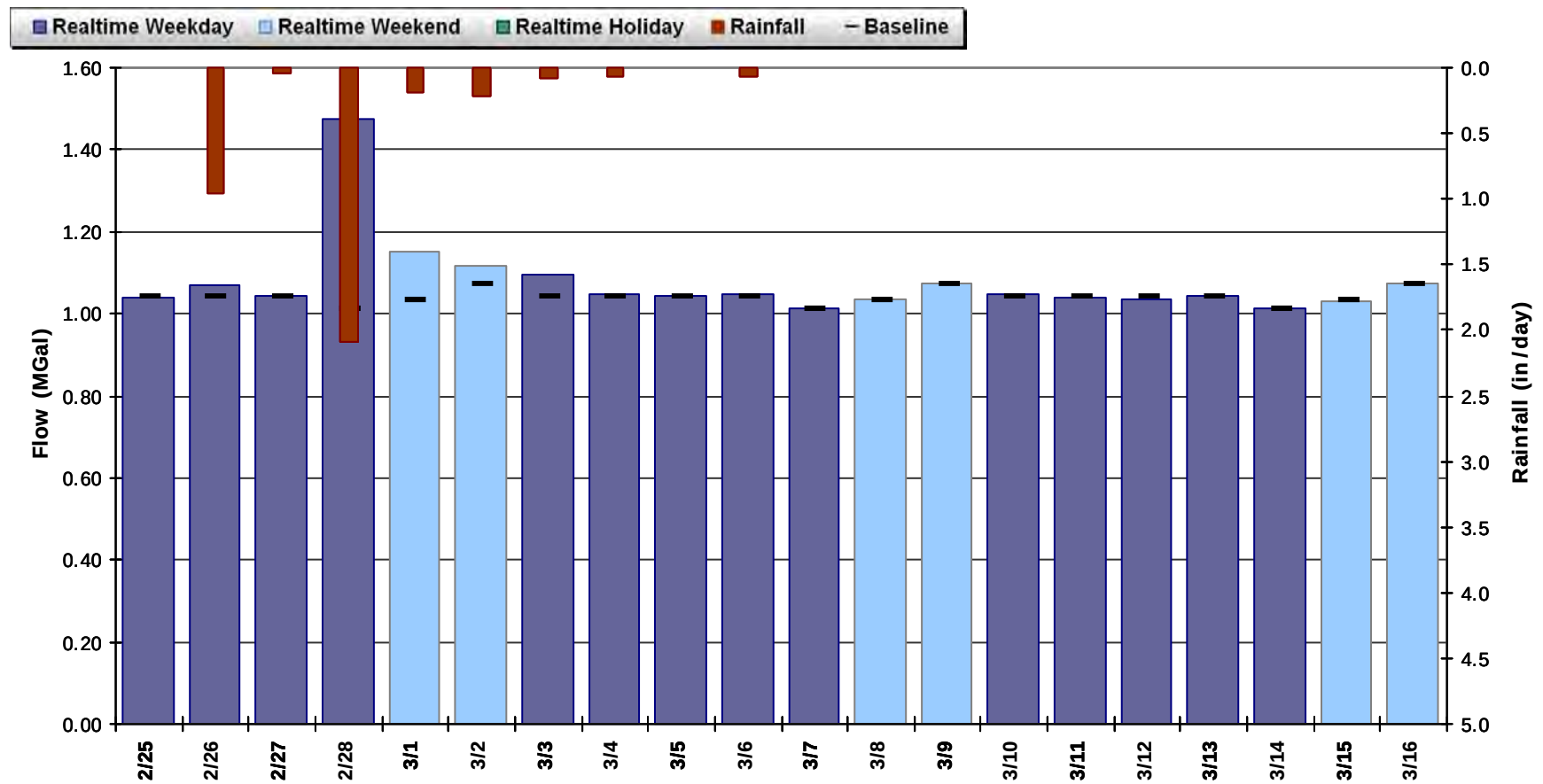


SITE 1

Period Flow Summary: Daily Flow Totals

Avg Period Flow: 1.077 MGal Peak Daily Flow: 1.476 MGal Min Daily Flow: 1.013 MGal

Total Period Rainfall: 3.72 inches

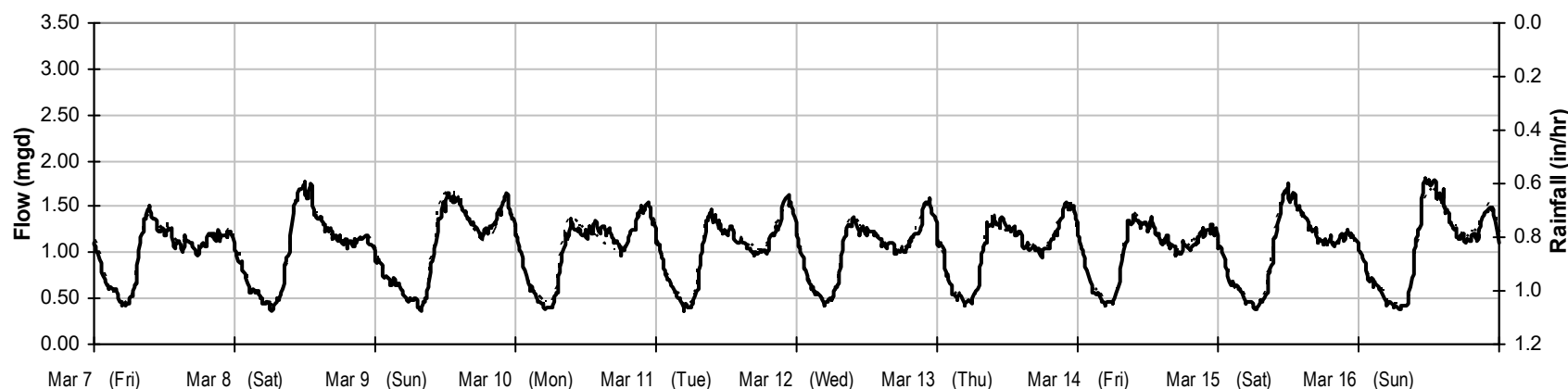
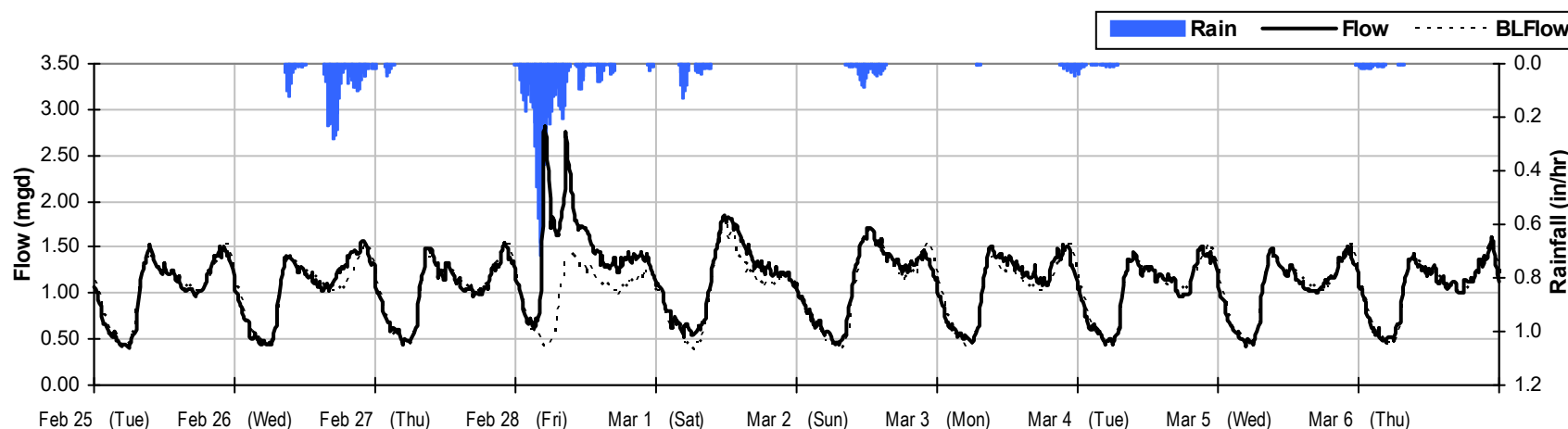




SITE 1

Flow Summary: 2/25/2014 to 3/16/2014

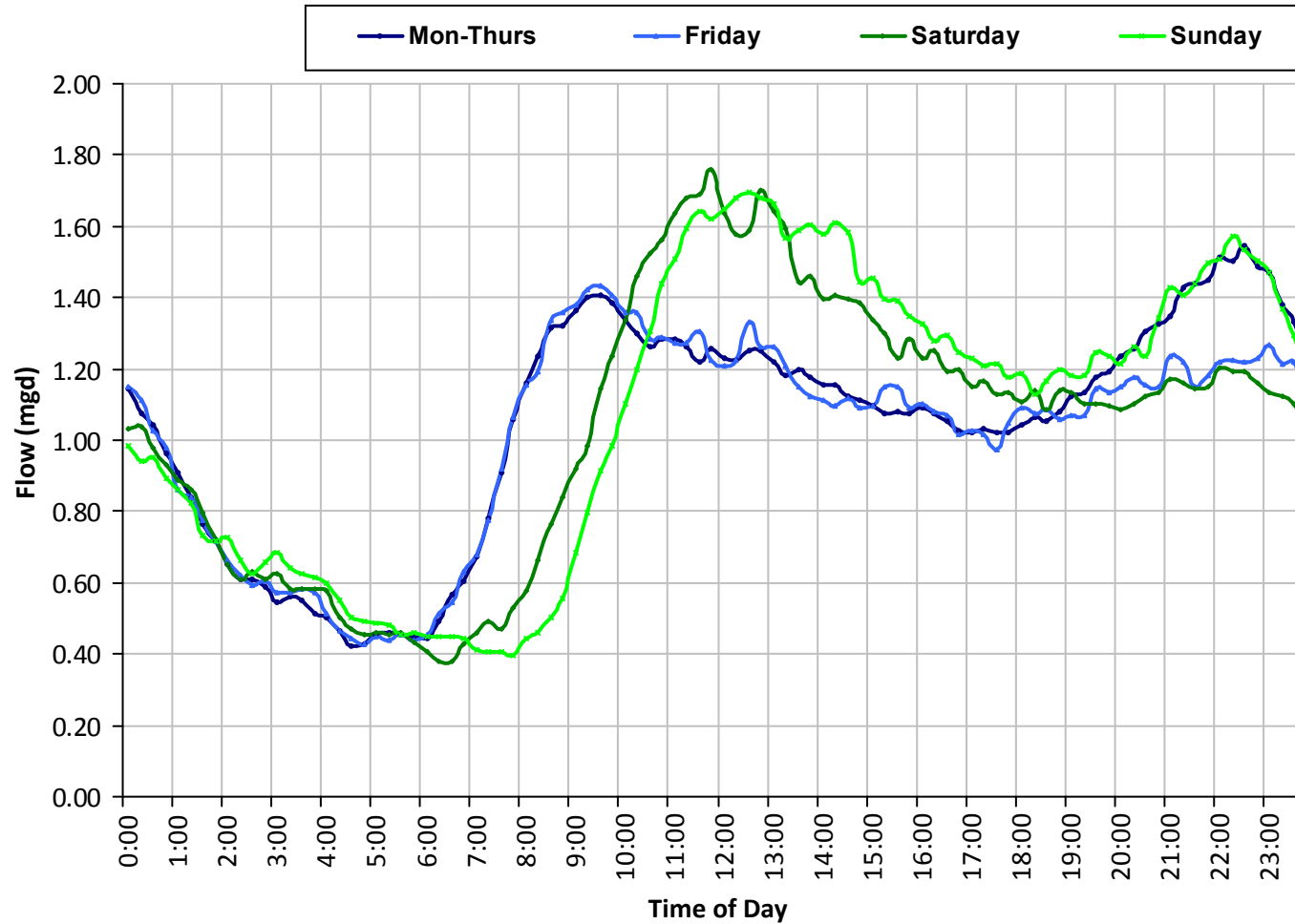
Total Period Rainfall: 3.72 inches Avg Flow: 1.077 mgd Peak Flow: 2.816 mgd Min Flow: 0.362 mgd





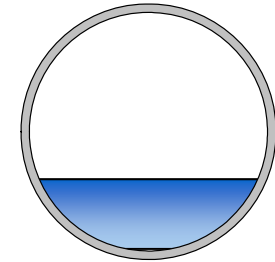
SITE 1

Baseline Flow Hydrographs



Baseline Flow:

1.042 mgd

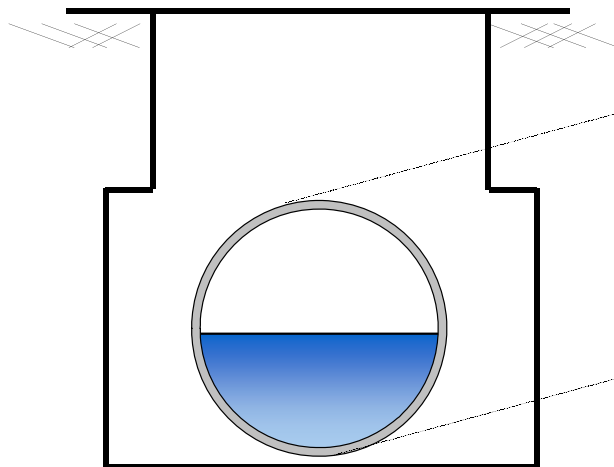
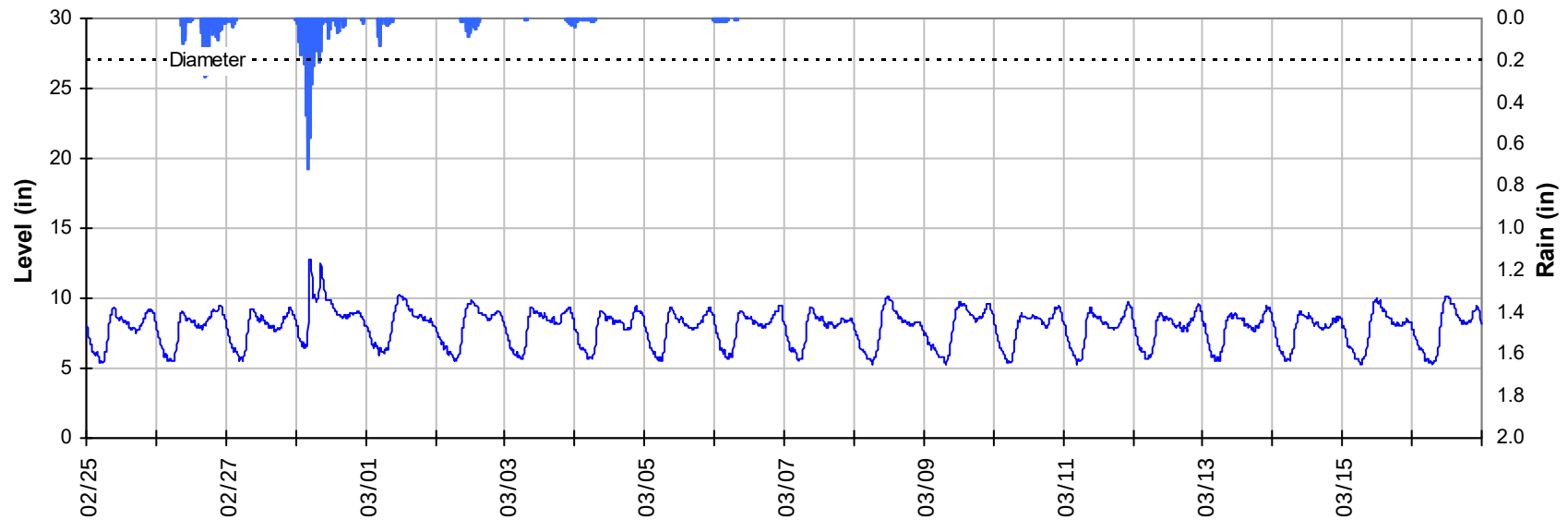




SITE 1

Site Capacity and Surge Summary

Realtime Flow Levels with Rainfall Data over Monitoring Period



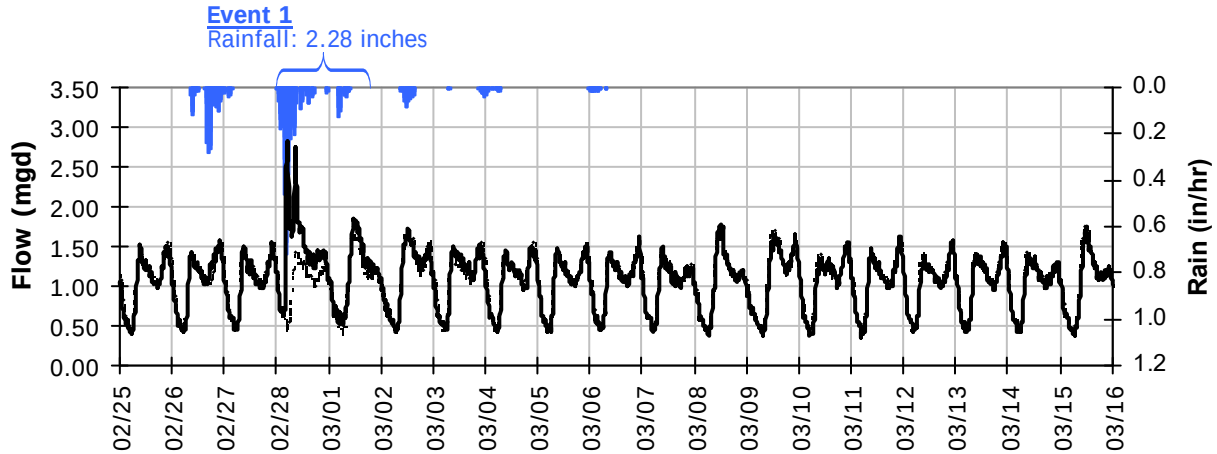
Pipe Diameter: 27 inches
Peak Measured Level: 12.8 inches
Peak d/D Ratio: 0.47



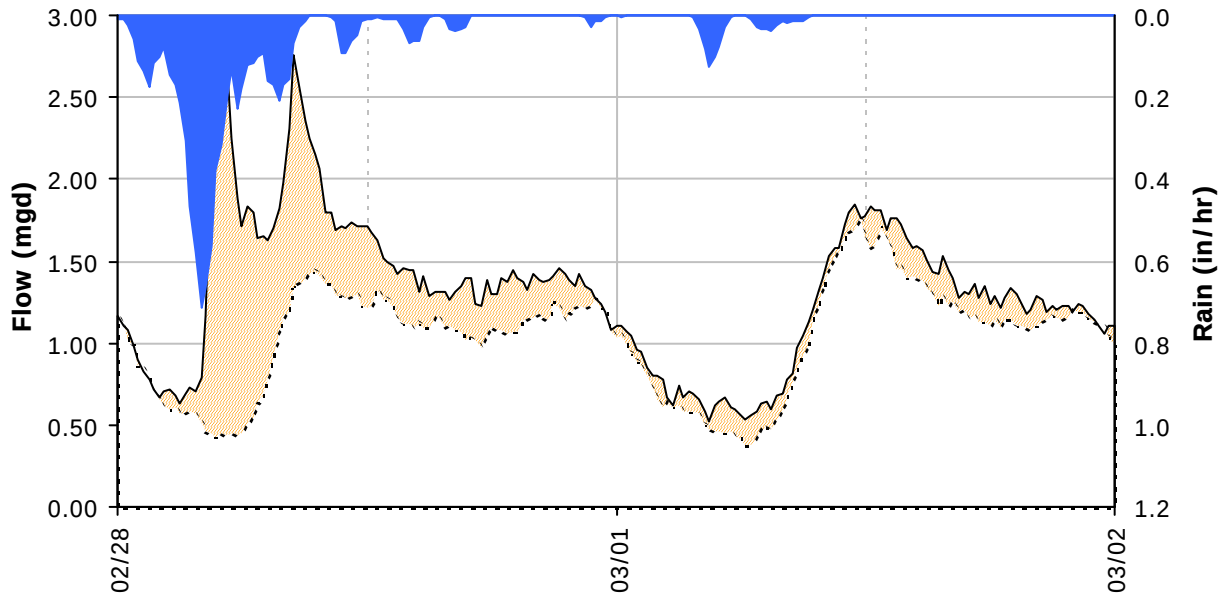
SITE 1

I/I Summary: Event 1

Baseline and Realtime Flows with Rainfall Data over Monitoring Period



Event 1 Detail Graph



Storm Event I/I Analysis (Rain = 2.28 inches)

Capacity

Peak Flow: 2.82 mgd
PF: 2.70

Inflow / Infiltration

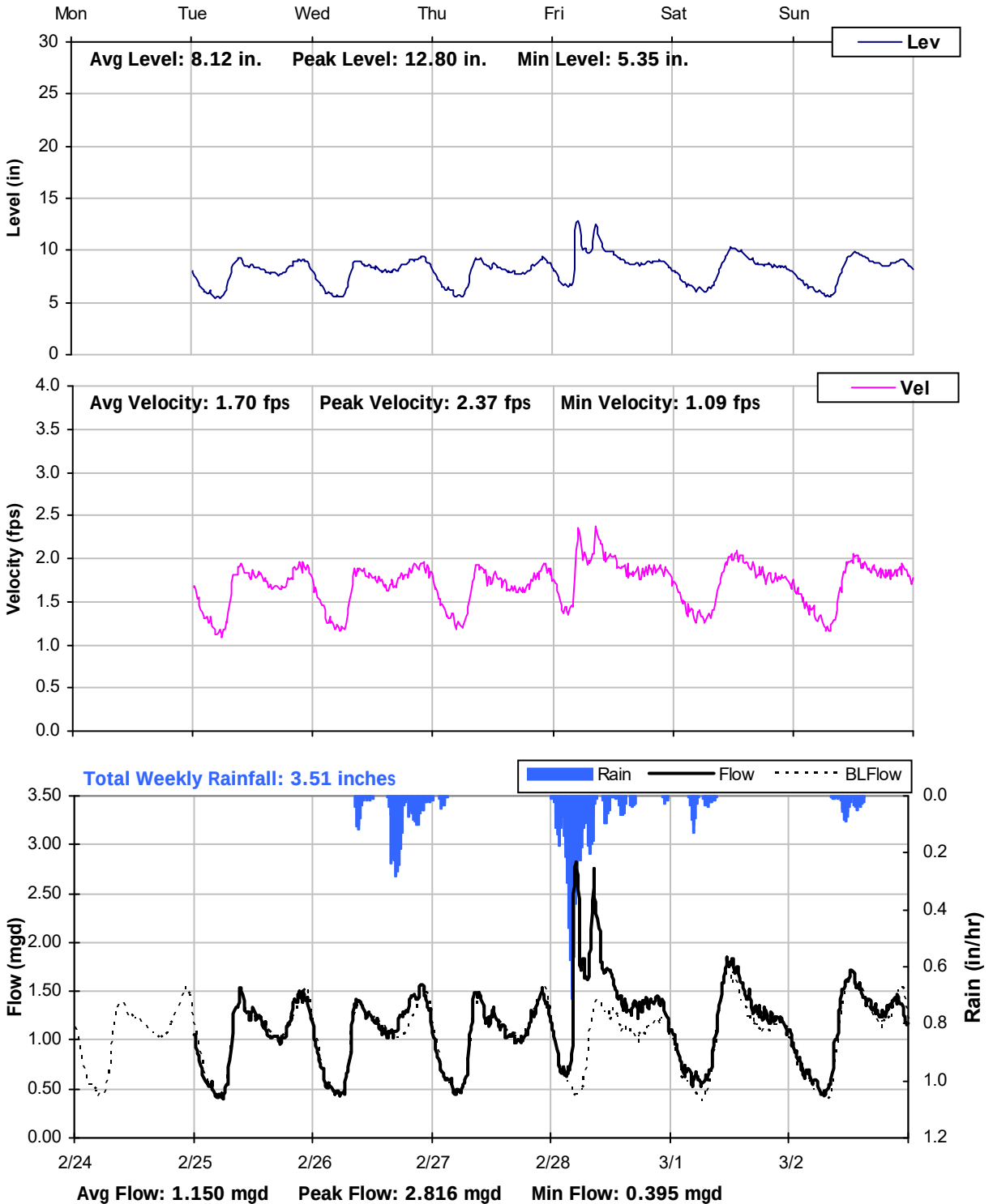
Peak I/I Rate: 2.37 mgd
Total I/I: 582,000 gallons



SITE 1

Weekly Level, Velocity and Flow Hydrographs

2/24/2014 to 3/3/2014

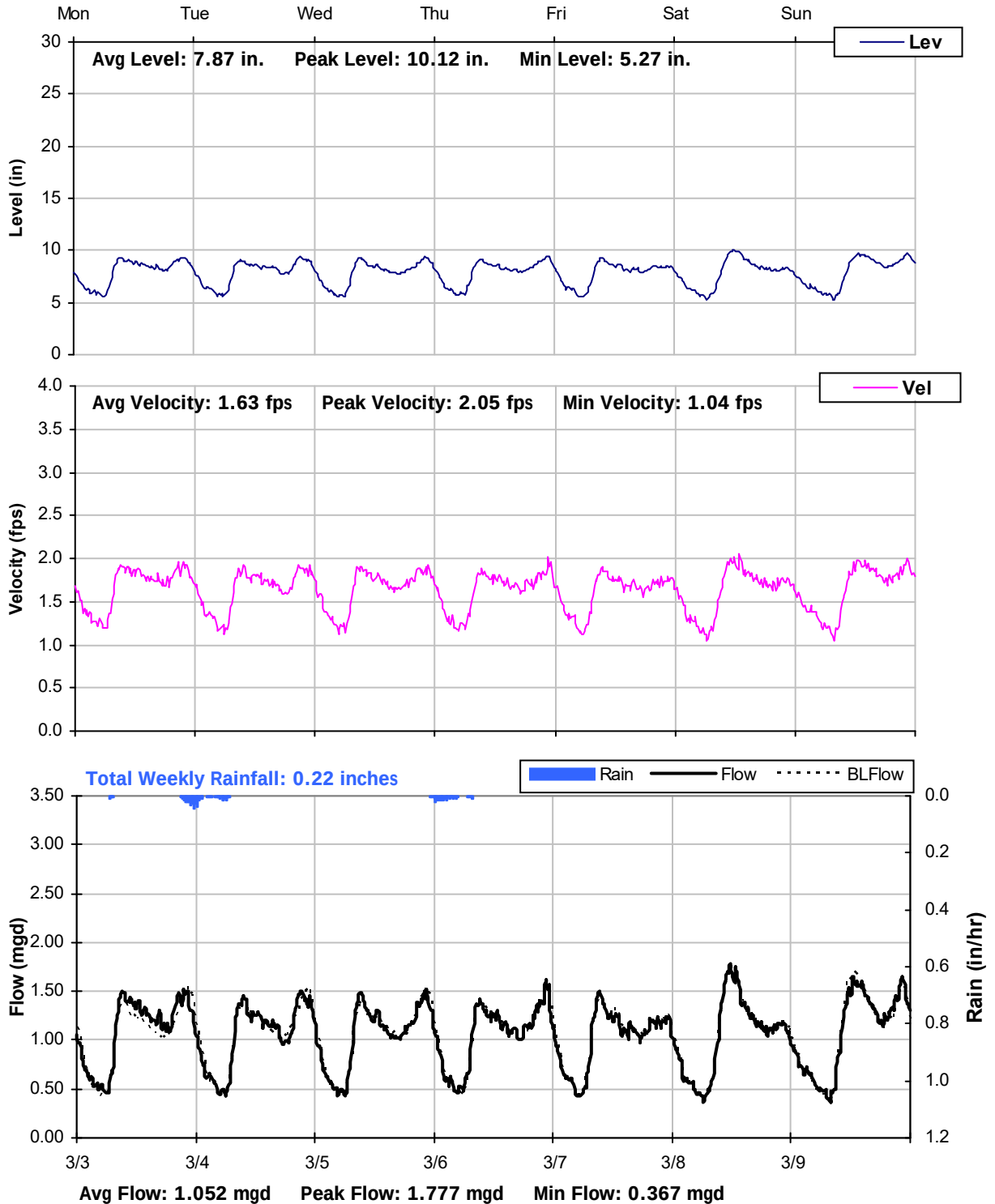




SITE 1

Weekly Level, Velocity and Flow Hydrographs

3/3/2014 to 3/10/2014

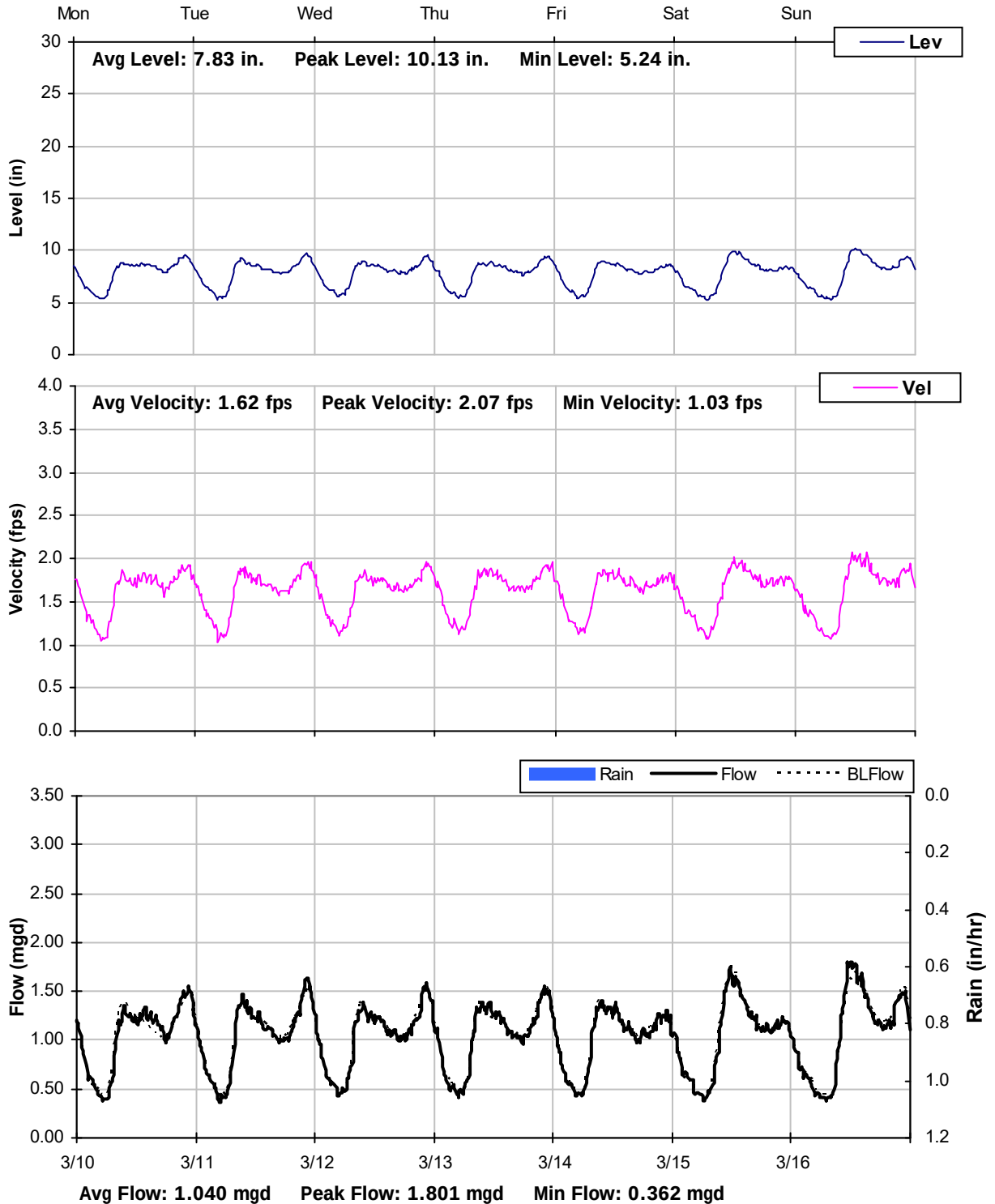




SITE 1

Weekly Level, Velocity and Flow Hydrographs

3/10/2014 to 3/17/2014





City of Gilroy

Sanitary Sewer Flow Monitoring

Temporary Monitoring: February and March, 2014

Monitoring Site: Site 2

Location: ROW southeast of Holloway Road

Data Summary Report



Vicinity Map: Site 2



SITE 2

Site Information

Location: ROW southeast of Holloway Road

Coordinates: 121.5444° W, 36.9916° N

Rim Elevation: 177 feet

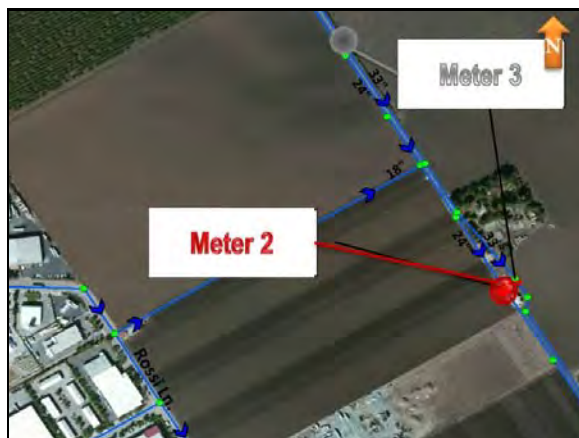
Pipe Diameter: 25 inches

Baseline Flow: 1.239 mgd

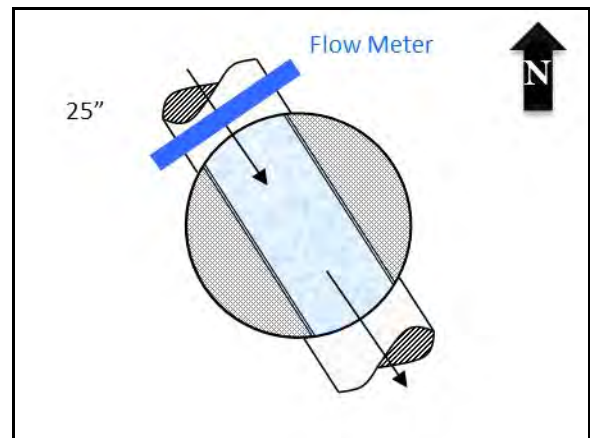
Peak Measured Flow: 2.211 mgd



Satellite Map



Sewer Map



Flow Sketch



Street View



Plan View



SITE 2

Additional Site Photos

Effluent Pipe



Influent Pipe



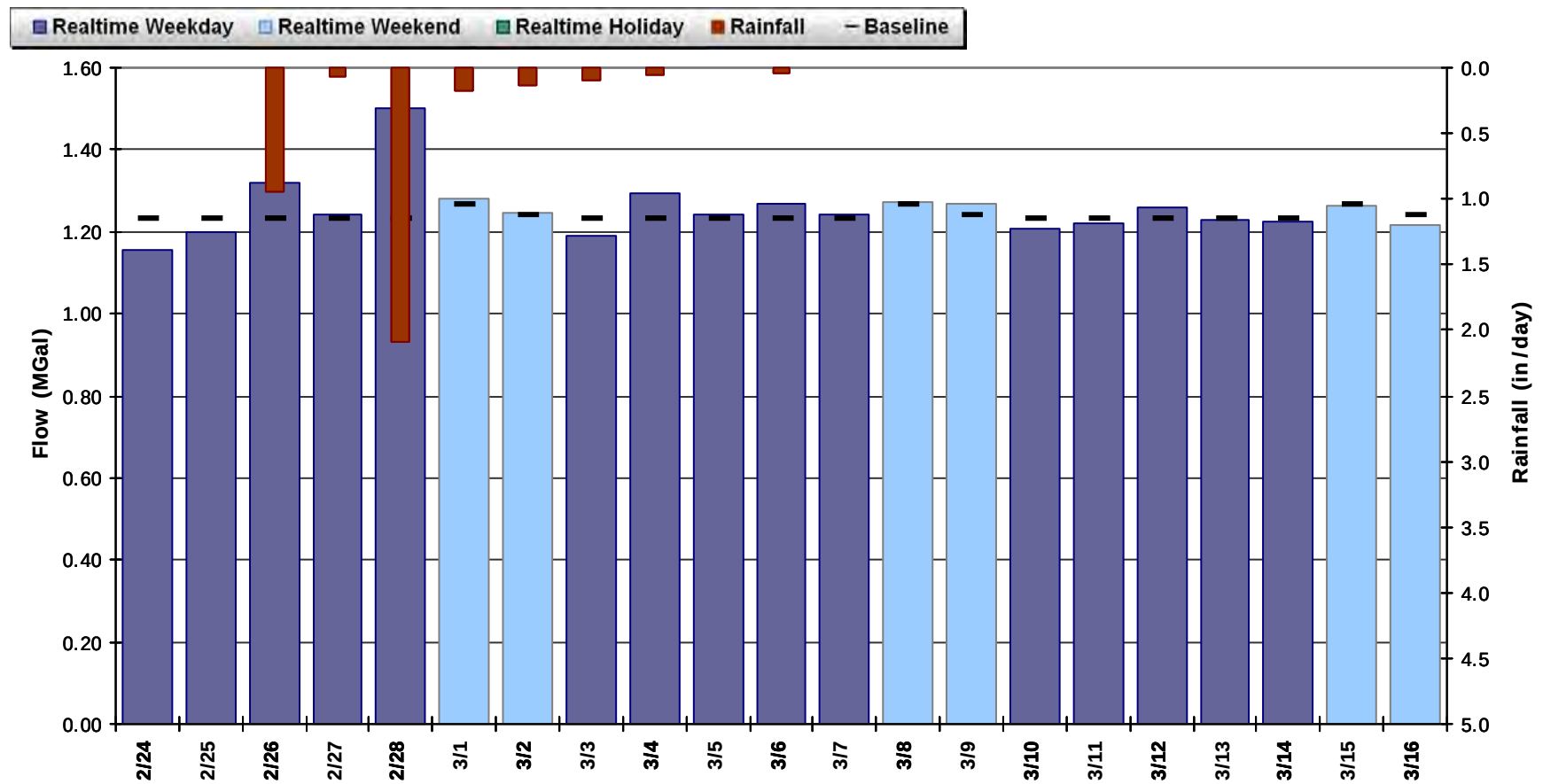


SITE 2

Period Flow Summary: Daily Flow Totals

Avg Period Flow: 1.254 MGal Peak Daily Flow: 1.501 MGal Min Daily Flow: 1.155 MGal

Total Period Rainfall: 3.61 inches

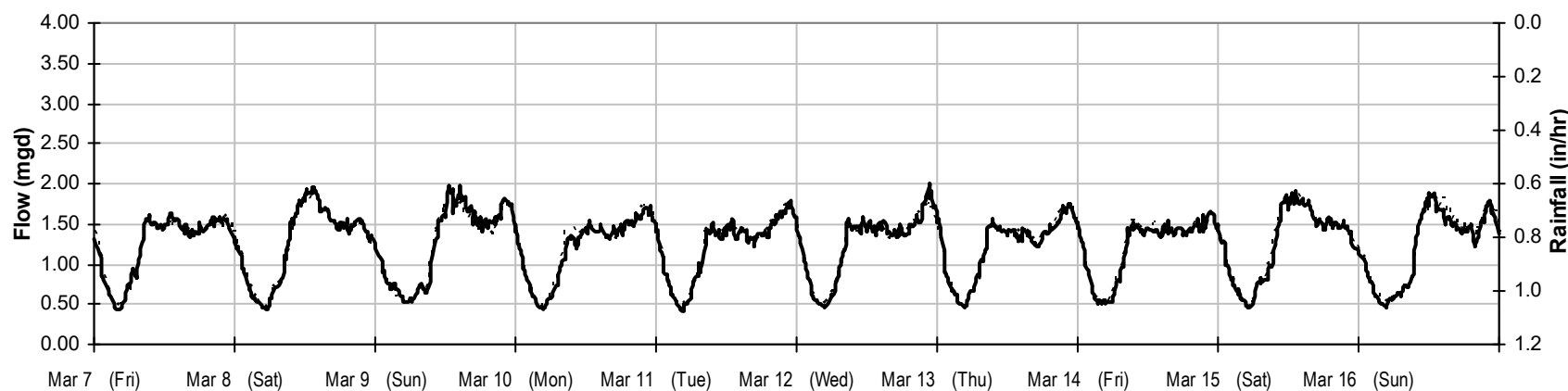
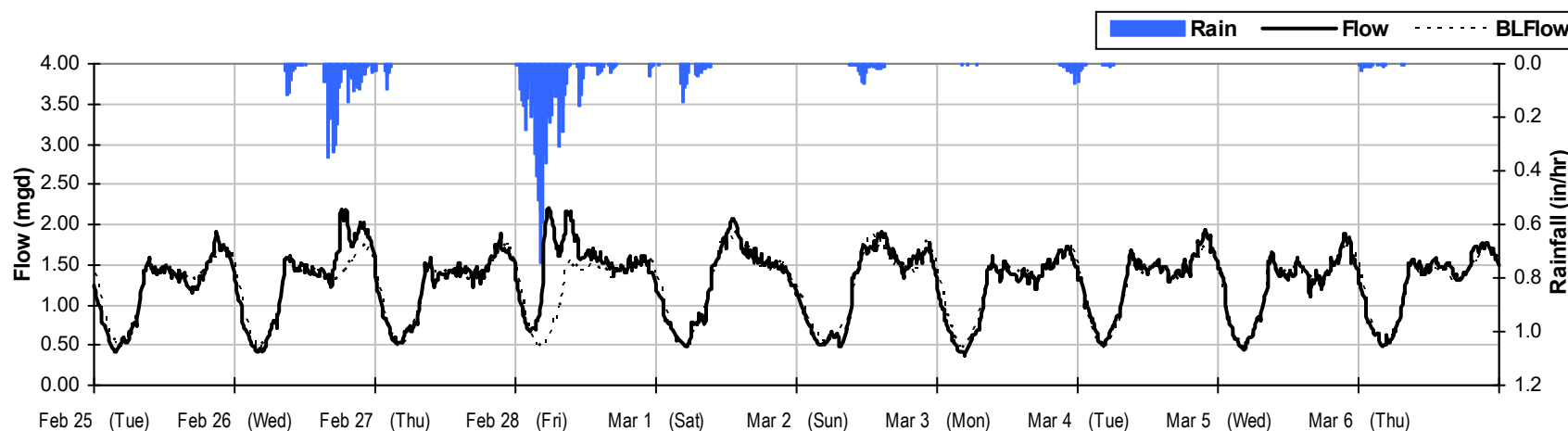




SITE 2

Flow Summary: 2/25/2014 to 3/16/2014

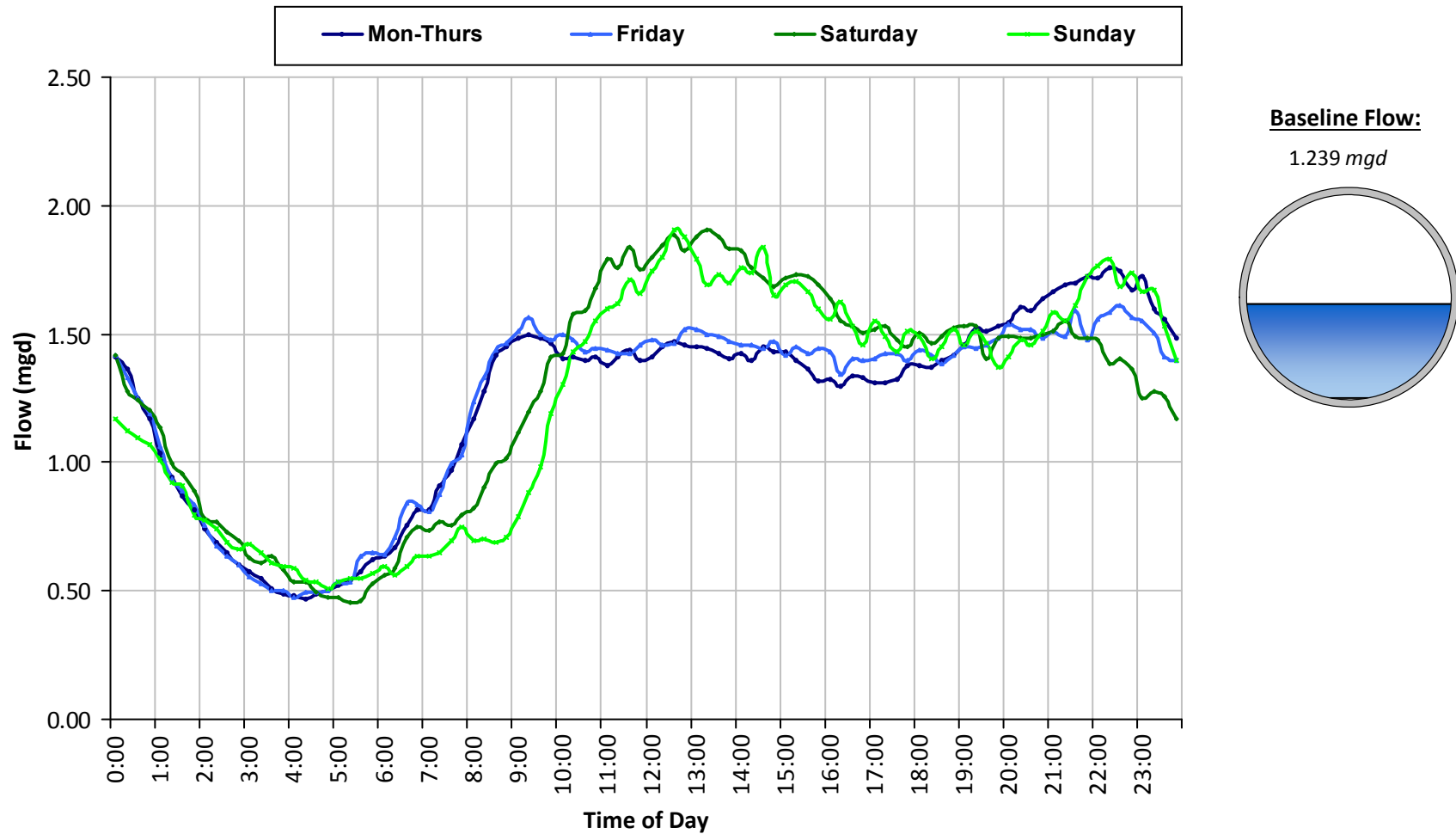
Total Period Rainfall: 3.61 inches Avg Flow: 1.259 mgd Peak Flow: 2.211 mgd Min Flow: 0.375 mgd





SITE 2

Baseline Flow Hydrographs

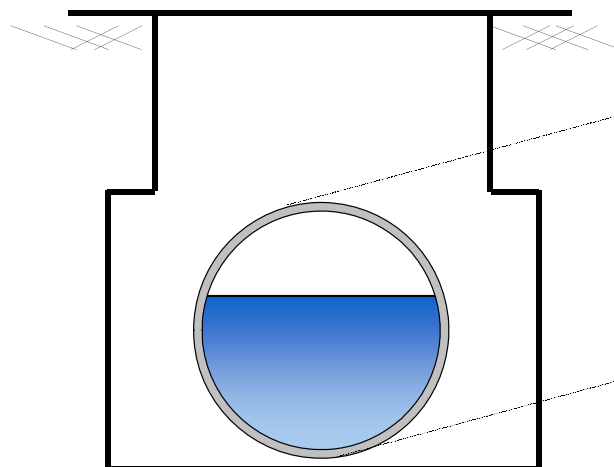
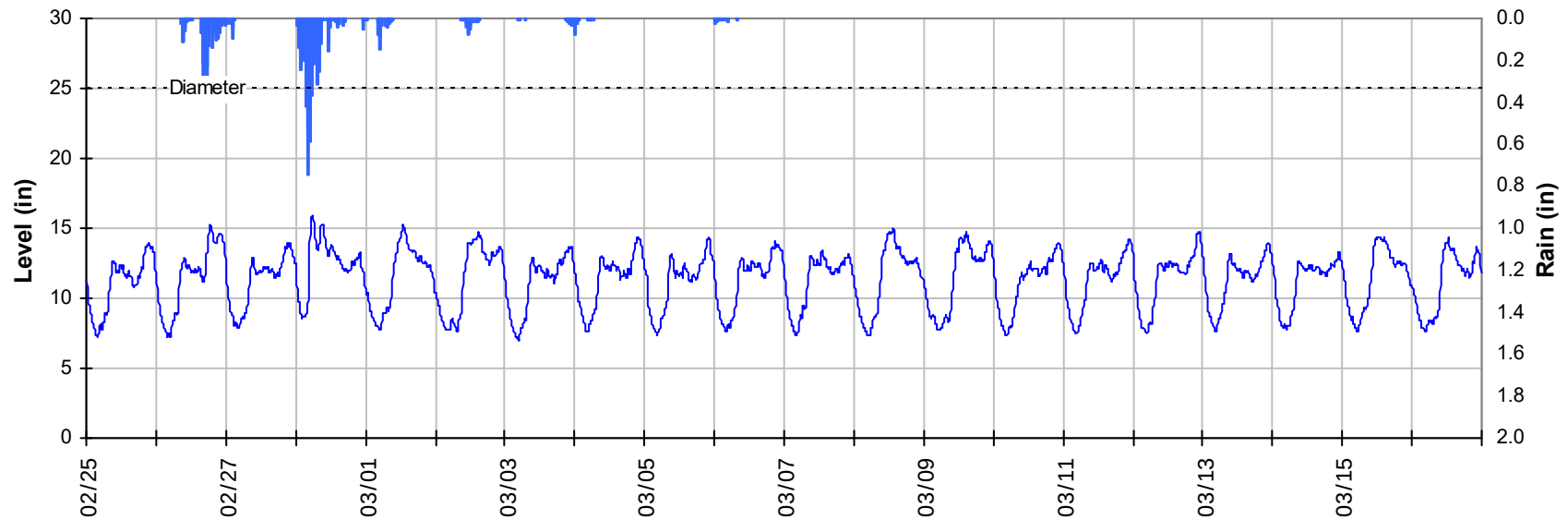




SITE 2

Site Capacity and Surge Summary

Realtime Flow Levels with Rainfall Data over Monitoring Period



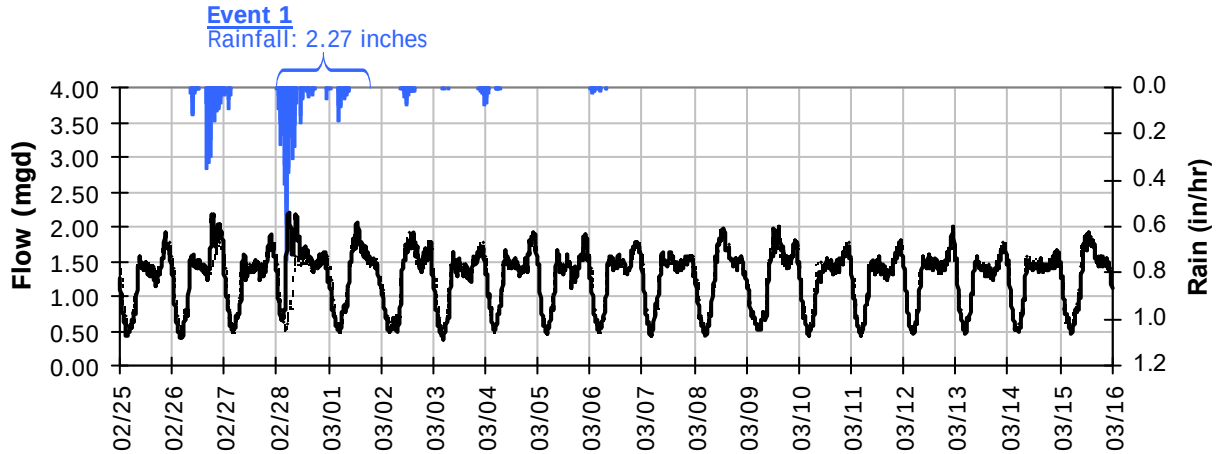
Pipe Diameter: 25 inches
Peak Measured Level: 15.9 inches
Peak d/D Ratio: 0.64



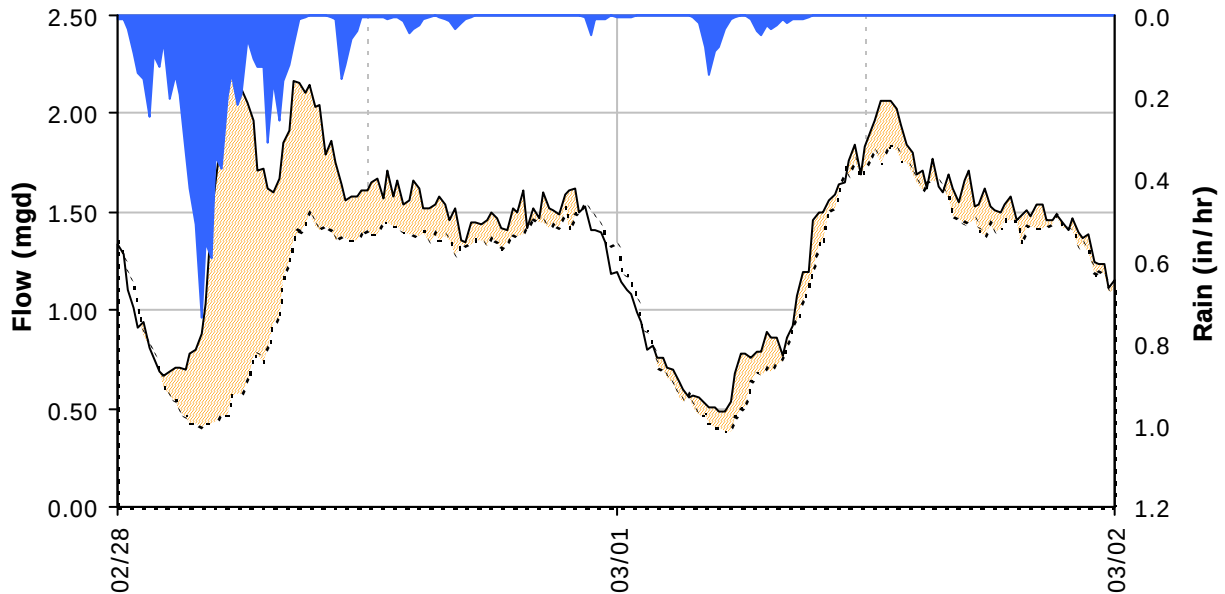
SITE 2

I/I Summary: Event 1

Baseline and Realtime Flows with Rainfall Data over Monitoring Period



Event 1 Detail Graph



Storm Event I/I Analysis (Rain = 2.27 inches)

Capacity

Peak Flow: 2.21 mgd
PF: 1.79

Inflow / Infiltration

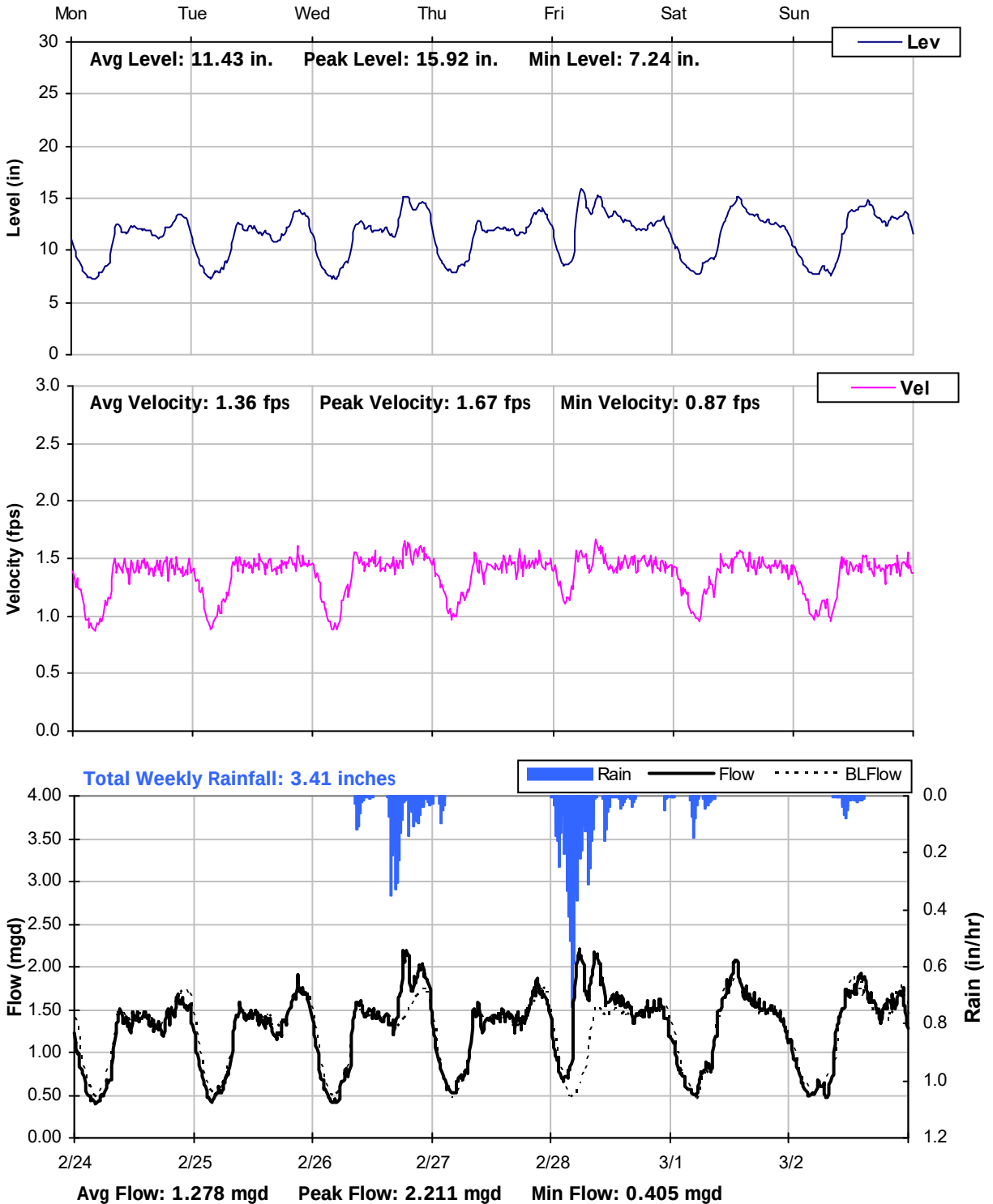
Peak I/I Rate: 1.66 mgd
Total I/I: 380,000 gallons



SITE 2

Weekly Level, Velocity and Flow Hydrographs

2/24/2014 to 3/3/2014

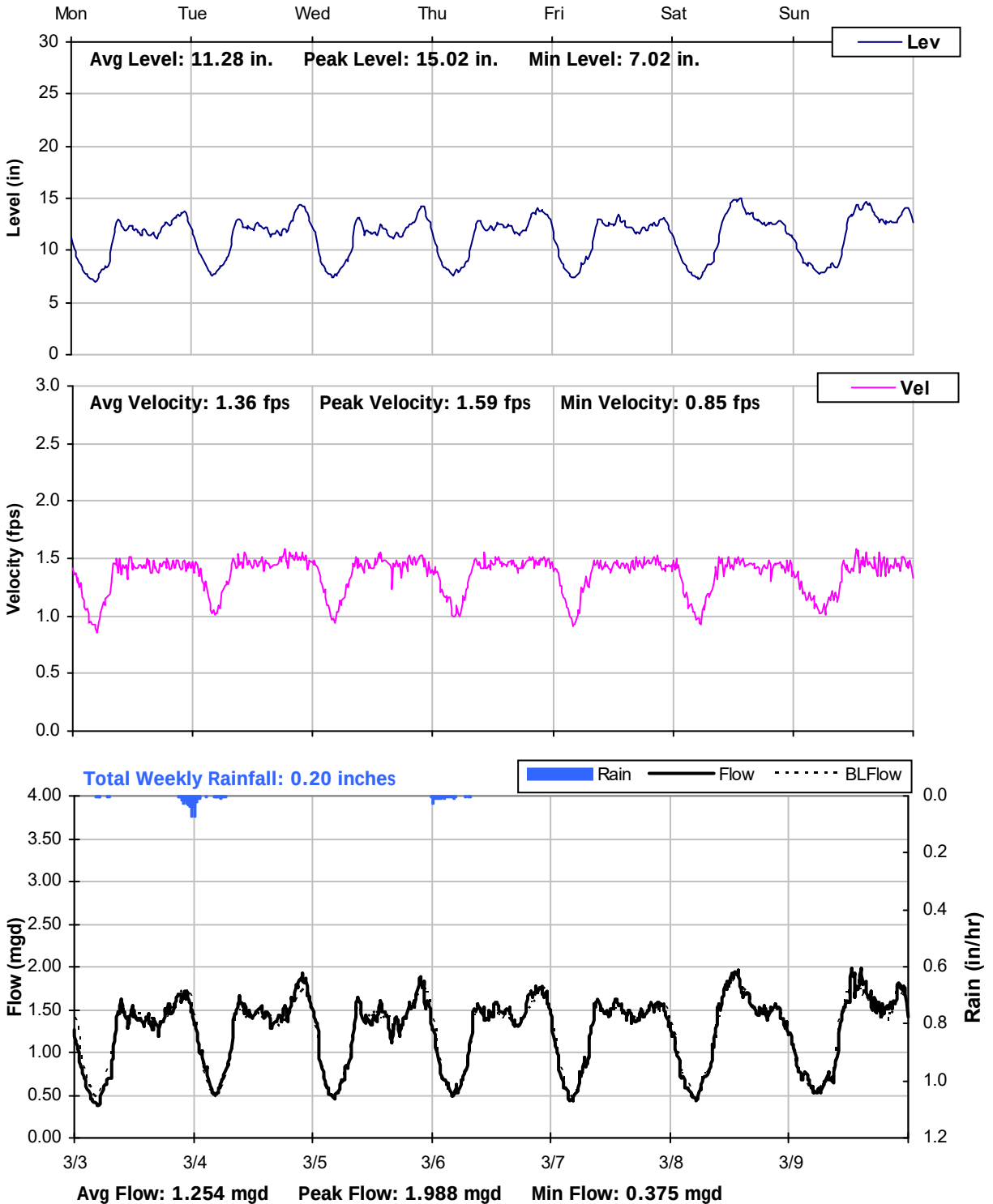




SITE 2

Weekly Level, Velocity and Flow Hydrographs

3/3/2014 to 3/10/2014

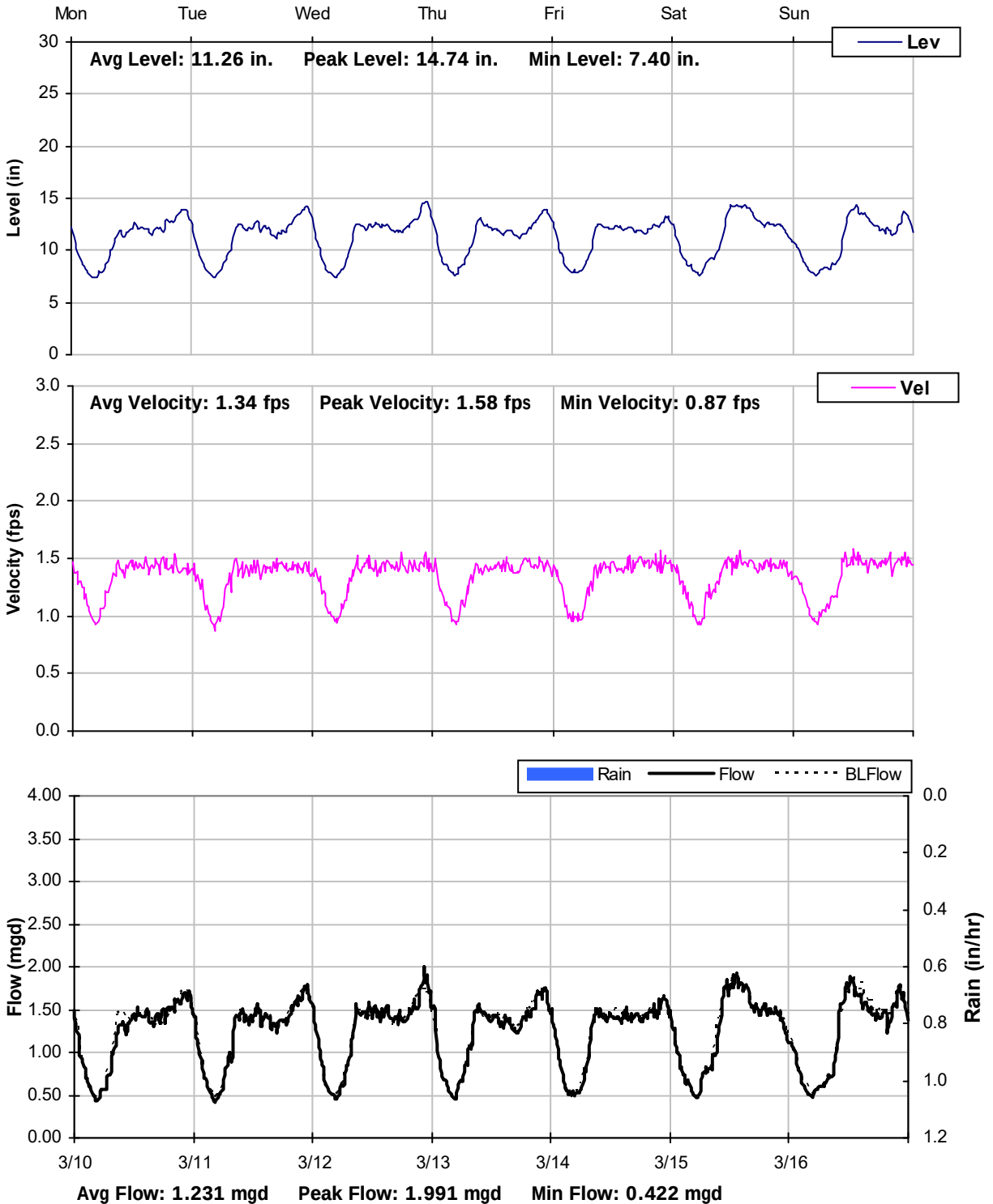




SITE 2

Weekly Level, Velocity and Flow Hydrographs

3/10/2014 to 3/17/2014





City of Gilroy

Sanitary Sewer Flow Monitoring

Temporary Monitoring: February and March, 2014

Monitoring Site: Site 3

Location: ROW southeast of Holloway Road

Data Summary Report



Vicinity Map: Site 3



SITE 3

Site Information

Location: ROW southeast of Holloway Road

Coordinates: 121.5464° W, 36.9942° N

Rim Elevation: 179 feet

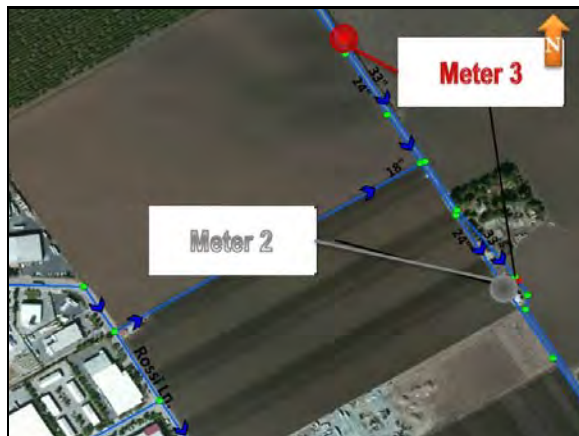
Pipe Diameter: 33 inches

Baseline Flow: 3.660 mgd

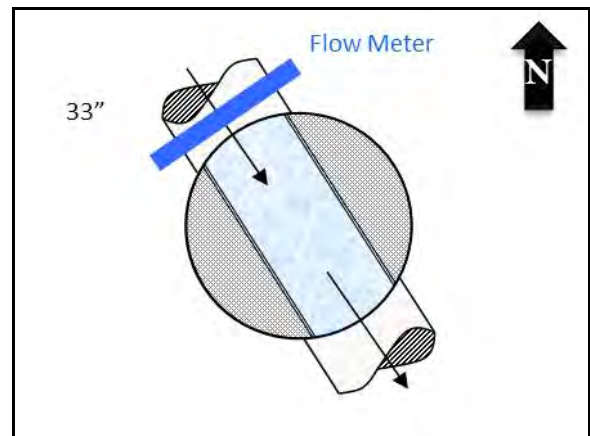
Peak Measured Flow: 6.693 mgd



Satellite Map



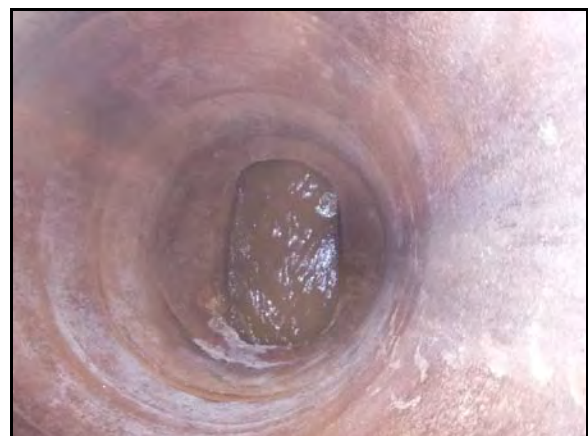
Sewer Map



Flow Sketch



Street View



Plan View



SITE 3

Additional Site Photos

Effluent Pipe



Influent Pipe



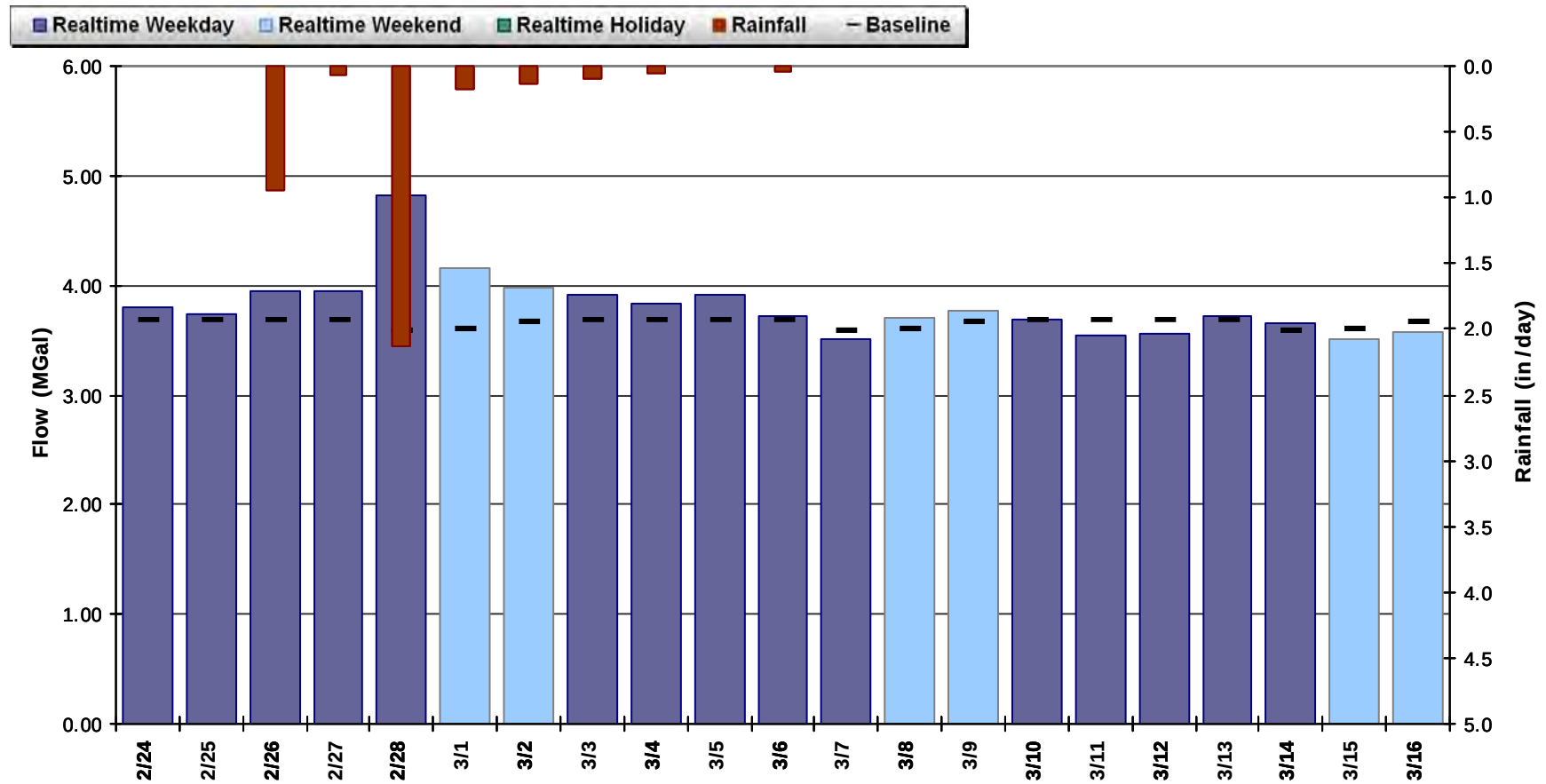


SITE 3

Period Flow Summary: Daily Flow Totals

Avg Period Flow: 3.810 MGal Peak Daily Flow: 4.815 MGal Min Daily Flow: 3.504 MGal

Total Period Rainfall: 3.63 inches

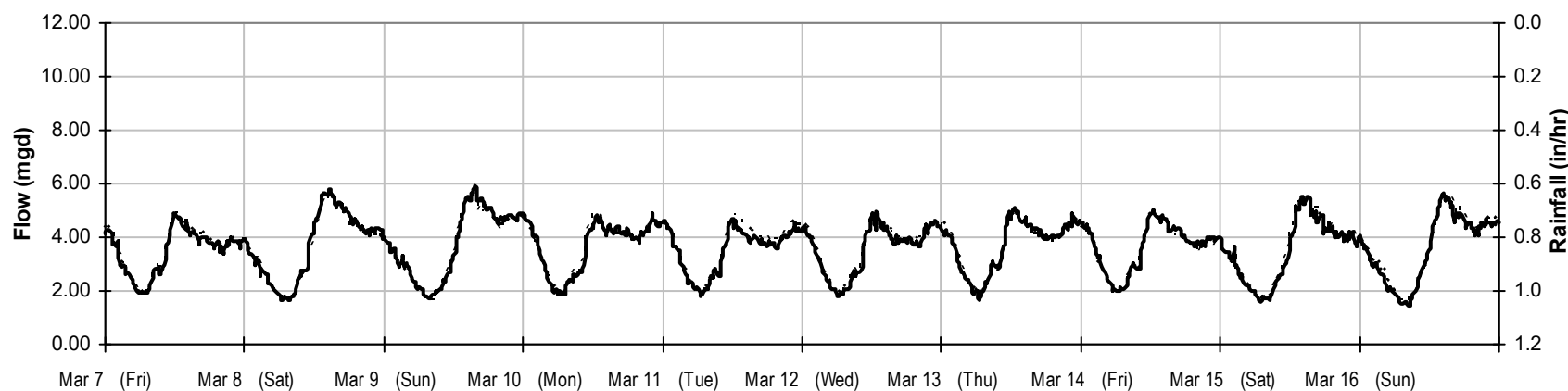
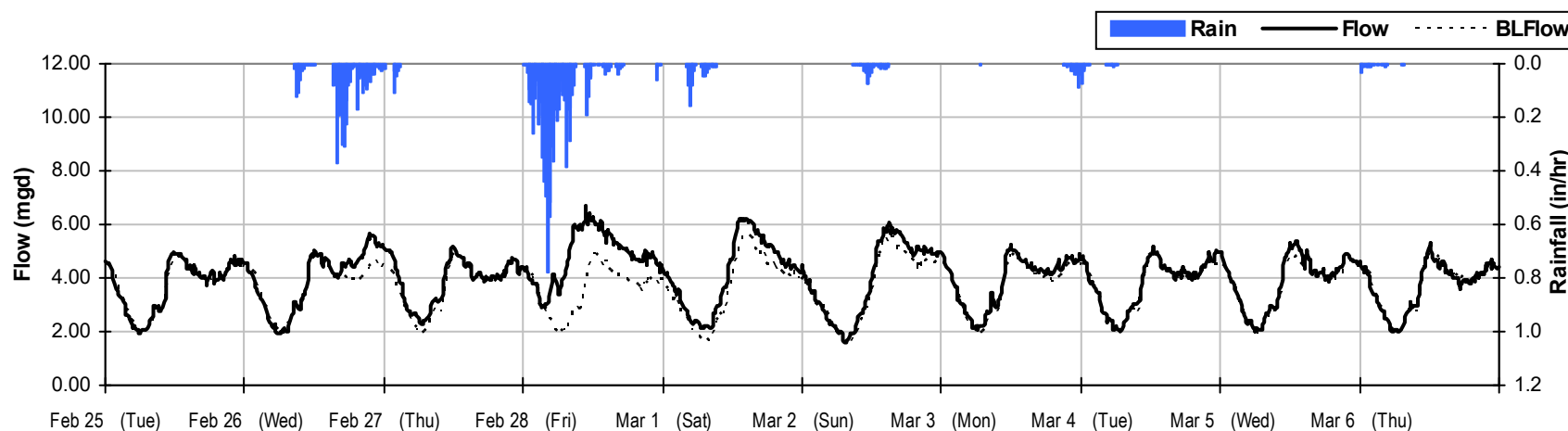




SITE 3

Flow Summary: 2/25/2014 to 3/16/2014

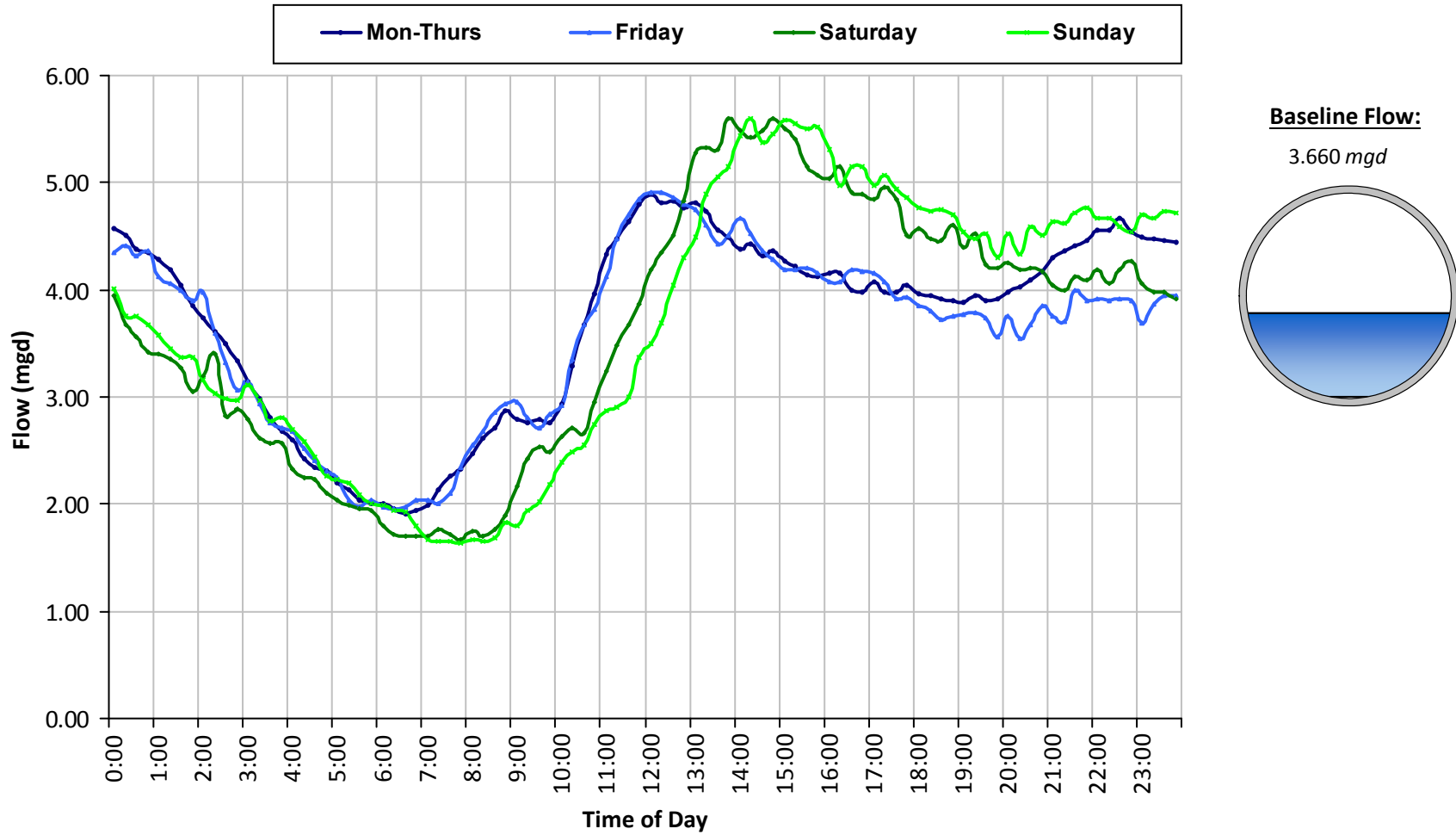
Total Period Rainfall: 3.63 inches Avg Flow: 3.810 mgd Peak Flow: 6.693 mgd Min Flow: 1.475 mgd





SITE 3

Baseline Flow Hydrographs

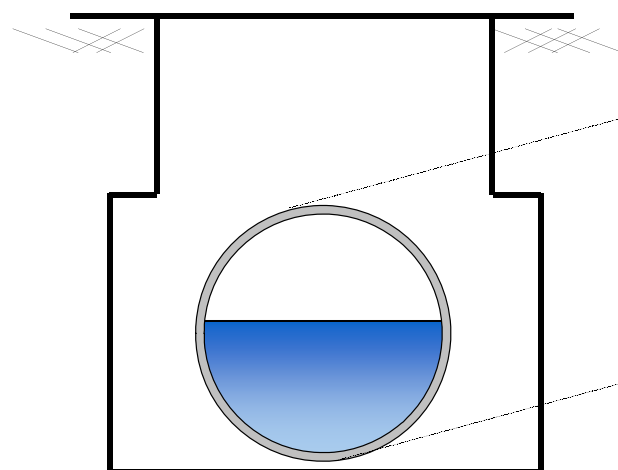
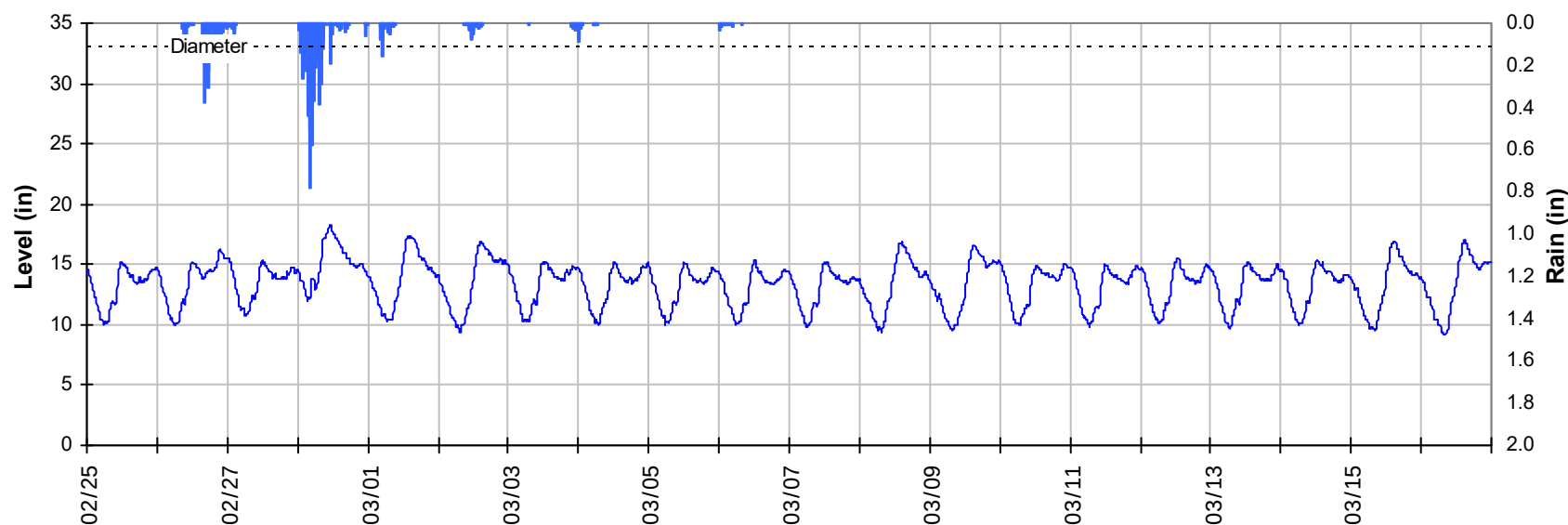




SITE 3

Site Capacity and Surge Summary

Realtime Flow Levels with Rainfall Data over Monitoring Period



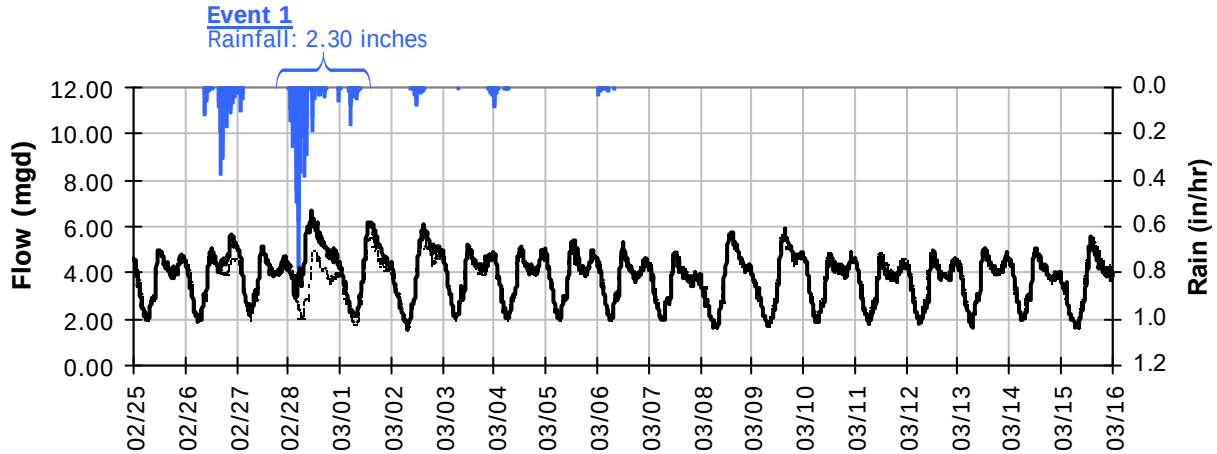
Pipe Diameter: 33 inches
Peak Measured Level: 18.2 inches
Peak d/D Ratio: 0.55



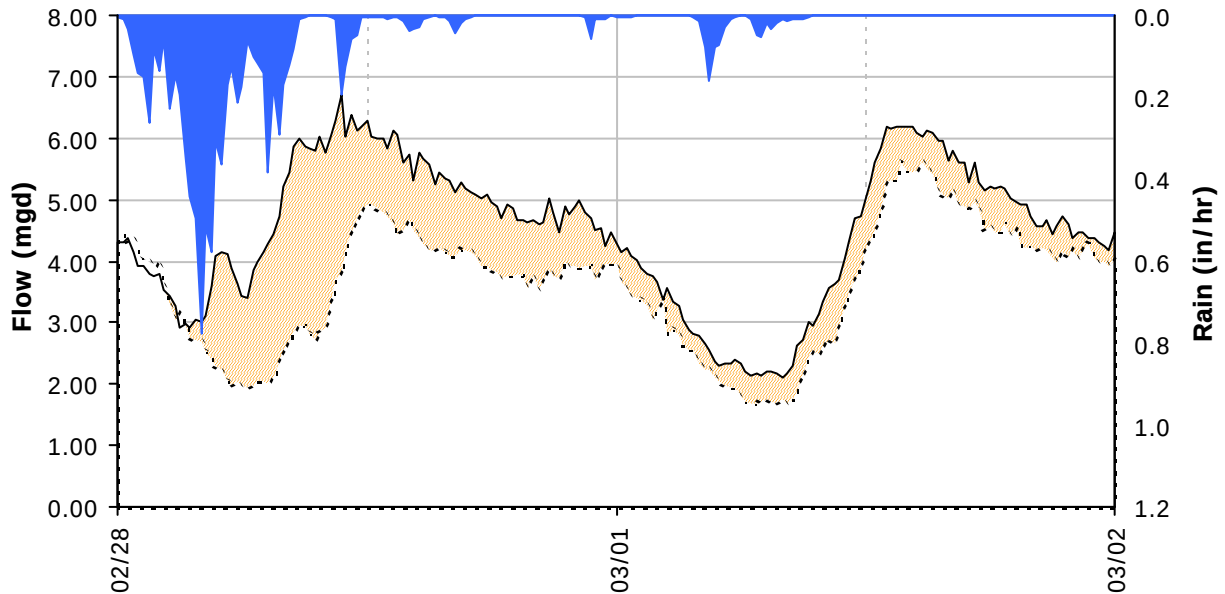
SITE 3

I/I Summary: Event 1

Baseline and Realtime Flows with Rainfall Data over Monitoring Period



Event 1 Detail Graph



Storm Event I/I Analysis (Rain = 2.30 inches)

Capacity

Peak Flow: 6.69 mgd
PF: 1.83

Inflow / Infiltration

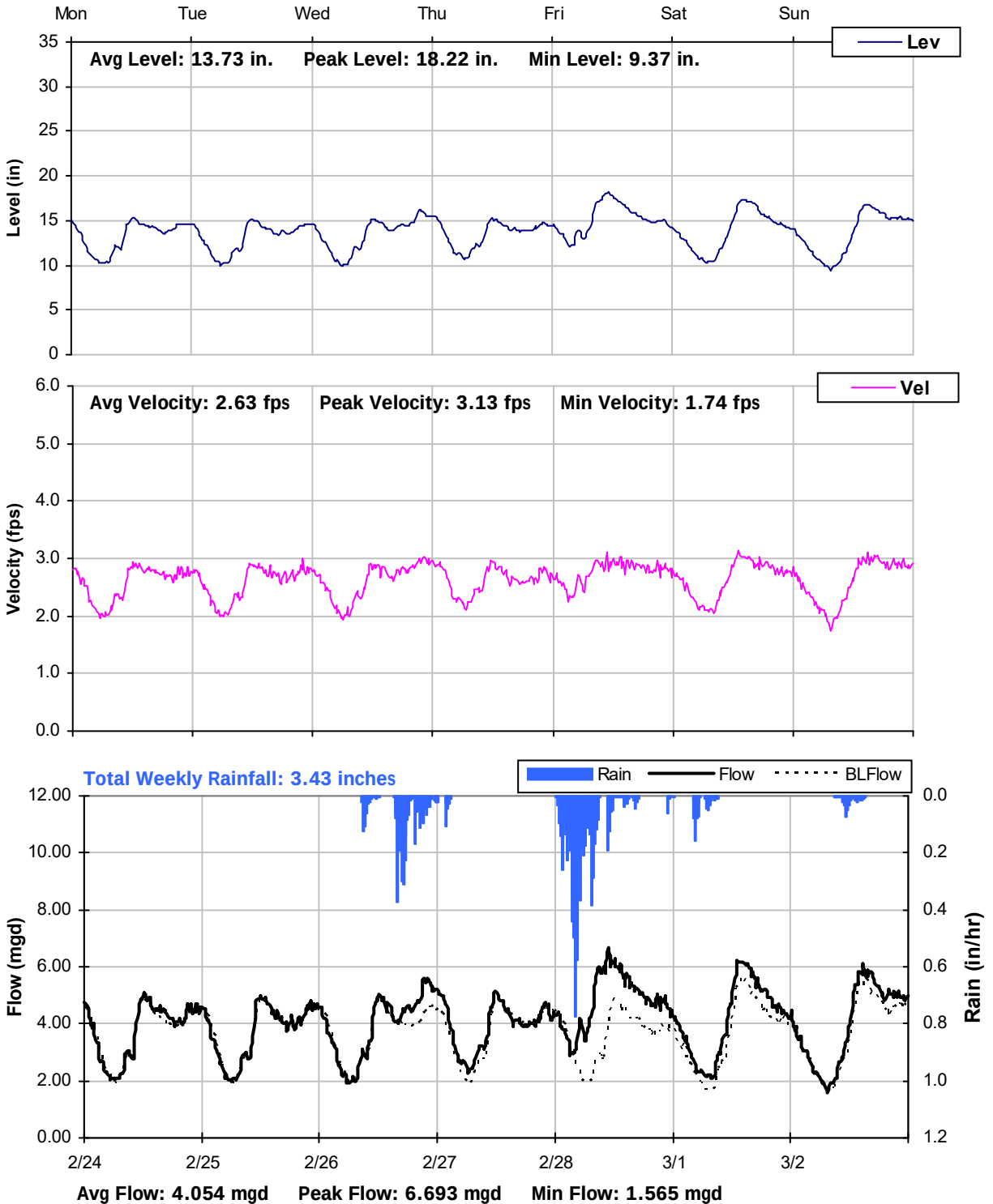
Peak I/I Rate: 3.18 mgd
Total I/I: 1,790,000 gallons



SITE 3

Weekly Level, Velocity and Flow Hydrographs

2/24/2014 to 3/3/2014

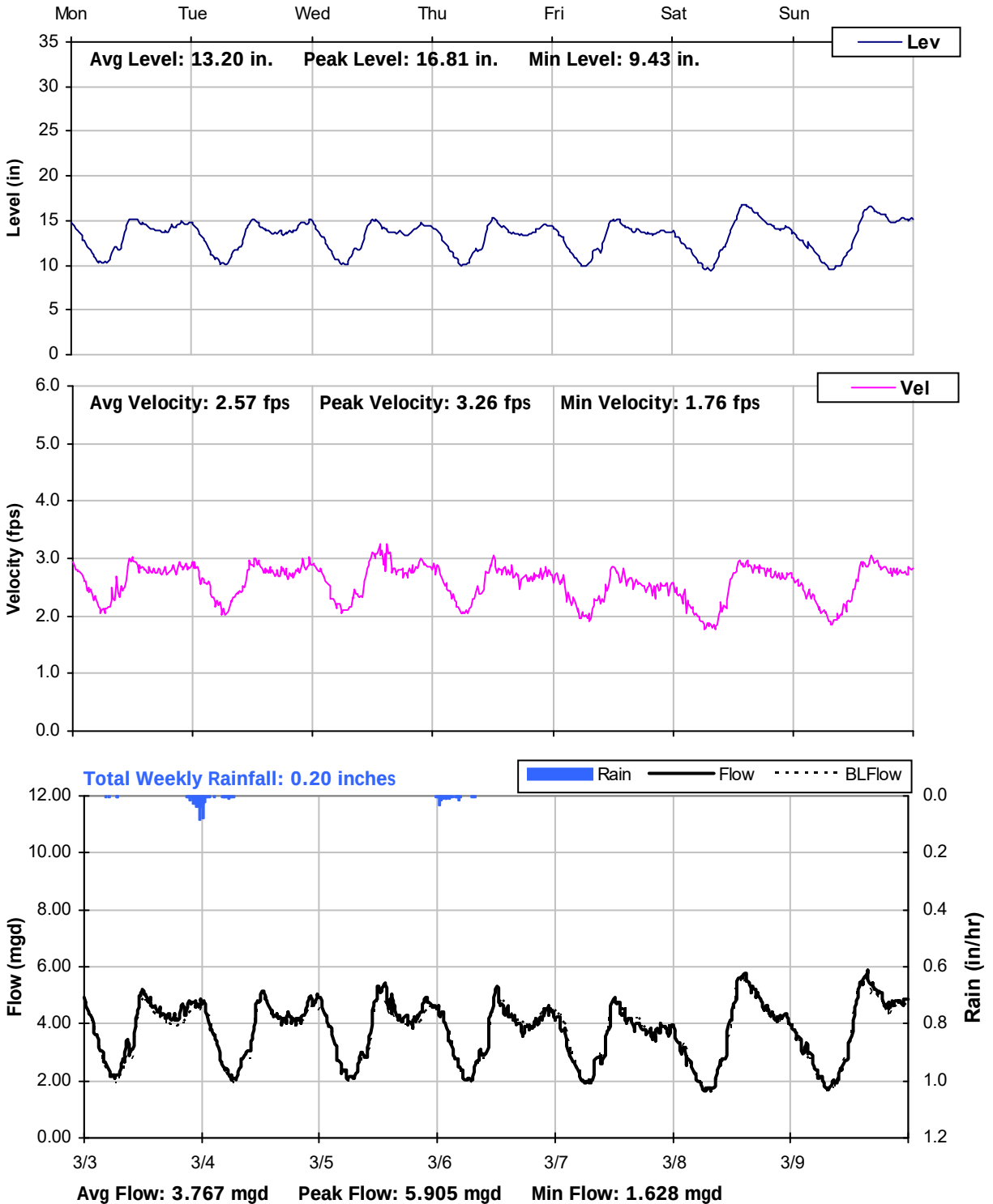




SITE 3

Weekly Level, Velocity and Flow Hydrographs

3/3/2014 to 3/10/2014

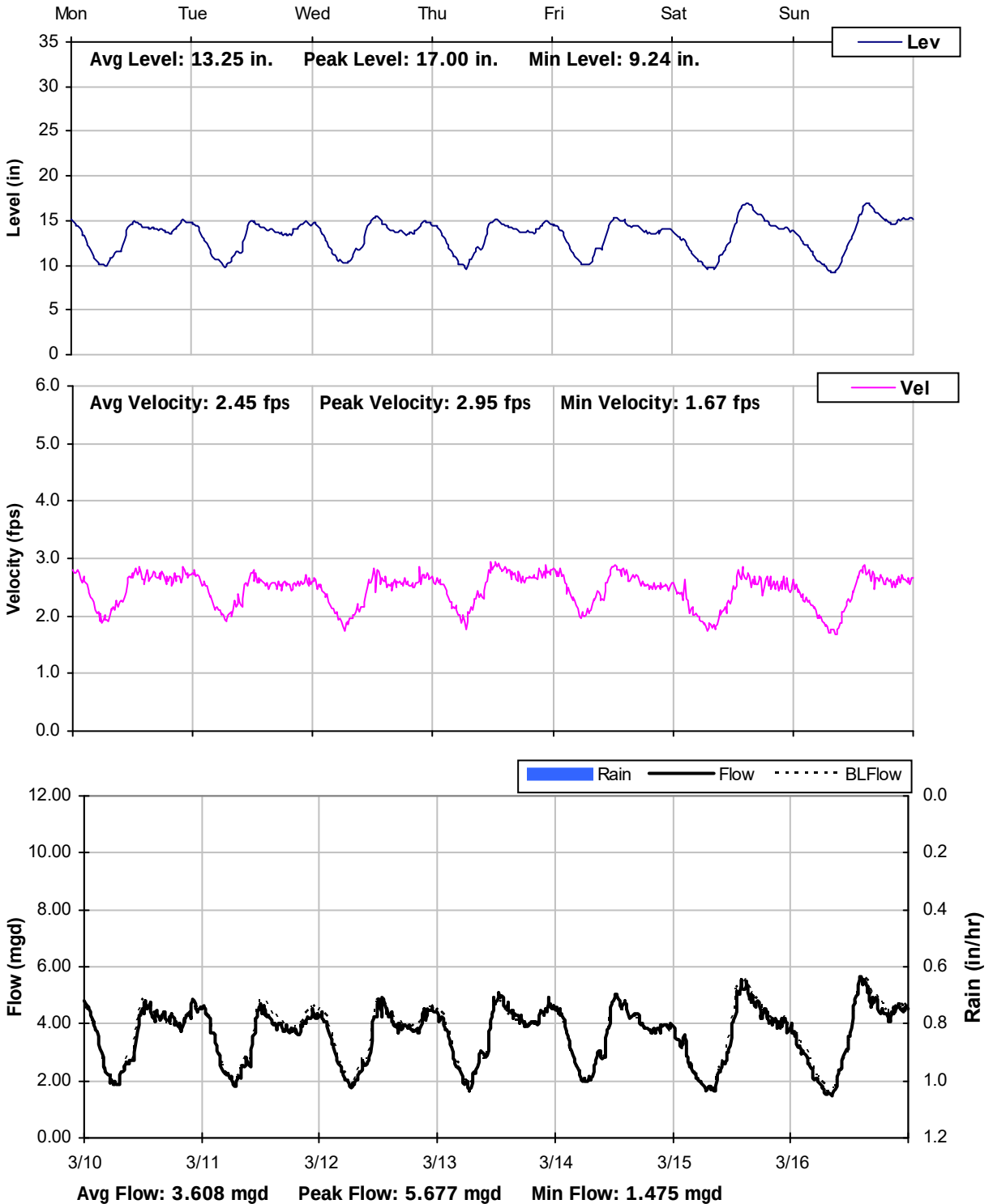




SITE 3

Weekly Level, Velocity and Flow Hydrographs

3/10/2014 to 3/17/2014





City of Gilroy

Sanitary Sewer Flow Monitoring

Temporary Monitoring: February and March, 2014

Monitoring Site: Site 4

Location: W. Luchessa Avenue near Hyde Park Drive

Data Summary Report



Vicinity Map: Site 4



SITE 4

Site Information

Location: W. Luchessa Avenue near Hyde Park Drive

Coordinates: 121.5638° W, 36.9915° N

Rim Elevation: 196 feet

Pipe Diameter: 12 inches

Baseline Flow: 0.126 mgd

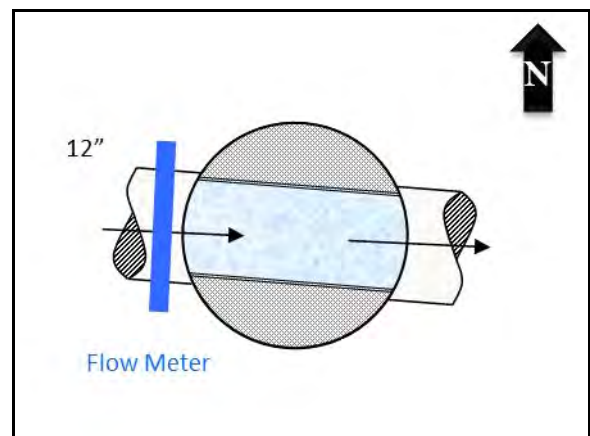
Peak Measured Flow: 0.306 mgd



Satellite Map



Sewer Map



Flow Sketch



Street View



Plan View



SITE 4

Additional Site Photos

Effluent Pipe



Influent Pipe



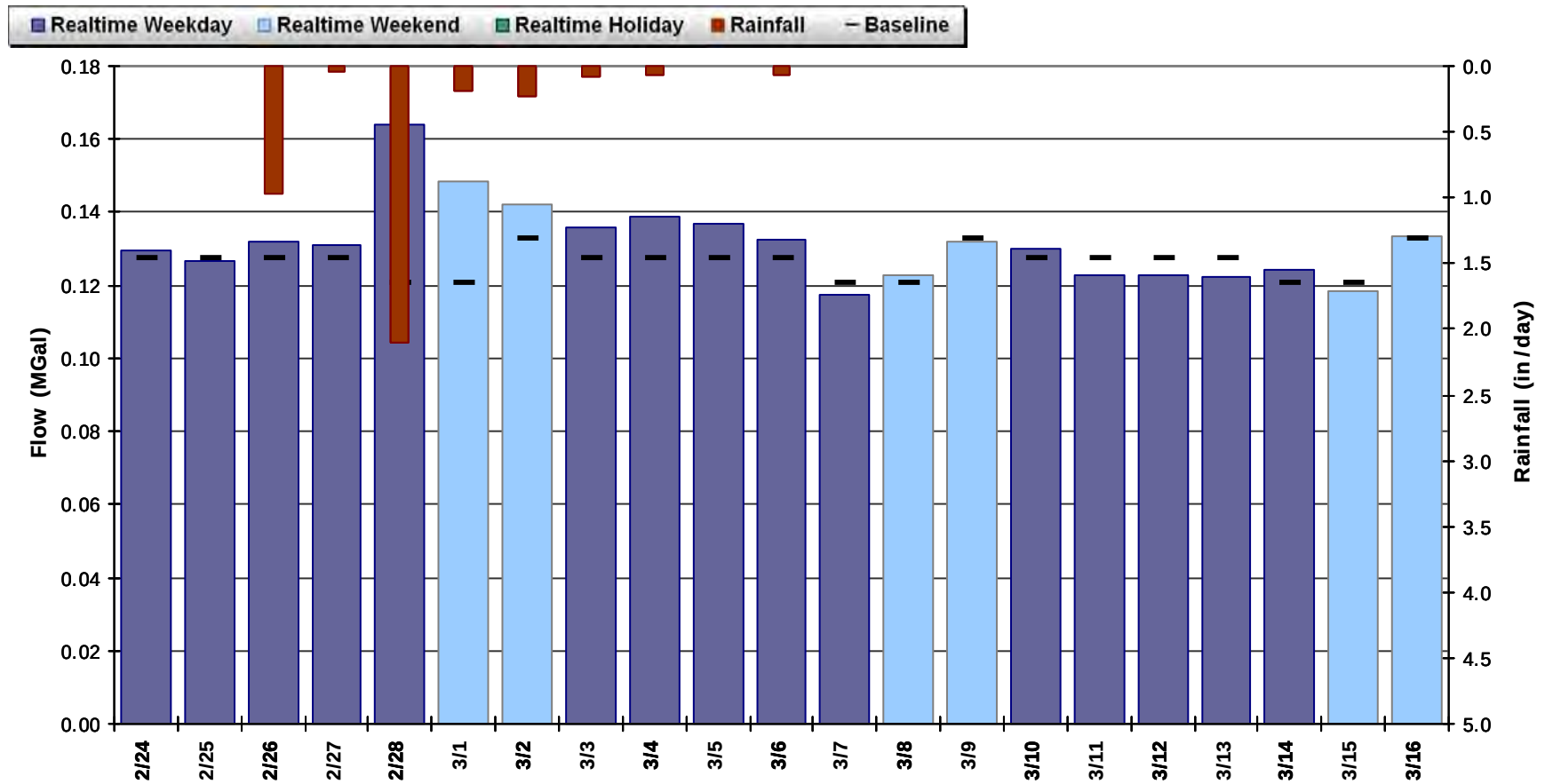


SITE 4

Period Flow Summary: Daily Flow Totals

Avg Period Flow: 0.132 MGal Peak Daily Flow: 0.164 MGal Min Daily Flow: 0.117 MGal

Total Period Rainfall: 3.74 inches

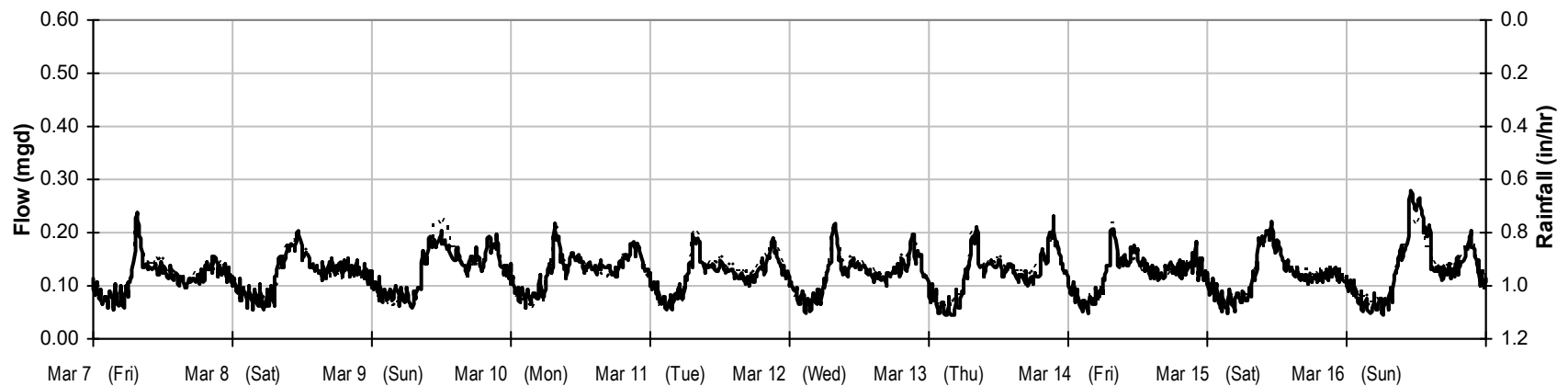
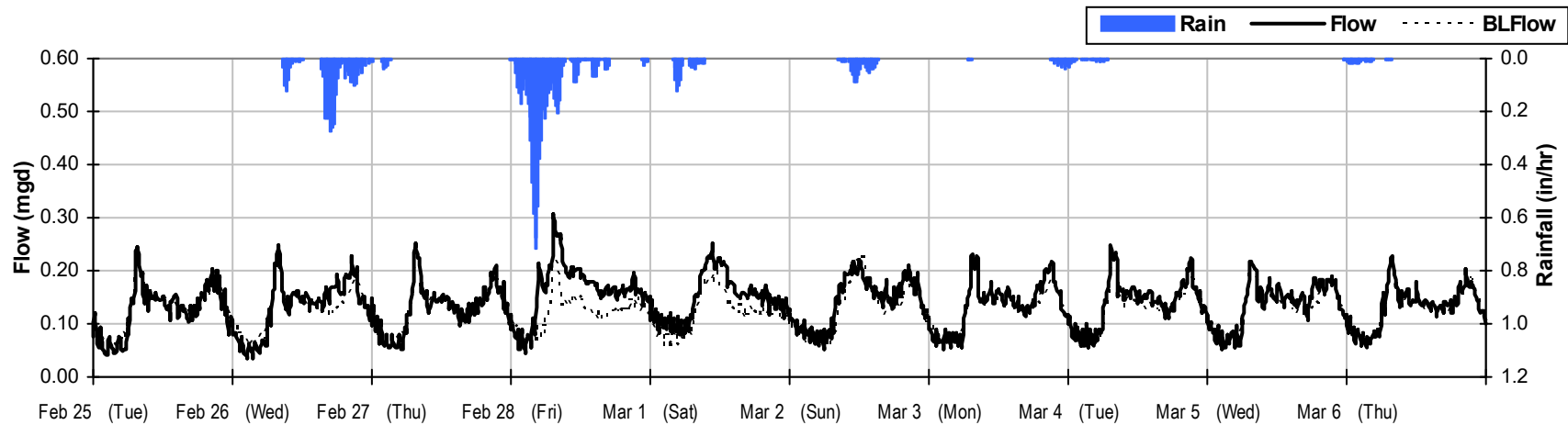




SITE 4

Flow Summary: 2/25/2014 to 3/16/2014

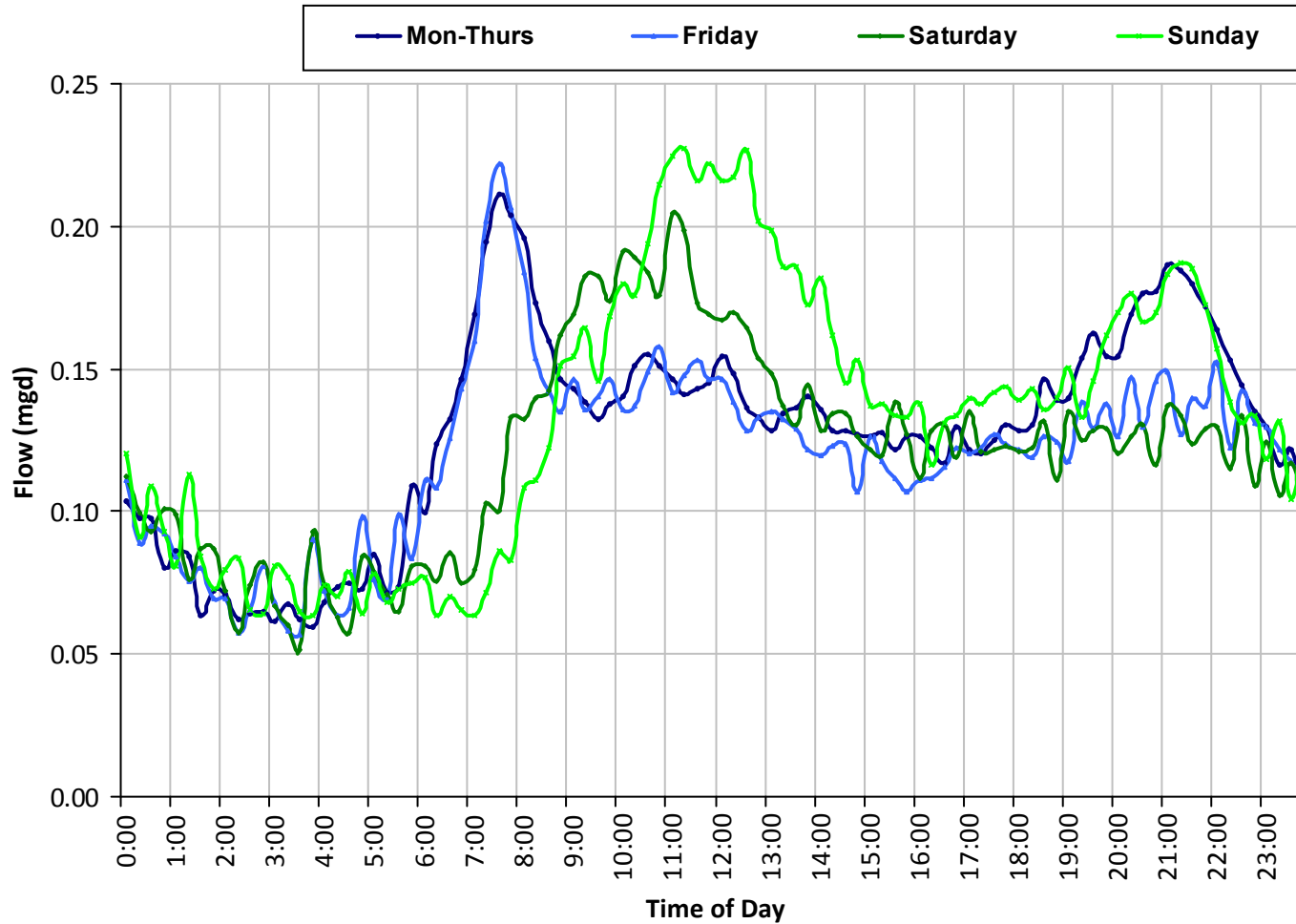
Total Period Rainfall: 3.74 inches **Avg Flow: 0.132 mgd** **Peak Flow: 0.306 mgd** **Min Flow: 0.035 mgd**





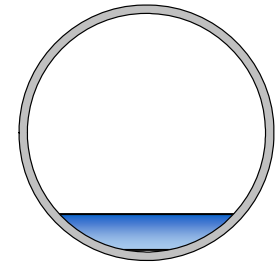
SITE 4

Baseline Flow Hydrographs



Baseline Flow:

0.126 mgd

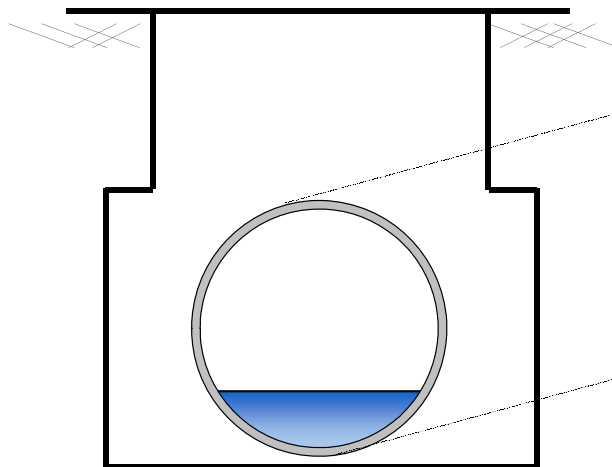
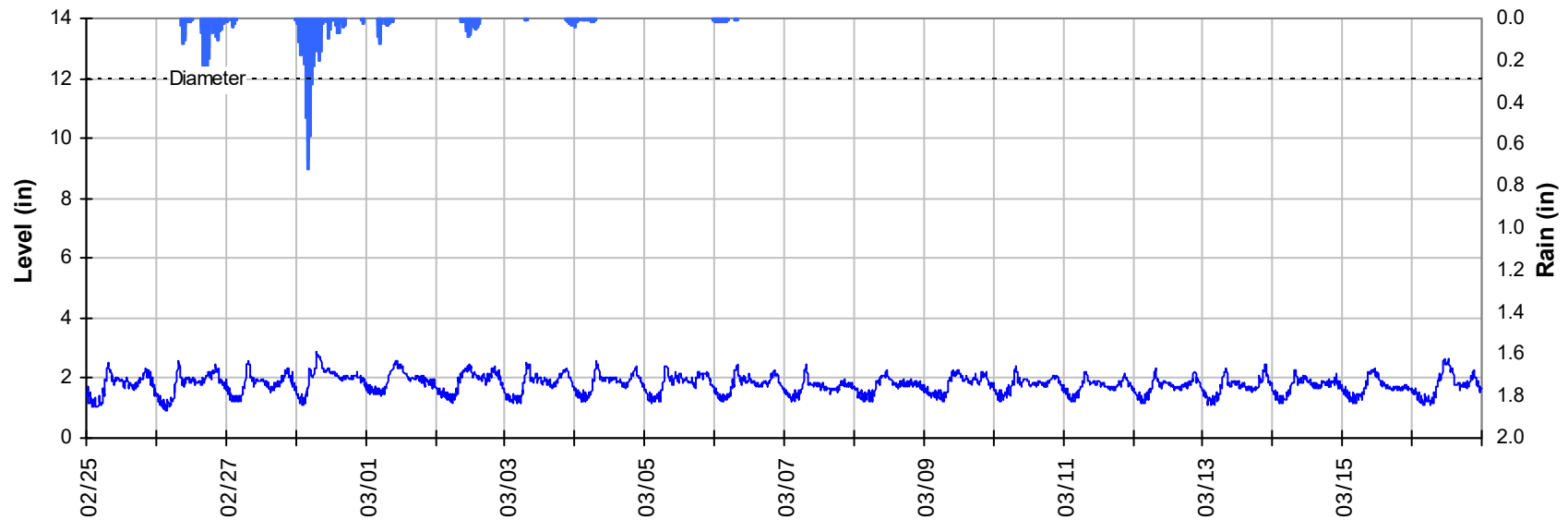




SITE 4

Site Capacity and Surge Summary

Realtime Flow Levels with Rainfall Data over Monitoring Period



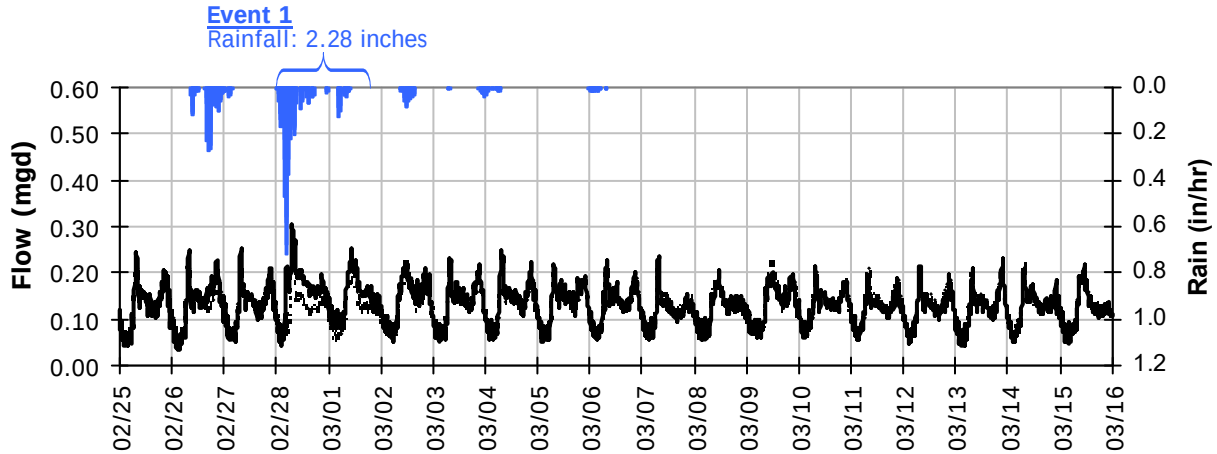
Pipe Diameter: 12 inches
Peak Measured Level: 2.86 inches
Peak d/D Ratio: 0.24



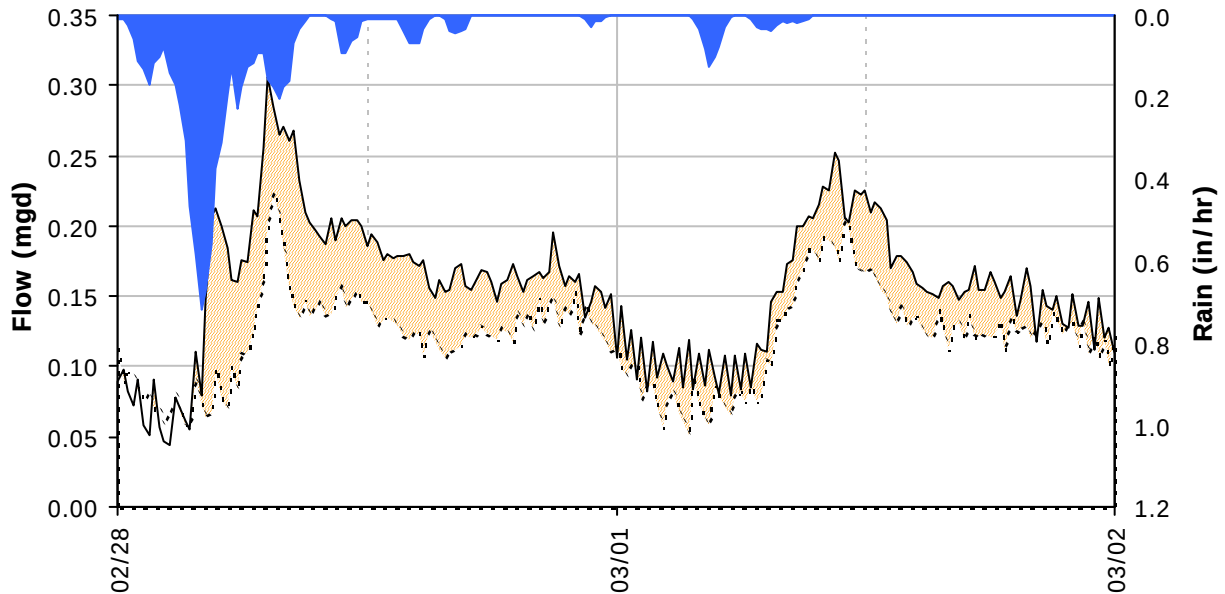
SITE 4

I/I Summary: Event 1

Baseline and Realtime Flows with Rainfall Data over Monitoring Period



Event 1 Detail Graph



Storm Event I/I Analysis (Rain = 2.28 inches)

Capacity

Peak Flow: 0.31 mgd
PF: 2.42

Inflow / Infiltration

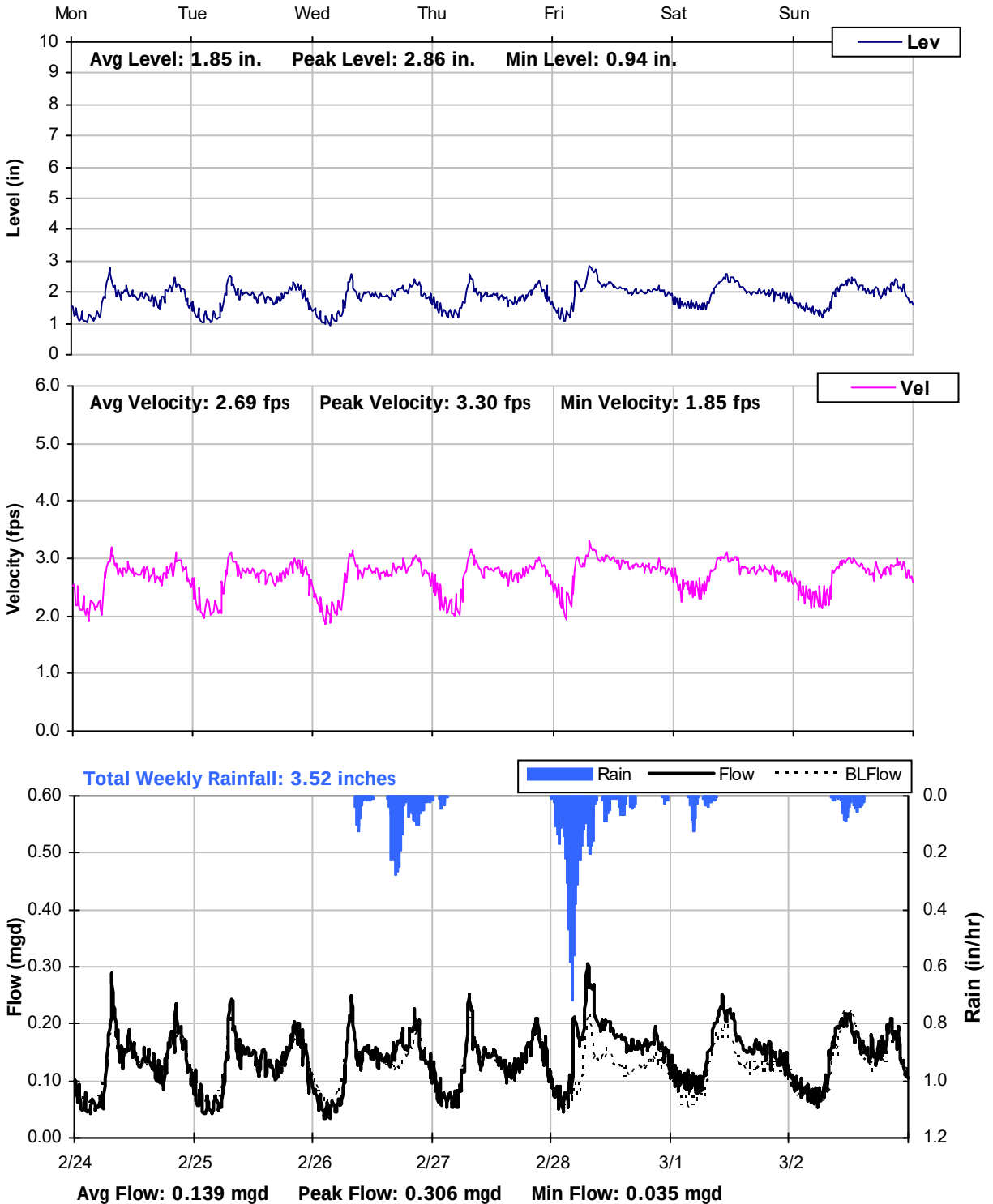
Peak I/I Rate: 0.14 mgd
Total I/I: 71,000 gallons



SITE 4

Weekly Level, Velocity and Flow Hydrographs

2/24/2014 to 3/3/2014

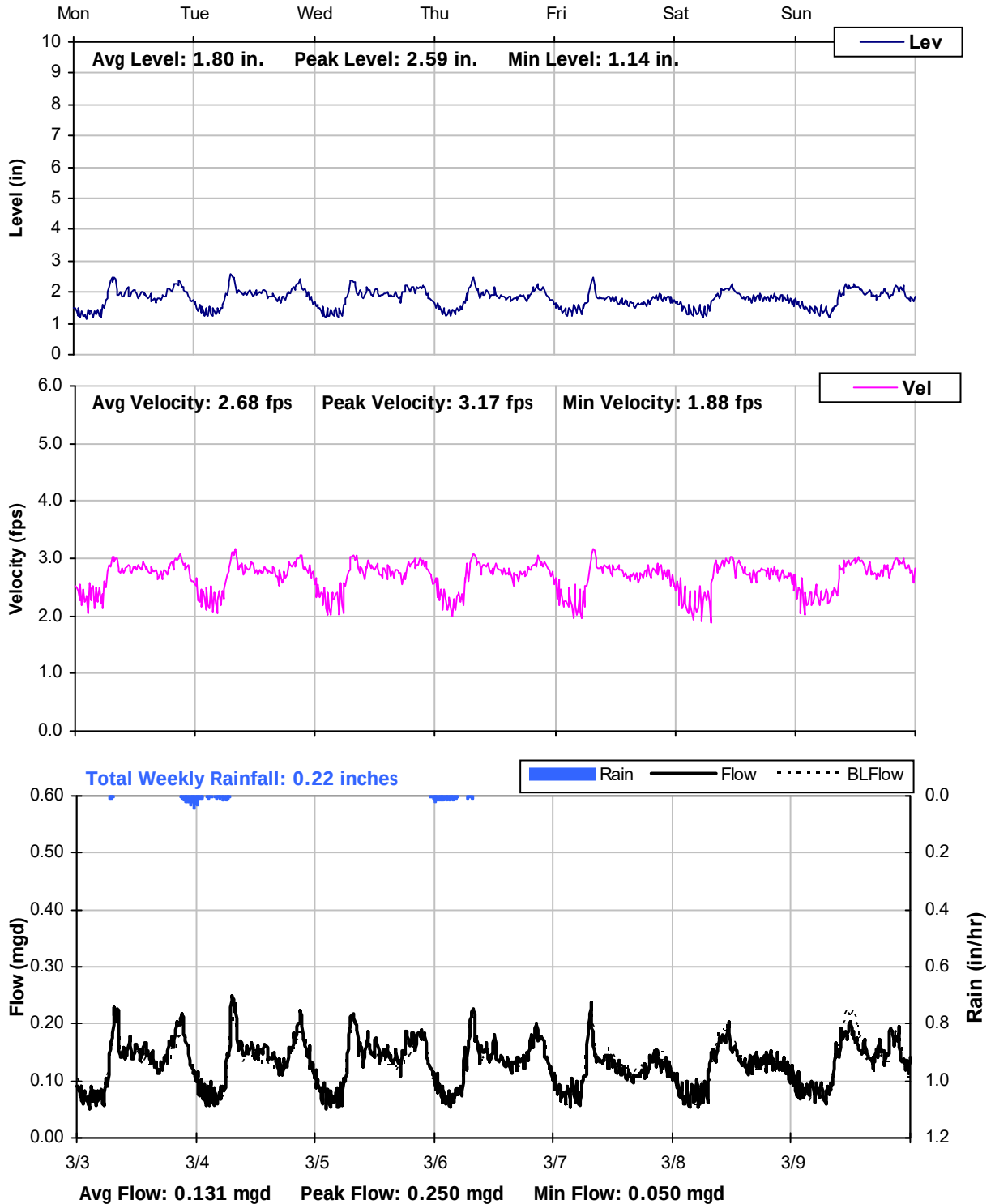




SITE 4

Weekly Level, Velocity and Flow Hydrographs

3/3/2014 to 3/10/2014

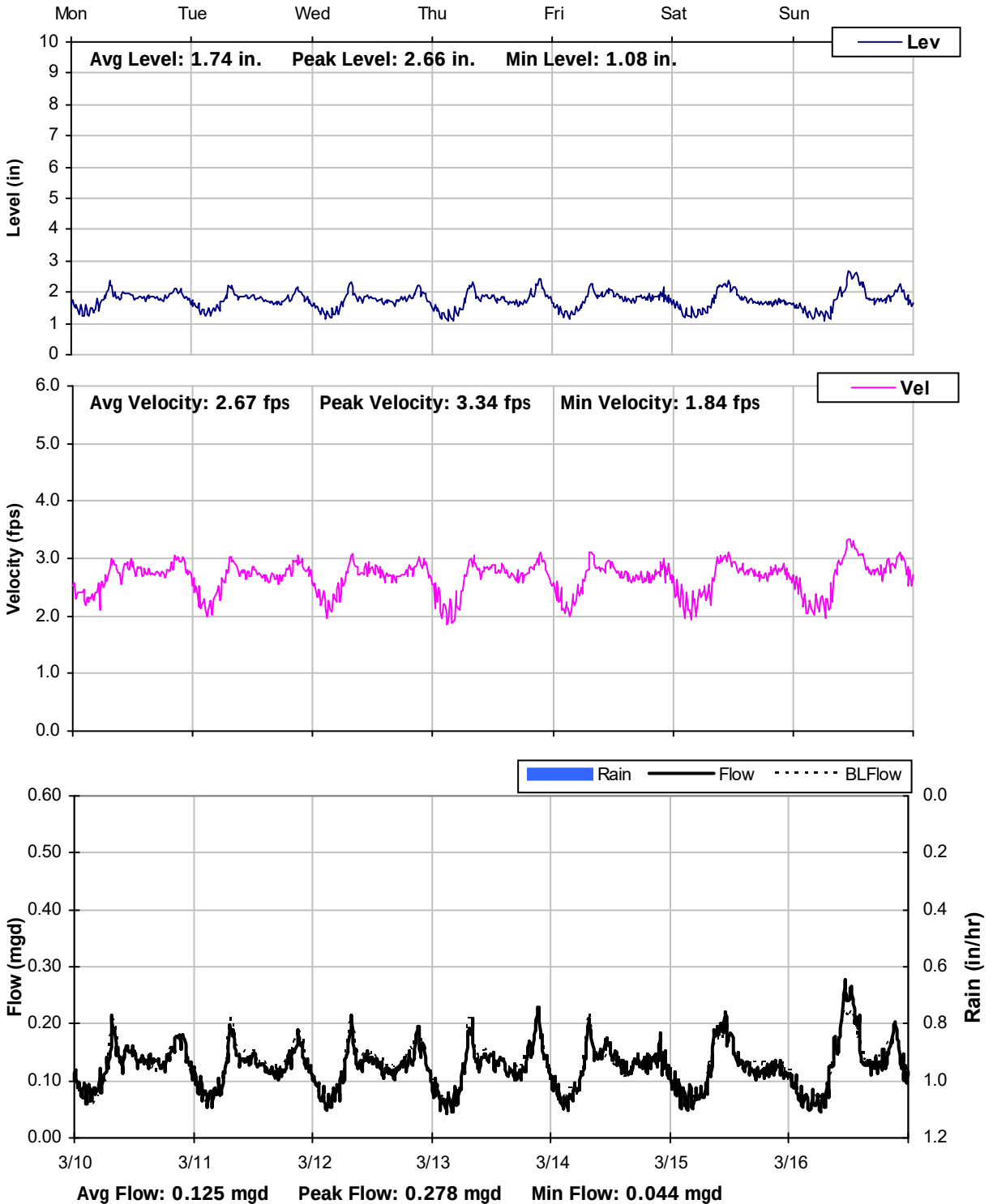




SITE 4

Weekly Level, Velocity and Flow Hydrographs

3/10/2014 to 3/17/2014





City of Gilroy

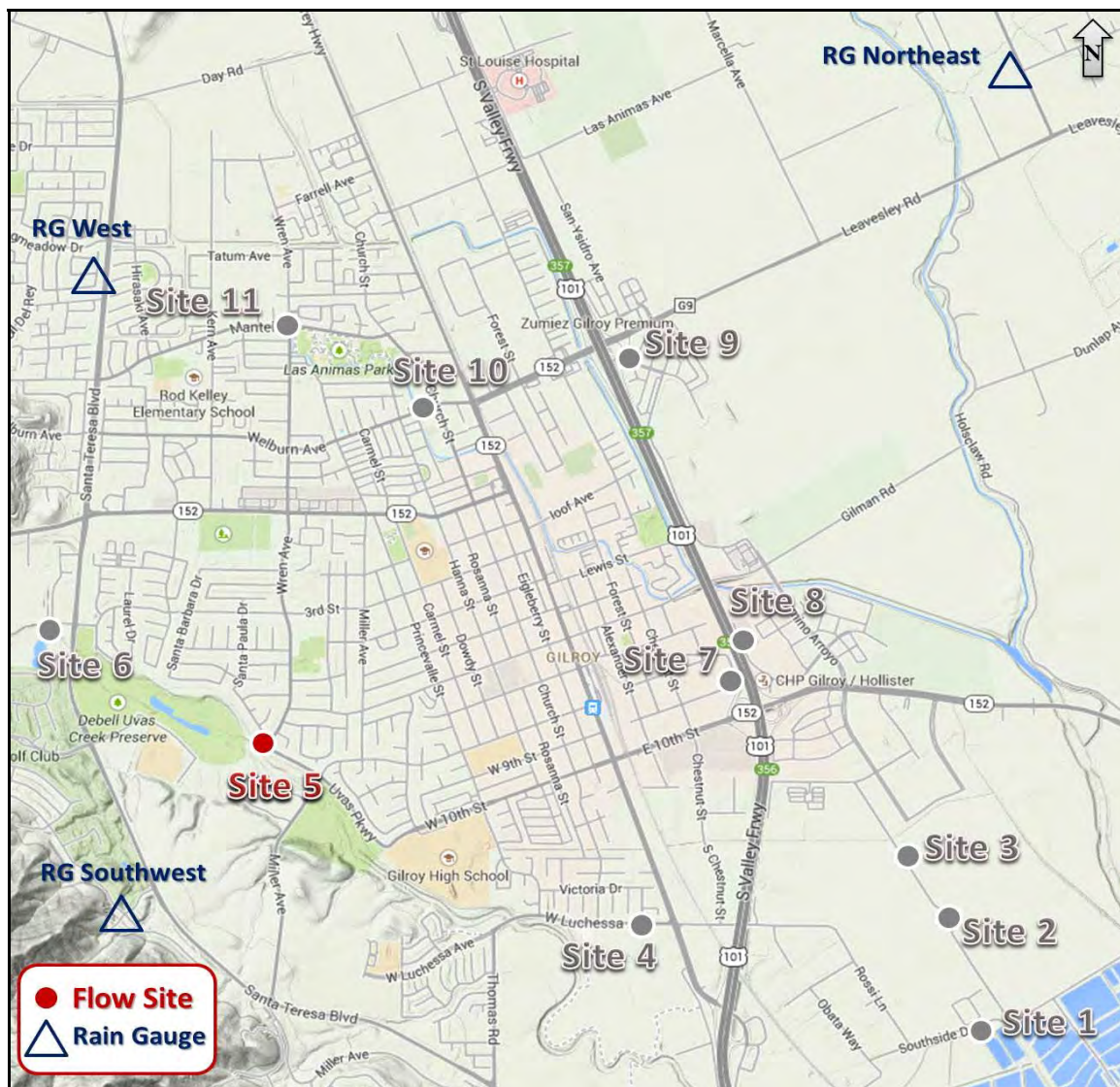
Sanitary Sewer Flow Monitoring

Temporary Monitoring: February and March, 2014

Monitoring Site: Site 5

Location: Wren Avenue and Uvas Park Drive

Data Summary Report



Vicinity Map: Site 5



SITE 5

Site Information

Location: Wren Avenue and Uvas Park Drive

Coordinates: 121.5881° W, 37.0010° N

Rim Elevation: 215 feet

Pipe Diameter: 10.5 inches

Baseline Flow: 0.120 mgd

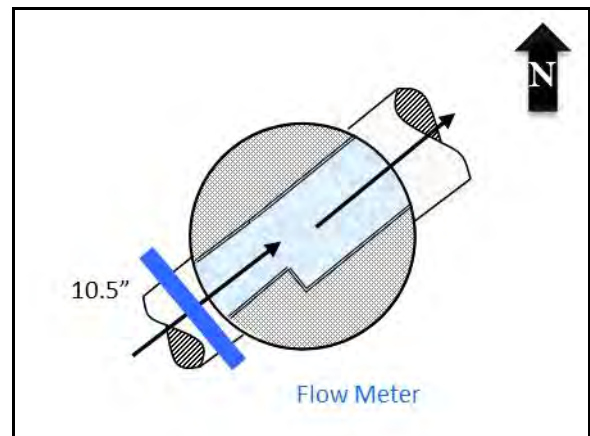
Peak Measured Flow: 0.410 mgd



Satellite Map



Sewer Map



Flow Sketch



Street View



Plan View



SITE 5

Additional Site Photos

Effluent Pipe



Influent Pipe



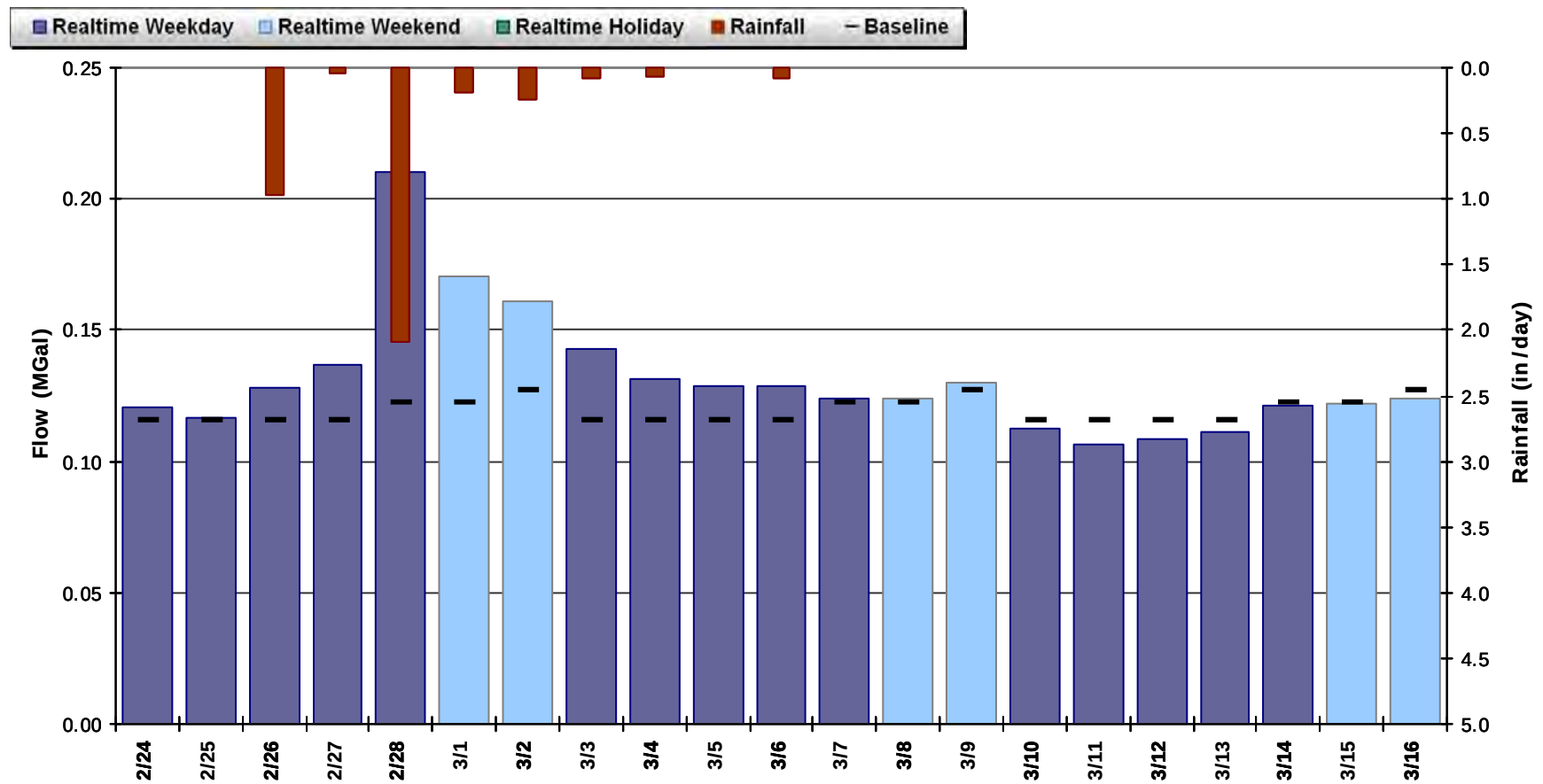


SITE 5

Period Flow Summary: Daily Flow Totals

Avg Period Flow: 0.131 MGal Peak Daily Flow: 0.210 MGal Min Daily Flow: 0.107 MGal

Total Period Rainfall: 3.75 inches

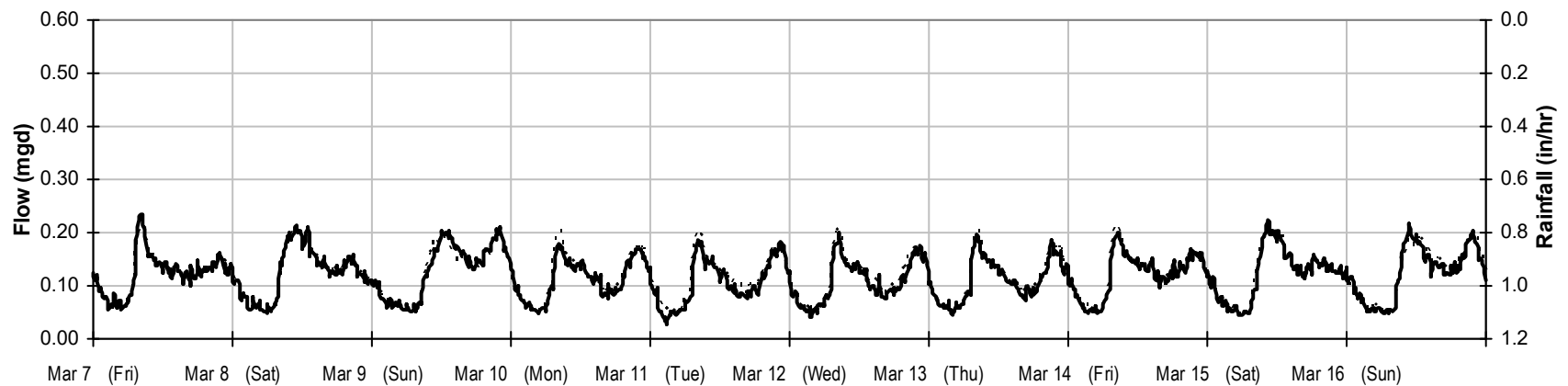
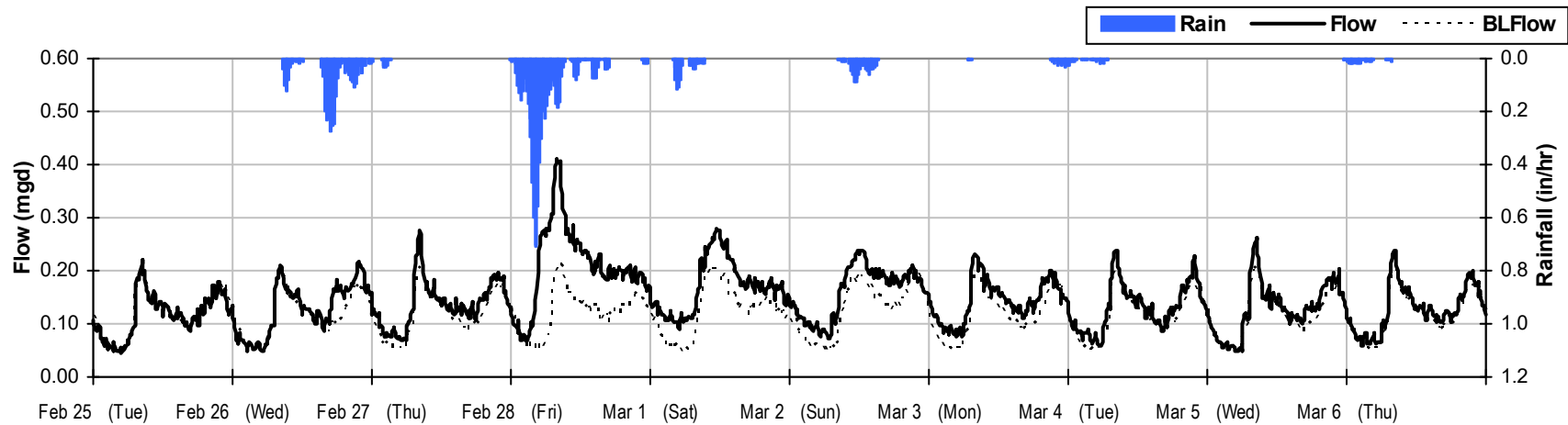




SITE 5

Flow Summary: 2/25/2014 to 3/16/2014

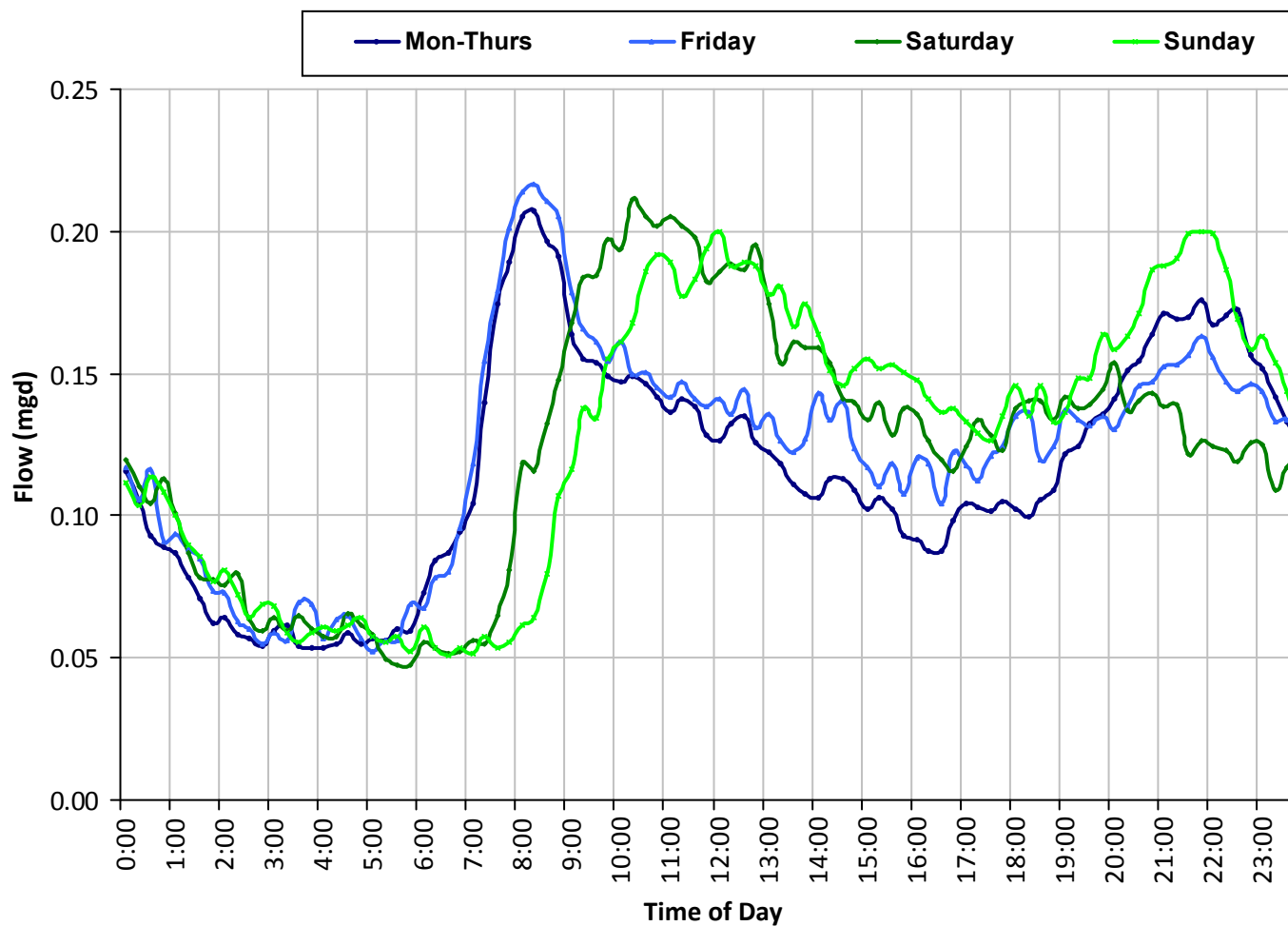
Total Period Rainfall: 3.75 inches **Avg Flow: 0.132 mgd** **Peak Flow: 0.410 mgd** **Min Flow: 0.027 mgd**





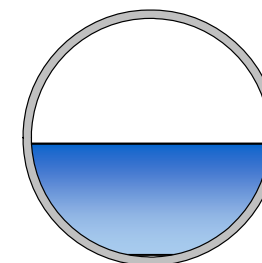
SITE 5

Baseline Flow Hydrographs



Baseline Flow:

0.120 mgd

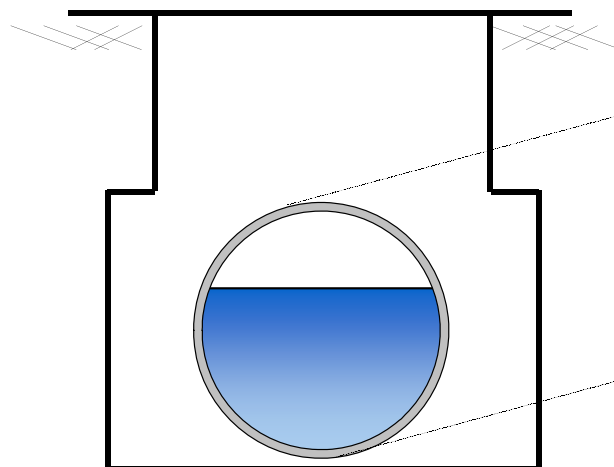
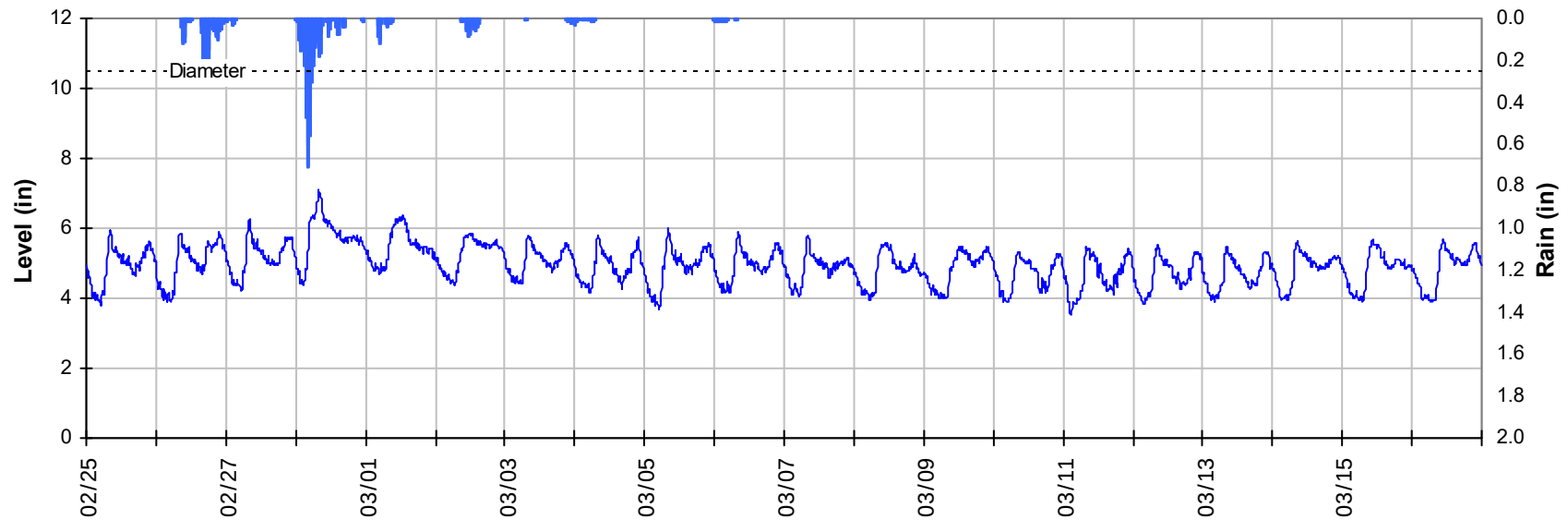




SITE 5

Site Capacity and Surge Summary

Realtime Flow Levels with Rainfall Data over Monitoring Period



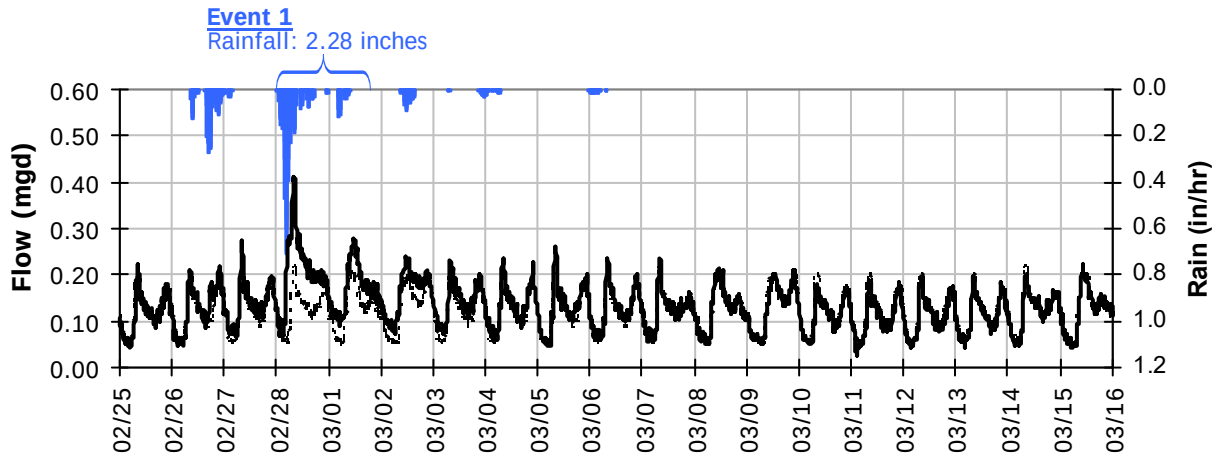
Pipe Diameter: 10.5 inches
Peak Measured Level: 7.1 inches
Peak d/D Ratio: 0.68



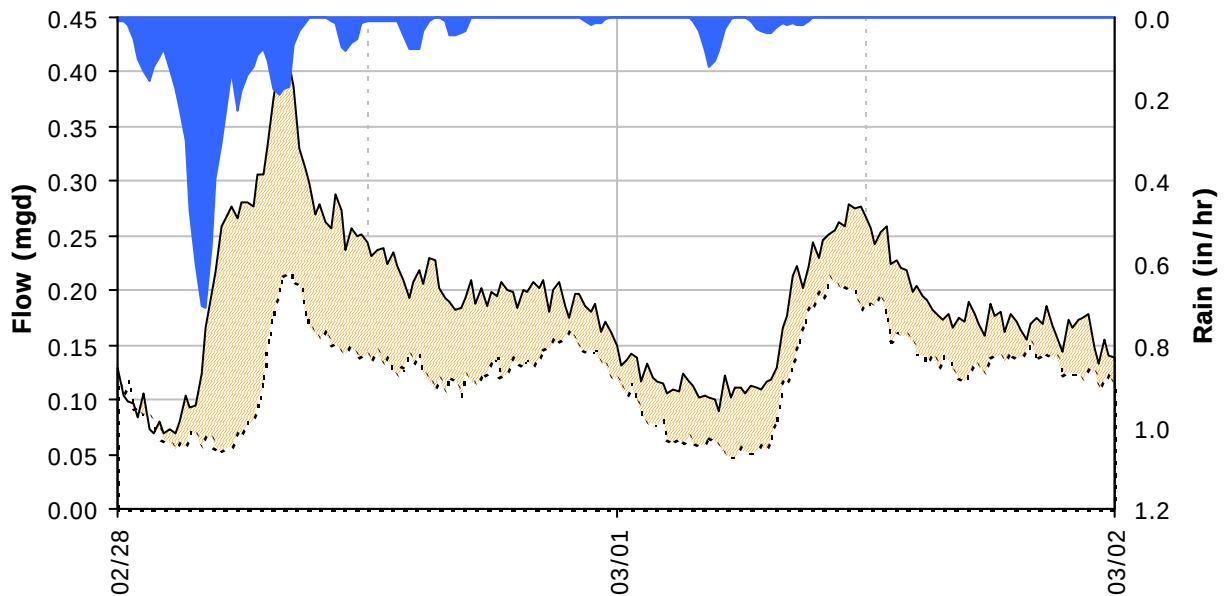
SITE 5

I/I Summary: Event 1

Baseline and Realtime Flows with Rainfall Data over Monitoring Period



Event 1 Detail Graph



Storm Event I/I Analysis (Rain = 2.28 inches)

Capacity

Peak Flow: 0.41 mgd
PF: 3.43

Inflow / Infiltration

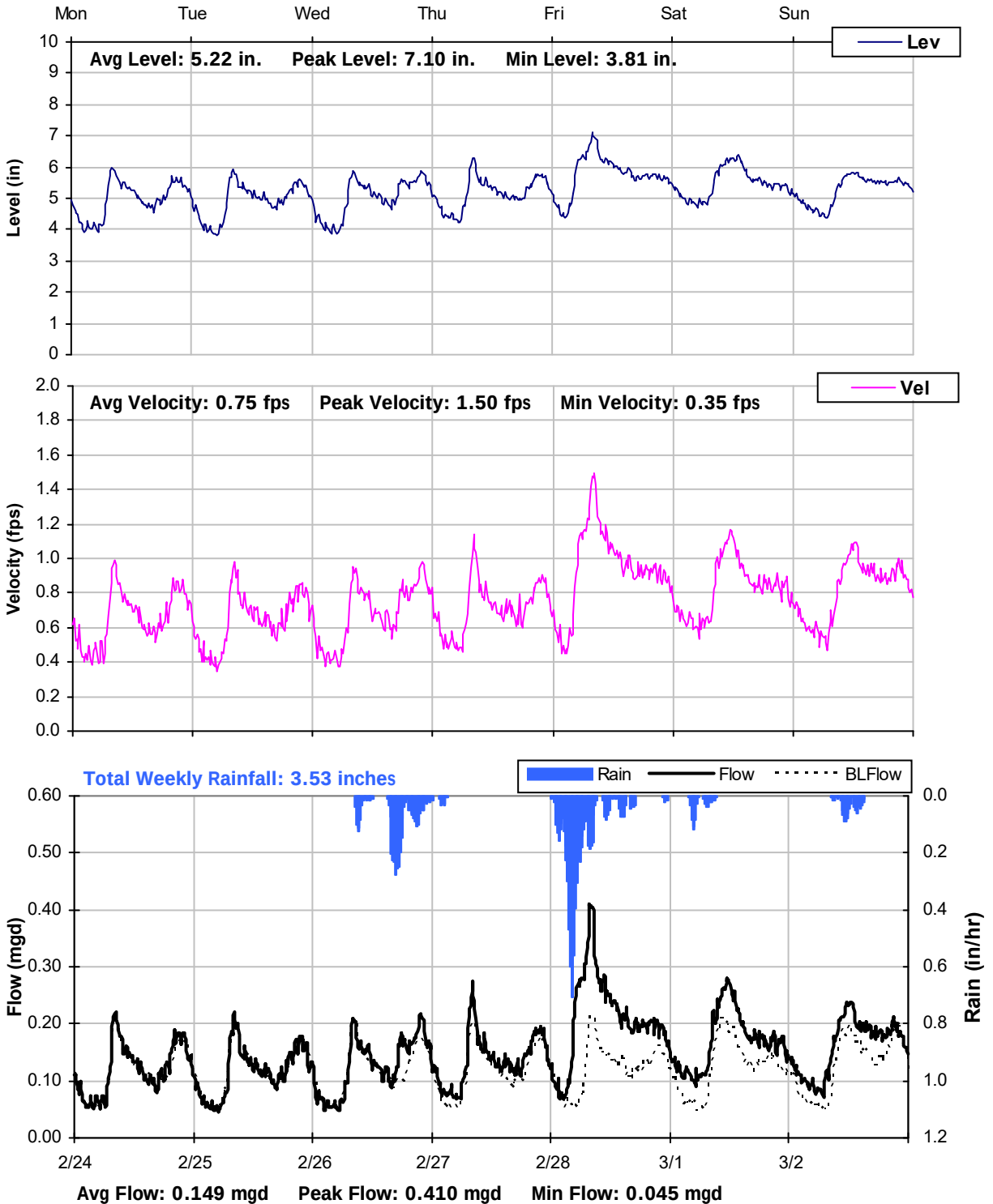
Peak I/I Rate: 0.22 mgd
Total I/I: 135,000 gallons



SITE 5

Weekly Level, Velocity and Flow Hydrographs

2/24/2014 to 3/3/2014

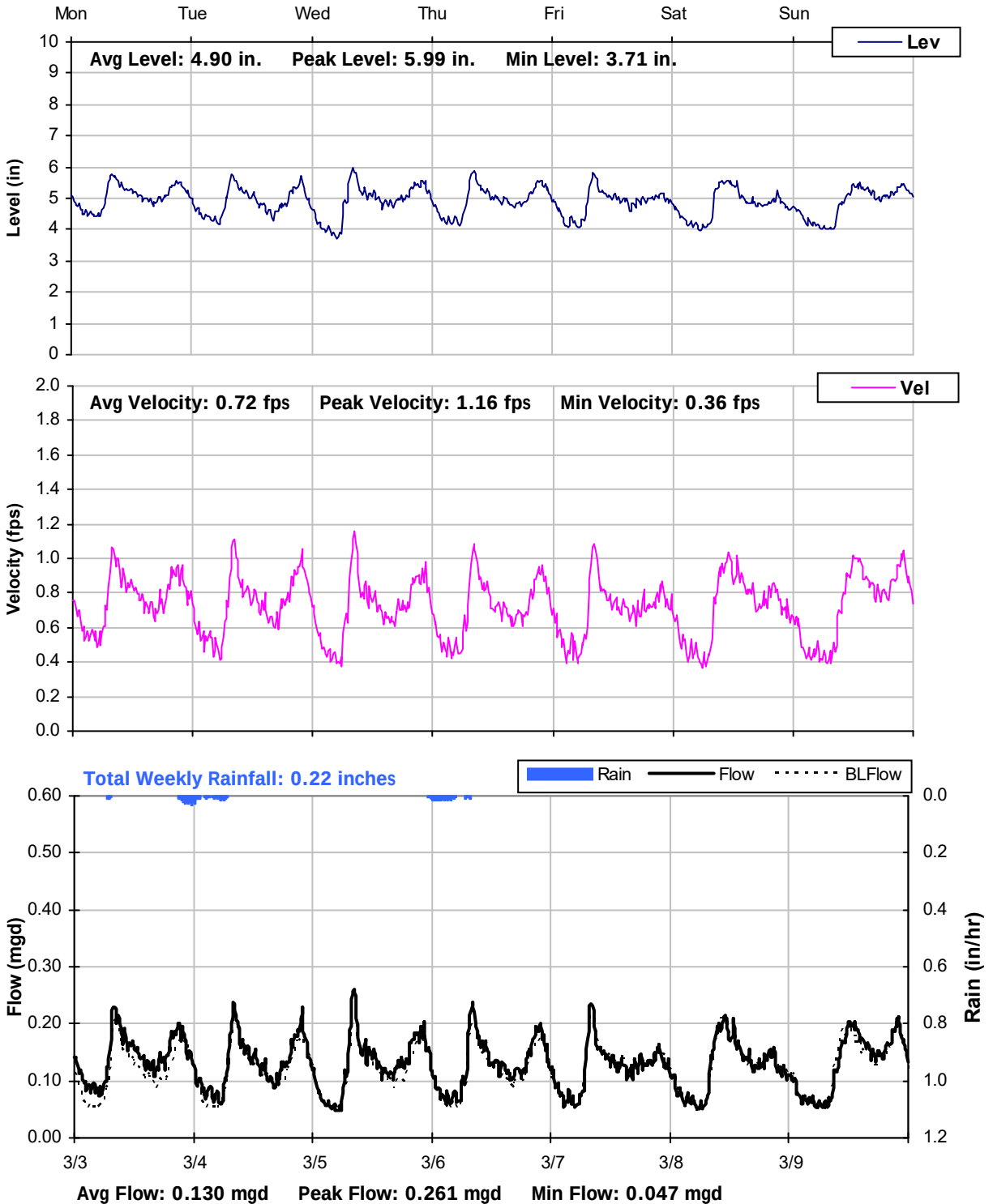




SITE 5

Weekly Level, Velocity and Flow Hydrographs

3/3/2014 to 3/10/2014

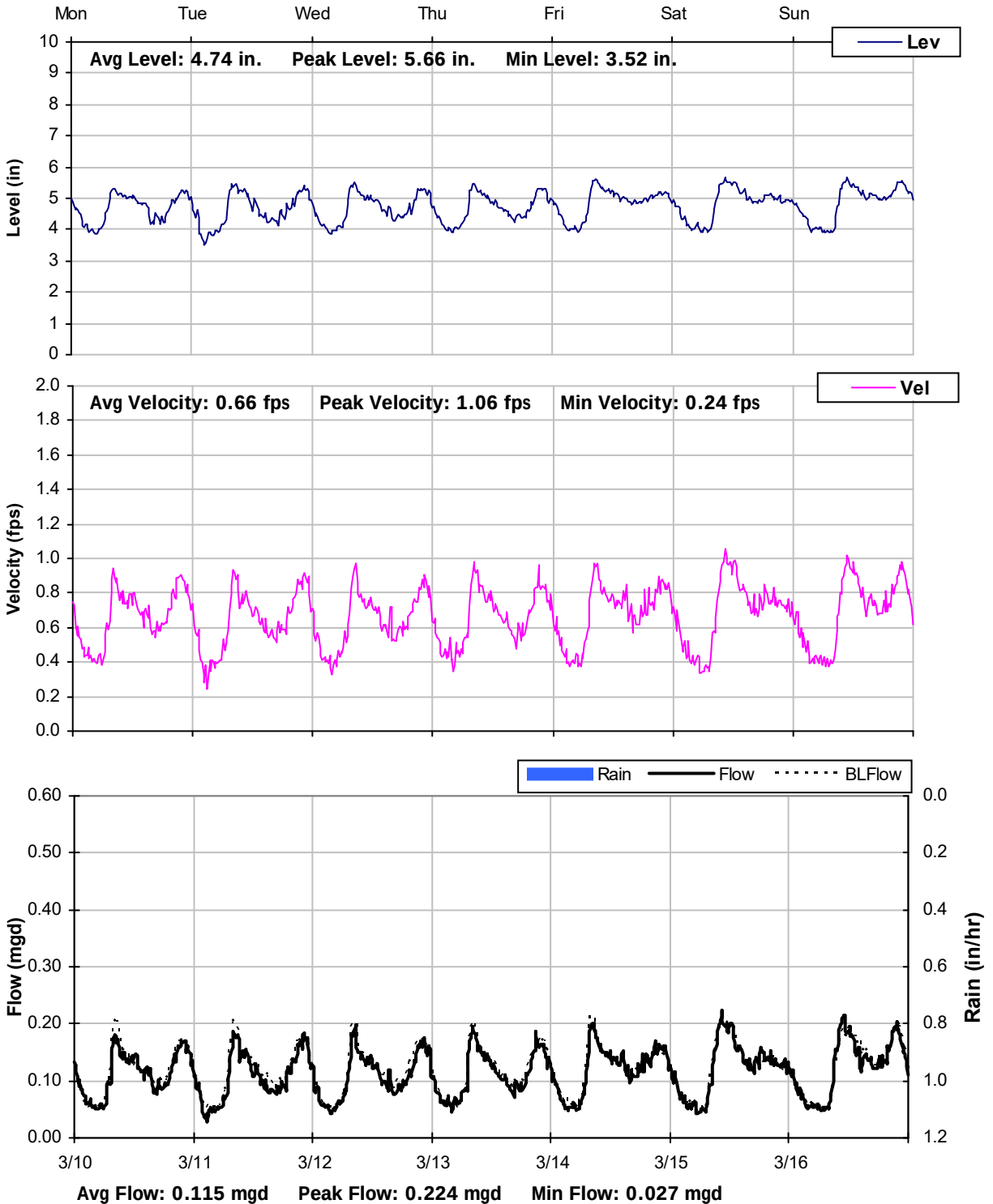




SITE 5

Weekly Level, Velocity and Flow Hydrographs

3/10/2014 to 3/17/2014





City of Gilroy

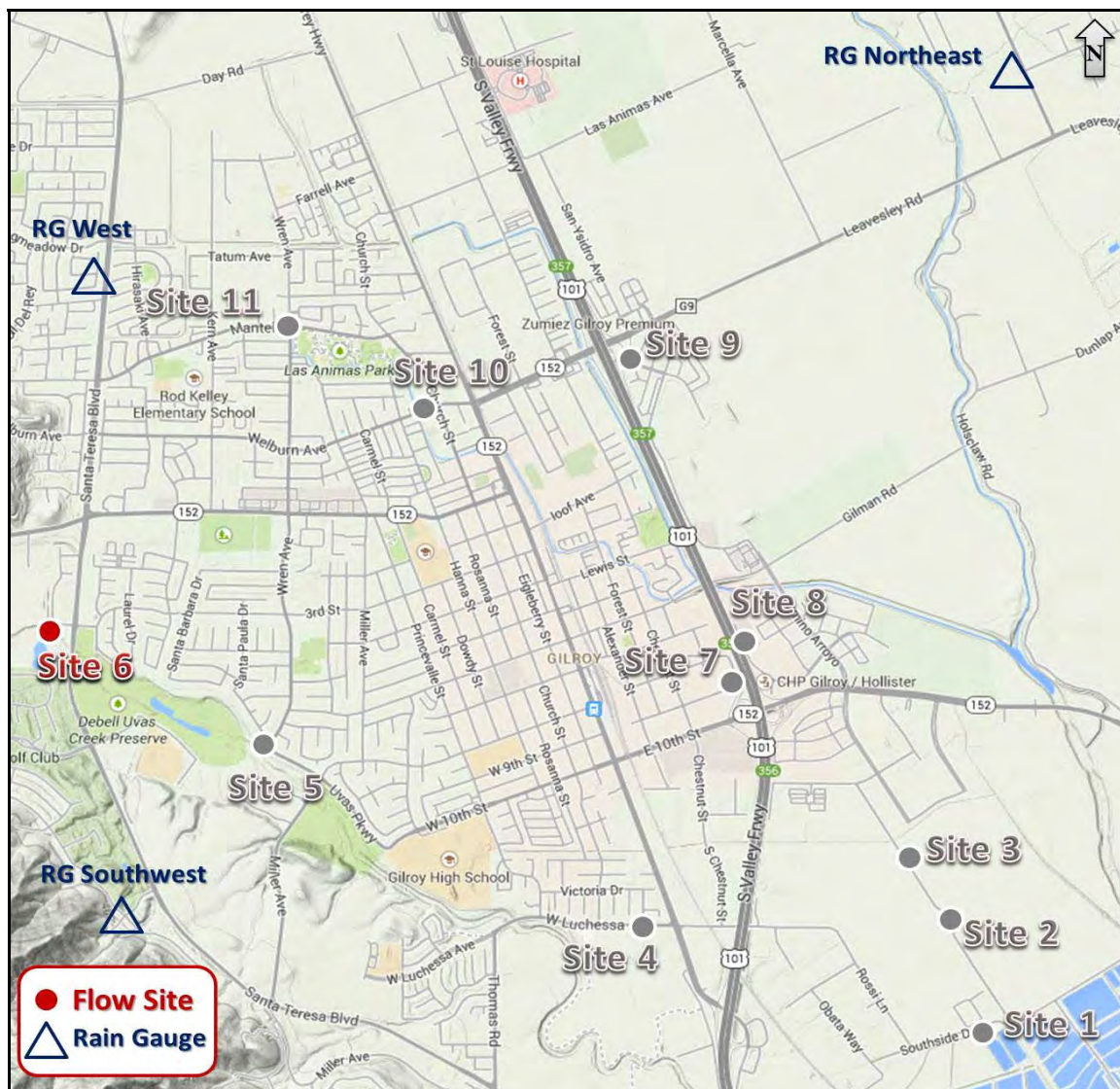
Sanitary Sewer Flow Monitoring

Temporary Monitoring: February and March, 2014

Monitoring Site: Site 6

Location: 100' south of west end of 3rd Street on bike path

Data Summary Report



Vicinity Map: Site 6



SITE 6

Site Information

Location: 100' south of west end of 3rd Street on bike path

Coordinates: 121.6019° W, 37.0073° N

Rim Elevation: 226 feet

Pipe Diameter: 24 inches

Baseline Flow: 0.071 mgd

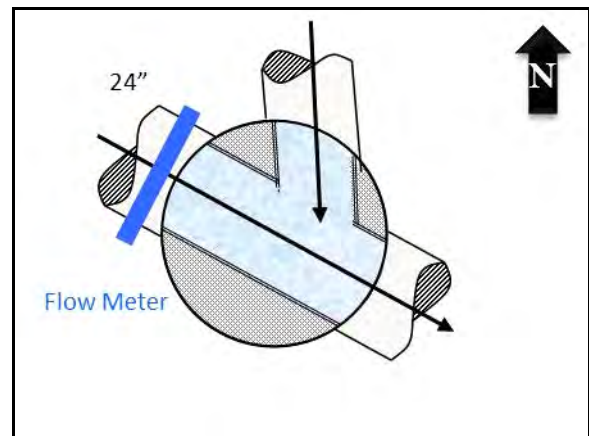
Peak Measured Flow: 0.152 mgd



Satellite Map



Sewer Map



Flow Sketch



Street View



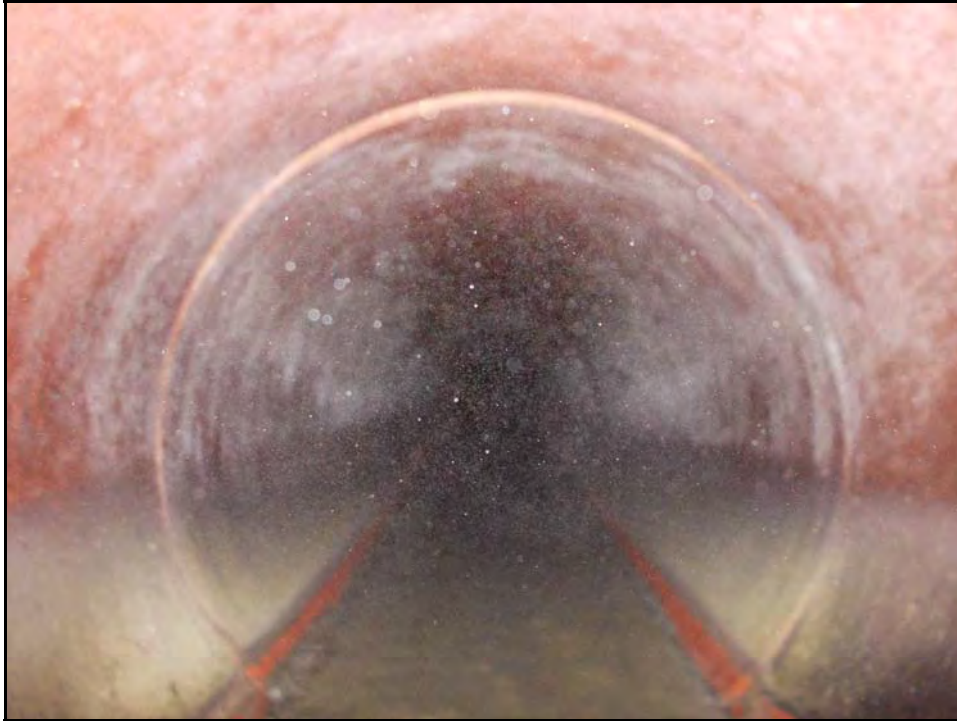
Plan View



SITE 6

Additional Site Photos

Effluent Pipe



Influent Pipe





SITE 6

Additional Site Photos

Lateral



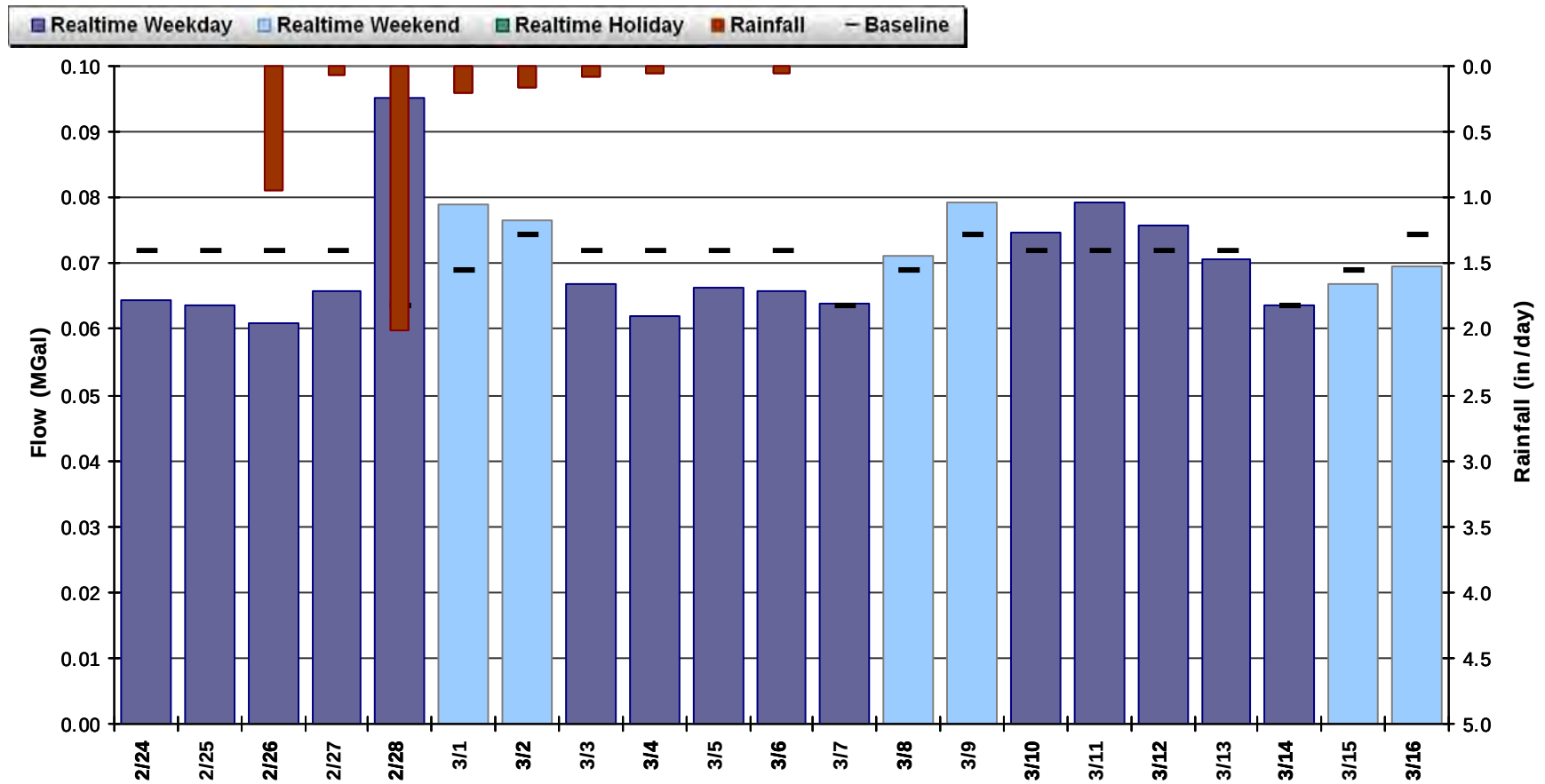


SITE 6

Period Flow Summary: Daily Flow Totals

Avg Period Flow: 0.071 MGal Peak Daily Flow: 0.095 MGal Min Daily Flow: 0.061 MGal

Total Period Rainfall: 3.58 inches

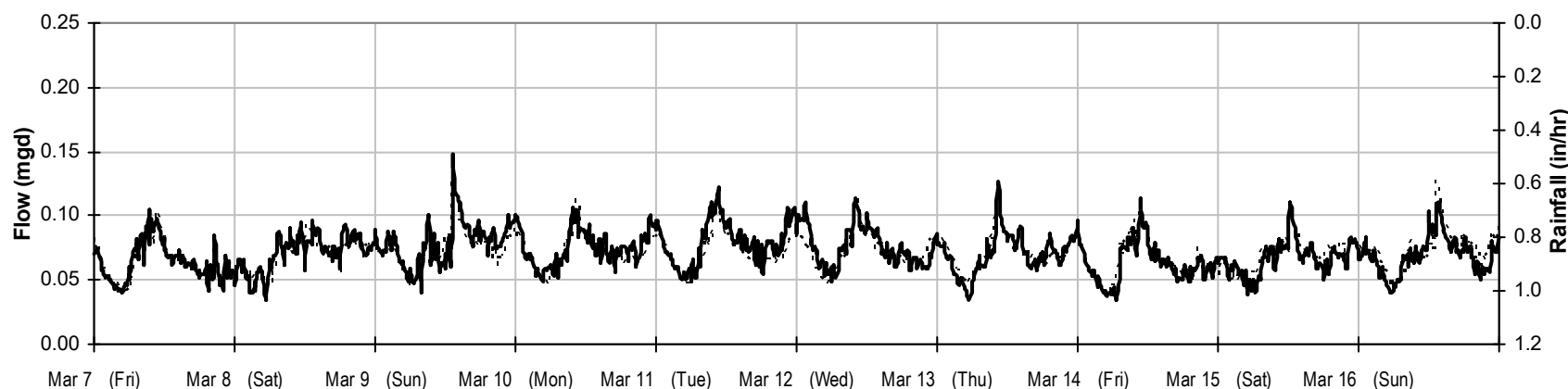
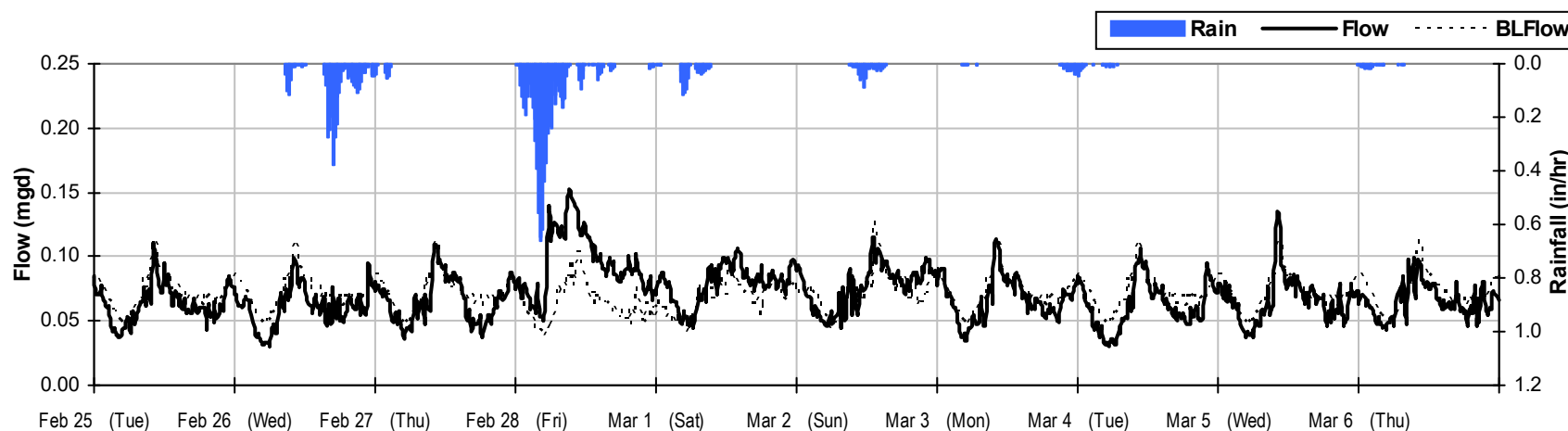




SITE 6

Flow Summary: 2/25/2014 to 3/16/2014

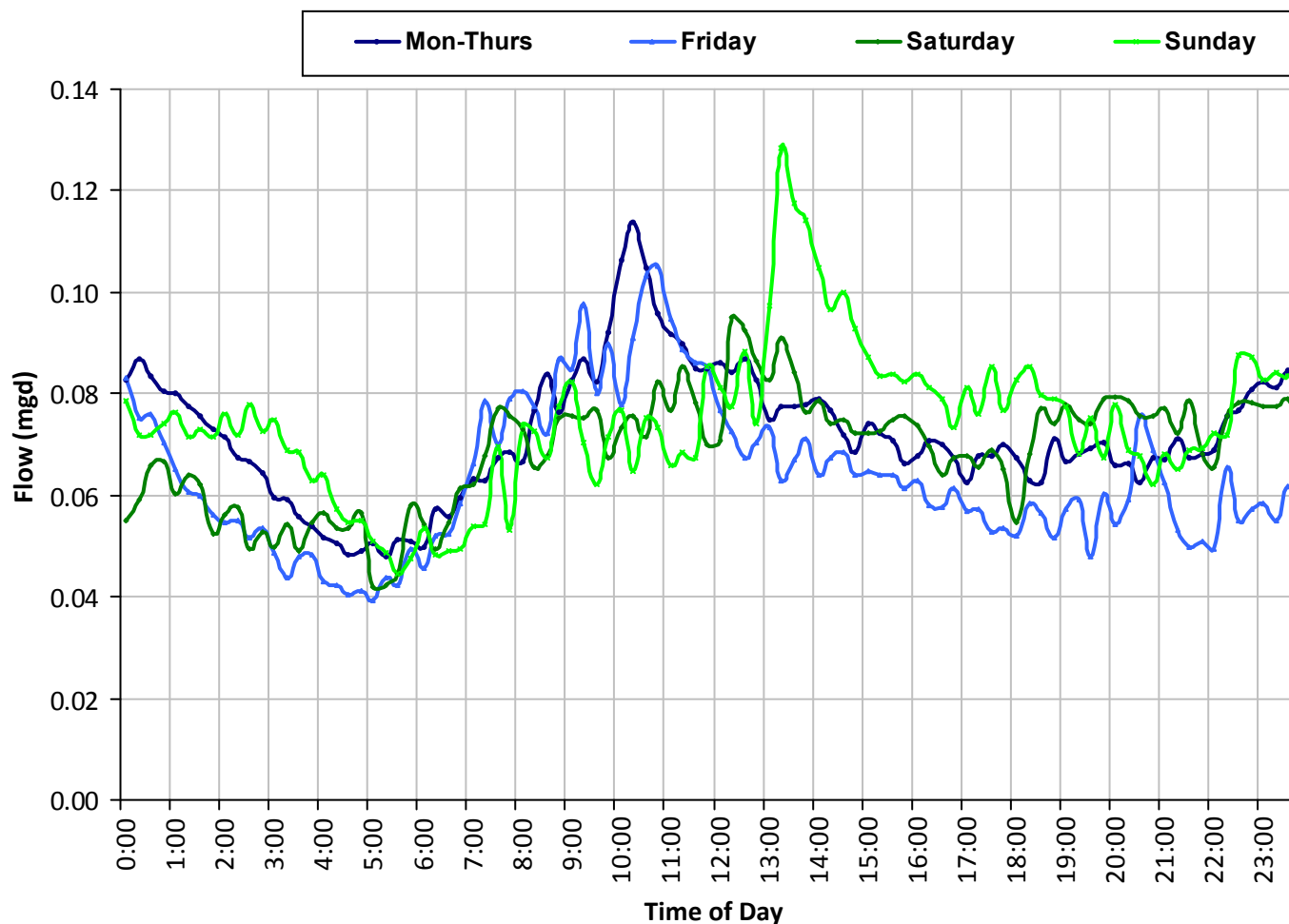
Total Period Rainfall: 3.58 inches Avg Flow: 0.071 mgd Peak Flow: 0.152 mgd Min Flow: 0.030 mgd





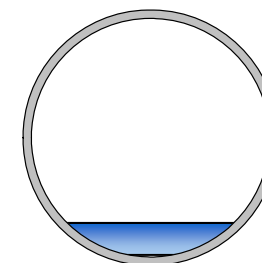
SITE 6

Baseline Flow Hydrographs



Baseline Flow:

0.071 mgd

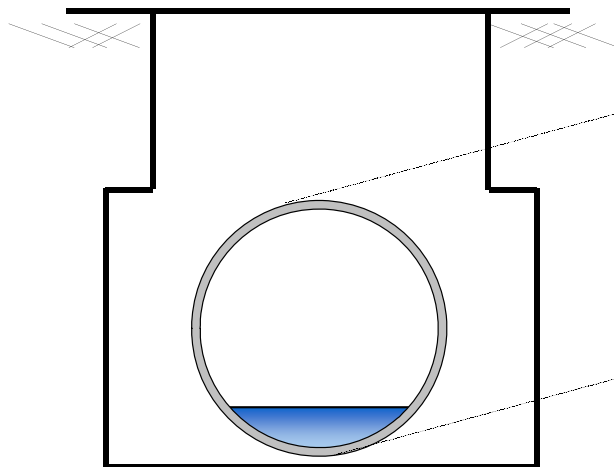
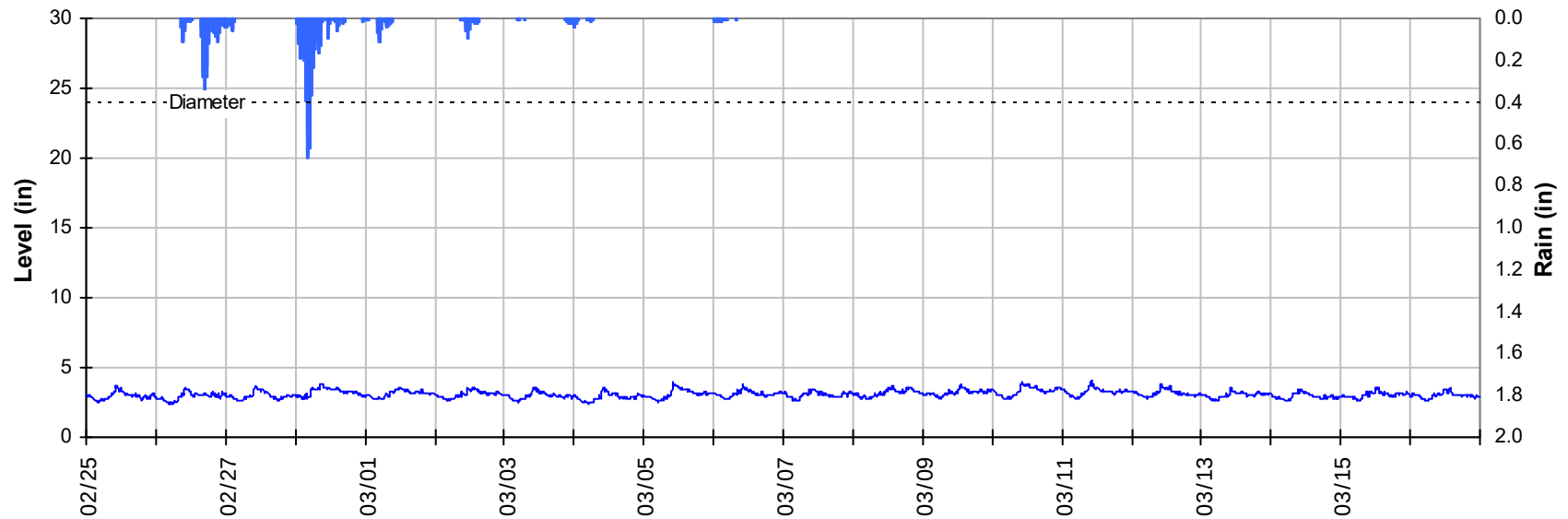




SITE 6

Site Capacity and Surge Summary

Realtime Flow Levels with Rainfall Data over Monitoring Period



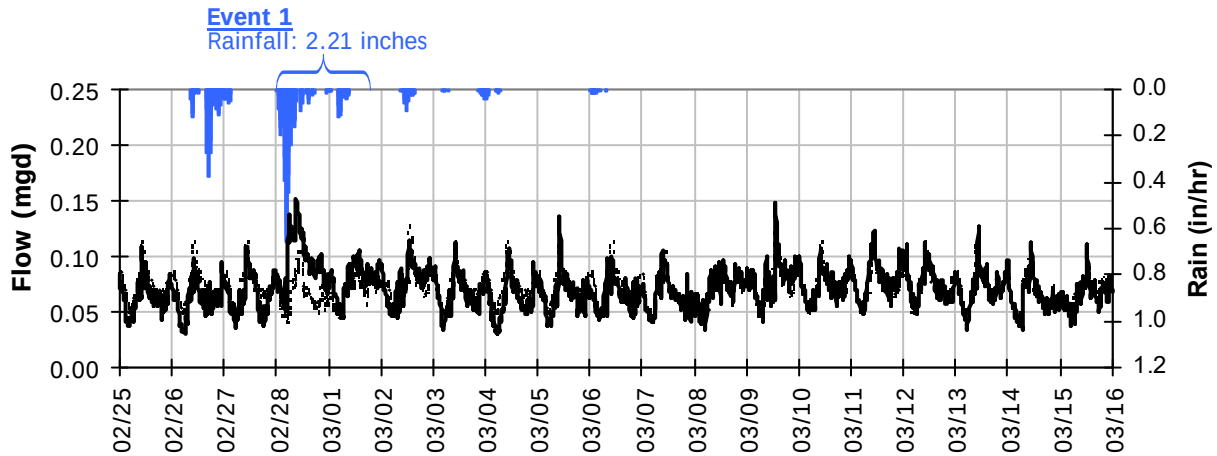
Pipe Diameter: 24 inches
Peak Measured Level: 4.05 inches
Peak d/D Ratio: 0.17



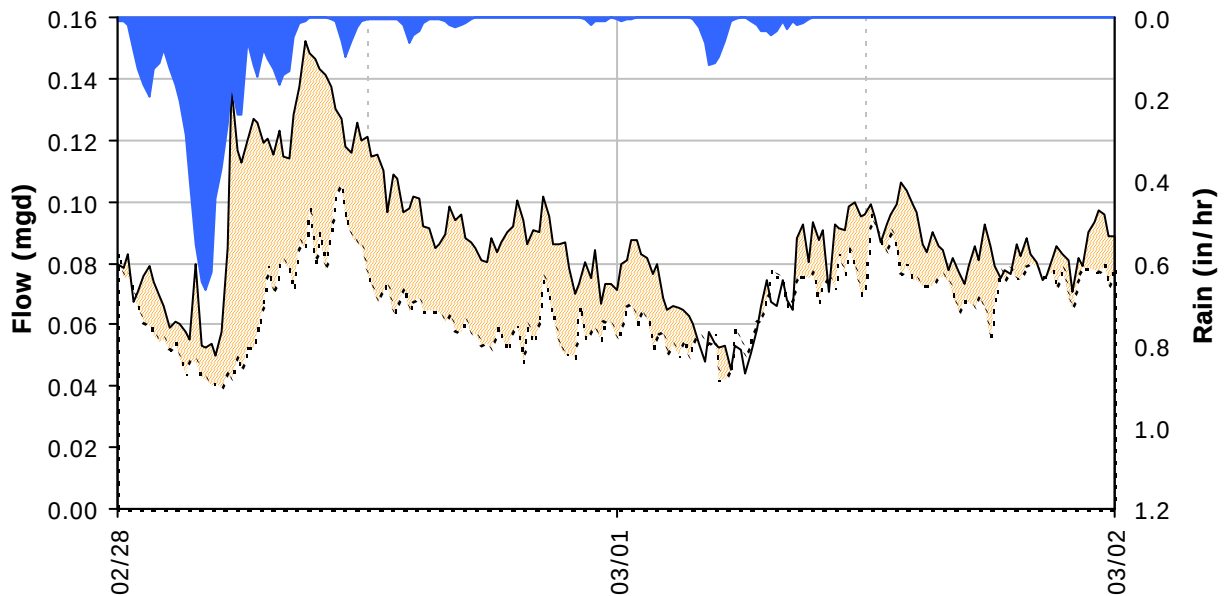
SITE 6

I/I Summary: Event 1

Baseline and Realtime Flows with Rainfall Data over Monitoring Period



Event 1 Detail Graph



Storm Event I/I Analysis (Rain = 2.21 inches)

Capacity

Peak Flow: 0.15 mgd
PF: 2.15

Inflow / Infiltration

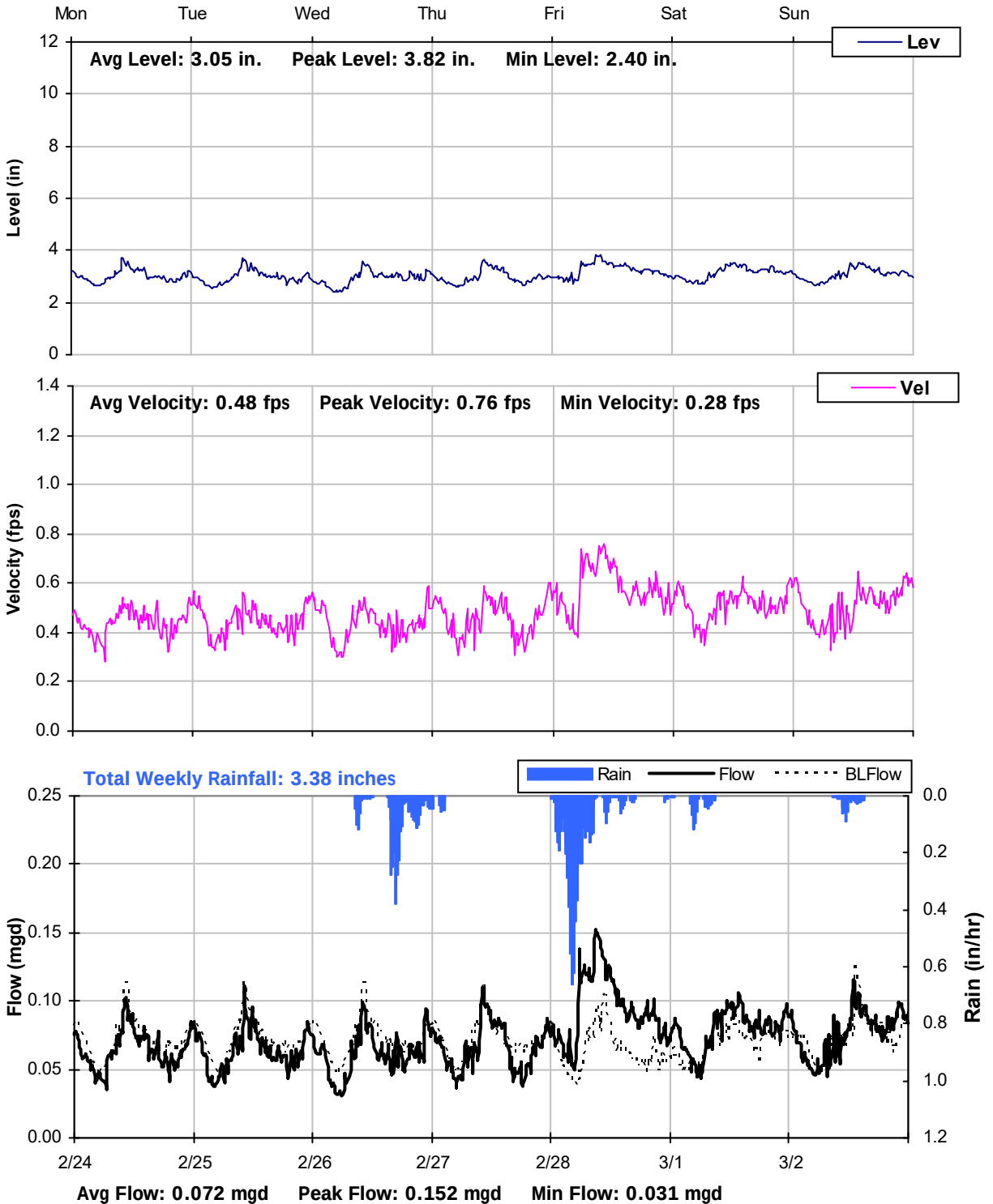
Peak I/I Rate: 0.10 mgd
Total I/I: 42,000 gallons



SITE 6

Weekly Level, Velocity and Flow Hydrographs

2/24/2014 to 3/3/2014

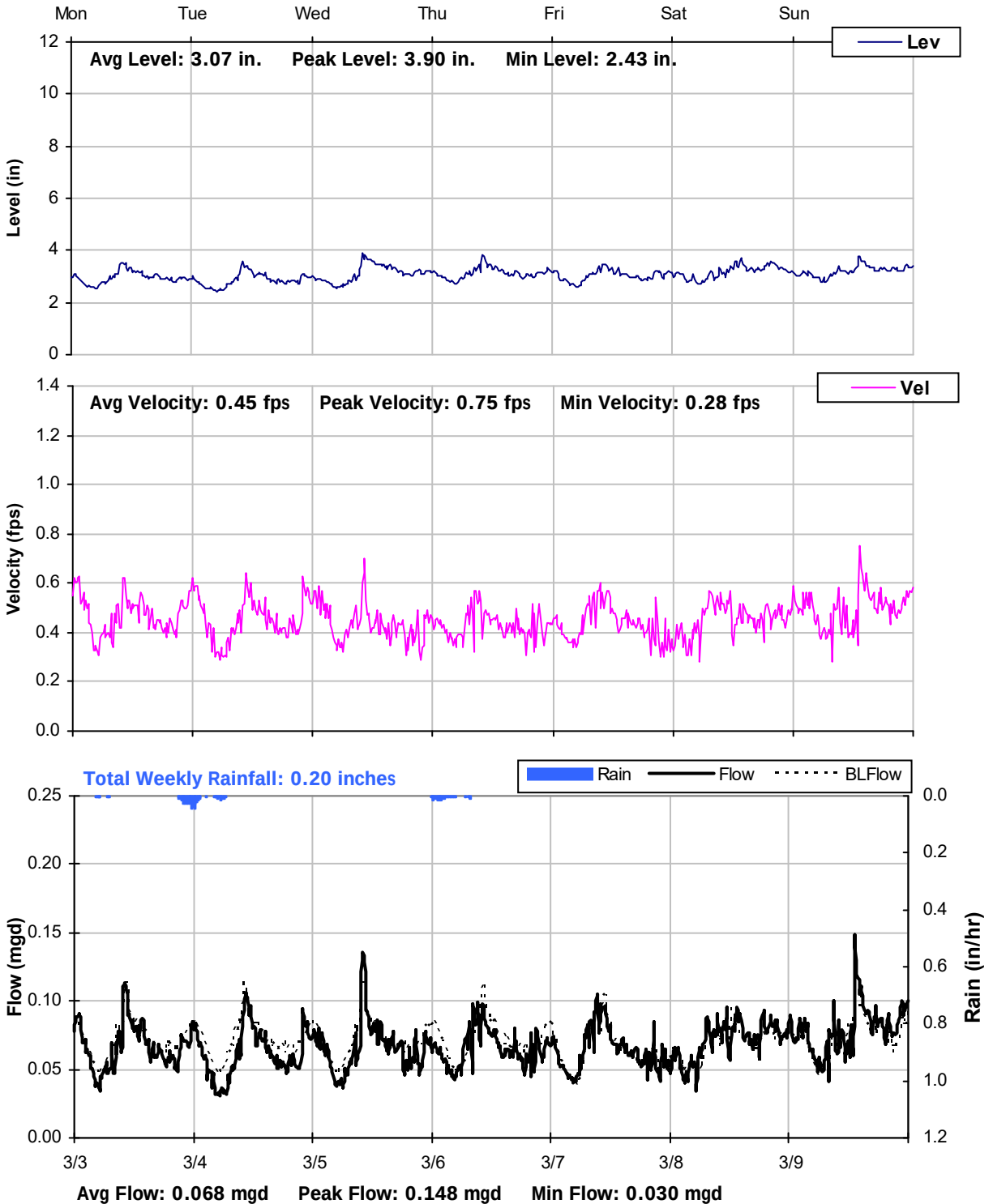




SITE 6

Weekly Level, Velocity and Flow Hydrographs

3/3/2014 to 3/10/2014

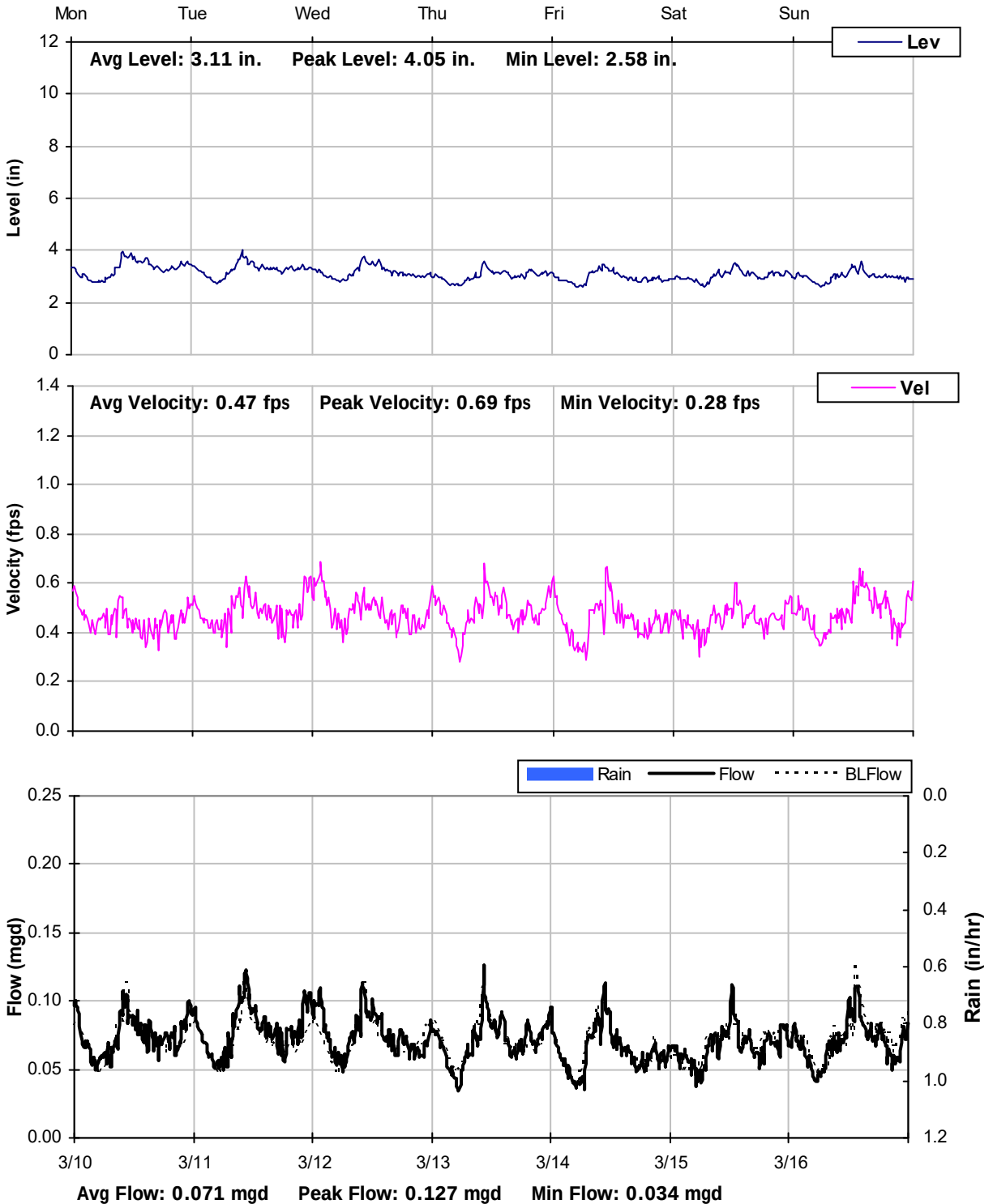




SITE 6

Weekly Level, Velocity and Flow Hydrographs

3/10/2014 to 3/17/2014





City of Gilroy

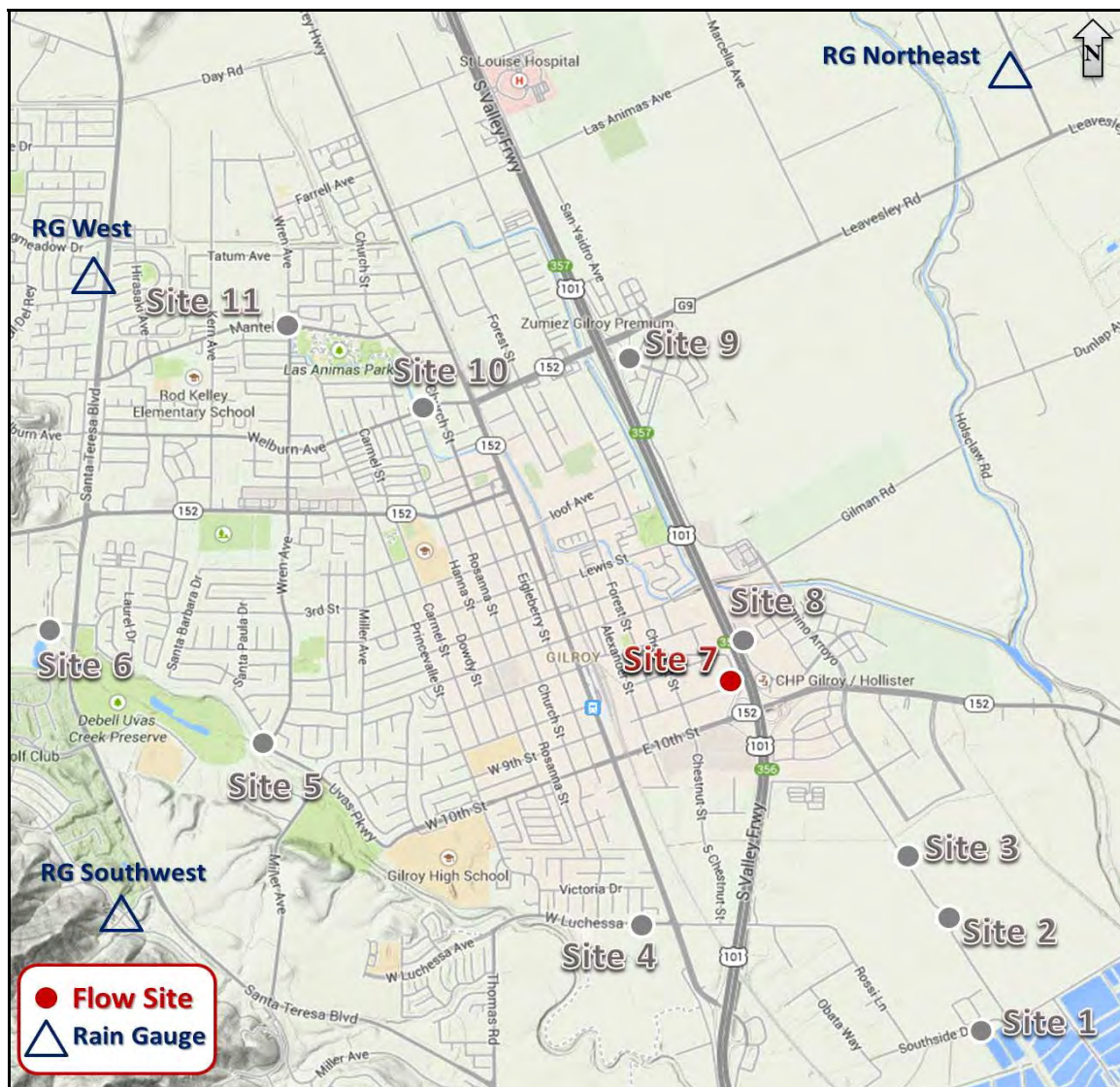
Sanitary Sewer Flow Monitoring

Temporary Monitoring: February and March, 2014

Monitoring Site: Site 7

Location: East end of E. 9th Street near Highway 101 offramp

Data Summary Report



Vicinity Map: Site 7



SITE 7

Site Information

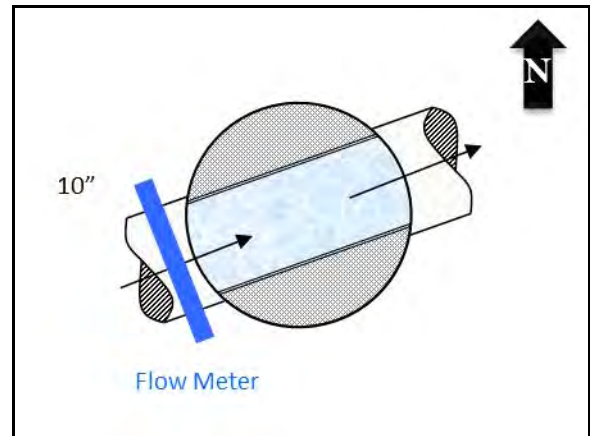
Location:	East end of E. 9th Street near Highway 101 offramp
Coordinates:	121.5581° W, 37.0042° N
Rim Elevation:	193 feet
Pipe Diameter:	10 inches
Baseline Flow:	0.148 mgd
Peak Measured Flow:	0.279 mgd



Satellite Map



Sewer Map



Flow Sketch



Street View



Plan View



SITE 7

Additional Site Photos

Effluent Pipe



Influent Pipe



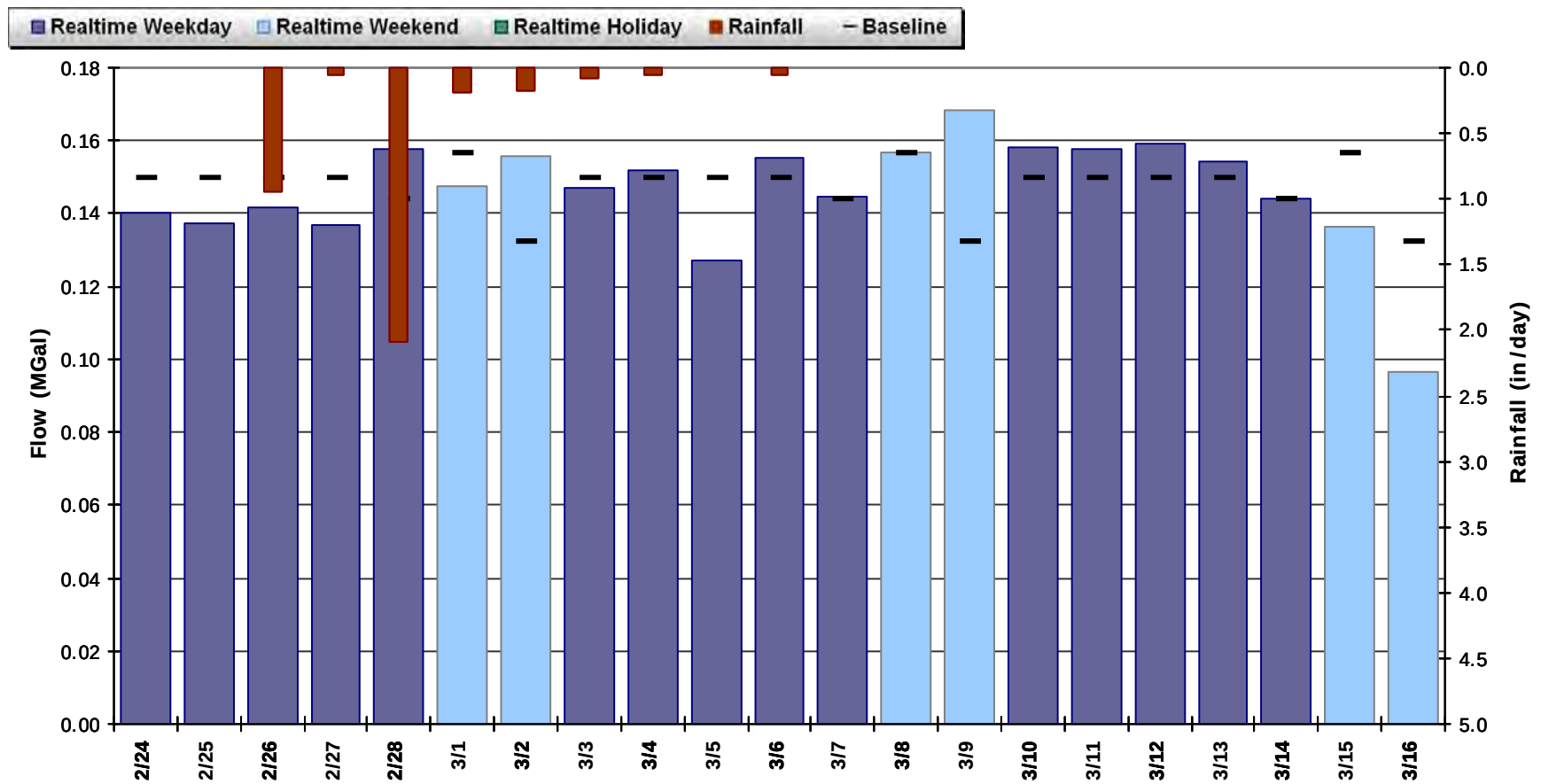


SITE 7

Period Flow Summary: Daily Flow Totals

Avg Period Flow: 0.146 MGal Peak Daily Flow: 0.168 MGal Min Daily Flow: 0.096 MGal

Total Period Rainfall: 3.66 inches

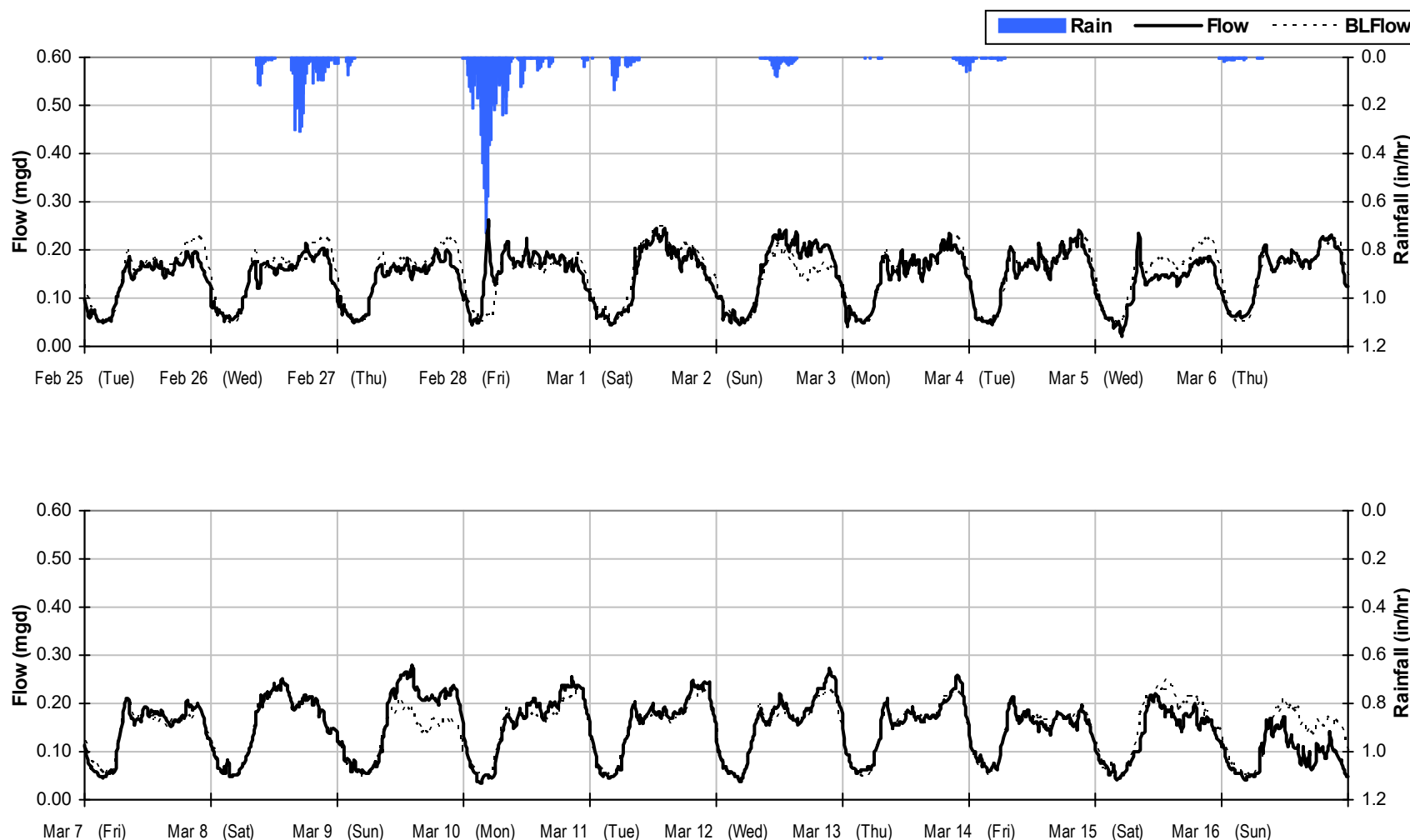




SITE 7

Flow Summary: 2/25/2014 to 3/16/2014

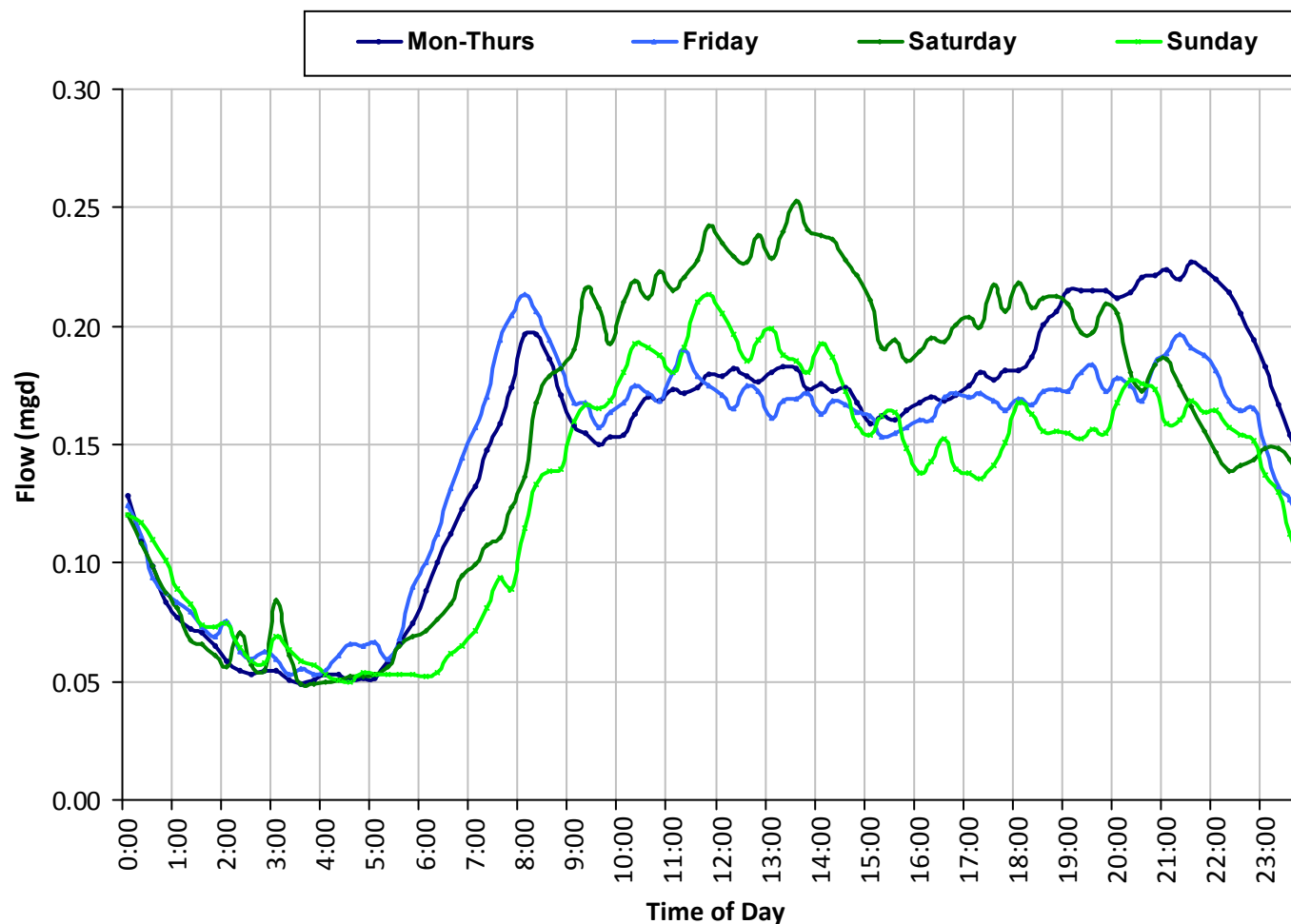
Total Period Rainfall: 3.66 inches Avg Flow: 0.147 mgd Peak Flow: 0.279 mgd Min Flow: 0.021 mgd





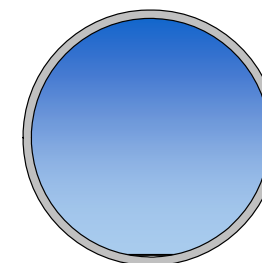
SITE 7

Baseline Flow Hydrographs



Baseline Flow:

0.148 mgd

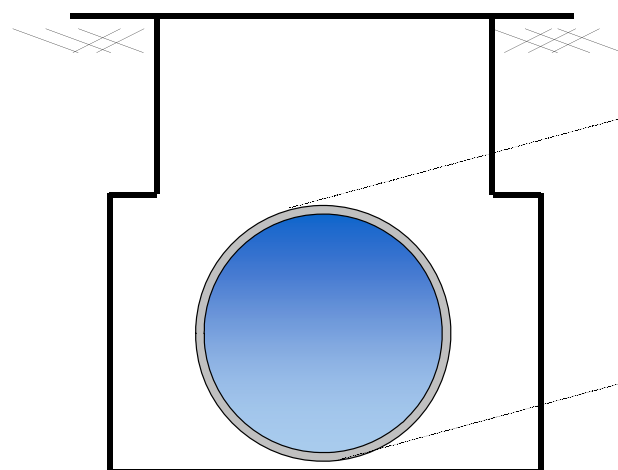
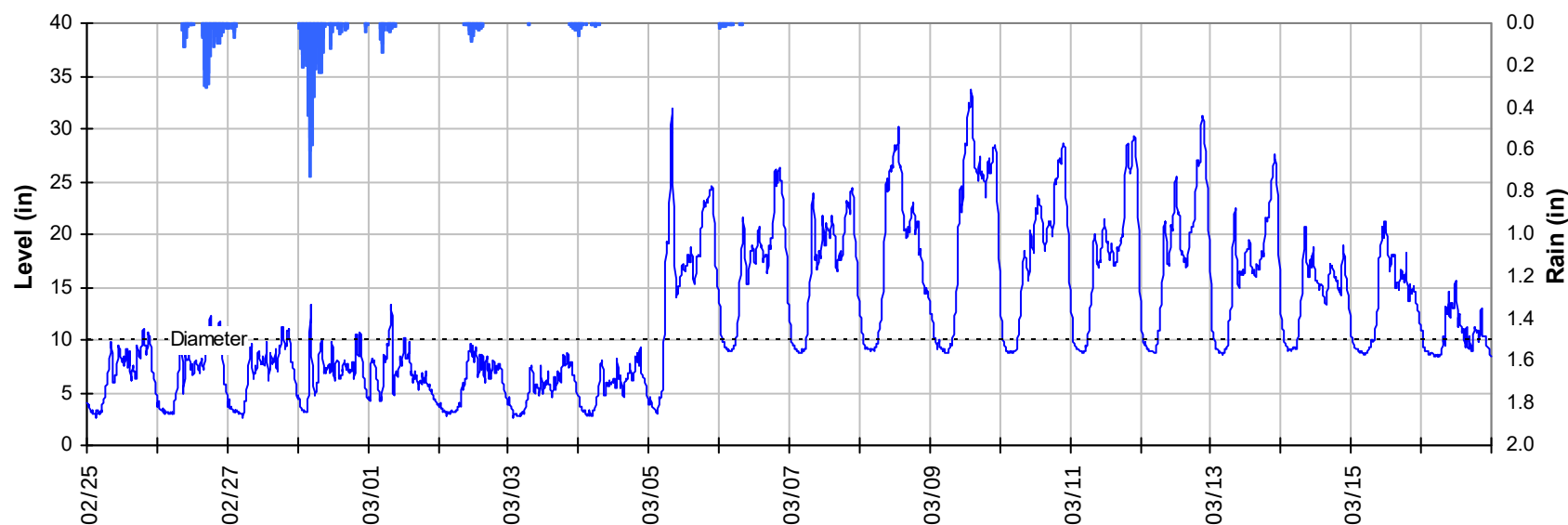




SITE 7

Site Capacity and Surge Summary

Realtime Flow Levels with Rainfall Data over Monitoring Period



Pipe Diameter: 10 inches

Peak Measured Level: 33.6 inches

Peak d/D Ratio: 3.36

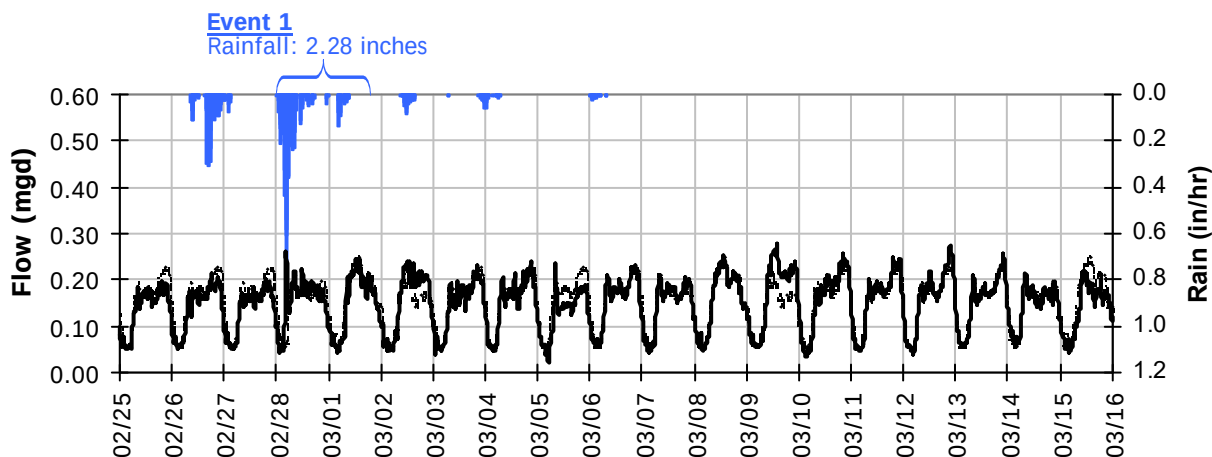
Surcharged 23.6 inches over crown



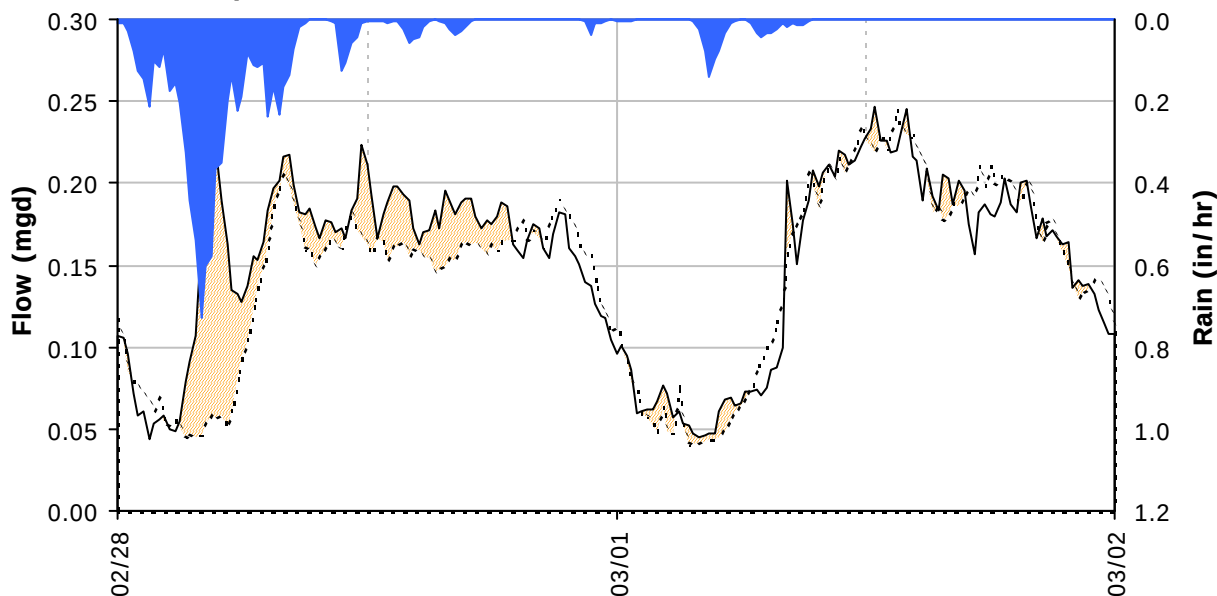
SITE 7

I/I Summary: Event 1

Baseline and Realtime Flows with Rainfall Data over Monitoring Period



Event 1 Detail Graph



Storm Event I/I Analysis (Rain = 2.28 inches)

Capacity

Peak Flow: 0.26 mgd
PF: 1.78

Inflow / Infiltration

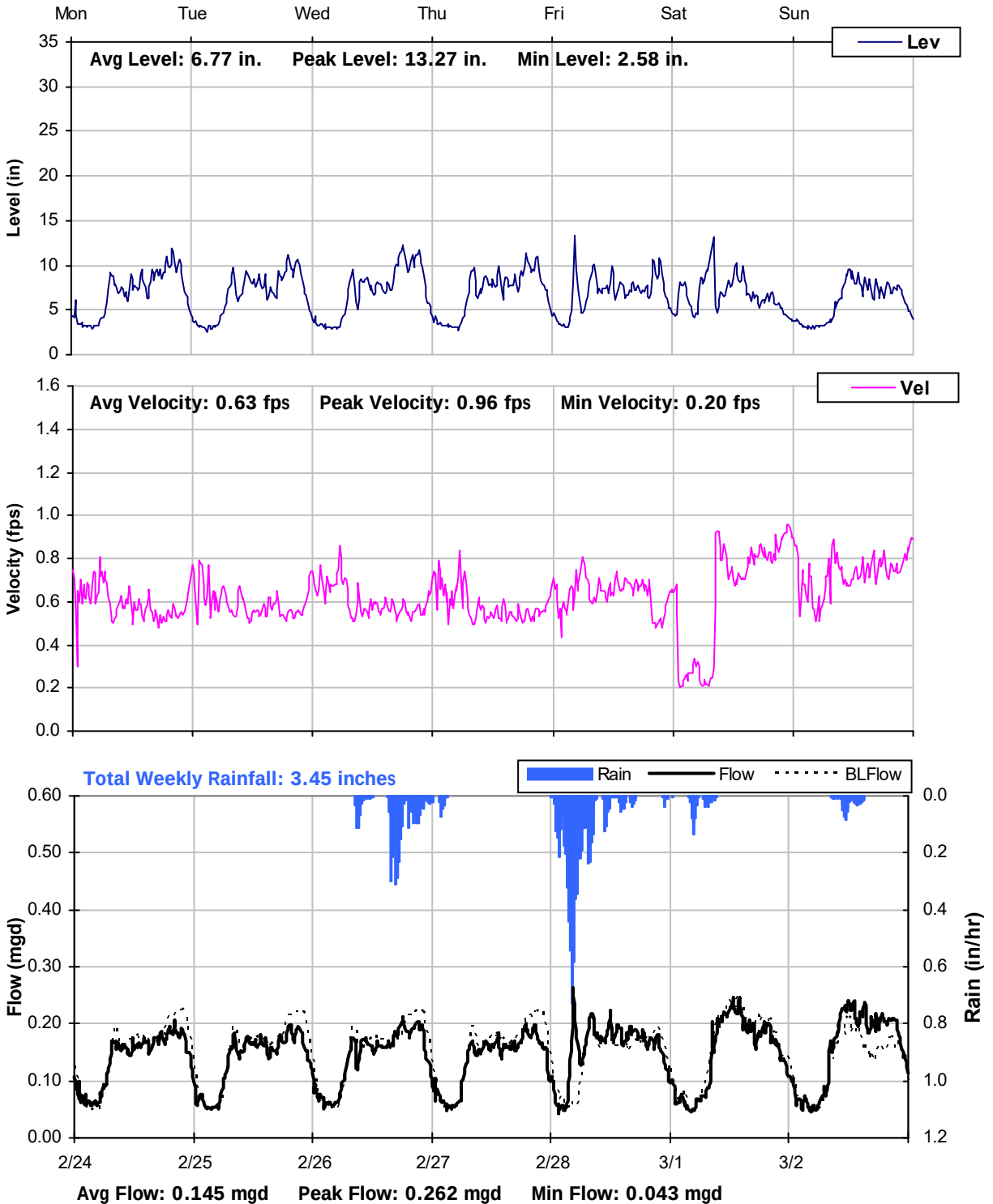
Peak I/I Rate: 0.20 mgd
Total I/I: 20,000 gallons



SITE 7

Weekly Level, Velocity and Flow Hydrographs

2/24/2014 to 3/3/2014

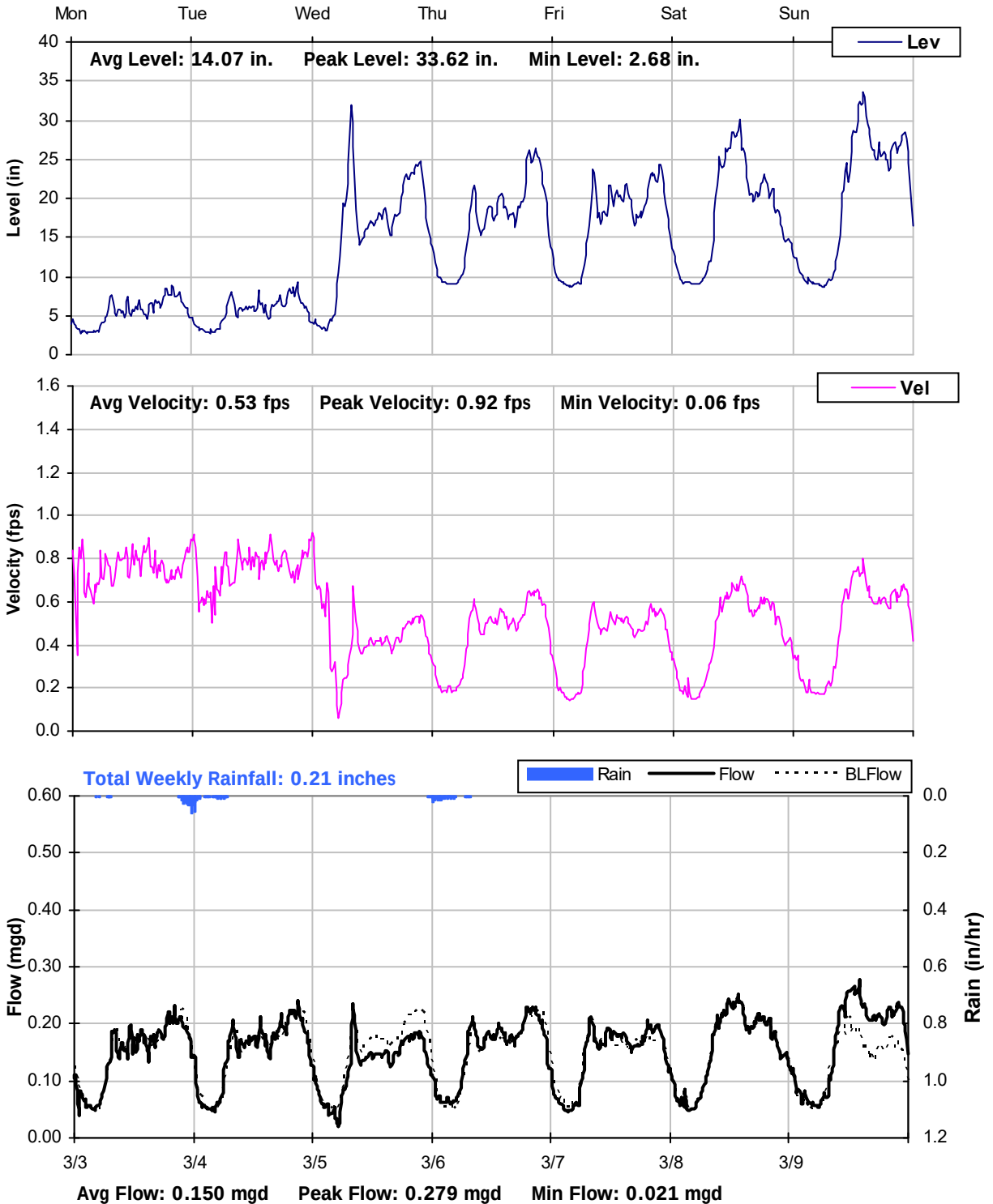




SITE 7

Weekly Level, Velocity and Flow Hydrographs

3/3/2014 to 3/10/2014

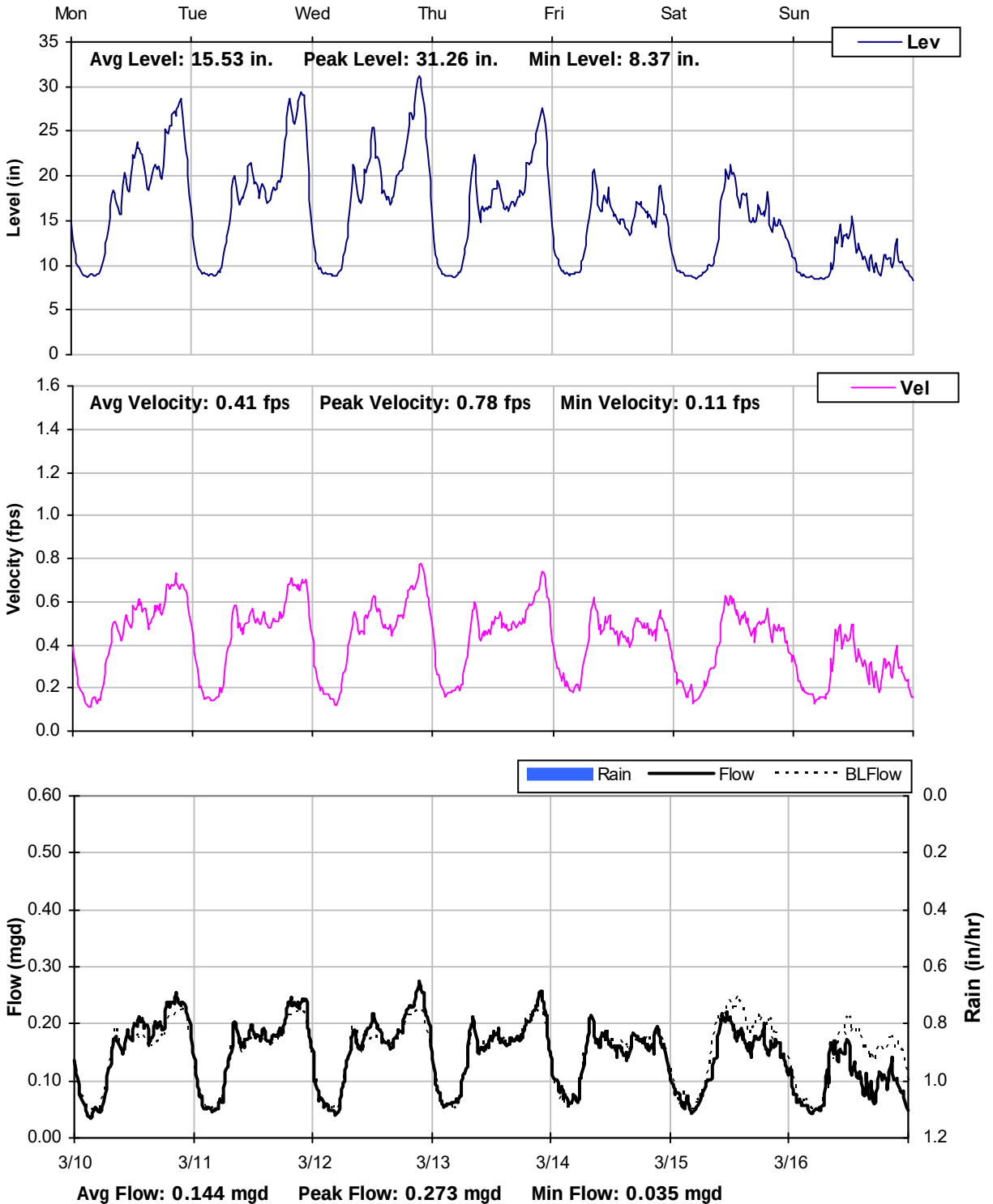




SITE 7

Weekly Level, Velocity and Flow Hydrographs

3/10/2014 to 3/17/2014





City of Gilroy

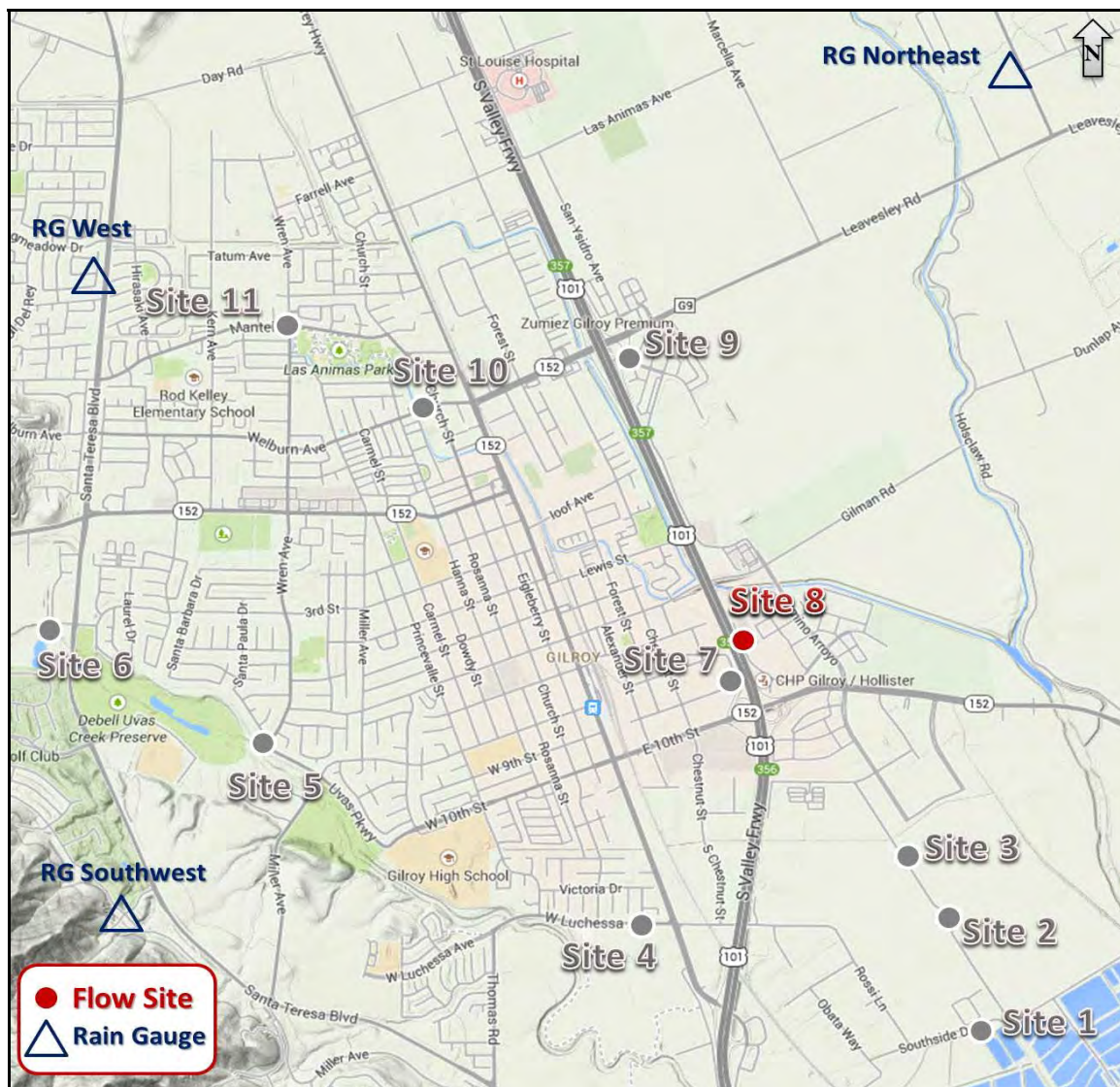
Sanitary Sewer Flow Monitoring

Temporary Monitoring: February and March, 2014

Monitoring Site: Site 8

Location: Near northwest end of Renz Lane

Data Summary Report



Vicinity Map: Site 8



SITE 8

Site Information

Location: Near northwest end of Renz Lane

Coordinates: 121.5571° W, 37.0057° N

Rim Elevation: 191 feet

Pipe Diameter: 14 inches

Baseline Flow: 0.294 mgd

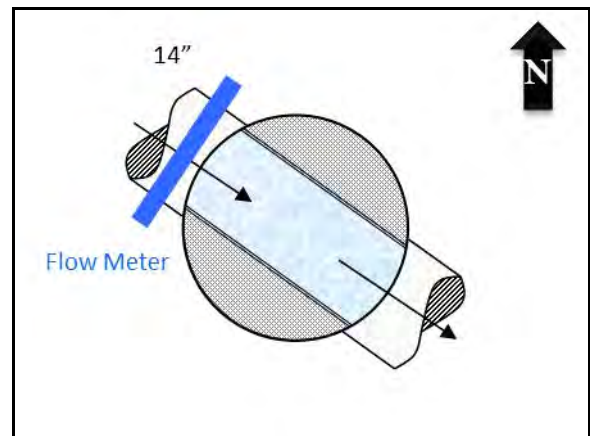
Peak Measured Flow: 0.910 mgd



Satellite Map



Sewer Map



Flow Sketch



Street View



Plan View



SITE 8

Additional Site Photos

Effluent Pipe



Influent Pipe



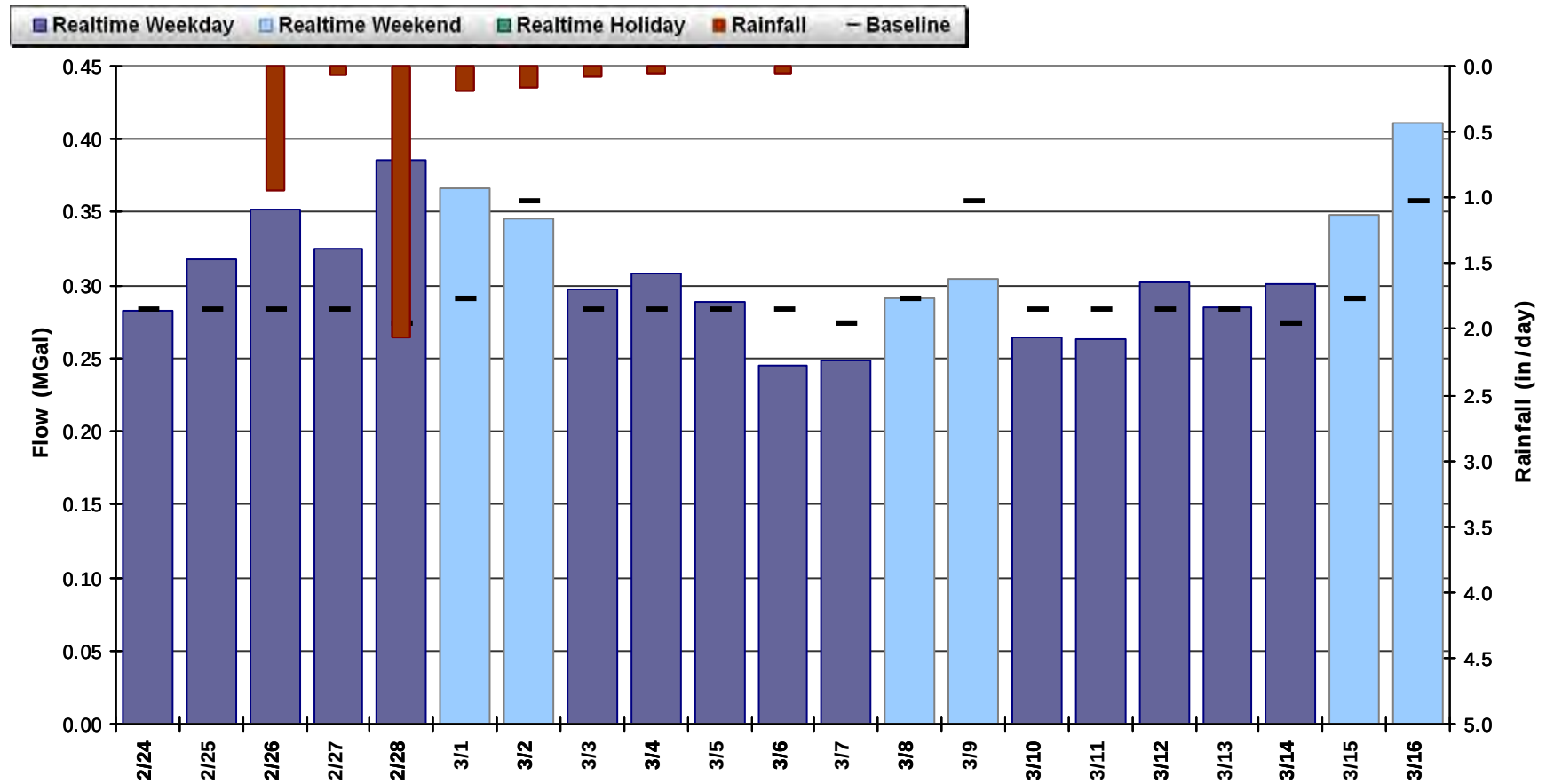


SITE 8

Period Flow Summary: Daily Flow Totals

Avg Period Flow: 0.311 MGal Peak Daily Flow: 0.412 MGal Min Daily Flow: 0.245 MGal

Total Period Rainfall: 3.62 inches

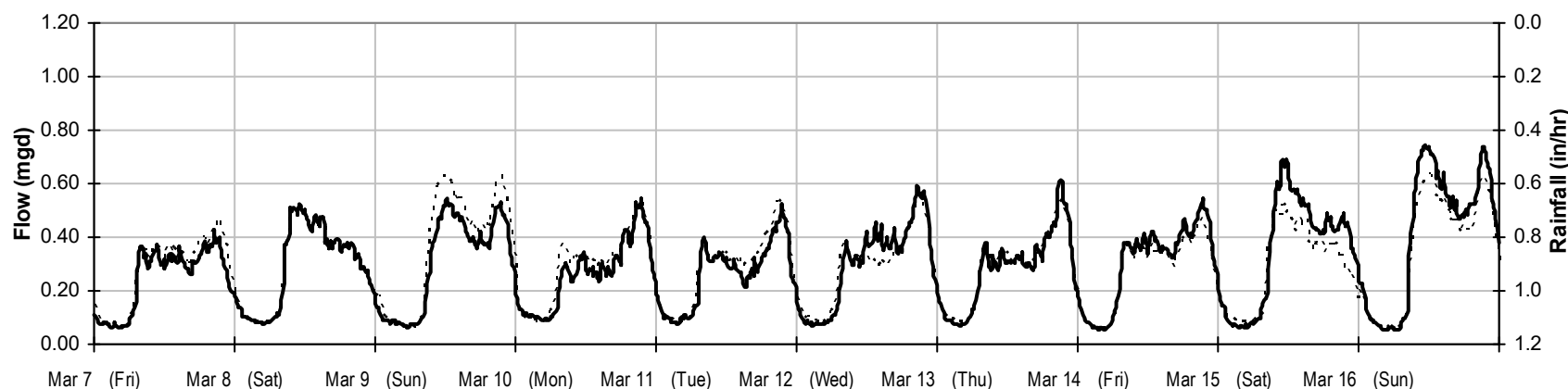
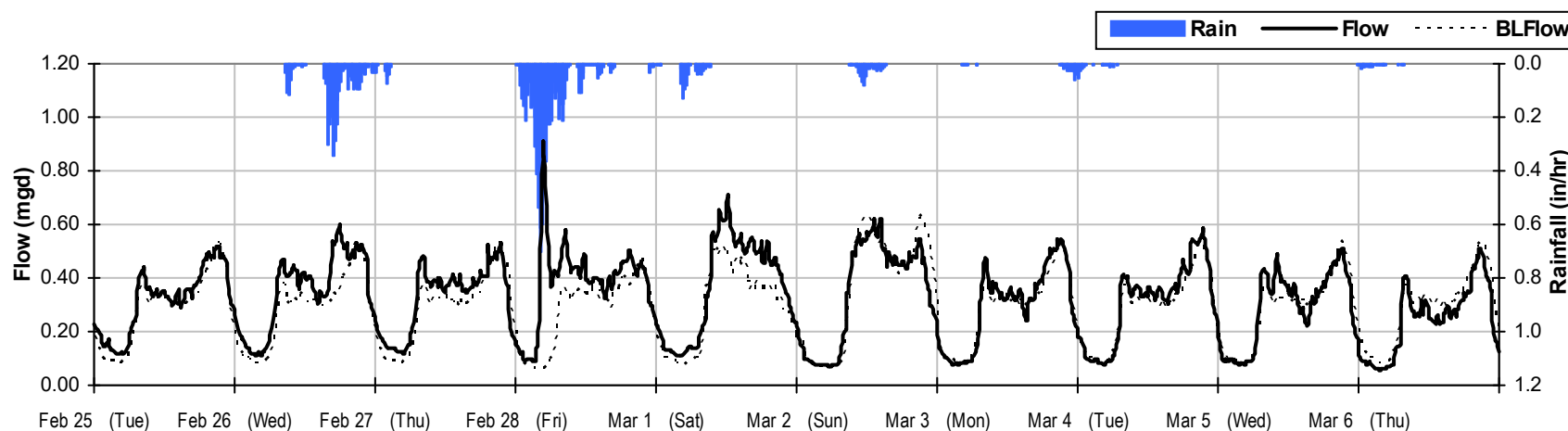




SITE 8

Flow Summary: 2/25/2014 to 3/16/2014

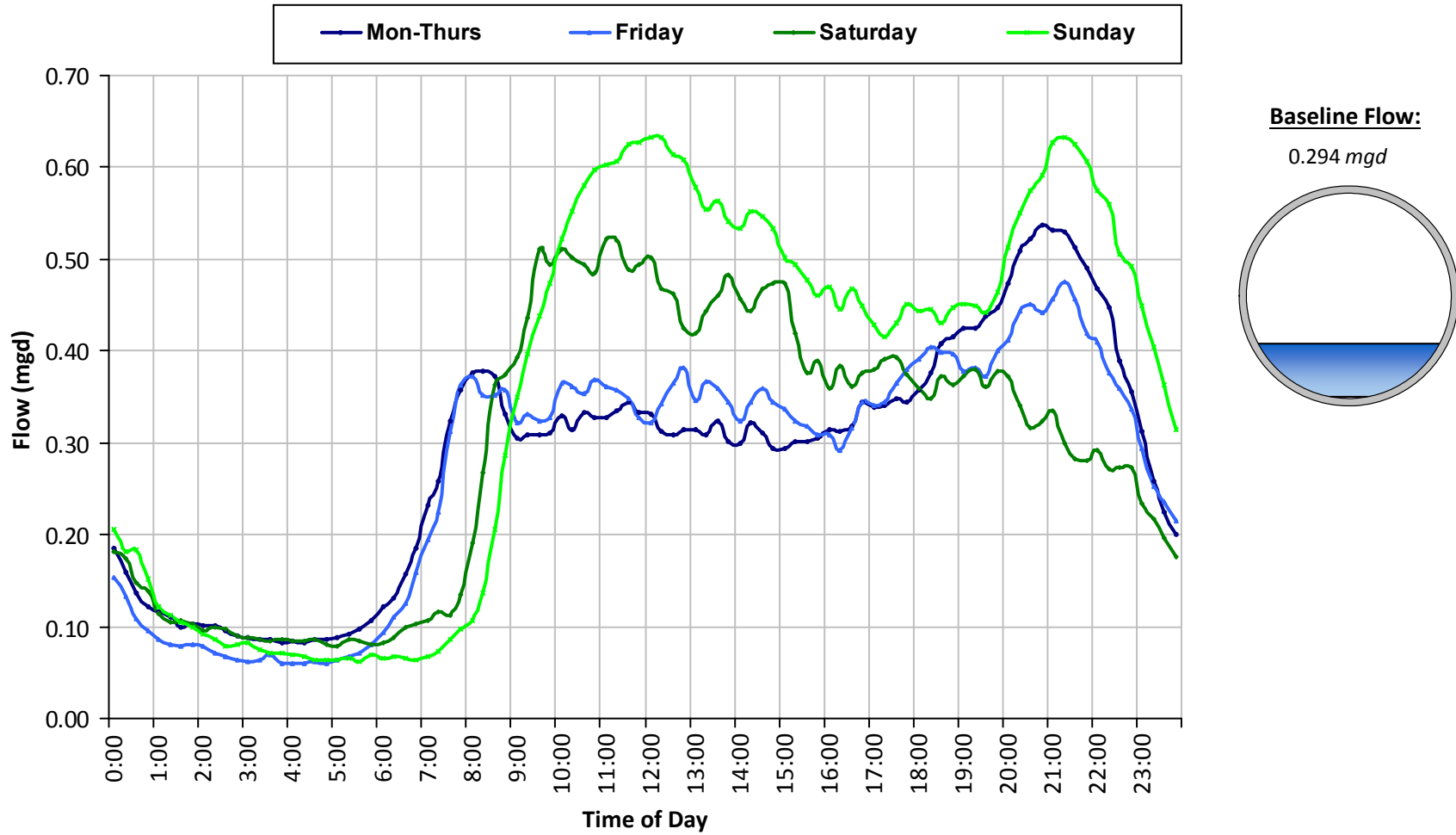
Total Period Rainfall: 3.62 inches Avg Flow: 0.313 mgd Peak Flow: 0.910 mgd Min Flow: 0.053 mgd





SITE 8

Baseline Flow Hydrographs

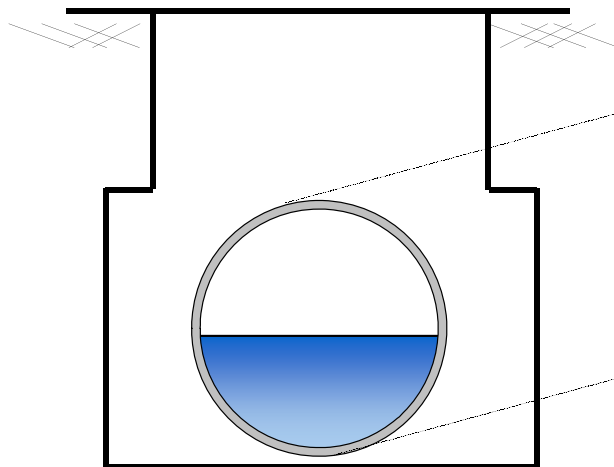
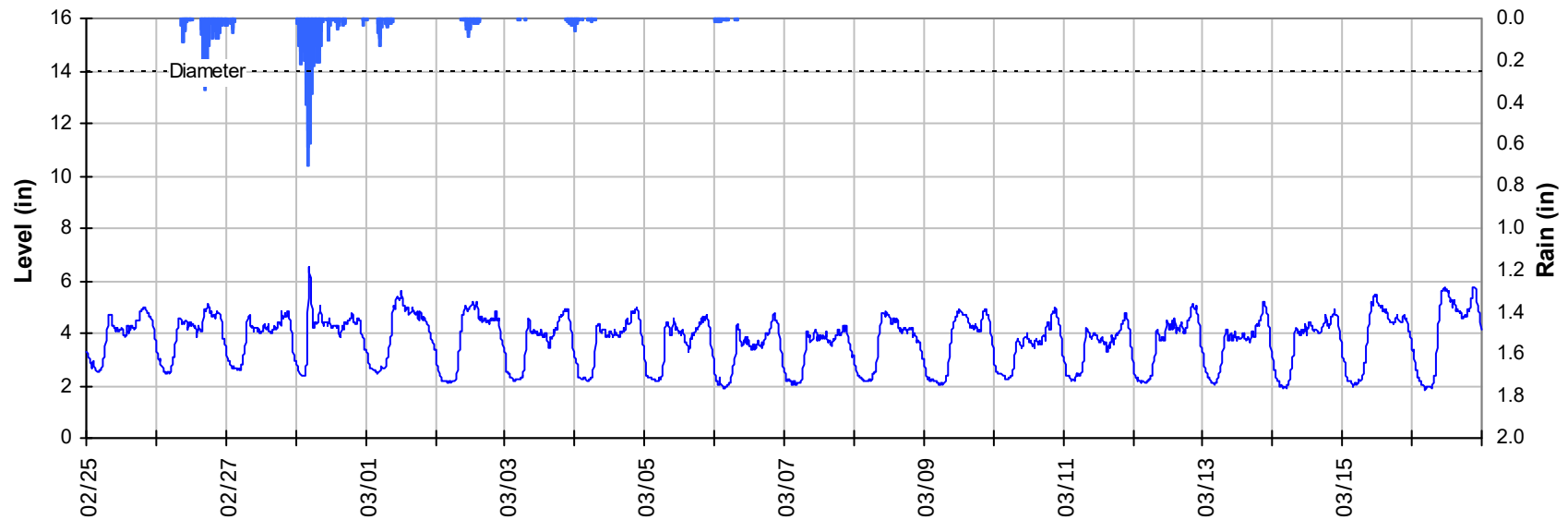




SITE 8

Site Capacity and Surge Summary

Realtime Flow Levels with Rainfall Data over Monitoring Period



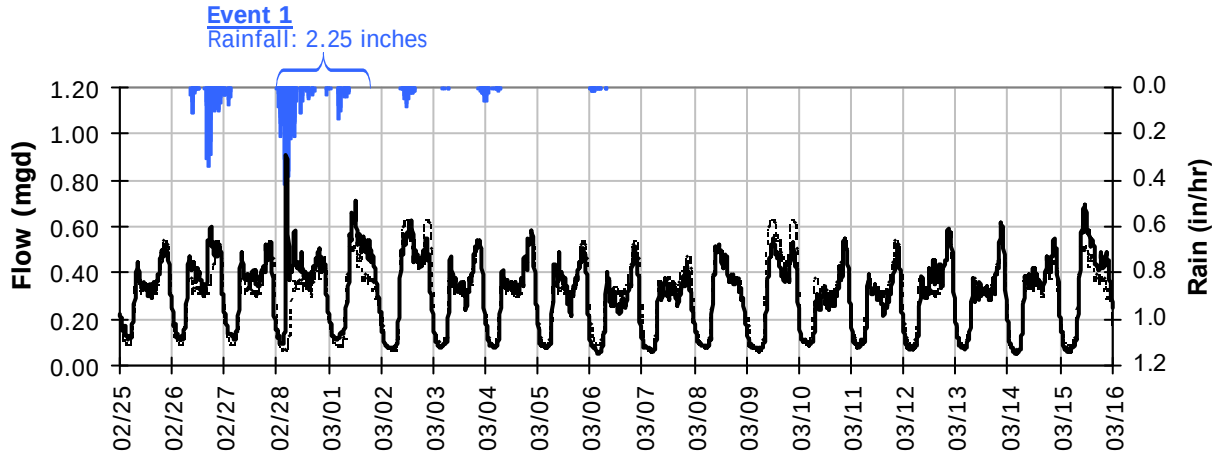
Pipe Diameter: 14 inches
Peak Measured Level: 6.51 inches
Peak d/D Ratio: 0.47



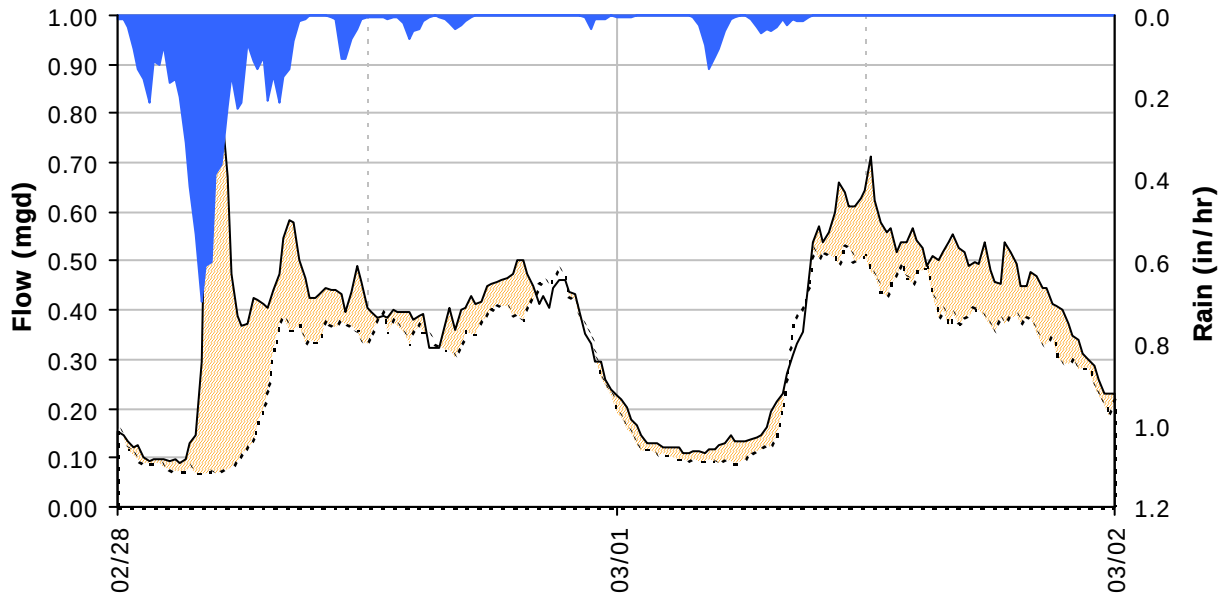
SITE 8

I/I Summary: Event 1

Baseline and Realtime Flows with Rainfall Data over Monitoring Period



Event 1 Detail Graph



Storm Event I/I Analysis (Rain = 2.25 inches)

Capacity

Peak Flow: 0.91 mgd
PF: 3.09

Inflow / Infiltration

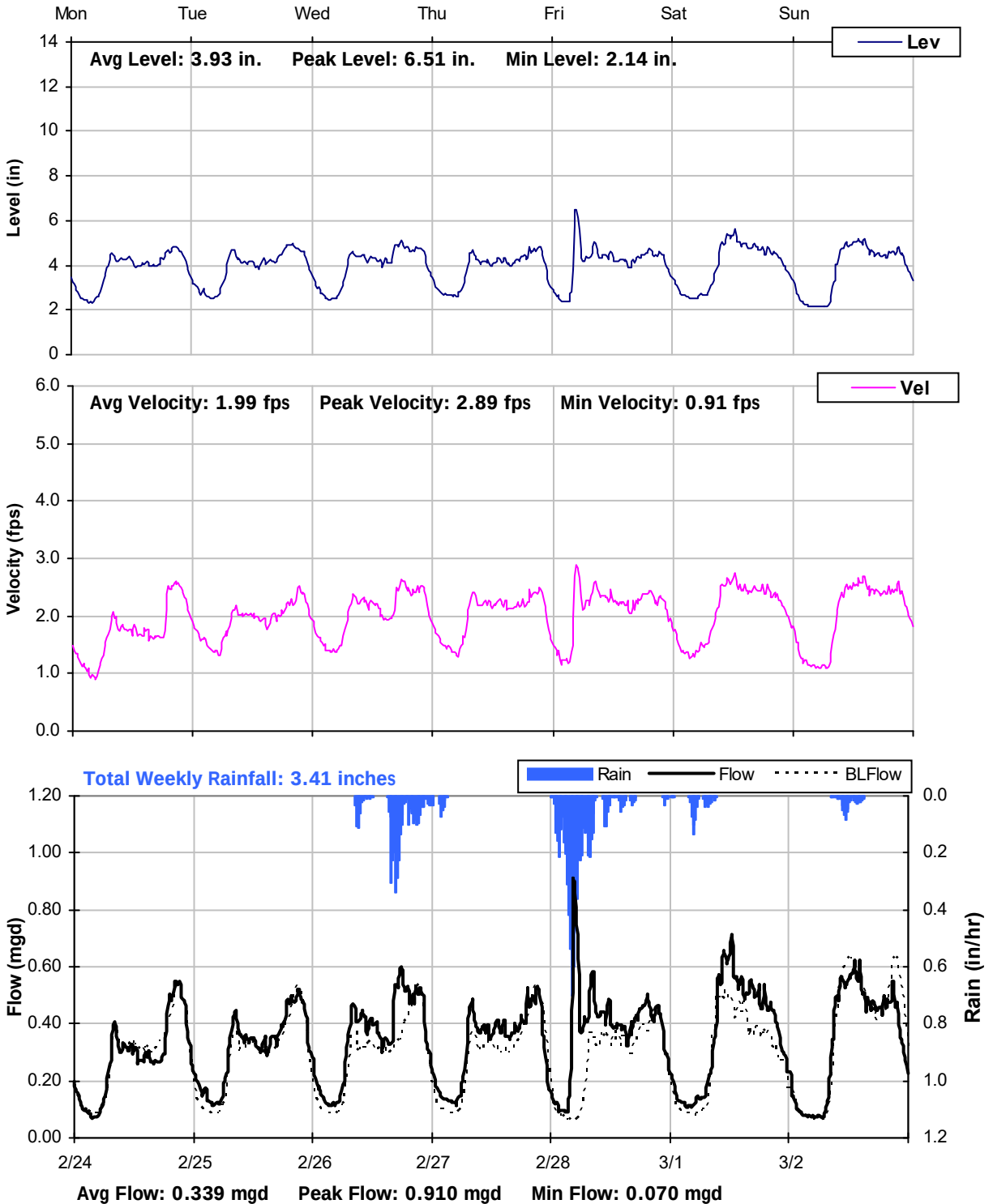
Peak I/I Rate: 0.84 mgd
Total I/I: 167,000 gallons



SITE 8

Weekly Level, Velocity and Flow Hydrographs

2/24/2014 to 3/3/2014

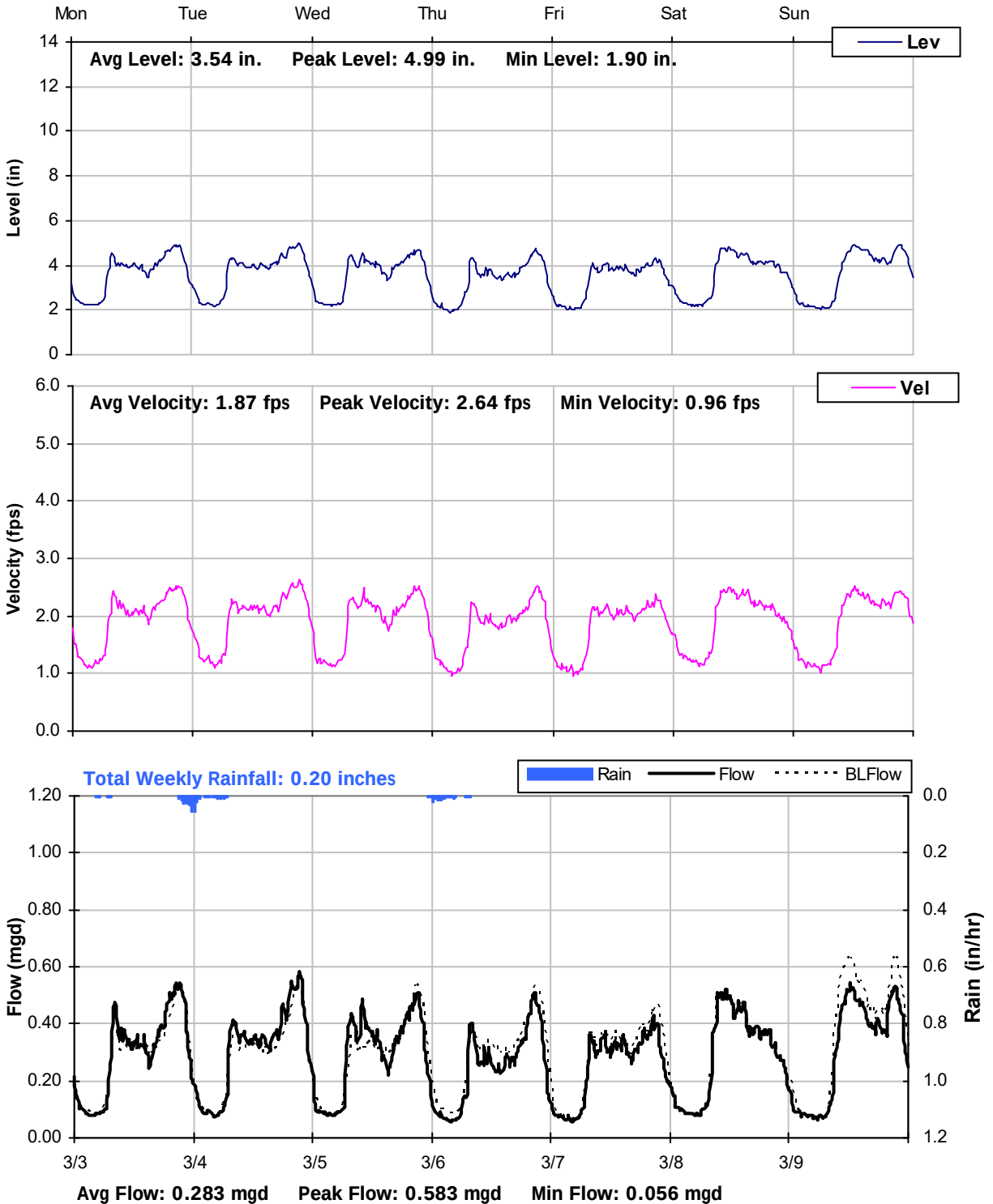




SITE 8

Weekly Level, Velocity and Flow Hydrographs

3/3/2014 to 3/10/2014

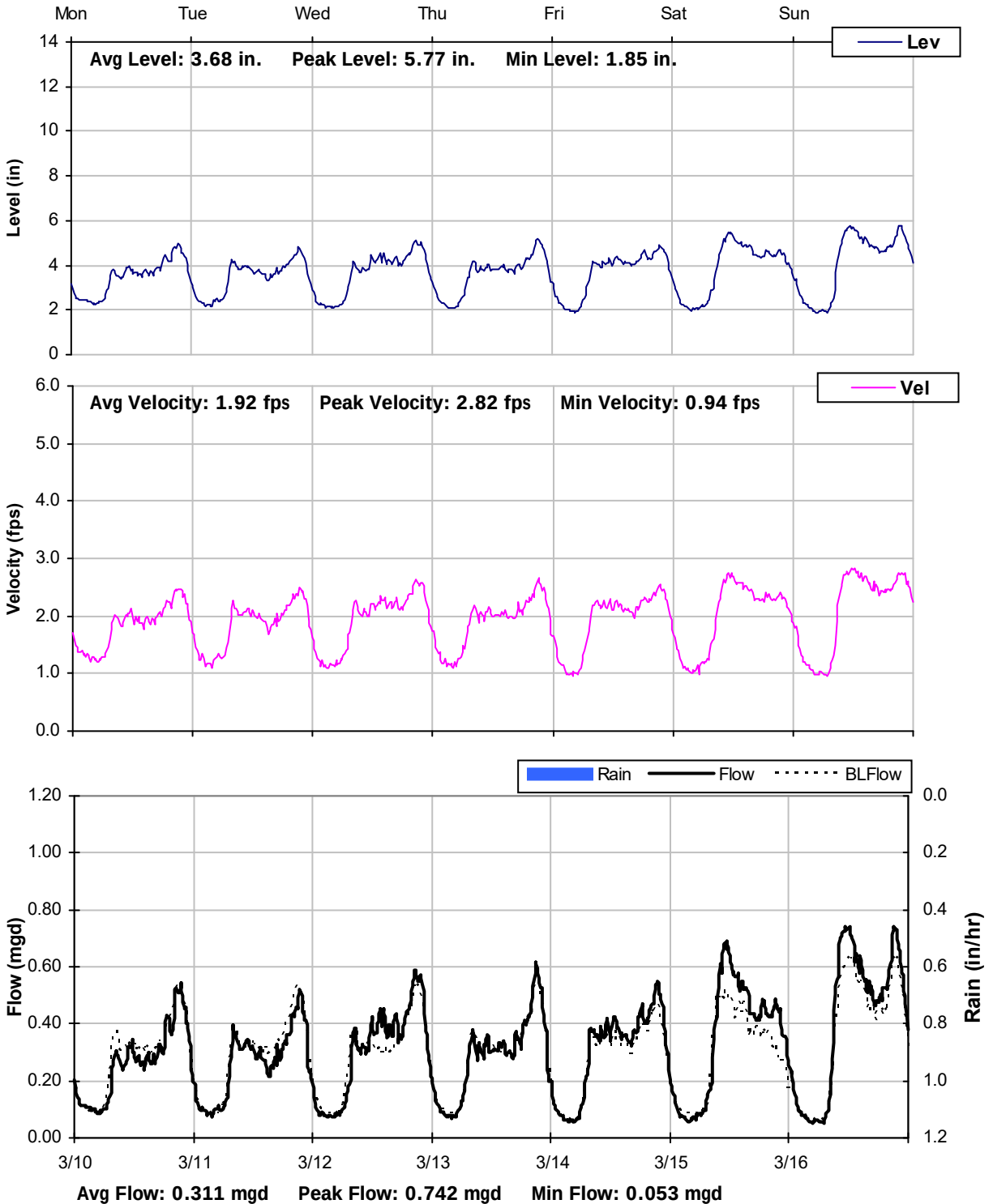




SITE 8

Weekly Level, Velocity and Flow Hydrographs

3/10/2014 to 3/17/2014





City of Gilroy

Sanitary Sewer Flow Monitoring

Temporary Monitoring: February and March, 2014

Monitoring Site: Site 9

Location: Behind Nike Outlet Store off Arroyo Circle

Data Summary Report



Vicinity Map: Site 9



SITE 9

Site Information

Location: Behind Nike Outlet Store off Arroyo Circle

Coordinates: 121.5649° W, 37.0206° N

Rim Elevation: 202 feet

Pipe Diameter: 33 inches

Baseline Flow: 3.304 mgd

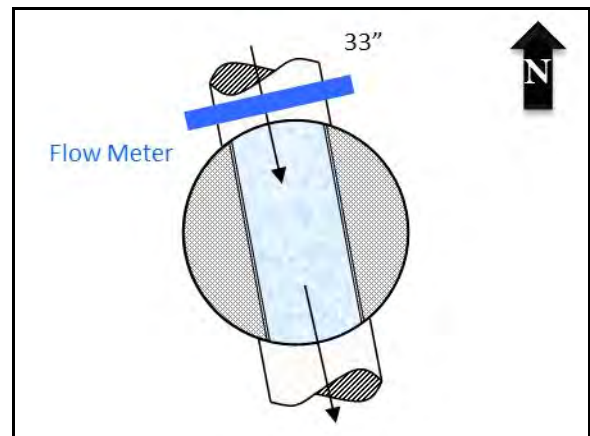
Peak Measured Flow: 6.486 mgd



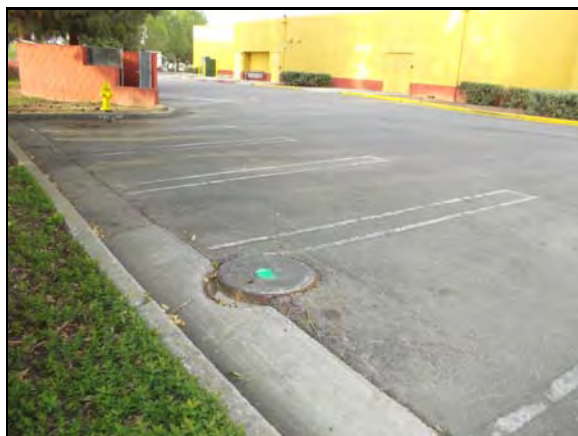
Satellite Map



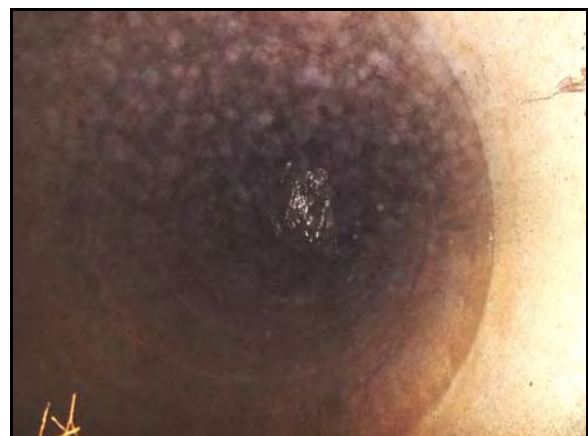
Sewer Map



Flow Sketch



Street View



Plan View



SITE 9

Additional Site Photos

Effluent Pipe



Influent Pipe



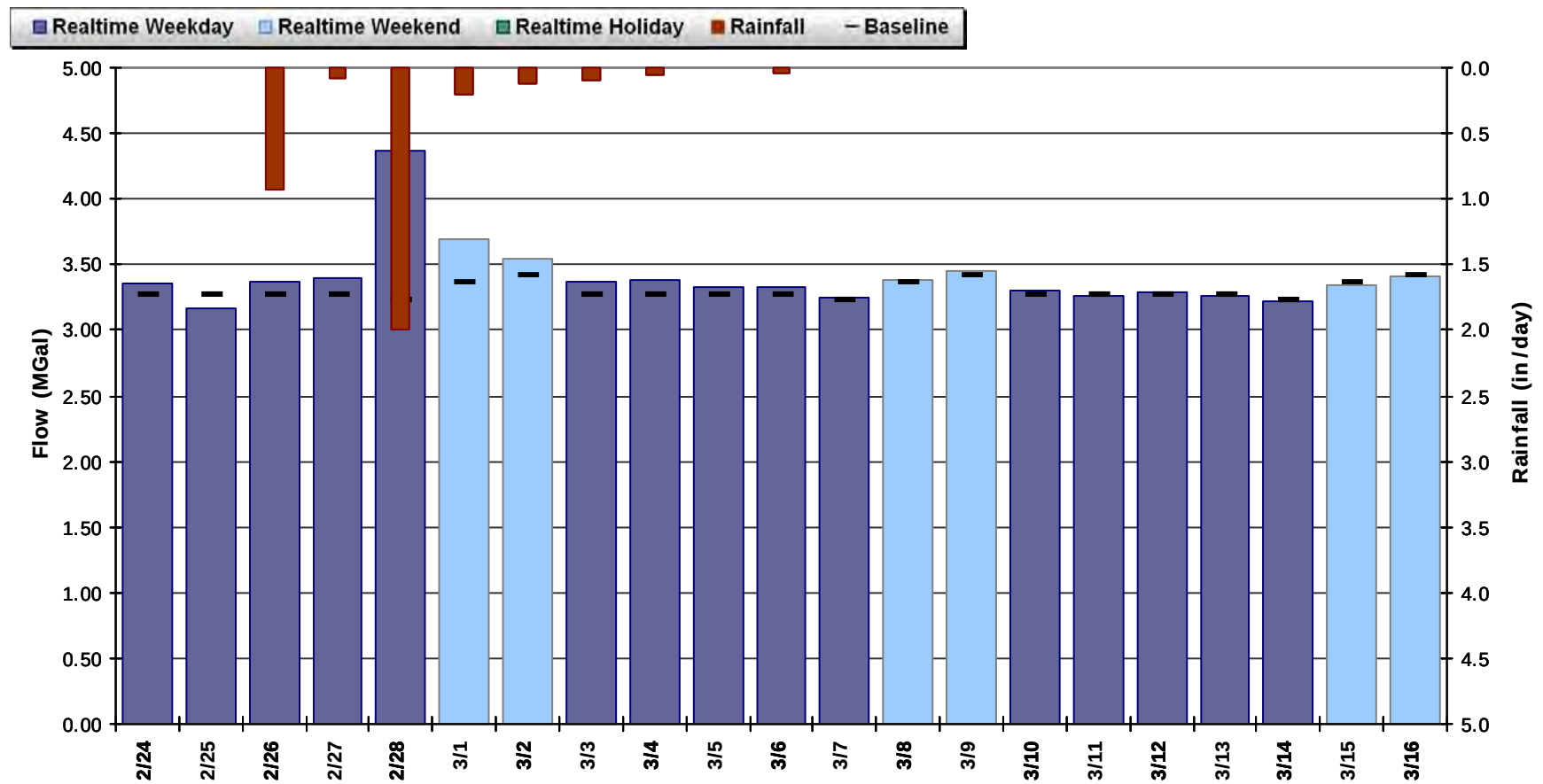


SITE 9

Period Flow Summary: Daily Flow Totals

Avg Period Flow: 3.403 MGal Peak Daily Flow: 4.366 MGal Min Daily Flow: 3.168 MGal

Total Period Rainfall: 3.52 inches

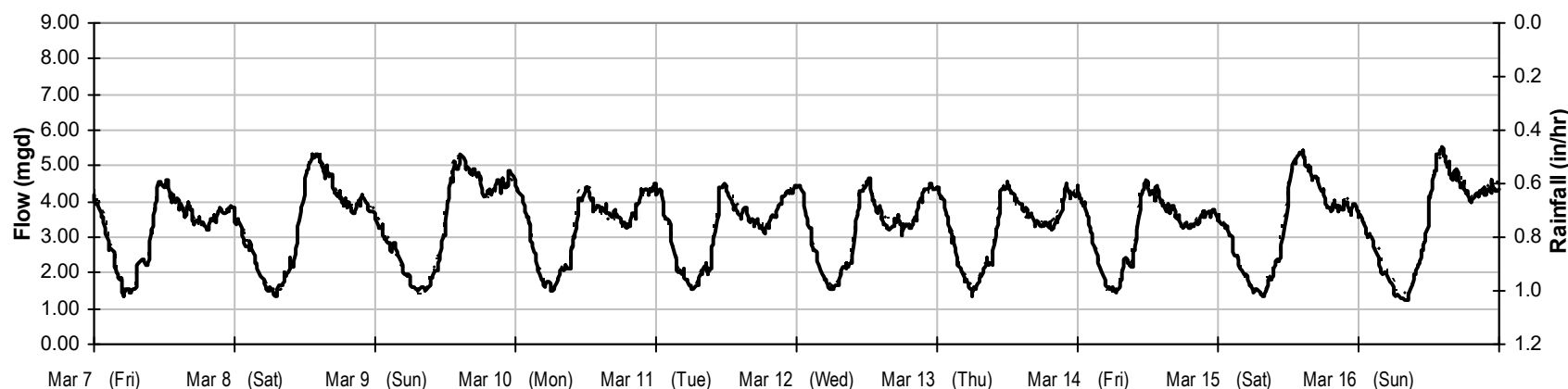
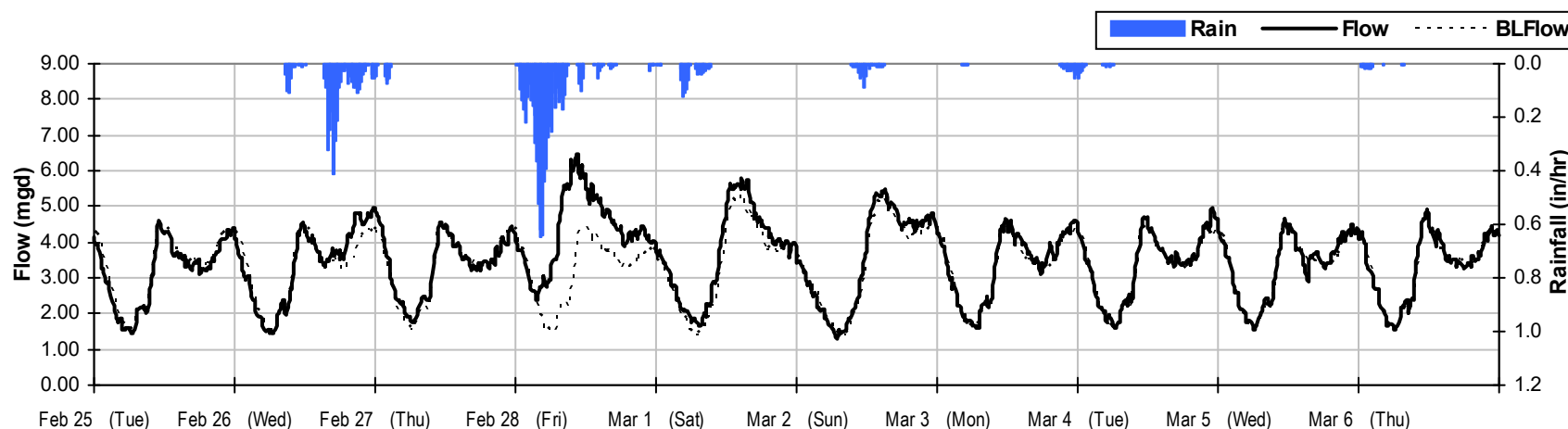




SITE 9

Flow Summary: 2/25/2014 to 3/16/2014

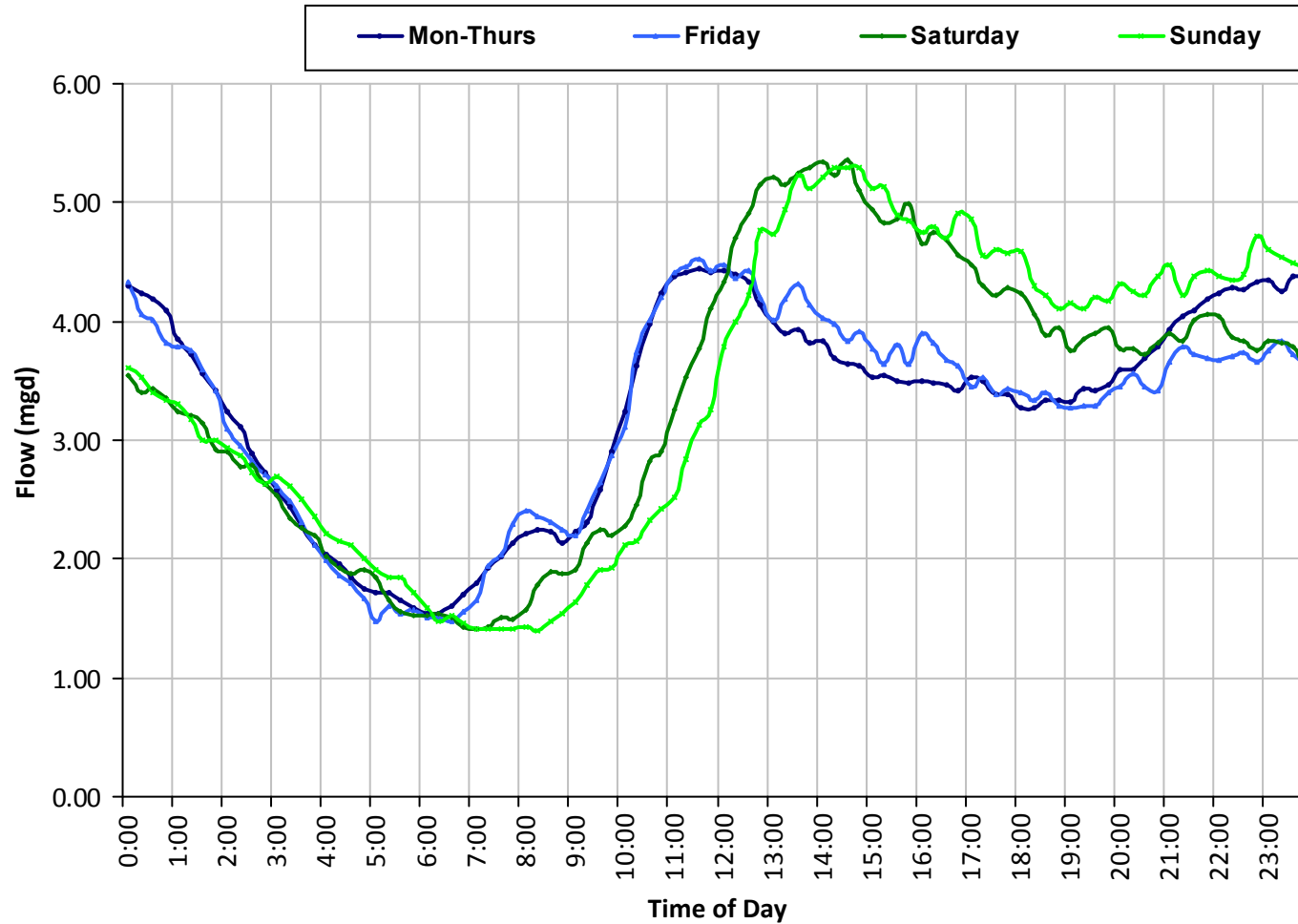
Total Period Rainfall: 3.52 inches Avg Flow: 3.406 mgd Peak Flow: 6.486 mgd Min Flow: 1.224 mgd





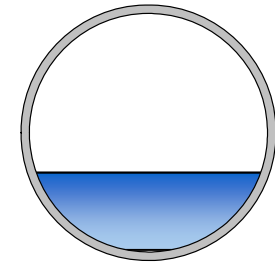
SITE 9

Baseline Flow Hydrographs



Baseline Flow:

3.304 mgd

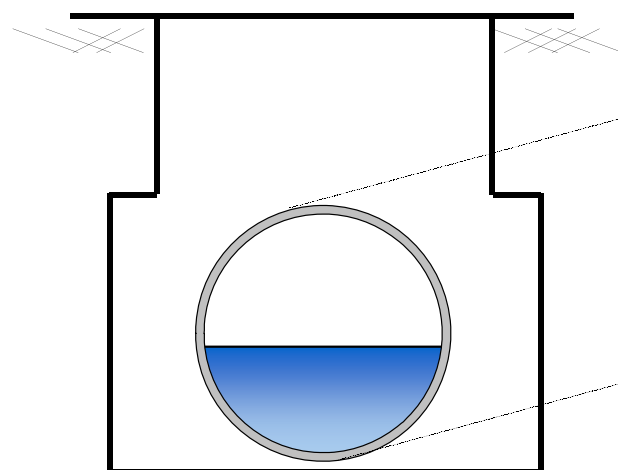
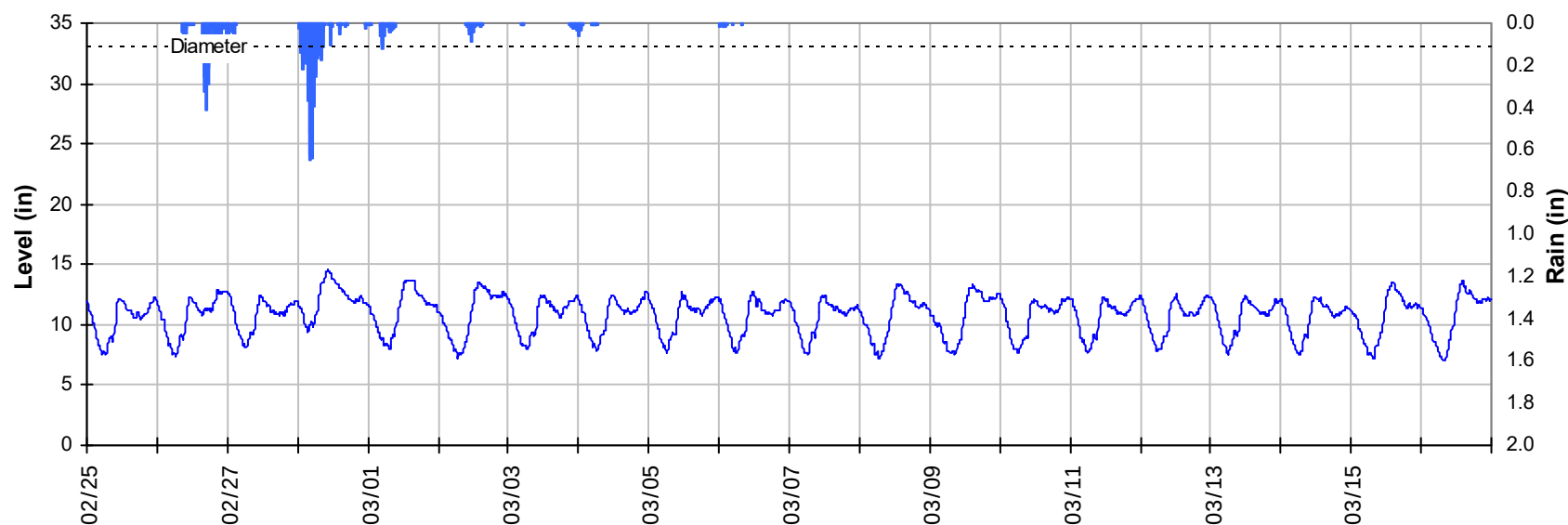




SITE 9

Site Capacity and Surge Summary

Realtime Flow Levels with Rainfall Data over Monitoring Period



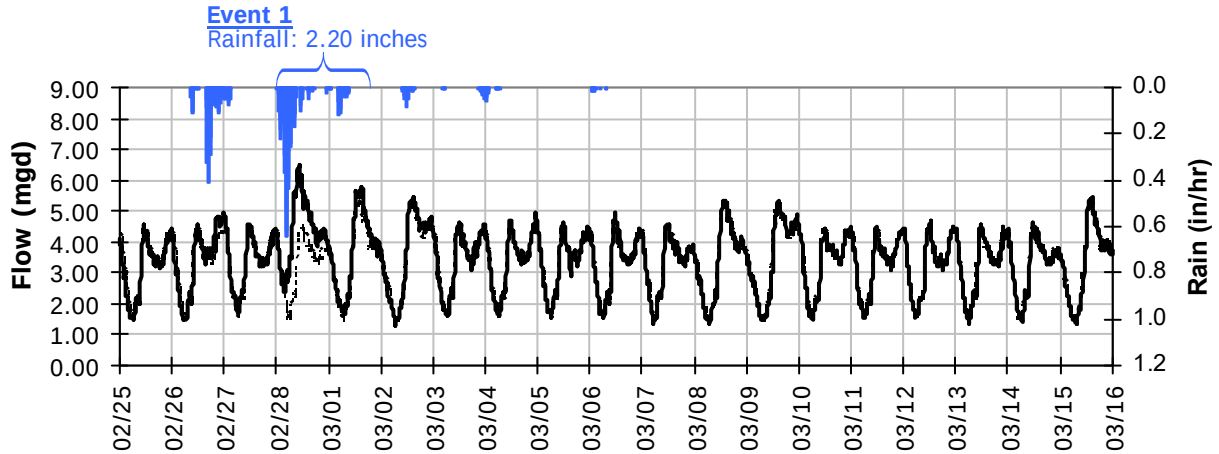
Pipe Diameter: 33 inches
Peak Measured Level: 14.5 inches
Peak d/D Ratio: 0.44



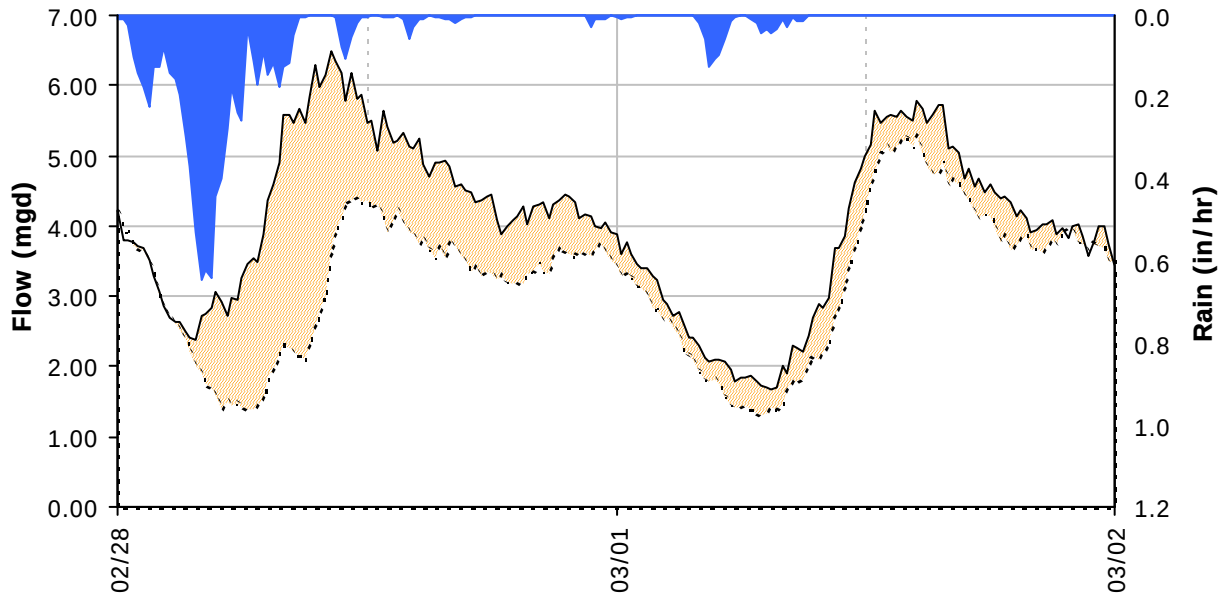
SITE 9

I/I Summary: Event 1

Baseline and Realtime Flows with Rainfall Data over Monitoring Period



Event 1 Detail Graph



Storm Event I/I Analysis (Rain = 2.20 inches)

Capacity

Peak Flow: 6.49 mgd
PF: 1.96

Inflow / Infiltration

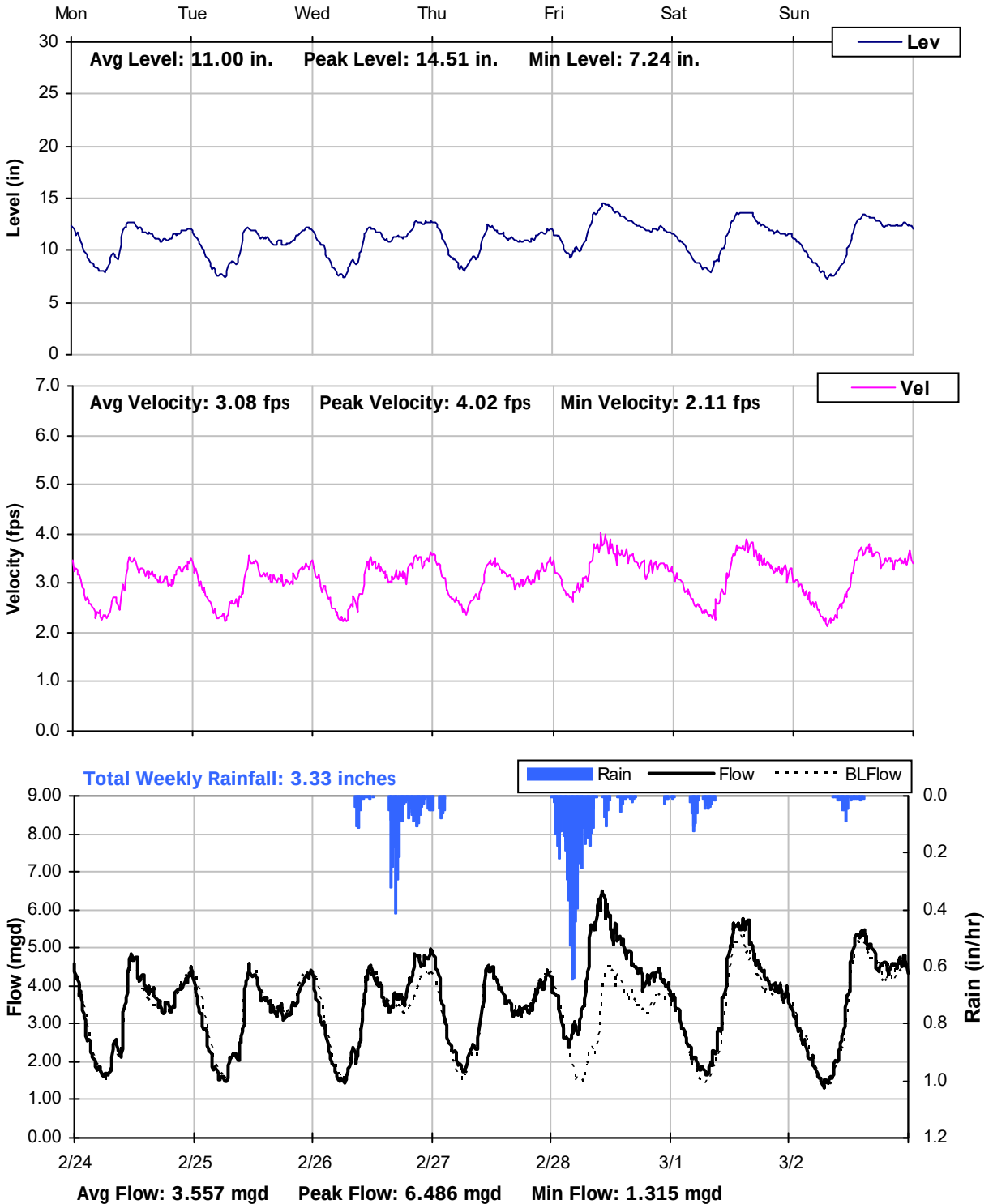
Peak I/I Rate: 3.75 mgd
Total I/I: 1,307,000 gallons



SITE 9

Weekly Level, Velocity and Flow Hydrographs

2/24/2014 to 3/3/2014

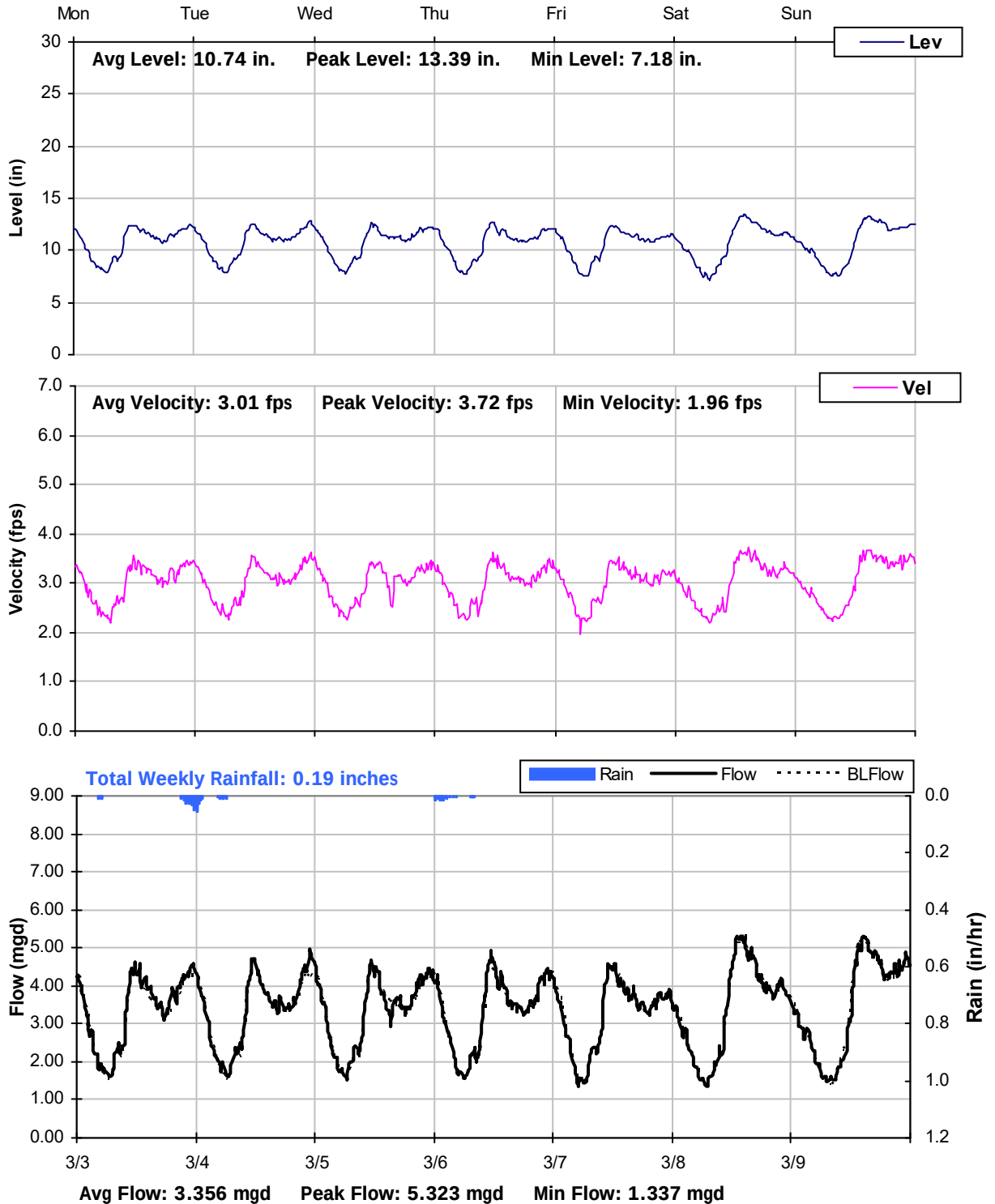




SITE 9

Weekly Level, Velocity and Flow Hydrographs

3/3/2014 to 3/10/2014

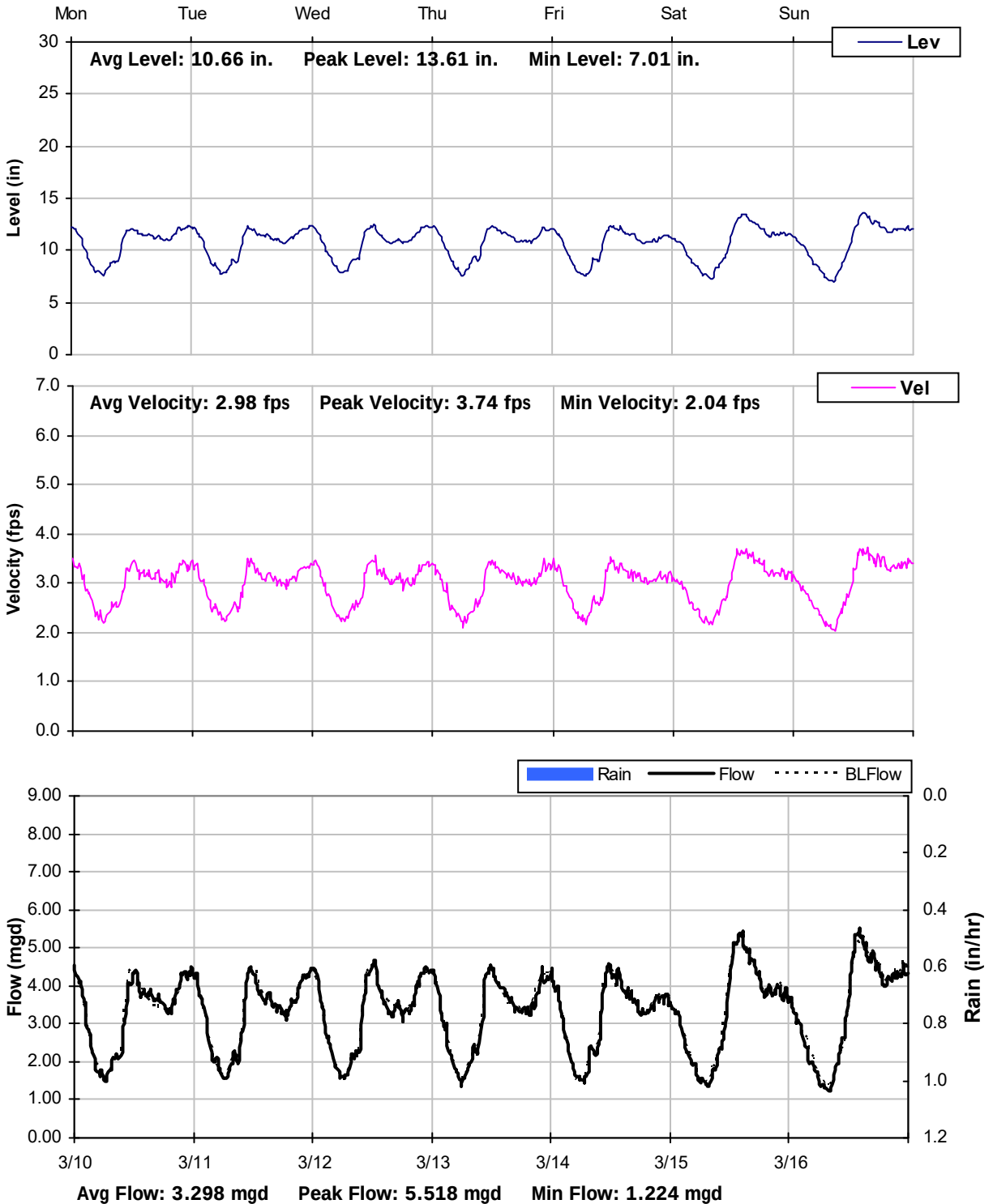




SITE 9

Weekly Level, Velocity and Flow Hydrographs

3/10/2014 to 3/17/2014





City of Gilroy

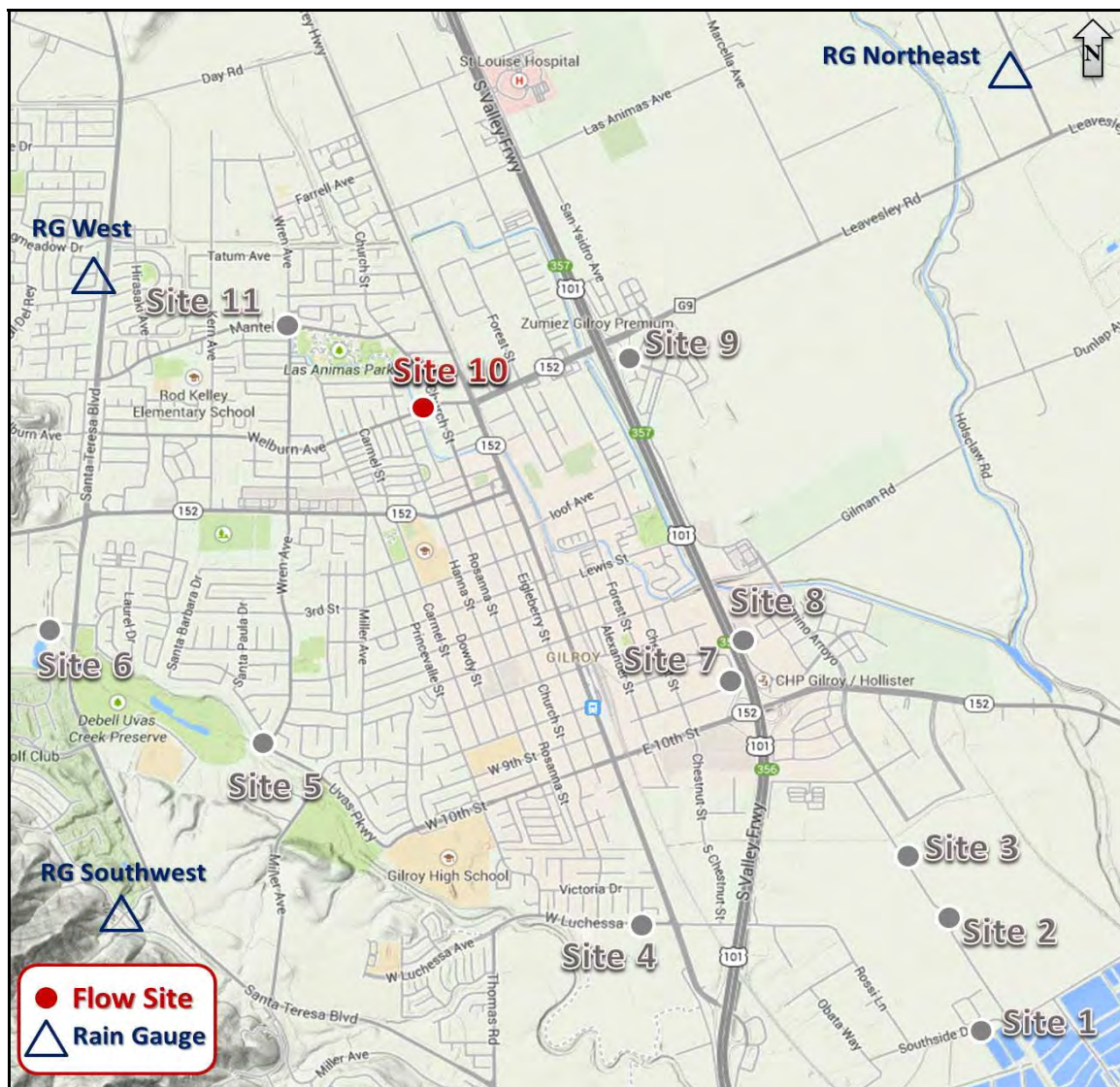
Sanitary Sewer Flow Monitoring

Temporary Monitoring: February and March, 2014

Monitoring Site: Site 10

Location: Welburn Avenue west of Church Street

Data Summary Report



Vicinity Map: Site 10



SITE 10

Site Information

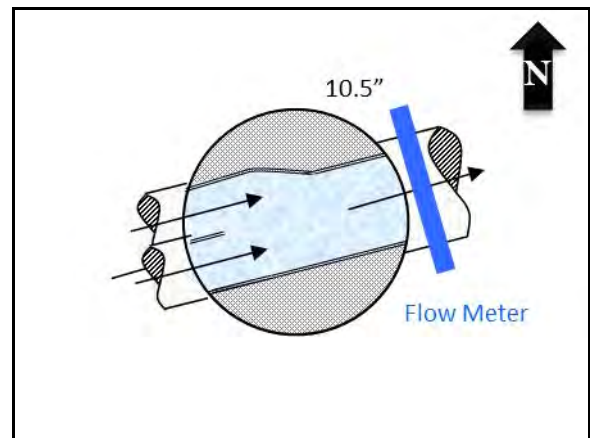
Location:	Welburn Avenue west of Church Street
Coordinates:	121.5781° W, 37.0189° N
Rim Elevation:	207 feet
Pipe Diameter:	10.5 inches
Baseline Flow:	0.310 mgd
Peak Measured Flow:	0.664 mgd



Satellite Map



Sewer Map



Flow Sketch



Street View



Plan View



SITE 10

Additional Site Photos

Effluent Pipe



Influent Pipe



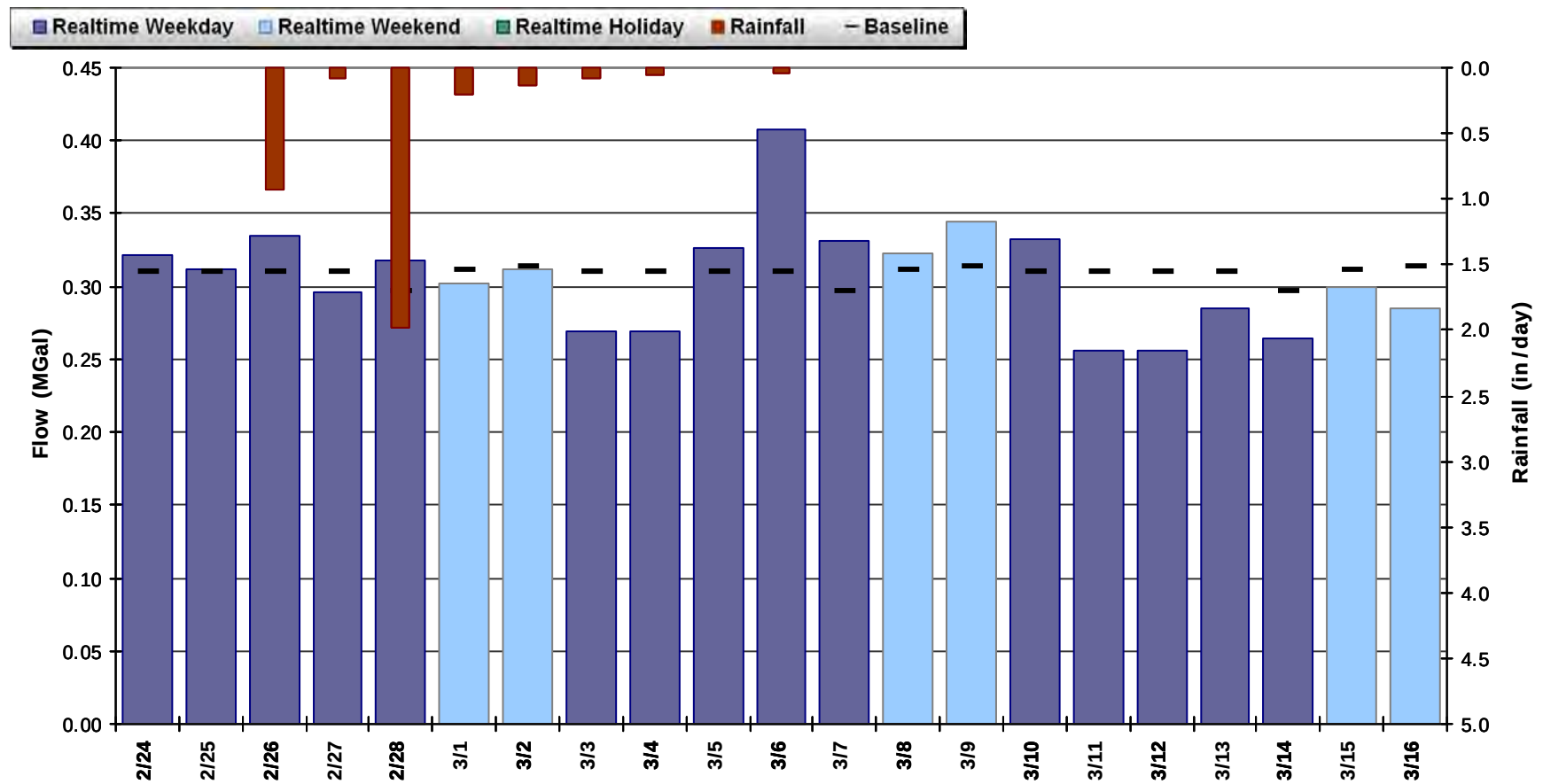


SITE 10

Period Flow Summary: Daily Flow Totals

Avg Period Flow: 0.307 MGal Peak Daily Flow: 0.408 MGal Min Daily Flow: 0.255 MGal

Total Period Rainfall: 3.51 inches

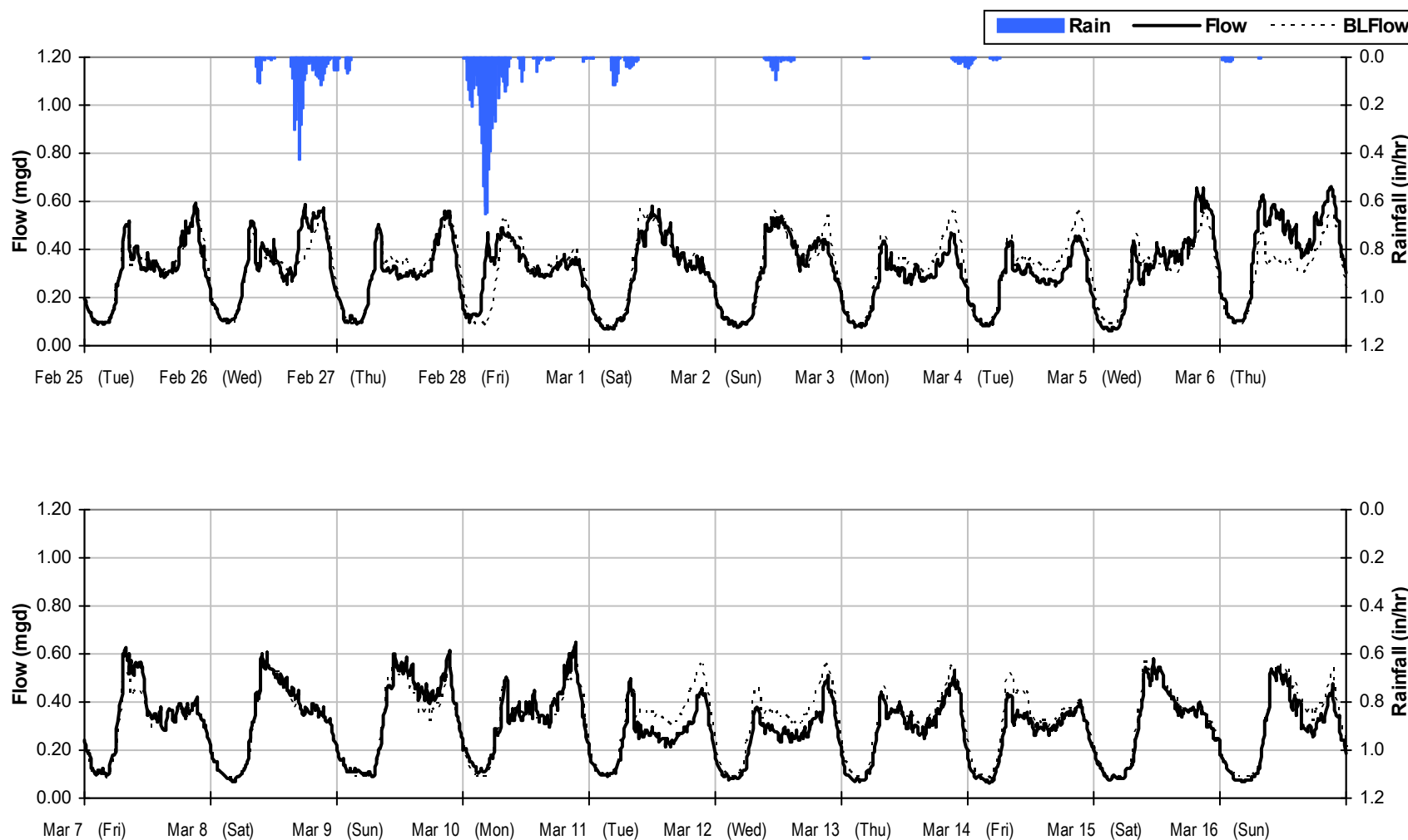




SITE 10

Flow Summary: 2/25/2014 to 3/16/2014

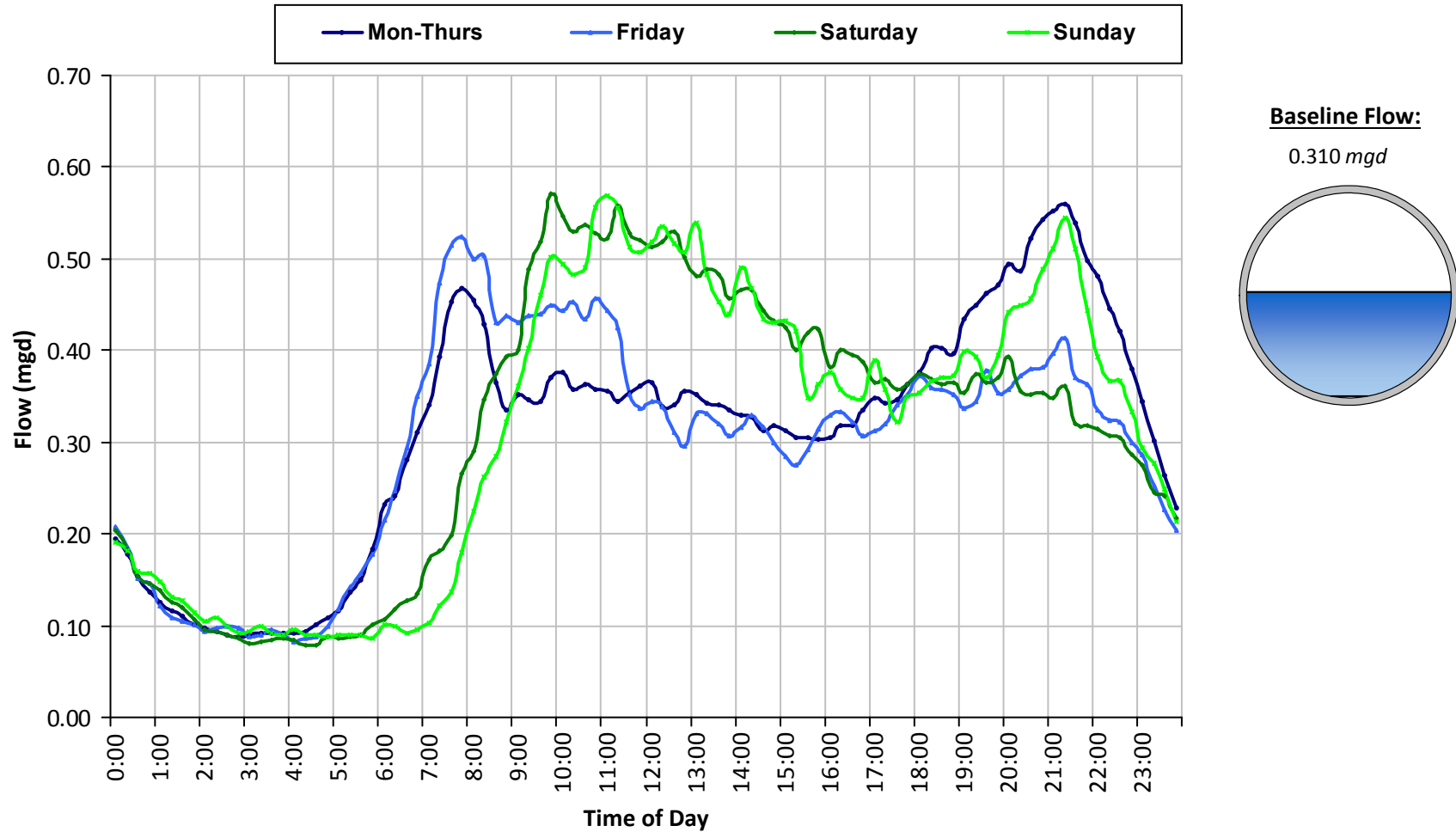
Total Period Rainfall: 3.51 inches Avg Flow: 0.306 mgd Peak Flow: 0.664 mgd Min Flow: 0.063 mgd





SITE 10

Baseline Flow Hydrographs

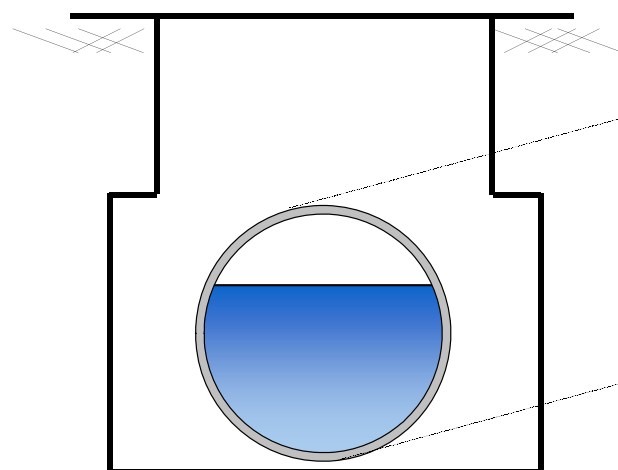
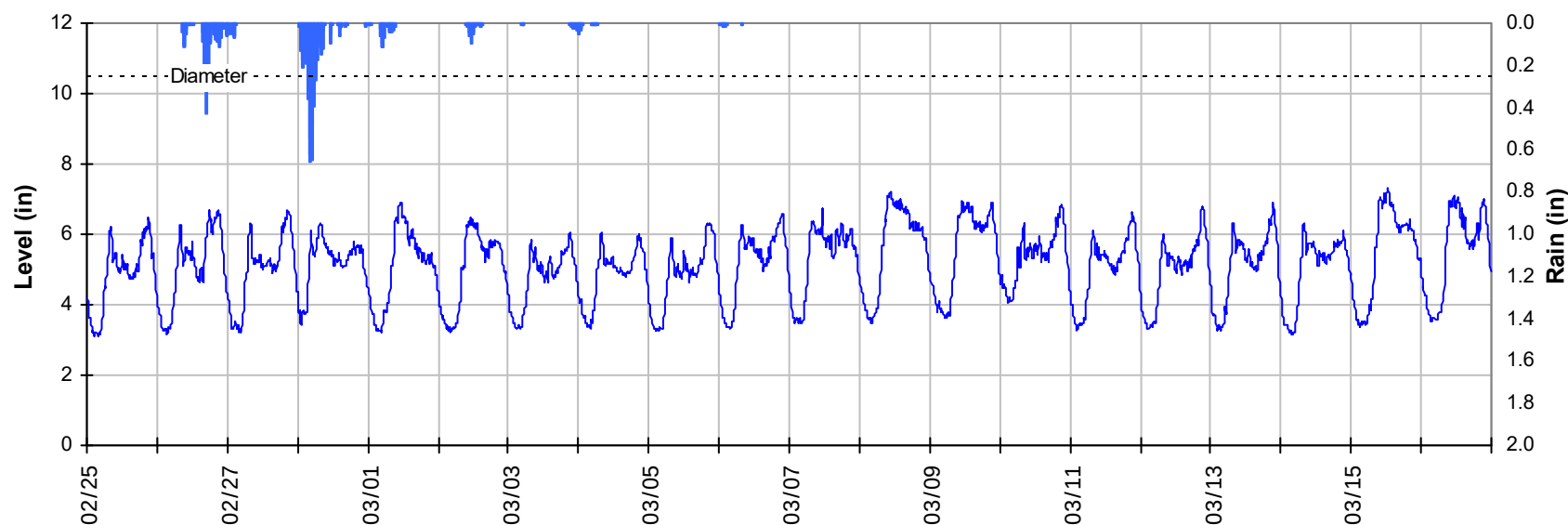




SITE 10

Site Capacity and Surge Summary

Realtime Flow Levels with Rainfall Data over Monitoring Period



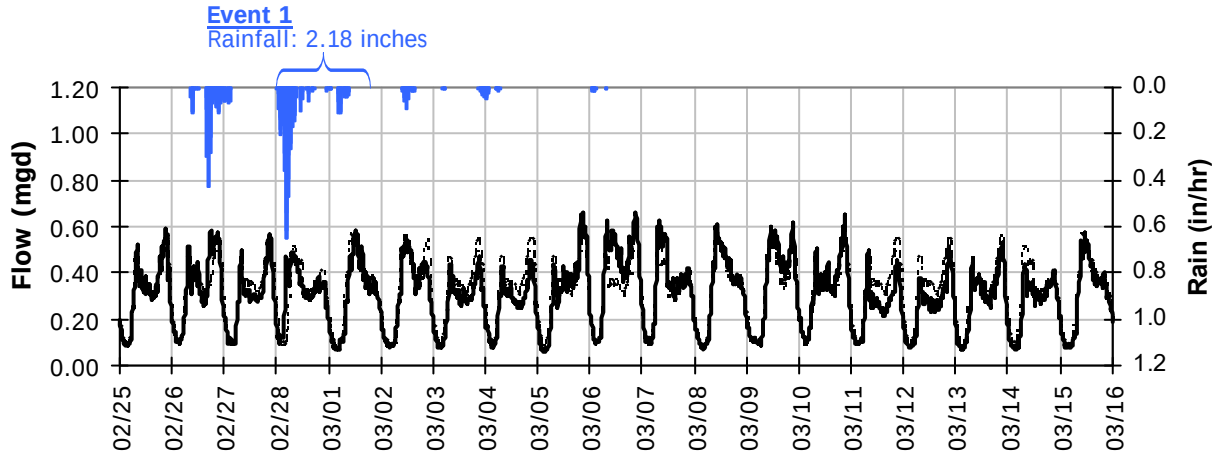
Pipe Diameter: 10.5 inches
Peak Measured Level: 7.29 inches
Peak d/D Ratio: 0.69



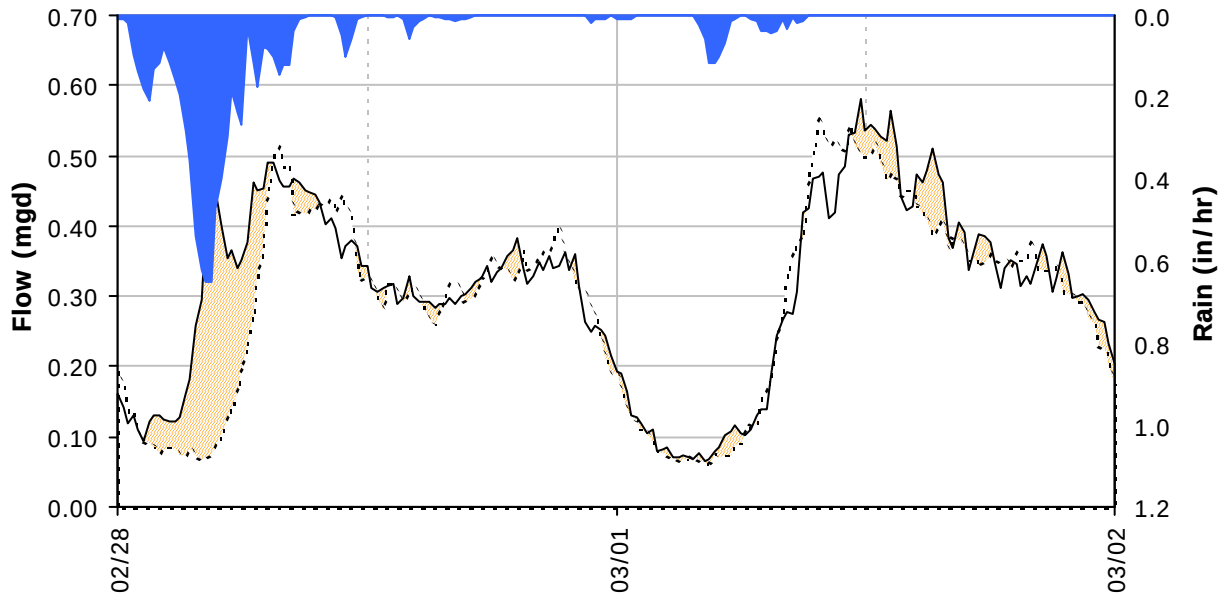
SITE 10

I/I Summary: Event 1

Baseline and Realtime Flows with Rainfall Data over Monitoring Period



Event 1 Detail Graph



Storm Event I/I Analysis (Rain = 2.18 inches)

Capacity

Peak Flow: 0.58 mgd
PF: 1.88

Inflow / Infiltration

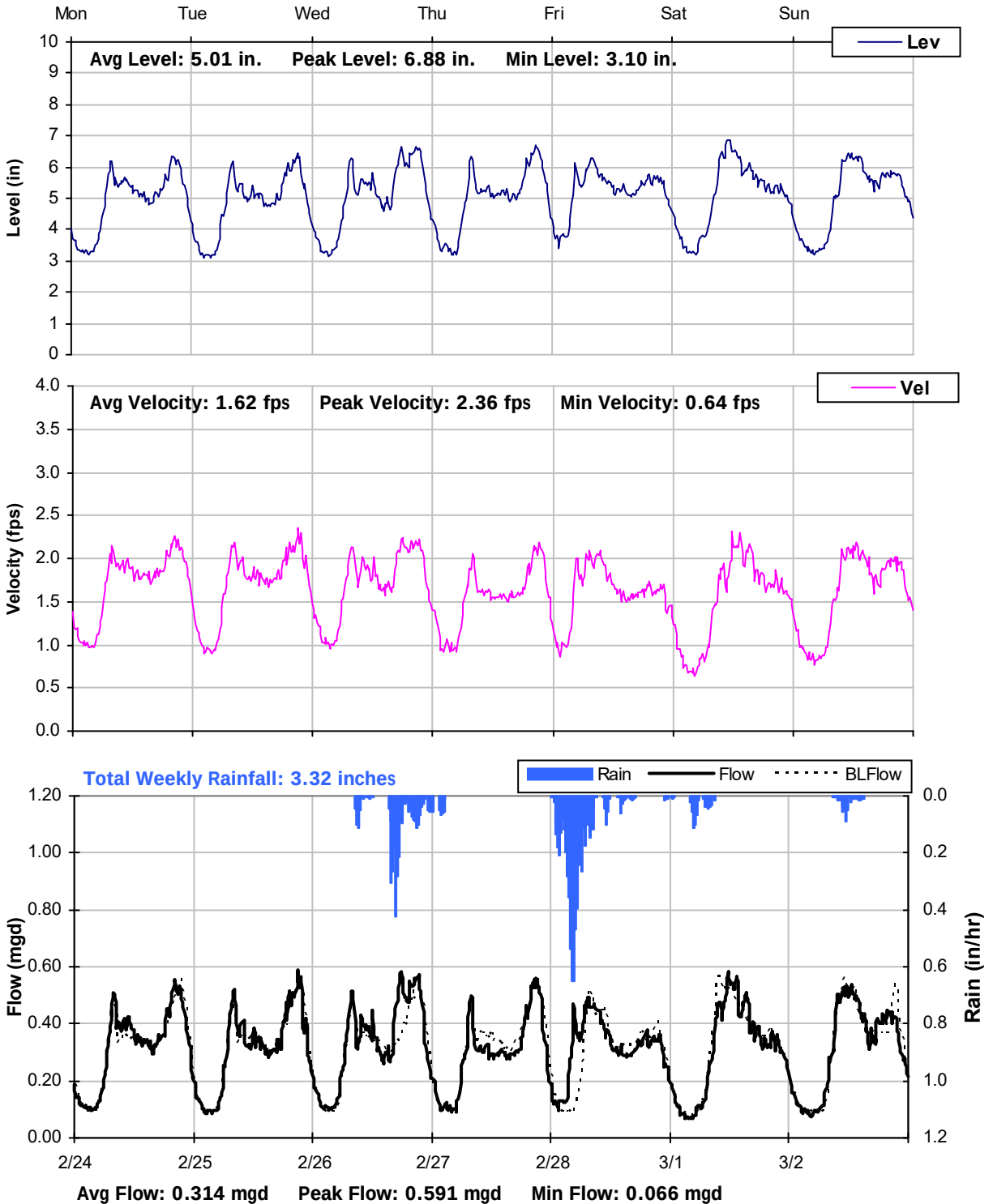
Peak I/I Rate: 0.40 mgd
Total I/I: 41,000 gallons



SITE 10

Weekly Level, Velocity and Flow Hydrographs

2/24/2014 to 3/3/2014

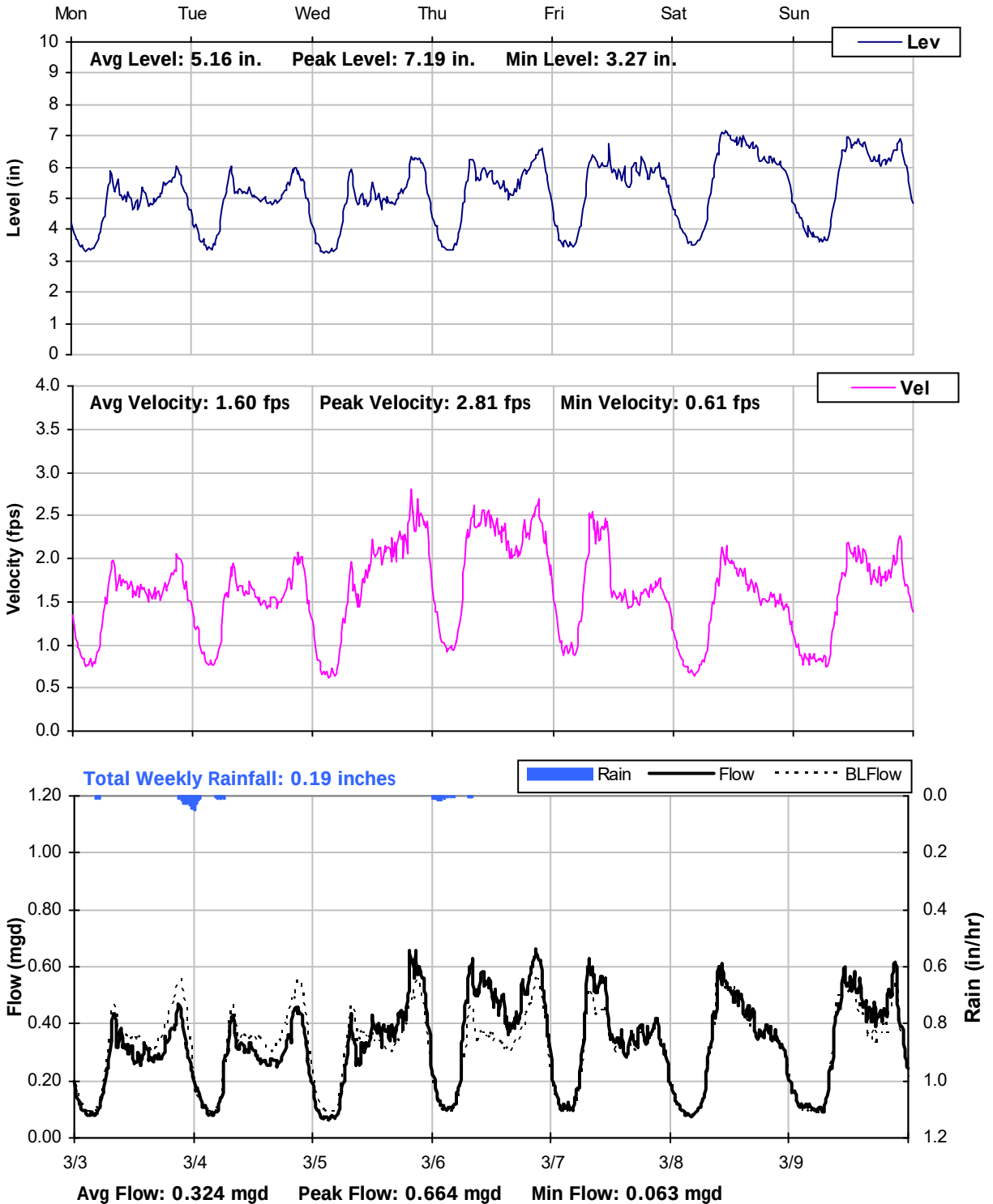




SITE 10

Weekly Level, Velocity and Flow Hydrographs

3/3/2014 to 3/10/2014

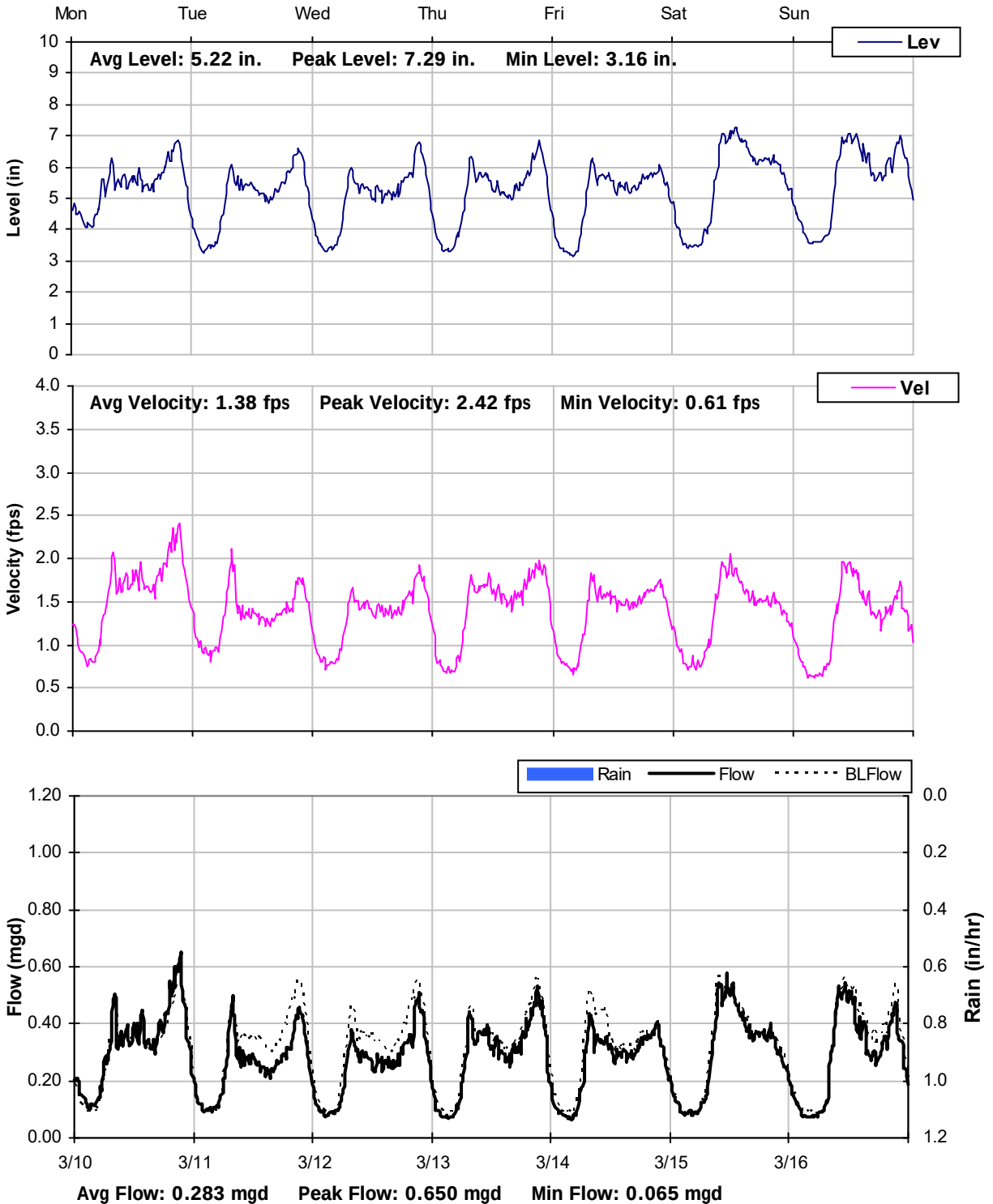




SITE 10

Weekly Level, Velocity and Flow Hydrographs

3/10/2014 to 3/17/2014





City of Gilroy

Sanitary Sewer Flow Monitoring

Temporary Monitoring: February and March, 2014

Monitoring Site: Site 11

Location: Intersection of Wren Avenue and Mantelli Drive

Data Summary Report



Vicinity Map: Site 11



SITE 11

Site Information

Location: Intersection of Wren Avenue and Mantelli Drive

Coordinates: 121.5867° W, 37.0234° N

Rim Elevation: 212 feet

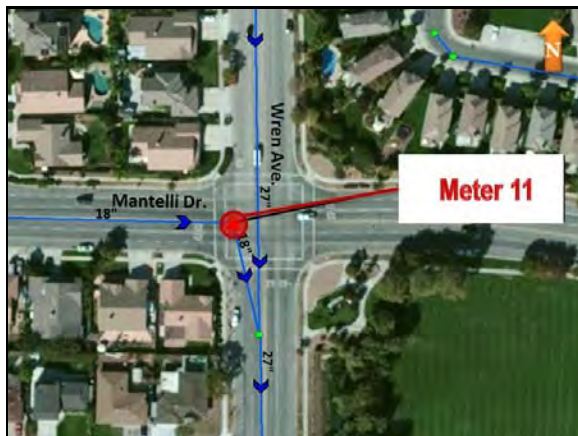
Pipe Diameter: 17.75 inches

Baseline Flow: 0.535 mgd

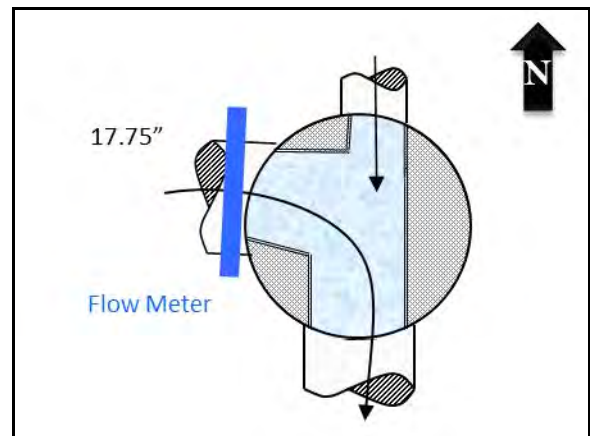
Peak Measured Flow: 1.161 mgd



Satellite Map



Sewer Map



Flow Sketch



Street View



Plan View



SITE 11

Additional Site Photos

Effluent Pipe



Influent Pipe



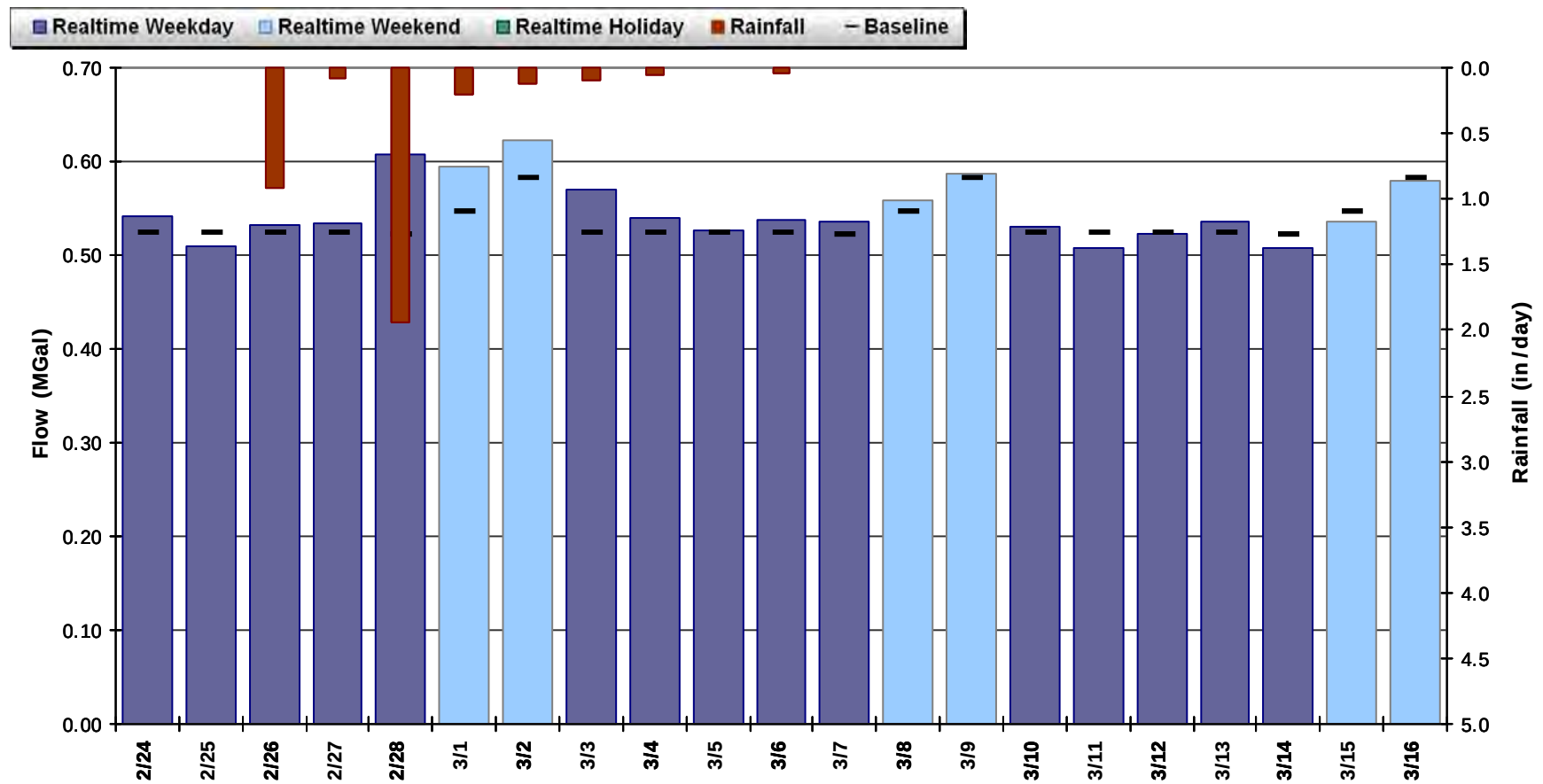


SITE 11

Period Flow Summary: Daily Flow Totals

Avg Period Flow: 0.548 MGal Peak Daily Flow: 0.623 MGal Min Daily Flow: 0.507 MGal

Total Period Rainfall: 3.45 inches

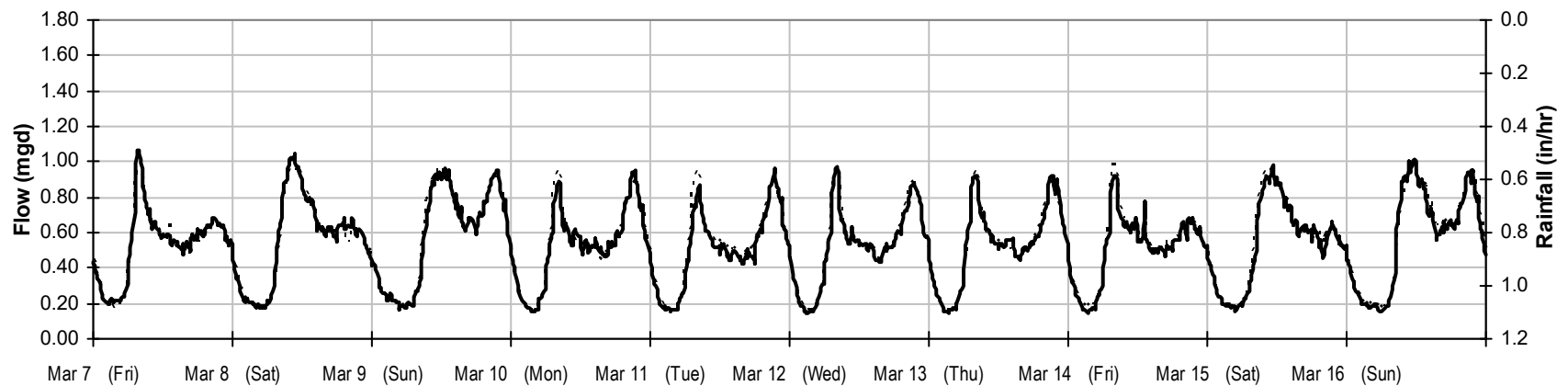
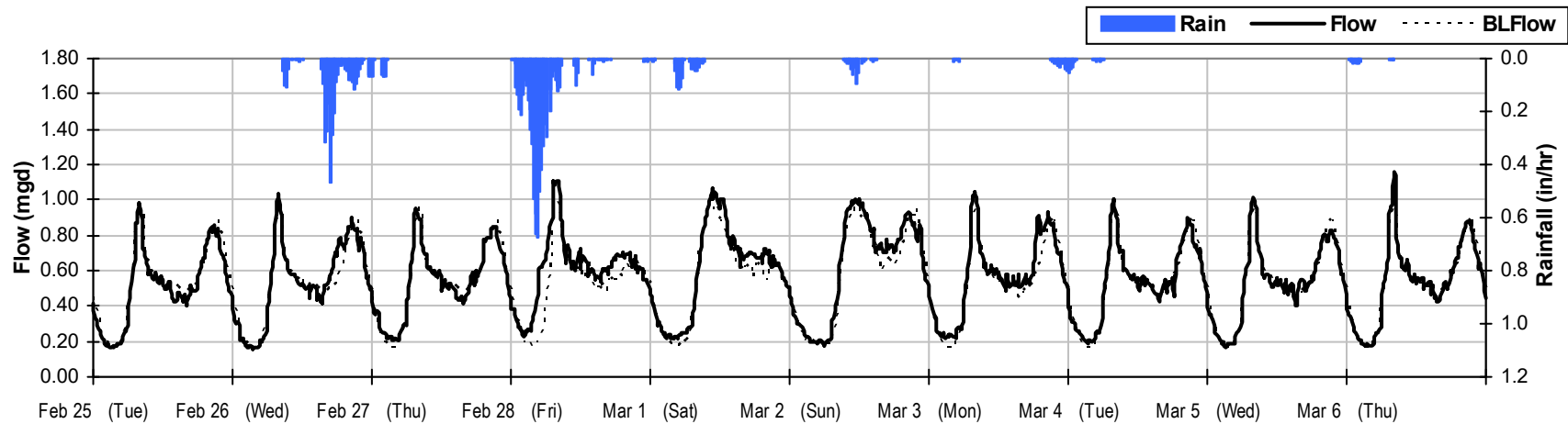




SITE 11

Flow Summary: 2/25/2014 to 3/16/2014

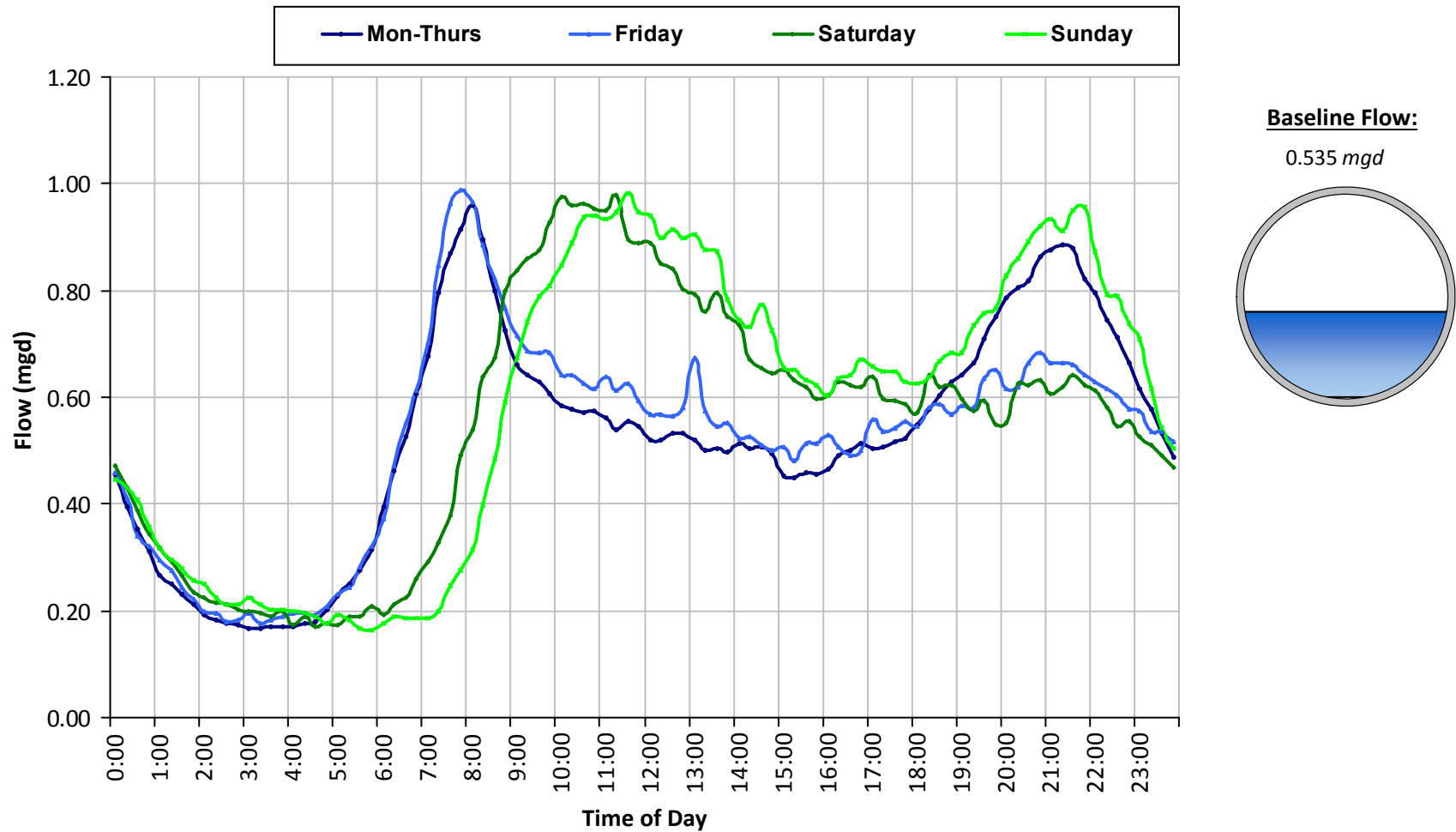
Total Period Rainfall: 3.45 inches **Avg Flow: 0.549 mgd** **Peak Flow: 1.161 mgd** **Min Flow: 0.142 mgd**





SITE 11

Baseline Flow Hydrographs

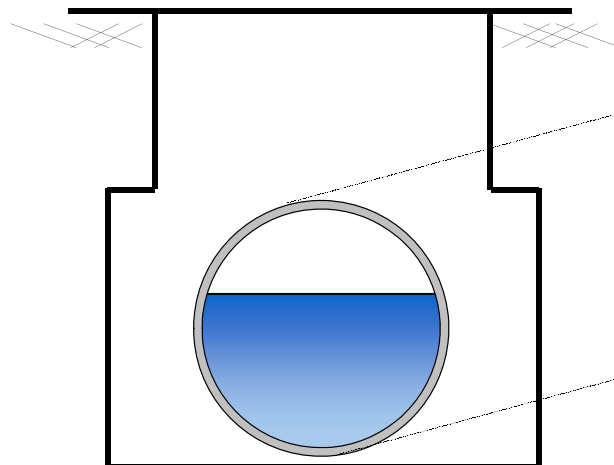
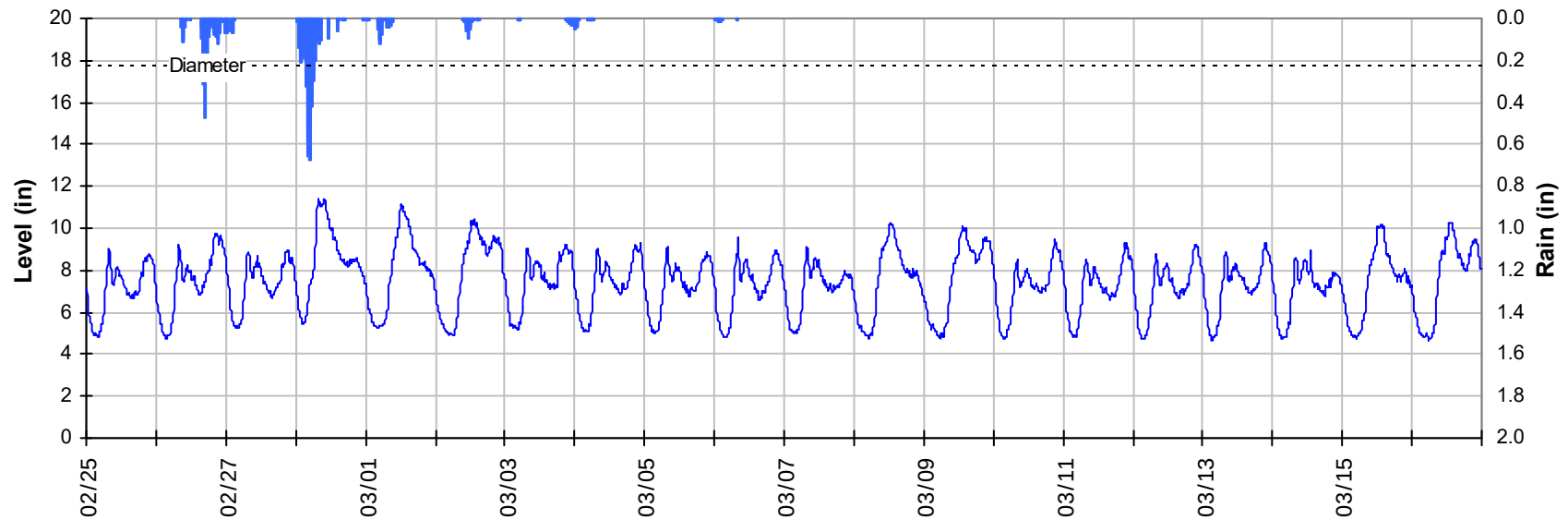




SITE 11

Site Capacity and Surge Summary

Realtime Flow Levels with Rainfall Data over Monitoring Period



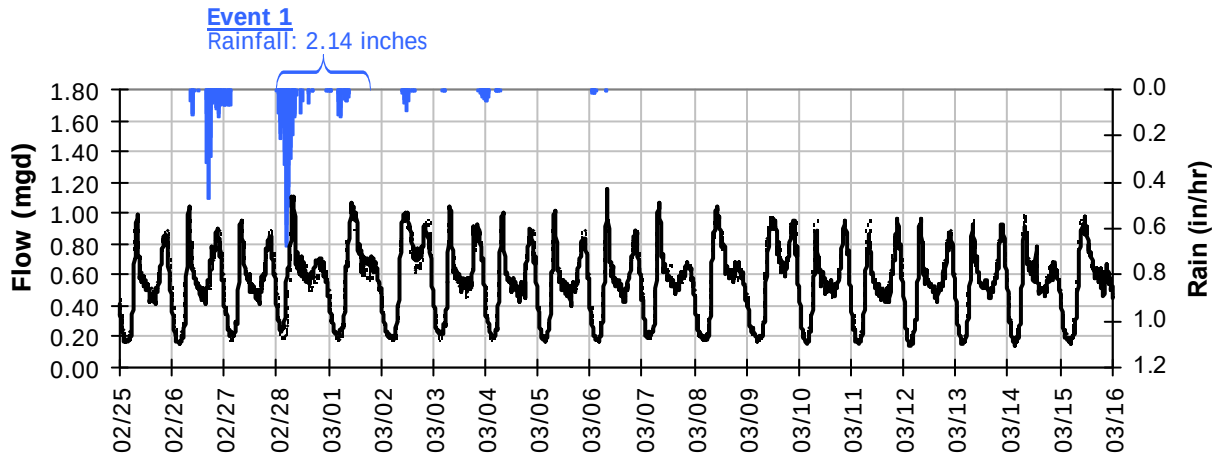
Pipe Diameter: 17.8 inches
Peak Measured Level: 11.4 inches
Peak d/D Ratio: 0.64



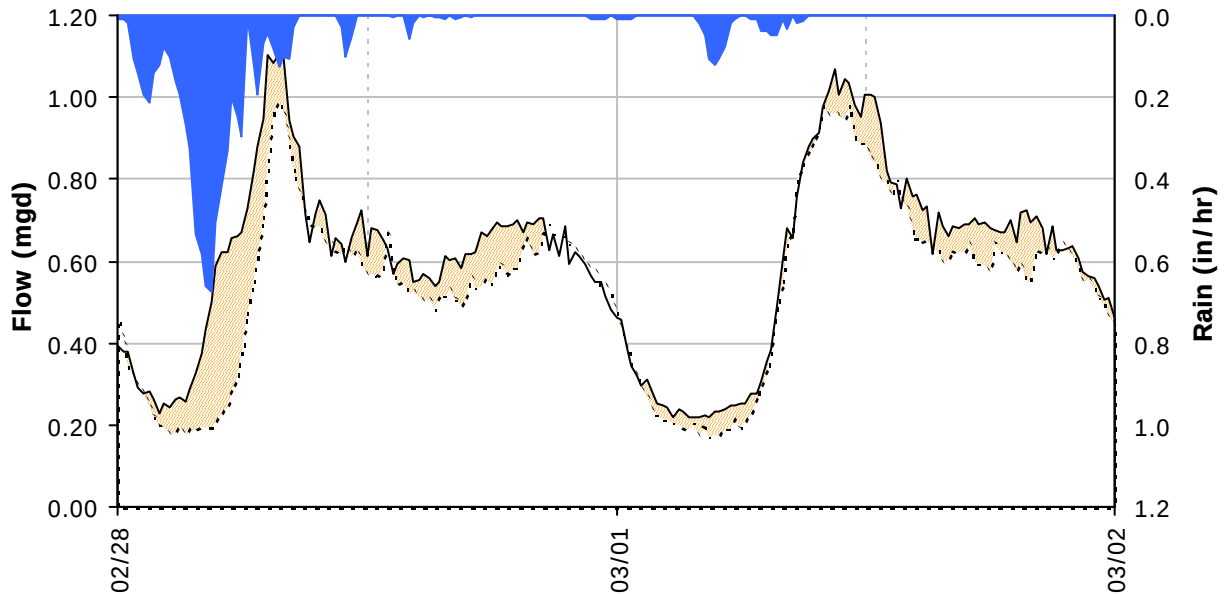
SITE 11

I/I Summary: Event 1

Baseline and Realtime Flows with Rainfall Data over Monitoring Period



Event 1 Detail Graph



Storm Event I/I Analysis (Rain = 2.14 inches)

Capacity

Peak Flow: 1.11 mgd
PF: 2.07

Inflow / Infiltration

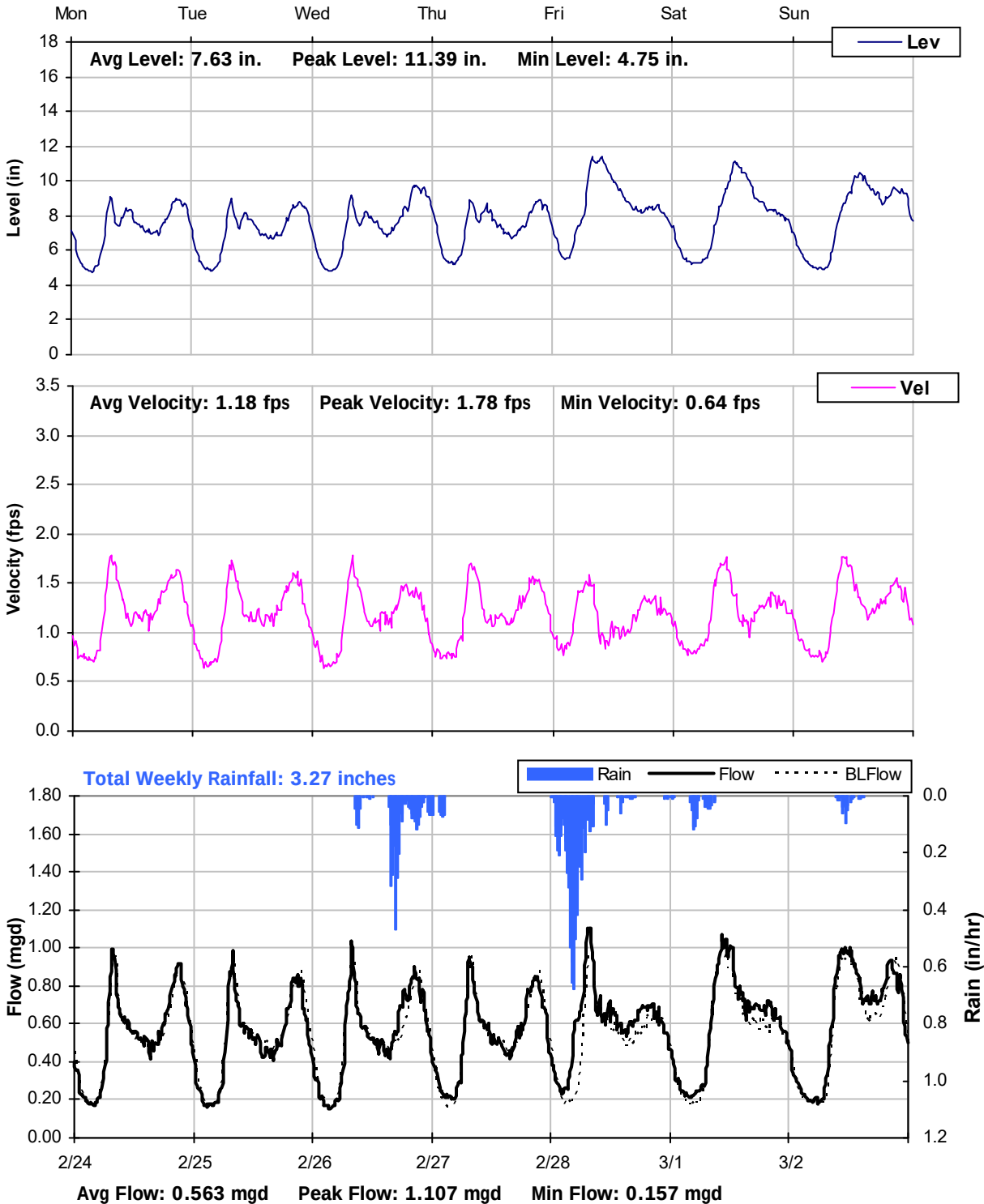
Peak I/I Rate: 0.39 mgd
Total I/I: 133,000 gallons



SITE 11

Weekly Level, Velocity and Flow Hydrographs

2/24/2014 to 3/3/2014

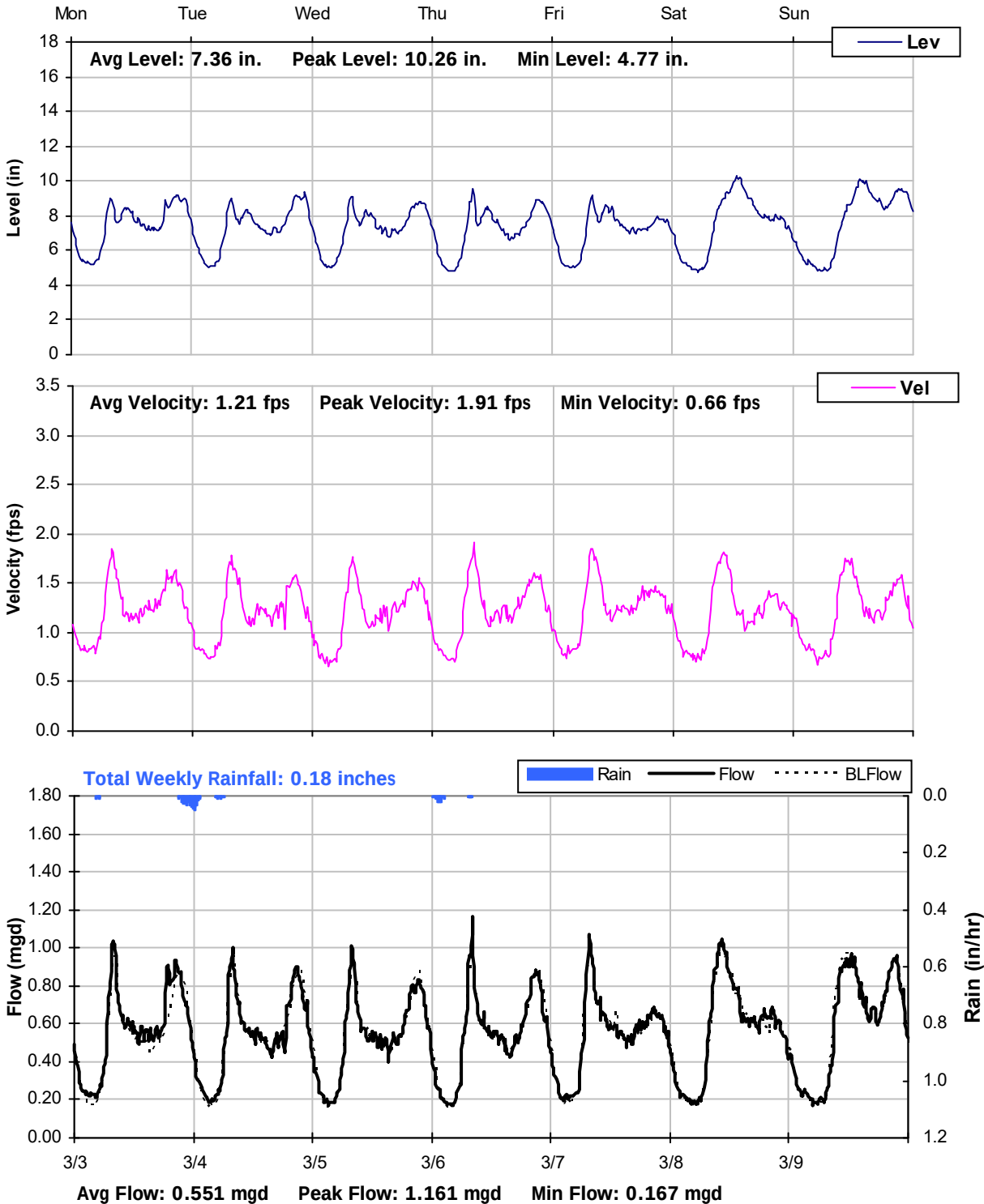




SITE 11

Weekly Level, Velocity and Flow Hydrographs

3/3/2014 to 3/10/2014

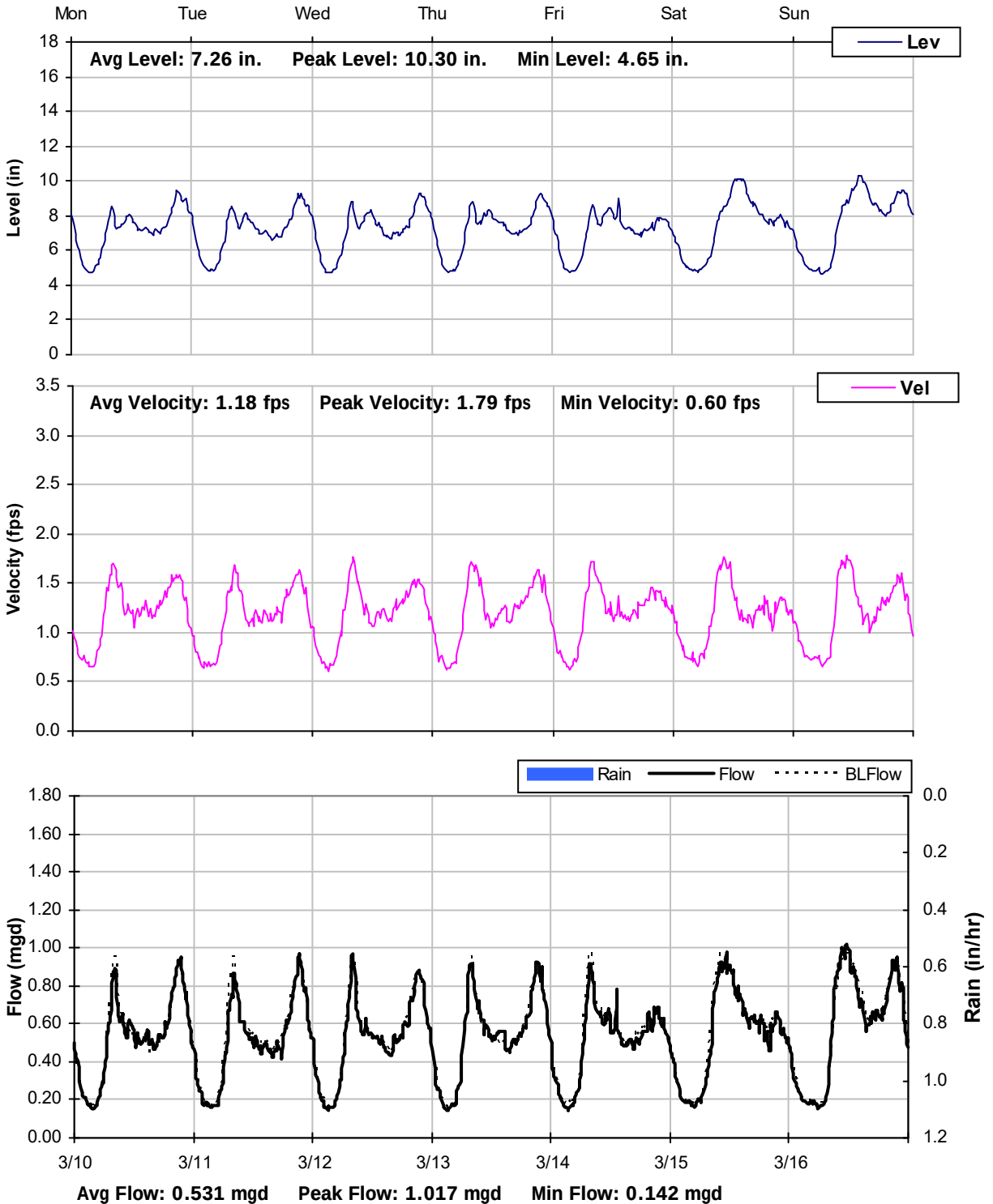




SITE 11

Weekly Level, Velocity and Flow Hydrographs

3/10/2014 to 3/17/2014





City of Gilroy

Sanitary Sewer Flow Monitoring

Temporary Monitoring: February and March, 2014

Monitoring Site: Sites 1+2+3

Location: Sum of Sites 1, 2 and 3 -- total flow entering the treatment facility

Data Summary Report

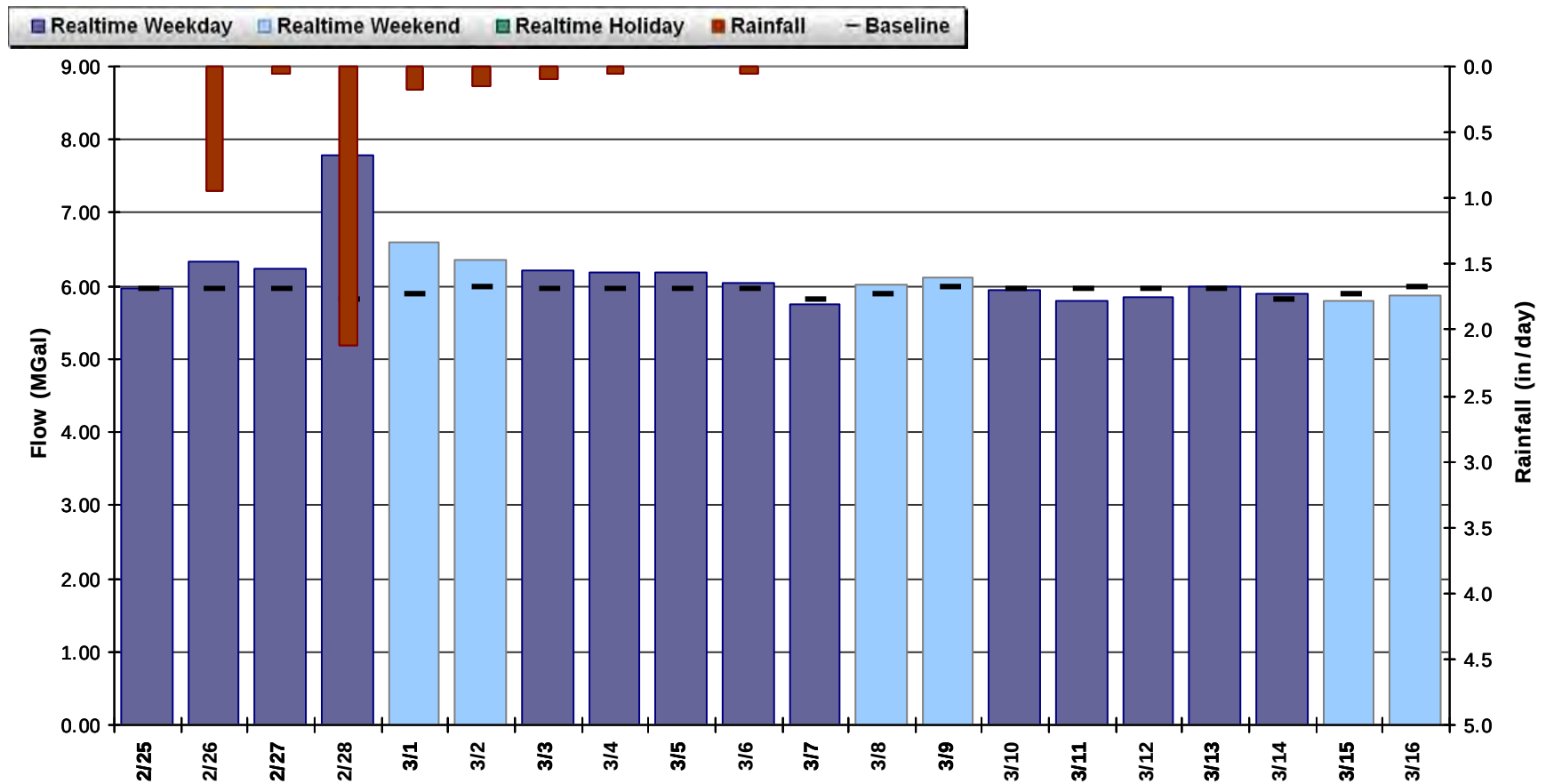


Vicinity Map: Sites 1+2+3



SITES 1+2+3

Period Flow Summary: Daily Flow Totals

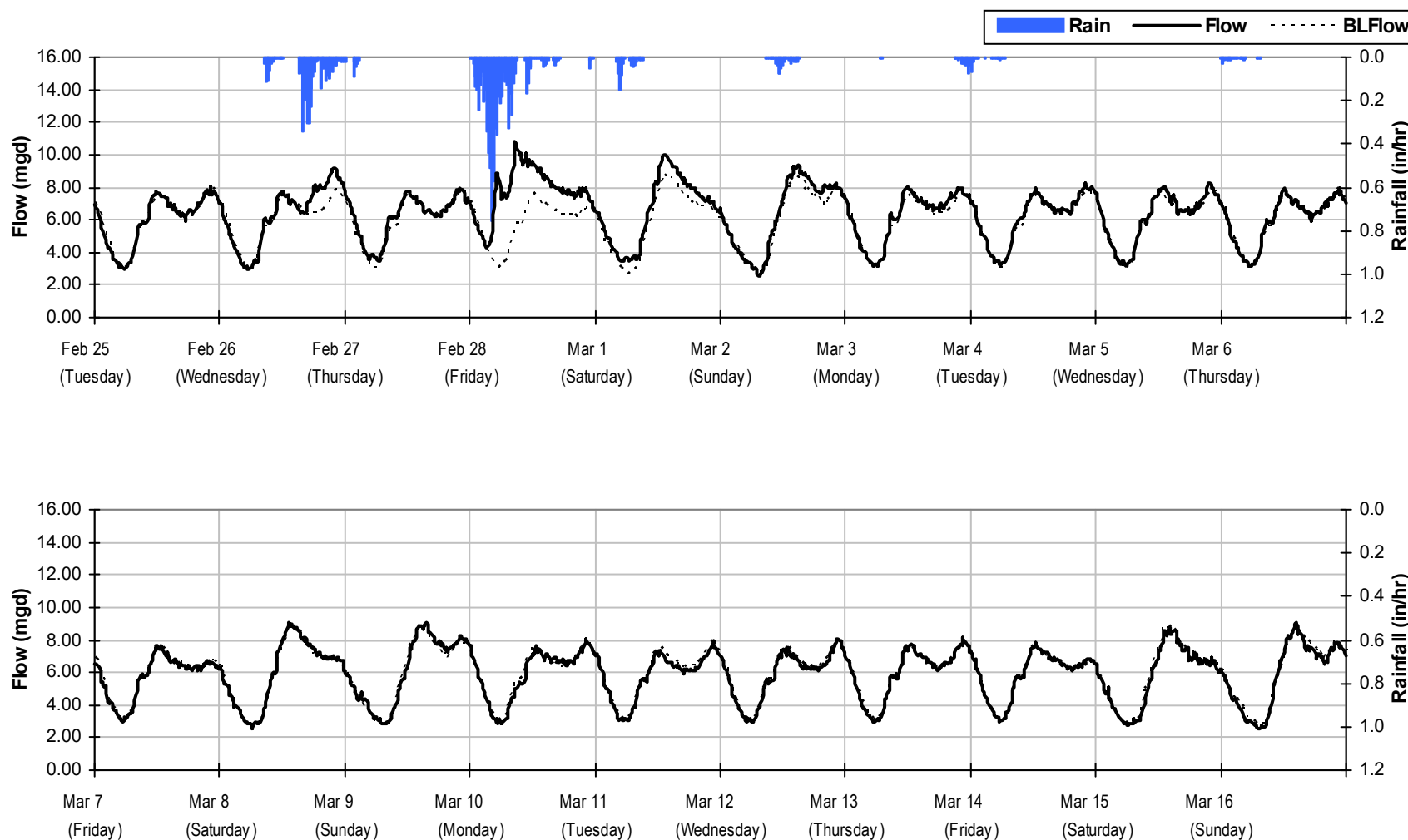




SITES 1+2+3

Flow Summary: 2/25/2014 to 3/16/2014

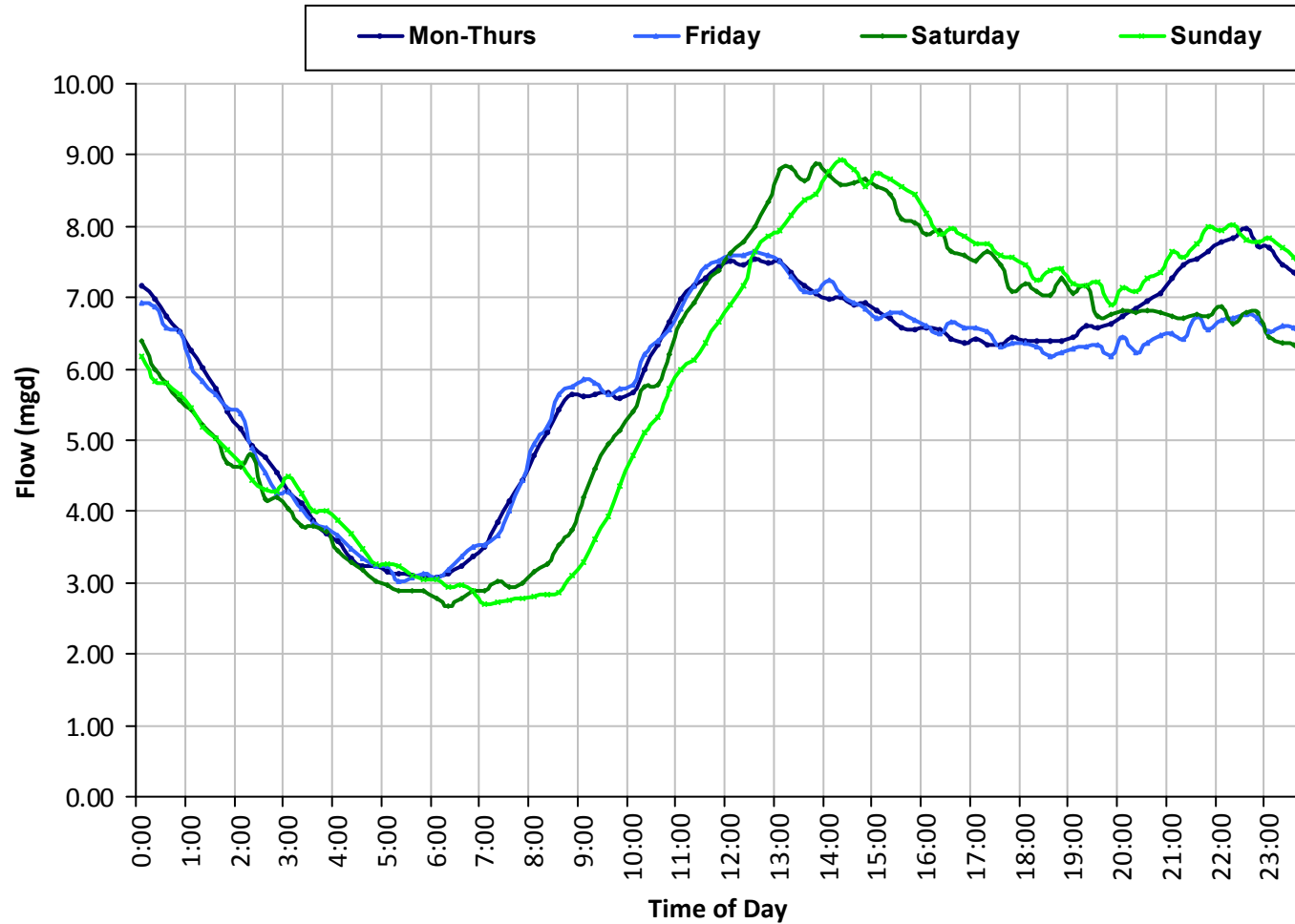
Total Period Rainfall: 3.64 inches Avg Flow: 6.147 mgd Peak Flow: 10.785 mgd Min Flow: 2.522 mgd





SITES 1+2+3

Baseline Flow Hydrographs



Baseline Flow:

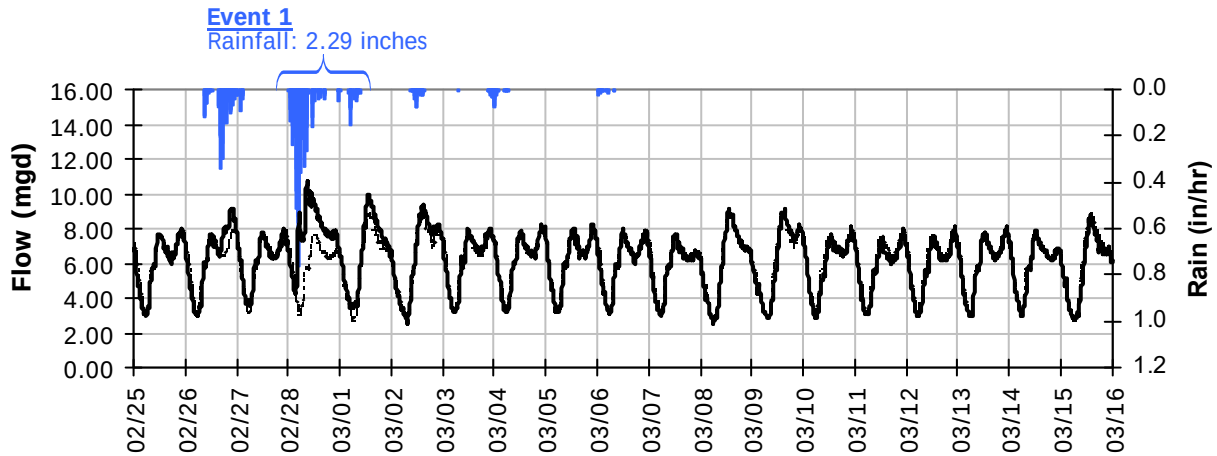
5.944 mgd



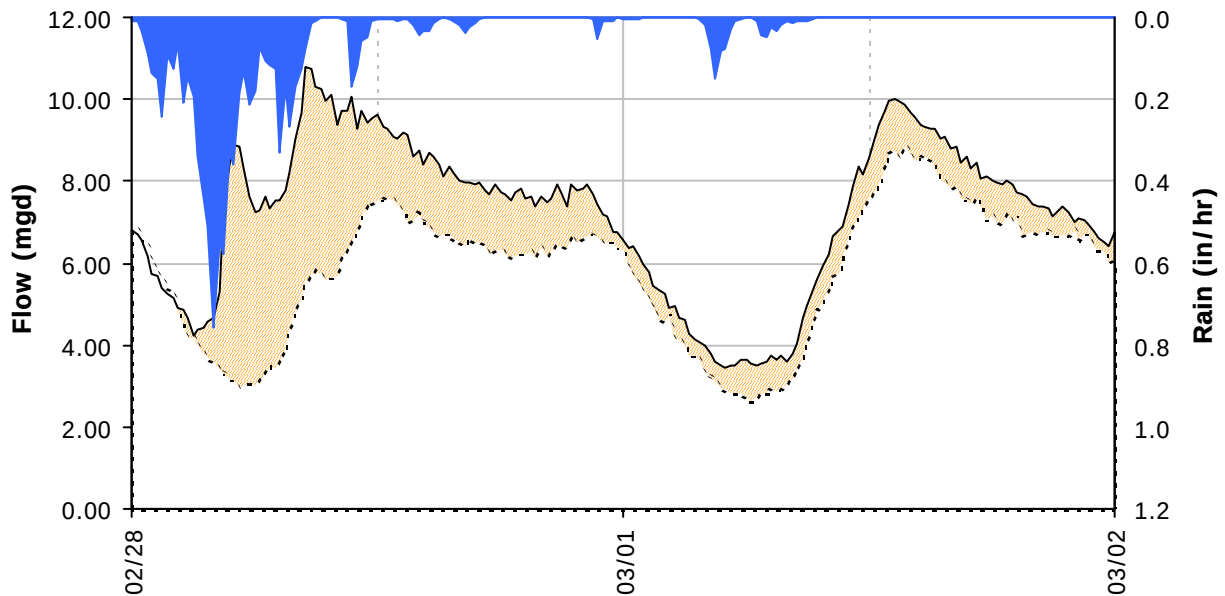
SITES 1+2+3

I/I Summary: Event 1

Baseline and Realtime Flows with Rainfall Data over Monitoring Period



Event 1 Detail Graph



Storm Event I/I Analysis (Rain = 2.29 inches)

Capacity

Peak Flow: 10.78 mgd
PF: 1.81

Inflow / Infiltration

Peak I/I Rate: 5.92 mgd
Total I/I: 2,796,000 gallons



Oakland
 155 Grand Avenue, Suite 700
 Oakland, CA 94612
 510.903.6600 **Tel**
 510.903.6601 **Fax**

San Diego
 11011 Via Frontera, Suite C
 San Diego, CA 92127
 858.576.0226 **Tel**

Houston
 8220 Jones Road, Suite 500
 Houston, TX 77065
 713.568.9067 **Tel**

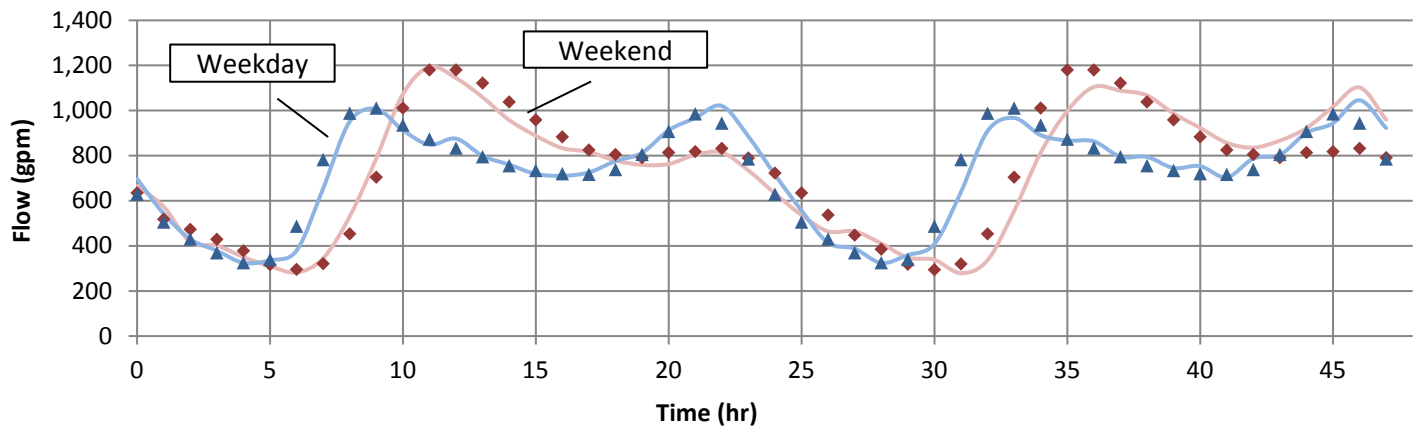
Las Vegas
 3430 East Russell Road, Suite 316
 Las Vegas, NV 89120
 702.522.7967 **Tel**
 702.553.4694 **Fax**

vaengineering.com

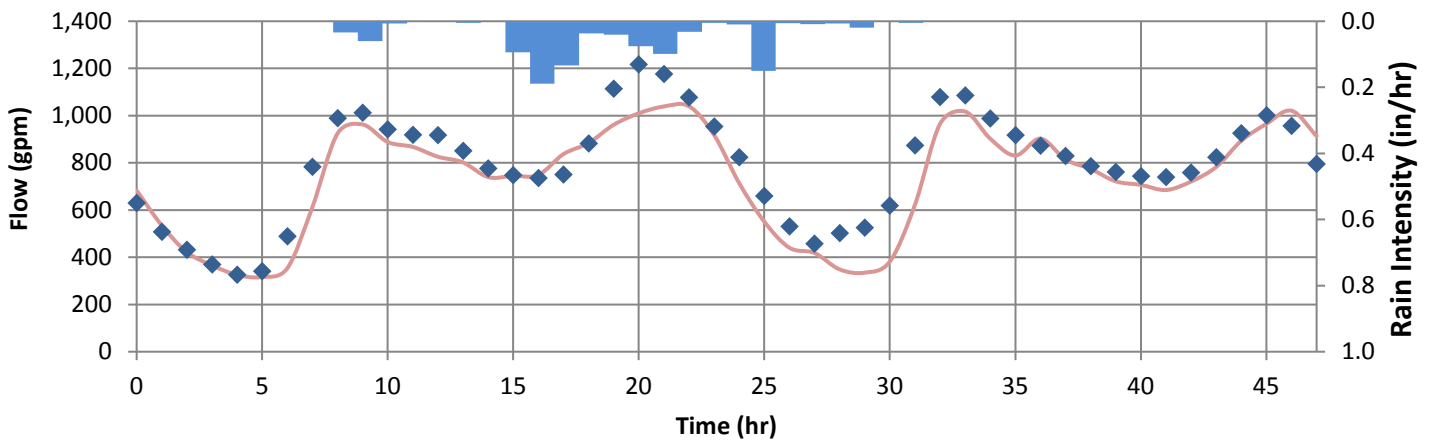
APPENDIX B

Hydraulic Model Calibration Exhibits

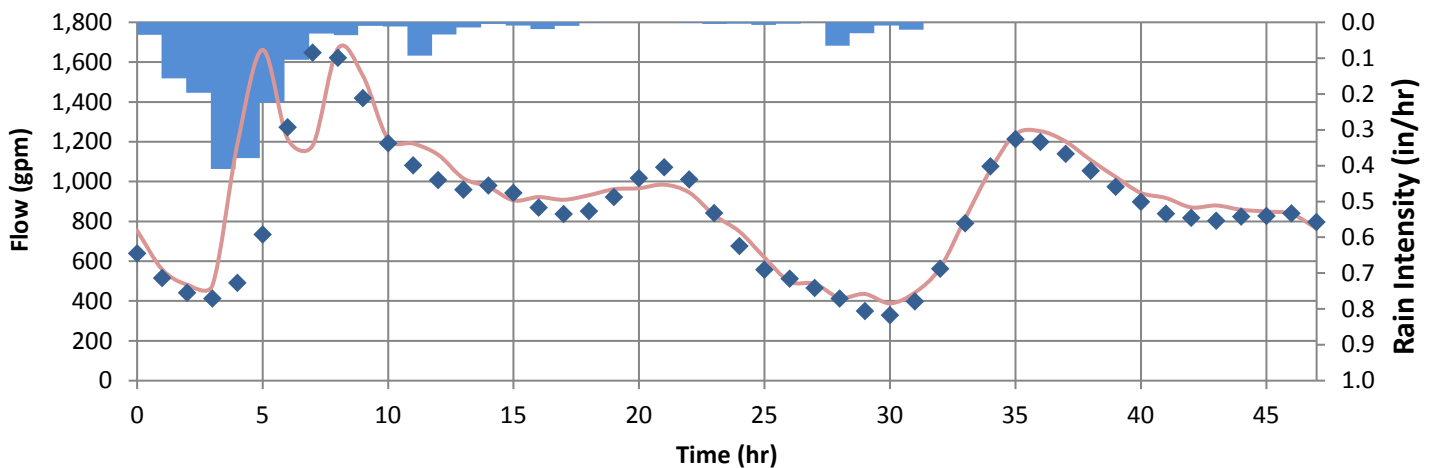
Dry Weather Flow



Wet Weather Event 1 (02/26/14 - 02/27/14)



Wet Weather Event 2 (02/28/14 - 03/01/14)



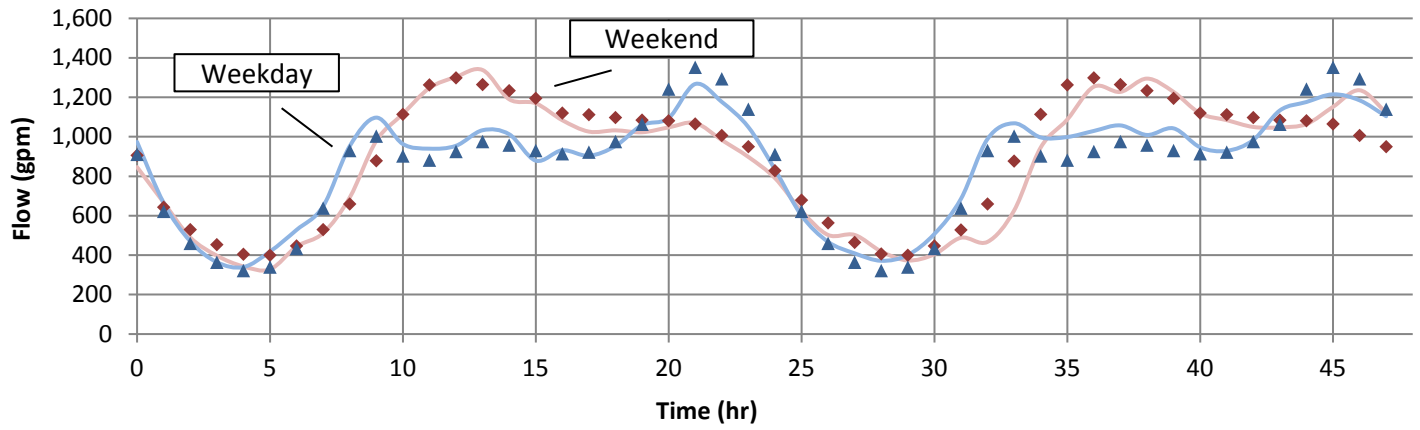
LEGEND

- Rain Event
- Hydraulic Model
- V&A Flow Monitoring
- V&A Flow Monitoring

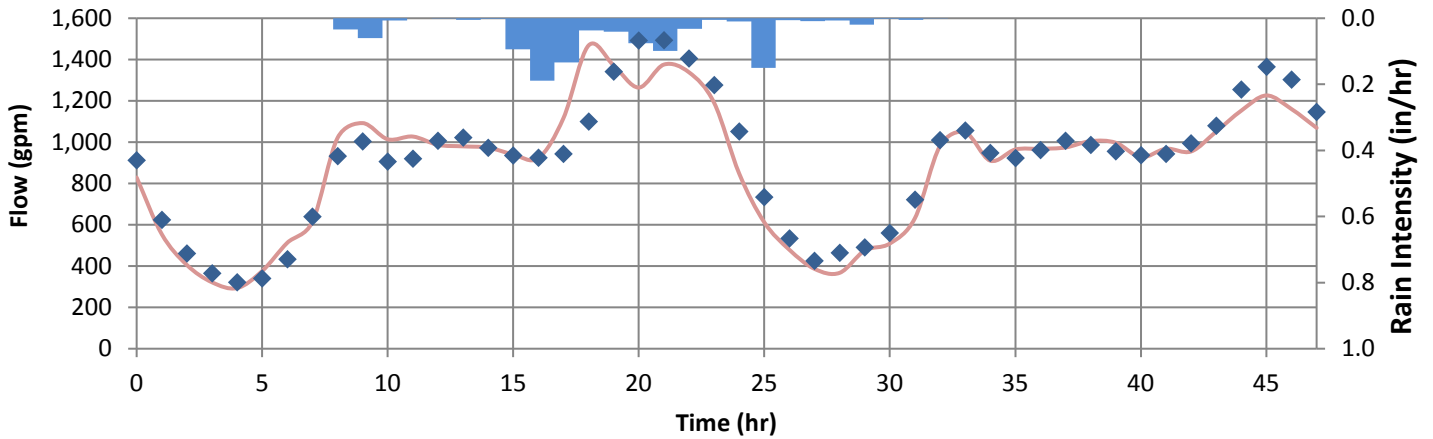
Figure 6.5

Site 1 Calibration
Inside WWTP
Sewer System Master Plan
City of Gilroy

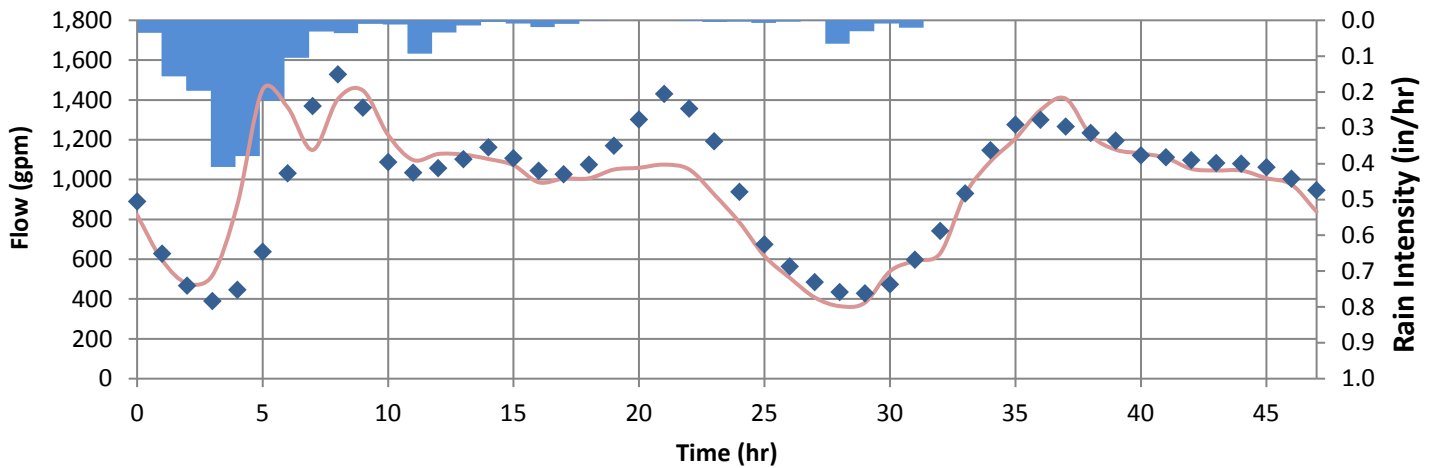
Dry Weather Flow



Wet Weather Event 1 (02/26/14 - 02/27/14)



Wet Weather Event 2 (02/28/14 - 03/01/14)



LEGEND

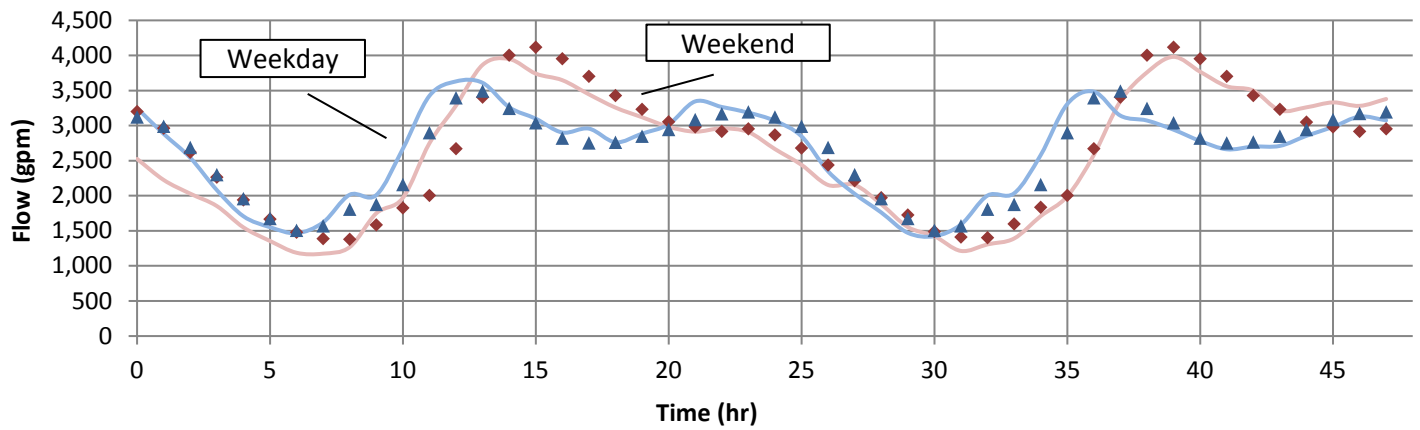
- Rain Event
- Hydraulic Model
- V&A Flow Monitoring
- V&A Flow Monitoring

Figure 6.6

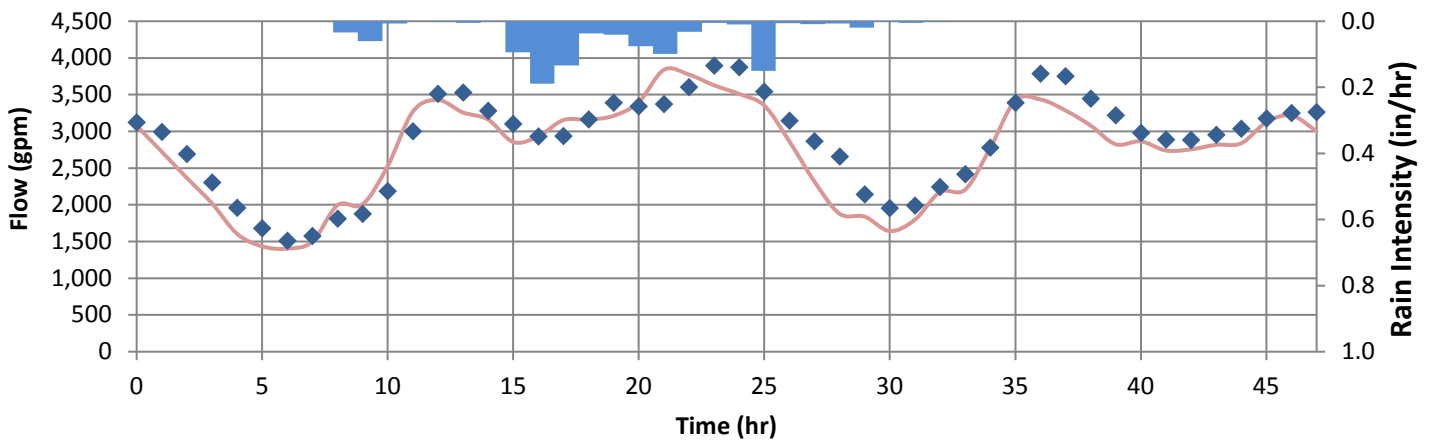
Site 2 Calibration

ROW se/o Holloway Rd.
Sewer System Master Plan
City of Gilroy

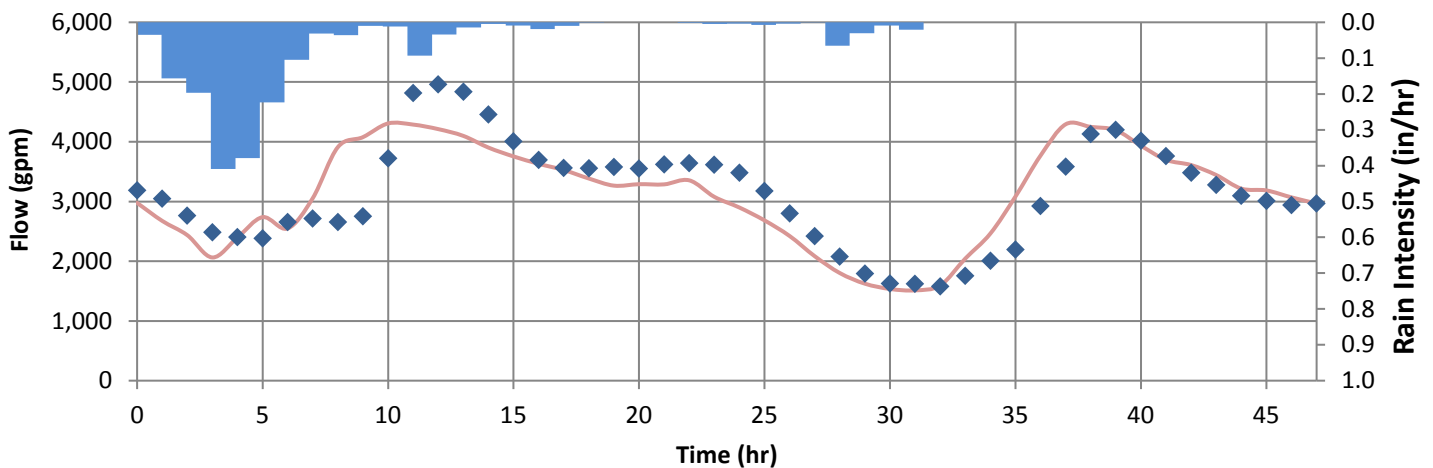
Dry Weather Flow



Wet Weather Event 1 (02/26/14 - 02/27/14)



Wet Weather Event 2 (02/28/14 - 03/01/14)



LEGEND

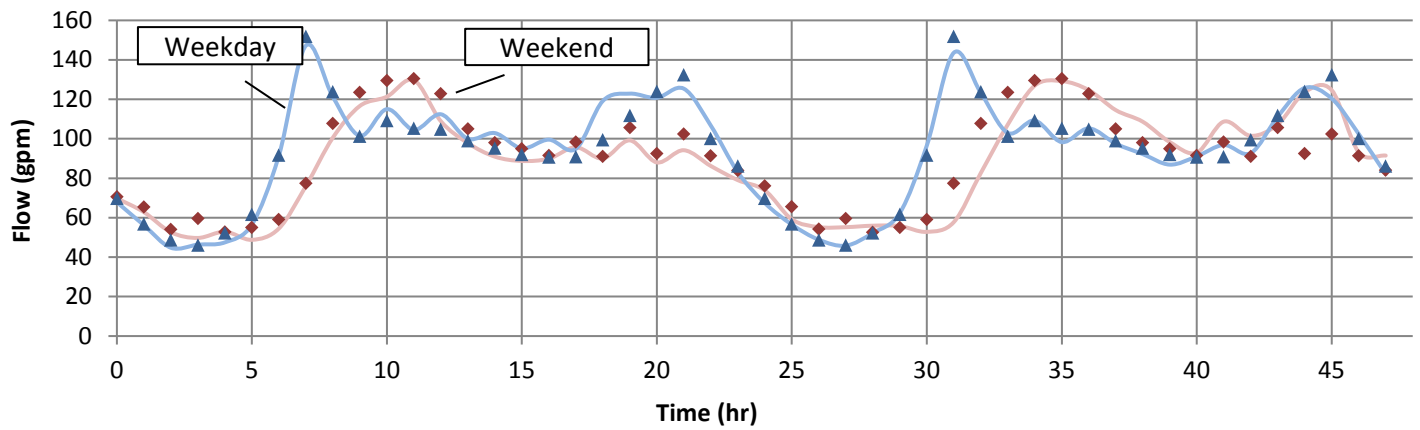
- Rain Event
- Hydraulic Model
- V&A Flow Monitoring
- V&A Flow Monitoring

Figure 6.7

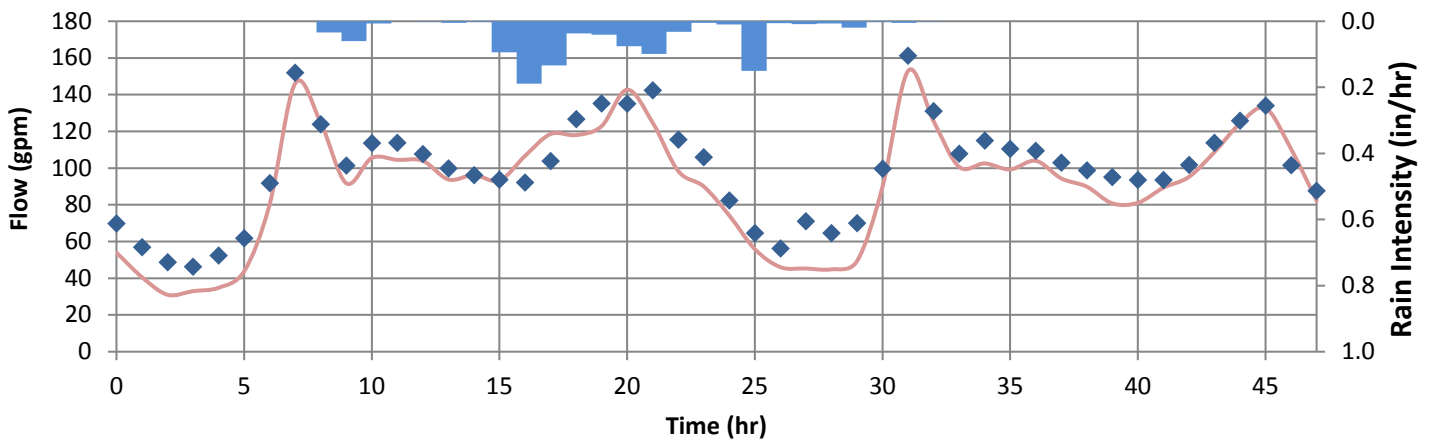
Site 3 Calibration
ROW se/o Holloway Rd.
Sewer System Master Plan
City of Gilroy



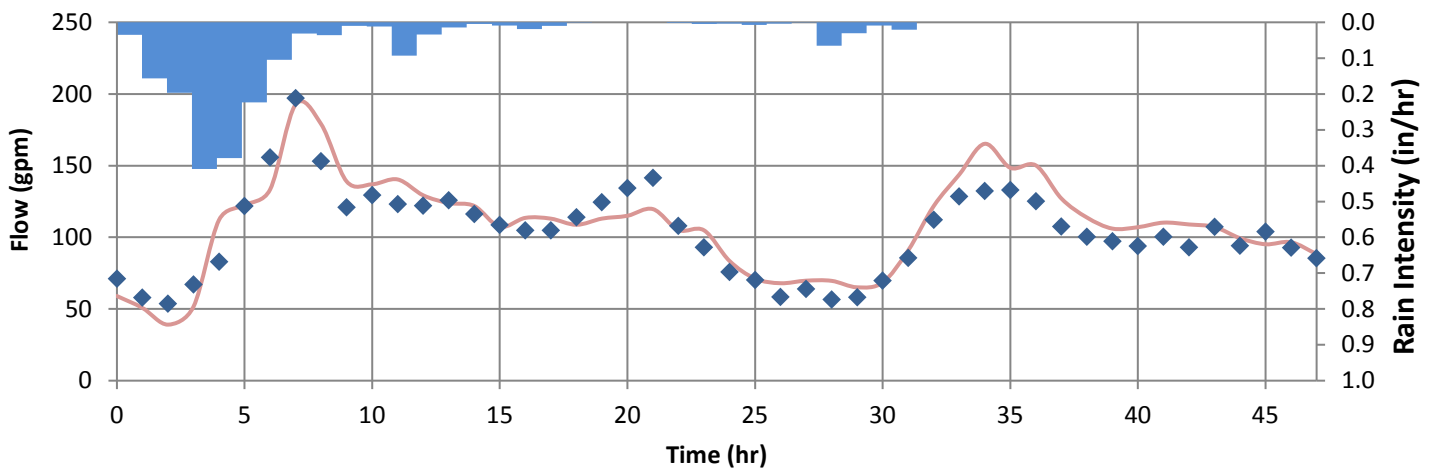
Dry Weather Flow



Wet Weather Event 1 (02/26/14 - 02/27/14)



Wet Weather Event 2 (02/28/14 - 03/01/14)



LEGEND

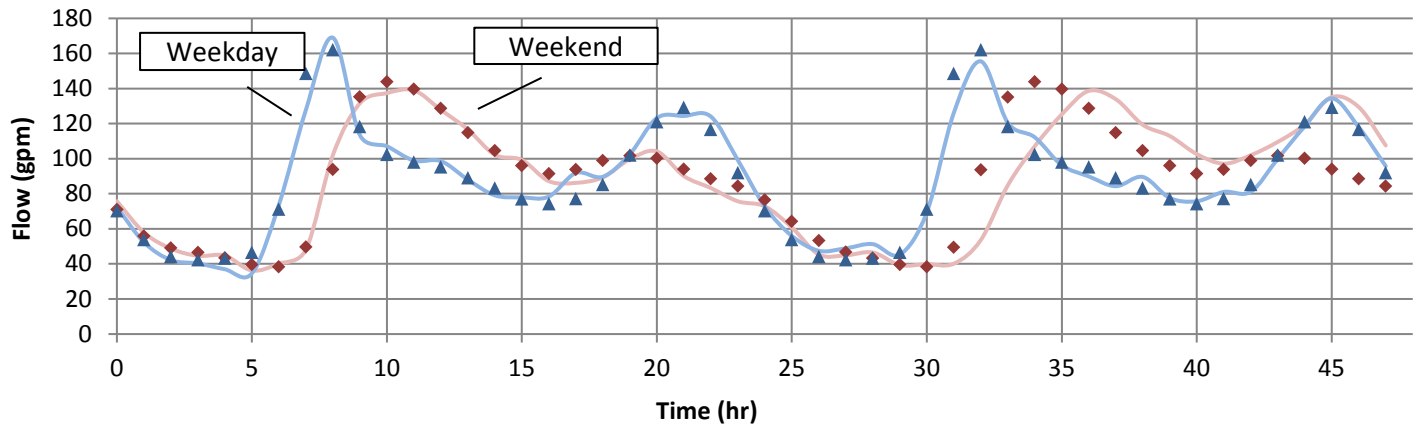
- Rain Event
- Hydraulic Model
- V&A Flow Monitoring
- V&A Flow Monitoring

Figure 6.8

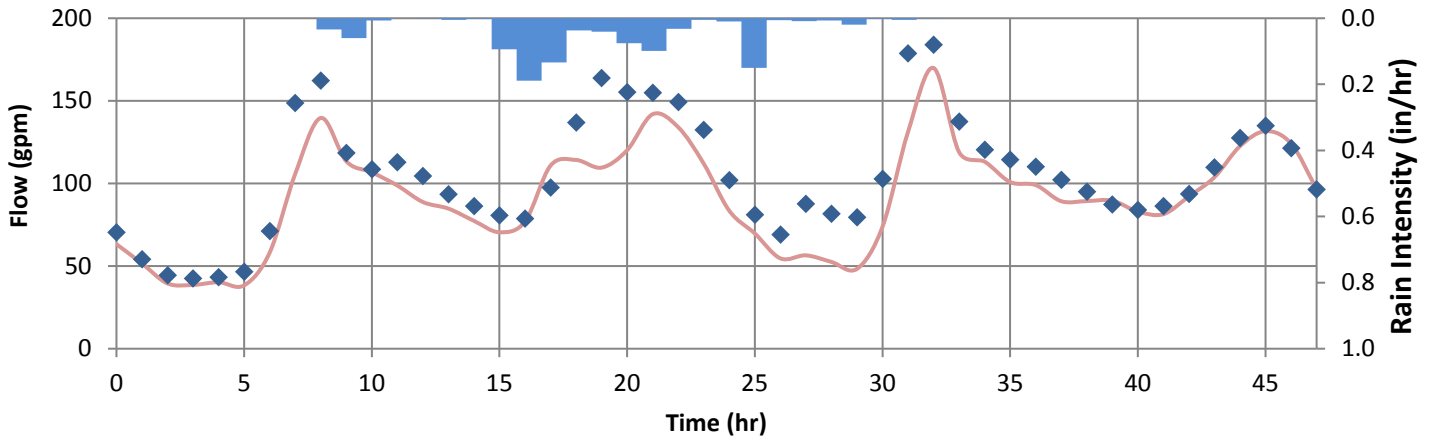
Site 4 Calibration

W. Luchessa Ave. and Hyde Park Dr.
Sewer System Master Plan
City of Gilroy

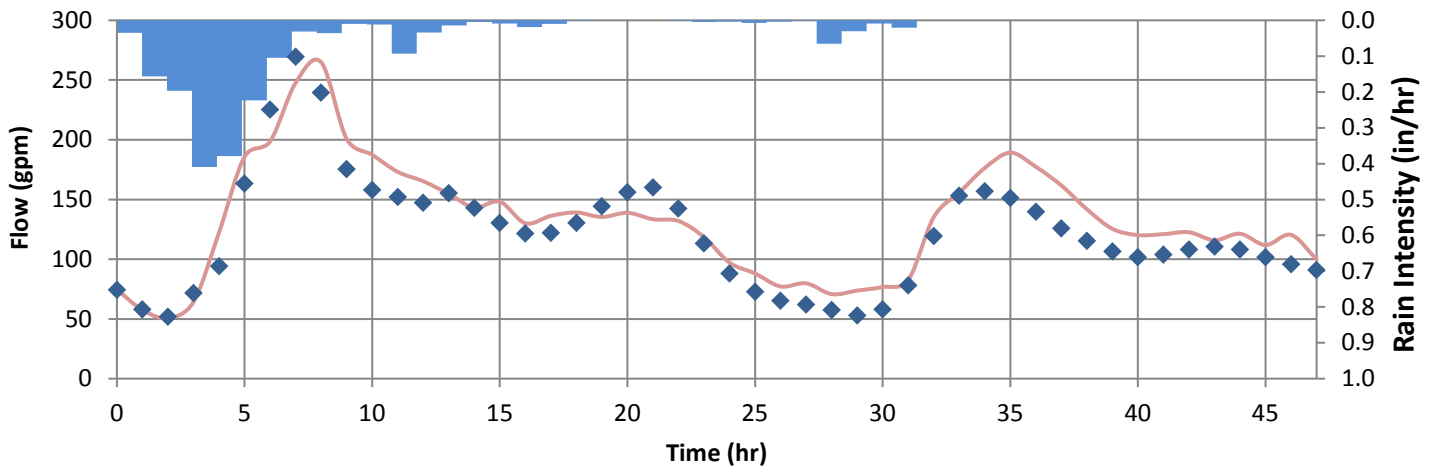
Dry Weather Flow



Wet Weather Event 1 (02/26/14 - 02/27/14)



Wet Weather Event 2 (02/28/14 - 03/01/14)



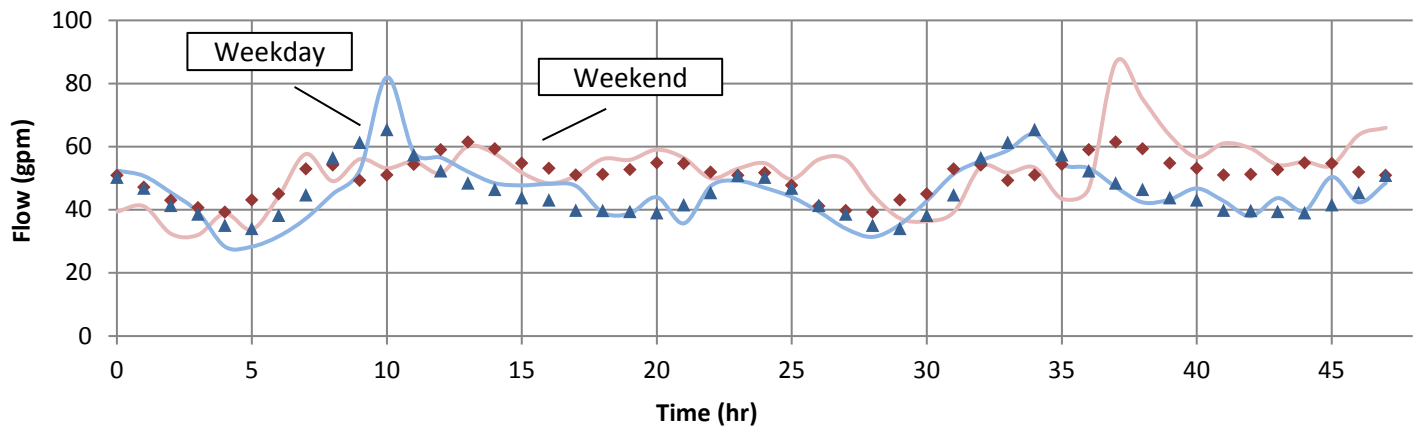
LEGEND

- Rain Event
- Hydraulic Model
- V&A Flow Monitoring
- V&A Flow Monitoring

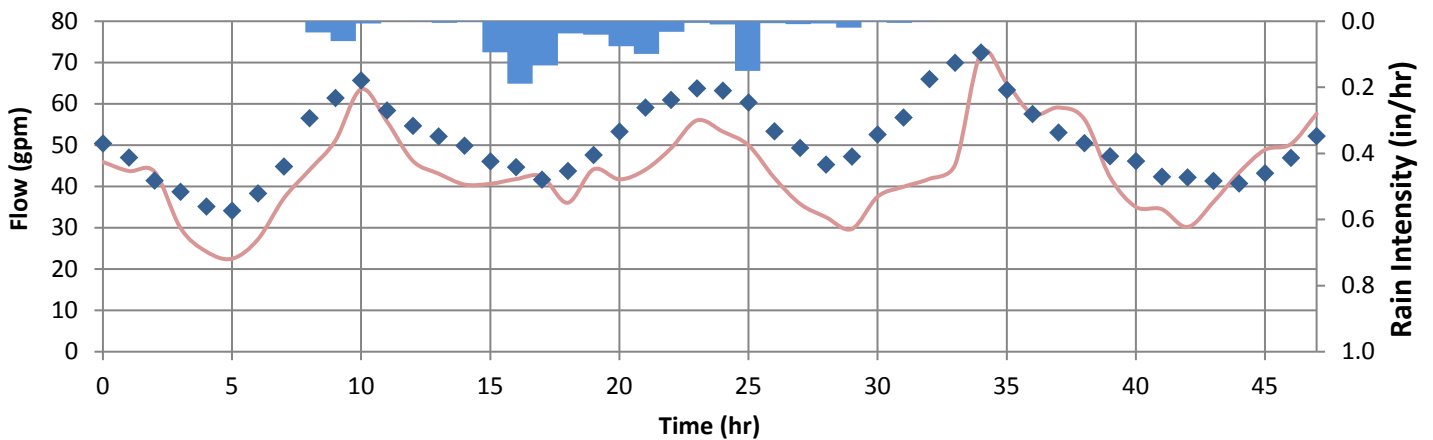
Figure 6.9

Site 5 Calibration
Wren Ave. and Uvas Park Dr.
Sewer System Master Plan
City of Gilroy

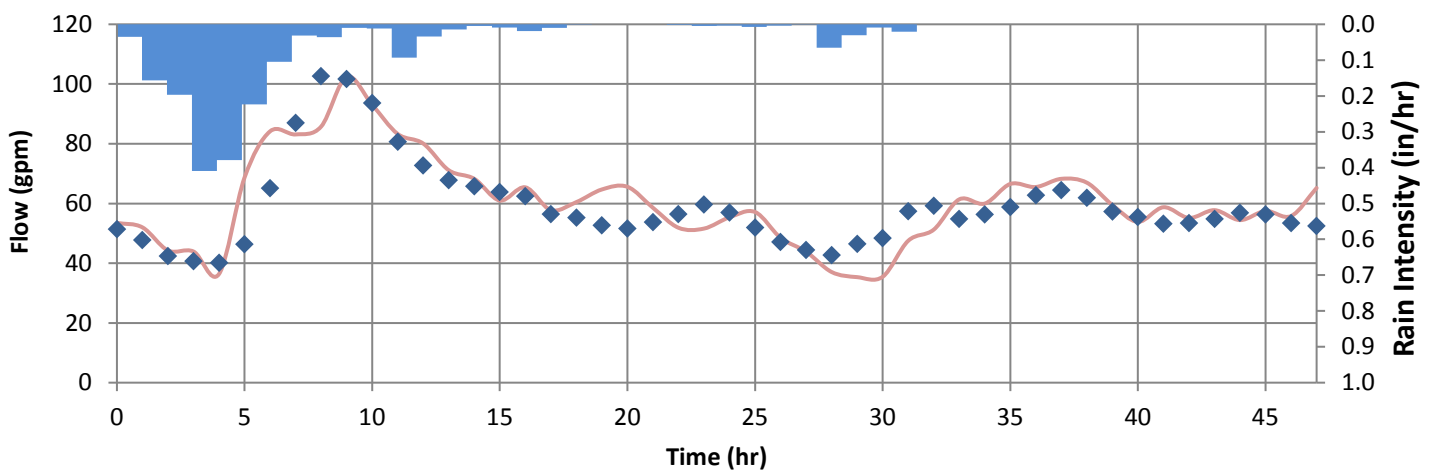
Dry Weather Flow



Wet Weather Event 1 (02/26/14 - 02/27/14)



Wet Weather Event 2 (02/28/14 - 03/01/14)



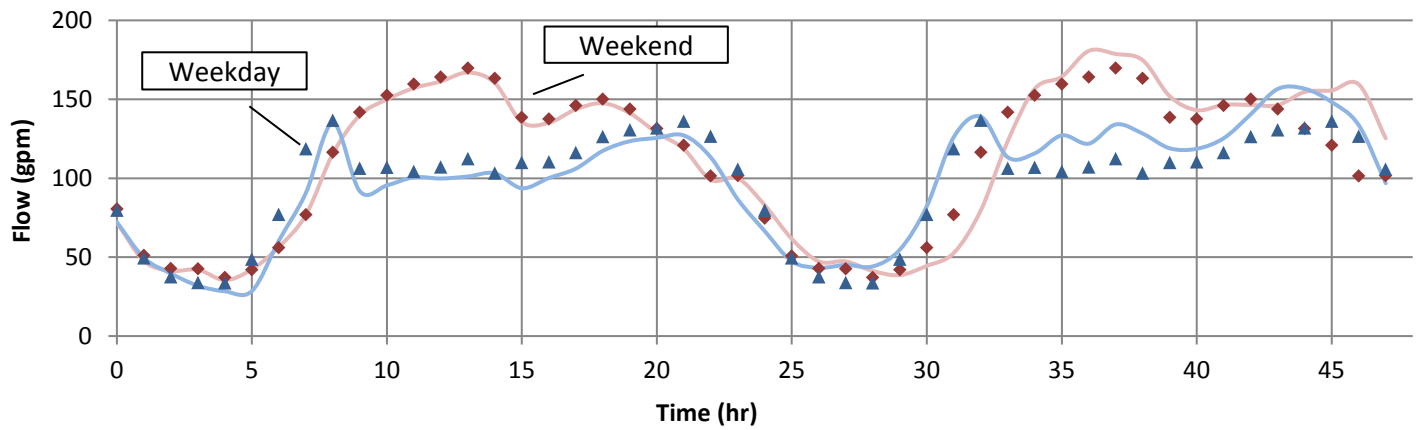
LEGEND

- Rain Event
- Hydraulic Model
- V&A Flow Monitoring
- V&A Flow Monitoring

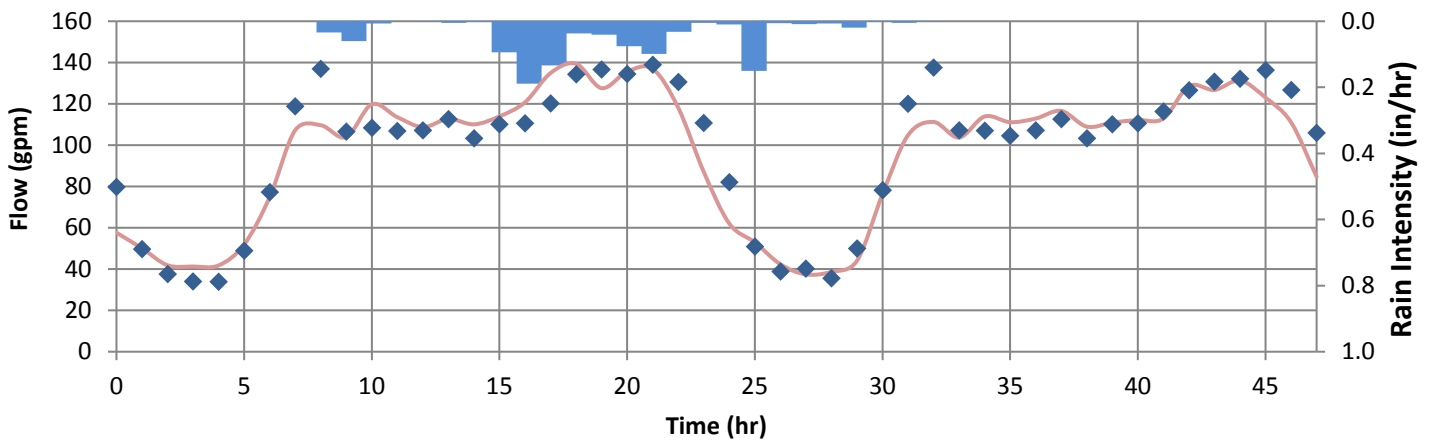
Figure 6.10

Site 6 Calibration
sw/o 3rd S.t and Santa Teresa Blvd.
Sewer System Master Plan
City of Gilroy

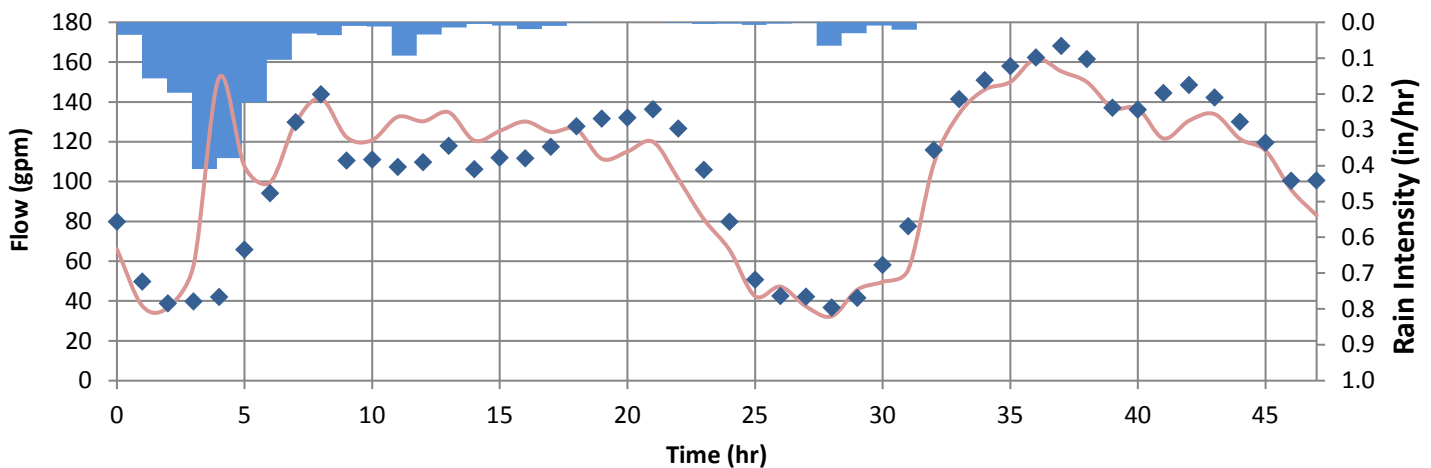
Dry Weather Flow



Wet Weather Event 1 (02/26/14 - 02/27/14)



Wet Weather Event 2 (02/28/14 - 03/01/14)



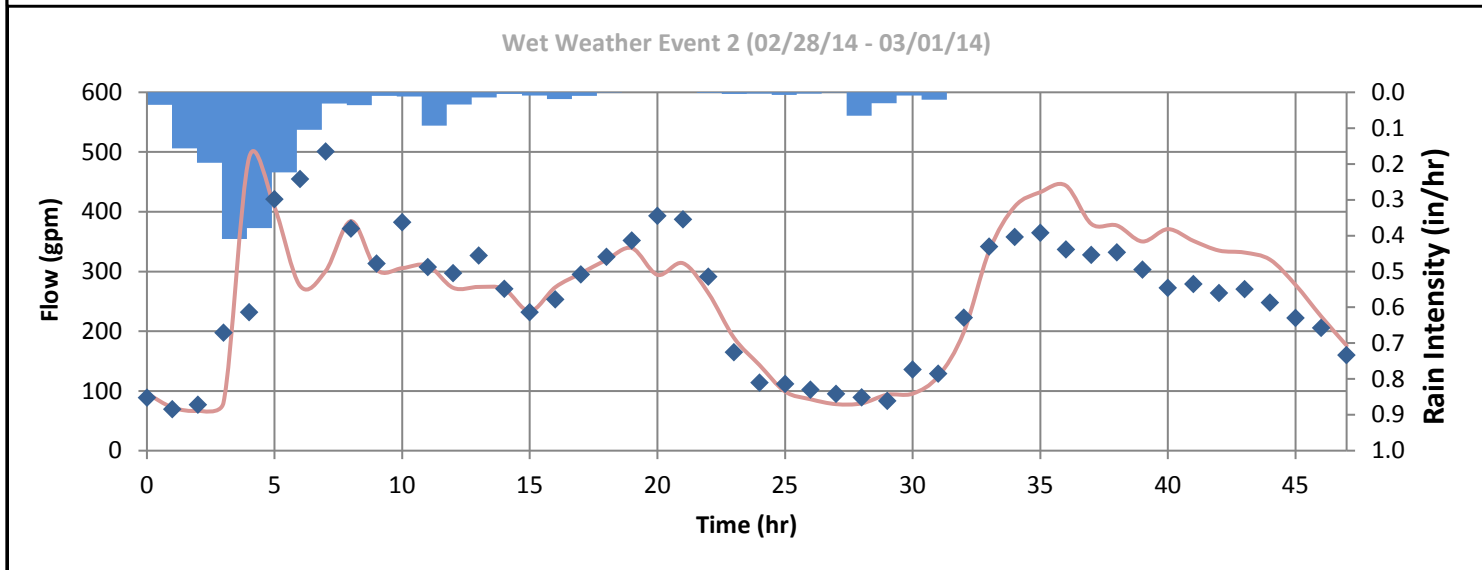
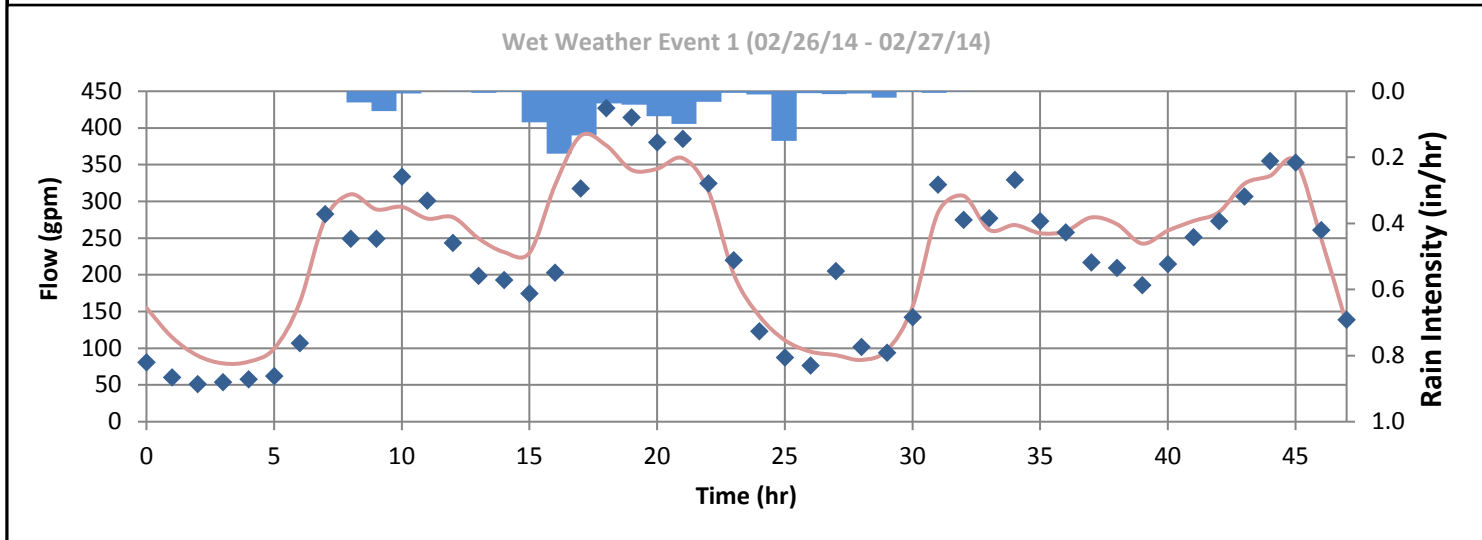
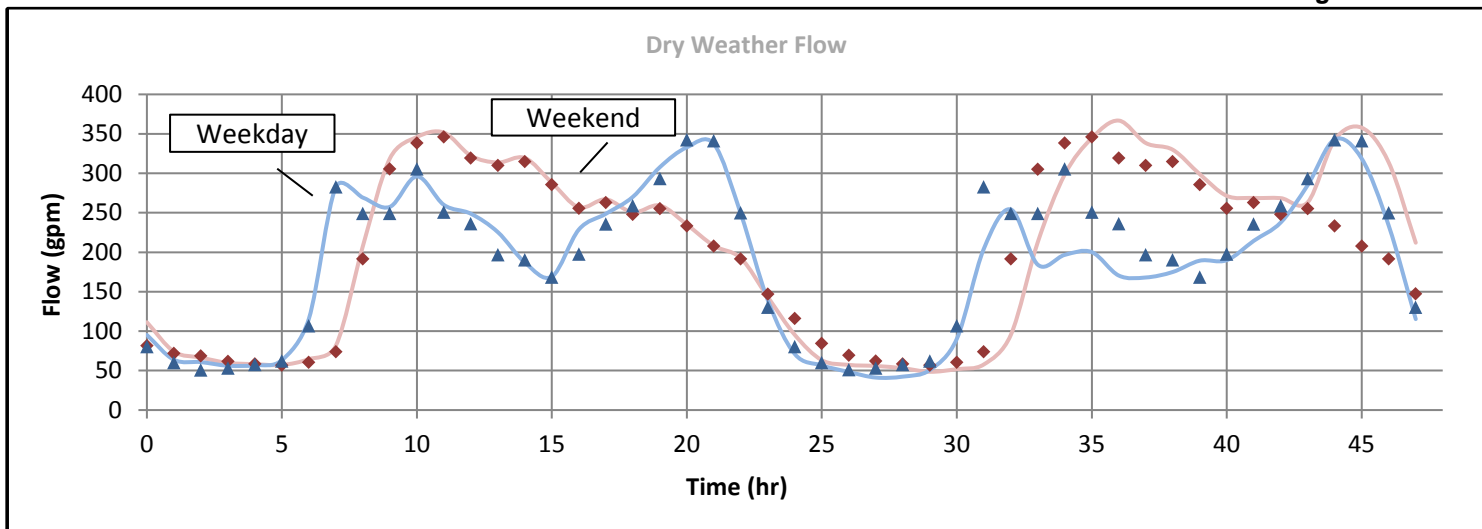
LEGEND

- Rain Event
- Hydraulic Model
- V&A Flow Monitoring
- V&A Flow Monitoring

Figure 6.11

Site 7 Calibration

E. 9th St. and Highway 101 Off-ramp
Sewer System Master Plan
City of Gilroy



LEGEND

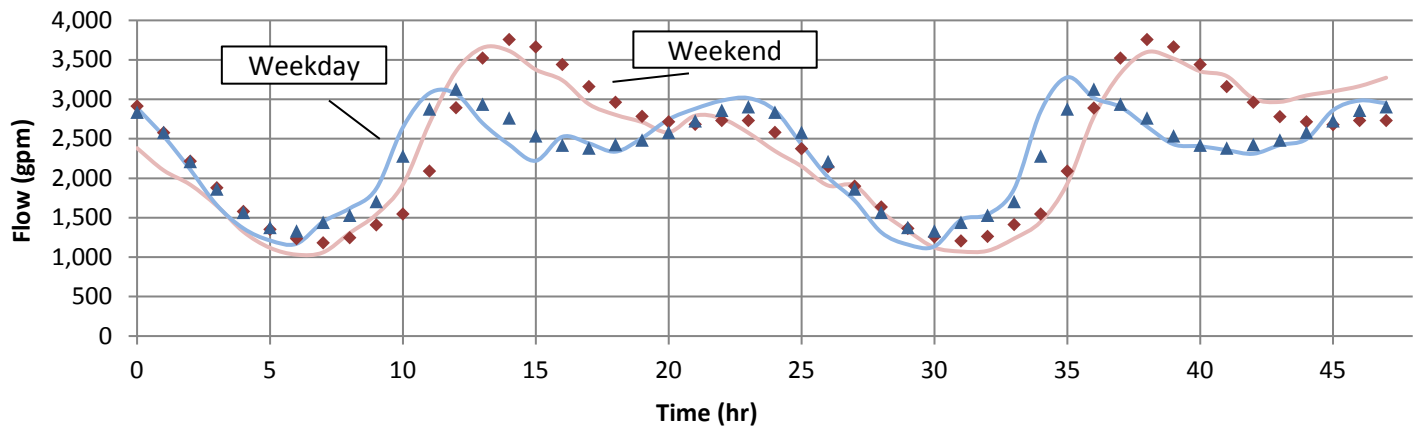
- Rain Event
- Hydraulic Model
- V&A Flow Monitoring
- V&A Flow Monitoring

Figure 6.12

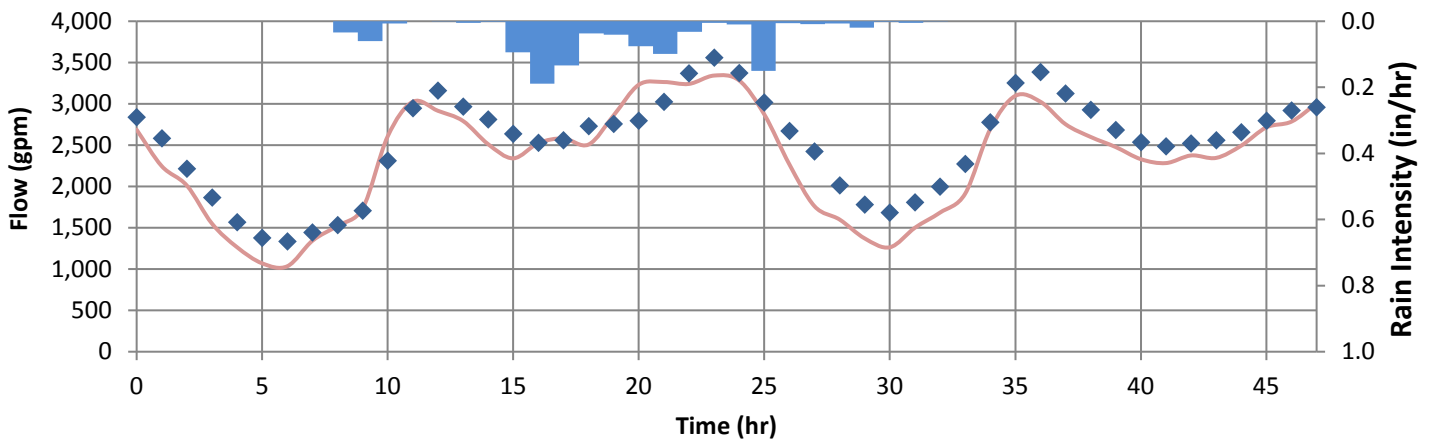
Site 8 Calibration

Renz Ln. and Highway 101 On-ramp
Sewer System Master Plan
City of Gilroy

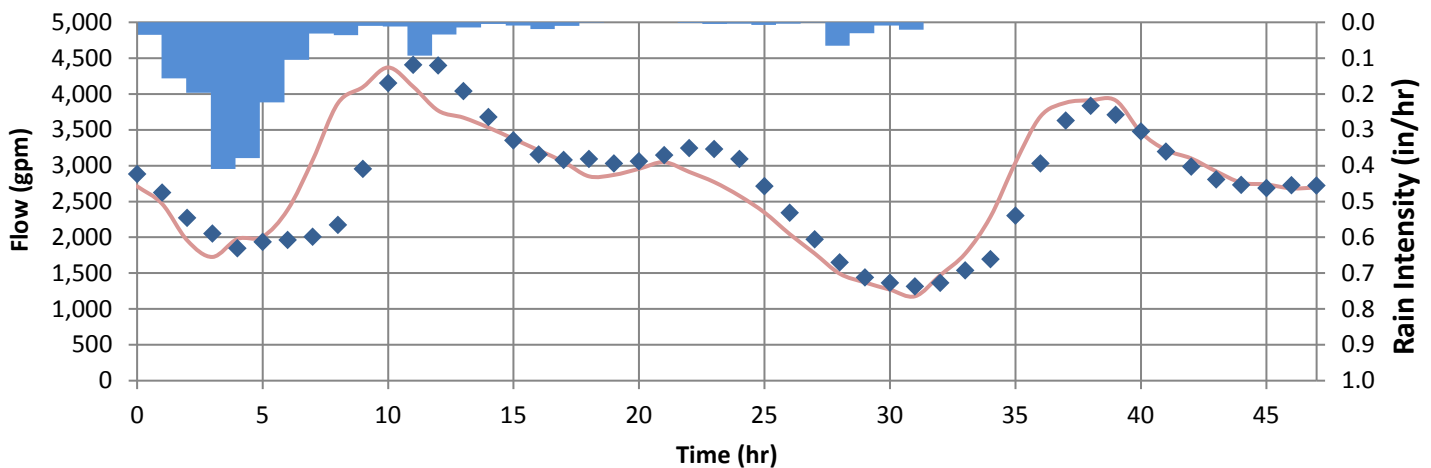
Dry Weather Flow



Wet Weather Event 1 (02/26/14 - 02/27/14)



Wet Weather Event 2 (02/28/14 - 03/01/14)



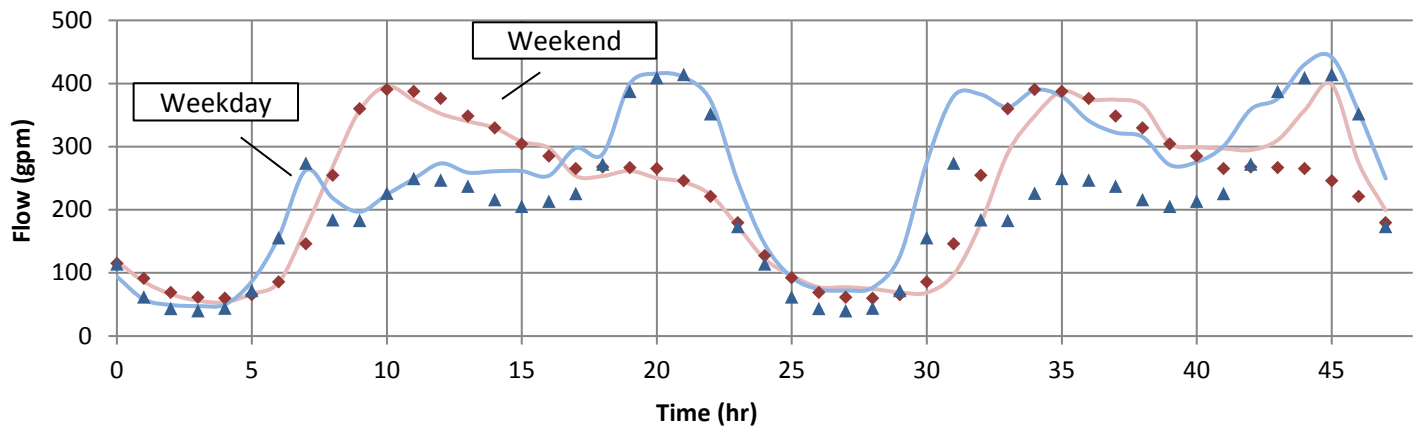
LEGEND

- Rain Event
- Hydraulic Model
- V&A Flow Monitoring
- V&A Flow Monitoring

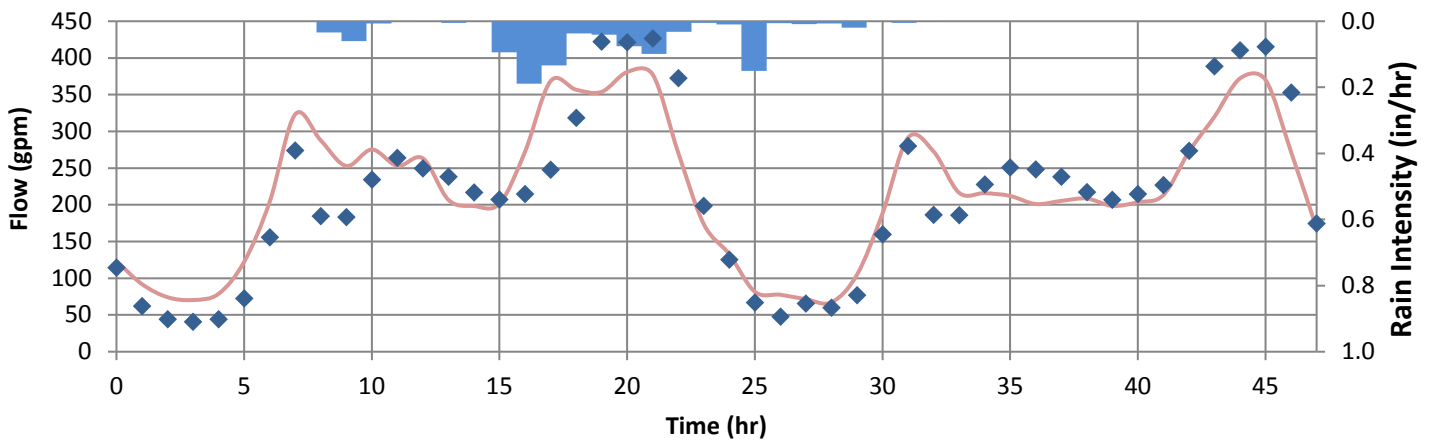
Figure 6.13

Site 9 Calibration
Behind Nike Outlet off Arroyo Circle
Sewer System Master Plan
City of Gilroy

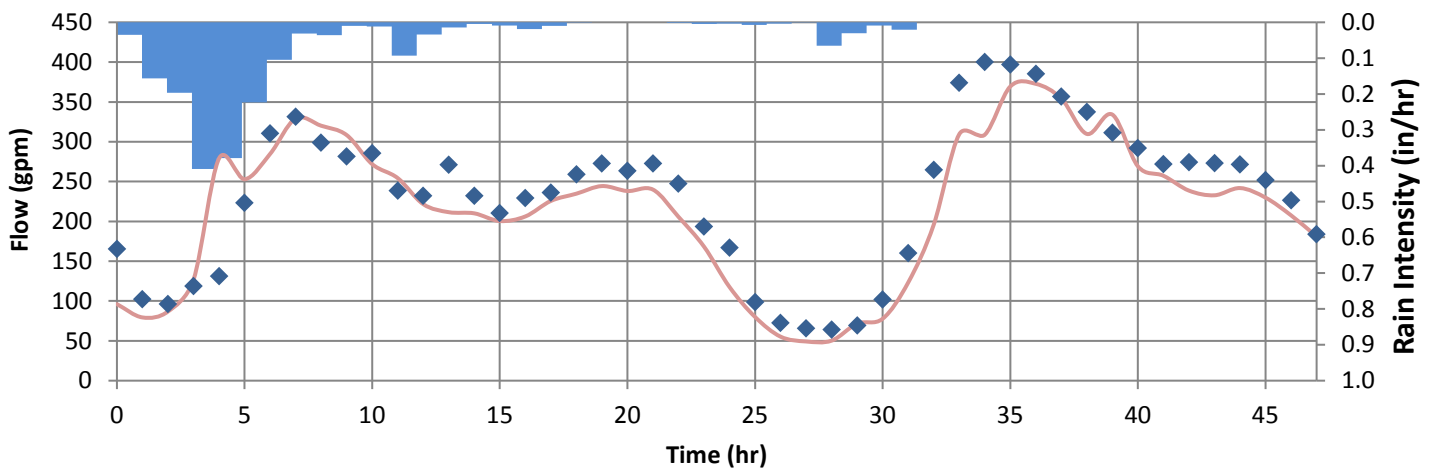
Dry Weather Flow



Wet Weather Event 1 (02/26/14 - 02/27/14)



Wet Weather Event 2 (02/28/14 - 03/01/14)



LEGEND

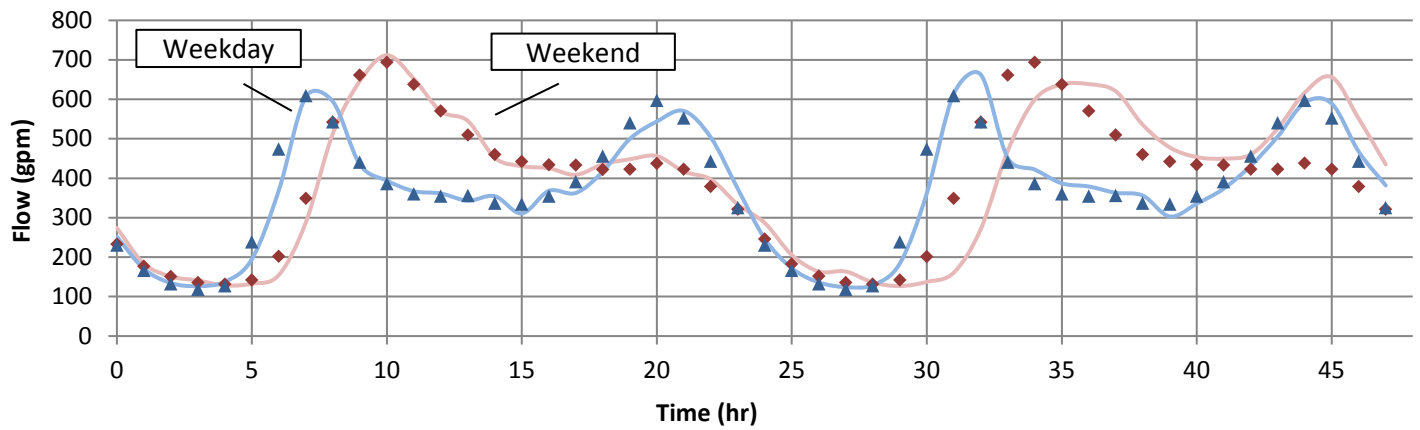
- Rain Event
- Hydraulic Model
- V&A Flow Monitoring
- V&A Flow Monitoring

Figure 6.14

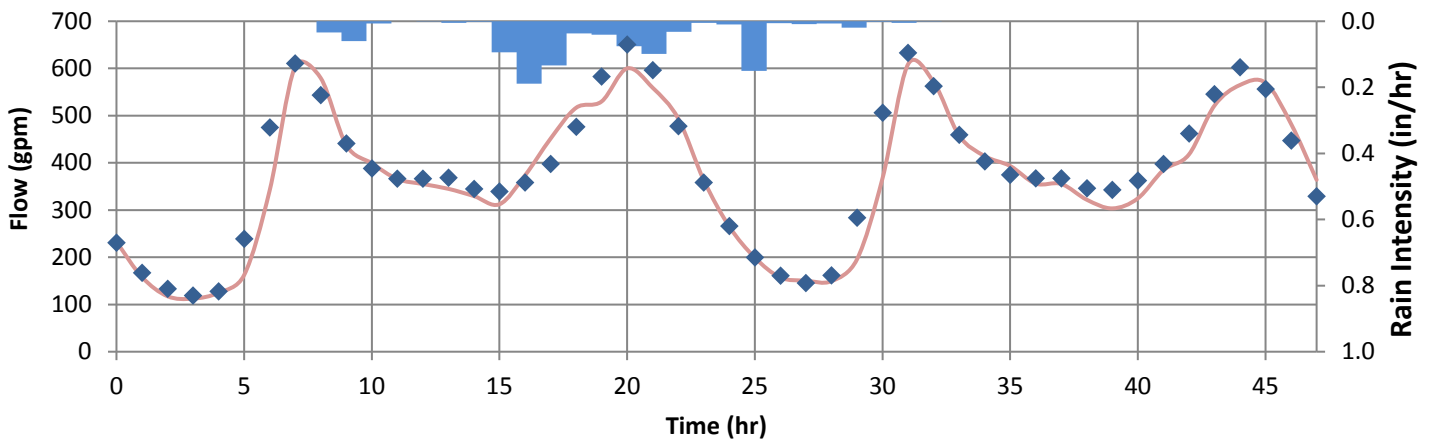
Site 10 Calibration

Welburn Ave. and Church St.
Sewer System Master Plan
City of Gilroy

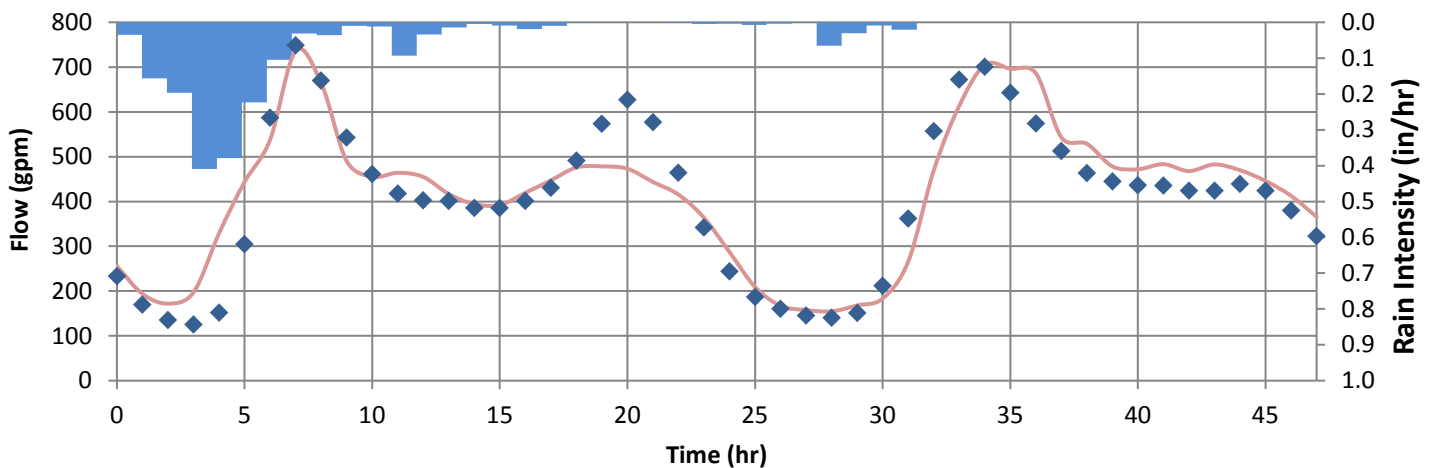
Dry Weather Flow



Wet Weather Event 1 (02/26/14 - 02/27/14)



Wet Weather Event 2 (02/28/14 - 03/01/14)



LEGEND

- Rain Event
- Hydraulic Model
- V&A Flow Monitoring
- V&A Flow Monitoring

Figure 6.15

Site 11 Calibration

Wren Ave. and Mantelli Dr.
Sewer System Master Plan
City of Gilroy



June 29, 2016

APPENDIX C

Joint Trunk Condition Assessment Report

City of Morgan Hill

Joint Trunk Pipeline

Condition Assessment Report - DRAFT

Date: January 2021

Prepared by: Water Works Engineers
Anthony Baltazar, P.E.

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0 Executive Summary

This Condition Assessment Report (Report) was prepared by Water Works Engineers (WWE) on behalf of the City of Morgan Hill (City) in an effort to summarize the condition assessment performed, and the resultant recommendation(s), for the JTP sanitary sewer trunk main. After collecting condition assessment data on roughly 61,807 linear feet of trunk main, a review/analysis was performed on the data in conjunction with a capacity analysis based on the City's Sewer System Management Plan (SSMP), October 2017. A Risk Prioritization Methodology was employed for all pipelines to determine their Overall Risk Rating, which is used to determine the recommended path forward for rehabilitating the trunk main. Multiple Repair, Rehabilitation, and Renewal (RRR) alternative methodologies (Section 7) were explored as options to address the trunk main's varying structural degradation and capacity constraints. In particular, two methodologies were considered as viable for various components of the overall project: Structural Cured-in-Place-Pipe (CIPP) Lining (Section 7.1.2.2) and Spray Coating (Section 7.1.2.3). From a constructability standpoint, Microtunneling (Section 7.1.3.3) was considered as a viable alternative for replacement of the existing line but has a significant cost impact when compared with other alternatives. Also from a constructability standpoint, Pipe Bursting (Section 7.1.3.2) was considered as a viable alternative for replacement of the existing line but is considered infeasible due to the structurally degraded portions of the JTP trunk main being reinforced concrete pipe material. By analyzing these alternative methodologies side-by-side with the viable capacity projects from the City's SSMP, two project bundles/approaches (Section 10) were formed with an emphasis on risk reduction, feasibility/constructability, consistent and accurate cost estimating taking into account identified project constraints, and cost efficiencies.

The results of the condition assessment analysis formed the basis for recommending rehabilitation for the reinforced concrete pipe segments along the trunk main. The Overall Risk Rating for each pipeline was determined on a scale of 1 to 5, with 1 being a relatively low risk and 5 being a high risk of failure. A majority of the trunk main pipelines have Overall Risk Ratings of 5 or 4. The following summarizes the number of pipelines that fall under each value for the Overall Risk Rating.

Table i: Executive Summary Overall Risk Rating Summary

Overall Risk Rating	Number of Pipelines
5	57
4	30
3	35
2	38
1	8

Two alternatives were developed and analyzed. These included improvements to address existing and future buildout planning horizon capacity related problems identified in the SSMP(i.e. capacity improvement projects JT-P2 through JT-P9) combined with improvements required to address emergency (0-2 year), immediate (2-5 year) and intermediate (2-15 year) condition deficiencies identified during the project field work. An intermediate project to address significant existing structural deficiencies is recommended be constructed within the next 2-

years. To address the remainder of the capacity and condition deficiencies, two phasing approaches were analyzed.

“All-at-Once” assumed all of the condition deficiencies and existing and future buildout planning horizon capacity deficiencies (i.e. JT-P2 through JT-P9) would be constructed within a 5-year period as a single immediate/intermediate project.

“Phased” assumed all of the condition deficiencies and existing and future buildout planning horizon capacity deficiencies (i.e. JT-P2 through JT-P9) would be constructed over a 5 to 15-year period as a multi-phased intermediate project. This approach required additional emergency/immediate improvements (i.e. crown spraying of lines with capacity deficiencies that are being phased).

The following summarizes the cost estimate for each by project bundle.

Table ii: Executive Summary Project Alternatives Cost Estimate Summary

Approach	Project Bundle	Emergency / Immediate Project	Immediate / Intermediate Project	Total Project Cost*
All-at-Once	Structural CIPP Lining & JT-P2 through JT-P9 (Appendix E)	\$0.84 Million (0-2 years)	\$32.8 Million (2-5 years)	\$47.1 Million
Phased	Structural CIPP Lining & JT-P2 through JT-P9 (Appendix F)	\$1.1 Million (0-2 years)	\$28.3 Million (2-5 years) \$5.8 Million (5-15 years)	\$47.8 Million

*All presented 2021 dollars rounded to the nearest \$100,000, including design and construction contingencies.

The recommended project bundle for the JTP trunk main is summarized below. It should be noted that the recommendation for completing the capacity improvement projects JT-P2 through JT-P9 is based on the results of the SSMP. The capacity project’s efficacy should be confirmed through flow monitoring during the design phase to verify the proposed pipe diameters.

Structural CIPP Lining & JT-P2 through JT-P9 – All-at-Once

The “Emergency/Immediate Projects” (0-2 years) include the following:

- Structural CIPP lining and/or open cut replacement of the pipelines found to be in need of point repairs (see Appendix G)
- Manhole RRR activities (as discussed in Section 9.2)

The “Intermediate Projects” (2-5 years) include the following:

- Structural CIPP lining of all assigned pipelines (see Section 9.1 and Appendix H)
- Capacity Improvement Projects JT-P2 through JT-P9

This project bundle assumes the City is able to obtain the necessary funding to perform the various projects within 5 years (exclusive of engineering design and permitting, which is assumed to be 1 year), with anticipated substantial completion of all improvements in 2027. The “Emergency/Immediate Projects” are recommended to be completed by Year 2, with the “Intermediate Projects” recommended to be completed by Year 5. The Total Construction Cost Opinion for this project bundle is \$47.1 Million. However, if the City is unable to take this approach, a “Phased” approach has also been explored in this Report (see Section 10.2). While more expensive overall than the project bundle explained above, this approach allows the City to “space out” the requisite funding over a span of about 15 years.

1 Purpose for Investigation

The City aims to complete cyclical condition assessment(s) of its wastewater collection assets by identifying system deficiencies, developing rehabilitation and replacement recommendations to repair those deficiencies, and create a prioritized capital program to construct the improvements. The City's Joint Trunk Pipeline (JTP) conveys wastewater from a large portion of the City's collection system infrastructure, and eventually discharges its flow to the South County Regional Wastewater Authority (SCRWA) Wastewater Treatment Plant (WWTP). The JTP starts near the intersection of Monterey Rd and California Ave, turning west and then south along Harding Ave, through various agricultural fields in San Martin, through the City of Gilroy, and terminating at the SCRWA WWTP.

The goal of the condition assessment project is to inspect the trunk sewer main to determine its physical condition and determine if there are structural and/or maintenance deficiencies that require repair, rehabilitation, replacement and/or O&M enhancements to maintain level of service consistent with City requirements. Once/if pipelines are identified as having structural and/or maintenance deficiencies, they are evaluated to determine the appropriate renewal/maintenance activity to address the issue(s) and lessen the potential risk of failure. Pipeline renewal denotes any activity that is taken to renew or increase the serviceable life of an asset. Pipeline renewal can be accomplished in various ways, including repair (i.e. localized repair of individual defects that affect a small portion of the overall line segment), rehabilitation (i.e. activities that address defects along the entire line segment but leave the host pipe in place), and replacement (i.e. activities that replace the defective line segment with an entirely new pipeline). Maintenance activities aim to improve operation and knowledge of the sewer trunk main and allow the City to better maintain the sewer infrastructure through activities like periodic cleaning. Maintenance activities can encompass various methods such as heavy cleaning (i.e. remove debris/dirt from pertinent line segments), closed-circuit television (CCTV) inspection (i.e. CCTV of line segments not completed as part of this project), and adding access (i.e. adding manholes to portions of the alignment to allow for future access).

This Report contains a summary of the results of the condition assessment performed and the engineering analysis WWE utilized to determine the preferred methodology for the rehabilitation of the JTP wastewater trunk main. Each pipeline segment is prioritized by need for repair, rehabilitation, and/or replacement (RRR) based on a risk prioritization methodology, which is explained in more detail in Section 2 below.

2 Project Approach/Methodology

2.1 Risk Prioritization Methodology

The risk prioritization methodology utilized by WWE produces an Overall Risk Rating for each pipeline segment that can then be used to rank each asset in order of their calculated risk of failure. The Overall Risk Rating is determined using two separate ratings: Probability Rating and Consequence Rating. Figure 1 below shows the Risk Rating Matrix used to determine the Overall Risk Rating. The orange box with a thick black outline denotes a pipeline that has a Probability Rating of 4 and a Consequence Rating of 3, resulting in an Overall Risk Rating of 4 as shown in the legend. In general, pipelines with a high probability of failure represent a higher risk. The risk associated with pipelines that have serious consequences of failure can be mitigated if the probability of failure is low.

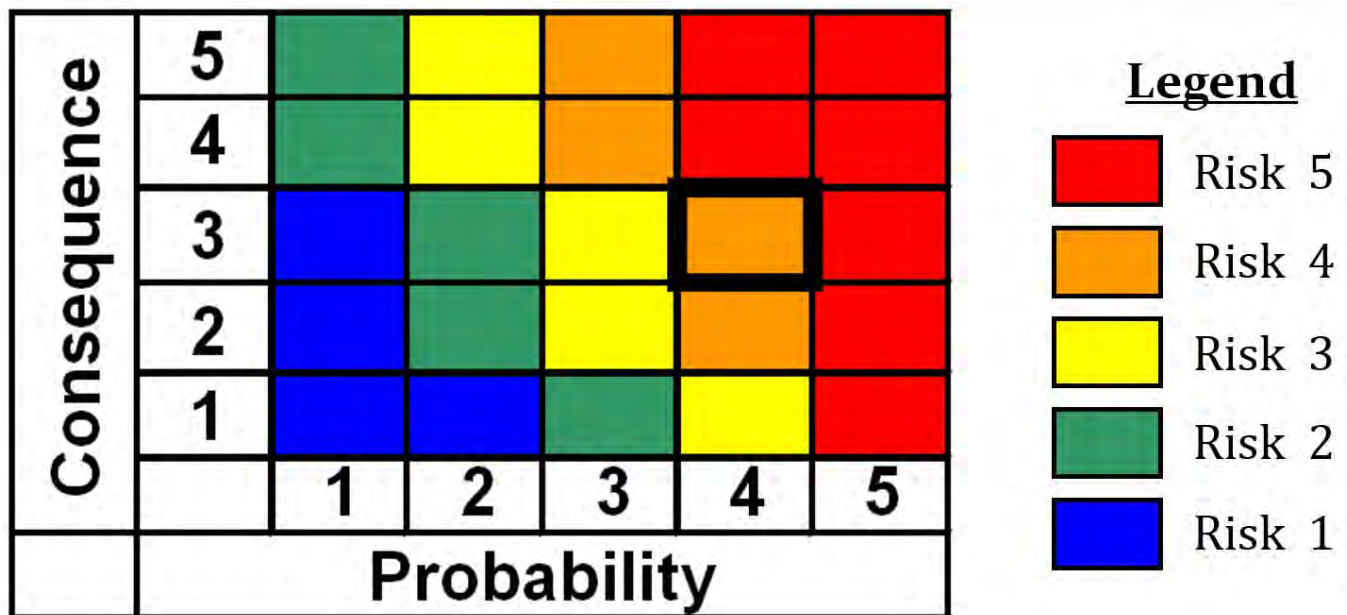


Figure 1: Risk Rating Matrix

2.1.1 Probability Rating

The Probability Rating is based on three criteria:

- Structural Condition Rating
- O&M Condition Rating
- Pipe Capacity Rating

2.1.1.1 Structural Condition Rating

The Structural Condition Rating is based on the structural observations obtained during the CCTV inspections. Each observation (e.g. cracks, fractures, breaks, holes, etc.) is assigned an individual defect grade ranging from 1 to 5, with 5 being the most severe. These structural observations are used to calculate the pipeline's Total Structural Score. The Total Structural Score for a pipeline is calculated through the summation of three terms, as described below:

- The highest structural observation defect grade multiplied by 100.
- The sum of the structural observation defect grades.
- The average structural observation defect grade per unit length of the pipeline multiplied by 100.

The resultant Total Structural Score is then used to determine the pipeline's Structural Condition Rating, as shown in Table 1 below.

Table 1: Structural/O&M Condition Rating Determination

Total Structural/O&M Score	Structural/O&M Condition Rating
< 150	1
150 – 249.9	2
250 – 349.9	3
350 – 449.9	4
> 450	5

For example, assume a pipeline that is 438.9 feet in length has a high structural observation defect grade of 3. Also assume the sum of its structural observation defect grades is 43. The pipeline's Total Structural Score would be calculated as follows:

- $(3 \times 100) = 300$
- 43
- $100 \times (43 / 438.9) = 9.797$
 - o Total Structural Score = $300 + 43 + 9.797 = 352.797$

This pipeline's Total Structural Score would then be rounded up to the nearest whole number (i.e. 353). As Table 1 shows, the pipeline's Structural Condition Rating would be 4.

2.1.1.2 O&M Condition Rating

The O&M Condition Rating is determined exactly the same way as the Structural Condition Rating, except the O&M observation data for the pipeline is used instead. For the same pipeline described above, assume the highest O&M observation defect grade is 2 and the sum of its O&M observation defect grades is 23. The pipeline's Total O&M Score would be calculated as follows:

- $(2 \times 100) = 200$
- 23
- $100 \times (23 / 438.9) = 5.24$
 - o Total O&M Score = $200 + 23 + 5.24 = 228.24$

This pipeline's Total O&M Score would then be rounded up to the nearest whole number (i.e. 229). As Table 1 shows, the pipeline's O&M Condition Rating would be 2.

2.1.1.3 Pipe Capacity Rating

The Pipe Capacity Rating is based on the pipeline's depth-to-diameter (d/D) value during existing peak wet weather flow (PWWF) conditions. The City's hydraulic modeling results for the existing peak wet weather flow scenario are utilized for determining each pipeline's d/D value. A pipeline's Pipe Capacity Rating is determined according to Table 2 below.

Table 2: Pipe Capacity Rating Determination

d/D Value	Pipe Capacity Rating
< 0.60	1
0.60 – 0.6999	2
0.70 – 0.7499	3
0.75 – 0.90	4
> 0.90	5

Pipelines that are flowing at or near hydraulic capacity are more likely to cause a sanitary sewer overflow (SSO) in the case of a total or partial blockage or structural failure. For the same pipeline previously described, assume its d/D value is 0.65 under the “Existing PWWF” modeling scenario. As Table 2 shows, the pipeline’s Pipe Capacity Rating would be 2.

2.1.1.4 Total Probability Score

The Total Probability Score for a given pipeline is the summation of the three probability criteria after each criterion has been multiplied by their associated weighting factor. Table 3 below summarizes the weighting factors for all three of the probability criteria.

Table 3: Weighting Factors for Probability Criteria

Probability Criteria	Weighting Factor
Structural Condition Rating	5
Pipe Capacity Rating	3
O&M Condition Rating	2

Continuing with the same pipeline from above, its Total Probability Score would be calculated as follows:

- (Structural Condition Rating = 4) x (Weighting Factor = 5) = 20
- (Pipe Capacity Rating = 2) x (Weighting Factor = 3) = 6
- (O&M Condition Rating = 2) x (Weighting Factor = 2) = 4
 - o Total Probability Score = 20 + 6 + 4 = 30

The Total Probability Score is then translated into the Probability Rating according to Table 4 below.

Table 4: Probability Rating Determination

Total Probability Score	Probability Rating
10 – 16	1
17 – 24	2
25 – 32	3
33 – 40	4
41 – 50	5

Therefore, the hypothetical pipeline’s Total Probability Score of 30 translates to a Probability Rating of 3.

2.1.2 Consequence Rating

The Consequence Rating is based on four criteria:

- Flow Volume Rating
- Proximity to Waterways Rating
- Public Impact Rating
- O&M Access and Safety Rating

2.1.2.1 Flow Volume Rating

The Flow Volume Rating is based on the pipeline's maximum flow volume during current PWWF conditions. Each pipeline's maximum flow value is taken from the City's hydraulic modeling results for the "Existing PWWF" scenario. In the absence of model results, the pipeline's existing diameter will be used instead. The probability of failure (i.e. SSO) is not more likely in a pipeline solely because it conveys more flow volume than another. However, a failure in a pipeline with larger flow volumes will result in more damages, higher cleanup costs, and is more likely to cause Category 1 SSOs. A pipeline's Flow Volume Rating is determined according to Table 5 below.

Table 5: Flow Volume Rating Determination

Flow Volume (MGD)	Pipe Diameter (in)	Flow Volume Rating
< 0.25	< 10	1
0.25 – 1.05	10 – 13	2
1.05 – 3.15	14 – 23	3
3.15 – 7.20	24 – 35	4
> 7.20	> 35	5

Assuming the same hypothetical pipeline had a maximum flow volume of 1.75 MGD, its corresponding Flow Volume Rating would be 3.

2.1.2.2 Proximity to Waterways Rating

The Proximity to Waterways Rating is based on the distance from the pipeline's US manhole to drainages (i.e. to storm drain inlets and/or waterways). A major focus of the California State Water Resources Control Board's General Waste Discharge Requirements is to reduce the occurrence of SSOs, particularly SSOs that affect waterways of the United States. Any sewage spill to a waterway immediately becomes a Category 1 SSO, and is likely to draw fines or other enforcement action for the responsible agency. Therefore, proximity of assets to waterways is another significant factor in the criticality of failure. A pipeline's Proximity to Waterways Rating is determined according to Table 6 below.

Table 6: Proximity to Waterways Rating Determination

Location – Proximity to Waterways	Proximity to Waterways Rating
US SSMH > 2500 ft to waterway	1
US SSMH > 2500 ft to waterway & < 500 ft to storm drain inlet	2
US SSMH < 2500 ft to waterway	3
US SSMH < 2500 ft to waterway & < 500 ft to storm drain inlet	4
US SSMH < 1000 ft to waterway	5

Assuming the same hypothetical pipeline is less than 2500 feet from the nearest waterway and less than 500 feet from the nearest storm drain inlet, its corresponding Proximity to Waterways Rating would be 4.

2.1.2.3 Public Impact Rating

The Public Impact Rating is based on the distance from the pipeline to public areas such as farms, parks, schools, hospitals, and other densely populated locations. A pipeline's Public Impact Rating is determined according to Table 7 below.

Table 7: Public Impact Rating Determination

Location – Public Impact	Public Impact Rating
> 1000 feet from public facilities, limited public traffic, limited economic impact	1
Within 1000 feet of public facilities, moderate public traffic, moderate economic impact	3
Within 100 feet of public facilities, significant public traffic, significant economic impact, high construction cost	5

Assuming the same hypothetical pipeline is within 1000 feet of an elementary school, its corresponding Public Impact Rating would be 3.

2.1.2.4 O&M Access and Safety Rating

The O&M Access and Safety Rating is based on the ability to access the pipeline for O&M or repair work as well as the ability for O&M staff or contractors to safely perform the work. A pipeline's Public Impact Rating is determined according to Table 8 below.

Table 8: O&M Access and Safety Rating Determination

Location – O&M Access and Safety	O&M Access and Safety Rating
In roadway, residential street	1
In roadway, arterial roadway	2
Not in roadway, can access with truck	3
Not in roadway, must walk equipment to site	4
Not in roadway, no safe working area, under buildings	5

Assuming the same hypothetical pipeline is in an arterial roadway, its corresponding O&M Access and Safety Rating would be 2.

2.1.2.5 Total Consequence Score

The Total Consequence Score for a given pipeline is the summation of the four consequence criteria after each criterion has been multiplied by their associated weighting factor. Table 9 below summarizes the weighting factors for all four of the consequence criteria.

Table 9: Weighting Factors for Consequence Criteria

Consequence Criteria	Weighting Factor
Flow Volume Rating	4
Proximity to Waterway Rating	3
Public Impact Rating	2
O&M Access and Safety	1

Continuing with the same pipeline from above, its Total Consequence Score would be calculated as follows:

- (Flow Volume Rating = 3) x (Weighting Factor = 4) = 12
- (Proximity to Waterway Rating = 4) x (Weighting Factor = 3) = 12
- (Public Impact Rating = 3) x (Weighting Factor = 2) = 6
- (O&M Access and Safety = 2) x (Weighting Factor = 1) = 2
 - o Total Consequence Score = 12 + 12 + 6 + 2 = 32

The Total Consequence Score is then translated into the Consequence Rating according to Table 10 below.

Table 10: Consequence Rating Determination

Total Consequence Score	Consequence Rating
10 – 16	1
17 – 24	2
25 – 32	3
33 – 40	4
41 – 50	5

Therefore, the hypothetical pipeline's Total Consequence Score of 32 translates to a Consequence Rating of 3. This pipeline's Consequence Rating of 3 and Probability Rating of 3 equates to an Overall Risk Rating of 3 according to Figure 1.

The following sections discuss how the aforementioned criteria are collected for their use in the risk prioritization methodology.

2.2 Field Assessment Role in Risk Prioritization

During the field assessment of the JTP, data for two of the criteria are collected. The CCTV inspections provide the structural and O&M defect observations that are used to determine the Structural Condition Rating and the O&M Condition Rating of each pipeline. The inspections also provide the diameter of each pipeline, which is used to determine the Flow Volume Rating in the absence of maximum flow volume data from the model results. The procedures of the CCTV inspections are discussed in more detail in Section 3.1 below.

2.3 City Master Plan Role in Risk Prioritization

The City's Sewer System Master Plan contains a capacity assessment that provides the information needed to determine the Pipe Capacity Rating and Flow Volume Rating for the pipelines. Specifically, the model scenario titled "Existing PWWF" was utilized to determine the d/D values needed for the Pipe Capacity Rating and the maximum flow values needed for the Flow Volume Rating. It should be noted that Ultimate Buildout PWWF values contained in the Master Plan are projected to be higher than existing values. However, when assessing an individual pipe's risk of failure as it pertains to this Report, the pipe's current conditions are utilized so as to not overestimate the asset's probability/consequence of failure should future conditions be used. A more detailed discussion of the City's Master Plan can be found in Section 5 below.

2.4 Location Criteria Forms Role in Risk Prioritization

Location Criteria Forms filled out during the field assessment provide the information needed to determine the Proximity to Waterways Rating, Public Impact Rating, and O&M Access and Safety Rating. A more detailed discussion of the Location Criteria Forms can be found in Section 4 below.

3 Summary of Field Assessment

3.1 Investigation Procedures

3.1.1 Pipelines

Water Works Engineers (WWE) was retained to coordinate the inspection efforts and conduct the condition assessment of the JTP wastewater trunk main. WWE teamed with Professional Pipe Services (Pro-Pipe), a division of Hoffman Southwest Corporation, to perform the cleaning and CCTV inspection of the identified sewer trunk main. Cleaning and inspection work began on October 12th, 2019 and continued until March 2020, at which time Santa Clara County issued a Shelter in Place Order due to public health concerns regarding COVID-19. While a majority of the pipeline inspection work was completed in this timeframe, the remaining pipeline work was completed in October 2020. Due to the location of the JTP along farmland and roads with regular traffic, as well as higher wastewater flows during the day, virtually all cleaning and inspection work was conducted at night. Various methods of flow control were utilized along the JTP trunk main to provide a larger view of the pipeline segments by lowering water level in the inspected segment. The “plug and release” method was utilized whereby a plug was inserted to completely stop flow while crew members monitored upstream surcharging to ensure no spills occurred. Another method utilized in pipe segments with larger amounts of flow involved inserting “flow-through” plugs, which allow much smaller amounts of wastewater flow to pass through and into the pipe segment being inspected.

Cleaning activities were conducted with a Vac-Con Recycler combination sewer cleaner to perform high-velocity/vacuum cleaning (HVVC) of the sewer trunk pipeline segments before CCTV inspections were completed. The Recycler machine allows for the reuse of water in the debris tank for cleaning purposes, leading to reduction in occurrences of tank refilling during working hours and increased efficiency. Cleaning of the sewer trunk pipelines was conducted before inspections to:

- 1) Increase the probability that the CCTV camera would be able to traverse the pipeline and not be slowed or stopped by debris so a complete inspection could be performed; and
- 2) Provide the CCTV camera an unobstructed view of the pipeline interior so that structural defects (e.g. cracks, fractures) could be assessed.

This method may limit the ability of the assessment to document maintenance related problems (e.g. debris, grease, roots) since pre-cleaning by design has the potential to remove or reduce some of these potential deficiencies. However, assessing the structural condition of the pipeline was prioritized above the maintenance condition for this project because it was assumed that the pipes were more likely to fail due to a structural issue than a blockage since the pipelines were to be cleaned as part of this project.

CCTV inspections were conducted using the IBAK Panoramo scanner technology. The IBAK Panoramo 3D Optoscanner incorporates the use of two high-resolution digital cameras in the front and rear sections of the housing, with 185° wide-angle lenses and parallel-mounted xenon flashlights capable of 360° spherical images. The Panoramo system captures 100% of the pipeline interior and is delivered with a virtual 3D reader that enables the reviewer to see the entire pipe interior from any angle. Additionally, the virtual 3D reader provides a flat-view

component that enables the reviewer to make accurate measurements of features/observations and to more easily assess the changes in observations along the pipeline to identify trends. Hyperlinks to the inspection files were included in an ESRI GIS shapefile of the inspected pipelines so the virtual 3D reader could be opened for a specific pipeline from a map environment for easy access.

Observations and defects were collected during the inspection work and coded using the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) standards. Version 7.0 of the PACP Reference Manual was used for coding. The intent of the NASSCO PACP is to provide a means to accurately assess underground infrastructure using tools and procedures that can serve as a national standard. A benefit of the NASSCO PACP is it includes a Condition Grading System that provides pipe ratings to quantitatively describe the condition of a pipeline that can be used to compare it to ratings of other pipelines. The PACP Quick Rating uses a four-character alphanumeric score based on the number of defects with the highest severity grade and the number of defects of the next highest severity grade for a given pipeline. Quick Ratings for both structural and maintenance conditions were applied to all of the pipelines inspected as part of this project. Quick Ratings are formulated as follows:

1. The first character is the highest severity grade occurring along the pipe segment.
2. The second character is the total number of occurrences of that highest severity grade. If the total number is greater than 9, then alphabetic characters are assigned as follows: A – 10-14; B – 15-19; C – 20-24; etc.
3. The third character is the next highest severity grade occurring along the pipe segment.
4. The fourth character is the total number of occurrences of the severity grade derived in Step 3 above. This follows the same rules as the character in Step 2.

WWE reviewed each pipeline inspected as part of this project, with particular attention to pipelines that had Quick Ratings (Structural and Maintenance) indicating PACP Grade 5 and Grade 4 defects. WWE evaluated potential renewal/maintenance activities for each pipeline so that no pipeline inspected as part of this project will have defect(s) more severe than a Grade 3 once the activities are completed. The findings from the condition assessment and a discussion of the potential renewal/maintenance activities can be found below in Section 3.3.1 and Section 7.1, respectively.

3.1.2 Manholes

Manhole inspection work began on March 4th, 2020 and continued until March 18th, 2020. As was the case for the pipeline inspection work, Santa Clara County issued a Shelter in Place Order due to public health concerns regarding COVID-19. Similar to the pipeline work, manhole inspections were conducted at night.

CCTV manhole inspections were conducted using the IBAK Panoramo Si 3D Optical Manhole Scanner. The Si captures 100% of the entire manhole cavity for review in a virtual 3D reader, which can be utilized in flat-view for measuring inverts, defects, etc. It also has the capability to be exported as a point cloud into AutoCAD. Hyperlinks to the inspection files were included in an ESRI GIS shapefile of the inspected manholes so the virtual 3D reader could be opened for a specific manhole from a map environment for easy access.

Observations and defects were collected during the inspection work and coded using the NASSCO Manhole Assessment and Certification Program (MACP) standards. Level 2 MACP coding was performed using Version 7.0 of the PACP Reference Manual. Many of the defects found in pipelines are also found in manholes, therefore PACP defect codes are used where applicable for the Level 2 MACP inspections.

WWE reviewed each manhole inspected as part of this project, with particular attention to manholes that had Structural Quick Ratings indicating Grade 5 and Grade 4 defects. WWE evaluated potential renewal activities for each manhole so that no manhole inspected as part of this project will have defect(s) more severe than a Grade 3 once the activities are completed. The findings from the condition assessment and a discussion of the potential renewal activities are found below in Section 0 and Section 7.2, respectively.

3.2 Summary of Work Completed

3.2.1 Pipeline Cleaning/Inspection

The JTP trunk main consists of approximately 62,006 linear feet of sewer pipe as it pertains to this project. Cleaning was performed on each pipeline prior to commencement of CCTV inspection, which were performed on almost every pipe segment along the trunk main (i.e. 61,807 LF, or 99%, of trunk main was inspected). It is the opinion of the WWE that there is sufficient inspection data to warrant the recommendation of projects to address the deteriorating condition of certain portions of the JTP trunk main.

The following CCTV inspections were abandoned due to the stated reasoning provided in Table 11 below.

- MH-116_MH-116A: The entirety of this pipeline was able to be inspected by performing a reverse inspection from the opposite direction until the same joint seal was reached.
- MH-155_MH_156: As the last pipeline along the trunk main, the water level during the time of inspection was too high for a complete CCTV inspection to be performed.

Table 11: Abandoned Inspection Summary

Date	Pipeline Facility ID	US Manhole	DS Manhole	Cleaning?	Reason for Abandonment
12/10/2019	MH-116_MH-116A	MH-116	MH-116A	YES	Joint Seal Blocking Path (reverse setup completed total pipe inspection length)
01/16/2020	MH-155_MH-156	MH-155	MH-156	YES	Camera Underwater (missing approximately 163 LF of estimated 263LF of total pipeline length due to excessive water level)

Table 12 below summarizes the three siphon pipelines (on Wren Ave, north of La Primavera Way) that were not inspected during the field assessment. A brief explanation of why the pipe segments were unable to be inspected is described in Table 12, with a more detailed explanation of what was performed provided below.

- Pro-Pipe set up the bypass pumping system, with the intent to install a flow-through plug at MH-90 and connect the bypass pump to the plug in order to reroute the sewage around the siphon pipe segments. Cleaning was then to be performed on both siphon barrels before eventually running the CCTV camera through the barrels in a relatively dry condition.
- Pro-Pipe rented a variety of flow-through plugs with the recognition that getting a 24" plug into these relatively small manholes was going to be difficult, especially given the configuration of the siphon inlet. The bypass pump manufacturer recommended that the connection size of the flow-through portion of the plug be 8" in diameter to achieve full capacity, however the 24"/8" flow-through plug was very rigid and the manholes are not big enough to get the plug into the line. Pro-Pipe was able to get a 6" flow-through plug into the line, however the bypass operation was limited by the smaller diameter pipe and the system started to surcharge, thereby not allowing sufficient time to complete the CCTV inspection before Pro-Pipe was forced to remove the plug entirely.
- Pro-Pipe was able to clean both the 12" and 18" siphon barrels, and while doing so were able to visually inspect the siphon inlet manhole configuration where the two barrels split. Roughly 85% of the wastewater flow and almost all of the debris was going through the lower 12" barrel, which had significant levels of debris that Pro-Pipe was able to remove with multiple cleaning passes. The 18" barrel inlet is configured at a higher elevation than the 12" barrel, thereby resulting in a lower amount of flow (~15%) and very little debris. Pro-Pipe was able to successfully clean and remove the debris in the 18" barrel.
- Pro-Pipe also found during the visual inspection that there was no indication of pipe degradation at the pipe inlets. Refer to Section 11.2 later in this report for WWE's recommendation(s) regarding the siphon barrel pipe segments.

Table 12: Pipelines Not Inspected

Pipeline Facility ID	US Manhole (USMH)	DS Manhole (DSMH)	Length (ft)*	Reason for No Inspection
MH-90_MH-91	MH-90	MH-91	47	Due to the relatively small size of the manhole openings, the flow-through plug with sufficient capacity to allow for CCTV inspection was unable to be installed. The largest flow-through plug that was successfully installed was unable to convey enough bypassed flow, resulting in the upstream system surcharging too quickly to allow for inspection.
MH-91_MH-92	MH-91	MH-92	99	
MH-92_MH-93	MH-92	MH-93	56	

*Total length of pipe segment based on estimated GIS lengths

3.2.2 Manhole Inspection

There are a total of 169 manholes along the JTP trunk main, of which 150 (88.7%) were MACP inspected. Table 13 below summarizes the manholes that were not inspected as part of this project. The reasoning behind the inability to inspect each manhole is also provided.

Table 13: Manholes Not MACP Inspected

Manhole Facility ID	Reason for No MACP Inspection
MH-66	Unable to locate
MH-71	Unable to safely access in garlic fields without crop damage
MH-72	Unable to safely access in garlic fields without crop damage
MH-85	Unable to confirm exact manhole
MH-91	Intermediate siphon manhole, unable to inspect
MH-92	Intermediate siphon manhole, unable to inspect
MH-127	Unable to locate under grass/landscaping
MH-128	Unable to locate under grass/landscaping
MH-137	Unable to locate manhole
MH-138	Unable to locate manhole
MH-138A	Unable to locate manhole, potentially paved over
MH-142A	Unable to locate manhole, under gravel road
MH-142B	Unable to locate manhole, under gravel road
MH-151	Unable to access locked cover
MH-152	Unable to access locked cover
MH-153	Unable to access locked cover
MH-154	Unable to access locked cover
MH-155	Unable to access locked cover
MH-156	Unable to access locked cover

The manholes listed below in Table 14 seemingly do not exist after the inspection work was completed and reviewed, even though they were initially included in the City's original system GIS data. A description of the location where each manhole was originally believed to exist is also provided.

Table 14: Nonexistent Manholes

Nonexistent Manhole Facility ID	Original Location Description
MH-45	On Harding Ave north of intersection of Highland Ave and Harding Ave
MH-49	On Highland Ave west of intersection of Highland Ave and Harding Ave
MH-124	Grass Area west of Arroyo Cir near Hometown Buffet (7950 Arroyo Cir, Gilroy, CA 95020)
MH-129	Grass area west of Arroyo Cir near Kaiser Medical Center (7520 Arroyo Cir, Gilroy, CA 95020)

3.3 Summary of Findings

This section reviews the findings of the inspection work and subsequent condition assessment. The section is broken down into four further sections. The first section reviews the structural/O&M/construction observations found during the pipeline inspections, while the second section reviews the structural/O&M observations found during the manhole inspections. The third section reviews the manholes that were unable to be found during the inspections and are thought to be buried (i.e. under grass/landscaping, gravel, road, etc.). The fourth section reviews differences along the alignment between the City's GIS and field assessment findings.

3.3.1 Pipeline Inspection Findings

This section provides a summary of the pipeline observations made during the inspection phase. As previously explained in Section 2.1.1, these pipeline observations are used in the risk prioritization methodology. Figures summarizing the Structural Quick Rating and O&M Quick Rating for each pipeline inspected as part of this project are included in Appendix B and Appendix C, respectively. See Table 38 and Table 39 in Section 6 for the pipelines' Structural and O&M Condition Ratings. A more detailed view of the pipeline inspections performed and the defect observations found during the field assessment can be found in Appendix I in Section 15.9.

3.3.1.1 Structural Observations

The structural defect codes listed in the tables below are the PACP codes applied to the observed structural defects. The number in parentheses indicates the number of occurrences of that code. There may also be continuous stretches of the codes, which will have the linear footage indicated. A condensed list of codes and their associated descriptions is provided below. The tables are sorted on the Structural Quick Rating column so the pipelines with the largest count of the highest severity defects are listed in descending order from the top of the table. Refer to the PACP Reference Manual Version 7.0 for additional detailed information about these and other PACP codes.

- SMW – Missing Wall (Grade 5)
- SRP – Reinforcement Projecting (Grade 5)
- SRV – Reinforcement Visible (Grade 4)
- SAM – Aggregate Missing (Grade 4)
- FM – Fractures, Multiple (Grade 4)
- SAP – Aggregate Projecting (Grade 3)
- FL – Fracture, Longitudinal (Grade 3)
- FS – Fracture, Spiral (Grade 3)
- CM – Cracks, Multiple (Grade 3)
- JAM – Joint Angular Medium (Grade 3)
- CL – Crack Longitudinal (Grade 2)
- CS – Crack Spiral (Grade 2)
- FC – Fracture Circumferential (Grade 2)
- SAV – Aggregate Visible (Grade 2)
- SSS – Surface Spalling (Grade 2)
- CC – Crack Circumferential (Grade 1)
- SRI – Roughness Increased (Grade 1)
- SSC – Spalling of Coating (Grade 1)

It should be noted that the linear footage provided for the continuous stretches of a defect might be the total sum of multiple continuous stretches along the pipe segment. For example, a single pipe segment may have 2 separate 10-foot stretches of continuous Spiral Fractures (FS) that would be described as having 20 feet of this particular defect.

Table 15 below lists the pipelines along the JTP trunk main that have a Grade 5 structural defect. These pipelines are shown as red pipelines in Appendix B.

Table 15: Pipelines with Grade 5 Structural Defects

Pipeline Facility ID	Structural Quick Rating	Most Severe PACP Observations
MH-116_MH-116A	544B	(1) SMW, (1) SRP, 10 LF of continuous SMW

Table 16 lists the pipelines that have a Grade 4 defect as the most severe structural defect on the line. These pipelines are shown as orange pipelines in Appendix B.

Table 16: Pipelines with Grade 4 Structural Defects as Highest Severity

Pipeline Facility ID	Structural Quick Rating	Most Severe PACP Observations
MH-60_MH-61	4331	16 LF of continuous FM
MH-135_MH-136	422R	(1) SRV, (1) SAM
MH-142B_MH-142C	4138	(1) FM
MH-143_MH-144	4132	(1) FM

Table 17 lists the pipelines that have a Grade 3 defect as the most severe structural defect on the line. These pipelines are shown as yellow pipelines in Appendix B.

Table 17: Pipelines with Grade 3 Structural Defects as Highest Severity

Pipeline Facility ID	Structural Quick Rating	Most Severe PACP Observations
MH-142F_MH-143	372Z	(4) CM, (3) SAP
MH-116A_MH-117	372E	(1) SAP, 28 LF of continuous SAP
MH-147_MH-148	352M	(3) SAP, (2) CM
MH-139_MH-140	342Z	(3) CM, (1) FL
MH-142C_MH-142D	342N	(4) FL
MH-153_MH-154	342L	(3) SAP, (1) FL
MH-59_MH-60	3411	(4) FL
MH-151_MH-152	332Z	(2) CM, (1) SAP
MH-117_MH-118	332G	(3) SAP
MH-137_MH-138	332D	(1) SAP, 10 LF of continuous SAP
MH-142A_MH-142B	332C	(2) FL, (1) CM
MH-53_MH-54	3321	(1) CM, (1) FL, (1) FS
MH-131_MH-132	322Z	(2) SAP
MH-126_MH-127	322S	(2) CM
MH-142E_MH-142F	322L	(2) CM
MH-110_MH-111	322G	(1) FL, (1) CM

Pipeline Facility ID	Structural Quick Rating	Most Severe PACP Observations
MH-146_MH-147	322G	(1) CM, (1) SAP
MH-145_MH-146	322C	(1) FL, (1) SAP
MH-7_MH-9	3225	(1) CM, (1) JAM
MH-100_MH-101	312O	(1) FS
MH-152_MH-153	312N	(1) SAP
MH-97A_MH-98	312L	(1) FL
MH-112_MH-113	312L	(1) CM
MH-142D_MH-142E	312L	(1) CM
MH-88_MH-89	312K	(1) FS
MH-95_MH-96	312F	(1) CM
MH-138_MH-138A	312F	(1) SAP
MH-113_MH-114	312I	(1) CM
MH-149_MH-150	312B	(1) SAP
MH-32_MH-33	3127	(1) FL
MH-3_MH-5	3126	(1) FS
MH-5_MH-7	3126	(1) FS
MH-16_MH-18	3126	(1) JAM
MH-44_MH-48	3125	(1) FL
MH-70_MH-71	3124	(1) FL
MH-24_MH-26	3122	(1) CM
MH-21_MH-21A	3121	(1) FS
MH-61_MH-62	3100	(1) FL

Table 18 lists the pipelines that have a Grade 2 defect as the most severe structural defect on the line. These pipelines are shown as blue pipelines in Appendix B.

Table 18: Pipelines with Grade 2 Structural Defects as Highest Severity

Pipeline Facility ID	Structural Quick Rating	Most Severe PACP Observations
MH-140_MH-141	2Z1V	(10) CL, (3) SAV, (1) CC, 850 LF of continuous SAV
MH-128_MH-130	2Y1U	(10) CL, (2) CS, (1) SAV, (1) SSS, 586 LF of continuous SAV
MH-150_MH-151	2X1W	(7) CL, (2) SAV, 595 LF of continuous SAV
MH-107_MH-108	2W1U	(2) CL, (1) SAV, 585 LF of continuous SAV
MH-125_MH-126	2T1O	(5) CL, (1) CS, (1) FC, (1) SAV, 486 LF of continuous SAV
MH-106_MH-107	2T13	532 LF of continuous SAV
MH-105_MH-106	2S1R	(3) CL, (1) FC, (1) SAV, 479 LF of continuous SAV
MH-111_MH-112	2R12	490 LF of continuous SAV
MH-133_MH-134	2Q1R	(2) SAV, 458 LF of continuous SAV

Pipeline Facility ID	Structural Quick Rating	Most Severe PACP Observations
MH-115_MH-116	2P1P	(1) CL, (1) SAV, 416 LF of continuous SAV
MH-101_MH-102	2P1D	(3) CL, (1) CS, (1) FC, 408 LF of continuous SAV
MH-98_MH-99	2O1O	(3) SAV, (2) SSS, (2) CS, (2) CL, 363 LF of continuous SAV, 10 LF of continuous SSS
MH-134A_MH-135	2N1U	(4) SAV, 373 LF of continuous SAV
MH-109_MH-110	2M1R	(3) SAV, (3) CL, (1) CS, 319 LF of continuous SAV
MH-118_MH-119	2M1O	(3) SAV, (1) CL, (1) FC, 341 LF of continuous SAV
MH-123_MH-125	2M1N	(2) CL, (1) SAV, 342 LF of continuous SAV
MH-104_MH-105	2L1K	(4) CL, (2) SAV, 311 LF of continuous SAV
MH-127_MH-128	2K1Z	(3) CL, (3) CS, (3) SAV, (1) FC, 248 LF of continuous SAV
MH-96_MH-96A	2K1L	(2) CL, (1) SSS, 293 LF of continuous SAV
MH-89_MH-90	2G1H	(2) CL, (2) SAV, (1) CS, 174 LF of continuous SAV
MH-103_MH-104	2G1G	217 LF of continuous SAV
MH-148_MH-149	2G1F	(1) CS, 192 LF of continuous SAV, 24 LF of continuous CL
MH-141_MH-142	2D1O	(7) CL, (4) SAV, 73 LF of continuous SAV
MH-138A_MH-139	2D1I	(1) CL, (1) SAV, 113 LF of continuous SAV
MH-96A_MH-97	2D1C	(2) SSS, 120 LF of continuous SAV
MH-122_MH-123	2D16	(8) SAV, (3) CL, (1) FC, 76 LF of continuous SAV
MH-94_MH-95	2D00	130 LF of continuous SAV
MH-99_MH-100	2D00	(2) SAV, (1) CL, (1) CS, 115 LF of continuous SAV
MH-97_MH-97A	2C00	120 LF of continuous SAV
MH-102B_MH-103	2B1B	91 LF of continuous SAV
MH144_MH-145	2B1A	(3) SAV, (2) CL, 54 LF of continuous CL
MH-130_MH-131	2A1V	(3) SAV, (1) CL, 37 LF of continuous SAV
MH-121_MH-122	2A1F	(8) SAV, 25 LF of continuous SAV
MH-26_MH-27	2A11	(9) CL, (1) CS
MH-119_MH-120	2912	(6) SAV, (2) FC, (1) CL
MH-33_MH-36	2900	(8) CL, (1) CS
MH-108_MH-109	281C	(1) CL, (1) SAV, 28 LF of continuous SAV
MH-142_MH-142A	281A	(1) CL, 33 LF of continuous SAV
MH-102_MH-102A	2812	(1) CL, (1) SAV, 28 LF of continuous SAV
MH-114_MH-115	261L	(3) SAV, (2) CS, (1) CL
MH-29_MH-32	2611	(5) CL, (1) CS
MH-120_MH-121	251A	(3) SAV, (1) CL, (1) FC
MH-64_MH-65	2500	(4) CL, (1) CS
MH-132_MH-133	241S	(3) CL, (1) SAV
MH-87_MH-88	2400	(4) CL
MH-93_MH-94	2400	(1) FC, 17 LF of continuous SAV

Pipeline Facility ID	Structural Quick Rating	Most Severe PACP Observations
MH-77_MH-78	2311	(3) CL
MH-11_MH-15	2300	(2) CL, (1) FC
MH-42_MH-44	2300	(2) CL, (1) CS
MH-55_MH-56	2300	(3) CL
MH-18_MH-21	2211	(2) CL
MH-9_MH-11	2200	(2) CL
MH-15_MH-16	2200	(1) CL, (1) CS
MH-21A_MH-24	2200	(2) CL
MH-27_MH-29	2200	(2) CL
MH-38_MH-40	2200	(2) CL
MH-56_MH-57	2200	(2) CL
MH-71_MH-72	2200	(1) CL, (1) CS
MH-102A_MH-102B	211B	(1) FC
MH-134_MH-134A	211A	(1) SAV
MH-136_MH-137	211A	(1) SAV
MH-73_MH-74	2112	(1) CL
MH-36_MH-38	2100	(1) SAV
MH-40_MH-41	2100	(1) CL
MH-34_MH-35	2100	(1) CL
MH-39A_MH-43	2100	(1) CL
MH-86_MH-87	2100	(1) CL
MH-154_MH-155	2100	5 LF of continuous SAV
MH-155_MH-156	2100	(1) CL
MH-54_MH-55	2100	(1) CL
MH-57_MH-58	2100	(1) CL
MH-68_MH-69	2100	(1) CL
MH-50_MH-51	2100	(1) CL
MH-51_MH-52	2100	(1) CL
MH-52_MH-53	2100	(1) CL
MH-65_MH-66	2100	(1) CL

Table 19 lists the pipelines that have a Grade 1 defect as the most severe structural defect on the line. These pipelines are shown as cyan pipelines in Appendix B.

Table 19: Pipelines with Grade 1 Structural Defects as Highest Severity

Pipeline Facility ID	Structural Quick Rating	Most Severe PACP Observations
MH-80_MH-81	1100	(1) CC
MH-63_MH-64	1100	(1) CC

3.3.1.2 O&M Observations

The O&M defect codes listed in the tables below are the PACP codes applied to the observed O&M defects. The number in parentheses indicates the number of occurrences of that code. There may also be continuous stretches of the codes, which will have the linear footage indicated. A condensed list of codes and their associated descriptions is provided below. Refer to the PACP Reference Manual Version 7.0 for additional detailed information about these and other PACP codes.

- IGB – Infiltration Gusher, Barrel (Grade 5)
- RMB – Roots Medium, Barrel (Grade 4)
- IRB – Infiltration Runner, Barrel (Grade 4)
- IR – Infiltration Runner (Grade 4)
- MCU – Miscellaneous, Camera Underwater (Grade 4)
- RMJ – Roots Medium, Joint (Grade 3)
- DAGS – Deposits Attached, Grease (1-10%: Grade 2)
- DSZ – Deposits Settled, Other (1-10%: Grade 2)
- DSF – Deposits Settled, Fine (Grade 2)
- DSGV – Deposits Settled, Gravel (Grade 2)
- DNF – Deposits Ingress, Fine (Grade 2)
- DAE – Deposits Attached, Encrustation (1-10%: Grade 2)
- DSC – Deposits Settled, Hard/Compacted (Grade 2)
- IW – Infiltration Weeper (Grade 2)
- DAR – Deposits Attached, Ragging (Grade 2)
- OBS – Obstruction Built Into Structure (Grade 2)
- ISSRB – Intruding Sealing Material Sealing Ring Broken (Grade 2)
- ISSR – Intruding Sealing Material Sealing Ring (Grade 2)
- RFB – Roots Fine, Barrel (Grade 2)
- OBR – Obstruction Rocks (Grade 2)
- RFJ – Roots Fine, Joint (Grade 1)
- IS – Infiltration Stain (Grade N/A)
 - o IS defects are described in the NASSCO PACP Manual as follows: “No moisture present during the inspection but a watermark indicates water has entered in the past.”

It should be noted that the linear footage provided for the continuous stretches of a defect might be the total sum of multiple continuous stretches along the pipe segment. For example, a single pipe segment may have 2 separate 10-foot stretches of continuous DAGS defect that would be described as having 20 feet of this particular defect.

Table 20 lists the pipeline(s) in the trunk main that has a Grade 5 O&M defect. This pipeline is shown as a red pipeline in Appendix C.

Table 20: Pipelines with Grade 5 Maintenance Defects

Pipeline Facility ID	Maintenance Quick Rating	Most Severe PACP Observations
MH-153_MH-154	512A	(1) IGB

Table 21 lists the pipelines that have a Grade 4 defect as the most severe O&M defect on the line. These pipelines are shown as orange pipelines in Appendix C.

Table 21: Pipelines with Grade 4 Maintenance Defects as Highest Severity

Pipeline Facility ID	Maintenance Quick Rating	Most Severe PACP Observations
MH-145_MH-146	422Z	(2) IRB
MH-155_MH-156	4200	(2) MCU
MH-152_MH-153	412Z	(1) IR
MH-146_MH-147	412P	(1) IRB
MH-120_MH-121	412L	(1) RMB

Table 22 lists the pipelines that have a Grade 3 defect as the most severe O&M defect on the line. These pipelines are shown as yellow pipelines in Appendix C.

Table 22: Pipelines with Grade 3 Maintenance Defects as Highest Severity

Pipeline Facility ID	Maintenance Quick Rating	Most Severe PACP Observations
MH-121_MH-122	312Z	(1) RMJ

Table 23 lists the pipelines that have a Grade 2 defect as the most severe O&M defect on the line. These pipelines are shown as blue pipelines in Appendix C.

Table 23: Pipelines with Grade 2 Maintenance Defects as Highest Severity

Pipeline Facility ID	Maintenance Quick Rating	Most Severe PACP Observations
MH-15_MH-16	2Z1M	781 LF of continuous DAGS
MH-32_MH-33	2Z1C	995 LF of continuous DAGS
MH-16_MH-18	2Z16	(1) DSZ, 1013 LF of continuous DAGS, 444 LF of continuous DAE
MH-19_MH-20	2Z16	(1) DAE, 1027 LF of continuous DAGS
MH-118_MH-119	2Z16	(3) ISSRB, (1) IW, 909 LF of continuous DAGS
MH-128_MH-130	2Z15	(1) IW, (1) SSS, (1) DAR, 1171 LF of continuous DAGS
MH-35_MH-37	2Z15	763 LF of continuous DAGS
MH-126_MH-127	2Z13	(7) OBR, (5) DAR, (3) IW, (1) DSZ, 1011 LF of continuous DAGS, 495 LF of continuous DAE

Pipeline Facility ID	Maintenance Quick Rating	Most Severe PACP Observations
MH-139_MH-140	2Z13	(1) IW, 1150 LF of continuous DAGS
MH-64_MH-65	2Z13	1154 LF of continuous DAGS
MH-143_MH-144	2Z13	(6) DAR, 962 LF of continuous DAGS
MH-113_MH-114	2Z13	696 LF of continuous DAGS
MH-140_MH-141	2Z12	1148 LF of continuous DAGS
MH-65_MH-66	2Z12	1144 LF of continuous DAGS
MH-25_MH-28	2Z12	1077 LF of continuous DAGS
MH-23_MH-25	2Z12	1010 LF of continuous DAGS
MH-127_MH-128	2Z12	1009 LF of continuous DAGS
MH-131_MH-132	2Z12	(8) ISSRB, (1) ISSR, 957 LF of continuous DAGS
MH-86_MH-87	2Z12	990 LF of continuous DAGS
MH-33_MH-36	2Z12	(3) IW, 943 LF of continuous DAGS
MH-72_MH-73	2Z12	835 LF of continuous DAGS
MH-130_MH-131	2Z11	(1) DAR, (1) DSGV, 1180 LF of continuous DAGS
MH-122_MH-123	2Z11	1060 LF of continuous DAGS
MH-24_MH-26	2Z11	1015 LF of continuous DAGS
MH-87_MH-88	2Z11	1014 LF of continuous DAGS
MH-105_MH-106	2Z11	1011 LF of continuous DAGS
MH-9_MH-11	2Z11	(3) DSGV, 961 LF of continuous DAGS, 22 LF of continuous DSF
MH-30_MH-31	2Z11	988 LF of continuous DAGS
MH-28_MH-30	2Z11	879 LF of continuous DAGS
MH-101_MH-102	2Z11	(1) IW, 840 LF of continuous DAGS
MH-141_MH-142	2Z11	804 LF of continuous DAGS
MH-123_MH-125	2Z11	783 LF of continuous DAGS
MH-100_MH-101	2Z11	(3) DAR, (2) ISSRB, 781 LF of continuous DAGS
MH-18_MH-21	2Z00	(1) DSGV, (1) DSF, 1021 LF of continuous DAGS, 881 LF of continuous DAE, 12 LF of continuous DSGV
MH-10_MH-12	2Z00	(2) DSZ, 880 LF of continuous DAGS, 439 LF of continuous DSF
MH-150_MH-151	2Z00	(23) DAR, 1205 LF of continuous DAGS
MH-37_MH-39	2Z00	1205 LF of continuous DAGS
MH-151_MH-152	2Z00	(30) DAR, 1199 LF of continuous DAGS
MH-107_MH-108	2Z00	1180 LF of continuous DAGS
MH-51_MH-52	2Z00	1175 LF of continuous DAGS
MH-50_MH-51	2Z00	1163 LF of continuous DAGS

Pipeline Facility ID	Maintenance Quick Rating	Most Severe PACP Observations
MH-42_MH-44	2Z00	(2) IW, 1097 LF of continuous DAGS, 40 LF of continuous DSGV
MH-134A_MH-135	2Z00	(1) DAR, 1111 LF of continuous DAGS
MH-44_MH-48	2Z00	(3) IW, 1102 LF of continuous DAGS
MH-26_MH-27	2Z00	1096 LF of continuous DAGS
MH-106_MH-107	2Z00	1085 LF of continuous DAGS
MH-55_MH-56	2Z00	1068 LF of continuous DAGS
MH-61_MH-62	2Z00	1062 LF of continuous DAGS
MH-58_MH-59	2Z00	(2) DAR, 1059 LF of continuous DAGS
MH-56_MH-57	2Z00	1057 LF of continuous DAGS
MH-43_MH-46	2Z00	(1) DAR, 1046 LF of continuous DAGS
MH-53_MH-54	2Z00	1045 LF of continuous DAGS
MH-39A_MH-43	2Z00	1044 LF of continuous DAGS
MH-142F_MH-143	2Z00	(9) DAR, (6) IW, (1) DSGV, 1042 LF of continuous DAGS
MH-59_MH-60	2Z00	(2) DAR, 1038 LF of continuous DAGS
MH-60_MH-61	2Z00	1036 LF of continuous DAGS
MH-57_MH-58	2Z00	1035 LF of continuous DAGS
MH-4_MH-6	2Z00	1028 LF of continuous DAGS
MH-36_MH-38	2Z00	(1) DSGV, 1005 LF of continuous DAGS, 16 LF of continuous DSGV
MH-132_MH-133	2Z00	(1) DAE, (1) DAR, 1019 LF of continuous DAGS
MH-17_MH-19	2Z00	1018 LF of continuous DAGS
MH-34_MH-35	2Z00	1009 LF of continuous DAGS
MH-21_MH-21A	2Z00	499 LF of continuous DAE, 499 LF of continuous DAGS
MH-125_MH-126	2Z00	(1) IW, 991 LF of continuous DAGS
MH-31_MH-34	2Z00	986 LF of continuous DAGS
MH-52_MH-53	2Z00	985 LF of continuous DAGS
MH-62_MH-63	2Z00	984 LF of continuous DAGS
MH-111_MH-112	2Z00	(1) DAR, 973 LF of continuous DAGS
MH-5_MH-7	2Z00	971 LF of continuous DAGS
MH-133_MH-134	2Z00	970 LF of continuous DAGS
MH-67_MH-68	2Z00	965 LF of continuous DAGS
MH-68_MH-69	2Z00	965 LF of continuous DAGS
MH-76_MH-77	2Z00	965 LF of continuous DAGS
MH-3_MH-5	2Z00	(1) DAR, (1) DSGV, 964 LF of continuous DAGS
MH-75_MH-76	2Z00	964 LF of continuous DAGS

Pipeline Facility ID	Maintenance Quick Rating	Most Severe PACP Observations
MH-29_MH-32	2Z00	(2) IW, 962 LF of continuous DAGS
MH-74_MH-75	2Z00	(1) DAGS, 961 LF of continuous DAGS
MH-109_MH-110	2Z00	960 LF of continuous DAGS
MH-8_MH-10	2Z00	952 LF of continuous DAGS
MH-54_MH-55	2Z00	939 LF of continuous DAGS
MH-6_MH-8	2Z00	938 LF of continuous DAGS
MH-78_MH-79	2Z00	914 LF of continuous DAGS
MH-38_MH-40	2Z00	(1) DAR, 905 LF of continuous DAGS
MH-79_MH-80	2Z00	893 LF of continuous DAGS
MH-115_MH-116	2Z00	(1) DSZ, (1) ISSRB, 883 LF of continuous DAGS
MH-27_MH-29	2Z00	(1) DSC, 881 LF of continuous DAGS
MH-83_MH-84	2Z00	873 LF of continuous DAGS
MH-84_MH-85	2Z00	868 LF of continuous DAGS
MH-82_MH-83	2Z00	863 LF of continuous DAGS
MH-77_MH-78	2Z00	862 LF of continuous DAGS
MH-73_MH-74	2Z00	855 LF of continuous DAGS
MH-71_MH-72	2Z00	839 LF of continuous DAGS
MH-70_MH-71	2Z00	837 LF of continuous DAGS
MH-80_MH-81	2Z00	823 LF of continuous DAGS
MH-48_MH-50	2Z00	810 LF of continuous DAGS
MH-85_MH-85A	2Z00	790 LF of continuous DAGS
MH-14_MH-17	2Z00	752 LF of continuous DAGS
MH-135_MH-136	2Z00	(1) DAR, 750 LF of continuous DAGS
MH-98_MH-99	2Z00	(3) DSGV, (1) DAR, (1) DAGS, 742 LF of continuous DAGS
MH-112_MH-113	2Z00	(2) DAR, (1) DSZ, 726 LF of continuous DAGS
MH-114_MH-115	2Z00	(2) DAR, 666 LF of continuous DAGS
MH-138_MH-138A	2Z00	(16) ISSRB, (5) ISSR, 607 LF of continuous DAGS
MH-142C_MH-142D	2Y00	664 LF of continuous DAGS
MH-88_MH-89	2Y00	663 LF of continuous DAGS
MH-104_MH-105	2Y00	652 LF of continuous DAGS
MH-97A_MH-98	2X00	(1) IW, (1) DAR, 632 LF of continuous DAGS
MH-96_MH-96A	2X00	(4) DAGS, (1) IW, 611 LF of continuous DAGS
MH-63_MH-64	2W00	618 LF of continuous DAGS
MH-102_MH-102A	2W00	600 LF of continuous DAGS
MH-142E_MH-142F	2W00	(8) DAR, (1) RFB, 560 LF of continuous DAGS
MH-117_MH-118	2V00	(1) DAR, 595 LF of continuous DAGS
MH-81_MH-82	2T00	538 LF of continuous DAGS

Pipeline Facility ID	Maintenance Quick Rating	Most Severe PACP Observations
MH-22_MH-23	2S11	505 LF of continuous DAGS
MH-21A_MH-24	2S00	(1) DSZ, 514 LF of continuous DAGS
MH-20_MH-22	2R12	490 LF of continuous DAGS
MH-142B_MH-142C	2Q11	(3) DAR, 442 LF of continuous DAGS
MH-89_MH-90	2Q00	464 LF of continuous DAGS
MH-138A_MH-139	2Q00	(1) DAR, 445 LF of continuous DAGS
MH-103_MH-104	2Q00	(4) IW, 434 LF of continuous DAGS
MH-147_MH-148	2Q00	(14) DAR, 393 LF of continuous DAGS
MH-110_MH-111	2P00	(3) ISSRB, 407 LF of continuous DAGS
MH-95_MH-96	2O00	(2) DAGS, 410 LF of continuous DAGS
MH-116_MH-116A	2O00	(3) ISSR, (3) ISSRB, (3) DAR, (1) DAGS, 352 LF of continuous DAGS
MH-148_MH-149	2O00	(2) DAR, 385 LF of continuous DAGS
MH-119_MH-120	2N00	(1) RFB, 393 LF of continuous DAGS
MH-66_MH-67	2N00	386 LF of continuous DAGS
MH-69_MH-70	2N00	385 LF of continuous DAGS
MH-137_MH-138	2L00	(1) DSZ, 328 LF of continuous DAGS
MH-116A_MH-117	2K00	(2) DAR, (3) ISSRB, (1) ISSR, 289 LF of continuous DAGS
MH-142D_MH-142E	2K00	(3) DAR, 295 LF of continuous DAGS
MH-94_MH-95	2I00	(1) DAGS, 259 LF of continuous DAGS
MH-96A_MH-97	2I00	250 LF of continuous DAGS
MH-99_MH-100	2I00	(2) DAGS, 235 LF of continuous DAGS
MH-11_MH-15	2I00	(3) DSGV, (1) DSZ, (1) DNF, 232 LF of continuous DAGS
MH-108_MH-109	2H11	237 LF of continuous DAGS
MH-7_MH-9	2H00	(1) DSZ, 139 LF of continuous DAGS, 101 LF of continuous DSF
MH-97_MH-97A	2H00	(1) IW, 239 LF of continuous DAGS
MH-142A_MH-142B	2H00	236 LF of continuous DAGS
MH-39_MH-39A	2F00	188 LF of continuous DAGS
MH-102B_MH-103	2F00	187 LF of continuous DAGS
MH-149_MH-150	2F00	(5) DAR, 149 LF of continuous DAGS
MH-13_MH-14	2D00	144 LF of continuous DAGS
MH-102A_MH-102B	2D00	(1) DAR, 129 LF of continuous DAGS
MH-134_MH-134A	2C11	98 LF of continuous DAGS
MH-144_MH-145	2C00	113 LF of continuous DAGS
MH-142_MH-142A	2C00	(1) DAR, 109 LF of continuous DAGS
MH-136_MH-137	2C00	108 LF of continuous DAGS
MH-85A_MH-85B	2A00	66 LF of continuous DAGS

Pipeline Facility ID	Maintenance Quick Rating	Most Severe PACP Observations
MH-2_MH-4	2A00	64 LF of continuous DAGS
MH-46_MH-47	2800	43 LF of continuous DAGS
MH-93_MH-94	2600	34 LF of continuous DAGS
MH-12_MH-13	2600	26 LF of continuous DAGS
MH-85B_MH-86	2200	14 LF of continuous DAGS
MH-1_MH-3	2100	(1) DSGV
MH-47_MH-48	2100	(1) DAGS
MH-41_MH-42	2100	(1) OBS (flow meter)

Table 24 lists the pipelines that have infiltration PACP defects. Looking at this data, the four pipelines with an infiltration and inflow (I&I) defect of severity grade 4 or 5 warrant consideration for rehabilitation to address the defect. Refer to Section 9.1 for the recommended rehabilitation activity for these defects. Besides these 4 pipelines, there does not seem to be evidence of widespread or significant I&I defects along the trunkline. A majority of the defects are “IS – Infiltration Stain”, which do not indicate an immediate risk for I&I flow entry to the collection system. “IS” defects are described in the NASSCO PACP Manual as follows: “No moisture present during the inspection but a watermark indicates water has entered in the past.”

Table 24: Pipelines with Infiltration Defect Observations

Pipeline Facility ID	Maintenance Quick Rating	Infiltration PACP Observation(s)
MH-153_MH-154	512A	(1) IGB
MH-145_MH-146	422Z	(2) IRB
MH-146_MH-147	412P	(1) IRB
MH-152_MH-153	412Z	(1) IR
MH-142F_MH-143	2Z00	(6) IW
MH-103_MH-104	2Q00	(4) IW
MH-33_MH-36	2Z12	(3) IW, (2) IS
MH-126_MH-127	2Z13	(3) IW, (2) IS
MH-44_MH-48	2Z00	(3) IW
MH-29_MH-32	2Z00	(2) IW
MH-42_MH-44	2Z00	(2) IW
MH-118_MH-119	2Z16	(1) IW, (6) IS
MH-128_MH-130	2Z15	(1) IW, (5) IS
MH-139_MH-140	2Z13	(1) IW, (3) IS
MH-101_MH-102	2Z11	(1) IW, (1) IS
MH-96_MH-96A	2X00	(1) IW
MH-97_MH-97A	2H00	(1) IW
MH-97A_MH-98	2X00	(1) IW
MH-125_MH-126	2Z00	(1) IW

MH-32_MH-33	2Z1C	(3) IS, 106 LF of continuous IS
MH-19_MH-20	2Z16	(6) IS
MH-35_MH-37	2Z15	(5) IS
MH-16_MH-18	2Z16	(4) IS
MH-15_MH-16	2Z1M	(3) IS
MH-113_MH-114	2Z13	(3) IS
MH-20_MH-22	2R12	(2) IS
MH-23_MH-25	2Z12	(2) IS
MH-25_MH-28	2Z12	(2) IS
MH-127_MH-128	2Z12	(2) IS
MH-131_MH-132	2Z12	(2) IS
MH-140_MH-141	2Z12	(2) IS
MH-22_MH-23	2S11	(1) IS
MH-24_MH-26	2Z11	(1) IS
MH-28_MH-30	2Z11	(1) IS
MH-30_MH-31	2Z11	(1) IS
MH-100_MH-101	2Z11	(1) IS
MH-108_MH-109	2H11	(1) IS
MH-121_MH-122	312Z	(1) IS
MH-122_MH-123	2Z11	(1) IS
MH-123_MH-125	2Z11	(1) IS
MH-130_MH-131	2Z11	(1) IS
MH-134_MH-134A	2C11	(1) IS
MH-141_MH-142	2Z11	(1) IS

3.3.1.3 Pipelines with Lateral Connections

A total of thirty-four (34) lateral, or “tap”, connections across sixteen (16) different pipelines were observed during the CCTV inspections. The PACP codes used to make the observations for the lateral connections, and their associated NASSCO descriptions, are provided below. Table 25 lists the pipelines that were observed to have lateral connections, along with pertinent information regarding the connections themselves.

- TF – Factory Made Tap Connection
 - The tap connection appears to be a “purpose-made or pre-formed pipe fitting that was built into the sewer during construction.”
- TFA – Active Factory Made Tap Connection
 - The tap connection appears to be a “purpose-made or pre-formed pipe fitting that was built into the sewer during construction.” The tap connection is considered active if it was obviously contributing flow to the pipeline during the inspection. However, use of another PACP code denoting a tap connection does not mean that the connection is not active. It simply means that while the CCTV camera was inspecting the tap connection, no activity was observed.

- TB – Break-in/Hammer Tap Connection
 - The tap connection appears to be a rough hole that “has been made in the wall of the sewer main with a lateral pipe inserted into it without the use of a fitting for connecting and sealing the lateral pipe.”
- TBA – Active Break-in/Hammer Tap Connection
 - The tap connection appears to be a rough hole that “has been made in the wall of the sewer main with a lateral pipe inserted into it without the use of a fitting for connecting and sealing the lateral pipe.” The tap connection is considered active if it was obviously contributing flow to the pipeline during the inspection. However, use of another PACP code denoting a tap connection does not mean that the connection is not active. It simply means that while the CCTV camera was inspecting the tap connection, no activity was observed.
- TS – Saddle Tap Connection
 - The tap connection appears to be “a special fitting used to connect and seal the lateral pipe to the inside or outside wall of the sewer main, typically found on lateral connections that have been made after the sewer main was installed, or on installed pipelines that will not accommodate a factory made tap.”
- TSA – Active Saddle Tap Connection
 - The tap connection appears to be “a special fitting used to connect and seal the lateral pipe to the inside or outside wall of the sewer main, typically found on lateral connections that have been made after the sewer main was installed, or on installed pipelines that will not accommodate a factory made tap.” The tap connection is considered active if it was obviously contributing flow to the pipeline during the inspection. However, use of another PACP code denoting a tap connection does not mean that the connection is not active. It simply means that while the CCTV camera was inspecting the tap connection, no activity was observed.

Table 25: Pipelines with Lateral Connections

Pipeline Facility ID	PACP Observation	Lateral Diameter (in)	Clock Position	Distance from USMH (ft)
MH-94_MH-95	TS	4	2	122.9
MH-95_MH-96	TS	4	1	168.7
	TS	4	9	139.4
	TS	4	2	138.9
	TS	4	2	48.6
MH-96_MH-96A	TB	4	2	5.5
	TB	4	10	48.4
	TB	4	3	51.5
	TB	4	3	59.1
	TB	4	11	79.9
	TB	4	3	113.7
	TB	4	10	171.1
	TB	4	3	191.3

	TB	4	3	280.4
MH-96A_MH-97	TB	4	2	27.2
	TB	4	10	74.5
MH-97_MH-97A	TB	4	10	39.9
MH-97A_MH-98	TB	4	3	144.2
	TB	4	3	192.1
	TB	4	2	269.4
	TB	4	2	313
MH-98_MH-99	TB	4	2	75.1
	TB	4	2	120.2
	TB	4	1	199.4
MH-100_MH-101	TBA	10	9	31.5
MH-106_MH-107	TSA	4	12	26.3
MH-111_MH-112	TB	6	2	100.9
MH-114_MH-115	TFA	6	9	2.1
MH-134A_MH-135	TF	8	1	272.1
MH-152_MH-153	TS	8	11	383.4
	TS	8	11	315.7
MH-59_MH-60	TB	6	11	233.9
MH-60_MH-61	TF	6	11	126.1
MH-62_MH-63	TBA	6	2	476.9

3.3.2 Manhole Inspection Findings

3.3.2.1 Structural Observations

The structural defect codes listed in the tables below are the MACP codes applied to the observed structural defects. The number in parentheses indicates the number of occurrences of that code. There may also be continuous stretches of the codes, which will have the linear footage indicated. A condensed list of codes and their associated descriptions is provided below. The tables are sorted on the Structural Quick Rating column so the manholes with the largest count of the highest severity defects are listed in descending order from the top of the table. Refer to the PACP Reference Manual Version 7.0 for additional detailed information about these and other MACP codes.

- SMW – Missing Wall (Grade 5)
- HVV – Hole Void Visible (Grade 5)
- JOL – Joint Offset Large (Grade 5)
- SRV – Reinforcement Visible (Grade 5)
- Frame Offset Distance
 - o >4": Grade 5
 - o 1"-4": Grade 3
 - o <1": Grade 1
- Cover/Frame Fit (Oversized): Grade 5
- SAM – Aggregate Missing (Grade 4)
- Cover Condition
 - o Corroded: Grade 4
 - o Sound: Grade 1
- Frame Seal Condition
 - o Cracked/Loose: Grade 4
 - o Missing: Grade 3
 - o Sound: Grade 1
- CM – Crack Multiple (Grade 3)
- FL – Fracture Longitudinal (Grade 3)
- SAP – Aggregate Projecting (Grade 3)
- LFW – Lining Feature Wrinkled (Grade 2)
- CC – Crack Circumferential (Grade 2)
- CL – Crack Longitudinal (Grade 2)
- CS – Crack Spiral (Grade 2)
- MMS – Missing Mortar Small (Grade 2)
- SAV – Aggregate Visible (Grade 2)
- SRI – Roughness Increased (Grade 1)
- Adjustment Ring Condition (Sound): Grade 1
- Frame Condition (Sound): Grade 1

Table 26 below lists the manholes along the trunk main that have a Grade 5 structural defect.

Table 26: Manholes with Grade 5 Structural Defects

Manhole Facility ID	Structural Quick Rating	Most Severe MACP Observations
MH-123	5341	(3) SRV
MH-130	5341	(3) SRV
MH-75	5331	(2) SRV, (1) SMW
MH-79	5241	(1) JOL, Frame Offset Distance = 7"
MH-29	5231	(2) SRV
MH-41	5231	(2) SRV
MH-87	5231	(2) SRV

Manhole Facility ID	Structural Quick Rating	Most Severe MACP Observations
MH-147	5226	(2) SRV
MH-146	5224	(2) SRV
MH-68	5223	(1) HVV, Cover/Frame Oversized
MH-120	5222	(1) SRV, Cover/Frame Oversized
MH-55	5141	(1) SRV
MH-70	5141	(1) SRV
MH-99	5132	(1) SRV
MH-32	5131	(1) SMW
MH-122	5131	(1) SRV
MH-97A	5131	(1) SRV
MH-102A	5131	(1) SRV
MH-109	5129	(1) SRV
MH-150	5128	Cover/Frame Oversized
MH-139	5128	(1) SRV
MH-90	5127	Cover/Frame Oversized
MH-64	5127	(1) SRV
MH-102B	5127	(1) SRV
MH-94	5127	(1) SMW
MH-148	5126	Cover/Frame Oversized
MH-101	5126	(1) SRV
MH-81	5125	Cover/Frame Oversized
MH-60	5125	(1) SRV
MH-144	5125	(1) SRV
MH-126	5124	Cover/Frame Oversized
MH-16	5124	(1) SMW
MH-93	5124	(1) SRV
MH-36	5124	(1) SMW
MH-15	5121	Cover/Frame Oversized
MH-119	5121	(1) SRV

The particular JOL defect found for MH-79 was found to be so severe that WWE/Pro-Pipe decided that immediate attention was deserved from the City. Subsequently, the City's repair crew promptly went out on June 18th, 2020 and performed a point repair on the JOL defect. Therefore, this report will not recommend a corrective action for this particular defect.

Table 27 below lists the manholes that have a Grade 4 defect as the most severe structural defect on the line.

Table 27: Manholes with Grade 4 Structural Defects as Highest Severity

Manhole Facility ID	Structural Quick Rating	Most Severe MACP Observations
MH-4	4324	(3) SAM
MH-149	4131	(1) SAM
MH-78	4131	Seal Condition Loose
MH-21A	4131	Cover Condition Corroded
MH-131	412B	Seal Condition Loose
MH-52	412A	Seal Condition Loose
MH-54	412A	Seal Condition Loose
MH-56	412A	Seal Condition Loose
MH-74	412A	Seal Condition Loose
MH-57	4129	Seal Condition Loose
MH-96	4129	Seal Condition Cracked
MH-73	4129	Seal Condition Loose
MH-53	4128	Seal Condition Loose
MH-51	4127	Seal Condition Loose
MH-58	4127	Seal Condition Loose
MH-59	4127	Seal Condition Loose
MH-100	4127	Seal Condition Cracked/Loose
MH-80	4127	Seal Condition Loose
MH-69	4126	Seal Condition Loose
MH-18	4124	Seal Condition Cracked
MH-135	4124	Cover Condition Corroded
MH-33	4122	Seal Condition Cracked
MH-31	4121	(1) SAM

Table 28 below lists the manholes that have a Grade 3 defect as the most severe structural defect on the line.

Table 28: Manholes with Grade 3 Structural Defects as Highest Severity

Manhole Facility ID	Structural Quick Rating	Most Severe MACP Observations
MH-24	3222	(1) CM, (1) SAP
MH-5	312A	(1) CM
MH-98	312A	(1) FL
MH-83	3128	Seal Condition Missing
MH-121	3128	(1) CM
MH-105	3128	(1) CM
MH-61	3126	(1) CM
MH-7	3125	(1) FL
MH-125	3124	Frame Offset Distance = 2"

Manhole Facility ID	Structural Quick Rating	Most Severe MACP Observations
MH-84	3123	(1) CM
MH-97	3123	(1) CM
MH-6	3122	(1) CM
MH-86B	3122	(1) CM
MH-22	3121	(1) CM
MH-96A	3121	(1) CM

Table 29 below lists the manholes that have a Grade 2 defect as the most severe structural defect on the line.

Table 29: Manholes with Grade 2 Structural Defects as Highest Severity

Manhole Facility ID	Structural Quick Rating	Most Severe MACP Observations
MH-133	2A15	(6) CL, (4) SAV
MH-108	2A15	(6) SAV, (4) CL
MH-134	2A15	(6) SAV, (4) CL, (2) CC, (1) MMS
MH-67	2A14	(7) CL, (6) SAV
MH-136	2A14	(7) SAV, (3) CL
MH-76	2A14	(5) CL, (5) SAV
MH-116	2A14	(6) SAV, (5) CL
MH-27	2914	(5) SAV, (3) CL, (1) CC
MH-107	2914	(6) SAV, (3) CL
MH-142D	2814	(4) SAV, (2) CC, (1) CL, (1) CS
MH-88	2814	(3) CL, (3) SAV, (2) CC
MH-110	2814	(5) SAV, (2) MMS, (1) CL
MH-114	2814	(5) SAV, (2) CL, (1) CC
MH-117	2814	(4) SAV, (2) CL, (2) CC
MH-142	2715	(5) SAV, (1) CC, (1) CL
MH-143	2715	(5) SAV, (2) CL
MH-118	2715	(6) SAV, (1) CL
MH-145	2715	(5) SAV, (1) CL, (1) CC
MH-14	2714	(6) SAV, (1) CC
MH-116A	2714	(7) SAV
MH-102	2714	(4) SAV, (2) CL (1) CC
MH-63	2714	(4) SAV, (2) CL, (1) MMS
MH-13	2714	(5) SAV, (2) CL
MH-106	2714	(5) SAV, (2) CL
MH-115	2714	(5) SAV, (1) CL, (1) CC
MH-112	2615	(5) SAV, (1) CL
MH-82	2615	(3) SAV, (3) CL

Manhole Facility ID	Structural Quick Rating	Most Severe MACP Observations
MH-103	2614	(4) CL, (2) SAV
MH-11	2614	(5) SAV, (1) CC
MH-9	2614	(5) SAV, (1) CC
MH-77	2614	(4) SAV, (2) CL
MH-111	2614	(4) SAV, (2) CL
MH-8	2614	(3) SAV, (3) CC
MH-132	2614	(4) SAV, (2) CL
MH-3	2516	(5) SAV
MH-17	2515	(2) SAV, (1) MMS, (1) CL, (1) CC
MH-1	2515	(4) SAV, (1) CL
MH-140	2515	(4) SAV, (1) CC
MH-62	2515	(5) SAV
MH-113	2514	(3) SAV, (1) CL, (1) CC
MH-141	2514	(4) SAV, (1) CL
MH-142F	2514	(4) SAV, (1) CC
MH-134A	2416	(3) SAV, (1) CC
MH-19	2415	(2) SAV, (2) CC
MH-142E	2414	(4) SAV
MH-12	2414	(3) SAV, (1) CC
MH-2	2414	(4) SAV
MH-104	2414	(1) CC, (1) CL, (1) MMS, (1) SAV
MH-65	2315	(2) SAV, (1) CL
MH-95	2315	(2) CC, (1) SAV
MH-42	2314	(2) CC, (1) SAV
MH-21	2314	(3) SAV
MH-44	2314	(3) SAV
MH-26	2314	(3) SAV
MH-38	2314	(2) CL, (1) SAV
MH-86	2314	(2) MMS, (1) CL
MH-40	2314	(2) CC, (1) LFW
MH-10	2218	(1) CL, (1) CC
MH-85A	2215	(2) SAV
MH-142C	2215	(1) SAV, (1) CC
MH-46	2215	(2) CC
MH-89	2215	(2) SAV
MH-28	2214	(1) CL, (1) SAV
MH-30	2214	(1) SAV, (1) CC
MH-34	2214	(1) SAV, (1) CC
MH-35	2214	(1) CL, (1) CC

Manhole Facility ID	Structural Quick Rating	Most Severe MACP Observations
MH-47	2214	(2) CC
MH-25	2115	(1) CC
MH-20	2114	(1) CC
MH-48	2114	(1) CC
MH-39	2114	(1) SAV
MH-43	2114	(1) CC
MH-50	2114	(1) SAV

Table 30 below lists the manholes that have a Grade 1 defect as the most severe structural defect on the line.

Table 30: Manholes with Grade 1 Structural Defects as Highest Severity

Manhole Facility ID	Structural Quick Rating	Most Severe MACP Observations
MH-39A	1500	Cover Condition Sound, Adjustment Ring Condition Sound, Frame Condition Sound, Seal Condition Sound, Frame Offset Distance = 0",
MH-23	1400	Cover Condition Sound, Frame Condition Sound, Seal Condition Sound, Frame Offset Distance = 0"
MH-37	1400	Cover Condition Sound, Frame Condition Sound, Seal Condition Sound, Frame Offset Distance = 0"

3.3.2.2 O&M Observations

The O&M defect codes listed in the tables below are the PACP codes applied to the observed O&M defects. The number in parentheses indicates the number of occurrences of that code. A condensed list of codes and their associated descriptions is provided below. Refer to the PACP Reference Manual Version 7.0 for additional detailed information about these and other PACP codes.

- OBI – Obstruction Intruding Through Wall (Grade 5)
- Cover/Frame Fit
 - o Oversized: Grade 5
 - o Good: Grade 1
- Frame Seal Condition
 - o Cracked/Loose/Offset/Missing: Grade 3
 - o Sound: Grade 1
- Pipe Connection Condition
 - o Defective: Grade 3
 - o Sound: Grade 1
- Frame Seal Inflow
 - o Stained: Grade 2
 - o None: Grade 1
- OBS – Obstruction Built into Structure
 - o Chimney/Cone & Wall (30-100%): Grade 2
- RFB – Roots Fine Barrel
 - o Channel: Grade 2
 - o Chimney/Cone & Wall/Bench: Grade 1
- DAR – Deposits Attached, Ragging
 - o Chimney/Cone & Wall: Grade 1
 - o Bench (<30%): Grade 1
 - o Channel (1-10%): Grade 1
- DSC – Deposits Settled Hard/Compacted
 - o Bench (<30%): Grade 1
- DSF – Deposits Settled, Fine silt/sand
 - o Bench (<30%): Grade 1
- DSGV – Deposits Settled Gravel
 - o Bench (<30%): Grade 1
- DSZ – Deposits Settled, Other
 - o Bench (<30%): Grade 1
- IS – Infiltration Stain (Grade 1)
- ISJ – Infiltration Stain Joint (Grade 1)
- ISZ – Intruding Sealing Material Other (Grade 1)
- OBN – Obstruction Construction Debris

- o Bench (<30%): Grade 1
- OBP – Obstruction External Pipe or Cable
 - o Chimney/Cone & Wall (<30%): Grade 1
- RFC – Roots Fine Connection (Grade 1)
- RFJ – Roots Fine Joint (Grade 1)
- RMB – Roots Medium Barrel
 - o Chimney: Grade 1
- RMC – Roots Medium Connection
 - o Wall: Grade 1
- RMJ – Roots Medium Joint
 - o Cone & Wall: Grade 1
- Cover Insert Condition (Sound): Grade 1
- Frame Condition (Sound): Grade 1
- Chimney I/I (None): Grade 1

Table 31 below lists the manholes in the JTP trunk main that have a Grade 5 O&M defect.

Table 31: Manholes with Grade 5 O&M Defects

Manhole Facility ID	Maintenance Quick Rating	Most Severe MACP Observations
MH-68	5121	Cover/Frame Oversized
MH-120	5121	Cover/Frame Oversized
MH-32	5121	(1) OBI
MH-150	5121	Cover/Frame Oversized
MH-90	5121	Cover/Frame Oversized
MH-148	5121	Cover/Frame Oversized
MH-81	5121	Cover/Frame Oversized
MH-126	5121	Cover/Frame Oversized
MH-15	5121	Cover/Frame Oversized
MH-119	5121	(1) OBI
MH-149	5121	(1) OBI
MH-133	5121	(1) OBI
MH-28	5121	(1) OBI

Table 32 below lists the manholes that have a Grade 3 defect as the most severe O&M defect on the line.

Table 32: Manholes with Grade 3 O&M Defects as Highest Severity

Manhole Facility ID	Maintenance Quick Rating	Most Severe MACP Observations
MH-18	3122	Seal Condition Cracked
MH-123	3121	Seal Condition Loose
MH-130	3121	Seal Condition Loose
MH-79	3121	Seal Condition Loose/Offset

Manhole Facility ID	Maintenance Quick Rating	Most Severe MACP Observations
MH-55	3121	Seal Condition Cracked/Loose
MH-70	3121	Seal Condition Loose
MH-122	3121	Pipe #4 Condition Defective (Root Intrusion)
MH-78	3121	Seal Condition Loose
MH-131	3121	Seal Condition Loose
MH-52	3121	Seal Condition Loose
MH-54	3121	Seal Condition Loose
MH-56	3121	Seal Condition Loose
MH-74	3121	Seal Condition Loose
MH-57	3121	Seal Condition Loose
MH-96	3121	Seal Condition Cracked
MH-73	3121	Seal Condition Loose
MH-53	3121	Seal Condition Loose
MH-51	3121	Seal Condition Loose
MH-58	3121	Seal Condition Loose
MH-59	3121	Seal Condition Loose
MH-100	3121	Seal Condition Cracked/Loose
MH-80	3121	Seal Condition Loose
MH-69	3121	Seal Condition Loose
MH-33	3121	Seal Condition Cracked
MH-83	3121	Seal Condition Missing
MH-14	3121	Pipe #2 Condition Defective (Blocked)
MH-116A	3121	Pipe #3 Condition Defective (Protruding)

Table 33 below lists the manholes that have a Grade 2 defect as the most severe O&M defect on the line.

Table 33: Manholes with Grade 2 O&M Defects as Highest Severity

Manhole Facility ID	Maintenance Quick Rating	Most Severe MACP Observations
MH-42	2215	(1) OBS, Frame Seal Inflow Stained
MH-39A	2215	(1) OBS, Frame Seal Inflow Stained
MH-21A	211A	Frame Seal Inflow Stained
MH-134A	211A	Frame Seal Inflow Stained
MH-65	211A	Frame Seal Inflow Stained
MH-21	211A	Frame Seal Inflow Stained
MH-16	2119	Frame Seal Inflow Stained
MH-93	2119	Frame Seal Inflow Stained
MH-24	2119	Frame Seal Inflow Stained
MH-17	2119	Frame Seal Inflow Stained

Manhole Facility ID	Maintenance Quick Rating	Most Severe MACP Observations
MH-113	2119	Frame Seal Inflow Stained
MH-142E	2119	Frame Seal Inflow Stained
MH-44	2119	Frame Seal Inflow Stained
MH-64	2118	Frame Seal Inflow Stained
MH-102B	2118	Frame Seal Inflow Stained
MH-103	2118	Frame Seal Inflow Stained
MH-29	2117	Frame Seal Inflow Stained
MH-60	2117	Frame Seal Inflow Stained
MH-144	2117	Frame Seal Inflow Stained
MH-5	2117	Frame Seal Inflow Stained
MH-84	2117	Frame Seal Inflow Stained
MH-22	2117	Frame Seal Inflow Stained
MH-27	2117	Frame Seal Inflow Stained
MH-142	2117	Frame Seal Inflow Stained
MH-143	2117	Frame Seal Inflow Stained
MH-11	2117	Frame Seal Inflow Stained
MH-1	2117	Frame Seal Inflow Stained
MH-140	2117	Frame Seal Inflow Stained
MH-26	2117	Frame Seal Inflow Stained
MH-75	2116	Frame Seal Inflow Stained
MH-41	2116	Frame Seal Inflow Stained
MH-147	2116	Frame Seal Inflow Stained
MH-146	2116	Frame Seal Inflow Stained
MH-97A	2116	Frame Seal Inflow Stained
MH-94	2116	Frame Seal Inflow Stained
MH-36	2116	Frame Seal Inflow Stained
MH-31	2116	Frame Seal Inflow Stained
MH-121	2116	Frame Seal Inflow Stained
MH-7	2116	Frame Seal Inflow Stained
MH-96A	2116	Frame Seal Inflow Stained
MH-67	2116	Frame Seal Inflow Stained
MH-136	2116	Frame Seal Inflow Stained
MH-142D	2116	Frame Seal Inflow Stained
MH-118	2116	Frame Seal Inflow Stained
MH-102	2116	Frame Seal Inflow Stained
MH-112	2116	Frame Seal Inflow Stained
MH-9	2116	Frame Seal Inflow Stained
MH-141	2116	Frame Seal Inflow Stained
MH-142F	2116	Frame Seal Inflow Stained

Manhole Facility ID	Maintenance Quick Rating	Most Severe MACP Observations
MH-19	2116	Frame Seal Inflow Stained
MH-12	2116	Frame Seal Inflow Stained
MH-38	2116	Frame Seal Inflow Stained
MH-86	2116	Frame Seal Inflow Stained
MH-85A	2116	Frame Seal Inflow Stained
MH-30	2116	Frame Seal Inflow Stained
MH-34	2116	Frame Seal Inflow Stained
MH-35	2116	Frame Seal Inflow Stained
MH-47	2116	Frame Seal Inflow Stained
MH-25	2116	Frame Seal Inflow Stained
MH-20	2116	Frame Seal Inflow Stained
MH-48	2116	Frame Seal Inflow Stained
MH-23	2116	Frame Seal Inflow Stained
MH-99	2115	Frame Seal Inflow Stained
MH-102A	2115	Frame Seal Inflow Stained
MH-4	2115	Frame Seal Inflow Stained
MH-98	2115	Frame Seal Inflow Stained
MH-125	2115	Frame Seal Inflow Stained
MH-6	2115	Frame Seal Inflow Stained
MH-86B	2115	Frame Seal Inflow Stained
MH-88	2115	Frame Seal Inflow Stained
MH-145	2115	Frame Seal Inflow Stained
MH-63	2115	Frame Seal Inflow Stained
MH-82	2115	Frame Seal Inflow Stained
MH-77	2115	Frame Seal Inflow Stained
MH-111	2115	Frame Seal Inflow Stained
MH-62	2115	Frame Seal Inflow Stained
MH-2	2115	Frame Seal Inflow Stained
MH-95	2115	Frame Seal Inflow Stained
MH-40	2115	Frame Seal Inflow Stained
MH-10	2115	Frame Seal Inflow Stained
MH-142C	2115	Frame Seal Inflow Stained
MH-39	2115	Frame Seal Inflow Stained
MH-43	2115	Frame Seal Inflow Stained
MH-50	2115	Frame Seal Inflow Stained
MH-37	2115	Frame Seal Inflow Stained
MH-87	2114	Frame Seal Inflow Stained
MH-109	2114	Frame Seal Inflow Stained
MH-139	2114	Frame Seal Inflow Stained

Manhole Facility ID	Maintenance Quick Rating	Most Severe MACP Observations
MH-101	2114	Frame Seal Inflow Stained
MH-135	2114	Frame Seal Inflow Stained
MH-105	2114	Frame Seal Inflow Stained
MH-61	2114	Frame Seal Inflow Stained
MH-97	2114	Frame Seal Inflow Stained
MH-108	2114	Frame Seal Inflow Stained
MH-134	2114	Frame Seal Inflow Stained
MH-76	2114	Frame Seal Inflow Stained
MH-116	2114	Frame Seal Inflow Stained
MH-107	2114	Frame Seal Inflow Stained
MH-110	2114	Frame Seal Inflow Stained
MH-114	2114	Frame Seal Inflow Stained
MH-117	2114	Frame Seal Inflow Stained
MH-13	2114	Frame Seal Inflow Stained
MH-106	2114	Frame Seal Inflow Stained
MH-115	2114	Frame Seal Inflow Stained
MH-8	2114	Frame Seal Inflow Stained
MH-132	2114	Frame Seal Inflow Stained
MH-104	2114	Frame Seal Inflow Stained
MH-46	2114	Frame Seal Inflow Stained
MH-89	2114	Frame Seal Inflow Stained

Table 34 below lists the manholes that have a Grade 1 defect as the most severe O&M defect on the line.

Table 34: Manholes with Grade 1 O&M Defects as Highest Severity

Manhole Facility ID	Maintenance Quick Rating	Most Severe MACP Observations
MH-3	1700	Cover/Frame Fit Good, Cover Insert Condition Sound, Frame Condition Sound, Seal Condition Sound, Frame Seal Inflow None, Chimney I/I None, Pipe Connection Condition(s) Sound

Table 35 lists the manholes that have infiltration MACP defects. Looking at this data, there does not seem to be evidence of potentially significant infiltration and inflow (I&I).

Table 35: Manholes with Infiltration Defect Observations

Manhole Facility ID	Maintenance Quick Rating	Infiltration PACP Observation(s)
MH-21A	1500	(3) IS
MH-93	1400	(1) IS

Manhole Facility ID	Maintenance Quick Rating	Infiltration PACP Observation(s)
MH-16	1300	(1) IS
MH-17	1300	(3) ISJ
MH-143	1300	(2) IS
MH-12	1200	(1) IS
MH-14	1200	(2) IS
MH-84	1200	(2) IS
MH-118	1200	(2) IS
MH-142D	1200	(1) IS
MH-144	1200	(1) IS
MH-146	1200	(1) IS
MH-111	1100	(1) IS
MH-102	1100	(1) IS

3.3.3 Buried Manholes

During the field assessment, there were found to be multiple instances along the JTP trunkline where the manhole was unable to be found and is assumed to be buried. Table 36 below lists the manholes that are believed to be buried, along with a description of their estimated locations.

Table 36: Buried Manholes

Manhole Facility ID	Pipeline Diameter (in)	Location Description
MH-66	24"	South of Fitzgerald Ave, located in a ditch that straddles the property line between the residential homes to the west and the farmland to the east
MH-127	36"	Located underneath the grass/landscaping on the western side of Arroyo Circle, near 7700 Arroyo Circle, Gilroy, CA 95020
MH-128	36"	Located underneath the grass/landscaping on the western side of Arroyo Circle, near 7520 Arroyo Circle, Gilroy, CA 95020
MH-137	36"	Located on the southern side of Renz Lane, west of 850 Renz Lane, Gilroy, CA 95020
MH-138	36"	Located underneath the grass/landscaping south of Renz Lane/MH-137, west of 850 Renz Lane and north of SR-152
MH-138A	36"	Located underneath parking lot pavement of the Gilroy Crossing shopping mall, near southwest corner of Mimi's Café at 6935 Camino Arroyo, Gilroy, CA 95020
MH-142A	36"	Located underneath gravel/dirt road, south of Holloway Road
MH-142B	36"	Located underneath gravel/dirt road, south of Holloway Road and MH-142A

3.3.4 Differences between City GIS and Field Assessment Findings

During the field assessment, discrepancies between the City's wastewater collection system configuration in GIS and WWE's field assessment findings were found. Table 37 below lists the differences for the associated assets.

Table 37: City GIS and Field Assessment Findings Discrepancies

Asset Facility ID	Discrepancy Description
MH-45; MH-44_MH-48	MH-45 does not exist; because the manhole does not exist, new pipeline MH-44_MH-48 was created
MH-49; MH-48_MH-50	MH-49 does not exist; because the manhole does not exist, new pipeline MH-48_MH-50 was created
MH-124; MH-123_MH-125	MH-124 does not exist; because the manhole does not exist, new pipeline MH-123_MH-125 was created
MH-129; MH-128_MH-130	MH-129 does not exist; pipeline is split into two separate pipelines in City GIS due to MH-129; because the manhole does not exist, new pipeline MH-128_MH-130 was created
MH-21A; MH-39A; MH-85A; MH-85B; MH-96A; MH-97A; MH-102A; MH-102B; MH-116A; MH-134A; MH-138A; MH-142A; MH-142B; MH-142C; MH-142D; MH-142E; MH-142F	Manholes not in City GIS
MH-21_MH-21A; MH-21A_MH-24; MH-39_MH-39A; MH-39A_MH-43; MH-85_MH-85A; MH-85A_MH-85B; MH-85B_MH-86; MH-96_MH-96A; MH-96A_MH-97; MH-97_MH-97A; MH-97A_MH-98; MH-102_MH-102A; MH-102A_MH-102B;	Pipelines not in City GIS that were created based on the new manholes found and described in the row above

Asset Facility ID	Discrepancy Description
MH-102B_MH-103; MH-116_MH-116A; MH-116A_MH-117; MH-134_MH-134A; MH-134A_MH-135; MH-138_MH-138A; MH-138A_MH-139; MH-142_MH-142A; MH-142A_MH-142B; MH-142B_MH-142C; MH-142C_MH-142D; MH-142D_MH-142E; MH-142E_MH-142F;	
MH-99	Manhole actually located about 128 feet south of City GIS location
MH-100	Manhole actually located about 37 feet southwest of City GIS location
MH-106	Manhole actually located about 75 feet southeast of City GIS location
MH-110	Manhole actually located about 46 feet southeast of City GIS location
Pipelines/manholes from MH-119 to MH-128	Manhole locations, and by extension pipe lengths/locations, differ significantly from original City GIS data
Pipelines from MH-142 to MH-152	Manhole locations, and by extension lengths/locations/alignments, differ from original City GIS data

4 Summary of Manhole Location Criteria Forms

Manhole Location Criteria Forms were completed for manholes along the JTP trunkline. The forms include space for a sketch of the area surrounding the manhole under inspection. The sketches typically include any surrounding streets, other known utilities, and/or buildings of importance. The likely drainage path of an SSO emanating from the manhole to the nearest storm drain inlet or waterway was drawn when identifiable. The bottom half of the form is comprised of three location descriptions of the manhole. These three location descriptions are the Proximity to Waterways Rating, Public Impact Rating, and O&M Access and Safety Rating previously described in Section 2.1.2. When determining a pipeline's Consequence Rating, the US manhole's three location criteria ratings are used. See Table 40 in Section 6 for the ratings for the trunk main pipelines.

5 Summary of City Master Plan

In October of 2017, Akel Engineering Group (AKEL) completed the Sewer System Master Plan (SSMP) for the City, which included a capacity assessment of the City's wastewater collection system and the JTP trunk main. In this section, WWE has summarized the pertinent capacity improvement(s) recommended by AKEL. How the capacity improvement(s) help to direct and prioritize the recommended RRR alternative proposed in this Report is discussed in more detail in Section 9.1 and Section 10. This section also includes discussion on the model results data used for determining the Pipe Capacity Rating and the Flow Volume Rating for the pipelines.

5.1 Capital Improvement Projects

AKEL's modeling approach to criterion for assessing capacity performance of existing pipes allowed for depth to diameter (d/D) ratios up to 90 percent, even though the City's maximum d/D ratio for newly designed pipes is 0.7. WWE generally agrees with this stance, in that "the criterion for existing pipes is relaxed in order to maximize the use of the existing pipes before costly pipe improvements are required." AKEL recommended a total of nine (9) improvement projects pertaining to the JTP trunk main, all but one of which consists of constructing a new relief trunk. The improvement project titled JT-P1 is an upsizing replacement of an existing section of the JTP from 21" to 30", which appears to have already been constructed (i.e. pipe segment MH-48_MH-50, located on Highland Avenue from Harding Avenue and then west along JTP trunk main for about 400 linear feet). Figure 2 below is an excerpt of Table 7.1 from AKEL's SSMP, which shows brief descriptions of the improvements JT-P2 through JT-P9.

Improv. No.	Type of Improvement	Alignment	Limits	Existing Diameter	Pipeline Improvements		
				(in)	New/Parallel/Replace	Diameter (in)	Length (ft)
Relief Trunk Improvements							
JT-P2	Gravity Main	Highland Ave	From Harding Ave to Monterey Rd	-	New	36	2,050
JT-P3	Gravity Main	Monterey Rd	From Highland Ave to Las Animas Ave	-	New	36	19,700
JT-P4	Gravity Main	Las Animas Ave	From Monterey Rd to Murray Ave	-	New	36	1,750
JT-P5	Gravity Main	Murray Ave	From Las Animas Ave to Chestnut St	-	New	36	7,550
JT-P6	Gravity Main	Chestnut St	From Murray Ave to Lewis St	-	New	36	400
JT-P7	Gravity Main	Chestnut St	From Chestnut St to 7th St	-	New	36	2,100
JT-P8	Gravity Main	7th Street	From Chestnut St to US Highway 101.	-	New	36	1,450
JT-P9	Gravity Main	Along US 101	Jogging from 7th St and US Highway 101 to Renz Lane	-	New	36	2,000

Figure 2: Excerpt of Table 7.1 from AKEL SSMP

Figure 3 below is an excerpt of Figure 7.4 from the AKEL SSMP, which shows the locations of the proposed improvement projects (i.e. JT-P2 through JT-P9).

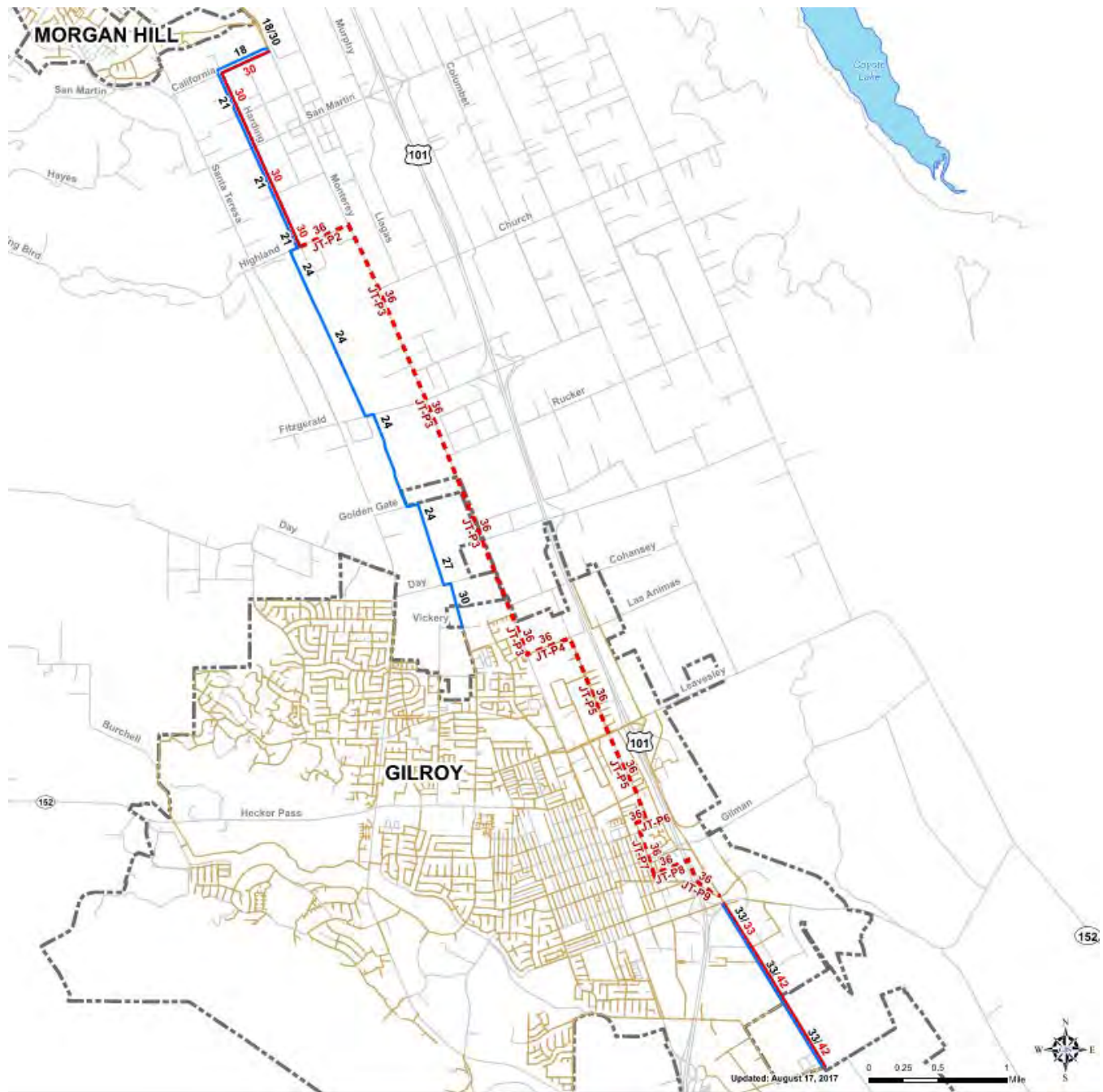


Figure 3: Excerpt of Figure 7.4 from AKEL SSMP

The JTP improvement projects JT-P2 through JT-P9 make up a large portion of the Joint Relief Trunk that was initially identified in the City's 2002 Master Plan, and its necessity has been confirmed since then through more recent studies.

To estimate the total project costs shown in Figure 2 above, AKEL applied a contingency of 15% to construction costs. AKEL estimated various costs as the 15% of the total construction cost with contingency. These costs include, but are not limited to, the following:

- Unforeseen events
- Unknown conditions
- Project Administration
- Construction Management and Inspection
- Legal Costs

5.2 Pipe Capacity Rating Data

The City's SSMP capacity assessment results provide the data needed to determine the Pipe Capacity Ratings for the pipelines as previously discussed in Section 2.1.1. The results of the model scenario "Existing PWWF" were used to determine the d/D values. Please refer to Table 38 and Table 39 in Section 6 for the Pipe Capacity Ratings for the trunk main pipelines.

5.3 Flow Volume Rating

Lastly, the City's SSMP capacity assessment results were also utilized to determine the Flow Volume Ratings for the pipelines as previously discussed in Section 2.1.2. The results of the model scenario "Existing PWWF" were used to determine the maximum flow values. Please refer to Table 38 and Table 39 in Section 6 for the Flow Volume Ratings for the trunk main pipelines.

6 Risk Prioritization Results

In this section, all of the various criteria previously discussed in Section 2.1.1 and Section 2.1.2 are assigned for each pipe segment (both comprehensively for those segments that were CCTV'ed and for only those criteria where we have data for segments where CCTV was not able to be conducted). For the pipelines that were not CCTV inspected, the Structural and O&M Condition Ratings had to be assumed, thereby resulting in assumed values for Total Probability Score, Probability Rating, and the Overall Risk Rating. For these pipelines, the Structural and O&M Condition Ratings are chosen by looking at the nearby US and/or DS pipelines that were CCTV inspected and assuming the lowest Quick Rating applies. This was chosen as the methodology for pipelines not CCTV inspected because it is not desirable to overestimate the severity and frequency of defect observations, which would likely lead to recommended repair/rehabilitation that might not have been necessary had CCTV inspection been performed.

For a visual representation of each pipeline's Overall Risk Rating, see Appendix Din Section 15.4.

6.1 Probability Rating and Criteria

Table 38 below lists the three probability criteria, Total Probability Score, and Probability Rating for the trunk main pipelines that were CCTV inspected. It should be noted that the pipelines are listed from US to DS along the alignment.

Table 38: Probability Rating & Criteria for Inspected Pipelines

Pipeline Facility ID	Structural Condition Rating	Pipe Capacity Rating	O&M Condition Rating	Total Probability Score	Probability Rating
MH-1_MH-3	1	1	2	12	1
MH-2_MH-4	1	1	3	14	1
MH-3_MH-5	3	1	5	28	3
MH-4_MH-6	1	1	5	18	2
MH-5_MH-7	3	1	5	28	3
MH-6_MH-8	1	1	5	18	2
MH-7_MH-9	3	1	3	24	2
MH-8_MH-10	1	1	5	18	2
MH-9_MH-11	2	1	5	23	2
MH-10_MH-12	1	1	5	18	2
MH-11_MH-15	2	1	4	21	2
MH-12_MH-13	1	1	3	14	1
MH-13_MH-14	1	1	3	14	1
MH-15_MH-16	2	1	5	23	2
MH-14_MH-17	1	1	5	18	2
MH-16_MH-18	3	1	5	28	3
MH-17_MH-19	1	1	5	18	2
MH-18_MH-21	2	1	5	23	2
MH-19_MH-20	1	1	5	18	2
MH-21_MH-21A	3	1	5	28	3

Pipeline Facility ID	Structural Condition Rating	Pipe Capacity Rating	O&M Condition Rating	Total Probability Score	Probability Rating
MH-20_MH-22	1	1	5	18	2
MH-21A_MH-24	2	1	5	23	2
MH-22_MH-23	1	1	5	18	2
MH-24_MH-26	3	1	5	28	3
MH-23_MH-25	1	1	5	18	2
MH-26_MH-27	2	1	5	23	2
MH-25_MH-28	1	1	5	18	2
MH-27_MH-29	2	1	5	23	2
MH-28_MH-30	1	1	5	18	2
MH-29_MH-32	2	1	5	23	2
MH-30_MH-31	1	1	5	18	2
MH-32_MH-33	3	1	5	28	3
MH-31_MH-34	1	1	5	18	2
MH-33_MH-36	2	1	5	23	2
MH-34_MH-35	2	1	5	23	2
MH-36_MH-38	2	1	5	23	2
MH-35_MH-37	1	1	5	18	2
MH-37_MH-39	1	1	5	18	2
MH-38_MH-40	2	2	5	26	3
MH-40_MH-41	2	2	1	18	2
MH-39_MH-39A	1	1	3	14	1
MH-41_MH-42	1	1	2	12	1
MH-42_MH-44	2	2	5	26	3
MH-39A_MH-43	2	1	5	23	2
MH-44_MH-48	3	3	5	34	4
MH-43_MH-46	1	1	5	18	2
MH-46_MH-47	1	1	3	14	1
MH-47_MH-48	1	1	2	12	1
MH-48_MH-50	1	1	5	18	2
MH-50_MH-51	2	5	5	35	4
MH-51_MH-52	2	5	5	35	4
MH-52_MH-53	2	3	5	29	3
MH-53_MH-54	3	1	5	28	3
MH-54_MH-55	2	1	5	23	2
MH-55_MH-56	2	1	5	23	2
MH-56_MH-57	2	1	5	23	2
MH-57_MH-58	2	1	5	23	2
MH-58_MH-59	1	1	5	18	2
MH-59_MH-60	3	1	5	28	3
MH-60_MH-61	4	2	5	36	4
MH-61_MH-62	3	1	5	28	3
MH-62_MH-63	1	1	5	18	2

Pipeline Facility ID	Structural Condition Rating	Pipe Capacity Rating	O&M Condition Rating	Total Probability Score	Probability Rating
MH-63_MH-64	1	3	5	24	2
MH-64_MH-65	2	5	5	35	4
MH-65_MH-66	2	5	5	35	4
MH-66_MH-67	1	5	4	28	3
MH-67_MH-68	1	5	5	30	3
MH-68_MH-69	2	5	5	35	4
MH-69_MH-70	1	5	4	28	3
MH-70_MH-71	3	5	5	40	4
MH-71_MH-72	2	5	5	35	4
MH-72_MH-73	1	5	5	30	3
MH-73_MH-74	2	4	5	32	3
MH-74_MH-75	1	3	5	24	2
MH-75_MH-76	1	4	5	27	3
MH-76_MH-77	1	3	5	24	2
MH-77_MH-78	2	2	5	26	3
MH-78_MH-79	1	2	5	21	2
MH-79_MH-80	1	2	5	21	2
MH-80_MH-81	1	2	5	21	2
MH-81_MH-82	1	2	5	21	2
MH-82_MH-83	1	1	5	18	2
MH-83_MH-84	1	1	5	18	2
MH-84_MH-85	1	2	5	21	2
MH-85_MH-85A	1	1	5	18	2
MH-85A_MH-85B	1	1	3	14	1
MH-85B_MH-86	1	1	2	12	1
MH-86_MH-87	2	1	5	23	2
MH-87_MH-88	2	1	5	23	2
MH-88_MH-89	5	1	5	38	4
MH-89_MH-90	4	1	5	33	4
MH-93_MH-94	2	1	3	19	2
MH-94_MH-95	3	3	4	32	3
MH-95_MH-96	5	1	4	36	4
MH-96_MH-96A	5	1	5	38	4
MH-96A_MH-97	3	1	4	26	3
MH-97_MH-97A	3	1	4	26	3
MH-97A_MH-98	5	1	5	38	4
MH-98_MH-99	5	2	5	41	5
MH-99_MH-100	3	1	4	26	3
MH-100_MH-101	5	1	5	38	4
MH-101_MH-102	5	1	5	38	4
MH-102_MH-102A	2	1	5	23	2
MH-102A_MH-102B	2	1	3	19	2

Pipeline Facility ID	Structural Condition Rating	Pipe Capacity Rating	O&M Condition Rating	Total Probability Score	Probability Rating
MH-102B_MH-103	3	1	4	26	3
MH-103_MH-104	4	5	5	45	5
MH-104_MH-105	5	1	5	38	4
MH-105_MH-106	5	1	5	38	4
MH-106_MH-107	5	1	5	38	4
MH-107_MH-108	5	1	5	38	4
MH-108_MH-109	3	1	4	26	3
MH-109_MH-110	5	1	5	38	4
MH-110_MH-111	4	1	5	33	4
MH-111_MH-112	4	1	5	33	4
MH-112_MH-113	5	1	5	38	4
MH-113_MH-114	5	1	5	38	4
MH-114_MH-115	3	1	5	28	3
MH-115_MH-116	5	1	5	38	4
MH-116_MH-116A	5	1	4	36	4
MH-116A_MH-117	5	1	4	36	4
MH-117_MH-118	5	1	5	38	4
MH-118_MH-119	5	1	5	38	4
MH-119_MH-120	2	1	4	21	2
MH-120_MH-121	2	1	5	23	2
MH-121_MH-122	3	1	5	28	3
MH-122_MH-123	3	2	5	31	3
MH-123_MH-125	5	1	5	38	4
MH-125_MH-126	5	1	5	38	4
MH-126_MH-127	5	1	5	38	4
MH-127_MH-128	5	1	5	38	4
MH-128_MH-130	5	1	5	38	4
MH-130_MH-131	4	1	5	33	4
MH-131_MH-132	5	1	5	38	4
MH-132_MH-133	3	1	5	28	3
MH-133_MH-134	5	1	5	38	4
MH-134_MH-134A	2	1	3	19	2
MH-134A_MH-135	5	1	5	38	4
MH-135_MH-136	5	2	5	41	5
MH-136_MH-137	2	3	3	25	3
MH-137_MH-138	5	1	4	36	4
MH-138_MH-138A	5	1	5	38	4
MH-138A_MH-139	3	4	5	37	4
MH-139_MH-140	5	2	5	41	5
MH-140_MH-141	5	2	5	41	5
MH-141_MH-142	4	2	5	36	4
MH-142_MH-142A	3	4	3	33	4

Pipeline Facility ID	Structural Condition Rating	Pipe Capacity Rating	O&M Condition Rating	Total Probability Score	Probability Rating
MH-142A_MH-142B	4	4	4	40	4
MH-142B_MH-142C	5	4	5	47	5
MH-142C_MH-142D	5	4	5	47	5
MH-142D_MH-142E	5	4	4	45	5
MH-142E_MH-142F	5	4	5	47	5
MH-142F_MH-143	5	4	5	47	5
MH-143_MH-144	5	1	5	38	4
MH-144_MH-145	3	1	3	24	2
MH-145_MH-146	5	2	5	41	5
MH-146_MH-147	5	1	5	38	4
MH-147_MH-148	5	5	5	50	5
MH-148_MH-149	4	1	4	31	3
MH-149_MH-150	4	1	4	31	3
MH-150_MH-151	5	2	5	41	5
MH-151_MH-152	5	2	5	41	5
MH-152_MH-153	5	3	5	44	5
MH-153_MH-154	5	1	5	38	4
MH-154_MH-155	2	1	1	15	1
MH-155_MH-156	2	5	4	33	4

Table 39 below lists the three probability criteria, Total Probability Score, and Probability Rating for the trunk main pipelines that were not CCTV inspected. It should be noted that the pipelines are listed from US to DS along the alignment.

Table 39: Probability Rating & Criteria for Pipelines Not Inspected

Pipeline Facility ID	Structural Condition Rating	Pipe Capacity Rating	O&M Condition Rating	Total Probability Score	Probability Rating
MH-90_MH-91	2	1	2	17	2
MH-91_MH-92	2	1	2	17	2
MH-92_MH-93	2	1	2	17	2

6.2 Consequence Rating and Criteria

Table 40 below lists the four consequence criteria, Total Consequence Score, and Consequence Rating for the trunk main pipelines that were CCTV inspected. It should be noted that the pipelines are listed from US to DS along the alignment.

Table 40: Consequence Rating & Criteria for Inspected Pipelines

Pipeline Facility ID	Flow Volume Rating	Public Impact Rating	Proximity to Waterways Rating	O&M Access and Safety Rating	Total Consequence Score	Consequence Rating
MH-1_MH-3	4	5	1	1	30	3
MH-2_MH-4	4	5	1	1	30	3
MH-3_MH-5	3	5	1	1	26	3
MH-4_MH-6	4	5	1	1	30	3
MH-5_MH-7	3	5	1	1	26	3
MH-6_MH-8	4	5	1	1	30	3
MH-7_MH-9	3	5	1	1	26	3
MH-8_MH-10	4	5	1	1	30	3
MH-9_MH-11	3	5	1	1	26	3
MH-10_MH-12	4	5	1	1	30	3
MH-11_MH-15	4	5	1	1	30	3
MH-12_MH-13	4	5	1	1	30	3
MH-13_MH-14	4	5	1	1	30	3
MH-15_MH-16	4	3	1	1	26	3
MH-14_MH-17	4	3	1	1	26	3
MH-16_MH-18	4	3	1	1	26	3
MH-17_MH-19	4	3	1	1	26	3
MH-18_MH-21	4	3	1	1	26	3
MH-19_MH-20	4	3	1	1	26	3
MH-21_MH-21A	4	3	1	1	26	3
MH-20_MH-22	4	3	1	1	26	3
MH-21A_MH-24	4	3	1	1	26	3
MH-22_MH-23	4	3	1	1	26	3
MH-24_MH-26	4	1	1	1	22	2
MH-23_MH-25	4	1	1	1	22	2
MH-26_MH-27	4	3	1	1	26	3
MH-25_MH-28	4	3	1	1	26	3
MH-27_MH-29	4	5	1	1	30	3
MH-28_MH-30	4	5	1	1	30	3
MH-29_MH-32	4	5	1	1	30	3
MH-30_MH-31	4	5	1	1	30	3
MH-32_MH-33	4	5	1	1	30	3
MH-31_MH-34	4	5	1	1	30	3
MH-33_MH-36	4	3	1	1	26	3
MH-34_MH-35	4	3	1	1	26	3
MH-36_MH-38	4	5	1	1	30	3
MH-35_MH-37	4	5	1	1	30	3
MH-37_MH-39	4	5	1	1	30	3
MH-38_MH-40	4	5	1	1	30	3

Pipeline Facility ID	Flow Volume Rating	Public Impact Rating	Proximity to Waterways Rating	O&M Access and Safety Rating	Total Consequence Score	Consequence Rating
MH-40_MH-41	4	5	1	1	30	3
MH-39_MH-39A	3	5	1	1	26	3
MH-41_MH-42	4	5	1	1	30	3
MH-42_MH-44	4	5	1	1	30	3
MH-39A_MH-43	3	5	1	1	26	3
MH-44_MH-48	5	5	1	1	34	4
MH-43_MH-46	3	5	1	1	26	3
MH-46_MH-47	3	3	1	1	22	2
MH-47_MH-48	5	3	1	1	30	3
MH-48_MH-50	5	3	1	1	30	3
MH-50_MH-51	5	5	2	1	37	4
MH-51_MH-52	5	5	2	4	40	4
MH-52_MH-53	5	5	2	3	39	4
MH-53_MH-54	5	5	2	3	39	4
MH-54_MH-55	5	5	1	3	36	4
MH-55_MH-56	5	5	1	3	36	4
MH-56_MH-57	5	5	1	3	36	4
MH-57_MH-58	5	5	1	3	36	4
MH-58_MH-59	5	5	1	4	37	4
MH-59_MH-60	5	5	1	1	34	4
MH-60_MH-61	5	5	1	1	34	4
MH-61_MH-62	5	5	1	1	34	4
MH-62_MH-63	5	5	1	1	34	4
MH-63_MH-64	5	5	1	1	34	4
MH-64_MH-65	5	5	1	1	34	4
MH-65_MH-66	5	5	1	3	36	4
MH-66_MH-67	5	5	1	3	36	4
MH-67_MH-68	5	5	1	4	37	4
MH-68_MH-69	5	5	1	4	37	4
MH-69_MH-70	5	5	1	4	37	4
MH-70_MH-71	5	5	1	3	36	4
MH-71_MH-72	5	5	1	4	37	4
MH-72_MH-73	5	5	1	4	37	4
MH-73_MH-74	5	5	2	4	40	4
MH-74_MH-75	5	5	2	3	39	4
MH-75_MH-76	5	5	1	3	36	4
MH-76_MH-77	5	5	1	4	37	4
MH-77_MH-78	5	5	1	3	36	4
MH-78_MH-79	5	5	1	3	36	4
MH-79_MH-80	5	5	1	4	37	4
MH-80_MH-81	5	5	1	4	37	4

Pipeline Facility ID	Flow Volume Rating	Public Impact Rating	Proximity to Waterways Rating	O&M Access and Safety Rating	Total Consequence Score	Consequence Rating
MH-81_MH-82	5	5	1	1	34	4
MH-82_MH-83	5	5	1	1	34	4
MH-83_MH-84	5	5	1	3	36	4
MH-84_MH-85	5	5	1	3	36	4
MH-85_MH-85A	5	1	4	1	35	4
MH-85A_MH-85B	5	3	4	1	39	4
MH-85B_MH-86	5	3	4	1	39	4
MH-86_MH-87	5	3	4	1	39	4
MH-87_MH-88	5	5	5	1	46	5
MH-88_MH-89	5	5	5	1	46	5
MH-89_MH-90	5	3	5	1	42	5
MH-93_MH-94	5	1	5	1	38	4
MH-94_MH-95	5	1	5	1	38	4
MH-95_MH-96	5	1	5	1	38	4
MH-96_MH-96A	5	1	5	1	38	4
MH-96A_MH-97	5	3	5	1	42	5
MH-97_MH-97A	5	3	5	1	42	5
MH-97A_MH-98	5	3	4	1	39	4
MH-98_MH-99	5	3	4	1	39	4
MH-99_MH-100	5	5	4	1	43	5
MH-100_MH-101	5	5	4	1	43	5
MH-101_MH-102	5	5	4	3	45	5
MH-102_MH-102A	5	5	4	3	45	5
MH-102A_MH-102B	5	5	4	3	45	5
MH-102B_MH-103	5	5	4	3	45	5
MH-103_MH-104	5	5	2	1	37	4
MH-104_MH-105	5	5	4	1	43	5
MH-105_MH-106	5	5	4	1	43	5
MH-106_MH-107	5	5	2	1	37	4
MH-107_MH-108	5	3	2	1	33	4
MH-108_MH-109	5	3	1	2	31	3
MH-109_MH-110	5	3	1	2	31	3
MH-110_MH-111	5	3	1	2	31	3
MH-111_MH-112	5	3	1	2	31	3
MH-112_MH-113	5	3	2	2	34	4
MH-113_MH-114	5	3	2	2	34	4
MH-114_MH-115	5	3	2	2	34	4
MH-115_MH-116	5	3	2	2	34	4
MH-116_MH-116A	5	5	2	2	38	4
MH-116A_MH-117	5	5	2	2	38	4
MH-117_MH-118	5	5	2	2	38	4

Pipeline Facility ID	Flow Volume Rating	Public Impact Rating	Proximity to Waterways Rating	O&M Access and Safety Rating	Total Consequence Score	Consequence Rating
MH-118_MH-119	5	5	2	2	38	4
MH-119_MH-120	5	3	2	1	33	4
MH-120_MH-121	5	3	2	1	33	4
MH-121_MH-122	5	3	2	1	33	4
MH-122_MH-123	5	3	2	1	33	4
MH-123_MH-125	5	3	2	2	34	4
MH-125_MH-126	5	3	2	3	35	4
MH-126_MH-127	5	1	2	3	31	3
MH-127_MH-128	5	1	2	3	31	3
MH-128_MH-130	5	1	2	3	31	3
MH-130_MH-131	5	1	1	3	28	3
MH-131_MH-132	5	1	3	3	34	4
MH-132_MH-133	5	3	5	3	44	5
MH-133_MH-134	5	3	2	1	33	4
MH-134_MH-134A	5	3	2	1	33	4
MH-134A_MH-135	5	3	2	3	35	4
MH-135_MH-136	5	3	2	1	33	4
MH-136_MH-137	5	3	2	1	33	4
MH-137_MH-138	5	3	2	1	33	4
MH-138_MH-138A	5	3	2	3	35	4
MH-138A_MH-139	5	3	2	1	33	4
MH-139_MH-140	5	3	2	1	33	4
MH-140_MH-141	5	3	2	1	33	4
MH-141_MH-142	5	3	2	1	33	4
MH-142_MH-142A	5	5	2	1	37	4
MH-142A_MH-142B	5	5	2	3	39	4
MH-142B_MH-142C	5	5	2	3	39	4
MH-142C_MH-142D	5	5	2	3	39	4
MH-142D_MH-142E	5	5	2	3	39	4
MH-142E_MH-142F	5	5	2	3	39	4
MH-142F_MH-143	5	5	2	3	39	4
MH-143_MH-144	5	5	2	3	39	4
MH-144_MH-145	5	5	2	3	39	4
MH-145_MH-146	5	5	2	3	39	4
MH-146_MH-147	5	5	2	3	39	4
MH-147_MH-148	5	5	2	3	39	4
MH-148_MH-149	5	5	2	3	39	4
MH-149_MH-150	5	5	2	3	39	4
MH-150_MH-151	5	5	2	3	39	4
MH-151_MH-152	5	5	2	3	39	4
MH-152_MH-153	5	5	2	3	39	4

Pipeline Facility ID	Flow Volume Rating	Public Impact Rating	Proximity to Waterways Rating	O&M Access and Safety Rating	Total Consequence Score	Consequence Rating
MH-153_MH-154	5	5	2	3	39	4
MH-154_MH-155	5	5	2	3	39	4
MH-155_MH-156	5	5	2	3	39	4

Table 41 below lists the four consequence criteria, Total Consequence Score, and Consequence Rating for the trunk main pipelines that were not CCTV inspected. It should be noted that the pipelines are listed from US to DS along the alignment.

Table 41: Consequence Rating & Criteria for Pipelines Not Inspected

Pipeline Facility ID	Flow Volume Rating	Public Impact Rating	Proximity to Waterways Rating	O&M Access and Safety Rating	Total Consequence Score	Consequence Rating
MH-90_MH-91	1	1	5	1	22	2
MH-91_MH-92	1	1	5	1	22	2
MH-92_MH-93	1	1	5	1	22	2

6.3 Overall Risk Rating

Table 42 below lists the Probability Rating, Consequence Rating, and Overall Risk Rating for the trunk main pipelines that were CCTV inspected. In the event that pipelines have the same Overall Risk Rating according to Figure 1 above, they will be ranked in order of the following:

1. Probability Rating
2. Consequence Rating
3. Total Probability Score
4. Total Consequence Score
5. Structural Condition Rating
6. Pipe Capacity Rating
7. O&M Condition Rating
8. Flow Volume Rating
9. Proximity to Waterways Rating
10. Public Impact Rating
11. O&M Access and Safety Rating
12. Most US

Table 42: Overall Risk Rating by Rank for Inspected Pipelines

Pipeline Facility ID	Probability Rating	Consequence Rating	Overall Risk Rating	Rank
MH-147_MH-148	5	4	5	1
MH-142B_MH-142C	5	4	5	2
MH-142C_MH-142D	5	4	5	3
MH-142E_MH-142F	5	4	5	4
MH-142F_MH-143	5	4	5	5
MH-142D_MH-142E	5	4	5	6
MH-103_MH-104	5	4	5	7
MH-152_MH-153	5	4	5	8
MH-98_MH-99	5	4	5	9
MH-145_MH-146	5	4	5	10
MH-150_MH-151	5	4	5	11
MH-151_MH-152	5	4	5	12
MH-135_MH-136	5	4	5	13
MH-139_MH-140	5	4	5	14
MH-140_MH-141	5	4	5	15
MH-88_MH-89	4	5	5	16
MH-101_MH-102	4	5	5	17
MH-100_MH-101	4	5	5	18
MH-104_MH-105	4	5	5	19
MH-105_MH-106	4	5	5	20
MH-89_MH-90	4	5	5	21
MH-142A_MH-142B	4	4	5	22
MH-70_MH-71	4	4	5	23
MH-97A_MH-98	4	4	5	24
MH-143_MH-144	4	4	5	25
MH-146_MH-147	4	4	5	26
MH-153_MH-154	4	4	5	27
MH-96_MH-96A	4	4	5	28
MH-117_MH-118	4	4	5	29
MH-118_MH-119	4	4	5	30
MH-106_MH-107	4	4	5	31
MH-125_MH-126	4	4	5	32
MH-134A_MH-135	4	4	5	33
MH-138_MH-138A	4	4	5	34
MH-131_MH-132	4	4	5	35
MH-112_MH-113	4	4	5	36
MH-113_MH-114	4	4	5	37
MH-115_MH-116	4	4	5	38
MH-123_MH-125	4	4	5	39
MH-107_MH-108	4	4	5	40
MH-133_MH-134	4	4	5	41

Pipeline Facility ID	Probability Rating	Consequence Rating	Overall Risk Rating	Rank
MH-138A_MH-139	4	4	5	42
MH-95_MH-96	4	4	5	43
MH-116_MH-116A	4	4	5	44
MH-116A_MH-117	4	4	5	45
MH-60_MH-61	4	4	5	46
MH-137_MH-138	4	4	5	47
MH-141_MH-142	4	4	5	48
MH-51_MH-52	4	4	5	49
MH-50_MH-51	4	4	5	50
MH-68_MH-69	4	4	5	51
MH-71_MH-72	4	4	5	52
MH-65_MH-66	4	4	5	53
MH-64_MH-65	4	4	5	54
MH-44_MH-48	4	4	5	55
MH-155_MH-156	4	4	5	56
MH-142_MH-142A	4	4	5	57
MH-126_MH-127	4	3	4	58
MH-127_MH-128	4	3	4	59
MH-128_MH-130	4	3	4	60
MH-109_MH-110	4	3	4	61
MH-110_MH-111	4	3	4	62
MH-111_MH-112	4	3	4	63
MH-130_MH-131	4	3	4	64
MH-132_MH-133	3	5	4	65
MH-102B_MH-103	3	5	4	66
MH-99_MH-100	3	5	4	67
MH-96A_MH-97	3	5	4	68
MH-97_MH-97A	3	5	4	69
MH-73_MH-74	3	4	4	70
MH-94_MH-95	3	4	4	71
MH-148_MH-149	3	4	4	72
MH-149_MH-150	3	4	4	73
MH-122_MH-123	3	4	4	74
MH-67_MH-68	3	4	4	75
MH-72_MH-73	3	4	4	76
MH-52_MH-53	3	4	4	77
MH-53_MH-54	3	4	4	78
MH-69_MH-70	3	4	4	79
MH-66_MH-67	3	4	4	80
MH-114_MH-115	3	4	4	81
MH-59_MH-60	3	4	4	82
MH-61_MH-62	3	4	4	83
MH-121_MH-122	3	4	4	84

Pipeline Facility ID	Probability Rating	Consequence Rating	Overall Risk Rating	Rank
MH-75_MH-76	3	4	4	85
MH-77_MH-78	3	4	4	86
MH-136_MH-137	3	4	4	87
MH-32_MH-33	3	3	3	88
MH-16_MH-18	3	3	3	89
MH-21_MH-21A	3	3	3	90
MH-3_MH-5	3	3	3	91
MH-5_MH-7	3	3	3	92
MH-108_MH-109	3	3	3	93
MH-38_MH-40	3	3	3	94
MH-42_MH-44	3	3	3	95
MH-24_MH-26	3	2	3	96
MH-87_MH-88	2	5	3	97
MH-102_MH-102A	2	5	3	98
MH-102A_MH-102B	2	5	3	99
MH-144_MH-145	2	4	3	100
MH-74_MH-75	2	4	3	101
MH-76_MH-77	2	4	3	102
MH-63_MH-64	2	4	3	103
MH-86_MH-87	2	4	3	104
MH-54_MH-55	2	4	3	105
MH-55_MH-56	2	4	3	106
MH-56_MH-57	2	4	3	107
MH-57_MH-58	2	4	3	108
MH-120_MH-121	2	4	3	109
MH-79_MH-80	2	4	3	110
MH-80_MH-81	2	4	3	111
MH-78_MH-79	2	4	3	112
MH-84_MH-85	2	4	3	113
MH-81_MH-82	2	4	3	114
MH-119_MH-120	2	4	3	115
MH-93_MH-94	2	4	3	116
MH-134_MH-134A	2	4	3	117
MH-58_MH-59	2	4	3	118
MH-83_MH-84	2	4	3	119
MH-85_MH-85A	2	4	3	120
MH-62_MH-63	2	4	3	121
MH-82_MH-83	2	4	3	122
MH-7_MH-9	2	3	2	123
MH-27_MH-29	2	3	2	124
MH-29_MH-32	2	3	2	125
MH-36_MH-38	2	3	2	126
MH-15_MH-16	2	3	2	127

Pipeline Facility ID	Probability Rating	Consequence Rating	Overall Risk Rating	Rank
MH-18_MH-21	2	3	2	128
MH-21A_MH-24	2	3	2	129
MH-26_MH-27	2	3	2	130
MH-33_MH-36	2	3	2	131
MH-34_MH-35	2	3	2	132
MH-9_MH-11	2	3	2	133
MH-39A_MH-43	2	3	2	134
MH-11_MH-15	2	3	2	135
MH-40_MH-41	2	3	2	136
MH-48_MH-50	2	3	2	137
MH-4_MH-6	2	3	2	138
MH-6_MH-8	2	3	2	139
MH-8_MH-10	2	3	2	140
MH-10_MH-12	2	3	2	141
MH-28_MH-30	2	3	2	142
MH-30_MH-31	2	3	2	143
MH-31_MH-34	2	3	2	144
MH-35_MH-37	2	3	2	145
MH-37_MH-39	2	3	2	146
MH-14_MH-17	2	3	2	147
MH-17_MH-19	2	3	2	148
MH-19_MH-20	2	3	2	149
MH-20_MH-22	2	3	2	150
MH-22_MH-23	2	3	2	151
MH-25_MH-28	2	3	2	152
MH-43_MH-46	2	3	2	153
MH-23_MH-25	2	2	2	154
MH-154_MH-155	1	4	2	155
MH-85A_MH-85B	1	4	2	156
MH-85B_MH-86	1	4	2	157
MH-2_MH-4	1	3	1	158
MH-12_MH-13	1	3	1	159
MH-13_MH-14	1	3	1	160
MH-39_MH-39A	1	3	1	161
MH-47_MH-48	1	3	1	162
MH-1_MH-3	1	3	1	163
MH-41_MH-42	1	3	1	164
MH-46_MH-47	1	2	1	165

Table 43 below lists the Probability Rating, Consequence Rating, and Overall Risk Rating for the trunk main pipelines that were not CCTV inspected. Note that these pipelines are listed according to the ranking explained for Table 42.

Table 43: Overall Risk Rating by Rank for Pipelines Not Inspected

Pipeline Facility ID	Probability Rating	Consequence Rating	Overall Risk Rating	Rank
MH-90_MH-91	2	2	2	166
MH-91_MH-92	2	2	2	167
MH-92_MH-93	2	2	2	168

7 Proposed Repair, Rehabilitation, and/or Replacement (RRR) Alternatives

In this section, WWE reviews various RRR alternative methodologies that aim to address the widespread structural condition issues along the JTP trunk main. In Section 7.1, pipeline RRR alternatives are discussed, while manhole RRR alternatives are discussed in Section 7.2.

All of the pipeline RRR alternatives discussed in Section 7.1 require sewage bypass pumping, with the exception of the following alternative: spray coating. Spray coating, as described in Section 7.1.2.3, is applied to the crown of the pipe, thus allowing for continual conveyance of live wastewater flow. Bypass pumping operations will largely be similar for the various alternatives that require it, but the length of time of bypass pumping will depend on how quickly the actual RRR work is completed. The cost of the bypass pumping is also dependent on how long the RRR work lasts, as the sewer pipeline needs to remain out of service until the finished product is tested and ready to be put back into service.

7.1 Pipelines

7.1.1 Repair

Grade 5 structural defects characterized as “point defects” can pose an immediate failure risk. The point defects found along the JTP trunk main include the following:

- SMW – Missing Wall
- SRP – Reinforcement Projecting

The following repair methodologies can be utilized to address the point defects.

7.1.1.1 Open Cut Point Repair

Open cut trench excavation consists of excavating a trench to manually install each “stick” or piece of new pipe where the point defect is located. Excavation must be performed to an adequate depth such that the existing pipe is exposed, allowing for the repair to take place. This method is commonly used where the pipe is located under non-pavement areas such as a front yard or back yard of a residence. However, open cut trench excavation for a pipeline under a paved area can be accomplished, albeit at higher costs. This is due to the need to saw cut and remove the existing pavement, fill the excavated area with the proper backfill (compacted stone, sand, aggregate base, etc.), and then replace the pavement after the pipe repair has been completed. Open cut point repairs under non-pavement areas would typically require backfilling with soil and the restoration of surface vegetation with seed/sod, which is significantly cheaper. One significant advantage of the open cut method is that due to it being widely known, with many experienced contractors available, it promotes a competitive bidding environment.

For a majority of the JTP trunk main alignment, heavily trafficked areas (e.g. Leavesley Road near US-101) are not an issue when assessing feasibility and cost of repair methodologies. However, the only pipe segment that was found to have grade 5 structural defects (MH-116_MH-116A) that would warrant immediate corrective action(s) is located on Leavesley Road west of US-101 highway. Due to the severity and continuous length of the “missing wall” defect, as well as the close proximity of the other two grade 5 “missing wall” and “reinforcement projecting”

structural defects, it is likely an open cut point repair to address these defects will be the most cost-conscious methodology while still sufficiently addressing the near-term risks of the inspected defects.

7.1.1.2 Point Repair(s) with Structural CIPP Lining

The structural defects mentioned above could theoretically be addressed utilizing segmental structural CIPP point repair technology that would cover the defect length plus approximately 5 to 10 linear feet either side of the defect. A proven structural CIPP system would be used to renew the short sections of the gravity-flow pipelines. This is a relatively fast, trenchless installation for maximum diameters of up to 48" depending on the manufacturer and installer. The process is typically done with a corrosion-resistant fiberglass composite system and is an industry proven means for expeditiously repairing and sealing isolated pipe defects such as cracks, holes, fractures, leaks, joint offsets, corrosion and root intrusion. As such, point repairs utilizing a structural CIPP liner material are also commonly used to address I&I defects to reduce additional wastewater flow volumes and associated treatment costs.

Using a properly designed high-strength resin and fiberglass matrix, this method provides structural strength while maintaining a relatively thin (1/2" – 1" thick), tapered profile and smooth finish to help maintain flow capacity. The resins can be cured under ambient sewer conditions with very low shrink and can cure under water if necessary. It is desirable to have design criteria that maximizes the potential for the tightest possible fit against the host pipe while eliminating the need for a preliner/heater system/end seal. However, if a preliner/heater system/end seal is determined to be necessary, it will be addressed in the design stage of the project.

This alternative would require less excavation when compared to the open cut method, thus potentially reducing overall costs for point repairs under paved areas. The method typically only requires one access point to complete the installation of the CIPP liner as well. An added benefit of this jointless pipe liner is the reduction in root and water infiltration when compared to a new "stick" of installed pipe under the open cut method. For successful implementation of the trenchless point repair method any roots and debris in the pertinent pipeline must be removed before installation. It should also be noted that this method is typically not applicable for collapsed/severely broken pipe, or pipes with heavy root blockages. While a large majority of CIPP work is performed on the "smaller" pipe sizes of about 12" and smaller, there are still a number of contractors who are experienced and qualified enough to address the aforementioned structural defects through the use of this methodology.

While the structural CIPP lining point repair methodology would typically address most grade 5 structural defects that warrant immediate corrective action, the aforementioned defects found in pipeline MH-116_MH-116A are so severe that CIPP lining would likely not be feasible. However, this point repair methodology will still be considered for potentially addressing any significant I&I point defects found through the inspection work.

7.1.1.3 Chemical Grouting

Chemical grouting is one of the oldest methods for impeding infiltration into sewer systems, including pipes and manholes. Several chemical grouting manufacturers, such as AvantiGrout, can provide a short term (2 to 10-year service life) product suitable for the rehabilitation of pipeline infiltration spots. Due to the grout being applied under pressure, the product is able to form into the surrounding soil near the infiltration defect and not simply fill

the crack/joint/etc. The product's low viscosity allows it to enter virtually any space/area that water can reach, making chemical grout a robust and versatile option.

7.1.2 Rehabilitation

7.1.2.1 Sliplining

The sliplining method of pipe rehabilitation would involve the insertion (pushing or pulling) of a new, smaller pipeline (typically HDPE pipe) inside the existing JTP trunk main. The newly inserted pipeline would provide adequate structural strength to replace the deteriorated existing pipeline. The annular space between the inside of the existing pipeline and the outside of the new sliplined pipeline would be grouted for the following reasons:

- To prevent soil and groundwater migration into the annular space
- To keep the newly inserted pipe from moving around while inside of the existing pipe
- To transfer loads from the existing pipe to the new pipe to maintain structural integrity

Advantages of the sliplining method include the fact that it has been successfully used for decades, thus making it a well-understood technology. With many experienced contractors available, the anticipated competitive bids often result in sliplining being a cost effective trenchless rehabilitation solution. However, it would be prudent to require contractors to provide evidence of sufficient prior sliplining experience. Another advantage of sliplining includes the installation rate of about 300-500 feet per day, after mobilization and preparation, thus limiting significant impacts (such as major multi-lane closures) to shorter periods of time.

A significant disadvantage of the sliplining method is the resultant reduction in flow capacity for the trunk main. The JTP trunk main has already been identified as capacity deficient, thus requiring the construction of the JT-P2 through JT-P9 improvement projects (as discussed in Section 5.1). Also, the insertion pit and staging area required for sliplining are much larger than what is required for structural CIPP installation (see Section 7.1.2.2). The insertion pits are typically about 60 feet long by 4-8 feet wide, while the staging areas are typically about 250 feet long by 15 feet wide due to the HDPE pipe fusion process, although this staging work can potentially be located outside of the alignment (or at minimum outside of a traffic lane along the edge of the right of way) and then the pipe mobilized to the alignment only when the insertion pit is prepared and ready for actual installation. Another potential disadvantage includes the need for small pits to reconnect all of the laterals along the trunk main. The contractor would have to completely clean the trunk main of all debris and roots before the sliplining installation can occur and CCTV inspect the finished product to ensure its quality. Due to the JTP trunk main already being identified as capacity deficient and in need of the relief trunk improvement project (see Section 5.1), combined with the plan of continued use of the JTP trunk main for conveyance of future flows even after the relief trunk improvement project is constructed, the sliplining rehabilitation methodology will not be considered for addressing the structural issues along the JTP trunk main due to the greater reduction in flow capacity when compared to structural CIPP lining (discussed in Section 7.1.2.2) and/or spray coating (discussed in Section 7.1.2.3).

7.1.2.2 Structural CIPP Lining – Full Pipe Segment

Full segment structural CIPP lining utilizes the same methodology as previously described in Section 7.1.1.2, but with the liner being installed from manhole to manhole for the pipeline (i.e. "full segment"). Major factors that can impact the thickness of the CIPP liner include the following:

- Extent of (crown) deterioration of the existing pipe
- The “ovality” of the pipe (i.e. whether or not the existing pipe has lost its round shape)
- Depth of cover
- Groundwater level

Based on preliminary research of expected groundwater levels in Morgan Hill and Gilroy, groundwater within the pipe zone during installation of the structural CIPP liner becomes more likely as one moves further downstream along the JTP trunk main. This is due to two primary reasons: 1) the JTP trunk main depth typically increases the further downstream one goes, and 2) groundwater levels tend to increase as you move south from Morgan Hill to Gilroy. However, the groundwater levels in Gilroy tend to follow a seasonal pattern where the highest levels are recorded during the typical “wet” months of December through March. In any case, the possibility for high groundwater levels will need to be considered during design and construction of any potential CIPP lining improvement projects.

A distinct advantage of structural CIPP lining is that the liner is thinner than the typical HDPE pipe used for the sliplining process, while still providing adequate structural strength to replace the deteriorated trunk main. Because the liner is bonded to the existing pipe, there is no annular space that would have to be grouted and the cured liner would not be likely to move inside the host pipe. Another advantage is the ability of CIPP liners to be used through siphons like the one located near the intersection of Wren Avenue and La Primavera Way. Also, the insertion pit and staging area required for this method are much smaller than what is required for a sliplining installation. The insertion pits are typically about 5 feet long by 5 feet wide where needed (most smaller diameter CIPP installations can typically utilized an existing manhole entrance as the insertion point), while the staging areas are typically about 20 feet long by 12 feet wide. The staging area size assumes that the felt is impregnated with the resin at the factory rather than on-site. Installation lengths can reach up to 1,000 feet between access pits, which should render this methodology applicable to every pipeline along the JTP trunk main. Another advantage to consider is that the lateral connections along the JTP trunk main can be remotely reinstated, whereas sliplining would require a small pit for each lateral reinstatement. Lastly, due to the existence of several companies capable of installing structural CIPP liners, this method can be cost-competitive with sliplining.

One disadvantage of structural CIPP lining is the potential of styrene from the curing water to be eventually discharged to the SCRWA WWTP. This styrene could negatively affect the plant’s biological treatment process(es). To prevent styrene discharge, options include the following:

- The use of a resin system that does not contain styrene
- Cure the pipe liner through steam or ultraviolet light instead of water
- Require the onsite treatment of the curing water prior to discharge into the trunk main; however, this may require an additional water discharge permit review

Another disadvantage is related to the reinstatement of the lateral connections. Each time the lateral pipe is tapped, there is some risk of water seeping between the CIPP liner and the existing pipe. With the potential high groundwater table for the JTP trunk main as one moves further south, a lateral sealing technology would be preferred where the lateral connects to the trunk main. A robot can be used to remotely apply top hats or

interface seals from inside the CIPP liner, thus eliminating the need for aboveground access as with sliplining lateral reinstatement. Also, the contractor would have to completely clean the trunk main of all debris and roots before the structural CIPP lining installation can occur and potential repairs would be needed where holes in the pipe liner walls occur. Lastly, CCTV inspection of the finished lining product would be needed to ensure its quality.

7.1.2.3 *Spray Coating*

Applying a magnesium hydroxide spray coating to the crown of the concrete sections of the JTP trunk main could reduce corrosion potential for some period of time and thus extend the useful life by acting as a sacrificial layer that the sulphuric acid will react with and neutralize instead of the concrete pipe. An example of such a product is Thioguard TST, which is an alkaline magnesium hydroxide slurry that is typically applied with a coating thickness of 100-125 mils. While the spray coating neutralizes existing sulphuric acid on the surface of the pipeline, it also deactivates the bacteria that is responsible for the generation of the sulphuric acid. The spray coating also reacts with hydrogen sulfide gas, thus helping to reduce potential odor problems.

Typical spray coating treatment can cost significantly less than the previously mentioned rehabilitation methodologies, but would need to be replenished on a regular basis. Thioguard TST has been estimated to extend sewer asset life by 20 years provided that annual retreatment using the magnesium hydroxide spray coating occurs. In the case of the JTP trunk main, this system could be used on a more limited basis (spray every 2-3 years) to support phasing of the more comprehensive rehabilitation methods over a longer period of time.

7.1.3 **Replacement**

7.1.3.1 *Dig & Replace Open Cut Method*

The dig and replace open cut method is the same methodology previously described in Section 7.1.1.1, but with an entire manhole to manhole pipe segment being removed and replaced with a new pipe. This traditional method of excavating, bedding, laying, and backfilling a pipeline is commonly utilized across the industry, thus providing a competitive bidding environment if chosen.

The main disadvantage of this method in relation to the JTP trunk main is the substantial negative impact on local residents, regional commuters, traffic, and the environment. Relative to other trenchless replacement methods discussed in this Report, the open cut method would have the greatest impact on nearby commercial businesses and local residents due to traffic impacts. Also, in areas of the alignment where the groundwater table is high, dewatering of the trench and the preparation of a suitable, stable trench bottom can be difficult to achieve. To prevent settlement of the area surrounding the trench, areas with high groundwater would likely require impermeable shoring and imported light-weight backfill. Lastly, with depths of the trunk main reaching 23 feet, the open cut construction costs would be significantly more expensive than the trenchless methodologies discussed below. Due to the high construction costs and negative impact on local residents, traffic, and the environment, the open cut replacement methodology will not be explored further in this Report.

7.1.3.2 *Pipe Bursting*

Pipe bursting is a trenchless construction method for replacing an existing pipe through the fragmentation of the existing pipe and installing a new pipe of equal or larger diameter in its place. The method starts with the initial cracking of the existing pipe with an oversized conical bursting head, which then fragments the existing pipe. This

conical bursting head is effectively creating a tunnel into which the new pipe, which is pulled behind the bursting head, is simultaneously installed. Typical diameters for new pipe installed through this method can experimentally reach up to 54 inches, although more typical maximum diameters are 24 to 36-inches, with installation lengths varying from 200-600 feet. On routine to moderately difficult projects, upsizing typically ranges from 1-2 pipe diameter sizes. Pipe diameter upsizing of three or more sizes can be difficult and is dependent on favorable soil conditions. It also tends to require specific bursting equipment to be specified.

Using an appropriate pipe bursting technique, almost all types of existing pipe material can be replaced. However, exceptions to pipe bursting applications include pre-stressed concrete cylinder and heavily reinforced concrete pipe (RCP). There have been instances where concrete pipe can be successfully replaced with pipe bursting if it is not heavily reinforced or if it is substantially deteriorated. Because roughly 40% of the JTP trunk main is concrete pipe or reinforced concrete pipe, this must be taken into consideration. While HDPE is the most commonly used material for the newly installed pipe, both continuous and segmented pipe such as HDPE, polyvinyl chloride (PVC), ductile iron and steel are used as the new product pipe.

Pipe bursting is very effective if the existing pipeline has structural defects that prevent other trenchless methods from being utilized and if the pipeline has inadequate capacity. When compared to the traditional open-cut construction method, pipe bursting can limit ground surface damage and disruption. Because these are significant concerns along the JTP trunk main (crop fields, heavily trafficked roadways, commercial parking lots), pipe bursting could reduce the social costs typically associated with pipeline replacement. While providing a significantly smaller environmental footprint, installation rates can reach up to 200 linear feet per hour after all of the required set-up is completed. Another advantage is that the pipe bursting pits have the ability to be located at manholes that already require replacement. While the receiving pit can be an existing manhole where replacement is not required, this manhole has to be prepared in advance by enlarging the pipe entry point in order to avoid damage to the existing manhole.

One disadvantage of the pipe bursting method is the increasing difficulty of installation as the existing pipe diameter increases. Typical pipe bursting diameters of the existing pipeline range from 8 to 24 inches with installation lengths of up to 500 feet. However, projects have been completed in the past for larger diameter pipes using the pneumatic pipe bursting technique. Another disadvantage involves the potential for soil heave or settlement, especially when upsizing larger diameter pipelines. Soil heave can impact crossing utilities, but the impact can be mitigated by potholing or placing pits above the utility and then extracting the soil so that no load is placed on the existing utility during the pipe bursting application. While certain sections of the roadway can be sawcut so that only that area is raised when significant heave is anticipated, roadway disruption like this would need to be minimized on any highly traversed roadway along the JTP trunk main alignment. Lastly, pipe bursting is possible for a single siphon. However, pipe bursting is not recommended for parallel siphon pipes located close together like the double barrel siphon near the intersection of Wren Avenue and La Primavera Way.

7.1.3.3 *Microtunneling*

Microtunneling is a trenchless pipe replacement methodology that utilizes a closed face, remotely controlled, guided, pipe jacking system to provide continuous support to the excavation face. Personnel entry into the tunnel is not required because microtunneling is remotely controlled. A method of microtunneling called in-line

microtunneling can be employed to replace the existing trunk main. The existing pipe is filled with flowable fill to prevent fluid loss, and then the microtunnel boring machine (MTBM) excavates the entire pipe and surrounding ground to allow for the installation of the new pipe. The system is guided by a laser mounted in the jacking shaft that projects a beam onto a target in the steering section of the MTBM. The remotely controlled steering jacks steer the MTBM by extending or retracting. In this manner, the contractor can precisely control the line and grade of the installed pipe. Microtunneling can achieve installation lengths of around 800 linear feet. Microtunneling typically has a unit cost around \$35 per inch-diameter foot, making it considerably more expensive than the other methodologies discussed in this Report.

7.2 Manholes

7.2.1 Repair

In Section 3.3.3, instances of buried manholes along the JTP trunk main are discussed. The manholes described in Table 36 were found to be buried during the field assessment. These manholes are recommended to be repaired by raising them to be flush with ground level so that they are accessible when necessary (i.e. for any future cleaning/inspection/repair activities). The work involved will likely include the following: locating the existing buried manhole, excavating down to the top of the manhole, installing the necessary amount of manhole sections/risers/rings, installing the existing or new manhole frame and cover, cleaning, bedding/backfill, compaction, testing, and any other subgrade improvements required per the applicable jurisdictional agency's standards.

7.2.2 Rehabilitation

This section contains discussion of the potential rehabilitation methodologies available to address the Grade 5 and Grade 4 structural defects listed in Table 26 and Table 27, respectively.

7.2.2.1 Cured-In-Place Manhole Liners

Cured-in-place manhole (CIPM) liners are similar to the CIPP liners previously discussed for pipeline rehabilitation in Section 7.1.2.2. A properly designed high-strength resin and fiberglass matrix would be installed in the manhole. These liners can be pre-made, designed and fabricated for each manhole as necessary. Constant diameter liners are also available should the pertinent manholes be similar in size and shape. Any infiltration spots must be stopped using a fast-setting cementitious material before the CIPM liner can be installed (see Section 7.2.2.2), with the liner providing further infiltration prevention once installed. CIPM liners are a good rehabilitation alternative that can expeditiously repair and seal isolated manhole defects while keeping the structural integrity of the manhole intact. They are typically installed from the bench all the way up to the cone of the manhole. While more expensive than the other manhole rehabilitation methodologies discussed below, CIPM liners are suitable for manholes with several structural/O&M defects that would render spot application of cementitious liners/grout cost prohibitive in comparison.

7.2.2.2 Cementitious Liners

Cementitious liners, such as SewperCoat, provide high-strength, corrosion-resistant protection against potential future structural defects. They can also be used to rehabilitate existing defects such as those found in the manholes described in Table 26 and Table 27. The liner is typically applied by troweling, spray application, and/or

centrifugally spin-casting. Cementitious liners, as discussed in the previous section, can also be used to stop infiltration at manholes. The following process is recommended to be used when using cementitious liners to rehabilitate manhole defects:

- 1) Break away any degraded concrete to create a hard surface.
- 2) Clean and coat any exposed reinforcement.
- 3) Apply fast setting mortar.
- 4) Apply SewperCoat or other similar cementitious lining product to defect(s).

7.2.2.3 Chemical Grouting

Chemical grouting is one of the oldest methods for impeding infiltration into sewer systems, including manholes. Several chemical grouting manufacturers, such as AvantiGrout, can provide a short term (2 to 10-year service life) product suitable for the rehabilitation of manhole infiltration spots. Typically, chemical grout is only applied to manholes that are structurally sound unless the grout is being used to prevent water from entering the manhole during application of a liner such as CIPM liners discussed in Section 7.2.2.1 above. Grout injection holes are drilled at strategic locations so as to re-direct flow that is infiltrating into the manholes. This is a good reason why the potential contractors should provide evidence of prior experience with applying chemical grout.

8 Unit Cost for Each RRR Alternative

This section includes discussion of the unit costs assumed for the viable RRR alternatives mentioned previously in Section 7.

8.1 Pipelines

8.1.1 Repair: Point Repair(s) with Structural CIPP Lining

For the point repairs with structural CIPP lining methodology discussed in Section 7.1.1.2, a unit cost of \$435 per linear foot will be used. This unit cost comes out larger than the comparable “per linear foot” unit cost of the structural CIPP lining rehabilitation methodology due to the significantly smaller total length of pipeline to be repaired. Mobilization costs for installing CIPP lining along a handful of different pipeline segments, as opposed to the full pipe segment CIPP lining of the entire JTP trunk main, are a factor in the difference in unit costs. Also, the pipelines that will potentially be recommended for this repair methodology are all 36” diameters which also helps to account for the higher unit cost. This unit cost of \$435 per linear foot accounts for the structural lining material, installation, insertion pits, bedding and backfill, mobilization and demobilization, traffic control, excavation, bypass pumping, and equipment.

8.1.2 Repair: Point Repair(s) with Open Cut

For the point repair with open cut dig and replace methodology discussed in Section 7.1.1.1, a unit cost of \$1,000 per linear foot will be used. This unit cost accounts for excavation, backfill, paving, sheeting/shoring/bracing, pipe material, installation, mobilization and demobilization, traffic control, bypass pumping, and equipment.

8.1.3 Rehabilitation: Structural CIPP Lining – Full Pipe Segment

For the structural CIPP lining of full pipe segments rehabilitation methodology discussed in Section 7.1.2.2, a unit cost of \$12 per inch-diameter-foot will be used. This unit cost accounts for the structural lining material, installation, insertion pits, bedding and backfill, mobilization and demobilization, traffic control, excavation, bypass pumping, and equipment. The unit cost also accounts for manhole channelization upgrades to eliminate potential low spots and to smoothen the wastewater flow.

8.1.4 Rehabilitation: Spray Coating

For the spray coating rehabilitation methodology discussed in Section 7.1.2.3, a unit cost of \$0.30 per inch-diameter-foot will be used. This unit cost accounts for the coating material, application, insertion pits, bedding and backfill, mobilization and demobilization, traffic control, excavation, and equipment.

8.2 Manholes

8.2.1 Repair: Raising Buried Manholes

A unit cost of \$4,000 per manhole will be used for estimating the cost of raising the buried manholes identified in this Report. This unit cost accounts for locating the manhole, excavation, installed materials, bedding and backfill, mobilization and demobilization, traffic control, and equipment.

8.2.2 Rehabilitation: CIPM Liners

A unit cost of \$11 per inch-diameter-vertical foot will be used for estimating the cost of rehabilitating manholes utilizing CIPM liners. This unit cost accounts for labor, mobilization and demobilization, traffic control, structural lining material, and equipment.

8.2.3 Rehabilitation: Cementitious Liners

A unit cost of around \$110 per vertical foot would typically be for estimating the cost of rehabilitating manholes utilizing cementitious liners. However, given the limited number of manholes that have significant vertical footage lengths in need of rehabilitation within the same manhole, a unit cost of \$2,675 per manhole will be used. This unit cost accounts for material, labor, mobilization and demobilization, traffic control, and equipment.

9 RRR Alternatives Assignment

This section entails assigning viable RRR alternative methodologies to pipelines based on an analysis of their Pipe Capacity Rating, Structural Condition Rating and Overall Risk Rating as previously discussed in Section 6. For the three siphon pipelines not CCTV inspected during the field assessment, RRR alternative methodologies will be assigned based on their assumed Structural Condition Rating and Overall Risk Rating (note these segments should be reevaluated for appropriate RRR alternative based on actual field results from any future CCTV inspection). The assignment of RRR alternative methodologies to manholes is based on an analysis of their observed defects (structural and O&M) and field assessment findings.

9.1 Pipelines

Pipelines were assigned viable RRR methodologies based on the decision tree presented in Figure 4 below. For each pipeline along the trunk main, the steps in the decision tree are followed until one of the four end results is

reached. The results of the assignment procedure for each pipeline is listed in Table 44 below (listed in order from upstream to downstream). The table lists the following information:

- Pipeline Facility ID
- Length (feet)
- Pipe Material
- Pipe Diameter (in)
- Pipe Capacity Rating (utilized in decision tree)
- Structural Condition Rating (utilized in decision tree)
- Overall Risk Rating
- Rank
- Structural CIPP Lining viable? “Y” for yes and “N” for no
- Spray Coating viable? “Y” for yes and “N” for no
- Pipe Bursting viable? “Y” for yes and “N” for no

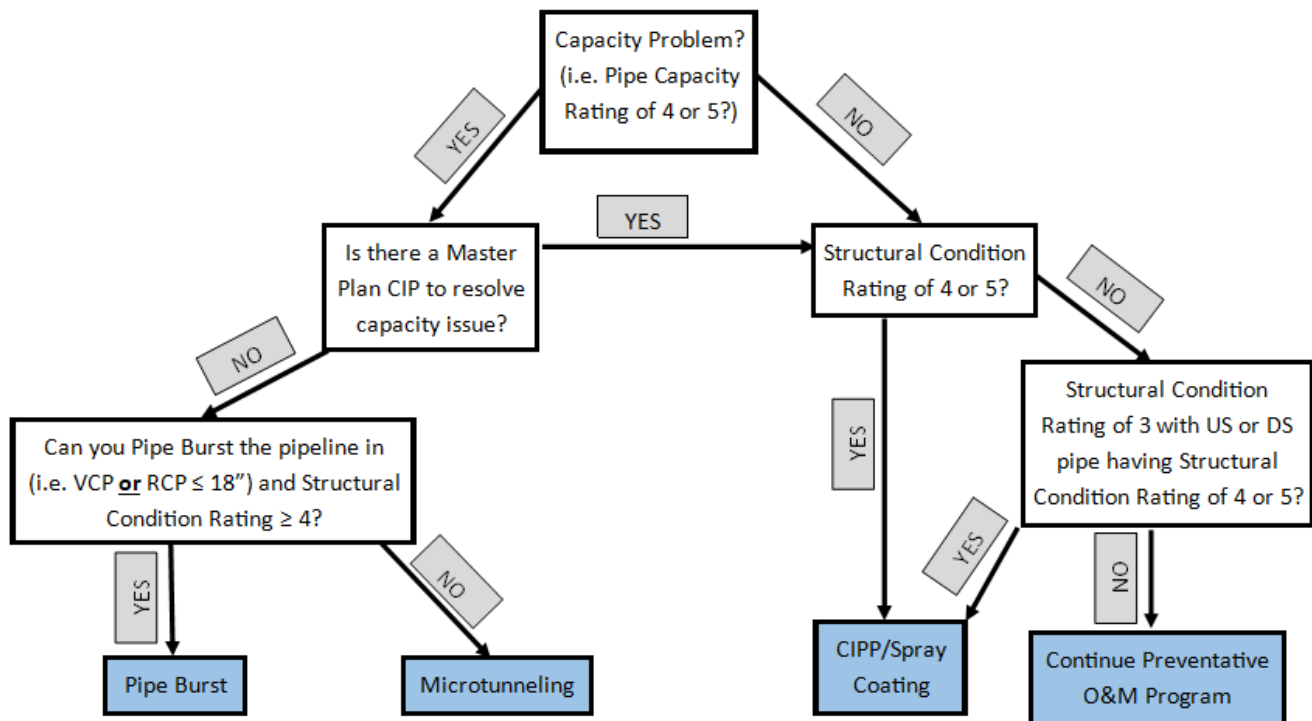


Figure 4: RRR Pipe Assignment Decision Tree

Table 44: Pipeline RRR Alternatives Assignment

Pipeline Facility ID	Length (ft)	Material	Diameter (in)	Pipe Capacity Rating	Structural Condition Rating	Overall Risk Rating	Rank	CIPP	Spray Coating	Pipe Bursting
MH-1_MH-3	32.8	PVC	18	1	1	1	163	N	N	N
MH-2_MH-4	37.4	PVC	30	1	1	1	158	N	N	N
MH-3_MH-5	513.7	VCP	18	1	3	3	91	N	N	N
MH-4_MH-6	522.5	PVC	30	1	1	2	138	N	N	N
MH-5_MH-7	488.18	VCP	18	1	3	3	92	N	N	N
MH-6_MH-8	486.8	PVC	30	1	1	2	139	N	N	N
MH-7_MH-9	494.28	VCP	18	1	3	2	123	N	N	N
MH-8_MH-10	493.76	PVC	30	1	1	2	140	N	N	N
MH-9_MH-11	489.95	VCP	21	1	2	2	133	N	N	N
MH-10_MH-12	456.1	PVC	30	1	1	2	141	N	N	N
MH-11_MH-15	120.41	VCP	24	1	2	2	135	N	N	N
MH-12_MH-13	26.3	PVC	30	1	1	1	159	N	N	N
MH-13_MH-14	81.9	PVC	30	1	1	1	160	N	N	N
MH-15_MH-16	397.13	VCP	24	1	2	2	127	N	N	N
MH-14_MH-17	404.8	PVC	30	1	1	2	147	N	N	N
MH-16_MH-18	514.49	VCP	24	1	3	3	89	N	N	N
MH-17_MH-19	514.43	PVC	30	1	1	2	148	N	N	N
MH-18_MH-21	520.37	VCP	24	1	2	2	128	N	N	N
MH-19_MH-20	519.02	PE	30	1	1	2	149	N	N	N
MH-21_MH-21A	253.39	VCP	24	1	3	3	90	N	N	N
MH-20_MH-22	250.9	PE	30	1	1	2	150	N	N	N
MH-21A_MH-24	261.4	VCP	24	1	2	2	129	N	N	N
MH-22_MH-23	260.2	PE	30	1	1	2	151	N	N	N
MH-24_MH-26	518.1	VCP	24	1	3	3	96	N	N	N
MH-23_MH-25	522	PE	30	1	1	2	154	N	N	N
MH-26_MH-27	566.04	VCP	24	1	2	2	130	N	N	N
MH-25_MH-28	564.4	PE	30	1	1	2	152	N	N	N
MH-27_MH-29	447.3	VCP	24	1	2	2	124	N	N	N
MH-28_MH-30	446.6	PE	30	1	1	2	142	N	N	N
MH-29_MH-32	503.34	VCP	24	1	2	2	125	N	N	N
MH-30_MH-31	499.8	PE	30	1	1	2	143	N	N	N
MH-32_MH-33	500.75	VCP	24	1	3	3	88	N	N	N
MH-31_MH-34	501.4	PE	30	1	1	2	144	N	N	N
MH-33_MH-36	510.03	VCP	24	1	2	2	131	N	N	N
MH-34_MH-35	508.2	PE	30	1	2	2	132	N	N	N
MH-36_MH-38	551.14	VCP	24	1	2	2	126	N	N	N
MH-35_MH-37	388.7	PE	30	1	1	2	145	N	N	N
MH-37_MH-39	611.4	PE	30	1	1	2	146	N	N	N
MH-38_MH-40	455.76	VCP	24	2	2	3	94	N	N	N
MH-40_MH-41	83.5	VCP	24	2	2	2	136	N	N	N
MH-39_MH-39A	107.4	PE	30	1	1	1	161	N	N	N

Pipeline Facility ID	Length (ft)	Material	Diameter (in)	Pipe Capacity Rating	Structural Condition Rating	Overall Risk Rating	Rank	CIPP	Spray Coating	Pipe Bursting
MH-41_MH-42	12.5	VCP	24	1	1	1	164	N	N	N
MH-42_MH-44	551.73	VCP	24	2	2	3	95	N	N	N
MH-39A_MH-43	532.3	PE	30	1	2	2	134	N	N	N
MH-44_MH-48	556.29	VCP	24	3	3	5	55	N	N	N
MH-43_MH-46	539.46	PE	30	1	1	2	153	N	N	N
MH-46_MH-47	28.8	PVC	30	1	1	1	165	N	N	N
MH-47_MH-48	8.89	PVC	30	1	1	1	162	N	N	N
MH-48_MH-50	412	PVC	30	1	1	2	137	N	N	N
MH-50_MH-51	599.64	VCP	24	5	2	5	50	N	N	N
MH-51_MH-52	593.04	VCP	24	5	2	5	49	N	N	N
MH-52_MH-53	498.32	VCP	24	3	2	4	77	N	N	N
MH-53_MH-54	526.24	VCP	27	1	3	4	78	N	N	N
MH-54_MH-55	473.22	VCP	27	1	2	3	105	N	N	N
MH-55_MH-56	540.38	VCP	27	1	2	3	106	N	N	N
MH-56_MH-57	534.31	VCP	27	1	2	3	107	N	N	N
MH-57_MH-58	534.64	VCP	27	1	2	3	108	N	N	N
MH-58_MH-59	534.41	VCP	27	1	1	3	118	N	N	N
MH-59_MH-60	535.26	VCP	27	1	3	4	82	Y	N	N
MH-60_MH-61	532.74	VCP	27	2	4	5	46	Y	Y	N
MH-61_MH-62	536.74	VCP	27	1	3	4	83	Y	N	N
MH-62_MH-63	498.1	VCP	27	1	1	3	121	N	N	N
MH-63_MH-64	313.73	VCP	24	3	1	3	103	N	N	N
MH-64_MH-65	581.72	VCP	24	5	2	5	54	N	N	N
MH-65_MH-66	577.32	VCP	24	5	2	5	53	N	N	N
MH-66_MH-67	199.32	VCP	24	5	1	4	80	N	N	N
MH-67_MH-68	487.4	VCP	24	5	1	4	75	N	N	N
MH-68_MH-69	488.64	VCP	24	5	2	5	51	N	N	N
MH-69_MH-70	199	VCP	24	5	1	4	79	N	N	N
MH-70_MH-71	425.2	VCP	24	5	3	5	23	N	N	N
MH-71_MH-72	424	VCP	24	5	2	5	52	N	N	N
MH-72_MH-73	423.6	VCP	24	5	1	4	76	N	N	N
MH-73_MH-74	439.82	VCP	24	4	2	4	70	N	N	N
MH-74_MH-75	486.2	VCP	24	3	1	3	101	N	N	N
MH-75_MH-76	487.3	VCP	24	4	1	4	85	N	N	N
MH-76_MH-77	487	VCP	24	3	1	3	102	N	N	N
MH-77_MH-78	447.63	VCP	27	2	2	4	86	N	N	N
MH-78_MH-79	467.84	VCP	27	2	1	3	112	N	N	N
MH-79_MH-80	457.54	VCP	27	2	1	3	110	N	N	N
MH-80_MH-81	418.23	VCP	27	2	1	3	111	N	N	N
MH-81_MH-82	275.51	VCP	27	2	1	3	114	N	N	N
MH-82_MH-83	442.31	VCP	30	1	1	3	122	N	N	N
MH-83_MH-84	440.74	VCP	30	1	1	3	119	N	N	N
MH-84_MH-85	437.72	VCP	30	2	1	3	113	N	N	N

Pipeline Facility ID	Length (ft)	Material	Diameter (in)	Pipe Capacity Rating	Structural Condition Rating	Overall Risk Rating	Rank	CIPP	Spray Coating	Pipe Bursting
MH-85_MH-85A	402.12	VCP	30	1	1	3	120	N	N	N
MH-85A_MH-85B	38.81	VCP	30	1	1	2	156	N	N	N
MH-85B_MH-86	9.51	VCP	30	1	1	2	157	N	N	N
MH-86_MH-87	501.53	VCP	30	1	2	3	104	N	N	N
MH-87_MH-88	511.18	VCP	30	1	2	3	97	N	N	N
MH-88_MH-89	336.9	RCP	27	1	5	5	16	Y	Y	N
MH-89_MH-90	235.7	RCP	27	1	4	5	21	Y	Y	N
MH-90_MH-91	47	RCP	12&18	1	2	2	166	N	N	N
MH-91_MH-92	99	RCP	12&18	1	2	2	167	N	N	N
MH-92_MH-93	56	RCP	12&18	1	2	2	168	N	N	N
MH-93_MH-94	20.4	RCP	27	1	2	3	116	N	N	N
MH-94_MH-95	134.4	RCP	27	3	3	4	71	Y	Y	N
MH-95_MH-96	211.23	RCP	27	1	5	5	43	Y	Y	N
MH-96_MH-96A	310.05	RCP	27	1	5	5	28	Y	Y	N
MH-96A_MH-97	134.5	RCP	27	1	3	4	68	Y	Y	N
MH-97_MH-97A	122.4	RCP	27	1	3	4	69	Y	Y	N
MH-97A_MH-98	321.51	RCP	27	1	5	5	24	Y	Y	N
MH-98_MH-99	402.68	RCP	27	2	5	5	9	Y	Y	N
MH-99_MH-100	130.62	RCP	27	1	3	4	67	Y	Y	N
MH-100_MH-101	395.82	RCP	36	1	5	5	18	Y	Y	N
MH-101_MH-102	427.42	RCP	36	1	5	5	17	Y	Y	N
MH-102_MH-102A	310.71	RCP	36	1	2	3	98	N	N	N
MH-102A_MH-102B	75.89	RCP	36	1	2	3	99	N	N	N
MH-102B_MH-103	98.4	RCP	36	1	3	4	66	Y	Y	N
MH-103_MH-104	222.71	RCP	36	5	4	5	7	Y	Y	N
MH-104_MH-105	340.21	RCP	36	1	5	5	19	Y	Y	N
MH-105_MH-106	510.62	RCP	36	1	5	5	20	Y	Y	N
MH-106_MH-107	553.05	RCP	36	1	5	5	31	Y	Y	N
MH-107_MH-108	596.75	RCP	36	1	5	5	40	Y	Y	N
MH-108_MH-109	124.91	RCP	36	1	3	3	93	Y	Y	N
MH-109_MH-110	485.72	RCP	36	1	5	4	61	Y	Y	N
MH-110_MH-111	211.62	RCP	36	1	4	4	62	Y	Y	N
MH-111_MH-112	496.55	RCP	36	1	4	4	63	Y	Y	N
MH-112_MH-113	371.84	RCP	36	1	5	5	36	Y	Y	N
MH-113_MH-114	351.13	RCP	36	1	5	5	37	Y	Y	N
MH-114_MH-115	336.83	RCP	36	1	3	4	81	Y	Y	N
MH-115_MH-116	444.31	RCP	36	1	5	5	38	Y	Y	N
MH-116_MH-116A	199.42	RCP	36	1	5	5	44	Y	Y	N
MH-116A_MH-117	151.62	RCP	36	1	5	5	45	Y	Y	N
MH-117_MH-118	307.23	RCP	36	1	5	5	29	Y	Y	N
MH-118_MH-119	462.46	RCP	36	1	5	5	30	Y	Y	N
MH-119_MH-120	206.7	RCP	36	1	2	3	115	N	N	N
MH-120_MH-121	193.51	RCP	36	1	2	3	109	N	N	N

Pipeline Facility ID	Length (ft)	Material	Diameter (in)	Pipe Capacity Rating	Structural Condition Rating	Overall Risk Rating	Rank	CIPP	Spray Coating	Pipe Bursting
MH-121_MH-122	532.15	RCP	36	1	3	4	84	N	N	N
MH-122_MH-123	534.84	RCP	36	2	3	4	74	Y	Y	N
MH-123_MH-125	398.54	RCP	36	1	5	5	39	Y	Y	N
MH-125_MH-126	498.12	RCP	36	1	5	5	32	Y	Y	N
MH-126_MH-127	510.46	RCP	36	1	5	4	58	Y	Y	N
MH-127_MH-128	511.05	RCP	36	1	5	4	59	Y	Y	N
MH-128_MH-130	596.03	RCP	36	1	5	4	60	Y	Y	N
MH-130_MH-131	595.2	RCP	36	1	4	4	64	Y	Y	N
MH-131_MH-132	484.6	RCP	36	1	5	5	35	Y	Y	N
MH-132_MH-133	518.3	RCP	36	1	3	4	65	Y	Y	N
MH-133_MH-134	492.45	RCP	36	1	5	5	41	Y	Y	N
MH-134_MH-134A	53.8	RCP	36	1	2	3	117	N	N	N
MH-134A_MH-135	559.2	RCP	36	1	5	5	33	Y	Y	N
MH-135_MH-136	379.8	RCP	36	2	5	5	13	Y	Y	N
MH-136_MH-137	60.5	RCP	36	3	2	4	87	N	N	N
MH-137_MH-138	172.12	RCP	36	1	5	5	47	Y	Y	N
MH-138_MH-138A	308.1	RCP	36	1	5	5	34	Y	Y	N
MH-138A_MH-139	226.7	RCP	36	4	3	5	42	Y	Y	N
MH-139_MH-140	577.8	RCP	36	2	5	5	14	Y	Y	N
MH-140_MH-141	578.3	RCP	36	2	5	5	15	Y	Y	N
MH-141_MH-142	406.6	RCP	36	2	4	5	48	Y	Y	N
MH-142_MH-142A	60.7	RCP	36	4	3	5	57	Y	Y	N
MH-142A_MH-142B	122.6	RCP	36	4	4	5	22	Y	Y	N
MH-142B_MH-142C	223.99	RCP	36	4	5	5	2	Y	Y	N
MH-142C_MH-142D	336.5	RCP	36	4	5	5	3	Y	Y	N
MH-142D_MH-142E	150.8	RCP	36	4	5	5	6	Y	Y	N
MH-142E_MH-142F	283	RCP	36	4	5	5	4	Y	Y	N
MH-142F_MH-143	523.9	RCP	36	4	5	5	5	Y	Y	N
MH-143_MH-144	485.6	RCP	36	1	5	5	25	Y	Y	N
MH-144_MH-145	63.9	RCP	36	1	3	3	100	Y	Y	N
MH-145_MH-146	560.9	RCP	36	2	5	5	10	Y	Y	N
MH-146_MH-147	206.05	RCP	36	1	5	5	26	Y	Y	N
MH-147_MH-148	199.2	RCP	36	5	5	5	1	Y	Y	N
MH-148_MH-149	196.8	RCP	36	1	4	4	72	Y	Y	N
MH-149_MH-150	80.29	RCP	36	1	4	4	73	Y	Y	N
MH-150_MH-151	608.6	RCP	36	2	5	5	11	Y	Y	N
MH-151_MH-152	603.2	RCP	36	2	5	5	12	Y	Y	N
MH-152_MH-153	392.51	RCP	36	3	5	5	8	Y	Y	N
MH-153_MH-154	327.2	RCP	36	1	5	5	27	Y	Y	N
MH-154_MH-155	10.6	RCP	36	1	2	2	155	N	N	N
MH-155_MH-156	207.2	RCP	42	5	2	5	56	N	N	N

Table 45 below lists the pipeline that was found to have significant structural defects that are in need of immediate rehabilitation.

Table 45: Pipelines with Structural Defects Requiring Immediate Rehabilitation

Facility ID	RRR Alternative	Reason for Recommendation
MH-116_MH-116A	Open Cut Point Repair (replace roughly 35 LF of pipe from approximately 19' to 54' downstream of MH-116)	(1) SMW – Missing Wall 10 LF of continuous SMW – Missing Wall (1) SRP – Reinforcement Projecting

Table 46 below lists the pipelines that were found to have significant I&I-related defects that are in need of immediate rehabilitation. All four (4) of the pipelines are recommended for eventual full pipe length structural CIPP lining rehabilitation due to the widespread structural degradation of the reinforced concrete pipe sections of the JTP trunk main (i.e. from MH-88 to the SCRWA WWTP), and thus are recommended for immediate structural CIPP lining rehabilitation in order to complete that work in advance.

Table 46: Pipelines with I&I Defects Requiring Immediate Rehabilitation

Facility ID	RRR Alternative	Reason for Recommendation
MH-153_MH-154	Structural CIPP Lining (Full Pipe Segment)	(1) IGB – Infiltration Gusher, Barrel (Grade 5 Severity)
MH-145_MH-146		(2) IRB – Infiltration Runner, Barrel (Grade 4 Severity)
MH-146_MH-147		(1) IRB – Infiltration Runner, Barrel (Grade 4 Severity)
MH-152_MH-153		(1) IR – Infiltration Runner (Grade 4 Severity)

9.2 Manholes

This section lists the manholes that were found to be in need of repair, rehabilitation, or replacement based on observed defects and field assessment findings. Table 47 below lists these manholes along with their RRR alternative(s) and reason for recommendation.

Table 47: Manhole RRR Alternatives Assignment

Facility ID	RRR Alternative	Reason for Recommendation
MH-66	Repair: Raising Buried Manholes	These manholes were found to be buried during the field assessment. In order to allow for proper and adequate access for future O&M and/or construction activities, these manholes are recommended to be raised flush with ground level.
MH-127		
MH-128		
MH-137		
MH-138		
MH-138A		
MH-142A		
MH-142B		

Facility ID	RRR Alternative	Reason for Recommendation
MH-123	Rehabilitation: Cementitious Liners or Rehabilitation: CIPM Liner	These manholes were observed to have either Grade 5 or Grade 4 structural defects. Therefore, these manholes are recommended for rehabilitation through the use of a cementitious liner or CIPM liner.
MH-130		
MH-75		
MH-29		
MH-41		
MH-87		
MH-147		
MH-146		
MH-68		
MH-120		
MH-55		
MH-70		
MH-99		
MH-32		
MH-122		
MH-97A		
MH-102A		
MH-109		
MH-139		
MH-64		
MH-102B		
MH-94		
MH-101		
MH-60		
MH-144		
MH-16		
MH-93		
MH-36		
MH-119		
MH-4		
MH-149		
MH-31		

10 Proposed Improvement Project Bundling/Phasing & Analysis

This section contains discussion of the analysis performed to determine feasible project bundling/phasing alternatives. As mentioned previously in Section 5.1, the JT-P2 through JT-P9 improvement projects are required to address the capacity deficiencies identified in the City's SSMP. The following topics were used to determine comparable project bundling approaches.

Construction Methodology Feasibility

As it pertains to the RRR methodologies to address the widespread structural degradation along the RCP portions of JTP trunk main, structural CIPP lining and spray coating are considered feasible. Pipe bursting is not feasible for the RCP portions of the JTP trunk main because pipe bursting of reinforced concrete pipe is difficult/experimental and in many cases not feasible, and the concern for potential heaving of the various crop fields/roads/commercial areas would make the construction process slow with a high probability of failure and/or significant surface damage and unsafe conditions for the general public. For this reason, pipe bursting would not be considered feasible for addressing the trunk main's structurally degraded portions.

While the microtunneling and open cut replacement methodologies are technically feasible to address the structural degradation found along the JTP trunk main, the significantly higher associated costs and overall public disturbance when compared to the aforementioned structural CIPP lining and spray coating methodologies effectively rule out their potential for recommendation. Also, the extent to which the RCP portions of the JTP trunk main have become degraded does not preclude the host pipe's ability to continue to serve as a trunk main for the City should a rehabilitation methodology be employed to extend its useful life. For these reasons, the structural CIPP lining and spray coating rehabilitation methodologies will be included in the proposed improvement project bundling and phasing options.

Capacity

Due to the planned continued use of the existing JTP trunk main even after the relief trunk JT-P2 through JT-P9 capacity improvement projects are constructed, any methodology employed to address the structural degradation along the JTP trunk main needs to account for impacts on conveyance capacity. To that end, the relatively low impact on conveyance capacity stemming from structural CIPP lining and/or spray coating of the JTP trunk main was an important factor in the decision to recommend their potential implementation in the future. While structural CIPP lining obviously decreases the inside diameter of the JTP trunk main once installed, the smoother profile (and thereby smaller friction losses when analyzing conveyance capacity) can effectively offset the loss of inside diameter. Lastly, spray coating is typically applied to a thickness of about 100-125 mils (or 0.1 to 0.125 inches), which will likely not negatively affect the conveyance capacity of the JTP trunk main to the point where the JT-P2 through JT-P9 capacity improvement projects would become insufficient/undersized.

Capacity Project Cost Review

When looking at the cost estimates in the City's SSMP for the aforementioned JT-P2 through JT-P9 capacity improvement projects, the unit costs utilized appear to adequately account for the degree of difficulty of constructing the various projects along the selected route. Therefore, when estimating the costs of the approaches subsequently in this section, the original cost estimates will be utilized as the starting basis and will

be escalated utilizing ENR's 20-city national average Construction Cost Index values (i.e. a roughly 2% increase per year from the original estimate).

Two variations of project bundling/phasing approaches were analyzed, with the following sub-sections discussing the approaches determined to be feasible, comparatively costed (with similar feasibility profiles and level of risk contingencies included), and addressing the structural degradation of the JTP trunk main. Two alternatives were developed, analyzed, and grouped into two separate sections, the first being "Emergency/Immediate Projects" and the second being "Intermediate Projects". These included improvements to address existing and future buildout planning horizon capacity related problems identified in the SSMP combined with improvements required to address emergency (0-2 year) and intermediate (2-10 year) condition deficiencies identified during the project field work. An emergency/immediate project to address significant existing structural deficiencies and raise buried manholes will be constructed in the next 2-years. To address the remainder of the capacity and condition deficiencies, two phasing approaches were analyzed.

"All-at-Once" assumed all of the projects addressing the structural condition deficiencies and existing and future planning horizon capacity deficiencies (i.e. JT-P2 through JT-P9) would be constructed within a 5-year period as a single intermediate project.

"Phased" assumed all of the projects addressing the structural condition deficiencies would be constructed over a 2 to 15-year period as a multi-phased immediate/intermediate project. However, the JT-P2 through JT-P9 capacity improvement projects would still be constructed within a 5-year period due to the City's SSMP originally recommending these projects to begin in 2018. This approach required additional emergency/immediate improvements (i.e. crown spraying of lines with condition deficiencies that are being phased).

The project bundling options are described below and their associated cost estimates in Section 12.

10.1 "All-at-Once" Approach

Providing there are no schedule and/or budgetary constraints, the various components of the overall project are recommended to be completed all at the same time. This provides the most expedient approach to address the high-risk structural defects with a methodology that will extend the trunk main's useful life by 30-50 years for rehabilitated pipe segments and 50-75 years for new pipes.

Structural CIPP Lining & JT-P2 through JT-P9 – All-at-Once

The "Emergency/Immediate Projects" (0-2 years) include the following:

- Structural CIPP lining and/or open cut replacement of the pipelines found to be in need of point repairs (see Appendix G)
- Manhole RRR activities (as discussed in Section 9.2)

The "Intermediate Projects" (2-5 years) include the following:

- Structural CIPP lining of all assigned pipelines (see Section 9.1 and Appendix H)
- Capacity Improvement Projects JT-P2 through JT-P9

10.2 Phasing Approach

If the “All-at-Once” approach cannot be implemented due to City identified constraints, a combination of structural CIPP lining and crown spray coating could be completed. Note after completion of the phased approach, service life expectancies similar to the “All-at-Once” approach would be met.

Structural CIPP Lining & CIP-6 with Microtunneling – Phased

The “Emergency/Immediate Projects (Years 0-2)” include the following:

- Structural CIPP lining and/or open cut replacement of the pipelines found to be in need of point repairs (see Appendix G)
- Spray coating of all assigned pipelines (see Section 9.1)
- Manhole RRR activities (as discussed in Section 9.2)

The “Immediate/Intermediate Projects (Years 2-5 years)” include the following:

- Structural CIPP lining of all assigned pipelines (see Section 9.1) DS of MH-130
- Spray coating re-application of assigned pipelines (see Section 9.1) US of MH-130
- Capacity Improvement Projects JT-P2 through JT-P9

The “Intermediate/15-YR Projects (Years 5-15)” include the following:

- Spray coating re-application of assigned pipelines (see Section 9.1) US of MH-130
- Structural CIPP lining of all assigned pipelines (see Section 9.1) US of the “CIP-6” capacity project

11 O&M Recommendations

Due to past discussions with City staff regarding historical cleaning regimens/programs employed for the JTP trunk main, WWE recommends that the City perform periodic cleaning of the JTP trunk main on a more regular basis (i.e. once every 3-5 years). This will ensure that the vital JTP trunk main is maintained properly so that the City can continue to sufficiently convey wastewater flows while reducing the potential for O&M-related SSOs and associated costs. In addition, due to the visual inspection performed on the siphon barrel pipe segments near the intersection of Wren Avenue and La Primavera Way, WWE recommends that these also be cleaned on a more regular basis (similarly, once every 3-5 years) to ensure continued function performance for the only siphon along the JTP trunk main.

12 Construction Cost Estimates

Planning level construction cost estimates were prepared for the project bundles previously described in Section 10. Table 51 below lists the associated appendices and total construction cost opinion for the aforementioned project bundles.

Table 48: Cost Estimate Comparison

Approach	Project Bundle	Appendix	Total Construction Cost Opinion
All-at-Once	Structural CIPP Lining & JT-P2 through JT-P9	Appendix E	\$47.1 Million
Phased	Structural CIPP Lining & JT-P2 through JT-P9	Appendix F	\$47.8 Million

13 Recommended Project

Based on previous discussion regarding construction methodology feasibility, capacity, and the costs shown in Table 51, the project bundle “Structural CIPP Lining & JT-P2 through JT-P9 – All-at-Once” is the recommended project. Not only is this project bundle the least expensive, but it also addresses the structurally degraded portions of the JTP trunk main in the quickest fashion. If this All-at-Once approach is not feasible based on City-identified constraints (i.e. funding, schedule), the phased approach for the project bundle “Structural CIPP Lining & JT-P2 through JT-P9– Phased” is recommended.

The recommended project bundle “Structural CIPP Lining & JT-P2 through JT-P9 – All-at-Once” is broken down into two separate groups of various RRR projects, as shown in Appendix E. The first group of “Emergency/Immediate Projects” is comprised of pipeline and manhole work, with Table 52 below summarizing the RRR activities for each asset. Appendix G contains a figure that graphically illustrates the “Emergency/Immediate Projects”.

Table 49: Recommended Emergency/Immediate Projects

Asset Facility ID	RRR Activity	Note(s)
MH-116_MH-116A	Open Cut Point Repair	36”; replace roughly 35 LF of pipe from approximately 19’ to 54’ downstream of MH-116
MH-153_MH-154	Structural CIPP Lining (Full Pipe Segment)	36”
MH-145_MH-146		36”
MH-146_MH-147		36”
MH-152_MH-153		36”
MH-66	Repair: Raising Buried Manholes	These manholes were found to be buried during the field assessment. In order to allow for proper and adequate access for future O&M and/or construction activities, these manholes are recommended to be raised flush with ground level.
MH-127		
MH-128		
MH-137		
MH-138		
MH-138A		
MH-142A		
MH-142B		
MH-123	Rehab: Cementitious Liners	These manholes were observed to have either Grade 5 or Grade 4 structural defects. Therefore, these
MH-130		
MH-75		

Asset Facility ID	RRR Activity	Note(s)
MH-29		manholes are recommended for rehabilitation through the use of a cementitious liner or CIPM liner.
MH-41		
MH-87		
MH-147		
MH-146		
MH-68		
MH-120		
MH-55		
MH-70		
MH-99		
MH-32		
MH-122		
MH-97A		
MH-102A		
MH-109		
MH-139		
MH-64		
MH-102B		
MH-94		
MH-101		
MH-60		
MH-144		
MH-16		
MH-93		
MH-36		
MH-119		
MH-4		
MH-149		
MH-31		

The second group of “Intermediate Projects” aims to address the structural degradation of the trunk main through structural CIPP lining. Also included are the capacity Improvement projects JT-P2 through JT-P9 as previously discussed in 5.1. Table 53 below lists the pipelines that are recommended to be structurally lined with CIPP. Appendix H contain a figure that graphically illustrates the “Intermediate Projects”.

Table 50: Recommended Immediate/Intermediate Projects

Pipeline Facility ID	RRR Activity	Note(s)
From MH-59 to MH-62	Structural CIPP	Total Length: 1,605 ft
From MH-88 to MH-90		Total Length: 573 ft
From MH-94 to MH-102		Total Length: 2,591 ft
From MH-102B to MH-119		Total Length: 6,265 ft
From MH-122 to MH-134		Total Length: 5,140 ft

Pipeline Facility ID	RRR Activity	Note(s)
From MH-134A to MH-136		Total Length: 939 ft
From MH-137 to MH-154		Total Length: 7,695 ft

14 Potential Constraints of Recommended Methodology

14.1 Permits

The following are potential permits that could be required for construction of these project alternatives dependent on final selected alignment and construction methodology:

- California Department of Transportation Encroachment Permit
- Santa Clara County and City of Gilroy Encroachment Permits
- US Army Corps of Engineers Section 404 Permit (Miller Slough)
- Regional Water Quality Control Board 401 Water Quality Certification (if contaminated water is encountered or CIPP curing water is pretreated prior to discharge)

14.2 Environmental Considerations

Examples of environmental considerations for structural CIPP lining include noise, dust, and California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) compliance documentation. It is anticipated that the condition related work could be conducted as a categorical exemption (CatEx) or initial study and mitigated or negative declaration (IS M/ND). However, the capacity related project would likely require an ISMND.

14.3 Utility Coordination

Due to the potential for conflicting existing utilities, the project should follow the ABC Process as agreed upon by the American Public Works Association (APWA) Joint Utilities Coordination Committee to collect Quality A Level information as defined by the ASCE Standard 38-02 for Collection and Depiction of Existing Subsurface Utility Data.

15 Appendices

- 15.1 *Appendix A – Summary of Pipeline Work Completed*
- 15.2 *Appendix B – Pipeline Structural Quick Ratings*
- 15.3 *Appendix C – Pipeline Maintenance Quick Ratings*
- 15.4 *Appendix D – Pipeline Overall Risk Ratings*
- 15.5 *Appendix E – Cost Estimate for Structural CIPP Lining & JT-P2 through JT-P9 – All-at-Once*
- 15.6 *Appendix F – Cost Estimate for Structural CIPP Lining & JT-P2 through JT-P9 – Phased*
- 15.7 *Appendix G – Recommended Emergency/Immediate Projects*
- 15.8 *Appendix H – Recommended Intermediate Projects*
- 15.9 *Appendix I – Mapbook, Pipeline Inspection Findings*

Appendix A – Summary of Pipeline Work Completed



CITY OF MORGAN HILL

Legend

Work Description

- CCTV & Cleaning
- Abandoned
- No CCTV/Cleaning

Joint Trunk Pipeline
Condition Assessment Report

Summary of Pipeline
Work Completed

Appendix A



Agenda Item 9.1
WATERWORKS
ENGINEERS

N

0 1,500 3,000 6,000 Feet



Appendix B – Pipeline Structural Quick Ratings

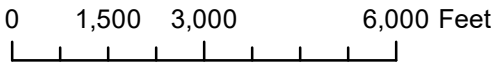


- Legend**
Structural Quick Rating
- 5000 - 5999
 - 4000 - 4999
 - 3000 - 3999
 - 2000 - 2999
 - 1000 - 1999
 - 0000
 - Not Inspected



Structural Quick Ratings

Appendix B



Appendix C – Pipeline Maintenance Quick Ratings

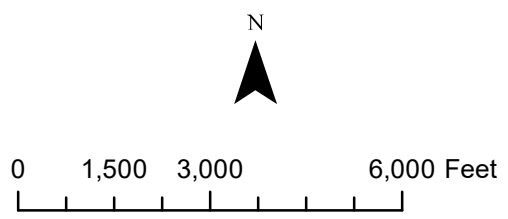


Legend
Maintenance Quick Rating

- 5000 - 5999
- 4000 - 4999
- 3000 - 3999
- 2000 - 2999
- 1000 - 1999
- 0000
- Not Inspected

Maintenance Quick Ratings

Appendix C



Appendix D – Pipeline Overall Risk Ratings



Legend
Overall Risk Rating

- 5
- 4
- 3
- 2
- 1

Joint Trunk Pipeline
Condition Assessment Report

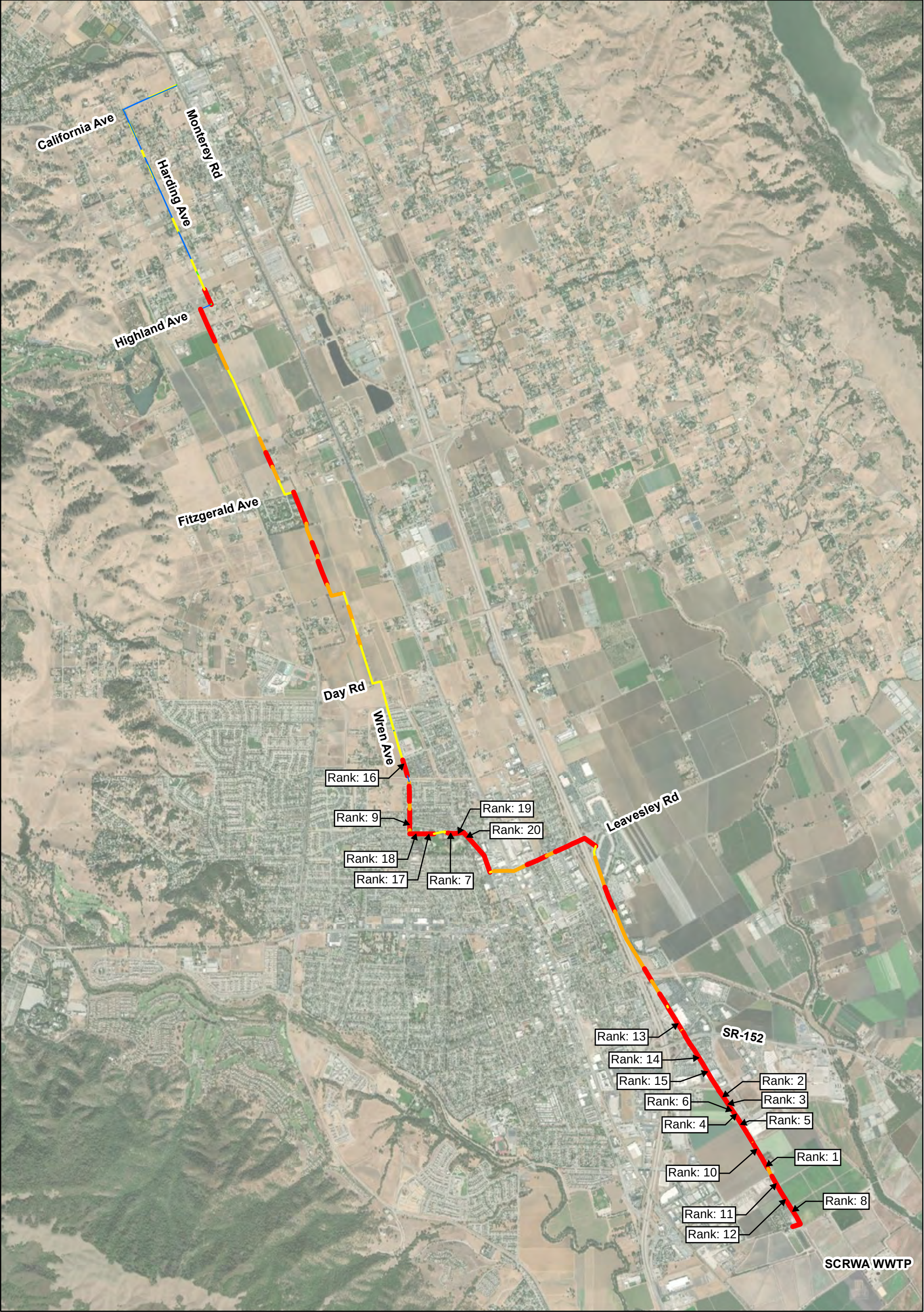
Overall Risk Ratings

Appendix D

Agenda Item 9.1

N

0 1,500 3,000 6,000 Feet



Appendix E – Cost Estimate for Structural CIPP Lining & JT-P2 through JT-P9 – All-at-Once

 WATERWORKS ENGINEERS	Project: Morgan Hill Joint Trunk Pipeline	
	Computed By: ARB 1/15/21	
	Checked By: MJF 1/15/21	

APPENDIX E - Project Cost Estimate for Structural CIPP Lining & JT-P2 through JT-P9 - All-at-Once				
	Quantity	Unit	Unit Cost	Total Cost
Emergency/Immediate Projects				
Pipelines				
MH-116_MH-116A (Open Cut Point Repair)	35	LF	\$1,000	\$35,000
MH-145_MH-146 (Structural CIPP)	561	LF	\$435	\$244,035
MH-146_MH-147 (Structural CIPP)	206	LF	\$435	\$89,610
MH-152_MH-153 (Structural CIPP)	393	LF	\$435	\$170,955
MH-153_MH-154 (Structural CIPP)	327	LF	\$435	\$142,245
Manholes				
Repair: Raising Buried Manholes	8	EA	\$4,000	\$32,000
Rehabilitation: Cementitious Liners	32	EA	\$4,000	\$125,675
Subtotal				\$839,500
Immediate/Intermediate Projects				
Structural CIPP Lining*	24807	LF	\$415	\$10,290,723
Capacity Improvement Projects: JT-P2 thru JT-P9**	1	LS	\$22,473,992	\$22,473,992
Subtotal				\$32,800,000
Note: All costs are in 2021 Dollars.				
Subtotal, Emergency/Immediate Projects (years 0-2)				\$839,500
Subtotal, Immediate/Intermediate Projects (years 2-5)				\$32,800,000
Project SUBTOTAL				\$33,640,000
Design (Emergency/Immediate)			15%	\$125,925
Design (Intermediate)			10%	\$3,280,000
Design Contingency			15%	\$5,046,000
Construction Contingency			15%	\$5,046,000
TOTAL PROJECT COST ESTIMATE (WWE AND JT-P2 thru JT-P9) to the nearest \$10,000				\$47,100,000

Appendix F – Cost Estimate for Structural CIPP Lining & JT-P2 through JT-P9 – Phased

 WATERWORKS ENGINEERS	Project:		Morgan Hill Joint Trunk Pipeline	
	Computed By:		ARB 1/15/21	
	Checked By:		MJF 1/15/21	

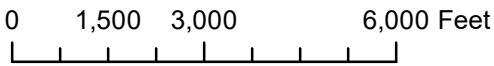
APPENDIX F - Project Cost Estimate for Structural CIPP Lining & JT-P2 through JT-P9 - Phased				
	Quantity	Unit	Unit Cost	Total Cost
Emergency/Immediate Projects (Years 0-2)				
Pipelines				
MH-116_ MH-116A (Open Cut Point Repair)	35	LF	\$1,000	\$35,000
MH-145_ MH-146 (Structural CIPP)	561	LF	\$435	\$244,035
MH-146_ MH-147 (Structural CIPP)	206	LF	\$435	\$89,610
MH-152_ MH-153 (Structural CIPP)	393	LF	\$435	\$170,955
MH-153_ MH-154 (Structural CIPP)	327	LF	\$435	\$142,245
Spray Coat	24807	LF	\$10.37	\$257,268
Manholes				
Repair: Raising Buried Manholes	8	EA	\$4,000	\$32,000
Rehabilitation: Cementitious Liners	32	EA	\$4,000	\$125,675
Subtotal				\$1,096,800
Intermediate Projects (Years 2-5)				
Structural CIPP Lining* (DS of MH-130)	10725	LF	\$432	\$4,633,161
Spray Coat (re-application of pipes US of MH-130)	14082	LF	\$10.04	\$141,439
Capacity Improvement Projects: JT-P2 thru JT-P9**	1	LS	\$22,473,992	\$22,473,992
Subtotal				\$27,200,000
*based on \$12/in-dia-ft for structural liner				
**escalated from original City SSMP estimate using ENR CCI Index				
Note: All costs are in 2021 Dollars.				
Subtotal, Emergency/Immediate Projects (years 0-2)				\$1,096,800
Subtotal, Immediate/Intermediate Projects (years 2-5)				\$27,200,000
Project SUBTOTAL				\$28,297,000
Design (Emergency/Immediate)		15%		\$164,520
Design (Immediate/Intermediate)		10%		\$2,720,000
Design Contingency		15%		\$4,244,550
Construction Contingency		15%		\$4,244,550
YEARS 0-5 COST ESTIMATE (WWE AND JT-P2 thru JT-P9) to the nearest \$10,000				\$39,700,000
Intermediate/15-YR Projects (Years 5-15)				
Spray Coat (re-application of pipes US of MH-130)	14082	LF	\$10.04	\$141,439
Structural CIPP Lining* (US of MH-130)	14082	LF	\$402	\$5,657,562
Subtotal				\$5,800,000
Subtotal, Intermediate/15-YR Phase Projects (years 10-15)				\$5,800,000
Design (Intermediate/15-YR Phase Projects)		10%		\$580,000
Design Contingency		15%		\$870,000
Construction Contingency		15%		\$870,000
YEARS 10-15 COST ESTIMATE (WWE AND CIP-6 15-YR PHASE) to the nearest \$10,000				\$8,100,000
TOTAL PROJECT COST ESTIMATE (WWE AND CIP-6) to the nearest \$10,000				\$47,800,000

Appendix G – Recommended Emergency/Immediate Projects



Recommended Emergency/Immediate Projects

Appendix G



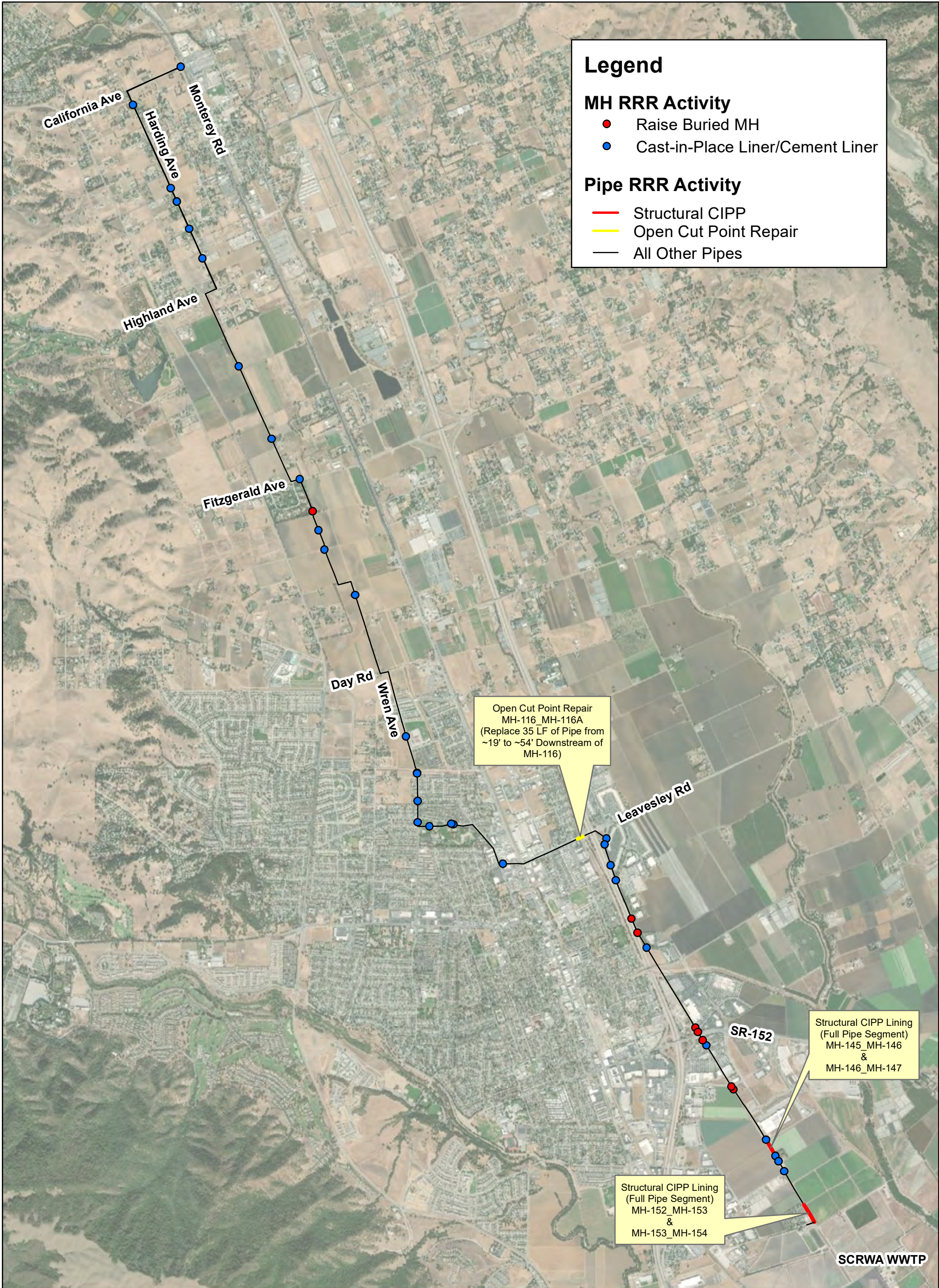
Legend

MH RRR Activity

- Raise Buried MH
- Cast-in-Place Liner/Cement Liner

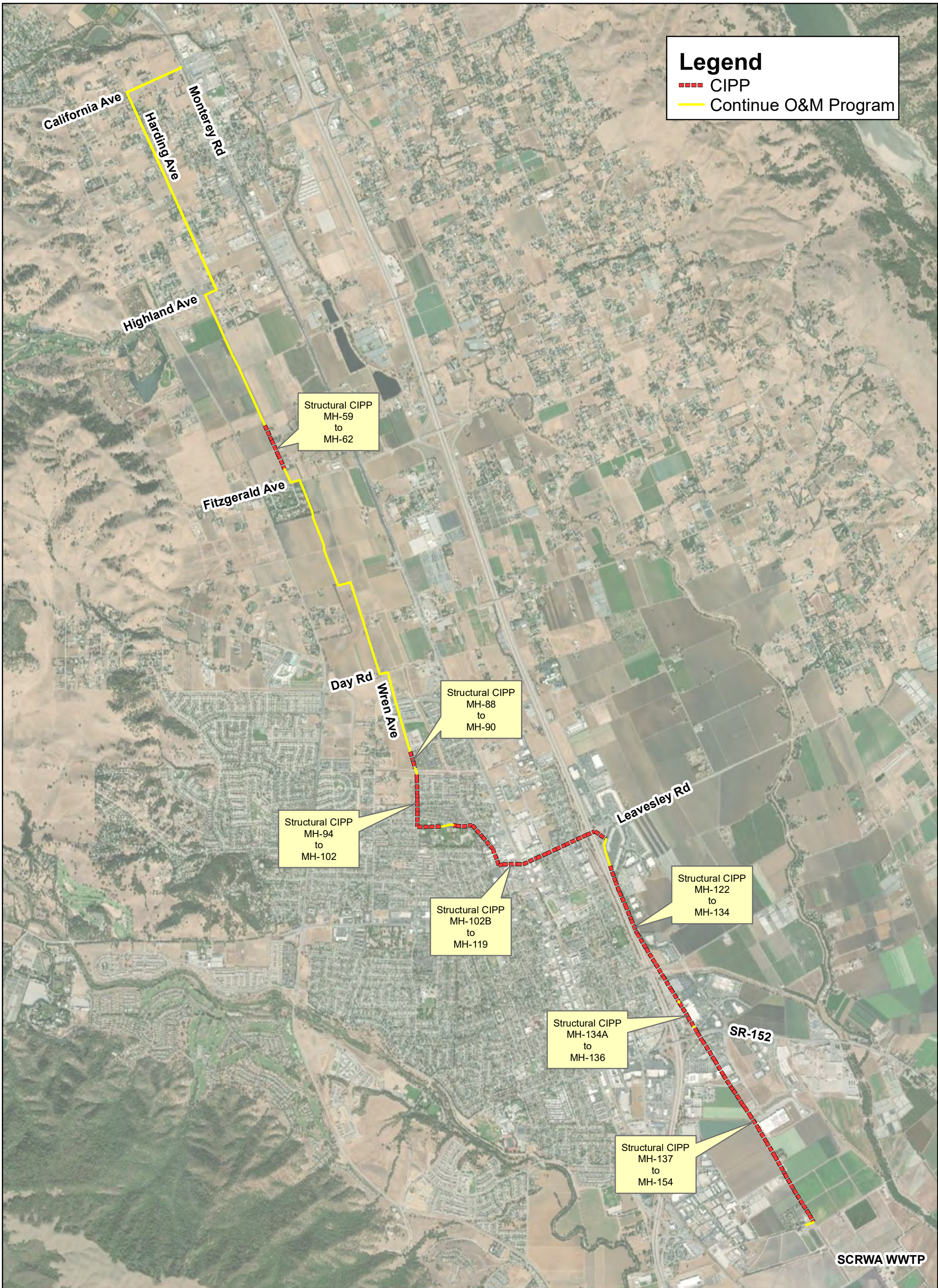
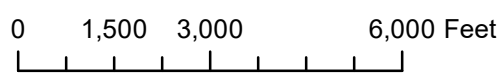
Pipe RRR Activity

- Structural CIPP
- Open Cut Point Repair
- All Other Pipes



Appendix H – Recommended Intermediate Projects

Joint Trunk Pipeline
Condition Assessment Report
**Recommended
Intermediate
Projects**
Appendix H



Appendix I –Mapbook, Pipeline Inspection Findings

Table ES.4 Capital Improvement Program
Sewer System Master Plan
City of Gilroy

Improv. No.	Type of Improvement	Alignment	Limits	Pipeline Improvements		Infrastructure Costs				Baseline Constr. Costs ¹	Estimated Const. Costs ²	Capital Improv. Cost ³	Construction Trigger	Suggested Cost Allocation		Cost Allocation	
				Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost					Existing Users	Future Users	Existing Users	Future Users
				(in)		(in)	(ft)	(\$)	(\$)	(\$)	(\$)	(\$)	(ppm)	(%)	(%)	(\$)	(\$)
Gravity Main Improvements																	
Santa Teresa - Long Meadow Subtrunk																	
SLP-1	Gravity Main	Santa Teresa Blvd	From Sunrise Dr to Longmeadow Dr	10	Replacement	12	2,025	332	671,321	671,400	872,900	1,134,800	954 EDU	61%	39%	689,302	445,498
Subtotal - Santa Teresa - Long Meadow Subtrunk										671,400	872,900	1,134,800				689,302	445,498
Welburn Subtrunk																	
WP-1	Gravity Main	Welburn Ave	From Chiesa Dr to Aspen Wy	10	Replacement	12	1,700	332	563,578	563,600	732,700	952,600	Existing Deficiency	90%	10%	861,520	91,080
WP-2	Gravity Main	Welburn Ave	From Church St to Hanna St	10	Replacement	12	750	332	248,637	248,700	323,400	420,500	Existing Deficiency	91%	9%	384,531	35,969
Subtotal - Welburn Subtrunk										812,300	1,056,100	1,373,100				1,246,051	127,049
Forest-Swanston Subtrunk																	
FP-1	Gravity Main	loof Ave	From Monterey Rd to Forest Ave	10	Replacement	12	1,150	332	381,244	381,300	495,700	644,500	Existing Deficiency	93%	7%	601,483	43,017
FP-2	Gravity Main	Forest St	From Lewis St to Old Gilroy St	12	Replacement	15	1,875	360	675,064	675,100	877,700	1,141,100	Existing Deficiency	96%	4%	1,093,639	47,461
Subtotal - Forest-Swanston Subtrunk										1,056,400	1,373,400	1,785,600				1,695,122	90,478
Old Gilroy Subtrunk																	
OP-1	Gravity Main	Old Gilroy St	From 75' w/o Railroad St to Railroad St	10	Replacement	12	100	332	33,152	33,200	43,200	56,200	Existing Deficiency	89%	11%	50,159	6,042
OP-2	Gravity Main	Old Gilroy St	From Railroad St to Forest St	12	Replacement	15	750	360	270,026	270,100	351,200	456,600	Existing Deficiency	89%	11%	407,516	49,085
Subtotal - Old Gilroy Subtrunk										303,300	394,400	512,800				457,674	55,126
Uvas Park Subtrunk																	
UP-1	Gravity Main	Uvas Park Dr	From 3rd St to 350 ft e/o Santa Barbara Dr	-	New	12	2,375	332	787,352	787,400	1,023,700	1,330,900	Existing Deficiency	39%	61%	517,772	813,128
UP-2	Gravity Main	Hoxett St / ROW	From Wren Ave to Miller Ave	12	Replacement	18	1,550	389	602,255	602,300	783,000	1,017,900	2,020 EDU	36%	64%	370,355	647,545
UP-3	Gravity Main	Yorktown Dr	From Miller Ave to Greenwich Dr	12	Replacement	18	1,725	389	670,252	670,300	871,400	1,132,900	1,923 EDU	38%	62%	427,260	705,640
UP-4	Gravity Main	Greenwich Dr	From Yorktown Dr to Orchard Dr	12	Replacement	18	575	389	223,417	223,500	290,600	377,800	2,152 EDU	38%	62%	145,055	232,745
UP-5	Gravity Main	Orchard Dr	From Greenwich Dr to W 10th St	12	Replacement	18	200	389	77,710	77,800	101,200	131,600	2,401 EDU	39%	61%	51,307	80,293
UP-6	Gravity Main	W 10th St	From Orchard Dr to Princeville St	12	Replacement	18	1,350	389	524,545	524,600	682,000	886,600	3,085 EDU	39%	61%	346,721	539,879
Subtotal - Uvas Park Subtrunk										2,885,900	3,751,900	4,877,700				1,858,470	3,019,230
Thomas Subtrunk																	
TP-1	Gravity Main	London Pl	From Monterey Rd to Princeville St	18	Replacement	21	2,775	418	1,160,665	1,160,700	1,509,000	1,961,700	5,873 EDU	62%	38%	1,224,966	736,734
TP-2	Gravity Main	Monterey Rd	From Luchessa Ave to London Pl	18	Replacement	21	1,525	418	637,843	637,900	829,300	1,078,100	5,303 EDU	62%	38%	672,095	406,005
Subtotal - Thomas Subtrunk										1,798,600	2,338,300	3,039,800				1,897,061	1,142,739
Total Costs																	
Subtotal - Santa Teresa - Long Meadow Subtrunk										671,400	872,900	1,134,800				689,302	445,498
Subtotal - Welburn Subtrunk										812,300	1,056,100	1,373,100				1,246,051	127,049
Subtotal - Forest-Swanston Subtrunk										1,056,400	1,373,400	1,785,600				1,695,122	90,478
Subtotal - Old Gilroy Subtrunk										303,300	394,400	512,800				457,674	55,126
Subtotal - Uvas Park Subtrunk										2,885,900	3,751,900	4,877,700				1,858,470	3,019,230
Subtotal - Thomas Subtrunk										1,798,600	2,338,300	3,039,800				1,897,061	1,142,739
Total Improvement Costs										7,527,900	9,787,000	12,723,800				7,843,681	4,880,119

3/28/2023

Notes :

1. Cost estimates are based on the Engineering News Record (ENR) construction cost index (CCI) of 13,176 (March 2023).
2. Baseline construction costs plus 30% to account for unforeseen events and unknown conditions.
3. Estimated construction cost plus 30% to cover other costs including: engineering design, project administration (developer and City staff), construction management and inspection, and legal costs.

RESOLUTION NO. 2023-XX

**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF
GILROY ADOPTING THE SEWER SYSTEM MASTER
PLAN FOR THE CITY OF GILROY**

WHEREAS, the 2022 Sewer System Master (Plan) serves as a guide to assess the current operations and functionality of the City's existing sewer system; and

WHEREAS, the City last developed a Sewer System Master Plan in 2004, which identified capacity deficiencies in the existing sewer system and recommended improvements to alleviate existing deficiencies and serve future developments in the Gilroy Planning Area; and

WHEREAS, Akel Engineering Group, Inc. was retained by the City Council in August 2019 to prepare the Plan; and

WHEREAS, the objective of the Plan is to review and make recommendations on how the current sewer system can be upgraded within the City to best suit the sewer needs of the City in the future; and

WHEREAS, the projects identified in the Plan will be added to the City's Capital Improvement Program; and

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Gilroy hereby adopts the Sewer System Master Plan attached hereto and made a part hereof.

PASSED AND ADOPTED by the City Council of the City of Gilroy at a regular meeting duly held on the 3rd day of April 2023 by the following roll call vote:

AYES: COUNCIL MEMBERS:

NOES: COUNCIL MEMBERS:

ABSTAIN: COUNCIL MEMBERS:

ABSENT: COUNCIL MEMBERS:

APPROVED:

Marie Blankley, Mayor

ATTEST:

Thai Nam Pham, City Clerk



City of Gilroy

STAFF REPORT

Agenda Item Title: Adopt the 2022 Water Master Plan

Meeting Date: April 3, 2023

From: Jimmy Forbis, City Administrator

Department: Public Works

Submitted By: Daryl Jordan, Public Works Director

Prepared By: Michael Lewis, Management Analyst

STRATEGIC PLAN GOALS

Maintain and Improve City Infrastructure

RECOMMENDATION

Adopt a resolution approving the 2022 Water System Master Plan.

BACKGROUND

Cities rely on water master plans to assess the current operations and functionality of the City's existing water system and to help meet the future water needs of the community. The City last developed a water master plan in 2004 which identified capacity deficiencies in the existing water system and recommended improvements to alleviate existing deficiencies and serve future developments in the Gilroy Planning Area.

The City operates and maintains a domestic water system that covers most of the area within the service area limits. Currently, the water demands are provided from groundwater wells located throughout the service area. The City's municipal water system consists of nine (9) groundwater wells, ten (10) storage reservoirs that have a cumulative capacity of 14.1 million gallons (MG), and over approximately 202 miles of distribution pipelines. The City's generally flat topography slopes up from east to west at approximately 180 feet above sea level in the east to approximately 250 feet above sea level in the west. Even with this generally flat topography, the City utilizes three separate pressure zones due to the slopes on the west side.

The City's most recent water master plan was completed in 2004. This Master Plan

included an evaluation of servicing growth to the planning area, evaluated existing demands and projected future demands, evaluated groundwater conditions and management, and recommended phased improvements to the water system for the horizon year of 2040 to be consistent with the recently updated 2040 General Plan, state-approved Urban Water Management Plan (UWMP) and Water Service Contingency Plan (WSCP). This 2020 WSCP document builds upon previous water shortage contingency planning efforts completed by the City and documented in the 2015 UWMP Plans. Additionally, the 2004 Master Plan included the development of the original hydraulic model, which was then used for evaluating the water system. Improvements were recommended for servicing existing and future growth areas, and a corresponding Capital Improvement Program was developed to quantify construction costs. There were 12 water main segments out of 73 potential projects constructed from the 2004 Master Plan at a total cost of \$6,923,000.

Due to the increased demand for water, it became evident that an updated water master plan was necessary. As such, the City Council approved Akel Engineering Group, Inc. to prepare the 2022 Water Master Plan and a concurrent Sewer System Master Plan and Storm Drainage Master Plan in August 2019. These documents were coordinated for consistency with the City's 2040 General Plan.

ANALYSIS

The 2022 Water System Master Plan (Plan) evaluates the City's domestic water system and recommends capacity improvements necessary to service the needs of existing users and for servicing the future growth of the city. The Plan is intended to serve as a tool for planning and phasing the construction of future domestic water system infrastructure for the projected buildout of the City's service area.

The City Council authorized Akel Engineering Group, Inc. to perform the following tasks:

1. Summarize the City's existing domestic water system facilities.
2. Document growth planning assumptions and known future developments.
3. Summarize the water system performance criteria.
4. Project future domestic water demands.
5. Update and validate the City's hydraulic model based on the City's Geographic Information System (GIS).
6. Evaluate the domestic water facilities to meet existing and projected demand requirements and fire flows.
7. Evaluate existing groundwater conditions.
8. Perform a capacity analysis for major distribution mains.
9. Recommend a Capital Improvement Program (CIP) with an opinion of probable construction costs.
10. Develop a 2022 Water System Master Plan report.

RESULTS

The 2022 Water Master Plan provided recommendations for improvements based on immediate capacity needs and expected future growth. The recommended capital improvement program (Table 8.2) is attached as Attachment 1.

The Water System Master Plan identifies the current and future water needs of the community through the 2040 General Plan build-out. While there is adequate water supply now, there is an identified deficiency of 5.1 mgd if build-out occurs without any additional supply being generated. This will be remedied by constructing three new water supply wells by 2040.

Supply vs. Demand Evaluation

Supply Balance	Existing	2040 Buildout
Maximum Dry Day Demand	13.7 mgd	22.3 mgd
Standby Well	2.6 mgd	2.6 mgd
Required Capacity	16.3 mgd	24.9 mgd
Available Supply Capacity ¹	19.8 mgd	19.8 mgd
Capacity Surplus/Deficiency	+3.5 mgd	-5.1 mgd
Recommended New Wells (at 2.2 mgd each)	0	3

1. Includes capacity from the McCarthy Well #9 project that is currently in construction (projected production of 3.6 mgd).

To address deficiencies in the water distribution system, and 2040 General Plan build-out, projects have been recommended in the Water System Capital Improvement needs. The projects identified will be added to the City's Capital Improvement Program. In total, the plan recommends 22 pipeline improvement projects, totaling \$25.6 million, three groundwater well improvement projects totaling \$11.8 million and one storage reservoir improvement project totaling \$225,700 (attached).

Project	Number of Replacement Projects	Number of New Projects	Cost Allocation to Existing Users	Cost Allocation to Future Users
Pipeline Improvements	13	9	\$13,883,000	\$11,747,000
Storage Reservoir Improvements	0	1	\$0	\$225,700
Ground Well Improvements	0	3	\$0	\$11,776,000
Total Cost			\$13,883,000	\$23,738,700

ALTERNATIVES

Council may amend or reject the 2022 Water Master Plan. This is not recommended as the 2022 Master Plan is essential to planning and constructing water system projects to protect the provision of water to the community now and into the future.

FISCAL IMPACT/FUNDING SOURCE

The City has two water funds which are utilized to fund the capital improvements and the annual operations and maintenance needs. The Water Impact Fund, which collects revenues in the form of impact fees from developments that impact future growth, primarily funds infrastructure/capital costs attributable to future users for future capacity needs. The Water Operations Fund funds the current annual operational, maintenance, and capital costs to repair and maintain the existing infrastructure. The Water Impact (future users) and Water Operation (existing users) funds have a projected FY23 ending fund balance of \$3.8 million and \$25.0 million, respectively.

Of the total \$37.6 million capital improvements identified in the 2022 Water Master Plan, approximately \$13.9 million is attributable to existing users – to be funded by the Water Operations fund, and \$23.7 million is attributable to future users - to be funded by the Water Impact Fund. The 2022 Water Master Plan capital improvements are in addition to the existing capital improvements identified by staff.

While the Water Operations fund has adequate fund balance to fund the \$13.9 million identified in existing user costs, the Water Impact fund does not have sufficient fund balances to fund the \$23.7 million identified in future user costs. A typical next step after the Master Plan is updated is to review and update the utility user fees, and the development impact fees to incorporate the identified existing and future growth capital improvements and adjust the fees accordingly to ensure capital and operational needs are adequately funded for a period. The City is undergoing a rate study for the water

user fees and will consider the projects contemplated in this Master Plan and the CIP to help determine the rate proposals in the next few months. Staff will plan to review and update the water impact fee as a project in the departmental workplan in the upcoming fiscal year.

NEXT STEPS

With Council approval of the 2022 Water Master Plan, staff will incorporate the projects into the City's CIP, and plan for delivery of the recommended projects. State approval is not required.

Attachments:

1. Water System Master Plan
2. Water System Master Plan Capital Improvement Program List
3. Water Master Plan Draft Resolution



City of Gilroy

APRIL 2023

2023 Water System Master Plan



2023

CITY OF GILROY

WATER SYSTEM MASTER PLAN

FINAL

March 2023





Smart Planning Our Water Resources

March 29, 2023

City of Gilroy
7351 Rosanna Street
Gilroy, CA 95020

Attention: Gary Heap, P.E.
City Engineer

Subject: 2023 Water System Master Plan – Final Report

Dear Gary:

We are pleased to submit the draft report for the City of Gilroy Water System Master Plan. This master plan is a standalone document, though it was prepared as part of the integrated infrastructure master plans for the water, sewer, and storm drainage master plans. The master plan documents the following:

- Existing distribution system facilities, acceptable hydraulic performance criteria, and projected water demands consistent with the Urban Planning Area
- Development and calibration of the City's GIS-based hydraulic water model.
- Capacity evaluation of the existing water system with improvements to mitigate existing deficiencies and to accommodate future growth.
- Capital Improvement Program (CIP) with an opinion of probable construction costs and suggestions for cost allocations to meet AB 1600.

We extend our thanks to you, Sharon Goei, Community Development Director; Daryl Jordan, Director of Public Works; and other City staff whose courtesy and cooperation were valuable components in completing this study.

Sincerely,

AKEL ENGINEERING GROUP, INC.

Tony Akel, P.E.
Senior Principal

Enclosure: Report

City of Gilroy Water System Master Plan



Acknowledgements

City Council

Marie Blankley, Mayor

Dion Bracco, Mayor Pro Tempore

Rebeca Armendariz

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Carol Marques

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Gary Heap, P.E., City Engineer

Jorge Duran, P.E., Senior City Engineer

Sharon Goei, Community Development Director

Matt Jones, Deputy Director of Public Works

Other City Engineering, Planning, and Operations Staff

City of Gilroy Water System Master Plan

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APPENDICES

Appendix A Calibration Curves

EXECUTIVE SUMMARY

This executive summary presents a brief background of the City of Gilroy's (City) water distribution system, the planning area characteristics, the system performance and design criteria, the hydraulic model, and a capital improvement program.

The hydraulic model was used to evaluate the capacity adequacy of the existing distribution system and for recommending improvements to mitigate existing deficiencies, as well as servicing future growth. The prioritized capital improvement program accounts for growth throughout the Gilroy planning area.

ES.1 STUDY OBJECTIVES

Recognizing the importance of planning, developing, and financing system facilities to provide reliable domestic water system service to existing customers and for servicing anticipated growth within the sphere of influence, the City initiated the 2023 Water System Master Plan.

The City of Gilroy authorized Akel Engineering Group Inc. to complete the following tasks:

- Summarizing the City's existing domestic water system facilities.
- Documenting growth planning assumptions and known future developments.
- Summarizing the water system performance criteria.
- Projecting future domestic water demands.
- Updating and validating the City's hydraulic model based on the City's Geographic Information Systems (GIS).
- Evaluating the domestic water facilities to meet existing and projected demand requirements, and fire flows.
- Evaluating the existing groundwater conditions.
- Performing a capacity analysis for major distribution mains.
- Performing a fire flow analysis.
- Recommending a capital improvement program (CIP) with an opinion of probable construction costs.
- Performing a capacity allocation analysis for cost sharing purposes.
- Developing a 2023 Water System Master Plan report.

ES.2 INTEGRATED APPROACH TO MASTER PLANNING

The City implemented an integrated master planning approach and contracted the services of Akel Engineering Group to prepare the following documents:

- 2023 Water System Master Plan
- 2023 Sewer System Master Plan
- 2023 Storm Drainage System Master Plan

While each of these reports is published as a standalone document, they have been coordinated for consistency with the City's General Plan. Additionally, each document has been cross referenced to reflect relevant analysis results with the other documents.

ES.3 STUDY AREA

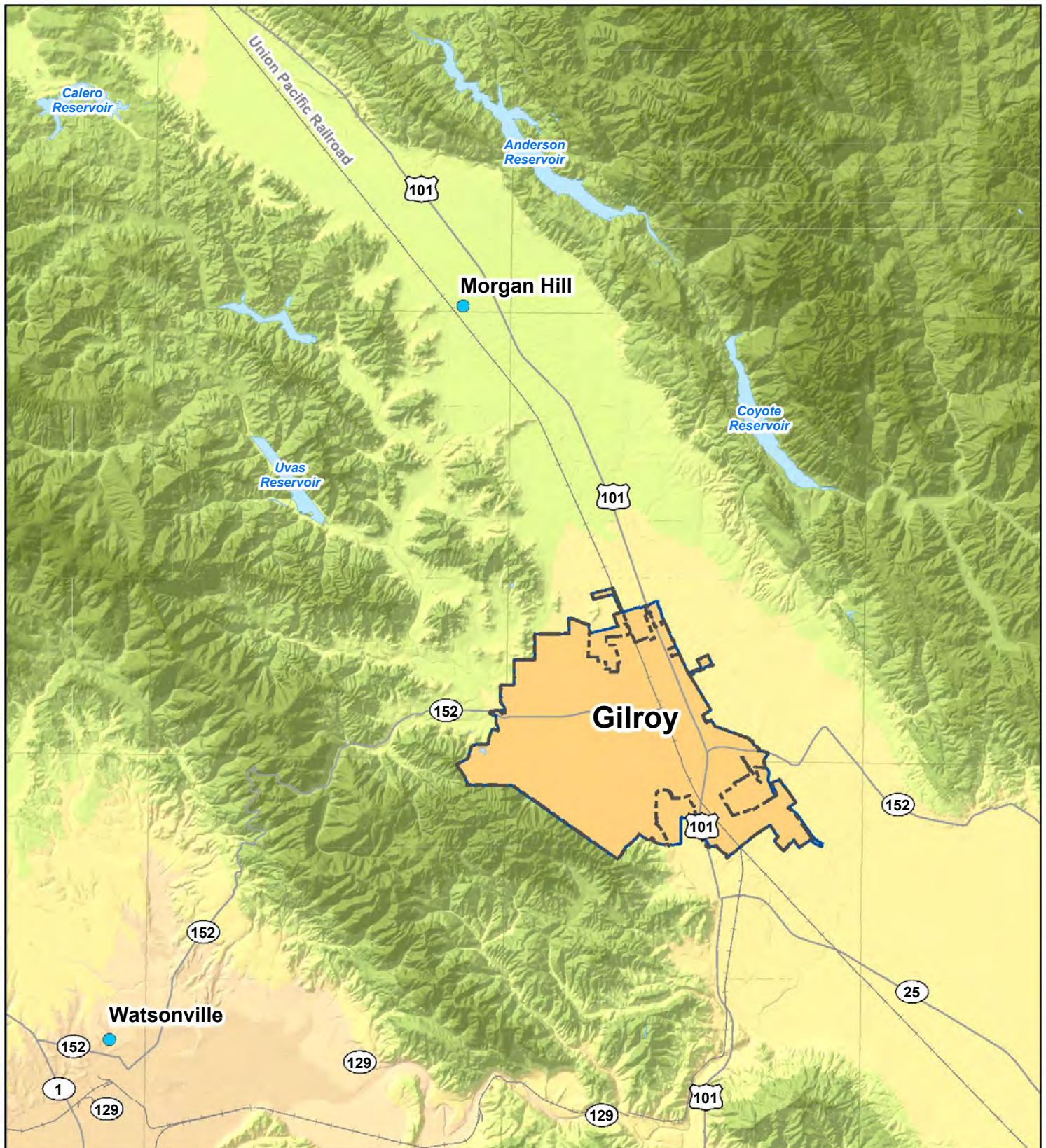
The City of Gilroy is located in Santa Clara County near the west coast of California, south of City of San Francisco. The City of Gilroy lies within the seismically active region of San Francisco Bay. The City of Gilroy lies in the southern portion of the Santa Clara County and is the most southern city located within the county. The City is located approximately 32 miles southeast of the City of San Jose, 8 miles southeast of Morgan Hill, 25 miles east of City of Santa Cruz, and 16 miles northwest of City of Hollister. The City limits currently encompass 16.5 square miles, with an approximate population of 56,600 residents, according to Department of Finance as of January 2021. [Figure ES.1](#) displays the City's location.

The City of Gilroy is generally bound to the north by Fitzgerald Avenue, to the northeast by San Ysidro Avenue, to the southeast by Camino Arroyo, to the west by Burchell Road and Rancho Vista Drive, and to the south by Carnadero Avenue. The U.S. Route 101 divides the City in a southeast to northwest direction and the California State Route 152 (Hecker Pass Hwy) runs east-west direction in the northern half of the City. The topography is relatively flat in the middle of the service area, with increasing slopes in the east and west side of the city due to the Santa Cruz Mountains to the west and the Diablo Range to the east. [Figure ES.2](#) displays the planning area showing city limits, the Urban Growth Boundary (UGC) of the City and Planning Area / Sphere of Influence (SOI).

The City operates and maintains a domestic water system that covers the majority of the area within the service area limits. Currently, the water demands are provided from groundwater wells located throughout the service area.

ES.4 SYSTEM PERFORMANCE AND DESIGN CRITERIA

This report documents the City's performance and design criteria that were used for evaluating the domestic water system. The system performance and design criteria are used to establish guidelines for determining future water demands, evaluating existing domestic water facilities, and



Legend

- Cities
 - Study Area
 - City Limits
 - Urban Growth Boundary
 - Highway
 - Railroads
- | Elevation (ft) | |
|----------------|---------------|
| | 9 - 50 |
| | 51 - 100 |
| | 101 - 250 |
| | 251 - 500 |
| | 501 - 1,000 |
| | 1,001 - 2,000 |
| | 2,001 - 3,000 |
| | 3,001 - 3,792 |
- ~ Waterbodies

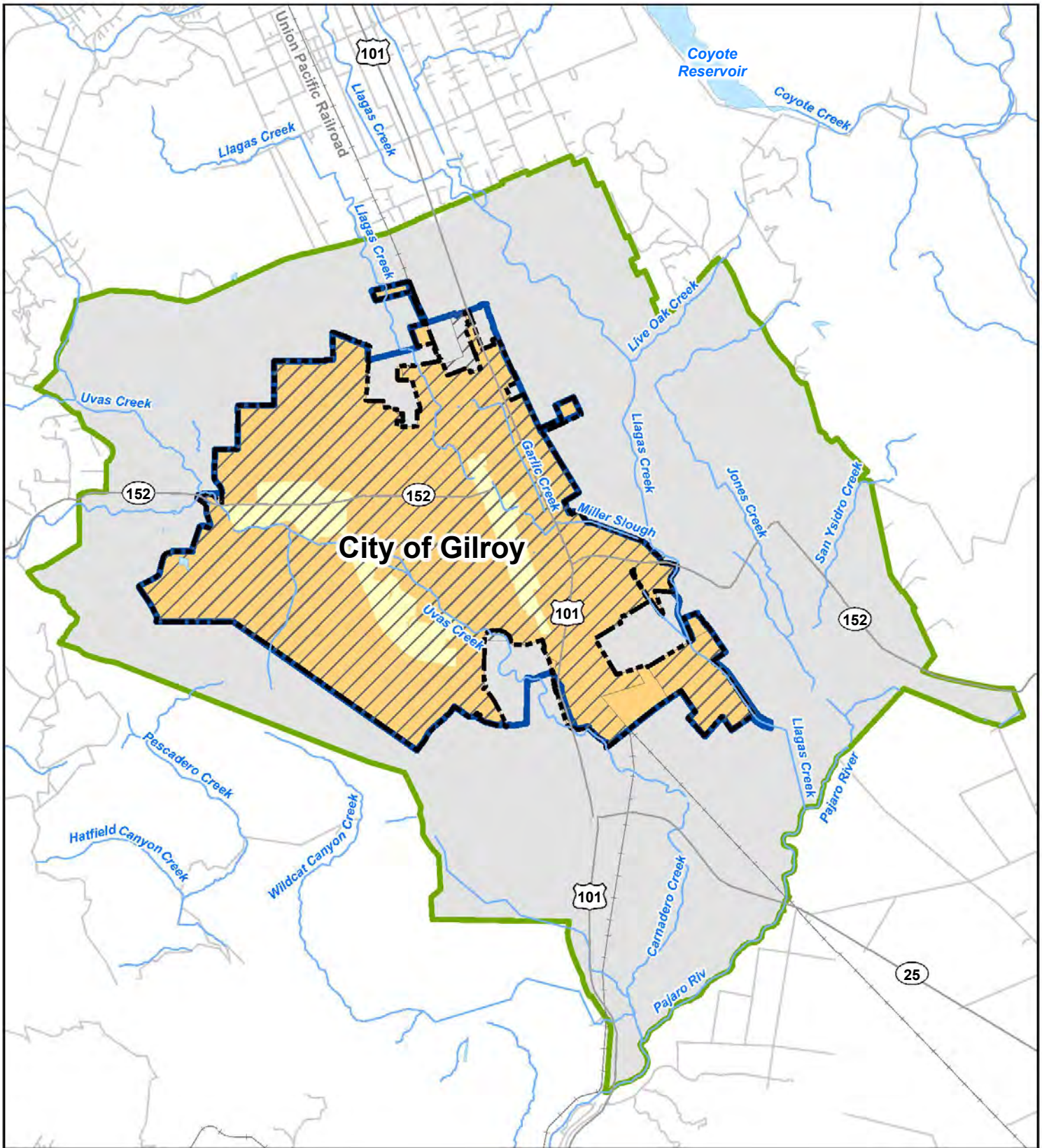
Updated: September 21, 2020

0 0.5 1 2 Miles



Figure ES.1
Regional Location Map
 Water System Master Plan
 City of Gilroy





Legend

- | | |
|------------------------------|-------------------|
| City Limits | General Plan Area |
| City Limits Area | Roads |
| Specific Plan Areas | Highways |
| Urban Service Area | Railroads |
| Urban Growth Boundary | Rivers & Creeks |
| Sphere of Influence Boundary | Waterbodies |

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Updated: September 21, 2020

0 0.5 1 2 Miles



Figure ES.2
Planning Area
Water System Master Plan
City of Gilroy

gilroy

for sizing future facilities. [Table ES.1](#) documents the system performance and design criteria for the domestic water system. This criterion was used in the capacity evaluation and for sizing recommended improvements.

ES.5 EXISTING DOMESTIC WATER SYSTEM OVERVIEW

The City's municipal water system consists of 9 groundwater wells, 10 storage reservoirs that have a cumulative capacity of 14.1 MG, and over approximately 202 miles of distribution pipelines. The City's generally flat topography slopes up from east to west at approximately 180 feet in the east to approximately 250 feet in the west. Even with this generally flat topography, the City utilizes three separate pressure zones due to the slopes on the west side.

The City's existing domestic water distribution system is shown in [Figure ES.3](#), with color coded pipe sizes. This figure also identifies the location of existing wells and the storage reservoir.

ES.6 EXISTING AND FUTURE DOMESTIC WATER DEMANDS

The existing water demands used for this master plan were based on the City's 2019 PWSS consumption records, which included the monthly demands for each land use category, as well as total annual production. These existing water demands in this analysis are adjusted to match the annual production records and account for system losses.

The existing demand distribution, by pressure zone, was obtained from the water billing records. Using GIS, each customer account was geocoded to its physical location within its existing pressure zone. The accounts were then stored by pressure zone and total demand in each zone was calculated.

The City's existing average day domestic water demand, as extracted from water billing records, were lower than the total demand listed in the annual production records due to system losses that occurred between groundwater wells and customer service connections. The total domestic water demand was increased proportionally to 4,768 gpm to reflect the total 2019 production and account for transmission main losses. The existing domestic water demands for each pressure zone (2019 SCADA) and design criteria peaking factors are summarized on [Table ES.2](#).

ES.7 HYDRAULIC MODEL DEVELOPMENT

Hydraulic network analysis has become an effectively powerful tool in many aspects of water distribution planning, design, operation, management, emergency response planning, system reliability analysis, fire flow analysis, and water quality evaluations. The City's hydraulic model was used to evaluate the capacity adequacy of the existing system and to plan its expansion to service anticipated future growth.

The City's previous hydraulic model was developed using the Environmental Protection Agency's EPANET software, which allows the use of a single modeling scenario, and basic simulation

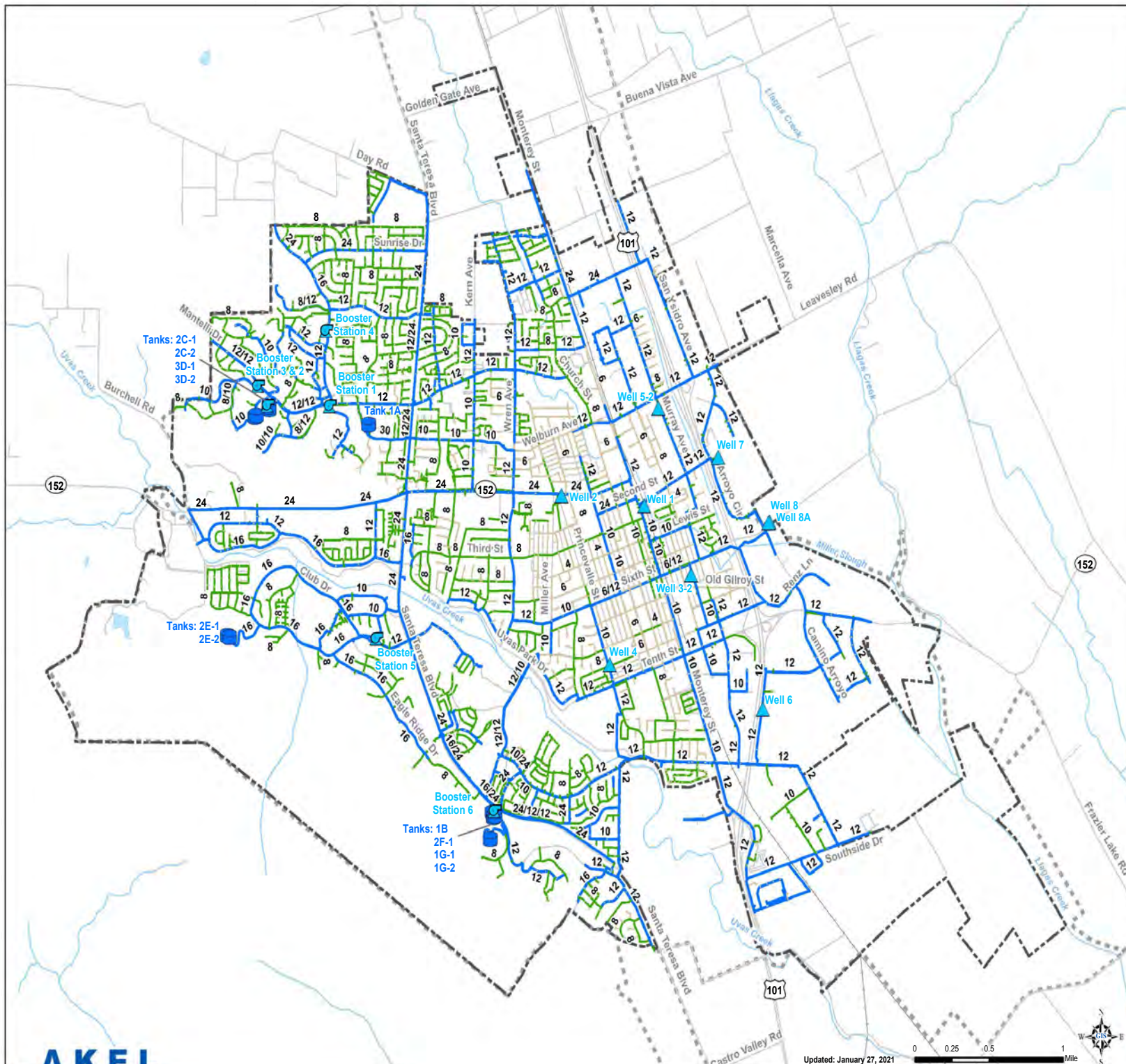
Legend

Existing System

- Tanks
- ▲ Wells
- ⬮ Booster Pumps

Existing Pipes by Diameter

- 4" - 6"
- 8"
- 10" - 30"
- Roads
- Railroads
- City Limits
- Urban Growth Boundary
- Rivers & Creeks
- Waterbodies



**Figure ES.3
Existing System**

Water System Master Plan
City of Gilroy



Table ES.1 Planning and Design Criteria Summary
Water System Master Plan
City of Gilroy

Design Parameter	Criteria
Supply	Supply = Maximum Day Demand + Standby Well (1,805 gpm)
Storage	Total Required Storage = Operational + Fire + Emergency For Pressure Zone 1 Operational Storage 25% of Maximum Day Demand Fire Storage Varies Emergency Storage 25% of Maximum Day Demand For Pressure Zones 2 and 3 Operational Storage 25% of Maximum Day Demand Fire Storage Varies Emergency Storage 50% of Maximum Day Demand
Booster Pumps	Pumping Capacity = Maximum Day Demand
Distribution Mains	Distribution mains should be designed to meet the greater of: 1) Peak Hour Demand, or 2) Maximum Day Demand + Fire Flow Criteria for existing and future pipelines include: Maximum pipe velocity of 8 feet per second Maximum friction losses of 10 feet / 1,000 feet
Service Pressures	Maximum Pressure 80 psi Minimum Pressure (during Maximum Day) 40 psi Minimum Pressure (during Peak Hour) 35 psi Minimum Pressure for New Development¹ (during Peak Hour) 40 psi Minimum Residual Pressure (during Fires) 20 psi
Demand Peaking Factors	Maximum Month Demand 1.50 x Average Day Demand Maximum Day Demand 2.00 x Average Day Demand Peak Hour Demand 3.00 x Average Day Demand
Fire Flows	Residential 1,500 gpm for 2 hours Commercial 2,500 gpm for 2 hours Industrial 5,000 gpm for 3 hours
Time-of-Use²	Time-of-Use considerations account for off-peak energy rate schedule before 4 PM and after 9 PM (19-hour pumping period).
Urban Water Use Targets	
2020 Urban Water Management Plan	Existing Coefficient 166 gpd/c 2015 Interim Target 149 gpd/c 2020 Target (20% Conservation) 133 gpd/c

Notes:

1. Unless otherwise noted, criteria is based on California Department of Public Health Title 22, Chapter 16, Article 8.

2. Source: PG&E Time-of-Use Pricing Schedule.

5/11/2021

Table ES.2 Buildout Water Demands
 Water System Master Plan
 City of Gilroy

Land Use Classification	Water Unit Factor (gpd/acre)	Total Water Demand			Buildout of Service Area	
		Existing Unchanged (acres)	Redeveloped Area (acres)	New Development (acres)	Total Area (acres)	Average Day Demand (gpd)
Residential						
Hillside Residential	1,270	442	112	353	907	1,151,593
Low Density Residential	2,000	1,583	122	89	1,794	3,587,897
Medium Density Residential	3,280	58	177	6	240	788,743
High Density Residential	4,260	67	18	18	104	442,583
Subtotal - Residential		2,151	429	466	3,045	5,970,816
Non-Residential						
Office and Commercial ¹	1,100	465	281	100	846	930,592
Industrial ²	990	293	213	643	1,149	1,137,375
Public Facility / Institution	180	559	153	129	841	151,310
Neighborhood District	1,140	0	38	358	395	450,832
City Gateway District	1,140	0	20	7	27	31,122
Downtown Specific Plan Area ³	Varies	0	57	32	89	210,626
Mixed Use Corridor High	1,100	0	25	7	33	35,976
Hecker Pass Special Use District ⁴	Varies	0	328	88	416	528,763
Glen Loma Ranch ⁴	Varies	0	103	237	341	577,791
Industrial Park	990	0	43	40	83	82,587
Employment Center	1,100	0	279	251	530	583,081
Subtotal - Non-Residential		1,317	1,541	1,893	4,750	4,720,055
Other						
Park and Recreation Facility	410	995	0	154	1,149	471,009
Vacant	0	0	0	0	0	0
Open Space	0	253	0	1,045	1,298	0
Rural County	0	0	28	3	30	0
Subtotal - Other		1,247	28	1,202	2,477	471,009
Total						
		4,714	1,997	3,561	10,272	11,161,880

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4/20/2022

Notes:

1. Office and Commercial accounts for Visitor Serving Commercial and General Services Commercial Land Use types.
2. Industrial accounts for General Industrial and Campus Industrial Land Use types.
3. Downtown Specific Plan Water Unit Factors vary based on land use.
4. Glen Loma and Hecker Pass water demand estimated separately, based on itemized land use plan and associated land use factors.

options for steady-state and extended period simulations. As part of this master plan, the hydraulic model has been updated for consistency the City's current GIS database and redeveloped using the InfoWater hydraulic modeling software, available from Innovyze Inc. This software is directly integrated with ESRI's ArcGIS (GIS) environment, providing a useful modeling tool linked to the City's newly developed GIS database.

ES.8 FIRE FLOW ANALYSIS

The fire flow analysis consisted of using the maximum day demand in the hydraulic model and applying hypothetical fire flows. The magnitude and duration of each fire flow was based on the governing land use type within proximity to the fire location. The criterion for fire flows was also summarized in the System Performance and Design Criteria chapter. The hydraulic model indicates that the City's existing distribution system performed adequately during the fire flow analysis, with the exceptions noted in the Evaluation and Proposed Improvements Chapter.

ES.9 SUPPLY AND STORAGE EVALUATION

The water supply source, in this case groundwater, must meet the maximum day demands for both existing and future growth conditions. Additionally, the groundwater supply capacity must include a redundancy, which assumes the largest well remains out of service due to equipment malfunction or reduced supply capacity during droughts.

Currently, the City of Gilroy's existing water supply requirement based on current water demands is approximately 16.3 MGD. The water supply evaluation indicates the available capacity is approximately 19.8 MGD, which results in a supply surplus of 3.5 MGD. Similarly, the future supply requirement based on the buildout of the 2040 General Plan is approximately 24.9 MGD, which results in a supply deficit of 5.1 MGD. As such, three new groundwater wells are recommended to meet city performance and design criteria. The first new well is recommended to be operational by year 2033, the second well by year 2041 and the third well by year 2048.

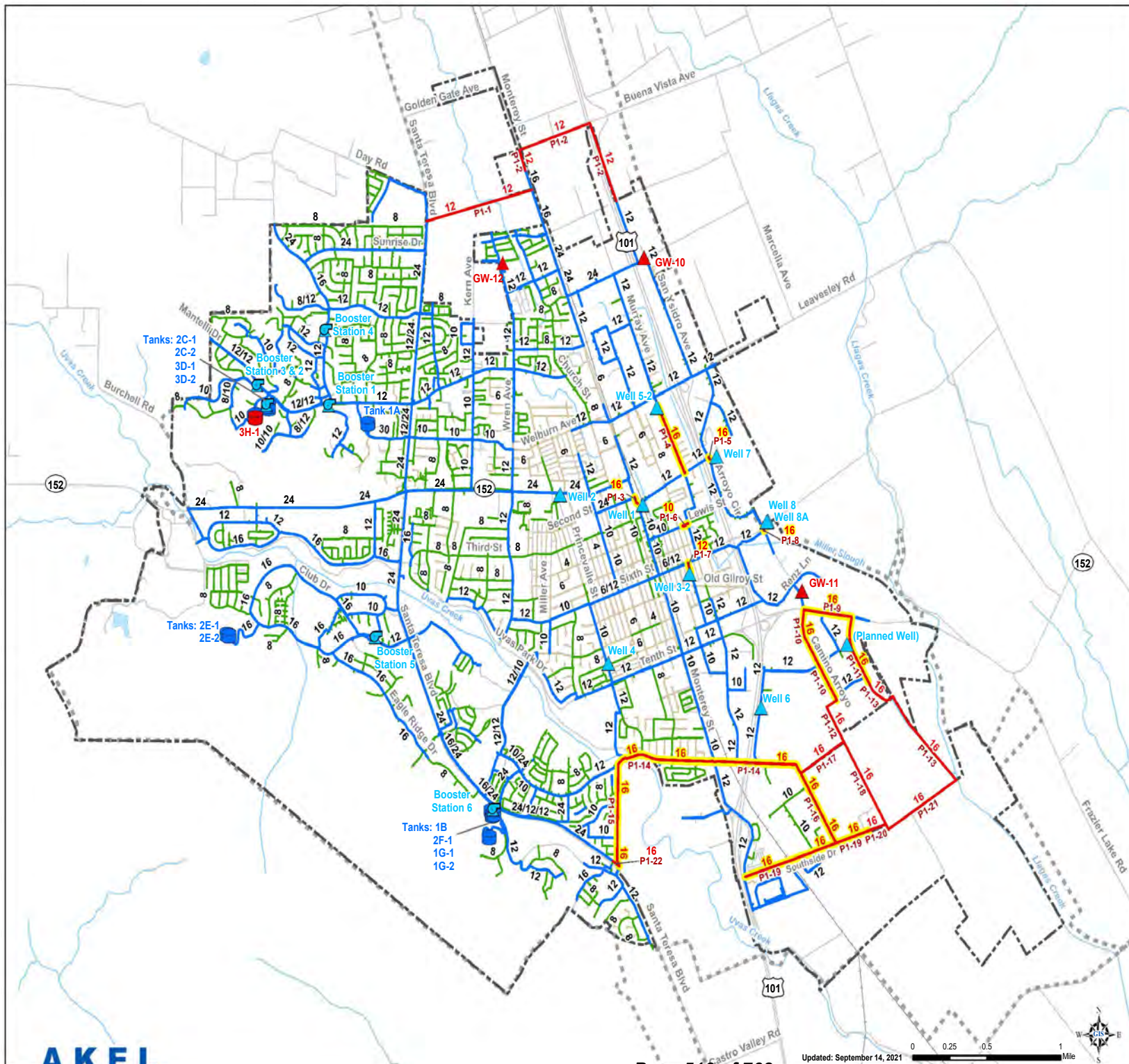
A water storage evaluation was also conducted in each pressure zone based on City's operational, emergency and fire storage criteria. The results of the storage analysis indicate that the existing storage volume is sufficient under existing conditions but is unable to meet the requirements for both existing and future customers at the buildout of the General Plan. Therefore, a new storage reservoir with a capacity of 0.1 MG is recommended specifically in Zone 3 to mitigate future deficiency.

ES.10 CAPITAL IMPROVEMENT PROGRAM

The overall capital improvements required for mitigating existing system deficiencies and for serving anticipated future growth throughout the City are summarized on [Table ES.3](#), and are graphically represented on [Figure ES.4](#). The unit costs for pipeline improvements, reservoir construction and groundwater well construction are also identified on [Table ES.4](#).

The estimated construction costs include the baseline costs plus **30 percent** contingency allowance to account for unforeseen events and unknown field conditions. Capital improvement costs include the estimated construction costs plus **30 percent** project-related costs (engineering design, project administration, construction management and inspection, and legal costs).

The costs in this Water System Master Plan were benchmarked using a 20-City national average Engineering News Record (ENR) Construction Cost Index (CCI) of 13,176, reflecting a date of March 2023. In total, the CIP includes approximately 9.8 miles of pipeline improvements, one new reservoir and three new groundwater wells with a total capital cost of over 37.6 million dollars.



Legend

Recommended Improvements

- Tanks
- ▲ Wells
- New Pipes
- Pipe Replacements

Existing System

- Tanks
- ▲ Wells
- Booster Pumps

Existing Pipes by Diameter

- 4" - 6"
- 8"
- 10" - 30"
- Roads
- Railroads
- City Limits
- Urban Growth Boundary
- Rivers & Creeks
- Waterbodies

Figure ES.4 Capital Improvement Program

Water System Master Plan
City of Gilroy



Table ES.3 Capital Improvement Program

Water System Master Plan
City of Gilroy

PRELIMINARY																		
Improv. No.	Improv. Type	Pressure Zone	Alignment	Limits	Pipeline Information		Infrastructure Costs				Baseline Constr. Costs	Estimated Const. Costs¹	Capital Improv. Costs²	Construction Trigger	Suggested Cost Allocation		Cost Sharing	
					Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost					Existing Users	Future Users	Existing Users	Future Users
					(in)		(in)	(ft)	(\$)	(\$)	(\$)	(\$)						
Pipeline Improvements																		
P1-1	Future Growth	Zone 1	Day Rd	From Santa Teresa Blvd to Monterey Hwy	-	New	12	3,860	254	978,700	978,700	1,272,400	1,654,200	With Development	0%	100%	0	1,654,200
P1-2	Future Growth	Zone 1	Monterey Hwy / Orsetti Rd / Hwy 101	From approx. 620' n/o Day Rd to Cohansey Ave	-	New	12	5,780	254	1,465,500	1,465,500	1,905,200	2,476,800	With Development	0%	100%	0	2,476,800
P1-3	Existing Deficiency	Zone 1	Monterey Hwy	From 2nd St to loof Ave	12	Replace	16	230	304	70,000	70,000	91,000	118,300	Existing Deficiency	100%	0%	118,300	0
P1-4	Existing Deficiency	Zone 1	Murray Ave	From Well 5-02 to loof Ave	12	Replace	16	2,200	304	669,400	669,400	870,300	1,131,400	Existing Deficiency	100%	0%	1,131,400	0
P1-5	Existing Deficiency	Zone 1	Arroyo Cir	From Well 7 to loof Ave	12	Replace	16	70	304	21,300	21,300	27,700	36,100	Existing Deficiency	100%	0%	36,100	0
P1-6	Existing Deficiency	Zone 1	Lewis St	From approx. 180' e/o Forest St to Chestnut St	8	Replace	10	230	211	48,600	48,600	63,200	82,200	Existing Deficiency	100%	0%	82,200	0
P1-7	Existing Deficiency	Zone 1	Forest St	From Well 3 to 6th St	10	Replace	12	320	254	81,200	81,200	105,600	137,300	Existing Deficiency	100%	0%	137,300	0
P1-8	Existing Deficiency	Zone 1	Gilman Rd / Camino Arroyo	From Well 8 to approx. 80' se/o Gilman Rd	12	Replace	16	300	304	91,300	91,300	118,700	154,400	Existing Deficiency	100%	0%	154,400	0
P1-9	FF Reliability	Zone 1	Pacheco Pass Hwy	From Camino Arroyo to Cameron Blvd	12	Replace	16	1,730	304	526,400	526,400	684,400	889,800	As Funding is Available	100%	0%	889,800	0
P1-10	FF Reliability	Zone 1	Camino Arroyo	From Pacheco Pass Hwy to Venture Wy	12	Replace	16	3,040	304	925,000	925,000	1,202,500	1,563,300	As Funding is Available	100%	0%	1,563,300	0
P1-11	FF Reliability	Zone 1	Cameron Blvd	From Pacheco Pass Hwy to approx. 200' se/o Venture Wy	12	Replace	16	2,100	304	639,000	639,000	830,700	1,080,000	As Funding is Available	100%	0%	1,080,000	0
P1-12	Future Growth	Zone 1	ROW	From Camino Arroyo to approx. 1,800' e/o Luchessa Ave	-	New	16	1,620	304	492,900	492,900	640,800	833,100	With Development	0%	100%	0	833,100
P1-13	Future Growth	Zone 1	ROW / Cameron Blvd	From approx. 200' se/o Venture Wy to Southside Dr	-	New	16	4,540	304	1,381,300	1,381,300	1,795,700	2,334,500	With Development	0%	100%	0	2,334,500
P1-14	FF Reliability	Zone 1	Luchessa Ave	From Thomas Rd to Rossi Ln	12	Replace	16	6,480	304	1,971,600	1,971,600	2,563,100	3,332,100	As Funding is Available	100%	0%	3,332,100	0
P1-15	FF Reliability	Zone 1	Thomas Rd	From Luchessa Ave to Santa Teresa Rd	12	Replace	16	3,060	304	931,000	931,000	1,210,300	1,573,400	As Funding is Available	100%	0%	1,573,400	0
P1-16	FF Reliability	Zone 1	Rossi Ln	From Luchessa Ave to Southside Dr	12	Replace	16	2,730	304	830,600	830,600	1,079,800	1,403,800	As Funding is Available	100%	0%	1,403,800	0
P1-17	Future Growth	Zone 1	ROW	From Luchessa Ave to approx. 1,800' e/o Luchessa Ave	-	New	16	1,810	304	550,700	550,700	716,000	930,800	With Development	0%	100%	0	930,800
P1-18	Future Growth	Zone 1	ROW	From approx. 1,800' e/o Luchessa Ave to Southside Dr	-	New	16	2,890	304	879,300	879,300	1,143,100	1,486,100	With Development	0%	100%	0	1,486,100
P1-19	FF Reliability	Zone 1	Garlic Farm Wy / Southside Dr	From Hwy 101 to Arizona Cir	12	Replace	16	4,630	304	1,408,700	1,408,700	1,831,400	2,380,900	As Funding is Available	100%	0%	2,380,900	0
P1-20	Future Growth	Zone 1	Southside Dr	From Arizona Cir to approx. 660' e/o Arizona Cir	-	New	16	660	304	200,900	200,900	261,200	339,600	With Development	0%	100%	0	339,600
P1-21	Future Growth	Zone 1	Southside Dr	From approx. 660' e/o Arizona Cir to Camaron Blvd	-	New	16	3,010	304	915,800	915,800	1,190,600	1,547,800	With Development	0%	100%	0	1,547,800
P1-22	Future Growth	Zone 1	Santa Teresa Blvd	From approx. 160' w/o Thomas Rd to approx. 110' e/o Thomas Rd	-	New	16	280	304	85,200	85,200	110,800	144,100	With Development	0%	100%	0	144,100
					Subtotal - Pipeline Improvements						15,164,400	19,714,500	25,630,000				13,883,000	11,747,000
Storage Reservoir Improvements					Proposed Storage Capacity (MG)													
3H-1	Storage Capacity	Zone 3	Construct an additional 0.1 MG storage reservoir at existing 3D site			New		0.10		133,442	133,500	173,600	225,700	813 EDU	0%	100%	0	225,700
					Subtotal - Storage Reservoir Improvements						133,500	173,600	225,700				0	225,700

Table ES.3 Capital Improvement Program

Water System Master Plan
City of Gilroy

PRELIMINARY																			
Improv. No.	Improv. Type	Pressure Zone	Alignment	Limits	Pipeline Information		Infrastructure Costs				Baseline Constr. Costs	Estimated Const. Costs ¹	Capital Improv. Costs ²	Construction Trigger	Suggested Cost Allocation		Cost Sharing		
					Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost					Existing Users	Future Users	Existing Users	Future Users	
					(in)		(in)	(ft)	(\$)	(\$)		(\$)	(\$)						
Groundwater Well Improvements					Proposed Pumping Capacity (gpm)														
GW-10	Supply Capacity	Zone 1	Construct new well near the intersection of San Ysidro Ave and Las Animas Ave		New		1,500		-	-	-	-	3,922,000	9,500 EDU	0%	100%	0	3,922,000	
GW-11	Supply Capacity	Zone 1	Construct new well near the intersection of Camino Arroyo and Renz Lane		New		1,500		-	-	-	-	3,922,000	15,550 EDU	0%	100%	0	3,922,000	
GW-12	Supply Capacity	Zone 1	Construct new well near the intersection of Wren Ave and Vickery Ln		New		1,500		-	-	-	-	3,922,000	21,600 EDU	0%	100%	0	3,922,000	
					Subtotal - Groundwater Well Improvements					0	0	11,766,000					0	11,766,000	
Total Improvement Cost																			
										Pipeline Improvements			15,164,400	19,714,500	25,630,000			13,883,000	11,747,000
										Storage Reservoirs			133,500	173,600	225,700			0	225,700
										Groundwater Wells			0	0	11,766,000			0	11,766,000
										Total Improvement Costs			15,297,900	19,888,100	37,621,700			13,883,000	23,738,700



Notes:

1. Baseline construction costs plus 30% to account for unforeseen events and unknown conditions.
2. Estimated construction costs plus 30% to cover other costs including: engineering design, project administration (developer and City staff), construction management and inspection, and legal costs.
3. Cost estimates are based on the Engineering News Record (ENR) construction cost index (CCI) of 13,176 for March 2023.

3/29/2023

Table ES.4 Unit Costs
 Water System Master Plan
 City of Gilroy

Pipelines	
Pipe Size (in)	Cost ^{1,2} (\$/lineal foot)
6	\$153
8	\$187
10	\$211
12	\$254
16	\$304
18	\$312
20	\$336
24	\$400
30	\$500
36	\$560
42	\$705
Pump Stations	
Estimated Pumping Station Project Cost = $2.1 * 10^{(0.7583 * \log(Q) + 3.1951)}$ where Q is in gpm	
Storage Reservoirs (\$/gallon) ^{1,3}	
≤1.0 MG	\$1.33
1.1 MG-3.0 MG	\$2.11
3.1 MG - 5.0 MG	\$3.22
> 5 MG	\$4.89
Groundwater Wells ^{1,4,5}	
1,500 gpm Capacity	\$3,922,000



3/28/2023

Notes:

1. Construction costs estimated using March 2023 ENR CCI of 13,176.
2. Pipeline costs include utilities, construction staging, traffic control, and lighting and signing
3. Source: City of Gilroy 2004 Water System Master Plan
4. Source: City of Gilroy 2021-2025 Capital Improvement Program
5. One new 1,500 gpm well costs \$3,626,645, per City of Gilroy 2021-2025 Capital Improvement Program. The cost accounts for Design, CEQA, Construction, Con. Support, and Land Acquisition

CHAPTER 1 - INTRODUCTION

This chapter provides a brief background of the City of Gilroy's (City) domestic water system, the need for this master plan, and the objectives of the study. Unit conversions, abbreviations, and definitions are also provided in this chapter.

1.1 BACKGROUND

The City of Gilroy is located approximately 32 miles southeast of the City of San Jose, 8 miles southeast of Morgan Hill, 25 miles east of the City of Santa Cruz, and 16 miles northwest of the City of Hollister. ([Figure 1.1](#)). The City provides potable water service to approximately 56,700 residents, as well as a myriad of commercial, industrial, and institutional establishments. The City operates a domestic water distribution system that consists of 9 groundwater wells, 10 storage reservoirs providing 14.1 MG total storage, and approximately 202 miles of distribution pipelines.

In 2004, the City developed a Water System Master Plan that identified capacity deficiencies in the existing water system and recommended improvements to alleviate existing deficiencies and service anticipated developments in the Gilroy Urban Growth Boundary.

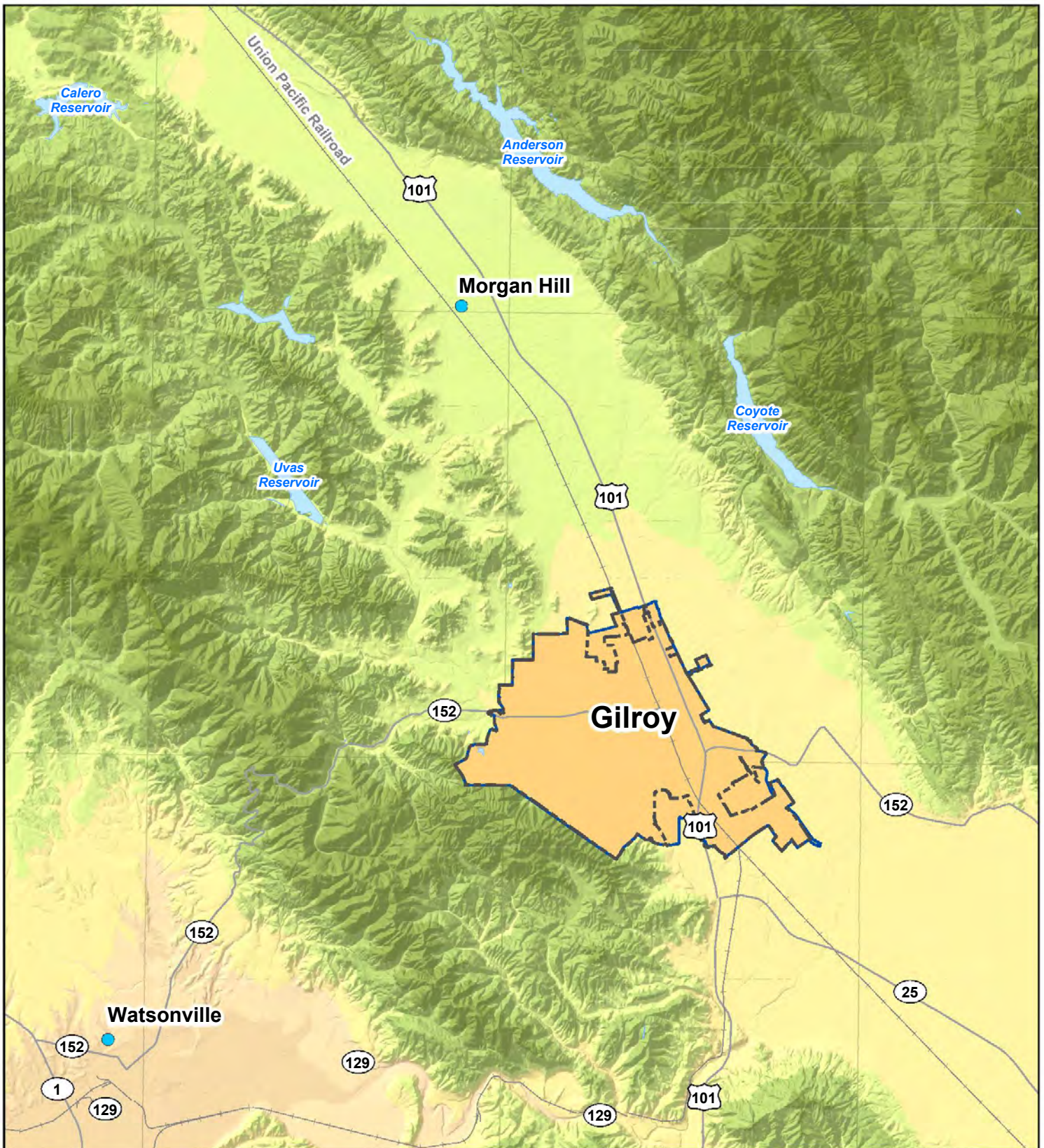
Recognizing the importance of planning, developing, and financing system facilities to provide reliable water service to existing customers and for servicing anticipated growth within the Gilroy Urban Growth Boundary, the City initiated updating elements of the 2004 Water System Master Plan, to reflect current land use conditions.

1.2 SCOPE OF WORK

City Council approved Akel Engineering Group Inc. to prepare this 2022 Water System Master Plan (WSMP) and a concurrent Sewer System Master Plan and Storm Drainage System Master Plan in August 2019. The 2022 WSMP evaluates the City's domestic water system and recommends capacity improvements necessary to service the needs of existing users and for servicing the future growth of the City. This 2022 WSMP is intended to serve as a tool for planning and phasing the construction of future domestic water system infrastructure for the projected buildout of the City's service area. The area and horizon for this master plan is based on the City's General Plan. Should planning conditions change, and depending on their magnitude, adjustments to the master plan recommendations might be necessary.

This master plan included the following tasks:

- Summarizing the City's existing domestic water system facilities.
- Documenting growth planning assumptions and known future developments.
- Summarizing the water system performance criteria.



Legend

- Cities
 - Study Area
 - City Limits
 - Urban Growth Boundary
 - Highway
 - Railroads
- | Elevation (ft) | |
|----------------|---------------|
| | 9 - 50 |
| | 51 - 100 |
| | 101 - 250 |
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| | 1,001 - 2,000 |
| | 2,001 - 3,000 |
| | 3,001 - 3,792 |
- ~ Waterbodies

Updated: September 21, 2020

0 0.5 1 2 Miles



Figure 1.1
Regional Location Map
Water System Master Plan
City of Gilroy



- Projecting future domestic water demands.
- Updating and validating the City's hydraulic model based on the City's Geographic Information Systems (GIS).
- Evaluating the domestic water facilities to meet existing and projected demand requirements and fire flows.
- Evaluating the existing groundwater conditions.
- Performing a capacity analysis for major distribution mains.
- Performing a fire flow analysis.
- Recommending a capital improvement program (CIP) with an estimation of probable costs.
- Performing a capacity allocation analysis for cost sharing purposes.
- Developing a 2023 Water System Master Plan report.

1.3 INTEGRATED APPROACH TO MASTER PLANNING

The City implemented an integrated master planning approach and contracted the services of Akel Engineering Group to prepare the following documents:

- 2023 Water System Master Plan
- 2023 Sewer System Master Plan
- 2023 Storm Drainage System Master Plan

While each of these reports is published as a standalone document, it has been coordinated for consistency with the City's General Plan. Additionally, each document has been cross referenced to reflect relevant analysis results with the other documents.

1.4 PREVIOUS MASTER PLANS

The City's most recent water master plan was completed in 2004. This master plan included an evaluation of servicing growth to the planning area, evaluated existing demands and projected future demands, evaluated groundwater conditions and management, and recommended phased improvements to the water system for a horizon year of 2040. Additionally, the 2004 master plan included the development of the original hydraulic model, which was then used for evaluating the water system. Improvements were recommended for servicing existing and future growth areas, and a corresponding Capital Improvement Program was developed to quantify construction costs.

1.5 RELEVANT REPORTS

The City has completed several special studies intended to evaluate localized growth. These reports were referenced and used during this capacity analysis. The following lists relevant reports

that were used in the completion of this master plan, as well as a brief description of each document:

- **City of Gilroy 2040 General Plan, November 2020 (2040 GP).** The City's 2040 General Plan provides future land use planning, and growth assumptions for the Planning Area. Additionally, this report establishes the planning horizon for improvements in this master plan.
- **City of Gilroy Water System Master Plan, February 2004 (2004 SSMP).** This report documents the planning and performance criteria, evaluates the water system, recommends improvements, and provides an estimate of costs.

1.6 REPORT ORGANIZATION

The water system master plan report contains the following chapters:

Chapter 1 - Introduction. This chapter provides a brief background of the City's domestic water system, the need for this master plan, and the objectives of the study. Abbreviations and definitions are also provided in this chapter.

Chapter 2 - Planning Areas Characteristics. This chapter presents a discussion of the planning area characteristics for this master plan and defines the land use classifications. The planning area is divided into several planning sub-areas, as established by the City's Planning Division.

Chapter 3 – System Performance and Design Criteria. This chapter presents the City's performance and design criteria, which was used in this analysis for identifying current system capacity deficiencies and for sizing proposed distribution mains, storage reservoirs, and wells.

Chapter 4 – Existing Domestic Water Facilities. This chapter provides a description of the City's existing domestic water system facilities including the existing wells, distribution mains, storage reservoirs, and booster station pumps.

Chapter 5 - Water Demands and Supply Characteristics. This chapter summarizes groundwater quality, existing domestic water demands, identifies the recycled water demands, and projects the future domestic water demands.

Chapter 6 - Hydraulic Model Development. This chapter describes the development and calibration of the City's domestic water distribution system hydraulic model. This hydraulic model was used to evaluate the capacity adequacy of the existing system and to plan its expansion to service anticipated future growth.

Chapter 7 - Evaluation and Proposed Improvements. This chapter presents a summary of the domestic water system evaluation and identifies improvements needed to mitigate existing deficiencies, as well as improvements needed to expand the system and service growth.

Chapter 8- Capital Improvement Program. This chapter provides a summary of the recommended domestic water system improvements to mitigate existing capacity deficiencies and to accommodate anticipated future growth. The chapter also presents the cost criteria and methodologies for developing the capital improvement program. Finally, a capacity allocation analysis, usually used for cost sharing purposes, is also included.

1.7 ACKNOWLEDGEMENTS

Obtaining the necessary information to successfully complete the analysis presented in this report, and developing the long term strategy for mitigating the existing system deficiencies and for accommodating future growth, was accomplished with the strong commitment and very active input from dedicated team members including:

- Karen L. Garner; Community Development Director
- Gary Heap, P.E.; City Engineer
- Jorge Duran, P.E.; Senior City Engineer
- Daryl Jordan, P.E.; Director of Public Works
- Matt Jones, Deputy Public Works Director

1.8 UNIT CONVERSIONS AND ABBREVIATIONS

Engineering units were used in reporting flow rates and volumes pertaining to the design and operation of various components of the domestic water system. Where it was necessary to report values in smaller or larger quantities, different sets of units were used to describe the same parameter. Values reported in one set of units can be converted to another set of units by applying a multiplication factor. A list of multiplication factors for units used in this report is shown on [Table 1.1](#).

Various abbreviations and acronyms were also used in this report to represent relevant water system terminologies and engineering units. A list of abbreviations and acronyms is included in [Table 1.2](#).

1.9 GEOGRAPHIC INFORMATION SYSTEMS

This master planning effort made extensive use of Geographic Information Systems (GIS) technology, for completing the following tasks:

- Develop the physical characteristics of the hydraulic model (pipes and junctions, wells, and storage reservoirs).
- Allocate existing water demands, as extracted from the water billing records, and based on each user's physical address.

Table 1.1 Unit Conversions
 Water System Master Plan
 City of Gilroy

Volume Unit Calculations		
To Convert From:	To:	Multiply by:
acre feet	gallons	325,851
acre feet	cubic feet	43,560
acre feet	million gallons	0.3259
cubic feet	gallons	7.481
cubic feet	acre feet	2.296×10^{-5}
cubic feet	million gallons	7.481×10^{-6}
gallons	cubic feet	0.1337
gallons	acre feet	3.069×10^{-6}
gallons	million gallons	1×10^{-6}
million gallons	gallons	1,000,000
million gallons	cubic feet	133,672
million gallons	acre feet	3.069
Flow Rate Calculations		
To Convert From:	To:	Multiply By:
ac-ft/yr	mgd	8.93×10^{-4}
ac-ft/yr	cfs	1.381×10^{-3}
ac-ft/yr	gpm	0.621
ac-ft/yr	gpd	892.7
cfs	mgd	0.646
cfs	gpm	448.8
cfs	ac-ft/yr	724
cfs	gpd	646300
gpd	mgd	1×10^{-6}
gpd	cfs	1.547×10^{-6}
gpd	gpm	6.944×10^{-4}
gpd	ac-ft/yr	1.12×10^{-3}
gpd	ac-ft/yr	1.44×10^{-3}
gpm	mgd	2.228×10^{-3}
gpm	cfs	1.61
gpm	ac-ft/yr	
gpm	gpd	1,440
mgd	cfs	1.547
mgd	gpm	694.4
mgd	ac-ft/yr	1,120
mgd	gpd	1,000,000

Table 1.2 Abbreviations and Acronyms
Water System Master Plan
City of Gilroy

Abbreviation	Expansion	Abbreviation	Expansion
2004 WSMP	2004 Water System Master Plan	gpd	gallons per day
2021 WSMP	2021 Water System Master Plan	gpcd	gallons per day per capita
AACE International	Association for the Advancement of Cost Engineering	gpm	gallons per minute
AC	acre	hp	horsepower
ACP	Asbestos Cement Pipe	HGL	hydraulic grade line
ADD	average day demand	HWL	high water level
Akel	Akel Engineering Group, Inc.	in	inch
CCI	Construction Cost Index	LAFCO	Local Agency Formation Commission
CDPH	California Department of Public Health	LF	linear feet
cfs	cubic feet per second	MDD	maximum day demand
CI	cast iron pipe	MG	million gallons
CIB	Capital Improvement Budget	MGD	million gallons per day
CIP	Capital Improvement Program	MMD	maximum month demand
City	City of Gilroy	NFPA	National Fire Protection Association
County	Santa Clara County	PHD	peak hour demand
DIP	Ductile Iron Pipe	PRV	pressure reducing valve
DU	dwelling unit	psi	pounds per square inch
EDU	equivalent dwelling unit	ROW	Right of Way
ENR	Engineering News Record	SCADA	Supervisory Control and Data Acquisition
EPA	Environmental Protection Agency	SOI	Sphere of Influence
EPS	Extended Period Simulation	TBD	to be determined
FRC	Facility Reserve Charge	ULL	Urban Limit Line
ft	feet	VW	Valley Water
fps	feet per second	WSMP	Water System Master Plan
FY	Fiscal Year	WTP	Water Treatment Plant
GIS	Geographic Information Systems		

- Calculate and allocate future water demands, based on future developments' water use.
- Extract ground elevations along the distribution mains from available contour maps.
- Generate maps and exhibits used in this master plan.

CHAPTER 2 – PLANNING AREA CHARACTERISTICS

This chapter presents a discussion of the planning area characteristics for this master plan and defines the land use classifications. The planning area is divided into several planning sub-areas, as established by the City's Planning Division.

2.1 STUDY AREA DESCRIPTION

The City of Gilroy is located in Santa Clara County near the west coast of California, south of City of San Francisco. The City of Gilroy lies within the seismically active region of San Francisco Bay. The City of Gilroy lies in the southern portion of the Santa Clara County and is the most southern city located within the county. The City is located approximately 32 miles southeast of the City of San Jose, 8 miles southeast of Morgan Hill, 25 miles east of City of Santa Cruz, and 16 miles northwest of City of Hollister. The City limits currently encompass 16.5 square miles, with an approximate population of 56,600 residents, according to the Department of Finance as of January 2021. [Figure 1.1](#) displays the City's location.

The City of Gilroy is generally bound to the north by Fitzgerald Ave, to the northeast by San Ysidro Avenue, to the southeast by Camino Arroyo, to the west by Burchell Road and Rancho Vista Drive, and to the south by Carnadero Avenue. The U.S. Route 101 divides the City in a southeast to northwest direction and the California State Route 152 (Hecker Pass Hwy) runs east-west direction in the northern half of the City. The topography is relatively flat in the middle of the service area, with increasing slopes in the east and west side of the city due to the Santa Cruz Mountains to the west and the Diablo Range to the east. [Figure 2.1](#) displays the planning area showing city limits, the Urban Growth Boundary (UGC) of the City and Planning Area / Sphere of Influence (SOI).

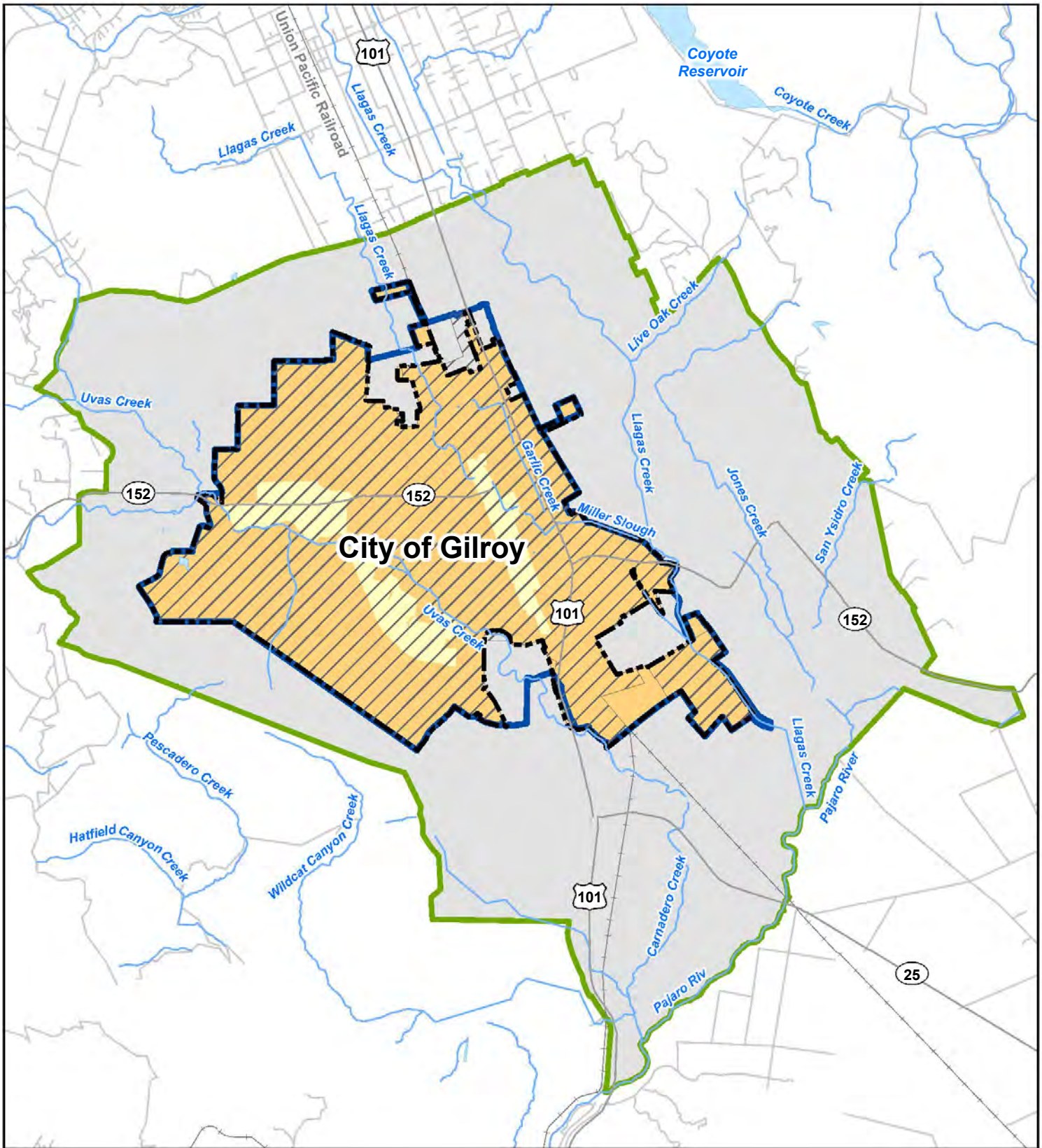
The City operates and maintains a domestic water system that covers the majority of the area within the service area limits. Currently, the water demands are provided from groundwater wells located throughout the service area.

2.2 WATER SERVICE AREA AND LAND USE

The City's domestic water system services residential and non-residential lands within the City limits, as summarized on [Table 2.1](#) and shown graphically on [Figure 2.2](#). Areas within the City's existing service area include:

- 5,429 acres of developed lands inside the City limits
- 3,673 acres of undeveloped lands inside the City limits.

At ultimate development of the General Plan, the City's domestic water system is anticipated to serve approximately 3,045 acres of residential land use, 4,750 acres of non-residential land use,



Legend

- | | |
|------------------------------|-------------------|
| City Limits | General Plan Area |
| City Limits Area | Roads |
| Specific Plan Areas | Highways |
| Urban Service Area | Railroads |
| Urban Growth Boundary | Rivers & Creeks |
| Sphere of Influence Boundary | Waterbodies |

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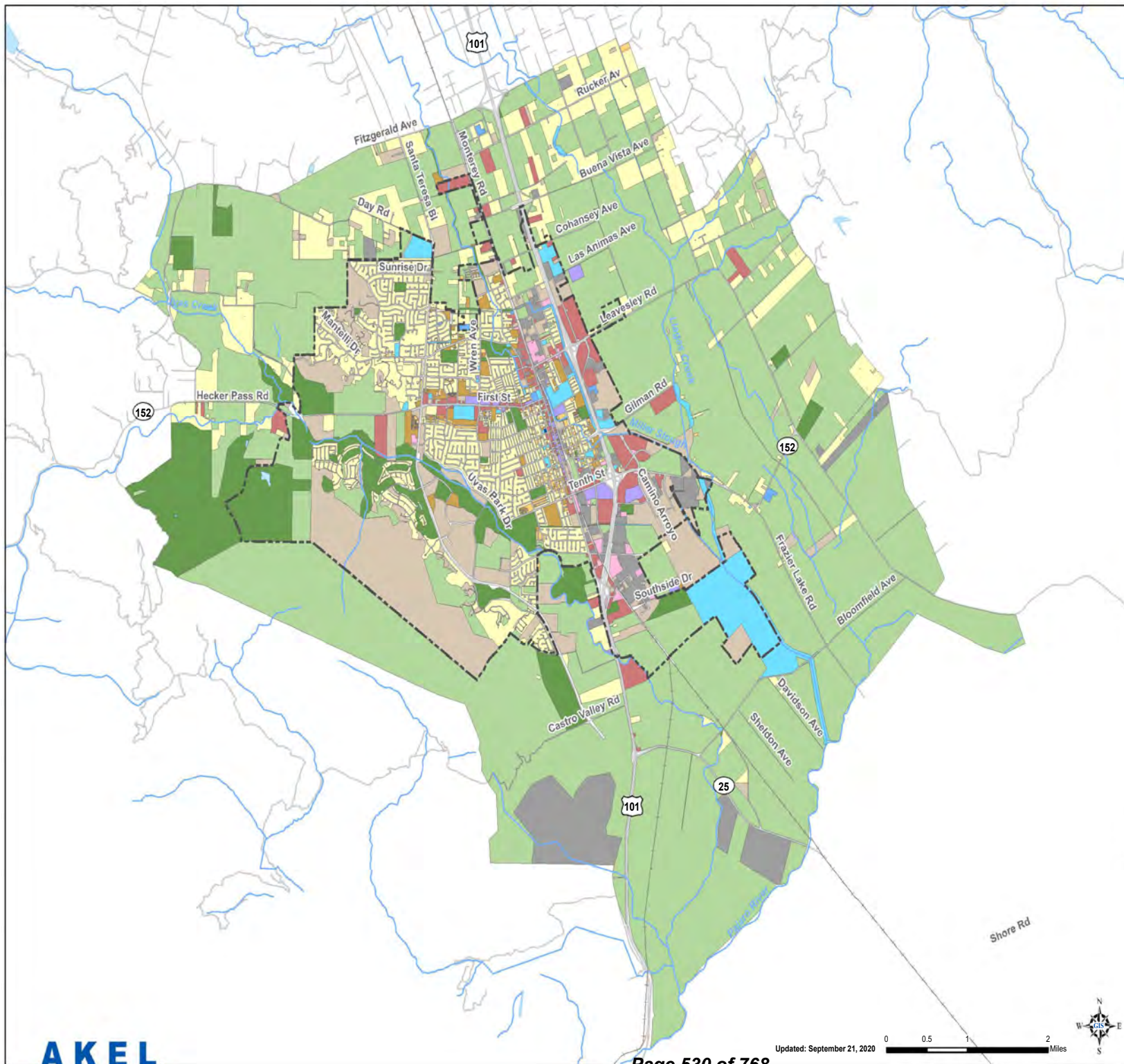
Updated: September 21, 2020

0 0.5 1 2 Miles



Figure 2.1
Planning Area
Water System Master Plan
City of Gilroy

gilroy



Legend

Existing Land Use

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Neighborhood District
- Public/Quasi-Public Facility
- Educational Facility
- Professional Office
- General Services Commercial
- Visitor-Serving Commercial
- Industrial
- Open Space
- Park and Recreation Facility
- Vacant
- City Limits
- Roads
- Railroads
- Rivers & Creeks
- Waterbodies

Figure 2.2
Existing Land Use
Water System Master Plan
City of Gilroy



Table 2.1 General Plan Land Use
Water System Master Plan
City of Gilroy

General Plan Land Use Classification	Existing Land Use Classification	Existing Development			Future Development				Total Development	
		Within City Limits		Subtotal Existing Development - Unchanged	Within City Limits		Urban Growth Boundary	Subtotal Future Development	Urban Growth Boundary	Sphere of Influence
		Existing (acre)	Existing Lands - Redeveloping (acre)		New Lands - Redevelopment (acre)	New Development (acre)				
Residential										
Rural Residential	-	0	0	0	0	0	0	0	0	0
Hillside Residential	Hillside Residential	444	-1	442	112	344	8	464	907	913
Low Density Residential	Low Density Residential	1,704	-121	1,583	122	45	44	211	1,794	4,221
Medium Density Residential	Medium Density Residential	100	-42	58	177	4	2	183	240	248
High Density Residential	High Density Residential	249	-182	67	18	15	3	36	104	111
	Subtotal - Residential	2,496	-346	2,151	429	408	58	895	3,045	5,493
Non-Residential										
Visitor Serving Commercial	Visitor Serving Commercial	99	-67	32	176	0	0	176	208	208
General Services Commercial	General Services Commercial	524	-91	432	106	55	44	205	637	837
	Professional Office	1	0	1	0	0	0	0	1	1
General Industrial	General Industrial	320	-71	249	213	255	389	856	1,105	2,036
	Campus Industrial	56	-12	44	0	0	0	0	44	44
Educational Facility	Educational Facility	12	-5	7	1	0	0	1	8	22
Public/Quasi-Public Facility	Public/Quasi-Public Facility	596	-44	552	152	102	28	281	833	1,013
Neighborhood District	Neighborhood District	94	-94	0	38	22	336	395	395	428
City Gateway District	-	0	0	0	20	7	0	27	27	27
Downtown Specific Plan Area	-	0	0	0	57	32	0	89	89	89
Mixed Use Corridor High	-	0	0	0	25	7	0	33	33	33
Hecker Pass Special Use District	-	0	0	0	328	88	0	416	416	416
Glen Loma Ranch	-	0	0	0	103	237	0	341	341	341
Industrial Park	-	0	0	0	43	40	0	83	83	83
Employment Center	-	0	0	0	279	30	222	530	530	530
	Subtotal - Non-Residential	1,701	-384	1,317	1,541	876	1,017	3,434	4,750	6,109
Other										
Agriculture	-	0	0	0	0	0	0	0	0	0
Park and Recreation Facility	Park and Recreation Facility	1,232	-238	995	0	66	88	154	1,149	2,392
Vacant	Vacant	2,391	-2,391	0	0	0	0	0	0	0
Open Space	Open Space	1,282	-1,030	253	0	1,041	4	1,045	1,298	2,897
Rural County	-	0	0	0	28	0	3	30	30	17,726
	Subtotal - Other	4,905	-3,658	1,247	28	1,107	95	1,230	2,477	23,015
Total										
	Total Developed Area	9,102	-4,388	4,714	1,997	2,391	1,170	5,558	10,272	34,616

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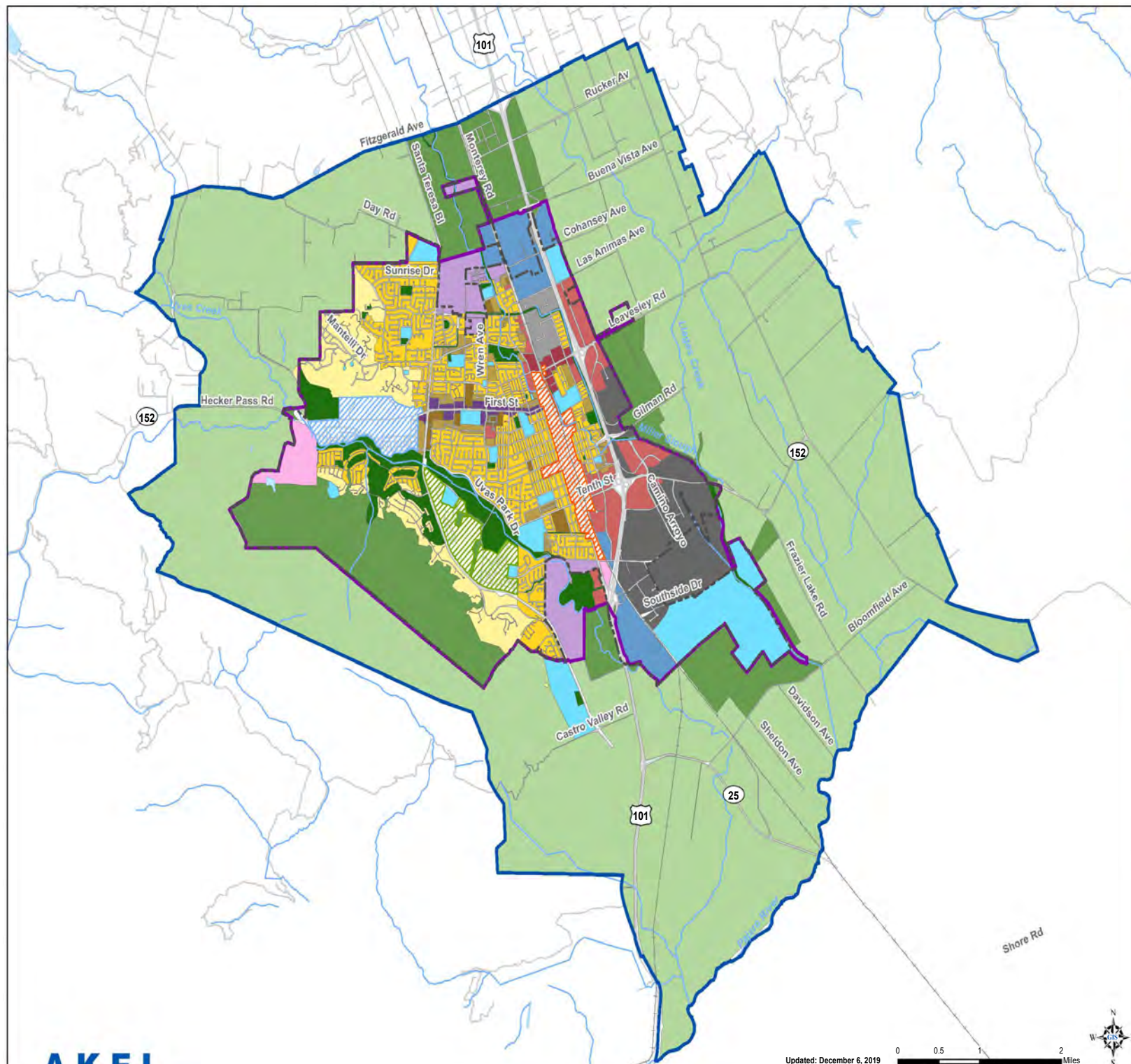
Notes:

1. Source: City of Gilroy General Plan Alternatives Report, Public Review Draft July 2019.
2. Specific Plan land use types (Downtown, Hecker Pass, Glen Loma) are comprised of multiple land use types. As such, existing land use acreages reflect existing Specific Plan development under current existing land use designations.

and 2,477 acres of other (open space and parks) land use, for a total of 10,272 acres inside the City's Urban Growth Boundary ([Table 2.1](#)). The land use designations used in this master plan are consistent with the City's 2040 General Plan. The Land Use Element received from the City's Planning Division is shown on [Figure 2.3](#).

In addition to the General Plan Land Use documented on [Figure 2.3](#), there are multiple areas of known development, which are defined by Specific Plans or other development planning information. These known development areas provide a more refined definition of planned land uses, which is critical for estimating future demands. The known development areas are summarized on [Figure 2.3](#), with the land use information shown on [Table 2.1](#). Based on a review of aerial imagery and existing land use information, some known development areas are partially developed or completely developed. The known development areas are summarized in the following sections.

- **Hecker Pass Specific Plan:** This development area includes approximately 416 acres, which includes 164 acres of residential, 154 acres of non-residential, and 98 acres of other land use as documented in [Table 2.2](#).
- **Glen Loma Specific Plan:** This development area includes approximately 341 acres, which includes 210 acres of residential, 35 acres of non-residential, and 96 acres of other land use as documented in [Table 2.2](#).
- **Downtown Specific Plan:** This development area includes approximately 202 acres, which includes 108 acres of residential and 94 acres of non-residential land use as documented in [Table 2.3](#). This development area is comprised of multiple land use districts as summarized in the following sections.
 - o **Historic Land Use District:** This development area includes approximately 18 acres, which includes 8 acres of residential and 10 acres of non-residential land use.
 - o **VTa Transit-Oriented Development:** This development area includes approximately 8 acres, which is mostly residential (7.5 acres) with very limited non-residential land use (0.3 acres).
 - o **Expansion Land Use District:** This development area includes approximately 48 acres, which includes 21 acres of residential and 27 acres of non-residential land use.
 - o **Cannery Land Use District:** This development area includes approximately 37 acres, which includes 11 acres of residential and 26 acres of non-residential land use.



Legend

- Planning Area/Sphere of Influence
- Urban Growth Boundary
- City Limits

General Plan Land Use

- Hillside Residential
- Low Density Residential
- Medium Density Residential
- High Density Residential
- General Services Commercial
- City Gateway District
- Visitor Serving Commercial
- General Industrial
- Employment Center
- Industrial Park
- Public and Quasi-Public Facility
- Neighborhood District
- Mixed Use
- Rural County
- Open Space
- Park and Recreation Facility

Specific Plan Areas

- Downtown
- Glen Loma Ranch
- Hecker Pass
- Roads
- Railroads
- Rivers & Creeks
- Waterbodies

Figure 2.3
2040 General Plan
Land Use
 Water System Master Plan
 City of Gilroy



Table 2.2 Glen Loma and Hecker Pass Specific Plans, Remaining Development Water Demand

Water Master Plan
City of Gilroy

Specific Plan	Units	Land Use Types									
		Residential				Non-Residential			Other		Total
		Hillside	Low Density	Medium Density	High Density	Office and Commercial	Public Facility / Institution	Park and Recreation Facility	Agriculture	Open Space	
Total Development ¹											
Hecker Pass	Acres	46.2	16.3	99.1	2.2	58.0	0.0	95.7	51.7	46.8	416.0
Glen Loma	Acres	0.0	112.9	70.3	26.5	0.0	26.9	8.7	0.0	95.7	341.0
Subtotal		46.2	129.2	169.5	28.7	58.0	26.9	104.3	51.7	142.5	757.0
Existing Development ²											
Hecker Pass	Acres	11.2	7.6	89.3	0.0	36.8	0.0	95.7	16.6	0.1	257.1
Glen Loma	Acres	0.0	33.7	70.3	0.3	0.0	24.5	3.9	0.0	22.0	154.7
Subtotal		11.2	41.2	159.6	0.3	36.8	24.5	99.6	16.6	22.1	411.9
Remaining Development ³											
Hecker Pass	Acres	35.0	8.8	9.9	2.2	21.2	0.0	0.0	35.1	46.7	158.8
Glen Loma	Acres	0.0	79.2	0.0	26.2	0.0	2.3	4.8	0.0	73.8	186.3
Subtotal		35.0	88.0	9.9	28.4	21.2	2.3	4.8	35.1	120.5	345.1
Existing Average Daily Demand											
		(1,270 gdp/acre)	(2,000 gdp/acre)	(3,280 gdp/acre)	(4,260 gdp/acre)	(1,100 gdp/acre)	(180 gdp/acre)	(410 gdp/acre)	(0 gdp/acre)	(0 gdp/acre)	
Hecker Pass	gpd	14,199	15,112	292,754	20	40,450	0	39,221	0	0	401,756
Glen Loma	gpd	0	67,314	230,747	1,390	0	4,417	1,604	0	0	305,472
Subtotal		14,199	82,426	523,501	1,410	40,450	4,417	40,825	0	0	707,228
Remaining Average Day Demand											
		(1,270 gdp/acre)	(2,000 gdp/acre)	(3,280 gdp/acre)	(4,260 gdp/acre)	(1,100 gdp/acre)	(180 gdp/acre)	(410 gdp/acre)	(0 gdp/acre)	(0 gdp/acre)	
Hecker Pass	gpd	44,505	17,527	32,337	9,333	23,306	0	0	0	0	127,007
Glen Loma	gpd	0	158,482	0	111,465	0	418	1,954	0	0	272,320
Subtotal		44,505	176,009	32,337	120,798	23,306	418	1,954	0	0	399,327

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Notes:

1. Unless noted otherwise, development information shown based on *Final Hecker Pass Specific Plan (May 2015)* and *Glen Loma Ranch Specific Plan (May 2014)*.
2. Existing development area based on a combination of City of Gilroy General Plan Land Use and aerial imagery review.
3. Remaining development area based on a combination of City of Gilroy General Plan Land Use and aerial imagery review.

Table 2.3 Downtown Specific Plan, Redevelopment and New Development Water Demand

Water Master Plan

City of Gilroy

Land Use Properties ¹					Estimated Land Use Breakdown ²		Development and Land Use Assumptions			Unit Factors			Additional Water Demand for Redevelopment and New Development ⁸
Land Use District	Existing Development	Re-Development	New Development	Total Buildout	Residential	Commercial	Total Dwelling Units ²	Residential Density ³	Commercial Density ²	Residential ⁴	Commercial ^{5,6}	Weighted ⁷	
	(acres)	(acres)	(acres)	(acres)	%	%	DU	DU/acre	FAR	gpd/acre	gpd/acre	gpd/acre	(gpd)
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Historic	5.4	0.8	11.7	17.9	44%	56%	56	3.1	2.5	594	2,750	1,801	22,529
VTA Transit-Oriented Development ⁹	-	7.8	0.0	7.8	96%	4%	320	41.0	2.5	7,792	2,750	7,614	59,388
Expansion	33.2	5.8	9.0	47.9	44%	56%	448	9.4	2.5	1,776	2,750	2,321	34,250
Cannery District	8.4	17.4	11.4	37.2	29%	71%	760	20.4	2.0	3,877	2,200	2,686	77,319
Transitional	20.1	0.28	0.0	20.4	69%	31%	79	3.9	1.5	735	1,650	1,019	280
Civic/Residential Only	14.8	1.3	1.0	17.0	40%	60%	14	0.8	1.5	156	1,650	1,052	2,361
Gateway	31.2	11.7	11.4	54.3	73%	27%	159	2.9	0.75	556	825	629	14,499
Total	113.1	45.0	44.4	202.5			1,836						210,626



5/12/2021

Notes:

1. Development area based on a combination of City of Gilroy General Plan Land Use, Downtown Gilroy Specific Plan, and aerial imagery review.
2. Source: Downtown Gilroy Specific Plan.
3. Residential Density calculated based on Total Dwelling Units and Total Buildout Acres.
4. Residential Unit Factor based on assumed residential density and a per dwelling unit consumption of 190 gpd/DU, which is estimated based on total High Density Residential consumption and number of dwelling units
5. Factors adjusted to account for increase in FAR.
6. WSMP Commercial Unit Factor of 1,100 gpd/acre assumes a FAR of 1.0.
7. Weighted unit factor based on Estimated Land Use Breakdown and Master Plan Unit Factors.
8. Additional water demand for new development and redevelopment estimated using weighted water unit factor.

- o **Transitional Land Use District:** This development area includes approximately 20 acres, which includes 14 acres of residential and 6 acres of non-residential land use.
- o **Civic/Residential Only Land Use District:** This development area includes approximately 17 acres, which includes 7 acres of residential and 10 acres of non-residential land use.
- o **Gateway Land Use District:** This development area includes approximately 54 acres, which includes 40 acres of residential and 14 acres of non-residential land use.

2.3 HISTORICAL AND FUTURE GROWTH

According to the California Department of Finance (DOF) population estimates, the 2021 City population is approximately 56,559 people. From 2015 to present, the City's service area has observed an average annual growth rate of approximately 0.7%. This 2022 WSMP is consistent with the City's 2020 Urban Water Management Plans (UWMP's) annual growth rate factor of 1.5%. The current and projected service area population is summarized in [Table 2.4](#).

Estimates of future water demands were not based on population, but rather on gross acreage for residential and non-residential land uses. Future population was used as a means for estimating the planning horizon of the domestic water system.

Table 2.4 Historical and Projected Population

Water System Master Plan
City of Gilroy

Year	Population ^{1,2}	Annual Growth (%)
Historical		
2000	41,464	-
2001	42,436	2.3%
2002	43,144	1.7%
2003	43,866	1.7%
2004	45,026	2.6%
2005	45,782	1.7%
2006	46,446	1.5%
2007	47,047	1.3%
2008	48,353	2.8%
2009	48,627	0.6%
2010	48,821	0.4%
2011	49,622	1.6%
2012	50,716	2.2%
2013	52,475	3.5%
2014	53,325	1.6%
2015	54,233	1.7%
2016	54,849	1.1%
2017	55,811	1.8%
2018	56,030	0.4%
2019	56,635	1.1%
2020	56,704	0.1%
Projected		
2021	57,555	1.5%
2022	58,418	1.5%
2023	59,294	1.5%
2024	60,184	1.5%
2025	61,086	1.5%
2026	62,003	1.5%
2027	62,933	1.5%
2028	63,877	1.5%
2029	64,835	1.5%
2030	65,807	1.5%
2031	66,794	1.5%
2032	67,796	1.5%
2033	68,813	1.5%
2034	69,845	1.5%
2035	70,893	1.5%
2036	71,957	1.5%
2037	73,036	1.5%
2038	74,131	1.5%
2039	75,243	1.5%
2040	76,372	1.5%

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Notes:

1. Historical populations extracted from California Department of Finance, Population Estimates E-4.
2. Projected population assuming medium annual growth rate of 1.5% per the City of Gilroy 2020 Urban Water Management Plan.

CHAPTER 3 – SYSTEM PERFORMANCE AND DESIGN CRITERIA

This chapter presents the City's performance and design criteria, which was used in this analysis for identifying current system capacity deficiencies and for sizing proposed distribution mains, storage reservoirs, and wells.

3.1 HISTORICAL WATER USE TRENDS

The historical domestic water consumption per capita was calculated to determine the average water use per capita per day. This was accomplished by dividing the City's historical water production by the historical population for the respective year.

The City's historical per capita consumption factors, for the period 2000-2019, are listed in [Table 3.1](#). The City's per capita consumption has generally decreased since 2008 by approximately 16%. This trend is largely attributed to the City's effort of implementing water conservation measures. [Table 3.2](#) lists the last three years of monthly water production in the City from 2017 to 2019.

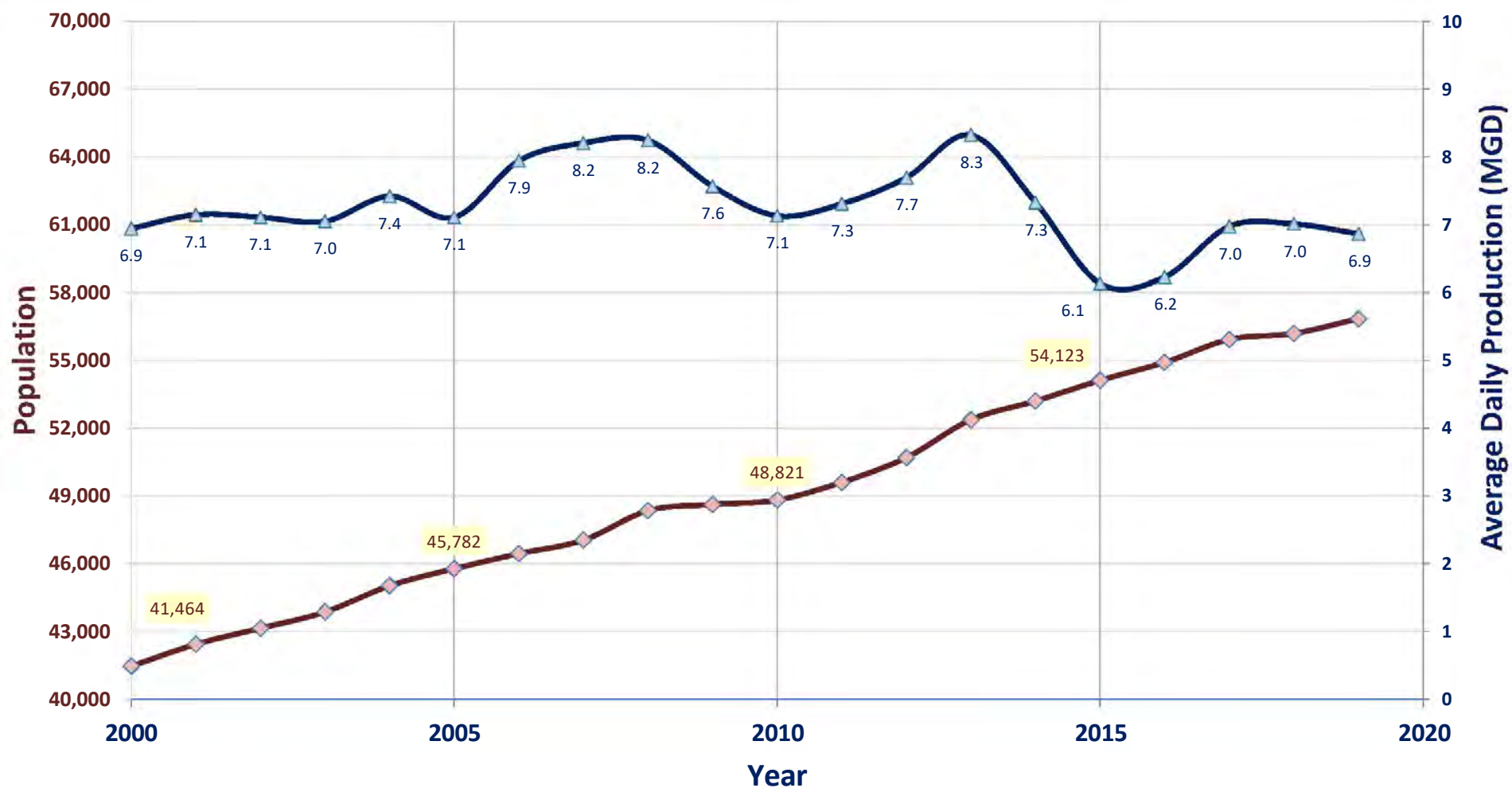
The ultimate demand forecasts included in this master plan for residential and non-residential land uses is based on net acreages. However, to generalize trends in the City's water use, per capita water use was documented. [Figure 3.1](#) displays the historical population in relation to average daily water production. [Figure 3.2](#) displays a comparison in the per capita water use and average daily water production. The remainder of the City's criteria are summarized in the following sections and on [Table 3.3](#).

3.2 SUPPLY CRITERIA

In determining the adequacy of the domestic water supply facilities, the source must be large enough to meet the varying water demand conditions, as well as provide sufficient water during potential emergencies such as power outages and natural or created disasters.

Ideally, a water distribution system should be operated at a constant water supply rate with consistent supply from the water source. On the day of maximum demand, it is desirable to maintain a water supply rate equal to the maximum day rate. Water required for peak hour demands or for fire flows would come from storage.

As the City is currently using groundwater wells as a sole source of supply, groundwater should be viewed as a sustainable resource. With little available existing storage in the system to supply during peak period usage, supply wells should be capable of meeting maximum day demand, including a 1,805 gallon per minute (gpm) standby capacity. The design criteria for water supply are documented on [Table 3.3](#).

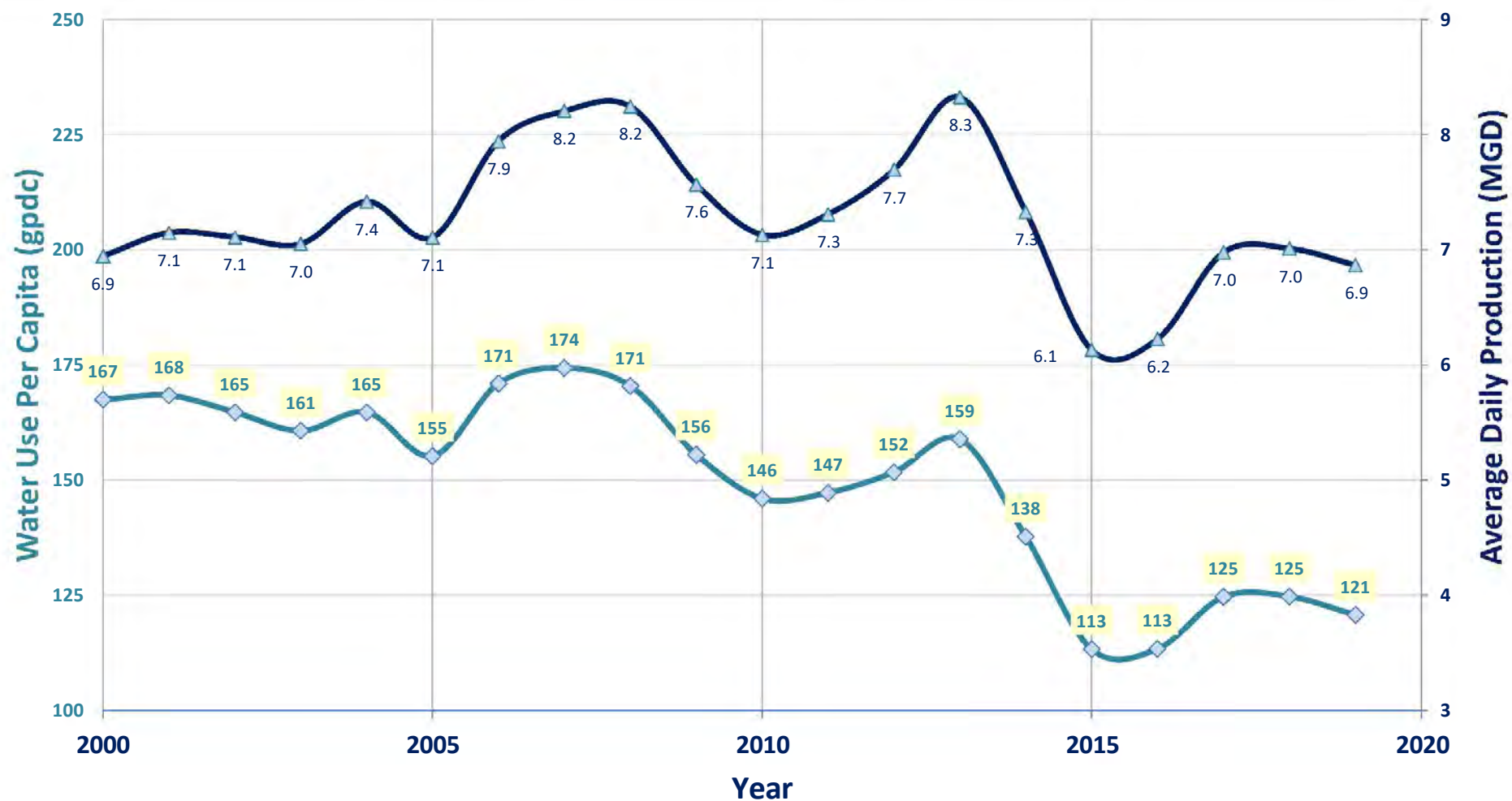


LEGEND

- Population
- Average Daily Production (MGD)

Figure 3.1
Historical Population vs.
Average Daily Production
 Water System Master Plan
 City of Gilroy





LEGEND

- Water Use Per Capita (gpcdc)
- Average Daily Production (MGD)

Figure 3.2
Water Use Per Capita vs.
Average Daily Production
 Water System Master Plan
 City of Gilroy



Table 3.1 Historical Water Production and Maximum Day Peaking Factors (2000-2019)
Water System Master Plan
City of Gilroy

Year	Population ¹	% Increase	Historical Water Production								Average Daily Water Use per Capita
			Annual Production ² (AF) (MGY) (gpm)				Monthly Production				
							Average	Maximum ^{3,4}	Month of Occur.	Max-to-Avg Ratio	
							(MGM)	(MGM)			(gpcd)
2000	41,464	-	7,800	2,542	4,836	-	212	308	August	1.46	168
2001	42,436	2%	8,006	2,609	4,963	3%	217	323	July	1.48	168
2002	43,144	2%	8,498	2,769	5,269	6%	231	330	July	1.43	176
2003	43,866	2%	7,897	2,573	4,896	-7%	214	342	July	1.60	161
2004	45,026	3%	8,333	2,715	5,166	6%	226	332	July	1.47	165
2005	45,782	2%	7,961	2,594	4,936	-4%	216	348	August	1.61	155
2006	46,446	1%	8,898	2,899	5,516	12%	242	389	August	1.61	171
2007	47,047	1%	9,190	2,995	5,698	3%	250	365	July	1.46	174
2008	48,353	3%	9,261	3,017	5,741	1%	251	404	July	1.61	171
2009	48,627	1%	8,475	2,762	5,254	-8%	230	355	June	1.54	156
2010	48,821	0%	7,986	2,602	4,951	-6%	217	337	July	1.56	146
2011	49,611	2%	8,186	2,667	5,075	3%	222	327	August	1.47	147
2012	50,698	2%	8,642	2,816	5,358	6%	235	348	July	1.48	152
2013	52,378	3%	9,324	3,038	5,781	8%	253	390	June	1.54	159
2014	53,208	2%	8,208	2,675	5,089	-12%	223	316	July	1.42	138
2015	54,123	2%	6,870	2,239	4,259	-16%	187	232	July	1.24	113
2016	54,916	1%	6,977	2,273	4,325	2%	189	273	July	1.44	113
2017	55,932	2%	7,814	2,546	4,844	12%	212	305	July	1.44	125
2018	56,198	0%	7,854	2,559	4,869	1%	213	305	July	1.43	125
2019	56,854	1%	7,691	2,506	4,768	-2%	209	299	August	1.43	121
Historical Maximum Month Peaking Factors											
10-Year Maximum (2010-2019)			9,324	3,038	5,781	12%	253	390		1.56	159
5-Year Maximum (2015-2019)			7,854	2,559	4,869	12%	213	305		1.44	125
3-Year Maximum (2017-2019)			7,854	2,559	4,869	12%	213	305		1.44	125
Last Year's Maximum (2019)			7,691	2,506	4,768	-2%	209	299		1.43	121
2020 Water System Master Plan Peaking Factors											
Maximum Month Demand							1.5 x Average Day Demand				
Maximum Day Demand							2.0 x Average Day Demand				

Notes:

1. Source: Historical populations extracted from California Department of Finance, Population Estimates E-4.
2. Source: Years 2000-2010, 2010 Urban Water Management Plan. Years 2011-2019, Monthly Well Production Data received from City staff.



9/21/2020

Table 3.2 Historical Monthly Water Production (2017-2019)

Water System Master Plan

City of Gilroy

Month	2017				2018				2019			
	Daily Production	Monthly		Peaking Factor	Daily Production	Monthly		Peaking Factor	Daily Production	Monthly		Peaking Factor
	Average Day (MGD)	Production (MGM)	Percent of Annual (%)	Month to Avg Factor	Average Day (MGD)	Production (MGM)	Percent of Annual (%)	Month to Avg Factor	Average Day (MGD)	Production (MGM)	Percent of Annual (%)	Month to Avg Factor
January	4.29	133	5%	0.63	4.48	139	5%	0.65	4.26	132	5%	0.63
February	4.19	117	5%	0.55	5.07	142	6%	0.67	4.14	116	5%	0.56
March	4.74	147	6%	0.69	4.58	142	6%	0.67	4.29	133	5%	0.64
April	5.37	161	6%	0.76	5.63	169	7%	0.79	5.83	175	7%	0.84
May	8.10	251	10%	1.18	7.94	246	10%	1.15	7.13	221	9%	1.06
June	9.31	279	11%	1.32	9.10	273	11%	1.28	8.70	261	10%	1.25
July	9.85	305	12%	1.44	9.84	305	12%	1.43	9.61	298	12%	1.43
August	9.74	302	12%	1.42	9.68	300	12%	1.41	9.65	299	12%	1.43
September	9.17	275	11%	1.30	8.87	266	10%	1.25	9.23	277	11%	1.33
October	8.16	253	10%	1.19	7.94	246	10%	1.15	8.13	252	10%	1.21
November	5.60	168	7%	0.79	6.43	193	8%	0.91	6.83	205	8%	0.98
December	5.00	155	6%	0.73	4.45	138	5%	0.65	4.45	138	6%	0.66
Total		2,547				2,559				2,507		
Average Value	6.96	212			7.00	213			6.85	209		
Maximum Value		305		1.44		305		1.43		299		1.43



9/21/2020

Note:

1. Source: 2017-2019 Monthly Well Production provided by City Staff on June 5, 2020.

Table 3.3 Planning and Design Criteria Summary

Water System Master Plan

City of Gilroy

Design Parameter	Criteria												
Supply	Supply = Maximum Day Demand + Standby Well (1,805 gpm)												
Storage	Total Required Storage = Operational + Fire + Emergency For Pressure Zone 1 <table> <tr> <td>Operational Storage</td><td>25% of Maximum Day Demand</td></tr> <tr> <td>Fire Storage</td><td>Varies</td></tr> <tr> <td>Emergency Storage</td><td>25% of Maximum Day Demand</td></tr> </table> For Pressure Zones 2 and 3 <table> <tr> <td>Operational Storage</td><td>25% of Maximum Day Demand</td></tr> <tr> <td>Fire Storage</td><td>Varies</td></tr> <tr> <td>Emergency Storage</td><td>50% of Maximum Day Demand</td></tr> </table>	Operational Storage	25% of Maximum Day Demand	Fire Storage	Varies	Emergency Storage	25% of Maximum Day Demand	Operational Storage	25% of Maximum Day Demand	Fire Storage	Varies	Emergency Storage	50% of Maximum Day Demand
Operational Storage	25% of Maximum Day Demand												
Fire Storage	Varies												
Emergency Storage	25% of Maximum Day Demand												
Operational Storage	25% of Maximum Day Demand												
Fire Storage	Varies												
Emergency Storage	50% of Maximum Day Demand												
Booster Pumps	Pumping Capacity = Maximum Day Demand												
Distribution Mains	Distribution mains should be designed to meet the greater of: 1) Peak Hour Demand, or 2) Maximum Day Demand + Fire Flow Criteria for existing and future pipelines include: Maximum pipe velocity of 8 feet per second Maximum friction losses of 10 feet / 1,000 feet												
Service Pressures	<table> <tr> <td>Maximum Pressure</td><td>80 psi</td></tr> <tr> <td>Minimum Pressure (during Maximum Day)</td><td>40 psi</td></tr> <tr> <td>Minimum Pressure (during Peak Hour)</td><td>35 psi</td></tr> <tr> <td>Minimum Pressure for New Development¹ (during Peak Hour)</td><td>40 psi</td></tr> <tr> <td>Minimum Residual Pressure (during Fires)</td><td>20 psi</td></tr> </table>	Maximum Pressure	80 psi	Minimum Pressure (during Maximum Day)	40 psi	Minimum Pressure (during Peak Hour)	35 psi	Minimum Pressure for New Development ¹ (during Peak Hour)	40 psi	Minimum Residual Pressure (during Fires)	20 psi		
Maximum Pressure	80 psi												
Minimum Pressure (during Maximum Day)	40 psi												
Minimum Pressure (during Peak Hour)	35 psi												
Minimum Pressure for New Development ¹ (during Peak Hour)	40 psi												
Minimum Residual Pressure (during Fires)	20 psi												
Demand Peaking Factors	<table> <tr> <td>Maximum Month Demand</td><td>1.50 x Average Day Demand</td></tr> <tr> <td>Maximum Day Demand</td><td>2.00 x Average Day Demand</td></tr> <tr> <td>Peak Hour Demand</td><td>3.00 x Average Day Demand</td></tr> </table>	Maximum Month Demand	1.50 x Average Day Demand	Maximum Day Demand	2.00 x Average Day Demand	Peak Hour Demand	3.00 x Average Day Demand						
Maximum Month Demand	1.50 x Average Day Demand												
Maximum Day Demand	2.00 x Average Day Demand												
Peak Hour Demand	3.00 x Average Day Demand												
Fire Flows	<table> <tr> <td>Residential</td><td>1,500 gpm for 2 hours</td></tr> <tr> <td>Commercial</td><td>2,500 gpm for 2 hours</td></tr> <tr> <td>Industrial</td><td>5,000 gpm for 3 hours</td></tr> </table>	Residential	1,500 gpm for 2 hours	Commercial	2,500 gpm for 2 hours	Industrial	5,000 gpm for 3 hours						
Residential	1,500 gpm for 2 hours												
Commercial	2,500 gpm for 2 hours												
Industrial	5,000 gpm for 3 hours												
Time-of-Use²	Time-of-Use considerations account for off-peak energy rate schedule before 4 PM and after 9 PM (19-hour pumping period).												
Urban Water Use Targets													
2020 Urban Water Management Plan	<table> <tr> <td>Existing Coefficient</td><td>166 gpd/c</td></tr> <tr> <td>2015 Interim Target</td><td>149 gpd/c</td></tr> <tr> <td>2020 Target (20% Conservation)</td><td>133 gpd/c</td></tr> </table>	Existing Coefficient	166 gpd/c	2015 Interim Target	149 gpd/c	2020 Target (20% Conservation)	133 gpd/c						
Existing Coefficient	166 gpd/c												
2015 Interim Target	149 gpd/c												
2020 Target (20% Conservation)	133 gpd/c												

Notes:

1. Unless otherwise noted, criteria is based on California Department of Public Health Title 22, Chapter 16, Article 8.

2. Source: PG&E Time-of-Use Pricing Schedule.

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Each new supply well should have adequate connections to power facilities, and every 4th well should have provisions for a backup power generator. For the purposes of this master plan, every 10th well was assumed to have provisions for water quality treatment.

3.3 STORAGE CRITERIA

The intent of domestic water storage is to provide adequate supply for operation equalization, emergency conditions and fire protection. Operational or equalization storage provides the difference in quantity between the customer's peak hour demands and the system's available reliable supply. Emergency storage allows the system to maintain service pressures in the event of emergency, such as system failure or power outages. Fire protection storage provides adequate supply to mitigate potential fire hazards while maintaining adequate service pressure.

3.3.1 Typical Storage Criteria

City of Gilroy's storage criteria consists of three main elements: operational, emergency, and fire storage. These elements can typically vary for each pressure zone depending on key factors including service population and demands. The storage criteria used for this master plan is described below and documented in [Table 3.3](#).

Operational Storage

Operational or equalization storage capacity is necessary to reduce the variations imposed on the supply system by daily demand fluctuations. Peak hour demands may require up to 1.5 times the amount of maximum day supply capacity. With storage in place, this increase in demand can be met by the operational storage rather than by increasing production from the supply sources.

Equalization storage also stabilizes system pressures for enhancing the service. Equalization storage requirements typically range from 25 percent to 50 percent of maximum day demand. For all three pressure zones, the City criterion requires that 25 percent of the maximum day demand be reserved for operational storage.

Emergency Storage

Emergency storage is the volume of water stored to meet demand during emergency situations such as pipe failures, distribution main failures, pump failures, power outages, natural disasters, or other cases in which the supply sources are not able to meet the demand condition.

The amount of water reserved for emergencies is determined by policies adopted by the City and is based on an assessment of the costs and benefits including the desired degree of system reliability, risk during an emergency situation, economic considerations, and water quality concerns.

In California, the amount of emergency storage reserve in municipal water systems is usually between 25 percent and 100 percent of the maximum day demand. The City criterion requires that

25 percent of the maximum day demand for Pressure Zone 1 be reserved for emergency storage. Additionally, the City criterion requires that 50 percent of the maximum day demand for Pressure Zone 2 and Zone 3 be reserved for emergency storage.

Fire Storage Requirement

Fire storage is also needed to maintain acceptable service pressures within a service zone, in the event of a fire flow, which may occur during the maximum day demand. The recommended fire storage capacity varies by land use type, and is usually higher for commercial and industrial areas. Fire flow provisions were calculated based on the governing (highest) land use type within the reservoir service area as follows:

- Residential: 1,500 gpm for 2 hours = 0.18 MG
- Commercial/Public Facility: 2,500 gpm for 2 hours = 0.30 MG
- Industrial: 5,000 gpm for 3 hours = 0.90 MG

Total Storage Requirement

For pressure zone 1, the total storage is the summation of operational (equalization), fire, and emergency storage requirements as follows:

$$Q_s = 25\% \text{ MDD (equalization)} + \text{fire flow (varies)} + 25\% \text{ MDD (emergency)}$$

For pressure zones 2 and 3, the total storage is the summation of operational (equalization), fire, and emergency storage requirements as follows:

$$Q_s = 25\% \text{ MDD (equalization)} + \text{fire flow (varies)} + 50\% \text{ MDD (emergency)}$$

where:

Q_s is the Total Required Storage, in gallons

MDD is the Maximum Day Demand, in gallons

3.4 PRESSURE CRITERIA

Acceptable service pressures within distribution systems vary depending on City criteria and pressure zone topography. It is essential that the water pressure in a consumer's residence or place of business be maintained within an acceptable range. Low pressures below 30 psi can cause undesirable flow reductions when multiple faucets or water using appliances are used at once.

Excessively high pressures can cause faucets to leak and valve seats to wear out prematurely. Additionally, high service pressures can cause unnecessarily high flow rates, which can result in

wasted water and high utility bills. The criteria for pressures in the domestic water system include the following:

- Maximum pressure, usually experienced during low demands and winter months
- Minimum pressure, usually experienced during peak hour demands and summer months
- Minimum pressure during fire flows and during the maximum day demand

The American Water Works Association Manual on Computer Modeling and Water Distribution System (AWWA M-32) indicates that maximum pressures are usually in the range of 90-110 pounds per square inch (psi). In some communities, the maximum pressure may be limited to 80 psi to mitigate the impact on internal plumbing. In this case, the distribution system is usually sized for the higher pressures, and individual pressure-reducing valves are installed on service lines where the pressure may be exceeded.

The minimum acceptable pressure is usually in the range of 40-50 psi, which generally provides for sufficient pressures for second story fixtures. When backflow preventers are required, they may reduce the pressures by approximately 5-15 psi. The recommended minimum pressure during fire flows is 20 psi, as established by the National Fire Protection Association (NFPA).

The City's pressure criteria are summarized as follows:

- Maximum pressure: 80 psi
- Minimum pressure: 40 psi during maximum day and 35 psi during peak hour demands, and 40 psi for new developments during peak hour demands
- Minimum pressure during fire flows: 20 psi

3.5 UNIT FACTORS

Domestic water demand unit factors are coefficients commonly used in planning level analysis to estimate future average daily demands for areas with predetermined land uses. The unit factors are multiplied by the number of dwelling units or gross acreages for residential categories, and by the gross acreages for non-residential categories, to yield the average daily demand projections.

There are several methods for developing the unit factors. This analysis relied on the City's 2019 Public Water System Statistics (PWSS) report, which lists the monthly water consumption by land use type in the City, to estimate the unit factors within the City service area.

The total domestic water demand was calculated from the consumption data. The demand was adjusted to balance with current production records, and to account for transmission main losses and vacancies in existing land uses. The demand unit factor was then calculated using the total water production and total number of residential and non-residential land use acreages.

The analysis generally indicates that existing single family residential, multiple family residential, public and park land uses have higher consumptive use factors than that of other land uses. The existing unit factor analysis is shown on [Table 3.4](#). The recommended water unit factors for the City's General Plan land use designations are summarized in [Table 3.5](#).

3.6 SEASONAL DEMANDS AND PEAKING FACTORS

Domestic water demands within municipal water systems vary with the time of day and month of the year. It is necessary to quantify this variability in demand so that the water distribution system can be evaluated and designed to provide reliable water service under these variable demand conditions.

Water use conditions that are of particular importance to water distribution systems include the average day demand (ADD), the maximum month demand (MMD), the maximum day demand (MDD), the peak hour demand (PHD), and the minimum month demand (MinMD).

The average day demand represents the annual water demand, divided by 365 days, since it is expressed in daily units. The minimum month demand typically represents the low month water demands (winter) and is used for simulating water quality analysis.

3.6.1 Maximum Month Demand

The maximum month demand (MMD) is the highest demand that occurs within a calendar month during a year. The City's MMD usually occurs in the summer months in either July or August. The MMD is used primarily in the evaluation of supply capabilities.

Historical monthly water production records, obtained for the period between 2000 and 2019 ([Table 3.1](#)), indicate the maximum month to average month ratio ranging between 1.2 and 1.6. Over the reviewed period, this ratio neither showed significant increasing or decreasing trends. Therefore, an MMD factor of 1.5 was deemed representative of trends in the City of Gilroy. This is a slight decrease in the peaking factor of 1.6 used in the 2004 master plan. The following equation is recommended for estimating the maximum month demand, given the average day demand:

$$\text{Maximum Month Demand} = 1.5 \times \text{Average Day Demand}$$

3.6.2 Maximum Day Demand

The maximum day demand (MDD) is the highest demand that occurs within a 24 hour day during a year. The City's MDD, which usually occurs during the summer months, is typically used for the evaluation and design of storage facilities, distribution mains, pump stations, and pressure reducing valves. The MDD, when combined with fire flows, is one of the highest demands that these facilities should be able to service while maintaining acceptable pressures within the system.

Table 3.4 Water Demand Unit Factor Analysis
Water System Master Plan
City of Gilroy

Existing Land Use Classification	Existing Development within City Limits	Existing Average Daily Water Demand Unit Factors									
		Consumption ¹			Production ²		Production at 100% Occupancy ^{3,4,5}			Recommended Water Unit Factor	
		Unadjusted Water Unit Factors	Annual Consumption		Unadjusted Water Unit Factors	Production (w/o Vacancy rate)	Vacancy Rate	Projected Production at 100% Occupancy		Recommended Factor	Balance Using Recommended Unit Factor
	(acres)	(gpd/acres)	(kgal/year)	(gpd)	(gpd/acres)	(gpd)	(%)	(gpd/acres)	(gpd)	(gpd/acres)	(gpd)
Residential											
Hillside Residential	444	1,128	182,582	500,226	1,219	540,815	3.5%	1,262	559,743	1,270	563,307
Low Density Residential	1,704	1,785	1,110,017	3,041,144	1,929	3,287,904	3.5%	1,997	3,402,981	2,000	3,408,180
Medium Density Residential	100	2,923	106,181	290,906	3,160	314,510	3.5%	3,271	325,518	3,280	326,448
High Density Residential	249	3,799	345,322	946,088	4,107	1,022,855	3.5%	4,251	1,058,655	4,260	1,061,015
Subtotal - Residential	2,496		1,744,103	4,778,364		5,166,084			5,346,897		5,358,951
Non-Residential											
Office and Commercial ⁶	623	938	213,440	584,767	1,014	632,216	7.5%	1,090	679,632	1,100	685,641
Industrial ⁷	376	892	122,486	335,578	964	362,807	2.0%	983	370,064	990	372,542
Public Facility / Institution ⁸	608	159	35,256	96,592	172	104,430	2.0%	175	106,519	180	109,388
Neighborhood District	94	1,015	34,692	95,047	1,097	102,759	3.5%	1,136	106,356	1,140	106,774
Subtotal - Non-Residential	1,701		405,875	1,111,985		1,202,212			1,262,570		1,274,344
Other											
Park and Recreation Facility	1,232	374	168,058	460,432	404	497,792	0	404	497,792	410	505,174
Vacant	2,391	0	0	0	0	0	0	0	0	0	0
Open Space	1,282	0	0	0	0	0	0	0	0	0	0
Subtotal - Other	4,905		168,058	460,432		497,792			497,792		505,174
Total Developed Area	9,102		2,318,035	6,350,781		6,866,088			7,107,258		7,138,469



4/27/2021

Notes:

1. 2019 Water Consumption provided by City staff on August 12, 2020.
2. In order to account for water system losses and other unmetered consumption, production was assumed to be equal to consumption increased by 8% based on Akel Engineering Group experience.
3. Residential vacancy rate extracted from California Department of Finance Sheet E-5 published 2020.
4. Office and Commercial vacancy rate extracted from Cushman & Wakefield Silicon Valley Retail MarketBeat report published Q2 2020.
5. Industrial vacancy rate extracted from Cushman & Wakefield Silicon Valley Industrial MarketBeat report published Q2 2020.
6. "Office and Commercial" contains development and consumption for "Visitor Serving Commercial", "General Services Commercial", and "Professional Office".
7. "Industrial" contains development and consumption for "General Industrial" and "Campus Industrial".
8. "Public Facility / Institution" contains development and consumption for "Public/Quasi-Public Facility" and "Educational Facility".

Table 3.5 Recommended Water Unit Factors
 Water System Master Plan
 City of Gilroy

Land Use Classification	Recommended Factor (gpd/net acre)
Residential	
Hillside Residential	1,270
Low Density Residential	2,000
Medium Density Residential	3,280
High Density Residential	4,260
Non-Residential	
Office and Commercial	1,100
Industrial	990
Public Facility / Institution	180
Neighborhood District	1,140
Park and Recreation Facility	410

Daily production records were not available for the period between 2000 to 2019. Due to the limited daily production data, it was determined that a ratio of 2.0 (as recommended by California Water Board standards) would be used in this master plan. The following equation is then used to estimate the maximum day demand, given the average day demand:

$$\text{Maximum Day Demand} = 2.0 \times \text{Average Day Demand}$$

3.6.3 Peak Hour Demand

The peak hour demand (PHD) is another high demand condition that is used in the evaluation and design of water distribution systems. The peak hour demand is the highest demand that occurs within a one hour period during a year. The peak hour demand is considered to be the largest single measure of the maximum demand placed on the distribution system. The PHD is often compared to the MDD plus fire flow to determine the largest demand imposed on the system for the purpose of evaluating distribution mains.

In general, the PHD ranges between 2.5 and 3.5 times greater than the average annual demand. In the absence of City metering records to assess the City's peak hour factor, and in accordance with direction from City staff this study recommends a peaking factor of 3.0. This is slightly lower than the peak use factor of 3.5 used in the previous master plan. The peak hour demand can then be calculated using the average day demand and the following equation:

$$\text{Peak Hour Demand} = 3.0 \times \text{Average Day Demand}$$

3.7 TRANSMISSION AND DISTRIBUTION MAIN CRITERIA

Transmission and distribution mains are usually designed to convey the maximum expected flow condition. In municipal water systems, this condition is usually the greater of either the peak hour demand or the maximum day demand plus fire flow. The hydrodynamics of pipe flow create two additional parameters that are taken into consideration when evaluating or sizing water mains: head loss and velocity.

Head loss is a loss of energy within pipes that is caused by the frictional effects of the inside surface of the pipe and friction within the moving fluid itself. Head loss creates a loss in pressure which is undesirable in water distribution systems. Head loss, by itself, is not an important factor as long as the pressure criterion has not been violated. However, high head loss may be an indicator that the pipe is nearing the limit of its carrying capacity and may not have sufficient capacity to perform under stringent conditions. The City's criterion for maximum pipeline head loss is summarized as follow:

- Greater of PHD or MDD + Fire Flow: 10 feet per 1,000 feet of pipe.

Since high flow velocities can cause damage to pipes and lead to high head loss, it is desirable to keep the velocity below a predetermined limit. The City's criterion for maximum pipeline velocity used in this master plan is 8 feet per second. This criterion also ensures that the head loss is kept

below an acceptable limit, as the head loss in a pipe is a function of the flow velocity. The City's criterion. The City's criteria for maximum pipeline velocity is summarized as follow:

- Greater of PHD or MDD + Fire Flow: 8 feet per second.

A summary of the criteria pertaining to transmission and distribution mains is included in [Table 3.3](#). It should be noted that the head loss criteria in transmission mains may be relaxed, where feasible, to account for transmission main redundancy and reliability. Relaxing of the criteria requires the review and approval of the City Engineer.

CHAPTER 4 – EXISTING DOMESTIC WATER FACILITIES

This chapter provides a description of the City's existing domestic water system facilities including the existing wells, distribution mains, storage reservoirs, and booster station pumps.

4.1 EXISTING WATER SYSTEM OVERVIEW

The City's municipal water system consists of 9 groundwater wells, 10 storage reservoirs that have a cumulative capacity of 14.1 MG, and over approximately 202 miles of distribution pipelines. The City's generally flat topography slopes up from east to west at approximately 180 feet in the east to approximately 250 feet in the west. Even with this generally flat topography, the City utilizes three separate pressure zones due to the slopes on the west side.

The City's existing domestic water distribution system is shown in [Figure 4.1](#), which displays the existing system by pipe size. This figure provides a general color coding for the distribution mains, as well as labeling the existing wells and the storage reservoir.

4.2 SOURCE OF SUPPLY

The City currently uses groundwater as the sole source of supply. There are 9 existing groundwater wells in the City that have been used for supply ([Figure 4.1](#)). The rated capacities for the existing groundwater wells were extracted from the City's 2004 Water System Master Plan as well as information provided by City staff. During the summer months, which are typically the peak for domestic water use, the City operates most available existing wells in some capacity. During the winter months, which are typically the minimum system demand, all of the wells operate.

During the preparation of this master plan, City operations staff provided well capacity ratings. It should be noted that, over time, well efficiencies may vary based on equipment conditions and groundwater levels. In periods of prolonged drought, well efficiency ratings may decrease due to a decline in groundwater levels. The opposite may occur in wet periods, as well efficiencies may increase as the groundwater levels recover. As such, the City should monitor the well efficiencies on a frequent basis to adequately manage the groundwater supply. If periods of prolonged drought persist, it may be necessary to construct additional wells to maintain adequate supply capacity.

[Table 4.1](#) lists the City's current total rated supply at approximately 18.8 million gallons per day (MGD). Consistent with the system performance and design criteria, the firm capacity was calculated as the capacity with the largest well out of service. Well No. 3 is the highest typical yield well with at a capacity of 2,300 gallons per minute (gpm). The firm capacity of the well supply is estimated at 15.5 MGD.

Legend

Existing System

- Tanks
- ▲ Wells
- ⬮ Booster Pumps

Existing Pipes by Diameter

- 4" - 6"
- 8"
- 10" - 30"
- Roads
- Railroads
- City Limits
- Urban Growth Boundary
- Rivers & Creeks
- Waterbodies

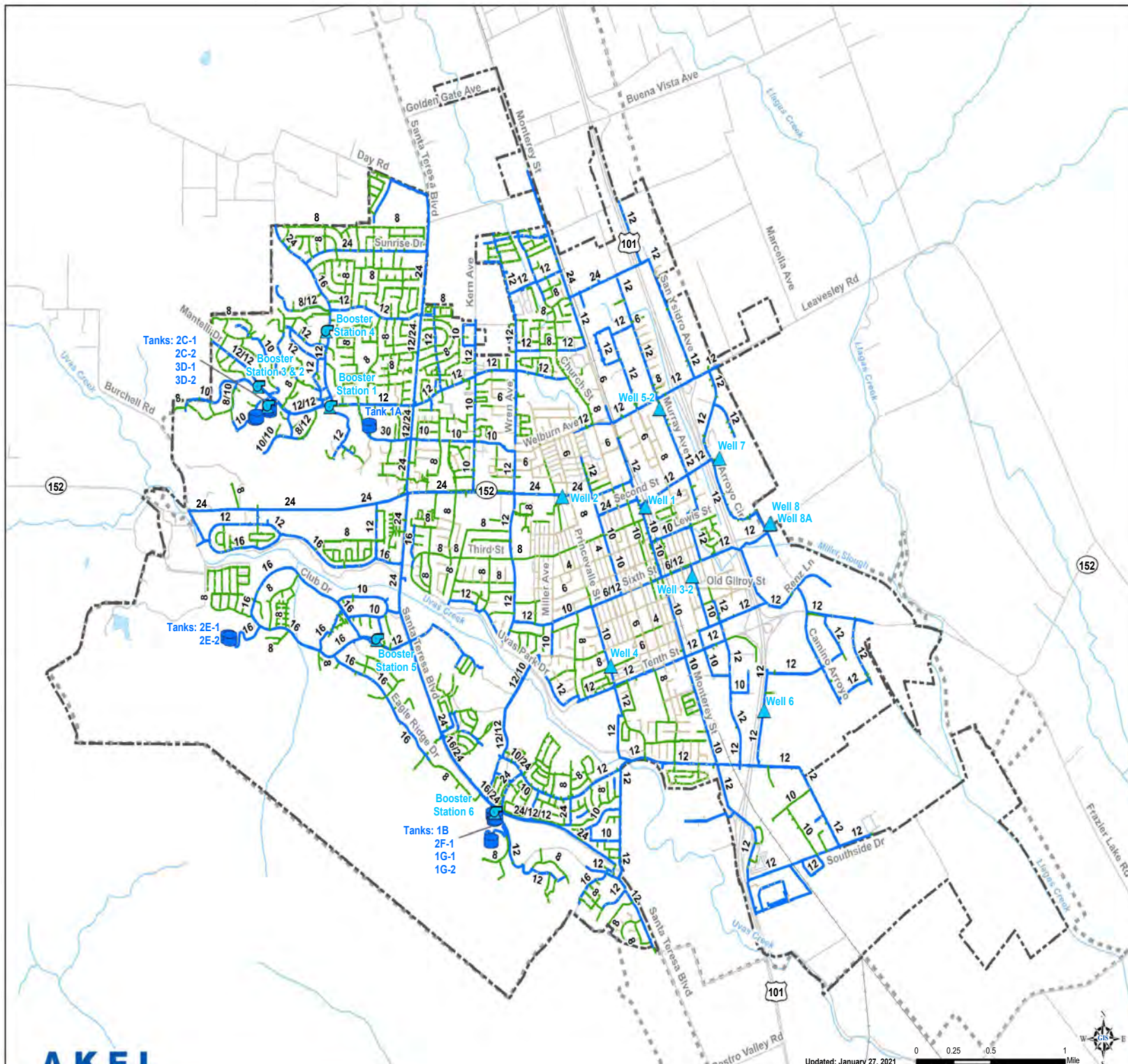


Figure 4.1
Existing System

Water System Master Plan
City of Gilroy



Table 4.1 Existing Groundwater Supply Capacity

Water System Master Plan

City of Gilroy

Supply Well	Well Location	Specifications ¹			Pump Test Data ²				Additional Information	
		Rated Capacity		Design Head	Pump Test Date	Flow Rate	Total Dynamic Head	Pumping Level	Horsepower	Ground Elevation
		(gpm)	(mgd)	(ft)		(gpm)	(ft)	(ft)	(HP)	(ft)
Well 1	100 loof Avenue	1,200	1.73	235	7/23/2020	1,113	263	83	107	200
Well 2	660 1st Street	1,100	1.58	219	8/23/2018	841	259	120	97	211
Well 3	7325 Forrest Street	2,300	3.31	357	7/23/2020	2,075	290	110	231	192
Well 4	695 9th Street	1,200	1.73	266	7/23/2020	1,179	266	105	122	202
Well 5	8295 Rosanna Street	1,600	2.30	312	7/23/2020	1,718	311	145	204	196
Well 6	6552 Brem Lane	1,500	2.16	204	9/19/2016	1,697	253	75	64	189
Well 7	7820 Arroyo Circle	1,700	2.45	206	7/23/2020	1,296	241	71	150	196
Well 8	701 Gilliam Road	2,200	3.17	230	7/23/2020	2,414	184	108	250	188
Well 8A	700 Gilliam Road	240	0.35	339	7/23/2020	228	646	470	94	188
Total and Firm Supply Capacity										
Total Supply Capacity		13,040	18.78			12,561				
Firm Capacity (Excluding largest Well)		10,740	15.47			10,147				

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Notes:

1. Unless noted otherwise, information extracted from City of Gilroy 2004 Water System Master Plan, Table 4.1

2. Pump test data extracted from pump efficiency test received from City staff August 20, 2020.

4.3 PRESSURE ZONES

The City's current water system serves communities located between an elevation of 180 feet above sea level to more than 600 feet. To adequately provide water in the City's service area, the water distribution system is divided into multiple pressure zones that operate with varying pressures between 45 and greater than 100 psi. **Figure 4.2** shows the water distribution system and names for these pressure zones.

4.4 WATER DISTRIBUTION PIPELINES

Groundwater is pumped directly into the City's distribution system via more than 200 miles of pipeline with diameters ranging from pipelines 1.0-inches to 30-inches in diameter. The existing system pipelines are documented on **Figure 4.1**, and color coded by pipe size. Similarly, **Figure 4.2** documents the existing system and color coded by pressure zone serviced

The City's domestic water system consists mainly of looped network connections. Looped connections provide an increased capacity and reliability of the distribution system. These connections allow peak demands and fire flows to be serviced from multiple directions, which typically relieves the need for large mains.

An inventory of existing pipes, extracted from the GIS-based hydraulic model and used in this analysis, is included in **Table 4.2**. For each pipe diameter, the inventory lists the length in feet, as well as the total length in units of miles. Additionally, standard Hazen-Williams pipe roughness coefficients used for various materials are included for reference on **Table 4.3**.

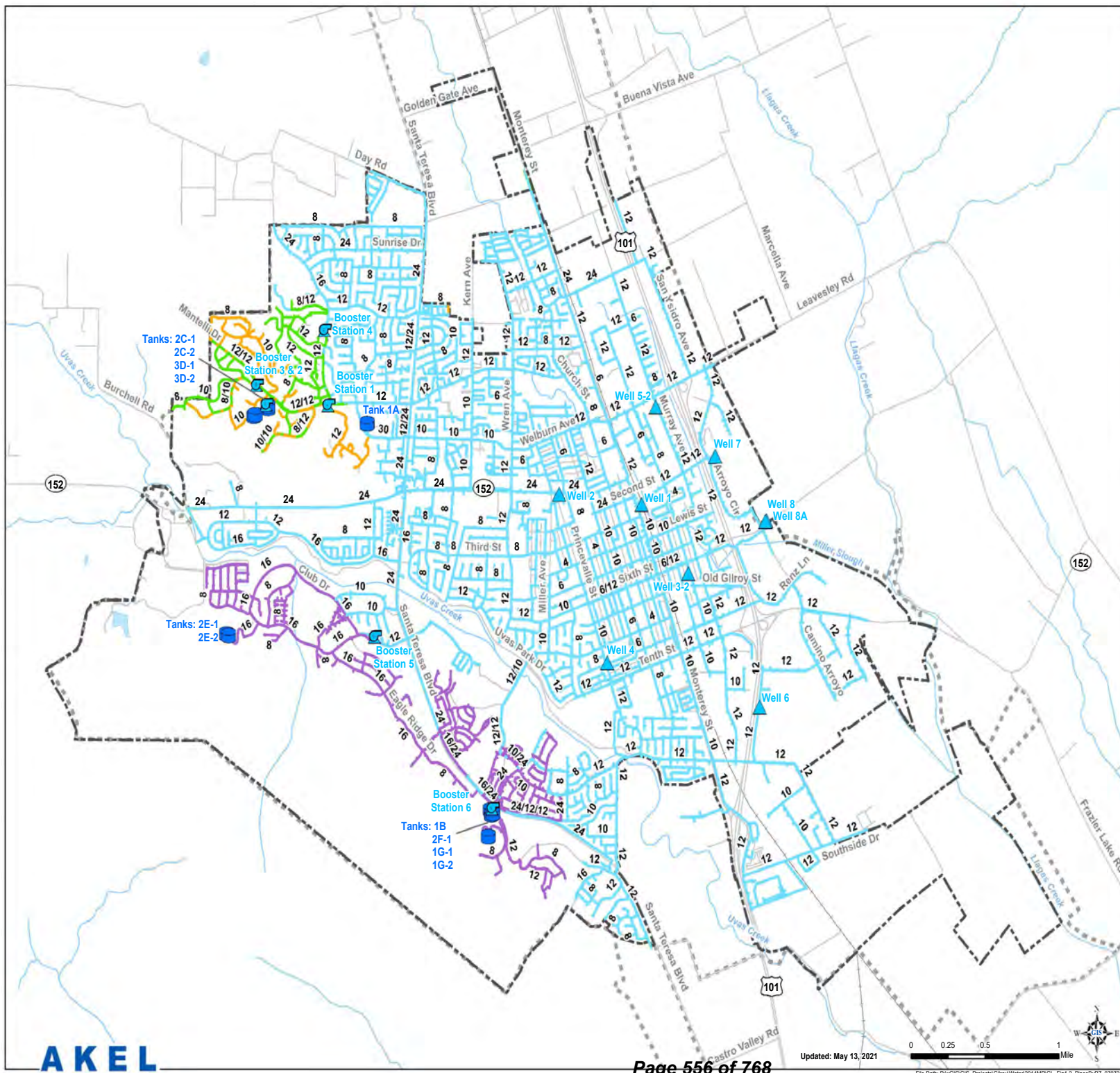
4.5 STORAGE RESERVOIRS

Storage reservoirs are typically incorporated in the water system to provide water supply for operation during periods of high demand, for meeting fire flow requirements, and for other emergencies, as defined in the City's planning criteria.

The City's existing storage reservoirs are summarized in **Table 4.4**, along with their volumes, height, diameter, bottom elevations, SHGL, overflow height and locations. The reservoirs are also shown on the hydraulic profile schematic (**Figure 4.3**), with the high-water level and bottom tank elevation. The City maintains a robust system storage capacity, in excess of 14 million gallons.

4.6 BOOSTER STATIONS

Water is conveyed from the lower supply pressure zones to the higher pressure zones via a series of booster pump stations. There are a total of 6 booster stations located in the City and listed in **Table 4.5**. This table also indicates booster station ground elevation, source and destination pressure zone, total pump capacity and additional information.



Legend

Existing System

- Tanks
- ▲ Wells
- Booster Pumps

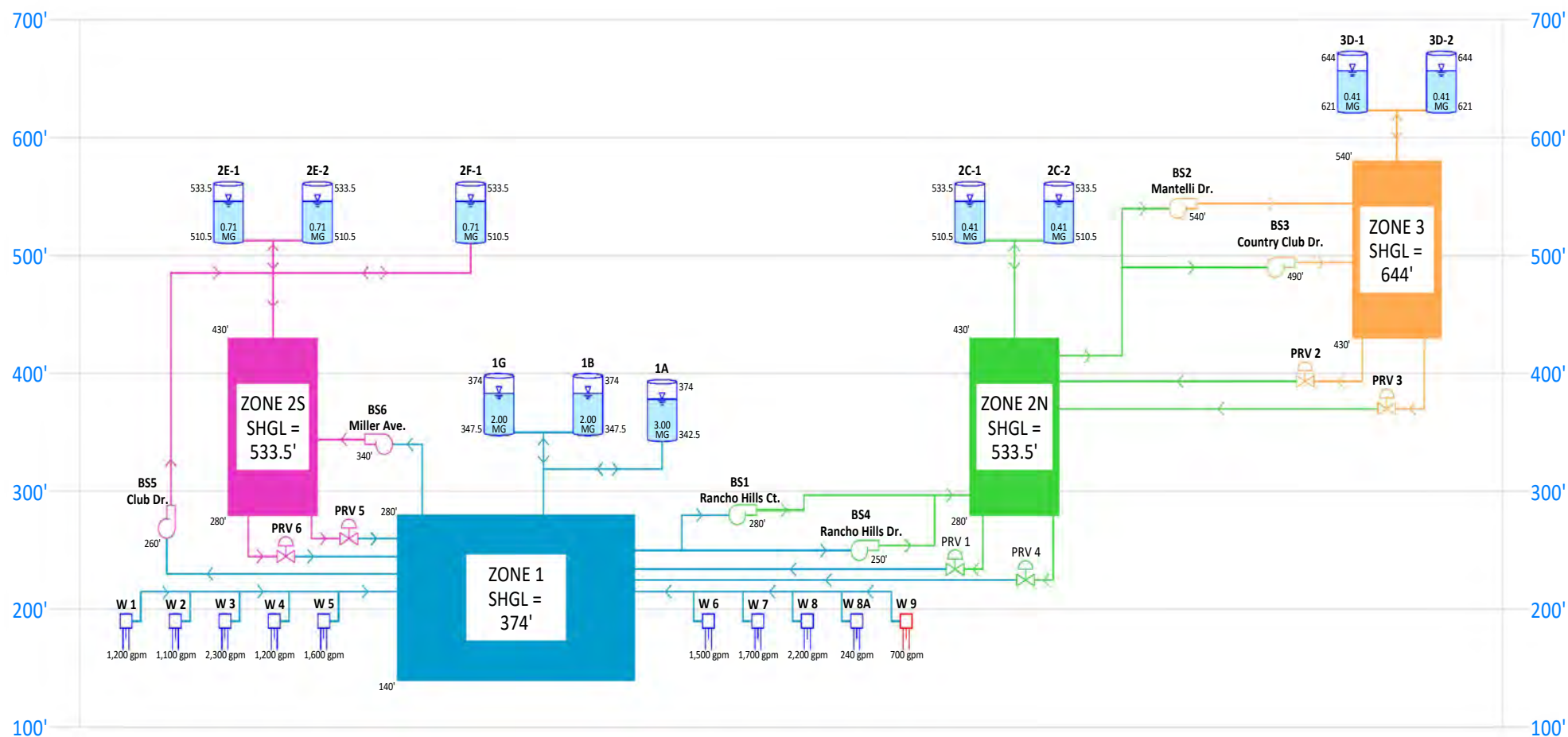
Existing Pipes by Pressure Zone

- Pressure Zone 1
- Pressure Zone 2N
- Pressure Zone 2S
- Pressure Zone 3
- Roads
- Railroads
- City Limits
- Urban Growth Boundary
- ~ Rivers & Creeks
- Waterbodies

Figure 4.2
Pipelines by Pressure Zone

Water System Master Plan
City of Gilroy





LEGEND

Reservoir ID: Tank ID HWL: High Water Level (ft) VOL: Reservoir Capacity (MG) LOW: Bottom Elevation (ft)	Pressure Zone HIGH: Highest Service Elevation (ft) ZONE: Zone ID SHGL: Static Hydraulic Grade Line HWL: Lowest Service Elevation (ft)	Proposed Well ID: Well ID GPM: Well Production (gpm)
Booster Pumping Station ID: Booster Station ID ELEV: Station Elevation (ft)	Existing Well ID: Well ID GPM: Well Production (gpm)	
Pressure Regulating Valve ID: Valve ID	Transmission Main	

Figure 4.3
Existing Hydraulic Profile
Schematic
Water System Master Plan
City of Gilroy



Last Updated: 11/29/2021

Table 4.2 Existing Modeled Pipe Inventory
 Water System Master Plan
 City of Gilroy

Pipe Diameter (in)	Pipe Length by Material						Total (ft) (miles)	
	C.I.P. (ft)	D.I.P. (ft)	P.V.C. (ft)	C.M.P. (ft)	Unknown (ft)			
1	0	182	1,009	0	0		1,192	0.2
1.25	0	0	146	0	0		146	0.03
2	0	887	266	0	426		1,579	0.3
3	0	174	594	0	0		768	0.1
4	5,928	22,174	8,562	0	2,262		38,926	7.4
6	64,482	98,096	10,753	113	15,332		188,776	35.8
8	82,156	325,392	15,155	0	25,885		448,588	85.0
10	15,286	38,486	2,274	0	1,110		57,155	10.8
12	31,728	169,851	12,737	0	16,193		230,509	43.7
15	0	283	0	0	0		283	0.1
16	0	44,340	3	0	0		44,343	8.4
24	0	48,658	341	0	5,877		54,876	10.4
30	1,836	0	0	0	0		1,836	0.3
Total	201,416	748,523	51,840	113	67,085		1,068,976	202.5

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Table 4.3 Pipe Roughness Coefficients

Water System Master Plan

City of Gilroy

Pipe Material	Age (years)					
	0	10	20	30	40	50
Cast Iron	120	110	100	90	85	80
Ductile Iron	130	125	120	115	110	105
Plastic (PVC)	145	145	140	140	135	135

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Note:

1. At an age of zero, the roughness coefficients are commonly used values for new pipes. Roughness coefficients decrease with age at a rate that depends on pipe material. For planning purposes, the hydraulic analysis assumed an average pipe age of 15-20 years for both existing and future scenarios.
2. Pipes with an unknown material or age were assigned a roughness coefficient of 111 or 121.

Table 4.4 Existing Storage Reservoirs

Water System Master Plan

City of Gilroy

Pressure Zone	Tank Number	Location	Hydraulic Information					
			Bottom Elevation (ft)	Height (ft)	Overflow Height (ft)	SHGL (ft)	Diameter (ft)	Volume (MG)
Zone 1	1A	Welburn Ave. at Rancho Real	342.5	34	32	374	128	3.00
	1B	Santa Teresa Blvd. at Miller Ave.	347.5	29	27	374	112	2.00
	1G	Santa Teresa Blvd. at Miller Ave.	347.5	29	27	374	165 x 165	5.30
Zone 2N	2C-1	Mantelli Dr. at Periwinkle Dr.	510.5	25	24	533.5	54	0.41
	2C-2	Mantelli Dr. at Periwinkle Dr.	510.5	25	24	533.5	54	0.41
Zone 2S	2E-1	South end of Hoylake Court	510.5	25	24	533.5	70	0.71
	2E-2	South end of Hoylake Court	510.5	25	24	533.5	70	0.71
	2F-1	Walton Heath Court	510.5	25	24	533.5	70	0.71
Zone 3	3D-1	South end of Periwinkle Drive	621.0	25	24	644	54	0.41
	3D-2	South end of Periwinkle Drive	621.0	25	24	644	54	0.41
Total Storage								14.1

Note:

1. Source: City of Gilroy 2004 Water System Master Plan, Table 4.2

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Table 4.5 Existing Booster Pumping Stations
Water System Master Plan
City of Gilroy

Name	Description	Elevation (ft)	Source Pressure Zone	Destination Pressure Zone	Pump Station			Pump Test Date	Pump Number	Classification	Individual Horsepower (hp)	Operational Capacity ² (gpm)	Pump Head ² (gpm)	Operational Controls (Reservoir Levels)			
					Pump Station Capacity (gpm)	(mgd)	Horsepower (hp)							Reservoir	Operational Priority	On (ft)	Off (ft)
Booster Station 1	Rancho Hills Court	280	1 (374')	2 (533.5')	1,710	2.5	138.6	7/23/2020	1	Lead	45.1	641	162	2C-1	Lead	20.0	22.5
								7/23/2020	2	Lag	45.2	585	176	2C-1	Lag 1	18.0	20.0
								7/23/2020	3	Standby	48.3	655	166	2C-1	Lag 2	18.0	20.0
Booster Station 2	Mantelli Dr. at Periwinkle	540	2 (533.5')	3 (644')	870	1.3	45		1	Lead	15	290		3D-1	Lead	20.0	22.5
									2	Lag	15	290		3D-1	Lag 1	18.0	20.0
									3	Standby	15	290		3D-1	Lag 2	18.0	20.0
Booster Station 3	Country Club Dr.	490	2 (533.5')	3 (644')	870	1.3	45		1	Lead	15	290		3D-1	Lead	20.0	22.5
									2	Lag	15	290		3D-1	Lag 1	18.0	20.0
									3	Standby	15	290		3D-1	Lag 2	18.0	20.0
Booster Station 4	Rancho Hills Dr.	250	1 (374')	2 (533.5')	1,710	2.5	150	7/23/2020	1	Lead	48.1	438	203	2C-1	Lead	20.0	22.5
								7/23/2020	2	Lag	46.9	440	203	2C-1	Lag 1	18.0	20.0
								7/23/2020	3	Standby	42.3	443	203	2C-1	Lag 2	18.0	20.0
Booster Station 5	Club Dr.	260	1 (374')	2 (533.5')	1,710	2.5	150	7/23/2020	1	Lead	41.9	622	180	2E-1	Lead	20.0	22.5
								7/23/2020	2	Lag	40.8	605	178	2E-1	Lag 1	18.0	20.0
								7/23/2020	3	Standby	41	611	178	2E-1	Lag 2	18.0	20.0
Booster Station 6	Miller Ave. at Santa Teresa Blvd	340	1 (374')	2 (533.5')	1,710	2.5	150	7/23/2020	1	Lead	30.6	410	199	2E-2	Lead	20.0	22.5
								7/23/2020	2	Lag	36.4	536	194	2E-2	Lag 1	18.0	20.0
								7/23/2020	3	Standby	35.8	524	171	2E-2	Lag 2	18.0	20.0



1/26/2021

Notes:

1. Unless noted otherwise, data extracted from City of Gilroy 2004 Water System Master Plan, Table 4.3
2. Operational capacity for booster stations 1, 4, 5, 6 extracted from 2020 Pump efficiency tests, received from City staff August 20, 2020.
3. Booster station information based on location provided in updated City of Gilroy Water System GIS, provided August 20, 2020.

4.7 PRESSURE REDUCING VALVES

Some pressure zones are served from higher pressure zones through pressure reducing valves (PRVs), which are summarized on [Table 4.6](#). PRVs constructed at pressure zone intersections, allow the conveyance of water from higher pressure zones to the lower pressure zones in the City. Additionally, some PRVs provide a source of emergency supply to reduce service pressures in the case of booster station failure or other operational issues. The City currently operates 6 pressure reducing valves throughout its water system.

Table 4.6 Existing Pressure Reducing Valves

Water System Master Plan
City of Gilroy

Location	PRV ID	Size (in)	Pressure Zone		Downstream Setpoint (psi)
			Upstream	Downstream	
Rancho Hills Court	Valve_BS1	10"	2N	1	15.0
Mantelli Dr. at Periwinkle	Valve_BS2	8"	3	2N	5.0
Country Club Dr.	Valve_BS3	10"	3	2N	10.0
Rancho Hills Dr.	Valve_BS4	12"	2N	1	20.0
Club Dr.	Valve_BS5	8"	2S	1	20.0
Miller Ave. at Santa Teresa Blvd	Valve_BS6	16"	2S	1	1.0

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CHAPTER 5 – WATER DEMANDS AND SUPPLY CHARACTERISTICS

This chapter summarizes exiting domestic water demands and projects the future domestic water demands.

5.1 EXISTING DOMESTIC WATER DEMANDS

The existing water demands used for this master plan were based on the City's 2019 PWSS consumption records, which included the monthly demands for each land use category, as well as total annual production. These existing water demands in this analysis are adjusted to match the annual production records and account for system losses.

The existing demand distribution, by pressure zone, was obtained from the water billing records. Using GIS, each customer account was geocoded to its physical location within its existing pressure zone. The accounts were then stored by pressure zone and total demand in each zone was calculated.

The City's existing average day domestic water demand, as extracted from water billing records, were lower than total demand listed in the annual production records due to system losses that occurred between groundwater wells and customer service connections. The total domestic water demand was increased proportionally to 4,768 gpm to reflect the total 2019 production and account for transmission main losses. The existing domestic water demands, for each pressure zone for 2019 SCADA and designed criteria peaking factors, are summarized on [Table 5.1](#).

5.2 FUTURE DOMESTIC WATER DEMANDS

Future demands were projected using the unit factors for residential and non-residential land uses and included the anticipated developments within the City's service area. [Table 5.2](#) organizes the future land use categories and their corresponding domestic water demands. It should be noted that the existing domestic water demands in [Table 5.2](#) were calculated using the recommended water unit factors, which account for future water conservation practices, and are intended to represent the water use of existing users at buildout of the master plan horizon (2040). The average day domestic water demands from existing and future developments is calculated at 11.2 MGD.

These demands were used in sizing the future facilities, including distribution mains, storage reservoirs, and booster stations. Demands were also used for allocating and reserving capacities in the existing or proposed facilities.

Table 5.1 Existing Water Demands

Water System Master Plan
City of Gilroy

Pressure Zone	Average Day Demand ¹ (gpm)	Existing Water Demands			
		SCADA Based Peaking Factors		Design Criteria Peaking Factors	
		Maximum Day Demand ² (gpm)	Peak Hour Demand ³ (gpm)	Maximum Day Demand ⁴ (gpm)	Peak Hour Demand ⁵ (gpm)
Zone 1	4,200	6,702	10,215	8,400	12,600
Zone 2N	170	271	413	339	509
Zone 2S	307	490	747	615	922
Zone 3	91	145	222	182	273
Total	4,768	7,609	11,597	9,536	14,304

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Note:

1. Total demand was adjusted to reflect the total production for 2019, from Groundwater well production records. The distribution is based on 2019 water billing records.
2. Maximum Day Demand = 1.6 x Average Day Demand, as based on 2019 SCADA.
3. Peak Hour Demand = 2.4 x Average Day Demand, as based on 2019 SCADA.
4. Maximum Day Demand = 2.0 x Average Day Demand
5. Peak Hour Demand = 3.0 x Average Day Demand

Table 5.2 Buildout Water Demands
Water System Master Plan
City of Gilroy

Land Use Classification	Water Unit Factor (gpd/acre)	Total Water Demand			Buildout of Service Area	
		Existing Unchanged (acres)	Redeveloped Area (acres)	New Development (acres)	Total Area (acres)	Average Day Demand (gpd)
Residential						
Hillside Residential	1,270	442	112	353	907	1,151,593
Low Density Residential	2,000	1,583	122	89	1,794	3,587,897
Medium Density Residential	3,280	58	177	6	240	788,743
High Density Residential	4,260	67	18	18	104	442,583
Subtotal - Residential		2,151	429	466	3,045	5,970,816
Non-Residential						
Office and Commercial ¹	1,100	465	281	100	846	930,592
Industrial ²	990	293	213	643	1,149	1,137,375
Public Facility / Institution	180	559	153	129	841	151,310
Neighborhood District	1,140	0	38	358	395	450,832
City Gateway District	1,140	0	20	7	27	31,122
Downtown Specific Plan Area ³	Varies	0	57	32	89	210,626
Mixed Use Corridor High	1,100	0	25	7	33	35,976
Hecker Pass Special Use District ⁴	Varies	0	328	88	416	528,763
Glen Loma Ranch ⁴	Varies	0	103	237	341	577,791
Industrial Park	990	0	43	40	83	82,587
Employment Center	1,100	0	279	251	530	583,081
Subtotal - Non-Residential		1,317	1,541	1,893	4,750	4,720,055
Other						
Park and Recreation Facility	410	995	0	154	1,149	471,009
Vacant	0	0	0	0	0	0
Open Space	0	253	0	1,045	1,298	0
Rural County	0	0	28	3	30	0
Subtotal - Other		1,247	28	1,202	2,477	471,009
Total						
		4,714	1,997	3,561	10,272	11,161,880

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Notes:

1. Office and Commercial accounts for Visitor Serving Commercial and General Services Commercial Land Use types.
2. Industrial accounts for General Industrial and Campus Industrial Land Use types.
3. Downtown Specific Plan Water Unit Factors vary based on land use.
4. Glen Loma and Hecker Pass water demand estimated separately, based on itemized land use plan and associated land use factors.

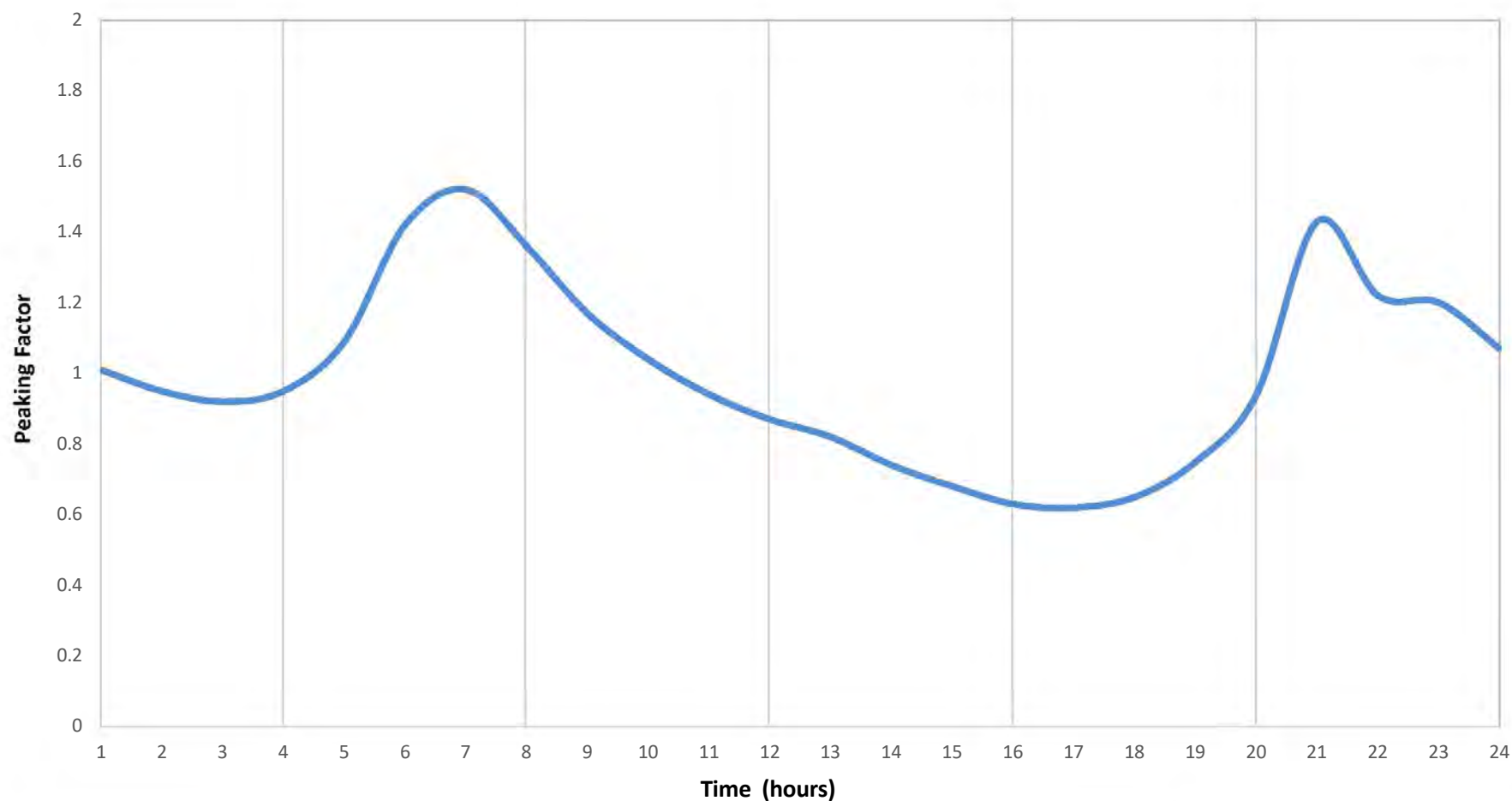
5.3 MAXIMUM DAY AND PEAK HOUR DEMANDS

The maximum day and peak hour demands for the existing and future demands were calculated using the average day demands and City peaking factor criteria. The maximum day to average day ratio of 2.0, and peak hour to average day ratio of 3.0, were applied to the average day demands to obtain estimates of the higher demand conditions. The maximum day and peak hour demand estimates for the buildout of the Urban Growth Boundary are 22.3 mgd and 33.5 mgd, respectively.

5.4 DIURNAL DEMAND PATTERNS

Water demands vary with the time of day and by account type according to the land use designation. These fluctuations were accounted for in the modeling effort and evaluation of the water distribution system. The diurnal demand patterns are a collection of unit factors that are applied to the demand, and which reflect the variable hourly fluctuation. Due to the sufficient SCADA data, the City was able to generate diurnal demand curve. [Figure 5.1](#) shows the city's diurnal, developed based on SCADA data observed June 2020 through August 2020.

EPS 2020 Demand Diurnal



LEGEND



Water Demand

Notes:

1. Diurnal curve was developed based on SCADA data observed June 2020 through August 2020.

Figure 5.1

Diurnal Curve

Water System Master Plan
City of Gilroy



May 12, 2021

CHAPTER 6 – HYDRAULIC MODEL DEVELOPMENT

This chapter describes the development and calibration of the City’s domestic water distribution system hydraulic model. The hydraulic model was used to evaluate the capacity adequacy of the existing system and to plan its expansion to service anticipated future growth.

6.1 OVERVIEW

Hydraulic network analysis has become an effectively powerful tool in many aspects of water distribution planning, design, operation, management, emergency response planning, system reliability analysis, fire flow analysis, and water quality evaluations. The City’s hydraulic model was used to evaluate the capacity adequacy of the existing system and to plan its expansion to service anticipated future growth.

6.2 MODEL SELECTION

The City’s hydraulic model combines information on the physical characteristics of the water system (pipelines, groundwater wells, and storage reservoirs) and operational characteristics (how they operate). The hydraulic model then performs calculations and solves series of equations to simulate flows in pipes and calculate pressures at nodes or junctions.

There are several network analysis software products that are released by different manufacturers, which can equally perform the hydraulic analysis satisfactorily. The selection of a particular software depends on user preferences, the distribution system’s unique requirements, and the costs for purchasing and maintaining the software.

The City’s previous hydraulic model was developed using the Environmental Protection Agency’s EPANET software, which allows the use of a single modeling scenario, and basic simulation options for steady-state and extended period simulations. As part of this master plan, the hydraulic model has been updated for consistency the City’s current GIS database and redeveloped using the InfoWater hydraulic modeling software, available from Innovyze Inc. This software is directly integrated with ESRI’s ArcGIS (GIS) environment, providing a useful modeling tool linked to the City’s newly developed GIS database.

6.3 HYDRAULIC MODEL DEVELOPMENT

Developing the hydraulic model included skeletonization, digitizing and quality control, developing pipe and node databases, and water demand allocation, as described in detail below.

6.3.1 Skeletonization

Skeletonizing the model refers to the process where pipes not essential to the hydraulic analysis of the system are stripped from the model. Skeletonizing the model is useful in creating a system that accurately reflects the hydraulics of the pipes within the system, while reducing complexities of large systems, which will reduce the time of analysis while maintaining accuracy, but will also comply with limitations imposed by the computer program.

In the City of Gilroy's case, skeletonizing was kept to a minimum due to the availability of the existing model, which has been maintained and updated since the completion of the 2004 Water System Master Plan.

6.3.2 Pipes and Nodes

Computer modeling requires the compilation of large numerical databases that enable data input into the model. Detailed physical aspects, such as pipe size, pipe elevation, and pipe lengths, contribute to the accuracy of the model.

Pipes and nodes represent the physical aspect of the system within the model. A node is a computer representation of a place where demand may be allocated into the hydraulic system, while a pipe represents the distribution and transmission aspect of the water demand. In addition, reservoir dimensions and capacities, and groundwater well capacity and design head, were also included in the hydraulic model.

6.3.3 Digitizing and Quality Control

The City's existing domestic water distribution system was digitized in GIS using several sources of data and various levels of quality control. The data sources included the City's existing system as maintained by staff in GIS, as well as the previously developed hydraulic model and subsequent updates.

After reviewing the available data sources, the hydraulic model was updated and verified by City staff. Resolving discrepancies in data sources was accomplished by graphically identifying each discrepancy and submitting it to engineering and public works staff for review and comments. City comments were incorporated in the verified model.

6.3.4 Demand Allocation

Demand allocation consists of assigning water demand values to the appropriate nodes in the model. The goal is to distribute the demands throughout the model to best represent actual system response.

Allocating demands to nodes within the hydraulic model required multiple steps, incorporating the efficiency and capabilities of GIS and hydraulic modeling software. Existing land use water demand factors were used in conjunction with the existing land use map. Each demand factor was

applied to the appropriate land use and then multiplied by the acreage. In the absence of complete water billing records, this methodology was considered the best approach to allocate existing water demands.

Domestic water demands from each anticipated future development, as presented in a previous chapter, were also allocated to the model for the purpose of sizing the required future facilities. The demands from the greater Planning Area were allocated based on proposed land use and the land use acreages. Since many of the areas were very large in size, demands were allocated evenly to the demand nodes within each area. Infill areas, redevelopment areas, and vacant lands were also included in the future demand allocation.

6.4 MODEL CALIBRATION

Calibration is intended to instill a level of confidence in the pressures and flows that are simulated. Calibration generally consists of comparing model predictions to field measured results and making necessary adjustments.

6.4.1 Calibration Plan and SCADA

In order to calibrate the hydraulic model, pressure SCADA data was collected for points throughout the water distribution system, as well as water level data for the City's storage reservoirs. City staff provide 10-minute pressure and flow data for each groundwater well and booster station as well as 10-minute water level data for the City's storage reservoirs, for the period between June and August 2020.

City staff provided hourly pressure and flow data for each well, as well as the pressure at the base of the water tank, for the period between June and August 2020. This data was further consolidated and compared with daily demand data to best calibrate to average day conditions. The calibration results are shown in [Figure 6.1](#) and [Figure 6.2](#).

6.4.2 EPS Calibration

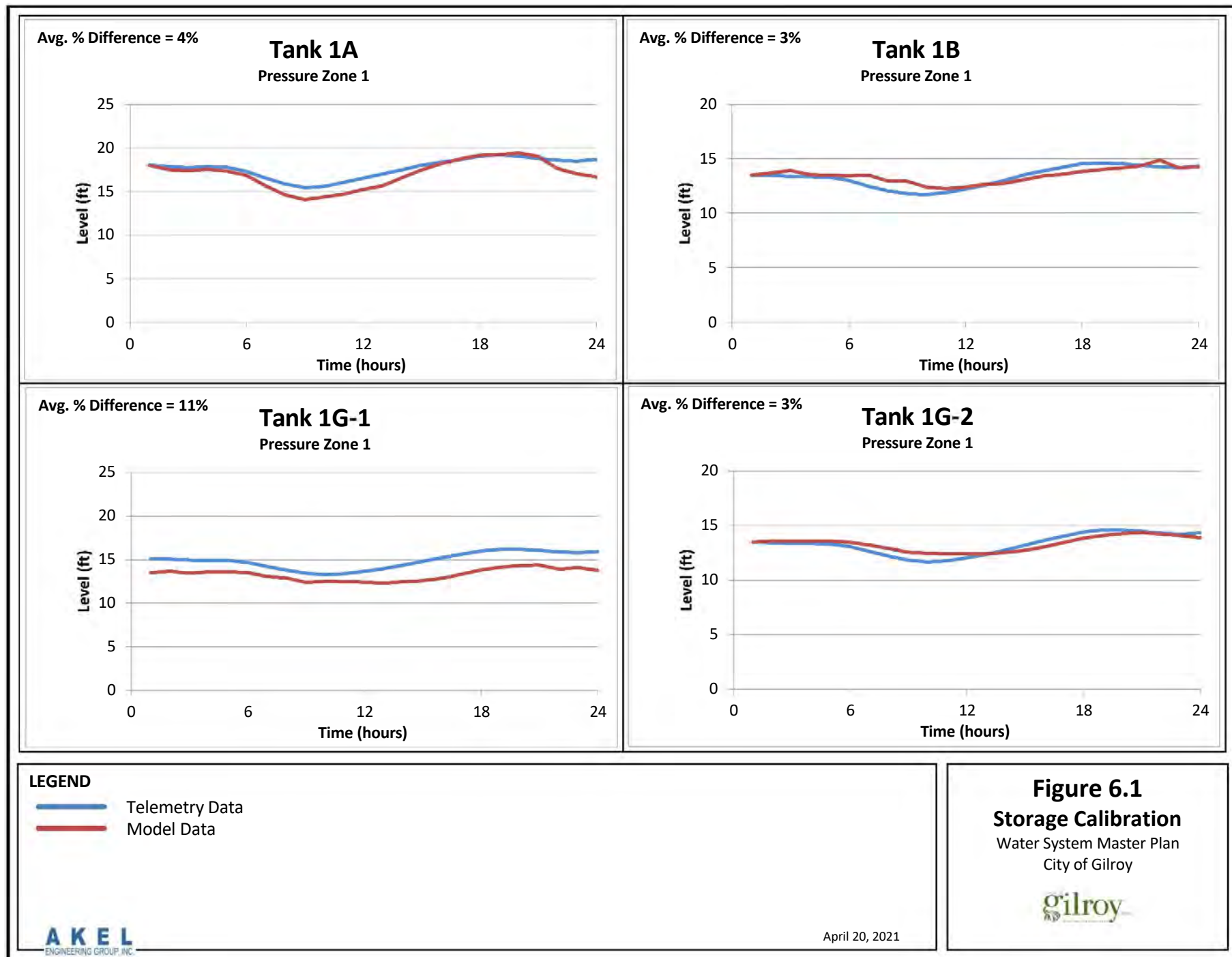
Calibration can be performed for steady state conditions or for extended period simulations (EPS). In steady state calibration, the model is compared to field monitoring results consisting of a single value, such as a single hydrant test. EPS calibration consists of comparing model predictions to diurnal operational changes in the water system.

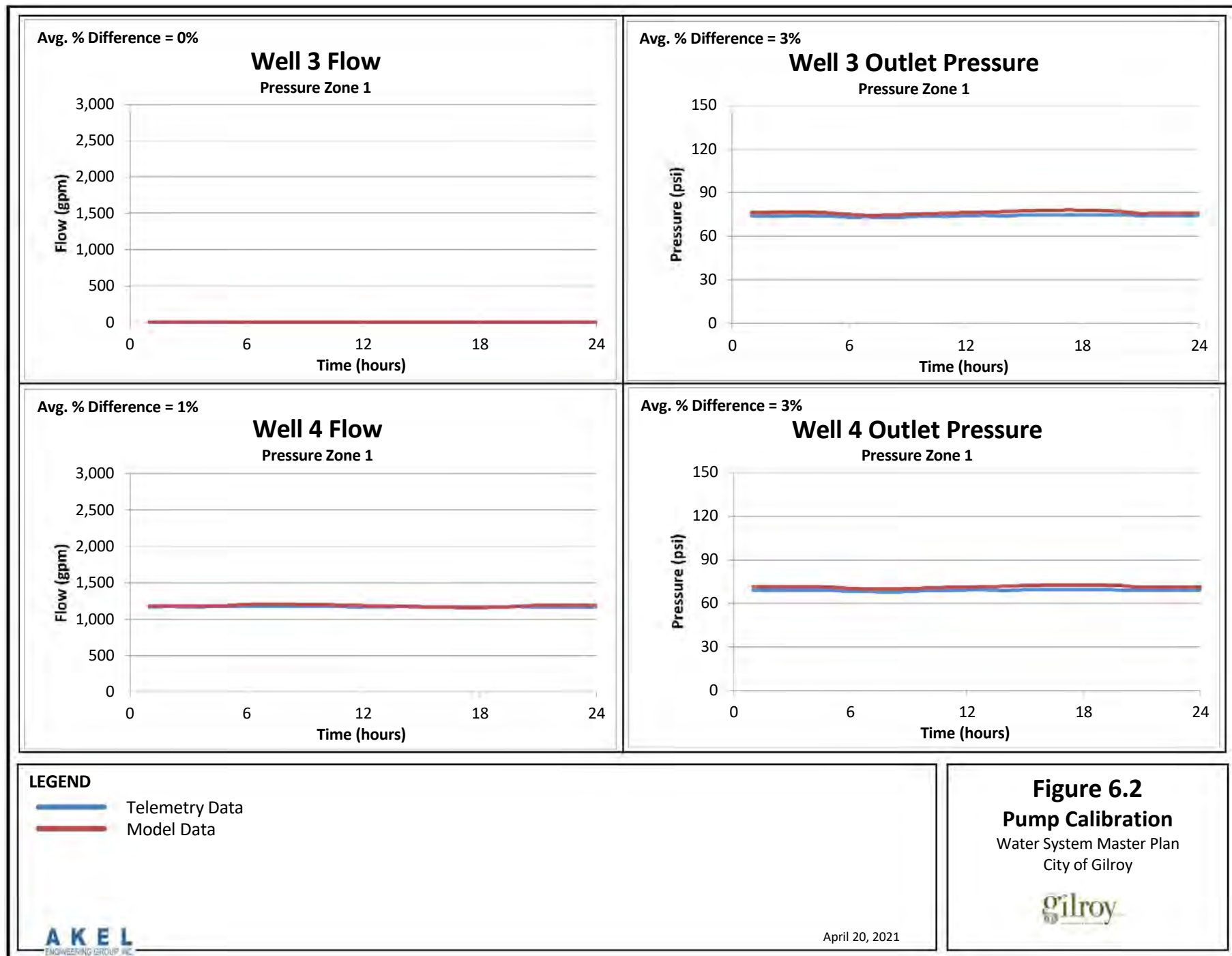
The calibration process was iterative and resulted with satisfactory comparisons between the field measurements and the hydraulic model predictions at each well site and the water tank. The calibration results were graphically summarized for each site and included in [Appendix A](#).

Representative extracts from [Appendix A](#) are shown on [Figure 6.1](#) and [Figure 6.2](#) for calibration points at the water tank 1A, 1B, 1G-1, 1G-2 and well 3, 4, respectively.

6.4.3 Use of the Calibrated Model

The calibrated hydraulic model was used as an established benchmark in the capacity evaluation of the existing water distribution system. The model was also used to identify improvements necessary for mitigating existing system deficiencies and for accommodating future growth. This valuable investment will continue to prove its value to the City as future planning issues or other operational conditions surface. It is recommended that the model be maintained and updated with recent construction to preserve its integrity.





CHAPTER 7 – EVALUATION AND PROPOSED IMPROVEMENTS

This chapter presents a summary of the domestic water system evaluation and identifies improvements needed to mitigate existing deficiencies, as well as improvements needed to expand the system and service growth.

7.1 OVERVIEW

The calibrated hydraulic model was used for evaluating the distribution system for capacity deficiencies during peak hour demand and during maximum day demands in conjunction with fire flows. Since the hydraulic model was calibrated for extended period simulations, the analysis duration was established at 24 hours for analysis.

The criteria used for evaluating the capacity adequacy of the domestic water distribution system facilities (transmission mains, storage reservoirs, and booster stations) was discussed and summarized in the System Performance and Design Criteria chapter.

7.2 LOW PRESSURE ANALYSIS

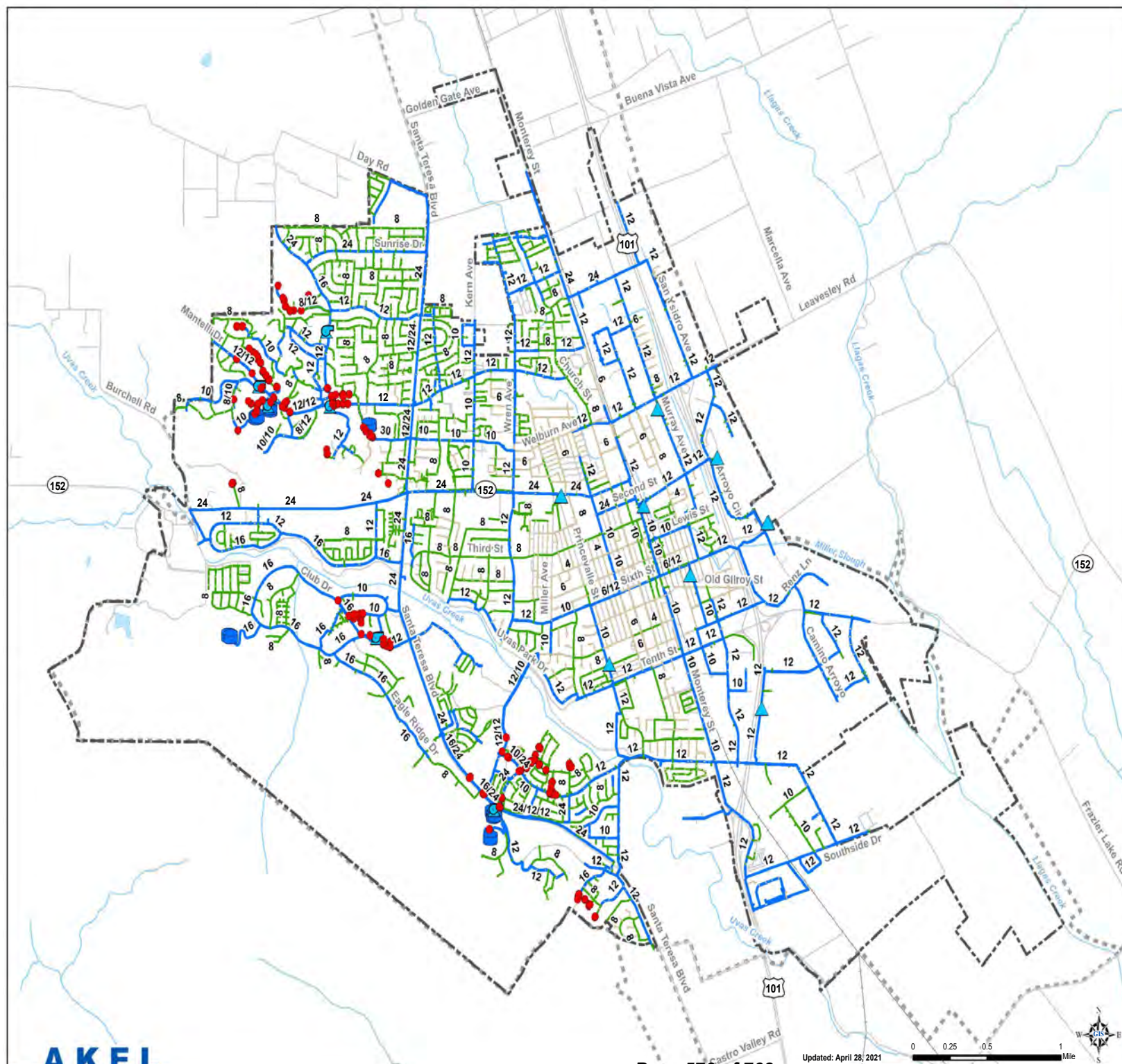
The hydraulic model was also used to determine if the existing domestic water distribution system meets the City's System Performance and Design Criteria for the maximum day and peak hour pressures, as discussed in a previous chapter. During maximum day demands the minimum pressure requirement is 40 psi, while during the peak hour demand, the minimum pressure requirement is 35 psi. The hydraulic analysis indicated the City's existing system performed reasonably well during under maximum day ([Figure 7.1](#)) and peak hour ([Figure 7.2](#)) operating conditions.

7.3 HIGH PRESSURE ANALYSIS

The hydraulic model was also used to identify areas that experience high pressure under maximum day demand conditions, as shown on [Figure 7.3](#). Areas of high pressure may be more susceptible to pipeline breaks and ruptures. The City's maximum desired pressure criterion is 80 psi. The hydraulic analysis indicated the City's system observes some periods of high pressures, primarily in the northwest, southwest and southeast sections of the City.

7.4 FIRE FLOW ANALYSIS

The fire flow analysis consisted of using the maximum day demand in the hydraulic model and applying hypothetical fire flows. The magnitude and duration of each fire flow was based on the governing land use type within proximity to the fire location. The criterion for fire flows was also summarized in the System Performance and Design Criteria chapter.



Legend

• Node Pressures < 40 psi

Existing System

■ Tanks

▲ Wells

⚙️ Booster Pumps

Existing Pipes by Diameter

— 4" - 6"

— 8"

— 10" - 30"

— Roads

— Railroads

⬜ City Limits

⬜ Urban Growth Boundary

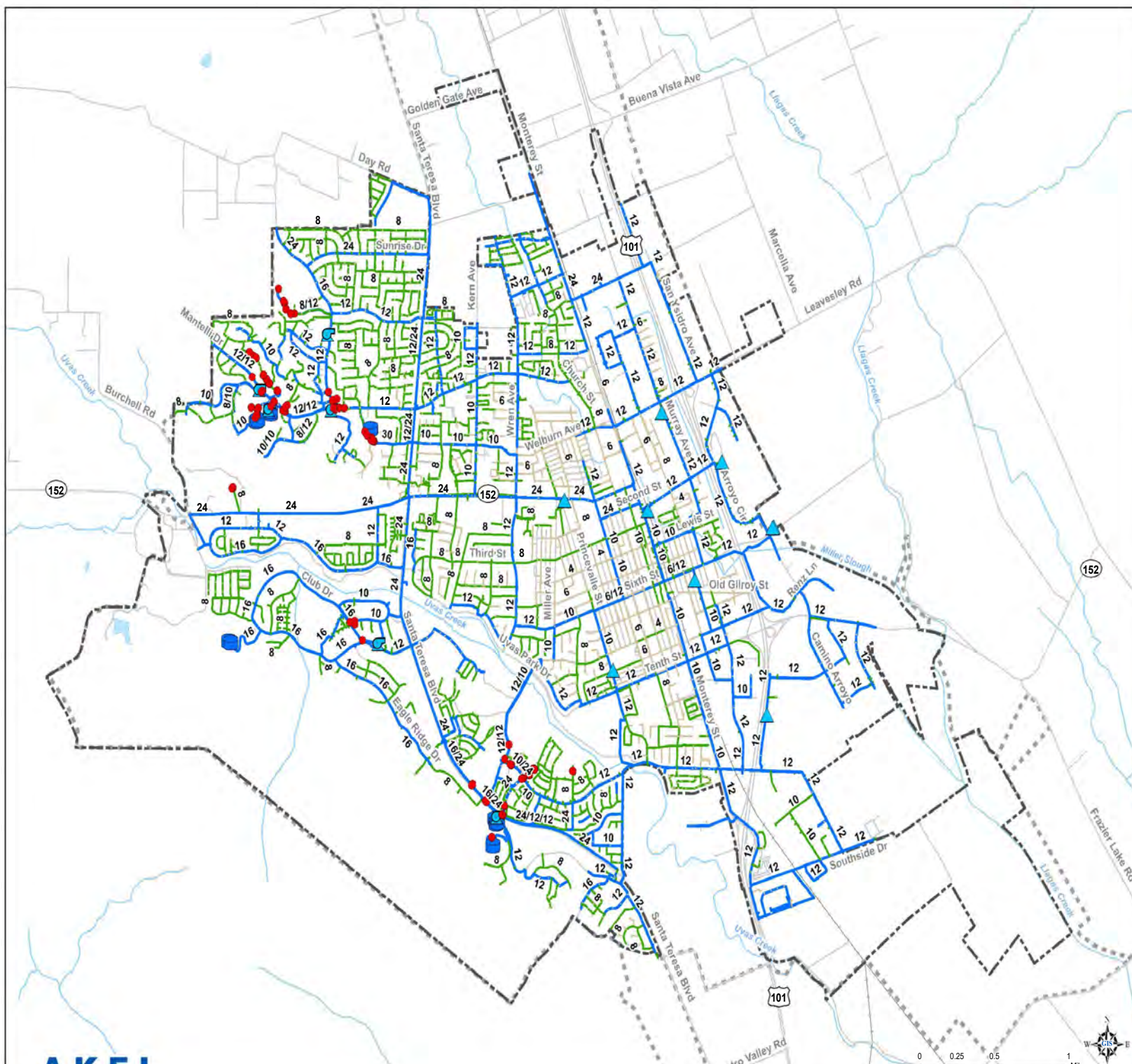
~ Rivers & Creeks

■ Waterbodies

Figure 7.1
Minimum System Pressures
(Maximum Day Demand)

Water System Master Plan
City of Gilroy





Legend

• Node Pressures < 35 psi

Existing System

■ Tanks

▲ Wells

⚙️ Booster Pumps

Existing Pipes by Diameter

— 4" - 6"

— 8"

— 10" - 30"

— Roads

— Railroads

⬡ City Limits

⬡ Urban Growth Boundary

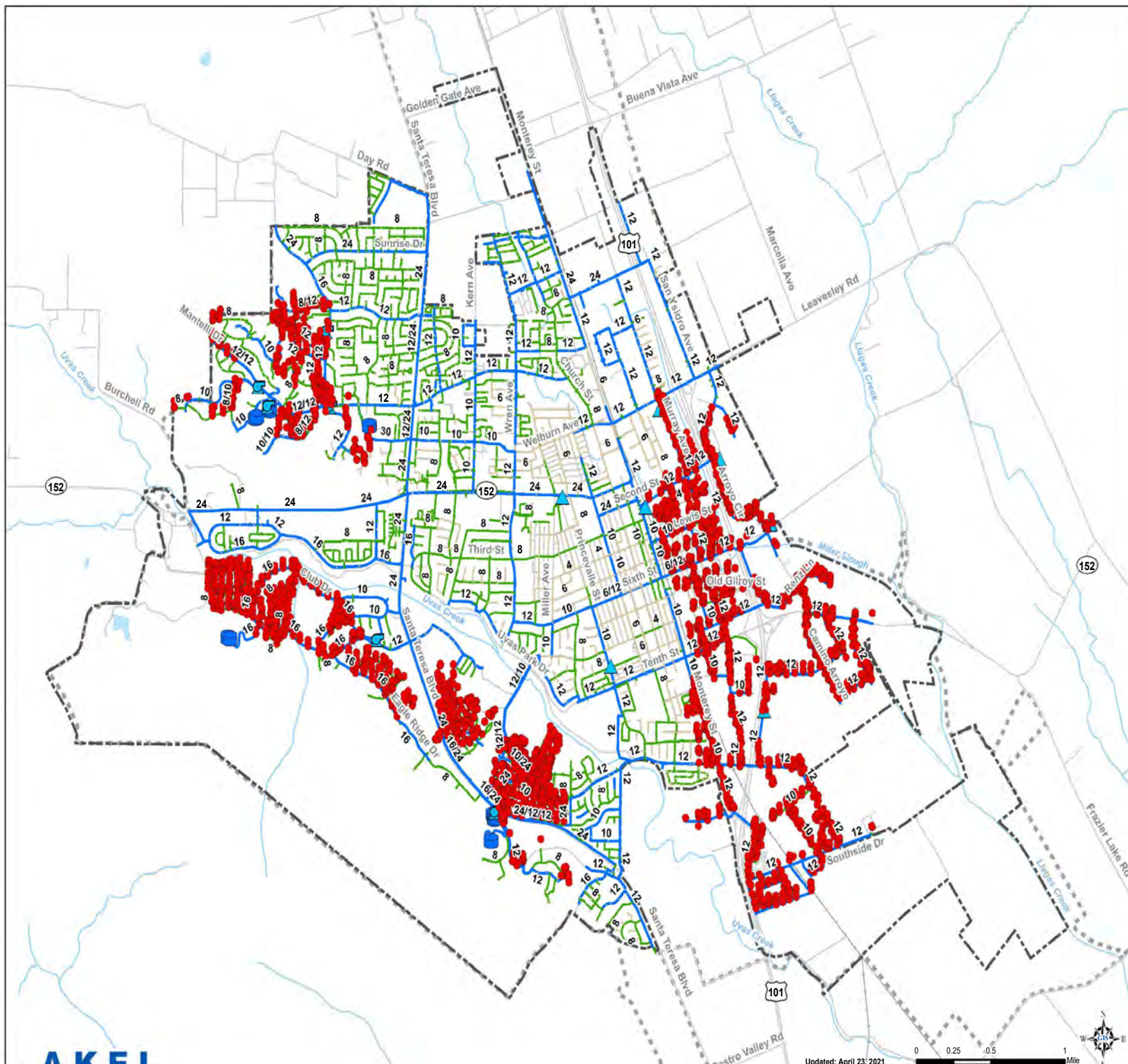
— Rivers & Creeks

— Waterbodies

Figure 7.2
Minimum System Pressures
(Peak Hour)

Water System Master Plan
City of Gilroy





Legend

- Node Pressures > 80 psi
- Existing System**
 - Tanks
 - ▲ Wells
 - ⚙️ Booster Pumps
- Existing Pipes by Diameter**
 - 4" - 6"
 - 8"
 - 10" - 30"
- Roads
- Railroads
- ▭ City Limits
- ▭ Urban Growth Boundary
- ~ Rivers & Creeks
- Waterbodies

Figure 7.3
Maximum System Pressures
 Water System Master Plan
 City of Gilroy



The hydraulic model indicates that the City's existing distribution system performed adequately during the fire flow analysis. The required fire flow, based on different types of land uses, are presented on [Figure 7.4](#). Areas where the City's water system did not meet the fire flow criteria are documented on [Figure 7.5](#). The available fire flow at the City's residual pressure criteria of 20 psi is shown on [Figure 7.6](#).

7.5 WATER SUPPLY

The criteria for water supply should be capable of meeting maximum day demand, including a 2.6 million gallons per day (MGD) standby capacity.

The City's existing water supply requirement for maximum day demands plus a 2.6 MGD standby capacity is 16.3 MGD. The buildout water supply requirement for Planning Area demands is projected at 25.0 MGD. [Table 7.1](#) includes a supply analysis for the City through the buildout of the Gilroy Planning Area.

It should be noted that the 2020 Urban Water Management Plan (UWMP) projected an average daily supply requirement of 7.4 MGD for existing conditions and projected 21.8 MGD for future conditions. This differs from the master plan average daily supply requirement of 6.9 MGD for existing conditions and projected 11.2 MGD for 2040 General Plan buildout conditions. The master plan demand projections have been reviewed and approved by City staff.

7.6 WATER SUPPLY REQUIREMENTS

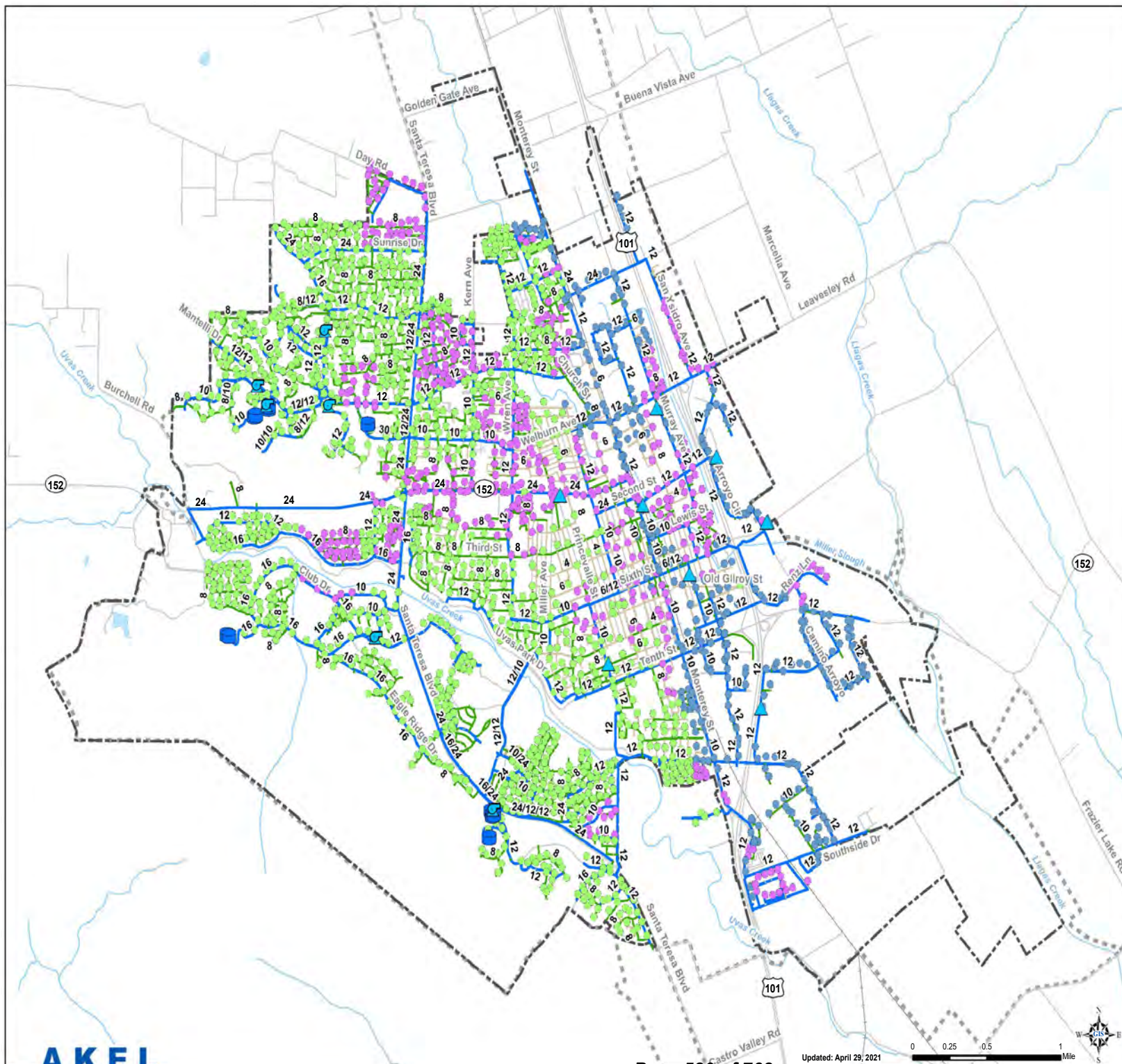
The City's existing domestic water supply capacity is identified in this section. Additionally, the section identifies the additional supply capacity required to meet the supply requirement.

7.6.1 Existing Supply Requirements

Existing supply requirements were identified for the City and are summarized on [Table 7.1](#). The City's existing water supply requirement is approximately 16.3 mgd, as based on existing land use and recommended water demands. The existing available supply capacity is approximately 19.8 mgd, which results in a supply surplus of 3.5 mgd.

7.6.2 Future Supply Requirements

Future supply requirements were identified based on the buildout of the 2040 General Plan and are summarized on [Table 7.1](#). As shown on [Table 7.1](#) the City's existing firm supply capacity is not sufficient to meet the City's buildout supply requirement, and three (3) new wells are required to be constructed. With the construction of three new wells (2.2 mgd capacity for each) in the City, the City's future firm supply capacity will meet the future supply requirement of 25 mgd under buildout conditions. [Figure 7.7](#) shows the projected population, required and available supply capacity through year 2020 to year 2040, and identifies the time when the proposed groundwater



Legend

Required Fire Flow

- Industrial: 5,000 gpm for 3 Hours
- Commercial: 2,500 gpm for 2 Hours
- Residential: 1,500 gpm for 2 Hours

Existing System

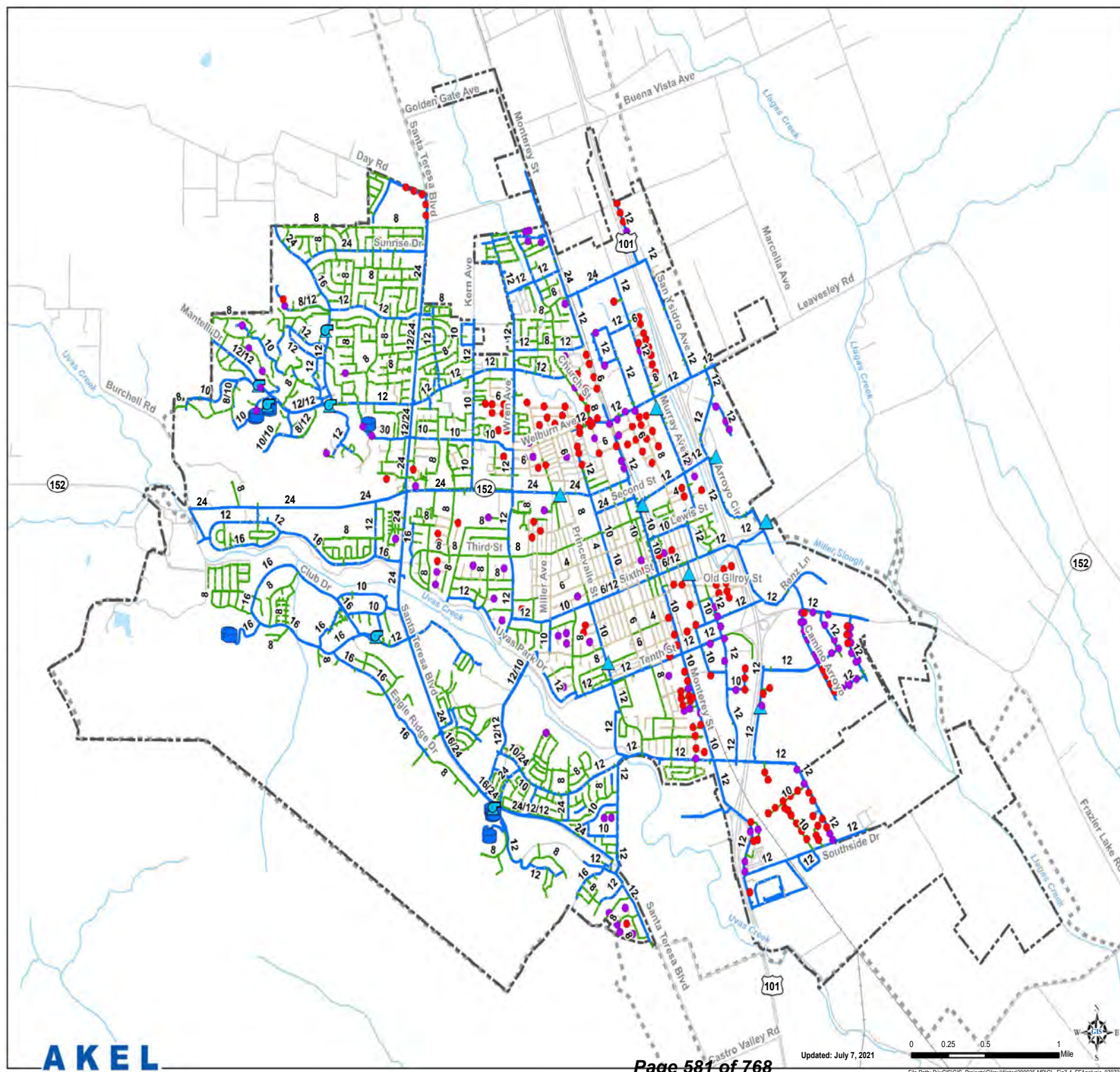
- Tanks
- ▲ Wells
- Booster Pumps

Existing Pipes by Diameter

- 4" - 6"
- 8"
- 10" - 30"
- Roads
- Railroads
- City Limits
- Urban Growth Boundary
- Rivers & Creeks
- Waterbod

Figure 7.4
Required Fire Flow
Water System Master Plan
City of Gilroy





Legend

● Residual Pressure < 20 psi

● Residual Pressure = 0 psi

Existing System

■ Tanks

▲ Wells

■ Booster Pumps

Existing Pipes by Diameter

— 4" - 6"

— 8"

— 10" - 30"

— Roads

— Railroads

— City Limits

— Urban Growth Boundary

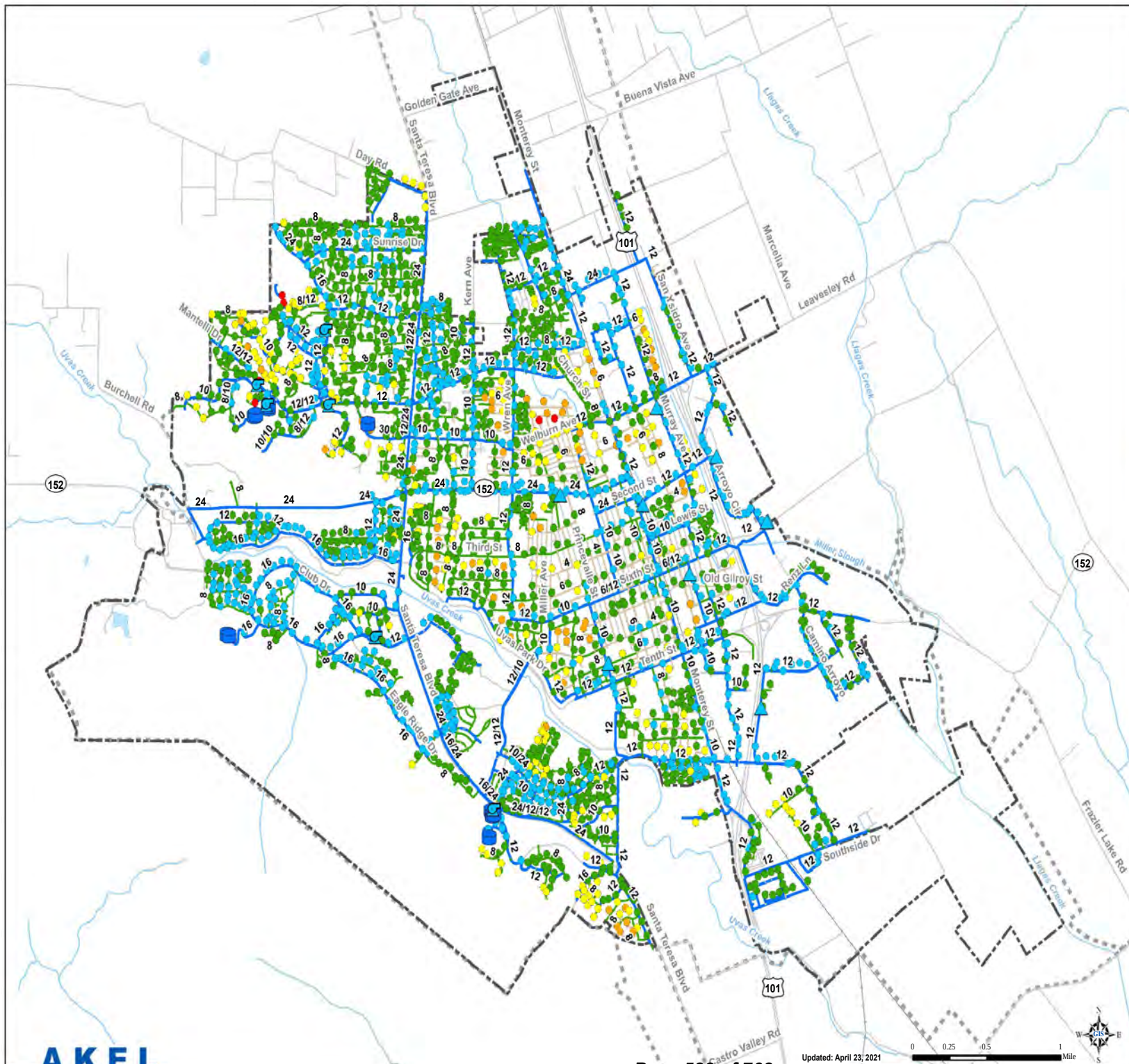
— Rivers & Creeks

— Waterbodies

Figure 7.5
Fire Flow Analysis

Water System Master Plan
City of Gilroy





Legend

Available Fire Flow

- Greater than 5,000 gpm
- 2,500 gpm - 5,000 gpm
- 1,500 gpm - 2,500 gpm
- 500 gpm - 1,500 gpm
- Less than 500 gpm

Existing System

- Tanks
- Wells
- Booster Pumps

Existing Pipes by Diameter

- 4" - 6"
- 8"
- 10" - 30"
- Roads
- Railroads
- City Limits
- Urban Growth Boundary
- Rivers & Creeks
- Waterbodies

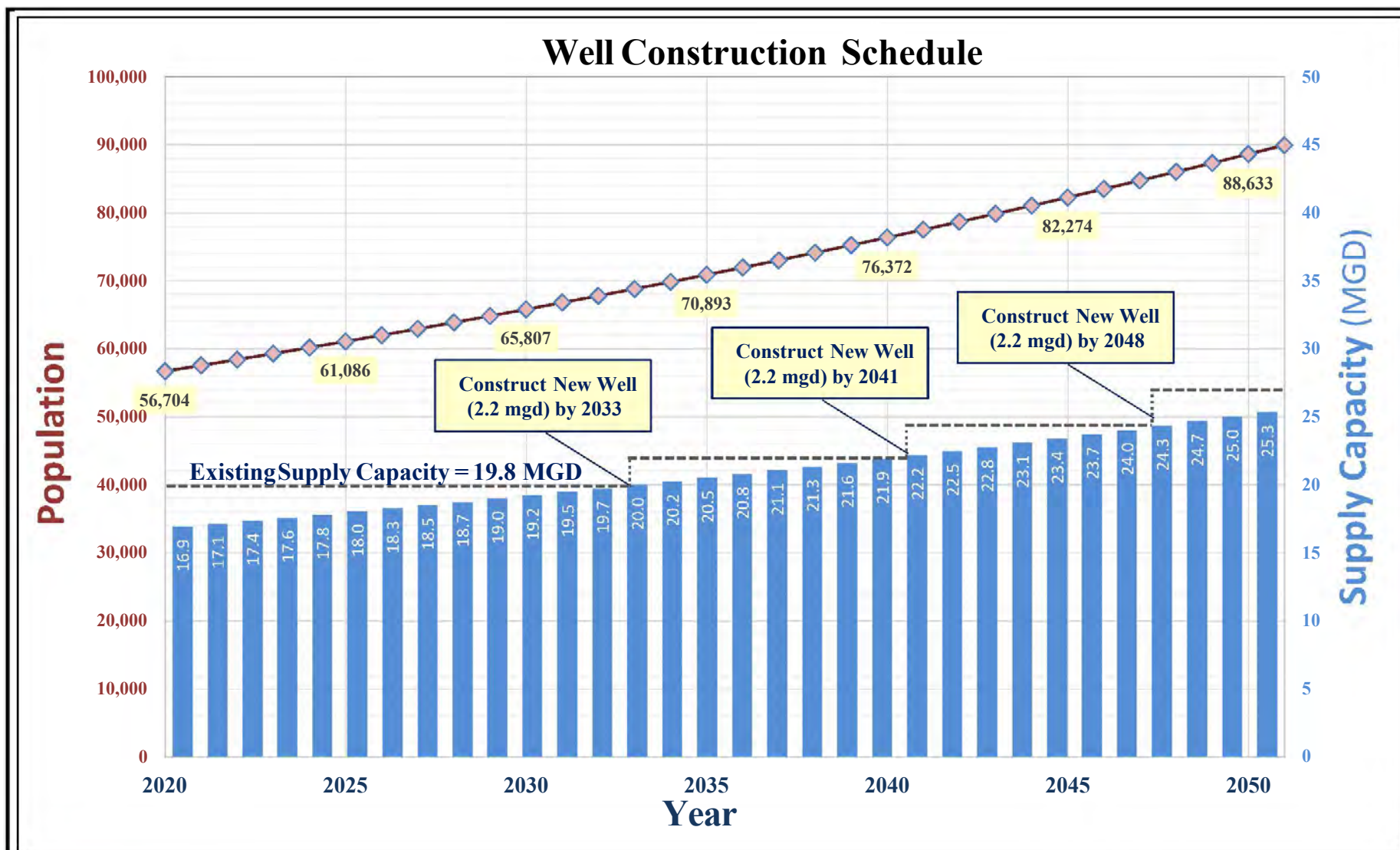
Note:

It should be noted that available fire flow values shown are based on a residual pressure of 20 psi.

Figure 7.6
Available Fire Flow

Water System Master Plan
City of Gilroy





LEGEND

- ◆— Population
- Required Supply Capacity
- - - Available Supply Capacity

Assumptions:

1. Water demand projections based on a demand factor of 126.35 gpcd.
2. Projected water demand based on Maximum Day Demand + Standby Well Requirement (2.6 MGD).

Figure 7.7
Well Construction
Schedule
 Water System Master Plan
 City of Gilroy



April 22, 2022

Table 7.1 Supply Capacity Evaluation
Water System Master Plan
City of Gilroy

Well No.	Rated Supply Capacity	
Supply Capacity Criteria		
Firm supply capacity to equal Maximum Day Demand + Standby Well (2.6 mgd)		
Groundwater Supply Capacity		
No. 1	1,200	gpm
No. 2	1,100	gpm
No. 3	2,300	gpm
No. 4	1,200	gpm
No. 5	1,600	gpm
No. 6	1,500	gpm
No. 7	1,700	gpm
No. 8	2,200	gpm
No. 8A	240	gpm
No. 9 ¹	700	gpm
Supply vs. Demand Evaluation		
Supply Balance	Existing	Buildout
Maximum Day Demand (mgd)	13.7	22.3
Standby Well (mgd)	2.6	2.6
Required Capacity (mgd)	16.3	24.9
Available Supply Capacity (mgd)	19.8	19.8
Capacity Surplus/Deficiency (mgd)	3.5	-5.1
Recommended New Wells (at 2.2 mgd each ²)	0	3.0
AKEL ENGINEERING GROUP, INC.		
		7/6/2021

7/6/2021

Note:

1. Project is currently under way to construct Well No. 9.
2. Recommended new well capacity of 2.2 mgd is consistent with the 2004 WSMP.

wells need to be constructed. The proposed groundwater well sites are shown graphically in [Figure 7.8](#) and described as follows:

- **GW-10:** Construct a new 1,500 gpm groundwater well near the intersection of San Ysidro Avenue and Las Animas Avenue (Anticipated Construction Year: 2033).
- **GW-11:** Construct a new 1,500 gpm groundwater well near the intersection of Camino Arroyo and Renz Lane (Anticipated Construction Year: 2041).
- **GW-12:** Construct a new 1,500 gpm groundwater well near the intersection of Wren Avenue and Vickery Lane (Anticipated Construction Year: 2048).

Akel recommends a feasibility study of each proposed site to confirm site-specific constraints such as subsurface conditions, aquifer depth, water quality treatment requirements and overall constructability.

7.7 WATER STORAGE REQUIREMENT

The City's existing domestic water system storage capacity is identified in this section. Additionally, this section identifies the existing and future storage requirements to meet the storage capacity and compares it with the existing storage facilities in each zone and makes recommendation for new storage facilities.

7.7.1 Existing Storage Requirements

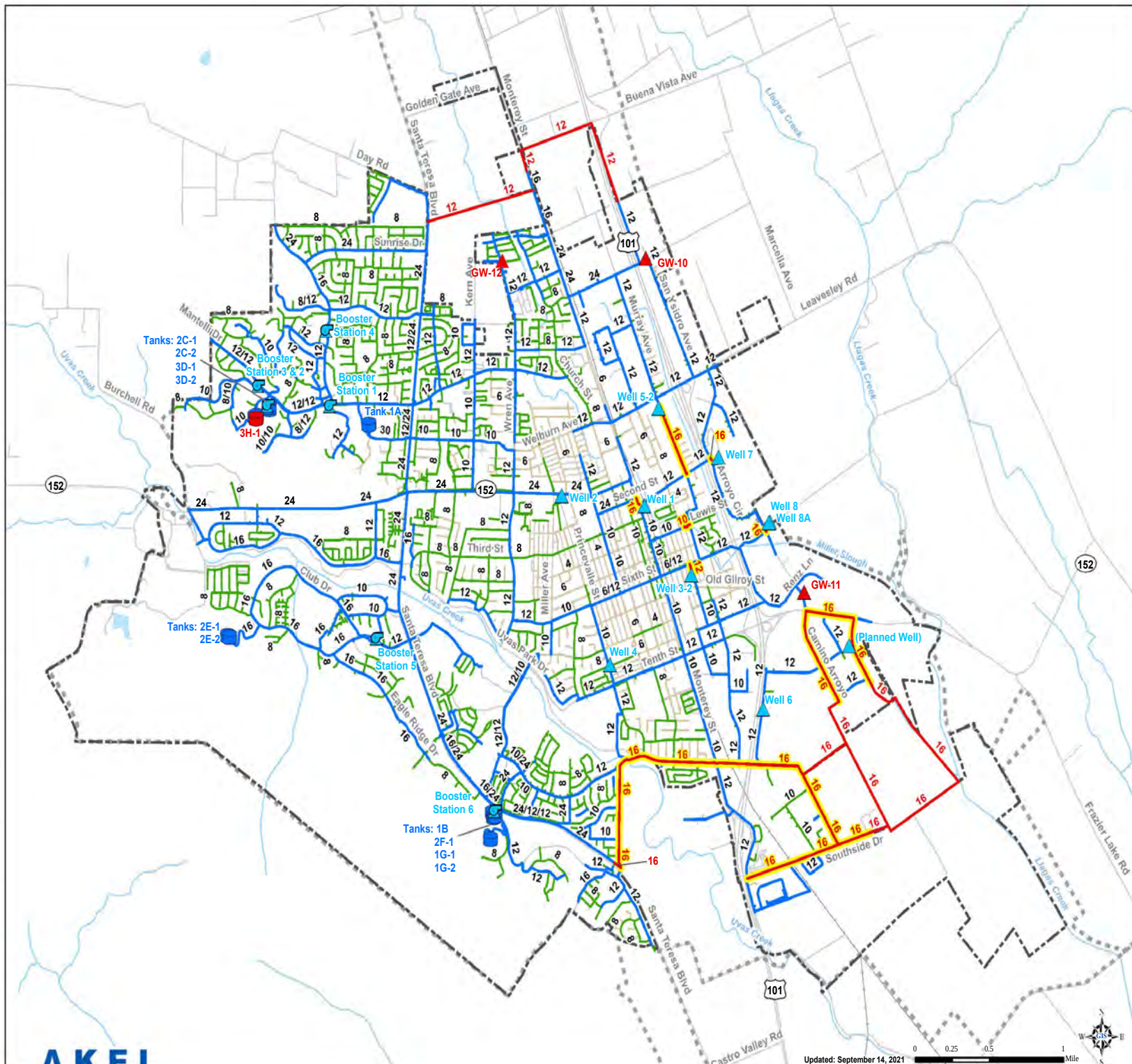
Existing storage requirements were identified for each pressure zone and are summarized in [Table 7.2](#). The table lists the existing domestic water demands and identifies the operational, emergency and fire storage for each pressure zone. The table also lists the total required storage for existing domestic water demands at 8.8 MG.

7.7.2 Future Storage Requirements

Future storage requirements were identified based on the buildout of the 2040 General Plan and summarized by pressure zone on [Table 7.3](#). The table lists the future domestic water demands and identifies the operational, emergency and fire storage for each pressure zones. The table also lists the total required storage for future domestic water demands at 13.7 MG.

7.7.3 Recommended New Storage Facilities

The existing and future storage requirements, shown on [Table 7.2](#) and [Table 7.3](#), were compared with existing City storage facilities in each pressure zone and requirement storage facility improvements that were identified and listed on [Table 7.4](#). The table lists existing storage facilities for each pressure zone, identifies existing storage capacity deficiencies, and identifies future storage capacity requirements to meet the needs from future growth.



Legend

Recommended Improvements

- Tanks
- ▲ Wells
- New Pipes
- Pipe Replacements

Existing System

- Tanks
- ▲ Wells
- Booster Pumps
- Existing Pipes by Diameter
 - 4" - 6"
 - 8"
 - 10" - 30"
- Roads
- Railroads
- City Limits
- Urban Growth Boundary
- Rivers & Creeks
- Waterbodies

Figure 7.8
Recommended System
Improvements

Water System Master Plan
City of Gilroy



Table 7.2 Existing Storage Requirements
Water System Master Plan
City of Gilroy

Pressure Zone	Existing Water Demands ¹		Existing Water Storage Requirements			
	Average Day Demand	Maximum Day Demand ²	Operational	Emergency	Fire Protection ³	Total, By Pressure Zone
	(MGD)	(MGD)	(MG)	(MG)	(MG)	(MG)
Zone 1	6.05	12.10	3.02	3.02	0.90	6.95
Zone 2N	0.24	0.49	0.12	0.24	0.18	0.55
Zone 2S	0.44	0.88	0.22	0.44	0.30	0.96
Zone 3	0.13	0.26	0.07	0.13	0.18	0.38
Total	6.87	13.73	3.43	3.84	1.56	8.83

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Notes:

1. Total demands reflect the average day production and escalated using the peaking factor. The distribution is based on 2019 water billing records.
2. Maximum Day Demand = 2.0 x Average Day Demand
3. Fire Protection requirement represents largest fire requirement for each zone, based on existing land use types.

Table 7.3 Buildout Storage Requirements
 Water System Master Plan
 City of Gilroy

Pressure Zone	Buildout Water Demands ¹		Buildout Water Storage Requirements			
	Average Day Demand	Maximum Day Demand ²	Operational	Emergency	Fire Protection ³	Total, By Pressure Zone
	(MGD)	(MGD)	(MG)	(MG)	(MG)	(MG)
Zone 1	9.16	18.31	4.58	4.58	0.90	10.06
Zone 2N	0.28	0.56	0.14	0.28	0.18	0.60
Zone 2S	1.23	2.45	0.61	1.23	0.30	2.14
Zone 3	0.50	1.00	0.25	0.50	0.18	0.93
Total	11.16	22.32	5.58	6.58	1.56	13.72

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Notes:

1. Buildout water demands include existing and future demands.
2. Maximum Day Demand = 2.0 x Average Day Demand
3. Fire Protection requirement represents largest fire requirement for each zone, based on existing land use types.

Table 7.4 Storage Capacity Evaluation by Pressure Zone
Water System Master Plan
City of Gilroy

Pressure Zone	Existing Water Storage Requirements		Existing Water Storage Requirements			Existing Storage Reservoirs										Storage Balance for Existing Demands	Buildout Water Storage Requirements		Buildout Water Storage Requirements			Proposed New Storage Reservoirs					Total Storage	Existing and Buildout Storage Balance	
	Existing Average Day Demand	Existing Maximum Day Demand	Operational + Emergency	Fire Protection	Total	1A	1B	1G	2C-1	2C-2	2E-1	2E-2	2F-1	3D-1	3D-2		Total	Buildout Average Day Demand	Buildout Maximum Day Demand	Operational + Emergency	Fire Protection	Total	Zone 1	Zone 2N	Zone 2S	Zone 3			Total
(MGD)	(MGD)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MGD)	(MGD)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	
Zone 1	6.0	12.1	6.0	0.9	6.9	3.0	2.0	5.3								10.3	3.4	9.2	18.3	9.2	0.9	10.1					0.0	10.3	0.24
Zone 2N	0.2	0.5	0.4	0.2	0.5				0.4	0.4						0.8	0.3	0.3	0.6	0.4	0.2	0.6					0.0	0.8	0.22
Zone 2S	0.4	0.9	0.7	0.3	1.0						0.7	0.7	0.7			2.1	1.2	1.2	2.4	1.8	0.3	2.1					0.0	2.1	0.00
Zone 3	0.1	0.3	0.2	0.2	0.4									0.4	0.4	0.8	0.4	0.5	1.0	0.7	0.2	0.9			0.1	0.1	0.9	0.00	
Total	6.9	13.7	7.3	1.6	8.8											14.1	5.2	11.2	22.3	12.2	1.6	13.7				0.10	14.17	0.46	

The results of the storage analysis indicate that the existing storage volume is sufficient under existing conditions but is unable to meet the requirements for both existing and future customers at the buildout of the General Plan. Therefore, a new storage reservoir is recommended specifically in Zone 3 to mitigate the storage deficiency.

The proposed storage reservoir is summarized on [Table 7.4](#) and graphically shown on [Figure 7.8](#). This reservoir is described as follows, with a preliminary capacity of 0.1 MG:

- **R 3H-1:** Construct a new 0.1 MG storage reservoir at existing Zone 3 Tank site, located on Periwinkle Drive, to provide additional storage for future demand.

It should be noted that a minimum storage capacity of 0.1 MG was required in pressure zone 3 to meet the buildout requirements. Potential for additional capacity should be investigated during subsequent design phases to provide resiliency, if feasible.

7.8 PUMP STATION CAPACITY ANALYSIS

The City's existing station capacity is identified in this section. Additionally, this section identified the existing and future pump station capacity requirements and compares it with the existing pump station facilities in each zone and makes recommendations for new pump station facilities.

7.8.1 Existing Pump Station Capacity Requirements

Existing pump station capacities and requirements established from the City criteria are summarized on [Table 7.5](#). This table indicates the City's existing pump stations have adequate capacity to meet existing requirements.

7.8.2 Future Pump Station Capacity Requirements

Existing pump station capacities and future requirements established from the City criteria are summarized on [Table 7.6](#). This table indicates the City's existing pump stations have sufficient capacity to meet projected water demands under buildout conditions.

7.9 PIPELINE IMPROVEMENTS

The buildout of the 2040 General Plan includes development outside of the extents of the existing domestic water distribution system. Distribution pipelines are recommended to serve future growth as well as increase the hydraulic reliability of the domestic water distribution system. Each pipeline improvement is assigned a uniquely coded identifier, which is intended to aid in defining the location of the improvement for mapping purposes. These identifiers reflect the pressure zone, improvement type, and sequence in the improvement schedule. The pipeline improvements are summarized on [Table 7.7](#) and described in detail on the following pages.

Table 7.5 Existing Pump Station Capacity Evaluation
Water System Master Plan
City of Gilroy

Pressure Zone				Pump Station Capacity Analysis					
Pump Station	Source Zone	Destination Zone	Supply Dependent Zones	Total Capacity	Firm Capacity ¹	Required Existing Capacity ²		Total	Surplus/ Deficiency
				(gpm)	(gpm)	Destination Zone	Supply Dependent Zones		
						(gpm)	(gpm)	(gpm)	(gpm)
Pressure Zone 2N									
Booster Station 1	1	2N	3	1,881	1,226				
Booster Station 4	1	2N	3	1,321	878				
Total				3,202	2,104	339	182	522	1,582
Pressure Zone 2S									
Booster Station 5	1	2S	-	1,838	1,216				
Booster Station 6	1	2S	-	1,470	934				
Total				3,308	2,150	615	0	615	1,535
Pressure Zone 3									
Booster Station 2	2N	3	-	870	580				
Booster Station 3	2N	3	-	870	580				
Total				1,740	1,160	182	0	182	978



5/7/2021

Notes:

1. Firm capacity for each pressure zone is defined as the sum of the total capacity of each pump station pumping into the pressure zone, with each pump station operating without their largest unit.
2. Pump stations to supply MDD of destination zone and all other supply dependent zones.

Table 7.6 Buildout Pump Station Capacity Evaluation

City of Silver Spring Master Plan

Pressure Zone				Pump Station Capacity Analysis					
Pump Station	Source Zone	Destination Zone	Supply Dependent Zones	Total Capacity (gpm)	Firm Capacity ¹ (gpm)	Required Buildout Capacity ²			Surplus/ Deficiency (gpm)
						Destination Zone (gpm)	Supply Dependent Zones (gpm)	Total (gpm)	
Pressure Zone 2N									
Booster Station 1	1	2N	3	1,881	1,226				
Booster Station 4	1	2N	3	1,321	878				
Total				3,202	2,104	389	692	1,081	1,023
Pressure Zone 2S									
Booster Station 5	1	2S	-	1,838	1,216				
Booster Station 6	1	2S	-	1,470	934				
Total				3,308	2,150	1,705	0	1,705	445
Pressure Zone 3									
Booster Station 2	2N	3	-	870	580				
Booster Station 3	2N	3	-	870	580				
Total				1,740	1,160	692	0	692	468

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5/17/2022

Notes:

1. Firm capacity for each pressure zone is defined as the sum of the total capacity of each pump station pumping into the pressure zone, with each pump station operating without their largest unit.
2. Pump stations to supply MDD of destination zone and all other supply dependent zones.

7.9.1 Pipeline Improvements to Serve Future Growth

This section documents pipeline improvements within the Pressure Zone 1.

- **P1-1.** Construct approximately 3,860 feet of a new 12-inch pipeline in Day Road from Santa Teresa Boulevard to Monterey Highway.
- **P1-2.** Construct approximately 5,780 feet of a new 12-inch pipeline in Monterey Highway / Orsetti Road / Highway 101 from 620 feet north of Day Road to Cohansey Avenue.
- **P1-12.** Construct approximately 1,620 feet of a new 16-inch pipeline in ROW from Camino Arroyo to approximately 1,800 feet east of Luchessa Avenue.
- **P1-13.** Construct approximately 4,540 feet of a new 16-inch pipeline in ROW / Cameron Boulevard from approximately 200 feet southeast of Venture Way to Southside Drive.
- **P1-17.** Construct approximately 1,810 feet of a new 16-inch pipeline in ROW from Luchessa Avenue to approximately 1,800 feet east of Luchessa Avenue.
- **P1-18.** Construct approximately 2,890 feet of a new 16-inch pipeline in ROW from approximately 1,800 feet east of Luchessa Avenue to Southside Drive.
- **P1-20.** Construct approximately 660 feet of a new 16-inch pipeline in Southside Drive from Arizona Circle to approximately 660 feet of Arizona Circle.
- **P1-21.** Construct approximately 3,010 feet of a new 16-inch pipeline in Southside Drive from approximately 660 feet east of Arizona Circle to Camaron Boulevard.
- **P1-22.** Construct approximately 280 feet of a new 16-inch pipeline in Santa Teresa Boulevard from approximately 160 feet west of Thomas Road to approximately 110 feet east of Thomas Road.

7.9.2 Pipeline Improvement to Increase Fire Flow Reliability

Improvements to mitigate specific fire flow deficiencies are discussed below with the corresponding coded identifier, which is also consistent with the capital improvements chapter:

- **P1-9.** Replace approximately 1,730 feet of 12-inch pipeline from Camino Arroyo to Cameron Boulevard along Pacheco Pass Highway with 16-inch pipeline.
- **P1-10.** Replace approximately 3,040 feet of 12-inch pipeline from Pacheco Pass Highway to Venture Way along Camino Arroyo with 16-inch pipeline.
- **P1-11.** Replace approximately 2,100 feet of 12-inch pipeline from Pacheco Pass Highway to 200 feet southeast of Venture Way along Cameron Boulevard with 16-inch pipeline.

- **P1-14.** Replace approximately 6,480 feet of 12-inch pipeline from Thomas Road to Rossi Lane along Luchessa Avenue with 16-inch pipeline.
- **P1-15.** Replace approximately 3,060 feet of 12-inch pipeline from Luchessa Avenue to Santa Teresa Road along Thomas Road with 16-inch pipeline.
- **P1-16.** Replace approximately 2,730 feet of 12-inch pipeline from Luchessa Avenue to Southside Drive along Rossi Lane with 16-inch pipeline.
- **P1-19.** Replace approximately 4,630 feet of 12-inch pipeline from Highway 101 to Arizona Circle along Garlic Farm Way / Southside Drive with 16-inch pipeline.

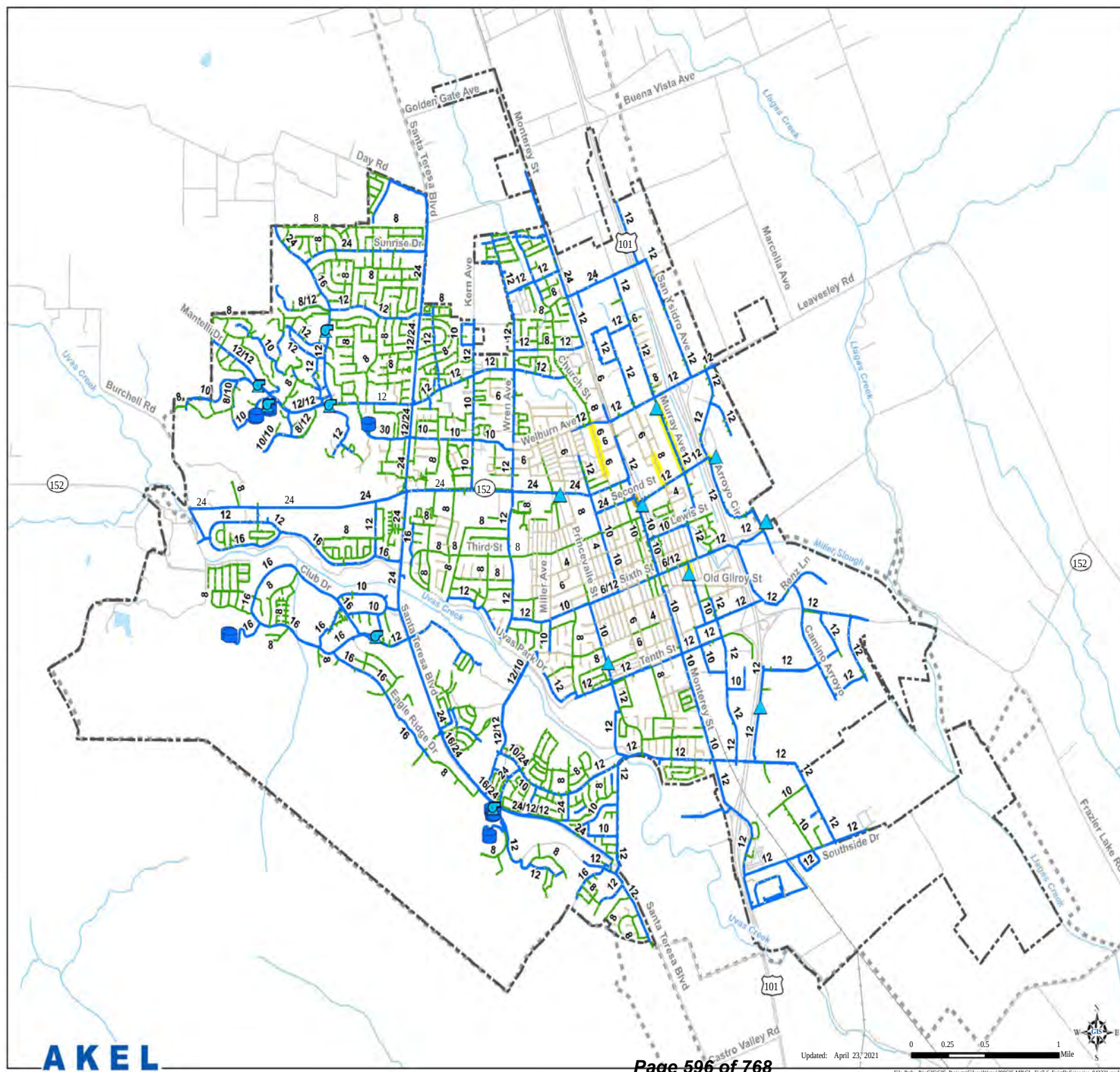
7.9.3 Pipeline Improvements to Mitigate Existing System Deficiencies

The hydraulic model was also used to identify areas that experience high headloss or high velocity under maximum day demand conditions. The areas of existing pipeline deficiencies are shown graphically on **Figure 7.9**. Areas of high velocity or high headloss may be more susceptible to pipeline breaks and ruptures. The City's maximum desired velocity criterion is 8 feet per second and maximum desired headloss is 10 ft per thousand feet. Improvements to mitigate existing pipeline deficiencies are discussed below with the corresponding coded identifier, which is also consistent with the capital improvements chapter:

- **P1-3.** Replace approximately 230 feet of 12-inch pipeline from Second Street to Loof Avenue along Monterey Highway with 16-inch pipeline.
- **P1-4.** Replace approximately 2,200 feet of 12-inch pipeline from Well 5-02 to Loof Avenue along Murray Avenue with 16-inch pipeline.
- **P1-5.** Replace approximately 70 feet of 12-inch pipeline from Well 7 to Loof Avenue along Arroyo Circle with 16-inch pipeline.
- **P1-6.** Replace approximately 230 feet of 8-inch pipeline from approximately 180 east of Forest Street to Chestnut Street along Lewis Street with 10-inch pipeline.
- **P1-7.** Replace approximately 320 feet of 10-inch pipeline from Well 3 to Sixth Street along Forest Street with 12-inch pipeline.
- **P1-8.** Replace approximately 300 feet of 12-inch pipeline from Well 8 to approximately 80 feet southeast of Gilman Road along Gilman Road / Camino Arroyo with 16-inch pipeline.

Table 7.7 Schedule of Improvements
Water System Master Plan
City of Gilroy

Improv. No.	Improv. Type	Pressure Zone	Alignment	Limits	Existing Diameter	Pipeline Improvements		
					New/Parallel/ Replace	Diam.	Length	
					(in)		(in)	(ft)
Pipeline Improvements								
P1-1	Future Growth	Zone 1	Day Rd	From Santa Teresa Blvd to Monterey Hwy	-	New	12	3,860
P1-2	Future Growth	Zone 1	Monterey Hwy / Orsetti Rd / Hwy 101	From approx. 620' n/o Day Rd to Cohansey Ave	-	New	12	5,780
P1-3	Existing Deficiency	Zone 1		Monterey Hwy	From 2nd St to Ioof Ave	12	Replace	16
P1-4	Existing Deficiency	Zone 1	Murray Ave	From Well 5-02 to Ioof Ave	12	Replace	16	2,200
P1-5	Existing Deficiency	Zone 1	Arroyo Cir	From Well 7 to Ioof Ave	12	Replace	16	70
P1-6	Existing Deficiency	Zone 1	Lewis St	From approx. 180' e/o Forest St to Chestnut St	8	Replace	10	230
P1-7	Existing Deficiency	Zone 1	Forest St	From Well 3 to 6th St	10	Replace	12	320
P1-8	Existing Deficiency	Zone 1	Gilman Rd / Camino Arroyo	From Well 8 to approx. 80' se/o Gilman Rd	12	Replace	16	300
P1-9	FF Reliability	Zone 1	Pacheco Pass Hwy	From Camino Arroyo to Cameron Blvd	12	Replace	16	1,730
P1-10	FF Reliability	Zone 1	Camino Arroyo	From Pacheco Pass Hwy to Venture Wy	12	Replace	16	3,040
P1-11	FF Reliability	Zone 1	Cameron Blvd	From Pacheco Pass Hwy to approx. 200' se/o Venture Wy	12	Replace	16	2,100
P1-12	Future Growth	Zone 1	ROW	From Camino Arroyo to approx. 1,800' e/o Luchessa Ave	-	New	16	1,620
P1-13	Future Growth	Zone 1	ROW / Cameron Blvd	From approx. 200' se/o Venture Wy to Southside Dr	-	New	16	4,540
P1-14	FF Reliability	Zone 1	Luchessa Ave	From Thomas Rd to Rossi Ln	12	Replace	16	6,480
P1-15	FF Reliability	Zone 1	Thomas Rd	From Luchessa Ave to Santa Teresa Rd	12	Replace	16	3,060
P1-16	FF Reliability	Zone 1	Rossi Ln	From Luchessa Ave to Southside Dr	12	Replace	16	2,730
P1-17	Future Growth	Zone 1	ROW	From Luchessa Ave to approx. 1,800' e/o Luchessa Ave	-	New	16	1,810
P1-18	Future Growth	Zone 1	ROW	From approx. 1,800' e/o Luchessa Ave to Southside Dr	-	New	16	2,890
P1-19	FF Reliability	Zone 1	Garlic Farm Wy / Southside Dr	From Hwy 101 to Arizona Cir	12	Replace	16	4,630
P1-20	Future Growth	Zone 1	Southside Dr	From Arizona Cir to approx. 660' e/o Arizona Cir	-	New	16	660
P1-21	Future Growth	Zone 1	Southside Dr	From approx. 660' e/o Arizona Cir to Camaron Blvd	-	New	16	3,010
P1-22	Future Growth	Zone 1	Santa Teresa Blvd	From approx. 160' w/o Thomas Rd to approx. 110' e/o Thomas Rd	-	New	16	280
Storage Reservoir Improvements						Proposed Storage Capacity (MG)		
3H-1	Storage Capacity	Zone 3	Construct an additional 0.2 MG storage reservoir at existing 3D site			New	0.10	
Groundwater Well Improvements						Proposed Pumping Capacity (gpm)		
GW-10	Supply Capacity	Zone 1	Construct new well near the intersection of San Ysidro Ave and Las Animas Ave			New	1,500	
GW-11	Supply Capacity	Zone 1	Construct new well near the intersection of Camino Arroyo and Renz Lane			New	1,500	
GW-12	Supply Capacity	Zone 1	Construct new well near the intersection of Wren Ave and Vickery Ln			New	1,500	



Legend

Existing Pipeline Deficiencies

Headloss is Greater than 10 ft/kft

Velocity is Greater than 8 fps

Existing System

Tanks

Wells

Booster Pumps

Existing Pipes by Diameter

4" - 6"

8"

10" - 30"

Roads

Railroads

City Limits

Urban Growth Boundary

Rivers & Creeks

Waterbodies

Figure 7.9
Existing Pipeline Deficiencies
Water System Master Plan
City of Gilroy



CHAPTER 8 – CAPITAL IMPROVEMENT PROGRAM

This chapter provides a summary of the recommended domestic water system improvements to mitigate existing capacity deficiencies and to accommodate anticipated future growth. The chapter also presents the cost criteria and methodologies for developing the capital improvement program. Finally, a capacity allocation analysis, usually used for cost sharing purposes, is also included.

8.1 COST ESTIMATE ACCURACY

Cost estimates presented in the CIP were prepared for general master planning purposes and, where relevant, for further project evaluation. Final costs of a project will depend on several factors including the final project scope, costs of labor and material, and market conditions during construction.

The Association for the Advancement of Cost Engineering (AACE International), formerly known as the American Association of Cost Engineers has defined three classifications of assessing project costs. These classifications are presented in order of increasing accuracy: Order of Magnitude, Budget, and Definitive.

- **Order of Magnitude Estimate.** This classification is also known as an “original estimate”, “study estimate”, or “preliminary estimate”, and is generally intended for master plans and studies.

This estimate is not supported with detailed engineering data about the specific project, and its accuracy is dependent on historical data and cost indexes. It is generally expected that this estimate would be accurate within -30 percent to +50 percent.

- **Budget Estimate.** This classification is also known as an “official estimate” and generally intended for predesign studies. This estimate is prepared to include flow sheets and equipment layouts and details. It is generally expected that this estimate would be accurate within -15 percent to +30 percent.
- **Definitive Estimate.** This classification is also known as a “final estimate” and prepared during the time of contract bidding. The data includes complete plot plans and elevations, equipment data sheets, and complete specifications. It is generally expected that this estimate would be accurate within -5 percent to +15 percent.

Costs developed in this study should be considered “Order of Magnitude” and have an expected accuracy range of **-30 percent** and **+50 percent**.

8.2 COST ESTIMATE METHODOLOGY

Cost estimates presented in this chapter are opinions of probable construction and other relevant costs developed from several sources including cost curves, Akel experience on other master planning projects, and input from City staff on the development of public and private cost sharing. Where appropriate, costs were escalated to reflect the more current Engineering News Records (ENR) Construction Cost Index (CCI).

This section documents the unit costs used in developing the opinion of probable construction costs, the Construction Cost Index, the land acquisition costs, and markups to account for construction contingency and other project related costs.

8.2.1 Unit Costs

The unit cost estimates used in developing the Capital Improvement Program are summarized on **Table 8.1**. Domestic water pipeline unit costs are based on length of pipes, in feet. Storage reservoir unit costs are based on capacity, per million gallons (MG). Pump Station costs are based on an equation that replaces the pump curve.

The unit costs are intended for developing the Order of Magnitude estimate and do not account for site-specific conditions, labor and material costs during the time of construction, final project scope, implementation schedule, detailed utility and topography surveys for reservoir sites, investigation of alternative routings for pipes, and other various factors. The capital improvement program included in this report accounts for construction and project-related contingencies as described in this chapter.

8.2.2 Construction Cost Index

Costs estimated in this study are adjusted utilizing the Engineering News Record (ENR) Construction Cost Index (CCI), which is widely used in the engineering and construction industries.

The costs in this Water System Master Plan were benchmarked using a 20-City national average ENR CCI of 13,176, reflecting a date of March 2023.

8.2.3 Construction Contingency Allowance

Knowledge about site-specific conditions for each proposed project is limited at the master planning stage; therefore, construction contingencies were used. The estimated construction costs in this master plan include a **30 percent** contingency allowance to account for unforeseen events and unknown field conditions, as well as market uncertainty and unpredictable inflation.

8.2.4 Project Related Costs

The capital improvement costs also account for project-related costs, comprising of engineering design, project administration (developer and City staff), construction management and

Table 8.1 Unit Costs
Water System Master Plan
City of Gilroy

Pipelines	
Pipe Size (in)	Cost ^{1,2} (\$/lineal foot)
6	\$153
8	\$187
10	\$211
12	\$254
16	\$304
18	\$312
20	\$336
24	\$400
30	\$500
36	\$560
42	\$705
Pump Stations	
Estimated Pumping Station Project Cost = $2.1 * 10^{(0.7583 * \log(Q) + 3.1951)}$ where Q is in gpm	
Storage Reservoirs (\$/gallon) ^{1,3}	
≤1.0 MG	\$1.33
1.1 MG-3.0 MG	\$2.11
3.1 MG - 5.0 MG	\$3.22
> 5 MG	\$4.89
Groundwater Wells ^{1,4,5}	
1,500 gpm Capacity	\$3,922,000
	

3/28/2023

Notes:

1. Construction costs estimated using March 2023 ENR CCI of 13,176.
2. Pipeline costs include utilities, construction staging, traffic control, and lighting and signing
3. Source: City of Gilroy 2004 Water System Master Plan
4. Source: City of Gilroy 2021-2025 Capital Improvement Program
5. One new 1,500 gpm well costs \$3,626,645, per City of Gilroy 2021-2025 Capital Improvement Program. The cost accounts for Design, CEQA, Construction, Con. Support, and Land Acquisition

inspection, and legal costs. The project related costs in this master plan were estimated by applying an additional **30 percent** to the estimated construction costs.

8.3 CAPITAL IMPROVEMENT PROGRAM

This section documents the capital improvement program, contingencies included in the costs, and the allocation of costs to meet the requirements of AB1600.

8.3.1 Capital Improvements Costs

The Capital Improvement Program costs for the projects identified in this master plan for mitigating existing system deficiencies and for serving anticipated future growth throughout the City are summarized on **Table 8.2**.

Each improvement was assigned a unique coded identifier associated with the improvement type, and is summarized graphically on **Figure 8.1**. The estimated construction costs include the baseline costs plus **30 percent** contingency allowance to account for unforeseen events and unknown field conditions, as described in a previous section. Capital improvement costs include the estimated construction costs plus **30 percent** project-related costs (engineering design, project administration, construction management and inspection, and legal costs).

8.3.2 Recommended Cost Allocation Analysis

Cost allocation analysis is needed to identify improvement funding sources, and to establish a nexus between development impact fees and improvements needed to service growth. In compliance with the provisions of Assembly Bill AB1600, the analysis differentiates between the project needs of servicing existing users and for those required to service anticipated future developments. The cost responsibility is based on model parameters for existing and future land use, and may change depending on the nature of development. **Table 8.2** lists each improvement, and separates the cost by responsibility between existing and future users.

8.3.3 Construction Triggers

As a part of this master planning process, construction triggers were developed in an effort to plan the expansion of the water system in an orderly manner. The construction triggers for multiple improvements are based on mitigating an existing system deficiency, increasing hydraulic reliability, or continuing improvements currently planned by the City. Other improvements replace existing infrastructure that is not currently deficient, but will violate master plan criteria with future development. The construction triggers quantify the amount of additional development that may occur before the improvement becomes necessary.

8.4 SUGGESTED PIPELINE REPLACEMENT BUDGET

The suggested pipeline replacement budget alternatives are shown on **Figure 8.2**, and includes the estimated costs for replacing pipelines phased by 5-year fiscal periods through the year 2055.

Table 8.2 Capital Improvement Program

Water System Master Plan
City of Gilroy

PRELIMINARY																		
Improv. No.	Improv. Type	Pressure Zone	Alignment	Limits	Pipeline Information		Infrastructure Costs				Baseline Constr. Costs	Estimated Const. Costs¹	Capital Improv. Costs²	Construction Trigger	Suggested Cost Allocation		Cost Sharing	
					Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost					Existing Users	Future Users	Existing Users	Future Users
					(in)		(in)	(ft)	(\$)	(\$)	(\$)	(\$)						
Pipeline Improvements																		
P1-1	Future Growth	Zone 1	Day Rd	From Santa Teresa Blvd to Monterey Hwy	-	New	12	3,860	254	978,700	978,700	1,272,400	1,654,200	With Development	0%	100%	0	1,654,200
P1-2	Future Growth	Zone 1	Monterey Hwy / Orsetti Rd / Hwy 101	From approx. 620' n/o Day Rd to Cohansey Ave	-	New	12	5,780	254	1,465,500	1,465,500	1,905,200	2,476,800	With Development	0%	100%	0	2,476,800
P1-3	Existing Deficiency	Zone 1	Monterey Hwy	From 2nd St to loof Ave	12	Replace	16	230	304	70,000	70,000	91,000	118,300	Existing Deficiency	100%	0%	118,300	0
P1-4	Existing Deficiency	Zone 1	Murray Ave	From Well 5-02 to loof Ave	12	Replace	16	2,200	304	669,400	669,400	870,300	1,131,400	Existing Deficiency	100%	0%	1,131,400	0
P1-5	Existing Deficiency	Zone 1	Arroyo Cir	From Well 7 to loof Ave	12	Replace	16	70	304	21,300	21,300	27,700	36,100	Existing Deficiency	100%	0%	36,100	0
P1-6	Existing Deficiency	Zone 1	Lewis St	From approx. 180' e/o Forest St to Chestnut St	8	Replace	10	230	211	48,600	48,600	63,200	82,200	Existing Deficiency	100%	0%	82,200	0
P1-7	Existing Deficiency	Zone 1	Forest St	From Well 3 to 6th St	10	Replace	12	320	254	81,200	81,200	105,600	137,300	Existing Deficiency	100%	0%	137,300	0
P1-8	Existing Deficiency	Zone 1	Gilman Rd / Camino Arroyo	From Well 8 to approx. 80' se/o Gilman Rd	12	Replace	16	300	304	91,300	91,300	118,700	154,400	Existing Deficiency	100%	0%	154,400	0
P1-9	FF Reliability	Zone 1	Pacheco Pass Hwy	From Camino Arroyo to Cameron Blvd	12	Replace	16	1,730	304	526,400	526,400	684,400	889,800	As Funding is Available	100%	0%	889,800	0
P1-10	FF Reliability	Zone 1	Camino Arroyo	From Pacheco Pass Hwy to Venture Wy	12	Replace	16	3,040	304	925,000	925,000	1,202,500	1,563,300	As Funding is Available	100%	0%	1,563,300	0
P1-11	FF Reliability	Zone 1	Cameron Blvd	From Pacheco Pass Hwy to approx. 200' se/o Venture Wy	12	Replace	16	2,100	304	639,000	639,000	830,700	1,080,000	As Funding is Available	100%	0%	1,080,000	0
P1-12	Future Growth	Zone 1	ROW	From Camino Arroyo to approx. 1,800' e/o Luchessa Ave	-	New	16	1,620	304	492,900	492,900	640,800	833,100	With Development	0%	100%	0	833,100
P1-13	Future Growth	Zone 1	ROW / Cameron Blvd	From approx. 200' se/o Venture Wy to Southside Dr	-	New	16	4,540	304	1,381,300	1,381,300	1,795,700	2,334,500	With Development	0%	100%	0	2,334,500
P1-14	FF Reliability	Zone 1	Luchessa Ave	From Thomas Rd to Rossi Ln	12	Replace	16	6,480	304	1,971,600	1,971,600	2,563,100	3,332,100	As Funding is Available	100%	0%	3,332,100	0
P1-15	FF Reliability	Zone 1	Thomas Rd	From Luchessa Ave to Santa Teresa Rd	12	Replace	16	3,060	304	931,000	931,000	1,210,300	1,573,400	As Funding is Available	100%	0%	1,573,400	0
P1-16	FF Reliability	Zone 1	Rossi Ln	From Luchessa Ave to Southside Dr	12	Replace	16	2,730	304	830,600	830,600	1,079,800	1,403,800	As Funding is Available	100%	0%	1,403,800	0
P1-17	Future Growth	Zone 1	ROW	From Luchessa Ave to approx. 1,800' e/o Luchessa Ave	-	New	16	1,810	304	550,700	550,700	716,000	930,800	With Development	0%	100%	0	930,800
P1-18	Future Growth	Zone 1	ROW	From approx. 1,800' e/o Luchessa Ave to Southside Dr	-	New	16	2,890	304	879,300	879,300	1,143,100	1,486,100	With Development	0%	100%	0	1,486,100
P1-19	FF Reliability	Zone 1	Garlic Farm Wy / Southside Dr	From Hwy 101 to Arizona Cir	12	Replace	16	4,630	304	1,408,700	1,408,700	1,831,400	2,380,900	As Funding is Available	100%	0%	2,380,900	0
P1-20	Future Growth	Zone 1	Southside Dr	From Arizona Cir to approx. 660' e/o Arizona Cir	-	New	16	660	304	200,900	200,900	261,200	339,600	With Development	0%	100%	0	339,600
P1-21	Future Growth	Zone 1	Southside Dr	From approx. 660' e/o Arizona Cir to Camaron Blvd	-	New	16	3,010	304	915,800	915,800	1,190,600	1,547,800	With Development	0%	100%	0	1,547,800
P1-22	Future Growth	Zone 1	Santa Teresa Blvd	From approx. 160' w/o Thomas Rd to approx. 110' e/o Thomas Rd	-	New	16	280	304	85,200	85,200	110,800	144,100	With Development	0%	100%	0	144,100
					Subtotal - Pipeline Improvements						15,164,400	19,714,500	25,630,000				13,883,000	11,747,000
Storage Reservoir Improvements					Proposed Storage Capacity (MG)													
3H-1	Storage Capacity	Zone 3	Construct an additional 0.1 MG storage reservoir at existing 3D site			New		0.10		133,442	133,500	173,600	225,700	813 EDU	0%	100%	0	225,700
					Subtotal - Storage Reservoir Improvements						133,500	173,600	225,700				0	225,700

Table 8.2 Capital Improvement Program

Water System Master Plan
City of Gilroy

PRELIMINARY																		
Improv. No.	Improv. Type	Pressure Zone	Alignment	Limits	Pipeline Information		Infrastructure Costs				Baseline Constr. Costs	Estimated Const. Costs ¹	Capital Improv. Costs ²	Construction Trigger	Suggested Cost Allocation		Cost Sharing	
					Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost					Existing Users	Future Users	Existing Users	Future Users
					(in)		(in)	(ft)	(\$)	(\$)		(\$)						
Groundwater Well Improvements					Proposed Pumping Capacity (gpm)													
GW-10	Supply Capacity	Zone 1	Construct new well near the intersection of San Ysidro Ave and Las Animas Ave		New	1,500		-		-	-	3,922,000	9,500 EDU	0%	100%	0	3,922,000	
GW-11	Supply Capacity	Zone 1	Construct new well near the intersection of Camino Arroyo and Renz Lane		New	1,500		-		-	-	3,922,000	15,550 EDU	0%	100%	0	3,922,000	
GW-12	Supply Capacity	Zone 1	Construct new well near the intersection of Wren Ave and Vickery Ln		New	1,500		-		-	-	3,922,000	21,600 EDU	0%	100%	0	3,922,000	
					Subtotal - Groundwater Well Improvements					0	0	11,766,000				0	11,766,000	
Total Improvement Cost																		
					Pipeline Improvements					15,164,400	19,714,500	25,630,000				13,883,000	11,747,000	
					Storage Reservoirs					133,500	173,600	225,700				0	225,700	
					Groundwater Wells					0	0	11,766,000				0	11,766,000	
					Total Improvement Costs					15,297,900	19,888,100	37,621,700				13,883,000	23,738,700	

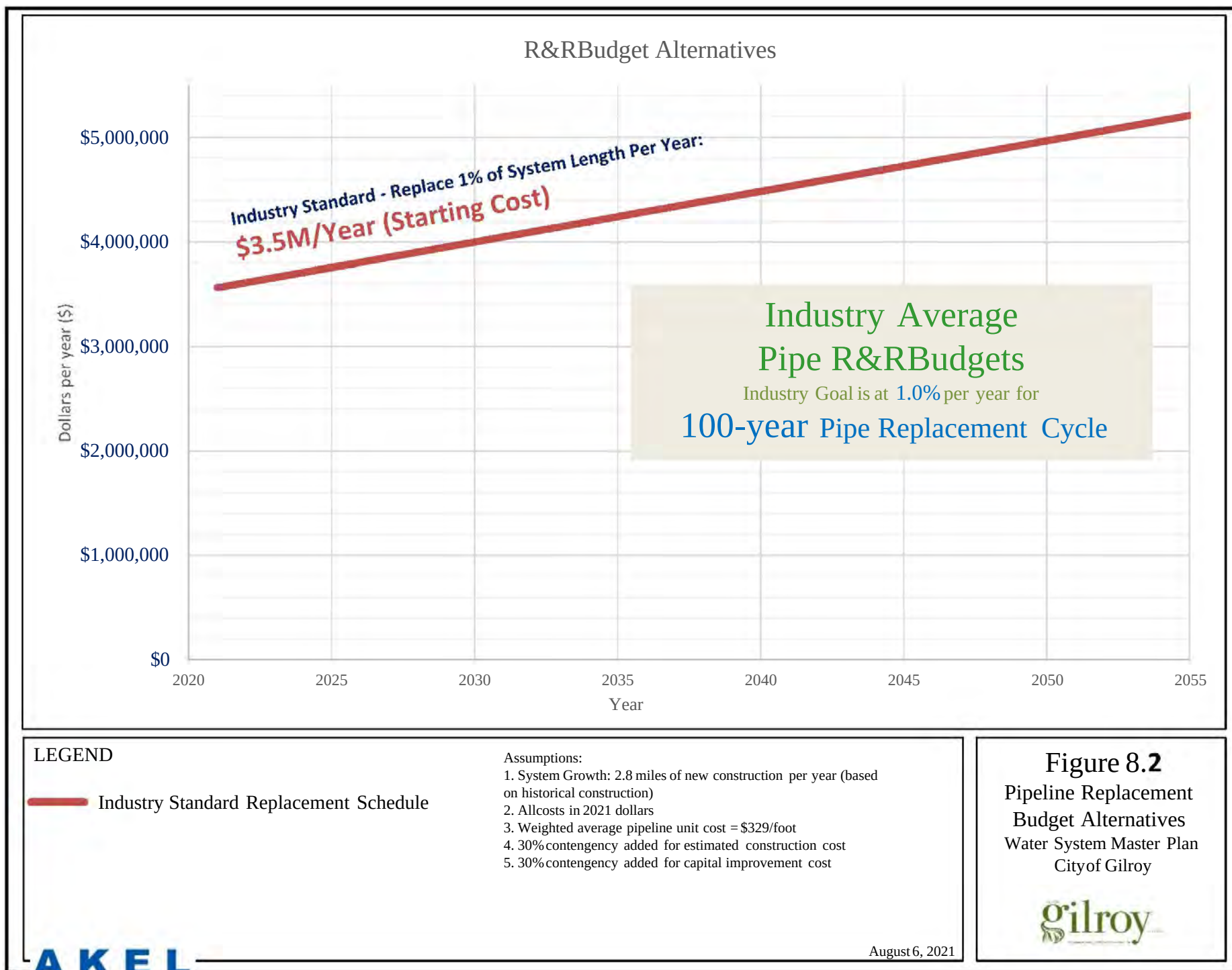


Notes:

1. Baseline construction costs plus 30% to account for unforeseen events and unknown conditions.
2. Estimated construction costs plus 30% to cover other costs including: engineering design, project administration (developer and City staff), construction management and inspection, and legal costs.
3. Cost estimates are based on the Engineering News Record (ENR) construction cost index (CCI) of 13,176 for March 2023.

3/29/2023

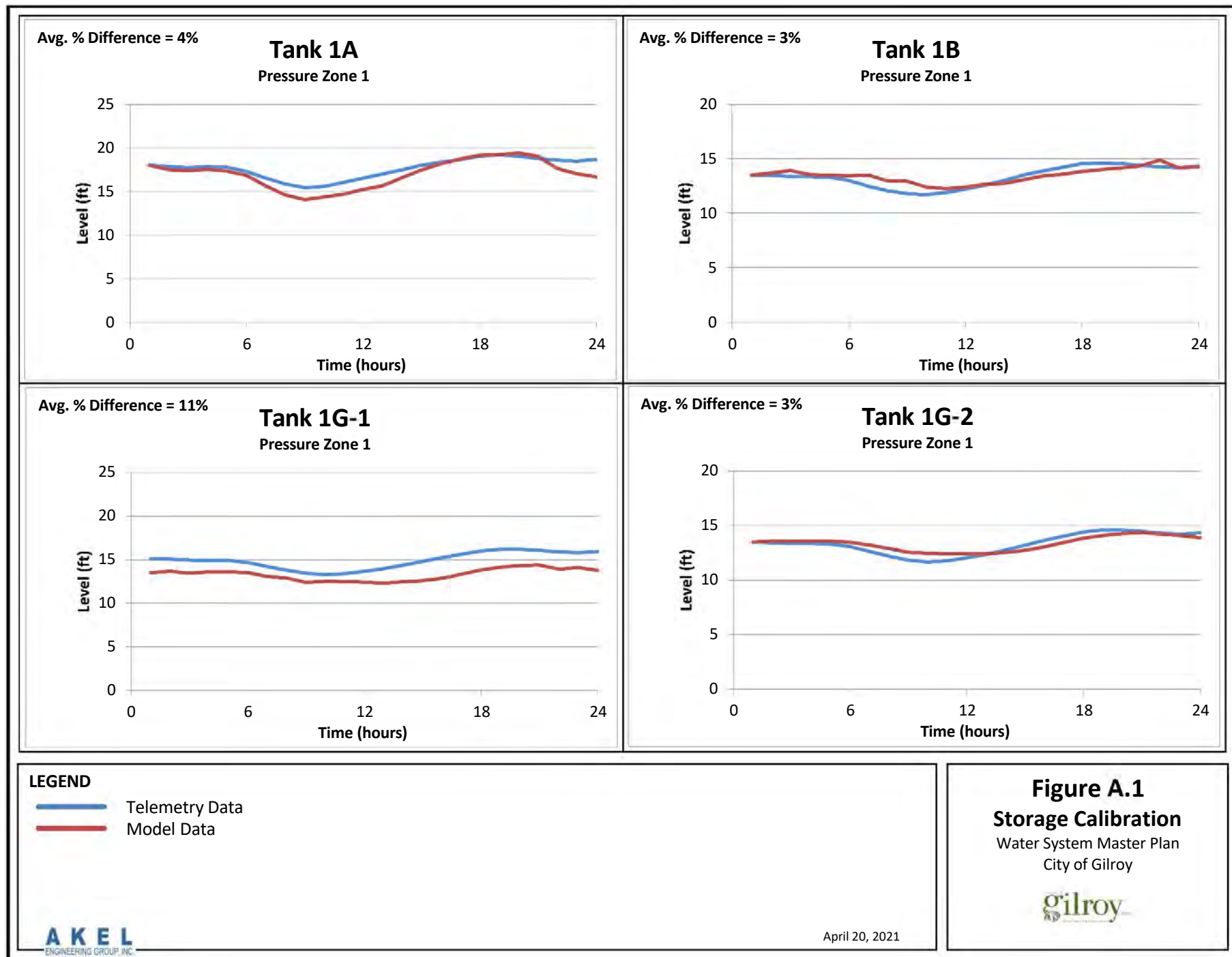
Costs are estimated based on the industry average goal of pipe R&R budgets, which is at 1.0% per year for 100-year pipe replacement cycle. The estimated costs are starting from a base rate of 3.5 million dollars per year, with a pipe replacement rate of 1% of system length per year, which is 2.8 miles of new construction per year for the City. The future costs in 2055 are expected to be approximately 4.2 million dollars per year.

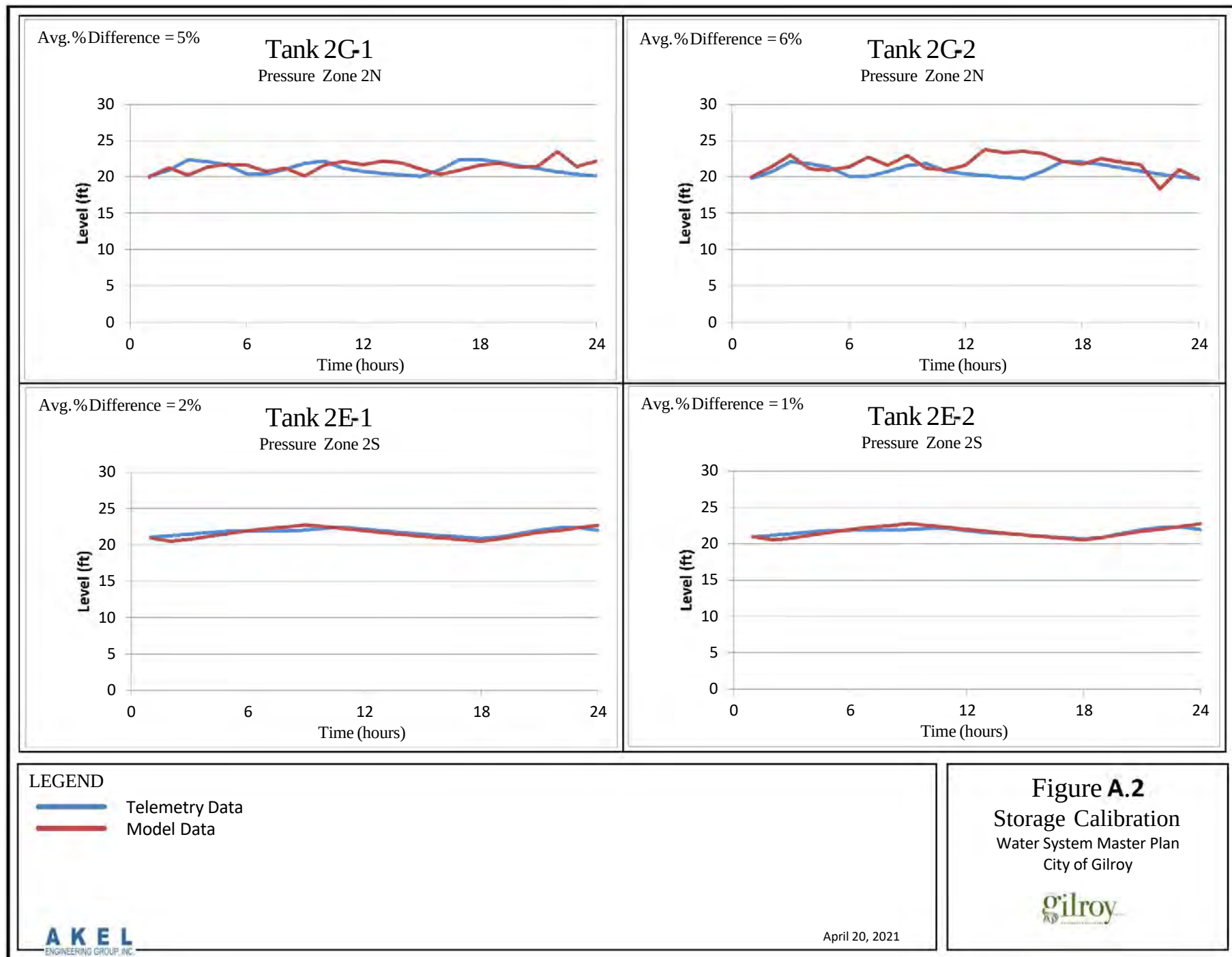


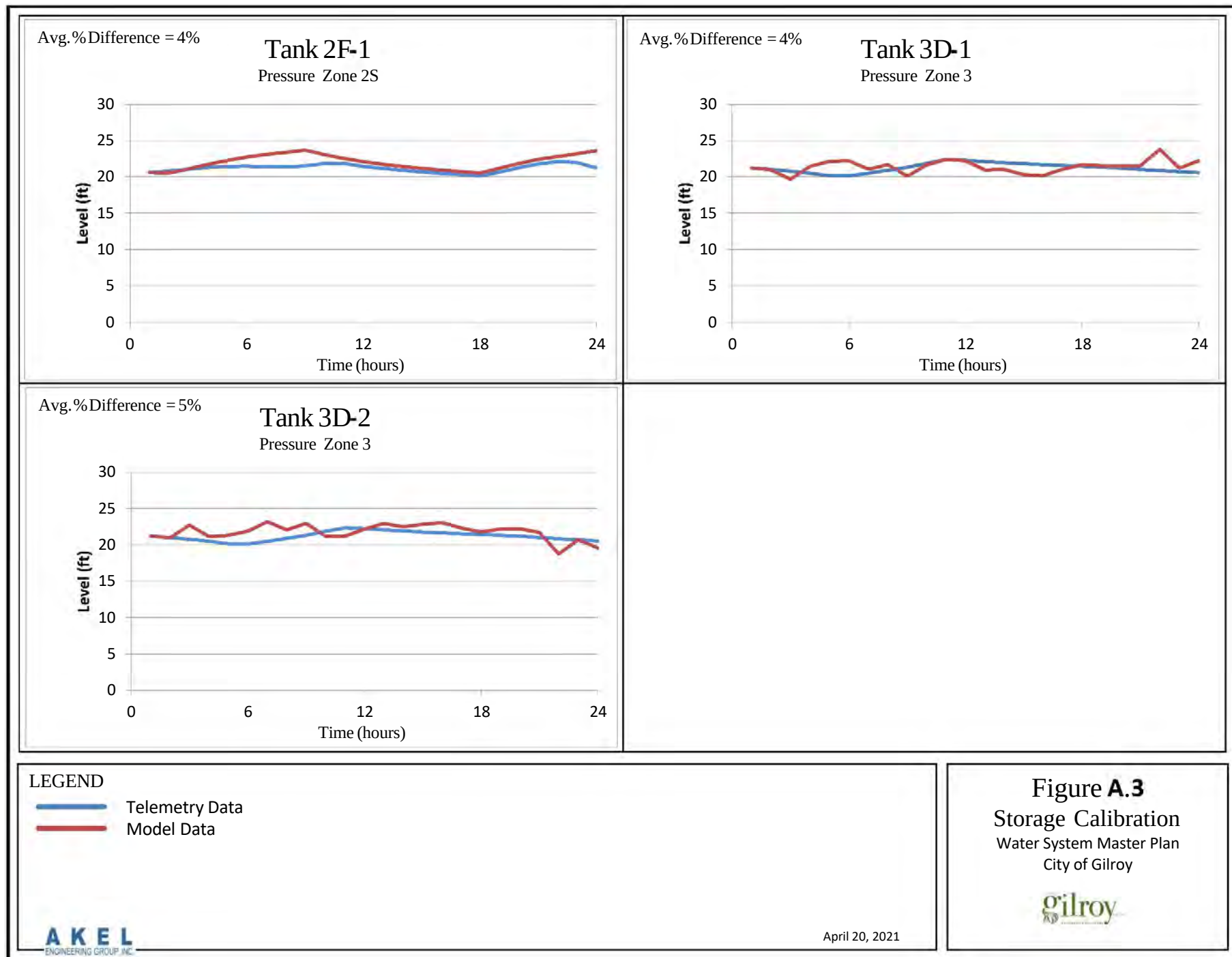
APPENDICES

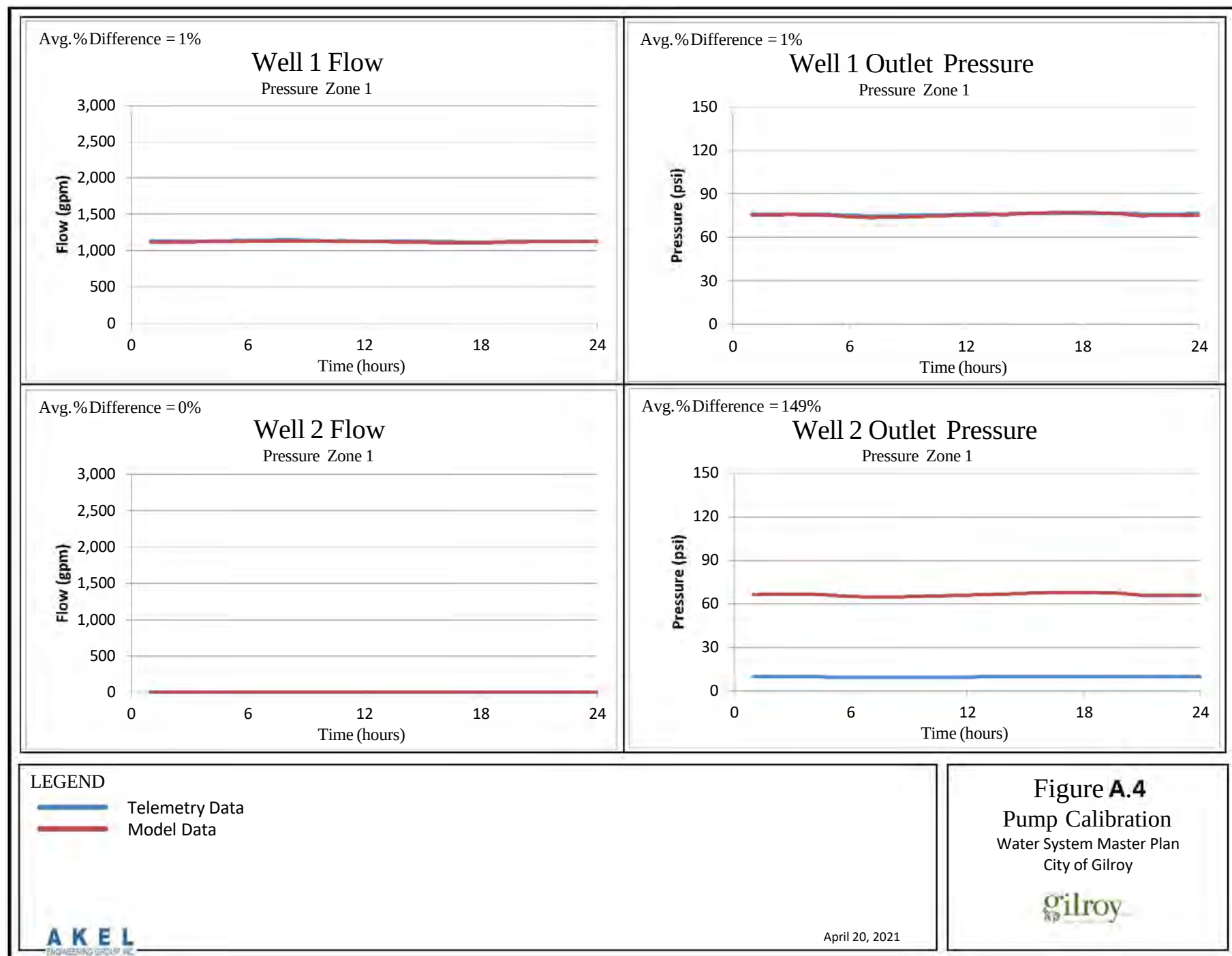
APPENDIX A

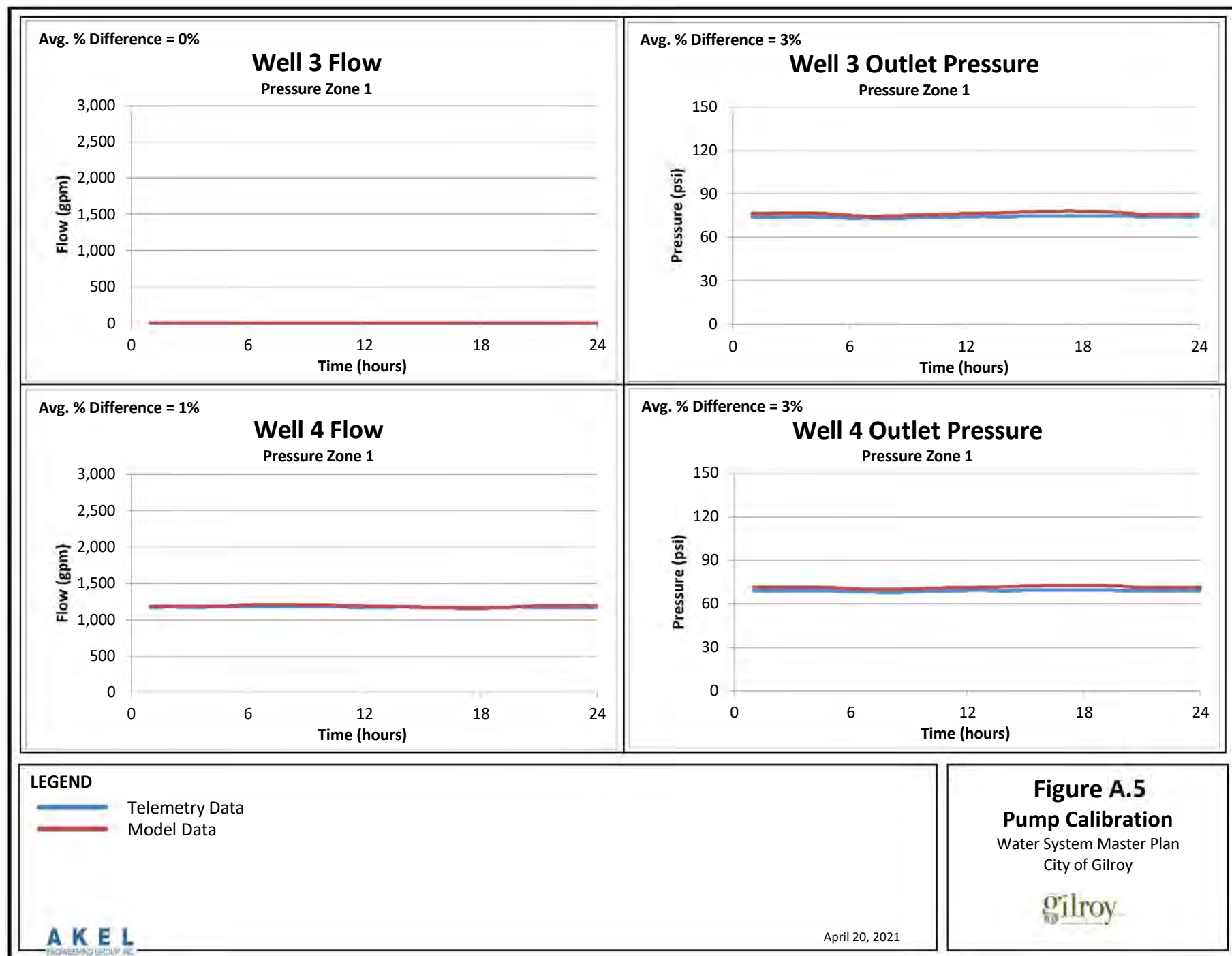
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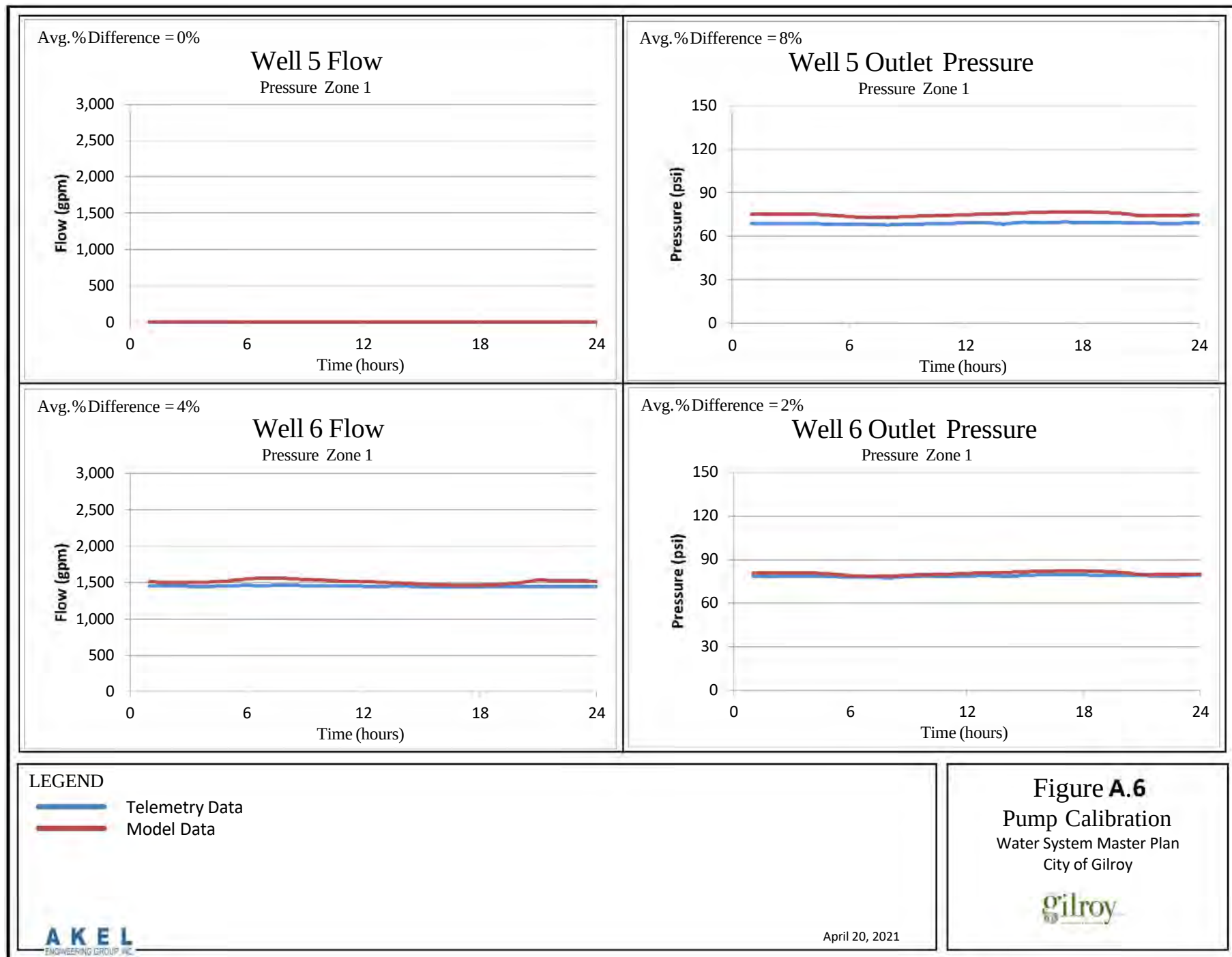


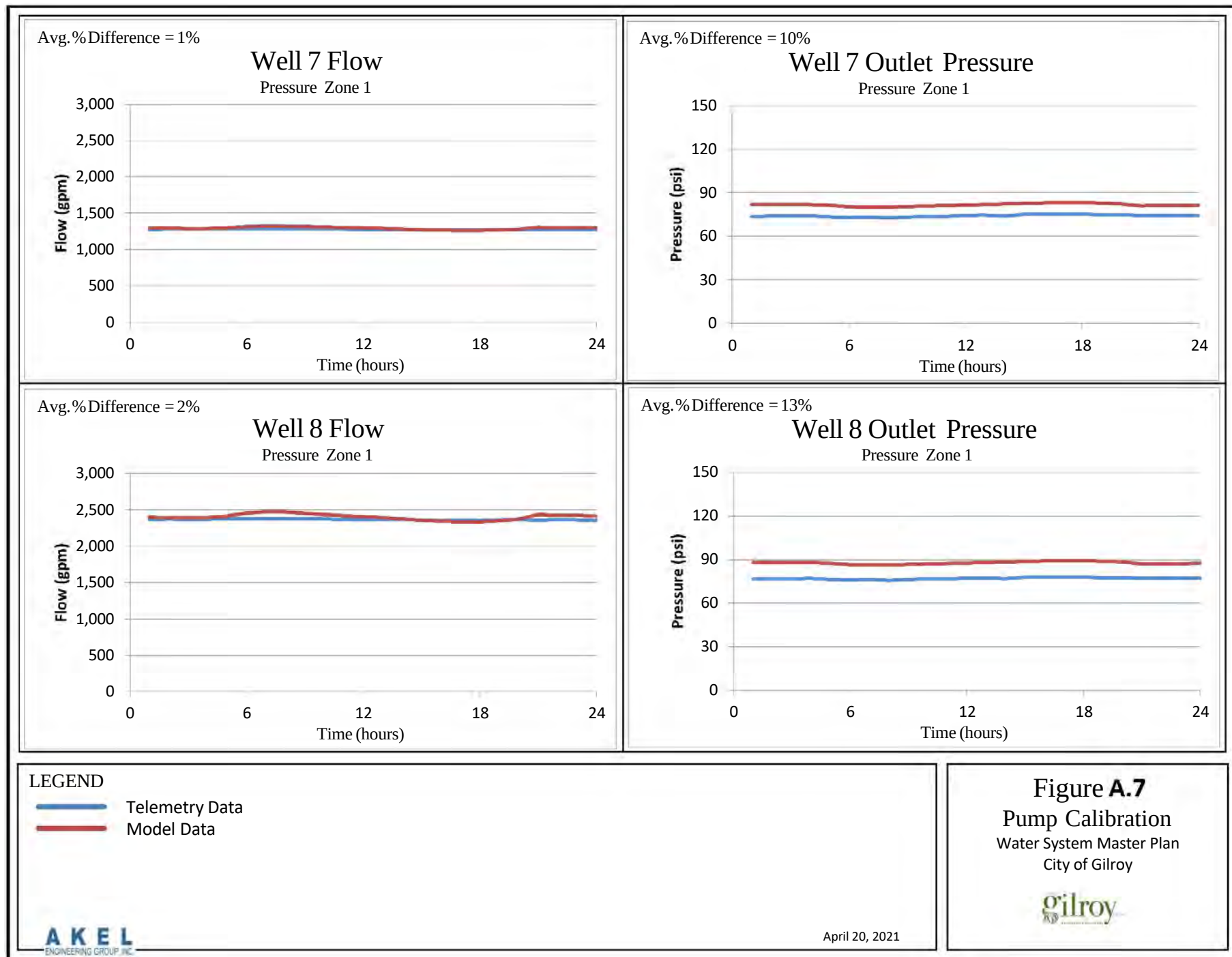








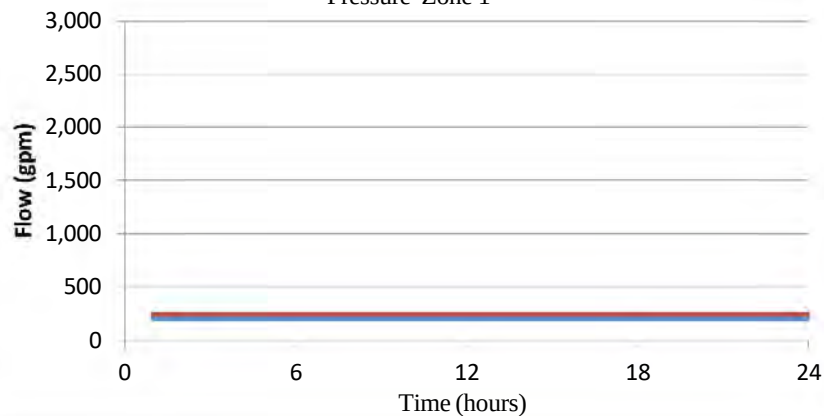




Avg. % Difference = 15%

Well 8A Flow

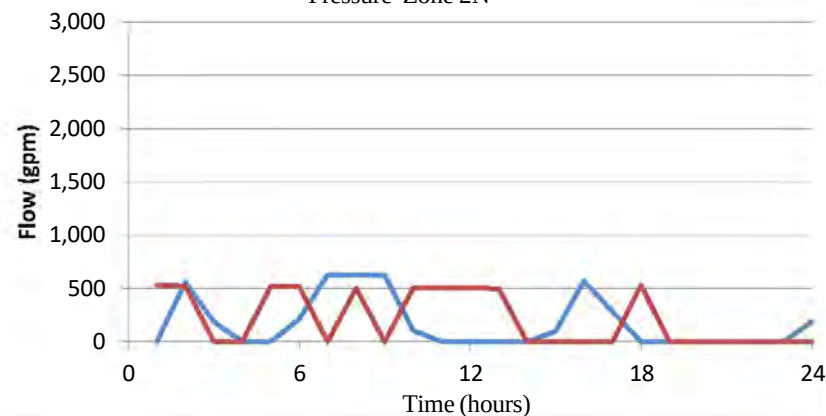
Pressure Zone 1



Avg. % Difference = 64%

BS1Flow

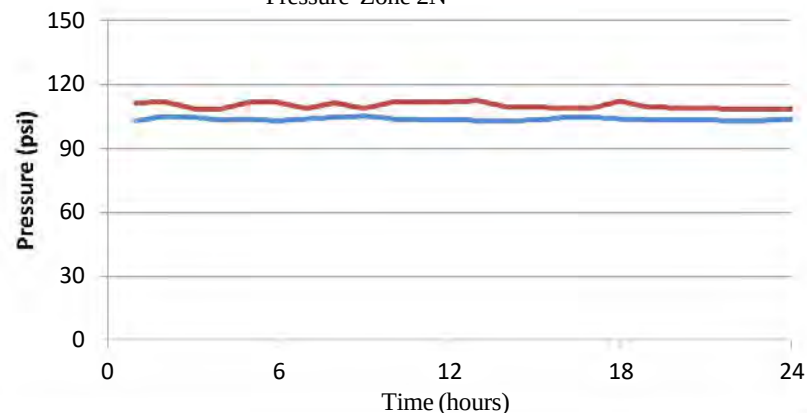
Pressure Zone 2N



Avg. % Difference = 6%

BS1Outlet Pressure

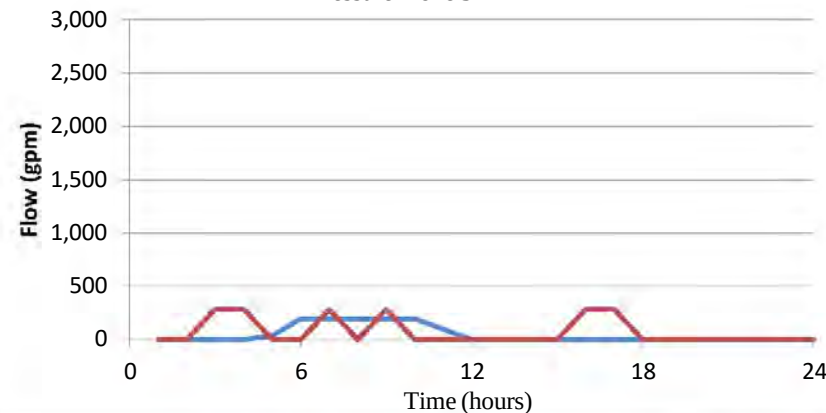
Pressure Zone 2N



Avg. % Difference = 41%

BS2Flow

Pressure Zone 3



LEGEND

- Telemetry Data
- Model Data

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April 20, 2021

Figure A.8

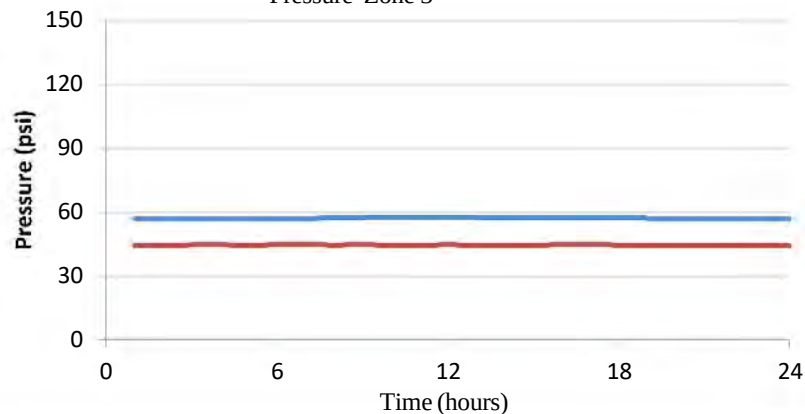
Pump Calibration
Water System Master Plan
City of Gilroy



Avg. % Difference = 25%

BS2Outlet Pressure

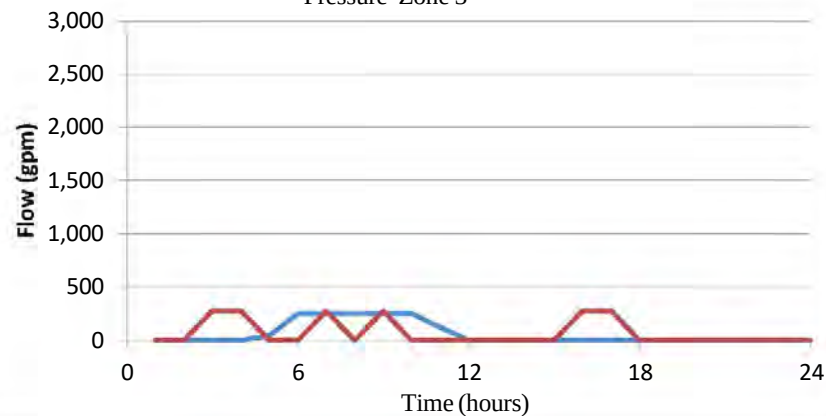
Pressure Zone 3



Avg. % Difference = 38%

BS3Flow

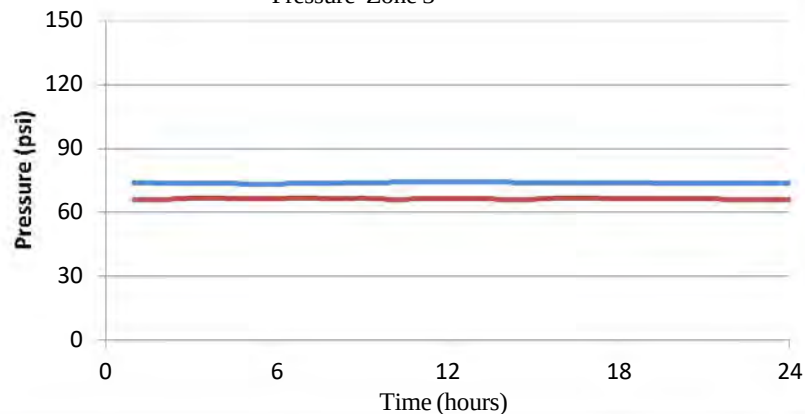
Pressure Zone 3



Avg. % Difference = 11%

BS3Outlet Pressure

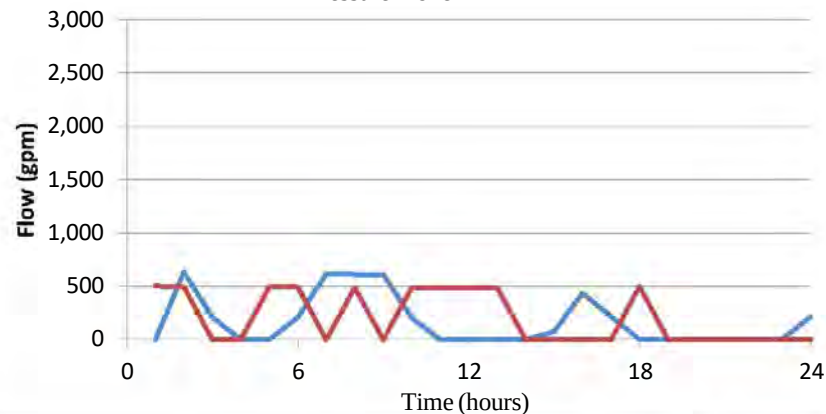
Pressure Zone 3



Avg. % Difference = 63%

BS4Flow

Pressure Zone 2N



LEGEND

- Telemetry Data
- Model Data

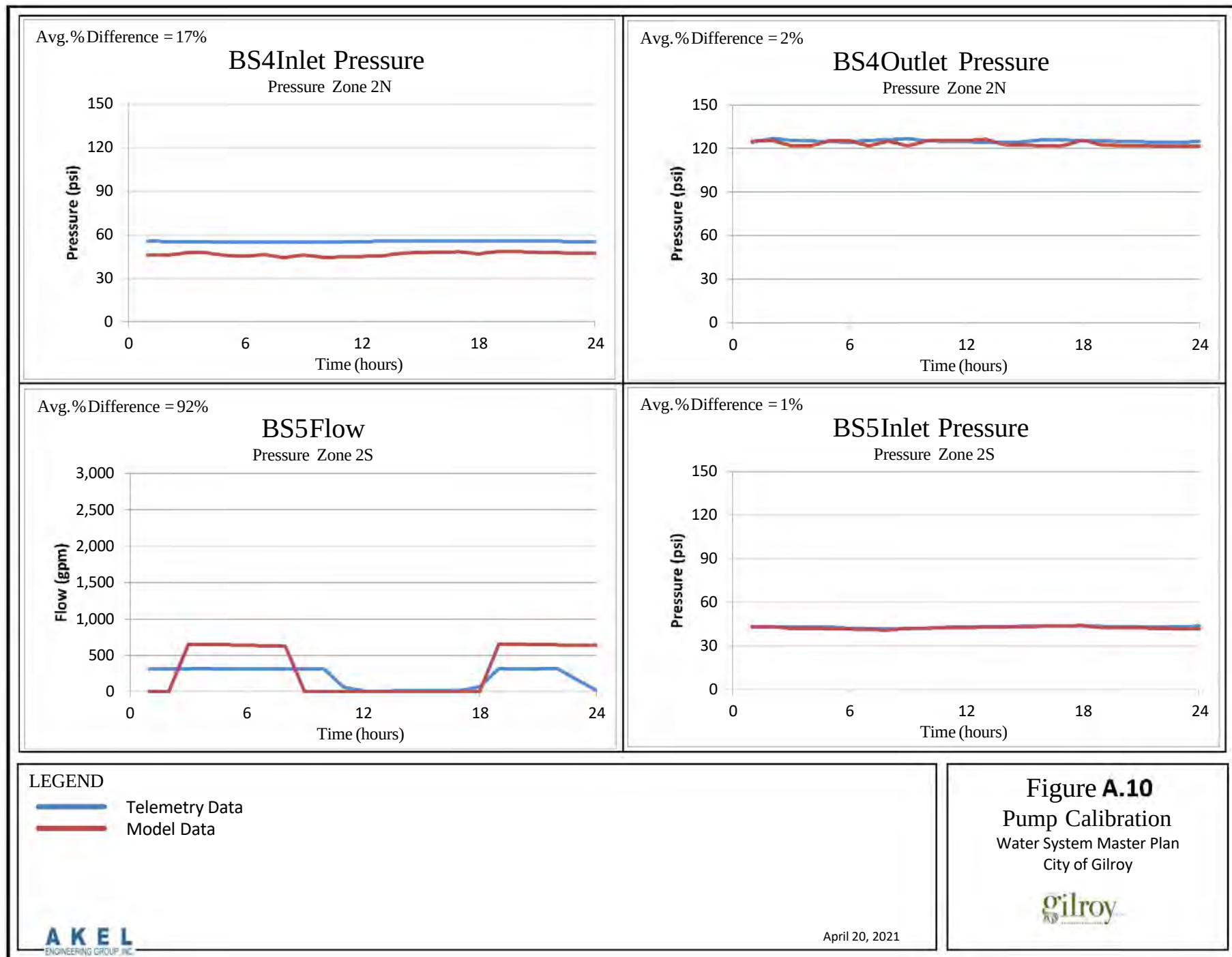
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April 20, 2021

Figure A.9

Pump Calibration
Water System Master Plan
City of Gilroy





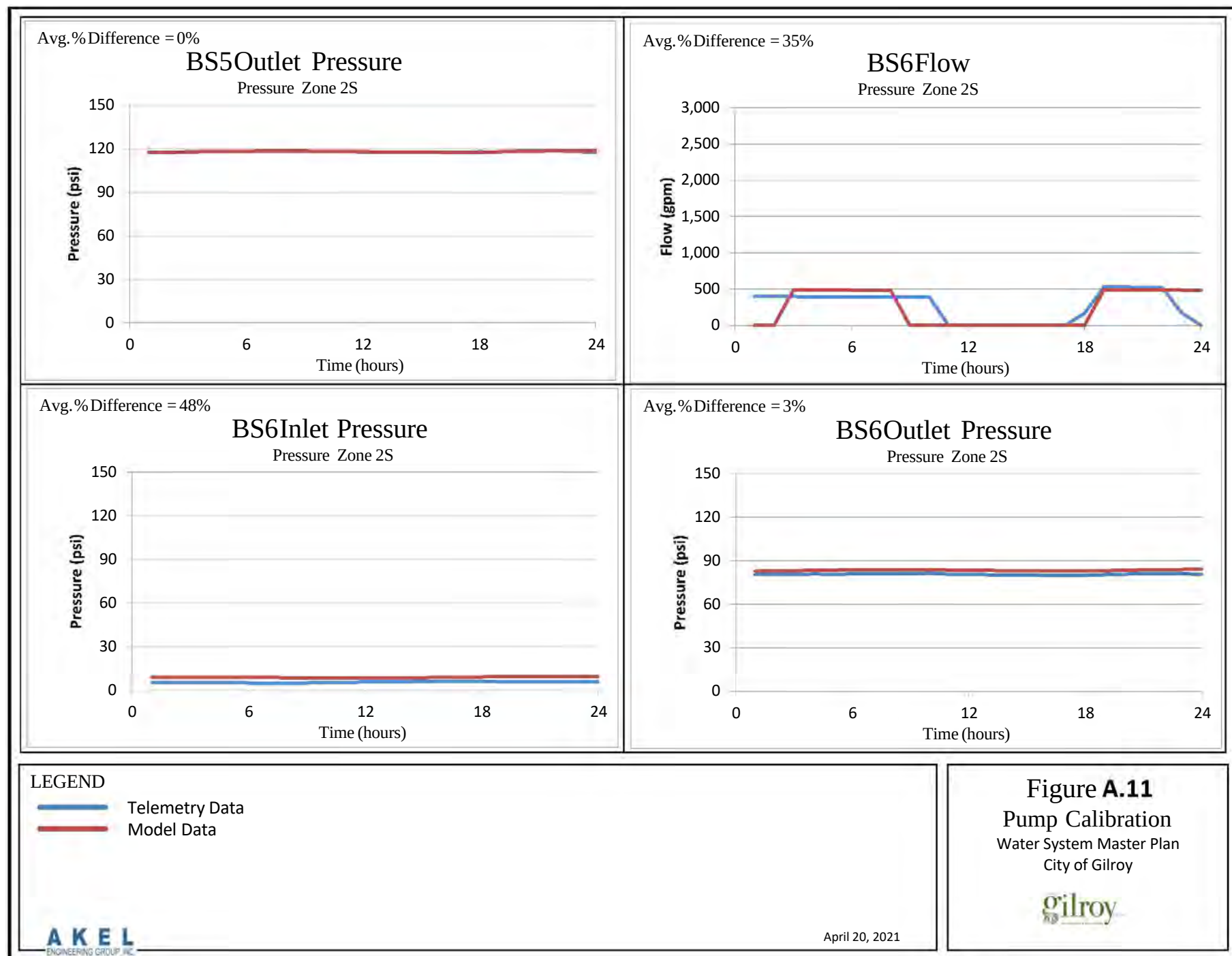


Table ES.3 Capital Improvement Program
Water System Master Plan
City of Gilroy

PRELIMINARY																			
Improv. No.	Improv. Type	Pressure Zone	Alignment	Limits	Pipeline Information		Infrastructure Costs				Baseline Constr. Costs	Estimated Const. Costs ¹	Capital Improv. Costs ²	Construction Trigger	Suggested Cost Allocation		Cost Sharing		
					Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost					Existing Users	Future Users	Existing Users	Future Users	
(ft) (ft) (\$) (\$)																			
Pipeline Improvements																			
P1-1	Future Growth	Zone 1	Day Rd	From Santa Teresa Blvd to Monterey Hwy	-	New	12	3,860	254	978,700	978,700	1,272,400	1,654,200	With Development	0%	100%	0	1,654,200	
P1-2	Future Growth	Zone 1	Monterey Hwy / Orsetti Rd / Hwy 101	From approx. 620' n/o Day Rd to Cohansey Ave	-	New	12	5,780	254	1,465,500	1,465,500	1,905,200	2,476,800	With Development	0%	100%	0	2,476,800	
P1-3	Existing Deficiency	Zone 1	Monterey Hwy	From 2nd St to loof Ave	12	Replace	16	230	304	70,000	70,000	91,000	118,300	Existing Deficiency	100%	0%	118,300	0	
P1-4	Existing Deficiency	Zone 1	Murray Ave	From Well 5-02 to loof Ave	12	Replace	16	2,200	304	669,400	669,400	870,300	1,131,400	Existing Deficiency	100%	0%	1,131,400	0	
P1-5	Existing Deficiency	Zone 1	Arroyo Cir	From Well 7 to loof Ave	12	Replace	16	70	304	21,300	21,300	27,700	36,100	Existing Deficiency	100%	0%	36,100	0	
P1-6	Existing Deficiency	Zone 1	Lewis St	From approx. 180' e/o Forest St to Chestnut St	8	Replace	10	230	211	48,600	48,600	63,200	82,200	Existing Deficiency	100%	0%	82,200	0	
P1-7	Existing Deficiency	Zone 1	Forest St	From Well 3 to 6th St	10	Replace	12	320	254	81,200	81,200	105,600	137,300	Existing Deficiency	100%	0%	137,300	0	
P1-8	Existing Deficiency	Zone 1	Gilman Rd / Camino Arroyo	From Well 8 to approx. 80' se/o Gilman Rd	12	Replace	16	300	304	91,300	91,300	118,700	154,400	Existing Deficiency	100%	0%	154,400	0	
P1-9	FF Reliability	Zone 1	Pacheco Pass Hwy	From Camino Arroyo to Cameron Blvd	12	Replace	16	1,730	304	526,400	526,400	684,400	889,800	As Funding is Available	100%	0%	889,800	0	
P1-10	FF Reliability	Zone 1	Camino Arroyo	From Pacheco Pass Hwy to Venture Wy	12	Replace	16	3,040	304	925,000	925,000	1,202,500	1,563,300	As Funding is Available	100%	0%	1,563,300	0	
P1-11	FF Reliability	Zone 1	Cameron Blvd	From Pacheco Pass Hwy to approx. 200' se/o Venture Wy	12	Replace	16	2,100	304	639,000	639,000	830,700	1,080,000	As Funding is Available	100%	0%	1,080,000	0	
P1-12	Future Growth	Zone 1	ROW	From Camino Arroyo to approx. 1,800' e/o Luchessa Ave	-	New	16	1,620	304	492,900	492,900	640,800	833,100	With Development	0%	100%	0	833,100	
P1-13	Future Growth	Zone 1	ROW / Cameron Blvd	From approx. 200' se/o Venture Wy to Southside Dr	-	New	16	4,540	304	1,381,300	1,381,300	1,795,700	2,334,500	With Development	0%	100%	0	2,334,500	
P1-14	FF Reliability	Zone 1	Luchessa Ave	From Thomas Rd to Rossi Ln	12	Replace	16	6,480	304	1,971,600	1,971,600	2,563,100	3,332,100	As Funding is Available	100%	0%	3,332,100	0	
P1-15	FF Reliability	Zone 1	Thomas Rd	From Luchessa Ave to Santa Teresa Rd	12	Replace	16	3,060	304	931,000	931,000	1,210,300	1,573,400	As Funding is Available	100%	0%	1,573,400	0	
P1-16	FF Reliability	Zone 1	Rossi Ln	From Luchessa Ave to Southside Dr	12	Replace	16	2,730	304	830,600	830,600	1,079,800	1,403,800	As Funding is Available	100%	0%	1,403,800	0	
P1-17	Future Growth	Zone 1	ROW	From Luchessa Ave to approx. 1,800' e/o Luchessa Ave	-	New	16	1,810	304	550,700	550,700	716,000	930,800	With Development	0%	100%	0	930,800	
P1-18	Future Growth	Zone 1	ROW	From approx. 1,800' e/o Luchessa Ave to Southside Dr	-	New	16	2,890	304	879,300	879,300	1,143,100	1,486,100	With Development	0%	100%	0	1,486,100	
P1-19	FF Reliability	Zone 1	Garlic Farm Wy / Southside Dr	From Hwy 101 to Arizona Cir	12	Replace	16	4,630	304	1,408,700	1,408,700	1,831,400	2,380,900	As Funding is Available	100%	0%	2,380,900	0	
P1-20	Future Growth	Zone 1	Southside Dr	From Arizona Cir to approx. 660' e/o Arizona Cir	-	New	16	660	304	200,900	200,900	261,200	339,600	With Development	0%	100%	0	339,600	
P1-21	Future Growth	Zone 1	Southside Dr	From approx. 660' e/o Arizona Cir to Camaron Blvd	-	New	16	3,010	304	915,800	915,800	1,190,600	1,547,800	With Development	0%	100%	0	1,547,800	
P1-22	Future Growth	Zone 1	Santa Teresa Blvd	From approx. 160' w/o Thomas Rd to approx. 110' e/o Thomas Rd	-	New	16	280	304	85,200	85,200	110,800	144,100	With Development	0%	100%	0	144,100	
					Subtotal - Pipeline Improvements						15,164,400	19,714,500	25,630,000				13,883,000	11,747,000	
Storage Reservoir Improvements																			
Proposed Storage Capacity (MG)																			
3H-1	Storage Capacity	Zone 3	Construct an additional 0.1 MG storage reservoir at existing 3D site		New		0.10				133,442	133,500	173,600	225,700	813 EDU	0%	100%	0	225,700
					Subtotal - Storage Reservoir Improvements						133,500	173,600	225,700				0	225,700	

Table ES.3 Capital Improvement Program
Water System Master Plan
City of Gilroy

PRELIMINARY																		
Improv. No.	Improv. Type	Pressure Zone	Alignment	Limits	Pipeline Information		Infrastructure Costs				Baseline Constr. Costs	Estimated Const. Costs ¹	Capital Improv. Costs ²	Construction Trigger	Suggested Cost Allocation		Cost Sharing	
					Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost					Existing Users	Future Users	Existing Users	Future Users
					(in)		(in)	(ft)	(\$)	(\$)	(\$)	(\$)						
Groundwater Well Improvements					Proposed Pumping Capacity (gpm)													
GW-10	Supply Capacity	Zone 1	Construct new well near the intersection of San Ysidro Ave and Las Animas Ave		New		1,500		-	-	-	3,922,000	9,500 EDU	0%	100%	0	3,922,000	
GW-11	Supply Capacity	Zone 1	Construct new well near the intersection of Camino Arroyo and Renz Lane		New		1,500		-	-	-	3,922,000	15,550 EDU	0%	100%	0	3,922,000	
GW-12	Supply Capacity	Zone 1	Construct new well near the intersection of Wren Ave and Vickery Ln		New		1,500		-	-	-	3,922,000	21,600 EDU	0%	100%	0	3,922,000	
					Subtotal - Groundwater Well Improvements					0	0	11,766,000				0	11,766,000	
Total Improvement Cost																		
							Pipeline Improvements				15,164,400	19,714,500	25,630,000				13,883,000	11,747,000
							Storage Reservoirs				133,500	173,600	225,700				0	225,700
							Groundwater Wells				0	0	11,766,000				0	11,766,000
							Total Improvement Costs				15,297,900	19,888,100	37,621,700				13,883,000	23,738,700

Notes:

1. Baseline construction costs plus 30% to account for unforeseen events and unknown conditions.
2. Estimated construction costs plus 30% to cover other costs including: engineering design, project administration (developer and City staff), construction management and inspection, and legal costs.
3. Cost estimates are based on the Engineering News Record (ENR) construction cost index (CCI) of 13,176 for March 2023.

RESOLUTION NO. 2023-XX**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF
GILROY ADOPTING THE WATER MASTER PLAN FOR
THE CITY OF GILROY**

WHEREAS, the 2022 Water Master Plan (Plan) serves as a guide to assess the current operations and functionality of the City's existing water system; and

WHEREAS, the City last developed a Water Master Plan in 2004, which identified capacity deficiencies in the existing water system and recommended improvements to alleviate existing deficiencies and serve future developments in the Gilroy Planning Area; and

WHEREAS, Akel Engineering Group, Inc. was retained by the City Council in August 2019 to prepare the Plan; and

WHEREAS, the objective of the Plan is to review and make recommendations on how the current water system can be upgraded within the City to best suit the water needs of the City in the future; and

WHEREAS, the projects identified in the Plan will be added to the City's Capital Improvement Program; and

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Gilroy hereby adopts the Water Master Plan attached hereto and made a part hereof.

PASSED AND ADOPTED by the City Council of the City of Gilroy at a regular meeting duly held on the 3rd day of April 2023 by the following roll call vote:

AYES: COUNCIL MEMBERS:

NOES: COUNCIL MEMBERS:

ABSTAIN: COUNCIL MEMBERS:

ABSENT: COUNCIL MEMBERS:

APPROVED:

ATTEST:

Marie Blankley, Mayor

Thai Nam Pham, City Clerk



City of Gilroy

STAFF REPORT

Agenda Item Title: Adopt the 2022 Storm Drainage System Master Plan
Meeting Date: April 3, 2023
From: Jimmy Forbis, City Administrator
Department: Public Works
Submitted By: Daryl Jordan, Public Works Director
Prepared By: Michael Lewis, Management Analyst

STRATEGIC PLAN GOALS

Maintain and Improve City Infrastructure

RECOMMENDATION

Approve a resolution to adopt the 2022 Storm Drainage System Master Plan.

BACKGROUND

The City's most recent storm drainage master plan was completed in 2004. This 2004 Master Plan included evaluation of the existing system and identifying storm drainage improvements required to serve future growth. Additionally, the 2004 Master Plan included the development of the hydrologic and hydraulic models, which were used for evaluating the storm drainage system. Improvements were recommended for servicing existing and future growth areas, and a corresponding Capital Improvement Program was developed to quantify the costs associated with each improvement. With the recent update to the 2040 General Plan, there was a need to update the 2004 Master Plan to accommodate the expected growth and land use changes identified in the updated plan.

Currently, stormwater runoff discharges to the Uvas Creek, Ronan Channel, Miller Slough Channel, Princevalle Channel, and Lower Miller Slough Channel. The City maintains a rich diversity of land use types, contributing to varying stormwater runoff containment needs. Several creeks, a vast array of agricultural lands, and small pockets of development, and the city comprises a wide array of runoff generation and conveyance within the planning area.

The city has multiple major watersheds within the Urban Growth Boundary that collect and convey stormwater runoff, and are as follows: Uvas Creek, Llagas Creek, and Pajaro River. The portion of the Uvas Creek Watershed within the City Limits is generally defined as the area bounded by Rancho Vista Drive to the west and Santa Teresa Boulevard to the east, with the northern and southern boundaries approximately represented by Uvas Creek and Santa Cruz Mountains, respectively.

The portion of the Lower Coyote Creek Watershed within the City Limits is generally bounded by Olea Court to the west and Llagas Creek to the east, with the northern and southern boundaries approximately represented by Fitzgerald Avenue and Luchessa Avenue, respectively.

The Pajaro River Watershed within the City Limits is generally defined as the area bounded by Uvas Creek to the west and Llagas Creek to the east, with the northern and southern boundaries approximately represented by Luchessa Avenue and Southside Drive, respectively.

To improve existing deficiencies and provide infrastructure to support future growth, it became apparent that an updated Storm Drainage Master Plan was necessary. As such, the City Council approved Akel Engineering Group, Inc. to prepare the 2022 Master Plan and a concurrent Sewer System Master Plan and Water Master Plan in August 2019. These documents were coordinated for consistency with the City's 2040 General Plan.

ANALYSIS

The 2022 Master Plan updates elements of the 2004 Master Plan to reflect current land use conditions and 2040 General Plan updates.

The City Council authorized Akel Engineering Group, Inc. to perform the following tasks:

1. Summarize the City's existing stormwater system facilities.
2. Document growth planning assumptions and known future developments.
3. Update the stormwater system performance criteria and design storm events.
4. Develop new hydrologic and hydraulic models.
5. Evaluate the storm drainage facilities to address hydraulic capacity requirements from existing and projected developments.
6. Recommend a capital improvement program (CIP) with an opinion of probable construction costs.
7. Perform a cost allocation analysis for cost-sharing purposes.
8. Develop a 2022 Storm Drainage System Master Plan Report.

RESULTS

The 2022 Master Plan provides recommendations for improvements needed to mitigate existing deficiencies and improvements needed to expand the system to service future growth identified in the 2040 General Plan. The recommended capital improvement program (Table 6.2) is attached as Attachment 1.

The Master Plan indicates that overall that the City's storm system is in fair condition but in need of improvements to mitigate some specific deficiencies and that future capacity projects will be development driven. In total, the plan recommends 43 pipeline improvement and replacement projects in six (6) drainage areas. Seven out of forty-two projects worth \$2,300,000 were completed from the last master plan. The current list includes projects carried over from the 2004 Master Plan that was not completed and new projects needed to accommodate future growth based on the updated Storm Drainage System modeling. The projects identified will be added to the City's Capital Improvement Program and budget.

Drainage Basin	Number of Improvements Needed for Capacity	Cost of Needed Capacity Improvements	Number of Improvements to Support Future Growth	Cost of Future Improvements
Ronan Channel	4	\$5,061,676	5	\$5,228,524
Miller Slough	6	\$2,543,000	0	\$0
North Uvas	4	\$7,580,300	4	\$2,808,900
South Uvas	1	\$217,700	0	\$0
Princeville	12	\$8,391,047	1	\$79,253
Lower Miller Slough	6	\$2,926,500	0	\$0
Total Cost		\$26,720,424		\$8,116,676

ALTERNATIVES

Council may modify or reject the 2022 Storm Drainage System Master Plan. This is not recommended due to the fact that this would restrict opportunities to update and maintain the citywide storm drains system.

FISCAL IMPACT/FUNDING SOURCE

The City currently has one Storm Drain Impact Fee Fund which is utilized to fund the capital improvements. The Fund, which collects revenues from impact fees from developments that impact future growth, primarily funds infrastructure/capital costs attributable to future users for future capacity needs. The Fund has a projected FY23 ending fund balance of \$1.2 million. There is no current revenue source, other than

General Fund, to fund the annual operational, maintenance, and capital costs to repair and maintain existing infrastructure.

Of the total \$34.8 million in capital improvements identified in the Master Plan, approximately \$8.1 million is attributable to existing users, and \$26.7 million is attributable to future users - to be funded by Storm Drain Impact Fee Fund. The Master Plan capital improvements are in addition to the existing capital improvements identified by staff.

The Storm Drain Impact Fee Fund does not have sufficient fund balances to fund the \$8.1 million identified in future user costs. A typical next step after the Master Plans are updated is to review and update the development impact fees to incorporate the identified future growth capital improvements and adjust the fees accordingly to ensure capital needs are adequately funded for a period of time. Staff will plan to review and update the storm drain impact fee as a departmental work plan in the upcoming fiscal year.

There is also a need to develop another revenue stream to pay for stormwater improvements, as well as operations and maintenance. Additional funding mechanisms are required since Storm Drainage is not an Enterprise Fund, like Sewer and Water, funded by user fees. Because of this, storm drain maintenance and capital projects must be paid out of the General Fund if it does not qualify for the use of storm drain impact fees. This will be studied over the next year.

NEXT STEPS

With Council adoption of the 2022 Storm Drainage System Master Plan, staff will incorporate the projects into the City's Capital Improvement Program and plan for the delivery of these projects.

Attachments:

1. Storm Drainage System Master Plan Attachment 1
2. Storm Drainage System Master Plan Capital Improvement Program List
3. Storm Drainage System Master Plan Resolution



City of Gilroy

APRIL 2023

2023 Storm Drainage System Master Plan



CITY OF GILROY

2023

STORM DRAINAGE SYSTEM MASTER PLAN

Final

March 2023





Smart Planning Our Water Resources

March 29, 2023

City of Gilroy
7351 Rosanna Street
Gilroy, CA 95020

Attention: Gary Heap, P.E.
City Engineer

Subject: 2023 Storm Drainage System Master Plan – Final Report

Dear Gary:

We are pleased to submit the draft report for the City of Gilroy Storm Drainage System Master Plan. This master plan is a standalone document, though it was prepared as part of the integrated infrastructure master plans for the water, sewer, and storm drainage master plans. The master plan documents the following:

- Existing system facilities, acceptable hydrologic and hydraulic performance criteria, and projected stormwater runoff consistent with the Urban Planning Area
- Development of the City's GIS-based hydrologic and hydraulic stormwater models.
- Capacity evaluation of the existing system with improvements to mitigate existing deficiencies and to accommodate future growth.
- Capital improvement program (CIP) with an opinion of probable construction costs and suggestions for cost allocations to meet AB 1600.

We extend our thanks to you, Daryl Jordan, Director of Public Works and other City staff whose courtesy and cooperation were valuable components in completing this study.

Sincerely,

AKEL ENGINEERING GROUP, INC.

Tony Akel, P.E., D. WRE
President

Enclosure: Report



Acknowledgements

City Council

Marie Blankley, Mayor

Dion Bracco , Mayor Pro Tempore

Rebeca Armendariz

Tom Cline

Zach Hilton

Carol Marques

Fred Tovar

Management Personnel

Jimmy Forbis, City Administrator

Daryl Jordan, P.E., Director of Public Works

Gary Heap, P.E., City Engineer

Jorge Duran, P.E., Senior City Engineer

Sharon Goei, Community Development Director

Matt Jones, Deputy Director of Public Works

Other City Engineering, Planning, and Operations Staff

City of Gilroy

Storm Drainage System Master Plan

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City of Gilroy

Storm Drainage System Master Plan

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City of Gilroy Storm Drainage System Master Plan

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Appendix A Hydrology Review

Appendix B Storm Drainage Area Hydrologic Routing

EXECUTIVE SUMMARY

This executive summary presents a brief background of the City of Gilroy's (City) storm drainage system, the planning area characteristics, the hydrology and hydraulic criteria, and the hydrology and hydraulic model developments.

These hydrology and hydraulic models were used to evaluate the capacity adequacy of the existing stormwater drainage system, for recommending improvements to mitigate existing deficiencies and for servicing future growth. The prioritized capital improvement program accounts for growth through the Gilroy Planning Area.

ES.1 STUDY OBJECTIVES

Recognizing the importance of planning, developing, and financing system facilities to provide reliable stormwater system service to existing customers and for servicing anticipated growth within the sphere of influence, the City initiated the 2022 Storm Drainage System Master Plan.

The City of Gilroy authorized Akel Engineering Group Inc. to complete the following tasks:

- Summarize the City's existing stormwater system facilities.
- Document growth planning assumptions and known future developments.
- Update the stormwater system performance criteria and design storm event.
- Develop new hydrologic and hydraulic models.
- Evaluate the storm drainage facilities to address hydraulic capacity requirements from existing and projected developments.
- Recommend a capital improvement program (CIP) with an opinion of probable construction costs.
- Perform a cost allocation analysis for cost sharing purposes.
- Develop a 2023 Storm Drainage System Master Plan Report.

ES.2 INTEGRATED APPROACH TO MASTER PLANNING

The City implemented an integrated master planning approach and contracted the services of Akel Engineering Group Inc. to prepare the following documents:

- 2023 Water System Master Plan
- 2023 Sewer System Master Plan
- 2023 Storm Drainage System Master Plan

While each of these reports is published as a standalone document, it has been coordinated for consistency with the City's General Plan. Additionally, each document has been cross referenced to reflect relevant analysis results with the other documents.

ES.3 STUDY AREA DESCRIPTION

The City of Gilroy is located in Santa Clara County near the west coast of California, south of City of San Francisco. The City of Gilroy lies within the seismically active region of San Francisco Bay. The City of Gilroy lies in the southern portion of the Santa Clara County and is the most southern City located within the county. The City is located approximately 32 miles southeast of the City of San Jose, 8 miles southeast of Morgan Hill, 25 miles east of City of Santa Cruz, and 16 miles northwest of City of Hollister. The City limits currently encompass 16.5 square miles, with an approximate population of 56,599 residents, according to Department of Finance as of January 2021. [Figure ES.1](#) displays the City's location.

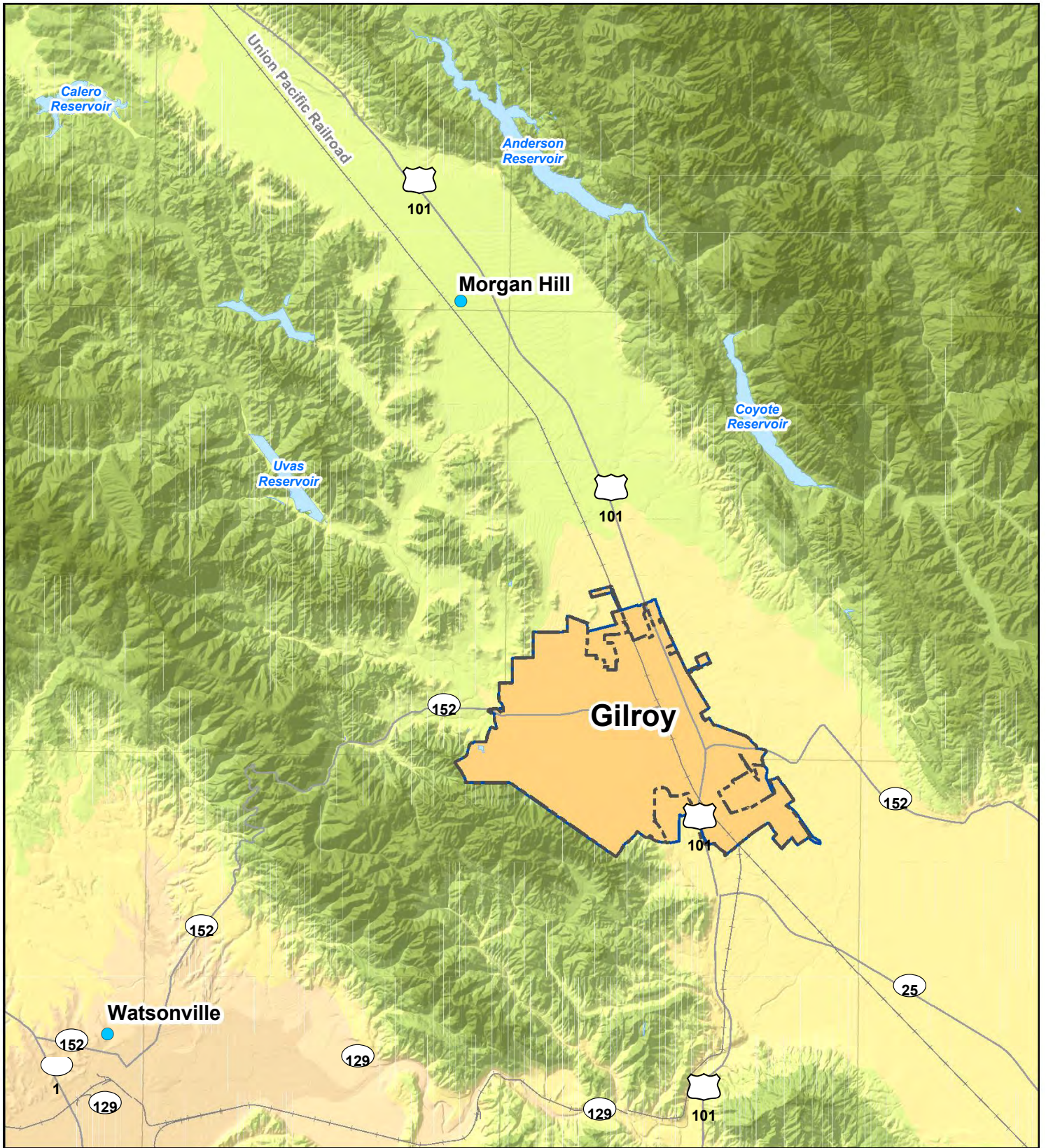
The City's service area is generally bound to the north by Fitzgerald Avenue, to the northeast by San Ysidro Avenue, to the southeast by Camino Arroyo, to the west by Burchell Road and Rancho Vista Drive, and to the south by Carnadero Avenue. U.S. Route 101 divides the City in a southeast to northwest direction and the California State Route 152 (Hecker Pass Hwy) runs east-west direction in the northern half of the City. The topography is generally flat in the middle of the service area, with increasing slopes in the east and west side of the City due to the Santa Cruz Mountains to the west and the Diablo Range to the east. [Figure ES.2](#) displays the planning area showing City limits, the Urban Growth Boundary (UGB) of the City and Planning Area / Sphere of Influence (SOI).

The City operates and maintains a storm drainage system that covers the area within the City Limits. Currently, stormwater runoff discharges to the Uvas Creek, Ronan Channel, Miller Slough Channel, Princevalle Channel and Lower Miller Slough Channel.

ES.4 SYSTEM PERFORMANCE AND DESIGN CRITERIA

This report documents the City's performance and design criteria that were used for evaluating hydrologic and hydraulic systems within the City's drainage watershed ([Table ES.1](#)). Hydrologic criteria are developed to characterize the flood routing of rainfall runoff in a defined drainage system. Akel Engineering Group Inc. obtained the services of Kasraie Consulting to review the hydrologic modeling approach, applied rainfall depths and distributions, sub-catchment delineations, model runoff, and outflow hydrographs of this project. The hydraulic criteria for the storm drainage system were used to evaluate the capacity requirements of conveyance facilities.

Two design storms were used for the evaluation of the City's existing storm drainage system, and for the future drainage conveyance facilities. The 10-year 24-hour design storm was used for evaluating the pipeline conveyance facilities as well as to size future pipeline while the 100-year 24-hour design storm was used to determine if street flooding exceeds one foot in depth.



Legend

- Cities
 - Study Area
 - City Limits
 - Urban Growth Boundary
 - Highway
 - +

+

 Railroads
- | Elevation (ft) | |
|----------------|---------------|
| | 9 - 50 |
| | 51 - 100 |
| | 101 - 250 |
| | 251 - 500 |
| | 501 - 1,000 |
| | 1,001 - 2,000 |
| | 2,001 - 3,000 |
| | 3,001 - 3,792 |
- ~ Waterbodies

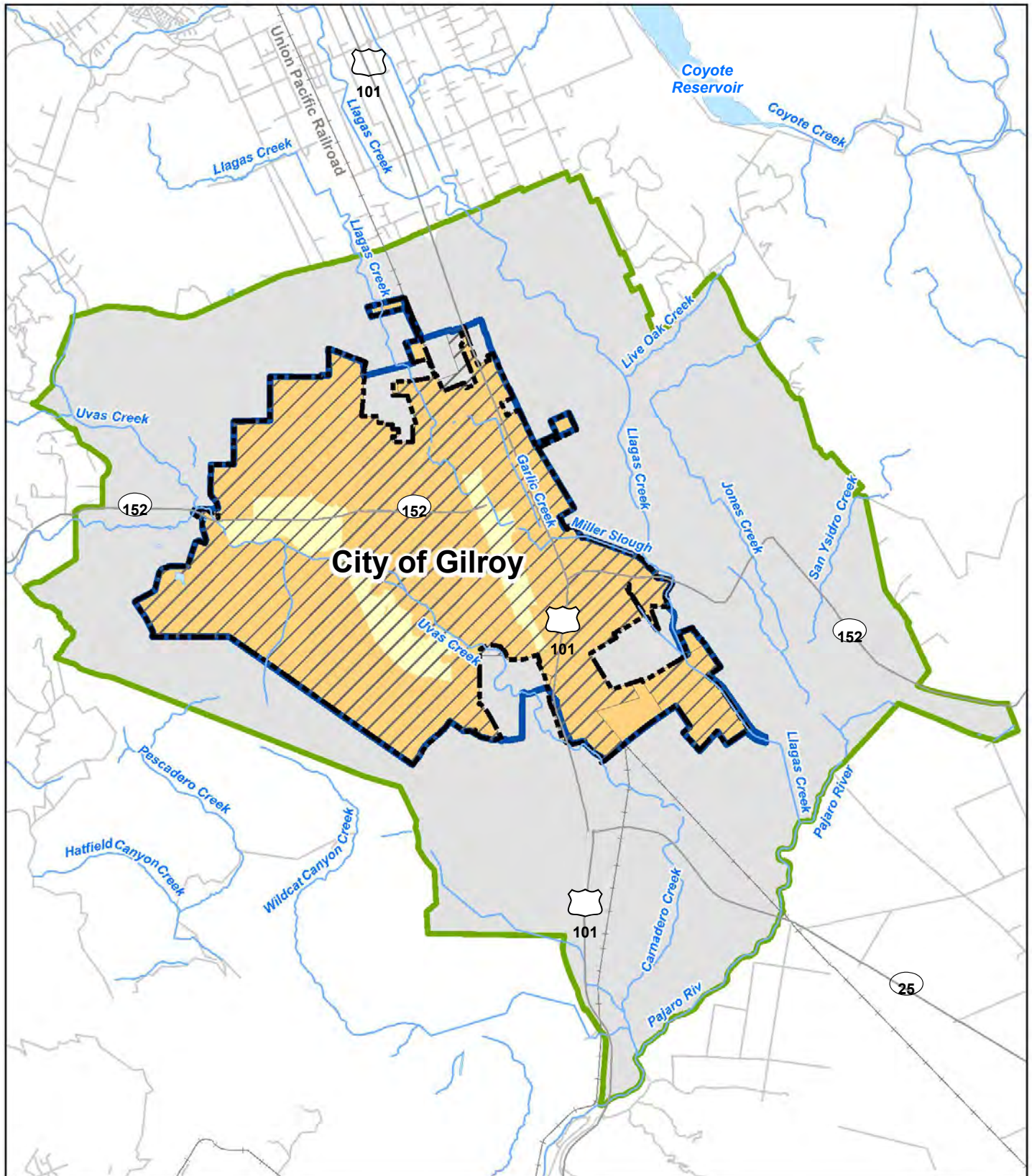
Updated: September 21, 2020

0 0.5 1 2 Miles



Figure ES.1
Regional Location Map
 Storm Drainage System Master Plan
 City of Gilroy





Legend

- | | |
|------------------------------|-------------------|
| City Limits | General Plan Area |
| City Limits Area | Roads |
| Specific Plan Areas | Highways |
| Urban Service Area | Railroads |
| Urban Growth Boundary | Rivers & Creeks |
| Sphere of Influence Boundary | Waterbodies |

AKEL
ENGINEERING GROUP, INC.

Updated: April 15, 2022

0 0.5 1 2 Miles



Figure ES.2 Planning Area

Storm Drainage System Master Plan
City of Gilroy



Table ES.1 Hydrologic and Hydraulic Design Criteria

Storm Drainage System Master Plan

City of Gilroy

Hydrology and Hydraulics Design Criteria

Conveyance Facilities

Pipelines	10-Year 24-Hour design storm to determine if storm water have a minimum of one foot of freeboard between the top of curb and the Hydraulic Grade Line.
Streets	100-Year 24-Hour design storm to determine if flooding exceeds one foot in depth and can flood buildings or create safety hazards.
Receiving Waters (Streams, Creeks, Channels)	FEMA 100-year water surface elevations used for downstream control for facilities where 100-year flood maps are available.

ES.5 HYDROLOGIC AND HYDRAULIC MODEL DEVELOPMENT

Factors critical to the hydrologic model development include watersheds, drainage areas within each watershed, overland flow routing within drainage sub-catchments, and conveyance that makes full use of pipes as well as streets for routing 100-year design storm events. The hydraulic model was developed to evaluate the capacity adequacy of the City's storm drainage system. The model was used to identify capacity deficiencies and to recommend improvements to mitigate those deficiencies.

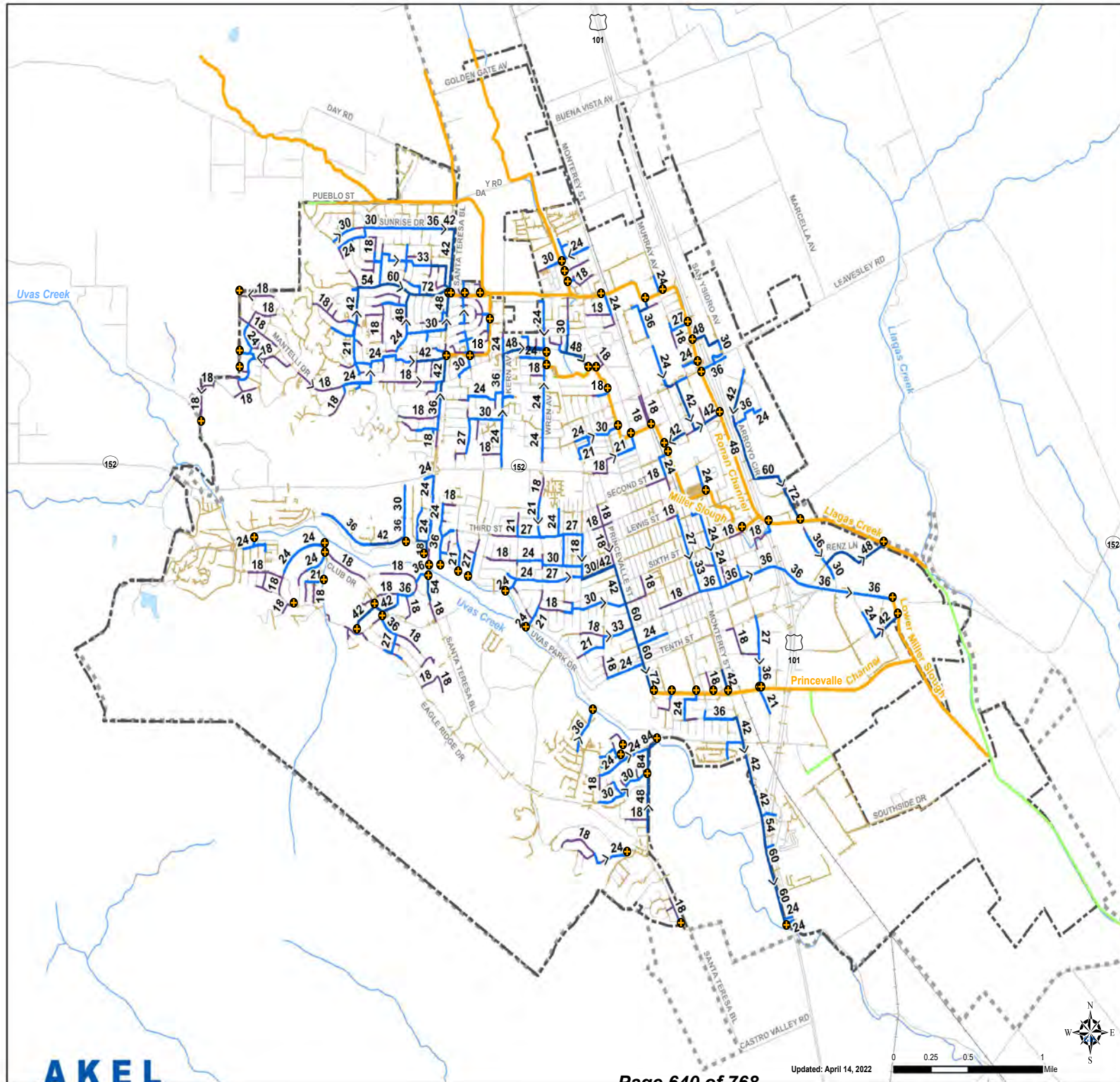
The hydrologic and hydraulic modeling software used for evaluating the capacity adequacy of the City's storm drainage system, InfoSWMM by Innovyze Inc. The software uses the fully dynamic St. Venant's Equation, which has a more accurate engine for simulating backwater and surcharge conditions. The software also incorporates the use of the Manning Equation in other calculations including upstream pipe flow conditions.

The physical hydraulic model was thus developed, as shown on [Figure ES.3](#). The model was populated to include rim elevations at manholes, invert elevations of pipelines, pipe sizes, pipe slopes, pipe lengths, and outfall elevations. Tributary catchments contributing runoff to the City's drainage system were delineated based on 1 foot contours. The hydrologic model developed in InfoSWMM was used to generate runoff from these tributary catchments. Inflow hydrographs from the hydrologic model were then imported to the hydraulic model to simulate runoff entering the piped system.

ES.6 CAPACITY EVALUATION

The City's hydrology and hydraulic models were used to evaluate the capacity adequacy of the existing system and for sizing future improvements.

Using the criteria described in the System Performance and Design Criteria chapter, the hydrology and hydraulic models were used to recommend capacity improvements. The recommended pipe improvements to mitigate existing system deficiencies and to serve future growth are shown on [Figure ES.4](#).



Legend

Existing Modeled System

● Outfalls

Pipes by Diameter

— 18" or Less

— 21" - 36"

— 42" or Greater

— Channels

Non-Modeled System

— Pipes

— Channels

— Roads

— Railroads

— City Limits

— Urban Growth Boundary

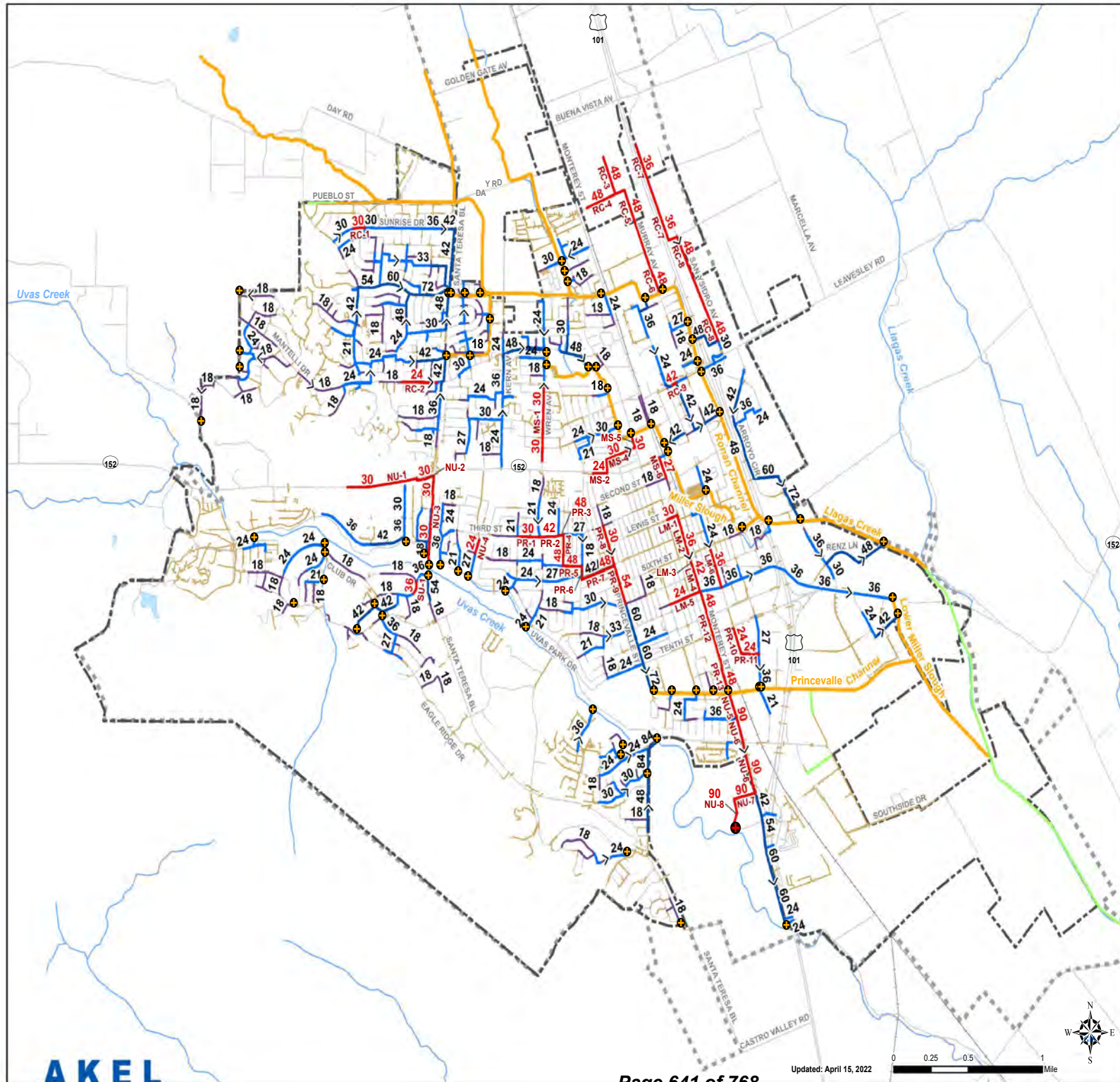
— Rivers & Creeks

— Waterbodies

Figure ES.3 Existing Modeled Storm Drainage System

Storm Drainage System Master Plan
City of Gilroy





Legend

Proposed Improvements

● Outfall

— Pipes

Existing Modeled System

● Outfalls

Pipes by Diameter

— 18" or Less

— 21" - 36"

— 42" or Greater

— Channels

Non-Modeled System

— Pipes

— Channels

— Roads

— Railroads

— City Limits

— Urban Growth Boundary

— Rivers & Creeks

— Waterbodies

Figure ES.4 Capital Improvement Program

Storm Drainage System Master Plan
City of Gilroy



ES.7 CAPITAL IMPROVEMENT PROGRAM

The Capital Improvement Program costs for the projects identified in this master plan for mitigating existing system deficiencies and for serving anticipated future growth throughout the City are summarized on [Table ES.3](#), and are graphically represented on [Figure ES.4](#). Each improvement was assigned a uniquely coded identifier corresponding to its respective hydrologic drainage area. The baseline costs for pipelines are shown in [Table ES.2](#).

The estimated construction costs include the baseline costs plus **30 percent** contingency allowance to account for unforeseen events and unknown field conditions. Capital improvement costs include the estimated construction costs plus **30 percent** project-related costs (engineering design, project administration, construction management and inspection, and legal costs).

The costs in this Storm Drainage System Master Plan were benchmarked using a 20-City national average ENR CCI of 12,647, reflecting a date of November 2021. In total, the CIP project cost totals approximately \$34.8 million dollars.

Table ES.2 Unit Costs

Storm Drainage System Master Plan
City of Gilroy

Pipelines	
(in)	(\$/Lineal Foot)
24	245
27	283
30	302
36	358
42	414
48	489
54	545
60	564
66	622
72	678
84	866
90	928
Pipeline Casings	
\$22 per inch diameter per liner foot	

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3/29/2023

Note :

1. Unit costs are based on an ENR CCI Index Value of 13,176 (March 2023).

Table ES.3 Capital Improvement Program
Storm Drainage System Master Plan
City of Gilroy

Improv. No.	Alignment	Limits	Pipeline Improvements		Infrastructure Costs				Baseline Constr. Costs	Estimated Constr. Costs	Capital Improv. Costs	Suggested Cost Allocation		Cost Sharing	
			Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost				Existing Users	Future Users	Existing Users	Future users
			(in)		(in)	(ft)	(\$/ft)	(\$)				(%)	(%)	(\$)	(\$)
Ronan Channel Drainage Area															
RC-1	Sunrise Dr	From Dream Catcher Way to Golden Sky Way	18	Replacement	30	400	302	120,601	121,000	158,000	206,000	100%	0%	206,000	0
RC-2	Mantelli Dr	From Muir Drive to Delta Dr	18	Replacement	24	1,250	245	306,506	307,000	400,000	520,000	100%	0%	520,000	0
RC-3	Zamzow Ct	From approx. 1,250' n/o Cohansey Ave to Cohansey Ave	-	New	48	1,200	489	586,990	587,000	764,000	994,000	8%	92%	74,621	919,379
RC-4	Cohansey Ave	From approx. 350' e/o Monterey Rd to Murray Ave	-	New	48	1,450	489	709,280	710,000	923,000	1,200,000	0%	100%	0	1,200,000
RC-5	Murray Ave	From Cohansey Ave to Tomkins Ct	-	New	48	2,800	489	1,369,643	1,370,000	1,781,000	2,316,000	9%	91%	219,340	2,096,660
RC-6	Murray Ave	From Tomkins Ct to Ronan Channel	24	Replacement	48	600	489	293,495	294,000	383,000	498,000	13%	87%	67,178	430,822
RC-7	No Name Uno/Las Animas Ave	From approx. 1,500' s/o Buena Vista Ave to San Ysidro Ave	-	New	36	3,400	358	1,216,516	1,217,000	1,583,000	2,058,000	91%	9%	1,875,920	182,080
RC-8	San Ysidro Ave	From Las Animas Ave to approx. 500' n/o Leavesley Rd	-	New	48	3,425	489	1,675,367	1,676,000	2,179,000	2,833,000	79%	21%	2,227,585	605,415
RC-9	Leavesley Rd	From approx. 220' e/o Forest St to approx. 360' e/o Forest St	18	Replacement	42	150	414	62,114	63,000	82,000	107,000	87%	13%	92,659	14,341
Subtotal - Ronan Channel Drainage Area									6,345,000	8,253,000	10,732,000			5,283,303	5,448,697
Miller Slough Drainage Area															
MS-1	Wren Ave	From approx. 290' n/o First St to Lawrence Dr	24	Replacement	30	2,325	302	700,991	701,000	912,000	1,186,000	100%	0%	1,186,000	0
MS-2	First St	From approx. 180' e/o Princevalle St to Sargent St	18	Replacement	24	525	245	128,732	129,000	168,000	219,000	100%	0%	219,000	0
MS-3	Sargent St	From First St to Broadway	18	Replacement	24	425	245	104,212	105,000	137,000	179,000	100%	0%	179,000	0
MS-4	Broadway	From Sargent St to Church St	18/21	Replacement	30	1,075	302	324,114	325,000	423,000	550,000	100%	0%	550,000	0
MS-5	Church St	From Broadway to approx. 100' s/o Howson St	21	Replacement	30	400	302	120,601	121,000	158,000	206,000	100%	0%	206,000	0
MS-6	Monterey Rd	From Second St to First St	18/24	Replacement	27	675	283	190,847	191,000	249,000	324,000	100%	0%	324,000	0
Subtotal - Miller Slough Drainage Area									1,572,000	2,047,000	2,664,000			2,664,000	0
North Uvas Drainage Area															
NU-1	Hecker Pass Hwy	From approx. 3,080' w/o Santa Teresa Blvd to approx. 360' w/o Santa Teresa Blvd	-	New	30	2,825	302	851,742	852,000	1,108,000	1,441,000	0%	100%	0	1,441,000
NU-2	Hecker Pass Hwy	From approx. 360' w/o Santa Teresa Blvd to Santa Teresa Blvd	24	Replacement	30	350	302	105,526	106,000	138,000	180,000	0%	100%	0	180,000
NU-3	Santa Teresa Blvd	From approx. 70' s/o Hecker Pass Hwy to Uvas Creek	24	Replacement	30	2,575	302	776,367	777,000	1,011,000	1,315,000	0%	100%	0	1,315,000
NU-4	Westwood Dr	From approx. 150' s/o Third St to Kentwood Ct	18	Replacement	24	425	245	104,212	105,000	137,000	179,000	100%	0%	179,000	0

Table ES.3 Capital Improvement Program
Storm Drainage System Master Plan
City of Gilroy

Improv. No.	Alignment	Limits	Pipeline Improvements		Infrastructure Costs				Baseline Constr. Costs	Estimated Constr. Costs	Capital Improv. Costs	Suggested Cost Allocation		Cost Sharing	
			Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost				Existing Users	Future Users	Existing Users	Future users
NU-5	Monterey Rd	From Princevalle Channel to Victoria Dr	-	New	90	775	928	718,859	719,000	935,000	1,216,000	100%	0%	1,216,000	0
NU-6	Monterey Rd	From Victoria Dr to approx. 950' n/o Farman Ln	42	Replacement	90	2,175	928	2,017,443	2,018,000	2,624,000	3,412,000	100%	0%	3,412,000	0
NU-7	ROW	From Monterey Rd to approx. 970' n/o Uvas Creek	-	New	90	975	928	904,371	905,000	1,177,000	1,531,000	100%	0%	1,531,000	0
NU-8	ROW	From approx. 970' n/o Uvas Creek to Uvas Creek	-	New	90	1,000	928	927,560	928,000	1,207,000	1,570,000	100%	0%	1,570,000	0
					Subtotal - North Uvas Drainage Area				6,410,000	8,337,000	10,844,000			7,908,000	2,936,000
South Uvas Drainage Area															
SU-1	St Andrews Cir	From Carnoustie Ct to approx. 380' nw/o Carnoustie Ct	18	Replacement	36	375	358	134,175	135,000	176,000	229,000	100%	0%	229,000	0
					Subtotal - South Uvas Drainage Area				135,000	176,000	229,000			229,000	0
Princevalle Drainage Area															
PR-1	Third St	From Santa Paula Dr to Wren Ave	27	Replacement	30	825	302	248,739	249,000	324,000	422,000	100%	0%	422,000	0
PR-2	Third St	From Wren Ave to approx. 170' e/o Santa Theresa Dr	27	Replacement	42	675	414	279,515	280,000	364,000	474,000	100%	0%	474,000	0
PR-3	Third St	From approx. 170' e/o Santa Theresa Dr to Santa Theresa Dr	27	Replacement	48	200	489	97,832	98,000	128,000	167,000	100%	0%	167,000	0
PR-4	Santa Theresa Dr	From Third St to approx. 300' s/o Fourth St	27/30	Replacement	48	950	489	464,700	465,000	605,000	787,000	100%	0%	787,000	0
PR-5	ROW	From Santa Theresa Dr to Miller Ave	30	Replacement	48	675	489	330,182	331,000	431,000	561,000	100%	0%	561,000	0
PR-6	Miller Ave	From approx. 300' s/o Fourth St to Fifth St	30	Replacement	48	400	489	195,663	196,000	255,000	332,000	100%	0%	332,000	0
PR-7	Fifth St	From Miller Ave to Princevalle St	30	Replacement	48	1,250	489	611,448	612,000	796,000	1,035,000	100%	0%	1,035,000	0
PR-8	Princevalle St	From Third St to Fifth St	18	Replacement	30	1,250	302	376,877	377,000	491,000	639,000	100%	0%	639,000	0
PR-9	Princevalle St	From Fifth St to Seventh St	42	Replacement	54	1,225	545	668,183	669,000	870,000	1,131,000	100%	0%	1,131,000	0
PR-10	Alexander St	From Tenth St to Banes Ln	18	Replacement	24	825	245	202,294	203,000	264,000	344,000	84%	16%	288,575	55,425
PR-11	Banes Ln	From Alexander St to Automall Pkwy	18	Replacement	24	625	245	153,253	154,000	201,000	262,000	89%	11%	234,103	27,897
PR-12	Monterey Rd	From approx. 380' n/o 8th St to Angra Way	-	New	48	2,475	489	1,210,667	1,211,000	1,575,000	2,048,000	100%	0%	2,048,000	0
PR-13	Monterey Rd	From Angra Way to Princevalle Channel	42	Replacement	48	775	489	379,098	380,000	494,000	643,000	100%	0%	643,000	0
					Subtotal - Princevalle Drainage Area				5,225,000	6,798,000	8,845,000			8,761,678	83,322

Table ES.3 Capital Improvement Program
Storm Drainage System Master Plan
City of Gilroy

Improv. No.	Alignment	Limits	Pipeline Improvements		Infrastructure Costs				Baseline Constr. Costs	Estimated Constr. Costs	Capital Improv. Costs	Suggested Cost Allocation		Cost Sharing	
			Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost				Existing Users	Future Users	Existing Users	Future users
			(in)		(in)	(ft)	(\$/ft)	(\$)				(%)	(%)	(\$)	(\$)
Lower Miller Slough Drainage Area															
LM-1	Fourth St	From Egleberry St to Monterey Rd	18	Replacement	30	400	302	120,601	121,000	158,000	206,000	100%	0%	206,000	0
LM-2	Monterey Rd	From Fourth St to Sixth St	27	Replacement	36	1,250	358	447,248	448,000	583,000	758,000	100%	0%	758,000	0
LM-3	Monterey Rd	From Sixth St to Hornlein Ct	27	Replacement	42	425	414	175,991	176,000	229,000	298,000	100%	0%	298,000	0
LM-4	Monterey Rd	From Hornlein Ct to approx. 240' n/o Eighth St	33	Replacement	42	775	414	320,924	321,000	418,000	544,000	100%	0%	544,000	0
LM-5	ROW	From Rosanna St to Monterey Rd	18	Replacement	24	1,125	245	275,855	276,000	359,000	467,000	100%	0%	467,000	0
LM-6	Alexander St	From Sixth St to Eighth St	24	Replacement	36	1,300	358	465,138	466,000	606,000	788,000	100%	0%	788,000	0
Subtotal - Lower Miller Slough Drainage Area					1,808,000	2,353,000	3,061,000							3,061,000	0
Total Costs															
Subtotal - Ronan Channel Drainage Area					6,345,000	8,253,000	10,732,000							5,283,303	5,448,697
Subtotal - Miller Slough Drainage Area					1,572,000	2,047,000	2,664,000							2,664,000	0
Subtotal - North Uvas Drainage Area					6,410,000	8,337,000	10,844,000							7,908,000	2,936,000
Subtotal - South Uvas Drainage Area					135,000	176,000	229,000							229,000	0
Subtotal - Princevalle Drainage Area					5,225,000	6,798,000	8,845,000							8,761,678	83,322
Subtotal - Lower Miller Slough Drainage Area					1,808,000	2,353,000	3,061,000							3,061,000	0
Total Improvement Costs					21,495,000	27,964,000	36,375,000							27,906,981	8,468,019



3/29/2023

Notes:

1. Cost estimates are based on the Engineering News Record (ENR) construction cost index (CCI) of 13,176 for March 2023
2. Baseline construction costs plus 30% to account for unforeseen events and unknown conditions.
3. Estimated construction cost plus 30% to cover other costs including: engineering design, project administration (developer and City staff), construction management and inspection, and legal costs.

CHAPTER 1 - INTRODUCTION

This chapter provides a brief background of the City of Gilroy's (City) Storm Drainage system, the need for this master plan, and the objectives of the study. Abbreviations, and definitions are also provided in this chapter.

1.1 BACKGROUND

The City of Gilroy is located approximately 32 miles southeast of the City of San Jose, 8 miles southeast of Morgan Hill, 25 miles east of the City of Santa Cruz, and 16 miles northwest of City of Hollister ([Figure 1.1](#)). The City provides storm drainage services to approximately 17,000 residential, commercial, industrial, and institutional establishments. The City currently owns and operates more than 132 miles of storm drainage pipelines, with up to 84-inch pipe sizes.

In 2004, the City of Gilroy developed a Storm Drainage System Master Plan that identified capacity deficiencies in the storm drainage system and recommended improvements to alleviate deficiencies and serve future developments in the Gilroy Planning Area.

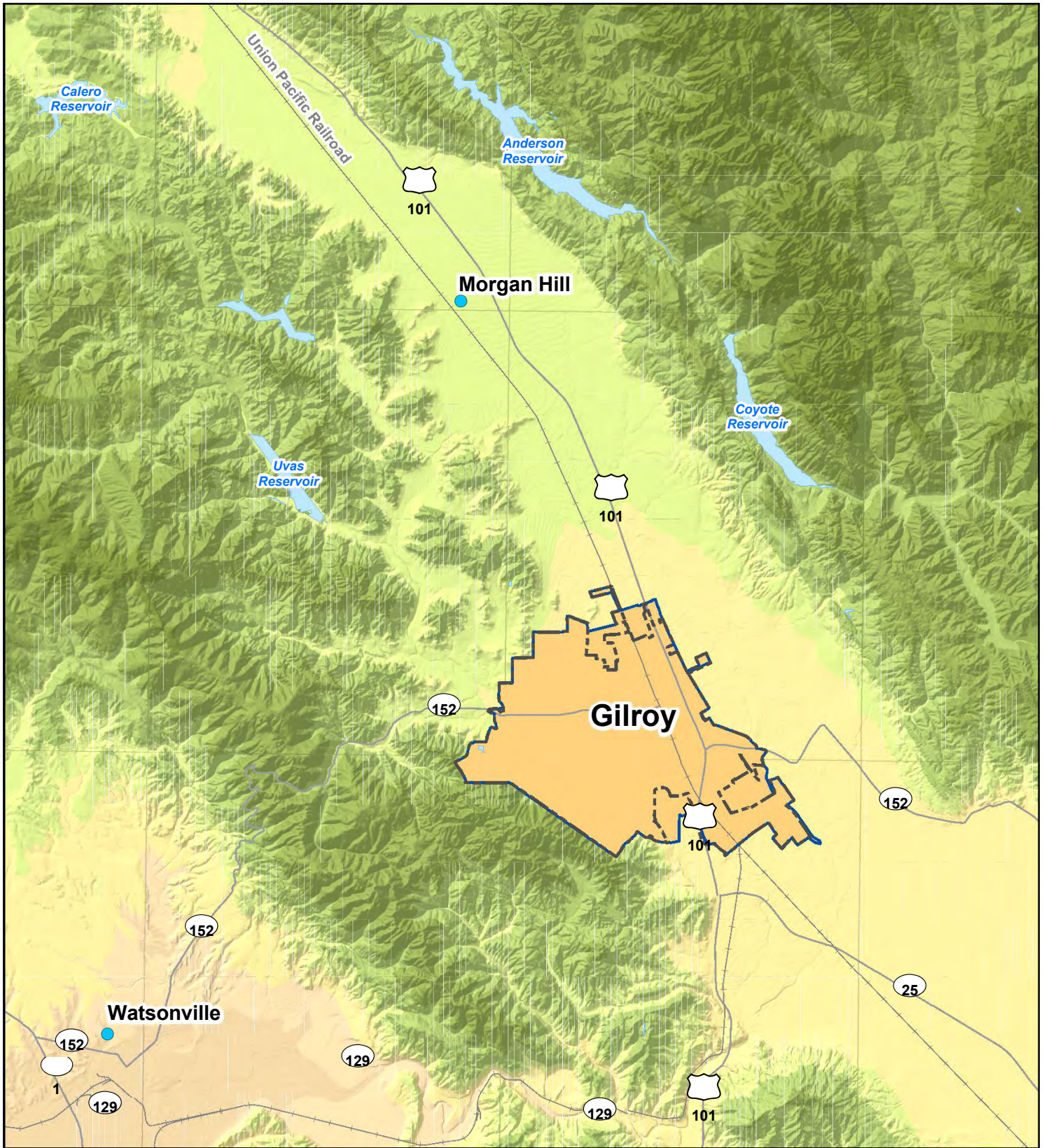
Recognizing the importance of planning, developing, and financing system facilities to provide enhanced stormwater drainage system service to existing customers and for servicing anticipated growth within the Gilroy Planning Area, the City initiated updating elements of the 2004 Storm Drainage System Master Plan, to reflect current land use conditions and General Plan updates.

1.2 SCOPE OF WORK

City Council approved Akel Engineering Group Inc. to prepare this 2022 Storm Drainage System Master Plan (SDSMP) and a concurrent Water System Master Plan and Sewer System Master Plan. The 2022 SDSMP evaluates the City's storm drainage system and recommends capacity improvements necessary to service the needs of existing users and for servicing the future growth of the City. This 2022 SDSMP is intended to serve as a tool for planning and phasing the construction of future storm drainage infrastructure for the projected buildout of the City's service area. The planning area and horizon for this master plan is based on the City's 2040 General Plan. Should planning conditions change, and depending on their magnitude, adjustments to the master plan recommendations might be necessary.

The master plan included the following tasks:

- Summarize the City's existing stormwater system facilities.
- Document growth planning assumptions and known future developments.
- Update the stormwater system performance criteria and design storm event.
- Develop new hydrologic and hydraulic models.



Legend

- Cities
 - Study Area
 - City Limits
 - Urban Growth Boundary
 - Highway
 - +

+

 Railroads
- | Elevation (ft) | |
|----------------|---------------|
| | 9 - 50 |
| | 51 - 100 |
| | 101 - 250 |
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| | 501 - 1,000 |
| | 1,001 - 2,000 |
| | 2,001 - 3,000 |
| | 3,001 - 3,792 |
- ~ Waterbodies

Updated: September 21, 2020

0 0.5 1 2 Miles



Figure 1.1
Regional Location Map
Storm Drainage System Master Plan
City of Gilroy



- Evaluate the storm drainage facilities to address hydraulic capacity requirements from existing and projected developments.
- Recommend a capital improvement program (CIP) with an opinion of probable construction costs.
- Perform a cost allocation analysis for cost sharing purposes.
- Develop a 2023 Storm Drainage System Master Plan Report.

1.3 INTEGRATED APPROACH TO MASTER PLANNING

This City implemented an integrated master planning approach and contracted the services of Akel Engineering Group Inc. to prepare the following documents:

- 2023 Water System Master Plan
- 2023 Sewer System Master Plan
- 2023 Storm Drainage System Master Plan

While each of these reports is published as a standalone document, it has been coordinated for consistency with the City's 2040 General Plan. Additionally, each document has been cross referenced to reflect relevant analysis results with the other documents.

1.4 PREVIOUS MASTER PLANS

The City's most recent storm drainage master plan was completed in 2004. This master plan included evaluation of servicing growth to the planning area, evaluating the existing system, and identifying storm drainage improvements required to serve future growth. Additionally, the 2004 master plan included the development of the hydrologic and hydraulic models, which were used for evaluating the storm drainage system. Improvements were recommended for servicing existing and future growth areas, and a corresponding Capital Improvement Program was developed to quantify the costs associated with each improvement.

1.5 RELEVANT REPORTS

The City has completed several special studies intended to evaluate localized growth. These reports were referenced and used during the capacity analysis. The following lists relevant reports that were used in the completion of this master plan, as well as a brief description of each document:

- **City of Gilroy 2040 General Plan, November 2020 (2040 GP).** The City's 2040 General Plan provides future land use planning, and growth assumptions for the Planning Area. Additionally, this report establishes the planning horizon for improvements in this master plan.

- **City of Gilroy Storm Drainage System Master Plan, May 2004 (2004 SDSMP).** This report documents the planning and performance criteria, evaluates the storm drainage system, recommends improvements, and provides an estimate of costs.

1.6 REPORT ORGANIZATION

The Storm Drainage System Master Plan report contains the following chapters:

Chapter 1 – Introduction. This chapter provides a brief background of the City’s Storm Drainage system, the need for this master plan, and the objectives of the study. Unit conversions, abbreviations, and definitions are also provided in this chapter.

Chapter 2 – Planning Area Characteristics. This chapter presents a discussion of the planning area characteristics affecting the hydrologic and hydraulic analysis of this master plan. These characteristics include soil, topography, floodplains, and land use.

Chapter 3 – System Performance and Design Criteria. This chapter presents the City’s planning and design criteria that were used for evaluating hydrologic and hydraulic systems within the City’s drainage watershed.

Chapter 4 –Existing Facilities Model Development. This chapter defines the hydrologic delineation of storm drainage areas, routing to their respective receiving facilities, and includes the hydrologic model development. Additionally, this chapter includes an overview of the storm drainage system, and the hydraulic model development.

Chapter 5 – Evaluation and Proposed Improvements. This chapter presents a summary of the storm drainage system evaluation and identifies improvements needed to mitigate existing deficiencies, as well as improvements needed to expand the system and service future growth.

Chapter 6 – Capital Improvement Program. This chapter provides a summary of the recommended storm drainage system improvements intended to mitigate existing capacity deficiencies and for accommodating anticipated future growth. This chapter also presents the cost criteria and methodologies for developing the Capital Improvement Program (CIP). Finally, a cost allocation analysis, usually used for cost sharing purposes, is also included.

1.7 ACKNOWLEDGEMENTS

Obtaining the necessary information to successfully complete the analysis presented in this report, and developing the long-term strategy for mitigating the existing system deficiencies and for accommodating future growth, was accomplished with the strong commitment and very active input from dedicated team members including:

- Daryl Jordan, P.E.; Director of Public Works
- Gary Heap, P.E.; City Engineer
- Jorge Duran, P.E.; Senior City Engineer

- Matt Jones, Deputy Public Works Director

1.8 UNIT CONVERSIONS AND ABBREVIATIONS

Engineering units were used in reporting flow rates and volumes pertaining to the design and operation of various components of the storm drainage system. Where it was necessary to report values in smaller or large quantities, different sets of units were used to describe the same parameter. Values reported in one set of units can be converted to another set of units by applying a multiplication factor. A list of multiplication factors for units used in this report are shown on [Table 1.1](#).

Various abbreviations and acronyms were also used in this report to represent relevant storm drainage system terminologies and engineering units. A list of abbreviations and acronyms is included in [Table 1.2](#).

1.9 GEOGRAPHIC INFORMATION SYSTEMS

This master planning effort made extensive use of Geographic Information Systems (GIS) technology, for completing the following tasks:

- Developing the physical characteristics of the hydraulic model.
- Delineating stormwater tributary areas, and outlining watershed areas.
- Extracting ground elevations along the storm drainage system from available contour maps and digital elevation models.
- Generating maps and exhibits used in this master plan.

Table 1.1 Unit Conversions

Storm Drainage System Master Plan
City of Gilroy

Volume Unit Calculations		
To Convert From:	To:	Multiply by:
acre feet	gallons	325,857
acre feet	cubic feet	43,560
acre feet	million gallons	0.3259
cubic feet	gallons	7.481
cubic feet	acre feet	2.296×10^{-5}
cubic feet	million gallons	7.481×10^{-6}
gallons	cubic feet	0.1337
gallons	acre feet	3.069×10^{-6}
gallons	million gallons	1×10^{-6}
million gallons	gallons	1,000,000
million gallons	cubic feet	133,672
million gallons	acre feet	3.069
Flow Rate Calculations		
To Convert From:	To:	Multiply By:
ac-ft/yr	mgd	8.93×10^{-4}
ac-ft/yr	cfs	1.381×10^{-3}
ac-ft/yr	gpm	0.621
ac-ft/yr	gpd	892.7
cfs	mgd	0.646
cfs	gpm	448.8
cfs	ac-ft/yr	724
cfs	gpd	646300
gpd	mgd	1×10^{-6}
gpd	cfs	1.547×10^{-6}
gpd	gpm	6.944×10^{-4}
gpd	ac-ft/yr	1.12×10^{-3}
gpm	mgd	1.44×10^{-3}
gpm	cfs	2.228×10^{-3}
gpm	ac-ft/yr	1.61
gpm	gpd	1,440
mgd	cfs	1.547
mgd	gpm	694.4
mgd	ac-ft/yr	1,120
mgd	gpd	1,000,000

Table 1.2 Abbreviations and Acronyms
 Storm Drainage System Master Plan
 City of Gilroy

Abbreviation	Expansion	Abbreviation	Expansion
2016 SDSMP	2016 Storm Drainage System Master Plan	ft	Feet
10Yr-24Hr	10-Year 24-Hour	fps	Feet per Second
100Yr-24Hr	100-Year 24-Hour	GIS	Geographic Information Systems
AC	Acre	HDPE	High Density Polyethylene Pipe
ACP	Asbestos Cement Pipe	in	Inch
Akel	Akel Engineering Group, Inc.	in/hr	Inch per Hour
Caltrans	California Department of Transportation	LF	Linear Feet
City	City of Gilroy	mi	Miles
CCI	Construction Cost Index	NRCS	National Resource Conservation Service
cfs	Cubic Feet per Second	NOAA	National Oceanic and Atmospheric Administration
CI	Cast Iron Pipe	PVC	Polyvinyl Chloride Pipe
CIP	Capital Improvement Program	RCP	Reinforced Concrete Pipe
County	County of Santa Clara	ROW	Right of Way
CMP	Corrugated Metal Pipe	SCS	Soil Conservation Service
DIP	Ductile Iron Pipe	SOI	Sphere of Influence
DDF	Depth Duration Frequency	SSURGO	Soil Survey Geographic database
ENR	Engineering News Record	SWMM	Stormwater Management Model
EPA	Environmental Protection Agency	UGB	Urban Growth Boundary
DOF	Department of Finance	UWMP	Urban Water Management Plan
FEMA	Federal Emergency Management Agency	VCP	Verified Clay Pipe

CHAPTER 2 – PLANNING AREA CHARACTERISTICS

This chapter presents a discussion of the planning area characteristics affecting the hydrologic and hydraulic analysis of this master plan. These characteristics include soil, topography, floodplains, and land use.

2.1 STUDY AREA DESCRIPTION

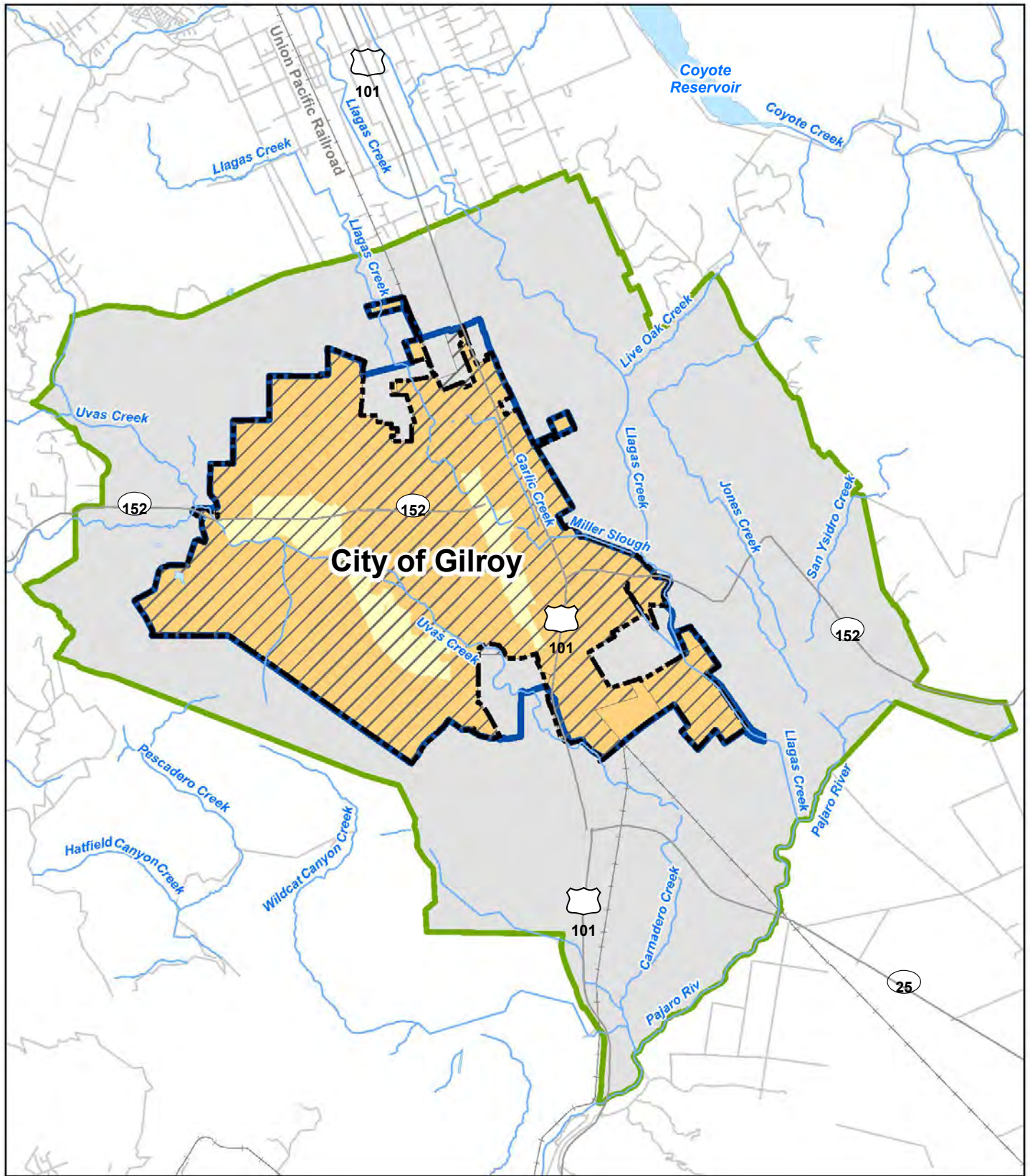
The City of Gilroy is located in Santa Clara County near the west coast of California, south of City of San Francisco. The City of Gilroy lies within the seismically active region of San Francisco Bay. The City of Gilroy lies in the southern portion of the Santa Clara County and is the most southern City located within the county. The City is located approximately 32 miles southeast of the City of San Jose, 8 miles southeast of Morgan Hill, 25 miles east of City of Santa Cruz, and 16 miles northwest of City of Hollister. The City limits currently encompass 16.5 square miles, with an approximate population of 57,000 residents, according to Department of Finance as of January 2021. [Figure 1.1](#) displays the City's location.

The City's service area is generally bound to the north by Fitzgerald Avenue, to the northeast by San Ysidro Avenue, to the southeast by Camino Arroyo, to the west by Burchell Road and Rancho Vista Drive, and to the south by Carnadero Avenue. U.S. Route 101 divides the City in a southeast to northwest direction and the California State Route 152 (Hecker Pass Hwy) runs east-west direction in the northern half of the City. The topography is generally flat in the middle of the service area, with increasing slopes in the east and west side of the City due to the Santa Cruz Mountains to the west and the Diablo Range to the east. [Figure 2.1](#) displays the planning area showing City limits, the Urban Growth Boundary (UGB) of the City and Planning Area / Sphere of Influence (SOI).

The City operates and maintains a storm drainage system that covers the area within the City Limits. Currently, stormwater runoff discharges to the Uvas Creek, Ronan Channel, Miller Slough Channel, Princevalle Channel and Lower Miller Slough Channel, as describe in the following section.

2.2 WATERSHEDS AND DRAINAGE AREAS

The City of Gilroy maintains a rich diversity of land use types, which contribute to a varying degree of stormwater runoff containment needs. Several creeks, a vast array of agricultural lands, small pockets of development, and the City itself comprises the wide array of runoff generation and conveyance within the planning area.



Legend

- | | |
|------------------------------|-------------------|
| City Limits | General Plan Area |
| City Limits Area | Roads |
| Specific Plan Areas | Highways |
| Urban Service Area | Railroads |
| Urban Growth Boundary | Rivers & Creeks |
| Sphere of Influence Boundary | Waterbodies |

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Updated: April 15, 2022

0 0.5 1 2 Miles



Figure 2.1 Planning Area

Storm Drainage System Master Plan
City of Gilroy



2.2.1 Watersheds

The City has multiple major watersheds within the Urban Growth Boundary that collect and convey stormwater runoff, and are as follows: Uvas Creek, Llagas Creek, and Pajaro River ([Figure 2.2](#)). The following are brief descriptions of the three watersheds:

- [Uvas Creek Watershed](#) – The portion of the Uvas Creek Watershed within the City limits is generally defined as the area bounded by Rancho Vista Drive to the west and Santa Teresa Boulevard to the east, with the northern and southern boundaries approximately represented by Uvas Creek and Santa Cruz Mountain respectively.
- [Llagas Creek Watershed](#) – The portion of the Lower Coyote Creek Watershed within the City limits is generally bounded by Olea Court to the west and Llagas Creek to the east, with the northern and southern boundaries approximately represented by Fitzgerald Avenue and Luchessa Avenue respectively.
- [Pajaro River Watershed](#) – The Pajaro River Watershed within the City limits is generally defined as the area bounded by Uvas Creek to the west and Llagas Creek to the east, with the northern and southern boundaries approximately represented by Luchessa Avenue and Southside Drive respectively.

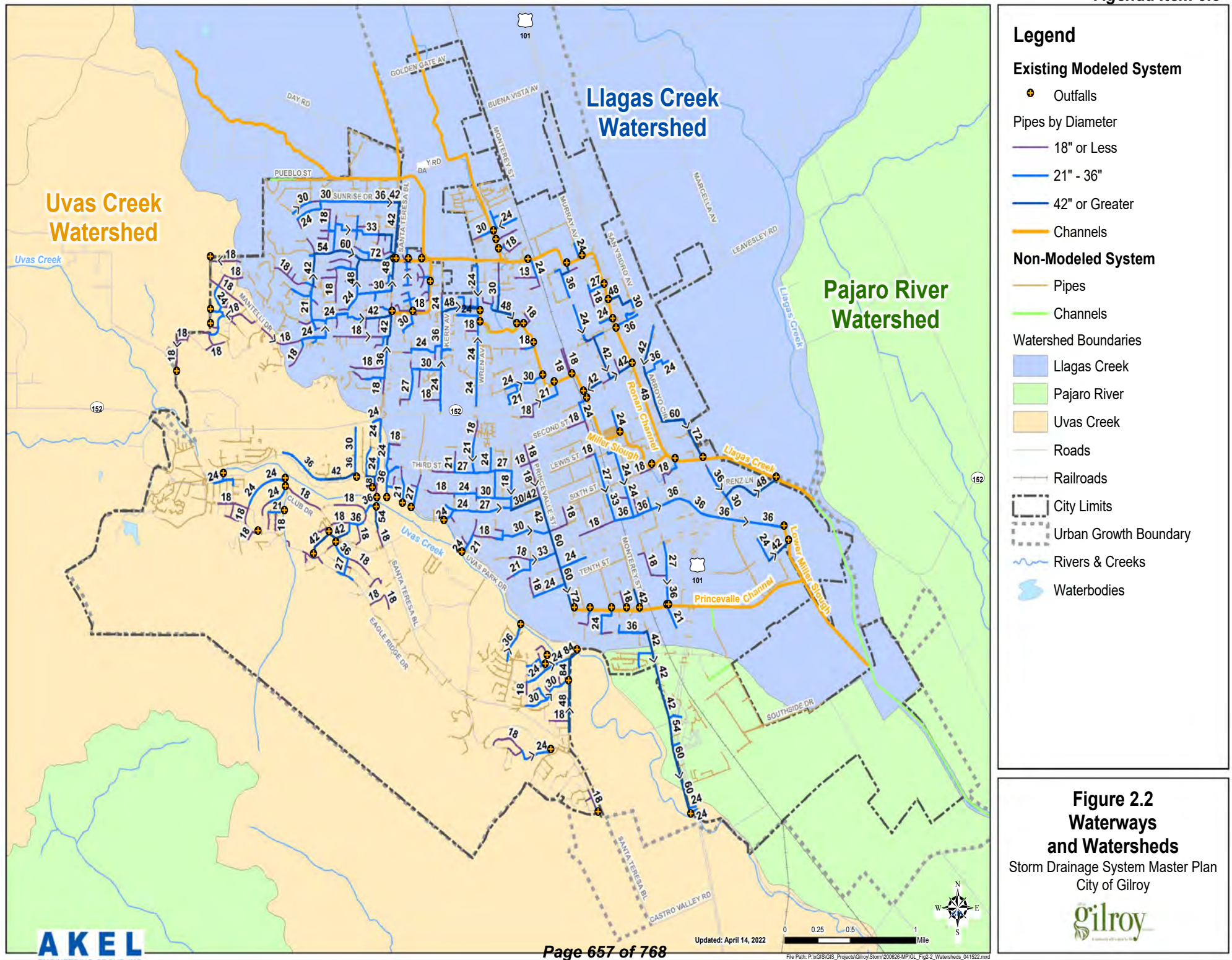
2.2.2 Drainage Areas

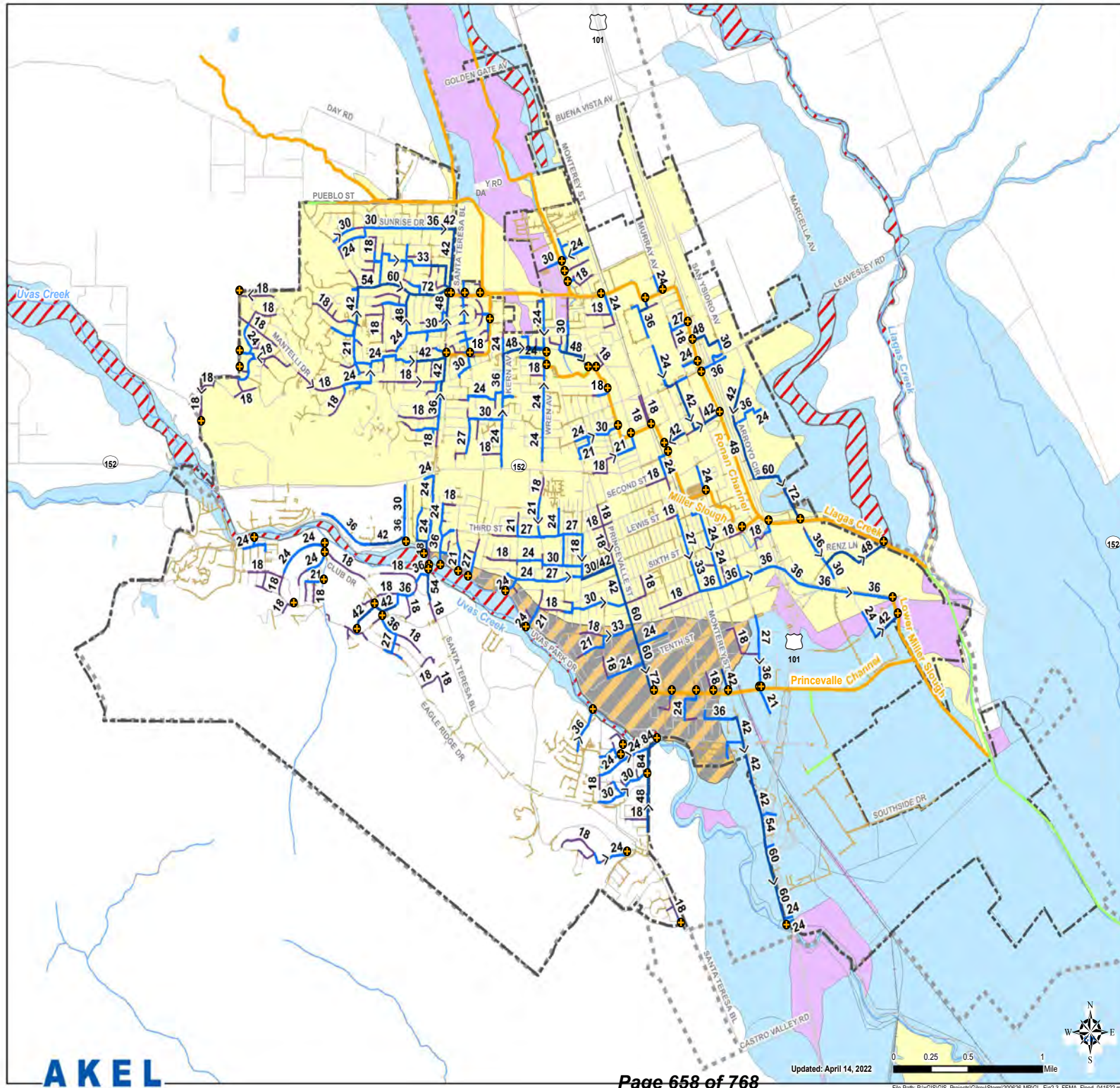
Watersheds are typically comprised of smaller drainage areas defined by topographical features. Additionally, these drainage areas may comprise multiple soil types as defined by Natural Resources Conservation Service (NRCS). The City's storm drainage system consists of a series of conveyance networks. These networks have different means of disposing of stormwater runoff, which include outfall points to Uvas Creek or Llagas Creek, or being conveyed to the canals and sloughs throughout the City.

2.3 FLOODPLAINS

Floodplains are important for delineating the extent of water-level rise during major floods. Typically, floodplains are estimated for the historic 100-Year and 500-Year flood. Most of the floodplains for the City are located southeast boundary of the City limits, as shown on [Figure 2.3](#).

The Federal Emergency Management Agency (FEMA) produces Flood Insurance Rate Maps that show areas subject to flooding during major storm events. The flood risk information shown on these maps is based on historical data, including meteorological, hydrological, and hydraulic data for the specified area. The map creation is a result of the 1968 National Flood Insurance Program, aimed at reducing or preventing property owner losses due to flooding by allowing premiums to be paid for those in need of protection.





Legend

FEMA 100 Year Flood Zones

- 0.2% Annual Chance Flood Hazard
- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- Area of Minimal Flood Hazard
- Area with Reduced Risk Due to Levee
- Area of undetermined Flood Hazard

Existing Modeled System

- Outfalls

Pipes by Diameter

- 18" or Less
- 21" - 36"
- 42" or Greater
- Channels

Non-Modeled System

- Pipes
- Channels
- Roads
- Railroads
- City Limits
- Urban Growth Boundary
- Rivers & Creeks
- Waterbodies

Figure 2.3 FEMA 100 Year Flood Zones

Storm Drainage System Master Plan
City of Gilroy



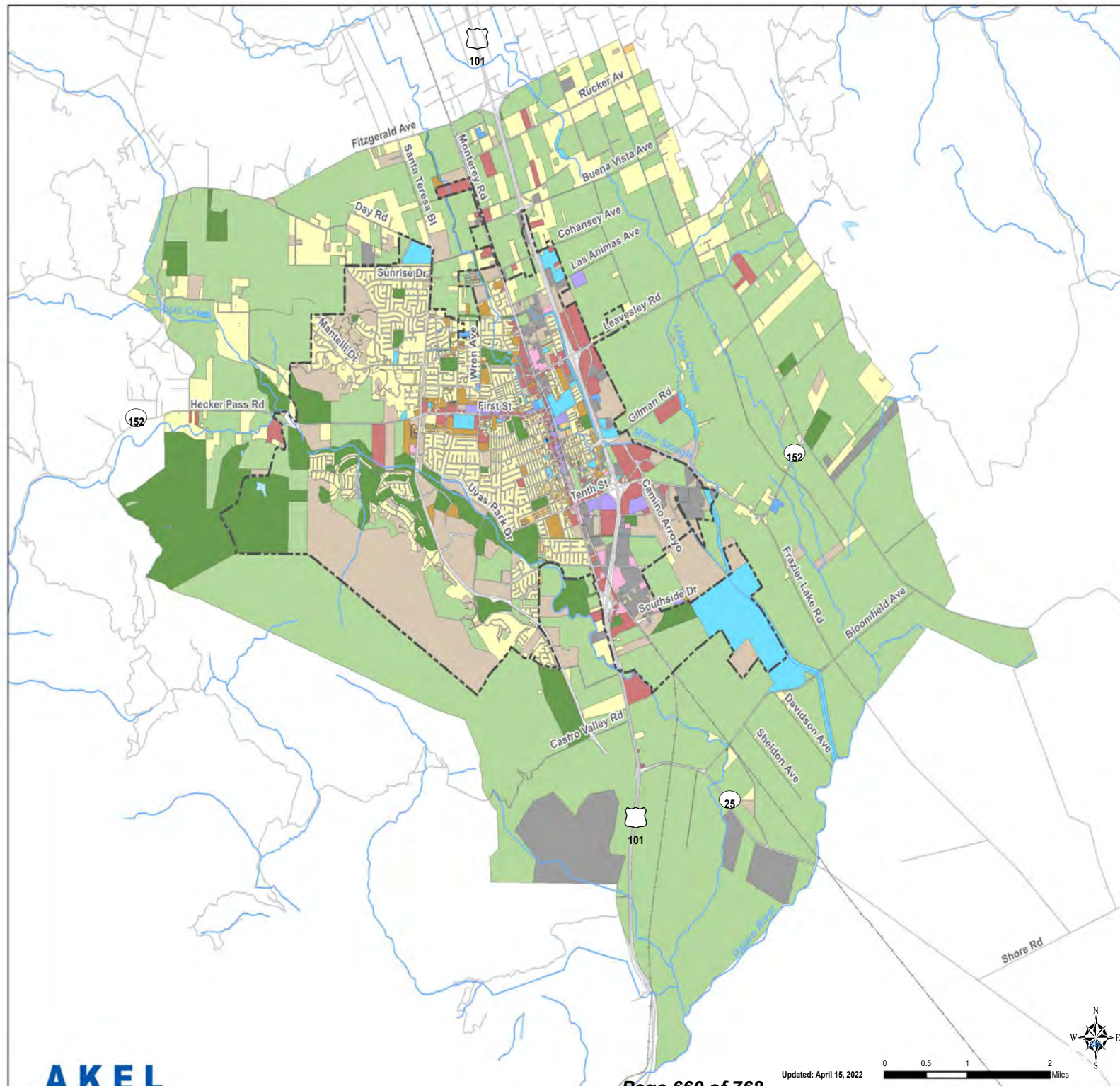
2.4 EXISTING SERVICE AREAS AND LAND USE

The City's storm drainage system services residential and non-residential lands within the City limits, as summarized on [Table 2.1](#), and shown graphically on [Figure 2.4](#). Areas within the City limit include 4,197 acres of developed lands and 4,905 acres of undeveloped lands.

At ultimate development of the General Plan, the City's storm drainage system is anticipated to service approximately 3,045 acres of residential land use, 4,750 acres of non-residential land use, and 2,477 acres of open space land use, for a total of 10,272 acres inside the City's Urban Growth Boundary ([Table 2.1](#)). The land use designations utilized in this master plan are consistent with the Land Use Element of the City's 2040 General Plan received from the City's planning division, and shown on [Figure 2.5](#).

2.5 HISTORICAL AND PROJECTED POPULATION

According to California Department of Finance (DOF) population estimates, the 2021 City population is approximately 57,000 people. From 2015 to present, the City's service area has observed an average annual growth rate of approximately 0.7%. This 2022 SDSMP is consistent with the City's 2020 Urban Water Management Plans (UWMP's) annual growth rate factor of 1.5%. The current and projected service area population is summarized in [Table 2.2](#).



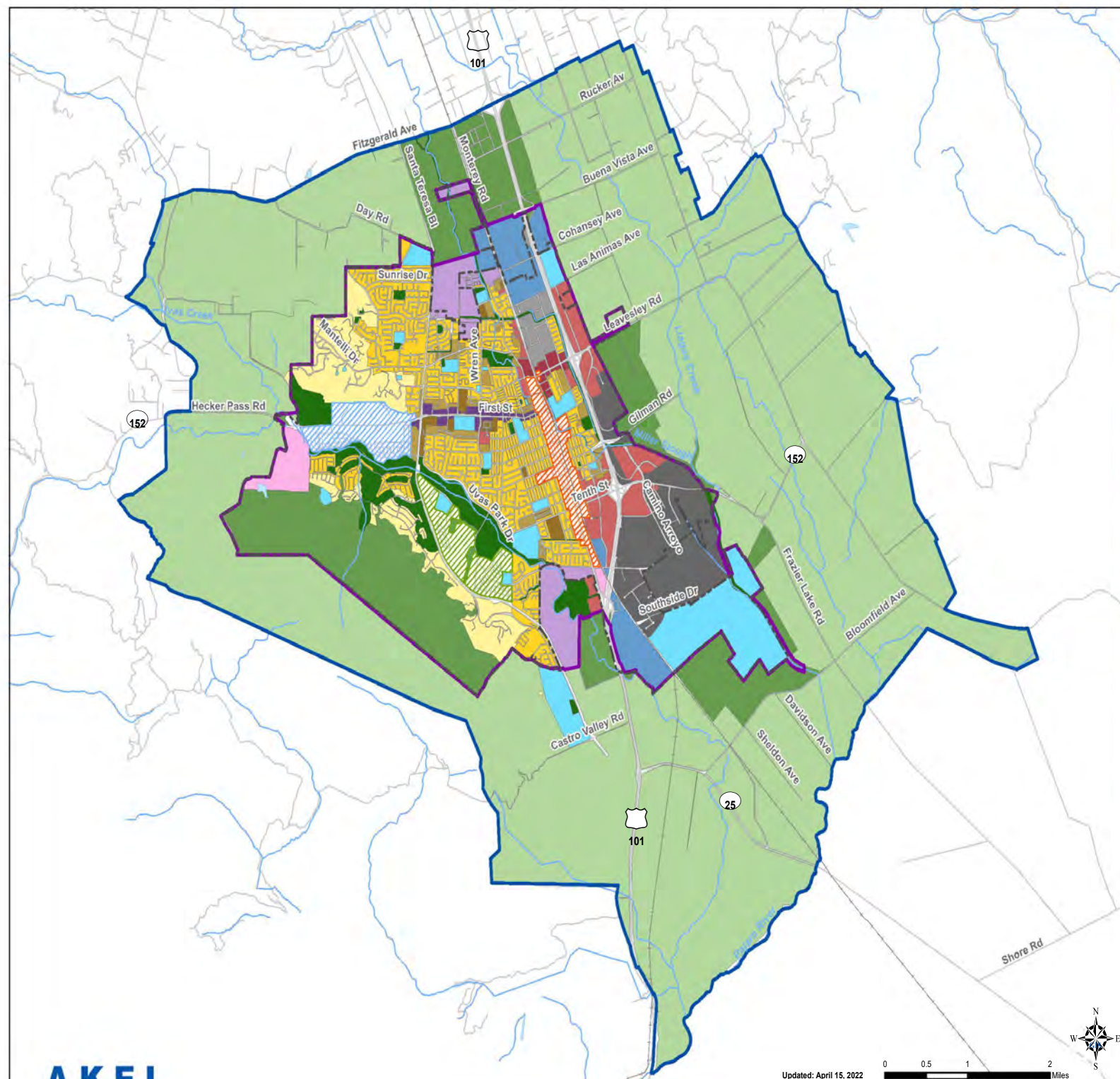
Legend

Existing Land Use

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Neighborhood District
- Public/Quasi-Public Facility
- Educational Facility
- Professional Office
- General Services Commercial
- Visitor-Serving Commercial
- Industrial
- Open Space
- Park and Recreation Facility
- Vacant
- City Limits
- Roads
- Railroads
- Rivers & Creeks
- Waterbodies

Figure 2.4
Existing Land Use
 Storm Drainage System Master Plan
 City of Gilroy





Legend

- Planning Area/Sphere of Influence
- Urban Growth Boundary
- City Limits

General Plan Land Use

- Hillside Residential
- Low Density Residential
- Medium Density Residential
- High Density Residential
- General Services Commercial
- City Gateway District
- Visitor Serving Commercial
- General Industrial
- Employment Center
- Industrial Park
- Public and Quasi-Public Facility
- Neighborhood District
- Mixed Use
- Rural County
- Open Space
- Park and Recreation Facility

Specific Plan Areas

- Downtown
- Glen Loma Ranch
- Hecker Pass
- Roads
- Railroads
- ~~~~~ Rivers & Creeks
- Waterbodies

Figure 2.5 2040 General Plan Land Use

Storm Drainage System Master Plan
City of Gilroy



Table 2.1 Existing and Future Land Use
Storm Drainage System Master Plan
City of Gilroy

General Plan Land Use Classification	Existing Land Use Classification	Existing Development			Future Development				Total Development
		Within City Limits		Subtotal Existing Development - Unchanged (acre)	Within City Limits		Urban Growth Boundary (acre)	Subtotal Future Development (acre)	
		Existing	Existing Lands - Redeveloping		New Lands - Redevelopment	New Development			
		(acre)	(acre)		(acre)	(acre)			
Residential									
Rural Residential	-	0	0	0	0	0	0	0	0
Hillside Residential	Hillside Residential	444	-1	442	112	344	8	464	907
Low Density Residential	Low Density Residential	1,704	-121	1,583	122	45	44	211	1,794
Medium Density Residential	Medium Density Residential	100	-42	58	177	4	2	183	240
High Density Residential	High Density Residential	249	-182	67	18	15	3	36	104
	Subtotal - Residential	2,496	-346	2,151	429	408	58	895	3,045
Non-Residential									
Visitor Serving Commercial	Visitor Serving Commercial	99	-67	32	176	0	0	176	208
General Services Commercial	General Services Commercial	524	-91	432	106	55	44	205	637
	Professional Office	1	0	1	0	0	0	0	1
General Industrial	General Industrial	320	-71	249	213	255	389	856	1,105
	Campus Industrial	56	-12	44	0	0	0	0	44
Educational Facility	Educational Facility	12	-5	7	1	0	0	1	8
Public/Quasi-Public Facility	Public/Quasi-Public Facility	596	-44	552	152	102	28	281	833
Neighborhood District	Neighborhood District	94	-94	0	38	22	336	395	395
City Gateway District	-	0	0	0	20	7	0	27	27
Downtown Specific Plan Area	-	0	0	0	57	32	0	89	89
Mixed Use Corridor High	-	0	0	0	25	7	0	33	33
Hecker Pass Special Use District	-	0	0	0	328	88	0	416	416
Glen Loma Ranch	-	0	0	0	103	237	0	341	341
Industrial Park	-	0	0	0	43	40	0	83	83
Employment Center	-	0	0	0	279	30	222	530	530
	Subtotal - Non-Residential	1,701	-384	1,317	1,541	876	1,017	3,434	4,750
Other									
Agriculture	-	0	0	0	0	0	0	0	0
Park and Recreation Facility	Park and Recreation Facility	1,232	-238	995	0	66	88	154	1,149
Vacant	Vacant	2,391	-2,391	0	0	0	0	0	0
Open Space	Open Space	1,282	-1,030	253	0	1,041	4	1,045	1,298
Rural County	-	0	0	0	28	0	3	30	30
	Subtotal - Other	4,905	-3,658	1,247	28	1,107	95	1,230	2,477
Total									
	Total Developed Area	9,102	-4,388	4,714	1,997	2,391	1,170	5,558	10,272

Notes:

1. Source: City of Gilroy General Plan Alternatives Report, Public Review Draft July 2019.
2. Specific Plan land use types (Downtown, Hecker Pass, Glen Loma) are comprised of multiple land use types. As such, existing land use acreages reflect existing Specific Plan development under current existing land use designations.

Table 2.2 Historical and Projected Population

Storm Drainage System Master Plan
City of Gilroy

Year	Population ^{1,2}	Annual Growth (%)
Historical		
2000	41,464	-
2001	42,436	2.3%
2002	43,144	1.7%
2003	43,866	1.7%
2004	45,026	2.6%
2005	45,782	1.7%
2006	46,446	1.5%
2007	47,047	1.3%
2008	48,353	2.8%
2009	48,627	0.6%
2010	48,821	0.4%
2011	49,622	1.6%
2012	50,716	2.2%
2013	52,475	3.5%
2014	53,325	1.6%
2015	54,233	1.7%
2016	54,849	1.1%
2017	55,811	1.8%
2018	56,030	0.4%
2019	56,635	1.1%
2020	56,704	0.1%
Projected		
2021	57,555	1.5%
2022	58,418	1.5%
2023	59,294	1.5%
2024	60,184	1.5%
2025	61,086	1.5%
2026	62,003	1.5%
2027	62,933	1.5%
2028	63,877	1.5%
2029	64,835	1.5%
2030	65,807	1.5%
2031	66,794	1.5%
2032	67,796	1.5%
2033	68,813	1.5%
2034	69,845	1.5%
2035	70,893	1.5%
2036	71,957	1.5%
2037	73,036	1.5%
2038	74,131	1.5%
2039	75,243	1.5%
2040	76,372	1.5%

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Notes:

1. Historical populations extracted from California Department of Finance, Population Estimates E-4.
2. Projected population assuming medium annual growth rate of 1.5% per the City of Gilroy 2020 Urban Water Management Plan.

CHAPTER 3 – SYSTEM PERFORMANCE AND DESIGN CRITERIA

This chapter presents the City’s planning and design criteria that were used for evaluating hydrologic and hydraulic systems within the City’s drainage watershed.

3.1 HYDROLOGIC CRITERIA

Hydrologic criteria are developed to characterize the flood routing of rainfall runoff in a defined drainage system. Akel Engineering Group obtained the services of Kasraie Consulting to review the hydrology modeling approach, applied rainfall depths and distributions, sub-catchment delineations, model runoff, and outflow hydrographs of this project. The hydrology sub-catchments review is shown graphically in [Appendix A](#). This section discusses the precipitation characteristics, the design storms used in this master plan, and soil imperviousness.

3.1.1 Precipitation Characteristics

A dominating factor in the generation of rainfall in California is the oscillation of the semi-permanent high pressure area of the north Pacific Ocean. This high pressure center moves north in the summer and south in the winter, adjusting the flow of moisture into California. In the winter, when the high pressure center moves further south, moisture can move south and bring widespread rainfall.

In certain instances when circulation patterns allow for subtropical moisture to enter California from a southwesterly direction, rainfall amounts can be quite heavy, and can result in widespread flooding. The City receives an average 20.5 inches of total precipitation per year. The City’s wet weather season typically starts in November and ends in April.

3.1.2 Design Storms

Design storms are typically defined by three important features: depth, duration and frequency.

- **Depth.** The depth of the storm identifies the amount of precipitation occurring during a specific time interval.

This master plan uses the precipitation depth-duration-frequency equations included in the Santa Clara County Drainage Manual, and converted to reflect City of Gilroy specific precipitation documented on [Table 3.1](#). The depth-duration-frequency values reflect rainfall events specific to the City and lists precipitations, in inches and inches per hour, for return intervals up to 100 years.

For comparison purposes, [Table 3.2](#) lists the difference in precipitation between the 2004 Master Plan, County Drainage Manual and NOAA Atlas 14 Volume 6 Version 2. While 2004 Master Plan and Santa Clara Drainage Manual values are relatively close, NOAA precipitation values have

Table 3.1 Precipitation Depth-Duration-Frequency

Storm Drainage System Master Plan

City of Gilroy

Duration	2-Year		5-Year		10-Year		25-Year		100-Year	
	(in)	(in/hr)	(in)	(in/hr)	(in)	(in/hr)	(in)	(in/hr)	(in)	(in/hr)
5-min	0.15	1.78	0.21	2.50	0.24	2.93	0.29	3.43	0.34	4.12
10-min	0.21	1.24	0.29	1.71	0.33	1.99	0.39	2.33	0.47	2.79
15-min	0.24	0.97	0.33	1.33	0.39	1.57	0.46	1.85	0.56	2.26
30-min	0.33	0.67	0.45	0.91	0.53	1.06	0.62	1.25	0.76	1.51
1-hr	0.48	0.48	0.63	0.63	0.73	0.73	0.85	0.85	1.02	1.02
2-hr	0.73	0.36	0.95	0.47	1.09	0.54	1.25	0.62	1.48	0.74
3-hr	0.94	0.31	1.22	0.41	1.39	0.46	1.60	0.53	1.88	0.63
6-hr	1.36	0.23	1.80	0.30	2.08	0.35	2.40	0.40	2.85	0.48
12-hr	1.83	0.15	2.51	0.21	2.94	0.24	3.44	0.29	4.15	0.35
24-hr	2.29	0.10	3.27	0.14	3.91	0.16	4.69	0.20	5.81	0.24


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Note:

1. Source: Santa Clara County Drainage Manual.

Table 3.2 Precipitation Depth-Duration-Frequency Comparison

Storm Drainage System Master Plan

City of Gilroy

Duration	2004 Master Plan				Santa Clara County Drainage Manual				NOAA Atlas 14 ¹			
	10-Year		100-Year		10-Year		100-Year		10-Year		100-Year	
	(in)	(in/hr)	(in)	(in/hr)	(in)	(in/hr)	(in)	(in/hr)	(in)	(in/hr)	(in)	(in/hr)
5-min	0.18	2.16	0.27	3.24	0.24	2.93	0.34	4.12	0.26	3.10	0.41	4.97
10-min	0.26	1.56	0.39	2.34	0.33	1.99	0.47	2.79	0.37	2.22	0.59	3.56
15-min	0.32	1.28	0.49	1.96	0.39	1.57	0.56	2.26	0.45	1.79	0.72	2.87
30-min	0.47	0.94	0.71	1.42	0.53	1.06	0.76	1.51	0.62	1.24	0.99	1.98
1-hr	0.69	0.69	1.04	1.04	0.73	0.73	1.02	1.02	0.87	0.87	1.40	1.40
2-hr	1.01	0.51	1.52	0.76	1.09	0.54	1.48	0.74	1.33	0.67	2.14	1.07
3-hr	1.26	0.42	1.89	0.63	1.39	0.46	1.88	0.63	1.68	0.56	2.71	0.90
6-hr	1.84	0.31	2.77	0.46	2.08	0.35	2.85	0.48	2.39	0.40	3.86	0.64
12-hr	2.69	0.22	4.05	0.34	2.94	0.24	4.15	0.35	3.40	0.28	5.46	0.46
24-hr	3.93	0.16	5.92	0.25	3.91	0.16	5.81	0.24	4.69	0.20	7.51	0.31



Note:

10/20/2021

1. Source: NOAA Atlas 14 Volume 6 Version 2 for Gilroy.

been consistently increasing over the years. City staff selected to maintain consistency with Santa Clara Drainage Manual.

- **Duration.** The duration of the storm can be little as 5-minutes and as high as 24-hours as documented on [Table 3.1](#). This storm drainage master plan uses 24-hours as the duration, and the distribution is based on NOAA Atlas 14 Balanced Centered Hyetograph. The balance centered hyetograph provides a design storm with the peak intensity occurring during the middle of the day ([Figure 3.1](#)).
- **Frequency.** The frequency of the storm is the recurrence interval at which the storm may occur at a given area.

3.1.3 Design Storm Events

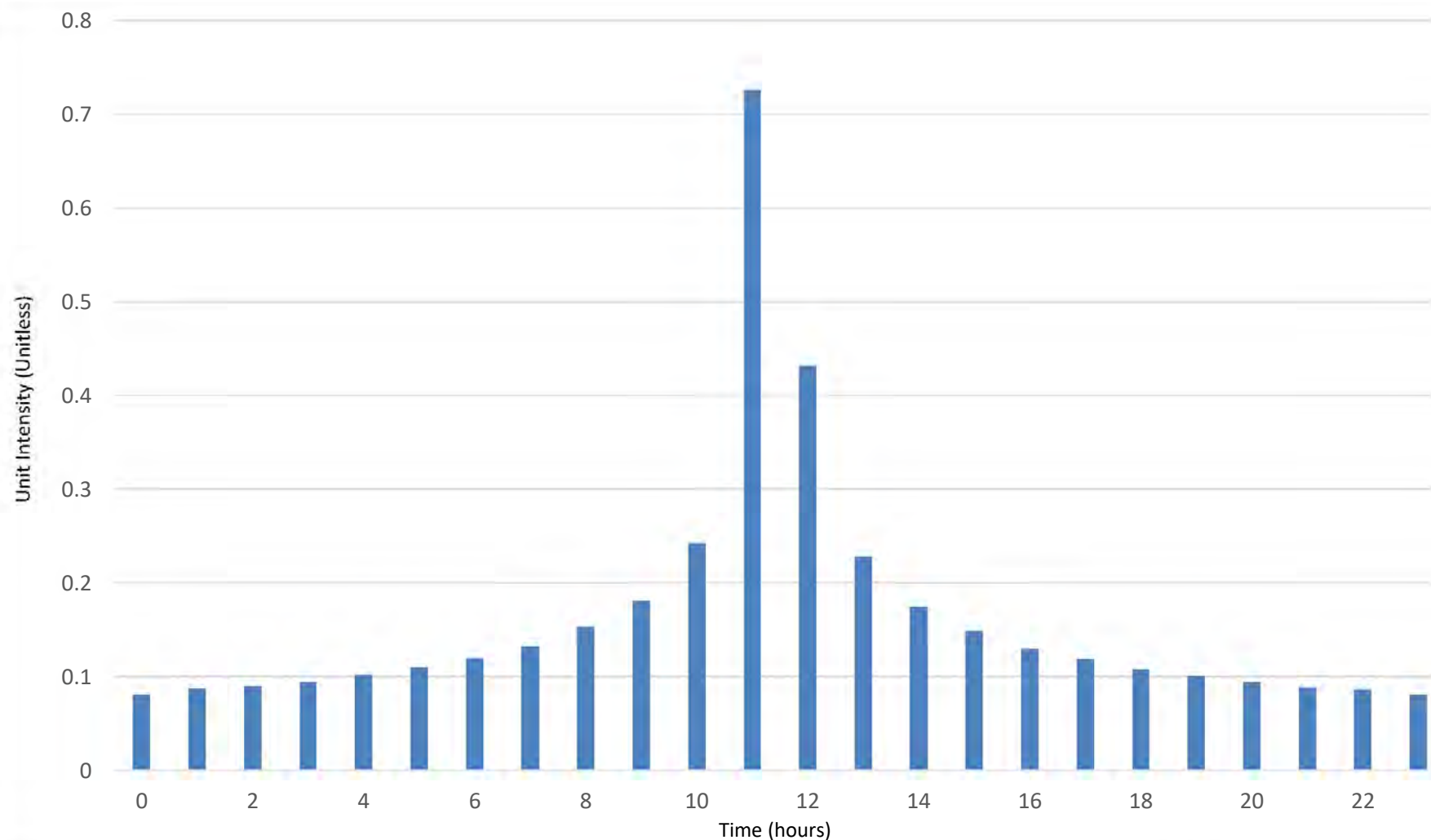
The design storms used in this evaluation, and which are specific to the City, are listed on [Table 3.3](#). The values used in evaluating the storm drainage system are as follows:

- **10-year 24-hour.** This design storm is used to evaluate pipeline conveyance facilities as well as to size future ones. This storm was quantified at 3.91 inches.
- **100-year 24-hour.** This design storm is used in evaluating City street performance for conveying stormwater flows, while allowing up to one foot of street flooding; this storm was quantified at 5.81 inches.

3.1.4 Soil Imperviousness

In determining the quantity of rainfall runoff generated from a given land use type, three factors dictate the volume of water that enters the storm drainage system: effective imperviousness, ineffective imperviousness, and effective pervious area.

- **Effective Impervious.** An effective impervious area is the percentage of impervious area that generates stormwater runoff entering the storm drainage system. The effective impervious percentages are based on land uses identified in the 2040 General Plan, and are included in [Table 3.4](#).
- **Ineffective Impervious.** An ineffective impervious area is land that has no flow path, or the flow path results in delayed timing of the runoff, to the storm drainage system. These areas are typically noted as residential backyards, pools, or dense shrub landscaping. The values for these areas are shown on [Table 3.4](#).
- **Effective Pervious.** Effective pervious areas contribute to runoff based on the National Resource Conservation Service (NRCS) Soil Classification Group, and the subsequent SCS Curve Number. The Curve Number is listed by soil group in [Table 3.4](#).



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■ Rainfall Unit Intensity (Design Storm: 3.91 inches)

Figure 3.1
10-Year/24-Hour
Unit Hyetograph
 Storm Drainage System Master
 Plan



January 15, 2021

Table 3.3 Relevant Design Storms
 Storm Drainage System Master Plan
 City of Gilroy

Design Criteria	Design Storm
10-year 24-hour	Used to evaluate if Hydraulic Grade Line have a minimum of one foot of freeboard between top of curb. Quantified at 3.91 inches.
100-year 24-hour	Used in evaluating street conveyance capacity and determining if street flooding exceeds one foot in depth. Quantified at 5.81 inches.

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Table 3.4 Soil Imperviousness and SCS Curve Numbers

Storm Drainage System Master Plan
City of Gilroy

Land Use Category	Effective Percent Impervious	Ineffective Percent Impervious	Effective Pervious		
			AMC-II Pervious Soil B	AMC-II Pervious Soil C	AMC-II Pervious Soil D
	(%)	(%)	(CN)	(CN)	(CN)
Rural Residential	5	0	63	73	82
Hillside	15	5	65	75	83
Low Density	35	15	67	77	83
Medium Density	50	5	69	79	84
High Density	60	0	71	81	86
Neighborhood District	2	0	78	85	89
Commercial	95	0	80	87	90
Industrial	70	0	76	84	88
Hecker Pass Special Use	1	0	61	73	80
Other Uses					
Water Surface, Ponds, Streams, Canals	100	0	99	99	99
Natural Grassland	1	0	65	77	82
Floodplains	1	0	55	70	76
Parks, Athletic Fields, Cemeteries	0	74	83	87	0
Government, Schools	80	0	79	83	89

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Note:

1. Source: City of Gilroy 2004 Storm Drainage System Master Plan.

3.2 HYDRAULIC CRITERIA

The hydraulic criteria for the storm drainage system were used to evaluate the capacity requirements of conveyance facilities.

3.2.1 Gravity Conveyance Facilities

Gravity pipeline capacities depend on several factors including: material and roughness of the pipe, the limiting velocity and slope, and the maximum allowable depth of flow. The hydraulic modeling software used for evaluating the capacity adequacy of the City storm drainage system is InfoSWMM by Innovyze Inc. This software uses the fully dynamic St. Venant's Equation, and has a more accurate engine for simulating backwater and surcharge, in addition to manifolded force mains. The software also incorporates the use of the Manning Equation in other calculations including upstream pipe flow conditions.

Storm Hydraulic Design

The 10-year 24-hour design storm was used to evaluate the City's existing stormwater system as well as to size pipelines to serve areas of future growth. ([Table 3.5](#)). For the the 100-year 24-hour design storm, City streets were allowed to flood in some cases to provide reasonable conveyance and storage capacity, thus reducing additional costly improvements.

Manning's Equation for Pipe Capacity

The Continuity Equation and the Manning's Equation for steady-state flow are used for calculating pipe capacities in open channel flow. Open channel flow can consist of either open conduits or, in the case of gravity pipelines, partially full closed conduits. Gravity full flow occurs when the conduit is flowing full but has not reached a pressure condition.

- Continuity Equation: $Q = V A$

Where:

Q = peak flow, in cubic feet per second (cfs)

V = velocity, in feet per second (fps)

A = cross-sectional area of pipe, in square feet (sq. ft.)

- Manning Equation: $V = (1.486 R^{2/3} S^{1/2})/n$

Where:

V = velocity, in feet per second (fps)

n = Manning's roughness coefficient

R = hydraulic radius, area divided by wetted perimeter (ft)

S = slope of pipe, in feet per foot (ft/ft)

Table 3.5 Hydrologic and Hydraulic Design Criteria
 Storm Drainage System Master Plan
 City of Gilroy

Hydrology and Hydraulics Design Criteria	
Conveyance Facilities	
Pipelines	10-Year 24-Hour design storm to determine if storm water have a minimum of one foot of freeboard between the top of curb and the Hydraulic Grade Line.
Streets	100-Year 24-Hour design storm to determine if flooding exceeds one foot in depth and can flood buildings or create safety hazards.
Receiving Waters (Streams, Creeks, Channels)	FEMA 100-year water surface elevations used for downstream control for facilities where 100-year flood maps are available.

St. Venant's Equation for Pipe Capacity

A dynamic type of modeling facilitates the analysis of unsteady and non-uniform flows (dynamic flows) within a gravity conveyance system. Some hydraulic modeling programs have the ability to analyze these types of flows using the St. Venant Equation, which take into account unsteady and non-uniform conditions that occur over changes in time and cross-section within system pipes.

The St. Venant Equations are a set of two equations, a Continuity Equation and a Dynamic Equation, used to analyze dynamic flows within a system. The first equation, the Continuity Equation, relates the continuity of flow mass within the system pipes in terms of: (A) the change in the cross-sectional area of flow at a point over time, and (B) The change of flow over the distance of piping in the system. The continuity equation is shown as follows:

$$\bullet \text{ Continuity Equation: } \frac{\partial Q}{\partial t} + \frac{\partial Q}{\partial x} = 0$$

(A) (B)

Where:

t = time

x = distance along the longitudinal direction of the channel

Q = discharge flow

A = flow cross-sectional area perpendicular to the x directional axis

The second equation, the Dynamic Equation, relates changes in flow to fluid momentum in the system using: (A) Changes in acceleration at a point over time, (B) Changes in convective flow acceleration, (C) Changes in momentum due to fluid pressure at a given point, (D) Changes in momentum from the friction slope of the pipe, and (E) Fluid momentum provided by gravitational forces. The Dynamic Equation is provided as follows:

$$\bullet \text{ Dynamic Equation: } \frac{\partial Q}{\partial t} + \frac{\partial Q}{\partial x} \left(\frac{\partial Q}{\partial t} \right) + \frac{\partial Q}{\partial x} \frac{\partial Q}{\partial x} + \frac{\partial Q}{\partial x} \frac{\partial Q}{\partial x} - \frac{\partial Q}{\partial x} \frac{\partial Q}{\partial x}$$

(A) (B) (C) (D) (E)

Where:

t = time

x = distance along the longitudinal direction of the channel

Q = discharge flow

A = flow cross-sectional area perpendicular to the x directional axis

y = flow depth measured from the channel bottom and normal to the x directional axis

S_f = friction slope

S_o = channel slope

β = momentum

g = gravitational acceleration

Use of this method of analysis provides a more accurate and precise analysis of flow conditions within the system compared to steady state flow analysis methods. It must be noted that two

assumptions are made for use of St. Venant Equations in the modeling software. First, flow is one dimensional. This means it is only necessary to consider velocities in the downstream direction and not in the transverse or vertical directions. Second, the flow is gradually varied. This means the vertical pressure distribution increases linearly with depth within the pipe.

Manning's Roughness Coefficient (n)

The Manning Roughness Coefficient 'n' is a friction coefficient that is used in the Manning formula for flow calculation in open channel flow. In conveyance systems, the coefficient can vary between 0.011 and 0.017 depending on pipe material, size of pipe, depth of flow, root intrusion, smoothness of joints, and other factors.

For the purpose of this evaluation, an "n" value of 0.013 was used for both existing and proposed gravity pipes unless directed otherwise by City staff based on pipe structural condition. This "n" value is an acceptable practice in planning studies.

CHAPTER 4 – EXISTING FACILITIES AND MODEL DEVELOPMENT

This chapter defines the hydrologic delineation of storm drainage areas, routing to their respective receiving facilities, and includes the hydrologic model development. Additionally, this chapter includes an overview of the storm drainage system, and the model development.

4.1 HYDROLOGIC SYSTEM OVERVIEW

Factors critical to the hydrologic model development include watersheds, drainage areas within each watershed, overland flow routing within drainage sub-catchments, and conveyance that makes full use of pipes as well as streets for routing 100-year design storm events. This section discusses the existing watersheds, and the delineation of drainage areas and sub-catchments.

4.1.1 Watersheds

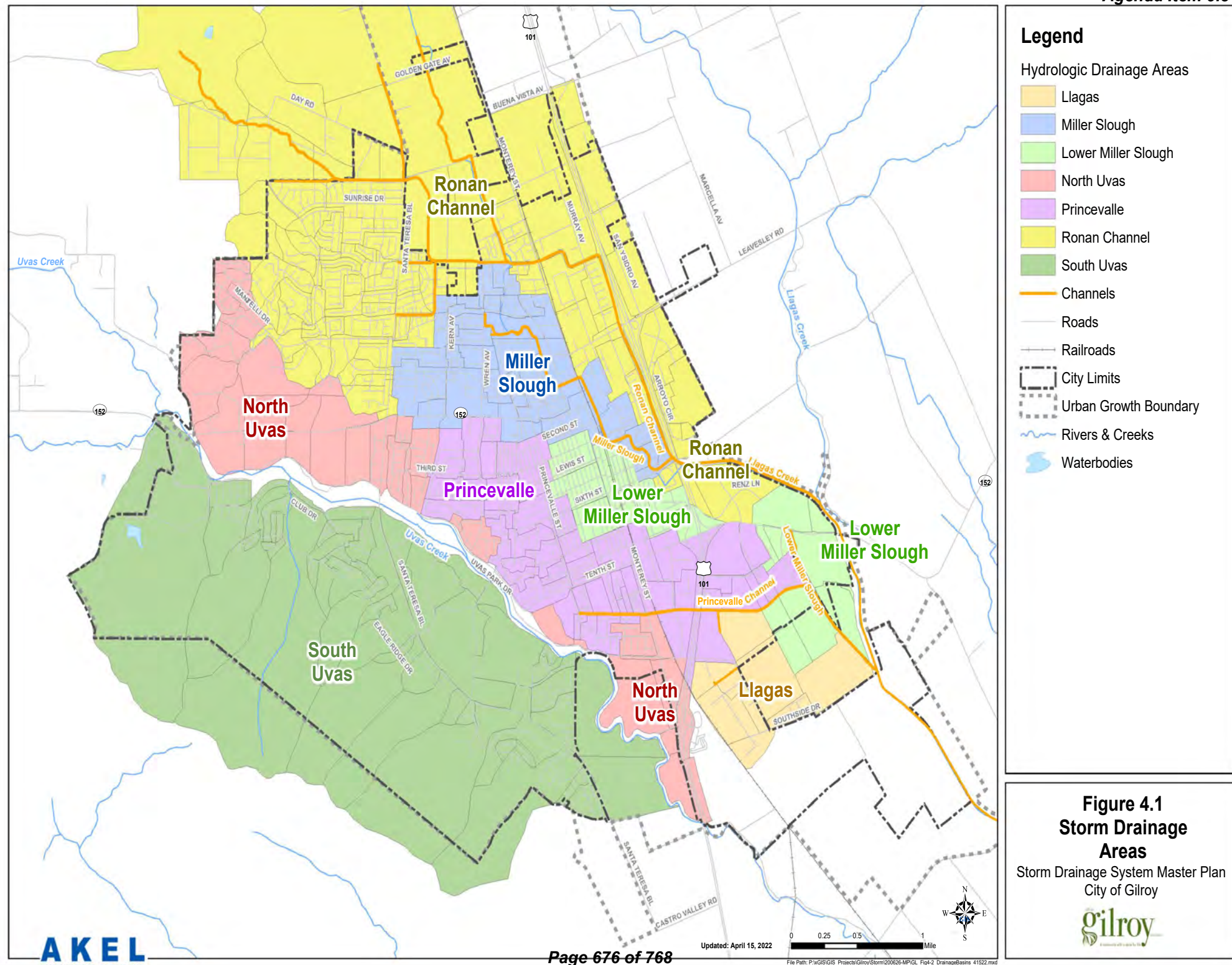
Watersheds within the City Planned Area Boundary and outlying areas were defined based on the receiving tributary creek or river system, with topographical or physical barriers dictating the limits of the watershed. The City has multiple natural watersheds that collect and convey stormwater runoff within Urban Growth Boundary: Uvas Creek Watershed, Llagas Creek Watershed, and Pajaro River Watershed ([Figure 2.2](#)).

4.1.2 Drainage Areas

Drainage areas are typically defined by existing or natural conveyance systems within each watershed. The City's drainage area boundaries are generally dictated by the open channel conveyance facilities throughout the City ([Figure 4.1](#)). Drainage areas in the City discharge stormwater runoff into creeks, channels or sloughs that flow through the City.

Each drainage area was assigned a unique identifier intended for cross-referencing purposes. The identifier reflects the name of the receiving water body or storm drainage infrastructure that receives the stormwater runoff. The project divided the City into seven drainage areas, which are briefly summarized as follows:

- **Llagas Drainage Area:** The Llagas drainage area is generally defined as the area east of Highway 101 and west of Llagas Creek, with the northern and southern boundaries approximately represented by Miller Slough Channel and Southside Drive respectively.
- **Miller Slough Drainage Area.** The Miller Slough drainage area is generally defined as the area east of Santa Teresa Boulevard and west of Highway 101, with the northern and southern boundaries approximately represented by La Primavera Way and First Street respectively. This drainage area generally flows in a northerly direction towards the Miller Slough Channel.



- **Lower Miller Slough Drainage Area.** The Lower Miller Slough drainage area is generally defined as the area east of Carmel Street and west of Highway 101, with the northern and southern boundaries approximately represented by Second Street and Tenth Street respectively. This drainage area is generally flows in easterly direction towards the Lower Miller Slough Channel.
- **North Uvas Drainage Area.** The North Uvas drainage area is generally defined as the area east of Burchell Road and Santa Barbara Drive, with northern and southern boundaries approximately represented by Olea Court and Uvas Creek respectively. This drainage area is generally flows in southerly direction towards the Uvas Creek.
- **Princevalle Drainage Area.** The Princevalle drainage area is generally defined as the area east of Santa Barbara Drive and west of Cameron Boulevard, with the northern and southern boundaries approximately represented by First Street and Luchessa Avenue respectively. This drainage area generally flows in a southeasterly direction, though it currently is drained, via storm drainage system, in a southerly direction, towards the Princevalle Channel.
- **Ronan Channel Drainage Area.** The Ronan Channel drainage area is generally defined as the area east of Jean Ellen Court and west of Highway 101, with northern and southern boundaries approximately represented by Fitzgerald Avenue and First Street respectively.
- **South Uvas Drainage Area.** The South Uvas drainage area is generally defined as the area east of the Rancho Vista Drive and west of Highway 101, with the southeastern boundaries approximately represented by Uvas Creek. This drainage area generally flows in a northeasterly direction towards the Uvas Creek.

4.1.3 Drainage Sub-catchment

Each drainage area shown on [Figure 4.1](#) was further divided into smaller sub-catchments for the purpose of routing tributary hydrologic stormwater flows to appropriate stormwater manhole. The connectivity within each sub-catchment is very critical for accurate analysis and was thus graphically documented on exhibits included in [Appendix B](#). Each sub-catchment included hydrologic modeling information to mimic Overland Flow Routing and Combined Pipe Street Conveyance.

- **Overland Flow Routing.** This element consists of routing rainfall runoff from sub-catchments to stormwater manhole. Overland flow routing is dependent on many factors such as land use, subsurface soil infiltration characteristics and physical barriers blocking the flow paths within the drainage sub-catchment. The nonlinear reservoir method is typically used to calculate overland flow and was built into the hydrologic component of the model.

- **Combined Pipe Street Conveyance.** During typical storm events, and up to 10-year 24-hour design storms, streets are used to convey rainfall runoff from house gutters to nearest catchments where it enters the conveyance system.

To mitigate very costly conveyance facility improvements during more intense storm events and up to the 100-year 24-hour design storm, this analysis assumed that existing streets may also provide additional capacity for routing rainfall runoff at a flood depth not to exceed one foot.

4.2 HYDRAULIC SYSTEM OVERVIEW

The City's storm drainage system consists of approximately 132 miles of up to 84-inch diameter gravity pipelines that convey stormwater runoff as shown on [Figure 4.2](#). A system-wide pipeline inventory, listing the total length by pipe diameter and material, is shown on [Table 4.1](#). This table is based on information extracted from the City's GIS database and was updated to reflect the review of construction drawings provided by City staff. The 15-inch and 18-inch diameter pipeline accounts for 50 percent of the total storm drainage pipeline lengths. The following section discusses the components of the storm drainage system.

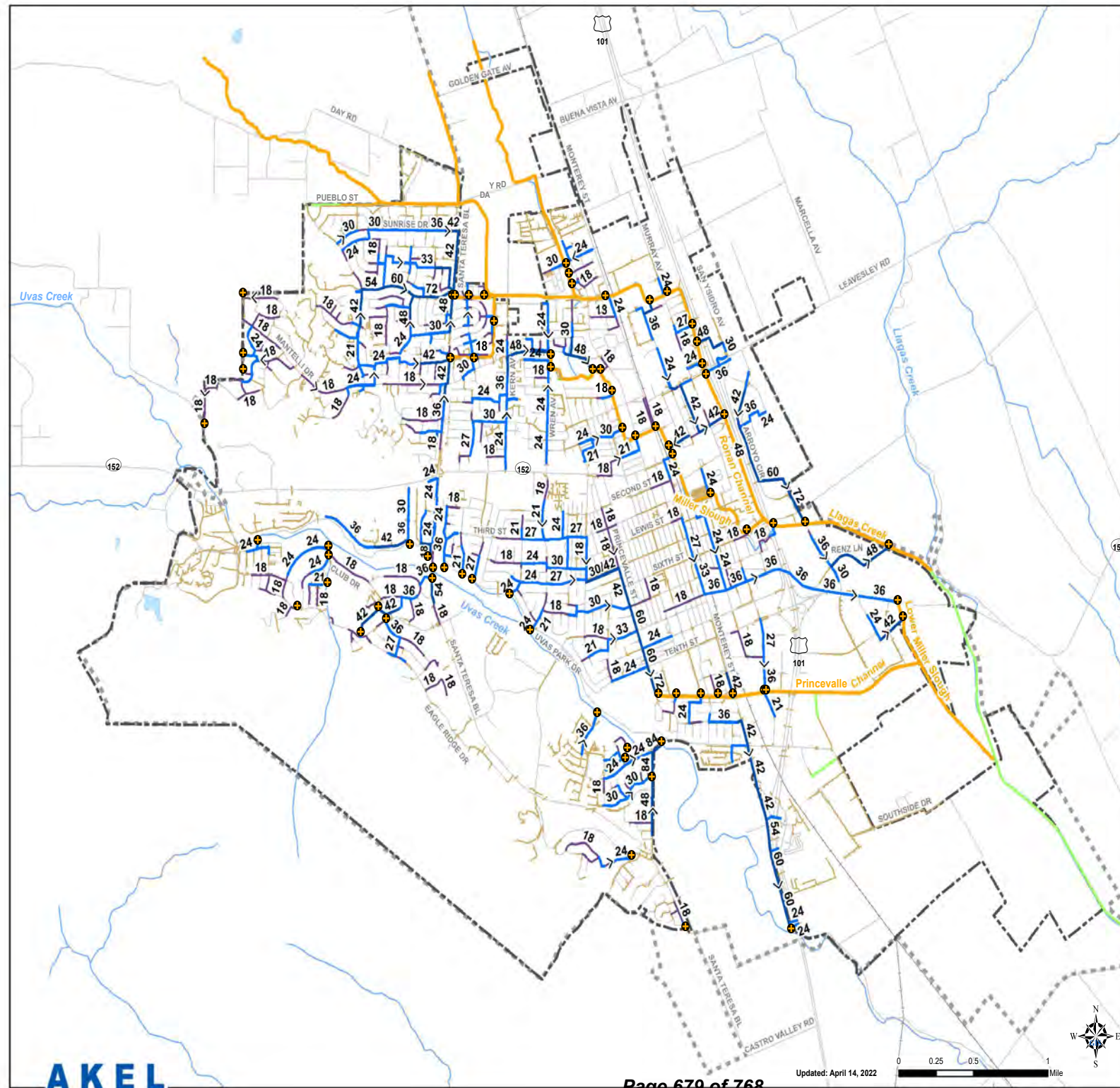
4.2.1 Conveyance System

The modeled storm drainage system includes approximately 55 miles of stormwater conveyance to local water bodies, or channels ([Table 4.2](#)). Pipe sizes range from 18-inches to 84-inches in diameter, and are shown on [Figure 4.2](#). The modeled storm conveyance system is predominantly composed of 18-, 24-, and 36-inch diameter pipelines.

The City-owned open channel conveyance systems includes the following: Ronan Channel, Miller Slough and Princevalle Channel. These channels play an important role in relieving stormwater runoff during intense rainfall events.

4.2.2 Outfalls

The modeled system consists of more than 60 outfall points that discharge runoff to natural creeks, sloughs, and channels. These outfalls were located along the Uvas Creek, Princevalle Channel, Miller Slough Channel, Lower Miller Slough Channel, Ronan Channel, and Llagas Creek as shown in [Figure 4.2](#).



- ### Legend
- Existing Modeled System**
- Outfalls
 - Pipes by Diameter
 - 18" or Less
 - 21" - 36"
 - 42" or Greater
 - Channels
- Non-Modeled System**
- Pipes
 - Channels
 - Roads
 - Railroads
 - City Limits
 - Urban Growth Boundary
 - Rivers & Creeks
 - Waterbodies

Figure 4.2
Existing Modeled Storm Drainage System
 Storm Drainage System Master Plan
 City of Gilroy



Table 4.1 Existing GIS Storm Pipe Inventory
Storm Drainage System Master Plan
City of Gilroy

Pipe Size (in)	Length In Material										Total Length (ft)
	RCP (ft)	CMP (ft)	CIP (ft)	Concrete (ft)	HDPE (ft)	PVC (ft)	VCP (ft)	ACP (ft)	DIP (ft)	Unknown (ft)	
Unknown Diameter	32,806	88	0	83	0	12	0	0	0	33,525	66,514
4	19	0	0	0	71	3,165	0	0	0	0	3,255
6	2,733	0	0	0	16	5,802	603	115	0	944	10,214
8	5,816	0	177	0	0	500	0	351	0	817	7,661
10	2,200	27	226	0	0	362	0	354	0	0	3,169
12	22,978	491	283	1,031	2,205	3,996	39	197	0	377	31,597
15	110,396	576	157	608	1,614	1,397	1,097	41	0	1,024	116,910
18	204,862	609	19	1,666	4,399	8,219	0	0	394	551	220,720
21	12,428	257	0	362	0	0	0	0	0	0	13,047
24	74,554	810	0	0	2,705	446	0	0	0	648	79,163
27	14,574	147	0	904	0	0	0	0	0	0	15,625
30	27,537	112	0	192	0	22	0	0	0	422	28,285
33	3,829	0	0	0	0	413	0	0	0	0	4,242
36	31,597	180	1,144	0	333	0	0	0	0	0	33,254
42	18,409	0	0	0	0	0	335	0	0	0	18,743
48	22,485	808	0	0	0	0	0	0	0	0	23,293
54	3,028	0	0	0	0	0	0	0	0	0	3,028
60	7,495	162	0	0	0	0	0	0	0	0	7,656
72	4,208	0	174	0	0	2,281	0	0	0	0	6,664
84	1,137	0	0	0	0	0	0	0	0	0	1,137
Total (ft)	603,090	4,268	2,179	4,846	11,343	26,617	2,073	1,058	394	38,309	694,176
Total (miles)	114.2	0.8	0.4	0.9	2.1	5.0	0.4	0.2	0.1	7.3	131.5

Note:

1. Source: GIS information provided by City Staff on September 04, 2020.

9/28/2020

Table 4.2 Existing Modeled Storm Pipe Inventory

Storm Drainage System Master Plan

City of Gilroy

Pipe Size	Length		Percent of Total System
(in)	(ft)	(miles)	(%)
18	101,964	19.3	35.14%
21	12,908	2.4	4.45%
24	58,024	11.0	19.99%
27	12,974	2.5	4.47%
30	23,095	4.4	7.96%
33	3,609	0.7	1.24%
36	28,224	5.3	9.73%
42	18,721	3.5	6.45%
48	16,129	3.1	5.56%
54	2,624	0.5	0.90%
60	6,830	1.3	2.35%
72	3,976	0.8	1.37%
84	1,117	0.2	0.38%
Total	290,194	55.0	100%


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4.3 MODEL DEVELOPMENT

A GIS-based model of the City's storm drainage system was developed to identify capacity deficiencies and to recommend improvements to mitigate those deficiencies. This section discusses the modeling software, land use and routing methodology.

4.3.1 Modeling Software

The hydrologic component of the drainage model generates runoff through synthetic design storm events and sub-catchment parameters that mimic actual surface response to rainfall. The hydraulic component of the drainage model routes stormwater runoff from source (loading manholes) to the discharge points (outfalls) by using physical characteristics of the storm drainage system (pipelines). The hydraulic model then performs calculations and solves series of equations to simulate flows in pipes, including backwater calculations for surcharged conditions.

There are several network analysis software products released by different manufacturers that can equally perform the hydrologic and hydraulic analysis satisfactorily. The selection of a particular software depends on user preferences, the storm drainage system's unique requirements, and the costs for purchasing and maintaining the software.

The modeling software used for evaluating the capacity adequacy of the Gilroy storm drainage system, InfoSWMM by Innovyze Inc. This software uses the fully dynamic St. Venant's Equation, and has a more accurate engine for simulating backwater and surcharge. The software also incorporates the use of the Manning Equation in other calculations including upstream pipe flow conditions. The St Venant's and Manning's Equations were discussed in the System Performance and Design Criteria chapter.

4.3.2 Land Use and Routing Methodology

The sub-catchment parameters in the model were populated to account for land use types, flood routing, and routing methodology.

- **Land Use.** Land use was used to define impervious area and the SCS Curve Number for pervious runoff. Residential areas included soil classifications to define non-effective runoff mostly confined in backyards.
- **Flood Routing.** Flood routing consists of determining the flow path and connectivity to the storm drainage collection system.
- **Routing Methodology.** Nonlinear reservoir method is used for transforming precipitation into runoff for overland flow routing, street flow, and pipe conveyance. This is typically defined by the time of concentration, which represents the time it takes for overland flow to reach from the furthest point in a sub-catchment to the outfall. It is calculated as the sum of the inlet time required to reach a manhole and the travel time in the conveyance system from the manhole to the outfall.

4.3.3 Hydrological Soil Classification

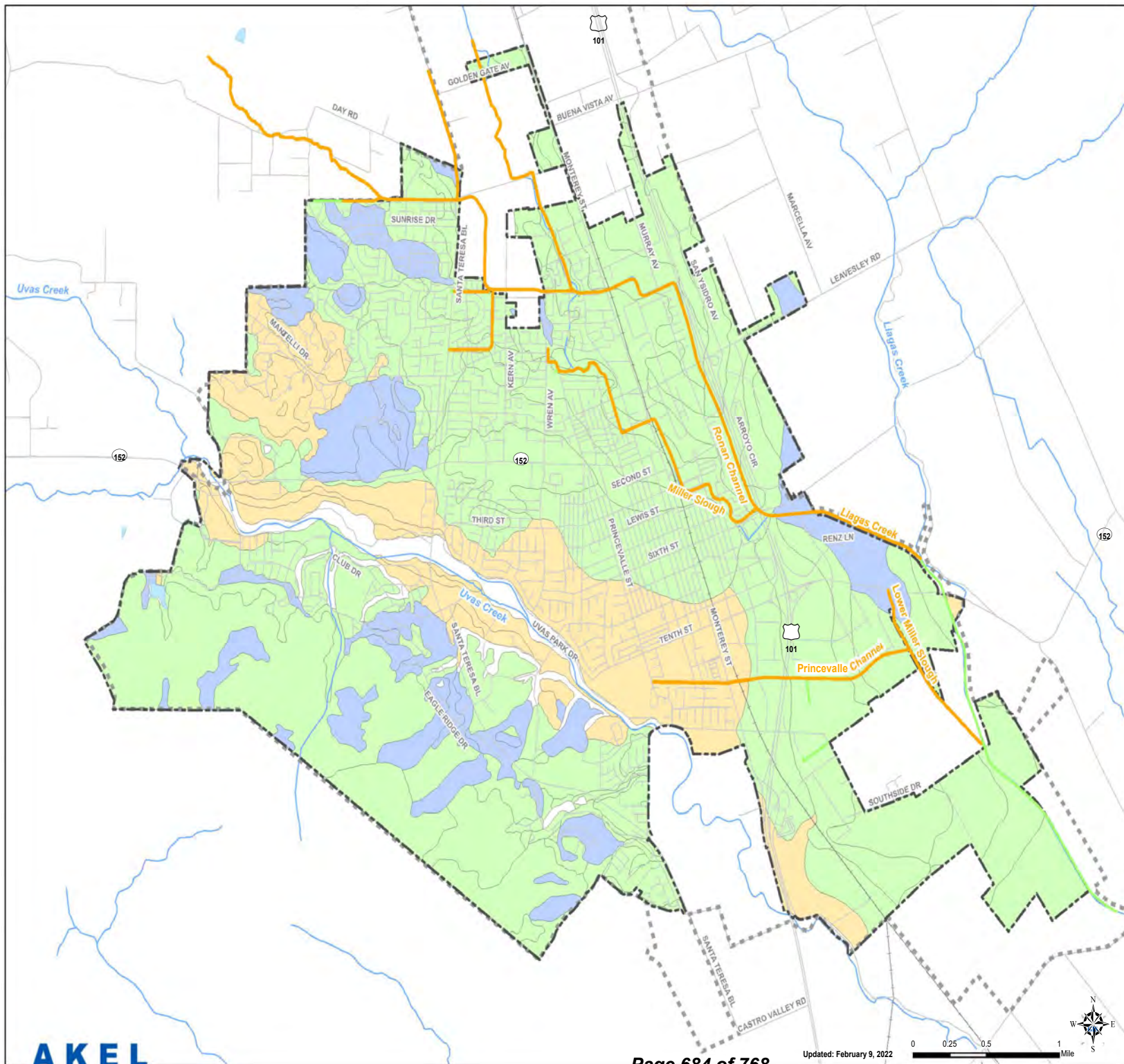
Soils are classified into four hydrologic soil units. These groups are A, B, C, and D, where A soil are characterized by having high infiltration rates and low potential runoff and D soil are characterized by having very slow infiltration rates and high runoff potential. The City hydrological soil classification extracted from Soil Survey Geographic database (SSURGO) is shown graphically on [Figure 4.3](#).

4.3.4 Typical Channel Cross-Section

The majority of the City's storm drainage system are pipelines that drain into the major channels discussed in the previous section. Typical channel cross-sections are shown graphically on [Figure 4.4](#) and were used to represent some of the channels in the models.

4.3.5 Physical Hydraulic Model Elements

The City's GIS database was used as a primary source to define physical hydraulic model elements. Data gaps related to inverts and ground elevations were resolved through review of as-built drawings. The physical hydraulic model was populated to include rim elevations at manholes, invert elevations of pipelines, pipe sizes, pipe slopes, pipe lengths, and outfall elevations.



Legend

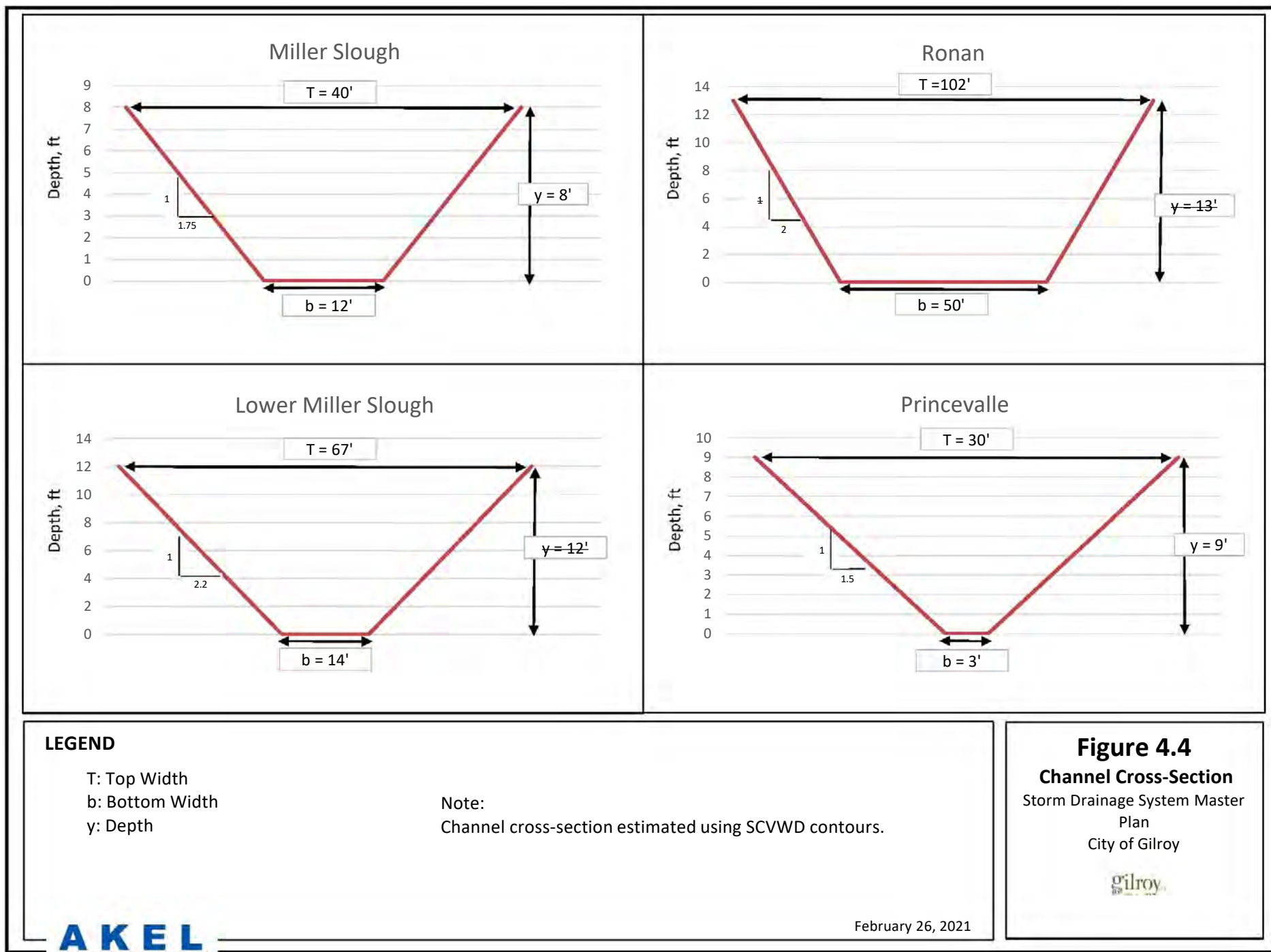
Subbasin Soil Type

- Type B
- Type C
- Type D
- Channels
- Roads
- Railroads
- City Limits
- Urban Growth Boundary
- Rivers & Creeks
- Waterbodies

Figure 4.3 Hydraulic Soil Classification

Storm Drainage System Master Plan
City of Gilroy





CHAPTER 5 – EVALUATION AND PROPOSED IMPROVEMENTS

This chapter presents a summary of the storm drainage system evaluation and identifies improvements needed to mitigate existing deficiencies as well as improvements needed to expand the system to service future growth.

5.1 OVERVIEW

The City's stormwater model was used to evaluate the current storm drainage system, identify capacity deficiencies and to recommend improvements required to serve future growth based on the relevant design storms. The criteria used for evaluating the capacity adequacy of the storm drainage system and used for sizing recommended improvements were discussed and summarized in the System Performance and Design Criteria chapter.

5.2 KNOWN AREAS OF CONCERN

The capacity evaluation phase also considered a detailed review of known areas of concern. City staff have maintained an inventory of known areas of concern that may experience surface water ponding during large storm events. The known areas of concern provided by City staff are documented on [Table 5.1](#). The capacity improvement recommended in this chapter are intended to alleviate some of these problem areas.

5.3 PIPELINE CONVEYANCE CAPACITY EVALUATION

The 10-year 24-hour design storm was used for evaluating the capacity adequacy of pipeline conveyance facilities. The existing capacity analysis indicates that the conveyance facilities are generally adequate to accommodate the design storm, with certain areas experiencing surcharging and flooding as shown on [Figure 5.1](#).

As part of the Master Plan, an analysis of the recently updated NOAA Atlas 14 precipitation was completed and corresponding recommendations were presented to City staff for review. City staff reviewed and requested a similar analysis using the precipitation data from the Santa Clara County Drainage Manual. City staff chose to maintain the precipitation data from the Santa Clara County Drainage Manual for the purposes of developing the capital improvement program (CIP) discussed in a later chapter.

5.4 CAPACITY EVALUATION ANALYSIS

This Master Plan evaluated the storm drainage system infrastructure and recommend improvements to mitigate existing system deficiencies and future development at the buildout. Two alternatives were considered and evaluated, discussed as follows:

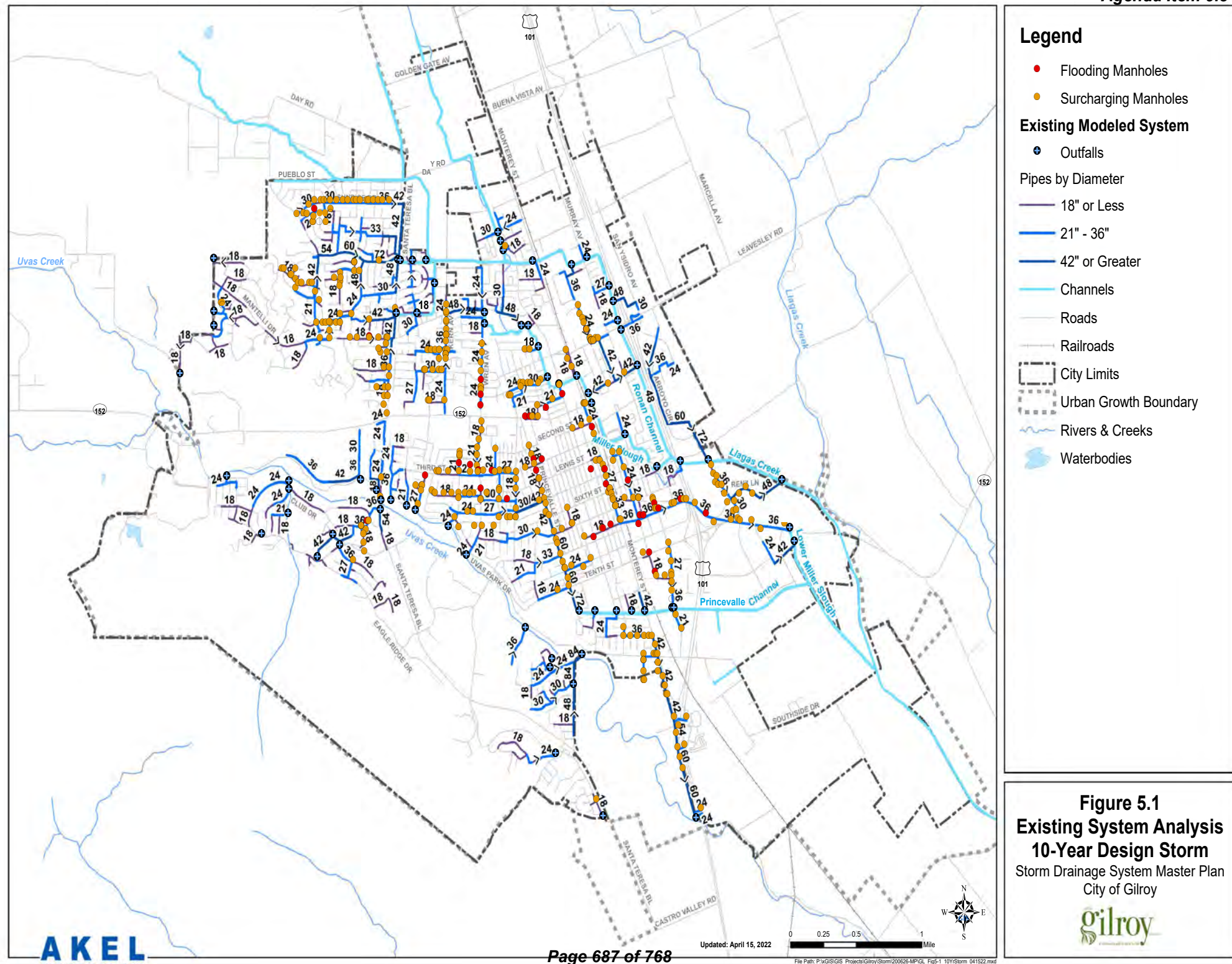


Table 5.1 Storm Drainage System Problem Areas

Storm Drainage System Master Plan

City of Gilroy

No.	Type of Concern	Location
1	Leaves on Catch Basin	Monterey Road & First Street
2	Flooding	First Street & Church Street
3	Flooding	Third Street & Church Street
4	Leaves on Catch Basin	Sixth Street & Church Street
5	Flooding	Seventh Street & Church Street
6	Flooding	Luchessa Avenue between Monterey Road & Chestnut Street
7	Flooding	Chestnut Street between Eighth Street & Ninth Street
8	Leaves on Catch Basin	Church Street & Howson Street
9	Flooding	Welburn Avenue & Hanna Street
10	Leaves on Catch Basin	Welburn Avenue & Westwood Drive
11	Flooding	Wren Avenue & Ronan Avenue
12	Leaves on Catch Basin	Driftwood Terrace & Westwood Drive
13	Flooding	Hanna Street & Broadway
14	Flooding	Hanna Street & Third Street
15	Flooding	Rosanna Street & Third Street
16	Flooding	Dowdy Street & Fifth Street
17	Leaves on Catch Basin	Fourth Street & Filice Drive
18	Leaves on Catch Basin	Fourth Street & Monte Vista Way
19	Leaves on Catch Basin	Fourth Street & Miller Avenue
20	Leaves on Catch Basin	Sixth Street & Princeville Street
21	Flooding	Forest Street & Martin Street



12/8/2021

Note:

1. Storm drainage problem locations provided by City staff on March 24, 2021.

5.4.1 Alternative 1 - 8th Street 36-inch Pipeline Improvements

This alternative consists of a total 10.1 miles of pipeline improvements, including paralleling the existing 36-inch diameter storm drainage pipeline along 8th Street under Highway 101. However, this alternative requires coordination with the California Department of Transportation (Caltrans) for the 36-inch diameter parallel pipeline. In summary, this alternative will require the following improvements, which are shown graphically on [Figure 5.2](#).

- 10.1 miles of new pipeline ranging in size from 24 to 90 inches in diameter.

As part of this master plan, preliminary costs were prepared as a means of comparing infrastructure improvements alternatives. The total approximate cost estimate for this alternative is at \$40.7 million.

5.4.2 Alternative 2 – Diverting Stormwater Runoff to Princevalle Channel

Following the review of the first alternative improvements, city staff requested Akel to evaluate the feasibility of diverting stormwater runoff south to Princevalle Channel, as a second alternative. This alternative consists of a total 9.3 miles of pipeline improvements, none of the which improvements are crossing Highway 101 and therefore do not require coordination with Caltrans. In summary, this alternative will require the following improvements, which are shown graphically on [Figure 5.3](#).

- 9.3 miles of new pipeline ranging in size from 24 to 90 inches in diameter.

The total estimated cost for this alternative is estimated at \$36.4 million. This alternative was selected by City staff due to the lower capital improvement costs and construction feasibility. In comparison, alternative 1 costs were estimated at \$40.7 million and that alternative require the construction of 36-inch pipeline under Highway 101.

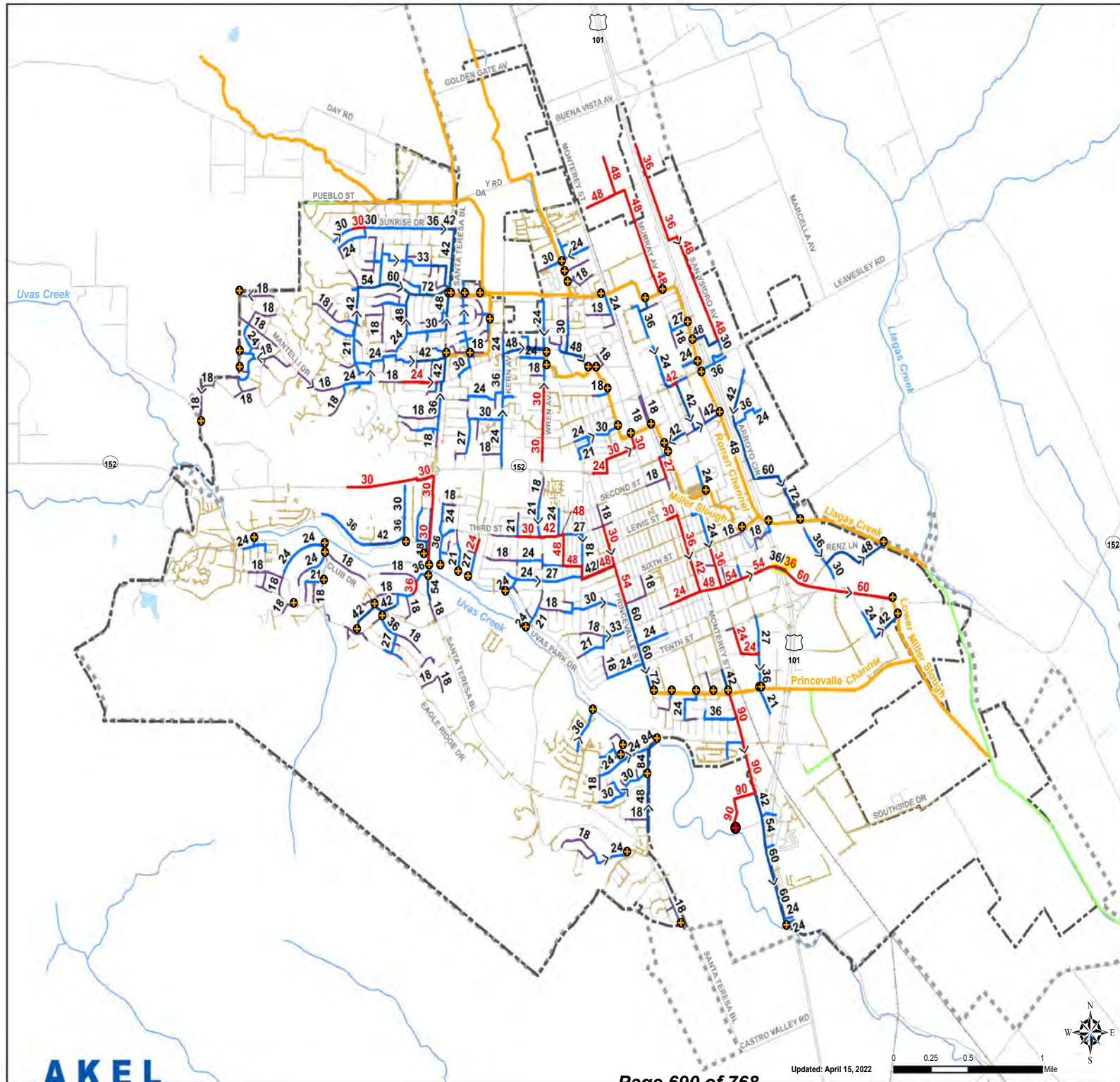
Alternative 1

Proposed Improvement Costs: \$40.7 million dollars. Also requires construction of 36-inch pipeline under Highway 101.

Alternative 2 (Recommended)

Recommended Improvement Costs: **\$36.4 million dollars**

Since Alternative 2 is the recommended alternative, a more detailed listing of improvements is summarized on [Table 5.2](#), and which are shown graphically and cross reference on [Figure 5.3](#). Each pipeline has been assigned a uniquely coded identifier corresponding to the drainage area in which it resided; this unique identifier is intended to aid in defining the location of the improvement for mapping purposes. The Alternative 2 improvements are also briefly described in this section, by drainage area:



Legend

Proposed Improvements

- Outfall
- Pipes
- Pipeline Casing

Existing Modeled System

- Outfalls
- Pipes by Diameter
 - 18" or Less
 - 21" - 36"
 - 42" or Greater
- Channels

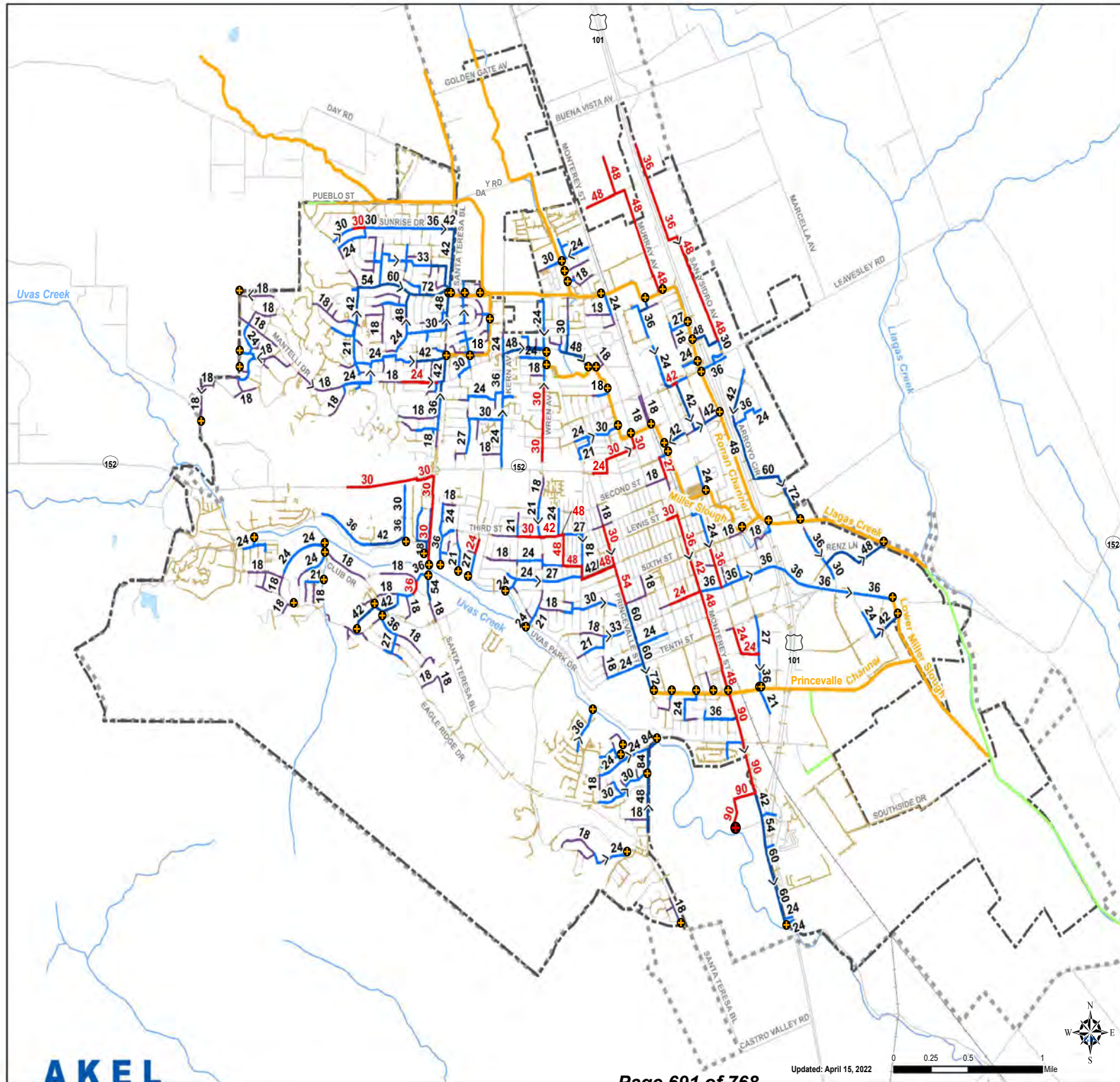
Non-Modeled System

- Pipes
- Channels
- Roads
- Railroads
- City Limits
- Urban Growth Boundary
- Rivers & Creeks
- Waterbodies

Figure 5.2 Proposed Improvements Alternative 1

Storm Drainage System Master Plan
City of Gilroy





Legend

Proposed Improvements

● Outfall

— Pipes

Existing Modeled System

● Outfalls

Pipes by Diameter

— 18" or Less

— 21" - 36"

— 42" or Greater

— Channels

Non-Modeled System

— Pipes

— Channels

— Roads

— Railroads

— City Limits

— Urban Growth Boundary

— Rivers & Creeks

— Waterbodies

Figure 5.3 Proposed Improvements Alternative 2

Storm Drainage System Master Plan
City of Gilroy



Table 5.2 Proposed Improvements
Storm Drainage System Master Plan
City of Gilroy

Improv. No.	Alignment	Limits	Existing Diameter (in)	Pipeline Improvements		
				New/Parallel/ Replace	Diameter (in)	Length (ft)
Ronan Channel Drainage Area						
RC-1	Sunrise Dr	From Dream Catcher Way to Golden Sky Way	18	Replacement	30	400
RC-2	Mantelli Dr	From Muir Drive to Delta Dr	18	Replacement	24	1,250
RC-3	Zamzow Ct	From approx. 1,250' n/o Cohansey Ave to Cohansey Ave	-	New	48	1,200
RC-4	Cohansey Ave	From approx. 350' e/o Monterey Rd to Murray Ave	-	New	48	1,450
RC-5	Murray Ave	From Cohansey Ave to Tomkins Ct	-	New	48	2,800
RC-6	Murray Ave	From Tomkins Ct to Ronan Channel	24	Replacement	48	600
RC-7	No Name Uno/Las Animas Ave	From approx. 1,500' s/o Buena Vista Ave to San Ysidro Ave	-	New	36	3,400
RC-8	San Ysidro Ave	From Las Animas Ave to approx. 500' n/o Leavesley Rd	-	New	48	3,425
RC-9	Leavesley Rd	From approx. 220' e/o Forest St to approx. 360' e/o Forest St	18	Replacement	42	150
Miller Slough Drainage Area						
MS-1	Wren Ave	From approx. 290' n/o First St to Lawrence Dr	24	Replacement	30	2,325
MS-2	First St	From approx. 180' e/o Princevalle St to Sargent St	18	Replacement	24	525
MS-3	Sargent St	From First St to Broadway	18	Replacement	24	425
MS-4	Broadway	From Sargent St to Church St	18/21	Replacement	30	1,075
MS-5	Church St	From Broadway to approx. 100' s/o Howson St	21	Replacement	30	400
MS-6	Monterey Rd	From Second St to First St	18/24	Replacement	27	675
North Uvas Drainage Area						
NU-1	Hecker Pass Hwy	From approx. 3,080' w/o Santa Teresa Blvd to approx. 360' w/o Santa Teresa Blvd	-	New	30	2,825
NU-2	Hecker Pass Hwy	From approx. 360' w/o Santa Teresa Blvd to Santa Teresa Blvd	24	Replacement	30	350
NU-3	Santa Teresa Blvd	From approx. 70' s/o Hecker Pass Hwy to Uvas Creek	24	Replacement	30	2,575
NU-4	Westwood Dr	From approx. 150' s/o Third St to Kentwood Ct	18	Replacement	24	425
NU-5	Monterey Rd	From Princevalle Channel to Victoria Dr	-	New	90	775
NU-6	Monterey Rd	From Victoria Dr to approx. 950' n/o Farman Ln	42	Replacement	90	2,175
NU-7	ROW	From Monterey Rd to approx. 970' n/o Uvas Creek	-	New	90	975
NU-8	ROW	From approx. 970' n/o Uvas Creek to Uvas Creek	-	New	90	1,000
South Uvas Drainage Area						
SU-1	St Andrews Cir	From Carnoustie Ct to approx. 380' nw/o Carnoustie Ct	18	Replacement	36	375

Table 5.2 Proposed Improvements
Storm Drainage System Master Plan
City of Gilroy

Improv. No.	Alignment	Limits	Existing Diameter (in)	Pipeline Improvements		
				New/Parallel/ Replace	Diameter (in)	Length (ft)
Princevalle Drainage Area						
PR-1	Third St	From Santa Paula Dr to Wren Ave	27	Replacement	30	825
PR-2	Third St	From Wren Ave to approx. 170' e/o Santa Theresa Dr	27	Replacement	42	675
PR-3	Third St	From approx. 170' e/o Santa Theresa Dr to Santa Theresa Dr	27	Replacement	48	200
PR-4	Santa Theresa Dr	From Third St to approx. 300' s/o Fourth St	27/30	Replacement	48	950
PR-5	ROW	From Santa Theresa Dr to Miller Ave	30	Replacement	48	675
PR-6	Miller Ave	From approx. 300' s/o Fourth St to Fifth St	30	Replacement	48	400
PR-7	Fifth St	From Miller Ave to Princevalle St	30	Replacement	48	1,250
PR-8	Princevalle St	From Third St to Fifth St	18	Replacement	30	1,250
PR-9	Princevalle St	From Fifth St to Seventh St	42	Replacement	54	1,225
PR-10	Alexander St	From Tenth St to Banes Ln	18	Replacement	24	825
PR-11	Banes Ln	From Alexander St to Automall Pkwy	18	Replacement	24	625
PR-12	Monterey Rd	From approx. 380' n/o 8th St to Angra Way	-	New	48	2,475
PR-13	Monterey Rd	From Angra Way to Princevalle Channel	42	Replacement	48	775
Lower Miller Slough Drainage Area						
LM-1	Fourth St	From Egleberry St to Monterey Rd	18	Replacement	30	400
LM-2	Monterey Rd	From Fourth St to Sixth St	27	Replacement	36	1,250
LM-3	Monterey Rd	From Sixth St to Hornlein Ct	27	Replacement	42	425
LM-4	Monterey Rd	From Hornlein Ct to approx. 240' n/o Eighth St	33	Replacement	42	775
LM-5	ROW	From Rosanna St to Monterey Rd	18	Replacement	24	1,125
LM-6	Alexander St	From Sixth St to Eighth St	24	Replacement	36	1,300

5.4.3 Ronan Channel Drainage Area

This section documents improvements within the Ronan Channel drainage service area.

- **RC-1:** Replace the existing 18-inch diameter pipeline on Sunrise Drive with a new 30-inch diameter pipeline from Dream Catcher Way to Golden Sky Way.
- **RC-2:** Replace the existing 18-inch diameter pipeline on Mantelli Drive with a new 24-inch diameter pipeline from Muir Drive to Delta Drive.
- **RC-3:** Construct a new 48-inch diameter pipeline on Zamzow Court from approximately 1,250 feet north of Cohansey Avenue to Cohansey Avenue.
- **RC-4:** Construct a new 48-inch diameter pipeline on Cohansey Avenue from approximately 350 feet east of Monterey Road to Murray Avenue.
- **RC-5:** Construct a new 48-inch diameter pipeline on Murray Avenue from approximately Murray Avenue to Tomkins Court.
- **RC-6:** Replace the existing 24-inch diameter pipeline on Murray Avenue with a new 48-inch diameter pipeline from Tomkins Court to Ronan Channel.
- **RC-7:** Construct a new 36-inch diameter pipeline along No Name Uno and Las Animas Avenue from approximately 1,500 feet south of Buena Vista Avenue to San Ysidro Avenue.
- **RC-8:** Construct a new 48-inch diameter pipeline on San Ysidro Avenue from Las Ysidro Avenue to approximately 500 feet north of Leavesley Road.
- **RC-9:** Replace the existing 18-inch diameter pipeline on Leavesley Road with a new 42-inch diameter pipeline from approximately 220 feet east of Forest Street to approximately 360 feet east of Forest Street.

5.4.4 Miller Slough Drainage Area

This section documents improvements within the Miller Slough drainage service area.

- **MS-1:** Replace the existing 24-inch diameter pipeline on Wren Avenue with a new 30-inch diameter pipeline from approximately 290 feet north of First Street to Lawrence Drive.
- **MS-2:** Replace the existing 18-inch diameter pipeline on First Street with a new 24-inch diameter pipeline from approximately 180 feet east of Princevalle Street to Sargent Street.
- **MS-3:** Replace the existing 18-inch diameter pipeline on Sargent Street with a new 24-inch diameter pipeline from First Street to Broadway.

- **MS-4:** Replace the existing 18 and 21-inch diameter pipeline on Broadway with a new 30-inch diameter pipeline from Sargent Street to Church Street.
- **MS-5:** Replace the existing 21-inch diameter pipeline on Church Street with a new 30-inch diameter pipeline from Broadway to approximately 100 feet south of Howson Street.
- **MS-6:** Replace the existing 18 and 24-inch diameter pipeline on Monterey Road with a new 27-inch diameter pipeline from Second Street to First Street.

5.4.5 North Uvas Drainage Area

This section documents improvements within the North Uvas drainage service area.

- **NU-1:** Construct a new 30-inch diameter pipeline on Hecker Pass Highway from approximately 3,080 feet west of Santa Teresa Boulevard to approximately 360 feet west of Santa Teresa Boulevard.
- **NU-2:** Replace the existing 24-inch diameter pipeline on Hecker Pass Highway with a new 30-inch diameter pipeline from approximately 360 feet west of Santa Teresa Boulevard to Santa Teresa Boulevard.
- **NU-3:** Replace the existing 24-inch diameter pipeline on Santa Teresa Boulevard with a new 30-inch diameter pipeline from approximately 70 feet south of Hecker Pass Highway to Uvas Creek.
- **NU-4:** Replace the existing 18-inch diameter pipeline on Westwood Drive with a new 24-inch diameter pipeline from approximately 150 feet south of Third Street to Kentwood Court.
- **NU-5:** Construct a new 90-inch diameter pipeline on Monterey Road from Princevalle Channel to Victoria Drive.
- **NU-6:** Replace the existing 42-inch diameter pipeline on Monterey Road with a new 90-inch diameter pipeline from Victoria Drive to approximately 950 feet north of Farman Lane.
- **NU-7:** Construct a new 90-inch diameter pipeline in right-of-way from Monterey Road to approximately 970 feet north of Uvas Creek.
- **NU-8:** Construct a new 90-inch diameter pipeline in right-of-way from approximately 970 feet north of Uvas Creek to Uvas Creek.

5.4.6 South Uvas Drainage Area

This section documents improvements within the South Uvas drainage service area.

- **SU-1:** Replace the existing 18-inch diameter pipeline on St Andrews Circle with a new 36-inch diameter pipeline from Carnoustie Court to approximately 380 feet northwest of Carnoustie Court.

5.4.7 Princevalle Drainage Area

This section documents improvements within the Princevalle drainage service area.

- **PR-1:** Replace the existing 27-inch diameter pipeline on Third Street with a new 30-inch diameter pipeline from Santa Paula Drive to Wren Avenue.
- **PR-2:** Replace the existing 27-inch diameter pipeline on Third Street with a new 42-inch diameter pipeline from Wren Avenue to approximately 170 feet east of Santa Theresa Drive.
- **PR-3:** Replace the existing 27-inch diameter pipeline on Third Street with a new 48-inch diameter pipeline from approximately 170 feet east of Santa Theresa Drive to Santa Theresa Drive.
- **PR-4:** Replace the existing 27 and 30-inch diameter pipeline on Santa Theresa Drive with a new 48-inch diameter pipeline from Third Street to approximately 300 feet south of Fourth Street.
- **PR-5:** Replace the existing 30-inch diameter pipeline in right-of-way with a new 48-inch diameter pipeline from Santa Theresa Drive to Miller Avenue.
- **PR-6:** Replace the existing 30-inch diameter pipeline on Miller Avenue with a new 48-inch diameter pipeline from approximately 300 feet south of Fourth Street to Fifth Street.
- **PR-7:** Replace the existing 30-inch diameter pipeline on Fifth Street with a new 48-inch diameter pipeline from Miller Avenue to Princevalle Street.
- **PR-8:** Replace the existing 18-inch diameter pipeline on Princevalle Street with a new 30-inch diameter pipeline from Third Street to Fifth Street.
- **PR-9:** Replace the existing 42-inch diameter pipeline on Princevalle Street with a new 54-inch diameter pipeline from Fifth Street to Seventh Street.
- **PR-10:** Replace the existing 18-inch diameter pipeline on Alexander Street with a new 24-inch diameter pipeline from Tenth Street to Baner Lane.
- **PR-11:** Replace the existing 18-inch diameter pipeline on Baner Lane with a new 24-inch diameter pipeline from Alexander Street to Automall Parkway.
- **PR-12:** Construct a new 48-inch diameter pipeline on Monterey Road from approximately 380 feet north of Eighth Street to Angra Way.

- **PR-13:** Replace the existing 42-inch diameter pipeline on Monterey Road with a new 48-inch diameter pipeline from Angra Way to Princevalle Channel.

5.4.8 Lower Miller Slough Drainage Area

This section documents improvements within the Lower Miller Slough drainage service area.

- **LM-1:** Replace the existing 18-inch diameter pipeline on Fourth Street with a new 30-inch diameter pipeline from Egleberry Street to Monterey Road.
- **LM-2:** Replace the existing 27-inch diameter pipeline on Monterey Road with a new 36-inch diameter pipeline from Fourth Street to Sixth Street.
- **LM-3:** Replace the existing 27-inch diameter pipeline on Monterey Road with a new 42-inch diameter pipeline from Sixth Street to Hornlein Court.
- **LM-4:** Replace the existing 33-inch diameter pipeline on Monterey Road with a new 42-inch diameter pipeline from Hornlein Court to approximately 240 feet north of Eighth Street.
- **LM-5:** Replace the existing 18-inch diameter pipeline in right-of-way with a new 24-inch diameter pipeline from Rosanna Street to Monterey Road.
- **LM-6:** Replace the existing 24-inch diameter pipeline on Alexander Street with a new 36-inch diameter pipeline from Sixth Street to Eighth Street.

5.5 OUTFALLS

The City's storm drainage system discharges stormwater runoff into several outfalls that discharge into: Ronan Channel, Miller Slough Channel, Princevalle Channel, Uvas Creek, and Llagas Creek. As part of this master plan, outfalls were assumed in adequate condition, and capable of conveying stormwater flows from upstream facilities.

CHAPTER 6 - CAPITAL IMPROVEMENT PROGRAM

This chapter provides a summary of the recommended storm drainage system improvements to mitigate existing capacity deficiencies and for accommodating anticipated future growth. This chapter also presents the cost criteria and methodologies for developing the Capital Improvement Program (CIP). Finally, a cost allocation analysis, usually used for cost sharing purposes, is also included.

6.1 COST ESTIMATE ACCURACY

Cost estimates presented in the Capital Improvement Program were prepared for general master planning purposes and, where relevant, for further project evaluation. Final costs of a project will depend on several factors including the final project scope, costs of labor and material, and market conditions during construction.

The Association for the Advancement of Cost Engineering (AACE International), formerly known as the American Association of Cost Engineers, has defined three classifications of assessing project costs. These classifications are presented in order of increasing accuracy: Order of Magnitude, Budget, and Definitive.

- **Order of Magnitude Estimate.** This classification is also known as an “original estimate”, “study estimate”, or “preliminary estimate”, and is generally intended for master plans and studies.

This estimate is not supported with detailed engineering data about the specific project, and its accuracy is dependent on historical data and cost indices. It is generally expected that this estimate would be accurate within -30 percent to +50 percent.

- **Budget Estimate.** This classification is also known as an “official estimate” and generally intended for pre-design studies. This estimate is prepared to include flow sheets and equipment layouts and details. It is generally expected that this estimate would be accurate within -15 percent to +30 percent.
- **Definitive Estimate.** This classification is also known as a “final estimate” and prepared during the time of contract bidding. The data includes complete plot plans and elevations, equipment data sheets, and complete specifications. It is generally expected that this estimate would be accurate within -5 percent to + 15 percent.

Costs developed in this study should be considered “Order of Magnitude” and have an expected accuracy range of **-30 percent** and **+50 percent**.

6.2 COST ESTIMATE METHODOLOGY

Cost estimates presented in this chapter are opinions of probable construction and other relevant costs developed from several sources including cost curves, Akel experience on other master planning projects, and input from City staff on the development of public and private cost sharing. Where appropriate, costs were escalated to reflect the more current Engineering News Records (ENR) Construction Cost Index (CCI).

This section documents the unit costs used in developing the opinion of probable construction costs, the Construction Cost Index, the land acquisition costs, and markups to account for construction contingency and other project related costs.

6.2.1 Unit Costs

The unit cost estimates used in developing the Capital Improvement Program are summarized on [Table 6.1](#). The unit costs are intended for developing the Order of Magnitude estimate, and do not account for site specific conditions, labor or material costs during the time of construction, final project scope, implementation schedule, detailed utility and topography surveys, investigation of alternative routes for pipelines, and other various factors. These factors are assumed included in the contingencies applied to the final capital improvement cost.

6.2.2 Construction Cost Index

Costs estimated in this study are adjusted utilizing the Engineering News Record (ENR) Construction Cost Index (CCI), which is widely used in the engineering and construction industries.

The costs in this Storm Drainage System Master Plan were benchmarked using a 20-City national average ENR CCI of 12,176, reflecting a date of March 2023.

6.2.3 Construction Contingency Allowance

Knowledge about site-specific conditions for each proposed project is limited at the master planning stage; therefore, construction contingencies were used. The estimated construction costs in this master plan include a **30 percent** contingency allowance to account for unforeseen events and unknown field conditions.

6.2.4 Project Related Costs

The capital improvement costs also account for project-related costs, comprising of engineering design, project administration (developer and City staff), construction management and inspection, and legal costs. The project related costs in this master plan were estimated by applying an additional **30 percent** to the estimated construction costs.

Table 6.1 Unit Costs

Storm Drainage System Master Plan City of Gilroy

Pipelines	
(in)	(\$/Lineal Foot)
24	245
27	283
30	302
36	358
42	414
48	489
54	545
60	564
66	622
72	678
84	866
90	928
Pipeline Casings	
\$22 per inch diameter per liner foot	

AKEL
ENGINEERING GROUP, INC.

3/29/2023

Note :

1. Unit costs are based on an ENR CCI Index Value of 13,176 (March 2023).

6.3 CAPITAL IMPROVEMENT PROGRAM

This section documents the capital improvement program, contingencies included in the costs, and the allocation of costs to meet the requirements of AB1600.

6.3.1 Capital Improvement Costs

The Capital Improvement Program costs for the projects identified in this master plan for mitigating existing deficiencies and for servicing future growth throughout the City are summarized on [Table 6.2](#).

Each improvement was assigned a unique code identifier associated with the improvement pipelines drainage area, and is summarized graphically on [Figure 6.1](#). The estimated construction costs include the baseline costs plus **30 percent** contingency allowance to account for unforeseen events and unknown field conditions, as described in a previous section. Capital Improvement Costs include the estimated construction costs plus **30 percent** project-related costs (engineering design, project administration, construction management and inspection, and legal costs).

6.3.2 Pipelines

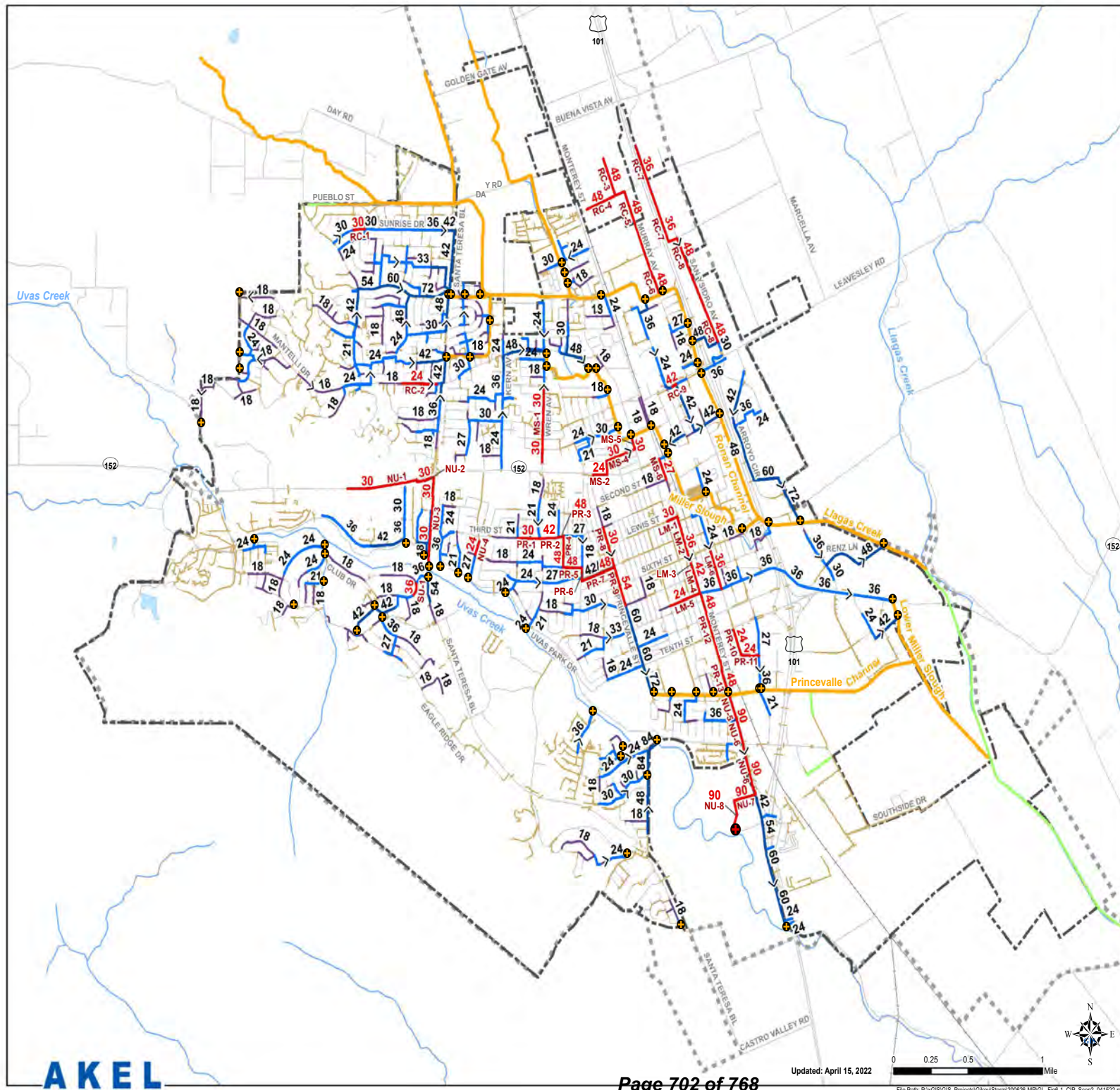
The recommended pipeline improvements are grouped by drainage area and listed on [Table 6.2](#). Each improvement includes a general description of the street alignment and limits, as well as existing pipe diameter and length. Improvements are shown on [Figure 6.1](#).

The following pipeline improvements categories were identified:

- **New Pipeline.** A new pipeline is proposed where none exists.
- **Replacement Pipeline.** This improvement is intended as a replacement to an existing pipeline, and along the same alignment. The existing pipeline should be abandoned when the replacement pipeline has been constructed.

The opinion of probable construction costs, for the projects included in this master plan, are based on the pipe unit costs summarized on [Table 6.1](#).

It is assumed that any replacement pipes will be in the same alignment and at the same slope as the existing pipe. However, this study recommends a field survey of the alignment during the pre-design stage of each project.



Legend

Proposed Improvements

● Outfall

— Pipes

Existing Modeled System

● Outfalls

Pipes by Diameter

— 18" or Less

— 21" - 36"

— 42" or Greater

— Channels

Non-Modeled System

— Pipes

— Channels

— Roads

— Railroads

— City Limits

— Urban Growth Boundary

— Rivers & Creeks

— Waterbodies

Figure 6.1 Capital Improvement Program

Storm Drainage System Master Plan
City of Gilroy



Table 6.2 Capital Improvement Program
Storm Drainage System Master Plan
City of Gilroy

Improv. No.	Alignment	Limits	Pipeline Improvements		Infrastructure Costs				Baseline Constr. Costs	Estimated Constr. Costs	Capital Improv. Costs	Suggested Cost Allocation		Cost Sharing	
			Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost				Existing Users	Future Users	Existing Users	Future users
			(in)		(in)	(ft)	(\$/ft)	(\$)				(%)	(%)	(\$)	(\$)
Ronan Channel Drainage Area															
RC-1	Sunrise Dr	From Dream Catcher Way to Golden Sky Way	18	Replacement	30	400	302	120,601	121,000	158,000	206,000	100%	0%	206,000	0
RC-2	Mantelli Dr	From Muir Drive to Delta Dr	18	Replacement	24	1,250	245	306,506	307,000	400,000	520,000	100%	0%	520,000	0
RC-3	Zamzow Ct	From approx. 1,250' n/o Cohansey Ave to Cohansey Ave	-	New	48	1,200	489	586,990	587,000	764,000	994,000	8%	92%	74,621	919,379
RC-4	Cohansey Ave	From approx. 350' e/o Monterey Rd to Murray Ave	-	New	48	1,450	489	709,280	710,000	923,000	1,200,000	0%	100%	0	1,200,000
RC-5	Murray Ave	From Cohansey Ave to Tomkins Ct	-	New	48	2,800	489	1,369,643	1,370,000	1,781,000	2,316,000	9%	91%	219,340	2,096,660
RC-6	Murray Ave	From Tomkins Ct to Ronan Channel	24	Replacement	48	600	489	293,495	294,000	383,000	498,000	13%	87%	67,178	430,822
RC-7	No Name Uno/Las Animas Ave	From approx. 1,500' s/o Buena Vista Ave to San Ysidro Ave	-	New	36	3,400	358	1,216,516	1,217,000	1,583,000	2,058,000	91%	9%	1,875,920	182,080
RC-8	San Ysidro Ave	From Las Animas Ave to approx. 500' n/o Leavesley Rd	-	New	48	3,425	489	1,675,367	1,676,000	2,179,000	2,833,000	79%	21%	2,227,585	605,415
RC-9	Leavesley Rd	From approx. 220' e/o Forest St to approx. 360' e/o Forest St	18	Replacement	42	150	414	62,114	63,000	82,000	107,000	87%	13%	92,659	14,341
Subtotal - Ronan Channel Drainage Area									6,345,000	8,253,000	10,732,000			5,283,303	5,448,697
Miller Slough Drainage Area															
MS-1	Wren Ave	From approx. 290' n/o First St to Lawrence Dr	24	Replacement	30	2,325	302	700,991	701,000	912,000	1,186,000	100%	0%	1,186,000	0
MS-2	First St	From approx. 180' e/o Princevalle St to Sargent St	18	Replacement	24	525	245	128,732	129,000	168,000	219,000	100%	0%	219,000	0
MS-3	Sargent St	From First St to Broadway	18	Replacement	24	425	245	104,212	105,000	137,000	179,000	100%	0%	179,000	0
MS-4	Broadway	From Sargent St to Church St	18/21	Replacement	30	1,075	302	324,114	325,000	423,000	550,000	100%	0%	550,000	0
MS-5	Church St	From Broadway to approx. 100' s/o Howson St	21	Replacement	30	400	302	120,601	121,000	158,000	206,000	100%	0%	206,000	0
MS-6	Monterey Rd	From Second St to First St	18/24	Replacement	27	675	283	190,847	191,000	249,000	324,000	100%	0%	324,000	0
Subtotal - Miller Slough Drainage Area									1,572,000	2,047,000	2,664,000			2,664,000	0
North Uvas Drainage Area															
NU-1	Hecker Pass Hwy	From approx. 3,080' w/o Santa Teresa Blvd to approx. 360' w/o Santa Teresa Blvd	-	New	30	2,825	302	851,742	852,000	1,108,000	1,441,000	0%	100%	0	1,441,000
NU-2	Hecker Pass Hwy	From approx. 360' w/o Santa Teresa Blvd to Santa Teresa Blvd	24	Replacement	30	350	302	105,526	106,000	138,000	180,000	0%	100%	0	180,000
NU-3	Santa Teresa Blvd	From approx. 70' s/o Hecker Pass Hwy to Uvas Creek	24	Replacement	30	2,575	302	776,367	777,000	1,011,000	1,315,000	0%	100%	0	1,315,000
NU-4	Westwood Dr	From approx. 150' s/o Third St to Kentwood Ct	18	Replacement	24	425	245	104,212	105,000	137,000	179,000	100%	0%	179,000	0

Table 6.2 Capital Improvement Program
Storm Drainage System Master Plan
City of Gilroy

Improv. No.	Alignment	Limits	Pipeline Improvements		Infrastructure Costs				Baseline Constr. Costs	Estimated Constr. Costs	Capital Improv. Costs	Suggested Cost Allocation		Cost Sharing	
			Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost				Existing Users	Future Users	Existing Users	Future users
NU-5	Monterey Rd	From Princevalle Channel to Victoria Dr	-	New	90	775	928	718,859	719,000	935,000	1,216,000	100%	0%	1,216,000	0
NU-6	Monterey Rd	From Victoria Dr to approx. 950' n/o Farman Ln	42	Replacement	90	2,175	928	2,017,443	2,018,000	2,624,000	3,412,000	100%	0%	3,412,000	0
NU-7	ROW	From Monterey Rd to approx. 970' n/o Uvas Creek	-	New	90	975	928	904,371	905,000	1,177,000	1,531,000	100%	0%	1,531,000	0
NU-8	ROW	From approx. 970' n/o Uvas Creek to Uvas Creek	-	New	90	1,000	928	927,560	928,000	1,207,000	1,570,000	100%	0%	1,570,000	0
					Subtotal - North Uvas Drainage Area				6,410,000	8,337,000	10,844,000			7,908,000	2,936,000
South Uvas Drainage Area															
SU-1	St Andrews Cir	From Carnoustie Ct to approx. 380' nw/o Carnoustie Ct	18	Replacement	36	375	358	134,175	135,000	176,000	229,000	100%	0%	229,000	0
					Subtotal - South Uvas Drainage Area				135,000	176,000	229,000			229,000	0
Princevalle Drainage Area															
PR-1	Third St	From Santa Paula Dr to Wren Ave	27	Replacement	30	825	302	248,739	249,000	324,000	422,000	100%	0%	422,000	0
PR-2	Third St	From Wren Ave to approx. 170' e/o Santa Theresa Dr	27	Replacement	42	675	414	279,515	280,000	364,000	474,000	100%	0%	474,000	0
PR-3	Third St	From approx. 170' e/o Santa Theresa Dr to Santa Theresa Dr	27	Replacement	48	200	489	97,832	98,000	128,000	167,000	100%	0%	167,000	0
PR-4	Santa Theresa Dr	From Third St to approx. 300' s/o Fourth St	27/30	Replacement	48	950	489	464,700	465,000	605,000	787,000	100%	0%	787,000	0
PR-5	ROW	From Santa Theresa Dr to Miller Ave	30	Replacement	48	675	489	330,182	331,000	431,000	561,000	100%	0%	561,000	0
PR-6	Miller Ave	From approx. 300' s/o Fourth St to Fifth St	30	Replacement	48	400	489	195,663	196,000	255,000	332,000	100%	0%	332,000	0
PR-7	Fifth St	From Miller Ave to Princevalle St	30	Replacement	48	1,250	489	611,448	612,000	796,000	1,035,000	100%	0%	1,035,000	0
PR-8	Princevalle St	From Third St to Fifth St	18	Replacement	30	1,250	302	376,877	377,000	491,000	639,000	100%	0%	639,000	0
PR-9	Princevalle St	From Fifth St to Seventh St	42	Replacement	54	1,225	545	668,183	669,000	870,000	1,131,000	100%	0%	1,131,000	0
PR-10	Alexander St	From Tenth St to Banes Ln	18	Replacement	24	825	245	202,294	203,000	264,000	344,000	84%	16%	288,575	55,425
PR-11	Banes Ln	From Alexander St to Automall Pkwy	18	Replacement	24	625	245	153,253	154,000	201,000	262,000	89%	11%	234,103	27,897
PR-12	Monterey Rd	From approx. 380' n/o 8th St to Angra Way	-	New	48	2,475	489	1,210,667	1,211,000	1,575,000	2,048,000	100%	0%	2,048,000	0
PR-13	Monterey Rd	From Angra Way to Princevalle Channel	42	Replacement	48	775	489	379,098	380,000	494,000	643,000	100%	0%	643,000	0
					Subtotal - Princevalle Drainage Area				5,225,000	6,798,000	8,845,000			8,761,678	83,322

Table 6.2 Capital Improvement Program
Storm Drainage System Master Plan
City of Gilroy

Improv. No.	Alignment	Limits	Pipeline Improvements		Infrastructure Costs				Baseline Constr. Costs	Estimated Constr. Costs	Capital Improv. Costs	Suggested Cost Allocation		Cost Sharing	
			Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost				Existing Users	Future Users	Existing Users	Future users
			(in)		(in)	(ft)	(\$/ft)	(\$)				(%)	(%)	(\$)	(\$)
Lower Miller Slough Drainage Area															
LM-1	Fourth St	From Egleberry St to Monterey Rd	18	Replacement	30	400	302	120,601	121,000	158,000	206,000	100%	0%	206,000	0
LM-2	Monterey Rd	From Fourth St to Sixth St	27	Replacement	36	1,250	358	447,248	448,000	583,000	758,000	100%	0%	758,000	0
LM-3	Monterey Rd	From Sixth St to Hornlein Ct	27	Replacement	42	425	414	175,991	176,000	229,000	298,000	100%	0%	298,000	0
LM-4	Monterey Rd	From Hornlein Ct to approx. 240' n/o Eighth St	33	Replacement	42	775	414	320,924	321,000	418,000	544,000	100%	0%	544,000	0
LM-5	ROW	From Rosanna St to Monterey Rd	18	Replacement	24	1,125	245	275,855	276,000	359,000	467,000	100%	0%	467,000	0
LM-6	Alexander St	From Sixth St to Eighth St	24	Replacement	36	1,300	358	465,138	466,000	606,000	788,000	100%	0%	788,000	0
Subtotal - Lower Miller Slough Drainage Area									1,808,000	2,353,000	3,061,000			3,061,000	0
Total Costs															
					Subtotal - Ronan Channel Drainage Area				6,345,000	8,253,000	10,732,000			5,283,303	5,448,697
					Subtotal - Miller Slough Drainage Area				1,572,000	2,047,000	2,664,000			2,664,000	0
					Subtotal - North Uvas Drainage Area				6,410,000	8,337,000	10,844,000			7,908,000	2,936,000
					Subtotal - South Uvas Drainage Area				135,000	176,000	229,000			229,000	0
					Subtotal - Princeville Drainage Area				5,225,000	6,798,000	8,845,000			8,761,678	83,322
					Subtotal - Lower Miller Slough Drainage Area				1,808,000	2,353,000	3,061,000			3,061,000	0
					Total Improvement Costs				21,495,000	27,964,000	36,375,000			27,906,981	8,468,019



3/29/2023

Notes:

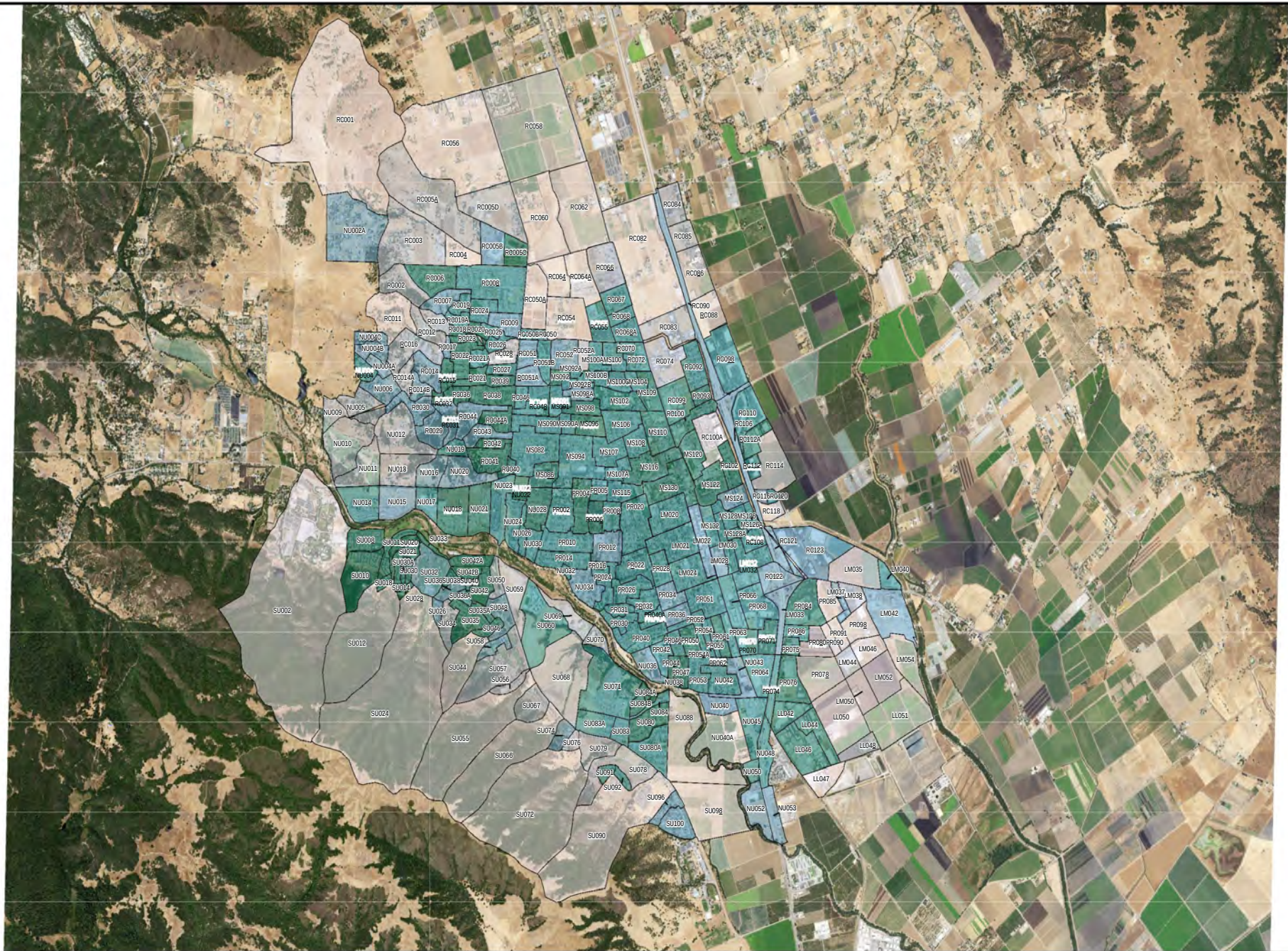
1. Cost estimates are based on the Engineering News Record (ENR) construction cost index (CCI) of 13,176 for March 2023
2. Baseline construction costs plus 30% to account for unforeseen events and unknown conditions.
3. Estimated construction cost plus 30% to cover other costs including: engineering design, project administration (developer and City staff), construction management and inspection, and legal costs.

6.3.3 Recommended Cost Allocation Analysis

Cost allocation analysis is needed to identify improvement funding sources, and to establish a nexus between development impact fees and improvements needed to service growth. In compliance with the provisions of Assembly Bill AB 1600, the analysis differentiates between the project needs of servicing existing users and for those required to service anticipated future developments. [Table 6.2](#) lists each improvement and separates the cost by responsibility between existing and future users. The cost responsibility is based on model parameters for existing and future land use, and may change depending on the nature of development.

APPENDIX A

Hydrology Review



Legend

10 YEAR YIELD CFS/ACRE	≤0.59
≤0.26	≤0.69
≤0.43	≤0.86

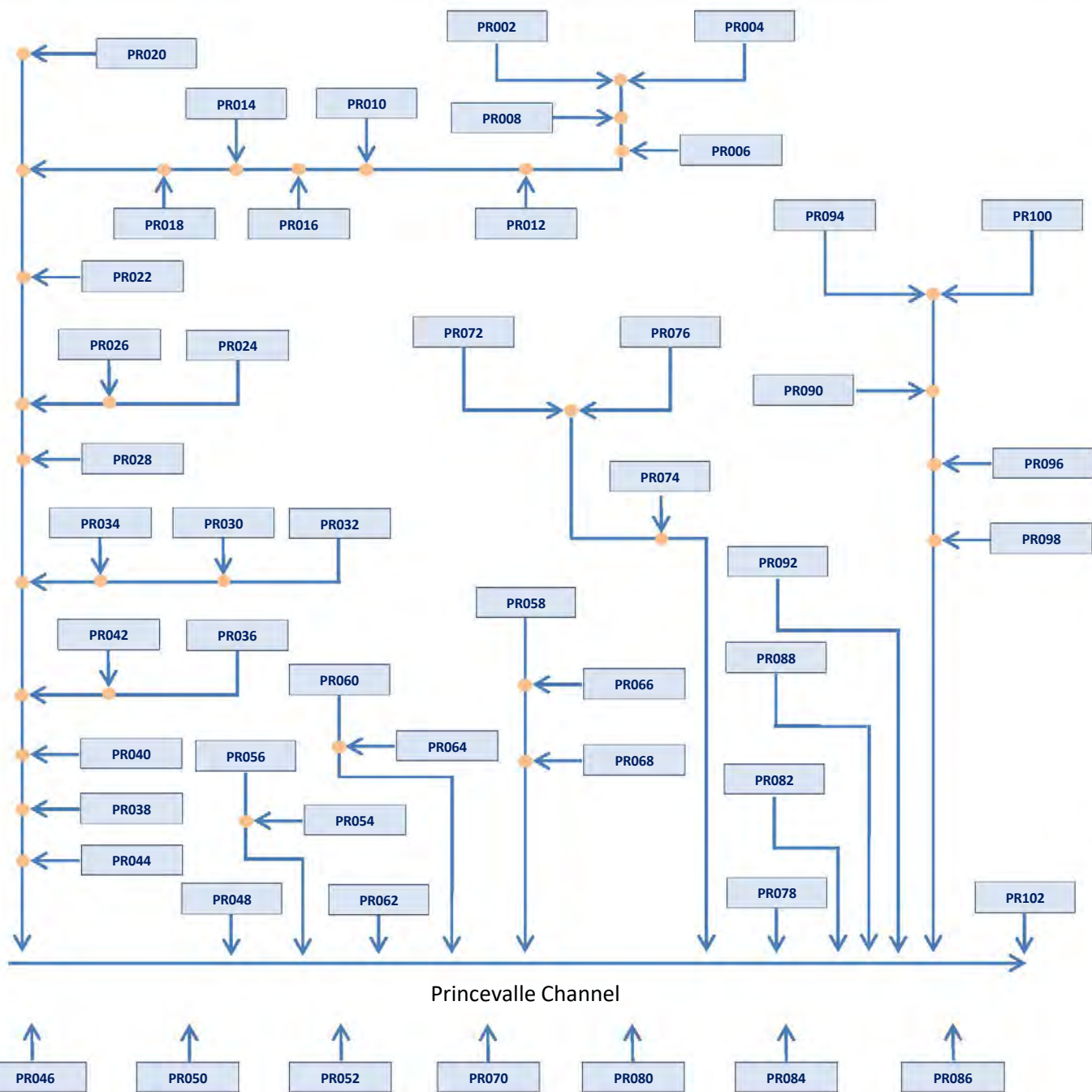
0 2,000 4,000
Feet
1 inch equals 4,000 feet



10-Year Yield (CFS/ACRE)
Hydrology Subcatchments

APPENDIX B

Storm Drainage Area Hydrologic Routing

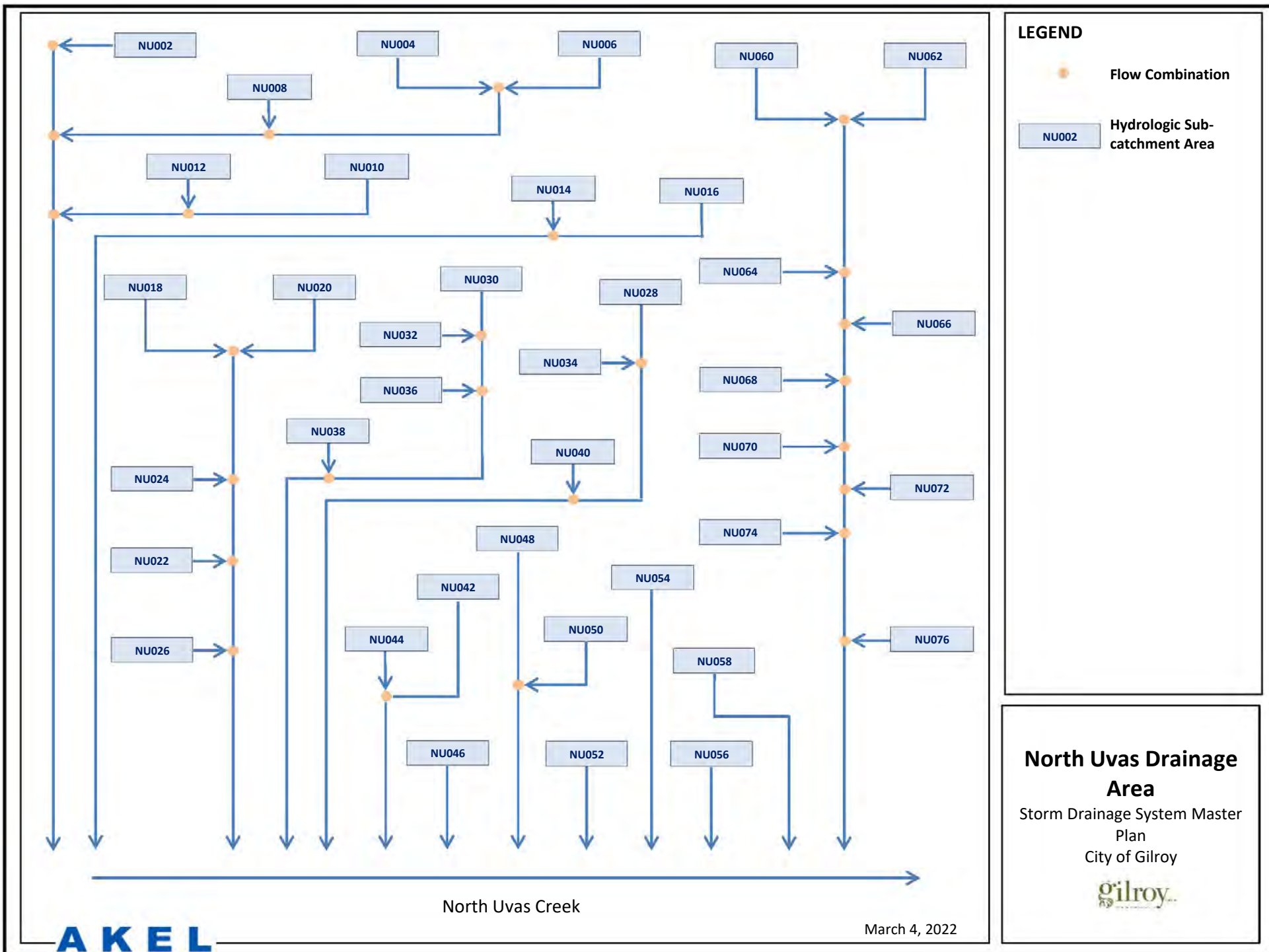


LEGEND

-  Flow Combination
-  Hydrologic Sub-catchment Area

Princevalle Drainage Area
Storm Drainage System Master Plan
City of Gilroy





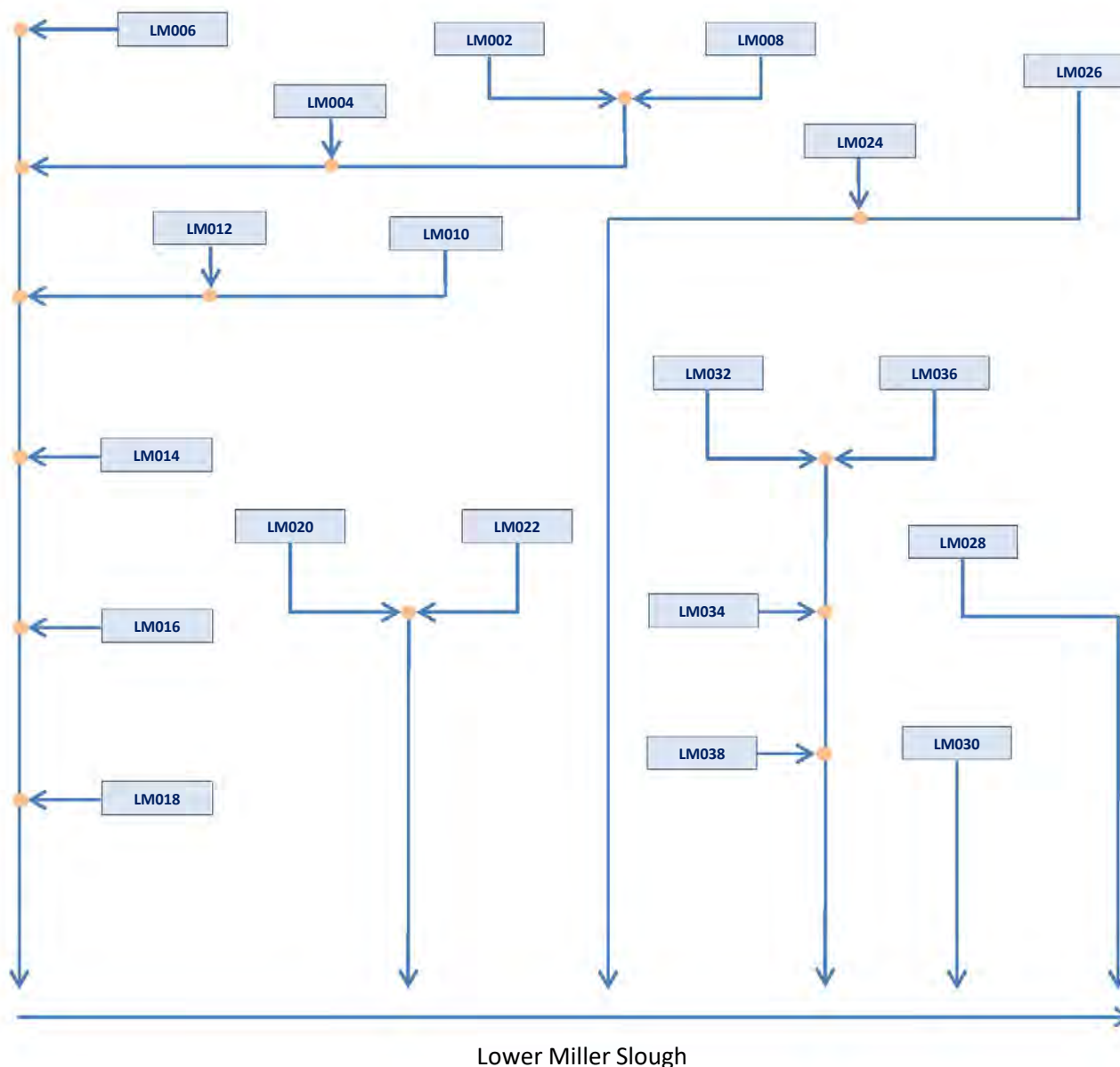
LEGEND

Flow Combination

Hydrologic Sub-catchment Area

North Uvas Drainage Area

Storm Drainage System Master Plan
City of Gilroy

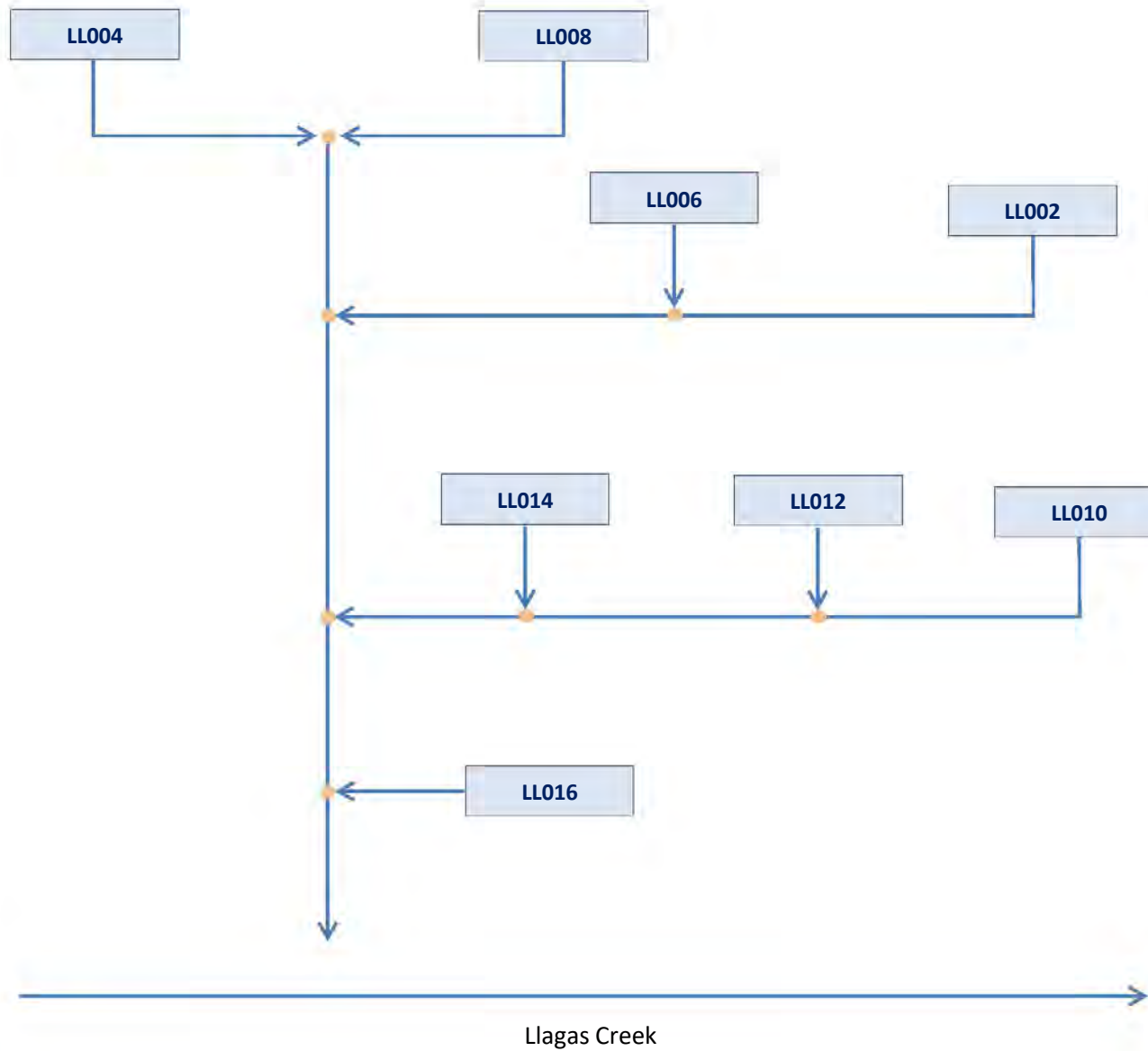


LEGEND

-  Flow Combination
-  Hydrologic Sub-catchment Area

**Lower Miller Slough
Drainage Area**
Storm Drainage System Master
Plan
City of Gilroy



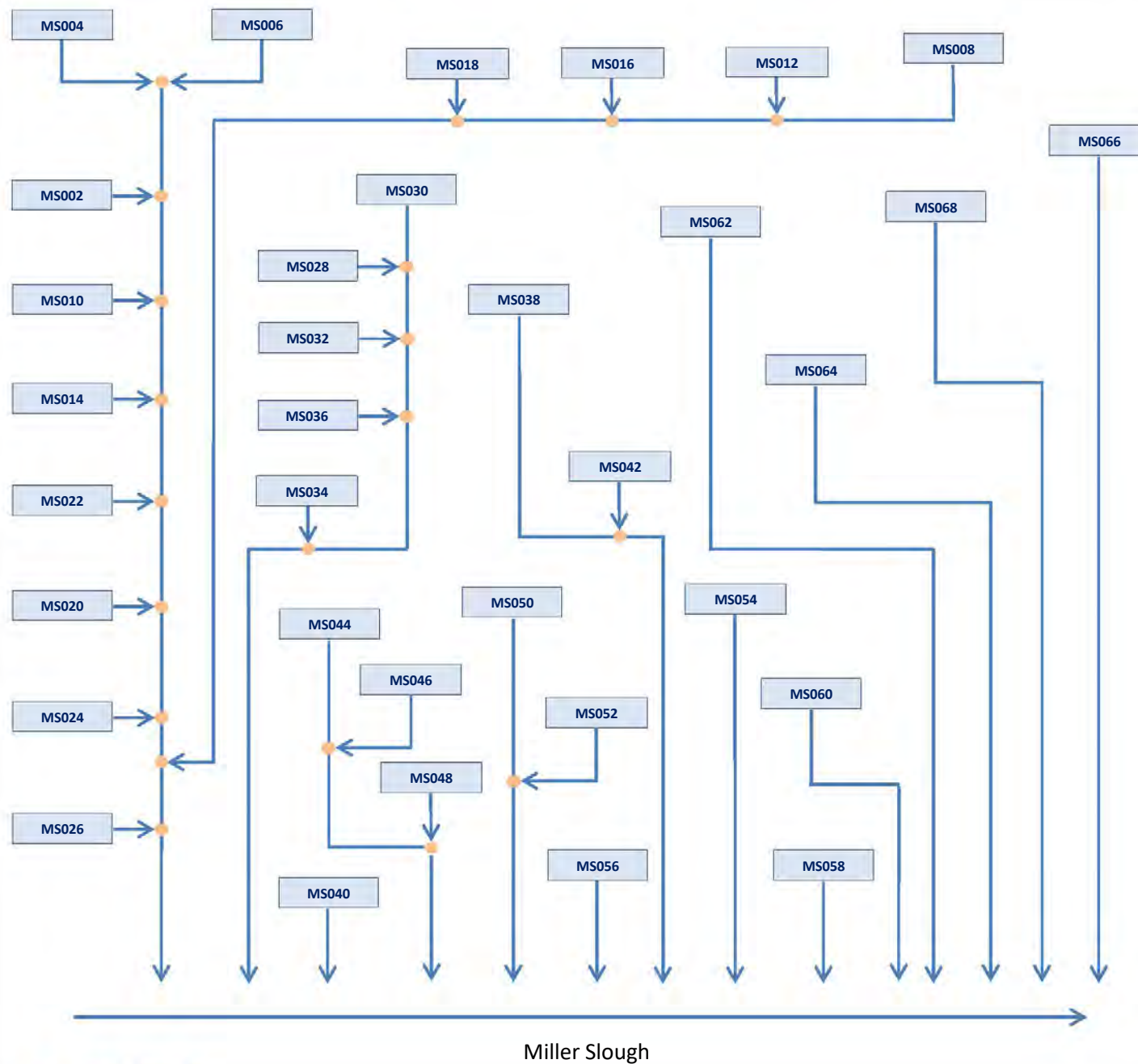


LEGEND

-  Flow Combination
-  Hydrologic Sub-catchment Area

Llagas Drainage Area
 Storm Drainage System Master
 Plan
 City of Gilroy



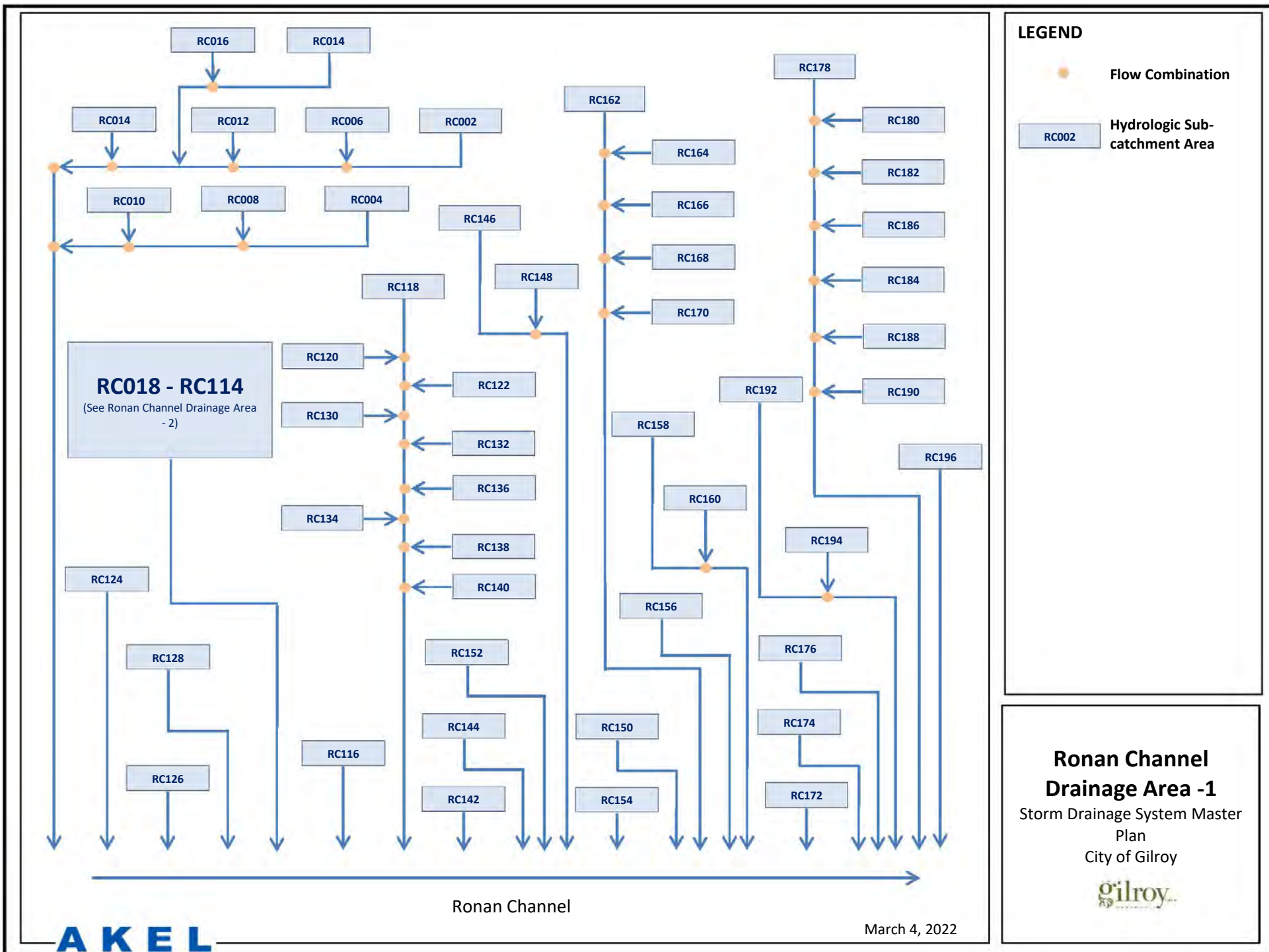


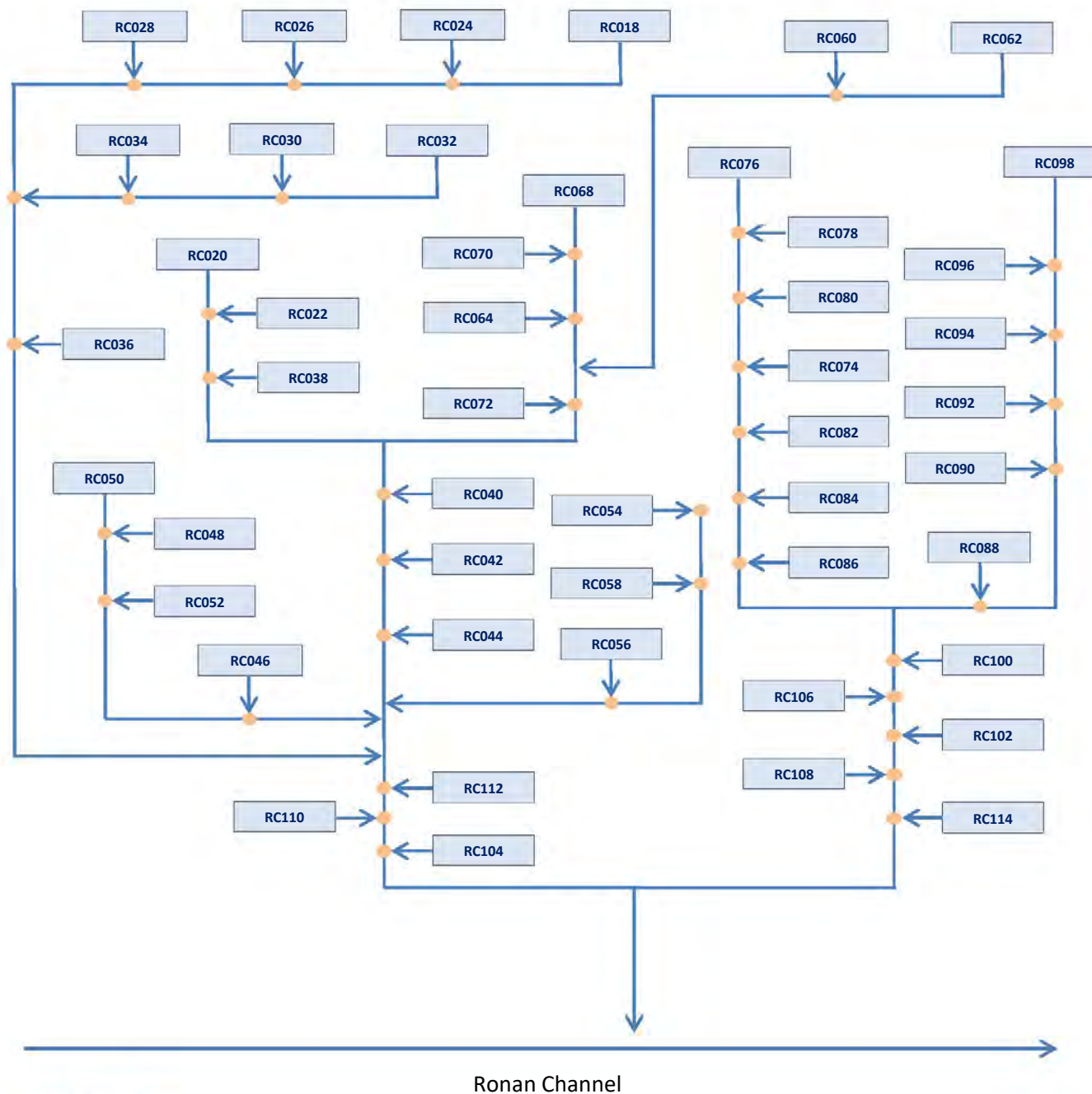
LEGEND

-  Flow Combination
-  Hydrologic Sub-catchment Area

**Miller Slough
Drainage Area**
Storm Drainage System Master
Plan
City of Gilroy







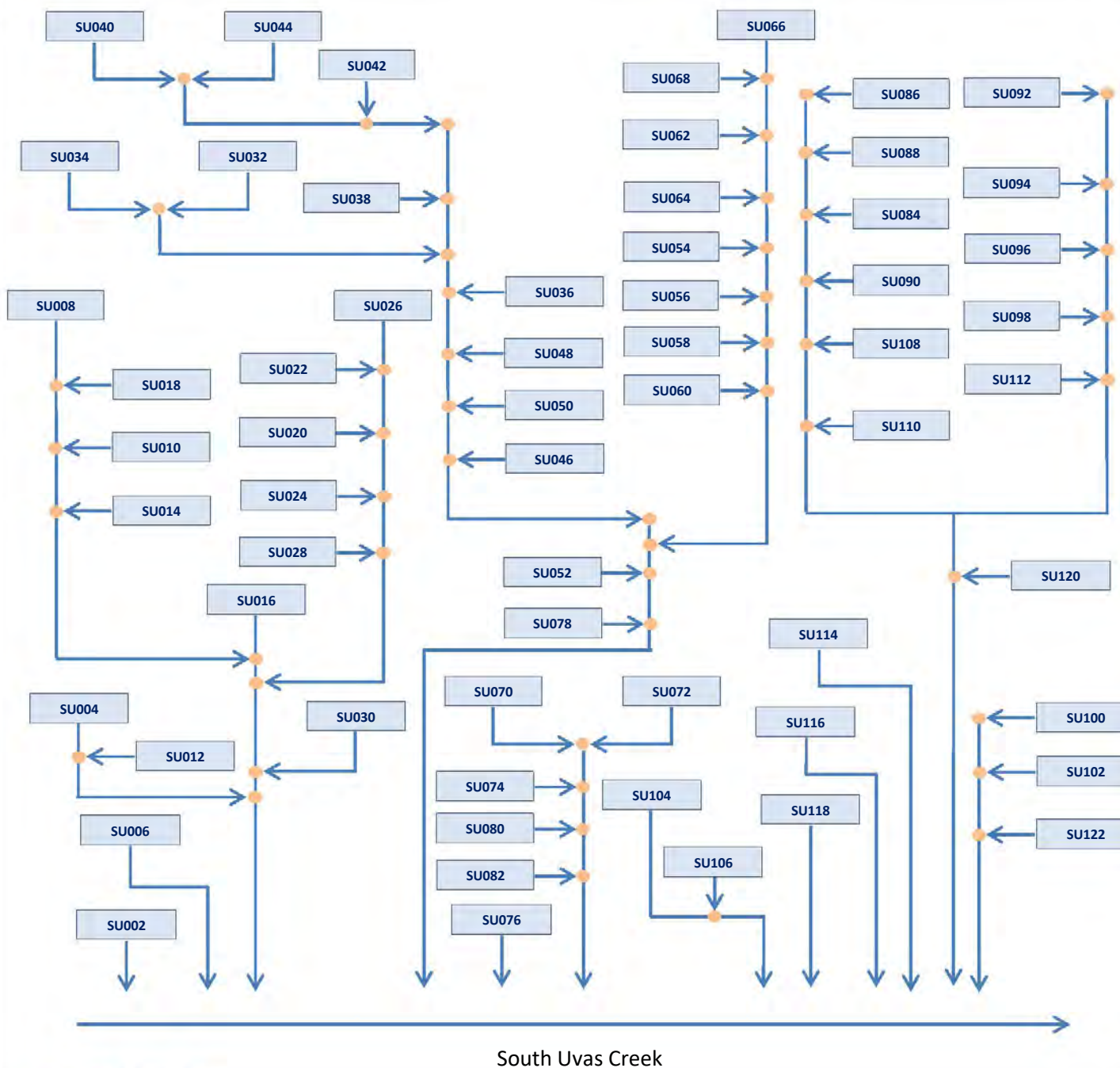
LEGEND

Flow Combination

RC002 Hydrologic Sub-catchment Area

**Ronan Channel
Drainage Area -2**
Storm Drainage System Master
Plan
City of Gilroy





LEGEND

Flow Combination

Hydrologic Sub-catchment Area

South Uvas Drainage Area

Storm Drainage System Master Plan
City of Gilroy



Table 6.2 Capital Improvement Program
Storm Drainage System Master Plan
City of Gilroy

Improv. No.	Alignment	Limits	Pipeline Improvements		Infrastructure Costs				Baseline Constr. Costs	Estimated Constr. Costs	Capital Improv. Costs	Suggested Cost Allocation		Cost Sharing	
			Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost				Existing Users	Future Users	Existing Users	Future users
			(in)		(in)	(ft)	(\$/ft)	(\$)				(%)	(%)	(\$)	(\$)
Ronan Channel Drainage Area															
RC-1	Sunrise Dr	From Dream Catcher Way to Golden Sky Way	18	Replacement	30	400	302	120,601	121,000	158,000	206,000	100%	0%	206,000	0
RC-2	Mantelli Dr	From Muir Drive to Delta Dr	18	Replacement	24	1,250	245	306,506	307,000	400,000	520,000	100%	0%	520,000	0
RC-3	Zamzow Ct	From approx. 1,250' n/o Cohansey Ave to Cohansey Ave	-	New	48	1,200	489	586,990	587,000	764,000	994,000	8%	92%	74,621	919,379
RC-4	Cohansey Ave	From approx. 350' e/o Monterey Rd to Murray Ave	-	New	48	1,450	489	709,280	710,000	923,000	1,200,000	0%	100%	0	1,200,000
RC-5	Murray Ave	From Cohansey Ave to Tomkins Ct	-	New	48	2,800	489	1,369,643	1,370,000	1,781,000	2,316,000	9%	91%	219,340	2,096,660
RC-6	Murray Ave	From Tomkins Ct to Ronan Channel	24	Replacement	48	600	489	293,495	294,000	383,000	498,000	13%	87%	67,178	430,822
RC-7	No Name Uno/Las Animas Ave	From approx. 1,500' s/o Buena Vista Ave to San Ysidro Ave	-	New	36	3,400	358	1,216,516	1,217,000	1,583,000	2,058,000	91%	9%	1,875,920	182,080
RC-8	San Ysidro Ave	From Las Animas Ave to approx. 500' n/o Leavesley Rd	-	New	48	3,425	489	1,675,367	1,676,000	2,179,000	2,833,000	79%	21%	2,227,585	605,415
RC-9	Leavesley Rd	From approx. 220' e/o Forest St to approx. 360' e/o Forest St	18	Replacement	42	150	414	62,114	63,000	82,000	107,000	87%	13%	92,659	14,341
Subtotal - Ronan Channel Drainage Area									6,345,000	8,253,000	10,732,000			5,283,303	5,448,697
Miller Slough Drainage Area															
MS-1	Wren Ave	From approx. 290' n/o First St to Lawrence Dr	24	Replacement	30	2,325	302	700,991	701,000	912,000	1,186,000	100%	0%	1,186,000	0
MS-2	First St	From approx. 180' e/o Princevalle St to Sargent St	18	Replacement	24	525	245	128,732	129,000	168,000	219,000	100%	0%	219,000	0
MS-3	Sargent St	From First St to Broadway	18	Replacement	24	425	245	104,212	105,000	137,000	179,000	100%	0%	179,000	0
MS-4	Broadway	From Sargent St to Church St	18/21	Replacement	30	1,075	302	324,114	325,000	423,000	550,000	100%	0%	550,000	0
MS-5	Church St	From Broadway to approx. 100' s/o Howson St	21	Replacement	30	400	302	120,601	121,000	158,000	206,000	100%	0%	206,000	0
MS-6	Monterey Rd	From Second St to First St	18/24	Replacement	27	675	283	190,847	191,000	249,000	324,000	100%	0%	324,000	0
Subtotal - Miller Slough Drainage Area									1,572,000	2,047,000	2,664,000			2,664,000	0
North Uvas Drainage Area															
NU-1	Hecker Pass Hwy	From approx. 3,080' w/o Santa Teresa Blvd to approx. 360' w/o Santa Teresa Blvd	-	New	30	2,825	302	851,742	852,000	1,108,000	1,441,000	0%	100%	0	1,441,000
NU-2	Hecker Pass Hwy	From approx. 360' w/o Santa Teresa Blvd to Santa Teresa Blvd	24	Replacement	30	350	302	105,526	106,000	138,000	180,000	0%	100%	0	180,000
NU-3	Santa Teresa Blvd	From approx. 70' s/o Hecker Pass Hwy to Uvas Creek	24	Replacement	30	2,575	302	776,367	777,000	1,011,000	1,315,000	0%	100%	0	1,315,000
NU-4	Westwood Dr	From approx. 150' s/o Third St to Kentwood Ct	18	Replacement	24	425	245	104,212	105,000	137,000	179,000	100%	0%	179,000	0

Table 6.2 Capital Improvement Program
Storm Drainage System Master Plan
City of Gilroy

Improv. No.	Alignment	Limits	Pipeline Improvements		Infrastructure Costs				Baseline Constr. Costs	Estimated Constr. Costs	Capital Improv. Costs	Suggested Cost Allocation		Cost Sharing	
			Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost				Existing Users	Future Users	Existing Users	Future users
			(in)		(in)	(ft)	(\$/ft)	(\$)				(%)	(%)	(\$)	(\$)
NU-5	Monterey Rd	From Princevalle Channel to Victoria Dr	-	New	90	775	928	718,859	719,000	935,000	1,216,000	100%	0%	1,216,000	0
NU-6	Monterey Rd	From Victoria Dr to approx. 950' n/o Farman Ln	42	Replacement	90	2,175	928	2,017,443	2,018,000	2,624,000	3,412,000	100%	0%	3,412,000	0
NU-7	ROW	From Monterey Rd to approx. 970' n/o Uvas Creek	-	New	90	975	928	904,371	905,000	1,177,000	1,531,000	100%	0%	1,531,000	0
NU-8	ROW	From approx. 970' n/o Uvas Creek to Uvas Creek	-	New	90	1,000	928	927,560	928,000	1,207,000	1,570,000	100%	0%	1,570,000	0
					Subtotal - North Uvas Drainage Area				6,410,000	8,337,000	10,844,000			7,908,000	2,936,000
South Uvas Drainage Area															
SU-1	St Andrews Cir	From Carnoustie Ct to approx. 380' nw/o Carnoustie Ct	18	Replacement	36	375	358	134,175	135,000	176,000	229,000	100%	0%	229,000	0
					Subtotal - South Uvas Drainage Area				135,000	176,000	229,000			229,000	0
Princevalle Drainage Area															
PR-1	Third St	From Santa Paula Dr to Wren Ave	27	Replacement	30	825	302	248,739	249,000	324,000	422,000	100%	0%	422,000	0
PR-2	Third St	From Wren Ave to approx. 170' e/o Santa Theresa Dr	27	Replacement	42	675	414	279,515	280,000	364,000	474,000	100%	0%	474,000	0
PR-3	Third St	From approx. 170' e/o Santa Theresa Dr to Santa Theresa Dr	27	Replacement	48	200	489	97,832	98,000	128,000	167,000	100%	0%	167,000	0
PR-4	Santa Theresa Dr	From Third St to approx. 300' s/o Fourth St	27/30	Replacement	48	950	489	464,700	465,000	605,000	787,000	100%	0%	787,000	0
PR-5	ROW	From Santa Theresa Dr to Miller Ave	30	Replacement	48	675	489	330,182	331,000	431,000	561,000	100%	0%	561,000	0
PR-6	Miller Ave	From approx. 300' s/o Fourth St to Fifth St	30	Replacement	48	400	489	195,663	196,000	255,000	332,000	100%	0%	332,000	0
PR-7	Fifth St	From Miller Ave to Princevalle St	30	Replacement	48	1,250	489	611,448	612,000	796,000	1,035,000	100%	0%	1,035,000	0
PR-8	Princevalle St	From Third St to Fifth St	18	Replacement	30	1,250	302	376,877	377,000	491,000	639,000	100%	0%	639,000	0
PR-9	Princevalle St	From Fifth St to Seventh St	42	Replacement	54	1,225	545	668,183	669,000	870,000	1,131,000	100%	0%	1,131,000	0
PR-10	Alexander St	From Tenth St to Banes Ln	18	Replacement	24	825	245	202,294	203,000	264,000	344,000	84%	16%	288,575	55,425
PR-11	Banes Ln	From Alexander St to Automall Pkwy	18	Replacement	24	625	245	153,253	154,000	201,000	262,000	89%	11%	234,103	27,897
PR-12	Monterey Rd	From approx. 380' n/o 8th St to Angra Way	-	New	48	2,475	489	1,210,667	1,211,000	1,575,000	2,048,000	100%	0%	2,048,000	0
PR-13	Monterey Rd	From Angra Way to Princevalle Channel	42	Replacement	48	775	489	379,098	380,000	494,000	643,000	100%	0%	643,000	0
					Subtotal - Princevalle Drainage Area				5,225,000	6,798,000	8,845,000			8,761,678	83,322

Table 6.2 Capital Improvement Program
Storm Drainage System Master Plan
City of Gilroy

Improv. No.	Alignment	Limits	Pipeline Improvements		Infrastructure Costs				Baseline Constr. Costs	Estimated Constr. Costs	Capital Improv. Costs	Suggested Cost Allocation		Cost Sharing	
			Existing Diameter	New/Parallel/ Replace	Diameter	Length	Unit Cost	Infr. Cost				Existing Users	Future Users	Existing Users	Future users
			(in)		(in)	(ft)	(\$/ft)	(\$)				(%)	(%)	(\$)	(\$)
Lower Miller Slough Drainage Area															
LM-1	Fourth St	From Egleberry St to Monterey Rd	18	Replacement	30	400	302	120,601	121,000	158,000	206,000	100%	0%	206,000	0
LM-2	Monterey Rd	From Fourth St to Sixth St	27	Replacement	36	1,250	358	447,248	448,000	583,000	758,000	100%	0%	758,000	0
LM-3	Monterey Rd	From Sixth St to Hornlein Ct	27	Replacement	42	425	414	175,991	176,000	229,000	298,000	100%	0%	298,000	0
LM-4	Monterey Rd	From Hornlein Ct to approx. 240' n/o Eighth St	33	Replacement	42	775	414	320,924	321,000	418,000	544,000	100%	0%	544,000	0
LM-5	ROW	From Rosanna St to Monterey Rd	18	Replacement	24	1,125	245	275,855	276,000	359,000	467,000	100%	0%	467,000	0
LM-6	Alexander St	From Sixth St to Eighth St	24	Replacement	36	1,300	358	465,138	466,000	606,000	788,000	100%	0%	788,000	0
Subtotal - Lower Miller Slough Drainage Area									1,808,000	2,353,000	3,061,000			3,061,000	0
Total Costs															
Subtotal - Ronan Channel Drainage Area									6,345,000	8,253,000	10,732,000			5,283,303	5,448,697
Subtotal - Miller Slough Drainage Area									1,572,000	2,047,000	2,664,000			2,664,000	0
Subtotal - North Uvas Drainage Area									6,410,000	8,337,000	10,844,000			7,908,000	2,936,000
Subtotal - South Uvas Drainage Area									135,000	176,000	229,000			229,000	0
Subtotal - Princeville Drainage Area									5,225,000	6,798,000	8,845,000			8,761,678	83,322
Subtotal - Lower Miller Slough Drainage Area									1,808,000	2,353,000	3,061,000			3,061,000	0
Total Improvement Costs									21,495,000	27,964,000	36,375,000			27,906,981	8,468,019



3/29/2023

Notes:

1. Cost estimates are based on the Engineering News Record (ENR) construction cost index (CCI) of 13,176 for March 2023
2. Baseline construction costs plus 30% to account for unforeseen events and unknown conditions.
3. Estimated construction cost plus 30% to cover other costs including: engineering design, project administration (developer and City staff), construction management and inspection, and legal costs.

RESOLUTION NO. 2023-XX**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF
GILROY ADOPTING THE STORM DRAINAGE SYSTEM
MASTER PLAN FOR THE CITY OF GILROY**

WHEREAS, the 2022 Storm Drainage System Master (Plan) serves as a guide to assess the current operations and functionality of the City's existing storm drain system; and

WHEREAS, the City last developed a Storm Drainage System Master Plan in 2004, which identified capacity deficiencies in the existing storm drain system and recommended improvements to alleviate existing deficiencies and serve future developments in the Gilroy Planning Area; and

WHEREAS, Akel Engineering Group, Inc. was retained by the City Council in August 2019 to prepare the Plan; and

WHEREAS, the objective of the Plan is to review and make recommendations on how the current sewer system can be upgraded within the City to best suit the sewer needs of the City in the future; and

WHEREAS, the projects identified in the Plan will be added to the City's Capital Improvement Program; and

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Gilroy hereby adopts the Storm Drain System Master Plan attached hereto and made a part hereof.

PASSED AND ADOPTED by the City Council of the City of Gilroy at a regular meeting duly held on the 3rd day of April 2023 by the following roll call vote:

AYES: COUNCIL MEMBERS:

NOES: COUNCIL MEMBERS:

ABSTAIN: COUNCIL MEMBERS:

ABSENT: COUNCIL MEMBERS:

APPROVED:

Marie Blankley, Mayor

ATTEST:

Thai Nam Pham, City Clerk



City of Gilroy

STAFF REPORT

Agenda Item Title: Appointment to City Boards, Commissions, and Committees with Open Vacancies

Meeting Date: April 3, 2023

From: Jimmy Forbis, City Administrator

Department: City Clerk

Submitted By: Thai Nam Pham, City Clerk

Prepared By: Thai Nam Pham, City Clerk

STRATEGIC PLAN GOALS

Not Applicable

RECOMMENDATION

Appoint members to Boards, Commissions, and Committees with open vacancies.

BACKGROUND

Five of the City's Boards, Commissions, and Committees (Arts & Culture Commission, Library Commission, Personnel Commission, Parks and Recreation Commission, and Physically Challenged Board of Appeals) currently have seats vacant as of April 3, 2023. At the close of the recruitment period, no new applications were received for any of the commissions and boards referenced above. Staff did receive notice of interest from previous applicants **Vincent Saso** and **Terrence Fugazzi** for the Parks and Recreation Commission with a term expiring December 31, 2023. On March 20, 2023, staff received a letter of resignation from Parks and Recreation Commissioner Eric Arredondo, leaving another seat vacant for a term ending on December 31, 2025. On March 27, 2023, staff received a letter of resignation from Parks and Recreation Commissioner Sergio Patterson, leaving another seat vacant for a term ending on December 31, 2025.

The Council interviewed both applicants at the March 20, 2023 Regular Meeting. The Council is now asked to consider their appointments to the Parks and Recreation Commission.

It should be noted that the City has previously adhered to a practice that did not allow an individual board/commission/committee member to serve simultaneously as a member of two different boards/commissions/committees. This was incorporated to allow as many residents as possible to participate in advisory roles. Currently, there are numerous commission vacancies, and Mr. Fugazzi has shown an interest in serving on two commissions simultaneously. As there are no legal hurdles (and no apparent conflicts of interest) to Mr. Fugazzi serving on two separate commissions simultaneously, Council should consider his appointment to a second commission should he be deemed a suitable appointee.

Attachments:

1. Parks and Recreation Application – Vincent Saso
2. Parks and Recreation Application – Terence Fugazzi



City of Gilroy Board, Committee, & Commission Application

**All Commission, Board, and Committee applications are a public record.*

Board/Committee/Commission of Interest:

Name: Vincent Saso

**Phone
number(s):**

**email
address*:**

Are you a registered voter within the City limits?

Yes

**Physical
Address*:**

**Driver's License
or
ID No.:**

**Date of
Birth*:**

**Last 4 of
SSN:**

List your qualifications for this appointment:

I worked for the State of California for 35 years and was a manager at the EDD office in Campbell. I dealt with various types of people and challenging problems that they faced. I delegated duties to the staff and always wanted to see the final outcome to see if it was handled properly for the clients. I was able to recognize the needs of others and deal with it in a professional manner. I dealt with Unemployment, Disability and Employment problems and had high positive outcomes.

List any service to the community including any prior appointments:

I am President of the Senior Advisory Board and have been for many years. Received many awards from city officials and the mayors of Gilroy for continued outstanding service and contributions to our community. Received awards from Parks and Rec., The Gilroy Chamber, YMCA, Senior Volunteer of the Year, Supervisor Wasserman, Gilroy Exchange Club, St. Louise Hospital, California Chamber of Comm. Congressional Recognition from Zoe Lofgren and Jimmy Panetta. I go out daily to various businesses to collect food and other donations to distribute to the people in need in our community, such as Wheeler Manor, Gilroy Senior Center, Salvation Army and The VFW. I have been doing this for many years and hopefully able to continue for more years to come.

What are your goals while serving on this Board/Commission/Committee?

I am extremely involved in the Gilroy Senior Center and have been for many years. I listen to their needs and take the initiative in getting results and solving problems. I am able to deal with the supervisor of the center or YMCA and in the past, Catholic Charities for improvement. I also want to keep up with the growth of the city and families moving in to the community. I recognize the needs of others and always had that experience with EDD. for many years. The community always want to be able to have something nice not only for them but their families and and the city needs to recognize and keep up with their expectations whenever possible. We need to keep are parks maintained, clean and safe for everyone to enjoy.

Why are you the most qualified to serve on this Board/Commission/Committee?

My family came to this valley 100 years ago to farm and start businesses. I had what a lot of others did not and feel very great full for that. I want to give back to the community what ever way possible and by being on the Parks and Recreation Commission will help with my hopes and goals. I see some of my friends on various commissions and I respect them for what they do and the results. When we get older, we look back and say did I do enough for the community. I want to yes I did and be very happy about it..

✓	By clicking on this box, I declare under penalty of perjury that I am currently a registered voter within the City limits of the City of Gilroy. Furthermore, I understand that this application and any attachments are subject to disclosure under the Public Records Act and must complete mandatory Open Government Ordinance Training. I further understand that members of the Planning Commission, Building Boards of Appeals, and Physically Challenged Board of Appeals are also subject to filing the Fair Political Practice Commission's Statement of Economic Interest Form 700 relating to financial disclosures.
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City of Gilroy Board, Committee, & Commission Application

**All Commission, Board, and Committee applications are a public record.*

Board/Committee/Commission of Interest:

Name: Terence Fugazzi

Phone number(s): [REDACTED]

email address*: [REDACTED]

Are you a registered voter within the City limits? Yes

Physical Address*: [REDACTED]

Driver's License or ID No.: [REDACTED]

Date of Birth*:

Last 4 of SSN: [REDACTED]

List your qualifications for this appointment:

9-year resident of Gilroy - native Californian born in Torrance, CA. Active in staying abreast of city issues and getting involved when I feel it necessary. Our family is active and enjoys the outdoors, especially the dog parks and trails. My personal qualifications are 25 years in executive management in the area of marketing technology products. I keep abreast of the latest happenings in technology and have a strong understanding of data systems, networking, social media, video production, podcasting, and current-times communication strategies. I also have a BS in Computer Science from California State University, Northridge.

List any service to the community including any prior appointments:

Helped in recent years in many ways as a parent to a Christopher High School Student. Until now (semi-retired), I have not had the time to really give back. Now that I have the time - it's time!

What are your goals while serving on this Board/Commission/Committee?

I am very interested in helping elevate our city for all citizens and help improve our quality of life. My areas of interest really surround properly managed growth, downtown, parks and outdoor services that meet the varied needs of our citizenry, and overall just using my skills and knowledge to give back to my city in the best way possible.

Why are you the most qualified to serve on this Board/Commission/Committee?

This question would require me to be a bit presumptive. Not knowing the other candidates I cannot make such a claim that I would be the "most qualified". What I can say is that my knowledge, attitude, passion, success in business, and my commitment to my family for the quality of our lives makes me an excellent choice as someone to help steer Gilroy toward a better future.

✓

By clicking on this box, I declare under penalty of perjury that I am currently a registered voter within the City limits of the City of Gilroy. Furthermore, I understand that this application and any attachments are subject to disclosure under the Public Records Act and must complete mandatory Open Government Ordinance Training. I further understand that members of the Planning Commission, Building Boards of Appeals, and Physically Challenged Board of Appeals are also subject to filing the Fair Political Practice Commission's Statement of Economic Interest Form 700 relating to financial disclosures.



City of Gilroy

STAFF REPORT

Agenda Item Title: Enhancing the Access to the Internet and Technology for Gilroy's Youth

Meeting Date: April 3, 2023

From: Jimmy Forbis, City Administrator

Department: Administration

Submitted By: Bryce Atkins, Assistant to the City Administrator

Prepared By: Bryce Atkins, Assistant to the City Administrator

STRATEGIC PLAN GOALS

Not Applicable

RECOMMENDATION

Council provide direction.

BACKGROUND

This topic was discussed at the February 20, 2021 and March 29, 2021 special meetings for strategic planning and the Council's Legislative Agenda for Fiscal Year 2022 and Fiscal Year 2023. At these meetings, the topic was raised regarding challenges for school children who, due to economic challenges, were not able to access the internet to attend school virtually. Additional concerns that were raised included businesses requiring a greater scope of accessibility to the internet for business attraction, the challenges that were resolved at the Ochoa Camp to bring internet to their site from the Sewer Treatment Plant so they could attend school, and discussions about potential downtown Wi-Fi service being provided, and looking at the potential for partnerships with Amazon and other possible partners in providing services. There was also discussion about partnering with the County on a multi-jurisdictional group to establish better internet access for communities in the County.

ANALYSIS

Assessing If There is a Continuing Need

At the time when this matter was discussed, the pandemic was fully underway and classes by the Gilroy Unified School District (GUSD) were being held virtually. During the pandemic and after the Legislative Agenda was adopted, GUSD invested significantly to provide their students the technology and internet access to attend school virtually. At this time, the classes are also back to in-person instruction, lessening the critical need that was present at the time of the Legislative Agenda adoption as it relates to youth access to attend classes. Additionally, since the adoption of the Legislative Agenda, Frontier Communications has submitted plans and has begun deploying a citywide fiber optic network, which will enhance the speeds and bandwidth for internet service in the community.

There are no set metrics available to the City to provide a defined level of access to technology, nor a detailed description of what technology or technological services may be lacking. As such, staff is not able to provide a quantitative or qualitative analysis on this topic to advise Council on the level of need present in the community.

While the newer developments may not address those currently experiencing economic challenges and an ability to pay for high-speed internet, the question is if this is something the City should be involved in addressing, and if so, to what extent.

Possible City Actions

Council could determine that a market failure is present. As staff has begun a cursory analysis of this topic, there are many different approaches that the City could undertake. Before spending significant staff time and resources to vet every option thoroughly, staff wishes to gain Council consensus on what levels of financial and operational commitment it is willing to consider. This will help determine if there are options that are not to be evaluated to allow a greater focus on other areas. The options that have been identified are broken down into the following three categories based on financial and operational commitment.

Direct Service Provision

This would involve the City in directly providing the service. This may take several forms. For example, some cities provide regional Wi-Fi access for free, such as in downtown areas or designated zones. Others provide internet access by providing the infrastructure, such as a fiber optic data network, and charge for services similar to other utilities (water, sewer, etc.).

These types of direct services carry a higher cost than the other categories and require higher commitments of operational resources and staff time. This category is also likely to result in the highest level of dependency on the service and present a higher level of risk of abuse of the service. This category does, however, provide the most control over providing equitable access to technology. Depending upon the type of service being provided, fair rates within the service and competitive rates compared to market services would need to be analyzed.

Direct provision of service is typically made when there is a market failure, which is a need where the services available in the market are either unable to provide service adequate to meet the need, the cost of the service in the private market is too great for a need that is fundamental to health and safety, or where a private company is not a proper source to provide the service. These typically are heavily regulated services or needs involving health and safety, such as fire, police, emergency medical, public health, and other services where it is not in the best interest of the public to rely on private companies for the service or to achieve cost savings for all members utilizing such a service.

Subsidization

The Council may also consider providing a form of subsidy to either a service provider to expand their services to areas that are not connected or directly to those currently challenged to pay the costs associated with access to the internet to attempt to grant additional access points for residents. This could take the form of a benefit provided to others already on discounted utility or other services or some other program that provides a stipend to provide the connection. The details of such a program, including eligibility, amount, length of term, etc., will be an important element of any eventual analysis should Council determine to pursue a program in this category.

This type of program has fewer financial and operational commitments than direct service provision and produces less dependency as it respects scale but may produce the same level of dependency at the individual level. The operational and staff time costs are much reduced compared to direct service provision. Additionally, the chance of liability is also reduced to nominal levels compared to direct service provision. The level of ability to influence access to technology is reduced compared to direct service, as it is dependent upon others to provide the access points.

Advocacy and Support

This category would include activities such as meeting with service providers to raise concerns about access to the internet or other technology needs, as well as meeting with non-profit organizations and other governmental agencies to see if collaboratives or alternate service delivery models are possible to meet the need. The goal would be to convince other organizations to either subsidize or directly provide the service for our residents who lack access to technology.

This option would not require any financial support from the City but may require more staff time than some subsidization options. There would be no financial commitments, liability, or dependency on the City to maintain a service or program to retain residents' access to technology. However, this category does not grant much, if any, ability to directly influence the means or ability to access technology for our residents.

Workforce Ability to Take on Tasks

As evidenced in the recent strategic planning sessions and assessing the staffing levels and work plans for the budget process, any activity listed above will need staff resources to deliver. Direct Service Provision would require the most, while

subsidization and advocacy will consume some staff time that may detract from current Council priorities or mandated and core projects or services. Staff is recommending that Council:

1. Determine if this is a need that will warrant the staff time to dig into deeper analysis, let alone for carrying out the activity; then
2. If determined that the need warrants analysis of options, identify for staff what category or types of programs Council wants to be evaluated and options explored.

Staff will then, if the direction is to proceed into analysis, evaluate the options based on Council feedback.

ALTERNATIVES

Council may provide direction to pursue or discontinue any work relating to policies or activities relating to enhancing the access for Gilroy's youth to the internet and technology.

FISCAL IMPACT/FUNDING SOURCE

None. This report is seeking Council direction. Based upon the direction received, any programs or projects proposed would be brought back to Council after analysis, including a fiscal report at the time of Council consideration.

PUBLIC OUTREACH

This item was included in the publicly posted agenda for this meeting.

NEXT STEPS

Staff will take direction from Council, and if the direction is to analyze and report back on a potential policy, program or project, staff will return to Council for consideration of the same.



City of Gilroy

STAFF REPORT

Agenda Item Title: Consideration of Creating a Job Protection Policy

Meeting Date: April 3, 2023

From: Jimmy Forbis, City Administrator

Department: Administration

Submitted By: Bryce Atkins, Assistant to the City Administrator

Prepared By: Bryce Atkins, Assistant to the City Administrator

STRATEGIC PLAN GOALS

Not Applicable

RECOMMENDATION

Council provide direction.

BACKGROUND

At the February 20, 2021 and March 29, 2021 special meeting regarding strategic planning and the formation of the City Council's FY22 and FY23 Legislative Agenda, the topic of a potential job protection policy was raised. The statements at those meetings involving this subject included:

- Other cities in the County and State have such policies
- Helps workers during pandemics and recessions
- If a worker gets laid off, allows such workers to be first in line to be retained/rehired
- If a company/contractor sells to another, would require new contractor to retain the purchased company's employees for a brief time period, 90 days was given as an example

ANALYSIS

Staff has conducted research and found several cities that had adopted Right of Recall Ordinances (ROROs). These ordinances were established as COVID responses to the layoffs of service, tourism, and other industries impacted by the shutdowns as a

protection mechanism during the pandemic. Most of the ROROs found are from larger cities, including cities such as San Diego, Los Angeles, San Francisco, and others.

These typically establish a timeframe from the point of layoff, usually within a few months after layoff, to when they would have to be offered their position back before recruitment could be done of a new employee. The laid-off employee would have five or so days to accept the position, or the business could hire whomever they desire to employ. Some of these ordinances, like San Diego's, have sunset provisions where the ordinance automatically ends (March 8, 2022, in this example). Others, like Los Angeles' ordinance, have a review report to determine if the ordinance's provisions are still necessary. In all of the ordinances reviewed, none appear to be designed to be perpetual and only applied to layoffs or restructuring due to the pandemic stay-at-home orders and impacts.

Later during the pandemic, the State of California enacted SB 93, which implemented similar requirements state-wide. The law is still in effect and sunset on December 31, 2024, roughly a year and eight months from this meeting. The Bill requires that an employer, as defined, offer its laid-off employees specified information about job positions that become available that the laid-off employees are qualified for and to offer positions to those laid-off employees based on a preference system. Positions that qualify are those whose most recent separation from active service was due to a reason related to the COVID-19 pandemic, including a public health directive, government shutdown order, lack of business, a reduction in force, or other economic, non-disciplinary reason related to the COVID-19 pandemic.

Based on the nature of these example ordinances and the current state law, staff believes that there is not currently a need for this type of ordinance unless Council desires to have these protections extend beyond December 31, 2024 timeframe or wishes to have a policy cover conditions that are not contained in SB 93. If Council wishes to proceed, depending upon what terms of the possible job protection ordinance are being requested, a legal analysis will be needed to determine what is acceptable, as well as what resources, both staff time and financial, are going to be expended to monitor these conditions, what triggers the requirement, and what penalties for non-compliance might be.

ALTERNATIVES

Council may direct staff to cease activity on this task or direct certain research or actions to be undertaken to develop a job protection policy.

FISCAL IMPACT/FUNDING SOURCE

None. This item seeks Council direction before expending staff time on further detailed research and policy development. No financial resources are anticipated to be spent. Any fiscal impact of any proposed policy at the completion of this process would be analyzed and reported at the recommendation of adopting such a policy.

PUBLIC OUTREACH

This item was included in the publicly posted agenda for this meeting.

NEXT STEPS

Staff will take the Council's direction, and either pursue or cease work on this potential policy as it so directs.

Attachments:

1. California SB 93 adopted bill language.



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SB-93 Employment: rehiring and retention: displaced workers: COVID-19 pandemic. (2021-2022)

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Date Published: 04/16/2021 09:00 PM

Senate Bill No. 93

CHAPTER 16

An act to add and repeal Section 2810.8 of the Labor Code, relating to employment, and making an appropriation therefor, to take effect immediately, bill related to the budget.

[Approved by Governor April 16, 2021. Filed with Secretary of State April 16, 2021.]

LEGISLATIVE COUNSEL'S DIGEST

SB 93, Committee on Budget and Fiscal Review. Employment: rehiring and retention: displaced workers: COVID-19 pandemic.

Existing law governs employment relations, defines the contract of employment, and establishes the obligations of employers to their employees.

This bill would, until December 31, 2024, require an employer, as defined, to offer its laid-off employees specified information about job positions that become available for which the laid-off employees are qualified, and to offer positions to those laid-off employees based on a preference system, in accordance with specified timelines and procedures. The bill would define the term "laid-off employee" to mean any employee who was employed by the employer for 6 months or more in the 12 months preceding January 1, 2020, and whose most recent separation from active service was due to a reason related to the COVID-19 pandemic, including a public health directive, government shutdown order, lack of business, a reduction in force, or other economic, nondisciplinary reason related to the COVID-19 pandemic. The bill would require an employer to keep records for 3 years, including records of communications regarding the offers. The bill would require an employer that declines to recall a laid-off employee on the grounds of lack of qualifications and instead hires someone other than a laid-off employee to provide the laid-off employee a written notice within 30 days including specified reasons for the decision, and other information on those hired.

This bill would, until December 31, 2024, prohibit an employer from refusing to employ, terminating, reducing compensation, or taking other adverse action against any laid-off employee for seeking to enforce their rights under these provisions. The bill would establish specified methods by which these provisions may be enforced, including authorizing an employee to file a complaint with the Division of Labor Standards Enforcement against the employer for specified relief, including hiring and reinstatement rights and awarding of back pay, as well as a civil penalty. The bill would authorize the Division of Labor Standards Enforcement to promulgate and enforce rules and regulations, and issue determinations and interpretations concerning these provisions. The bill would prohibit the imposition of criminal penalties for a violation of these provisions.

This bill would appropriate \$6,000,000 and make available through June 30, 2025, from the Labor and Workforce Development Fund to the Labor Commissioner for staffing resources to implement and enforce the provisions related to the rehiring and retention of workers displaced due to the COVID-19 pandemic.

This bill would declare that it is to take effect immediately as a bill providing for appropriations related to the Budget Bill.

Vote: majority Appropriation: yes Fiscal Committee: yes Local Program: no

THE PEOPLE OF THE STATE OF CALIFORNIA DO ENACT AS FOLLOWS:

SECTION 1. Section 2810.8 is added to the Labor Code, to read:

2810.8. (a) For purposes of this section, the following definitions apply:

(1) "Airport" means any area of land or water used or intended for landing or takeoff of aircraft including appurtenant area used or intended for airport buildings, facilities, as well as rights of way together with the buildings and facilities within the State of California, excluding any military base or federally operated facility.

(2) "Airport hospitality operation" means a business that prepares, delivers, inspects, or provides any other service in connection with the preparation of food or beverage for aircraft crew or passengers at an airport, or that provides food and beverage, retail, or other consumer goods or services to the public at an airport. The term airport hospitality operation does not include an air carrier certificated by the Federal Aviation Administration.

(3) "Airport service provider" means a business that performs, under contract with a passenger air carrier, airport facility management, or airport authority, functions on the property of the airport that are directly related to the air transportation of persons, property, or mail, including, but not limited to, the loading and unloading of property on aircraft, assistance to passengers under Part 382 (commencing with Section 382.1) of Title 14 of the Code of Federal Regulations, security, airport ticketing and check-in functions, ground-handling of aircraft, aircraft cleaning and sanitization functions, and waste removal. The term "airport service provider" does not include an air carrier certificated by the Federal Aviation Administration.

(4) "Building service" means janitorial, building maintenance, or security services.

(5) "Employee" means any individual who in a particular week performs at least two hours of work for an employer.

(6) "Employer" means any person, including a corporate officer or executive, who directly or indirectly or through an agent or any other person, including through the services of a temporary service or staffing agency or similar entity, owns or operates an enterprise and employs or exercises control over the wages, hours, or working conditions of any employee. "Employer" also means the successor employer as set forth under paragraph (6) of subdivision (b).

(7) "Enterprise" means a hotel, private club, event center, airport hospitality operation, airport service provider, or the provision of building service to office, retail, or other commercial buildings.

(8) "Event center" means a publicly or privately owned structure of more than 50,000 square feet or 1,000 seats that is used for the purposes of public performances, sporting events, business meetings, or similar events, and includes concert halls, stadiums, sports arenas, racetracks, coliseums, and convention centers. The term "event center" also includes any contracted, leased, or sublet premises connected to or operated in conjunction with the event center's purpose, including food preparation facilities, concessions, retail stores, restaurants, bars, and structured parking facilities.

(9) "Hotel" means a residential building that is designated or used for lodging and other related services for the public, and containing 50 or more guest rooms, or suites of rooms (adjoining rooms do not constitute a suite of rooms). "Hotel" also includes any contracted, leased, or sublet premises connected to or operated in conjunction with the building's purpose, or providing services at the building. The number of guest rooms, or suites of rooms, shall be calculated based on the room count on the opening of the hotel or on December 31, 2019, whichever is greater.

(10) "Laid-off employee" means any employee who was employed by the employer for 6 months or more in the 12 months preceding January 1, 2020, and whose most recent separation from active service was due to a reason related to the COVID-19 pandemic, including a public health directive, government shutdown order, lack of business, a reduction in force, or other economic, nondisciplinary reason due to the COVID-19 pandemic.

(11) "Length of service" means the total of all periods of time during which an employee has been in active service with the employer, based on the employee's date of hire, including periods of time when the employee was on leave or on vacation.

(12) "Person" means an individual, corporation, partnership, limited partnership, limited liability partnership, limited liability company, business trust, estate, trust, association, joint venture, agency, instrumentality, or any other legal or commercial entity, whether domestic or foreign.

(13) "Private club" means a private, membership-based business or nonprofit organization that operates a building or complex of buildings containing at least 50 guest rooms or suites of rooms that are offered as overnight lodging to members. The number of guest rooms or suites of rooms shall be calculated based on the room count on the opening of the private club or on December 31, 2019, whichever is greater.

(b) (1) Within five business days of establishing a position, an employer shall offer its laid-off employees in writing, either by hand or to their last known physical address, and by email and text message to the extent the employer possesses such information, all job positions that become available after the effective date of this section for which the laid-off employees are qualified. A laid-off employee is qualified for a position if the employee held the same or similar position at the enterprise at the time of the employee's most recent layoff with the employer.

(2) The employer shall offer positions to laid-off employees in an order of preference subject to paragraph (1) and this paragraph. If more than one employee is entitled to preference for a position, the employer shall offer the position to the laid-off employee with the greatest length of service based on the employee's date of hire for the enterprise.

(3) A laid-off employee who is offered a position pursuant to this section shall be given at least five business days, from the date of receipt, in which to accept or decline the offer. A "business day" is any day except Saturday, Sunday, or any official state holiday. An employer may make simultaneous, conditional offers of employment to laid-off employees, with a final offer of employment conditioned on application of the preference system set forth in paragraph (2).

(4) An employer must retain the following records for at least three years, measured from the date of the written notice regarding the layoff, for each laid-off employee: the employee's full legal name; the employee's job classification at the time of separation from employment; the employee's date of hire; the employee's last known address of residence; the employee's last known email address; the employee's last known telephone number; and a copy of the written notices regarding the layoff provided to the employee and all records of communications between the employer and the employee concerning offers of employment made to the employee pursuant to this section.

(5) An employer that declines to recall a laid-off employee on the grounds of lack of qualifications and instead hires someone other than a laid-off employee shall provide the laid-off employee a written notice within 30 days including the length of service with the employer of those hired in lieu of that recall, along with all reasons for the decision.

(6) This section also applies in any of the following circumstances:

(A) The ownership of the employer changed after the separation from employment of a laid-off employee but the enterprise is conducting the same or similar operations as before the COVID-19 state of emergency.

(B) The form of organization of the employer changed after the COVID-19 state of emergency.

(C) Substantially all of the assets of the employer were acquired by another entity that conducts the same or similar operations using substantially the same assets.

(D) The employer relocates the operations at which a laid-off employee was employed before the COVID-19 state of emergency to a different location.

(c) No employer shall refuse to employ, terminate, reduce in compensation, or otherwise take any adverse action against any laid-off employee as defined in subdivision (a) for seeking to enforce their rights under this section, for participating in proceedings related to this section, opposing any practice proscribed by this section, or otherwise asserting rights under this section. This subdivision shall also apply to any employee or laid-off employee who mistakenly, but in good faith, alleges noncompliance with this section.

(d) The Division of Labor Standards Enforcement shall have exclusive jurisdiction to enforce this section. This section may be enforced only as follows:

(1) A laid off employee may file a complaint with the Division of Labor Standards Enforcement for violations of this section and may be awarded any or all of the following, as appropriate:

(A) Hiring and reinstatement rights pursuant to this section.

(B) Front pay or back pay for each day during which the violation continues, which shall be calculated at a rate of compensation not less than the highest of any of the following rates:

- (i) The average regular rate of pay received by the laid-off employee during the last three years of that employee's employment in the same occupation classification.
- (ii) The most recent regular rate received by the laid-off employee while employed by the employer.
- (iii) The regular rate received by an employee occupying the position in place of the laid-off employee that should have been employed.

(C) Value of the benefits the laid-off employee would have received under the employer's benefit plan.

(2) No criminal penalties shall be imposed for violation of this section.

(3) Any employer, agent of the employer, or other person who violates or causes to be violated the provisions of this section shall be subject to a civil penalty of one hundred dollars (\$100) for each employee whose rights under these provisions are violated and an additional sum payable as liquidated damages in the amount of five hundred dollars (\$500), per employee, for each day the rights of an employee under this section are violated and continuing until such time as the violation is cured, which shall be recovered by the Labor Commissioner, deposited into the Labor and Workforce Development Fund, and paid to the employee as compensatory damages.

(4) The Labor Commissioner shall enforce this section, including investigating an alleged violation and ordering appropriate temporary relief to mitigate the violation pending the completion of a full investigation or hearing, through the procedures set forth in Section 98.3, 98.7, 98.74, or 1197.1, including by issuance of a citation against an employer who violates this section and by filing a civil action. If a citation is issued, the procedures for issuing, contesting, and enforcing judgments for citations and civil penalties issued by the Labor Commissioner shall be the same as those set out in Section 98.74 or 1197.1, as appropriate.

(5) In an action brought by the Labor Commissioner for enforcement of this section, the court may issue preliminary and permanent injunctive relief to vindicate the rights of employees.

(6) In an administrative or civil action brought under this section, the Labor Commissioner or court, as the case may be, shall award interest on all amounts due and unpaid at the rate of interest specified in subdivision (b) of Section 3289 of the Civil Code.

(7) The remedies, penalties, and procedures provided under this section are cumulative.

(e) The Division of Labor Standards Enforcement may promulgate and enforce rules and regulations, and issue determinations and interpretations, consistent with and necessary for the implementation of this section. Those rules and regulations, determinations, and interpretations shall have the force of law and may be relied upon by employers, employees, and other persons to determine their rights and responsibilities under this section.

(f) Nothing in this section shall prohibit a local government agency from enacting ordinances that impose greater standards than, or establish additional enforcement provisions to, those prescribed by this section. This section shall not be construed to limit a discharged employee or eligible employee's right to bring a common law cause of action for wrongful termination.

(g) All of the provisions of this section, or any part of this section, may be waived in a valid collective bargaining agreement, but only if the waiver is explicitly set forth in that agreement in clear and unambiguous terms. Unilateral implementation of terms and conditions of employment by either party to a collective bargaining relationship shall not constitute or be permitted as a waiver of all or any part of the provisions of this section.

(h) The provisions of this section are severable. If any provision of this section or its application is held invalid, that invalidity shall not affect other provisions or applications that can be given effect without the invalid provision or application.

(i) This section shall remain in effect only until December 31, 2024, and as of that date is repealed.

SEC. 2. The sum of six million dollars (\$6,000,000) is hereby appropriated and available through June 30, 2025, from the Labor and Workforce Development Fund to the Labor Commissioner for staffing resources to implement and enforce the provisions related to the rehiring and retention of workers displaced due to the COVID-19 pandemic as described in Section 2810.8 of the Labor Code.

SEC. 3. This act is a bill providing for appropriations related to the Budget Bill within the meaning of subdivision (e) of Section 12 of Article IV of the California Constitution, has been identified as related to the budget in the Budget Bill, and shall take effect immediately.



City of Gilroy

STAFF REPORT

Agenda Item Title: Review and Approve an Extension to the Memorandum of Understanding and Related Salary Schedules for the Gilroy Police Officers Association for the Period Ending June 30, 2025

Meeting Date: April 3, 2023

From: Jimmy Forbis, City Administrator

Department: Administrative Services

Submitted By: LeeAnn McPhillips, Administrative Services and Human Resources Director / Risk Manager

Prepared By: LeeAnn McPhillips, Administrative Services and Human Resources Director / Risk Manager

STRATEGIC PLAN GOALS

Not Applicable

RECOMMENDATION

1. Approve the Extension and Supplemental Agreement to the Memorandum of Understanding with the Gilroy Police Officers Association for the Period Ending June 30, 2025.
2. Adopt by Resolution the Salary Schedules Associated with the Gilroy Police Officers Association Memorandum of Understanding/Supplemental Agreement for the Period July 1, 2023 - June 30, 2025.

EXECUTIVE SUMMARY

The Gilroy Police Officers Association (GPOA) requested to engage in discussions with the City regarding the terms of their current Memoranda of Understanding (MOU). Although in a closed agreement, the City Council authorized City negotiators to hold discussions with the GPOA because the GPOA had agreed to concessions during the Covid recession and was the only labor group that did not discuss MOU terms following the Covid recovery period. As a result of the discussions, a Supplemental Agreement to

Review and Approve an Extension to the Memorandum of Understanding and Related Salary Schedules for the Gilroy Police Officers Association for the Period Ending June 30, 2025.

the GPOA Memorandum of Understanding is being presented to the City Council for review and approval.

BACKGROUND

In 2020, as a result of the Covid recession, the GPOA agreed to financial concessions that were memorialized in a Supplemental Agreement. Of note, the GPOA gave up a four percent (4%) salary increase that was scheduled for July 1, 2020 and agreed to a reduced salary increase from 4% to 3% for FY 22. In addition, the parties agreed to extend the MOU for two additional years through June 30, 2024 with a 3% salary increase each year.

At the beginning of the current fiscal year (FY 23), all the other labor groups reached agreements on new labor contracts. These contracts focused on recruitment and retention of employees and provided various salary and benefit improvements. As noted above, the GPOA was the only group that did not negotiate a new MOU at the start of FY 23 as the GPOA agreement was not scheduled to expire until June 30, 2024.

The GPOA Supplemental Agreement, like the other employee agreements approved earlier this fiscal year, contain retention salary steps added to the upper end of the salary schedule. These retention steps are designed to encourage employee retention as the employee can only earn the retention steps through years of service and a good employee performance evaluation.

The additional year added to the MOU provides important labor stability for the organization. In addition, the employees know what salary increases are scheduled so they can plan for the future. Also, the future salary increases are an important tool when recruiting new Police Officers and Detention Services Officers as this information is shared with job applicants and the future compensation increases are very attractive to new hires.

ANALYSIS

The new Supplemental Agreement to the GPOA MOU being presented includes the following changes:

- Term of MOU is extended for one year through June 30, 2025.
- The salary increases scheduled for FY 24 (1.5% - 7/1/23; 1.5% 1/1/24) are deleted and replaced with a 4% increase effective 7/1/23.
- A 2.5% retention step (Step F) is added effective 1/1/24. To access this step the employee must have one year at Step E, must have completed five years of service, and must have a good performance evaluation.
- A 3% cost of living increase effective 7/1/24 (COLA).

Review and Approve an Extension to the Memorandum of Understanding and Related Salary Schedules for the Gilroy Police Officers Association for the Period Ending June 30, 2025.

- A 2.5% retention step (Step G) is added effective 1/1/25. To access this step the employee must have one year at Step F, must have completed five years of service, and must have a good performance evaluation.
- Added two new specialty assignments to qualify/requalify for the existing Master Officer Program.
- Small increase (\$2 per employee per month) to the City-paid portion of the Long-Term Disability insurance program.
- Continue existing Retiree Medical Trust contributions through term of MOU.

FISCAL IMPACT/FUNDING SOURCE

The new cost associated with the Supplemental Agreement provisions is estimated to be \$225,000 for FY 24 and approximately \$592,000 for FY 25. These amounts will be included in the FY 24 and FY 25 budget that will be presented to Council in June 2023.

NEXT STEPS

Following Council approval of the Supplemental Agreement and related Salary Schedules, City representatives will sign-off on the Supplemental Agreement document. The two minor benefit changes will go into effect immediately (LTD & Master Officer Program changes) while the salary changes included in the Agreement are not effective until FY 24 and 25 and will not be implemented until the effective dates noted in the Supplemental Agreement.

Attachments:

1. Gilroy Police Officers Association Supplemental Agreement – April 3, 2023
2. Salary Resolution and Related Salary Schedules for the period July 1, 2023 – June 30, 2025

City of Gilroy/Gilroy Police Officers Association | 2023

MEMORANDUM OF UNDERSTANDING EXTENSION

SUPPLEMENTAL AGREEMENT

EFFECTIVE UPON GILROY CITY COUNCIL APPROVAL

APRIL 3, 2023

At this time, the City of Gilroy ("City") and the Gilroy Police Officers Association ("GPOA") have agreed to extend the current Memorandum of Understanding (MOU) for represented employees and intend to maintain the terms of the MOU subject to the below changes. On a non-precedent setting basis, the parties agreed to the below changes considering the concessions that were agreed upon in 2020 because of Covid-19. Due to the prior GPOA MOU extension with concessions, the GPOA was the only Gilroy labor group that did not have formal negotiations with the City since the time of the 2020 concessions.

Approval of Parties

The terms of this Tentative Agreement are subject to final approval of the City Council. The members of the GPOA approved the terms of this Tentative Agreement on February 23, 2023.

Term of Agreement

This Agreement shall be effective upon ratification and approval by the members of the GPOA (occurred on February 23, 2023) and upon approval by the Gilroy City Council (scheduled for April 3, 2023). The Term of the Memorandum of Understanding shall be extended from the effective date through June 30, 2025.

Salaries

MOU Article IV, Sections A and B as amended by the Supplemental Agreement approved by the Gilroy City Council on August 3, 2021, are amended as follows:

1. Effective the start of the pay period beginning July 1, 2021 the salaries for all bargaining unit members (except those who are Y-rated) shall be increased by one and one-half percent **(1.5%)**.

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2. Effective the start of the pay period beginning January 1, 2022 the salaries for all bargaining unit members (except those who are Y-rated) shall be increased by one and one-half percent **(1.5%)**.
3. Effective the start of the pay period beginning July 1, 2022 the salaries for all bargaining unit members (except those who are Y-rated) shall be increased by one and one-half percent **(1.5%)**.
4. Effective the start of the pay period beginning January 1, 2023 the salaries for all bargaining unit members (except those who are Y-rated) shall be increased by one and one-half percent **(1.5%)**.
- ~~5. Effective the start of the pay period beginning July 1, 2023 the salaries for all bargaining unit members (except those who are Y-rated) shall be increased by one and one-half percent **(1.5%)**.~~
- ~~6. Effective the start of the pay period beginning January 1, 2024 the salaries for all bargaining unit members (except those who are Y-rated) shall be increased by one point five percent **(1.5%)**.~~
5. Effective the start of the pay period beginning July 1, 2023 the salaries for all bargaining unit members (except those who are Y-rated) shall be increased by three percent (3%). In addition, effective the start of the pay period beginning July 1, 2023, the salaries for all bargaining unit members (except those who are Y-rated) shall be further increased by a one percent (1.0%) Equity Adjustment. (Exhibit A to this Supplemental Agreement incorporates both the Salary and Equity Adjustment).
6. Effective the start of the pay period beginning July 1, 2024 the salaries for all bargaining unit members (except those who are Y-rated) shall be increased by three percent (3%). (Exhibit B to this Supplemental Agreement incorporates this Salary Adjustment).

Retention Steps:

Step F (5 Years)

Effective January 1, 2024, the City will add a new Step F to the salary schedule for each bargaining unit classification. Step F will be set approximately 2.5% higher than the existing Step E. In addition to the normal requirements for Step Advancement (12 months of "meets standards" or better performance at Step E), an employee must have completed five (5) years of service in the bargaining unit.

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Employees who qualify for Step F as of January 1, 2024 (i.e., have both 5 years of service and 12 months at Step E) will be eligible to advance to Step F on January 1, 2024. For these employees, January 1 will become their new evaluation date. All other employees will be eligible to advance to Step F on their regularly scheduled evaluation date.

b. Step G (5 Years)

Effective the first full pay period following January 1, 2025, the City will add a new Step G to the salary schedule for each bargaining unit classification. Step G will be set approximately 2.5% higher than the existing Step F. In addition to the normal requirements for Step Advancement (12 months of “meets standards” or better performance at Step F), an employee must have completed five (5) years of service in the bargaining unit.

Employees will be eligible to advance to Step G on their regularly scheduled evaluation date.

Master Officer Program:

1. Bargaining unit members who meet the following requirements shall receive a 5% Master Officer pay differential (5% of base pay only) in lieu of specialty pays.
2. Initial Program Requirements for any employee in this Unit wishing to join the Master Officer Program.
 - a. Ten (10) years with Gilroy Police Department (GPD). Up to five (5) years of the ten (10) year full-time classification requirement may be met by the employee having held full-time employment in the same classification with another law enforcement agency. The lateral time must be in the same classification the employee holds with Gilroy Police Department.
 - b. Nine (9) years in designated specialties with GPD.
 - (1) Must have at least one (1) year each in at least three (3) different specialties. MSO's may qualify with two (2) different specialties.
 - (2) Specialty assignments must be at least one year in length to initially qualify. Thereafter, partial years may count toward requalification.
 - (3) “Full time” specialties count one year per year of time in specialty. Officers hired in as a lateral officer may count one full-time specialty from their prior law enforcement agency subject to the review and acceptance by the

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city at the city's sole discretion. Lateral officers will be required to submit written documentation for the City's consideration.

- (4) "Half time" specialties count one-half of year per year of time in specialty.
- (5) "Quarter time" specialties count one-quarter of year per year of time actively serving as an instructor in one or more of the areas noted below.
- (6) Three (3) years of qualifying time must be full-time specialties (per the list below). The City, at its sole discretion, may consider an application for Master Officer with less than three years in full-time specialties when the employee's participation in the full-time specialty assignment ends prior to three years as a result of budget reductions causing the specialty assignment to be eliminated.
- (7) Employee can simultaneously perform up to three (3) specialties.
- (8) Supervisors coordinating specialty units who are also members of those specialty units get credit for being a member of the specialty, or for being the coordinator, but not for both simultaneously.

3. Qualifying Specialties:

a. Full Time

- (1) Traffic
- (2) Detectives
- (3) SCCSET, RATTF, REACT, DEA, AB 109, or other full-time task force position
- (4) Canine
- (5) School Resource Officer (SRO)
- (6) Administration Sergeant (Internal Affairs, PIO, etc.)
- (7) ACT
- (8) FTO (not including Corporal)

Note: Employees who have at least one year as a Corporal prior to 7/1/06 may use one year of Corporal time as FTO time for Master Officer Program purposes.

(9) Community Engagement Team

b. Half Time

- (1) CIRT (SOG & HNT)
- (2) CSI
- (3) Arson
- (4) MAIT

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- (5) Firearms Instructor
- (6) Defensive Tactics/Less Lethal Instructor
- (7) Specialty Assignment Coordinators (including, but not limited to, Reserves, MSO, CSI, FTO, etc.)
- (8) Mounted Unit
- (9) Honor Guard
- (10) Drug Recognition Expert
- (11) Electronic Forensic Examiner
- (11)(12) Drone Unit

c. Quarter Time

- (1) First Aid/CPR Instructor
- (2) Driving Instructor
- (3) Explorer Advisor
- (4) Critical Incident Stress Debrief (CISD) Team Member
- (5) Parent Project Instructor
- (6) Fitness Program Coordinator
- (7) Homeless Liaison Officer
- (8) Specialty Assignment Coordinator (Bike Team, Dual Sport)
- (9) SCC Crowd Control Task Force

4. Application Process:

- a. Employee must submit application with appropriate backup information documenting their qualifications.
- b. Employees are responsible for maintaining their qualifications and for providing written proof of compliance to Police Administration.

5. Timeline for Submission of Master Officer Documentation.

- a. Master Officer Pay starts the first of the month following submission (of a complete packet) and approval of the Master Officer qualification packet provided that the packet is submitted to Field Operations Captain by the 15th of the prior month.

6. The number and type of specialty assignments (full-time or collateral) shall remain at the discretion of the Chief of Police.

7. Per General Order 5.4, specialty assignments (full-time and collateral) shall continue to be one year and may be extended by the Chief of Police for an

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additional one year period to a maximum of five years. No maximum tenure for collateral, part-time assignments as listed in GO 5.4.

8. Maintenance of Master Officer Status and Related Pay. In order for an employee to maintain their Master Officer Status and Related Pay once they have originally qualified, Master Officers must complete a. **AND** b. below:
 - a. Starting January 1, 2007, every three years, complete at least one “update class” (at least 24 hours) in a “qualifying specialty” (i.e., a specialty which the employee used to qualify for Master Officer status). The 24 hour requirement does not need to be at the same class or at the same time.
 - b. Every five years, complete at least one full year in any qualifying specialty. Employees may count time in half time and quarter time specialties, however, the time must total a full year, i.e. employee must complete two years in an assignment that is in the half time category and four years in an assignment that is in the quarter time category.
9. Re-Institution of Master Officer Pay. In order to have Master Officer Pay re-instituted, the employee must complete both a. **AND** b. below:
 - a. Completion of an “update class” (at least 24 hours) in a “qualifying specialty” (i.e., a specialty which the employee used to qualify for Master Officer status).
 - b. Completion of a full year in any qualifying specialty. Employees may count time in half time and quarter time specialties, however, the time must total a full year, i.e. employee must complete two years in an assignment that is in the half time category and four years in an assignment that is in the quarter time category.
 - c. Master Officer Pay will be re-instituted effective the July 1 or January 1 following the successful completion of the requirement noted above.

Retiree Medical Trust

MOU Article IV, Section O shall be amended as follows:

1. The Association intends to join the PORAC Retiree Medical Trust (Trust), the sole purpose of which is to provide funding for medical expenses and health insurance costs for eligible retirees or qualified family members of eligible retirees as established by the Trust. Participation in the Trust shall be the complete and sole responsibility of the Association. The City shall not have any involvement in the Trust’s design, its administration, or in the benefits paid; nor shall the City have any responsibility for any actions of the Trust or its

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trustees or of Association with respect to the Trust. The Association will indemnify, defend and hold harmless the City, its agents, officers, and employees, against any and all claims or legal proceedings regarding the operation of the Trust.

2. In lieu of continuing the additional personal leave hours in section VI. J, effective July 1, 2018 and for the term of this agreement, City will contribute \$150 per month on behalf of each bargaining unit member, in one aggregate check, to the Trust, which will include a report on the employees covered by the aggregate contribution.

Effective July 1, 2022 through June 30, 2023, City will contribute \$225 per month on behalf of each bargaining unit member, in one aggregate check, to the Trust, which will include a report on the employees covered by the aggregate contribution. Effective July 1, 2023 through June 30, 2024⁴⁵, City will contribute \$300 per month on behalf of each bargaining unit member, in one aggregate check, to the Trust, which will include a report on the employees covered by the aggregate contribution. Effective June 30, 2024⁴⁵, this paragraph will sunset and the City contribution will revert to \$150 per month as described above.

3. The Association shall have the option, during the life of this agreement, to establish a mandatory employee contribution to the Trust including, but not limited to, an active employee contribution and/or a percentage of accrued vacation at retirement. The Association will notify the City at least thirty (30) days prior to the beginning of any mandatory employee contributions, and the City will transfer that amount to the Trust in one aggregate check. Future changes to the mandatory employee contribution amount will occur at the start of a calendar year and POA will notify the Human Resources Department of the new contribution rate at least thirty (30) days prior to changing the mandatory employee contributions.

Employee Contribution: Beginning with the payroll cycle following the establishment of the Retiree Medical Trust, the City shall deduct, on a pre-tax basis, from each covered employee's payroll \$150.00 per month to the Trust. Effective July 1, 2022 through June 30, 2023, the City shall deduct, on a pre-tax basis, from each covered employee's payroll \$75.00 per month to the Trust. Effective July 1, 2023 through June 30, 2024⁴⁵, employees will not make a monthly pre-tax contribution to the trust.

- a. No employee election forms will be allowed or requested and there is no option for the employee to receive these funds in cash. This employee contribution amount may change in future calendar years following the procedure noted in 3. above.

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- b. Vacation Cash Out: Effective October 1, 2021, Upon a covered employee's separation from City of Gilroy employment, twentyone hundred percent (2100%) of the dollar amount of the employee's vacation cash out shall be deducted on a pre-tax basis and transferred to the Trust. There is no option for the employee to receive the twentyone hundred percent (2100%) portion of the vacation cash out in cash. The percentage amount noted above may change in future calendar years following the procedure noted in 3. above. (The edits noted in b. Vacation Cash Out are incorporated from a prior side letter agreement dated September 30, 2021.)
4. The parties recognize the complexity of maintaining both the Trust and the Retention/Recognition Program and agree that successor MOU negotiations will include negotiations over continued contributions to the Trust and the potential transition from the Retention/Recognition Program to the Trust.

Long Term Disability Insurance:

The City shall contribute up to thirty-~~five~~six dollars (\$~~35~~56.00) per employee per month toward the Long Term/Short Term Disability Insurance Program currently offered through the Association for unit members. The premiums paid by the city on behalf of the members will be considered taxable income so that any benefits received by the member are non-taxable.

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Existing MOU and Supplemental Agreements.

This Tentative Agreement identifies those articles, sections, and subsections of the Memorandum of Understanding and Supplemental Agreements between the City and the Gilroy Police Officers Association that the parties have mutually agreed to revise. All other terms of the Memorandum of Understanding and Supplemental Agreements remain in full force and effect. If approved by the parties, they may generate a new MOU incorporating the terms set forth above.

<u>For the City of Gilroy:</u>	<u>For the Gilroy Police Officers Association:</u>
<u>Signature/Date</u>	<u>Signature/Date</u>
LeeAnn McPhillips, Assistant City Administrator/Administrative Services & Human Resources Director	DocuSigned by: Brian Dutton EC725E7B2A9842C 3/27/2023 Brian Dutton, GPOA Negotiator
Jimmy Forbis, City Administrator	DocuSigned by: Jesus Cortez C85823E0E9C240E 3/27/2023 Jesus Cortez, GPOA President
Jason Smith, Police Captain	DocuSigned by: Andrew Lopez CADA85409C434DA 3/27/2023 Andrew Lopez, GPOA Vice President

RESOLUTION NO. 2023-XX**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF GILROY ESTABLISHING THE JULY 1, 2023, JANUARY 1, 2024, JULY 1, 2024, AND JANUARY 1, 2025 SALARY SCHEDULES FOR EMPLOYEES REPRESENTED BY THE GILROY POLICE OFFICERS ASSOCIATION**

WHEREAS, the City Council does establish salaries for city officers and employees by resolution.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF GILROY, AS FOLLOWS:

1. The previously approved salary scheduled for Gilroy Police Officers Association (GPOA) employees effective July 1, 2023 and January 1, 2024 as part of Resolution 2020-49 are hereby abolished.
2. The salaries effective July 1, 2023 for GPOA employees as set forth in the attached salary schedule consisting of one (1) page is hereby approved and established adding a three percent (3%) cost of living increase and a one percent (1%) equity adjustment for a total increase of four percent (4%).
3. The salaries effective January 1, 2024 for GPOA employees as set forth in the attached salary schedule consisting of one (1) page is hereby approved and established adding Step F (2.5% above Step E; Step F requirements contained in Supplemental Agreement dated April 3, 2023).
4. The salaries effective July 1, 2024 for GPOA employees as set forth in the attached salary schedule consisting of one (1) page is hereby approved and established adding a three percent (3%) cost of living increase.
5. The salaries effective January 1, 2025 for GPOA employees as set forth in the attached salary schedule consisting of one (1) page is hereby approved and established adding Step G (2.5% above Step F; Step G requirements contained in Supplemental Agreement dated April 3, 2023).

PASSED AND ADOPTED this 3rd day of April, 2023 by the following roll call vote:

AYES:	COUNCIL MEMBERS:
NOES:	COUNCIL MEMBERS:
ABSTAIN:	COUNCIL MEMBERS:

Resolution No. 2023-XX
GPOA Salary Schedules July 1, 2023 – June 30, 2025
City Council Regular Meeting | April 3, 2023
Page 2 of 2

ABSENT: **COUNCIL MEMBERS:**

APPROVED:

Marie Blankley, Mayor

ATTEST:

Thai Nam Pham, City Clerk

**POLICE UNIT
SALARY SCHEDULE
(Effective July 1, 2023)**

(3% COLA Increase + 1% Equity Adjustment = 4% Total Salary Increase)

Job Classification Title	Job Class/ Salary Range		Step A	Step B	Step C	Step D	Step E
Police Sergeant	700	SP35	10,370.33 124,444	10,889.17 130,670	11,432.67 137,192	12,005.92 144,071	12,604.83 151,258
Police Corporal	701	SP33	9,354.33 112,252	9,821.42 117,857	10,312.17 123,746	10,829.42 129,953	11,370.50 136,446
Police Officer	702	SP32	8,738.92 104,867	9,176.00 110,112	9,635.33 115,624	10,115.75 121,389	10,622.67 127,472
Detention Services Officer*	752	NP29	6,539.33 78,472	6,866.67 82,400	7,209.42 86,513	7,569.83 90,838	7,948.33 95,380

SP = Sworn Personnel Classifications

NP = Non-Sworn Personnel Classifications

Holiday Pay: 7.02% of base pay in lieu of holidays (GPOA MOU Article IV, Section J)

Bilingual Pay: 5% of base pay based on Police Chief's approval and test (GPOA MOU Article IV, Section K)

Master Officer Pay: 5% of base pay in lieu of specialty pays (GPOA MOU Article IV, Section E)

Canine and Mounted Unit Officers receive an additional \$421.38 per month (GPOA MOU Article IV, Section M)

*Effective with the 7/1/23 salary schedule, the DSO salary range/steps now exceeds the former MSO salary range/steps that was y-rated. One employee remains in the MSO classification and will now convert to DSO and will no longer be y-rated.

NP Classes receive \$77.75 per month uniform allowance.

SP Classes receive \$116.67 per month uniform allowance.

SP/CIRT receive a one time \$200.00 uniform/equipment requirement

SP/CIRT receive a one time \$150.00 uniform/equipment requirement

SP/HNT receive a one time \$150.00 uniform/equipment requirement

SWORN PERSONNEL

5% Educational incentive available for an AA/AS Degree or an Intermediate POST Certificate.

7.5% Educational incentive available for a BA/BS Degree (or higher) or an Advanced POST Certificate.

(Maximum educational total: 7.50%)

NON-SWORN PERSONNEL (DSO)

3.5% Educational incentive available for 30 semester college units or Basic POST Certificate.

5.0% Educational incentive available for 60 semester college units or Intermediate POST Certificate.

(Maximum educational total: 5.0%)

Note: Annual salary amounts are rounded to the nearest dollar. Steps A - E are approximately 5% between steps.

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POLICE UNIT
SALARY SCHEDULE
(Effective January 1, 2024)
(Addition of Step F - 2.5% Retention Step)

Job Classification Title	Job Class/ Salary Range		Step A	Step B	Step C	Step D	Step E	Step F*
Police Sergeant	700	SP35	10,370.33 124,444	10,889.17 130,670	11,432.67 137,192	12,005.92 144,071	12,604.83 151,258	12,919.92 155,039
Police Corporal	701	SP33	9,354.33 112,252	9,821.42 117,857	10,312.17 123,746	10,829.42 129,953	11,370.50 136,446	11,654.75 139,857
Police Officer	702	SP32	8,738.92 104,867	9,176.00 110,112	9,635.33 115,624	10,115.75 121,389	10,622.67 127,472	10,888.25 130,659
Detention Services Officer	752	NP29	6,539.33 78,472	6,866.67 82,400	7,209.42 86,513	7,569.83 90,838	7,948.33 95,380	8,147.08 97,765

SP = Sworn Personnel Classifications

NP = Non-Sworn Personnel Classifications

Holiday Pay: 7.02% of base pay in lieu of holidays (GPOA MOU Article IV, Section J)

Bilingual Pay: 5% of base pay based on Police Chief's approval and test (GPOA MOU Article IV, Section K)

Master Officer Pay: 5% of base pay in lieu of specialty pays (GPOA MOU Article IV, Section E)

Canine and Mounted Unit Officers receive an additional \$421.38 per month (GPOA MOU Article IV, Section M)

*1/1/24 salary schedule adds Step F - 2.5% Step (merit step, one year at Step E, and completion of 5 years of service requirement per MOU).

NP Classes receive \$77.75 per month uniform allowance.

SP Classes receive \$116.67 per month uniform allowance.

SP/CIRT receive a one time \$200.00 uniform/equipment requirement

SP/CIRT receive a one time \$150.00 uniform/equipment requirement

SP/HNT receive a one time \$150.00 uniform/equipment requirement

SWORN PERSONNEL

5% Educational incentive available for an AA/AS Degree or an Intermediate POST Certificate.

7.5% Educational incentive available for a BA/BS Degree (or higher) or an Advanced POST Certificate.

(Maximum educational total: 7.50%)

NON-SWORN PERSONNEL (MSO/DSO)

3.5% Educational incentive available for 30 semester college units or Basic POST Certificate.

5.0% Educational incentive available for 60 semester college units or Intermediate POST Certificate.

(Maximum educational total: 5.0%)

Note: Annual salary amounts are rounded to the nearest dollar. Steps A - E are approximately 5% between steps. Steps E - F are approximately 2.5% between steps.

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**POLICE UNIT
SALARY SCHEDULE
(Effective July 1, 2024)
(3% Salary Increase)**

Job Classification Title	Job Class/ Salary Range		Step A	Step B	Step C	Step D	Step E	Step F*
Police Sergeant	700	SP35	10,681.42 128,177	11,215.83 134,590	11,775.67 141,308	12,366.08 148,393	12,983.00 155,796	13,307.50 159,690
Police Corporal	701	SP33	9,635.00 115,620	10,116.08 121,393	10,621.50 127,458	11,154.33 133,852	11,711.58 140,539	12,004.42 144,053
Police Officer	702	SP32	9,001.08 108,013	9,451.25 113,415	9,924.42 119,093	10,419.25 125,031	10,941.33 131,296	11,214.92 134,579
Detention Services Officer	752	NP29	6,735.50 80,826	7,072.67 84,872	7,425.67 89,108	7,796.92 93,563	8,186.75 98,241	8,391.50 100,698

SP = Sworn Personnel Classifications

NP = Non-Sworn Personnel Classifications

Holiday Pay: 7.02% of base pay in lieu of holidays (GPOA MOU Article IV, Section J)

Bilingual Pay: 5% of base pay based on Police Chief's approval and test (GPOA MOU Article IV, Section K)

Master Officer Pay: 5% of base pay in lieu of specialty pays (GPOA MOU Article IV, Section E)

Canine and Mounted Unit Officers receive an additional \$421.38 per month (GPOA MOU Article IV, Section M)

*1/1/24 salary schedule adds Step F - 2.5% Step (merit step, one year at Step E, and completion of 5 years of service requirement per MOU).

NP Classes receive \$77.75 per month uniform allowance.

SP Classes receive \$116.67 per month uniform allowance.

SP/CIRT receive a one time \$200.00 uniform/equipment requirement

SP/CIRT receive a one time \$150.00 uniform/equipment requirement

SP/HNT receive a one time \$150.00 uniform/equipment requirement

SWORN PERSONNEL

5% Educational incentive available for an AA/AS Degree or an Intermediate POST Certificate.

7.5% Educational incentive available for a BA/BS Degree (or higher) or an Advanced POST Certificate.

(Maximum educational total: 7.50%)

NON-SWORN PERSONNEL (MSO/DSO)

3.5% Educational incentive available for 30 semester college units or Basic POST Certificate.

5.0% Educational incentive available for 60 semester college units or Intermediate POST Certificate.

(Maximum educational total: 5.0%)

Note: Annual salary amounts are rounded to the nearest dollar. Steps A - E are approximately 5% between steps. Steps E - F are approximately 2.5% between steps.

Rev. 03/23

POLICE UNIT
SALARY SCHEDULE
(Effective January 1, 2025)
(Addition of Step G - 2.5% Retention Step)

Job Classification Title	Job Class/ Salary Range		Step A	Step B	Step C	Step D	Step E	Step F*	Step G*
Police Sergeant	700	SP35	10,681.42 128,177	11,215.83 134,590	11,775.67 141,308	12,366.08 148,393	12,983.00 155,796	13,307.50 159,690	13,640.17 163,682
Police Corporal	701	SP33	9,635.00 115,620	10,116.08 121,393	10,621.50 127,458	11,154.33 133,852	11,711.58 140,539	12,004.42 144,053	12,304.50 147,654
Police Officer	702	SP32	9,001.08 108,013	9,451.25 113,415	9,924.42 119,093	10,419.25 125,031	10,941.33 131,296	11,214.92 134,579	11,495.25 137,943
Detention Services Officer**	752	NP29	6,735.50 80,826	7,072.67 84,872	7,425.67 89,108	7,796.92 93,563	8,186.75 98,241	8,391.50 100,698	8,601.25 103,215

SP = Sworn Personnel Classifications

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Holiday Pay: 7.02% of base pay in lieu of holidays (GPOA MOU Article IV, Section J)

Bilingual Pay: 5% of base pay based on Police Chief's approval and test (GPOA MOU Article IV, Section K)

Master Officer Pay: 5% of base pay in lieu of specialty pays (GPOA MOU Article IV, Section E)

Canine and Mounted Unit Officers receive an additional \$421.38 per month (GPOA MOU Article IV, Section M)

*1/1/24 salary schedule adds Step F - 2.5% Retention Step (merit step, one year at Step E, and completion of 5 years of service requirement per MOU). 1/1/25 salary schedule adds Step G - 2.5% Retention Step (merit step, one year at Step F, and completion of 5 years of service requirement per MOU).

NP Classes receive \$77.75 per month uniform allowance.

SP Classes receive \$116.67 per month uniform allowance.

SP/CIRT receive a one time \$200.00 uniform/equipment requirement

SP/CIRT receive a one time \$150.00 uniform/equipment requirement

SP/HNT receive a one time \$150.00 uniform/equipment requirement

SWORN PERSONNEL

5% Educational incentive available for an AA/AS Degree or an Intermediate POST Certificate.

7.5% Educational incentive available for a BA/BS Degree (or higher) or an Advanced POST Certificate.

(Maximum educational total: 7.50%)

NON-SWORN PERSONNEL (MSO/DSO)

3.5% Educational incentive available for 30 semester college units or Basic POST Certificate.

5.0% Educational incentive available for 60 semester college units or Intermediate POST Certificate.

(Maximum educational total: 5.0%)

Note: Annual salary amounts are rounded to the nearest dollar. Steps A - E are approximately 5% between steps. Steps E - G are approximately 2.5% between steps.

Rev. 03/23



City of Gilroy

STAFF REPORT

Agenda Item Title: Updates to Employment Agreement for City Administrator Jimmy Forbis

Meeting Date: April 3, 2023

From: Marie Blankley, Mayor

Department: City Council

Submitted By: Marie Blankley, Mayor

Prepared By: LeeAnn McPhillips, Administrative Services and Human Resources Director / Risk Manager

STRATEGIC PLAN GOALS

Not Applicable

RECOMMENDATION

Approve updates to City Administrator's Employment Agreement effective April 3, 2023 and authorize the Mayor to sign the Employment Agreement on behalf of the City/City Council.

EXECUTIVE SUMMARY

The City Council recently completed the City Administrator's annual performance evaluation process. Following that process, a brief contract negotiations process was completed with the Mayor serving as the negotiator. At this time, the Mayor is presenting an updated Employment Agreement with two changes for the City Council's consideration.

BACKGROUND

The two recommended changes to the City Administrator's Employment Agreement are effective January 1, 2023 as follows:

- Increase vacation accrual from three weeks per year to four weeks per year.
- Increase City's contribution to the City Administrator's 457 deferred compensation plan from 50% of the regular annual maximum (\$11,250 annually)

contribution to 100% of the regular annual maximum (\$22,500 annually). This annual amount adjusts each year with the maximum limit set by the Internal Revenue Code.

All other terms and conditions of employment will remain as is.

A copy of the City Administrator's employment agreement with these two changes noted in the track changes format is attached for reference.

FISCAL IMPACT/FUNDING SOURCE

The new cost associated with the above changes is \$11,250 annually for the increased cost of the City contribution to the deferred compensation plan. The increase in vacation does not have a direct hard cost as the benefit is in the form of time off and is only paid out in cash upon separation from employment.

NEXT STEPS

Upon Council approval of the amended employment agreement, the agreement will be put in the final (non-track changes) form and signed by the City Administrator and Mayor.

Attachments:

1. Revised Employment Agreement for City Administrator, Jimmy Forbis

DRAFT AGREEMENT**Employment Agreement**

This Employment Agreement is made and entered into this ~~5th~~^{3rd} day of ~~October~~^{April}, 202~~0~~³, by and between the CITY OF GILROY, California, a municipal corporation, (hereinafter called "Employer") and JIMMY FORBIS, (hereinafter called "Employee") both of whom agree as follows:

Section 1: Term

This agreement shall remain in full force and effect from ~~April~~^{October} ~~6~~³, 202~~0~~³ until terminated as provided in Sections 6 or 7 of this agreement.

Section 2: Duties and Authority

Employer employs Jimmy Forbis as City Administrator to perform the functions and duties specified in the City of Gilroy charter and to perform other legally permissible and proper duties and functions.

Section 3: Compensation

A. Base Salary: Employer agrees to pay Employee an annual base salary of \$277,614.00 payable in monthly installments (\$23,134.37) on the first business day of the month for the prior month of service.

B. Future Salary Increases: Employee's annual base salary will be ten percent (10%) above the highest paid executive-level position in the City. If the highest paid executive-level employee receives a cost-of-living percentage increase approved by the City Council, the same cost-of-living percentage increase will be provided to the Employee.

C. Effective ~~January 1, 2023~~^{October 6, 2020}, Employer shall contribute to the Employee's 457 Deferred Compensation Plan (employee must select from an already established city plan) an amount equivalent to ~~one hundred~~^{fifty} percent (~~5~~¹⁰⁰%) of the Internal Revenue Code ~~regular~~ maximum annual 457 plan contribution limit. The 2023 limit is \$22,500 and this amount may change annually. Employer's 457 plan contribution shall be made monthly with Employee's payroll.

D. Other than the above, there is no guarantee or promise of any increase in salary or deferred compensation benefit.

Section 4: Benefits, Vacation and Leaves of Absence

A. Except as specifically provided herein, Employer agrees to provide Employee the same level of health insurance, disability and life insurance, retirement, sick leave (accrue 8 hours per month/12 days per year) and other benefits provided to department head employees of the City of Gilroy.

B. Effective January 1, 2023, employee shall accrue vacation at the rate of ~~45~~²⁰ days/~~126⁶⁰ hours per working year (accrued at rate of ~~13.33~~⁹ hours per month). Future vacation accrual changes shall be at the same rate and schedule as other department head employees of the City of Gilroy.~~

C. Employee shall have a bank of 44 hours paid personal leave benefits, which shall be replenished on the first day of each fiscal year. Unused personal leave hours shall carry over from

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year to year and there shall be no cap on personal leave accrual.

D. Employee shall have a bank of 80 hours of paid administrative leave benefits (beginning with FY 21), which shall be replenished on the first day of each fiscal year. Unused administrative leave hours shall carry over from year to year and there shall be no cap on administrative leave accrual.

E. Once per fiscal year, the Employee may elect to cash out up to eighty (80) hours of available personal leave and/or administrative leave.

F. Employee may not use accrued leave to extend their employment prior to resignation or retirement.

G. Upon termination of Employee's employment for whatever reason, Employee or his estate, shall be compensated for all accrued, but unused vacation time, paid holidays and other benefits, to the fullest extent provided by state law and City of Gilroy policy. Administrative leave hours and personal leave hours shall only be compensated to the maximum of eighty (80) hours plus the current fiscal years' accrual as indicated in 4C, 4D, and 4E above. Upon termination, unused sick leave (if any) is not compensated, but is reported to California Public Employees Retirement System ("CalPERS") for service credit if Employee retires from the City of Gilroy consistent with CalPERS regulations.

Section 5: Use of City Pool Vehicle

For the term of this agreement, Employer agrees to assign Employee, a city pool vehicle to utilize for City of Gilroy business. In addition, Employee may take vehicle home (Morgan Hill, CA) and may drive vehicle to and from work.

Section 6: General Business Expenses

Employer agrees to budget for and to pay for professional dues and subscriptions of the Employee necessary for continuation and full participation in the League of California Cities and ICMA. Subject to budgeting approved by the City Council, Employer will also pay for professional dues and subscriptions of the Employee necessary for his membership and participation in other similar national, regional, state, and local associations, and organizations necessary and desirable for the Employee's continued professional participation, growth, and advancement, and for the good of the Employer.

Employer agrees to budget for and to pay for travel and subsistence expenses of Employee for professional and official travel, meetings, and occasions to adequately continue the professional development of Employee and to pursue necessary official functions for Employer, through the League of California Cities, and the ICMA, and committees of the League of California Cities and ICMA in which Employee serves as a member. Subject to budgeting approved by the City Council, Employer will also pay for travel and subsistence expenses of Employee for professional and official travel, meetings and occasions of other similar national, regional, state, and local governmental groups and committees in which Employee serves as a member.

C. Subject to budgeting approved by the City Council, Employer also agrees to budget for and to pay for travel and subsistence expenses of Employee for short courses, institutes, and seminars that are necessary for the Employee's professional development and for the good of the Employer. At least annually, the Employee will provide Employer with a written report of such professional development activities.

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D. Employer recognizes that certain expenses of a non-personal but job-related nature are incurred by Employee and agrees to reimburse or to pay said general expenses. Subject to appropriation, the finance director is authorized to disburse such moneys upon receipt of duly executed expense or petty cash vouchers, receipts, statements or personal affidavits.

Section 7: Performance Evaluation

Employer shall provide a written performance appraisal to Employee not less than annually. The appraisal process shall be in accordance with specific job criteria to be developed jointly by Employer and Employee. Job criteria may be added, modified or deleted by the Employer, in consultation with Employee. At a minimum the appraisal process shall include the opportunity for both parties to: (1) prepare a written evaluation, (2) meet and discuss the evaluation, and (3) present a written summary of the evaluation results. The final written evaluation should be completed and delivered to the Employee within 30 days after the evaluation meeting. Receipt of a performance appraisal does not guarantee an increase in compensation.

Section 8: Hours of Work

It is recognized that the Employee must devote a great deal of time outside the normal hours of business for the City, and to that end Employee shall be allowed to establish an appropriate work schedule.

Section 9: Outside Activities

The employment provided for by this Agreement shall be the Employee's sole employment. Recognizing that certain outside consulting or teaching opportunities provide indirect benefits to Employer and the community, subject to prior approval by the City Council, Employee may elect to accept limited teaching, consulting or other business opportunities which do not interfere with nor create a conflict of interest (or the appearance of a conflict of interest) with the performance of his duties or obligations under this Agreement, or place the City, the City Council or the Employee in an unfavorable light.

Section 10: Involuntary Termination

For the purpose of this agreement, involuntary termination of employment shall occur:

A. Upon the death or continued inability of Employee to perform the essential functions and duties of the job for a period greater than twelve-work weeks in any twelve-month period, whether such inability results from Employee's physical or mental disability, or a serious health condition, unless a longer disability period is agreed to by the City Council.

B. Following a vote by a majority of the City Council to terminate the Employee which vote occurs at a duly authorized public meeting. If the City Council is not able to provide Employee with thirty (30) days' notice, the Employer shall continue to compensate the employee as described by this agreement for a period of thirty (30) days.

C. If the Employee resigns following an offer made by a majority of the City Council to accept resignation.

Section 11: Severance

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A. If after the commencement of the Term of this Agreement set forth in Section 1 above, employment under this Agreement is involuntarily terminated as defined in Section 10 above, for reasons other than death or disability as provided in Section 10A above, and for reasons that do not constitute "Cause" as defined below, provided that Employee signs a release of claims for the benefit of Employer, and its officers, agents and representatives, Employer shall pay to Employee (in addition to any other amounts that may be due to Employee for salary earned as of the date of termination, or accrued but unused vacation or leaves), as consideration for such release, a lump sum cash payment as severance in an amount equal to six months base salary in effect at the time of termination. In addition, and provided that Employee is eligible to and elects to continue his health insurance and life insurance benefits, Employer will pay on Employee's behalf the premiums for such benefits for the same six-month period. At Employee's option, payment of such funds may be made (i) by lump sum payment upon the eighth (8th) day after Employee signs the release of claims; (ii) by lump sum payment upon the later of the eighth (8th) day after Employee signs the release of claims or the first (1st) business day of January thereafter; or (iii) in six (6) equal monthly installments starting the last day of the month after Employee signs the release of claims. Employer shall make all required employment and tax withholdings and deductions prior to making any payments to Employee pursuant to the provisions of this Section 11A.

B. Concurrently with Employee's execution of the release identified in Section 11.A above, and so long as Employee represents and warrants, in writing, to Employer that Employee is unaware of any facts which support Employee's involuntary termination for reasons that may or in fact constitute or lead to a finding of "Cause" as defined below, and there are no facts known to Employer which may or in fact constitute or lead to a finding of "Cause" as defined below, Employer shall execute a release of claims for the benefit of Employee and his heirs, estate, administrators and executors, consistent in scope to the release of claims signed by Employee.

C. If Employee is involuntarily terminated as defined in Section 8 for reasons constituting "Cause", then Employer is not obligated to pay severance under this section. "Cause" constitutes the conviction (including entry of guilty plea or plea of nolo contendere) of any misdemeanor or felony criminal act committed in the course of employment, a crime of moral turpitude, or crime which resulted in personal gain to the Employee; gross neglect or willful failure to perform the duties of the City Administrator, which neglect or failure persists for thirty (30) days after the date of receipt of written notice from Employer to Employee.

D. Employee agrees that the payment of severance payments by the City under this section shall constitute his sole remedy for any claim based upon the termination of his employment with City.

Section 12: Resignation

In the event that Employee voluntarily resigns his position with Employer, he shall provide a minimum of 30 days' notice unless the parties agree otherwise. In the event of resignation, Employer shall owe Employee nothing other than amounts that may be due to Employee for salary earned as of the date of termination and accrued but unused vacation or leaves. Upon notice of resignation, Employer shall have the option of relieving Employee of his duties and responsibilities prior to the effective date of resignation, provided that Employer continues to pay all amounts due to Employee for salary and benefits through and including the date of resignation

Section 13: Indemnification

A. To the fullest extent permitted by law, Employer shall defend, save harmless and indemnify Employee against any and all claims, losses, damages, judgments, interest, settlements, fines,

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court costs and other reasonable costs and expenses of legal proceedings including attorneys fees, and any other liabilities incurred by, imposed upon, or suffered by Employee in connection with or resulting from any claim, action, suit, or proceeding, actual or threatened, arising out of or in connection with the performance of his duties. Said duty to defend, indemnify and save harmless shall include, without limitation, any tort, professional liability claim or demand or other legal action, whether groundless or otherwise, that is asserted by a third-party other than the Employer and arises out of an alleged act or omission occurring in the performance of Employee's duties or resulting from his exercise of judgment or discretion in connection with the performance of his duties or responsibilities, unless the act or omission involved Employee's criminal act, intentional misconduct, or willful or wanton misconduct. The Employee shall promptly give written notice of any claim, threatened claim or litigation. Provided that prompt written notice is given, Employee may request, and the Employer shall not unreasonably refuse to provide independent legal representation with legal counsel selected by Employer at Employer's expense and subject to Employee's approval of the choice of legal counsel, which approval shall not be unreasonably withheld. Legal representation, provided by Employer for Employee, shall extend until a final determination of the legal action including all appeals brought by either party, and will be provided under a reservation of rights to not pay any judgment, compromise or settlement if it is established by a judicial decision or jury verdict after completion of all appeals that the claim arose out of an act that fell outside the scope of Employee's duties and employment or was the result of a criminal act, or willful or wanton misconduct of the Employee.

B. The duty of defense shall include reimbursement of any out-of-pocket expenses incurred by Employee in connection with his service as a witness, party or other participant in litigation, whether such service occurs during or after the termination of Employment.

C. Any duty of Employer to defend or indemnify Employee is contingent upon Employee's full, open and honest cooperation with defense counsel for Employer and Employee. Said duties of defense, indemnity and cooperation shall survive the termination of employment under this Agreement.

D. Employer may elect, at its expense, to obtain policies of insurance that provide coverage for liabilities that are the subject to the foregoing indemnification and defense provisions. The contractual indemnity and defense provisions set forth above are in addition to any defense or indemnity that may be provided to Employee under any contract of insurance, and are not intended to in any way limit, waive or relinquish any right to defense or coverage from a third-party insurer.

Section 14: Bonding

Employer shall bear the full cost of any fidelity or other bonds required of the Employee under any law or ordinance.

Section 15: Notices

Notice pursuant to this Agreement shall be given by depositing in the custody of the United States Postal Service, postage prepaid, addressed as follows:

(1) EMPLOYER: City of Gilroy, Attention: Mayor, 7351 Rosanna Street, Gilroy, CA 95020

(2) EMPLOYEE: Jimmy Forbis, 17010 Holiday Drive, Morgan Hill, CA, 95037

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Alternatively, notice required pursuant to this Agreement may be personally given by hand-delivery to the designated person. Notice shall be deemed given as of the date of personal service or as the date of deposit of such written notice in the course of transmission in the United States Postal Service.

Section 16: General Provisions

A. Integration. This Agreement sets forth and establishes the entire understanding and agreement between the Employer and the Employee relating to the employment of the Employee by the Employer. Any prior discussions or representations by or between the parties are merged into and rendered null and void by this Agreement. The parties by mutual written agreement may amend any provision of this agreement during the life of the agreement. Such amendments shall be incorporated and made a part of this agreement.

B. Binding Effect. This Agreement shall be binding on the Employer and the Employee as well as their heirs, assigns, executors, personal representatives and successors in interest.

C. Severability. The invalidity or partial invalidity of any portion of this Agreement will not affect the validity of any other provision. In the event that any provision of this Agreement is held to be invalid, the remaining provisions shall be deemed to be in full force and effect as if they have been executed by both parties subsequent to the expungement or judicial modification of the invalid provision.

D. This agreement was the subject of negotiation in which each side was advised by professional advisors of his/its own choosing. Accordingly, any presumption that any provision of this agreement should be construed for or against one side or the other is expressly disclaimed.

E. This Agreement is entered into under the laws of the State of California, and venue for any action concerning this Agreement shall be limited to the Superior Court of the County of Santa Clara. Employer and Employee have both read and understand and agree to the provisions of California Government Code Sections 53243 through 53243.4, which are required by law to be included in this Agreement. Said provisions are incorporated into this Agreement by reference as though set out in full herein.

Executed at Gilroy, California, on the date and year first above written.

EMPLOYEE:

EMPLOYER:

JIMMY FORBIS

MARIE BLANKLEY, MAYOR

By: _____

By: _____

APPROVED AS TO FORM:

ATTEST:

City Attorney

City Clerk



City of Gilroy

STAFF REPORT

Agenda Item Title: Report on Potential Temporary/Emergency Housing at Gilroy Transit Center

Meeting Date: April 3, 2023

From: Jimmy Forbis, City Administrator

Department: Administration

Submitted By: Jimmy Forbis, City Administrator

Prepared By: Jimmy Forbis, City Administrator

STRATEGIC PLAN GOALS

Promote Safe Affordable Housing for All

RECOMMENDATION

Receive report.

BACKGROUND

Homelessness is a growing local, regional, and state-wide trend and a challenge for all governments, especially for local governments.

Gilroy's point-in-time homeless count (unsheltered and sheltered) increased by 16% from 2019 to 2022 (704 to 814), continuing the trend that even though Gilroy is only the 8th (out of 15) most populous city in Santa Clara County, it retains the 2nd highest homeless population in the County. The impacts of Covid-19 are still being felt as the pandemic put an economic strain on many of our community's lowest wage earners and has placed the local government in a role normally held by the County.

This growing population, coupled with Gilroy being one of the lowest-income cities in Santa Clara County, puts enormous stress on already limited local government financial resources. It also strains the entire Community as the unhoused population requires significant resources and support, and there are very few providers able to assist, leaving the City as the safety net by default for our unhoused residents.

Much has been said about the conditions that cause homelessness, and the intent of this report is not to outline the underlying conditions but to focus on the impacts of certain social, economic, and/or health issues that have resulted from the number of individuals having no place to reside.

The outbreak of Covid impacted all residents of Gilroy, but the unhoused population faced the challenge of being unable to "shelter-in-place." Fortunately, several government-funded programs were able to provide additional temporary housing options, but as the Covid-19 pandemic subsided, many of those programs have had their funding lapse and are no longer offered to leave a significant gap between what is provided and what is needed with the City looking at options for housing that is both emergency/temporary and permanent. This is a service that the County has historically provided as they receive the tax revenues to address these issues.

In September 2020, the City Council created the Un-Housed Ad Hoc Committee (UAHC) comprising three sitting Council members and City staff. After several months of meeting with the community and unhoused stakeholders, the Committee received approval from the entire City Council to implement 14 different strategies to help the Gilroy community address these challenging issues.

ANALYSIS

The work of the UAHC identified many priorities, including the need to advocate for affordable housing, establish safe parking, adopt the Community Plan to End Homelessness, and partner with the Santa Clara County Office of Supportive Housing (OSH) to access more of their programs and services.

As the Committee sunsetted, staff began evaluating opportunities for emergency/temporary housing to give the City options for locating unhoused individuals into temporary housing, defined as housing that can be relocated as necessary and intended as shelter for up to 6 months per individual. This process began with discussions initiated by the Mayor with the Founder and Chief Executive Officer of Dignity Moves, Elizabeth Funk, whose company mobilizes investment capital to address unsheltered homelessness. Their focus is on temporary/emergency housing at the Gilroy Transit Center, a site previously identified as a potential Measure A permanent housing site that the City and Office of Supportive Housing have moved to the County-owned site at 8th and Alexander.

As Dignity Moves is currently partnering with the City of San Francisco to develop interim housing communities, in November 2022, Mayor Blankley and members of the City's Department Head team visited a site at 33 Gough Street in San Francisco to tour the pilot project that included 70 private rooms for individuals experiencing homelessness. Each room contains a bed, desk, chair, heating, a window, and a door that locks. The community also includes case manager offices, extensive dining and community spaces, a computer lab, a pet area, community gardens, and storage. The site receives 24/7 property management and security services.

As part of the visit, the City looked to understand how a similar concept could work in Gilroy from a public safety, public works, and service point of view. As the site receives federal funding, it is prohibited from denying active drug users, and thus this site does permit the use of illicit drugs. This was a considerable concern of public safety staff due to the secondary challenges with permitting drug use in a housing community (drug-related crime, addiction/overdose, infection, etc.). The housing community had receptacles for needles, needle exchange, and biohazard cleanup program and had medical personnel (and Narcan) onsite, which helps with these challenges, but also significantly adds to the operational costs.

The residents also receive counseling, addiction, mental health, and medical care services at the site. This is funded through HUD, the City of San Francisco, and others.

On December 14, 2022, the Mayor and City Administrator visited an Emergency Interim Housing (EIH) site in South San Jose, which is operated by HomeFirst. This site is a different model than the San Francisco site in that it is completely funded by the City of San Jose at the cost of approximately \$3.4 million annually and houses 78 individuals or \$44,000 per resident. These single-occupancy units each have a private restroom and shower.

The EIH model focuses on transitioning residents to permanent housing using resident advocates, case managers, and clinicians. The site also has 24-hour-a-day security.

In discussions with EIH staff, it was noted that although the site opened in 2021 with the concept that the program offered initial stays of 60 days, the program did not transition residents, with many residing for nearly two years.

In discussions with EIH staff, it was noted that although the initial concept for this program was to offer stays of up to 60 days, the program has not transitioned many residents, with most residing for nearly two years and continuing to do so.

Understanding exactly how these housing facilities operate is important to both staff and the City Council as establishing temporary/emergency housing is costly and, in the examples, has evolved into permanent housing. At this time, per Council direction, City staff will continue to work on permanent, affordable housing projects in residential areas of the City while engaging our local and County partners to provide emergency housing through the Gilroy Armory and emergency shelter at the Gilroy Senior Center and Gilroy library.

ALTERNATIVES

None.

FISCAL IMPACT/FUNDING SOURCE

None currently.

PUBLIC OUTREACH

N/A.

NEXT STEPS

None, unless Council provides direction.