CITY OF BELMONT
CITY COUNCIL

www.belmont.gov

CITY COUNCIL REGULAR MEETING AGENDA
Tuesday, February 11, 2025
6:00 PM
City Council Chambers
City Hall, One Twin Pines Lane, Belmont, California

MEETING ATTENDANCE:
Council meetings, unless otherwise noted, are broadcast live to Belmont residents on

1. Comcast Cable Channel 27
2. Streamed live via the City's website at Belmont.gov,
3. ZOOM https://belmont- gov.zoom.us/ **Meeting ID: 95745673035**
4. Public may attend the meeting in the Council Chambers, Belmont City Hall 2nd floor

PUBLIC COMMENT:

- Public in the Council Chamber present the Clerk a request to speak slip found at the table at the rear of the chamber.
- If participating virtually use the Raise Hand feature to request to speak.
    - For dial- in comments, call *67 1-(669) 900-6833 (your phone number will appear on the live broadcast if *67 is not dialed prior to the phone number),
    - enter **Meeting ID: 95745673035**, and press *9 to request to speak.

All public comments are subject to a **3-minute time limit** unless otherwise determined by the Chair.

If you wish to submit written public comment, you may send an email to cclerk@belmont.gov before the council considers the item. Please indicate the agenda item topic or agenda item number you wish to comment on in your email's subject line. Any public comment regarding agenda items that are received from the time of publication of the agenda and 3 hours before the start of the meeting will be distributed to the Council prior to the meeting and made part of the meeting record. Written public comments will not be read during the Council meeting.

The Mayor has the authority to rule any speaker out of order, including speakers during the Public Comment period; If the subject raised is not within the subject matter jurisdiction of the City Council, during a public hearing or a general business item if the speaker is not presenting testimony or evidence relevant to the matter or if the speaker becomes disruptive to the proceedings and conduct of the meeting.

The Mayor also has the authority to order any person who willfully interrupts the meeting to be removed. All persons are expected to conduct themselves with civility and courtesy at all times. All

persons giving comments shall speak directly to the Council and address issues, not individuals. Personal attacks, cursing and outbursts from the audience in support or opposition to a speaker are not tolerated in order to foster an environment where everyone feels welcome to speak.

1. CALL TO ORDER

2. ROLL CALL

3. CLOSED SESSION [None]

4. PLEDGE OF ALLEGIANCE

5. STUDY SESSION [6:30 p.m.]
The public will have an opportunity to address the City Council concerning this item.

A. **Cannabis Retail Businesses Community Benefit Terms**
Recommendation: Provide direction on the proposed Development Agreement terms under negotiation for the retail cannabis operators under entitlement review at 1397 El Camino Real and 1538 El Camino Real, Suite C and whether to continue to support consideration of one or both retail cannabis applications

Attachment(s):
Staff Report

REGULAR BUSINESS ITEMS [7:00 pm]

6. REPORT FROM CLOSED SESSION

7. SPECIAL PRESENTATIONS

A. **Black History Month Proclamation**

8. PUBLIC COMMENTS ON ITEMS NOT ON THE AGENDA
This portion of the meeting is reserved for persons wishing to address the Body on any City matter not on the agenda. The period for public comment at this point in the agenda is limited to 15 minutes, with a maximum of 3 minutes per speaker. Speakers who requested but did not receive an opportunity to speak during this comment period will be given an opportunity to address the Body later in the meeting. State law prohibits the Body from acting on non-agenda items.

9. COUNCILMEMBER ANNOUNCEMENTS

10. CONSENT BUSINESS
Consent business items are considered to be routine in nature and will be enacted by one motion. There will be no separate discussion on these items unless a member or staff request specific items to be removed for separate action. The City Attorney will read the title of ordinances to be adopted.

A. **Approval of Minutes**
Recommendation: Consider modifications and approve minutes

Attachment(s):
January 14, 2025
January 28, 2025
February 4, 2025

B. **Approval of Council Intergovernmental Assignment Updates**
Recommendation: Consider further modifications and approve the updates

Attachment(s):
2025 Assignment List

C. **Business License Tax Administration Services**
Recommendation: Motion authorizing the City Manager to negotiate and execute a 5-year Task Order with HdL Companies for Business License Tax administration services for an amount not to exceed $625,000, subject to annual Council budget appropriation

Attachment(s):
Staff Report
HdL Proposed Scope of Work - Business License Tax Administration Services

D. **Annual Investment Policy**
Recommendation: Affirm the City of Belmont Investment Policy as submitted by the Finance Director/City Treasurer

Attachment(s):
Staff Report
Investment Policy

E. **MOU with the City of San Bruno for FEMA Pre-Disaster Mitigation Grant and Contracted Fuel Reduction Under FEMA Grant and CAL FIRE Fire Prevention Grant**
Recommendation: Adopt two resolutions: (1) authorizing the City Manager to negotiate and execute a Memorandum of Understanding (MOU) with the City of San Bruno regarding the administration of FEMA Pre-Disaster Mitigation Grant No. LPDM-PJ-09-CA-2023-003 and (2) authorizing the City Manager to negotiate and execute two agreements purchasing fuel reduction work to be reimbursed by the FEMA grant and CAL FIRE Fire Prevention Grant No. 5GG21211 for a combined amount not to exceed $403,704

Attachment(s):
Staff Report
Resolution - MOU
Resolution - Fuel Reduction Contracts
Draft MOU

F. **Revised Emergency Services Council Joint Powers Agreement (JPA)**
Recommendation: Approve the Second Revised and Restated Joint Exercise of Powers Agreement for the San Mateo County Operational Area Emergency Services Organization and authorize the City Manager to execute

Attachment(s):
Staff Report
Resolution
ESC-JPA MOU

G. **Ordinance Repealing Provisions in the Belmont City Code Chapter 12 and 19 Pertaining to Business Licenses Superseded by Measure DD and Amending Solicitor Regulations Contained Therein**
Recommendation: Adopt ordinance as prsented

Attachment(s):

Ordinance

H. **Ongoing Communications Outreach and Consulting Services**
Recommendation: Authorize the City Manager to negotiate and execute Task Order No. 3 to the Master Service Agreement with The Lew Edwards Group to provide communications outreach and consulting services in the amount of $78,000 plus a 10% contingency, for a total Agreement not-to-exceed amount of $381,600

Attachment(s):
Staff Report

I. **Fiscal Year 2025-26 Budget Calendar**
Recommendation: Adopt motion approving Fiscal Year 2025-26 Budget Calendar

Attachment(s):
Staff Report
Proposed FY 2025-26 Budget Calendar

J. **Bishop Subdivision Open Space and Fire Road Acceptance**
Recommendation: Adopt a resolution accepting the Bishop subdivision's street improvements and fire road as completed and compliant with the City's approved plans, authorizing the release of subdivision improvement bond, accepting a maintenance and warranty bond for the required one-year warranty period, and accepting the dedication of open space

Attachment(s):
Staff Report
Resolution
Resolution - Irrevocable Offer of Dedication
Recorded Parcel Map
Agreement Containing Covenants Affecting Real Property

11. PUBLIC HEARINGS (None)

12. GENERAL BUSINESS

General Business items are considered separately, typically in the order listed. The chair will call for public comment on each item when the body considers the item.

A. **Adoption of Updated Sanitary Sewer Master Plan**
Recommendation: Motion to adopt the updated Sanitary Sewer Master Plan (Plan), a forward-looking document that guides the management, maintenance, and development of the City's sewer infrastructure

Attachment(s):
Staff Report
Proposed Projects Summary
Sanitary Sewer Master Plan
Harbor Industrial Area Sanitary Sewer Master Plan

B. **Report on Mid-Year Financial Results as of December 31, 2024**
Recommendation: Adopt resolutions amending the City of Belmont and Belmont Fire Protection District (BFPD) fiscal year (FY) 2024-25 budgets

Attachment(s):
Staff Report

Resolution - City of Belmont - Mid Year Resolution with Exhibit A Summarizing Proposed Budget Amendments by Fund
Resolution - Belmont Fire Protection District - Mid Year Resolution with Exhibit A Summarizing Proposed Budget Amendments by Fund
Mid-Year Financial Reports.pdf

C. **Appointment to City Commissions**
Recommendation: (1) Motion to appoint two residents to the Planning Commission; (2) Motion to appoint three residents as voting members and up to two non-voting youth members to the Parks and Recreation Commission.

Attachment(s):
Staff Report

13. BRIEF VERBAL REPORTS FROM MEMBERS AND STAFF

A. **Verbal report from Councilmembers on Intergovernmental (IGR) and Subcommittee Assignments**
B. **Verbal report from City Manager**

14. MATTERS OF INTEREST/CLARIFICATION

Items in this category are for discussion and direction to staff only. However, Council/Board may take final action on an item if there is no need for additional staff analysis.

A. **Discussion and Consideration of Endorsing San Mateo County's March Ballot Measure A**
Recommendation: The Council is asked to consider endorsing the March 4, 2025 Special Election Ballot Measure A - San Mateo County Charter Amendment Measure, and adopting the attached resolution

Attachment(s):
Staff Report
Resolution

15. ADJOURNMENT

If you need assistance to participate in this meeting, please contact the City Clerk at (650) 595-7413. Notification in advance of the meeting will enable the City to make reasonable arrangements to ensure accessibility to this meeting. Meeting information can also be accessed via the internet at: www.belmont.gov. All staff reports will be posted to the web in advance of the meeting, and any writings or documents provided to a majority of the City Council/District Board or Commission regarding any item on this agenda will be made available for public inspection in the City Clerk's Office, One Twin Pines Lane, during normal business hours and at the Council Chambers at City Hall, Second Floor, during the meeting.

AGENDA POSTING: I declare a copy of this agenda was posted at City Hall, One Twin Pines Lane, and the City's website www.belmont.gov on ,by . /s/

STAFF REPORT

Meeting Date:	February 11, 2025
Agency:	City of Belmont
Staff Contact:	Kathy Kleinbaum, Assistant City Manager
Agenda Title:	Cannabis Retail Businesses Community Benefit Terms
Agenda Action:	Discussion & Direction

Recommendation

Provide direction on the proposed Development Agreement terms under negotiation for the retail cannabis operators under entitlement review at 1397 El Camino Real and 1538 El Camino Real, Suite C and whether to continue to support consideration of one or both retail cannabis applications.

Strategic Focus Area

Economic Development and Housing

Background

The Belmont City Council has evaluated allowing cannabis-related businesses to operate in the City since January 2021.The City Council adopted a Cannabis Retail and Distribution Overlay Zoning District (S-3) on November 28, 2023 that may be applied to properties located in the El Camino Real corridor between O'Neill Avenue and F Street. Properties within this area may apply to be rezoned to the S-3 District and can then be considered for a Cannabis Use Permit to operate a cannabis retail and distribution business. The S-3 Overlay District allows for up to 2 cannabis retail and distribution businesses within this area, provided that they are located at least 600-feet apart and are not adjacent to any sensitive uses such as childcare facilities or schools.

The City Manager's Office created a process to pre-qualify interested businesses prior to them applying to be rezoned to the S-3 Overlay District. The process allowed staff to vet the proposed businesses with regards to the site attributes of their location, business operations, security plans, and potential benefits to the community. In addition, it allowed the City to verify the background and qualifications of all persons associated with the proposed business. Staff from multiple city departments participated in the pre-qualification review process including the Police Department, City Attorney's Office, and Community Development. Four retail cannabis businesses submitted proposals for consideration. No cannabis distribution businesses were interested in locating in Belmont at this time.

As a result of this thorough vetting process, two cannabis retail businesses were invited to go through the entitlement review process: Canna-Bel at 1397 El Camino Real and NUG at 1538 El Camino Real, Suite C. To establish a cannabis retail store, these businesses have applied to have their locations rezoned to the S-3 Overlay District, for a Conditional Use Permit (CUP), and a Cannabis Permit which requires Police Department (PD) review and approval of operational/safety plans and state licensing to ensure that these uses operate in accordance with all applicable laws. Staff have reviewed the applications for

compliance with all required design standards, safety protocols, and the business operators have completed the fingerprinting and background check screening process. In addition, these two businesses meet the distance requirements for both any sensitive uses in the surrounding neighborhood and from each other.

The cannabis entitlement applications will go before the Planning Commission for recommendation and before the City Council for approvals prior to the businesses being issued a Cannabis Permit allowing them to operate. As part of the entitlement process, the City will be entering into a Development Agreement with each business to memorialize their community benefit offers. Although staff intends to bring both applications forward for review at the same time, it is at the City Council's discretion whether to grant entitlement approvals to both locations. Staff anticipates bringing the entitlement applications to the Planning Commission in March.

Analysis

Economic Development Opportunity

Retail cannabis provides an important economic development opportunity for Belmont. Cannabis stores have the potential to provide an ongoing, stable source of revenue for the City from both sales tax and business license tax receipts. The City Council established a business license tax rate of 6% of gross receipts for cannabis retail businesses while the rate for other retailers is 0.4%. These revenues are in addition to any community benefit contribution offered by the cannabis businesses as part of their Development Agreement terms.

Currently, only a handful of cities in San Mateo County allow for retail cannabis operators which means that the local market is not yet saturated. However, there are a lot of uncertainties in the retail cannabis market and not every business that launches is ultimately successful. Staff had extensive discussions with other local communities that have operating retail cannabis storefronts and have learned that while some cannabis retailers are very successful, others are struggling or have closed. In addition, staff in other cities have said they could not have predicted in advance which businesses would ultimately end up being successful. Certain business models and retail styles may resonate better with different segments of the community.

As a result, staff recommends that the City move forward with approving both cannabis retail applications in order to diversify the City's portfolio and provide for some contingency if one operator is ultimately not viable. Given the City's constrained tax revenue streams, it is essential to optimize revenue generation from this key source to support fiscal sustainability and economic growth to support the community's service needs.

Cannabis Retail Businesses

The Canna-Bel dispensary will be located at 1397 El Camino, at the site of the current Sumac restaurant. The property is a stand-alone commercial building at the corner of El Camino and the east-bound leg of Harbor Boulevard that backs up to the Caltrain railroad tracks. The business is a partnership between Benny Lau and Al El-Shawa. Al El Shawa currently operates 3 other cannabis dispensaries in San Francisco: the San Francisco Mission Cannabis Club, the Russian Hill Cannabis Club, and the Union Cannabis Club.

The NUG dispensary will be located at 1538 El Camino Real, Suite C, at the site of the former Jenny Craig outlet. The store front is located within a small strip shopping center on the west-side of El Camino, south of the intersection of the west-bound leg of Harbor Boulevard. The ownership team for the Belmont dispensary includes Hrant Ekmekjian, and Adam Peterson and Raj Pottabathni. The NUG corporate entity and related companies control 29 commercial cannabis permits nationwide and operate 13 retail cannabis locations in California, including several in the East Bay under the NUG brand.

Development Agreement Terms

The Development Agreements with the cannabis retail businesses provide a mechanism for the City to memorialize the proposed community benefit offers and provide the ability for the City to outline specific remedies for non-payment of the proposed community benefits, business license taxes, or other applicable fees. In addition, the Development Agreements provide another lever for the City to ensure compliance with the operating requirements, including the unique security measures, related to this specialized business type. The term of the Development Agreements will be for a 10-year period with an option to renew for an additional 10 years.

The community benefit contributions provided by each business represent the individual proposals and negotiations with each ownership entity based on their unique business operational and financial models.

NUG Community Benefit Terms:

- $50,000 one-time donation to Belmont Parks and Recreation towards purchase of a mobile recreation vehicle
- On-going community benefit contribution of 1.5% of gross receipts up to $12 million revenues, then 2% of gross receipts for revenues above $12 million starting after the first year of operation. The community benefit contribution will be distributed as follows:
    - 50% directly to the City to be used for Parks and Recreation for programming, scholarships, and capital needs
    - 50% to Belmont Community Foundation (BCF) with a provision that if BCF sunsets then the funds are assigned to the City

Canna-Bel Community Benefit Terms:

- On-going community benefit contribution of 1.5% of gross receipts starting after the first year of operation. The community benefit contribution will be distributed as follows:
    - 30% directly to the City to be used for Parks and Recreation programming, scholarships, and capital needs
    - 40% to BCF with a provision that if BCF sunsets then the funds are assigned to the City
    - 30% discretionary, the use of which will be determined on an annual basis by the Canna-Bel Community Advisory Board (made up of designated community stakeholders)

In conclusion, staff seeks the Council's feedback on the proposed Development Agreement terms for the two retail cannabis operators under entitlement review. This includes guidance on whether to proceed with consideration of one or both retail cannabis applications. The community benefit contributions offered by

each business reflect tailored negotiations with each ownership entity, taking into account their distinct operational and financial models. Clear direction from the Council will allow staff to finalize the negotiations for Development Agreements that align with the City's priorities and ensure an equitable approach to community benefits and regulatory compliance.

Alternatives

1. Propose alternative community benefit contributions from the proposed cannabis retail operators.

Attachments

Insert Attachments – list in order with resolution first.

Fiscal Impact

☒ No Fiscal Impact	There is no fiscal impact to this action. Future operation of cannabis retail businesses within the City will generate revenue from business and sales taxes, as well as through community benefit contributions.
☐ Funding Source Confirmed:	

Source:	**Purpose:**	**Public Outreach:**
Council	Council Vision/Priority	Posting of Agenda

CITY OF BELMONT CITY COUNCIL CITY COUNCIL MEETING MINUTES
City Council Chambers, City Hall, One Twin Pines Lane, Belmont, California

TUESDAY, JANUARY 14, 2025

CALL TO ORDER 6:15 PM

ROLL CALL
COUNCILMEMBERS PRESENT: Mates, Pang-Maganaris, Latimerlo, McCune, Jordan
COUNCILMEMBERS ABSENT: None

RECESS TO CLOSED SESSION: 6:17 PM

CLOSED SESSION
Conference with Labor Negotiators (Govt Code Section 54957.6)
Agency designated representatives: Afshin Oskoui, City Manager Employee organization: Mid-Management Confidential Employee Association (MMCEA) and Belmont Police Officers Association (BPOA)

RECONVENE: 7:02 PM

PLEDGE OF ALLEGIANCE
Led by Mayor Mates

REPORT FROM CLOSED SESSION
No reportable action

SPECIAL PRESENTATIONS

Rethink Waste Poster Contest Recognition
Emi Hashizume, Environmental Education Manager introduced the artist and her art.

HIP Housing Calendar Contest Recognition
Daniel Barrera HIP Housing introduced the Belmont artists and their artwork.

AYSO 10UB White Wolves Recognition
Coaches Kristien Karmarkar Neelam Desai introduced the team and spoke on their accomplishments.

PUBLIC COMMENTS ON ITEMS NOT ON THE AGENDA
Chris Lu provided updates on Belmont library events.
Giuliano Carlini congratulated the 10UB team and commented on the need for more bicycle infrastructure in Belmont.
Tom Snider provided comments on wildfire mitigation efforts at Waterdog Park.
Carolyn Hoskins thanked the Council for recent recognition of her Black History Museum.
Victor Garza commented regarding his properties on the unincorporated portion of Alhambra Drive.
Max Reinhardt provided comments on his experience with the certificate compliance process.

DRAFT

Teresa Patel, Alexie Patel, Anjana Patel commented on a recent armed car theft incident at their home in Belmont.
Paul Martin provided comments on the Patel family.
Tiffany Obayashi commented on the need for a safety barrier on a portion of Ralston Avenue.

COUNCILMEMBER ANNOUNCEMENTS
Councilmembers provided information on upcoming local and reginal events.

CONSENT BUSINESS
Approval of Minutes of December 10, 2024 Meeting
Resolution 2025-01 accepting the construction work and authorizing the issuance of Notice of Completion for the San Juan Boulevard Sewer Capacity Improvements Project, City Contract Number, 2024-631, recording of the Notice of Completion with the County of San Mateo Recorder's Office, and release of retention 35 day after recordation of the Notice of Completion
Resolution 2025-02 installing a two-way stop on Malcolm Avenue at Anita Avenue, and a bike box and related improvements on Ralston Avenue at South Road
Resolution 2025-03 appropriating $40,476.36 for the purchase of a Toro Field Pro 6040 Field Groomer from Turf Star

In response to Councilmember questions City Attorney Oskoui stated that the San Juan Blvd. Pipeline, as related to Resolution 2025-01 is complete. He also noted that the San Juan pavement is part of the five year pavement management plan.

Public comment provided by Giuliano Carlini and Mike Swire on Resolution 2025-02.

ACTION: On a motion made by Latimerlo and seconded by Vice Mayor Pang-Maganaris the consent business items were unanimously approved by a roll call vote (5-0).

PUBLIC HEARINGS [None]

GENERAL BUSINESS

Business License Regulation Clean-Up, Solicitor Regulation Amendment, and Adjustment to the Category 4 Business License Tax Rate
Assistant City Manager Kleinbaum provided a brief background noting that this action will repeal provisions of Belmont City Code Chapters 12 and 19 pertaining to the business licenses that have been superseded by Measure DD passed at the November 5, 2024 election and amend solicitor regulations contained in Chapter 12. Solicitors are required to get permits from the City's Police Department These regulations were renumbered and updated to clarify and streamline the permit process. She also explained that a resolution before the Council will adjust the Business License Tax Rate for Category 4 (cannabis-related businesses) to $60 per $1,000 of gross receipts (6%).

ACTION: On a motion made by Councilmember McCune and seconded by Councilmember **Resolution 2025-04** adjusting the Category 4 Business License Tax rate for cannabis-related businesses was adopted and an Ordinance repealing provisions in the Belmont City Code Chapter 12 and 19 pertaining to

business licenses superseded by Measure DD and amending solicitor regulations contained therein was introduced by a roll call vote (5-0).

Adoption of the San Mateo Countywide Local Roadway Safety Plan and Vision Zero Goal
Assistant Public Works Director Scramaglia introduced Jeff LeCapp Transportation System Coordinators CCAG, he provided and overview of the Local Roadway Safety Plan. He explained that the plan follows Federal and State commitment to Safe System approach to improve traffic safety, provides an assessment of historical and existing roadway traffic safety and identifies actions and prioritized project lists with implementation partners. He concluded his presentation by noting that the next steps include adopting the plan perusing a safety grant funding and continue participation through countywide Transportation Safety Advisory Committee (TSAC).

Council discussion ensued.

Public comment on this topic provided by Giuliano Carlini and Mike Swire.

ACTION: On a motion by Councilmember Latimerlo and seconded by Councilmember **McCune Resolution 2025-05** the San Mateo Countywide Local Roadway Safety Plan and accompanying Vision Zero Goal was approved by a roll vote (5-0).

Council Intergovernmental Assignments for Calendar Year 2025
Council discussed changes and made appointments to the Council Intergovernmental Assignments for the calendar year 2025.

BRIEF VERBAL REPORTS FROM MEMBERS AND STAFF

Verbal report from Councilmembers on Intergovernmental (IGR) and Subcommittee Assignments
Councilmembers reported on their assignments.

Verbal report from City Manager
Commented on emergency preparedness and announced website updates with resources for the community.

MATTERS OF INTEREST/CLARIFICATION (none)

ADJOURNMENT at this time being 9:17 p.m. in memory of former Mayor Dick Green and those affected by the fires in Southern California.

Submitted by,
Jozi Plut, City Clerk

DRAFT

CITY COUNCIL SPECIAL MEETING MINUTES
Conference Room 360, 3rd. Floor, City Hall, One Twin Pines Lane, Belmont, California

TUESDAY, JANUARY 28, 2025

CALL TO ORDER 6:00 PM

COUNCILMEMBERS PRESENT: Jordan, McCune, Latimerlo
COUNCILMEMBERS ABSENT: Mates, Pang-Maganaris

ITEMS OF BUSINESS

PUBLIC COMMENT
Public comment provided by Giuliano Carlini.

COMMISSION INTERVIEWS
Council discussed the interview process and proceeded to interview the following individuals for the Planning Commission:
Brian Kulich (incumbent)
Mark Gurevich (incumbent)
Clint Freeman
Margaret Jadallah

Recess: 6:55 p.m.
Reconvene: 7:00 p.m.

Council interviewed the following individuals for the Parks and Recreation Commission:
Adar Emken
Avery Lyford
Arianna Cunha
Jerome Natoli

Council concluded the interviews.

City Clerk Plut stated that a second round of interviews will be held on February 4 for the non-voting Parks and Recreation Commission.

Adjournment at this time being 7:55 p.m.

Submitted by,
Jozi Plut, City Clerk

CITY COUNCIL SPECIAL MEETING MINUTES
Conference Room 360, 3rd. Floor, City Hall, One Twin Pines Lane, Belmont, California

TUESDAY, FEBRUARY 4, 2025

CALL TO ORDER 6:00 PM

COUNCILMEMBERS PRESENT: Jordan, McCune, Mates
COUNCILMEMBERS ABSENT: Pang-Maganaris, Latimerlo

ITEMS OF BUSINESS

PUBLIC COMMENT
None

COMMISSION INTERVIEWS
Council discussed the interview process and proceeded to interview the following applicants for the Parks and Recreation Commission (No-Voting):

Gracie Huang
Tristan Lim

Recess: 6:50 p.m.
Reconvene: 7:00 p.m.

Council Continued the interview process with the following applicants for the Parks and Recreation Commission (No-Voting):

Simon Gehrke
Karuna Mungali
Itza Perez
Sophia Grace Lee

Council concluded the interviews, discussion ensued regarding applicant Jiya Venkatesh unable to attend tonight. Council concurred that Councilmembers McCune and Jordan will interview the applicant on Thursday, February 6, 2025,

City Clerk Plut noted that a recording of the interview will be shared with Council to review before appointments are made.

Adjournment at this time being 8:05 p.m.

Submitted by,
Jozi Plut, City Clerk

DRAFT

Council Committee and Intergovernmental Assignments (IGR) 2025

Committee	Delegate/ Representative	Alternates	Schedule	Meeting Location	Contact
2+2 Ad hoc Committee with Mid-Peninsula Water District	McCune Jordan	n/a	As Needed		Public Works Director
2+2+2 BRSSD Committee Multi agency committee to discuss/share issues of interest between the Belmont Redwood Shores School District, Redwood City, and Belmont"	Pang-Maganaris Latimerlo	n/a	As Needed		City Manager
Audit Committee The Audit Committee provides independent review and oversight of the City's financial reporting processes, internal controls and independent auditors and participates in the budget review process	Pang - Maganaris Jordan	Latimerlo	Quarterly		Finance Director
Belmont-SC Fire Dept JPA - Oversight of the legacy Fire Department with San Carlos	Mates	McCune	As Needed		City Manager/ Finance Director
(C/CAG) C/CAG operates as a Joint Powers Authority and has membership that includes each of the 20 cities and the County in San Mateo	Mates	Pang-Maganaris	Monthly 2nd Thursday, 7:00 p.m..		650-599-1406 Public Works Director

County. It works on issues that affect the quality of life in general; transportation, air quality, stormwater runoff, airport/land use compatibility planning, hazardous waste, climate planning, energy and water resource strategies, and solid waste and recycling.					
Belmont Community Foundation Ad-Hoc Committee	Mayor and Pang-Maganaris				
Four Corners Ad-hoc Committee Alameda de Las Pulgas Corridor Improvement Project is a multi-agency regional transportation improvement project involving cities of Belmont, San Carlos, and two School Districts (Sequoia Union High School and San Carlos School District) along the Alameda de Las Pulgas and San Carlos Ave Corridor.	McCune and Pang-Maganaris	n/a	As Needed		City Manager Public Works Director
Liaison to Senior Citizen Advisory Committee	McCune	Latimerlo	Odd Months 4th Tuesday, 3:00 P.M. (time may change in 2024)	Twin Pines Senior & Community Center Craft Room	Parks and Rec
Liaison to Chamber San Mateo County – Governmental Relations Committee	Mayor	Jordan	Every other Month		Amy Buckmaster/ Mary Parden
Public Safety Committee – The Public Safety Committee's duties are to consider policy matters related to police and public safety services in Belmont, provide a forum for presentation and discussion of	Vice Mayor	Latimerlo	Quarterly/As Needed		City Manager/ Police Chief

specific information related to public safety policy and practices.					
Silicon Valley Clean Water JPA for Wastewater Treatment	McCune	Jordan	Monthly, 2nd Monday, 8:00 a.m.		Teresa Herrera, P.E. Manager 650-832-6220
Youth Advisory Committee - Belmont Youth (grades 7-12) focused on civic engagement through planning and hosting activities and events.	McCune	Pang-Maganaris	YAC meetings 2x Month Thursdays 6:30 pm; school year only; Delegate attendance only as needed	Barrett Community Center; Hideout Room	Parks and Rec

Joint Powers Authorities/Intergovernmental Agencies					
ABAG General Assembly - Regional planning agency for land use, housing, environmental quality, and economic development- Association of Bay Area Governments, mission is to strengthen cooperation and collaboration across local governments to build healthier, stronger communities. -ABAG is part regional planning agency and part local government service provider. We accomplish our goals by providing planning services and cost-effective ABAG member	Mayor	Vice Mayor	April, November General Assembly Meetings		Fred Castro Clerk of the Board fcastro@bayareametro.gov

services to local governments struggling with rising costs and diminishing incomes					
Caltrain Local Policy Maker Group (LPMG)- LMPG provides policy and stakeholder input to Caltrain staff on the Caltrain Modernization Program (CalMod), and Business Plan.	Pang-Maganaris	Jordan	Last Thurs of Month 6-8 pm		Bella Conferti, Government & Community Affairs Specialist Cell Phone: 650.647.3498 Email: ConfertiI@caltrain.com
Grand Boulevard – The Grand Boulevard is a collaboration of 19 cities, counties, local and regional agencies united to improve the performance, safety, and aesthetics of El Camino Real. The initiative brings together all the agencies having responsibility for the condition, use and performance of the street.	Mates	Pang-Maganaris	2-3 times annually		Community Development Director, Carlos de Melo
Home For All Initiative - The mission of Home for All initiative is to establish a climate in San Mateo County where a diversity of housing is produced and preserved so that San Mateo County is a culturally, generationally, and economically diverse community with housing for all. Home for All SMC is a collaborative initiative comprised of the County of San Mateo, local governments, school districts, community-based organizations, faith-based organizations, advocacy groups and businesses.	Mates	Latimerlo	As Needed		City Manager

Housing and Regional Trust (HEART) Member Agency Committee – HEART is a 501(c)(3) that was founded in 2003 as a public/private partnership among the cities in San Mateo County, the County, and the business, nonprofit, education, and labor communities to create more affordable housing in San Mateo County. HEART's mission is to create and preserve affordable housing for low- and moderate-income families by raising and investing money from public and private sources.	Latimerlo	Pang-Maganaris	2-3 annually, 3rd Wed, 7:30 a.m.		HEART Exec Director, (650) 204-5640
Regional Housing Needs Policy Committee	Latimerlo	Jordan	As Needed		Carlos de Melo C/CAG - Sean Charpentier (650)-599-1409
Peninsula Traffic Congestion Relief Alliance (Commute.org) – Commute.org's mission is to reduce the number of vehicle miles traveled (VMT) by commuters to decrease congestion, improve the environment, and enhance quality of life. The Board has five scheduled meetings each year for the purpose of adopting a work plan and budget, developing policy, and reviewing Commute.org performance.	Latimerlo	Jordan	Even months 3rd Thursday, 8 am		Public Works Director
Peninsula Clean Energy (PCE) - Peninsula Clean Energy is a community-controlled, not-for-profit, joint powers agency formed as a Community Choice Aggregation (CCA) program by San Mateo	McCune	Mates	4th Thursdays 6:30 p.m.		City Manager

County and all 20 of its cities and towns in 2016 and joined by the City of Los Banos in 2020.					
Peninsula Division, League of CA Cities - State and local legislative issues (All Councilmembers invited)- The Peninsula Division includes 36 cities in San Francisco, San Mateo, and Santa Clara counties and provides members with the opportunity to exchange ideas and information and share the advantages of cooperative advocacy.	Mayor	Vice Mayor	Quarterly dinner meetings		League of CA Cities
San Mateo County Library JPA - Policy direction, oversee budget, services & library programs for the JPA related library system	Mates	Pang-Maganaris	Quarterly plus one 2nd Monday, 8:00 A.M.		Ann-Marie Despaine, Library Director
San Mateo County Mosquito and Vector Control District - Independent Special District, the Board of Trustees consists of 21 members, one from each city and one representative for the County at-large. Trustees are appointed by their respective City Council to govern the Mosquito and Vector Control District	Citizen Representative: Chuck Cotton Term expires 12/24	n/a	Monthly 2nd Tuesday, 7:30 pm		650-344-8592
San Mateo County Pre-Hospital Emergency Services JPA – The San Mateo County Pre-Hospital Emergency Medical Services Group provides service to the residents and visitors of San Mateo County to advance life support first response fire companies to respond to all 911 emergency medical	Pang-Maganaris	McCune	Quarterly		North County Fire Authority (650) 991-5531 esolis@northcountyfire.gov

requests, to work in tandem with hospital transport and support partners.					
San Mateo County Emergency Service Council- Disaster Preparedness	McCune	Pang-Maganaris	Quarterly 3rd Thursday, 5:30 p.m., Courthouse		dem_roc@smcgov.org 650-363-7490
San Mateo County **Council of Cities/City Selection Committee-** (All Councilmembers invited)	Mayor	Vice Mayor	Monthly-Dinner meeting 4th Friday, 6:00 p.m.		Sukhmani Purewal 650) 363-1802 spurewal@smcgov.org
SBWMA (South Bay Waste Management Authority – "RethinkWaste") - RethinkWaste, also known as the South Bayside Waste Management Authority (SBWMA), is a joint powers authority formed by eleven local government jurisdictions in San Mateo County. California. The agency provides oversight, support and management of service providers that collect, process, recycle and dispose of materials on behalf of RethinkWaste agencies.	McCune	Latimerlo	4th Thursdays, 2:00 p.m., San Carlos		Public Works Director
SFO Roundtable - The Airport/Community Roundtable was established in 1981 to address community noise impacts from aircraft operations at San Francisco International Airport (SFO).	Jordan McCune Shared alternate months		1st Wednesday of Month 6 x yr., 7:00 p.m.		Diane Estipona, Clerk of the Roundtable destipona1@smcgov.org
San Mateo Consolidated Fire Department - established January 2019 The department was formed by the establishment of a Joint	Mates	McCune	Quarterly		City Manager

Powers Authority (JPA) and represents the merger of fire departments in San Mateo, Foster City, and Belmont. The Board of Directors for the Department is comprised of a Council member from each partner city.					

THESE APPOINTMENTS ARE MADE BY THE CITY SELECTION COMMITTEE (Council of Cities):		
Association of Bay Area Governments Regional planning agency for land use, housing, environmental quality, and economic development	**Local Agency Formation Commission (LAFCO)** Authority over all reorganizations & boundary changes within County	**Bay Area Air Quality Management District** Works to reduce air contaminants within the District
Metropolitan Transportation Commission (MTC) Reviews applications for state & federal transportation funds, maintains regional transportation plan for Bay Area	**California Identification System (Cal-ID)** Determine the placement of Random-Access Network equipment within the County	**Peninsula Corridor Joint Powers Board (Caltrain)** Set policy for operation of Peninsula Commute Service
Community Development Committee	**Supplemental Law Enforcement Oversight Committee** Review Supplemental Law Enforcement Service Fund expenditures	**Domestic Violence Council** Evaluate efforts to reduce domestic violence, raise public awareness and collect statistics
San Mateo County Transit District (SamTrans)	**San Mateo County Transportation Authority (SAMTAC)**	**HEART (Housing Endowment and Regional Trust) Board**

THESE APPOINTMENTS ARE MADE THROUGH C/CAG:		
2020 Peninsula Gateway Corridor	**Airport Land Use Committee (ALUC)**	**Bicycle and Pedestrian Advisory Committee (BPAC)**

Congestion Management Program and Environmental Quality Committee (CMEQ)	**Congestion Management Program Technical Advisory Committee (TAC)**	
National Pollutant Discharge Elimination Technical Advisory Committee (NPDES) -	**Integrated Waste management (SWAC)**	**Utilities Sustainability Task Force (USTF)**

STAFF REPORT

Meeting Date:	February 11, 2025
Agency:	City of Belmont
Staff Contact:	Grace Castaneda, Finance Director, gcastaneda@belmont.gov Nawel Voelker, Management Analyst, nvoelker@belmont.gov
Agenda Title:	Business License Tax Administration Services
Agenda Action:	Motion

Recommendation

Motion authorizing the City Manager to negotiate and execute a 5-year Task Order with HdL Companies for Business License Tax administration services for an amount not to exceed $625,000, subject to annual Council budget appropriation.

Strategic Focus Area

Fiscal and Organizational Sustainability

Background

Revenue, audit and recovery services are specialized in nature and require an in-depth knowledge of local and state government operations and legislation. These services ensure that the City is applying local law equitably and accurately for all individuals and entities subject to local taxation in the City of Belmont. The City has contracted with HdL Companies (HdL) to provide a broad array of audit and revenue administration services, including business license tax administration.

In the past, the City has executed Task Orders under a Master Service Agreement with HdL on triennial basis to the City's satisfaction. The proposed five-year term on business license tax administration will continue to provide staff with a reasonable time period to measure and ensure performance from HdL, while also securing the current fee structures as proposed.

Analysis

Based on the satisfactory service that HdL has provided, staff recommends renewing the same services for a five-year term, and that the City Manager be authorized to negotiate the Task Order agreement(s) with HdL for the required services within the approved budget. While annual Consumer Price Index (CPI) increases have been included in past for these services, staff was able to negotiate with HdL and freeze the CPI increase for the first two years of the five-year term.

The City issues over 1,500 business licenses annually. HdL currently administers the City's business license tax program, including renewal processing, new account processing, delinquent account processing and online filing and payment posting, in addition to regular audits monitoring for tax compliance. Based on historical data, the estimated fees for business license tax services after incorporating CPI increases are approximately $100,000 to $125,000 annually.

If approved by Council, the contract with HdL to perform Business License Tax administration services would commence effective immediately for a five-year term expiring December 31, 2029.

Alternatives

1. With direction seek an alternative firm.
2. Take no action.

Attachments

A. HdL Proposed Scope of Work – Business License Tax Administration Services

Fiscal Impact

☐ No Fiscal Impact

☒ Funding Source Confirmed: The current fiscal year 2024-25 budget has included expenditures for these services in the General Fund, and no supplemental appropriation is required. Future funding for the term of this service agreement is contingent on annual Council budget appropriation.

Source:	Purpose:	Public Outreach:
Staff	Discretionary Action	Posting of Agenda

SCOPE OF SERVICES

Consultant will provide the following Services relative to Client's business license tax administration. These services are for a 5-year term, expiring on 12/31/2029.

1. **Operations Management Services**
   - 1.1. Establish and maintain database of Client businesses.
   - 1.2. Receive and process applications, renewals and payments in a timely fashion.
   - 1.3. Send renewal notices to active businesses within 30 days of the renewal period end date or at another interval specified by Client.
   - 1.4. Provide businesses multiple options for submitting applications, renewals, payments, or support requests (including via website, email, mail, phone, and fax. Consultant license specialists will be available for live interactions Monday through Friday, 8:00am to 5:00pm Pacific).
   - 1.5. Remit revenue to Client no less than monthly.
   - 1.6. Provide Client staff access to website portal offering business registry inquiry, reporting, and electronic department approval capabilities.
2. **Compliance Services:** 1) Identify and register businesses which are subject to licensure or taxation, 2) collect known debt as pertains to business license or tax, and 3) identify under-reported tax liability.
   - 2.1. **Discovery Services**
     - 2.1.1. Develop a list of businesses subject to Client licensure or taxation.
     - 2.1.2. Notify non-compliant businesses of their options to comply or dispute their non-compliant status. Notification and support to businesses will be facilitated through the website, mail, email, phone and fax.
     - 2.1.3. Review information and forms submitted by the business for completion and accuracy, inclusive of any additional required documentation (i.e. home occupation permit). All submissions are filed and stored electronically and made available to Client upon request.
     - 2.1.4. Provide businesses with detailed invoicing and options to pay via website, mail, and phone.
     - 2.1.5. Remit revenue to Client no less than monthly, along with all business applications and any additional documentation.
   - 2.2. **Collection Services**
     - 2.2.1. Identify businesses subject to Client licensure or taxation which have known debt to Client and have failed to pay within an appropriate time frame.
     - 2.2.2. Notify businesses of their options to comply or dispute their non-compliant status.
     - 2.2.3. Provide businesses with detailed invoicing and options to pay via website, mail and phone.
     - 2.2.4. Remit revenue to Client no less than monthly.
   - 2.3. **Audit Services**
     - 2.3.1. Identify potential under-reporting and/or misclassified businesses.
     - 2.3.2. Audit businesses mutually agreed to by Client and Consultant that are identified as potential under-reporting businesses.
     - 2.3.3. Submit audit summaries to Client and discuss further actions.
     - 2.3.4. Educate businesses on proper reporting practices.
     - 2.3.5. Invoice and collect identified deficiencies.

3. **Online Payment Processing** – Consultant's services include PCI compliant payment processing services which supports both credit card and eCheck transactions.
   3.1. Client Responsibilities
      3.1.1. As a condition to its receipt of the Service, Client shall execute and deliver any and all applications, agreements, certifications or other documents required by Consultant's payment processor, Networks or other third parties whose consent or approval is necessary for the processing of Transactions by Consultant's payment processor. "Network" is an entity or association that operates, under a common service mark, a system which permits participants to authorize, route, and settle Transactions among themselves, including, for example, networks operated by VISA USA and Mastercard, Inc., NYCE Corporation, American Express, and Discover.
      3.1.2. Client hereby grants Consultant the full right, power and authority to request, receive and review any Data or records reflected in a Transaction report. Client represents and warrants that it has the full right and authority to grant these rights.

FEES

4. **Operations Management Services**
   4.1. Fees for performing operations management Services shall be $17.39 for each processed account, which is any account for which an application or renewal/return was processed, or active account which was sent a renewal notice.
   4.2. Fees will be increased as of January 1st of each calendar year, starting on January 2027, with reference to the 12-month percent change in the most recently published annual Consumer Price Index for All Urban Consumers (CPI-U), West Region, as reported by the U.S. Bureau of Labor Statistics (the "CPI Change"). Each annual increase in the Fees will be equal to the greater of two percent (2%) or the actual CPI Change and the lesser of ten percent (10%) or the actual CPI Change. For example, if the actual CPI Change is 1.5%, then the annual increase will be 2%, if the actual CPI Change is 3.5%, then the annual increase will be 3.5%, and if the actual CPI Change is 12%, then the annual increase will be 10%.
   4.3. Fees related to travel and lodging expenses are billed at cost and apply to all meetings (including implementation, training, operations and support). Travel expenses only apply to out of scope travel and must therefore be pre-approved by Client.
   4.4. Fees will be invoiced monthly to Client for Services performed during the prior month. Fees will be netted out of Client's monthly revenue disbursement. Client will submit payment for any balance due to Consultant within 30 days of receiving the invoice.
5. **Compliance Services**
   5.1. Fees for performing compliance Services apply to all monies received for the current tax/license period and any other prior period collected (including monies received for taxes, penalties, interest, and fees).
      5.1.1. Fees for performing discovery Services shall be a contingency Fee of 35% of the revenues received as a result of the Services.
      5.1.2. In the event that Client discovers a non-compliant business and reports the business to Consultant (including a calculation of all taxes/fees due), Consultant will categorize the

business as a collection service effort and thus apply the lower collection Services contingency Fee rate.

5.1.3. Fees for performing collection Services shall be a contingency Fee of 25% of the revenues received as a result of the Services.

5.1.4. Fees for performing audit Services shall be a contingency Fee of 40% of the revenues received as a result of the Services.

5.2. Consultant recognizes Client's authority to waive or reduce the tax/fee debt of a business. Should Client decide to do so for a business whose deficiency was identified by Consultant, Consultant shall be entitled to compensation in the amount of one half (1/2) of the Fees Consultant would have otherwise earned. Deficiencies which are uncollectable due to insolvency or dissolution of the business, or for deficiencies which are otherwise incapable of collection (i.e. statute of limitation or other legal defense) shall not be considered a Client voluntary election to waive, and thus, Consultant would not be entitled to compensation related thereto under this provision.

5.3. The fee shall be paid notwithstanding any related Client assistance, work in parallel, and/or incurrence of attorneys' fees or other costs or expenses in connection, with the relevant Services.

5.4. Fees related to travel and lodging expenses are billed at cost and applied to all meetings (including implementation, training, operations, and support). Travel expenses only apply to out of scope travel and must therefore be pre-approved by Client.

5.5. Fees will be invoiced monthly to Client for Services performed during the prior month. Fees will be netted out of Client's monthly revenue disbursement. Client will submit payment for any balance due to Consultant within 30 days of receiving the invoice.

6. **Payment Processing** – Consultant will configure payment processing services to utilize either a taxpayer funded model (convenience fee) or Client funded model, as directed by Client. Client may switch between these models upon written request to Consultant. Fees for each of these payment processing models are detailed here.

6.1. Taxpayer funded model – Client authorizes Consultant to collect each convenience fee from the taxpayer at time of payment.

6.1.1. Credit and debit card processing – 2.9% of transaction amount, minimum of $2.00

6.1.2. ACH/eCheck processing - $2.50 per transaction

6.2. Client funded

6.2.1. Credit and debit card processing – 2.9% of transaction amount

6.2.2. ACH/eCheck processing - $0.75 per transaction

6.3. Returned payments/NSF fee – Each occurrence of a card chargeback, returned payment or insufficient funds will incur a fee of $25.00, to be applied to the taxpayers account.

6.4. Consultant reserves the right to review and adjust pricing related to payment processing services on an annual basis. Consultant will communicate any such adjustment to Client in writing, with 60 days advance notice. Items that will be considered in the review of fees may include, but are not limited to: regulatory changes, card association rate adjustments, card association category changes, bank/processor dues and assessments, average consumer payment amounts, card type utilization, and costs of service.

STAFF REPORT

Meeting Date:	February 11, 2025
Agency:	City of Belmont
Staff Contact:	Grace Castaneda, Finance Director, gcastaneda@belmont.gov
Agenda Title:	Annual Investment Policy
Agenda Action:	Motion

Recommendation
Affirm the City of Belmont Investment Policy as submitted by the Finance Director/City Treasurer.

Strategic Focus Area
Fiscal and Organizational Sustainability

Background
In past years, the State of California Government Code Section 53646 required the Treasurer to render to the Council, at a public meeting, an annual investment policy. Although Council's approval is no longer required by statute, the City, consistent with best practice, annually reviews and accepts its Investment Policy to provide transparency and disclosure.

Analysis
The Investment Policy, as recommended, affirms the Finance Director's/City Treasurer's fiduciary responsibility to safeguard public assets. The policy places a high priority on insuring safety of principal first and foremost, and then ensuring that the liquidity needs for payment of City obligations are met, prior to considering yield on investments.

Alternatives
1. With direction, refer the presented Investment Policy back to the Finance Director/City Treasurer.

Attachments
A. Investment Policy

Fiscal Impact

☒ No Fiscal Impact

☐ Funding Source Confirmed:

Acceptance of the City's Investment Policy has no direct fiscal impact.

Source:	**Purpose:**	**Public Outreach:**
Staff	Discretionary Action	Posting of Agenda

CITY OF BELMONT
INVESTMENT POLICY

TO: Belmont City Council
Belmont City Manager

FROM: Grace Castaneda, Finance Director/City Treasurer

RE: Annual Investment Policy

DATE: February 11, 2025

1.0 Policy:

It is the policy of the City of Belmont to invest public funds in a manner which will maximize security, followed by meeting the daily cash flow demands of the entity and then provide the highest investment return consistent with, and conforming to, all state and local statutes governing the investment of public funds.

2.0 Scope:

This investment policy applies to all investments as defined by the State of California Government Code accounted for in the City of Belmont's Annual Comprehensive Financial Report.

3.0 Prudence:

Investments shall be made with judgment and care – under circumstances then prevailing – which persons of prudence, discretion, and intelligence exercise in the management of their own affairs, not for speculation, but for investment, considering the probable safety of their capital as well as the probable income to be derived.

3.1 The standard of prudence to be used by investment officials shall be the "prudent person" standard and shall be applied in the context of managing an overall portfolio. Investment officers acting in accordance with written procedures and the investment policy and exercising due diligence shall be relieved of personal responsibility for an individual security's credit risk or market price changes, provided deviations from expectations are reported in a timely fashion and appropriate action is taken to control adverse developments.

4.0 Objectives:

The primary objectives, in priority order, of the City of Belmont's investment activities shall be:

4.1 **Safety:** Safety of principal is the foremost objective of the investment program. Investments of the City of Belmont shall be undertaken in a manner that seeks to ensure the preservation of capital in the overall portfolio. To attain this objective, **diversification** is required in order that potential losses on individual securities do not exceed the income generated from the remainder of the portfolio. Funds invested with the California Local Agency Investment Fund administered by the California State Treasurer meet this requirement for diversification.

4.2 **Liquidity:** The City of Belmont's investment portfolio will remain sufficiently liquid to enable the City of Belmont to meet all operating requirements as reasonably anticipated.

4.3 **Return on Investments:** The City of Belmont's investment portfolio shall be designed with the objective of attaining a rate of return throughout budgetary and economic cycles, commensurate with the City of Belmont's investment risk constraints and the cash flow characteristics of the portfolio.

5.0 Delegation of Authority:

No person may engage in an investment transaction except as provided under the terms of this policy and the procedures established by the Finance Director/City Treasurer. The Finance Director/City Treasurer shall be responsible for all investment transactions undertaken and shall establish a system of internal controls to regulate the activities of authorized personnel.

6.0 Ethics and Conflicts of Interest:

Officers and employees involved in the investment process shall refrain from personal business activity that could conflict with proper execution of the investment program, or which could impair their ability to make impartial investment decisions. Employees and investment officials shall disclose to the Belmont City Clerk any material financial interests in financial institutions that conduct business within this jurisdiction.

7.0 Reporting:

The Finance Director/City Treasurer shall provide to the City Council monthly investment reports which provide a clear picture of the status of the current investment portfolio.

Schedules in the monthly report should include the following:

- A listing of individual securities held at the end of the reporting period by authorized investment category.

- Final maturity of all investments listed.

- Coupon, discount, or earnings rate.

- Par value and market value.

8.0 Investment Policy Adoption:

The City of Belmont's investment policy shall be accepted by the City Council. The policy shall be reviewed annually, and any modifications made thereto must be approved by the City Council.

STAFF REPORT

Meeting Date:	February 11, 2025
Agency:	City of Belmont
Staff Contact:	Brigitte Shearer, Parks and Recreation Director, bshearer@belmont.gov
Agenda Title:	MOU with the City of San Bruno for FEMA Pre-Disaster Mitigation Grant and Contracted Fuel Reduction Under FEMA Grant and CAL FIRE Fire Prevention Grant
Agenda Action:	Resolution

Recommendation

Adopt two resolutions: (1) authorizing the City Manager to negotiate and execute a Memorandum of Understanding (MOU) with the City of San Bruno regarding the administration of FEMA Pre-Disaster Mitigation Grant No. LPDM-PJ-09-CA-2023-003 and (2) authorizing the City Manager to negotiate and execute two agreements purchasing fuel reduction work to be reimbursed by the FEMA grant and CAL FIRE Fire Prevention Grant No. 5GG21211 for a combined amount not to exceed $403,704.

Strategic Focus Area

Public Safety

Background

In keeping with the City's Strategic Plan initiative to "Continue with urban forestry, fire, and hazard mitigation projects," the Parks and Recreation Department has secured $697,575 in grant funding for projects including hazardous fuel reduction and education and outreach. Of these funds, $372,575 come from Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation Grant No. LPDM-PJ-09-CA-2023-003 and $325,000 come from California's Department of Forestry and Fire Protection (CAL FIRE) Fire Prevention Grant No. 5GG21211.

Some CAL FIRE grant activities, such as developing a treatment plan and expanding the City's residential chipping program, are already underway; however, before proceeding with any FEMA grant activities, it is necessary for the City of Belmont to enter a Memorandum of Understanding (MOU) with the City of San Bruno. The FEMA grant was jointly awarded to both cities, requiring the formalization of roles, responsibilities, and procedures for managing grant funds and associated projects.

Most of the combined grant funds (70%) are reserved for contracted fuel reduction. In 2024, under the CAL FIRE grant, Dudek, an environmental, planning, and engineering firm, conducted a comprehensive assessment of the City's open space, recommending specific treatment strategies based on wildfire behavior and Belmont's unique topography and biology. The resulting treatment plan was completed in 2024 and will inform forthcoming requests for proposals (RFPs) for fuel reduction work.

Analysis

MOU

The attached draft MOU proposes a framework for collaboration between the City of Belmont and the City of San Bruno in the implementation of the FEMA grant. In summary, it memorializes both cities' understanding that each will serve as the Project Manager for all grant activities occurring within our respective jurisdictions while the City of Belmont will serve as the sole Fiscal Agent and Grant Administrator. This MOU was drafted by City of Belmont staff and at the time of writing this report, is still awaiting comments from the City of San Bruno.

Fuel Reduction RFPs

Proceeding with the contracted fuel reduction work proposed under Dudek's treatment plan and funded by both grants will include publishing two requests for proposals (RFPs), one for each grant. In total, there is $403,704 in grant funds available ($168,704 under CAL FIRE and $235,000 under FEMA) for the fuel reduction work and staff is working closely with Dudek to define an appropriate scope of work for each. To comply with grant terms, the City must expend the funds initially but will be fully reimbursed up to the available amount.

The contracted work will include fuel reduction along emergency access roads in Waterdog Lake and San Juan Canyon Open Spaces. In these areas, the first 25 feet from the roadway will be cleared of ladder fuels, dead trees, etc. while the second 25 feet will be treated, but to a lesser degree. Mechanical clearing with occur in some places, but due to the steep terrain, hand crews will be engaged in many areas.

City Council's Recommended Action

To proceed with work under both grants, City staff also ask that the Council adopt two resolutions: (1) authorizing the City Manager to negotiate and execute a Memorandum of Understanding (MOU) with the City of San Bruno regarding the administration of FEMA Pre-Disaster Mitigation Grant No. LPDM-PJ-09-CA-2023-003 and (2) authorizing the City Manager to negotiate and execute two agreements purchasing fuel reduction work to be reimbursed by the FEMA grant and CAL FIRE Fire Prevention Grant No. 5GG21211 for a combined amount not to exceed $403,704.

Alternatives

1. Refer to staff for additional information.

Attachments

A. Resolution – MOU
B. Resolution – Fuel Reduction Contracts
C. Draft MOU

Fiscal Impact

☐ No Fiscal Impact

☒ Funding Source Confirmed: All proposed contracted fuel reduction work will be reimbursed quarterly by CAL FIRE Fire Prevention Grant No. 5GG21211 or FEMA Pre-Disaster Mitigation Grant No. LPDM-PJ-09-CA-

2023-003.

Source:	**Purpose:**	**Public Outreach:**
Council	Statutory/Contractual Requirement	Posting of Agenda

*Insert additional information, or delete if not used

RESOLUTION NO. 2025 –

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF BELMONT AUTHORIZING THE CITY MANAGER TO EXECUTE A MEMORANDUM OF UNDERSTANDING (MOU) WITH THE CITY OF SAN BRUNO REGARDING U.S. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) PRE-DISASTER MITIGATION GRANT NO. LPDM-PJ-09-CA-2023-003

WHEREAS, the City of Belmont's Strategic Plan includes an initiative to "Continue with urban forestry, fire, and hazard mitigation projects"; and,

WHEREAS, on November 15, 2024, the City of Belmont and the City of San Bruno were jointly awarded a U.S. Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation Grant, Grant No. LPDM-PJ-09-CA-2023-003 for local hazard mitigation projects; and,

WHEREAS, the Grant awarded a total of $660,150, with $372,575 (less a $75,000 match) to the City of Belmont and $287,575 (including a $90,900 match) to the City of San Bruno; and,

WHEREAS, the Parties desire to enter into a memorandum of understanding (MOU) to memorialize their understanding that each Party will serve as the Project Manager for all aspects of Grant activities occurring within their respective jurisdictions while the City of Belmont will serve as the sole Fiscal Agent and Grant Administrator.

NOW, THEREFORE, the City Council of the City of Belmont resolves as follows:

SECTION 1. The City Manager is authorized to execute a Memorandum of Understanding (MOU) with the City of San Bruno regarding the administration of FEMA Pre-Disaster Mitigation Grant No. LPDM-PJ-09-CA-2023-003.

* * *

ADOPTED February 11, 2025 by the City of Belmont City Council by the following vote:

Ayes:

Noes:

Absent:

Abstain:

ATTEST:

_____
City Clerk

_____
Mayor

APPROVED AS TO FORM:

_____
City Attorney

RESOLUTION NO. 2025 –

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF BELMONT AUTHORIZING THE CITY MANAGER TO NEGOTIATE AND EXECUTE TWO AGREEMENTS PURCHASING FUEL REDUCTION WORK TO BE REIMBURSED BY FEMA PRE-DISASTER MITIGATION GRANT NO. LPDM-PJ-09-CA-2023-003 AND CAL FIRE FIRE PREVENTION GRANT NO. 5GG21211 FOR A COMBINED AMOUNT NOT TO EXCEED $403,704

WHEREAS, the City of Belmont's Strategic Plan includes an initiative to "Continue with urban forestry, fire, and hazard mitigation projects"; and,

WHEREAS, on August 30, 2022, the City of Belmont was awarded $325,000 through California's Department of Forestry and Fire Protection (CAL FIRE) Fire Prevention Grant No. 5GG21211 for hazardous fuel reduction; and,

WHEREAS, on November 15, 2024, the City of Belmont was awarded an additional $372,575 through U.S. Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation Grant, Grant No. LPDM-PJ-09-CA-2023-003 for fuel reduction and community outreach; and,

WHEREAS, in 2024, Dudek, an environmental, planning, and engineering firm, conducted a comprehensive assessment of the City's open space, recommending specific strategies to mitigate wildfire risk based on known fire behavior and Belmont's unique topography and biology; and,

WHEREAS, these strategies are identified in Dudek's culminating treatment plan; and,

WHEREAS, $403,704 of grant funding is currently available to help execute this plan through various hazardous fuel reduction projects in Waterdog Lake and San Juan Canyon Open Spaces in Belmont; and,

WHEREAS the City plans to publish two separate requests for proposals to keep the respective grant funds separate.

NOW, THEREFORE, the City Council of the City of Belmont resolves as follows:

SECTION 1. The City Manager is authorized to negotiate and execute two agreements purchasing fuel reduction work to be reimbursed by FEMA Pre-Disaster Mitigation Grant No. LPDM-PJ-09-CA-2023-003 and CAL FIRE Fire Prevention Grant No. 5GG21211 for a combined amount not to exceed $403,704.

* * *

ADOPTED February 11, 2025 by the City of Belmont City Council by the following vote:

Ayes:

Noes:

Absent:

Abstain:

ATTEST:

_____
City Clerk

_____
Mayor

APPROVED AS TO FORM:

_____
City Attorney

MEMORANDUM OF UNDERSTANDING
BETWEEN THE CITY OF SAN BRUNO AND THE CITY OF BELMONT
REGARDING U.S. FEDERAL EMERGENCY MANAGEMENT AGENCY
PRE-DISASTER MITIGATION GRANT, GRANT NO. LPDM-PJ-09-CA-2023-003

This Memorandum of Understanding (MOU) regarding U.S. Federal Emergency Management Agency Pre-Disaster Mitigation Grant, Grant No. LPDM-PJ-09-CA-2023-003 (the "Grant") is made and entered into as of the Effective Date (defined herein) by and between the City of Belmont and the City of San Bruno, each a municipal entity under California law. The Cities may be collectively referred to herein as "Parties" and individually as "Party." The U.S. Federal Emergency Management Agency may be referred to herein as the "Granting Agency."

WHEREAS, on November 15, 2024, the City of Belmont and the City of San Bruno were jointly awarded a U.S. Federal Emergency Management Agency Pre-Disaster Mitigation Grant, Grant No. LPDM-PJ-09-CA-2023-003 and,

WHEREAS, the Grant awarded a total of $660,150, with $372,575 (less a $75,000 match) designated to the City of Belmont and $287,575 (less a $90,900 match) designated to the City of San Bruno; and,

WHEREAS, the Grant's scope of work is described more particularly in the Grant Agreement, provided as Exhibit A, but generally includes multijurisdictional local hazard mitigation; and,

WHEREAS, the Parties desire to enter into this MOU to memorialize their understanding that each Party will serve as the Project Manager for all aspects of Grant activities occurring within their respective jurisdiction and the City of Belmont will serve as the sole Fiscal Agent and Grant Administrator.

NOW THEREFORE, BE IT RESOLVED that the Parties agree as follows:

I. PURPOSE

The purpose of this MOU is to set forth the terms and understanding between the Parties regarding their responsibilities for U.S. Federal Emergency Management Agency Pre-Disaster Mitigation Grant, Grant No. LPDM-PJ-09-CA-2023-003. The Grant Agreement is attached hereto as Exhibit A and is incorporated into this MOU by reference.

II. ROLES AND RESPONSIBILITES

a. *Project responsibility.* Each Party will serve as Project Manager for all aspects of Grant activities occurring within their respective jurisdiction.
b. *Contracted work.* Each Party will procure, manage, and be responsible for paying for any contracted work relating to the Grant and occurring within their respective jurisdiction.
c. *Fiscal Agent.* The City of Belmont will serve as the sole Fiscal Agent for the Grant, submitting all requests for the disbursement of Grant funds to the Granting Agency on behalf of both Parties. This process is further defined in Section III.
d. *Grant Administrator.* The City of Belmont will serve as the sole administrator for the Grant, submitting all Grant reports, responses to information requests, and amendment requests, pursuant to the terms of Exhibit A. The City of San Bruno will provide any

information reasonably necessary to complete these tasks to the City of Belmont in a timely manner.

e. *Budget variances.* Should the actual costs of completing the work set forth in Exhibit A exceed the budgets set forth in Exhibit A, the Parties will confer and agree to either reduce the scope of work within the affected jurisdiction or provide additional funding from the affected Party's agency budget. If required pursuant to the terms of Exhibit A, the City of Belmont will additionally file for a Grant Amendment.

f. *Communication.* The Parties agree to communicate clearly, early, and throughout the term of this MOU with any questions or concerns regarding the shared responsibilities of the Grant.

g. *Grant completion and audit documents.* At the conclusion of the Grant, each Party will produce all Grant Completion and Audit Documents identified in Exhibit A and relating to their respective Grant activities. The City of Belmont will additionally be responsible for submitting all Grant Completion Documents to the Granting Agency and retaining all Audit Documents, on behalf of both Parties and pursuant to the terms of Exhibit A.

III. FUNDING AND METHOD OF PAYMENT

The process of submitting requests for the disbursement of Grant funds is as follows.

a. The City of San Bruno will submit any invoices eligible for reimbursement to the City of Belmont on a quarterly basis. Invoices will be submitted in the required format with the required narrative, pursuant to the terms of Exhibit A.

b. The City of Belmont will then review the invoices and submit them to the Granting Agency within 14 days of receipt.

c. Should the Granting Agency request an amendment to the invoices, both Parties will make every reasonable effort to promptly address the changes.

d. Upon receiving reimbursement from the Granting Agency for invoices from the City of San Bruno, the City of Belmont will remit payment to the City of San Bruno within no more than 30 days.

IV. PERFORMANCE

The City of San Bruno will comply with all requirements of the Grant regarding use of funds, provision of matching funds, and timely provision of any requests for information to facilitate or otherwise clarify grant administration. The City of San Bruno will indemnify and hold the City of Belmont harmless from any demand of the Granting Agency related to San Bruno's use of grant funds or compliance with San Bruno's obligations owed to the Granting Agency.

V. TERM

This MOU is effective upon execution of the Parties and approval by their respective governing bodies (the "Effective Date") until grant closeout, unless modified by written amendment executed by both Parties.

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VI. AMENDMENTS

This MOU may be amended, modified, or supplemented only in writing(s) signed by both Parties. No oral understanding or agreement not incorporated herein will be binding for either Party.

VII. NOTICES

All notices and communications deemed by either Party to be necessary or desirable must be in writing and may be given by personal delivery to a representative of the other Party or by mailing the same, postage prepaid, addressed as follows, with an emailed copy to the following address.

If to the City of Belmont:
City of Belmont
Attn: Brigitte Shearer, Parks and Recreation Director
1 Twin Pines Ln, Belmont, CA 94002
Email copy to: bshearer@belmont.gov.

If to the City of San Bruno:
City of San Bruno
Attn: Ari Delay, Fire Chief
555 El Camino Real, San Bruno, CA 94066
Email copy to: adelay@sanbruno.gov

VIII. DISPUTE RESOLUTION

With regard to all disputes or disagreements arising under this MOU that are not resolved informally at the staff level after a good faith attempt, the Parties may, at their sole and mutual discretion, agree to engage in mediation, with the costs divided equally among the Parties involved in the mediation.

IX. SEVERABILITY

Should any portion of this MOU be judicially determined to be illegal or unenforceable, the remainder of the MOU shall continue in full force and effect, and either Party may renegotiate the terms affected by the severance.

X. GOVERNING LAW

The construction, interpretation, and enforcement of this MOU shall be governed by the laws of the State of California. The courts of the State of California, County of San Mateo, shall have jurisdiction over any action arising out of this MOU and over the Parties, and the venue for any such actions shall be the Superior Court for the County of San Mateo or the United States District Court for the Northern District of California.

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IN WITNESS WHEREOF, the Parties have executed this MOU as of the final signature date written below.

_____	_____
Alex McIntyre City Manager City of San Bruno	Date
_____	_____
Afshin Oskoui, P.E. City Manager City of Belmont	Date

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STAFF REPORT

Meeting Date:	February 11, 2025
Agency:	City of Belmont
Staff Contact:	Afshin Oskoui, city_manager@belmont.gov, 650-595-7408
Agenda Title:	Revised Emergency Services Council Joint Powers Agreement (JPA)
Agenda Action:	Resolution

Recommendation

Approve the Second Revised and Restated Joint Exercise of Powers Agreement for the San Mateo County Operational Area Emergency Services Organization and authorize the City Manager to execute.

Strategic Focus Area

Public Safety

Background

The San Mateo County Operational Area Emergency Services Organization Authority, also known as the Emergency Services Council (ESC), brings together local governments, special districts, and other entities to coordinate emergency planning and response, including for hazardous materials. This council engages in planning with respect to all phases of the emergency management cycle: prevention, protection, response, recovery, and mitigation efforts, while also maintaining key public information systems like SMC Alert.

The ESC last revised and restated the Joint Exercise of the Powers Agreement ("JPA" or "Agreement") on October 17, 2014. Since then, the Agreement has become outdated following significant changes within the County's Department of Emergency Management (DEM), which now operates as a standalone agency separate from the Sheriff's Office.

Analysis

To accurately reflect the current responsibilities of the DEM and the ESC, the ESC unanimously approved the changes to the JPA. The City of Belmont partners with ESC and DEM to receive services such as Hazmat Responses, Emergency Alert and Warning, and Training and Exercises for the whole Operational Area.

Key changes to the Agreement include:

- Standardizing nomenclature;
- Updating agreement language; and
- Clarifying and defining the roles of the ESC, the ESC Finance Committee, and the DEM.

To ensure that Belmont continues to receive these services, the City Council is requested to approve the updated JPA.

Alternatives

1. Return to staff for additional information
2. Take no action

Attachments

A. Second Revised and Restated Joint Exercise of Powers Agreement for the San Mateo County Operational Area Emergency Services Organization

Fiscal Impact

☒ No Fiscal Impact

☐ Funding Source Confirmed:

Source:	**Purpose:**	**Public Outreach:**
Staff	Statutory/Contractual Requirement	Posting of Agenda

RESOLUTION NO. 2025 – 01

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF BELMONT RESOLUTION APPROVING THE SECOND REVISED AND RESTATED JOINT EXERCISE OF POWERS AGREEMENT FOR THE SAN MATEO COUNTY OPERATIONAL AREA EMERGENCY SERVICES ORGANIZATION

WHEREAS, the Member Agencies of the San Mateo County Operational Area Emergency Services Organization ("Organization") have previously established and participated in a unified emergency services organization for the benefit of all parties within the jurisdiction of San Mateo County, with the goal of providing effective emergency response, preparedness, and recovery plans; and,

WHEREAS, the Member Agencies have agreed that the purpose of this Organization will be to operate pursuant to the principles and frameworks set forth in Presidential Policy Directive 5 (PPD-5), the National Response Framework, the National Incident Management System (NIMS), Presidential Policy Directive 8 (PPD-8), the National Preparedness Goal (NPG), California's Standardized Emergency Management System (SEMS), and local adopted Emergency Operations Plans (EOPs) and Annexes.; and,

WHEREAS, the Member Agencies desire to formally reaffirm and update the operational and governance structure of the Organization to enhance its ability to address emergency management needs across San Mateo County; and,

WHEREAS**,** this revised and restated Joint Exercise of Powers Agreement creates an entity known as the San Mateo County Operational Area Emergency Services Organization Authority or the Emergency Services Council ("ESC") to support the operational needs of local governments, special districts, and non-governmental entities in the geographic area of San Mateo County; and

NOW, THEREFORE, the City Council of the City of Belmont resolves as follows:

SECTION 1. The Council approves the Second Revised and Restated Joint Exercise of Powers Agreement for the San Mateo County Operational Area Emergency Services Organization, and authorizes the City Manager to execute the Agreement on behalf of the City.

SECTION 2. Upon execution of the Agreement, the City Clerk is directed to forward a copy of this resolution and the executed Agreement to the San Mateo County Operational Area Emergency Services Organization and the San Mateo County Office of Emergency Services.

* * *

ADOPTED February 11, 2025 by the City of Belmont City Council by the following vote:

Ayes:

Noes:

Abstain:

Absent:

ATTEST:

_____
City Clerk

_____
Mayor

APPROVED AS TO FORM:

_____
City Attorney

Second Revised and Restated
Joint Exercise of Powers Agreement
San Mateo County Operational Area Emergency Services Organization

THIS JOINT POWERS AGREEMENT ("Agreement") is made as of the Effective Date by and between the public entities set forth below, creating the San Mateo County Operational Area Emergency Services Organization Authority ("Organization"), also known as the Emergency Services Council ("ESC").

Each public entity executing this Agreement shall be referred to individually as a "Member Agency," with all referred to collectively as "Member Agencies."

RECITALS

Whereas Member Agencies have established a unified emergency services organization by forming the Organization; and

Whereas the Member Agencies agree that the purpose of this Organization will be to operate pursuant to Presidential Policy Directive 5 (PPD-5), the National Response Framework, National Incident Management System (NIMS), Presidential Policy Directive 8 (PPD-8), the National Preparedness Goal (NPG) and California's Standardized Emergency Management System (SEMS) and local adopted Emergency Operations Plans (EOPs) and Annexes.

Whereas the Member Agencies agree that the participants within this Organization may include all local governments within the geographic area of San Mateo County (SMC), special districts, unincorporated areas, and participating non-governmental entities; and

Whereas the Member Agencies agree that the goal of the Organization is to provide coordinated plans for the protection of persons and property based on the phases of emergency management; and

Whereas the Member Agencies have the authority to enter into this Agreement under the Joint Exercise of Powers Act ("JPA Act"), California Government Code Section 6500 *et seq*.

NOW, THEREFORE, in consideration of the recitals and mutual obligations of the Member Agencies as herein contained, the Member Agencies agree as follows:

Article I - GENERAL PROVISIONS

1.01 Purpose

This Agreement creates an entity to exercise the powers shared in common by the Member Agencies to engage in San Mateo County Operational Area (SMC OA) cooperative planning with respect to all phases of the emergency management cycle: preparedness, mitigation, response, and recovery. Such purposes are to be accomplished and the Members Agencies' common powers exercised as set forth in this Agreement.

1.02 Creation of Authority
Pursuant to the JPA Act, the Member Agencies hereby reaffirm the creation of an entity to be known as the Organization or ESC. The Organization will be comprised of Member Agencies. The Organization shall be a public entity separate and apart from the Member Agencies. The geographic jurisdiction of the Organization is all territory within the geographic boundaries of the Member Agencies; however, the Organization may undertake any action outside those geographic boundaries as is necessary and incidental to accomplishing its purpose.

1.03 Membership in the Organization
Membership in the Organization is limited to public entities, as defined by the JPA Act, located or operating within SMC that have approved and executed this Agreement, and contributed resources of any kind toward establishing and supporting the Organization (including, but not limited to financial, personnel, equipment, or other resources) as approved by the ESC.

1.04 Participating Members/Partners in the Organization
The DEM will establish standards for emergency management practices within the SMC OA. Member Agencies will take those standards into consideration and implement them as they see fit within their respective jurisdictions.

Participation in the Organization is intended to ensure cooperative emergency planning and response; all participating Member Agencies and partners are expected to attend all regular and special meetings of the ESC, encourage active participation by their jurisdictions in the development of plans and training programs, drills, exercises and training opportunities, and otherwise assist in supporting the implementation of this Agreement.

1.05 Powers of the Organization
The Organization may purchase, lease, own and/or dispose of property and equipment and enter into contract(s), as required to satisfy the purposes of this Agreement. The Organization may employ agents and/or employees, operate works and improvements, sue and be sued in its own name, and invest surplus funds.

Article II – GOVERNANCE

2.01 Composition of the Organization
The Organization shall be administered by the ESC consisting of the following members:

a) The Chair of the Organization shall be a representative from the Board of Supervisors. The Chair of the Organization shall be appointed by the President of the Board of Supervisors.
b) The mayor of each city or town in the County, or the mayor's designated representative, with the understanding that any representative shall be member of the City Council of the city whose mayor they are representing.
c) A Vice-Chair shall be selected by the ESC.

2.02 General Purpose of the Organization
The general purpose of the Organization is to:

a) Provide structure for administrative and fiscal policies and procedures;

b) Identify and pursue funding sources;
c) Set policy;
d) Maximize the utilization of available resources; and
e) Oversee all committee activities.

2.03 Specific Responsibilities of the ESC

The specific responsibilities of the ESC shall be as follows:

a) To review and recommend adoption by the Board of Supervisors and City Councils of each City, emergency and mutual aid plans and agreements and such ordinances and resolutions and rules and regulations as are necessary to implement such plans and agreements, in addition to the basic agreements as deemed necessary to carry out the purpose of the Organization.
b) To approve an annual budget in an amount necessary to carry out the purposes of the Organization. Upon review and approval of the annual budget by the ESC, each Member Agency shall recommend the budget to the governing body of the Member Agency to secure from each the appropriation consistent with each Member Agency's identified allocation (via Budget Sheets.)
c) Each Member Agency's Executive Officer shall identify and designate at the beginning of each fiscal year, a local coordinator for regular participation in the San Mateo County Emergency Managers Association (SMC EMA) and work alongside the DEM. Should the identified Coordinator change at any time during the year, the Member Agency shall advise the DEM within 30 days.
d) If a Member Agency participates in a contract relationship for the provision of emergency services, it is still required to name a local emergency coordinator to the EMA who will assure the continuity of communication between the Member Agency, the DEM and the Organization.

2.04 Meetings of the Organization.

a) **Regular Meetings:** The ESC shall approve a schedule for its regular meetings provided, however, the ESC shall hold at least four meetings in one calendar year. The ESC shall fix the date, hour, and location of regular meetings by resolution and the Secretary shall transmit a copy of the resolution to each Member Agency at the first meeting of the fiscal year. By the approval of the Chair, Vice Chair, or the Department of Emergency Management Director ("DEM Director"), meetings can be canceled due to extenuating circumstances, which may include, but are not limited to, a lack of agenda items.
b) **Agenda Setting -** The agenda shall be set by the Chair, Vice Chair, and the DEM Director.
c) **Special Meetings:** Special meetings of the ESC may be called by the Chair, a majority of the ESC or the DEM Director. Special meetings will be held in accordance with the Ralph M. Brown Act ("Brown Act"), California Government Code section 54950 et seq.
d) **Call, Notice and Conduct of Meetings**: All meetings of the legislative body of the ESC shall be noticed and held in accordance with the provisions of the Brown Act. As soon as practicable, but no later than the time of posting, the Secretary shall provide notice and the agenda to each Member Agency. Any Member Agency may request that an item be considered for placement on the Agenda by submitting the request to the DEM Director.
e) Meetings of the ESC shall be conducted by the Vice-Chair in the absence of the Chairperson.

In the absence of both Chair and Vice-Chair, the meeting shall be chaired by a member of the ESC selected by a majority vote of the ESC.

2.05 Minutes
The Secretary of the Organization shall cause to be kept a digital recording of each meeting, which shall be posted on the DEM Website. The Secretary will create brief summary written minutes for approval by the ESC. Once the minutes have been approved by the ESC, the minutes will be posted on the DEM website.

2.06 Voting
All power of the Organization shall reside with the ESC. Each Member Agency shall have one vote. A Member Agency's alternate representative may participate and vote in the proceedings of the ESC only in the absence of that Member Agency's regular representative. No absentee ballot is permitted.

2.07 Quorum; Required Votes; Approvals
A quorum of the ESC is a majority of the representatives of the Member Agencies of the Organization. If the number of Member Agencies is an even number, a majority is fifty percent of the Member Agencies, plus one. The ESC may not take any substantive action without a majority of the Member Agencies voting to take that action. Action on non-substantive procedural matters may be taken by a majority of a quorum.

Article III – PARTICIPATING PARTNERS, EMPLOYEES AND ADVISORY COMMITTEES

3.01 Treasurer
The Treasurer of the County of San Mateo shall be the Treasurer of the Organization. The Treasurer shall be the depository, shall have custody of the accounts, funds and money of the Organization from whatever source, and shall have the duties and obligations set forth in the JPA Act.

3.02 Auditor and Financial Accountability

Although the Organization is a JPA the State Controller's Office (SCO) has determined that the Organization meets the criteria of a special district for financial reporting purposes under Government Code section 12463, subdivision (d)(2).

Government Code section 53891 requires the Organization to furnish to the SCO a report of all the financial transactions of the Organization during the preceding fiscal year. The report shall contain underlying data from audited financial statements prepared in accordance with generally accepted accounting principles, if this data is available. The report shall be furnished within seven months after the close of each fiscal year or within the time prescribed by the SCO, whichever is later, and shall be in the form and manner required by the SCO. The Organization shall submit to the SCO information on annual compensation, as described in subdivision (l) of Section 53892, for the previous calendar year no later than April 30th.

Pursuant to Government Code section 12464, if the reports are not completed in the time, form, and manner required or there is reason to believe that a report is false, incomplete, or incorrect, the

SCO is authorized to proceed with an investigation to obtain the information required. Any costs incurred by the SCO shall be borne by the Organization.

Government Code section 26909 also requires that an audit be completed and filed with the SCO within 12 months after the close of the fiscal year under examination. Unless the ESC votes to appoint an independent auditor, audits will be conducted in accordance with existing County policy, and by the auditor selected by the Office of the County Executive or the Controller. In the event that the ESC selects an independent auditor, the full cost of the audit will be the responsibility of the Organization. The Auditor shall perform the functions of auditor for the Organization and shall make or cause an independent annual audit of the accounts and records of the Organization by a certified public accountant, in compliance with the requirements of applicable laws and generally accepted auditing standards.

3.03 Legal Counsel
The SMC Attorney's Office shall be the legal counsel for the Organization. To the extent permitted by the JPA Act, the Organization may change, by resolution, the legal counsel to the Organization. The full cost of outside legal counsel will be the responsibility of the Organization.

3.04 Secretary to the Organization
The DEM shall provide a Secretary and administrative support to the Organization.

3.05 Contractors
The Organization shall have the power by resolution to appoint and employ such other consultants and independent contractors as may be necessary to carry out the purposes of the Organization. The Organization will be responsible for any/all incurred costs.

3.06 Committees
The Organization may form and dissolve Committees as determined by the ESC.

3.07 Department of Emergency Management
The DEM is responsible for the on-going operation of the SMC OA and is also responsible for achieving the purposes of the Organization as follows:

a) Emergency Response Support - coordination and planning during any regional emergency in accordance with adopted emergency plans.
b) Emergency Plans - preparation, development, coordination, and integration of compatible and complimentary unified area-wide emergency plans for approval by the State of California and adoption by the ESC.
c) Communications - coordination, development and maintenance of an area-wide emergency communications systems, including public alert and warning systems, and other situational awareness tools. The DEM may host SMC OA communication infrastructure such as system-wide applications or platforms.
d) Public Education and Information - coordination and support of an area-wide public education and information program.
e) Training and Exercise - coordination and assistance in the training and exercising of all County employees identified as Disaster Service Workers, as defined by Sect. 3100 of the California Government Code and volunteers. The Member Agencies will be responsible for

the training and exercise of their identified employees; however, the DEM will provide needed support as requested.

f) Grant Program Administration - coordination and assistance with designated emergency coordinators within the OA in the securing and distribution of grant funds for regional emergency management initiatives and program support. The DEM Director will serve as the representative of Member Agencies with various grants and their approval authorities, including the State Homeland Security Program and Bay Area Urban Areas Security Initiative.
g) General Administration - coordination and assistance in the procurement and inventory of emergency equipment, management of, maintenance and distribution of area-wide inventories of vital supplies and equipment.
h) Function as a liaison with Cal OES and FEMA. Assist in providing guidance in recovery efforts.
i) Resource Management – allocation and coordination of resources during local emergencies. Local governments will request resources through the logistics section at the SMC OA EOC. The DEM will escalate resource requests to the state if unable to be fulfilled locally.
j) Regional Hazardous Material Emergency Response Program – The DEM will oversee the contract for hazardous material response in the SMC OA.

3.08 Staffing Reimbursement
The DEM is staffed by employees of the County of San Mateo. The DEM supports the purposes of the Organization. A portion of the cost of DEM staff is reimbursed by the Organization in an amount determined by the funding allocation in this Agreement.

3.09 Property
If the Organization acquires title to property, the DEM Director will have charge of, handle, or have access to the property of the Organization, and shall file an official bond in an amount to be fixed by the contracting parties, pursuant to Section 6505.1 of the Government Code.

Article IV – BUDGET AND COST-SHARING
In consideration of the mutual promises herein contained, it is hereby agreed that the cost of maintaining the Organization will be shared as described below.

a) From the total amount of the annual budget there shall be deducted estimated revenue from federal “matching funds,” state grants, and other revenues.
b) The balance of the annual budget remaining after anticipated revenues have been deducted shall be paid as follows:
    1. The county shall pay 50% of the remaining balance.
    2. The cities shall pay the remaining 50% of the balance, apportioned in accordance with the following formula:
        i. One half of said 50% to be apportioned by people units or population.
            a) Total population of all member cities divided into one-half of the total of the cities’ share of the budget equals a factor in cents.
            b) Population of each member city times the factor in cents equals the share for each city.
        ii. The remaining one-half of said 50% to be apportioned on the basis of assessed valuation as follows:

a) Total assessed value of real and personal property in all member cities divided into one-half of the total of the city's share of the budget equals a factor in mils.
b) Assessed value of real and personal property of each member city times the factor in mils equals the share for each city.

c) For the purpose of this Agreement the total assessed valuation of real and personal property in all Member Agencies shall be the most recent such total maintained by the offices of the County Assessor.
d) The population figures will be based on the Census and will be updated at a minimum of every ten years.
e) It is understood and agreed that the financial obligations incurred by the Member Agencies under the provisions of this Agreement will be incurred annually, subject to the limitation that the county and cities are financially able to make funds available.
f) If the Member Agencies representing 25% or more of the county's population do not approve the budget in any fiscal year, the proposed budget will be referred back to the DEM Director and the Finance Committee for revision and recommendation. If no resolution can be reached by the committee, the Member Agencies may proceed to adopt budgets that provide those services they deem necessary for adequate emergency services protection as a whole, but any Member Agency shall be financially responsible for that portion of the budget unilaterally adopted. Any Member Agency that does not meet its financial commitment under the adopted budget will lose its voting status and/or other such privileges of membership as determined by the ESC.
g) It is further agreed that any excess in federal or state funds, in any year, shall be reviewed by a finance committee, who will then make a recommendation to the ESC, as to the disposition of the excess funds.
h) With respect any Member Agency that is not a City or the County, the amount to be contributed is determined by a negotiation between those Member Agencies and the DEM Director and must be approved by the ESC. A letter memorializing the agreed contribution will be an attachment to this Agreement.
i) The Finance Committee will be a standing committee of the ESC and is responsible for administrative and financial recommendations to the ESC. The Finance Committee will consist of the following members: SMC Supervisor (Chair of the ESC), Vice Chair, and representatives chosen by the ESC to be limited to five members.
j) The Organization shall maintain a minimum of $500,000 in the Trust Fund with a maximum of $1,500,000. This policy can be reviewed and updated with a majority vote from the ESC.

Article V - INSURANCE

a) The County shall add the Organization and ESC to its existing excess liability insurance coverage and shall maintain such coverage in full force and effect during the life of the Agreement. Member Agencies understand that the County is partially self-insured. Unless the Organization decides otherwise, County shall provide for the defense of any claims or litigation within the self-insured retention. Legal representation by the County will ordinarily be provided by the County Attorney.
b) Any out-of-pocket expense or loss, by way of judgment or settlement, arising out of the operation of this Agreement, within the limits of the County's self-insured retention shall be shared by the parties in accordance with the formula as described in Article IV (b).

Article VI - EFFECTIVENESS

This Agreement shall be effective upon its execution by all Member Agencies. It is effective as to new Member Agencies upon adoption and approval by the ESC and by the new Member Agency's governing body. This Agreement shall continue in effect until terminated as provided herein.

Article VII – TERM AND TERMINATION

7.01 Withdrawal by Members

a) Any Member Agency may withdraw from this Agreement by written notice given by such Member Agency to all other Member Agencies, which notice shall be given at least 120 days prior to the commencement of the fiscal year in which it is to take effect. For the purpose of such notice, a fiscal year is defined as July 1 of a calendar year through June 30 of the succeeding calendar year.
b) Any former or prospective Member Agency may enter or re-enter the organization by petition to the ESC by its governing body, and majority approval of the petition by the ESC. Upon approval, the new Member Agency must agree in writing to all terms of this Agreement.
c) Should a Member Agency withdraw less than 120 days prior to the commencement of the fiscal year, the withdrawal will be effective, but that Member Agency will be responsible for its calculated contribution for that year pursuant to Article IV.
d) Should a Member Agency give required notice and withdraw from the Agreement, the prior contribution of that Member Agency will be divided equally by formula among the remaining Member Agencies.

7.02 Termination of Organization and Disposition of Surplus Money and Property

This Agreement shall terminate effective upon a vote of the ESC, the County and by at least eleven (11) cities representing the majority of the population of the County. In the event that the Organization ceases to exist, surplus funds will be returned consistent with Section 6512 of the Government Code in proportion to the contributions made. The Organization does not intend to acquire title to any property. But in the event that it does, title to all property acquired by the Organization shall be transferred to the County of San Mateo and be used for "County Wide" purposes.

7.03 Amendments

Any proposed Amendments to this Agreement may be recommended by the ESC but must be ratified by each Member Agency's governing body.

7.04 Bylaws

The ESC may, from time to time, adopt and/or amend Bylaws for the conduct of its affairs; provided the purpose is consistent with this Agreement and/or are necessary and appropriate.

Article VIII - MISCELLANEOUS PROVISIONS

8.01 Notices

It shall be the responsibility of the County Manager or designee to ensure all notices are provided to Member Agencies and posted in compliance with the legal requirements of the Agreement.

8.02 Severability

If any one or more of the terms, provisions, promises, covenants, or conditions of this Agreement were, to any extent, adjudged invalid, unenforceable, void, or voidable for any reason whatsoever by court of competent jurisdiction, each and all of the remaining terms, provisions, promises, covenants, and conditions of this Agreement shall not be affected thereby and shall be valid and enforceable to the fullest extent permitted by law.

8.03 Supersession

It is mutually understood and agreed by the Member Agencies that this Agreement supersedes the 2014 San Mateo County Operational Area Joint Powers Agreement, any previous agreements on this subject matter and any amendments thereto.

8.04 Assignment

No Member Agency shall assign any rights or obligations under this Agreement without the prior written consent of the ESC.

8.05 Governing Law

This Agreement is made and to be performed in the State of California, and as such, California substantive and procedural law shall apply. Venue for any litigation under this Agreement shall be in the County of San Mateo.

8.06 Headings

The section headings herein are for convenience only and are not to be construed as modifying or governing the language of this Agreement.

8.07 Counterparts

This Agreement may be executed in counterparts, each of which will be deemed an original and all of which shall constitute this Agreement.

8.08 No Third Party Beneficiaries

This Agreement and the obligations hereunder are not intended to benefit any party other than the Authority and its Member Agencies, except as expressly provided otherwise herein. No entity that is not a signatory to this Agreement shall have any rights or causes of action against any party to this Agreement as a result of that party's performance or non-performance under this Agreement, except as expressly provided otherwise herein.

8.09 Filing of Notice of Agreement

Within 30 days after the Effective Date, the Secretary shall cause to be filed with the Secretary of State the notice of Agreement required by the Act. Within 30 days after any amendment to this Agreement, the Secretary shall file the amendment with the Secretary of State.

8.10 Conflict of Interest Code

The Organization has adopted a conflict of interest code as required by law. Member Agencies understand that representatives and alternate representatives are listed on the Organization’s Conflict

of Interest Code and will be responsible for filing a Form 700 with the Organization.

8.11 Indemnification

The Organization shall defend, indemnify and hold harmless each Member Agency (and each Member Agency's officers, agents, and employees) from any and all liability, including but not limited to claims, losses, suits, injuries, damages, costs and expenses (including attorney's fees,) arising from or as a result of any acts, errors or omissions of the Organization or its officers, agents or employees.

Each Member Agency shall defend, indemnify and hold harmless the Organization and the other Member Agencies (and their officers, agents, and employees) from any and all liability, including but not limited to claims, losses, suits, injuries, damages, costs and expenses (including attorney's fees,) arising from or as a result of any acts, errors or omissions of that party or its officers, agents or employees.

8.12 Dispute Resolution/Legal Proceedings

Disputes regarding the interpretation or application of any provision of this Agreement shall, to the extent reasonably feasible, be resolved through good faith negotiations between the Member Agencies and/or the Organization.

8.13 Authorization to Enter Into Agreement

Each party warrants that the person signing this Agreement on its behalf is authorized to bind that party to this Agreement.

8.14 Confirmation of Jurisdictional Authority

By signing this Agreement, the Member Agencies retain all authority granted to them by the State and/or their respective Charters. The powers and/or authority granted pursuant to this Agreement shall in no way serve to limit or restrict an individual Member Agency’s jurisdictional authority.

(SIGNATURES ARE ON FOLLOWING PAGE)

IN WITNESS WHEREOF, each Member Agency has caused this Agreement to be executed and attested by its proper officers thereunto duly authorized, as follows:

Signatories	Resolution/Action Number	Date of Adoption
Atherton		
Belmont		
Brisbane		
Burlingame		
Colma		
Daly City		
East Palo Alto		
Foster City		
Half Moon Bay		
Hillsborough		
Menlo Park		
Millbrae		
Pacifica		
Portola Valley		
Redwood City		
San Bruno		
San Carlos		
San Mateo		
South San Francisco		
Woodside		
County of San Mateo		

ANNEX A – COMMON TERMINOLOGY

A.01 Terminology Defined
Not all vocabulary of technical terms listed in the Agreement is used in the Agreement. In part, the terms are included as a resource to further clarify terminology utilized in documentation, field operations and/or applicable subject matter.

A.02 All-Hazards: The consideration of the full spectrum of emergencies (natural, technological, or human-caused incidents) that calls for action to protect life, property, and environment. The advantages of adopting an all-hazards approach to prepare for and respond to disasters include comprehensive planning, resource flexibility, coordination among agencies, training, and community engagement to effectively control different types of disasters to reduce or eliminate duplication of effort and cost.

A.03 California Governor's Office of Emergency Services (Cal OES): State-level organization that functions as the central command center during major emergencies and disasters in California. Cal OES oversees the response, direction, and coordination of state and federal resources, as well as mutual aid assets, to support diverse communities in the state.

A.04 Catastrophe: Any incident, natural or human-caused, with consequences of high rates of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, national morale, and/or government functions. A catastrophic event could result in sustained impacts over a prolonged period, exceed resources normally available in the impacted area, and significantly interrupt governmental operations and emergency services to such an extent that national security could be threatened.

A.05 Community Emergency Response Team (CERT): Community-level organizations of volunteer emergency workers who can provide immediate assistance to supplement the efforts of professional responders in the event of a major disaster. CERT programs train volunteers in disaster preparedness and basic disaster response skills during disaster situations so professional responders can prioritize and allocate resources to more complex tasks. Local CERT programs are supported by the Federal Emergency Management Agency (FEMA), as well as the California Governor's Office of Emergency Services (Cal OES).

A.06 Command: The act or directing and or controlling by virtue of explicit legal, agency or delegated authority. The term "Command" may also refer to the Incident Commander.

A.07 Emergency: Any incident, natural, technological, or human-caused, that requires responsive action to protect life, property, and environment. Under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), an emergency means any occasion or instance for which, in the determination of the President, federal assistance is needed to supplement state and local efforts and capabilities to save lives and to protect property and public health and safety or to lessen or avert the threat of a catastrophe in any part of the United States.

A.08 Emergency Management: A subset of incident management, the coordination and integration of all activities necessary to build, sustain and improve the capability to prepare for, protect against, respond to, recover from, or mitigate against threatened or actual natural disasters, acts of terrorism or other human-caused disasters.

A.09 Emergency Operations Center (EOC): The physical location at which the coordination of information and resources to support incident management activities normally takes place. An EOC may be a temporary facility or maybe in a more central or permanently established facility, such as at a higher level of organization within a jurisdiction.

A.10 Federal Emergency Management Agency (FEMA): Federal-level organization that coordinates the federal government's response to major disasters and emergencies, providing support and resources to state and local authorities. Its role includes managing disaster relief efforts, facilitating recovery operations, and helping communities prepare for future incidents.

A.11 Incident: An occurrence or event, natural or human-caused, which requires a response to protect life or property. Incidents can, for example, include major disasters, emergencies, terrorist attacks, terrorist threats, civil unrest, wildland and urban fires, floods, hazardous materials spills, nuclear accidents, aircraft accidents, earthquakes, hurricanes, tornadoes, tropical storms, tsunamis, war-related disasters, public health and medical emergencies, and other occurrences requiring an emergency response.

A.12 Incident Command System (ICS): A standardized on-scene emergency management construct specifically designed to provide for the adoption of an integrated organizational structure that reflects the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries. It is used for all kinds of emergencies and can be applied to small as well as large and complex incidents.

A.13 Local Emergency: The duly proclaimed existence of conditions of disaster or extreme peril to the safety of persons and/or property within territorial limits of a county, city and county, or city caused by such conditions as fire, flood, storm, epidemic, riot, drought, sudden and severe energy shortage, plant or animal infestation or disease, earthquake, tsunami or other conditions which are likely to be beyond the control of the services, personnel, equipment and facilities of that local political subdivision to combat.

A.14 Local Government: A county, municipality, city, town, township, local public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under state law;) regional or interstate government entity or agency or instrumentality of a local government; an Indian tribe or authorized tribal entity, or in Alaska a Native Village or Alaska Regional Native Corporation; a rural community, unincorporated town or village or other public entity. See Section 2 (10), Homeland Security Act of 2002, P.L. 107−296, 116 Stat. 2135 (2002).

A.15 Mitigation: Activities providing a critical foundation in the effort to reduce the loss of life

and/or property from natural and/or human-caused disasters by avoiding or lessening the impact of a disaster and providing value to the public by creating safer communities. Mitigation seeks to fix the cycle of disaster damage, reconstruction, and repeated damage. These activities or actions, in most cases, will have a long-term sustained effect.

A.16 National Incident Management System (NIMS): A system that provides a proactive approach guiding government agencies at all levels, the private sector and nongovernmental organizations to work seamlessly to prepare for, prevent, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location or complexity, to reduce the loss of life or property and harm to the environment.

A.17 National Response Framework: Document that establishes a comprehensive, national, all-hazards approach to domestic incident response. It serves as a guide to enable responders at all levels of government and beyond to provide a unified national response to a disaster. It defines the key principles, roles, and structures that organize the way U.S. jurisdictions plan and respond.

A.18 Operational Area (OA): An intermediate level of the state emergency services organization, consisting of SMC and all political subdivisions within the county area. In a state of emergency, the OA shall serve as a link in the system of communications and coordination between the political subdivisions comprising the OA and the Regional Emergency Operations Center (REOC) or State Operations Center (SOC). The **SMC OA** mirrors the County's geographic boundaries.

A.19 Preparedness: Actions that involve a combination of planning, resources, training, as well as exercising and organizing to build, sustain, and improve operational capabilities. Preparedness is the process of identifying the personnel, training, and equipment needed for a wide range of potential incidents, and developing jurisdiction-specific plans for delivering capabilities when needed for an incident.

A.20 Recovery: The development, coordination, and execution of service- and site-restoration plans; the reconstitution of government operations and services; individual, private-sector, nongovernmental and public-assistance programs to provide housing and to promote restoration; long-term care and treatment of affected persons; additional measures for social, political, environmental and economic restoration; evaluation of the incident to identify lessons learned; and post-incident reporting and development of initiatives to mitigate the effects of future incident.

A.21 Resources: Personnel and major items of equipment, supplies, and facilities available or potentially available for assignment to incident operations and for which status is maintained. Under the NIMS, resources are described by kind and type and may be used in operational support or supervisory capacities at an incident or an EOC.

A.22 Response: Immediate actions to save and sustain lives, protect property and the environment, and meet basic human needs. Response also includes the execution of plans and actions to support short-term recovery.

A.23 Standardized Emergency Management System (SEMS): The cornerstone of California's emergency response system and the fundamental structure for the response phase of emergency management. SEMS is required by the California Emergency Services Act (ESA) for managing multiagency and multijurisdictional responses to emergencies in California. The system unifies all elements of California's emergency management community into a single integrated system and standardizes key elements. SEMS incorporates the use of the ICS, California Disaster and Civil Defense Master Mutual Aid Agreement (MMAA), the OA concept, and multiagency or inter-agency coordination. State agencies and local governments are required to use SEMS to be eligible for any reimbursement of response-related costs under the state's disaster assistance program.

ORDINANCE NO. _____

AN ORDINANCE OF THE CITY OF BELMONT REPEALING PROVISIONS PERTAINING TO BUSINESS LICENSES SUPERSEDED BY MEASURE DD (ORDINANCE 2024-1181) AND AMENDING REGULATIONS RELATED TO SOLICITORS

THE CITY COUNCIL OF THE CITY OF BELMONT DOES ORDAIN AS FOLLOWS:

SECTION 1. BCC § 1-2 AMENDED

Belmont City Code Section 1-2 is amended by modifying the unnumbered paragraph containing the rule "Computation of time" to read as follows. All other paragraphs in Section 1-2 are unchanged.

> *Computation of time*. The time in which any act provided by law is to be done is computed by excluding the first day and including the last, unless the last day is a Saturday, Sunday or holiday recognized by the City of Belmont, and then it is also excluded and the date for the performance of that act is extended to the next day that is not a Saturday, Sunday, or holiday.

SECTION 2. BCC CHP 12 SECTIONS RELATED TO TAXES REPEALED

City of Belmont Measure DD, Ordinance 2024-1181 adopted November 5, 2024 by the People of Belmont, restructures the City's Business License Tax and supersedes City Code Sections 12-1, 12-1.1, 12-2, 12-3, 12-4, 12-5, 12-6, 12-7, 12-8, 12-9, 12-10, 12-11, 12-12, 12-13, 12-16, 12-17, 12-18, 12-19, 12-20, 12-21, 12-23, 12-24, 12-25, 12-26, 12-27, 12-28, and 12-29. The foregoing sections are repealed effective January 1, 2025. This section which relates to taxes for the usual and current expenses of the city takes effect immediately under Government Code Section 36937(d) upon adoption of this ordinance.

SECTION 3. BCC CHP 12 AND SECTION 12-22 REPEALED

Belmont City Code Chapter 12 and section 12-22 are repealed.

SECTION 4. BCC CHP 12 ADDED.

Belmont City Code Chapter 12 is added to read:

Chapter 12 – Regulated Business Activities

Article 1 – Solicitors

Sec. 12-1 Definitions

The definitions in this section apply to the words and phrases used in this chapter unless the context clearly indicates otherwise.

"Applicant" means the natural person seeking to obtain a registration certificate.

"Registration Authority" means the chief of police, his or her authorized representatives, or

the person designated by the city manager.

"Solicitor" means any person who engaged in the business of going from door to door within the city, selling or taking orders for or offering to sell or take orders for goods, wares or merchandise or other things of value for future delivery, or for services to be performed in the future. For the purposes of this article, "solicitor" includes all persons engaged in the business of distributing samples, handbills, brochures, and other similar items door to door for commercial purposes. Solicitor does not include a person going door to door for the purpose of non-commercial communication.

"Solicitor Registration Certificate" means a certificate issued by the registration authority.

Sec. 12-2 Solicitor Registration and Identification

(a) It is unlawful for a person to engage in the business of a solicitor within the City without a current and valid solicitor registration certificate issued to the person by the registration authority.

(b) It is unlawful for a person to engage in the business of a solicitor within the City without displaying on their person at all times a valid solicitor identification card issued by the registration authority.

Sec. 12-3 Solicitor Registration Application

(a) An application to register as a solicitor, together with the required application fee, must be filed with the City Clerk who will forward the application to the registration authority. A new or renewal application may not be processed without the required application fee.

(b) If the registration authority determines the application is incomplete or that additional information is necessary to determine whether registration complies with this article, the registration authority must promptly inform the applicant in writing to cure the incompleteness or provide additional information required within 30 days or such time as the registration authority determines to be reasonable under the circumstances.

(c) If the applicant does not cure all incompleteness or provide all additional information requested within the time specified by the registration authority, the registration authority may deny the application.

(d) An application to register or renew registration must be on a form approved by the registration authority. The registration authority may develop a form for mandatory use. The application must include the information and documents in subsection (e) and any additional information or documents that the registration authority determines appropriate to carry out the intent and purpose of this chapter.

(e) A registration application must include the following. A mail box number may not be used for required address information.

(1) The legal name and physical address of the applicant.

(2) For each business for which orders are to be secured,

(A) The name and physical address of business;

(B) All fictitious business names and the county of fictitious name registration;

(C) If a business entity, the state of incorporation and proof of registration in good standing with the California Secretary of State and Franchise Tax Board;

(D) The name of the nearest local or state manager, if any, and physical address,

(E) The location of any warehouse or manufacturing facility within the State of California from which goods will be shipped.

(3) The kind of goods, wares, or merchandise to be shipped or forwarded and the business supplying them.

(4) The method of solicitation or taking orders.

(5) The method of delivery of goods or services.

(6) Any other facts the registration authority may require.

(7) A background check application with the following information about the Applicant.

(A) The Applicant's business, occupation, and employment history for the seven years preceding the date of the application, including the inclusive dates of any employment;

(B) A current driver's license or identification issued by a state or federal governmental agency or other authenticable photographic identification bearing a bona fide seal by a foreign government;

(C) Any arrests or convictions within the previous seven years for violations of local, state or federal law;

(D) Any administrative or civil proceeding in which a license, permit, or other permission to operate a business was suspended or revoked or in which a civil penalty or fine was imposed or stipulated to in the previous seven years.

(8) The Applicant must complete a California Department of Justice Live Scan BCIA 8016 form and submit to a live scan fingerprinting process through the Belmont Police Department or an authorized provider.

(9) The applicant attests under penalty of perjury that all of the information contained in the application, including supporting documentation is complete, true and accurate to the best of the Applicant's knowledge.

(10) The application must be signed by the applicant and the signature notarized.

Sec. 12-4 Registration

(a) *Registration certificate*. Registration is specific to the applicant and may not be

transferred to another person.

(b) *Term*. Registration is valid for one year unless revoked or surrendered. Suspension of a registration certificate does not extend the term of registration.

(c) *Renewal*. Registration may be renewed subject to the same requirements as registration, except as expressly otherwise provided in this chapter. A registration holder is solely responsible to timely submit a complete renewal application. Failure to timely submit a renewal application may result in the expiration of the registration before the renewal application is granted or denied.

(d) *Other approvals*. Registration required by this chapter is in addition to any other license or permit required under any other provisions of the Belmont City Code or Belmont ordinances, including but not limited to a business license, zoning administrator permit, conditional use permit, building permit, occupancy certification or permit, or any other permit or license required by law. The issuance of a registration certificate does not modify the requirements of any other permit or approval and is not a substitute for obtaining any other permit, license or approval otherwise required. The issuance of a registration certificate may not be construed as a factor in favor of the issuance of any other permit, license, or approval necessary under this Code for the operation of a regulated business.

Sec. 12-5 Registration certificate issuance or denial

(a) *Determination*. Within 45 days of receiving a complete application, the registration authority must register the applicant and issue a registration certificate unless he or she finds one or more grounds for denial under this section.

(b) *Mandatory grounds for denial*. The registration authority may not issue a registration certificate and must deny the application for registration if:

(1) The application fee has not been fully paid;

(2) The application, once complete, does not conform to the requirements of this article;

(3) The applicant is disqualified from registration under this article; or,

(4) Registration for purpose of sales identified in the application is not consistent with federal, state or local laws, rules, and regulations, or any final administrative decision or court order.

(c) *Permissive grounds for denial*. The registration authority may deny a registration application if:

(1) The applicant has outstanding violations associated with solicitor activity in another jurisdiction;

(2) The applicant held an approval to engage in the business of soliciting in another jurisdiction and within the last seven years the applicant either surrendered the approval while an enforcement proceeding was pending or had the approval revoked;

(3) The applicant holds an approval to engage in the business of soliciting in another jurisdiction and enforcement proceedings are pending in that jurisdiction based on conduct that if committed in the City of Belmont would be grounds to deny or revoke registration. The registration authority must make an independent determination based on substantial evidence as to whether the conduct occurred; or,

(d) An applicant is disqualified from registration and possessing a solicitor registration if:

(1) The application contains a material misrepresentation including false or misleading information, the application fails to include all required information, or a material fact is omitted;

(2) The applicant has been convicted of an offense that is substantially related to the qualifications, functions, or duties of the business or profession for which the application is made which include, but not be limited to, the following:

(A) A violent felony, as specified in subdivision (c) of Section 667.5 of the Penal Code;

(B) A serious felony, as specified in subdivision (c) of Section 1192.7 of the Penal Code;

(C) Any crime involving dishonesty, fraud, deceit, violence, or moral turpitude;

(D) A felony for hiring, employing, or using a minor in transporting, carrying, selling, giving away, preparing for sale, or peddling, any controlled substance to a minor; or selling, offering to sell, furnishing, offering to furnish, administering, or giving any controlled substance to a minor;

(E) Any crime involving burglary, larceny, identity theft, elder abuse, trespassing, public intoxication, or being under the influence of a controlled substance; or,

(F) Any crime involving the sale, manufacture, distribution or transportation of a controlled substance.

(3) The applicant has within the last 10 years from the date of the pending application:

(A) made a material misrepresentation in an application for license, permit or other permission to operate a business or engage in solicitor activity in the City;

(B) had a solicitor or other approval revoked by the City; or

(C) while an administrative, civil or criminal proceeding was pending against the applicant for conduct arising out of business activity in the city, the applicant surrendered the registration certificate, business permit, a land use permit, or other approval issued by the City and necessary to operate the business.

(e) The registration authority may disqualify an applicant from registration if the authority finds based on a preponderance of evidence that:

(1) The applicant engaged in conduct comprising all of the elements of any crime identified in subsection (d)(2);

(2) The applicant has a history of committing, permitting or failing to prevent significant violations of City of Belmont ordinances relating to business operations; or,

(3) The applicant had an approval from another jurisdiction to engage in solicitor activity in that jurisdiction within the last seven years and either:

(A) the jurisdiction revoked the approval, or

(B) while an administrative, civil or criminal proceeding was pending against the applicant for conduct arising out of solicitor activities, surrendered the approval.

(f) As used in this section the term conviction includes convictions that are dismissed under Penal Code Section 1203.4, 1203.4a, or 1203.41 or any other provision allowing for dismissal of a conviction.

(g) If the registration authority denies the application, he or she must notify the applicant of the reasons for the denial in writing, the right of appeal under this chapter, and that the failure to request a timely appeal will waive the applicant's to right to contest the decision.

Sec. 12-6 Registration revocation or suspension.

(a) The registration authority must revoke the registration of a solicitor found to be disqualified under Section 12-5(d).

(b) The registration authority must either revoke or suspend the registration found to be disqualified under Section 12-5(e).

(c) The registration authority must revoke a registration under subsection (b) unless he or she finds based on substantial evidence that the circumstance or conduct giving rise to the disqualification is not likely to be repeated.

(d) The remedies in this section are in addition to and cumulative of other remedies at law.

(e) Before suspending or revoking the registration of an existing registrant under this section, the registration authority must provide the ownership notice and an opportunity to be heard in accordance with procedures applicable to regulated businesses set forth in Section 13-11.

Sec. 12-7 Appeal of Registration Decision

Solicitor registration decisions may be appealed to the city manager in accordance with procedures applicable to regulated businesses set forth in Section 13-12.

Sec. 12-8 Enforcement

(a) A violation of this article is a misdemeanor offense that may be charged as an infraction at the discretion of the initiating enforcement official.

(b) Violation of this article may be remedied by any means available to remedy a violation of this Code. The remedies are cumulative and non-exclusive.

(c) Notwithstanding Section 30-12, administrative fines issued under chapter 30 for violation of this chapter may be issued in amount between $100 and $1,000 as determined by the registration authority for each offense.

(d) Every person violating this chapter is subject to a civil penalty of $1,000 for each day of each violation which may be recovered in a civil action.

(e) An offense charged as a misdemeanor violation of this chapter is punishable by imprisonment in the county jail not exceeding six months, or by fine not exceeding $1,000, or by both.

Sec. 12-9 Mandatory duty

This article is not intended to create a mandatory duty on the part of the city to protect any person from any injury or damage arising out of the establishment or operation of a regulated business activity or the enforcement or non-enforcement of this article.

SECTION 5. BCC CHP 19 REPEALED.

Belmont City Code Chapter 19 and sections 19-1 and 19-2 are repealed.

SECTION 6. EFFECTIVE DATE.

Except as provided in Section 2, this ordinance is effective 30 days after adoption.

* * *

YES:

NO:

ATTEST:

_____ _____

City Clerk Mayor

STAFF REPORT

Meeting Date:	February 11, 2025
Agency:	City of Belmont
Staff Contact:	Karen Clark, Management Analyst, kclark@belmont.gov
Agenda Title:	Ongoing Communications Outreach and Consulting Services
Agenda Action:	Motion

Recommendation

Authorize the City Manager to negotiate and execute Task Order No. 3 to the Master Service Agreement with The Lew Edwards Group to provide communications outreach and consulting services in the amount of $78,000 plus a 10% contingency.

Strategic Focus Area

Fiscal and Organizational Sustainability

Background

In September 2019, as part of the strategic planning process, the City Council directed staff to develop alternatives for long-term capital financing of deferred maintenance needs, maximize existing revenue sources, and identify new revenue sources to maintain financial stability. This prompted staff to issue a Request for Qualifications (RFQ) for Opinion Research and Communications Services to gauge public interest, determine feasibility, and raise community awareness for projects meeting these goals. Projects included upgrading the Barrett Community Center, improving storm drainage infrastructure, and modernizing the business license tax structure. These projects were primarily unfunded; therefore, the City was seeking guidance on where it made sense to allocate resources to advance efforts for community consideration. Following the RFQ process, the City entered a Master Service Agreement with The Lew Edwards Group (LEG).

Analysis

Communications outreach and consulting services are desired to further 2023-2027 Strategic Plan initiatives, specifically pertaining to addressing aging City facilities and infrastructure. To complete this work, City staff request that the City Council authorize the City Manager to negotiate and execute Task Order No. 3 to the Master Service Agreement with The Lew Edwards Group in the amount of $78,000 plus a 10% contingency. Funding for January-June 2025 has already been included in the 2024-25 (current) fiscal year budget; July-December 2025 services will be incorporated into the 2025-26 proposed fiscal year budget.

Alternatives

1. Deny the requested authority
2. Solicit services from an alternative firm
3. Continue the item for future discussion

Attachments

None

Fiscal Impact

☐ No Fiscal Impact

☒ Funding Source Confirmed: Funding for these services comes from the General Fund (Account #101-1-501-8351). January-June 2025 services have already been included in the 2024-25 (current) fiscal year budget and July-December 2025 services will be incorporated into the 2025-26 proposed fiscal year budget.

Source:	**Purpose:**	**Public Outreach:**
Council	Council Vision/Priority	Posting of Agenda

STAFF REPORT

Meeting Date:	February 11, 2025
Agency:	City of Belmont
Staff Contact:	Grace Castaneda, Finance Director, gcastaneda@belmont.gov; Joanne Yung, Budget Manager, jyung@belmont.gov
Agenda Title:	Fiscal Year 2025-26 Budget Calendar
Agenda Action:	Motion

Recommendation
Adopt motion approving Fiscal Year 2025-26 Budget Calendar.

Strategic Focus Area
Fiscal and Organizational Sustainability

Background
As part of the annual budget development process, the City Council adopts a budget calendar establishing dates leading to review and approval of the annual budget.

Analysis
The attached proposed Fiscal Year (FY) 2025-26 Budget Calendar calls for a series of work sessions ultimately resulting in the adoption of the budget on June 10, 2025.

Alternatives
1. Take no action.

Attachments
A. Proposed FY 2025-26 Budget Calendar

Fiscal Impact
☒ No Fiscal Impact
☐ Funding Source Confirmed:

Source:	**Purpose:**	**Public Outreach:**
Staff	Discretionary Action	Posting of Agenda

City of Belmont
FY 2025-26 Budget Calendar

Day	Event	Responsibility	✓
Tuesday, 2/11/2025	Adopt motion approving Budget Calendar	Finance	✓
Tuesday, 2/11/2025	FY 2025-26 Mid-Year Budget Review and Adoption	Finance & All Departments	✓
Thursday, 3/6/2025	Council Priority Workshop ▪ FY 2025-26 Strategic Planning & Financial Forecast ▪ Priorities and policy considerations	All Departments & Finance	✓
Monday, 3/10/2025	Issue budget priorities, Master Revenue Schedule, and detailed budget instructions and forms to City departments	Finance	
Wednesday, 3/26/2025	Submit proposed initiatives, operating and capital requests, and revenue estimates to Finance	All Departments	
Wednesday, 4/2/2025-Friday, 4/11/2025	Conduct departmental budget meetings	City Manager, Finance, & All Departments	
Monday, 4/14/2025	Begin compilation of FY 2025-26 Budget and preparation of budget message	City Manager, Finance	
Friday, 5/23/2025	Distribute proposed FY 2025-26 Budget	Finance	
Tuesday, 5/27/2025	▪ Introduce the proposed FY 2025-26 Budget and department presentations ▪ Set public hearing on adopting the FY 2025-26 Budget and setting non-Prop. 218 fees and charges – June 10, 2025	All Departments	✓
June 2025 (Date TBD)	Audit Committee reviews proposed FY 2025-26 Budget	City Manager, Finance	✓
Tuesday, 6/10/2025	▪ Present Audit Committee recommendation ▪ Public Hearing (City Council and Fire Protection District) ▪ Adopt resolutions implementing FY 2025-26 Budget	City Manager, Finance	✓

(✓) Check denotes Council or Council Standing Committee Action

STAFF REPORT

Meeting Date:	February 11, 2025
Agency:	City of Belmont
Staff Contact:	Tracy Scramaglia, Public Works, (650) 595-7469, tscramaglia@belmont.gov
Agenda Title:	Bishop Subdivision Open Space and Fire Road Acceptance
Agenda Action:	Resolution

Recommendation

Adopt a resolution accepting the Bishop subdivision's street improvements and fire road as completed and compliant with the City's approved plans, authorizing the release of subdivision improvement bond, accepting a maintenance and warranty bond for the required one-year warranty period, and accepting the dedication of open space.

Strategic Focus Area

Infrastructure and Mobility

Background

In December 2009, the Belmont City Council authorized the purchase of approximately 35 acres of undeveloped land in the San Juan Hills area, including an approximately 8.2 acres Bishop Road property.

In March 2013, the Council directed the sale of the 8.2 acres Bishop Road property, subject to certain requirements and development restrictions in the purchase documents. These requirements, which the purchaser committed to, include the preservation of approximately 6.2 acres as open space for public use and limiting development to no more than three single family residential lots on the remaining two acres. The purchaser is also responsible for maintaining the existing fire road/ public access trail from Bishop Road to the Sugarloaf Open Space Area.

The property owner has made an irrevocable offer of dedication to the City for the open space parcel in the above-referenced purchase documents. However, the offer of dedication, a decision that rests with the City, has not been accepted and is contingent upon the developer completing all public improvements. Before the City accepts the open space, the area of dedication is dedicated as easements for fire road access, open space, drainage, public utilities, and public access.

On April 10, 2018, the Council adopted a resolution approving the development's final subdivision map and subdivision improvement agreement. The development is a four-lot subdivision that includes three residential lots and a fourth lot consisting of 6.2 acres of permanent public open space. The developer for this project is Belmont Investment Group, LLC.

The developer has entered into subdivision improvement agreements with bonds to guarantee the completion of all public improvements related to the project. The developer is responsible for constructing

all off-site improvements fronting their parcels. The project also includes relocating the fire road/public access trail within the boundaries of the 6.2 acres of open space parcel, thus continuing to allow pedestrian access to the Sugarloaf Mountain/open space area.

Analysis

The developer has completed the construction of the street improvements and the relocation of the fire road. They are requesting that the City accept the improvements and release the security bonds in accordance with the terms of their Subdivision Improvement Agreement. On behalf of the City Engineer, the City's Public Works Inspectors have inspected the improvements and found them to follow the City's approved plans and specifications. The City Engineer recommends the City Council accept the improvements and release the security bonds. The 10% Maintenance and Warranty bonds will be held by the City and released following the expiration of the one-year warranty period and confirmation by the that no claims of defective improvements have been received.

At the time of parcel map approval, the City Council adopted Resolution 2018-027, directing the City Manager to determine the condition of the public improvements constructed, and make recommendations on whether the City shall accept the irrevocable offer of dedication of open space, after the expiration of a one-year warranty period. Since the public improvements were substantially completed more than a year ago, and the recent inspection determined they are in acceptable conditions, staff recommend the open space dedication can be accepted now. Staff also recommends that the City accept the improvements constructed on Bishop Road fronting the property as a part of the City's street system for maintenance.

Alternatives

1. Take no action.
2. Refer back to staff for more action.

Attachments

A. Resolution
B. Recorded Parcel Map
C. Agreement Containing Covenants Affecting Real Property
D. Exhibit A of the Resolution – Irrevocable Offer of Dedication

Fiscal Impact

☒ No Fiscal Impact
☐ Funding Source Confirmed:

Source:	**Purpose:**	**Public Outreach:**
Staff	Statutory/Contractual Requirement	Posting of Agenda

RESOLUTION NO. 2025 –

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF BELMONT ACCEPTING THE DEVELOPMENT'S STREET IMPROVEMENTS AND RELOCATION OF FIRE ROAD AS COMPLETED AND COMPLYING WITH THE CITY'S APPROVED PLANS, AUTHORIZE THE RELEASE OF SUBDIVISION IMPROVEMENT BOND, ACCEPT A MAINTENANCE AND WARRANTY BOND, AND ACCEPT THE DEDICATION OF OPEN SPACE FOR THE BISHOP SUBDIVISION AT 2009, 2011, 2013 BISHOP ROAD

WHEREAS, on April 10, 2018, the Council adopted a resolution approving the final subdivision map and subdivision improvement agreement for a four-lot subdivision that includes three residential lots and a fourth lot consisting of 6.2 acres of permanent public open space along Bishop Road; and,

WHEREAS, the property owner has made an irrevocable offer of dedication to the City for the open space parcel in the purchase documents; and,

WHEREAS, the offer of dedication has not been accepted by the City and is contingent upon the developer completing all public improvements and the relocation of a fire road; and,

WHEREAS, the property owner has made an irrevocable offer of dedication to the City for the open space parcel in the purchase documents; and,

WHEREAS, the developer for this development is Belmont Investment Group, LLC; and,

WHEREAS, the developer has entered into a subdivision improvement agreement with bonds to guarantee the completion of all public improvements related to the project; and,

WHEREAS, the developer has completed construction of the street improvements and relocation of a fire road, and is requesting that the City Council accept the improvements and release the security bonds; and,

WHEREAS, on behalf of the City Engineer, the City's Public Works Inspectors have inspected the improvements and found them to follow the City's approved plans and specifications.

NOW, THEREFORE, the City Council of the City of Belmont resolves as follows:

SECTION 1. Accept the development's street improvements and relocation of the fire road as completed and compliant with the City's approved plans.

SECTION 2. Authorize the release of subdivision improvement bond.

SECTION 3. Accept a maintenance and warranty bond for the required one-year warranty period.

SECTION 4. The maintenance and warranty bond shall be released following expiration of the one-year warranty period, and confirmation by the City Engineer that no claims of defective improvements have been received.

SECTION 5. Accept the open space as offered in the 'Irrevocable Offer of Dedication' recorded as instrument 2013-140399, filed in the office of the County Recorder of San Mateo County, State of California, on October 2, 2013 (attached as Exhibit A).

SECTION 6. Accept the improvements constructed on Bishop Road fronting the property as a part of the City's street system for maintenance after the expiration of the one-year warranty period.

SECTION 7. Accept the maintenance of the relocated fire road after the expiration of the one-year warranty period.

* * *

ADOPTED February 11, 2025 by the City of Belmont City Council by the following vote:

Ayes:

Noes:

Absent:

Abstain:

ATTEST:

_____
City Clerk

_____
Mayor

APPROVED AS TO FORM:

_____
City Attorney

EXHIBIT 'A'

CTC LA 84733108
999066089

RECORDING REQUESTED BY
AND WHEN RECORDED MAIL TO:

City of Belmont
One Twin Pines Lane
Belmont, California 94002
Attention: City Manager

Exempt from recording fee pursuant to
Government Code § 27383.

2013-140399
CHICAGO TITLE INSURANCE COMPANY
8:00 am 10/02/13 IC Fee: NO FEE
Count of Pages 3
Recorded in Official Records
County of San Mateo
Mark Church
Assessor-County Clerk-Recorder

* R 0 0 0 1 7 4 7 3 0 1 *

IRREVOCABLE OFFER OF DEDICATION

(Gov't Code § 7050; Civ. Code § 1009(c))

Shikui Chen and Jie Yan, husband and wife, the owners of real property located in the City of Belmont, San Mateo County, as described in Exhibit A attached hereto and incorporated herein by this reference (the "Property"), hereby make an irrevocable offer of dedication of the Property in fee to the City of Belmont for open space, recreation, drainage, public utilities, and public access use, as authorized by Government Code section 7050 and Civil Code section 1009(c).

The City of Belmont shall incur no liability with respect to this offer of dedication and shall not assume any responsibility for the Property until this offer has been accepted by appropriate action of the Belmont City Council.

The provisions of this offer shall inure to the benefit of and be binding upon the heirs, successors, assigns, and personal representatives of the respective parties to the offer.

Executed this 1st day of October, 2013.

By: _____
Shikui Chen

By: _____
Jie Yan

SIGNATURES MUST BE NOTARIZED

1750\07\1384329.1
09/05/2013

STATE OF CALIFORNIA)
COUNTY OF ~~SAN MATEO~~ Santa Clara)

On 10/1/13, before me, S. Wolf, Notary Public, personally appeared Shikui Chen, proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify UNDER PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

S. WOLF
COMM. # 2029407
NOTARY PUBLIC - CALIFORNIA
SAN BENITO COUNTY
MY COMM. EXP. JUNE 17, 2017

Notary Public

STATE OF CALIFORNIA)
COUNTY OF ~~SAN MATEO~~ Santa Clara)

On 10/1/13, before me, S. Wolf, Notary Public, personally appeared Jie Yan, proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify UNDER PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

S. WOLF
COMM. # 2029407
NOTARY PUBLIC - CALIFORNIA
SAN BENITO COUNTY
MY COMM. EXP. JUNE 17, 2017

Notary Public

1750\07\1384329.1
09/05/2013

Irrevocable Offer Of Dedication

EXHIBIT A

LEGAL DESCRIPTION

All that portion of Lot 68 in Block 123, as shown on that certain map entitled "Map of Subdivision No. 10, Belmont Country Club Properties, Belmont, San Mateo County, California", filed in the office of the County Recorder of San Mateo County, State of California on March 24, 1927 in Book 15 of Maps at Pages 29 through 38, inclusive, described as follows:

Beginning at Station No. 23 on the Northerly boundary of said Lot 68, same being the Southerly boundary of East Laurel Creek Road, said Station No. 23 being South 27° 29' East, 10.19 feet, and South 56° 42' East, 68.07 feet from the most Easterly corner of Lot 40 in said Block 123; thence from said Station No. 23 along the boundary line of said Lot 68, the following courses and distances; North 73°42' East, 113.41 feet; thence North 65° 13' East 53.49 feet; thence North 57° 45' East, 99.93 feet; thence North 65° 33' East, 82.75 feet to the TRUE POINT OF BEGINNING; thence continue along the boundary lines of said 68, North 65° 33' East, 110.95 feet; thence North 86° 24' East, 41.18 feet; thence South 46° 28' East, 385.23 feet; thence South 28° 26' East, 264.06 feet; thence South 46° 28' East, 205.06 feet; thence South 51° 28' East, 46.30 feet; thence 35.67 feet Southerly on the arc of a curve to the right tangent to last course, the radius of which curve is 15.00 feet; thence South 84° 46' West, 85.56 feet; thence North 88° 41' West, 114.26 feet, and South 73° 33' West, 106.13 feet to the most Easterly corner of Lot 1 in said Block 123; thence along the Northeasterly boundary of said Lot 1, North 16° 27' West, 124.99 feet to the Northeasterly corner of said Lot 1; thence North 80° 17' West, 55.73 feet to the northwesterly corner of said Lot 1; thence along the Northwesterly line of Lots 2, 3, 4 and 5 in said Block 123, South 62° 30' West, 202.95 feet to the most Easterly corner of Lot 36 in said Block 123; thence along the Northeasterly boundary of Lots 36, 37, 38 and 39 in said Block 123, North 14° 55' West, 248.37 feet, and North 26° 48' West, 110.02 feet to the most Northerly corner of said Lot 39; thence along the Northwesterly boundary of said Lot 39, South 45° 58' West, 150.22 feet to a point on a non-tangent curve from which point the radius point bears South 23° 00' 06" West; thence along the boundary line of said Lot 68 the following courses and distances; Northwesterly along the arc of said curve with a radius of 75 feet for an arc distance of 5.38 feet, and North 71° 06' West, 14.62 feet; thence leaving the boundary of said Lot 68, North 39° 16' 18" East, 150.00 feet, and North 1° 23' 26" West, 288.97 feet more or less, to the TRUE POINT OF BEGINNING.

OWNERS' STATEMENT

WE HEREBY STATE THAT WE ARE THE OWNERS OF OR HAVE SOME RIGHT, TITLE, OR INTEREST IN AND TO THE REAL PROPERTY INCLUDED WITHIN THE SUBDIVISION SHOWN UPON THE HEREIN MAP; THAT WE ARE THE ONLY PERSONS WHOSE CONSENT IS NECESSARY TO PASS CLEAR TITLE TO SAID REAL PROPERTY; AND THAT WE CONSENT TO THE PREPARATION AND RECORDATION OF SAID MAP AND SUBDIVISION AS SHOWN WITHIN THE DISTINCTIVE BORDER.

THE REAL PROPERTY DESCRIBED BELOW IS DEDICATED AS AN EASEMENT FOR PUBLIC ACCESS AND FIRE ROAD PURPOSES:
–FIRE ROAD EASEMENT

THE REAL PROPERTY DESCRIBED BELOW IS DEDICATED AS AN EASEMENT FOR PUBLIC OPEN SPACE PURPOSES:
–PARCEL "A" FOR PUBLIC OPEN SPACE PURPOSES

WE ALSO HEREBY RESERVE PRIVATE OPEN SPACE OVER THE REAR PORTION OF PARCELS 1, 2 AND 3 FOR THE RESPECTIVE BENEFIT OF SAID PARCELS AS SHOWN HEREIN. NO DEVELOPMENT SHALL OCCUR WITHIN THE PRIVATE OPEN SPACE WITHOUT PRIOR APPROVAL OF THE CITY OF BELMONT.

AS OWNER:
BELMONT INVESTMENT GROUP LLC, A CALIFORNIA LIMITED LIABILITY COMPANY

BY: TATYANA MITNIK BY: _____
TITLE: MANAGING MEMBER TITLE:

OWNER'S ACKNOWLEDGEMENT

A NOTARY PUBLIC OR OTHER OFFICER COMPLETING THIS CERTIFICATE VERIFIES ONLY THE IDENTITY OF THE INDIVIDUAL WHO SIGNED THE DOCUMENT TO WHICH THIS CERTIFICATE IS ATTACHED, AND NOT THE TRUTHFULNESS, ACCURACY, OR VALIDITY OF THAT DOCUMENT.

STATE OF CALIFORNIA
COUNTY OF San Mateo

ON 06/25/2018 BEFORE ME, T. Lolohea

A NOTARY PUBLIC, PERSONALLY APPEARED
Tatyana Mitnik

WHO PROVED TO ME ON THE BASIS OF SATISFACTORY EVIDENCE TO BE THE PERSON(S) WHOSE NAME(S) IS/ARE SUBSCRIBED TO THE WITHIN INSTRUMENT AND ACKNOWLEDGED TO ME THAT HE/SHE/THEY EXECUTED THE SAME IN HIS/HER/THEIR AUTHORIZED CAPACITY(IES), AND THAT BY HIS/HER/THEIR SIGNATURE(S) ON THE INSTRUMENT THE PERSON(S), OR THE ENTITY UPON BEHALF OF WHICH THE PERSON(S) ACTED, EXECUTED THE INSTRUMENT.

I CERTIFY UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA THAT THE FOREGOING PARAGRAPH IS TRUE AND CORRECT.

WITNESS MY HAND:
SIGNATURE _____
T. Lolohea
NAME (TYPED OR PRINTED), NOTARY PUBLIC IN AND FOR SAID COUNTY AND STATE.
PRINCIPAL COUNTY OF BUSINESS: San Mateo
COMMISSION EXPIRES: June 26, 2021
COMMISSION # OF NOTARY: 2202996

CITY CLERK'S STATEMENT:

I, TERRI COOK, CITY CLERK OF THE CITY OF BELMONT, HEREBY CERTIFY THAT THE CITY COUNCIL OF SAID CITY AT ITS REGULAR MEETING HELD ON April 10, 2018 DULY APPROVED THE MAP SHOWN HEREON AND AUTHORIZED ITS RECORDATION, AND (ACCEPTED)(REJECTED) ON BEHALF OF THE PUBLIC, ALL EASEMENTS AND OPEN SPACE PARCELS SHOWN AND DESIGNATED ON SAID MAP AS BEING OFFERED FOR DEDICATION FOR PUBLIC USE IN CONFORMITY WITH THE TERMS OF SAID OFFER OF DEDICATION.

9/27/18
DATE:

TERRI COOK, CITY CLERK

COUNTY RECORDER'S STATEMENT

FILED THIS 28th DAY OF September 2018 AT 3:55 P.M IN BOOK 84 OF MAPS AT PAGE(S) 29-31 AT THE REQUEST OF TERRI COOK, CITY CLERK OF THE CITY OF BELMONT.

MARK CHURCH, COUNTY RECORDER

FILE NO.: 2018-900124
BY: _____ DEPUTY RECORDER
FEE: $163.00

SURVEYOR'S STATEMENT

THIS MAP WAS PREPARED BY ME OR UNDER MY DIRECTION AND IS BASED UPON A FIELD SURVEY IN CONFORMANCE WITH THE REQUIREMENTS OF THE SUBDIVISION MAP ACT AND LOCAL ORDINANCE AT THE REQUEST OF BELMONT INVESTMENT GROUP, LLC, ON AUGUST 11, 2015. I HEREBY STATE THAT ALL THE MONUMENTS ARE OF THE CHARACTER AND OCCUPY THE POSITIONS INDICATED, THAT THE MONUMENTS ARE SUFFICIENT TO ENABLE THE SURVEY TO BE RETRACED, AND THAT THIS PARCEL MAP SUBSTANTIALLY CONFORMS TO THE APPROVED OR CONDITIONALLY APPROVED TENTATIVE MAP, IF ANY.

DATED: June 25, 2018

DANIEL G. MACLEOD, L.S. #5304

LICENSED LAND SURVEYOR DANIEL G. MACLEOD No. 5304 STATE OF CALIFORNIA

CITY ENGINEER'S STATEMENT

I HAVE EXAMINED THE HEREIN PARCEL MAP. THE SUBDIVISION AS SHOWN HEREON IS SUBSTANTIALLY THE SAME AS IT APPEARED ON THE TENTATIVE MAP, AND ANY APPROVED ALTERATIONS OF THE TENTATIVE MAP, IF ANY; AND THAT ALL PROVISIONS OF THE SUBDIVISION MAP ACT AND ANY LOCAL ORDINANCES APPLICABLE AT THE TIME OF APPROVAL OF THE TENTATIVE MAP HAVE BEEN COMPLIED WITH.

DATED: 6/27/2018

LETICIA ALVAREZ, CITY ENGINEER
REGISTRATION NO. 52025
EXPIRATION: 12-31-2018

REGISTERED PROFESSIONAL ENGINEER LETICIA ALVAREZ No. C 52025 CIVIL STATE OF CALIFORNIA

CITY TECHNICAL SURVEYOR'S STATEMENT

I AM SATISFIED THAT THIS MAP IS TECHNICALLY CORRECT.

DATED: 06/26/18

ANNE-SOPHIE TRUONG, CITY TECHNICAL SURVEYOR
REGISTRATION NO. L.S. 8998
EXPIRATION: 09-30-2019

PROFESSIONAL LAND SURVEYOR ANNE-SOPHIE TRUONG No. 8998 STATE OF CALIFORNIA

PARCEL MAP

LANDS OF BELMONT INVESTMENT GROUP, LLC

BEING A SUBDIVISION OF THE LANDS OF BELMONT INVESTMENT GROUP, LLC, AS DESCRIBED IN DOC. NO. 2015-080068; BEING A PORTION OF LOT 68, BLOCK 123, AS SHOWN ON THE MAP ENTITLED "MAP OF SUBDIVISION NO. 10 – BELMONT COUNTRY CLUB PROPERTIES" FILED MARCH 24, 1927, IN BOOK 15 OF MAPS AT PAGES 29–36 IN THE OFFICE OF THE RECORDER OF SAN MATEO COUNTY, STATE OF CALIFORNIA.

CITY OF BELMONT SAN MATEO COUNTY CALIFORNIA

JANUARY 2018

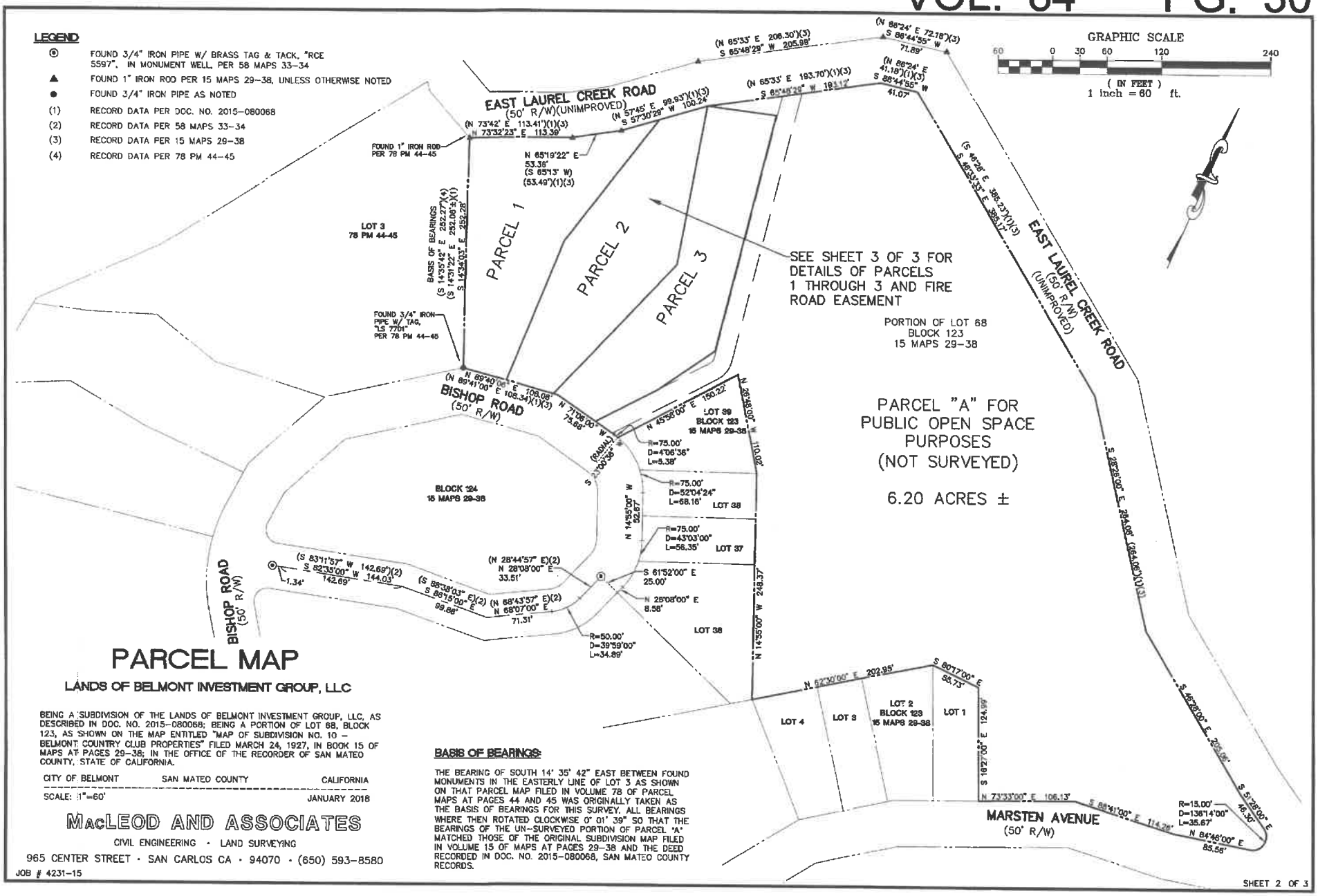
MacLEOD AND ASSOCIATES
CIVIL ENGINEERING • LAND SURVEYING
965 CENTER STREET • SAN CARLOS CA • 94070 • (650) 593-8580

JOB # 4231-15

SHEET 1 OF 3

LEGEND

- ⊙ FOUND 3/4" IRON PIPE W/ BRASS TAG & TACK, "RCE 5597", IN MONUMENT WELL, PER 58 MAPS 33–34
- ▲ FOUND 1" IRON ROD PER 15 MAPS 29–38, UNLESS OTHERWISE NOTED
- ● FOUND 3/4" IRON PIPE AS NOTED
- (1) RECORD DATA PER DOC. NO. 2015–080068
- (2) RECORD DATA PER 58 MAPS 33–34
- (3) RECORD DATA PER 15 MAPS 29–38
- (4) RECORD DATA PER 78 PM 44–45



PARCEL MAP

LANDS OF BELMONT INVESTMENT GROUP, LLC

BEING A SUBDIVISION OF THE LANDS OF BELMONT INVESTMENT GROUP, LLC, AS DESCRIBED IN DOC. NO. 2015–080068; BEING A PORTION OF LOT 68, BLOCK 123, AS SHOWN ON THE MAP ENTITLED "MAP OF SUBDIVISION NO. 10 – BELMONT COUNTRY CLUB PROPERTIES" FILED MARCH 24, 1927, IN BOOK 15 OF MAPS AT PAGES 29–38; IN THE OFFICE OF THE RECORDER OF SAN MATEO COUNTY, STATE OF CALIFORNIA.

CITY OF BELMONT SAN MATEO COUNTY CALIFORNIA

SCALE: 1"=60' JANUARY 2018

MacLEOD AND ASSOCIATES

CIVIL ENGINEERING · LAND SURVEYING

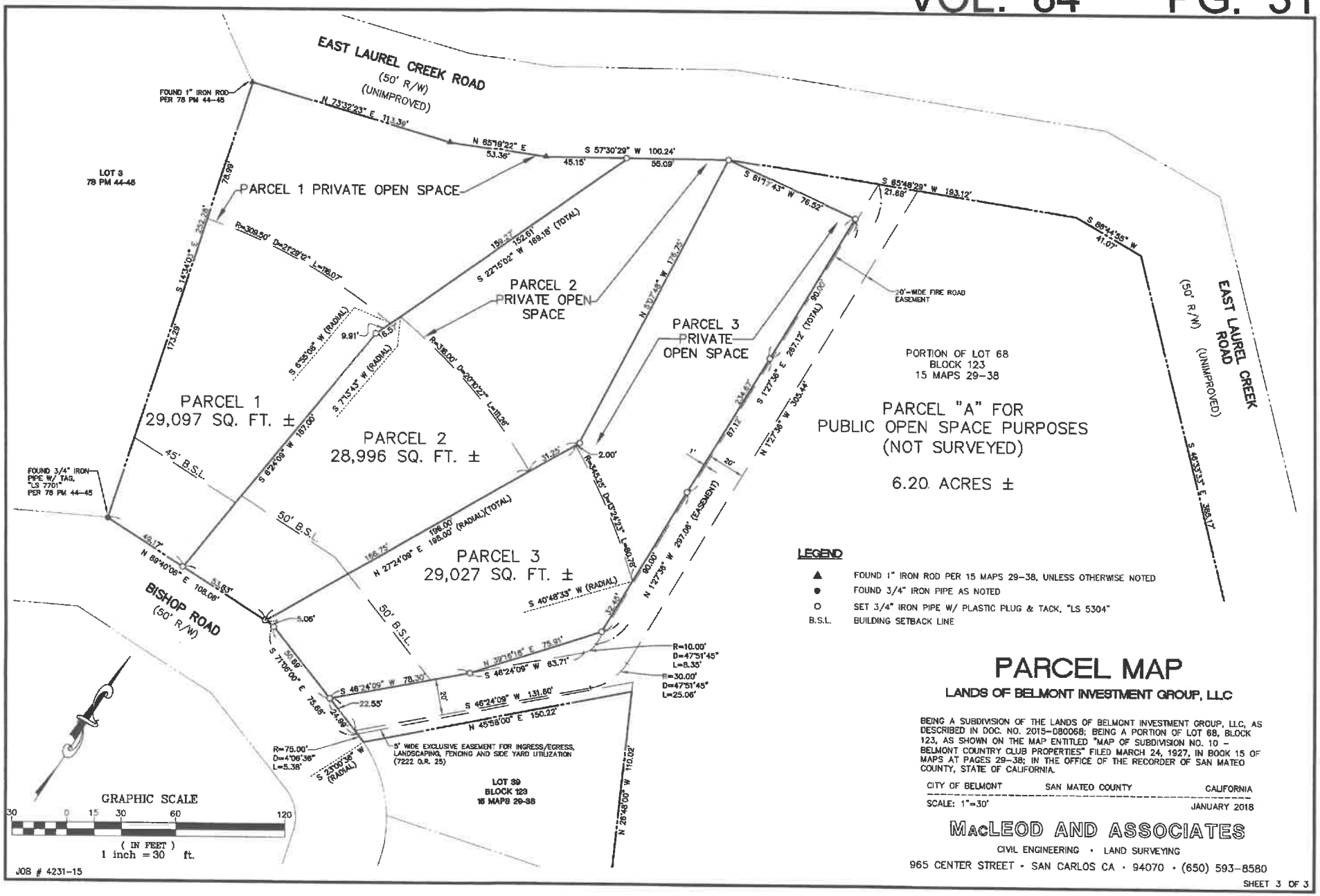
965 CENTER STREET · SAN CARLOS CA · 94070 · (650) 593–8580

JOB # 4231–15

BASIS OF BEARINGS:

THE BEARING OF SOUTH 14° 35' 42" EAST BETWEEN FOUND MONUMENTS IN THE EASTERLY LINE OF LOT 3 AS SHOWN ON THAT PARCEL MAP FILED IN VOLUME 78 OF PARCEL MAPS AT PAGES 44 AND 45 WAS ORIGINALLY TAKEN AS THE BASIS OF BEARINGS FOR THIS SURVEY. ALL BEARINGS WHERE THEN ROTATED CLOCKWISE 0° 01' 39" SO THAT THE BEARINGS OF THE UN–SURVEYED PORTION OF PARCEL "A" MATCHED THOSE OF THE ORIGINAL SUBDIVISION MAP FILED IN VOLUME 15 OF MAPS AT PAGES 29–38 AND THE DEED RECORDED IN DOC. NO. 2015–080068, SAN MATEO COUNTY RECORDS.

SHEET 2 OF 3


EAST LAUREL CREEK ROAD
(50' R/W)
(UNIMPROVED)
FOUND 1" IRON ROD PER 78 PM 44-45
LOT 3 78 PM 44-45
PARCEL 1 PRIVATE OPEN SPACE
PARCEL 2 PRIVATE OPEN SPACE
PARCEL 3 PRIVATE OPEN SPACE
PARCEL 1 29,097 SQ. FT. ±
PARCEL 2 28,996 SQ. FT. ±
PARCEL 3 29,027 SQ. FT. ±
PORTION OF LOT 68 BLOCK 123 15 MAPS 29-38
PARCEL "A" FOR PUBLIC OPEN SPACE PURPOSES (NOT SURVEYED)
6.20 ACRES ±
20'-WIDE FIRE ROAD EASEMENT
FOUND 3/4" IRON PIPE W/ TAG, "LS 7701" PER 78 PM 44-45
BISHOP ROAD
(50' R/W)
45' B.S.L.
50' B.S.L.
5' WIDE EXCLUSIVE EASEMENT FOR INGRESS/EGRESS, LANDSCAPING, FENCING AND SIDE YARD UTILIZATION (7222 O.R. 25)
LOT 39 BLOCK 123 15 MAPS 29-38
GRAPHIC SCALE
(IN FEET)
1 inch = 30 ft.
JOB # 4231-15
LEGEND
FOUND 1" IRON ROD PER 15 MAPS 29-38, UNLESS OTHERWISE NOTED
FOUND 3/4" IRON PIPE AS NOTED
SET 3/4" IRON PIPE W/ PLASTIC PLUG & TACK, "LS 5304"
B.S.L. BUILDING SETBACK LINE
PARCEL MAP
LANDS OF BELMONT INVESTMENT GROUP, LLC
BEING A SUBDIVISION OF THE LANDS OF BELMONT INVESTMENT GROUP, LLC, AS DESCRIBED IN DOC. NO. 2015-080068; BEING A PORTION OF LOT 68, BLOCK 123, AS SHOWN ON THE MAP ENTITLED "MAP OF SUBDIVISION NO. 10 - BELMONT COUNTRY CLUB PROPERTIES" FILED MARCH 24, 1927, IN BOOK 15 OF MAPS AT PAGES 29-38; IN THE OFFICE OF THE RECORDER OF SAN MATEO COUNTY, STATE OF CALIFORNIA.
CITY OF BELMONT SAN MATEO COUNTY CALIFORNIA
SCALE: 1"=30' JANUARY 2018
MacLEOD AND ASSOCIATES
CIVIL ENGINEERING • LAND SURVEYING
965 CENTER STREET • SAN CARLOS CA • 94070 • (650) 593-8580
SHEET 3 OF 3

CTC LA 84733108
99906089

RECORDING REQUESTED BY
AND WHEN RECORDED MAIL TO:

City of Belmont
One Twin Pines Lane
Belmont, California 94002
Attention: City Manager

Exempt from recording fee pursuant to
Government Code §27383.

2013-140398
CHICAGO TITLE INSURANCE COMPANY
8:00 am 10/02/13 AG Fee: NO FEE
Count of Pages 12
Recorded in Official Records
County of San Mateo
Mark Church
Assessor-County Clerk-Recorder
R00017472 96

AGREEMENT CONTAINING COVENANTS AFFECTING REAL PROPERTY

This Agreement Containing Covenants Affecting Real Property (this "Agreement") is made and entered into by and between the City of Belmont, a municipal corporation (the "City"), and Shikui Chen and Jie Yan, husband and wife (the "Owner"), with reference to the following facts, purposes, and understandings.

RECITALS

A. The Owner has acquired from the City that certain real property located on Bishop Road in the City of Belmont, California, as more particularly described in Exhibit A (the "Property") attached hereto and incorporated herein.

B. As a condition of the acquisition of the Property from the City, the Owner agreed to restrict the use of the Property in accordance with this Agreement.

THEREFORE, the City and the Owner hereby agree as follows.

ARTICLE 1.
DEFINITIONS

Section 1.1 Definitions. The following terms are specially defined for this Agreement and their definitions can be found in the sections indicated below:

(a) "Agreement" – first paragraph of this Agreement.

(b) "City" – first paragraph of this Agreement.

(c) "Effective Date" – signature page.

(d) "Event of Default" – Section 4.2.

(e) "Grant Deed" – Section 2.3(e).

(f) "Offer of Dedication" – Section 2.4.

(g) "Open Space Parcel" – Section 2.3 and Exhibit B.

(h) "Open Space Use" – Section 2.3.

(i) "Owner" – first paragraph of this Agreement.

(j) "Permitted Use" – Section 2.1.

(k) "Property" – Recital A and Exhibit A.

Section 1.2 Exhibits. The following exhibits are attached to and incorporated by reference in this Agreement:

(a) Exhibit A – Legal Description of the Property.

(b) Exhibit B – Legal Description of the Open Space Parcel.

ARTICLE 2.
COVENANTS AFFECTING USE OF THE PROPERTY

Section 2.1 Covenant to Restrict Use of the Property. The Property shall be used exclusively for (a) Open Space Use, as defined below; or (b) no more than three single-family dwellings and accessory structures and uses: (i) located on the same parcel as a single-family dwelling; and (ii) clearly related to the single-family dwelling (the "Permitted Use"). The Property shall not be used for any purpose other than the Permitted Use. Owner hereby covenants that the Property shall be used and operated for the Permitted Use in compliance with all City and other applicable governmental approvals and all applicable local, state, and federal laws.

Section 2.2 Parcel Map Required to Construct More Than One Single-Family Dwelling; City Approvals Required. Owner acknowledges that, as of the Effective Date of this Agreement, the Property consists of only one legal parcel. No more than one single-family dwelling and structures and uses accessory to that dwelling may be constructed until a parcel map is approved by the City and recorded in compliance with the Subdivision Map Act. Owner further acknowledges that execution of this Agreement by the City will not constitute approval by the City of permits required for construction of any structures on the Property and in no way limits the discretion of the City in the permit and approval process. Owner further acknowledges that such City review will occur without limitation by or consideration of the terms of this Agreement.

Owner acknowledges that the City may not make any commitment to any particular development before it completes environmental review, and City does not make any representation or commitment regarding the imposition of any mitigation measures or other conditions of approval. In addition, the Owner acknowledges that

other local, state or federal agencies may require additional entitlements, including environmental review, and that any approval by the City does not bind any other local, state or federal agency.

Owner acknowledges that the City may not commit to planning and zoning approvals by contract. Nothing in this Agreement shall obligate the City to exercise its discretion regarding any proposed development of the Property in any particular manner nor constitute a commitment by the City to approve any development whatsoever

Section 2.3 Covenant to Restrict Use of the Open Space Parcel. The "Open Space Parcel" consists of a portion of the Property, as more particularly described in Exhibit B attached hereto and incorporated herein. The Open Space Parcel shall be used exclusively for those purposes that will maintain the existing natural and scenic open space character of the Open Space Parcel, including without limitation the preservation of existing scenic areas, views, trees and other vegetation, natural drainageways, and plant and wildlife habitats ("Open Space Use"). The Open Space Parcel may not be used for, nor may Owner do, permit, or cause any of the following specific acts on the Open Space Property:

(a) Use of the Open Space Property for any use except Open Space Use;

(b) Use of the Open Space Property for agricultural purposes;

(c) Constructing improvements, buildings, fences, or structures of any kind;

(d) Constructing, placing, or maintaining a parking lot or area, storage area, dump site, overhead pipes, conduits, or wires;

(e) Excavating, grading, surfacing or placing any asphalt, stone, concrete, sand, soil, or other material of any type; except (i) with the prior written permission of the City and for health and safety purposes only; or (ii) to construct the Right of Way reserved to the City in the grant deed from the City to the Owner, recorded in the Official Records of San Mateo County of even date herewith (the "Grant Deed"). The Grant Deed provides that the Right of Way may be relocated to the Open Space Parcel if: (i) the City approves the relocation of the Right of Way; and (ii) the Owner improves the relocated Right of Way to City's standards at Owner's sole expense.

(f) Mining, extracting, severing, or removing any natural resource found or located on, above, or below the Open Space Parcel, or otherwise engaging in any activity that will alter the physical and scenic characteristics of the Open Space Parcel;

(g) Hunting, trapping, killing, capturing, or destroying animal life, except with the prior written permission of the City and for health and safety purposes only;

(h) Cutting, uprooting, or removing vegetation, except with the prior written permission of the City and for fire prevention or similar health and safety purposes only;

(i) Subdividing the Open Space Parcel or otherwise conveying (except under threat of condemnation) any portion of the Open Space Parcel to another party; or

(j) Operating a motor bike, trail bike, or other motor-powered vehicle.

Section 2.4 Irrevocable Offer of Dedication of Open Space Parcel. Owner has made an irrevocable offer of dedication to the City of the Open Space Parcel, which irrevocable offer of dedication has been recorded in the Official Records of San Mateo County of even date herewith (the "Offer of Dedication"). City hereby agrees that it shall not accept the Offer of Dedication unless one of the following has occurred: (a) a parcel map is recorded for all or a portion of the Property; (b) any building permit is issued for the Property; or (c) Owner has failed to cure an Event of Default upon the expiration of the cure period, if any, specified in Section 4.2.

ARTICLE 3.
ON-GOING OBLIGATIONS

Section 3.1 Maintenance of the Property. Notwithstanding any right provided to the City by this Agreement, the Owner shall bear all costs and liabilities of any kind concerning the ownership, operation, and maintenance of the Property. The Owner shall be solely responsible for the payment of all expenses and costs relating to the maintenance of the Property in accordance with this Agreement.

Section 3.2 Taxes. The Owner shall pay, when due, all real and personal property taxes and any and all other assessments assessed and levied on the Property, and shall remove any levy or attachment made on the Property following the Effective Date. The Owner may, however, contest the validity or amount of any tax, assessment, or lien on the Property.

ARTICLE 4.
DEFAULT

Section 4.1 Events of Default. Any of the following events, subject to the applicable notice and cure period (if any), shall constitute an "Event of Default" by the Owner.

(a) Use of the Property for Other Than the Permitted Use. The Property is being used for a use other than the Permitted Use, in violation of Section 2.1.

(b) Use of the Open Space Parcel for Other Than Open Space Use. The Open Space Parcel is being used for a use other than Open Space Use, in violation of Section 2.3, or is being used for a use specifically prohibited by Section 2.3.

(c) Other Breach of Agreement. The Owner breaches any other material provision of this Agreement.

Section 4.2 Notice and Cure. Upon an Event of Default, the City shall give the Owner the opportunity to cure the default by delivering a written notice of default to the Owner, which notice shall provide thirty (30) days, from the date thereof, to cure the default; provided, however, if the default cannot be cured within thirty (30) days, the Owner shall not be deemed to be in default if the Owner shall within such period commence to cure and thereafter diligently prosecute the same to completion within ninety (90) days from the date of the City's initial written notice to the Owner. Notwithstanding the foregoing, in no event shall such cure period apply if the City delivers two (2) notices under this Section 4.2 within any twelve (12) month period and at the time of each notice the Property was being used for a use other than the Permitted Use, or the Open Space Parcel was being used for use other than Open Space Use or for a use specifically prohibited by Section 2.3.

Section 4.3 Remedies Upon Default. In the event that the Owner fails to cure any Event of Default upon notice and cure, if any, as provided in Section 4.2, then the City may pursue any remedy available at law or at equity, including, but not limited to, an action for damages or an action for specific performance. Owner grants to City the right, but not the obligation, to prevent or prohibit any activity that is inconsistent with the terms, conditions, restrictions, or covenants of this Agreement and the right to enter the Property for the purpose of removing any building, structure, improvement, or any material whatsoever constructed, placed, stored, deposited, or maintained on the Property contrary to this Agreement.

Section 4.4 Remedies Cumulative. No right or power given by the terms of this Agreement, is intended to be exclusive of any other right or power; and each and every such right or power shall be cumulative and in addition to every other right or power given by the terms of any such instrument, or by any statute or otherwise.

ARTICLE 5.
MISCELLANEOUS

Section 5.1 Nondiscrimination. The Owner shall not discriminate against any person or group of persons on account of race, color, creed, religion, sexual orientation, sex, marital status, national origin. or ancestry in the sale, lease, sublease, transfer, use, occupancy, tenure or enjoyment of the Property, nor shall the Owner or any person claiming under or through it establish or permit any such practice or practices of discrimination with reference to the selection, location, number, use or occupancy of tenants, lessees, subtenants, sublessees or vendees in the Property.

Section 5.2 Covenants to Run With the Land. The City and the Owner hereby declare their express intent that the covenants and restrictions set forth in this Agreement shall run with the land, and shall bind all successors in title to the Property. This Agreement shall bind any successor, heir or assign of the Owner, whether a change in interest occurs voluntarily or involuntarily, by operation of law or otherwise. Each and every contract, deed or other instrument executed covering or conveying the Property or any portion of the Property shall be held conclusively to have been executed, delivered and accepted subject to the covenants and restrictions set forth in this Agreement, regardless of whether such covenants or restrictions are set forth in such contract, deed or other instrument, unless the City expressly releases such conveyed portion of the Property from the requirements of this Agreement.

Section 5.3 Recording and Filing. The City and the Owner shall cause this Agreement, and all amendments and supplements to it, to be recorded against the Property in the Official Records of the County of San Mateo.

Section 5.4 Execution of Other Agreements. The Owner agrees that it has not and will not execute any other agreement with provisions contradictory of, or in opposition to, the provisions of this Agreement, and that in any event, the provisions of this Agreement are paramount and controlling as to the rights and obligations set forth and supersede any other requirements in conflict herewith.

Section 5.5 Amendments, Modifications, and Waivers. This Agreement may not be amended, modified or changed, nor shall any waiver of any provision hereof be effective, except by an instrument in writing and signed by the Owner and the City.

Section 5.6 Waiver. The City's waiver of any term, covenant, or condition shall not be deemed to be a waiver of such term, covenant or condition of any subsequent breach of the same or any other term, covenant or condition. The City's failure to exercise any right, option or privilege hereunder shall not be deemed a waiver of such right, option or privilege nor shall it relieve the Owner from its obligation to perform each and every covenant and condition on its part to be performed.

Section 5.7 Entire Understanding of the Parties. This Agreement constitutes the entire understanding and agreement of the Parties with respect to the Property. The Parties and their counsel have read and reviewed this Agreement and agree that any rule of construction to the effect that ambiguities are to be resolved against the drafting party (including, but not limited to Civil Code Section 1654, as may be amended from time to time) shall not apply to the interpretation of this Agreement. This Agreement is to be liberally construed to effectuate the restrictions on use contained in Article 2.

Section 5.8 Severability. If any term, provision, covenant or condition of this Agreement is held in a final disposition by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions shall continue in full force and effect.

Section 5.9 Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the State of California, without reference to

conflict of laws principles. In the event that suit shall be brought by either Party to this Agreement, the Parties agree that venue shall be exclusively vested in the state courts of the County of San Mateo, and the Parties consent to the personal and exclusive jurisdiction and venue of such courts.

Section 5.10 Time. In all matters under this Agreement, the Parties agree that time is of the essence.

Section 5.11 Notice. All notices given or certificates delivered under this Agreement shall be in writing and be deemed received on the delivery, or refusal, date shown on the delivery receipt, if: (a) personally delivered, (b) mailed by certified mail, return receipt requested, postage prepaid, addressed as shown below, or (iii) delivered by reputable overnight delivery service with a receipt showing date of delivery. Either of the Parties may, by notice given hereunder, designate any further or different addresses to which subsequent notices, certificates or communications shall be sent.

City:	City of Belmont One Twin Pines Lane Belmont, California 94002 Attention: City Manager
Owner:	Shikui Chen and Jie Yan 10 Rollins Road, Suite #119 Millbrae, CA 94030

Section 5.12 City Approval. Whenever this Agreement calls for the City's approval, consent, or waiver, the written approval, consent, or waiver of the City Manager shall constitute the approval, consent, or waiver of the City, without further authorization required from the City Council. The City hereby authorizes the City Manager or the City Manager's designee, to deliver such approvals or consents as are required by this Agreement, or to waive requirements under this Agreement, on behalf of the City.

Section 5.13 No Third Party Beneficiaries. This Agreement is not intended to create, nor shall it be in any way interpreted or construed to create, any third party beneficiary rights in any person not a party hereto.

Section 5.14 No Partnership. This Agreement shall not be construed to constitute any form of partnership or joint venture between the Parties.

Section 5.15 Article Headings. Article headings are for convenience only and are not to be used to interpret this Agreement.

Section 5.16 Exhibits. All exhibits attached to this Agreement and referred to in this Agreement are incorporated into this Agreement by this reference as though they were fully set forth in this Agreement.

Section 5.17 Multiple Originals; Counterparts. This Agreement may be executed in multiple originals, each of which is deemed to be an original, and may be signed in counterparts.

****

IN WITNESS WHEREOF, the Parties have executed this Agreement as of the last date entered below, which shall be the "Effective Date" of this Agreement.

CITY:

CITY OF BELMONT, a municipal corporation

By: _____
Greg Scoles, City Manager

Date: 01/10/2013

OWNER:

_____
Shikui Chen

Date: 01/10/2013

_____
Jie Yan

Date: 01/10/2013

SIGNATURES MUST BE NOTARIZED

1750\07\1384327.1
09/05/2013

STATE OF CALIFORNIA)
Santa Clara)
COUNTY OF ~~SAN MATEO~~)

On 10/1/13, before me, S. Wolf, Notary Public, personally appeared Shikui Chen, proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify UNDER PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

S. WOLF
COMM. # 2029407
NOTARY PUBLIC - CALIFORNIA
SAN BENITO COUNTY
MY COMM. EXP. JUNE 17, 2017

Notary Public

STATE OF CALIFORNIA)
Santa Clara)
COUNTY OF ~~SAN MATEO~~)

On 10/1/13, before me, S. Wolf, Notary Public, personally appeared Xie Yan, proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify UNDER PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

S. WOLF
COMM. # 2029407
NOTARY PUBLIC - CALIFORNIA
SAN BENITO COUNTY
MY COMM. EXP. JUNE 17, 2017

Notary Public

1750\07\1384327.1
09/05/2013

STATE OF CALIFORNIA)
COUNTY OF ~~SAN MATEO~~ Santa Clara)

On 10/1/13, before me, S. Wolf, Notary Public, personally appeared Greg Scotes, proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify UNDER PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

S. WOLF
COMM. # 2029407
NOTARY PUBLIC - CALIFORNIA
SAN BENITO COUNTY
MY COMM. EXP. JUNE 17, 2017

Notary Public

1750\07\1384327.1
09/05/2013

Covenant Agreement

EXHIBIT A

LEGAL DESCRIPTION OF PROPERTY

The land referred to herein is situated in the State of California, County of San Mateo, City of Belmont, and is described as follows:

All that portion of Lot 68 in Block 123, as shown on that certain map entitled "Map of Subdivision No. 10, Belmont Country Club Properties, Belmont, San Mateo County, California", filed in the office of the County Recorder of San Mateo County, State of California on March 24, 1927 in Book 15 of Maps at Pages 29 through 38, inclusive, described as follows:

Beginning at Station No. 23 on the Northerly boundary of said Lot 68, same being the Southerly boundary of East Laurel Creek Road, said Station No. 23 being South 27° 29' East, 10.19 feet, and South 56° 42' East, 68.07 feet from the most Easterly corner of Lot 40 in said Block 123; thence from said Station No. 23, being the point of beginning along the boundary line of said Lot 68, the following courses and distances; North 73°42' East, 113.41 feet; thence North 65° 13' East 53.49 feet; thence North 57° 45' East, 99.93 feet; thence North 65° 33' East, 193.70 feet; thence North 86° 24' East, 41.18 feet; thence South 46° 28' East, 385.23 feet; thence South 28° 26' East, 264.06 feet; thence South 46° 28' East, 205.06 feet; thence South 51° 28' East, 46.30 feet; thence 35.67 feet Southerly on the arc of a curve to the right tangent to last course, the radius of which curve is 15.00 feet; thence South 84° 46' West, 85.56 feet; thence North 88° 41' West, 114.26 feet, and South 73° 33' West, 106.13 feet to the most Easterly corner of Lot 1 in said Block 123; thence along the Northeasterly boundary of said Lot 1, North 16° 27' West, 124.99 feet to the Northeasterly corner of said Lot 1; thence North 80° 17' West, 55.73 feet to the Northwesterly corner of said Lot 1; thence along the Northwesterly line of Lots 2, 3, 4 and 5 in said Block 123, South 62° 30' West, 202.95 feet to the most Easterly corner of Lot 36 in said block 123; thence along the Northeasterly boundary of Lots 36, 37, 38 and 39 in said Block 123, North 14° 55' West, 248.37 feet, and North 26° 48' West, 110.02 feet to the most Northerly corner of said Lot 39; thence along the Northwesterly boundary of said Lot 39, South 45° 58' West, 150.22 feet to a point on a non-tangent curve from which point the radius point bears South 23° 00' 06" West; thence along the boundary line of said Lot 68 the following courses and distances; Northwesterly along the arc of said curve with a radius of 75 feet for an arc distance of 5.38 feet; thence North 71° 06' West, 75.68 feet; thence South 89° 41' West, 108.34 feet; thence crossing and subdividing said Lot 68, in a direct line on a course bearing North 14°31'22" West, 252.06 feet more or less, to said Station No. 23 and the point of beginning.

Covenant Agreement

EXHIBIT B

LEGAL DESCRIPTION OF OPEN SPACE PARCEL

The land referred to herein is situated in the State of California, County of San Mateo, City of Belmont, and is described as follows:

All that portion of Lot 68 in Block 123, as shown on that certain map entitled "Map of Subdivision No. 10, Belmont Country Club Properties, Belmont, San Mateo County, California", filed in the office of the County Recorder of San Mateo County, State of California on March 24, 1927 in Book 15 of Maps at Pages 29 through 38, inclusive, described as follows:

Beginning at Station No. 23 on the Northerly boundary of said Lot 68, same being the Southerly boundary of East Laurel Creek Road, said Station No. 23 being South 27° 29' East, 10.19 feet, and South 56° 42' East, 68.07 feet from the most Easterly corner of Lot 40 in said Block 123; thence from said Station No. 23 along the boundary line of said Lot 68, the following courses and distances; North 73°42' East, 113.41 feet; thence North 65° 13' East 53.49 feet; thence North 57° 45' East, 99.93 feet; thence North 65° 33' East, 82.75 feet to the TRUE POINT OF BEGINNING; thence continue along the boundary lines of said 68, North 65° 33' East, 110.95 feet; thence North 86° 24' East, 41.18 feet; thence South 46° 28' East, 385.23 feet; thence South 28° 26' East, 264.06 feet; thence South 46° 28' East, 205.06 feet; thence South 51° 28' East, 46.30 feet; thence 35.67 feet Southerly on the arc of a curve to the right tangent to last course, the radius of which curve is 15.00 feet; thence South 84° 46' West, 85.56 feet; thence North 88° 41' West, 114.26 feet, and South 73° 33' West, 106.13 feet to the most Easterly corner of Lot 1 in said Block 123; thence along the Northeasterly boundary of said Lot 1, North 16° 27' West, 124.99 feet to the Northeasterly corner of said Lot 1; thence North 80° 17' West, 55.73 feet to the northwesterly corner of said Lot 1; thence along the Northwesterly line of Lots 2, 3, 4 and 5 in said Block 123, South 62° 30' West, 202.95 feet to the most Easterly corner of Lot 36 in said Block 123; thence along the Northeasterly boundary of Lots 36, 37, 38 and 39 in said Block 123, North 14° 55' West, 248.37 feet, and North 26° 48' West, 110.02 feet to the most Northerly corner of said Lot 39; thence along the Northwesterly boundary of said Lot 39, South 45° 58' West, 150.22 feet to a point on a non-tangent curve from which point the radius point bears South 23° 00' 06" West; thence along the boundary line of said Lot 68 the following courses and distances; Northwesterly along the arc of said curve with a radius of 75 feet for an arc distance of 5.38 feet, and North 71° 06' West, 14.62 feet; thence leaving the boundary of said Lot 68, North 39° 16' 18" East, 150.00 feet, and North 1° 23' 26" West, 288.97 feet more or less, to the TRUE POINT OF BEGINNING.

STAFF REPORT

Meeting Date:	February 11, 2025
Agency:	City of Belmont
Staff Contact:	Bozhena Palatnik, Public Works, (650) 595-7463, bpalatnik@belmont.gov
Agenda Title:	Adoption of Updated Sanitary Sewer Master Plan
Agenda Action:	Motion

Recommendation

Motion to adopt the updated Sanitary Sewer Master Plan (Plan), a forward-looking document that guides the management, maintenance, and development of the City's sewer infrastructure.

Strategic Focus Area

Infrastructure and Mobility

Background

The City of Belmont sanitary sewer system has two components: collection and treatment. The collection system ranges in age from 40 to 100 years and consists of approximately 80 miles of gravity sanitary sewer pipes and force mains, 1,500 maintenance access points/manholes (MH) and 10 lift stations. The pipes range in size from 4 to 27 inches in diameter. The City's collection area is approximately five square miles and serves a population of about 27,000 residents, in addition to businesses and visitors. The property owners are responsible for installation, maintenance and repair of the private sewer lateral(s) connecting the property to the City's public mains. The City is a member of Silicon Valley Clean Water (SVCW) who is responsible for the treatment and disposal of its member agency's wastewater flows.

The City routinely conducts systematic assessment, repair, and upgrade of its sanitary sewer system including pump stations. The sewer system is divided into fifteen drainage basins and each year one or more basins have been selected for a two to four-year evaluation and rehabilitation process, consisting of inspection, design, and repair or replacement construction. The sewer system is funded as an enterprise utility fund supported by the annual sewer service charges collected on property tax bills. Since 2000, approximately half of the system has been rehabilitated and or replaced.

The City has invested significantly in sewer system maintenance and upgrades since 2000, with half of the system rehabilitated or replaced. Routine inspections, preventive cleaning, and repairs have established Belmont as a leader in minimizing sanitary sewer overflows (SSOs) and reducing inflow and infiltration (I&I).

Through a coordinated effort by the operations and engineering staff, the results of the field activities (smoke testing, root foaming, CCTV, cleaning and jetting) are routinely reviewed to identify any potential maintenance or capital replacement plan of the sewer system for repairs, replacement, and rehabilitation needs. The engineering staff evaluates the conditions of the sewer lines based on the video inspection reports, historical maintenance records, and rehabilitation history to determine the priority and type of

rehabilitation of the defects using a proactive approach.

Additionally, the City routinely updates its short- and long-term capital improvement projects (CIPs) through its master plans. Staff has been implementing CIPs listed in the 2007 Sanitary Sewer Rehabilitation Master Plan and the 2010 Sewer System Capacity Analysis. The estimated cost of these CIPs per the Master Plan documents was $45.9M at that time. The vast majority of projects listed in these CIPs were completed. The four remaining major projects to be completed are the Island Park Pump Station Upgrade, Citywide Force Main Replacement project, and Notre Dame Avenue capacity improvement projects.

The City's Sewer Pump Station Master Plan, and Force Main Master Plan were updated in the past eight years. The subject of this report, the updated Sanitary Sewer Master Plan (Plan), represents a comprehensive evaluation of the City's sewer infrastructure, offering critical insights into capacity, condition, and future needs. The Plan serves as a roadmap for CIPs and maintenance strategies to ensure the system operates efficiently and sustainably for the community's current and future needs.

The Plan identifies key projects to address infrastructure deficiencies, optimize system performance, and enhance resilience. Adoption of the Plan is a significant step in maintaining high service standards and safeguarding the health and well-being of Belmont's residents, businesses, and the environment. This Plan improves the asset management processes using state of the art technologies for both the City of Belmont, as well as the Harbor Industrial Area, that is targeted as a planned annexation area.

The funding for the sanitary sewer CIPs and Operation and Maintenance is provided by the property related sewer usage charges, sewer connection fees for new development, and any potential development related fair share contributions.

Analysis

The updated Plan is an important milestone in our community's infrastructure development. The comprehensive analysis and planning conducted in this Plan will provide valuable insights into our sanitary sewer system, identifying areas for improvement and ensuring the safety and well-being of our existing and future residents. This process has involved rigorous data collection in Belmont, as well as in the Harbor Industrial Area, analysis of the existing system and proposed growth, and stakeholder consultations. This Plan focused on sanitary sewer capacity evaluation and condition assessment.

Key Findings and Plan Highlights

1. ***Capacity Evaluation***

   The Plan used hydraulic modeling to assess sewer system capacity under current and future conditions. Sixteen capacity improvement projects have been prioritized into short- and long-term phases to address deficiencies and accommodate growth, see Attachment A.

   - ***Notable Projects:***
     - Upsizing the San Juan Pump Station ($5 million, 2025-2027)
     - Multiple pipeline upgrades citywide to enhance flow capacity and reduce bottlenecks.

2. ***Condition Assessment***

   The condition of the sewer system was evaluated using CCTV data. Pipes with higher risk scores were prioritized for rehabilitation or replacement, see Attachment A.
   - Rehabilitation methods include point repairs, partial/full lining, and replacements.
   - Over 100,000 feet of pipelines are planned for upgrades, targeting basins with the greatest need.

3. ***Preventive Maintenance and Proactive Measures***

   The City employs advanced technologies such as root foaming, smoke testing, geographic information system (GIS) and asset management software to identify issues early and maintain system integrity.
   - Routine cleaning cycles and inspections ensure the system remains in excellent condition.

Capital Improvement Program Overview

The CIP is based on a detailed capacity evaluation and condition assessment as described above to prioritize upgrades and expansions. The key goals are to address current deficiencies, accommodate future development, and maintain reliable service. Cost estimates incorporate a 5% escalation factor to account for inflation over the life of the program.

Funding Sources

- Wastewater Enterprise Fund: Primarily supports the CIP implementation.
- Connection Fees: Paid by new developments to offset costs related to capacity increases in the system.

Project Prioritization

- Critical projects will be scheduled in the early years (2024–2029) to address immediate needs.
- Project schedules are adjustable based on operating conditions and funding availability.

CIP Phases and Costs

The program is divided into three phases:

Phase 1: 2024–2029

- **Focus**: Capacity improvements, addressing condition-related issues, and lift station upgrades.
- **Total Cost**: $35,948,000
  - Capacity-Related Improvements: $11,803,460 (Gravity Mains & Manholes)
  - Condition-Related Improvements: $24,144,484 (Gravity Mains, Manholes, Lift Stations, Force Mains, and Others)

Phase 2: 2030–2034

- **Focus**: Continued capacity and condition-related improvements, focusing primarily on gravity mains.
- **Total Cost**: $21,526,000
  - Capacity-Related Improvements: $5,448,771
  - Condition-Related Improvements: $16,077,457

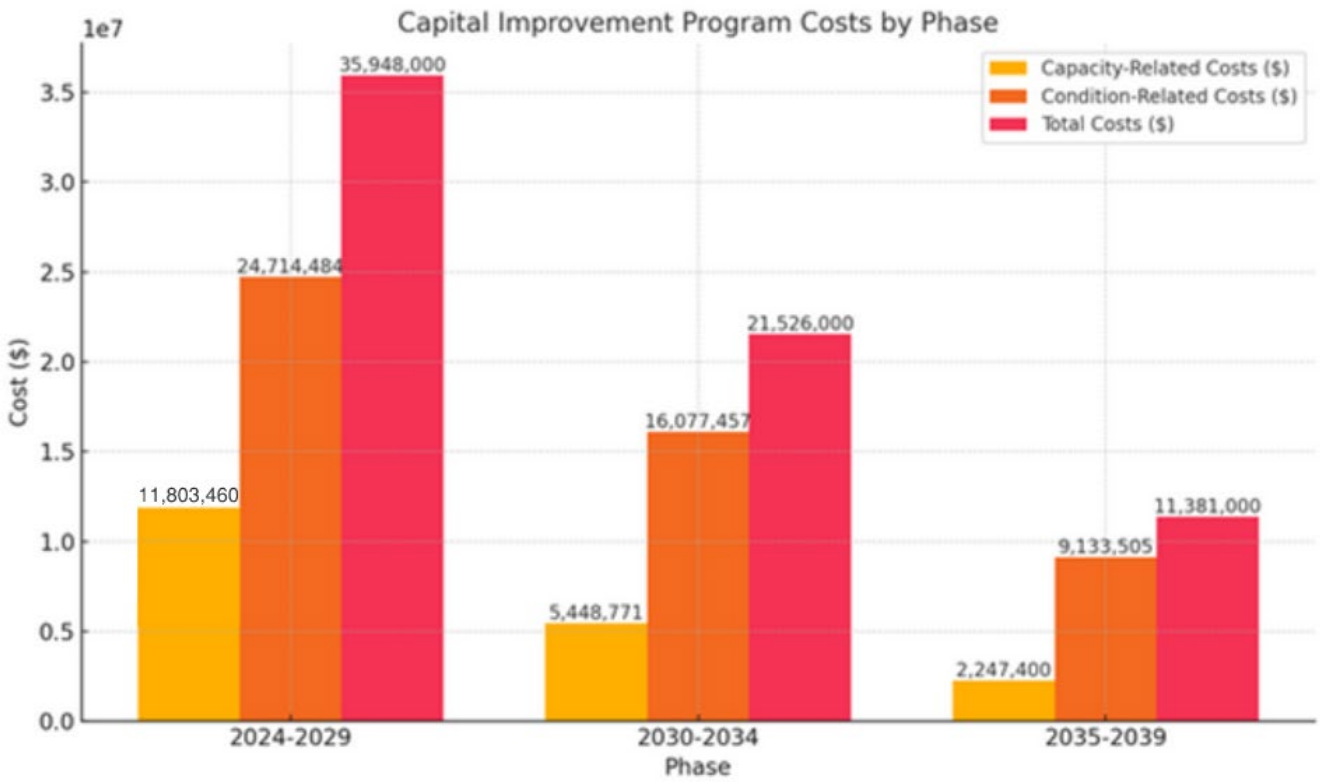
Phase 3: 2035–2039

- **Focus**: Final capacity and condition-related upgrades to address long-term needs.
- **Total Cost**: $11,381,000
  - Capacity-Related Improvements: $2,247,400
  - Condition-Related Improvements: $9,133,505

Total Program Cost

- **Estimated Total (2024–2039)**: $68,855,000

This amount ensures the necessary upgrades and expansions to the sanitary sewer infrastructure over the planning horizon. Here's a visualization of the Capital Improvement Program (CIP) costs by phase. Each bar represents the costs for capacity-related projects, condition-related projects, and the total costs for each phase.



Next Steps

Upon adoption, staff will proceed with implementing the Plan's recommendations, including design and construction of high-priority CIPs, ongoing maintenance activities, and continued monitoring of system performance. Updates will be provided to the City Council on progress and funding needs.

Fiscal Analysis

Implementation of the Plan will be rolled into the City's rate setting and budget approval process, Staff will adjust project timing based on funding and operational requirements, and monitor inflation and cost escalations for any necessary recalibration of estimates. Funding is available through established resources, including sewer rates and connection fees.

Conclusion

The updated Sanitary Sewer Master Plan reflects the City's commitment to maintaining a reliable, efficient, and environmentally responsible sewer system. Adoption of this Plan ensures continued high-quality service for our community while planning for future growth.

Alternatives

1. Take No Action.
2. Refer back to staff for additional information.

Attachments

A. Proposed Projects Summary
B. Sanitary Sewer Master Plan
C. Harbor Industrial Area Sanitary Sewer Master Plan

Fiscal Impact

☐ No Fiscal Impact

☒ Funding Source Confirmed:	Projects from the sanitary sewer master plan are funded through the sewer enterprise funds, sewer connection fees, and development fair share contributions. Projects are incorporated in the five-year Capital Improvement Program as appropriate.

Source:	**Purpose:**	**Public Outreach:**
Staff	Discretionary Action	Posting of Agenda

ATTACHMENT A – PROPOSED PROJECTS SUMMARY

Phase	Improvement Type	Facility Type	Capital Cost ($)	Total Baseline Capital Costs ($)
2024-2029	Capacity-Related	Gravity Main & Manhole	6,803,460	35,948,000
		Lift Station	5,000,000	
	Condition Related	Gravity Main & Manhole	14,574,504	
		Lift Station	4,590,000	
		Force Main	4,779,980	
		Others	200,000	
2030-2034	Capacity-Related	Gravity Main & Manhole	5,448,771	21,526,000
	Condition Related	Gravity Main & Manhole	14,757,457	
		Lift Station	1,320,000	
2035-2039	Capacity-Related	Gravity Main & Manhole	2,247,400	11,381,000
	Condition Related	Gravity Main & Manhole	9,133,505	
Total ($)				**68,855,000**

Notes:

1. Costs are rounded to the nearest thousands.

Sanitary Sewer Master Plan Update

City of Belmont

FINAL

Prepared for:

City of Belmont

1 Twin Pines Lane, Suite 385

Belmont, CA 94002

May 8, 2024

Prepared by:

IEC, an Ardurra Company

3737 Birch St, Ste 250,

Newport Beach, CA 92660

IEC, an Ardurra Company Confidential and Proprietary
Do not distribute without approval.

Table of Contents

Executive Summary 1
Existing Wastewater Collection System *1*
Wastewater Flows *1*
Capacity Evaluation *2*
Condition Assessments *3*
Capital Improvement Program (CIP) *3*
1. Introduction 6
1.1. Background and Purpose *6*
1.2. Scope of Work *7*
1.3. Authorization *7*
1.4. Acknowledgements *8*
1.5. Data Sources *8*
1.6. Report Organization *8*
2. Planning Area 10
2.1. Study Area *10*
2.2. Population *10*
2.3. Land Use *15*
2.3.1. Existing Land Use 15
2.3.2. Anticipated Future Developments 18
3. Existing Sewer System Description 22
3.1.1. Geographic Information System (GIS) 22
3.1.2. Sewer Basins 22
3.1.3. Gravity Sewers 22
3.1.4. Lift Station and Force Main 29
3.1.5. Operation and Maintenance 33
4. Planning Criteria 34
4.1. Gravity Sewers *34*
4.2. Manhole *35*
4.3. Lift Station and Force Main *35*
5. Wastewater Flow Characteristics and Projections 36
5.1. Wastewater Flow Component *36*
5.1.1. Average Dry Wastewater Flow (ADWF) 36
5.1.2. Peak Dry Weather Flow (PDWF) 36
5.1.3. Peak Wet Weather Flow (PWWF) 36

5.2. Historical Wastewater Flow 36
5.3. Sewer Generation Factors 40
5.4. Sewer Flow Projections 41
5.5. Flow Monitoring Program 44
5.5.1. Temporary Flow Monitoring Sites 44
5.5.2. Flow Monitoring Results 49
5.6. Design Storm 56
6. Hydraulic Model Update 57
6.1. Previous Hydraulic Model 57
6.2. Data Collection and Validation 57
6.2.1. Field Verification and GIS Update 57
6.3. Model Update 57
6.4. Model Calibration 57
6.4.1. Dry Weather Flow Calibration 58
6.4.2. Wet Weather Flow Calibration 63
7. Capacity Evaluation 69
7.1. Gravity Main 69
7.2. Lift Station 73
7.3. Force Main 73
8. Condition Assessment 74
8.1.1. Gravity Main and Manhole 74
8.1.2. Lift Stations 94
8.1.3. Force Main 97
9. Capital Improvement Program (CIP) 100
9.1. Unit Costs 100
9.2. Capacity-related Improvements 102
9.3. Condition-related Improvements 102
9.4. SCADA CIP 106
9.4.1. SCADA System Assessment 106
9.5. Cost Estimates 107

Figures

Figure 2-1. Vicinity Map 12
Figure 2-2. Existing Land Use 17
Figure 2-3. Anticipated Future Developments 21
Figure 3-1. Existing Sewer System 25
Figure 3-2. Gravity Main by Material 26
Figure 3-3. Gravity Main by Size 27
Figure 3-4. Gravity Main by Installation Year 28
Figure 5-1. Sewer Service Area 39
Figure 5-2. 2021-2022 Flow Monitoring Locations 47
Figure 5-3. 2021-2022 Flow Meter Schematic Diagram 48
Figure 5-4. Observed Rainfall Events during 2021-2022 Flow Monitoring Study 49
Figure 5-5. System Responses to Tide 55
Figure 5-6. Design Storm 56
Figure 6-1. Weekday Diurnal Patterns 62
Figure 6-2. Weekend Diurnal Patterns 63
Figure 6-3. RTK Unit Hydrographs 64
Figure 7-1. Model Results under Existing PWWF 70
Figure 7-2. Model Results under 2028 PWWF 71
Figure 7-3. Model Results under 2043 PWWF 72
Figure 8-1. Gravity Mains without PACP Record 76
Figure 8-2. Gravity Mains Defect Grading Scores 77
Figure 8-3. Structural Scores and Rating Indexes by Pipe Material 78
Figure 8-4. Structural Score and Rating Indexes by Installation Period 78
Figure 8-5. Historical SSOs Occurrence 82
Figure 8-6. Locations of SSOs between 2017 and 2022 83
Figure 8-7. Risk Analysis Tool in IAP 86
Figure 8-8. Gravity Mains by Risk Score 88
Figure 8-9. InfoAsset Planner Rehabilitation Decision Tree 90
Figure 8-10. Pipes Proposed for CCTV Inspection, Cleaning, and/or Root Removal 91
Figure 8-11. “MSA” Gravity Mains 92
Figure 8-12. Final Gravity Main Rehabilitation Actions 93
Figure 9-1. Capacity-related CIP Projects 104
Figure 9-2. Proposed Condition-related CIP Projects 105

Tables

Table ES-1. Capital Improvement Cost Estimates Summary 5
Table 2-1. City of Belmont Population Forecast based on Plan Bay Area 2040 (Method 1) 13
Table 2-2. Population Forecast Based on Plan Bay Area 2050 (Method 2) 13
Table 2-3. Population Forecast Based on DOF (Method 3) 14
Table 2-4. Comparison of Population Projected with Different Methods 15
Table 2-5. Existing Land Uses 15
Table 2-6. Anticipated Future Developments 19
Table 3-1. Gravity Main by Material 23
Table 3-2. Gravity Main by Size 23
Table 3-3. Gravity Main by Installation Period 23
Table 3-4. Lift Station Summary 30
Table 3-5. Force Main Summary 32
Table 4-1. Planning Criteria for Gravity Main 34
Table 5-1. Historical 2016-2021 Dry Weather Flow (DWF) to Belmont Pump Station 37
Table 5-2. City of Belmont Existing (2023) Average Dry Weather Flow 38
Table 5-3. Recommended Sewer Generation Factor for Future Developments 40
Table 5-4. Anticipated Future Development Flows 42
Table 5-5. Future Projected ADWF 44
Table 5-6. 2021-2022 Flow Meter Locations 45
Table 5-7. Observed Large Rain Events 49
Table 5-8. Dry Weather Data Summary of the 2021-2022 Flow Monitoring Meters 50
Table 5-9. Wet Weather Data Summary of the 2021-2022 Flow Monitoring Meters 52
Table 5-10. Minimum Flows at Potential Tidal Influenced Meter Sites 54
Table 6-1. WaPUG Calibration Criteria 58
Table 6-2. Dry Weather Calibration Summary 60
Table 6-3. Calibrated R, T, K Parameters 65
Table 6-4. Wet Weather Calibration Summary 66
Table 7-1. Model Results for Lift Stations 73
Table 7-2. Model Results for Force Mains 73
Table 8-1. LOF Scoring by Inspection Condition (Structural Rating Index) 79
Table 8-2. LOF Scoring by Inspection Condition (Total Structural Score) 80
Table 8-3. LOF Scoring by Inspection Condition (Service Rating Index) 80
Table 8-4. LOF Scoring by Pipe Installation Period 80
Table 8-5. Pipe Material Criteria 81
Table 8-6. LOF Scoring by SSOs 82
Table 8-7. COF Scoring by Pipe Size 84
Table 8-8. COF Scoring by 2043 PWWF 84
Table 8-9. COF Scoring by Critical Facilities 85
Table 8-10. COF Scoring by Water Bodies 85
Table 8-11. COF Scoring by Speed Limit 85
Table 8-12. Weighting of Risk Criteria 87
Table 8-13. Risk Analysis Results Summary 87
Table 9-1. Pipe Replacement/Upsizing Unit Costs 100
Table 9-2. Partial Lining Unit Costs 100
Table 9-3. Full Lining Unit Costs 101
Table 9-4. Point Repair Unit Costs 101

Table 9-5. Manhole Repair/Replacement Unit Costs 102
Table 9-6. Force Main Unit Costs 102
Table 9-7. Cost Estimation and Phasing for Capacity Related Improvements..... 109
Table 9-8. CIP Cost Estimations by Planning Year 111

Appendices

Appendix A	2023 HISMD Sanitary Sewer Master Plan
Appendix B	Design Guide
Appendix C	Planning Criteria Comparison Matrix
Appendix D	Sewer Generation Factors Calculations
Appendix E	Dry Weather Calibration Results
Appendix F	Wet Weather Calibration Results
Appendix G	Model Results
Appendix H	Defect Codes and Rehabilitation Actions Table
Appendix I	LS and FM Condition Assessment Matrices
Appendix J	Capacity related Zoom-in Exhibits
Appendix K	Condition-related Improvements
Appendix L	Sewer Near-term CIP Cost Summary Sheet

Abbreviations

2007 SMP	2007 Sewer Master Plan
2010 Capacity Analysis	Sanitary Sewer Capacity Analysis prepared by RBF Consulting in 2010
2015 FMCA	Force Main Condition Assessment prepared by Pure Engineering Services in 2015
2017 PSCA	Pump Station Condition Assessment prepared by HydroScience Engineers in 2017
2018 CP Testing	City of Belmont Cathodic Protection Testing of Sewer Force Mains prepared by Nation Corrosion in 2018
2020 Census	2020 Census of Population and Housing
2020 Model Update and CIP Study	Sewer Model Update and Capital Improvement Program Study prepared by IEC in 2020
2024-2029 Pavement Plan	Pavement Plan for Street Improvements between 2024 and 2029
AACE	American Association of Cost Engineers
ABAG	Association of bay Area Governments
AC	Asbestos cement
ADD	Average day demand
ADWF	average dry weather flow
ASCE	American Society of Civil Engineers
ASCE Manual No. 60	ASCE Manuals and Reports on Engineering Practice No. 60 Gravity Sanitary Sewer Design and Construction
BGP	Belmont Gravity Pipeline
BPS	Belmont Pump Station
BVD Modeling and Analysis	Belmont Village Development Hydraulic Modeling and Analysis prepared by HydroScience Engineers in 2017

BVSP	Belmont Village Specific Plan
BWF	base wastewater flow
CCTV	closed-circuit television
CIP	Capital Improvement Program
CIP	Cast Iron Pipe
City	City of Belmont
CIWEM	Chartered Institute of Water and Environmental Management
COF	Consequence of Failure
County	San Mateo County
CP	cathodic protection
DIP	Ductile Iron Pipe
DOF	California Department of Finance
DU	Dwelling Unit
FAR	Floor area ratio
FM	Force Main
fps	feet per second
ft	feet
General Plan	2035 General Plan
GIS	Geographic Information System
GWI	groundwater infiltration
HDPE	high-density polyethylene
HIA	Habor Industrial Area
HISMD	Harbor Industrial Sewer Maintenance District
HMI	Human Machine Interface
HP	Horsepower
I&I	Infiltration and Inflow
IAP	InfoAsset Planner
ID	unique Identifier
LF	Linear feet
LOF	Likelihood of Failure
LS	Lift Station
Master Plan	Sanitary Sewer Master Plan Update
MDDF	maximum dry day flow
mgd	million gallon per day
mi	mile
MPWD	Mid-Peninsula Water District
MTC	Metropolitan Transportation Commission
NASSCO	National Association of Sewer Service Companies
NOAA	National Oceanic and Atmospheric Administration
PACP	Pipeline Assessment Condition Program
PDA	Belmont Village Planned Development Area
PDWF	peak dry weather flow
PLC	Programmable Logic Controller
PVC	polyvinyl chloride

PWWF	peak wet weather flow
RDII	rainfall dependent infiltration and inflow
Redwood City	City of Redwood City
RG	rain gauge
RTK	R represents the fraction of rainfall volume entering the collection system as RDII. T is the time, in hours, to reach peak RDII flow, and K is the ratio of the time of recession to the time of peak.
RTS	Return-to-sewer ratio
San Carlos	City of San Carlos
San Mateo	City of San Mateo
SCADA	Supervisory Control and Data Acquisition
SOI	sphere of influence
sq. mi.	square mile
SSMP	Sewer System Management Plan
SSO	Sanitary Sewer Overflow
State Water Board	California State Water Resources Control Board
SVCW	Silicon Valley Clean Water
TDH	Total Dynamic Head
UNK	Unknown
UWMP	Urban Water Management Plan
VCP	vitrified clay pipe
WaPUG Manual	Wastewater Planning Users Group Code of Practice for the Hydraulic Modeling of Sewer Systems
WEF	Water Environment Federation
WWTP	Wastewater Treatment Plant

Executive Summary

This Sanitary Sewer Master Plan Update (Master Plan) presents an evaluation of the City of Belmont (City)'s wastewater collection system under existing and future conditions, and recommendations for a 16-year Capital Improvement Program (CIP) based on findings from capacity evaluation and condition assessment studies. This Master Plan is a tool to help the City proactively make decisions on implementing and budgeting for CIP projects to provide reliable and resilient sewer services to its existing and future customers. This Master Plan has a 20-year planning horizon till year 2043.

Existing Wastewater Collection System

The City's sewer service area encompasses approximately 4.6 square miles (sq. mi.) serving a population of approximately 28,335.[1] The City's wastewater collection system is divided into 15 sewer basins with approximately 80 miles of gravity mains, 10 lift stations, and approximately 3.4 miles of force mains. Under current condition, the majority of the City's wastewater flows are carried by two parallel trunk sewer lines along Ralston Ave, herein referred to as "Ralston Trunk Lines", and discharged into the Belmont Pump Station (BPS) that is owned and operated by Silicon Valley Clean Water (SVCW), and subsequently treated at the SVCW Wastewater Treatment Plant (WWTP). A small portion of wastewater flows are discharged into the wastewater collection systems of the City of San Mateo (San Mateo) and a small portion of wastewater flows are flowing from and to the City of San Carlos (San Carlos). SVCW recently completed the construction of Belmont Gravity Pipeline (BGP) project and is planning to demolish the BPS. The City's wastewater will be discharged into BGP and carried to the San Carlos Pump Station by gravity once BGP is in service.

The City has also planned to annex a small collection system south of the City limit called the Harbor Industrial Sewer Maintenance District (HISMD) that is in the unincorporated part of San Mateo County, and is currently owned and operated by the County.

Wastewater Flows

Based on the historical BPS influent data, water consumption data, and temporary flow monitoring data, the City's existing average dry weather flow (ADWF) is estimated to be 1.44 million gallons per day (mgd) with 1.38 mgd discharged into the BPS, 0.017 mgd discharged into San Mateo's wastewater collection system, and 0.036 mgd discharged into San Carlos's wastewater collection system. The City's maximum dry day flow (MDDF) between 2016 and 2021 was 1.91 mgd, approximately 1.38 times the ADWF. With anticipated future developments and population growth, the City's ADWF is projected to increase to 2.65 mgd by 2043.

The City is subject to high rainfall dependent infiltration and inflow (RDII) during storm events. A temporary flow monitoring study was performed between November 2021 and April 2022 as part of the Master Plan. During the rain event that occurred between December 12, 2021 and December 17, 2021,

[1] Source: U.S. Census Bureau, 2020 Census of Population and Housing (https://www.census.gov/quickfacts/fact/table/belmontcitycalifornia/POP010220)

observed peak flow at BPS influent was 10.92 mgd which occured on December 13, 2021, and was approximately 7.9 times the existing ADWF. Details on the City's wastewater flow characteristics are provided in **Section 5**.

Capacity Evaluation

The City's wastewater collection Geographic Information System (GIS) database has been updated as part of the Master Plan project. In addition, a field survey of approximately 200 manholes was performed as part of the Master Plan. Based on the updated GIS database, survey data, flow monitoring data, and other supporting information, the City's hydraulic model was updated and re-calibrated to reflect current flow characteristics observed in the system. System RDII responses to storm events were analyzed by sewer basin using the RTK method described in **Section 6**. Based on the calibrated results, Sewer Basins 8,12, and 14 have the highest RDII responses and Sewer Basin 9 has the lowest RDII responses. These RDII responses may change with the City's on-going rehabilitation and maintenance program as rehabilitating and replacing aged and defective pipes and manholes can reduce RDII into the collection system. Therefore, a temporary flow monitoring study is recommended to be performed every three to five years as part of future model updates.

Capacity evaluation was performed using the calibrated model under existing (2023), near-term future (2028), and long-term future (2043) Peak Wet Weather Flow (PWWF) conditions. The PWWF scenarios account for a 10-year recurrence frequency, 24-hour duration storm event with a total precipitation of 3.64 inches based on the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 Volume 6 Version 2 Point Precipitation Frequency Estimates at the San Mateo Station with Site ID 04-7864. Temporal distribution of the 10-year 24-hour design storm was derived based on the storm event that occurred on March 5, 2016. The design storm has a peak intensity of 0.97 inches per hour. The existing PWWF was estimated to be approximately 11.3 mgd at BPS inlet, the 2028 PWWF was estimated to be approximately 13.2 mgd discharging into BGP, and the 2043 PWWF was estimated to be approximately 16.3 mgd discharging into BGP. System capacity evaluation details are provided in **Section 7**.

Model results were checked against the established planning criteria. Most of the deficient pipelines identified under the 2043 PWWF condition are deficient under 2023 PWWF condition. There are 16 capacity-related gravity main improvement projects identified based on the capacity evaluation results.

Capacity-related Improvement CCIP_8 is considered a vital improvement for the City as it is an improvement proposed at the most downstream segments of the trunk lines that collect almost the entire system's wastewater flows. CCIP_8 proposed upsizing of existing 21-inch line in Karen Rd to 27-inch, upsizing the downstream 27-inch line in Harbor Blvd to 30-inch, adding a new 27-inch parallel line crossing Hwy 101 connecting to the existing 18-inch line in Shoreway, and upsizing the 18-inch line in Shoreway bewteen the new 27-inch parallel line and the exisitng 27-inch line.

This proposed improvement will eliminate capacity deificiencies of the existing trunk lines and will accommodate wastewater flows from HISMD, so it is recommended be completed before the annexation of the HISMD wastewater collection system and is phased in the near-term (2024-2029) CIP.

San Juan Lift Station is also identified to be upsized to meet the recommended lift station capacity criteria. Proposed capacity-related projects have been prioritized into three phases: near-term (2024-2029), intermediate-term (2029-2033), and long-term (2034-2038).

Condition Assessments

A desktop gravity main condition assessment was performed with the closed-circuit television (CCTV) inspection data provided by the City using InfoAsset Planner (by Autodesk). According to the inspection data, vitrified clay pipes (VCP) and lined VCP were observed to have higher structural defect scores and rating indexes than polyvinyl chloride (PVC) pipes and high-density polyethylene (HDPE) pipes. Structural defect scores and rating indexes generally increase as pipes age. Rehabilitation actions were assigned to observed defects based on the type of defects.

In addition to evaluating the physical conditions of the pipes, a risk analysis was performed on the gravity mains based on Likelihood of Failure (LOF) criteria such as pipe structural condition, pipe age, pipe material, etc., and Consequence of Failure (COF) criteria such as pipe sizes, carried PWWF, proximity to water bodies, etc. A risk score was assigned to each pipe segment on a scale of 1 to 5.

The final rehabilitation method of a gravity main segment was determined based on a customized decision tree with additional considerations. For example, 6-inch pipelines are not good candidates for lining as it will reduce the inner diameter of the pipes and can lead to future maintenance issues. Thus, 6-inch pipelines which were determined to be fully lined based on defects were recommended to be replaced instead. Proposed rehabilitation methods for the gravity mains include CCTV inspection, cleaning/heavy cleaning/root removal, point repair, partial lining, point repair plus partial lining, investigation, and replacement. The City can perform CCTV inspection, cleaning, and heavy cleaning in-house. The City has also contracted out root removal service to some local vendors. Thus, pipelines proposed with these rehabilitation methods are not included in the CIP cost estimations. Condition-related improvement projects are grouped by rehabilitation methods. Pipelines with risk scores of 3 and above are included in the 16-year CIP. The City concurrently developed a pavement plan for street improvements throughout 2029 (2024-2029 Pavement Plan). This Master Plan proposed gravity main rehabilitation to align with the proposed pavement plan. Rehabilitation of pipelines in the streets proposed in the pavement plan between 2025 and 2029 are phased as near-term CIP and the remaining ones are phased as intermediate-term CIP and long-term CIP based on risk scores and locations.

Manhole assessments were not performed as part of this project scope. For CIP budgeting purposes, 30% of the manholes connected to the pipelines which are proposed to be repaired or replaced are assumed to be rehabilitated as well. Lift station (LS) and force main (FM) rehabilitation projects were identified based on previous condition assessment studies as well as interviews with City staff. Hiller LS, San Juan FM, Island Park LS and its force main, as well as the Sports Complex FM are proposed to be rehabilitated in 2024-2028, and Ralston Ranch LS is proposed to be rehabilitated in 2030-2034. Condition assessment results are discussed in **Section 8**.

Capital Improvement Program (CIP)

Based on the findings from capacity evaluation and condition assessment and discussions with City staff, a recommended CIP was developed for a 16-year planning horizon that is phased in near-term CIP(2024 – 2029), intermediate-term CIP (2030-2034), and long-term CIP (2035-2039), as presented in **Table ES-1**. Costs estimations presented in Tables ES-1 were estimated based on unit costs developed from recent local bid results between 2018 and 2023 and the City's adopted budget plans for 2020 to 2022 and are presented in the 2023 U.S. Dollars. Total CIP costs for near-term CIP,

intermediate-term CIP, and long-term CIP are $35.9 Million Dollars, $21.5 Million Dollars, and $11.4 Million Dollars, respectively. CIP cost and phasing details are provided in **Section 9**.

Table ES-1. Capital Improvement Cost Estimates Summary

Phase	Improvement Type	Facility Type	Capital Cost ($)	Total Baseline Capital Costs ($)
2024-2029	Capacity-Related	Gravity Main & Manhole	6,803,460	35,948,000
		Lift Station	5,000,000	
	Condition-Related	Gravity Main & Manhole	14,574,504	
		Lift Station	4,590,000	
		Force Main	4,779,980	
		Others	200,000	
2030-2034	Capacity-Related	Gravity Main & Manhole	5,448,771	21,526,000
	Condition-Related	Gravity Main & Manhole	14,757,457	
		Lift Station	1,320,000	
2035-2039	Capacity-Related	Gravity Main & Manhole	2,247,400	11,381,000
	Condition-Related	Gravity Main & Manhole	9,133,505	
Total ($)				**68,855,000**

Notes:

1. Costs are rounded to the nearest thousands.

1. Introduction

This section provides an overview of the project background, purposes of this Master Plan, and associated scope of work.

1.1. Background and Purpose

The City is located in the San Francisco Bay Area region approximately halfway between San Francisco and San Jose metros in San Mateo County (County). The City area spans approximately 4.6 square miles with a population of 28,335.[2] The City's existing sewer collection system consists of approximately 80 miles of gravity sewer pipelines, 10 lift stations, and approximately three miles of force mains. The system was first constructed in the early 1920's.

The City's most recent sewer master plan was completed by RMC Water and Environment and was adopted in 2007. The 2007 Sewer Master Plan (2007 SMP) did not include any capacity related improvement projects. Several studies and assessments of the sewer system were completed since then with recommendations on system improvements. The following is a timeline of the studies:

- In 2010, RBF Consulting completed a Sanitary Sewer Capacity Analysis (2010 Capacity Analysis) based on flow monitoring data, and recommended a list of improvement projects.
- Between 2012 and 2016, Atlantic Consultants conducted multiple cathodic protection (CP) system testing on the San Juan FM with reports summarized their findings.
- In 2015 Pure Engineering Services completed a Force Main Condition Assessment (2015 FMCA) on the City's sanitary force mains and developed a list of prioritized capital improvement projects to rehabilitate or replace the force mains.
- In 2017, HydroScience Engineers completed a Pump Station Condition Assessment (2017 PSCA) on the City's lift stations and developed a list of prioritized capital improvement projects to rehabilitate or replace the lift stations. In the same year, HydroScience Engineers completed the Belmont Village Development Hydraulic Modeling and Analysis (BVD Modeling and Analysis) and identified improvements needed to accommodate the proposed Belmont Village Development.
- In 2018 National Corrosion conducted CP testing of four of the City's force mains (San Juan FM, El Camino FM, Island Parkway FM, and North Road FM) and made recommendations.
- In 2020, IEC completed a Sewer Model Update and Capital Improvement Program Study (2020 Model Update and CIP Study) for the City based on a 2-year flow monitoring study conducted between 2015 and 2018. A list of capacity-related improvement projects was identified based on the model results under PWWF conditions.

Since the adoption of the 2007 SMP, the City has been conducting ongoing capital improvement and maintenance projects based on the above assessments and studies. Some of the improvement projects have been constructed while some of them have been deferred. In addition, many of the City's

[2] Source: U.S. Census Bureau, 2020 Census of Population and Housing, April 2020

gravity mains are aged, and some of the lift stations and force mains are under capacity or in poor condition, thus, they are in need of rehabilitation, replacement, or upgrade.

The primary objective of this Master Plan is to consolidate findings from this Master Plan and previous studies into one comprehensive planning document in order to provide a roadmap for planning, budgeting and implementing improvements to the City's sewer infrastructure to accommodate future growth and provide reliable sewer service to existing as well as future customers. The City also has planned to annex the HISMD's sewer collection system of about 60 laterals currently in an unincorporated part of San Mateo County. A separate sewer master plan was prepared concurrently for this area, and is included as **Appendix A**. PWWF from the HISMD post annexation improvements was accounted for under 2043 PWWF in this Master Plan. A prioritized 16-year CIP with cost estimations is developed as part of the Master Plan.

1.2. Scope of Work

This Master Plan includes the following tasks:

- Perform data review and field verifications on areas with missing/inconsistent data
- Clean up and update the City's sewer collection system GIS database with available as-built drawings, inspection reports, field verified data, and inputs from City staff
- Perform temporary flow monitoring study to capture the system's current flow characteristics for model update and tidal inflow analysis
- Update existing and future flows based on the latest flow monitoring data, water consumption data, and land use information
- Update and refine the City's existing InfoSWMM-based sewer model using updated GIS database, survey data, and new flow data
- Review and update the City's planning criteria based on professional manual and planning criteria used by other Bay Area agencies
- Evaluate the system under various flow conditions using the updated model and identify capacity-related issues
- Perform condition assessment for system assets based on available inspection data and previous condition assessment studies
- Develop a prioritized and phased CIP based on condition assessment results and capacity analysis results
- Develop a 2023 Sewer Master Plan Report

1.3. Authorization

The Master Plan was performed under an Architectural and Engineering Services Agreement (AESA) entered into between Infrastructure Engineering Corporation (IEC), now Ardurra, and the City of Belmont, dated February 19th, 2021.

1.4. Acknowledgements

IEC wishes to acknowledge and thank all City staff for their support and assistance in providing the necessary information in completing this Master Plan. Special thanks go to the following key staff: Bozhena Palatnik (Senior Civil Engineer), Ryan Moran (Street/Traffic Supervisor), Tim Murray (Public Works Field Supervisor Sewer/Storm), Paul Bologna (CCTV Operator), Jason Eggers (GIS Coordinator), Carlos de Melo (Community Development Director), Peter Brown (Public Works Director), and Afshin Oskoui, PE (City Manager).

1.5. Data Sources

This Master Plan is developed using various data and information, including but not limited to the following:

- City of Belmont Sanitary Sewer Rehabilitation Master Plan prepared by RMC Water and Environment, September 2007 **(2007 SMP)**
- City of Belmont Sanitary Sewer System Capacity Analysis prepared by RBF Consulting, April 2010 **(2010 Capacity Analysis)**
- City of Belmont Force Main Condition Assessment Final Report prepared by Pure Engineering Services Inc, July 2015 **(2015 FMCA)**
- City of Belmont Pump Station Assessment and Inventory Report prepared by HydroScience, April 2017 **(2017 PSCA)**
- Belmont Village Development Hydraulic Modeling and Analysis prepared by HydroScience, September 2017 **(2017 BVD Modeling and Analysis)**
- City of Belmont Cathodic Protection Testing of Sewer Force Mains prepared by National Corrosion, February 2018 **(2018 CP Testing)**
- City of Belmont Sewer Model Update and Capital Improvement Program prepared by IEC, February 2020 (**2020 Model Update and CIP Study)**
- Mapping data from City GIS files, City As-builts, field survey of manholes, and field data collection by City operators and engineering staff
- Condition assessment data from field assessments, ITPipes database, and interviews with City operators
- GIS database of the 2024-2029 Pavement Plan for the City of Belmont prepared by Pavement Engineering Inc. (**2024-2029 Pavement Plan**)

1.6. Report Organization

This Master Plan is presented with the following sections:

- Executive Summary
- Section 1 – Introduction

- Section 2 – Planning Area
- Section 3 – Existing Sewer System Description
- Section 4 – Planning Criteria
- Section 5 – Wastewater Flow Characteristics and Projections
- Section 6 – Hydraulic Model Update
- Section 7 – Capacity Evaluation
- Section 8 – Condition Assessment
- Section 9 – Capital Improvement Program

2. Planning Area

This section provides general information on the City's existing and future land use and population.

2.1. Study Area

The City was incorporated in October 1926 and operates under a Council-Manager form of government with a five-member City Council. The City is located in the San Mateo County, California, bounded by San Mateo and Foster City to the north, by Redwood City to the east, by San Carlos to the south, and by unincorporated County area to the west. The City encompasses approximately 4.6 square miles. A vicinity map of the City is shown in **Figure 2-1**. The City's topography generally slopes downward from the eastern foothills of the Santa Cruz Mountains to the west along the flat Bay plain, ranging from sea level to almost 900 feet in elevation.

The Harbor Industrial Area (HIA) is an unincorporated area of the County south of the City limit, bounded by O'Neil Ave, Old County Rd, Belmont Creek, and US 101. Although the HIA is not within the City limit, it is within the City's approved Sphere of Influence (SOI). Due to its location and proximity to the infrastructure and service area, the City is considering annexation. The County provides sewer services to this area and refers to this area as the Harbor Industrial Sewer Maintenance District (HISMD). As a result, HIA and HISMD are used interchangeably in this Master Plan. A sewer master plan for HIA was prepared concurrently with this Master Plan, and is included as **Appendix A**.

The City has a semi-arid Mediterranean climate with moderate to warm summers and mild winters.[3] The average annual precipitation is 19.16 inches with 90% of the rain events occurring between October and April.

The City is one of four members of the SVCW, a Joint Powers Authority. Wastewater collected from the City is conveyed through a series of pipelines and lift stations to the SVCW WWTP for treatment and disposal.

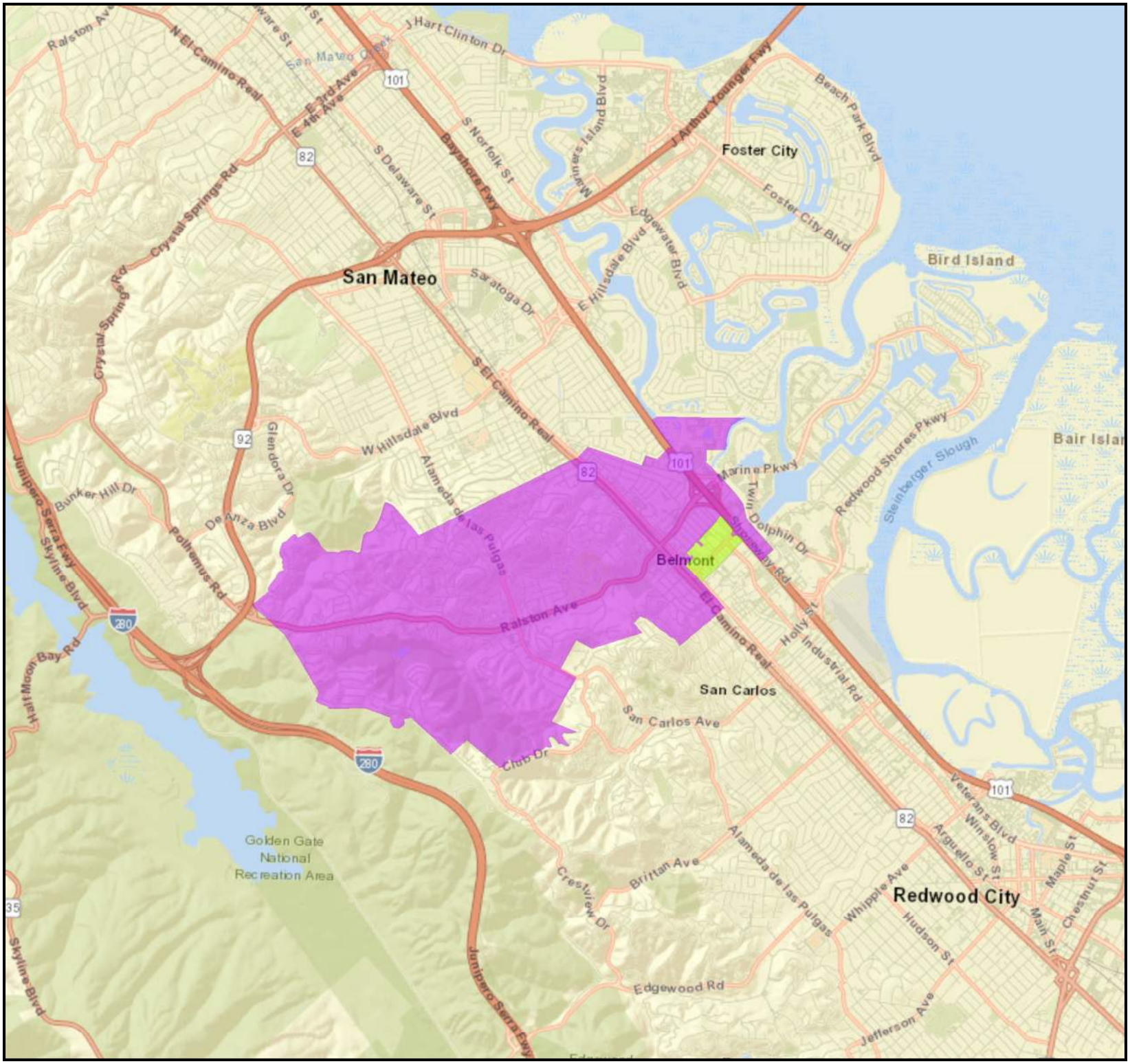
2.2. Population

Based on the 2020 Census of Population and Housing (2020 Census) by the U.S. Census Bureau, the City has a population of 28,335 as of 2020. Based on a five-year estimate (2015-2019), the City has approximately 10,285 households with an average of 2.58 persons per household. Population forecasts from a few recently prepared planning documents were reviewed to develop population projection for this Master Plan. The City's water service provider Mid-Peninsula Water District (MPWD) had recently adopted its 2020 Urban Water Management Plan (UWMP), which used population data from the Association of Bay Area Governments (ABAG)'s Plan Bay Area 2040 that was prepared in 2017. Plan Bay Area 2040 included city-level population forecast and estimated the City's 2020 population as 27,405 with an estimated annual growth rate of 0.5% throughout 2040. The 2020 population estimated for the City by Plan Bay Area 2040 is approximately 3.3% less than the 2020 population from the 2020 Census.

[3] Source: Mid-Peninsula Water District 2020 Urban Water management Plan by Manage Water Consulting, Inc dated June 2021

The ABAG and the Metropolitan Transportation Commission (MTC) adopted the Plan Bay Area 2050 on October 21, 2021. It was developed on top of the Plan Bay Area 2040 and covers four key elements including housing, economy, transportation, and environment through 2050. As part of the Plan Bay Area 2050 plan, the regional growth forecast through 2050 has been revised using demographic and economic model, land use model, and travel model developed by MTC and ABAG staff. Plan Bay Area 2050 used 2015 as the plan baseline year for the regional growth forecast. Unlike Plan Bay Area 2040 which provided city-level growth forecasts on households, population, and jobs, Plan Bay Area 2050 did not include city-level growth forecasts but only county and sub-county growth forecasts on households and jobs.

The California Department of Finance (DOF) has released the county population projections from 2010 to 2060 data in July 2021. The population projections were calculated using the demographic balancing equation (Current Population = Previous Population + Births – Deaths + Net Migration) with the latest historical population, birth, death, and migration data available as of July 1, 2020. This county population projections used 2019 as the baseline year.



Legend

- City Limit
- Harbor Industrial Area

N

Feet

0 2,500 5,000

Infrastructure

City of Belmont
2023 Sewer Master Plan Update

Vicinity Map

Figure 2-1

Based on the above findings, three methodologies were considered to forecast the City's population through 2040. Method 1 utilized the population forecast for the City from the Plan Bay Area 2040 and adjusted it with the City's 2020 population from the 2020 Census, as shown in **Table 2-1**.

Table 2-1. City of Belmont Population Forecast based on Plan Bay Area 2040 (Method 1)

Planning Year	Population[1]	5-Yr Growth Rate[2]	Modified Population
2020	27,405		28,335 [3]
2025	27,685	1.02%	28,625
2030	27,970	1.03%	28,919
2035	29,145	4.20%	30,134
2040	30,085	3.23%	31,106

Notes:
1. Population data obtained from Projections 2040 by Jurisdiction as part of the Plan Bay Area 2040. (http://projections.planbayarea.org/)
2. 5-yr growth rate was estimated based on the Plan Bay Area 2040 population projection.
3. The modified population in 2020 was based on the 2020 Census.

Method 2 utilized the regional growth forecast from the Plan Bay Area 2050 and the City's 2020 population from the 2020 Census, as shown in **Table 2-2**. The growth forecast including population, employment, households, and housing units have been provided from baseline year (2015) throughout 2050 in 5-year increment from the Plan Bay Area 2050. Growth forecast is only available for households and employment on a county and sub-county level for planning years 2015 and 2050. The City is within Central San Mateo County. To estimate the City's population projection, average persons per household and the percentage of population growth with respect to the baseline year were first determined for each planning year. Then, population forecast for Central San Mateo County for 2015 and 2020 were estimated based on the projected households and the calculated average persons per household. Population growth with respect to the baseline year for Central San Mateo County for the intermittent planning years is assumed to be similar to the regional population growth pattern and is proportional to the percent of regional population growth.

Once the population is projected for the Central San Mateo County, 5-year population growth rate is determined for each planning year with respect to the previous planning year (baseline year of 2020). The 5-year population growth rates for the Central San Mateo County are applied to the City's 2020 population to estimate the population throughout 2050 assuming the City follows the same population growth pattern.

Table 2-2. Population Forecast Based on Plan Bay Area 2050 (Method 2)

Planning Year	2015	2020	2025	2030	2035	2040	2045	2050
Regional Growth Forecast								
Total Population[1]	7,660,000	7,940,000	8,230,000	8,560,000	9,010,000	9,490,000	9,930,000	10,330,000
Total Households[1]	2,680,000	2,760,000	2,950,000	3,210,000	3,500,000	3,710,000	3,890,000	4,040,000
Persons per Household	2.858	2.877	2.790	2.667	2.574	2.558	2.553	2.557
Percent of Population Growth from Baseline Year (2015)[2]	-	3.7%	7.4%	11.7%	17.6%	23.9%	29.6%	34.9%

Table 2-2. Population Forecast Based on Plan Bay Area 2050 (Method 2)

Planning Year	2015	2020	2025	2030	2035	2040	2045	2050
Central San Mateo County Growth Forecast								
Households[3]	87,000	-	-	-	-	-	-	121,000
Population[4]	248,664	255,032	261,628	269,133	279,368	290,284	300,291	309,389
Percent of Population Growth from Baseline Year (2015)[5]	-	2.6%	5.2%	8.2%	12.3%	16.7%	20.8%	24.4%
5-Yr Population Growth Rate (Baseline 2020) [6]	-	-	2.6%	2.9%	3.8%	3.9%	3.4%	3.0%
City of Belmont Population Forecast								
Population[7]	-	28,335	29,068	29,902	31,039	32,252	33,363	34,374

Notes:

1. Information obtained from Table 8 of the Plan Bay Area 2050 Forecasting and Modeling Report prepared in October 2021.
2. Percent of population growth is estimated with respect to the population in 2015.
3. Information obtained from Appendix 1 Plan Bay Area 2050 Growth Pattern of the Plan Bay Area 2050 Forecasting and Modeling Report prepared in October 2021.
4. Population of the Central San Mateo County for 2015 and 2050 was estimated by multiplying the calculated persons per household to the households. Population for the intermittent planning years was estimated using the percent of population growth from baseline year.
5. The percent of population growth for the Central San Mateo County for the intermittent planning year (2020-2045) were calculated by proportionating the 2050 percent of population growth of 24.4% to the 2050 percent of population growth of 34.9% for the region.
6. 5-yr growth rate was estimated with respect to the previous planning year.
7. The City's population was estimated with the 5-yr population growth rate estimated for the Central San Mateo County.

Method 3 utilized the County population projections developed by DOF and the City's 2020 population from the 2020 Census, as shown in **Table 2-3**. The City is assumed to follow the same population growth pattern of the County.

Table 2-3. Population Forecast Based on DOF (Method 3)

Planning Year	2020	2025	2030	2035	2040	2045	2050
Regional Growth Forecast							
Total Population[1]	775,132	787,161	800,006	808,253	813,098	815,187	814,643
5-Yr Population Growth Rate from 2020 [2]		1.6%	1.6%	1.0%	0.6%	0.3%	-0.1%
City of Belmont Population Forecast							
Population[3]	28,335	28,775	29,244	29,546	29,723	29,799	29,779

Notes:

1. based on Report P-1A: Total Population Projections, 2010-2060 California and Counties prepared by DOF dated July 19, 2021.
2. 5-yr growth rate was estimated with respect to the previous planning year.
3. The City's population was estimated with the 5-yr population growth rate calculated for the County.

Table 2-4 compares the population projected by the three methods. Method 2 produces the highest values while Method 3 produces the lowest values. Since projections from Plan Bay Area 2050 is more up-to-date and supersedes the projections from the Plan Bay Area 2040 and they were developed with

more in-depth focus on the region than the projections from DOF, population projected by Method 2 is used for this Master Plan Update.

Table 2-4. Comparison of Population Projected with Different Methods

Planning Year	2020	2025	2030	2035	2040
Method 1	28,335	28,625	28,919	30,134	31,106
Method 2	28,335	29,068	29,902	31,039	32,252
Method 3	28,335	28,775	29,244	29,546	29,723

2.3. Land Use

The City's land use is primarily residential and is nearly built-out. It's 2035 General Plan (General Plan) was adopted in November 2017, which is the City's primary guide and blueprint for developments through 2035. The City also adopted the Belmont Village Specific Plan (BVSP) in November 2017. The Housing Element 2015-2023 of the General Plan was prepared as a separate document and was adopted in May 2015. The City is working on updating its 2023-2031 Housing Element and is anticipated to adopt it by January 2024. The City has also established Zoning Ordinance as an important tool to implement the General Plan and to provide regulations and a precise guide for new developments or redevelopments. Land use classifications in the General Plan are slightly different from the Zoning Ordinance classifications. The General Plan's land use classifications are more general than the Zoning Ordinance classifications. The City is in the process of making corrections or amendments to the mapping and zoning inconsistencies.

2.3.1. Existing Land Use

The City comprises of approximately 3,017 acres. Based on the City's provided latest zoning GIS layer, the City has been designated into 32 zones, as summarized in **Table 2-5** and shown in **Figure 2-2**.

Table 2-5. Existing Land Uses

Zoning Code	Zoning Description	Acres	Percent	Residential Density (Dwelling Units per Acre)[1]	Max. Floor Area Ratio (FAR)[1]
CMU	Corridor Mixed Use (CMU)	57.4	1.9%	45 - 60	1.75 - 2.2
E1	Professional Office (E1)	0.3	0.0%	-	1.5
E2.1	Executive Office (E2.1)	1.7	0.1%	-	1.5
E2.2	Executive Office & Warehouse (E2.2)	17.8	0.6%	-	1.5
HIA-1	Harbor Industrial Area-1 (HIA-1)	4.7	0.2%	not specified	5
HIA-2	Harbor Industrial Area-2 (HIA-2)	54.5	1.8%	not specified	5
HRO1	Hillside Res. & Open Space (unsubdivided) (HRO1)	71.2	2.4%	Determined by slope	-
HRO2	Hillside Res. & Open Space (subdivided) (HRO2)	64.2	2.1%	Determined by slope	-
HRO3	Hillside Res. & Open Space (Western Hills) (HRO3)	114.3	3.8%	Determined by slope	-
HWY	HWY 101 (HWY)	54.6	1.8%	-	-
NC	Neighborhood Commercial (NC)	16.3	0.5%	-	1.5

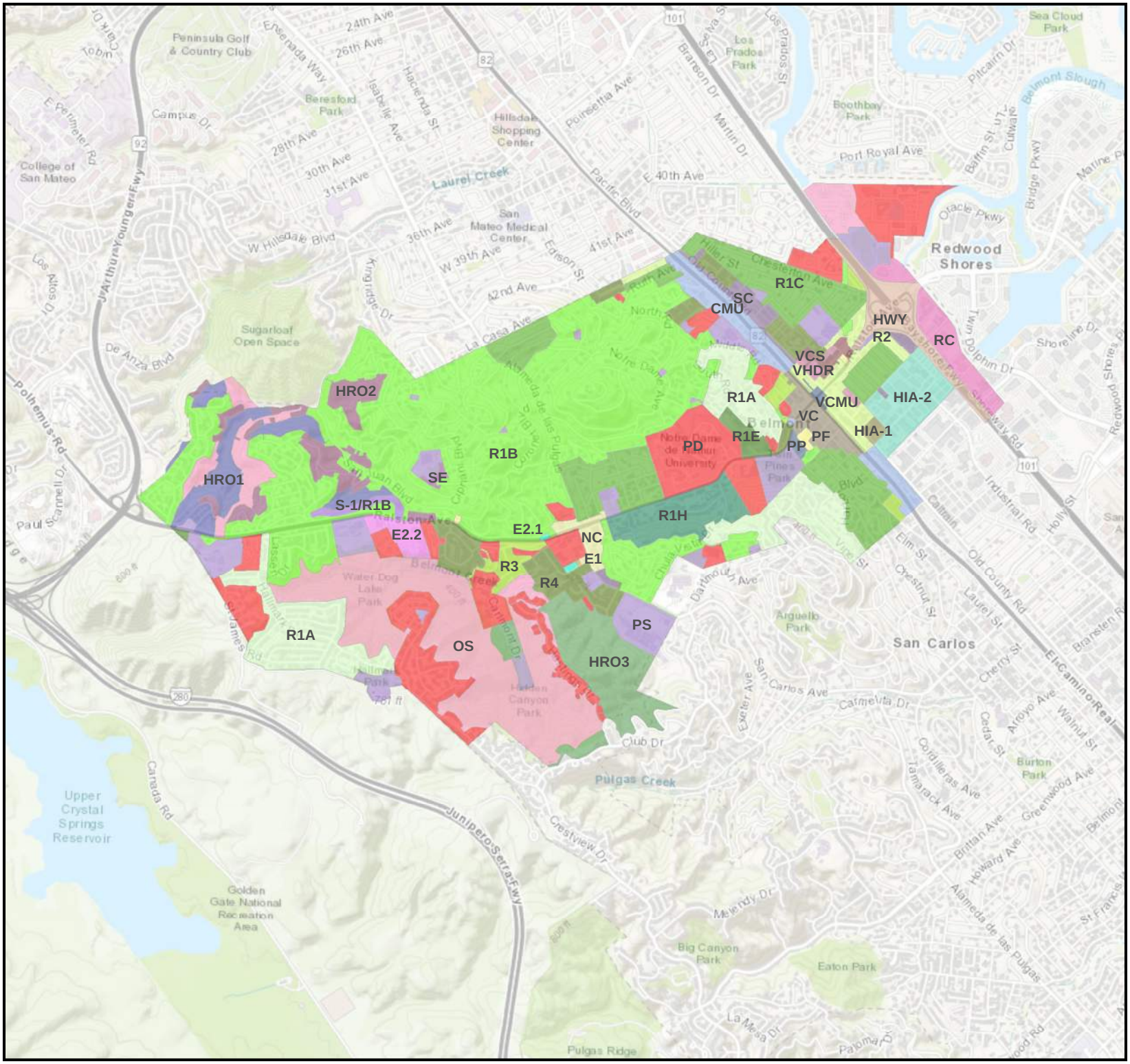
Table 2-5. Existing Land Uses

Zoning Code	Zoning Description	Acres	Percent	Residential Density (Dwelling Units per Acre)[1]	Max. Floor Area Ratio (FAR)[1]
OS	Open Space (OS)	353.1	11.7%	-	
PD	Planned Unit Development (PD)	333.6	11.1%	Up to 30 as a conditional use	2
PF	Public Facility (PF)	3.8	0.1%	-	-
PP	Park/Plaza (PP)	5.3	0.2%	-	-
PS	Public Space (PS)	160.8	5.3%	-	-
R1A	Single Family Residential- 9600 sq. ft./D.U. (R1A)	215.4	7.1%	1-7	-
R1B	Single Family Residential- 6000 sq. ft./D.U. (R1B)	874.1	29.0%	1-7	-
R1C	Single Family Residential- 5000 sq.ft./D.U. (R1C)	239.2	7.9%	1-7	-
R1E	Single Family Residential- 1 acre/D.U. (R1E)	14.7	0.5%	1-7	-
R1H	Single Family Residential- 1/2 acre/D.U. (R1H)	61.0	2.0%	1-7	-
R2	Duplex- 3000 sq.ft./D.U. (R2)	18.9	0.6%	8-20	-
R3	Multi-Family Residential- 1950 sq.ft./D.U. (R3)	31.5	1.0%	8-20	-
R4	Multi-Family Residential- 1450 sq.ft./D.U. (R4)	94.0	3.1%	21-30	-
RC	Regional Commercial (RC)	44.1	1.5%	-	1.8
S-1/R1B	Special (Setback) Combining (S-1/R1B)	9.1	0.3%	-	-
SC	Service Commercial (SC)	24.9	0.8%	-	1.5
SE	School and Other Educational Uses (SE)	2.7	0.1%	-	-
VC	Village Core (VC)	28.3	0.9%	-	2 - 2.5
VCMU	Village Corridor Mixed Use (VCMU)	29.7	1.0%	-	2 - 2.5
VCS	Village Station Core (VCS)	9.2	0.3%	-	1.5 - 2
VHDR	Village High Density Residential (VHDR)	6.4	0.2%	45 - 60	-
Total		3016.9	100.0%		

Sources:

1. Table 2-4 of 2035 General Plan.

Based on the City's latest parcel GIS layer, approximately 90% of the City is developed. Residential land use designation areas and Mixed-use designation areas account for approximately 60% and 17% of the planning areas, respectively.



Legend

Zoning Code

CMU	R1A
E1	R1B
E2.1	R1C
E2.2	R1E
HIA-1	R1H
HIA-2	R2
HRO1	R3
HRO2	R4
HRO3	RC
HWY	S-1/R1B
NC	SC
OS	SE
PD	VC
PF	VCMU
PP	VCS
PS	VHDR

N

Feet

0 1,500 3,000

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City of Belmont
2023 Sewer Master Plan Update

Existing Land Use

Figure 2-2

2.3.2. Anticipated Future Developments

The City's Planning Department has identified the anticipated development and redevelopment in the next 20 years. Most of the anticipated developments and redevelopments are located in the eastern side of the City, especially in the Belmont Village Planned Development Area (PDA), along El Camino Real, and east of US 101.[4]

Table 2-6 summarizes the anticipated developments and redevelopments over the next 20 years based on input and discussion with City's Planning Department staff. **Figure 2-3** shows the locations of the anticipated developments and redevelopments. These developments/redevelopments are either just completed and not yet fully occupied, under construction, approved for entitlement, under entitlement review, or are still conceptual. Specific development information regarding proposed dwelling units and building square footage are included if available. A few development areas have been identified with anticipated future density increase, as Projects 31, 32, and 35 in **Table 2-6**. A future floor area ratio (FAR) has been assumed for these areas based on the maximum FAR designated for the zones as well as input from City's planning staff.

Anticipated future developments and redevelopments which will be connected to the HISMD sewer system are not included in **Table 2-6** or shown in **Figure 2-3**. Details can be found in the **2023 HISMD Sanitary Sewer Master Plan (Appendix A)**.

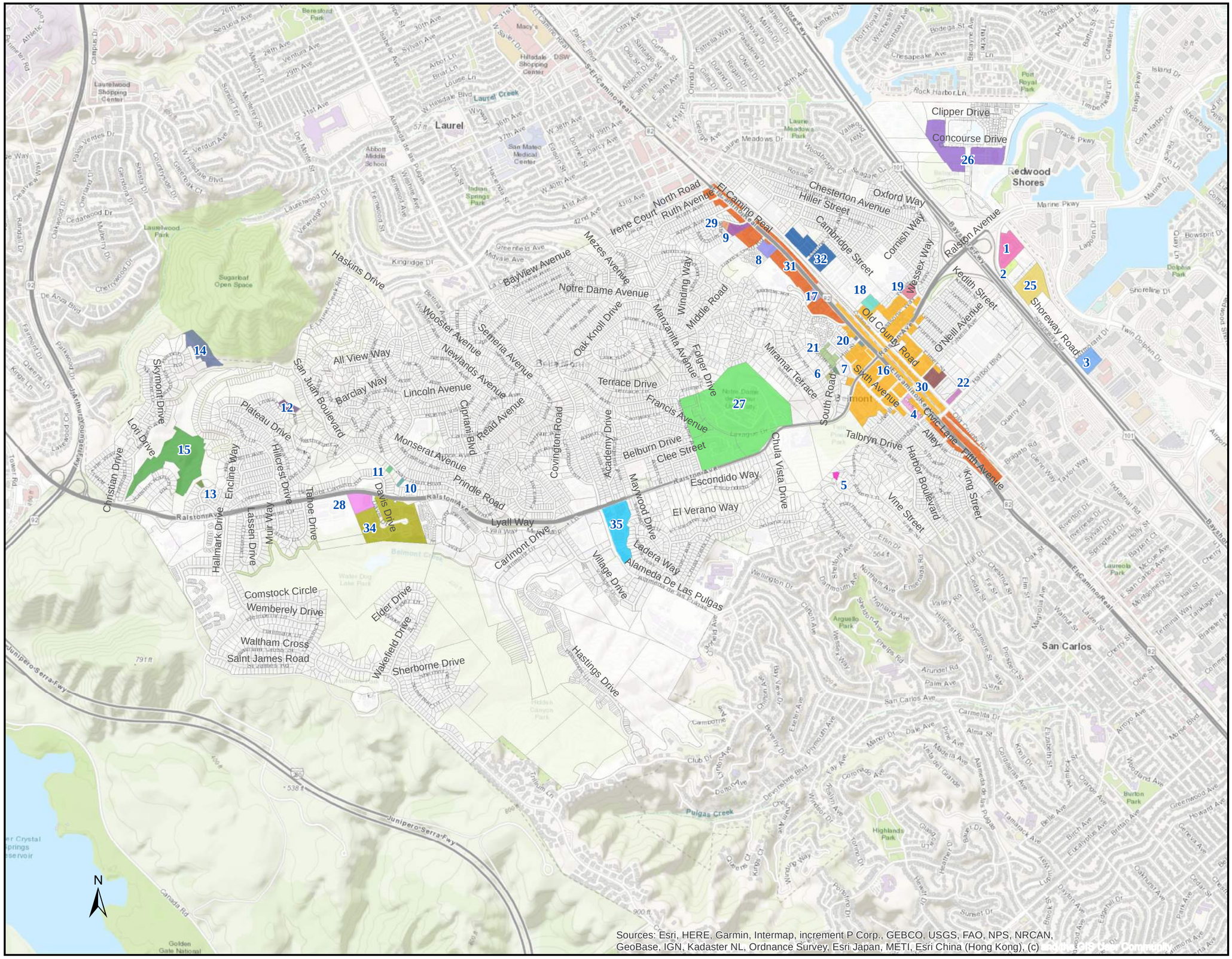
[4] Source: the City of Belmont 2035 General Plan

Table 2-6. Anticipated Future Developments

Project #	Name	Location	Single Family (unit)	Multi-Family (unit)	High Density Residential (unit)	Retail (sq. ft.)	Office (sq. ft.)	Hotel Rooms	Institutional (sq. ft.)	Note	Planning Horizon
1	Shoreway Place	1101 Shoreway	0	0	0	10,000	300,000	280	0	1. May start in 2028-2029	Long-term (within 20-30 Years)
4	Firehouse Square	1350 Civic Lane (Block between El Camino Real and Fifth Avenue, and between O'Neill Avenue and Broadway)	0	81	0	0	0	0	0	1. Part of Belmont Village 2.Constructed in two phases. Phase 2 includes15 townhouse 3. Apartments completed in 2022; townhouses to be completed in 2023	Near-term (within 5 Years)
6		900 South Rd	1	0	0	0	0	0	0		Near-term (within 5 Years)
7		905 South Rd	1	0	0	0	0	0	0		Near-term (within 5 Years)
8		490 El Camino Real	0	74	0	2,500	2,500	0	0	Partially occupied (Retail use)	Completed (Partially occupied)
9	800 - 803 Belmont Ave	Bounded by El Camino, Anita, and Belmont	0	0	125	0	0	0	0	Construction will start in 2024	Near-term (within 5 Years)
10		2837 San Juan	1	0	0	0	0	0	0		Near-term (within 5 Years)
11		2847 San Juan	1	0	0	0	0	0	0		Near-term (within 5 Years)
12		Piazza Lands	1	0	0	0	0	0	0		Near-term (within 5 Years)
13		3858 W. Naughton	1	0	0	0	0	0	0		Near-term (within 5 Years)
14		2007 Bishop	3	0	0	0	0	0	0		Near-term (in progress)
15		3900 Marsten	4	0	0	0	0	0	0		Near-term (within 5 Years)
16	Belmont Village	Belmont Village	0	744	150	971,930	0	0	68,150		Long-term (within 20-30 Years)
17		576- 600 El Camino Real	0	32	0	2,500	7,500	0	0	Partially occupied (multi-family)	Completed (Partially occupied)
18	815 OCR	815 Old County Rd	0	0	177	0	0	0	0	To be completed 2024 Q1	Near-term (within 5 Years)
19	580 Masonic	580 Masonic Way	0	0	139	0	0	0	0		Near-term (within 5 Years)
20	900 ECR	900 El Camino Real	0	0	37	0	0	0	0		Near-term (within 5 Years)
21	Belmont Townhome	800 Laurel	0	16	0	0	0	0	0		Near-term (within 5 Years)
22	608 Harbor	604-610 Harbor Blvd	0	0	103	0	0	0	0	1. 103 apartment units 2. 5-story apartment building 3. within HIA area but connect at O'Neil 4. Construction anticipated by 2025	Near-term (within 5 Years)
25	1301 Shoreway Rd	1301 Shoreway Rd	0	0	0	0	550,000	0	0	1. potentially 550 K SF bio-science complex 2. 3 buildings, biotech life science	Near-term (within 5 Years)

Table 2-6. Anticipated Future Developments

Project #	Name	Location	Single Family (unit)	Multi-Family (unit)	High Density Residential (unit)	Retail (sq. ft.)	Office (sq. ft.)	Hotel Rooms	Institutional (sq. ft.)	Note	Planning Horizon
26	Island Park	Concourse Drive & Island Parkway	0	0	0	0	800,000	0	0	1. Bioscience Complex in 2 phases 2. Phase 1 160 KSF, built in 2000, Oracle moved out in August 2021 3. 800 KSF in Phase 2	Near-term (within 5 Years)
27	NDNU-Stanford	1500 Ralston Ave	0	0	0	0	0	0	400,000	1. Project 6 of Carlos' List 2. 400 KSF more in 15-20 years	Long-term (within 20-30 Years)
28	2 Davis Drive	2 Davis Drive	0	0	0	0	75,000	0	15,000	1. 75 KSF office building 2. 15 KSF fire station	Near-term (within 5 Years)
29	Van's Restaurant	815 Belmont Ave	0	20	0	0	0	0	0	15-20 units (conceptual)	Near-term (within 5 Years)
30	Artisan Crossing	1325 Old County Road	0	0	250	0	0	0	0	1. 250 multi-family res. Units 2. under construction, to be completed 2024 Q1	Near-term (within 5 Years)
31	El Camino Real Corridor Mixed Use		Estimated Existing FAR = 0.5 Proposed FAR = 2							1. density will increase 2. assumed future FAR of 2	Long-term (within 20-30 Years)
32	Old County Rd		Estimated Existing FAR = 0.7 Proposed FAR = 2							1. similar to Belmont Village but with more housing 2. with adoption of housing element, upzone with significant density increase 3. assumed future FAR of 2	Long-term (within 20-30 Years)
34	Davis Drive		0	0	0	0	100,000	0	0	1. additional 100 KSF	Long-term (within 20-30 Years)
35	Carlmont Shopping Center		Estimated Existing FAR = 0.5 Proposed FAR = 1							1. assume future FAR of 1.0	Long-term (within 20-30 Years)



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City of Belmont
2023 Sewer Master Plan

Specific Future Developments

Figure 2-3

3. Existing Sewer System Description

The City's sewer collection system was constructed over a period of close to 100 years beginning in the 1920's. The system consists of approximately 80 miles of gravity sewers ranging from 6 inches to 27 inches in sizes, 10 lift stations equipped with two to three pumps, and approximately 3.4 miles of force mains ranging from 2 to 12 inches in size. All lift stations are connected to a Supervisory Control and Data Acquisition (SCADA) System at the Corporation Yard managed by Mission Communications.

3.1.1. Geographic Information System (GIS)

The City maintains up-to-date CCTV inspection data and GIS database of its existing sewer facilities. Based on the 2020 Model Update and CIP study, inconsistent data was found among hydraulic model, GIS records, and field observations. GIS data review and clean up has been performed as part of this Master Plan project. The City's most recent GIS database and hydraulic model were reviewed to identify missing or inconsistent information including but not limited to pipe size, material, invert depth, network configuration, etc. These areas were corrected or updated utilizing knowledge from field staff, CCTV inspection records, as-builts, as well as field verifications. Two hundred manholes spatially spread throughout the system were selected to be field surveyed to validate the invert information from the hydraulic model and updated into GIS.

3.1.2. Sewer Basins

The City divided its service area into 15 sewer basins as part of an Inflow/Infiltration (I/I) study in the 1980s.[5] The sewer basins have been updated and refined in the subsequent studies to reflect more accurate mapping of the sewer system. In this Master Plan, the sewer basins were further refined based on the updated GIS database, as shown in **Figure 3-1**. Most of the basins have slight boundary adjustments. Ralston Trunk Lines along Ralston Ave serve as the backbone of the system and collect flows from each basin.

3.1.3. Gravity Sewers

The City owns and operates approximately 80 miles of gravity sewer pipelines. More than half (approximately 59%) of the gravity sewer pipelines are VCP or lined VCP. **Table 3-1** summarize the gravity mains by material. **Figure 3-2** shows the locations of the gravity mains by material. Material information was obtained from the City's latest sewer collection system geodatabase. Approximately 8,000 linear feet (LF) of gravity sewer were replaced or rehabilitated annually, and the gravity sewers were typically lined or replaced with plastic pipe such as Polyvinyl Chloride (PVC) or High-Density Polyethylene (HDPE) pipes.[6]

[5] Source: 2007 Sewer Master Plan
[6] Source: 2010 Capacity Analysis

Table 3-1. Gravity Main by Material

Material	Total Length (ft)	Total Length (miles)	Percent
Vitrified Clay Pipe (VCP)	148,837	28.2	35.32%
Lined VCP	99,672	18.9	23.65%
Polyvinyl Chloride (PVC)	70,127	13.3	16.64%
High Density Polyethylene (HDPE)	100,077	19.0	23.75%
Reinforced Concrete Pipe (RCP)	2,660	0.5	0.63%
Unknown (UNK)	125	0.0	0.03%
Total	**421,373**	**79.8**	**100.00%**

The City's gravity mains range from 6 inches to 27 inches in diameter with 6-inch gravity sewers predominating, as shown in **Table 3-2**. Gravity mains displayed by size are shown in **Figure 3-3**.

Table 3-2. Gravity Main by Size

Size (inch)	Total Length (ft)	Total Length (miles)	Percent
6	328,931	62.3	78.0%
8	52,332	9.9	12.4%
10	10,914	2.1	2.6%
12	7,610	1.4	1.8%
15	3,276	0.6	0.8%
16	360	0.1	0.1%
18	8,113	1.5	1.9%
21	5,412	1.0	1.3%
24	1,580	0.3	0.4%
27	2,970	0.6	0.7%
Total	**421,498**	**79.8**	**100.0%**

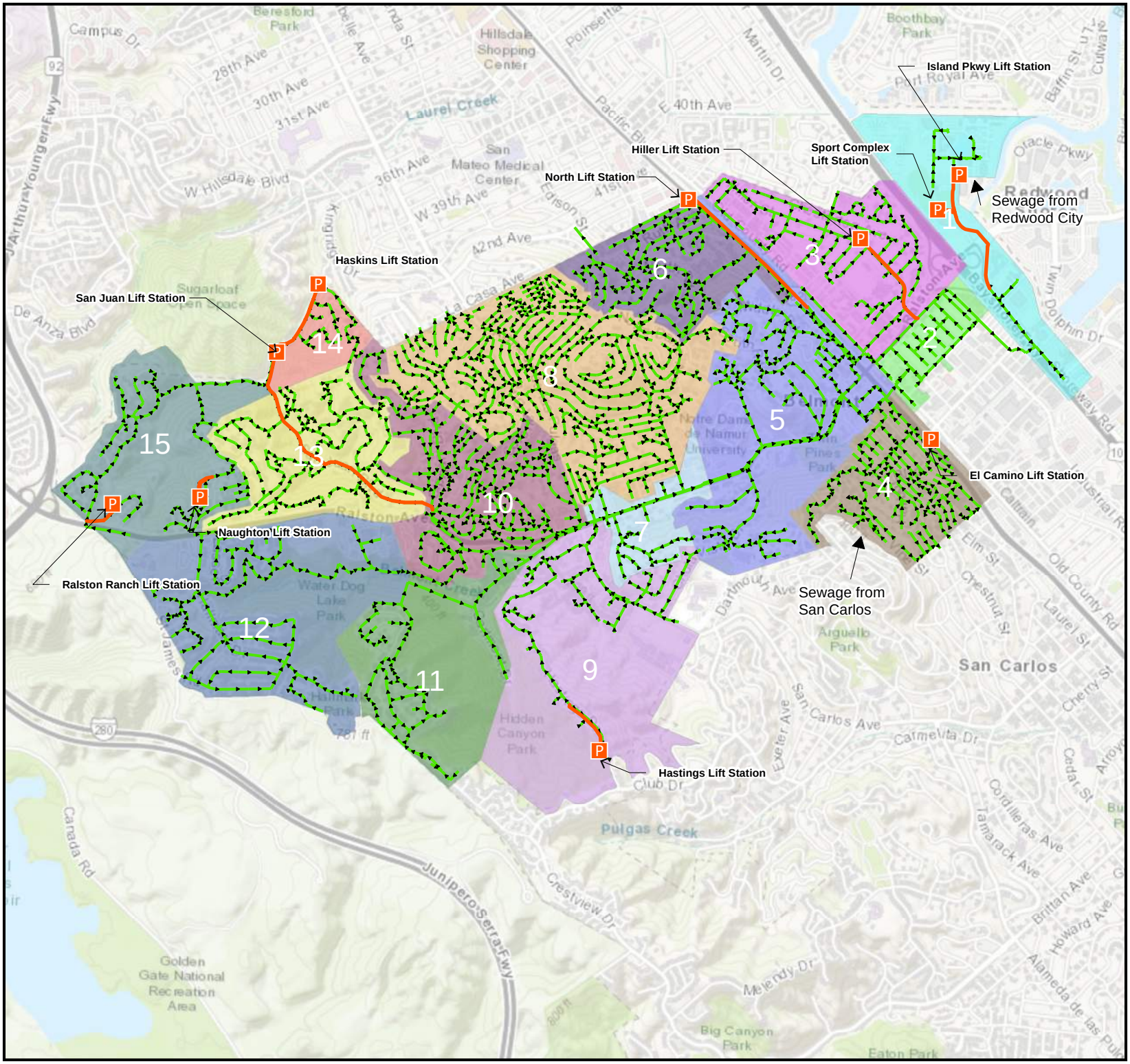
Gravity mains of the City's sewer system were installed as early as in the 1920s. As shown in **Table 3-3**, over half of the gravity mains were installed prior to Year 2000. The City has continuously rehabilitated or replaced its gravity mains since 1991 through its annual sewer maintenance and rehabilitation program. Gravity mains displayed by installation period are shown in **Figure 3-4**.

Table 3-3. Gravity Main by Installation Period

Installation Period	Total Length (ft)	Total Length (miles)	Percent
1920-1929	22,235	4.2	5.28%
1930-1939	2,380	0.5	0.56%
1940-1949	9,957	1.9	2.36%
1950-1959	52,889	10.0	12.55%

Table 3-3. Gravity Main by Installation Period

Installation Period	Total Length (ft)	Total Length (miles)	Percent
1960-1969	23,782	4.5	5.64%
1970-1979	37,408	7.1	8.88%
1980-1989	11,669	2.2	2.77%
1990-1999	75,334	14.3	17.87%
2000-2009	137,285	26.0	32.57%
2010-2019	41,098	7.8	9.75%
2020 to present	5,737	1.1	1.36%
Unknown	1,722	0.3	0.41%
Total	**421,498**	**79.8**	**100.00%**



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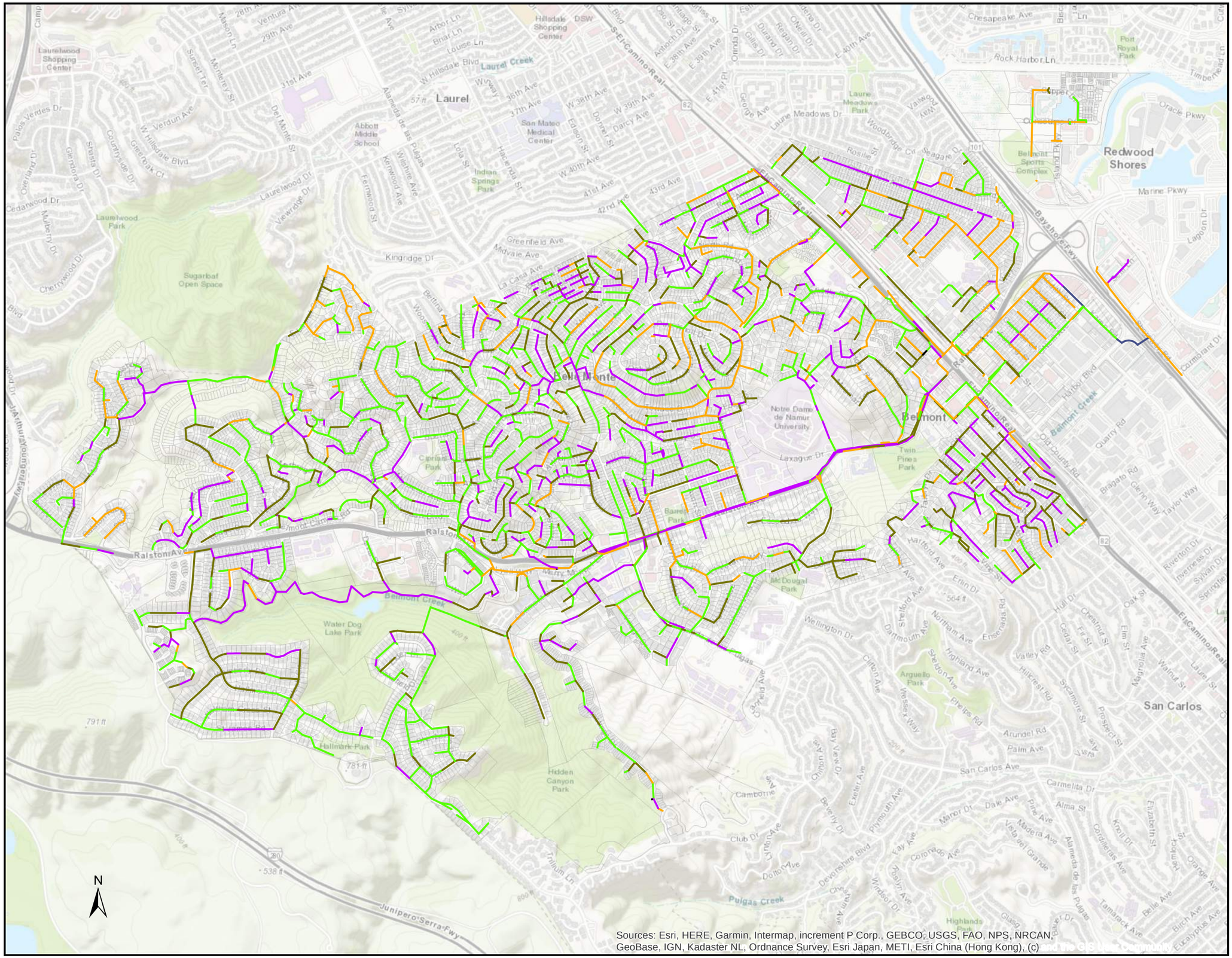
City of Belmont
2023 Sewer Master Plan Update

Existing Sewer System

Figure 3-1



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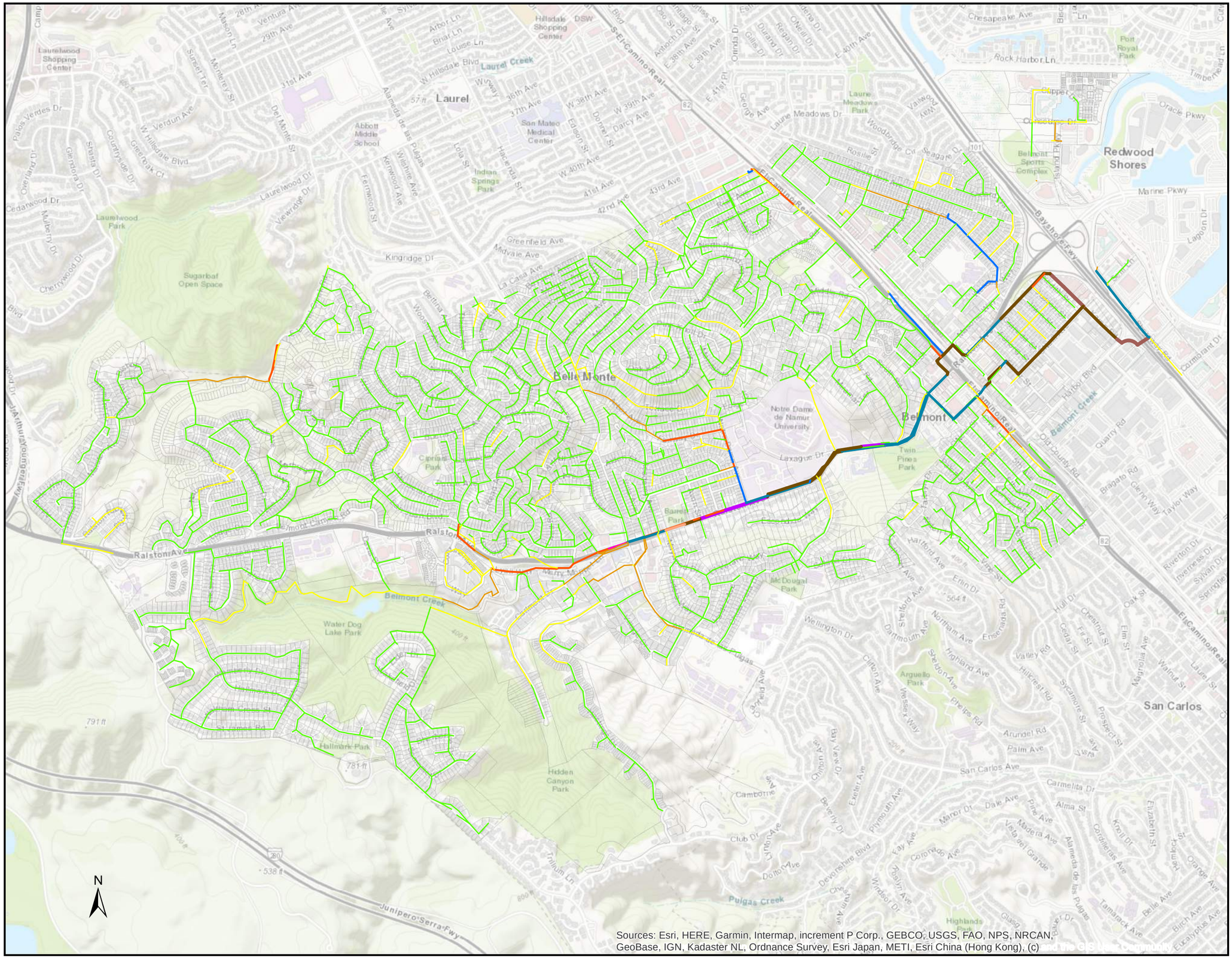
City of Belmont
2023 Sewer Master Plan

Gravity Main by Material

Figure 3-2



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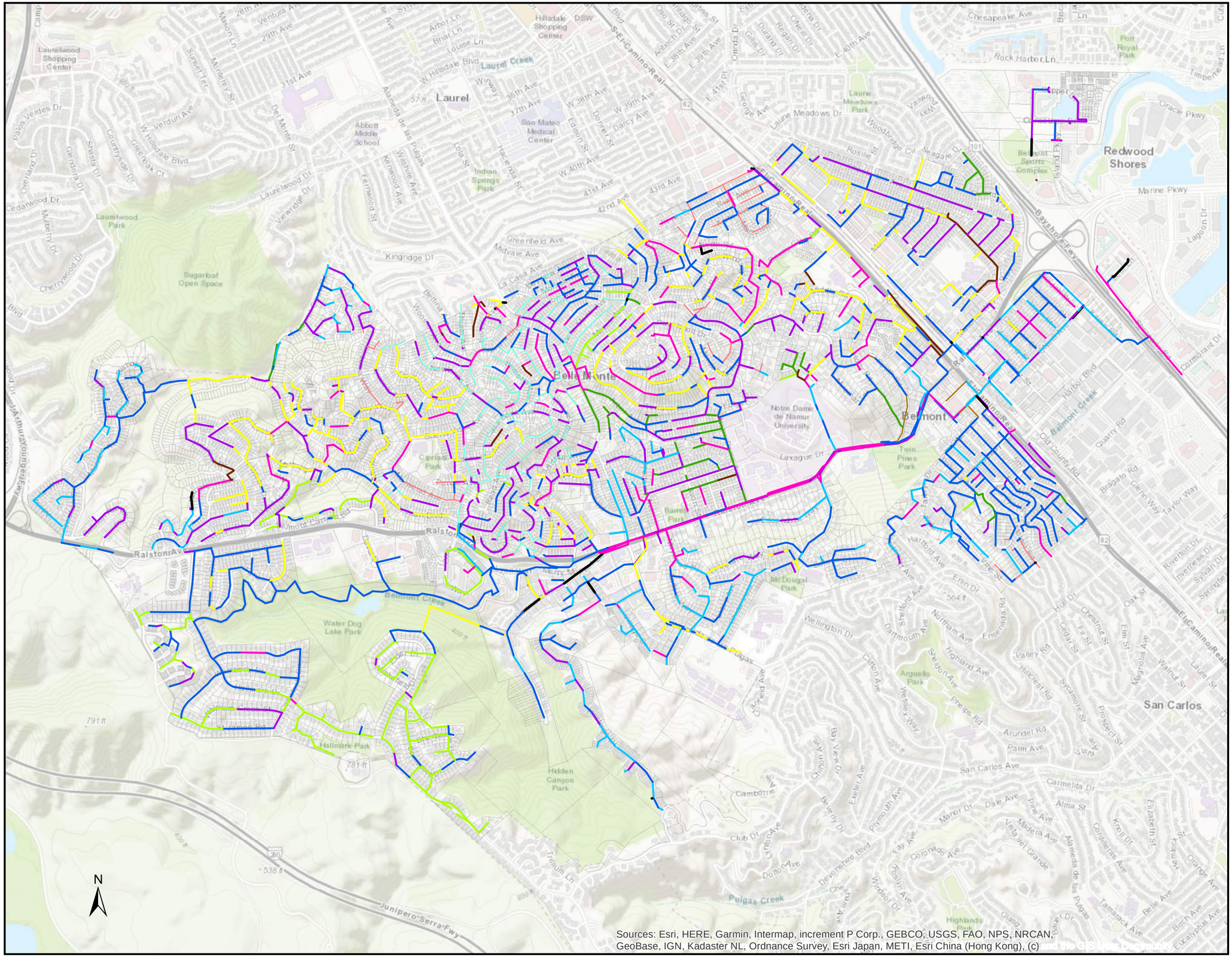
City of Belmont
2023 Sewer Master Plan

Gravity Main by Size

Figure 3-3



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City of Belmont
2023 Sewer Master Plan

Gravity Main by Installation Period

Figure 3-4

3.1.4. Lift Station and Force Main

The system consists of 10 lift stations equipped with 2 to 3 pumps at each station. Seven of the lift stations have either on-site or portable backup generators. The remaining lift stations have connections such as generator termination lugs or pin and sleeve generator receptables for portable backup generators. **Table 3-4** summarizes the pump and wet well information of each lift station. Locations of the lift stations and force mains are shown in **Figure 3-1**. The City recently replaced and upgraded the North Road LS and its force main, and the wet well and force main of El Camino Real LS.

The system consists of approximately 3.4 miles of force mains ranging from 2 to 12 inches in size. Force main materials include PVC, HDPE, asbestos cement (AC) pipe, cast iron pipe (CIP), and Ductile Iron Pipe (DIP). **Table 3-5** summarizes the force main information.

Table 3-4. Lift Station Summary

Lift Station	Location	Year Constructed	On-site Emergency Generator	Pump Information				Wet Well Information			
				No. of Pumps	HP	Design Flow (gpm)	TDH (ft)	Wet Well Configuration	Wet Well Size (ft)	Wet Well Depth (ft)	Capacity (Gallons)
Ralston Ranch	Ralston Ranch Road	1996	Yes	2	10	250	60	Circular	6	20.2	4,265
Naughton	Near 3821 Naughton Ave	1994	None	3 (with one uninstalled spared pump)	5	230	43	Circular	6	7.0	1,480
Hastings	2618 Hastings Drive	2010 (rebuilt)	Yes	2	29	550	91.6	Circular	6	17.0	3,595
Hiller	600 Block of Hiller Street	1998 (rebuilt)	Yes	2	20	850	45	Square	8x8	20.0	9,574
Island Park	301 Island Parkway	1989	Yes	2	10.4	730	50	Circular	7	22.0	6,333
Sports Complex	550 Island Parkway	1988	None	2	2	140	34	Square	4x4	6.0	2,872
San Juan	3118 East Laurel Creek Road	1997 (rebuilt)	Yes	3 (with one shelf spare)	139.4	1000	244	Rectangular	18.67 x 11.67	10.8	17,655

Table 3-4. Lift Station Summary

Lift Station	Location	Year Constructed	On-site Emergency Generator	Pump Information				Wet Well Information			
				No. of Pumps	HP	Design Flow (gpm)	TDH (ft)	Wet Well Configuration	Wet Well Size (ft)	Wet Well Depth (ft)	Capacity (Gallons)
North Road	El Camino Real and North Road	2021 (rebuilt)	Yes	3	20	929	57.1	Rectangular	8.83 x 6.83	18.2	8,210
Haskins	East Laurel Creek Rd and Haskins Drive	2008 (rebuilt)	Yes	2	20	600	64	Circular	6	18.0	3,807
El Camino	S/E Corner of El Camino Real and Harbor Blvd	1998	None	2	0.5	100	17	Circular	5	8.0	1,175

Sources:

1. Belmont Pump Station Assessment and Inventory Report prepared by HydroScience, dated April 2017
2. City provided spreadsheet "Pump Station - Force Main Information 2015 with serial #.xlsx"
3. 2021 Sanitary Sewer Management Plan

Table 3-5. Force Main Summary

Force Main	Year Built	Size (in.)	Material	Length (ft)	Total Length (miles)
Ralston Ranch	1996	6	PVC	650	0.12
Naughton	1994	6	PVC	450	0.09
Hastings	1970	6	ACP	1,200	0.23
Hiller	1953	10	ACP	1,300	0.25
	1998	10	HDPE	500	0.09
Island Park	1989	8	PVC/CIP	3,484	0.66
Sports Complex	1988	2	PVC	250	0.05
San Juan	1977	12	DIP	5,000	0.95
North Road	2021	12	HDPE	3,100	0.59
Haskins	1982	6	DIP/ACP	1,600	0.30
El Camino	2021	4	HDPE	160	0.03
Total				17,694	3.35

Sources:

1. Sanitary Sewer Rehabilitation Master Plan prepared by RMC dated September 2007
2. The City of Belmont Force Main Assessment prepared by Pure Technologies dated July 2015
3. City provided spreadsheet "Pump Station - Force Main Information 2015 with serial #.xlsx"
4. North Road Pump Station and Force Main Rehabilitation Project as-builts dated 10/11/19.
5. El Camino Real and Old County Road Sanitary and Storm Sewer Rehabilitation as-builts dated 12/21/20

3.1.5. Operation and Maintenance

The City revised its Sewer System Management Plan (SSMP) in October 2020 that details the City's sewer system operation and maintenance efforts. The City implements an on-going inspection and rehabilitation program since the early 1990s. The program includes on-going CCTV inspection program for the gravity sewers, proactive, preventive, and corrective maintenance of the gravity sewers, rehabilitation and replacement of mains that are in poor condition, and periodic inspection and preventive maintenance for lift stations and force mains.[7] The City has low Sanitary Sewer Overflows (SSO) incidents. More details are provided in **Section 8**.

The City proactively cleans its entire gravity mains at least once every two to three years and preventively cleans sewers with a history of problems every three and six months. The City inspects manholes as part of the cleaning operations. The City routinely inspects the gravity sewers basin by basin utilizing its in-house CCTV crew and facilities and has inspected the gravity sewers of the entire system. The City can complete inspection of all the gravity sewers in the system once every three to four years with the current CCTV frequency. A list of known structural deficiencies determined from the inspection results is maintained and kept in order of priority by structural rating. Major defects that would result in a stoppage or overflow are immediately reported and scheduled for repair.

The maintenance crew provides emergency standby operation 24 hours a day, 7 days a week. The City summarizes all sewer related service calls and keeps them in electronic records. Approximately 8,000 linear feet of video inspection, 31,000 linear feet of line cleaning in average were performed monthly in 2020. The City contracts out for root foaming on a regular basis to reduce stoppages due to invasive roots.[8]

The City inspects its lift stations on a weekly basis. Inspection activities include changing fluids, pump testing, checking batteries and batteries chargers, exercising valves and standby generators, cleaning wet wells and bar screens, locks and hardware lubrication, and visual evaluation of other elements. Inspection forms are completed by the maintenance staff following each inspection to document their findings and actions.[8]

[7] Source: 2021 SSMP
[8] Source: 2010 Capacity Analysis

4. Planning Criteria

As part of the Master Plan, the City's planning criteria were reviewed as well as compared against those criteria used by other Bay Area Agencies and related industry standards (2nd Ed. WEF Manual of Practice no. FD-5 Gravity Sanitary Sewer Design and Construction published by the American Society of Civil Engineers (ASCE) and the Water Environment Federation (WEF). This section presents the summary of planning criteria recommended and subsequently used for hydraulic analysis, evaluation of system capacity, and sizing of capital improvements to mitigate deficiencies and accommodate future growth. A separate document, the Design Guide, details the criteria presented herein and is included as **Appendix A**. Comparison matrices of the planning criteria against other agencies are included as **Appendix B**.

4.1. Gravity Sewers

The planning criteria used to evaluate the capacity of the gravity sewers are presented in **Table 4-1**.

Table 4-1. Planning Criteria for Gravity Main

Design Criteria	Value
For existing gravity mains 12 inches or smaller in size	maximum depth of Diameter (d/D) shall not exceed 0.7 under PWWF condition
For existing gravity mains greater than 12 inches in size	maximum d/D shall not exceed 0.85 under PWWF condition
For new gravity mains 12 inches or smaller in size	maximum d/D shall not exceed 0.5 under PWWF condition
For new gravity mains greater than 12 inches in size	maximum d/D shall not exceed 0.75 under PWWF condition
Minimum velocity	2 fps when flowing half full
Maximum velocity	10 fps
Minimum size for new pipe	8 inches
Manning's n	0.013

Based on the previous flow monitoring studies as well as the 2021-2022 flow monitoring study conducted for this Master Plan between November 2021 and April 2022, the City's sewer system has significant rainfall dependent Infiltration/inflow (RDII) issues during wet seasons.[9] Therefore, it is recommended to size new gravity mains under PWWF conditions. The minimum diameter for new gravity mains is recommended to be 8 inches for maintenance purposes.

The City is largely built out and future development patterns are relatively certain. Existing City-owned sewer gravity mains may be flowing at levels above a d/D of 50% and still be operating satisfactorily.

[9] Sources: 2010 Capacity Analysis prepared by RBF Consulting, 2020 Model Update and CIP Study prepared by IEC, and the 2022 Flow Monitoring Study.

Therefore, the maximum d/D recommended for existing gravity mains are higher than new gravity mains to “trigger” a capacity improvement project. For new gravity mains, the remaining pipeline capacity, d/D above 50% or 75% depending on pipe size, has been reserved to handle emergency flows and provide for ventilation within the pipe.

Pipe materials, pipe size, age, structural conditions, and other factors affect the pipe roughness. For planning purposes, a manning’s n value of 0.013 is used for hydraulic analysis of the gravity mains in the City’s sewer system. This is a typical design value used by various agencies, as shown in **Appendix B**. Minimum velocity of gravity mains is recommended to be 2 feet per second (fps) when flowing half-full to achieve self-cleaning, and maximum velocity of gravity mains is recommended to be 10 fps to minimize scouring and erosion.

4.2. Manhole

Manholes are recommended to be installed at points of change in pipe grade, changes in pipe size or material, at intersections of where two or more sewer mains join, and accessible locations for maintenance and emergency service. The maximum spacing for gravity mains 21 inches or smaller in diameter is 300 feet and the maximum spacing for gravity mains larger than 21 inches in diameter is 400 feet. Additional details are provided in the Design Guide (**Appendix B**).

4.3. Lift Station and Force Main

Lift stations are recommended to be sized with firm capacity sufficient to accommodate PWWF. Firm capacity is defined as the capacity with the largest pump not in operation. This would provide a factor of safety in case a pump malfunctions and require maintenance, or miscellaneous debris, and wear and tear that may reduce pumping performance.

The Hazen-Williams “C” factor for force mains varies depending on the pipe material, age, and structural conditions. For planning purposes, a Hazen-William’s “C” factor of 130 is used for the hydraulic analysis of the force mains. Force mains are recommended to be sized to provide minimum velocity of at least 3 fps at Peak Dry Weather Flow (PDWF) condition and maximum velocities not exceeding 8 fps under PWWF condition to minimize scouring, erosion, and surge issues.

5. Wastewater Flow Characteristics and Projections

This section discusses the City's wastewater flow characteristics under existing (2023) system conditions and flow projections under near-term future (2028), and long-term future (2043) conditions.

5.1. Wastewater Flow Component

Below are brief descriptions of wastewater flow terms used in this Master Plan.

5.1.1. Average Dry Wastewater Flow (ADWF)

The Average Dry Weather Flow (ADWF) includes base wastewater flow (BWF) and groundwater infiltration (GWI). BWF is domestic (or sanitary) wastewater flow from residential, commercial, institutional, and industrial wastewater. GWI is defined as groundwater entering the sewer collection system through pipe joints, cracks, and manhole walls due to structural defects or improper construction.

5.1.2. Peak Dry Weather Flow (PDWF)

Domestic sewer flows vary throughout the day due to different customer water use patterns. Peak Dry Weather Flow (PDWF) is the highest flow during a typical dry day and is determined by multiplying a peaking factor to the ADWF.

5.1.3. Peak Wet Weather Flow (PWWF)

Peak Wet Weather Flow (PWWF) is the highest flow occurred during a significant rain event and is estimated as Peak Dry Weather Flow (PDWF) plus Peak Rainfall Dependent Infiltration/Inflow (RDII). RDII is infiltration and inflow of storm water that enters the sewer collection system in direct response to the intensity and duration of a rainfall event. Typically, peak RDII is derived from flow monitoring data collected for wet weather events.

5.2. Historical Wastewater Flow

The City's sewer system serves approximately 97% of the City's jurisdictional area. A small portion of the area is connected to San Carlos's sewer system and a small portion of the area is connected to San Mateo's sewer system. In addition, there are some sewer flows from the City of Redwood City (Redwood City) and San Carlos discharging into the City's sewer system, as shown in **Figure 5-1**. Sewer flows collected by the City's sewer system are conveyed to the BPS[10], which is owned, operated, and maintained by SVCW and are subsequently treated at the SVCW WWTP.

The City's existing ADWF was estimated based on a few sources of data, including: 1) flow data from the flow monitoring study conducted between November 2021 and April 2022 with 22 flow monitoring sites as part of this Master Plan, hereinafter referred to as 2021-2022 flow monitoring study ; 2) flow

[10] Also commonly referred to as the Shoreway pump station

data from the 2-year flow monitoring program conducted between 2015 and 2017 as part of the 2020 Model Update and CIP study, hereinafter referred to as 2015-2017 flow monitoring study; 3) daily BPS influent flow data between 2014 and 2021 as well as 15-minute time interval BPS influent flow data for period between January 1, 2021 and April 20, 2022 provided by SVCW.

The aforementioned data was used to quantify and characterize the City's wastewater flows for the sewer hydraulic model update as well as developing sewer generation factors for future development flow calculations. The 2021-2022 flow monitoring data and the BPS influent flow data were used as the primary source for wastewater analysis as they were the most current data set. Data from the 2015-2017 flow monitoring study was used as an additional source to help calibrate the hydraulic model.

Wastewater flow data was checked against water consumption data. Water billing records between November 2019 and April 2020 were provided by MPWD. Average day demand (ADD) was calculated by service connection and geocoded by service addresses. More than 99% of the billing records returned with matched addresses. Remainders were manually located if possible. The geocoded water billing records were then linked to the closest parcels. Water demands with irrigation classification were assumed to not return to the sewer system.

Parcel-level ADWF were calculated by applying calibration factors to the parcel-level ADD so that the total ADWF of parcels within the same flow monitoring meter tributary area match the observed ADWF from the 2021-2022 flow monitoring data and BPS influent flow data. No flow monitoring meters measured areas that connect to the San Carlos sewer system or the San Mateo sewer system. Existing ADWF from these areas were estimated based on the water consumption data and the calibration factors used on the metered areas within the same sewer basins.

Table 5-1 summarizes the City's historical dry weather flows (DWF) to BPS between 2016 and 2021.

Table 5-1. Historical 2016-2021 Dry Weather Flow (DWF) to Belmont Pump Station

Year	ADWF (mgd)	Max. Dry Day Flow (mgd)
2016	1.38	1.58
2017	1.65	3.66
2018	1.31	1.58
2019	1.39	1.91
2020	1.37	1.60
2021	1.19	1.39

The City's ADWF to BPS was estimated based on influent flow data during dry months (months without precipitation). The City's ADWF to BPS over the past 6 years (2016-2021) was approximately **1.38** mgd. The maximum dry day flow (MDDF) over the past 6 years of 3.66 mgd occurring on June 15, 2017, was considered an outlier and not representing the City's typical MDDF and was disregarded. The MDDF of **1.91** mgd occurring on April 2, 2019, was considered to be the MDDF over the past 6 years, which is 1.38 times the ADWF.

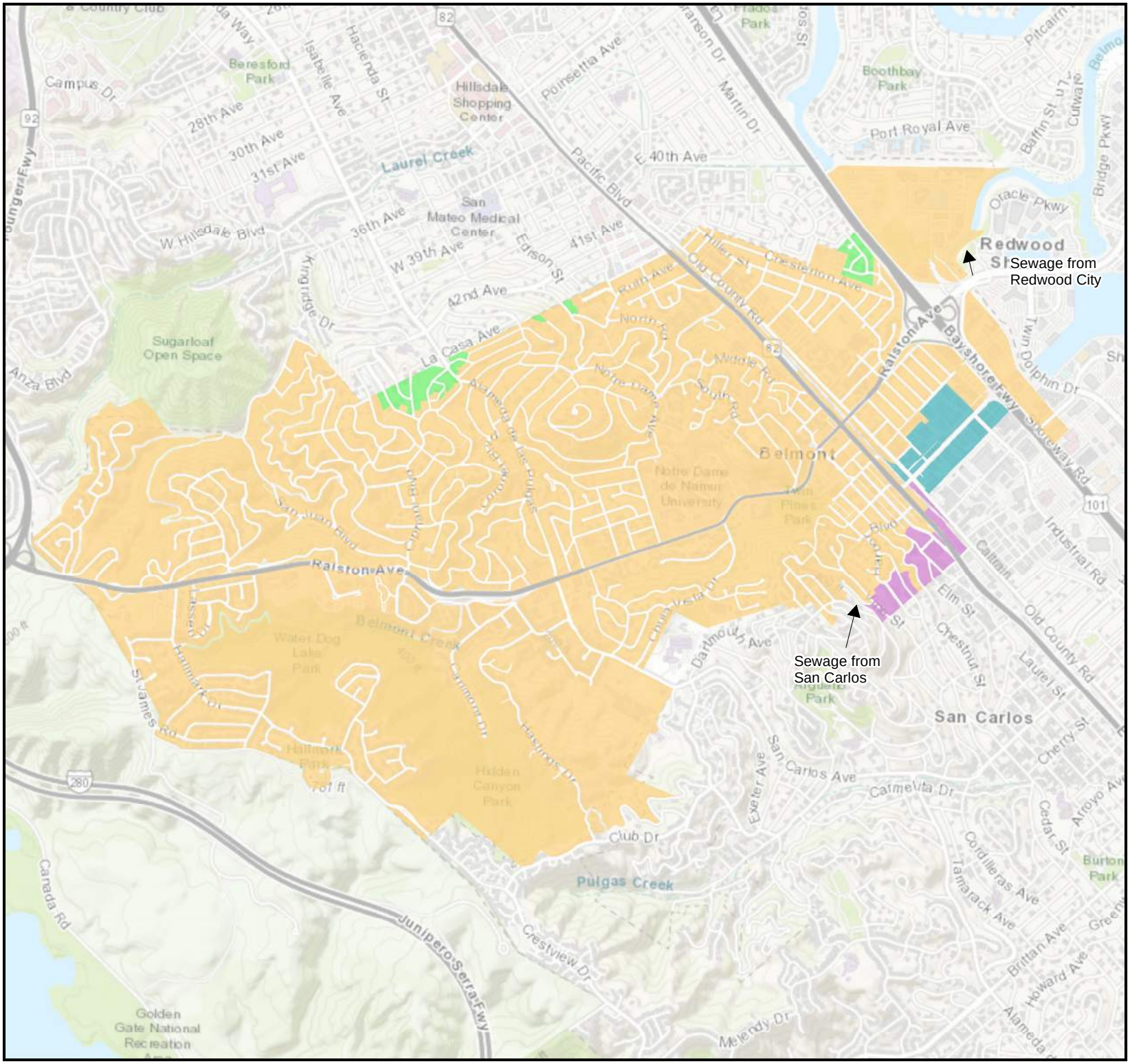
Table 5-2 summarizes the City's existing ADWF by receiving sewer systems.

Table 5-2. City of Belmont Existing (2023) Average Dry Weather Flow

Receiving System	Estimated Existing (2023) Average Dry Weather Flow (mgd)
BPS[1]	1.383
City of San Carlos	0.036
City of San Mateo	0.017
Total	1.436

Note:

1. Accounted for sewer flows from a few parcels from Redwood City and San Carlos.



Infrastructure

City of Belmont
2023 Sewer Master Plan Update

Sewer Service Areas

Figure 5-1

5.3. Sewer Generation Factors

As part of this Master Plan, sewer generation factors were developed for future development flow estimation, as shown in **Table 5-3**. These sewer generation factors were recommended based on the 2021-2022 flow monitoring data and water billing records, as well as sewer generation factors used by neighboring agencies. Average sewer flows were determined based on dry day data and compared to the geocoded water demands. These meters collected flow data from a mix of land use types. Residential land uses made up a great portion of the metered areas.

Sewer flow was calculated for each land use type by applying a return-to-sewer ratio (RTS) assumed for each land use type to the water demands of the corresponding area and calibrating the RTS to match the metered flow as close as possible under an iterative, trial and error process. Lower density residential land use is assumed to have lower RTS than higher density residential land use due to more outdoor water use. Likewise, Commercial and Office land use types are assumed to have higher RTS than residential land use. Irrigation water usage is assumed to have 0% RTS.

Gross acreage information was obtained from the City's parcel GIS layer and the building square footage was estimated from the County's building footprint GIS layer which includes footprint area and building height. An average story height of 12 feet was assumed to determine the building stories which was then multiplied by the footprint area to estimate the building square footage. Additional details of sewer generation factors calculated from sample areas are provided in **Appendix D**.

Table 5-3. Recommended Sewer Generation Factor for Future Developments

Land Use Type	Zoning Code	Recommended Sewer Generation Factor	Unit
Single-Family Residential	R1A, R1B, R1C, R1E, R1H	160	gpd/unit
		1120 [1]	gpd/ac
Hillside Residential	HRO1, HRO2, HRO3	325	gpd/unit
		470 [2]	gpd/ac
Duplex/Medium-Density Residential	R2	160	gpd/unit
		1600 [3]	gpd/ac
Multi-family/High Density Residential	R3, R4, VHDR	160	gpd/unit
		4800 [4]	gpd/ac
Office	E1, E2.1, E2.2	125	gpd/1,000 sf
		2700 [5]	gpd/ac
Commercial	NC, SC, RC	110	gpd/1,000 sf
		2400 [5]	gpd/ac
Institution and Public Facility	SE, PS, PF	35	gpd/1,000 sf
		760 [5]	gpd/ac
Mixed Use	PD, VC, VSC, VCMU, HIA	140	gpd/1,000 sf
		3050 [5]	gpd/ac

Table 5-3. Recommended Sewer Generation Factor for Future Developments

Land Use Type	Zoning Code	Recommended Sewer Generation Factor	Unit
Hotel		100 [6]	gpd/room
Research and Development		200 [6]	gpd/1,000 sf

Notes:

1. assumed a residential density of 7 du/ac.
2. assumed a residential density of 1.45 du/ac.
3. assumed a residential density of 10 du/ac.
4. assumed a residential density of 30 du/ac.
5. assumed a FAR of 0.5
6. based on sewer generation factors used by agencies in California.

5.4. Sewer Flow Projections

Using the sewer generation factors listed in **Table 5-3**, sewer flows for the future developments identified in **Table 2-6** were estimated based on proposed land use types, as presented in **Table 5-4**. For developments without specific proposed land use information, such as Project 31 and Project 32, sewer flows were assumed to increase proportionally to the increase in density using the FAR ratios.

Future sewer flows were projected for near-term (2028) and long-term (2043). Near-term future (2028) future flows account for developments that have been completed or are anticipated to be realized by 2028. Flows from the remaining areas are assumed to increase proportionately to the population growth to account for infill growth. Similarly, long-term (2043) future flows account for all the developments identified in **Table 5-4** and flows from the remaining areas are assumed to increase proportionately to the population growth to account for infill growth. Sewer flows from the HIA area are assumed to be re-routed and discharged into the City's collection system by 2043. The 2043 ADWF of the HIA area is projected to be 0.32 mgd. **Table 5-5** summarizes the projected future sewer flows within the City's sewer service area. Details of the projected future sewer flows within the HIA area are included in the **2023 HISMD Sanitary Sewer Master Plan (Appendix A)**.

Table 5-4. Anticipated Future Development Flows

Project #	Name	Location	Single Family (unit)	Multi-Family (unit)	High Density Residential (unit)	Retail (sq. ft.)	Office (sq. ft.)	Hotel Rooms	Institutional (sq. ft.)	Existing Flow (gpd)	Development Flow (gpd)	Estimated Project Realization
1	Shoreway Place	1101 Shoreway	0	0	0	10,000	300,000	280	0	11,327	66,600	Long-term (within 20-30 Years)
4	Firehouse Square	1350 Civic Lane (Block between El Camino Real and Fifth Avenue, and between O'Neill Avenue and Broadway)	0	81	0	0	0	0	0	0	12,960	Near-term (within 5 Years)
6	900 South Rd	900 South Rd	1	0	0	0	0	0	0	54	160	Near-term (within 5 Years)
7	905 South Rd	905 South Rd	1	0	0	0	0	0	0	6	160	Near-term (within 5 Years)
8	490 El Camino Real	490 El Camino Real	0	74	0	2,500	2,500	0	0	3,924	12,428	Completed (Partially occupied)
9	800 - 803 Belmont Ave	Bounded by El Camino, Anita, and Belmont	0	0	125	0	0	0	0	1,237	20,000	Near-term (within 5 Years)
10	2837 San Juan	2837 San Juan	1	0	0	0	0	0	0	130	160	Near-term (within 5 Years)
11	2847 San Juan	2847 San Juan	1	0	0	0	0	0	0	98	160	Near-term (within 5 Years)
12	Piazza Lands	Piazza Lands	1	0	0	0	0	0	0	0	160	Near-term (within 5 Years)
13	3858 W. Naughton	3858 W. Naughton	1	0	0	0	0	0	0	41	160	Near-term (within 5 Years)
14	2007 Bishop	2007 Bishop	3	0	0	0	0	0	0	0	480	Near-term (in progress)
15	3900 Marsten	3900 Marsten	4	0	0	0	0	0	0	41	640	Near-term (within 5 Years)
16	Belmont Village	Belmont Village	0	744	150	971,930	0	0	68,150	61,546	252,338	Long-term (within 20-30 Years)
17	576- 600 El Camino Real	576- 600 El Camino Real	0	32	0	2,500	7,500	0	0	611	6,333	Completed (Partially occupied)
18	815 OCR	815 Old County Rd	0	0	177	0	0	0	0	0	28,320	Near-term (within 5 Years)
19	580 Masonic	580 Masonic Way	0	0	139	0	0	0	0	2,065	22,240	Near-term (within 5 Years)
20	900 ECR	900 El Camino Real	0	0	37	0	0	0	0	6	5,920	Near-term (within 5 Years)
21	Belmont Townhome	800 Laurel	0	16	0	0	0	0	0	0	2,560	Near-term (within 5 Years)
22	608 Harbor	604-610 Harbor Blvd	0	0	103	0	0	0	0	982	16,480	Near-term (within 5 Years)

Table 5-4. Anticipated Future Development Flows

Project #	Name	Location	Single Family (unit)	Multi-Family (unit)	High Density Residential (unit)	Retail (sq. ft.)	Office (sq. ft.)	Hotel Rooms	Institutional (sq. ft.)	Existing Flow (gpd)	Development Flow (gpd)	Estimated Project Realization
25	1301 Shoreway Rd	1301 Shoreway Rd	0	0	0	0	550,000	0	0	0	68,750	Near-term (within 5 Years)
26	Island Park	Concourse Drive & Island Parkway	0	0	0	0	800,000	0	0	3,111	100,000	Near-term (within 5 Years)
27	NDNU-Stanford	1500 Ralston Ave	0	0	0	0	0	0	400,000	5,333	14,000	Long-term (within 20-30 Years)
28	2 Davis Drive	2 Davis Drive	0	0	0	0	75,000	0	15,000	168	9,900	Near-term (within 5 Years)
29	Van's Restaurant	815 Belmont Ave	0	20	0	0	0	0	0	2,193	3,200	Near-term (within 10 Years)
30	Artisan Crossing	1304 Elmer St	0	0	250	0	0	0	0	0	40,000	Near-term (within 5 Years)
31	El Camino Real Corridor Mixed Use		Estimated Existing FAR = 0.5 Proposed FAR = 2							38,084	152,334	Long-term (within 20-30 Years)
32	Old County Rd		Estimated Existing FAR = 0.7 Proposed FAR = 2							3,305	9,443	Long-term (within 20-30 Years)
34	Davis Drive		0	0	0	0	100,000	0	0	8,080	12,500	Long-term (within 20-30 Years)
35	Carlmont Shopping Center		Estimated Existing FAR = 0.5 Proposed FAR = 1.0							12,678	25,355	Long-term (within 20-30 Years)
Total										**155,021**	**883,740**	

Table 5-5. Future Projected ADWF

	Existing (mgd)	2025 (mgd)	2040 (mgd)
To BPS			
Base ADWF	1.383	-	-
Future Developments Added Flow	-	0.341	0.681
Infill Added Flow	-	0.032	0.137
Total	*1.383*	1.756	*2.574*
To San Mateo			
Base ADWF	0.017	-	-
Future Developments Added Flow	-	-	-
Infill Added Flow	-	0.000	0.002
Total	*0.017*	0.018	*0.020*
To San Carlos			
Base ADWF	0.036	-	-
Future Developments Added Flow	-	-	0.021
Infill Added Flow	-	0.001	0.003
Total	*0.036*	0.037	*0.060*
Total City Flow	**1.436**	**1.810**	**2.654**

5.5. Flow Monitoring Program

As mentioned in Section 5.2, a two-year flow monitoring program was conducted between 2015 and 2017 as part of the 2020 Model Update and CIP study, and a flow monitoring study was conducted between November 2021 and April 2022 with 22 flow monitoring sites as part of this Master Plan. The 2021-2022 flow monitoring study focused on locations with system improvements completed post the 2015-2017 flow monitoring study, flow splits in the Ralston Trunk Lines, and representative areas for institutional and commercial land uses. The flow data were reviewed for mass flow balance, that is, comparing the flows from upstream meters to downstream meters to check for flow continuity. Meters with mass flow balance issues were disregarded and not used for model calibration.

5.5.1. Temporary Flow Monitoring Sites

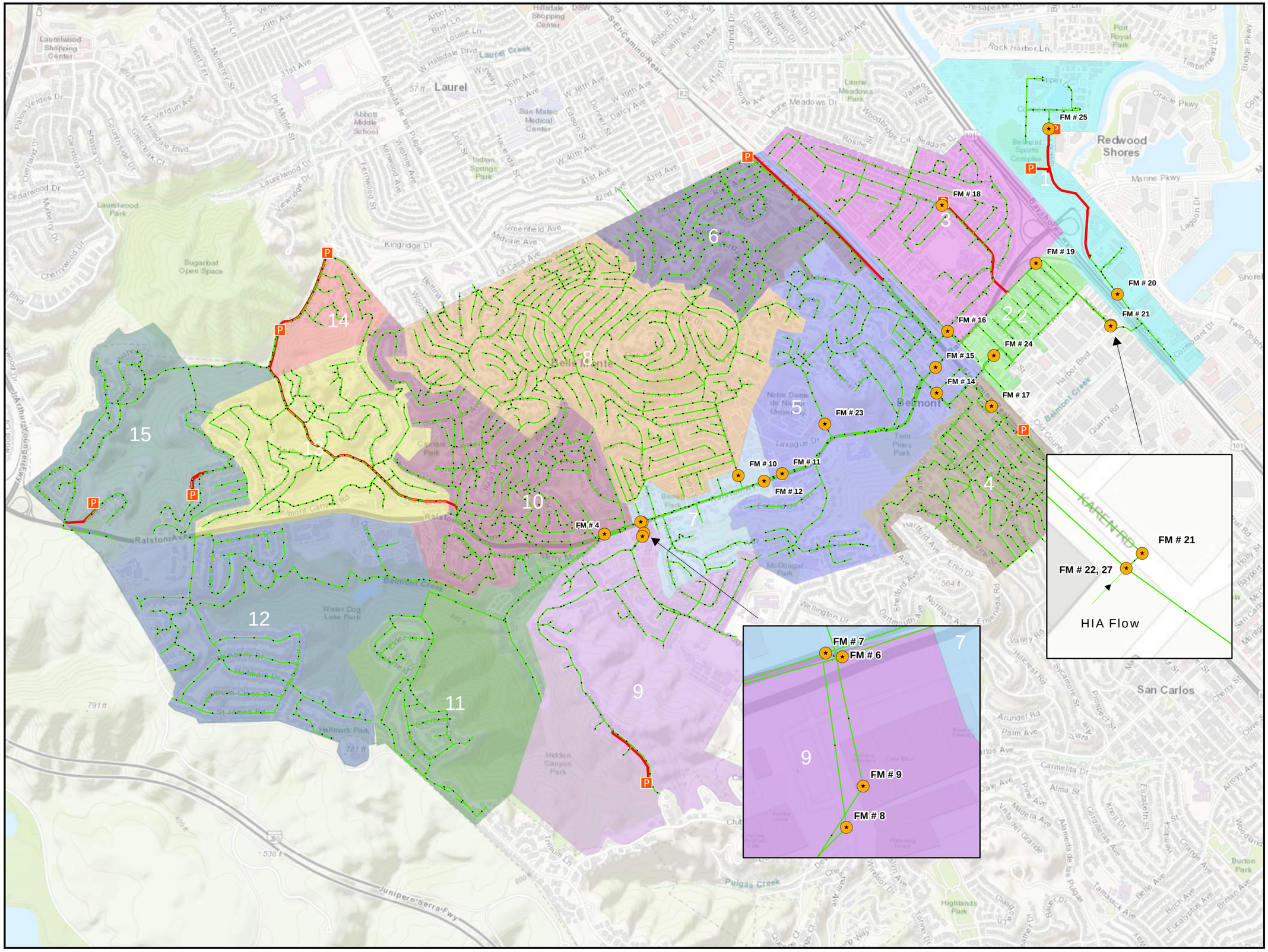
Table 5-6 lists the 2021-2022 flow monitoring meter locations and monitoring periods. The data was collected in 5-minute time intervals. **Figure 5-2** shows the flow meter locations geographically. **Figure 5-3** is the schematic diagram of the flow monitoring meters.

Table 5-6. 2021-2022 Flow Meter Locations

Meter	Access Manhole (GIS ID)	Location	Metered Pipe Size (in.)	Notes	Monitoring Period
#4	442701A	Near 2100 Ralston Ave	12	12" inlet coming southwesterly; capture flow in Basin 11	11/16/2021-12/14/2021; 1/12/2022-3/8/3033
#6	450419	Near Ralston Ave & Villa Ave	18	18" inlet, capture flow in Ralston Trunk South Line	11/16/2021-12/14/2021; 1/12/2022-4/19/2022
#7	450420	Near Ralston Ave & Villa Ave	18	18" inlet, capture flow in Ralston Trunk North Line	11/16/2021-12/14/2021;
#8	450415	Near 1011 Alameda De Las Pulgas	12	12" inlet, capture flow in Basin 9	1/12/2022-4/19/2022
#9	450409	Near 2043 Ralston Ave	10	10" inlet, capture flow in Basin 9	11/15/2021-12/13/2021; 1/11/2022-4/18/2022
#10	443205	In Notre Dame Ave approximately 120 ft south of Clee St	15	15" outlet, capture flow in Basin 8	11/17/21-12/14/2021; 1/12/22-4/20/2022
#11	451003	Near 1532 Ralston Ave	21	21" inlet, capture flow in Ralston Trunk North Line	11/15/2021-12/13/2021; 1/11/2022-4/18/2022
#12	451006	Near 1546 Ralston Ave	18	18" inlet, capture flow in Ralston Trunk South Line	11/17/2021-12/14/2021; 3/8/2022-4/20/2022
#14	451808	Near 6th Ave & Emmett Ave	18	18" inlet, capture flow split from Ralston Trunk Line on 6th Ave	11/16/2021-12/14/2021; 1/12/2022-4/19/2022
#15	451803	In Ralston Ave approximately 170 ft west of Flashner Ln	18	18" inlet, capture flow in Ralston Trunk Line	11/16/2021-12/1420/21; 4/12/2022-4/19/2022
#16	451803E	Near Old County Rd & Masonic Way	21	21" inlet, capture flow in Ralston Trunk Line	11/16/2021-12/14/2021; 1/13/2022-4/19/2022
#17	452404	Near 1334 El Camino Real	12	12" inlet, capture flow in Basin 4	11/17/2021-12/14/2021; 1/12/2022-4/20/2022

Table 5-6. 2021-2022 Flow Meter Locations

Meter	Access Manhole (GIS ID)	Location	Metered Pipe Size (in.)	Notes	Monitoring Period
#18	Hiller PS Wet Well Inlet	In Hiller St approximately 180 ft west of Cambridge St	10	10" wet well inlet, capture flow in Basin 3	11/15/2021-12/14/2021; 1/11/2022-4/17/2022
#19	403404	Near Ralston Ave & Kedith St	12	12" outlet near Ralston Ave & Kedith St, capture flow in Basin 2	11/15/2021-12/13/2021; 1/11/2022-4/18/2022
#20	403700E	Near 1345 Shoreway Rd	18	18" inlet, capture flow in Basin 1	11/17/2021-12/13/2021; 1/13/2022-4/19/2022
#21	403423D	In Karen Rd approximately 60 ft west of Harbor Blvd	27	capture flow from 27" trunk line on Karen Rd	3/8/2022-4/18/2022
#22	403423D	In Karen Rd approximately 60 ft west of Harbor Blvd	21	capture flow from 21" Trunk Line on Karen Rd	3/8/2022-4/18/2022
#23	443606	In Notre Dame De Namur University approximately 200 ft north of Laxague Dr	8	8" outlet, capture flow in Basin 5	11/17/2021-12/14/2021; 1/21/2022-4/20/2022
#24	403310A	Near 641 Waltermire St	10	10" inlet, capture flow in Basin 2	11/17/2021-12/13/2021; 1/13/2022-3/9/2022
#25	403610	In Island Pkwy approximately 330 ft south of Concourse Dr	10	10" outlet, Island Park LS wet well inlet, capture flow in Basin 1	11/16/2021-12/14/2021; 1/13/2022-4/19/2022
#27	403423D	In Karen Rd approximately 60 ft west of Harbor Blvd	27	27" inlet, capture flow from HIA	11/15/21-12/13/21; 1/11/2022-4/18/2022



Legend

- Flow Meter Site
- Pump Station
- Gravity Main
- Force Main

Sewer Basin

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

N

Feet
0 875 1,750

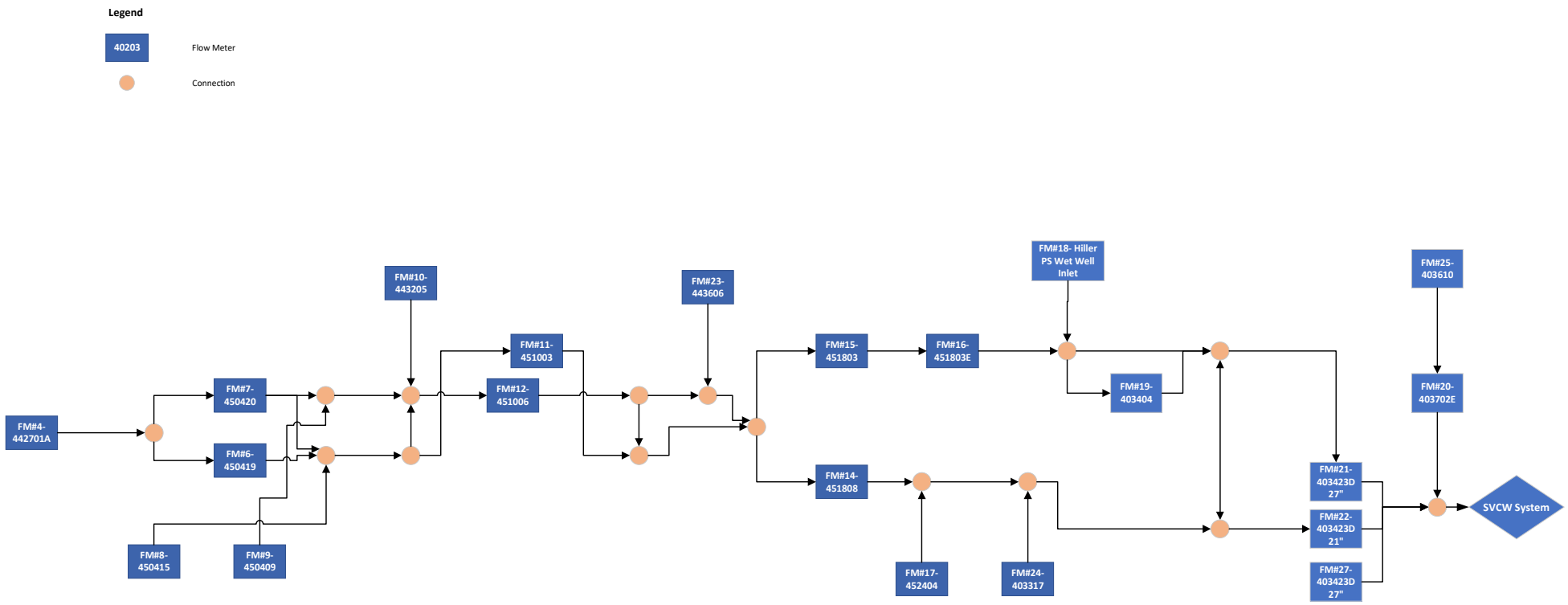
Infrastructure ENGINEERING CORPORATION

City of Belmont
2023 Sewer Master Plan Update

2021-2022 Flow Meter Locations

Figure 5-2

Figure 5-3. 2021-2022 Flow Monitoring Schematic



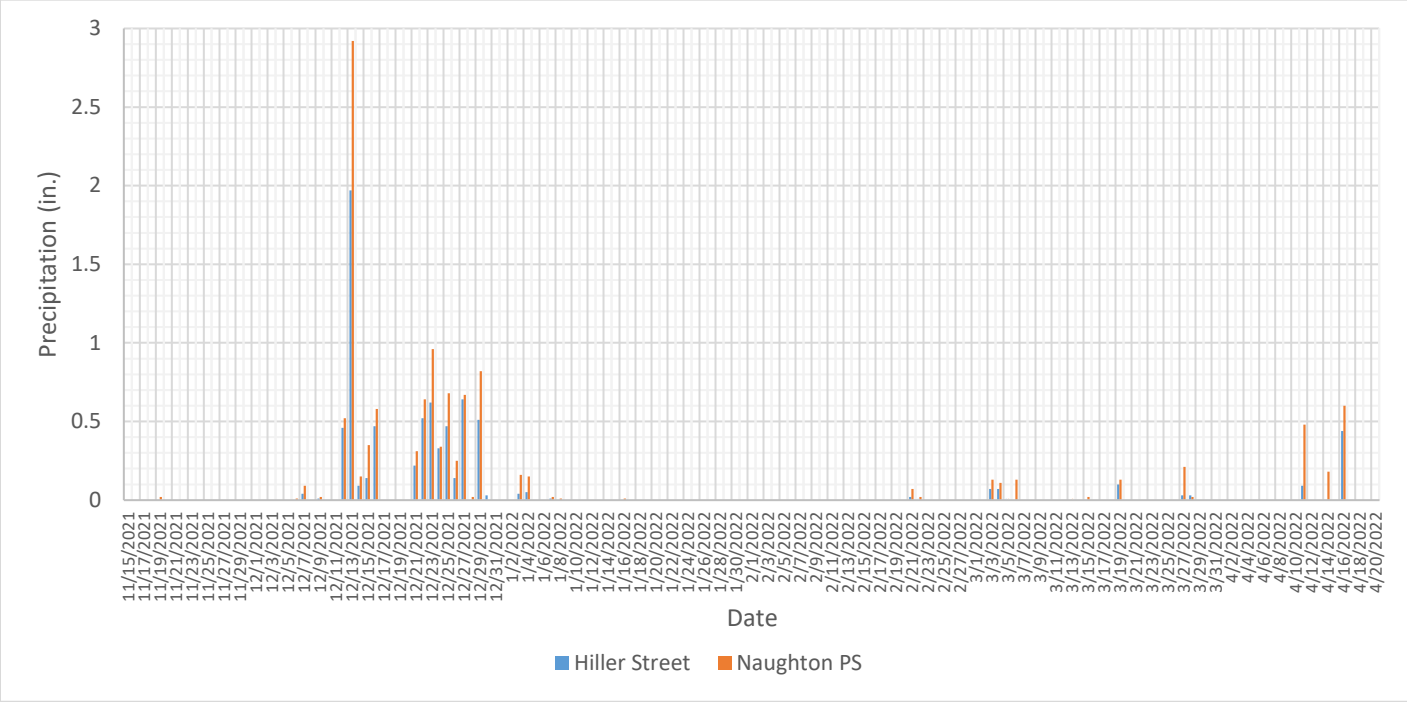
5.5.2. Flow Monitoring Results

Flow monitoring data collected from the 2021-2022 flow monitoring study was analyzed to determine observed ADWF, PDWF, and PWWF.

5.5.2.1. Rainfall Events

The City has rain gauges installed at Hiller Street LS (Hiller RG) and Naughton LS (Naughton RG). Precipitation data from these two rain gauges were collected in 15-minute time intervals and was used to identify the flow data for dry days and wet days. **Figure 5-4** shows the observed precipitation at the two rain gauges between November 15, 2021, and April 20, 2022.

Figure 5-4. Observed Rainfall Events during 2021-2022 Flow Monitoring Study



In general, precipitation observed at the Naughton RG was higher than what was observed at the Hiller RG. Between November 15, 2021, and April 20, 2022, there were two large rain events observed (with total precipitation greater than 0.5 inch), as summarized in **Table 5-7**.

Table 5-7. Observed Large Rain Events

Rain Event	Hiller RG		Naughton RG	
	Period	Total Precipitation (in.)	Period	Total Precipitation (in.)
Event 1	12/12/2021-12/16/2021	3.13	12/12/2021-12/16/2021	4.52
Event 2	12/21/2021-12/30/2021	3.48	12/21/2021-12/30/2021	4.69

During the 2021-2022 flow monitoring study, flow data during Event 1 had been partially captured at most meter sites and no flow data during Event 2 was captured, as shown in **Table 5-7**. During Event 1, the highest daily precipitation occurred on December 13, 2021, with 1.98 inch recorded at Hiller RG and 2.97 inches recorded at Naughton RG. According to the NOAA Atlas 14 Volume 6 Version 2 Point Precipitation Frequency Estimates at San Mateo Station (Site ID 04-7864), Event 1 recorded at Hiller RG was slightly larger than a 1-year 4-day storm event of 2.92 inches, and Event 1 recorded at Naughton RG was closed to a 5-year 4-day storm event of 4.99 inches.

5.5.2.2. Dry Weather Flow Data

Table 5-8 summarizes the observed ADWF and PDWF from each meter. As the data was in 5-minute time intervals, observed hourly PDWF were determined by averaging the flow data points hourly. Since the Ralston Trunk Lines are parallel trunk lines with multiple flow splits, as shown in **Figure 5-3**, multiple meters were reviewed in pairs to check for mass flow balance, such as Meters #6 and #7, Meters #8 and #9, and Meters #11 and #12.

Table 5-8. Dry Weather Data Summary of the 2021-2022 Flow Monitoring Meters

Meter	Access Manhole (GIS ID)	Metered Pipe Size (in.)	Observed ADWF (mgd)	Observed 5-minute PDWF (mgd)	Observed Hourly PDWF	Observed Hourly PDWF Factor	Note
#4	442701A	12	0.069	0.257	0.206	2.969	
#6	450419	18	0.578	2.396	1.550	2.680	- Observed ADWF was greater than average water use
#7	450420	18	0.000	0.001	0.001	20.000	- Observed PDWF is significantly higher than observed ADWF due to low flow.
#8	450415	12	0.000	0.535	0.128	297.478	- Observed PDWF is significantly higher than observed ADWF, can be an outlier due to unusual flow events or instrumental error.
#9	450409	10	0.159	0.875	0.522	3.295	
#10	443205	15	0.210	0.729	0.460	2.191	
#11	451003	21	0.708	7.070	5.035	7.112	- sum of observed ADWF at Meters #11 and #12 was greater than average water use - Observed PDWF is significantly higher than observed ADWF, can be an outlier due to unusual flow events or instrumental error.
#12	451006	18	0.699	1.767	1.265	1.809	- sum of observed ADWF at Meters #11 and #12 was greater than average water use
#14	451808	18	0.394	1.095	0.744	1.890	-sum of observed ADWF at Meters #14 and #15 is less than sum of observed ADWF at Meters #11 and #12. -sum of observed ADWF at Meters #14 and #15 is greater than average water use.

Table 5-8. Dry Weather Data Summary of the 2021-2022 Flow Monitoring Meters

Meter	Access Manhole (GIS ID)	Metered Pipe Size (in.)	Observed ADWF (mgd)	Observed 5-minute PDWF (mgd)	Observed Hourly PDWF	Observed Hourly PDWF Factor	Note
#15	451803	18	0.719	1.420	1.184	1.647	-sum of observed ADWF at Meters #14 and #15 is less than sum of observed ADWF at Meters #11 and #12. -sum of observed ADWF at Meters #14 and #15 is greater than average water use. - observed ADWF is greater than Meter #16 downstream.
#16	451803E	21	0.660	1.489	1.243	1.884	
#17	452404	12	0.107	0.218	0.183	1.716	
#18	Hiller PS Wet Well Inlet	10	0.155	0.381	0.344	2.215	
#19	403404	12	0.022	0.153	0.078	3.534	
#20	403700E	18	0.054	2.745	1.853	34.215	- Observed PDWF is significantly higher than observed ADWF, can be an outlier due to unusual flow events or instrumental error.
#21	403423D	27	1.029	1.670	1.540	1.497	- sum of observed ADWF at Meters #21 and #22 is greater than the observed ADWF at BPS influent meter downstream.
#22	403423D	21	0.672	2.500	1.081	1.609	- sum of observed ADWF at Meters #21 and #22 is greater than the observed ADWF at BPS influent meter downstream.
#23	443606	8	0.273	2.360	1.579	5.788	
#24	403310A	10	0.000	0.020	0.006	54.045	- Observed PDWF is significantly higher than observed ADWF, can be an outlier due to unusual flow events or instrumental error.
#25	403610	10	0.065	0.568	0.152	2.322	
#27	403423D	27	-0.082	3.450	0.057	-0.696	- under normal condition, minimal flow from the HIA area discharges into the Belmont system. - during unusual flow events such as maintenance activity at BPS which causes backwater condition upstream, flows would be discharged reversely from Belmont system into HIA system.
BPS*			1.335	21.250	5.372	4.025	- Observed PDWF is significantly higher than observed ADWF due to pump maintenance activity.

* Flow data at Belmont Pump Station Influent (BPS) was based on the 15-min time interval data provided by SVCW between 11/15/21 and 4/20/22.

Flow data from a few meter locations show mass flow balance inconsistency by comparing the observed ADWF between upstream and downstream meters individually or by pair as well as by

comparing to the corresponding average water usage from the metered areas. The mass balance inaccuracies can be due to various factors such as meter calibration issues, device or sensor issues, or other factors that affect readings such as system transients or obstructions in the sewer system.

5.5.2.3. Wet Weather Flow Data

Table 5-9 summarizes the observed PWWF based on the available flow data. Most meters show the observed PWWF occurred on December 13, 2021, that is consistent with the precipitation data. Some meter sites showed different PWWF dates. This may be due to unusual flow events or instrumental error.

Table 5-9. Wet Weather Data Summary of the 2021-2022 Flow Monitoring Meters

Meter	Access Manhole (GIS ID)	Metered Pipe Size (in.)	Observed ADWF (mgd)	Observed 5-minute PWWF (mgd)	Observed Hourly PWWF (mgd)	Observed Hourly PWWF Factor	Observed 5-minute PWWF Date	Note
#4	442701A	12	0.069	0.383	0.336	4.848	12/13/2021	
#6	450419	18	0.578	2.660	2.135	3.691	12/13/2021	
#7	450420	18	0.000	0.001	0.001	20.000	4/11/2022	- Overflow pipe, minimal/no flow under normal condition. - Observed PWWF did not occur during the large rain event, can be an outlier due to unusual flow events or instrumental error.
#8	450415	12	0.000	0.650	0.098	228.978	4/13/2022	- Overflow pipe, minimal/no flow under normal condition. - Observed PWWF did not occur during the large rain event, can be as outlier due to unusual flow events or instrumental error.
#9	450409	10	0.159	0.921	0.662	4.176	12/13/2021	
#10	443205	15	0.210	1.700	1.481	7.062	12/13/2021	
#11	451003	21	0.708	3.580	3.240	4.576	3/7/2022	- Observed PWWF did not occur during the large rain event, can be an outlier due to unusual flow events or instrumental error.
#12	451006	18	0.699	3.150	2.901	4.149	12/13/2021	
#14	451808	18	0.394	3.950	3.542	8.995	12/13/2021	-sum of observed PWWF at Meters #14 and #15 is less than sum of observed PWWF at Meters #11 and #12.
#15	451803	18	0.719	2.430	2.290	3.187	12/13/2021	-sum of observed PWWF at Meters #14 and #15 is less than sum of observed PWWF at Meters #11 and #12.
#16	451803E	21	0.660	4.42	4.128	6.254	12/13/2021	
#17	452404	12	0.107	0.574	0.522	4.887	12/13/2021	

Table 5-9. Wet Weather Data Summary of the 2021-2022 Flow Monitoring Meters

Meter	Access Manhole (GIS ID)	Metered Pipe Size (in.)	Observed ADWF (mgd)	Observed 5-minute PWWF (mgd)	Observed Hourly PWWF (mgd)	Observed Hourly PWWF Factor	Observed 5-minute PWWF Date	Note
#18	Hiller PS Wet Well Inlet	10	0.155	0.753	0.665	4.280	12/13/2021	
#19	403404	12	0.022	0.292	0.185	8.412	12/13/2021	
#20	403700E	18	0.054	1.600	1.416	26.147	12/9/2021	- Observed PWWF did not occur during the large rain event, can be an outlier due to unusual flow events, instrumental error, or pumped flow from Island Park LS and Sport Complex LS.
#21	403423D	27	1.029	1.930	1.886	1.833	3/9/2022	-flow data not available for the large rain events
#22	403423D	21	0.672	2.290	1.445	2.151	3/9/2022	-flow data not available for the large rain events
#23	443606	8	0.273	2.643	1.677	6.146	3/19/2022	- Observed PWWF did not occur during the large rain event, can be an outlier due to unusual flow events or instrumental error.
#24	403310A	10	0.000	0.006	0.005	43.329	12/13/2021	
#25	403610	10	0.065	0.288	0.226	3.452	12/13/2021	
#27	403423D	27	-0.082	2.450	0.014	-0.175	12/9/2021	- Observed PWWF did not occur during the large rain event, can be an outlier due to unusual flow events or instrumental error.
BPS*			1.335	10.540	9.936	7.445	12/13/2021	

* Flow data at Belmont Pump Station Influent (BPS) was based on the 15-minute time interval data provided by SVCW between 11/15/21 and 4/20/22.

5.5.2.4. Tidal Influence

The City is situated near the eastern edge of the San Francisco Peninsula, a few miles inland from the Pacific Ocean. High infiltration and inflow (I&I) have been observed at the Island Park LS wet well and Hiller Street LS wet well that may be subject to sea level rise and tidal influence. Meter #18 was installed at the inlet of the Hiller LS wet well, Meter #25 was installed at the inlet of the Island Park LS wet well, and Meter #20 was located downstream of the Island Park FM in close proximity to the coastline. To exclude the impact of I&I due to rainfall event, minimum hourly nighttime flow observed during dry days at these meter sites were determined and flow patterns at these sites were compared with tide data to evaluate system response to tide fluctuation. Observed minimum hourly nighttime flows were assumed to be contributed by I&I at the sites. I&I rate of each meter site was estimated by dividing the observed minimum hourly flow by meter basin area.

Table 5-10 summarizes the observed minimum flows and estimated I&I rates at the three aforementioned sites.

Table 5-10. Minimum Flows at Potential Tidal Influenced Meter Sites

Meter	Access Manhole (GIS ID)	Metered Pipe Size (in.)	Observed ADWF (mgd)	Observed Minimum Hourly Flow (mgd)	Minimum to Average Flow (%)	Meter Basin Area (ac)	I&I Rate (gpd/ac)
#18	Hiller LS Wet Well Inlet	10	0.155	0.024	15.4%	128.14	187.3
#20	403700E	18	0.054	0.01	18.5%	92.88	108
#25	403610	10	0.065	0.01	15.3%	119.76	83.5

The City does not have standards on maximum allowable I&I. Based on the ASCE Manual No. 60, the standards on maximum allowable I&I vary by agency. For example, the State of Oregon has an I&I allowance of less than 2,000 gpd/ac, and the Maryland Department of the Environment has an I&I allowance of 400 gpd/ac.

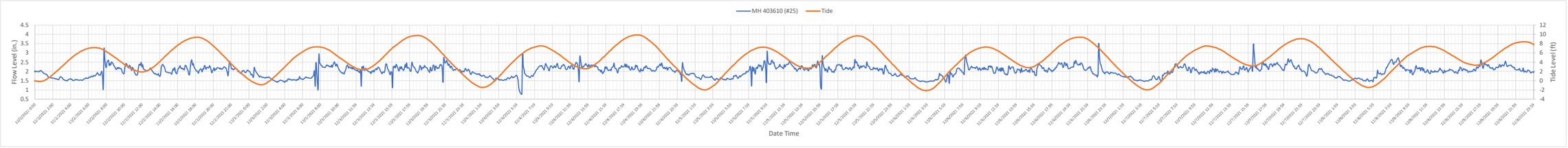
Based on the locations of the three meters, Meters #20 and #25 are closer to the coastline and are more likely to be subjected to tidal inflow. However, based on the flow data, observed minimum hourly flows at these two sites were minimal and observed minimum flow at Meter #18 was the highest. The I&I rate calculated for Meter #18 was below the typical I&I allowance.

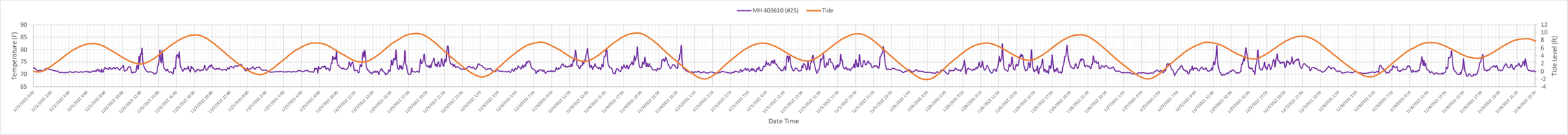
In addition, level and temperature data collected from the three meters during a dry weather week were compared to the tide pattern obtained from NOAA's Tides and Currents website at Station 9414523.[11] It is assumed that when substantial tidal inflow enters the system at the metered areas, the observed flow level would increase correspondingly. Also, tidal inflow is assumed to have lower temperature than typical BWF and would reduce the wastewater flow temperature when substantial tidal inflow enters the sewer system.

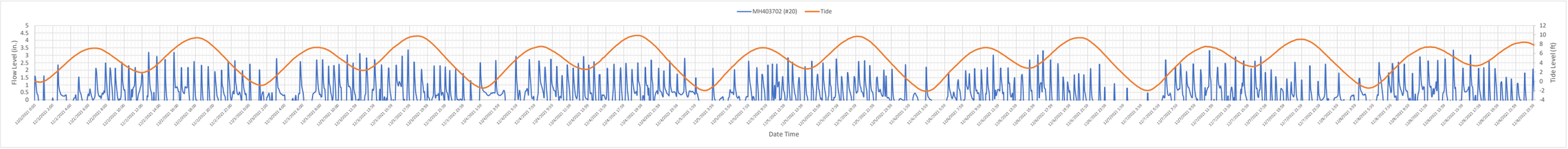
None of the sites showed significant inflow changes or temperature reduction corresponding to tide level changes, as shown in **Figure 5-5**. Based on the available data, it is inconclusive that tidal influence occurs at the metered areas of the City's sewer system.

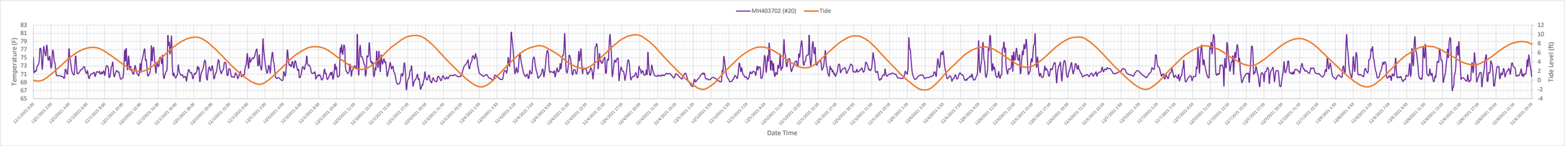
[11] Source: https://tidesandcurrents.noaa.gov/

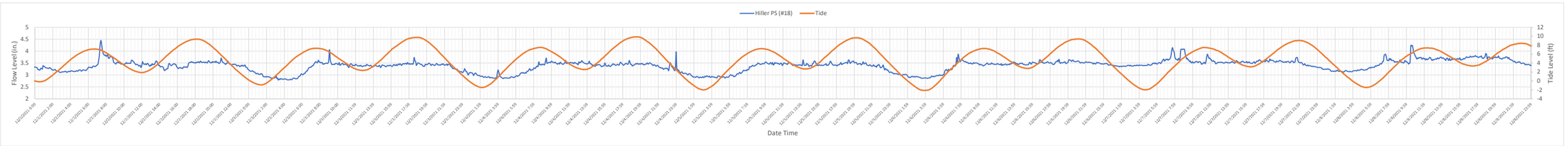
Figure 5-5. System Responses to Tide

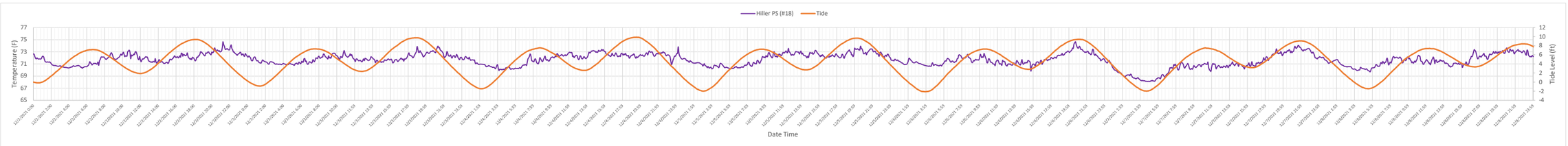








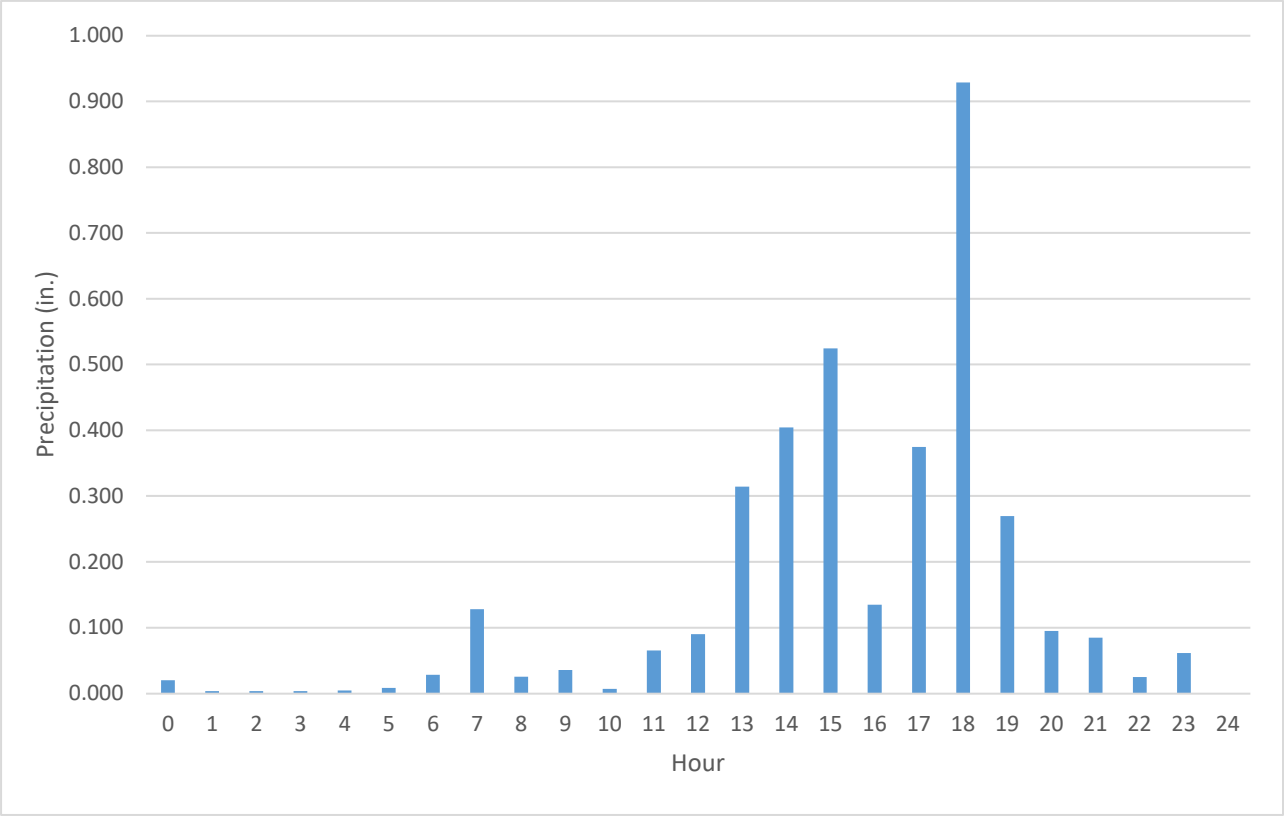




5.6. Design Storm

System capacity is usually evaluated under PWWF condition, and sizing of facilities is based on PWWF. A design storm is a synthetic rainfall event used to evaluate the sewer system's response under wet weather flow conditions. A design storm has a specific recurrence interval and rainfall duration. The selection of a design storm is a decision that balances risk of capacity deficiency during a particularly heavy rainfall event versus economic consequences of over-designing the collection system to handle flow that occurs only occasionally. Based on a review of neighboring agencies' planning studies and management plans and discussion with City staff, a 10-year 24-hour design storm was used for hydraulic evaluation in this Master Plan. According to the NOAA Atlas 14 Volume 6 Version 2 Point Precipitation Frequency Estimates, a 10-year 24-hour storm within the City's vicinity (Site 04-7864) has a total precipitation of 3.64 inches. Temporal rainfall distribution of the design storm was developed based on the storm event that occurred on 3/5/2016 and has a peak intensity of 0.93 inch per hour, as shown in **Figure 5-6**.

Figure 5-6. Design Storm



6. Hydraulic Model Update

The City's sewer hydraulic model was updated and refined based on the updated GIS database, survey data, as well as flow monitoring data.

6.1. Previous Hydraulic Model

A sewer hydraulic model was developed in 2010 using H2OMap Sewer as part of the City's 2010 Capacity Analysis. The model was converted to an InfoSWMM sewer model and was updated based on available as-built drawings, pump curves, and the 2015-2017 flow monitoring data as part of the 2020 Model Update and CIP Study**.** The model was calibrated to represent the observed peak flow conditions. Peak RDII was estimated from the flow monitoring data using the constant unit rate method. That is, peak RDII was estimated as a fixed constant and was distributed evenly to the model nodes within the same flow meter tributary area.

6.2. Data Collection and Validation

6.2.1. Field Verification and GIS Update

In support of the hydraulic model update and analysis, and to provide more accurate and up-to-date maps, part of this Master Plan effort was to verify missing/inconsistent data such as invert depths, pipe size, pipe age, etc. in the existing sewer GIS database. Using available video inspection reports, as-builts, field verified data, as well as interviews with City's operation staff, DCSE, a subconsultant to Ardurra for this Master Plan, performed the cleanup and updates to the City's GIS database.

Approximately 200 manholes, or about 8% of the City manholes, were surveyed in the field with the collection of manhole inverts, pipe inverts, and pipe sizes. Inverts were compared with the inverts in the existing hydraulic model to identify any discrepancies and make corrections accordingly.

6.3. Model Update

The updated GIS database and field survey data were utilized to update the City's sewer hydraulic model, which included update and correction to network configuration, manhole and pipe inverts, and pipe sizes. As mentioned in Section 5, ADWF was calculated on a parcel level by applying multipliers to the water consumption data to match the observed ADWF from the most recent flow monitoring data and BPS influent flow data. Wastewater flows that were updated were apportioned on a manhole-by manhole basis by assigning each parcel to the closest manhole (model node).

6.4. Model Calibration

To make sure that the model accurately represents current system conditions, the model was further calibrated using the 2021-2022 flow monitoring data. Model calibration is an iterative process of comparing model prediction to actual field data and adjusting model parameters to produce model results that are within an acceptable agreement of the field measurements. The model was first calibrated for dry weather condition and then for wet weather condition for each sewer basin. Since there was no meter installed at Sewer Basins 6, 12, 13, 14, and 15 during the 2021-2022 Flow

Monitoring Study, flow monitoring data from meters installed in these sewer basins in the 2015-2017 Flow Monitoring Study was used for model calibration.

There are no established standards on accuracy for hydraulic model calibration in the United States as the required level of accuracy depends on the expected use of the model. However, a popular source referenced in the U.S. for model calibration criteria comes from a U.K. based organization called the Chartered Institute of Water and Environmental Management (CIWEM) that developed the "Wastewater Planning Users Group Code of Practice for the Hydraulic Modeling of Sewer Systems" or WaPUG Manual. **Table 6-1** below lists the WaPUG calibration criteria.

Table 6-1. WaPUG Calibration Criteria[12]

Parameter	General	Critical Locations	Comments
Shape*	Good match (NSEC if used >0.5)	Good match (NSEC if used >0.5)	An evaluation technique may be used to compare the shape such as the Nash-Sutcliffe Efficiency Co-efficient (NSEC) method together with a visual check.
Time of peaks and troughs	+/- 0.5 hour	+/- 0.5 hour	The timing of peaks and troughs should be similar having regard to the duration of the event
Peak depth (unsurcharged)	+/- 0.33 ft or +/- 10% whichever is greater	+/- 0.33 ft	
Peak depth (surcharged)	1.64 ft to – 0.33 ft	+/- 0.33 ft	Relaxation may be appropriate in deep sewers. Where coupled 1D-2D models are used the 'critical locations' criteria should be applied
Peak flow	+ 25% to -15%	+/- 10%	
Flow volume	+20% to -10%	+/- 10%	Excluding poor/missing data

* Shape or pattern of the flow and depth

6.4.1. Dry Weather Flow Calibration

Depending on the available flow monitoring data for the sewer basins, several five consecutive dry days were selected as the representative days for dry weather calibration. The selected dry weather calibration days include weekdays and weekends. Most sewer basins had a meter installed that solely

[12] CIWEN Wastewater Planning Users Group Code of Practice for the Hydraulic Modeling of Urban Drainage Systems, Version 01, 2017

captured flows coming from the corresponding sewer basin. Hourly diurnal patterns were developed for weekdays and weekends based on flow monitoring data for these basins. Sewer basins 5, 7, and 10 did not have direct flow monitoring data. Diurnal patterns for these sewer basins were assumed to be similar to the diurnal patterns of sewer basins with similar land use types and were further adjusted based on the metered data downstream at the Ralston Trunk Lines. These diurnal patterns were adjusted under an iterative process to match the metered flow shapes during the calibration process.

Calibration started from upstream basins, followed by downstream basins, then along the Ralston Trunk Lines. During the calibration process, base flows, diurnal patterns, and manning's n values were adjusted to bring better convergence between model predictions and observed flows and depths at each metered location.

The dry weather calibration was aimed to provide a reasonable match between the modeled and metered average flows and diurnal patterns.

Table 6-2 summarizes the dry weather calibration results. Comparison graphs between observed flows and depth and model predictions are included in **Appendix E – Dry Weather Calibration Results**.

Table 6-2. Dry Weather Calibration Summary

Sewer Basin	Metered Manhole	Meter Location	Calibration Period		Max. Flow (mgd)	Average Flow (mgd)	Max. Depth (ft)	Average Depth (ft)	Note
1	403610	In Island Pkwy approximately 330 ft south of Concourse Dr	04/02/22-04/06/22	Metered	0.193	0.071	0.26	0.18	observed peak flow is considered an anomaly
				Modeled	0.160	0.067	0.181	0.110	
				Difference	-17.3%	-5.4%	-0.08	-0.07	
2	403404	Near Ralston Ave & Kedith St	04/02/22-04/06/22	Metered	0.105	0.020	0.341	0.158	meter experienced backwater condition
				Modeled	0.134	0.022	0.482	0.326	
				Difference	28.0%	7.5%	0.14	0.17	
3	Hiller LS Wet Well Inlet	In Hiller St approximately 180 ft west of Cambridge St	04/02/22-04/06/22	Metered	0.351	0.170	0.559	0.421	observed peak flow is considered an anomaly
				Modeled	0.279	0.170	0.360	0.278	
				Difference	-20.5%	0.1%	-0.20	-0.14	
4	452404	Near 1334 El Camino Real	04/02/22-04/06/22	Metered	0.209	0.112	0.510	0.410	
				Modeled	0.211	0.109	0.280	0.199	
				Difference	1.2%	-3.1%	-0.23	-0.21	
6	441501	Near 811 North Rd	04/28/17-05/02/17	Metered	0.195	0.095	0.180	0.130	
				Modeled	0.161	0.095	0.149	0.114	
				Difference	-17.6%	-0.3%	-0.03	-0.02	
8	443205	In Notre Dame Ave approximately 120 ft south of Clee St	04/02/22-04/06/22	Metered	0.543	0.216	0.286	0.169	observed peak flow is considered an anomaly
				Modeled	0.410	0.216	0.331	0.233	
				Difference	-24.5%	0.0%	0.04	0.06	
9	450409	Near 2043 Ralston Ave	04/02/22-04/06/22	Metered	0.825	0.152	1.453	0.279	observed peak flow is considered an anomaly
				Modeled	0.281	0.148	0.261	0.182	adjusted n-value of metered pipe to 0.015
				Difference	-65.9%	-2.7%	-1.19	-0.10	
11	442701A	Near 2100 Ralston Ave	2/9/2022-2/14/2022	Metered	0.165	0.086	0.247	0.179	
				Modeled	0.161	0.085	0.171	0.123	
				Difference	-2.2%	-1.2%	-0.08	-0.06	
12	453710	Near 2351 Lyall Way	04/28/17-05/02/17	Metered	0.195	0.118	0.294	0.238	adjusted n-value of metered pipe to 0.015
				Modeled	0.211	0.117	0.195	0.143	
				Difference	8.1%	-0.4%	-0.10	-0.10	
13	431604	Near 3040 San Juan Blvd	04/28/17-05/02/17	Metered	0.180	0.049	0.268	0.111	observed peak flow is considered an anomaly
				Modeled	0.104	0.049	0.173	0.113	adjusted n-value of metered pipe to 0.015
				Difference	-42.1%	0.0%	-0.10	0.00	
14	Haskins LS Wet Well	Near Haskins Dr & Laurel Creek Rd	04/28/17-05/02/17	Metered	0.041	0.014	0.126	0.077	adjusted n-value of wet well inlet pipe to 0.011
				Modeled	0.033	0.014	0.122	0.080	
				Difference	-20.5%	-0.2%	0.00	0.00	
15	431601	Near 3041 San Juan Blvd	04/28/17-05/02/17	Metered	0.092	0.057	0.158	0.118	
				Modeled	0.114	0.057	0.137	0.098	
				Difference	23.4%	-0.1%	-0.02	-0.02	

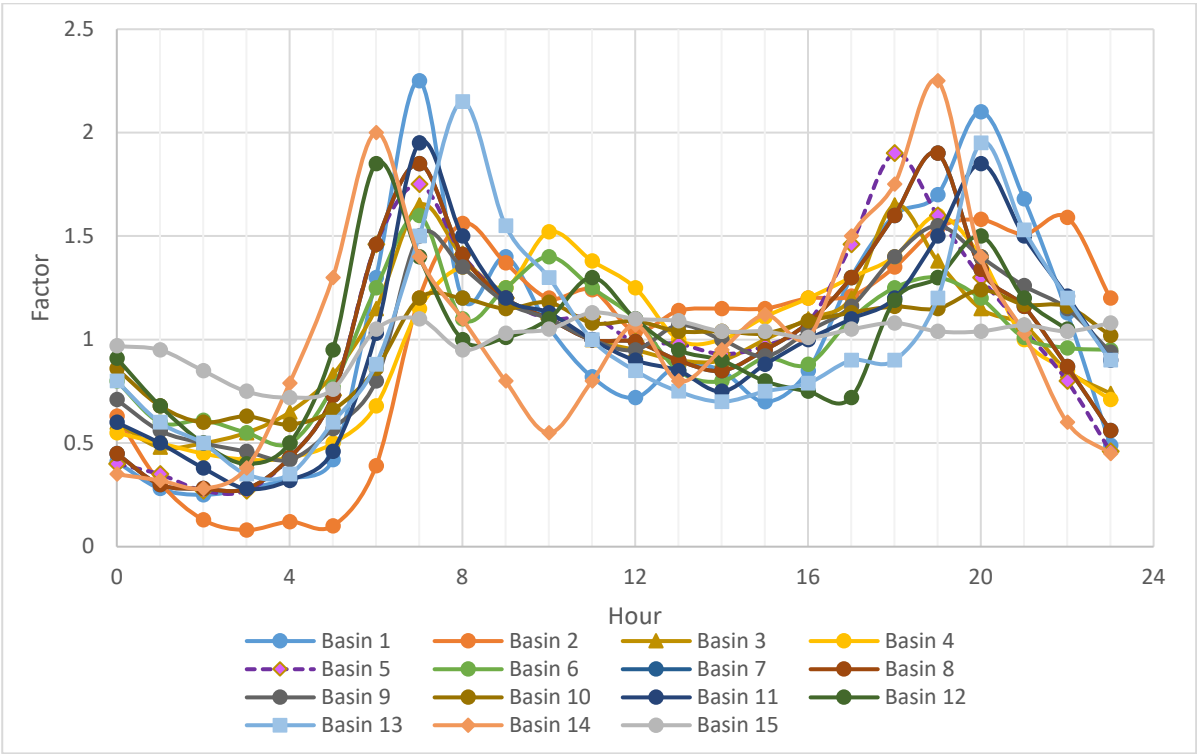
Table 6-2. Dry Weather Calibration Summary

Sewer Basin	Metered Manhole	Meter Location	Calibration Period		Max. Flow (mgd)	Average Flow (mgd)	Max. Depth (ft)	Average Depth (ft)	Note
Trunk Line	450419	Near Ralston Ave & Villa Ave	04/02/22-04/06/22	Metered	1.29	0.43	0.37	0.20	
				Modeled	1.12	0.42	0.33	0.20	
				Difference	-13.6%	-2.1%	-0.05	0.00	
Trunk Line	451808	Near 6th Ave & Emmett Ave	04/02/22-04/06/22	Metered	0.938	0.344	0.478	0.273	observed average flow is less than observed average flow at upstream meter. Disregard observed ADWF due to mass balance issue
				Modeled	0.823	0.440	0.398	0.286	
				Difference	-12.2%	28.1%	-0.08	0.01	
Trunk Line	451803E	Near Old County Rd & Masonic Way	04/02/22-04/06/22	Metered	1.256	0.632	0.560	0.404	
				Modeled	1.177	0.613	0.508	0.360	
				Difference	-6.3%	-3.0%	-0.05	-0.04	
BPS	BPS	1385 Shoreway Rd	04/02/22-04/06/22	Metered	2.535	1.345	-	-	
				Modeled	2.265	1.379	-	-	
				Difference	-10.7%	2.5%			

Overall, model average flows and depths agree reasonably (within 10% of flow or +/- 0.33 ft of depth) with the observed data at most metered locations. The observed average flow at Meter Site 451808 has a mass flow balance discrepancy as it was less than the observed average flow upstream at Meter Site 420419. Adjusting the base flow in the model to bring a closer match at Meter Site 451808 would result in model average flows deviating from the observed average flows at the other upstream and downstream sites. Therefore, observed ADWF at 451808 was disregarded for the dry weather calibration. Simulated flow depths are generally lower than observed depth at most meter sites. The discrepancy can be caused by various factors including but not limited to debris or obstructions in the sewer system that affects flow depths, inaccurate slopes in the model, and/or meter reading errors, etc. Sewer lines in the system are primarily VCP, and the typical manning's n value for VCP sewer pipes range from 0.011-0.017.[13] As shown in **Table 6-2**, manning's n of a few metered pipes was adjusted within the typical range to increase the simulated depths.

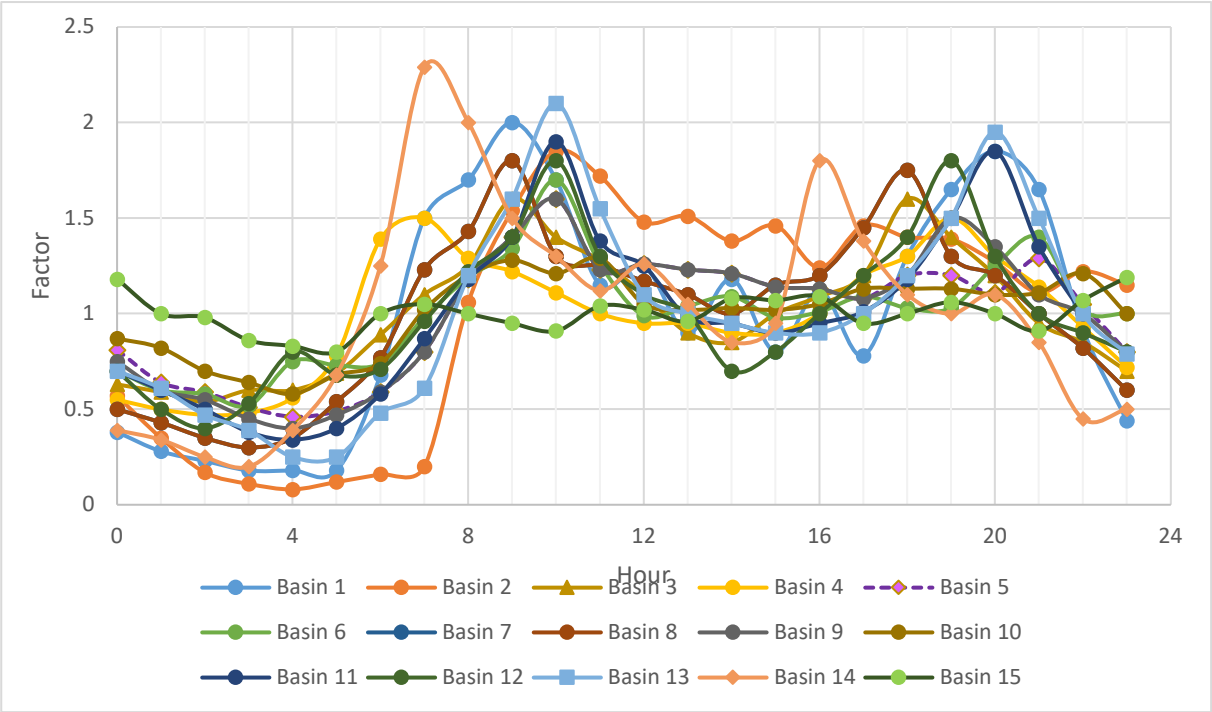
Modeled peak flows show more than +/- 25% difference compared to observed peak flows at some metered locations. These observed peak flows were abrupt spikes in the recording period and did not occur daily, so they were considered outliers and did not represent the typical dry weather flow patterns at the metered locations. Therefore, the calibration was still considered acceptable. **Figure 6-1** and **Figure 6-2** shows the normalized hourly diurnal patterns by sewer basin for weekdays and weekends, respectively.

Figure 6-1. Weekday Diurnal Patterns



[13] Source: Open-Channel Hydraulics by Ven Te Chow published in 1959 by McGraw-Hill Book Company, Inc. (Chow, 1959)

Figure 6-2. Weekend Diurnal Patterns

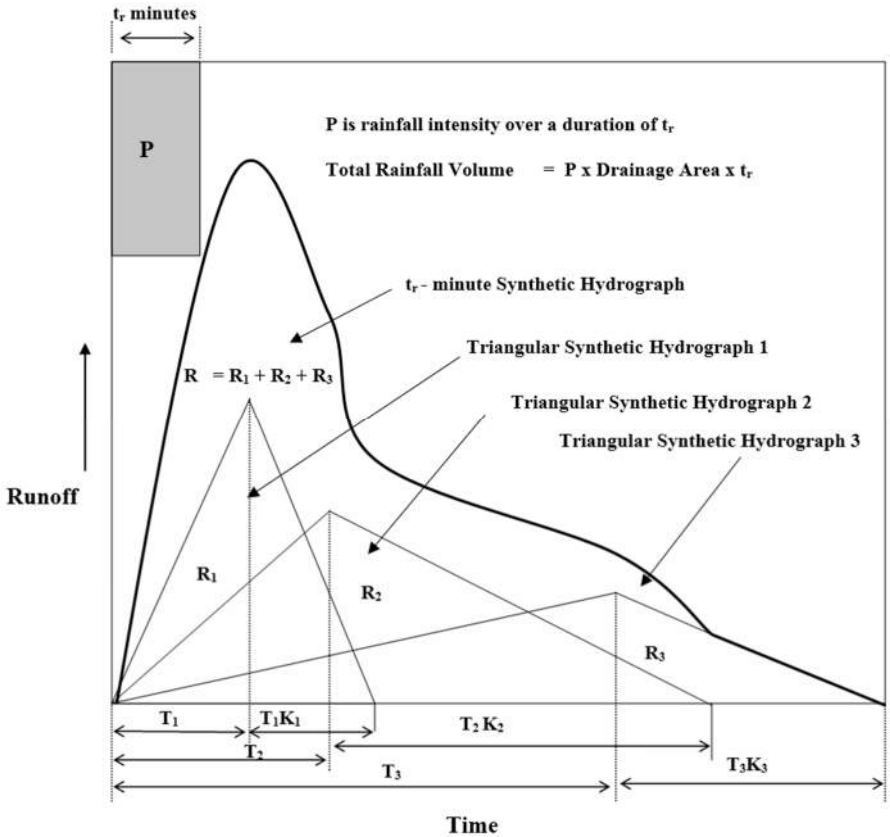


6.4.2. Wet Weather Flow Calibration

Once the model was calibrated under dry weather condition, it was calibrated for wet weather flow condition. The wet weather flow calibration mainly focused on calibration of the RDII component. In order to simulate the system response more accurately during rainfall events, the RTK method was used to develop RDII unit hydrographs for each sewer basin. This method assumes that RDII in the collection system responding to rainfall is similar to stormwater runoff in a watershed and uses three triangular unit hydrographs to represent the fast, medium, and slow RDII responses to the rainfall, as shown in **Figure 6-3**.[14] R represents the fraction of rainfall volume entering the collection system as RDII. T is the time, in hours, to reach peak RDII flow, and K is the ratio of the time of recession to the time of peak. The wet weather flow data was analyzed in the RDII Analyst Tool within InfoSWMM to develop the fast, medium, and slow R, T, and K parameters for each sewer basin. The tool numerically determined the R, T, and K parameters that best matched the estimated RDII flows to the observed RDII flows. These RTK parameters were then assigned to corresponding model manhole nodes and further adjusted by comparing model predictions against observed data under an iterative process.

[14] Fu-hsiung Lai and others, 'A Toolbox for Sanitary Sewer Overflow Analysis and Planning (SSOAP) and Applications', 1–16.

Figure 6-3. RTK Unit Hydrographs



Source: InfoSewer Help Documentation (https://help.innovyze.com/space/infosewer/17467281/The+Tri-Triangle+or+RTK+Method)

Table 6-3 lists the final calibrated R, T, and K parameters for each sewer basin. Similar to the dry weather calibration, the wet weather calibration also started from upstream basins, followed by downstream basins, then along the Ralston Trunk Lines. Sewer Basin 5, 7, and 10 did not have direct flow monitoring data. The initial R, T, and K parameters for Sewer Basins 5 and 7 were determined based on averaging the R, T, and K parameters of the remaining metered basins and then further adjusted based on the observed flow data at the downstream trunk line Meter Site 451803E. The initial R, T, and K parameters for Sewer Basin 10 were determined based on averaging the R, T, and K parameters of Basins 11, 12, 13, 14, and 15, and then further adjusted based on the observed flow data at the downstream trunk line Meter Site 451808.

Flow data from the 2015-2017 flow monitoring study were initially used to develop the R, T, and K parameters for Basins 6, 12, 13, 14, and 15 as there was no meter installed in these sewer basins during the 2021-2022 flow monitoring study. The 2015-2017 data revealed very high RDII responses at Basins 12, 13, 14, and 15. Using the R, K, T parameters derived from the 2015-2017 flow monitoring data for these sewer basins would result in significantly overestimations downstream at the trunk line meter location 451808 compared against the 2021-2022 flow monitoring data as well as at the BPS compared against the 15-minute BPS influent data. The inconsistency can be due to reading errors in

the 2015-2017 flow monitoring data or reduction in RDII resulting from the City's on-going rehabilitation and maintenance efforts.

Since the 2021-2022 flow monitoring data and the BPS influent data is more up-to-date and reflects the current conditions of the system, R, T, and K parameters for Basins 12, 13, 14, and 15 were adjusted for better convergence of the model predictions to the observed flows at 451808 from the 2021-2022 flow monitoring study as well as the BPS influent data. The 2015-2017 flow monitoring data for Basins 12, 13, 14, and 15 was not used for wet weather flow calibration comparison.

Table 6-3. Calibrated R, T, K Parameters

Basin	Fast			Medium			Slow			
	R1	T1	K1	R2	T2	K2	R3	T3	K3	RT
1	0.04	0.90	1.50	0.02	5.76	4.36	0.02	17.17	4.92	0.07
2	0.07	0.95	2.15	0.10	4.56	1.93	0.12	17.77	10.02	0.29
3	0.05	0.90	1.00	0.04	3.50	2.00	0.11	13.50	3.53	0.20
4	0.06	0.97	1.03	0.06	3.55	2.08	0.11	14.01	3.67	0.23
5	0.04	0.87	1.12	0.05	3.78	2.51	0.16	14.47	5.11	0.25
6	0.09	1.00	0.35	0.12	4.50	3.80	0.10	13.50	3.00	0.31
7	0.04	0.87	1.12	0.05	3.78	2.51	0.16	14.47	5.11	0.25
8	0.07	0.97	1.03	0.07	3.55	2.18	0.20	14.50	3.90	0.34
9	0.02	0.75	0.80	0.02	4.00	2.18	0.01	14.50	3.90	0.04
10	0.04	0.79	1.11	0.04	3.18	2.32	0.19	13.75	5.69	0.27
11	0.01	0.81	3.83	0.02	4.71	2.20	0.07	13.80	13.03	0.10
12	0.05	0.95	0.50	0.04	3.80	2.50	0.26	13.00	4.50	0.34
13	0.06	0.95	0.50	0.03	2.50	3.00	0.17	14.50	4.50	0.25
14	0.04	0.30	0.40	0.02	2.00	2.00	0.28	13.50	3.20	0.34
15	0.04	0.95	0.30	0.02	2.90	1.90	0.04	13.92	3.20	0.10

Table 6-4 summarizes the wet weather calibration results. Calibration graphs for the individual meter site are included in **Appendix F – Wet Weather Calibration Results**.

Table 6-4. Wet Weather Calibration Summary

Sewer Basin	Metered Manhole	Meter Location	Calibration Period		Max. Flow (mgd)	Average Flow (mgd)	Max. Depth (ft)	Average Depth (ft)	Note
1	403610	In Island Pkwy approximately 330 ft south of Concourse Dr	12/10/2021-12/18/2021	Metered	0.269	0.080	0.36	0.18	Site may experience rainfall pattern slightly different from Naughton RG,
				Modeled	0.269	0.093	0.238	0.131	observed data did not show RDII response to precipitation in the morning of 12/13/21
				Difference	-0.1%	16.8%	-0.13	-0.05	Flow data spiked maybe due to meter sensor issue or debris or obstruction in field
2	403404	Near Ralston Ave & Kedith St	12/10/2021-12/18/2021	Metered	0.292	0.040	0.728	0.210	meter experienced backwater condition, which may affect meter reading accuracy
				Modeled	0.151	0.034	1.000	0.480	
				Difference	-48.3%	-15.9%	0.27	0.27	
3	Hiller LS Wet Well Inlet	In Hiller St approximately 180 ft west of Cambridge St	12/10/2021-12/18/2021	Metered	0.753	0.252	0.543	0.325	
				Modeled	0.763	0.274	0.624	0.344	
				Difference	1.3%	8.6%	0.08	0.02	
4	452404	Near 1334 El Camino Real	12/10/2021-12/18/2021	Metered	0.574	0.198	0.766	0.493	Site may experience rainfall pattern slightly different from Naughton RG
				Modeled	0.615	0.197	0.500	0.260	
				Difference	7.1%	-1.0%	-0.27	-0.23	
6	441501	Near 811 North Rd	2/15/2017-2/22/2017	Metered	0.304	0.111	0.194	0.118	observed peak flow is considered an anomaly
				Modeled	0.253	0.111	0.167	0.137	
				Difference	-16.7%	0.7%	-0.03	0.02	
8	443205	In Notre Dame Ave approximately 120 ft south of Clee St	12/10/2021-12/18/2021	Metered	1.700	0.466	0.507	0.228	
				Modeled	1.584	0.507	0.686	0.343	
				Difference	-6.8%	8.9%	0.18	0.11	
9	450409	Near 2043 Ralston Ave	12/10/2021-12/18/2021	Metered	0.921	0.163	1.797	0.292	Site may experience rainfall pattern slightly different from Naughton RG
				Modeled	0.467	0.182	0.364	0.203	observed peak flow is considered an anomaly
				Difference	-49.3%	11.5%	-1.43	-0.09	
9	450415	Near 1011 Alameda De Las Pulgas	12/10/2021-12/18/2021	Metered	0.116	0.012	0.17	0.03	Site may experience rainfall pattern slightly different from Naughton RG
				Modeled	0.104	0.022	0.12	0.01	meter reading accuracy may reduce due to low flow
				Difference	-10.1%	88.7%	-0.05	-0.02	capture overflow upstream
11	442701A	Near 2100 Ralston Ave	12/10/2021-12/18/2021	Metered	0.383	0.113	0.358	0.169	
				Modeled	0.373	0.126	0.265	0.144	
				Difference	-2.7%	11.2%	-0.09	-0.03	
Trunk Line	450419	Near Ralston Ave & Villa Ave	12/10/2021-12/18/2021	Metered	2.66	0.92	0.52	0.30	potential meter reading errors
				Modeled	4.36	1.24	0.67	0.31	mass flow balance with upstream and downstream sites
				Difference	64.0%	34.3%	0.14	0.02	disregard for calibration result comparison
Trunk Line	451808	Near 6th Ave & Emmett Ave	12/10/2021-12/18/2021	Metered	3.950	0.921	0.835	0.374	
				Modeled	4.201	1.204	0.997	0.447	
				Difference	6.4%	30.7%	0.16	0.07	

Table 6-4. Wet Weather Calibration Summary

Sewer Basin	Metered Manhole	Meter Location	Calibration Period		Max. Flow (mgd)	Average Flow (mgd)	Max. Depth (ft)	Average Depth (ft)	Note
Trunk Line	451803E	Near Old County Rd & Masonic Way	12/10/2021-12/18/2021	Metered	4.420	1.346	0.862	0.497	
				Modeled	4.963	1.776	1.162	0.342	
				Difference	12.3%	31.9%	0.30	-0.16	
BPS	BPS	1385 Shoreway Rd	12/10/2021-12/18/2021	Metered	10.540	3.105	-	-	
				Modeled	11.906	3.961	-	-	
				Difference	13.0%	27.6%			

Modeled peak flow at Meter Site 403404 was more than 10% less than the observed peak flow. Observed flows and depths spiked at this site due to backwater condition caused by flows from the connecting 21-inch sewer line downstream which may have affected meter reading accuracy.

Observed peak flow and maximum depth at Meter Site 450409 revealed a sharp spike among the flow data and were considered as anomalies and disregarded. Modeled peak flow at Meter Site 420419 was more than 25% greater than the observed peak flow. However, observed peak flow at Meter Site 420419 was significantly lower than observed peak flow at downstream Meter Site 451808. Calibrating peak flow to the observed peak flow at Meter Site 420419 resulted in significant underestimation of flow downstream at Meter Site 451808 and at BPS. Therefore, observed peak flow at Meter Site 420419 was disregarded. Modeled average flow when compared to the observed average flow at Meter Site 450415, showed a large percent difference. This site captured overflow from a flow split upstream. Observed flows were very low which may reduce meter reading accuracy.

Overall, model peak flows, average flows, maximum depths, and average depths agree (within +25% to – 15% of flow or +/- 0.33 ft of depth) with the observed data at most metered locations. Calibration cannot be further refined without causing model predictions deviating from field observations at other locations. Calibration results were reviewed and approved by City staff before performing capacity evaluation. In order to further refine the model in future updates, it is recommended that the City conduct a system-wide survey of manhole and pipe inverts to confirm the slope information in the model as it affects flow depth. Survey information or invert data from as-builts should be updated to the City's GIS database which can be used for future model updates. As a matter of best management practice, it is recommended that the City should conduct system-wide flow monitoring studies in the future, especially on basins that were not metered in the 2021-2022 flow monitoring study and in areas that fell outside of the calibration criteria range described in **Table 6-1**.The information can help with refining model calibration in the future.

7. Capacity Evaluation

This section discusses the model results on system capacity evaluation for existing and future conditions and identified system deficiencies per planning criteria presented in Section 4.

7.1. Gravity Main

The system was evaluated utilizing the calibrated model under three scenarios: Existing (2023) PWWF condition, Near-term future (2028) PWWF condition, and Long-term Future (2043) PWWF condition. Capacity analysis of gravity mains is generally evaluated based on the maximum depth of flow to the diameter of the pipe (d/D) under PWWF scenarios. Model results for each scenario were evaluated to identify the deficient pipelines for each time frame. **Figures 7-1** to **7-3** illustrates the locations of the deficient pipelines for 2023, 2028, and 2043 PWWF conditions, respectively. Model results are included as **Appendix G – Hydraulic Model Results**.

Under current operating conditions, the City's wastewater flows are mostly conveyed to BPS located east of Shoreway Rd, east of Harbor Blvd, and North of Belmont Creek. SVCW has recently completed the construction of the Belmont Gravity Pipeline (BGP) Project along Shoreway Rd that extends from the existing BPS to the San Carlos Pump Station. BPS is anticipated to be demolished in the near-term future as part of the BGP project.[15] Once the BGP is in use, it will carry City wastewater flows by gravity to the new gravity tunnel at the San Carlos Pump Station. [16]

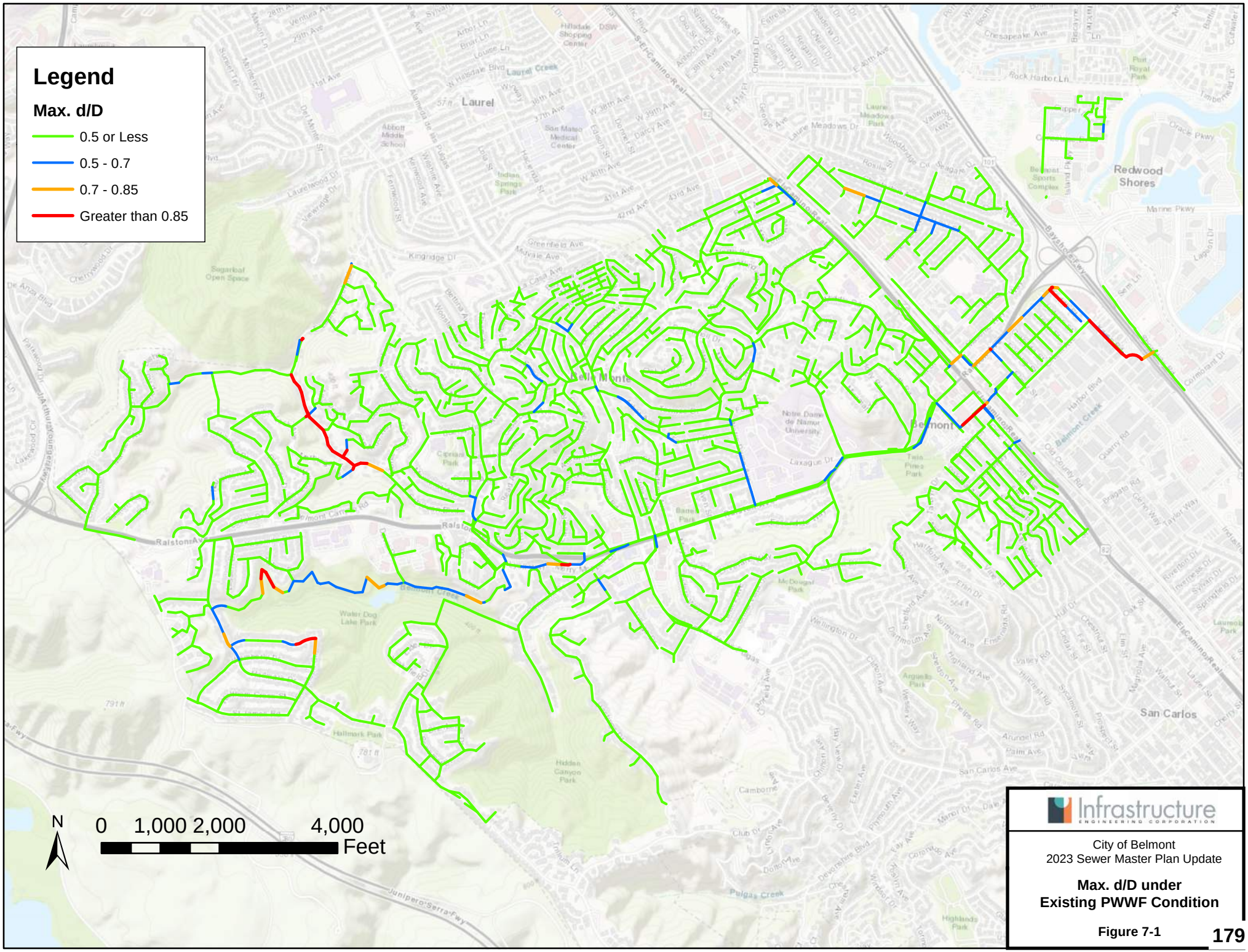
Therefore, the existing scenario in the model analyzed the system with BPS in service. Near-term future and long-term future scenarios in the model analyzed the system with BPS demolished and BGP in service as well as improvement project anticipated to be completed in the near-term future as below:

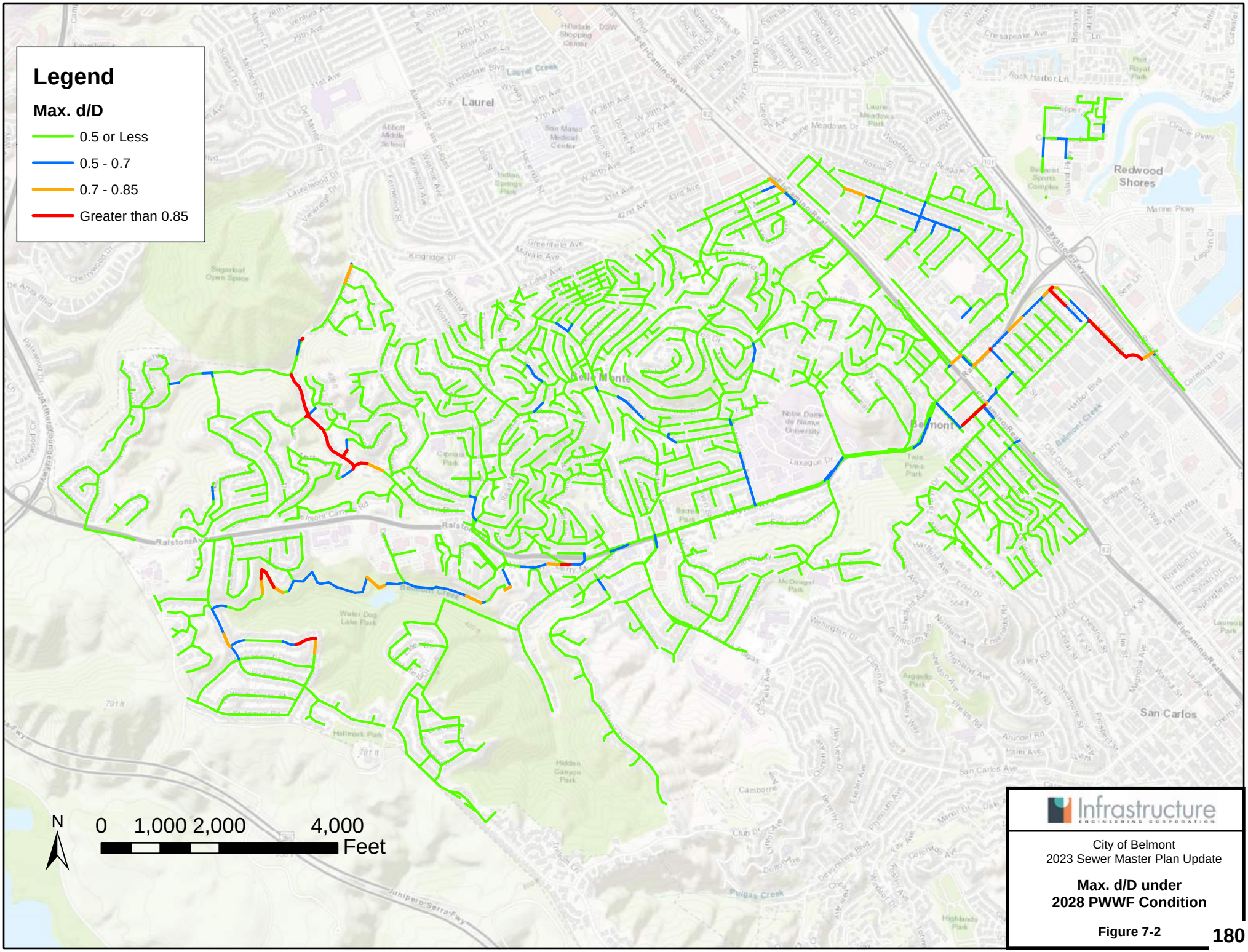
- Village Walk Firehouse Townhomes Sewer Offsite Improvement: upsizing the existing 12-inch sewer in El Camino Real between O'Neill Ave and Broadway to 16-inch in size.

In addition, the City plans to annex the HIA sewer collection system to its service area, though the exact timing of annexation is not known as of the preparation of this report. The HIA sewer collection system is currently owned and governed by the County. At present, the majority of the HIA wastewater flows are conveyed into the San Carlos sewer collection system. If the HIA sewer collection system is annexed to the City's sewer service area, the City anticipates that all the HIA wastewater flows will be re-routed and conveyed into the City's sewer collection system. The 2043 PWWF of the HIA area discharging into the City's collection system is estimated to be 2.01 mgd per the **2023 HISMD Sewer Master Plan (Appendix A)**. The 2043 PWWF scenario analyzed the system with the HIA long-term future PWWF as a point load into the City's sewer collection system near Harbor Blvd and Karen Rd.

Some of the deficient pipelines shown in the figures were due to backwater condition of their downstream deficient pipelines and will meet the planning criteria once the downstream deficient pipelines are upsized. Most deficient pipelines identified under 2043 PWWF condition are deficient under 2023 PWWF condition.

[15] Source: https://svcw-rescu.org/pump-stations-improvements-july-2023/
[16] Source: https://svcw-rescu.org/pump-station-improvements-june-2021/?utm_source=rss&utm_medium=rss&utm_campaign=pump-station-improvements-june-2021


Legend
Max. d/D
0.5 or Less
0.5 - 0.7
0.7 - 0.85
Greater than 0.85
N
0 1,000 2,000 4,000
Feet
Infrastructure
ENGINEERING CORPORATION
City of Belmont
2023 Sewer Master Plan Update
Max. d/D under
Existing PWWF Condition
Figure 7-1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Max. d/D
0.5 or Less
0.5 - 0.7
0.7 - 0.85
Greater than 0.85
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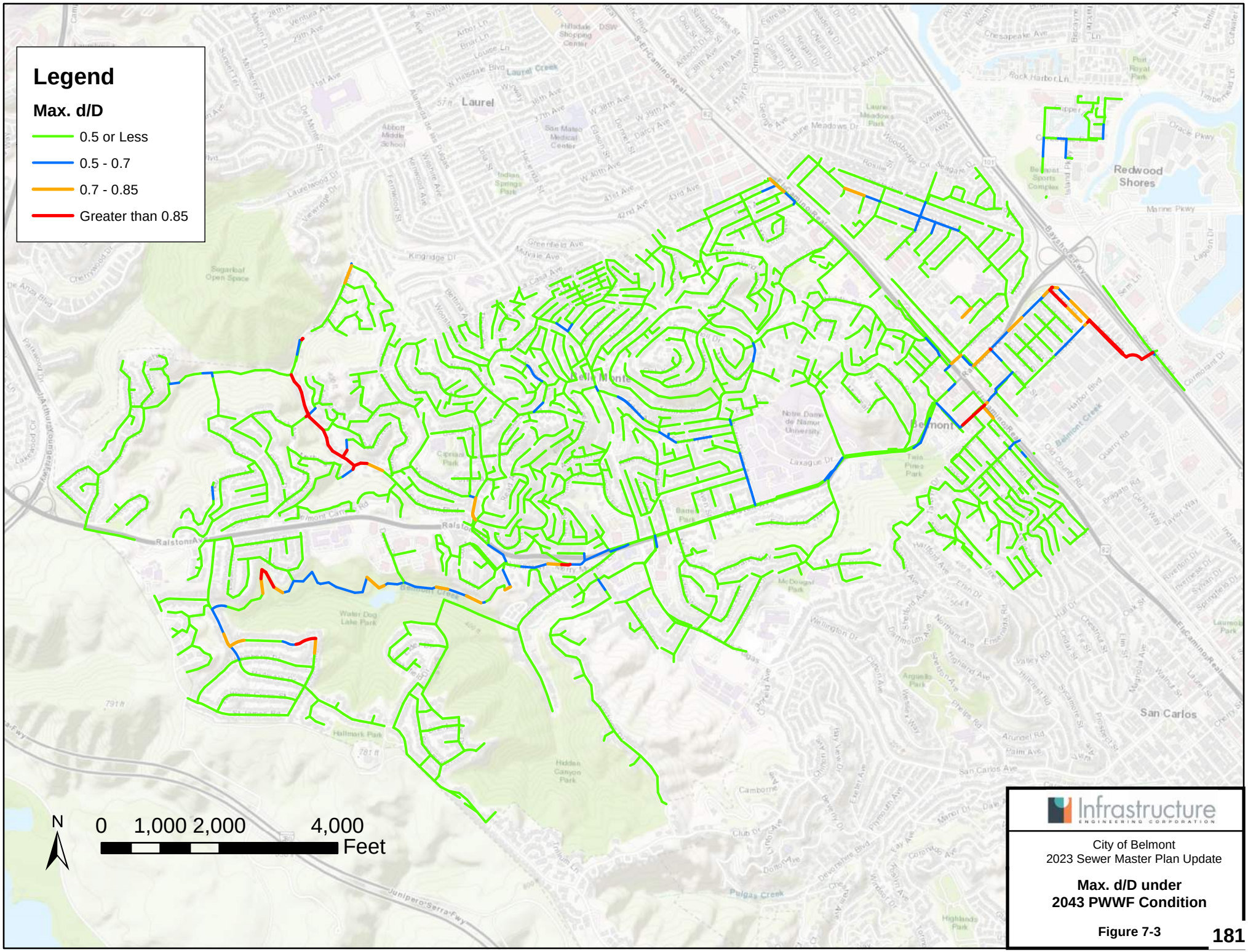
0 1,000 2,000 4,000
Feet
Infrastructure
ENGINEERING CORPORATION
City of Belmont
2023 Sewer Master Plan Update
Max. d/D under
2028 PWWF Condition
Figure 7-2


Legend
Max. d/D
0.5 or Less
0.5 - 0.7
0.7 - 0.85
Greater than 0.85
N
0 1,000 2,000 4,000
Feet
Infrastructure
ENGINEERING CORPORATION
City of Belmont
2023 Sewer Master Plan Update
Max. d/D under
2043 PWWF Condition
Figure 7-3

7.2. Lift Station

Most lift stations are equipped with two pumps except the newly constructed North Road LS which is equipped with three pumps. Naughton LS and San Juan LS are each equipped with two pumps plus one shelf spare pump. Shelf spared pumps are excluded when determining the firm capacity of these two lifts stations. Model results indicated that most lift stations have sufficient capacity to accommodate future growth under 2043 PWWF condition except San Juan LS. **Table 7-1** summarizes the model results of maximum influent to the lift stations under existing and 2043 PWWF conditions.

Table 7-1. Model Results for Lift Stations

Lift Station (LS)	No. of Pumps	Firm Capacity (mgd)	Existing Max. Influent (mgd)	2043 Max. Influent (mgd)
Ralston Ranch	2	0.36	0.11	0.12
Naughton	2 + 1 shelf spared pump	0.33	0.05	0.05
Hastings	2	0.79	0.14	0.15
Hiller	2	1.22	0.77	0.97
Island Park	2	1.05	0.29	0.56
Sports Complex	2	0.08	0.03	0.04
San Juan	2 + 1 shelf spared pump	1.44	1.92	1.95
North Road	3	2.45	1.12	1.28
Haskins	2	0.86	0.38	0.38
El Camino	2	0.14	0.02	0.04

7.3. Force Main

Model results for force mains are summarized in **Table 7-2**. Model results indicate that maximum velocities of all force mains are below the planning criteria of 8 fps under PWWF conditions.

Table 7-2. Model Results for Force Mains

Force Main (FM)	Size (in.)	Max. Flow under Existing PWWF (mgd)	Max. Velocity under Existing PWWF (fps)	Max. Flow under 2043 PWWF (mgd)	Max. Velocity under 2043 PWWF (fps)
Ralston Ranch	6	0.35	3.80	0.35	3.80
Naughton	4	0.33	6.00	0.33	6.00
Hastings	10	0.73	3.50	0.71	3.40
Hiller	10	2.10	6.00	2.20	6.30
Island Park	8	0.99	4.50	0.99	4.50
Sports Complex	2	0.07	5.10	0.07	5.10
San Juan	12	2.45	4.90	2.45	4.90
North Road	12	1.58	4.00	1.58	4.00
Haskins	6	0.53	5.00	0.53	5.00
El Camino	4	0.15	3.50	0.15	3.50

8. Condition Assessment

A desktop condition assessment of the City's gravity mains, lift stations, and force mains were completed as part of this Master Plan.

8.1.1. Gravity Main and Manhole

The City operation and maintenance staff inspect its gravity mains on a regular basis and the CCTV inspection data are maintained in an ITpipes database. The inspection data was exported into a National Association of Sewer Service Companies (NASSCO) 7.0 Pipeline Assessment Condition Program (PACP) database for use as part of this Master Plan.

8.1.1.1. Condition Assessment

A data cleanup was performed on the provided PACP database to exclude the non-gravity main inspection records. The revised PACP database was then imported and analyzed using InfoAsset Planner (IAP). IAP is an ArcGIS-based asset integrity management and capital planning software developed by Innovyze. It leverages GIS data and links CCTV data for capital planning analysis including condition assessment, risk analysis, and rehabilitation planning.

The PACP database was imported into IAP and linked to the City's GIS database by facility unique identifier (ID) and upstream and downstream manhole facility IDs. Unmatched records were reviewed and manually linked to the corresponding pipe segment where possible. There were approximately 4,400 inspection records, and approximately 98% of the inspection records were matched to a pipe segment in GIS. Approximately 18% of the gravity mains did not have matched inspection records and are shown in **Figure 8-1**.

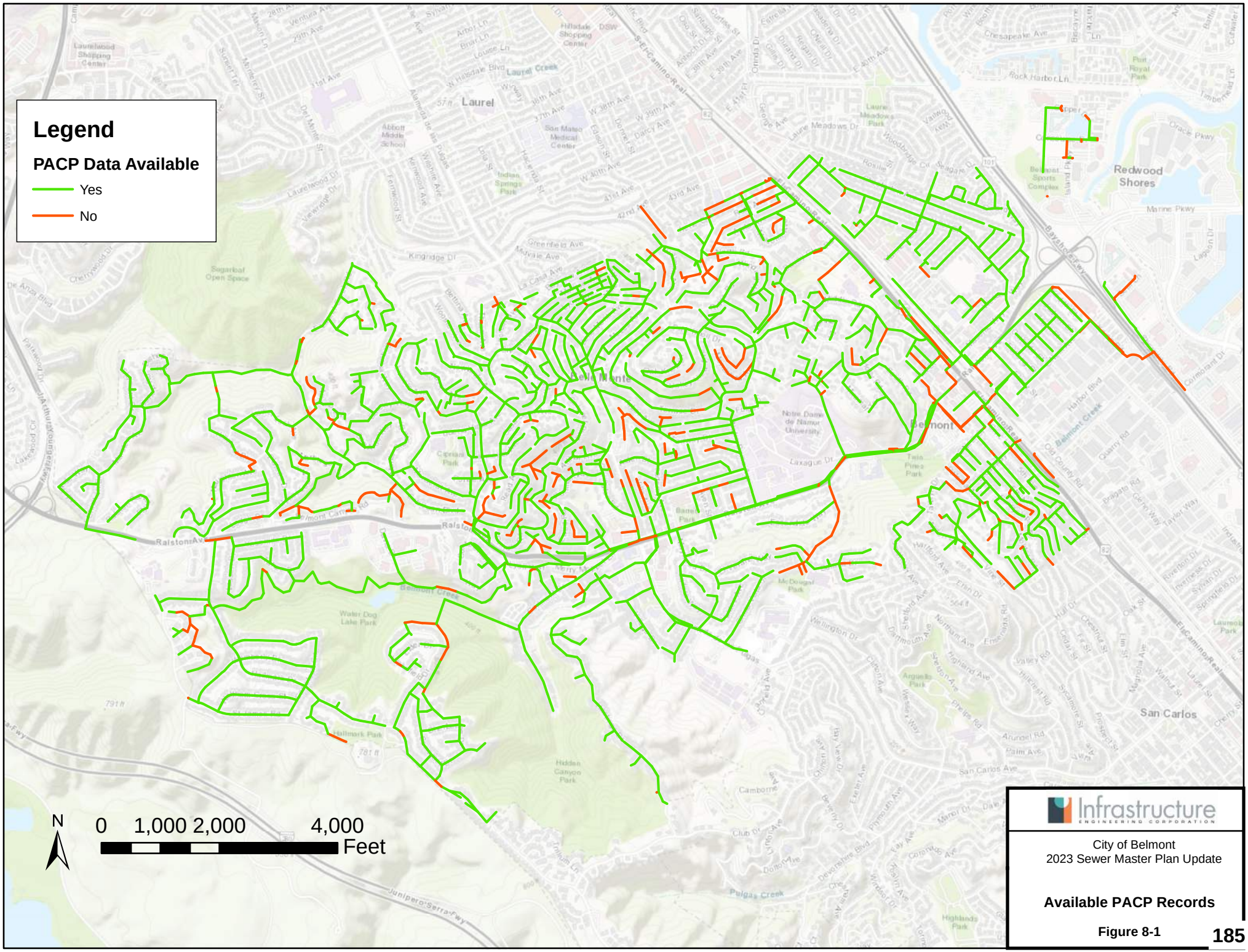
Using the imported inspection records, a condition assessment was performed in IAP by geocoding the defects, scoring the defects, and generating rehabilitation actions for the corresponding defects based on the customized defect code and rehabilitation action tables, which is included as **Appendix H**. Per NASSCO standards, the defects were graded on a scale of 1 to 5 with 1 being the least severe and 5 being the most severe. No rehabilitation action was assigned to most defects with scores 2 or less as they are considered minor defects and are unlikely to fail for at least another 20 years[17]. Exceptions were made for defects with a score of 2 which were related to deposits, obstruction, roots, and sag. **Figure 8-2** shows the pipes by defect grading.

Approximately 60% of the inspected pipes are VCP or lined VCP. By comparing the average structural scores and structural rating indexes of the pipes by material, VCP and lined VCP have much higher average structural score and structural rating index than PVC pipes and HDPE pipes, as shown in **Figure 8-3**. The structural score of a pipe is the sum of structural defects of the pipe, and structural rating index of a pipe is the average grade of structural defects found in the pipe.

Structural scores and structural rating indexes were also compared by pipe installation period, as shown in **Figure 8-4**. In general, older pipes have higher structural scores and structural rating indexes, except pipes installed between 1930 and 1939 and pipes installed between 2010 and 2020. Sample

[17] Source: https://ladpw.org/smd/SMD/CAPdefectgradedescrp.pdf

size of pipes installed between 1930 and 1939 may be too small to represent the group. Pipes installed between 2010 and 2020 have high structural scores and relatively low structural rating indexes. This indicates that more structural defects occurred on pipes installed between 2010 and 2020, but most of the structural defects are minor defects.


Legend
PACP Data Available
Yes
No
N
0 1,000 2,000 4,000
Feet
Infrastructure
ENGINEERING CORPORATION
City of Belmont
2023 Sewer Master Plan Update
Available PACP Records
Figure 8-1

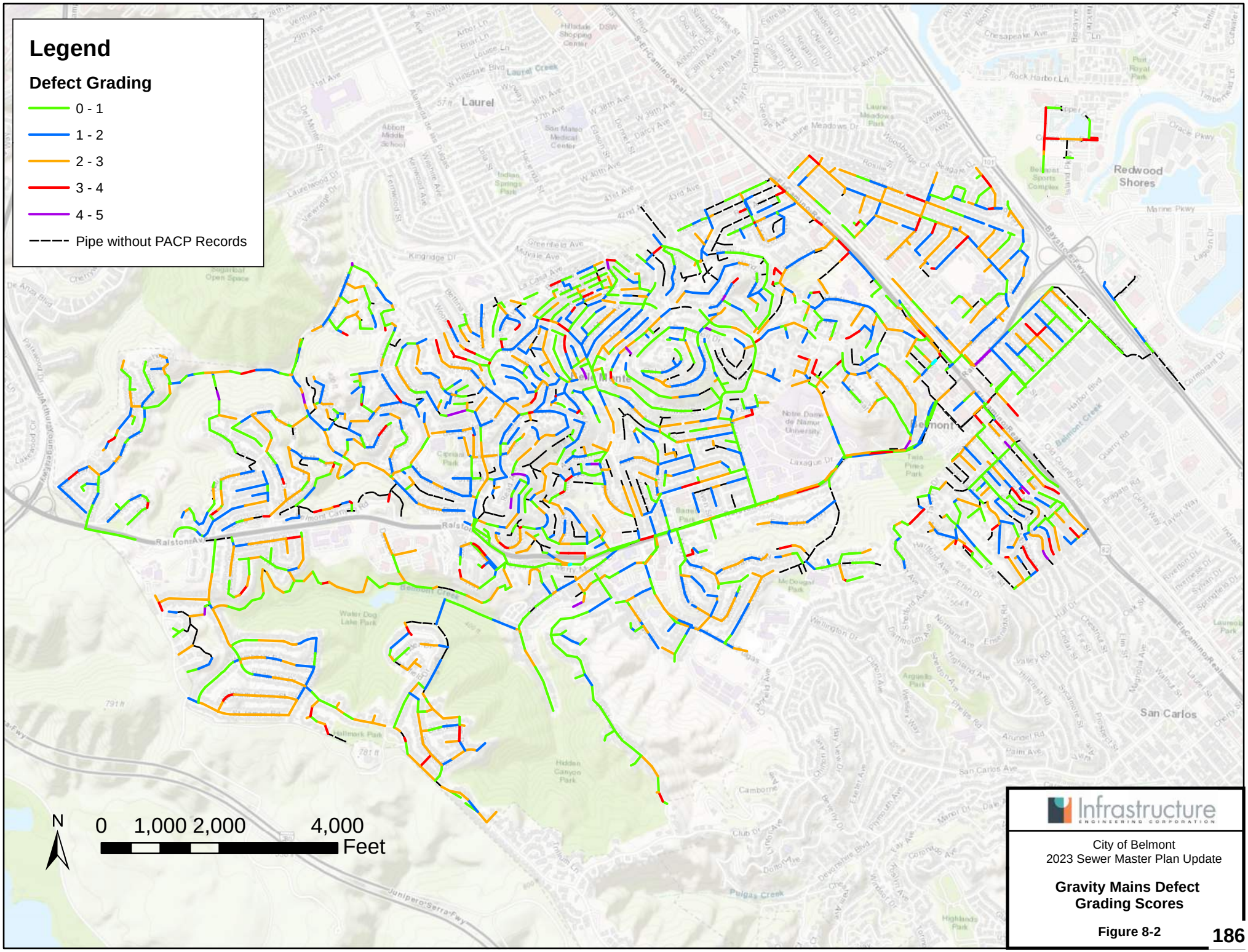
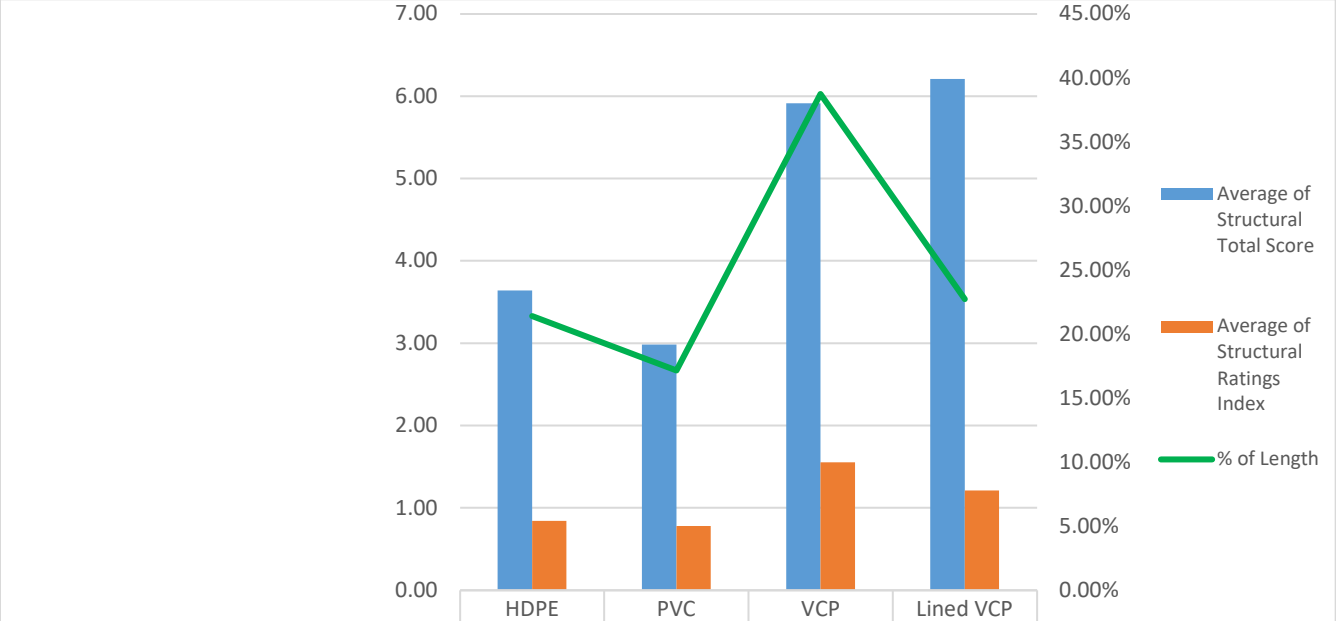
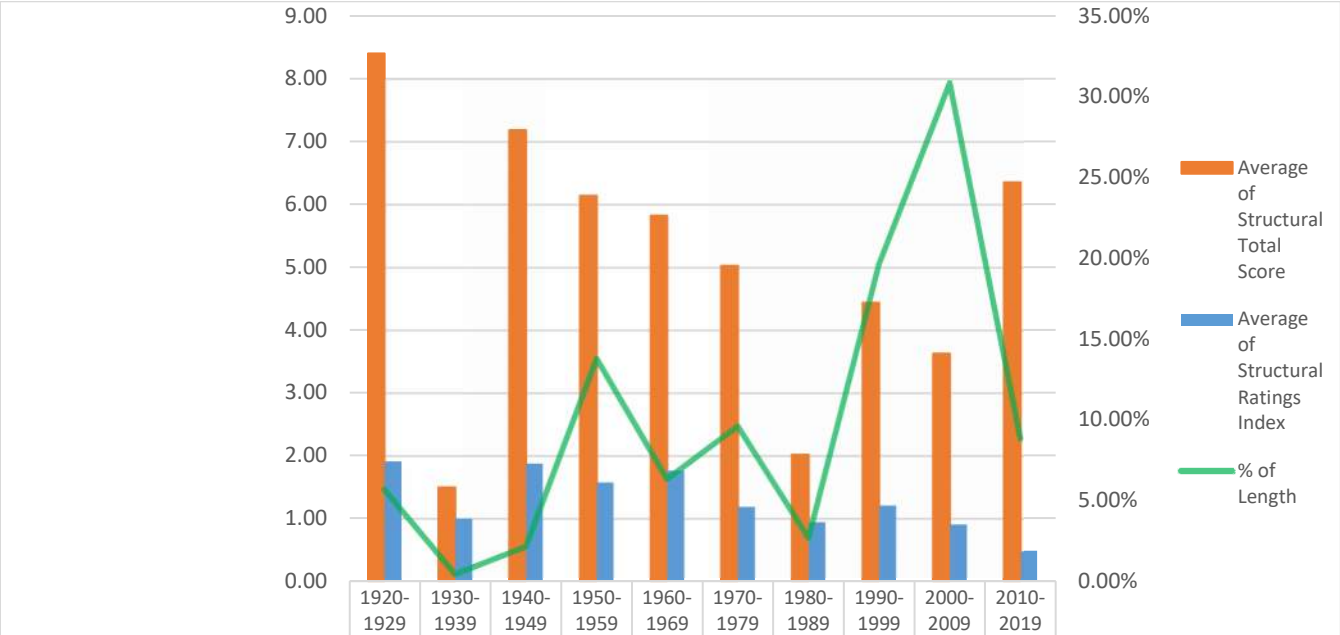

Legend
Defect Grading
0 - 1
1 - 2
2 - 3
3 - 4
4 - 5
Pipe without PACP Records
N
0 1,000 2,000 4,000
Feet
Infrastructure
ENGINEERING CORPORATION
City of Belmont
2023 Sewer Master Plan Update
Gravity Mains Defect Grading Scores
Figure 8-2

Figure 8-3. Structural Scores and Rating Indexes by Pipe Material



	HDPE	PVC	VCP	Lined VCP
Average of Structural Total Score	3.64	2.98	5.91	6.21
Average of Structural Ratings Index	0.84	0.78	1.55	1.21
% of Length	21.40%	17.15%	38.73%	22.71%

Figure 8-4. Structural Score and Rating Indexes by Installation Period



	1920-1929	1930-1939	1940-1949	1950-1959	1960-1969	1970-1979	1980-1989	1990-1999	2000-2009	2010-2019
Average of Structural Total Score	8.40	1.50	7.19	6.14	5.83	5.03	2.02	4.44	3.63	6.36
Average of Structural Ratings Index	1.92	1.00	1.88	1.58	1.76	1.19	0.95	1.21	0.91	0.48
% of Length	5.68%	0.45%	2.15%	13.79%	6.33%	9.61%	2.69%	19.63%	30.85%	8.83%

8.1.1.2. Risk Analysis

In addition to condition assessment based on the CCTV inspection data, a risk-based assessment was performed based on the pipes' material, age, size, hydraulic capacity, etc. The risk assessment includes an evaluation of the pipelines' LOF and COF. The results of the risk assessment were used for pipe selection into the 10-year Prioritized CIP.

Likelihood of Failure (LOF)

A pipeline's LOF was scored based on six criteria:

- Structural rating index
- Structural score
- Service rating index
- Installation year
- Pipe material
- Proximity to Sanitary Sewer Overflow (SSO)

Structural Rating Index

A pipeline's structural rating index is the average structural grading of structural defects found in the pipe and is based on the total structural scores divided by the total structural defect occurrences. Therefore, the more severe the defects are, the higher the structural rating index will be. It is assumed that the higher the structural rating index is, the more likely the pipe will fail. **Table 8-1** lists the risk score by structural rating index.

Table 8-1. LOF Scoring by Inspection Condition (Structural Rating Index)

Structural Rating Index	Score
0	0
0 - 1	2
1 - 2	4
2 - 3	6
3 - 4	8
4 - 5	10
Not inspected	5

Structural Score

A pipeline's structural score is the sum of defect scores of structural defects that occurred on a pipe. The more severe the defects are and the more defects that occur on a pipe, the higher the structural score will be. **Table 8-2** lists the risk score by structural score.

Table 8-2. LOF Scoring by Inspection Condition (Total Structural Score)

Total Structural Score	Score
0	0
0 - 3	2
3 - 10	4
10 - 30	6
30 - 90	8
Greater than 90	10
Not inspected	5

Service Rating Index

Service rating index of a pipe is calculated by dividing the sum of service defect scores (operation and maintenance defect grades) by the total number of service defects. Service defects include defects related to deposits, infiltration, obstruction, roots, water sags, etc. Pipes with higher service rating index are assumed to be more likely to cause operation and maintenance issues and lead to structural failures. **Table 8-3** lists the risk score by service rating index.

Table 8-3. LOF Scoring by Inspection Condition (Service Rating Index)

Service Rating Index	Score
0	0
0 - 1	2
1 - 2	4
2 - 3	6
3 - 4	8
4 - 5	10
Not inspected	5

Age

A pipeline's installation year was used to determine the age of the pipe. Older pipes were assumed to be more likely to fail. **Table 8-4** lists the risk score by installation period.

Table 8-4. LOF Scoring by Pipe Installation Period

Installation Period	Age (Years)	Score
1920-1929	94-103	10
1930-1939	84-93	9
1940-1949	74-83	8
1950-1959	64-73	7
1960-1969	54-63	6
1970-1979	44-53	5
1980-1989	34-43	4

Table 8-4. LOF Scoring by Pipe Installation Period

Installation Period	Age (Years)	Score
1990-1999	24-33	3
2000-2009	14-23	2
2010-2019	4-13	1
Unknown	-	5

Pipe Material

A pipeline's estimated useful life varies based on the pipe material. The strength and corrosion resistance varies based on the pipe material. **Table 8-5** lists the risk score by material. The scores were determined based on the CCTV inspection data. Since the majority of gravity mains are VCP or lined VCP, pipelines with unknown material were assumed to be VCP and assigned with a score of 10.

Table 8-5. Pipe Material Criteria

Material	Estimated Service Life	Score
Vitrified Clay Pipe (VCP)	100 [18,19]	10
Lined VCP	50[20]	10
Polyvinyl Chloride (PVC)	50-100 [25,21]	5
High Density Polyethylene (HDPE)	50 [25,26]	5
Reinforced Concrete (RCP)	75 - 100 [25,26]	1
Unknown		10

Sanitary Sewer Overflows (SSOs)

With the City's on-going rehabilitation and maintenance program, SSO incidents were observed to be reduced over the past 11 years, as shown in **Figure 8-5**. Based on the California State Water Resources Control Board (State Water Board), SSOs has various spill categories:

- Category 1: is a spill of any volume of wastewater from or caused by a sewer collection system result in a discharge to surface water or a drainage system that discharges to surface waters.
- Category 2: is a spill of 1,000 gallons or greater from or caused by a sewer collection system that does not reach surface water.
- Category 3 is a spill of equal to or greater than 30 gallons but less than 1,000 gallons from or caused by a sewer collection system that does not reach surface water.

[18] Source: Vitrified Clay Pipe Engineering Manual by National Clay Pipe Institute, 2017
[19] Source: National Academies of Sciences, Engineering, and Medicine 2015. Service Life of Culverts. Washington, DC: The National Academies Press. https://doi.org/10.17226/22140.
[20] Assumed Lined VCP is equivalent to HDPE.
[21] Source: Deteriorating Buried Infrastructure Management Challenges and Strategies, EPA, 2002

- Category 4 is a spill of less than 50 gallons from or caused by a sewer collection system that does not reach surface water.

Figure 8-6 shows the locations of the SSOs occurred within 2017 to 2022. Pipelines near historical SSOs are assumed to be more likely to fail. **Table 8-6** lists the risk score by proximity to SSOs.

Figure 8-5. Historical SSOs Occurrence

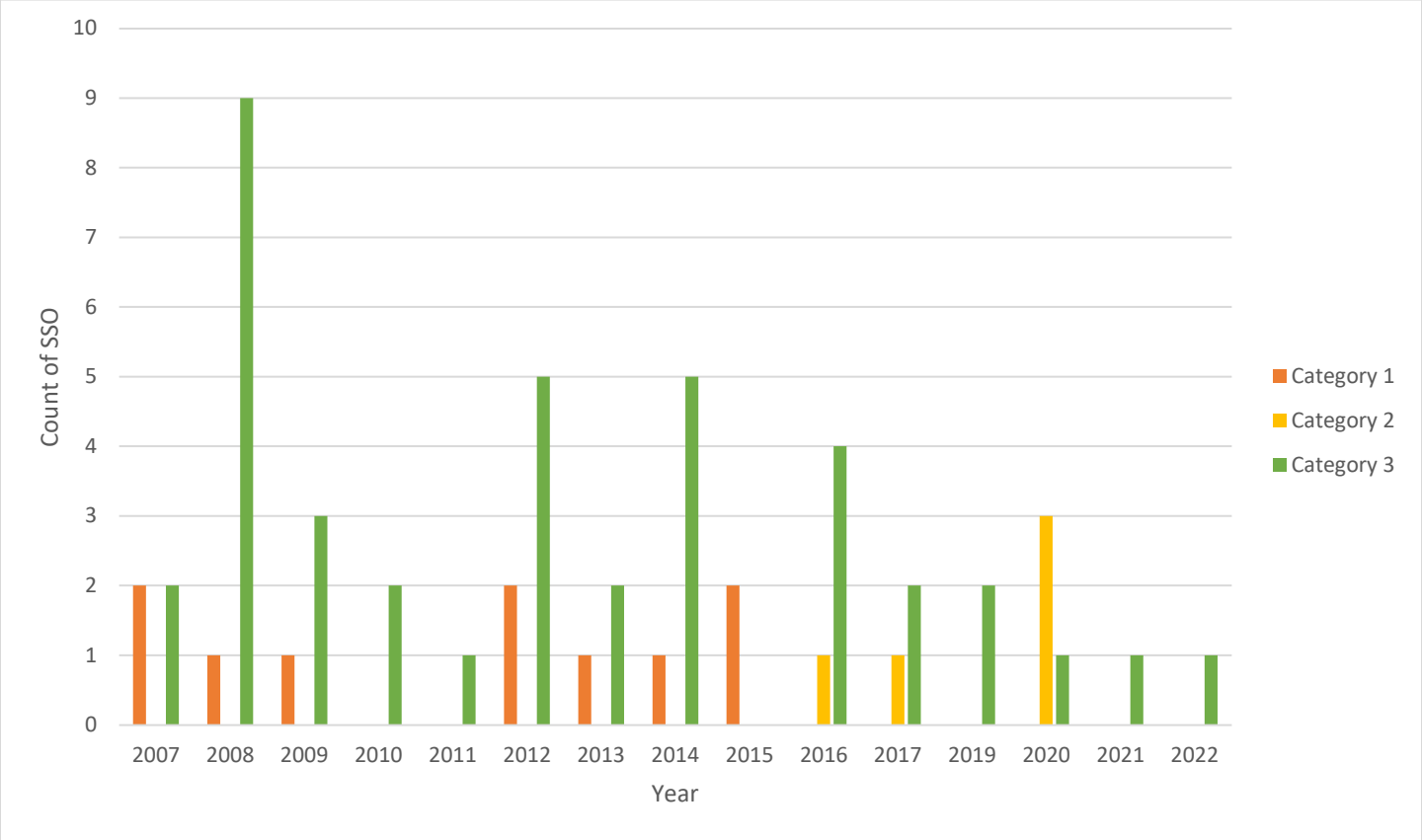
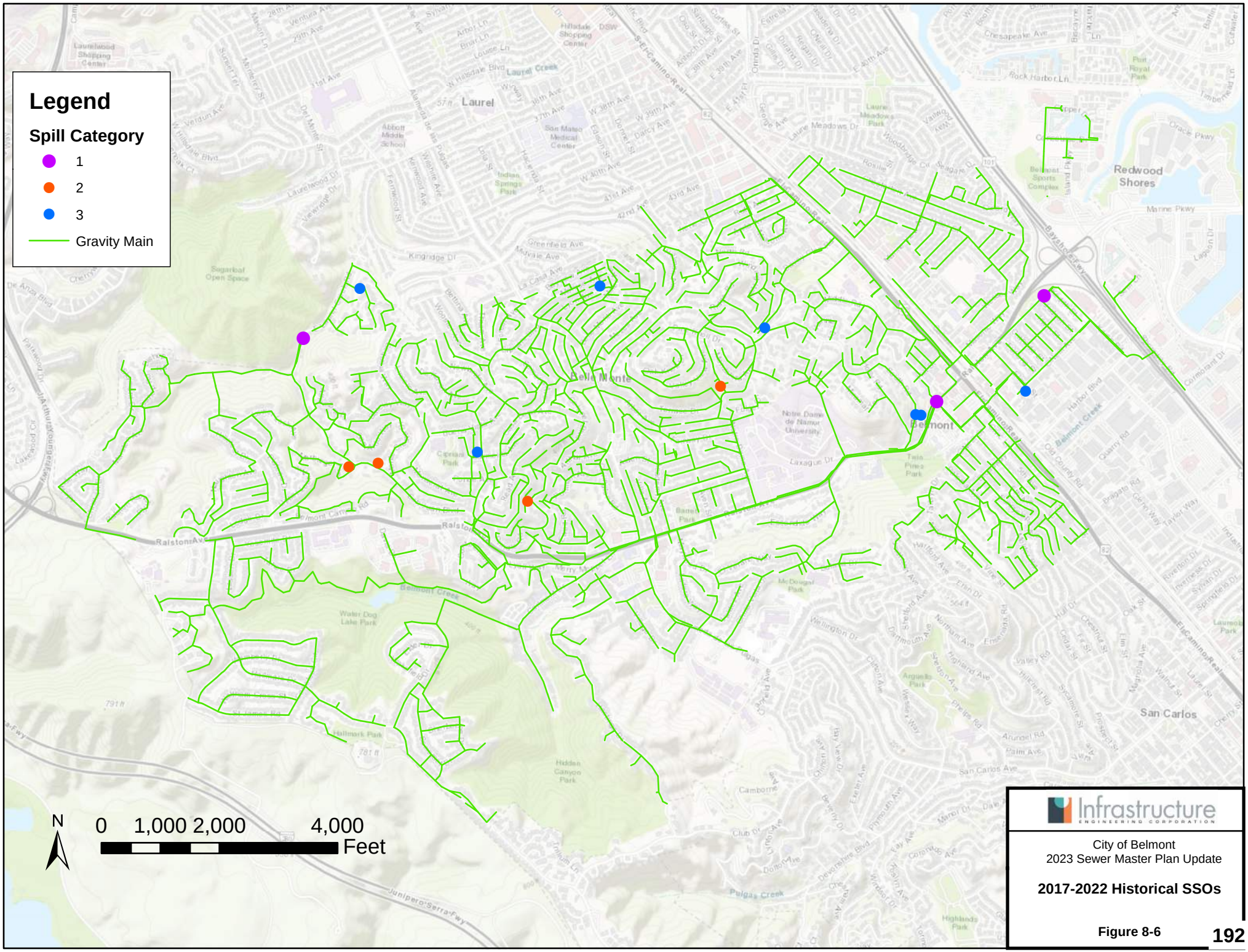


Table 8-6. LOF Scoring by SSOs

SSOs	Score
within 100 ft	10
greater than 100 ft	0


Legend
Spill Category
1
2
3
Gravity Main
N
0 1,000 2,000 4,000
Feet
Laurel
Belmont
Redwood Shores
San Carlos
Infrastructure
ENGINEERING CORPORATION
City of Belmont
2023 Sewer Master Plan Update
2017-2022 Historical SSOs
Figure 8-6

Consequence of Failure (COF)

A pipeline's COF was scored based on five criteria:

- Size
- 2043 PWWF
- Proximity to Critical Facilities
- Proximity to Water Bodies
- Nearest Street Type

Size

Larger pipes usually carry more flows and serve a larger population and are backbones of the system. Failures of larger pipes can result in higher cost of replacement, more adverse impacts to the environment and the community, thus, these pipes are assumed to have a higher consequence of failure. **Table 8-7** lists the risk score by pipe size.

Table 8-7. COF Scoring by Pipe Size

Size (inch)	Score
6	2
8	3
10	4
12	5
15	6
16	7
18	8
21	9
27	10

2043 PWWF

Pipes carrying more flows are assumed with higher consequence of failure. **Table 8-8** lists the risk score by 2043 PWWF.

Table 8-8. COF Scoring by 2043 PWWF

Max. Flow (mgd)	Score
< 0.01	0
0.01 -0.1	2
0.1 - 0.5	4
0.5 - 1	6
1-1.5	8
> 1.5	10

Proximity to Critical Facilities

Pipes located near critical facilities including fire stations, schools, government facilities, sport complexes, and community centers are considered to have higher community impacts. **Table 8-9** lists the risk score by proximity to critical facilities.

Table 8-9. COF Scoring by Critical Facilities

Distance	Score
within 50 ft	10
Within 100 ft	5
Greater than 100 ft	0

Proximity to Water Bodies

Failure of a pipe in close proximity to an above-ground water body can result in SSO into the water bodies, leading to environmental and public health concerns. **Table 8-10** lists the risk score by proximity to the nearest water body.

Table 8-10. COF Scoring by Water Bodies

Distance	Score
Within 100 ft	10
Greater than 100 ft	0

Street Type

Pipes located in busy streets are assumed to have a higher consequence of failure as pipe repair or replacement will aggravate higher volumes of traffic and impact more people. Streets with higher speed limits are considered busier streets such as freeways, highways, and arterial roads. **Table 8-11** lists the risk score by the nearest street type.

Table 8-11. COF Scoring by Speed Limit

Speed Limit (mph)	Score
15 or less	1
20	2
25	3
30	4
35	5
40	6
45	7
50	8
55	9
65	10

Risk Score

After pipes were scored based on the above criteria, a risk analysis was performed in IAP using the Risk Analysis Tool to combine the LOF scores and the COF scores to determine a total risk score for the pipes. Bi-Directional Distribution method is the most commonly used method by IAP users and was used for this risk analysis in this Master Plan. This method allows users to create a matrix of either 3x3 (3 levels of LOF scores and 3 levels of COF scores) or 5x5 to compare the LOF and COF results independently before grading the risk of an asset. **Figure 8-7** is a screenshot of the risk analysis in IAP.

Figure 8-7. Risk Analysis Tool in IAP

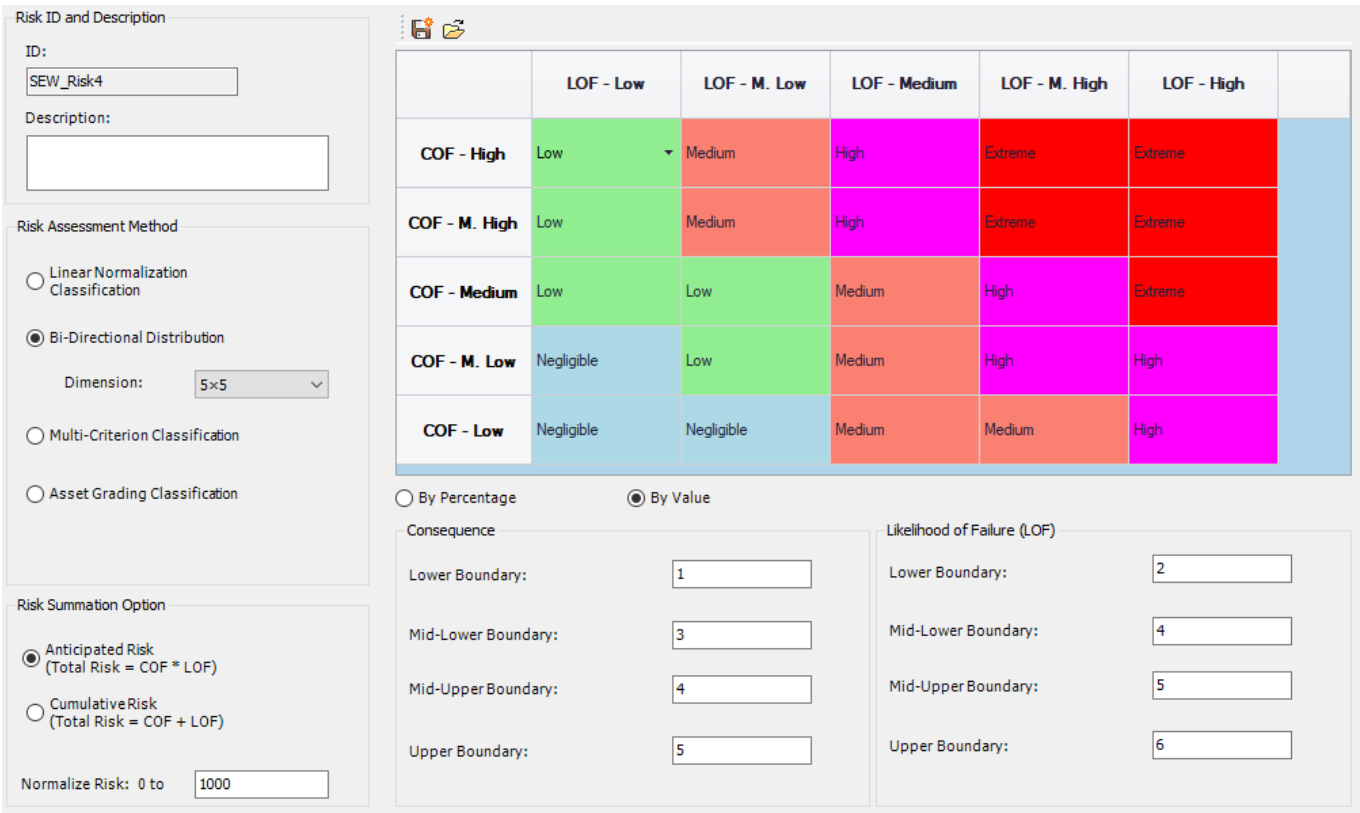


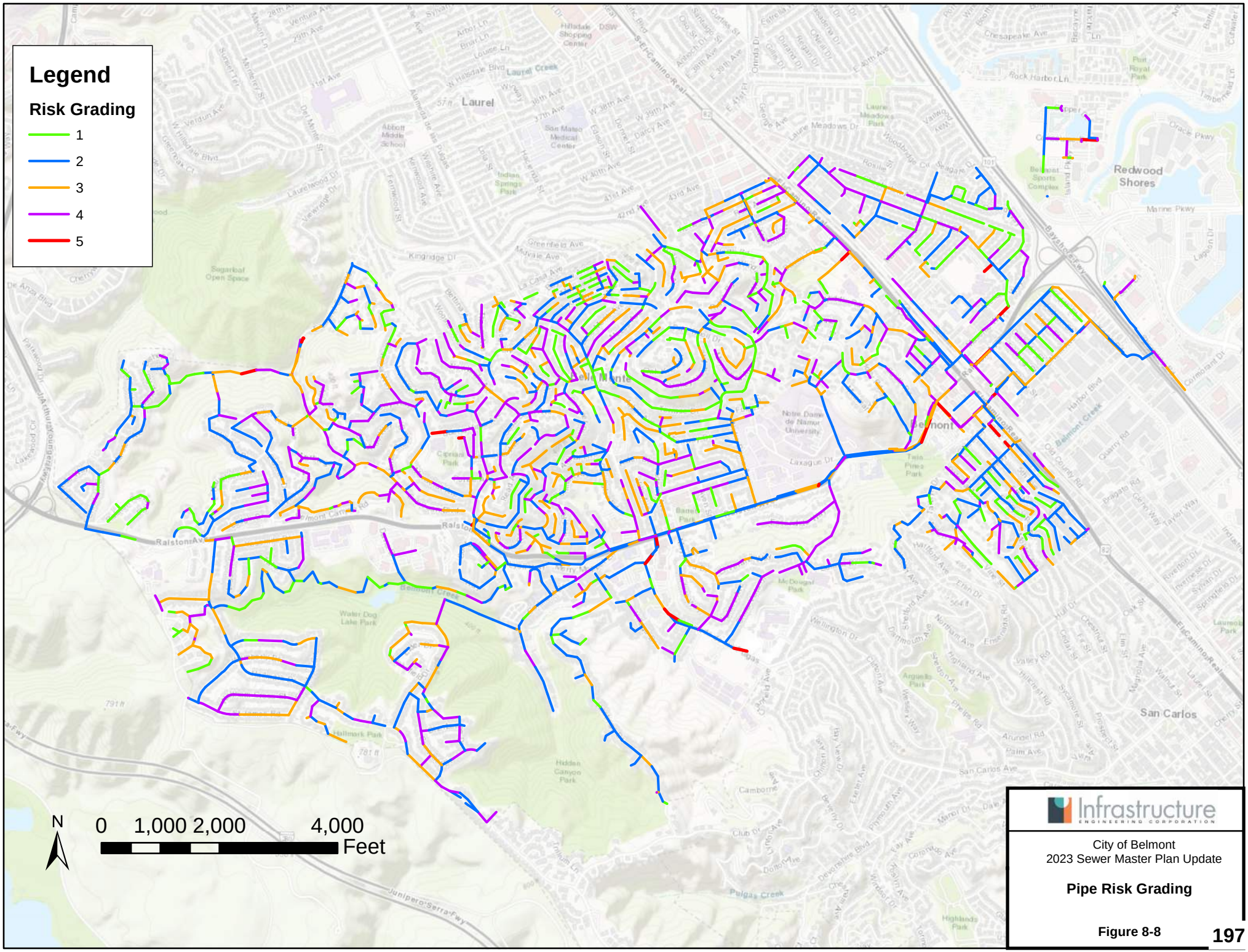
Table 8-12 summarizes the weightings associated with each LOF and COF criterion for the risk analysis. **Table 8-13** presents a summary of the risk analysis results. **Figure 8-8** is a map that shows the gravity mains by risk score.

Table 8-12. Weighting of Risk Criteria

LOF Criteria	Weighting Factor
Structural Rating Index	0.35
Structural Score	0.1
Service Rating Index	0.15
Installation Period	0.1
Material	0.2
SSOs	0.1
COF Criteria	**Weighting Factor**
Pipe Size	0.2
Flow	0.2
Critical Facilities	0.2
Water Bodies	0.2
Traffic	0.2

Table 8-13. Risk Analysis Results Summary

Risk Score	Length (Miles)	% of Total Length	Number of Facilities
1-Negligible	14.16	16.91	473
2-Low	29.1	34.74	847
3-Medium	18.62	22.23	623
4-High	21.06	25.14	626
5-Extreme	0.82	0.97	26


Legend
Risk Grading
1
2
3
4
5
N
0 1,000 2,000 4,000
Feet
Infrastructure
ENGINEERING CORPORATION
City of Belmont
2023 Sewer Master Plan Update
Pipe Risk Grading
Figure 8-8

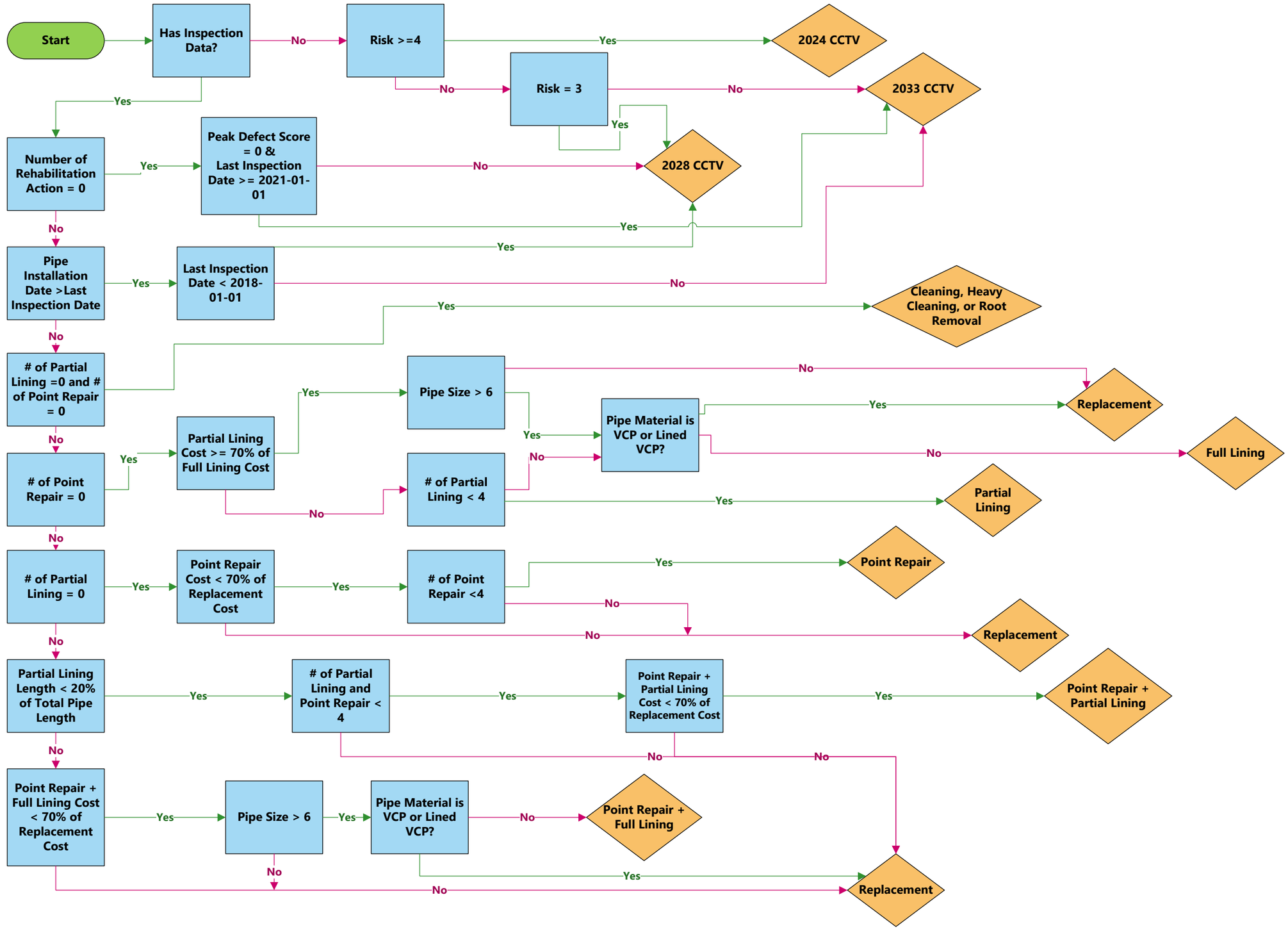
8.1.1.3. Final Gravity Main Rehabilitation Plan

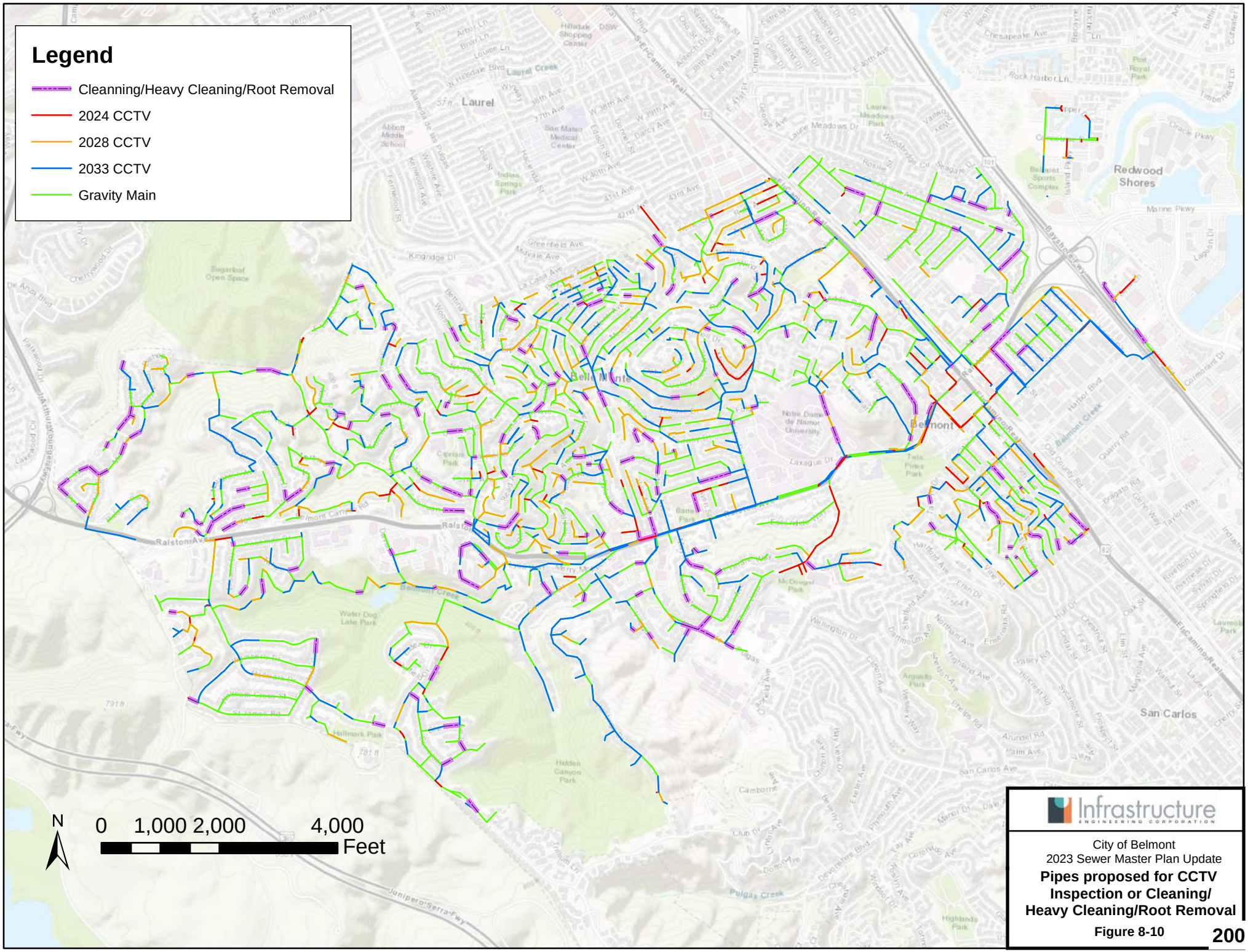
With consideration of both the condition assessment results and risk assessment results, a decision tree was created to make the final recommendations on pipe rehabilitation/replacement. The decision tree is a fully customizable tool in IAP that allows users to specify thresholds for the corresponding rehabilitation method. The decision tree of the final pipeline rehabilitation plan is shown in **Figure 8-9**. The decision tree also considered additional factors such as costs and future maintenance effectiveness. For example, if the partial lining costs or defect repair + partial lining costs is greater than 75% of the replacement cost, the final rehabilitation method is “replacement”. If a pipe is assigned with full lining based on defect type but its size is 6-inch, the final rehabilitation method is “replacement” to avoid future maintenance issues due to a reduced pipe size.

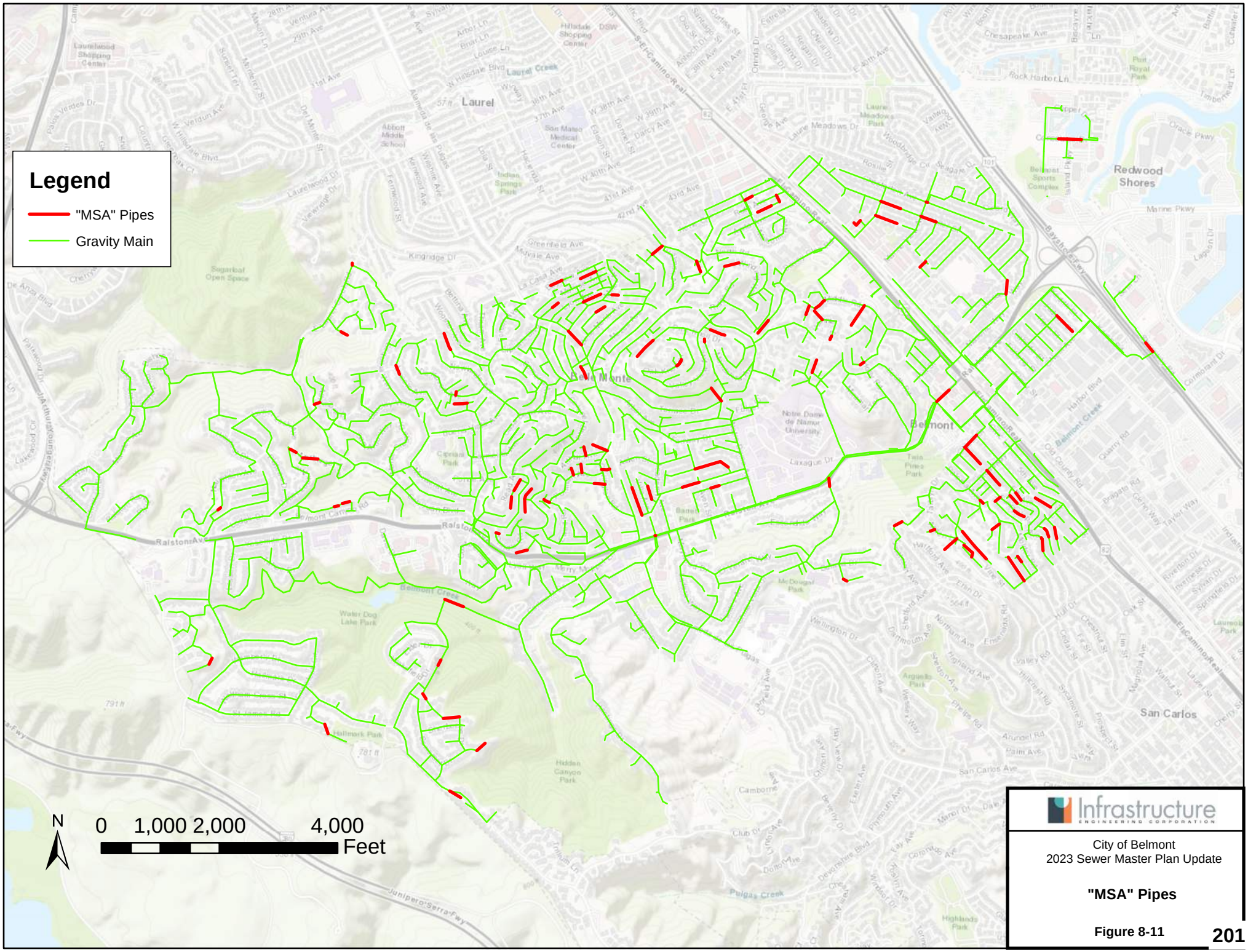
Final rehabilitation methods include CCTV inspection, cleaning/heavy cleaning/root removal, defect repair, full lining, defect repair + partial lining, defect repair + full lining, replacement, and investigation. Rehabilitation/replacement of the gravity mains were recommended to start from high-risk pipelines to low-risk pipelines. Pipelines with risk scores 3 and above were selected for the 16-year CIP, which are discussed in more detail in **Section 9**. **Figure 8-10** shows pipes recommended for CCTV inspection and cleaning/heaving cleaning/root removal.

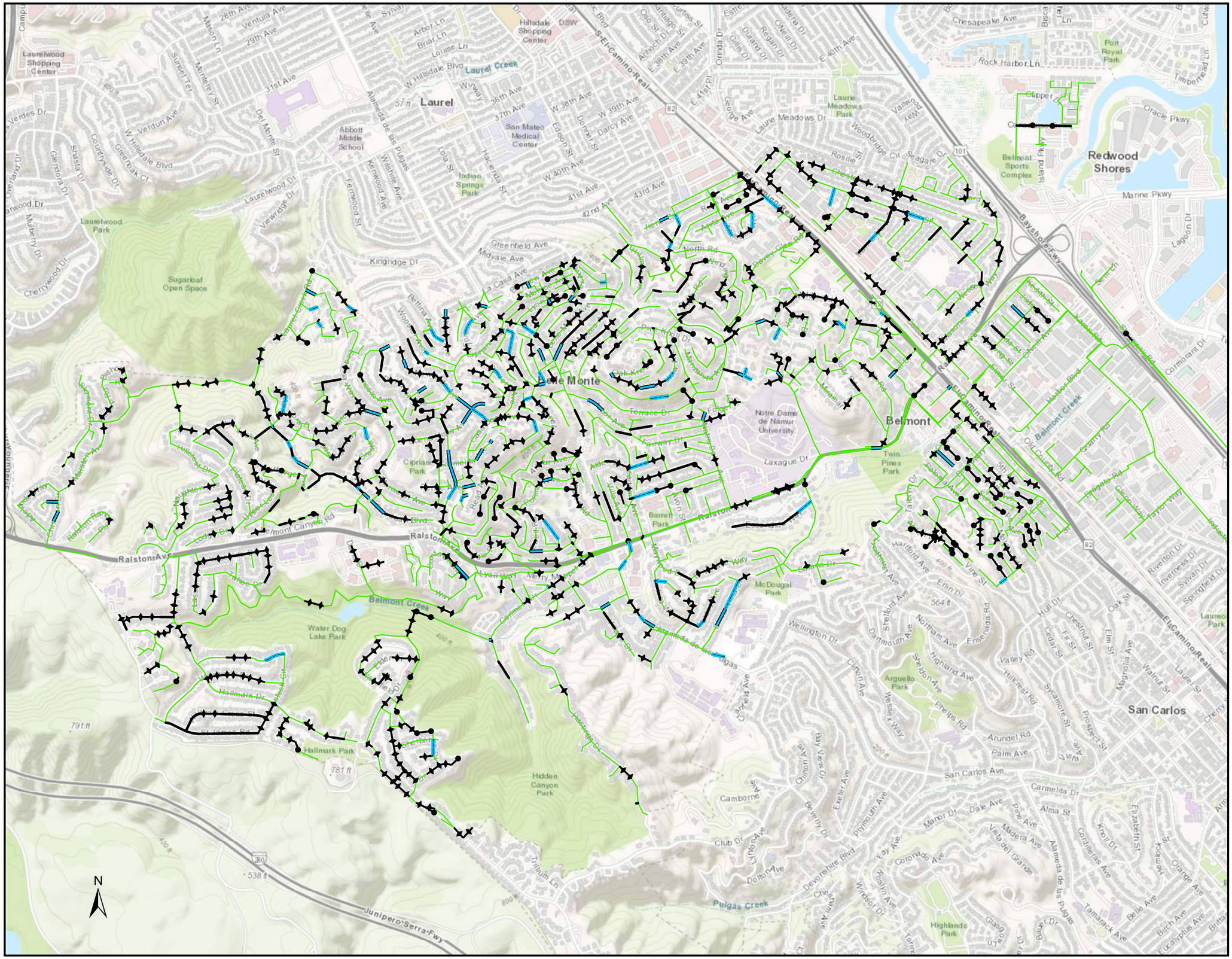
A small portion of gravity mains have incomplete inspection data with a defect code “Miscellaneous Survey Abandoned (MSA)” assigned. Inspections in these pipes were not able to be completed due to various reasons such as obstruction in the inspected pipe, sizes of the inspected pipe, large joint offset, etc. These “MSA” gravity mains would require further investigation and are identified in **Figure 8-11**. **Figure 8-12** shows the final rehabilitation actions for the gravity mains with risk scores 3 and above.

Figure 8-9. Gravity Main Rehabilitation Decision Tree




Legend
Cleanning/Heavy Cleaning/Root Removal
2024 CCTV
2028 CCTV
2033 CCTV
Gravity Main
N
0 1,000 2,000 4,000
Feet
Infrastructure
ENGINEERING CORPORATION
City of Belmont
2023 Sewer Master Plan Update
Pipes proposed for CCTV Inspection or Cleaning/ Heavy Cleaning/Root Removal
Figure 8-10


Legend
"MSA" Pipes
Gravity Main
N
0 1,000 2,000 4,000
Feet
Infrastructure
ENGINEERING CORPORATION
City of Belmont
2023 Sewer Master Plan Update
"MSA" Pipes
Figure 8-11



Legend

Final Rehabilitation Action

- Defect Repair
- Defect Repair + Partial Lining
- Partial Lining
- Replace
- Investigation
- Gravity Main

Infrastructure ENGINEERING CORPORATION

City of Belmont
2023 Sewer Master Plan Update

Final Rehabilitation Actions

Figure 8-12

8.1.2. Lift Stations

As part of the asset management study, a desktop assessment was performed on the City's existing lift stations based on the City's available record drawings, maintenance records, lift station condition assessment studies, and operation staff knowledge. A lift station condition assessment (**2017 PSCA**) was conducted by HydroScience in April 2017, which included documentation of the structural, mechanical, civil, instrumentation, and electrical components of the lift stations, assessment of the physical conditions, and recommended improvements. Recommendations were prioritized into three tiers. The first tier were critical improvements on lift stations that were the most problematic and have immediate issues. The second tier were not as critical but should be completed to mitigate risk and/or replace aging facilities. The third tier were low priority improvements that can be addressed in the long-term future phase.

Based on findings of the 2017 PSCA and input from City staff, assessments for each lift station are summarized below.

8.1.2.1. Island Park LS

The 2017 PSCA indicated that this lift station was generally in fair condition. This lift station was undersized with upstream surcharging occurred during storm events. The wet well was in good condition. Control panel slab was settling. Access for maintenance was considered difficult.

This lift station was recommended to be relocated to the other side of the street. If the lift station is to be remained at its current location, recommended improvements include installation of a flow meter, geotechnical investigation to determine the potential for future settlement at the control panel, redesign of new support system for control panel, adding a mixer, canopy, and safety grate, new access hatch, and replacement of generator. The recommended improvements were considered in high priority with a ranking of 1C.

The City's 2021 Fats, Oils, and Grease (FOG) Program identified Island Park LS as one of the FOG related "hot spot" areas.[22] City staff observed high FOG occurrences at the wet well. However, based on related CCTV inspection data, its upstream line segments did not show severe FOG problem.

In addition, operation and maintenance staff observed high inflow/infiltration (I/I) issue at this lift station. The City has budgeted to rehabilitate the Island Park LS in the near-term (2024-2029) CIP.[23]

8.1.2.2. Sports Complex LS

The 2017 PSCA indicated that this lift station had sufficient capacity and was generally in fair condition except that its electrical system did not meet the electrical service codes. The condition assessment recommended to redesign the electrical system, make improvements to wet well cover, relocate valves for easier access, and replace supports. The recommended improvement was considered as medium priority with a ranking of 2B.

Since this lift station serves the baseball field restrooms and concession stand at the sports complex, it does not use often. The City does not plan on any rehabilitation or upgrades on this lift station in the

[22] Source: Belmont FOG Program dated 12/16/2021
[23] Source: City of Belmont Adopted Fiscal Year 2022 Budget

near future. However, its force main may be upgraded along with the Island Park LS Improvement Project in the near future.

8.1.2.3. Hiller Street LS

The 2017 PSCA indicated that there was significant I/I issues during high tide, and both pumps operated during substantial rainfall events. Surcharges occurred upstream of the lift station during a significant rain event. In generally, this lift station was in fair condition. There was no pump redundancy and no fall protection in the wet well. There was considerable deterioration on the pipes, supports, and structural beams supporting cover. Plug valves and gate valves were not accessible. There was no backup level control and no permanent generator at this location.

This condition assessment recommended to upsize the pumps to include redundancy, add a safety grate, replace structural supports, pipe supports and beams with corrosion resistant material, replace non-operational plug valves and influent gate valves, replace corroded pipe, install canopy over electrical panel, install an articulated jib crane to support maintenance work, install a secondary backup level control system, and provide dedicated bypass connection. The recommended improvements were considered high priority with a ranking of 1D.

Hiller Street LS has been identified as one of the FOG related “hot spot” areas in the City’s 2021 FOG Program.[24] City staff observed high FOG occurrences at the wet well. However, based on related CCTV inspection data, its upstream line segments did not show severe FOG problem.

The City is working on upgrading this lift station and is currently in the design phase. The improvement is anticipated to be completed in 2024/2025.

8.1.2.4. El Camino Real LS

The 2017 PSCA indicated that this lift station could not meet future needs and was in moderately poor condition. This lift station ran solely on float control with no safety grate, no water service available, and no canopy for electrical panel. The lift station was undersized and utilized power from nearby Harbor Stormwater LS.

The condition assessment recommended this lift station to be demolished and completely redesigned. The recommended improvement was considered in medium priority with a ranking of 2A.

The City has recently upgraded the wet well of this lift station for the El Camino Real Force Main improvement project. Since this lift station serves a small area (two buildings), the City does not plan on any upgrades on this lift station in the near future.

8.1.2.5. North Road LS

This lift station was identified to be undersized in both the 2017 PSCA and the 2020 Model Update and CIP Study, and its location was difficult for access and maintenance due to heavy traffic and wet well location in the roadway. Therefore, the City initiated the North Road Lift Station and Force Main Rehabilitation Project in 2019 to relocate and upgrade this lift station, its force main, and gravity sewer main downstream of the force main. The project was completed in March 2022.

[24] Source: Belmont FOG Program dated 12/16/2021

8.1.2.6. Hastings LS

The 2017 PSCA indicated that this lift station has sufficient capacity and was generally in good condition. Minor improvements were recommended that were considered to be in low priority. The City does not plan on any rehabilitation or improvement on this lift station in the near future.

8.1.2.7. Haskins LS

The 2017 PSCA indicated that this lift station had sufficient capacity and was generally in good condition. Minor improvements were recommended that were considered to be as low priority. The City does not plan on any rehabilitation or improvement on this lift station in the near future.

8.1.2.8. San Juan LS

The 2017 PSCA indicated that this lift station was undersized under PWWF condition, and capacity evaluation of this Master Plan also indicated similar results. In addition, the 2017 PSCA indicated that this lift station was in poor condition. The lift station had no sufficient redundancy, and deteriorations were found throughout the wet well and building. Wet well shape created short circuiting and had poor hydraulics.

The condition assessment recommended significant modifications in this lift station such as adding a third pump, replacing wet well cover and grate, adding a temporary pump for redundancy, adding seismic restraints to the generator, upgrading wet well piping, etc. The recommended improvements were considered as high priority with a ranking of 1B.

The City has planned on rehabilitation/improvements of this lift station and has budgeted it in the near-term CIP. Since this lift station has capacity issues under existing significant rain events, it is included as a near-term capacity-related CIP project in this Master Plan.

8.1.2.9. Naughton LS

The 2017 PSCA indicated that this lift station had sufficient capacity for PWWF and was in decent condition. Minor improvements were recommended and were considered as low priority. The City does not plan on any rehabilitation or improvement of this lift station in the near future.

8.1.2.10. Ralston Ranch LS

The 2017 PSCA indicated that this lift station had sufficient capacity for PWWF. The wet well had a considerable amount of rust making it unsafe and was poorly accessible for maintenance. Access hatch framing was corroded. Accesses to the site, to the valves, and to the electrical panel were difficult.

The condition assessment recommended a few improvements in this lift station such as replacing the access hatch and corroded equipment, adding a backup level control system, installing a valve vault and relocating valves from inside the wet well, etc. These recommended improvements were considered as medium priority with a ranking of 2C.

Due to poor accessibility for maintenance and pump model no longer manufactured, the City is considering upgrade to this lift station and has budgeted it in the intermediate-term CIP.

8.1.3. Force Main

As part of the condition assessment study, a desktop assessment was performed on the City's existing force mains based on the City's record drawing, maintenance records, force main condition assessment studies, and operation staff knowledge. The most recent force main condition assessment (2015 FMCA) was conducted by Pure Engineering Services Inc. in April 2015, which included documentation of the City's force main inventory, engineering analysis, condition assessment, and rehabilitation recommendations. The 2015 FMCA was made based on findings from various field investigation techniques including leak and gas pocket detection survey, hydrogen sulfide monitoring, pressure transient monitoring, hydraulic evaluation, pipe wall assessment for selected mains, soil corrosion, and fatigue analysis.

As part of the 2015 FMCA, a risk analysis was performed on the force mains based on the LOF and COF, and the force mains were rated from low to high risk. Recommendations were prioritized into near-term and long-term phases. The near-term improvements were critical improvements to be taken within six months to address immediate concerns, and the long-term improvements were optional improvements in a 30-year horizon to extend the remaining useful life of the force mains.

Following the 2015 FMCA, in 2018, National Corrosion performed a series of Cathodic Protection (CP) tests on four of the City's force mains to determine the feasibility of implementing CP system on the force mains. Four force mains were selected based on the findings from the 2015 FMCA.

Based on findings of the 2015 FMCA, the 2018 CP testing report, and interviews with City staff, assessments for each force main are summarized below.

8.1.3.1. Island Park FM

The 2015 FMCA indicated that the PVC portion of this force main was in serviceable condition while the CIP portion required further investigation based on the results from the field investigation assessments. Field investigation results indicated that the PVC portion had low internal and external corrosion potential and no immediate risk of fatigue failure under current operating conditions. The CIP portion had high internal and external corrosion potential based on the observed high hydrogen sulfide concentrations, the presence of several gas pockets, and the severely corrosive soil condition. The likelihood of failure of this force main was identified as high, and the consequence of failure of this force main was identified as moderate. The overall risk rating of this force main was high.

The condition assessment recommended additional field investigation assessments to identify pipe wall deterioration, installation of CP system on the CIP portion to mitigate external corrosion potential, and operation adjustments to minimize the effects of pressure transients.

Following the 2015 FMCA, a CP Testing was conducted on the City's force mains with metallic components. The Island Park FM was one of the force mains that have been tested. The testing study was not able to locate the metallic portions of the pipeline which indicated that this force main was not in fact metallic and/or was not electrically continuous. No further actions were recommended in the 2018 CP testing report for this force main.

The City is planning to rehabilitate the Island Park Lift Station as well as the force main based on the findings from the condition assessments and has budgeted it in the near-term CIP.

8.1.3.2. Sports Complex FM

The Sports Complex FM is a short 2-inch force main that connects to the Island Park FM. Due to its small size, it was not included in the 2015 FMCA and the 2018 CP testing report. There are no known problems with this force main. This force main is not used often because the Sports Complex LS only serves the baseball field restrooms and concession stand at the sports complex.

Although this force main does not rate high in criticality, due to the Sports Complex FM connecting to the Island Park FM, the City has considered upgrading of the force main as part of the Island Park FM improvement in the near future.

8.1.3.3. Hiller Street FM

The 2015 FMCA indicated that this force main was in serviceable condition based on the results from the field investigation assessments with low internal corrosion potential and minor external corrosion concern. The likelihood of failure of this force main was identified as low, and the consequence of failure was identified as moderate. The overall risk rating of this force main was low.

The condition assessment recommended destructive testing at predetermined locations within the ACP portion of the force main in the near-term and proactive non-destructive assessments on this force main and ovality testing of the HDPE portion in the long-term.

Since the condition assessment was done nine years ago, the City anticipates to perform another condition assessment with destructive testing on the force main to further evaluate the condition of this force main in the near-term CIP.

8.1.3.4. El Camino Real FM

The City replaced this force main in 2021 with slight change in size, alignment, and material.

8.1.3.5. North Road FM

The City has installed a new 12-inch force main as part of the North Road LS Replacement and Force Main Rehabilitation Project, which was completed in March 2022. The old North Road FM was kept in place for redundancy purpose.

8.1.3.6. Hastings FM

The 2015 FMCA indicated that this force main was in serviceable condition based on the results from the field investigation assessments with low internal and external corrosion potential. The likelihood of failure of this force main was identified as low and the consequences of failure of this force main were identified as moderate. The overall risk rating of this force main was low.

The condition assessment recommended implementation of soft start/stop controls on the pumps to minimize the effects of pressure transients and destructive assessment at predetermined locations in the near term and further non-destructive assessment in the long run.

The City has not planned for any rehabilitation or improvements of this force main in the near future.

8.1.3.7. Haskins Force Main

The 2015 FMCA indicated that this force main was in serviceable condition based on the results from the field investigation assessments with lower internal and external corrosion potential. The likelihood of

failure of this force main was identified to be low and the consequence of failure of this force main was identified to be moderate. The overall risk rating of this force main was low.

The condition assessment recommended destructive assessment at predetermined locations in the near term and further non-destructive assessment in the long run.

The City has not planned for any rehabilitation or improvement of this force main in the near future.

8.1.3.8. San Juan Force Main

The 2015 FMCA indicated that this force main was in serviceable condition based on the results from the field investigation assessments with low internal and external corrosion potential. The likelihood of failure of this force main was identified to be moderate. The force main was rated with a high consequence of failure because it carries flows from the City's largest lift station and is located in a densely populated area. The overall risk rating of this force main was moderate.

The condition assessment made near-term recommendations on pump operations to minimize pressure transients and non-destructive assessment to proactively evaluate corrosion issue in the long run.

Following the 2015 FMCA, a CP testing was conducted on the City's force mains with metallic components. San Juan FM was one of the force mains that have been tested. Results indicated that the force main was not electrically continuous. Due to the lack of electrical continuity, relatively high current demand to achieve cathodic protection, and the long pipe length, the study determined that installation of cathodic protection systems would not be a viable option.

The City performs routine checks on the force main's CP system and has planned on installing a new parallel force main while keeping the existing force main for redundancy and maintenance purposes. The new parallel force main is budgeted in the 2024-2028 CIP.

8.1.3.9. Naughton Force Main

The 2015 FMCA indicated that this force main was in serviceable condition based on the results from the field investigation assessments with low internal and external corrosion potential and no immediate risk of fatigue failure under current operating conditions. The likelihood of failure of this force main was identified as low and the consequence of failure of this force main was identified as low. The overall risk rating was low. No actions were recommended for this force main.

The City has not planned for any rehabilitation or improvement of this force main in the near future.

8.1.3.10. Ralston Ranch Force Main

The 2015 FMCA indicated that this force main was in serviceable condition based on the results from the field investigation assessments with low internal and external corrosion potential and no immediate risk of fatigue failure under current operating conditions. The likelihood of failure of this force main was identified as low and the consequence of failure of this force main was identified as low. The overall risk rating was low. No actions were recommended for this force main.

The City has not planned for any rehabilitation or improvement of this force main in the near future.

Condition assessment matrices were created for the lift stations and force mains, included as **Appendix I**.

9. Capital Improvement Program (CIP)

This section discusses the recommended projects to be considered in a prioritized CIP with a 16-year planning horizon and cost estimations of the CIP. The CIP is phased into near-term CIP(2024 – 2029), intermediate-term CIP (2030 – 2034), and long-term CIP (2035 – 2039).

9.1. Unit Costs

Planning-level unit costs were developed based on local bid results between 2018 and 2023 and similar studies completed in the past 5 years. The cost estimates in this study are provided for planning purposes and represent "Class 4 for Studies or Feasibility Report" level costs as established by the American Association of Cost Engineers (AACE), with an accuracy of +50% to -30%. Construction unit costs shown herein represent the typical construction unit cost for the individual item of work (e.g., partial lining, point repair, replacement, etc.) plus additional costs associated with a typical construction project such as mobilization, demobilization, permits, traffic control, lateral reinstallation, etc. Capital unit costs include construction costs plus 30% contingency for costs associated with engineering, construction management and inspection, and project administration and legal. Capital unit costs presented herein are in 2023 U.S. Dollars. Since prices of material and labor fluctuate with time, costs should be re-estimated during the preliminary design of a project to confirm budget amounts.

Table 9-1 to **Table 9-6** list the unit costs of the different rehabilitation/replacement methods for gravity mains and manholes.

Table 9-1. Pipe Replacement/Upsizing Unit Costs

Pipe Size	Construction Unit Costs ($/LF)	Capital Unit Cost ($/LF)
6	477	620
8	500	650
10	646	840
12	685	890
15	715	930
18	762	990
21	923	1,200
24	1,054	1,370
27	1,185	1,540
30	1,315	1,710

Table 9-2. Partial Lining Unit Costs

Pipe Size	Construction Unit Costs ($/LF)	Capital Unit Cost ($/LF)
6	328	426
8	365	474
10	392	510

Table 9-2. Partial Lining Unit Costs

Pipe Size	Construction Unit Costs ($/LF)	Capital Unit Cost ($/LF)
12	429	558
15	531	690
18	794	1,032
21	1,191	1,548
24	1,454	1,890
27	1,635	2,126

Table 9-3. Full Lining Unit Costs

Pipe Size	Construction Unit Costs ($/LF)	Capital Unit Cost ($/LF)
6	87	113
8	97	126
10	105	137
12	114	148
15	141	183
18	213	276
21	318	413
24	388	504
27	437	568

Table 9-4. Point Repair Unit Costs

Pipe Size	Construction Unit Costs ($ ea.)	Capital Unit Cost ($ ea.)
6	14,400	18,720
8	17,262	22,440
10	19,431	25,260
12	20,954	27,240
15	23,585	30,660
18	25,477	33,120
21	26,769	34,800
24	27,508	35,760
27	27,877	36,240

*assumed 6-ft point repair

Table 9-5. Manhole Repair/Replacement Unit Costs

Rehabilitation Method	Construction Unit Costs ($ ea.)	Capital Unit Cost ($ ea.)
Rehabilitation	10,385	13,500
Replacement	21,250	27,625

Table 9-6. Force Main Unit Costs

Pipe Size	Construction Unit Costs ($/LF)	Capital Unit Cost ($/LF)
8	377	490
10	423	550
12	454	590

9.2. Capacity-related Improvements

Capacity-related improvement projects were developed based on the deficient pipelines identified in **Section 7**. There are 16 capacity-related gravity main improvement projects identified. The projects were prioritized into the near-term CIP, intermediate-term CIP, and long-term CIP based on results from the capacity evaluation, results from the condition assessment, as well as inputs from City staff. **Figure 9-1** shows the locations of the proposed capacity-related CIP projects. Zoom-in exhibits of the proposed capacity-related CIP projects are included in **Appendix J**. For CIP budgeting purposes, 50% of the manholes connecting to the gravity mains proposed to be upsized are assumed to be replaced as part of the projects. Improvements near Karen Rd & Harbor Blvd (CCIP_8) were split into two parts, CCIP_8A and CCIP_8B, based on the proposed re-routing connection of the HIA system.

In order to meet the pump capacity criteria, San Juan LS is recommended for upsizing to accommodate existing and future PWWF.

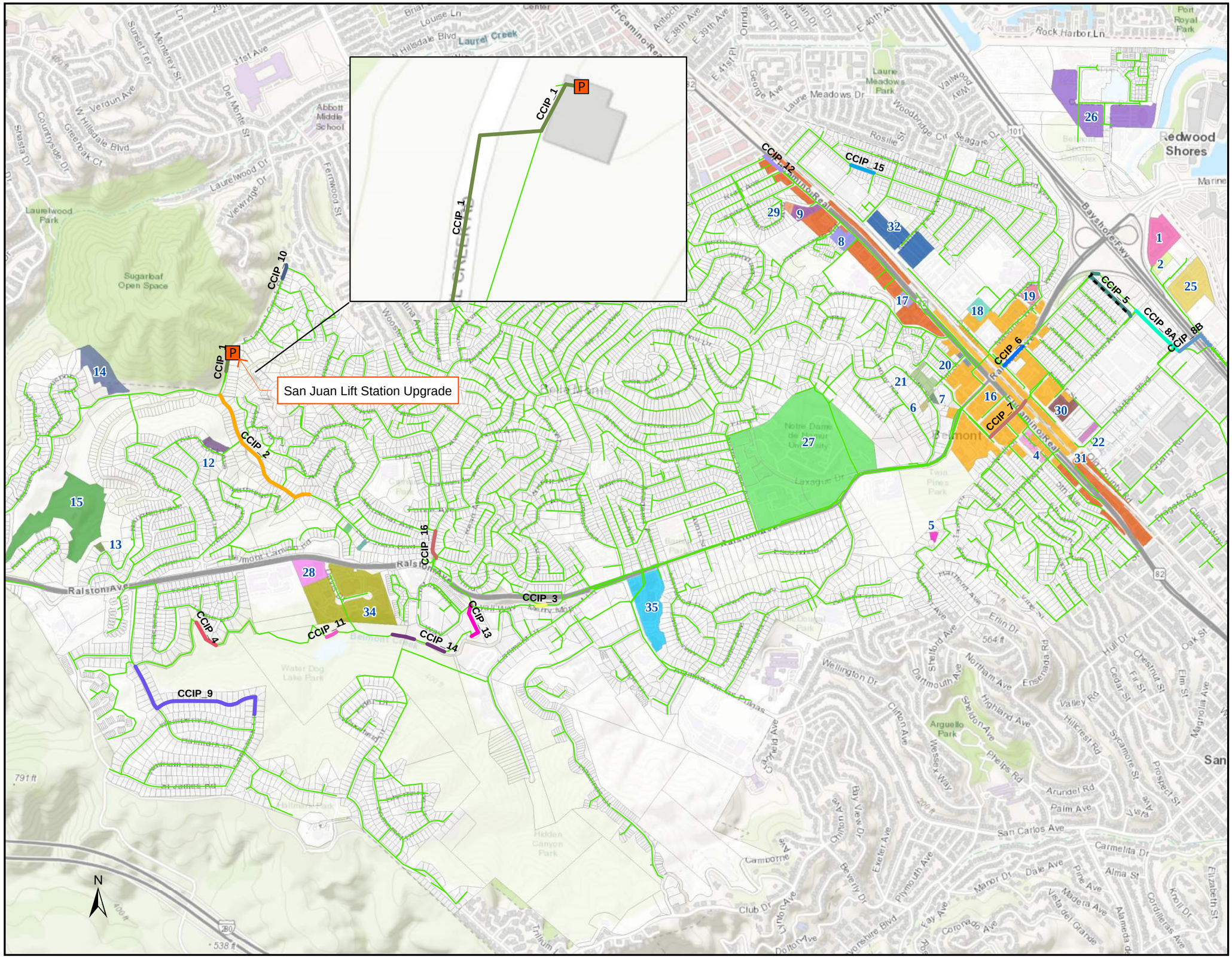
9.3. Condition-related Improvements

As mentioned in **Section 8**, it is recommended that gravity mains with risk score 3 or above to be repaired/replaced as part of the CIP, as shown in **Figure 9-2**. There are approximately 27 miles of gravity mains proposed with point repairs, point repairs + partial lining, partial lining, investigation, and replacement. Pipelines proposed for CCTV inspection, cleaning/ heavy cleaning, and root removal are assumed to be done in-house and were excluded from CIP cost estimations.

The City historically rehabilitated approximately 8,000 LF or 1.5 miles of pipelines per year. Concurrently, the City developed the 2024-2029 Pavement Plan proposing roads to be rehabilitated each year. Pipelines in or near the roads proposed to be rehabilitated between 2025 and 2029 are assumed to be rehabilitated alongside with pavement rehabilitation to avoid repeated excavations, minimize inconvenience to residents, and reduce other future disruptions. Pipelines in the roads proposed to be rehabilitated in 2024 would not be simultaneously rehabilitated due to the tight schedule and are assumed to be rehabilitated in 2030 as part of the intermediate-term CIP.

The remaining pipelines are grouped into the intermediate-term CIP and long-term CIP based on risk scores and locations. Pipelines recommended for capacity-related improvements are excluded from condition-related improvements. For CIP budgeting purposes, 30% of the manholes connecting to the pipelines proposed to be repaired/replaced are assumed to be rehabilitated as part of the projects. Fifty percent (50%) of the pipelines that required further investigation are assumed to be in need of replacement.

Based on previous condition assessment studies on lift stations and force mains and interviews with City staff, Hiller LS, Island Park LS, Ralston LS, Island Park FM, Sports Complex FM, and San Juan FM are proposed to be rehabilitated. Details of the proposed condition-related improvement projects are included in **Appendix K**.



Legend

- San Juan Lift Station
- Proposed to be abandoned

Capacity-Related Improvement

- CCIP_1
- CCIP_2
- CCIP_3
- CCIP_4
- CCIP_5
- CCIP_6
- CCIP_7
- CCIP_8A
- CCIP_8B
- CCIP_9
- CCIP_10
- CCIP_11
- CCIP_12
- CCIP_13
- CCIP_14
- CCIP_15
- CCIP_16
- Gravity Main
- Parcel

Future Developments

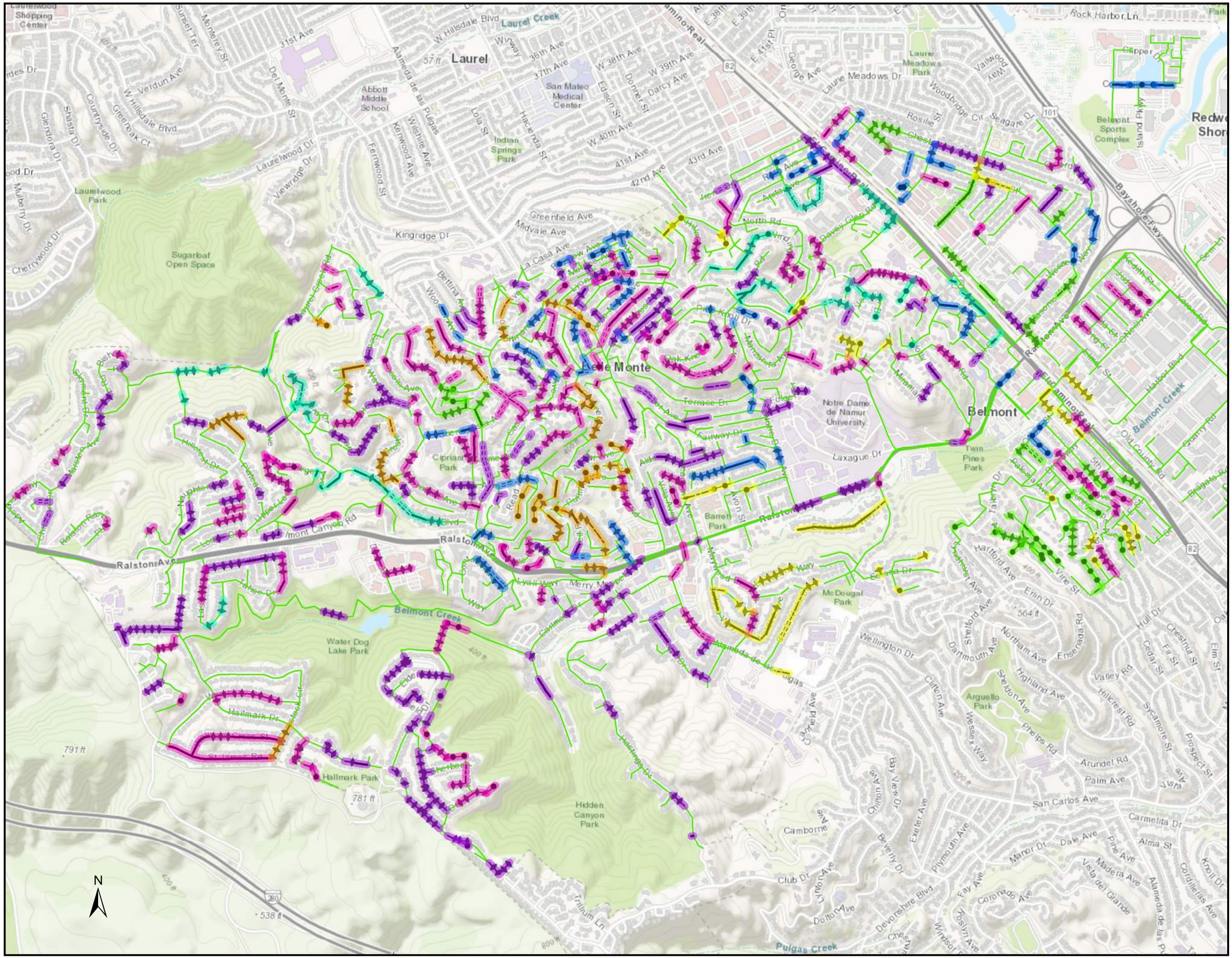
- 1, Shoreway Place
- 2, Hilton Homewood Suites Hotel
- 3, Marriott Springhill Suites Hotel
- 4, Firehouse Square
- 5, 1320 Talbryn
- 6, 900 South Rd
- 7, 905 South Rd
- 8, 490 El Camino Real
- 9, 803 Belmont Ave,803 Belmont Ave
- 10, 2837 San Juan
- 11, 2847 San Juan
- 12, Piazza Lands
- 13, 3858 W. Naughton
- 14, 2007 Bishop
- 15, 3900 Marsten
- 16, Belmont Village
- 17, 576- 600 El Camino Real
- 18, 815 Old County Rd
- 19, 580 Masonic Way
- 20, 900 El Camino
- 21, Belmont Townhomes
- 22, Harbor Line
- 25, 1301 Shoreway Rd
- 26, Island Park
- 27, NDNU-Standford
- 28, 2 Davis Drive
- 29, Van's restaurant
- 30, Artisan Crossing
- 31, El Camino Real Corridor Mixed Use
- 32, Old County Rd
- 34, Davis Drive
- 35, Carlmont Shopping Center

Infrastructure ENGINEERING CORPORATION

City of Belmont
2023 Sewer Master Plan Update

Proposed Capacity-Related CIP Projects

Figure 9-1



Legend

Phase

- Phase
- 2026
- 2027
- 2028
- 2029
- 2034
- 2039

Rehabilitation Actions

- Defect Repair
- Defect Repair + Partial Lining
- Partial Lining
- Replace
- Investigation
- Gravity Main

Infrastructure ENGINEERING CORPORATION

City of Belmont
2023 Sewer Master Plan Update

Proposed Condition-Related CIP Projects

Figure 9-2

9.4. SCADA CIP

Ardurra staff held a conference call with City senior staff on June 15th, 2022, to discuss the current state of their SCADA system. One of the primary objectives of the call was to determine if any course corrections in the evolution of the SCADA system were necessary. Based on the information received, Ardurra sees no compelling reason to make any major changes. The following is a summary description of the call and related assessment.

9.4.1. SCADA System Assessment

The City's current SCADA system is relatively small and focused solely on wastewater operations. There are 10 lift stations connected to a Mission Communications SCADA System. The City has recently implemented a solution called VTSCADA manufactured by Trihedral Engineering at the North Road LS. In the past, the City used a different telemetry system but due to difficulties with receptions, presence of canyons and trees, telemetry antennas were not able to transfer signals. As a result, the City switched to the Mission Communications SCADA System.

The solution provided by Mission Communications fits the City's budget well. Comments by staff indicated that the system is meeting their needs well. Remote control of devices may be the only feature lacking with this solution. For the next 5 to 10 years it's likely that they can provide cost-effective solutions for the City. Mission Communications has a good history of releasing upgrades to their product lines which the City can implement as necessary.

Mission Communications builds and programs the control modules that get installed in the City's lift station. Moreover, they maintain the hardware that receives data from field devices. Staff is provided a secure web portal with which they can see the data. Maintenance workers carry pagers that receive lift station messages sent through the SCADA system. Since Missions Communications provides most of the devices and owns a portion of the network infrastructure, they are responsible for a significant part of system security. They must be held to the highest industry standards and periodically inspected to ensure they are meeting or exceeding applicable standards. Cellular service providers also provide network security as data traverses their network.

VTSCADA has some features that staff finds attractive. By using a different manufacturer, the City is mitigating a security risk with their legacy system provider. If a vulnerability is exploited in the Mission Communications system, it will very likely not affect the North Road LS. Diversifying SCADA technology, while a potential benefit to security, places a greater burden on staff. They need to learn how to operate and maintain a completely different system. For a one-off site this should not be too onerous. Additionally, spare parts inventory costs will increase slightly as well.

The same concern about future needs regarding Mission Communications applies to VTSCADA. For any solution to be considered suitable for the long term, it must evolve as the City's needs evolve.

The City's SSMP, revised August 27, 2020, states "public observation is the most common way that the City is notified of blockages and spills". A method used at other agencies to prevent or mitigate SSOs is by using level sensors installed in manholes located at key points in the system. These level sensors are equipped with cellular modems which relay high level alarms to system operators prior to actual spills. With enough advanced warning operators can clear blockages or contain spills before they reach waterways. There are a few level sensors to choose from which perform this type of function. These types of sensors (or solutions) are usually not incorporated into SCADA systems, but rather augment them.

If the City were to replace the legacy SCADA system in its entirety with something different, then a carefully considered approach will be necessary. Many questions will need to be answered before an upgrade project can be put out to bid. Unless a proprietary system is opted for, then the new system will consist of an HMI (and its ancillary components) and a PLC platform for remote sites which in many cases are provided by different manufacturers. The HMI and PLC can be sourced from one supplier if necessary, but this involves some trade-offs. Just how much interaction the SCADA system will have with other enterprise applications is a question that gets more attention these days. Detailed system requirements are highly recommended as the relative weighting of requirements will dictate the overall system design.

Rough cost estimates for upgrading a system like what the City operates are as follows:

Software - $10,000 to $100,000

Hardware - $350,000 to $700,000

Integration - $300,000 to $400,000

Based on this review, the City has opted not to make changes to its existing SCADA system at present.

9.5. Cost Estimates

Ardurra worked closely with City staff to develop the CIP cost estimations. Gravity main improvement projects typically have a 2-year project schedule with one year of design and one year of construction, while lift station and force main improvement projects typically have a 3-year project schedule with one year of design and two years of construction. Costs for the near-term CIP were estimated on a yearly basis and costs for the intermediate-term CIP and long-term CIP were estimated on a 5-year increment. **Table 9-7** summarizes the cost estimations associated with the proposed capacity-related improvements in the CIP based on the unit costs established in Section 9.1 and the anticipated years of implementation. The proposed 27-inch parallel pipe in CCIP_8B requires crossing of the 101 Freeway and would need to be constructed via microtunneling. A unit cost of $4,800/LF was included to estimate the capital costs of the proposed 27-inch parallel pipe to account for the costs associated with microtunneling. Due to the complexity of the project, it is anticipated with a 3-year project schedule. The future HIA flows were proposed to be discharged into the City's sewer system at the upstream manhole of the proposed 27-inch parallel pipe. Per the City's Sewer Design Guide (**Appendix B**), developers are responsible for share costs of the system improvements. The share costs were determined based on a percentage of the total improvement costs proportional to the ratio of the development ADWF over the total ADWF of the facilities recommended for improvement. In this case, the HIA developers would be responsible for share costs of CCIP_8B, which was estimated to be approximately $315,000.

As shown in Figure 9-2, the pipelines have been grouped into 7 batches for rehabilitation. The first five batches were phased on a yearly basis aligned with the 2024-2029 Pavement Plan while the last two batches were phased on a 5-year increment for the intermediate-term CIP and long-term CIP. Details of the cost estimations and phasing for the condition-related CIP by facility type and rehabilitation methods can be found in **Appendix K**. The City's Sewer Near-term CIP Summary Sheet for 2024-2030 is included as **Appendix L**.

Table 9-8 summarizes the cost estimations associated with the proposed capacity-related improvements and condition-related improvements by planning year. Costs estimated in **Tables 9-7 and 9-8** are presented in 2023 U.S. Dollars. **Table 9-9** summarizes the total CIP costs by phase. Total

CIP costs for near-term CIP, intermediate-term CIP, and long-term CIP are $35.9 Million Dollars, $21.5 Million Dollars, and $11.4 Million Dollars, respectively.

Table 9-7. Cost Estimation and Phasing for Capacity Related Improvements

Gravity Main & Manholes			Gravity Main				Manhole				
CIP Project	Project Description	Phase	Size (in.)	Length (ft)	Unit Cost ($)	Cost ($)	Total # of Connected Manholes	Estimated # of Manhole Replacement	Unit Cost ($)	Costs ($)	**Total Costs ($)**
CCIP_1	upsize the 8" inlet pipe to San Juan PS to 15"	2024-2025	15	325	930	302,250	5	3	27,600	82,800	385,050
CCIP_2	upsize existing 6" line in San Juan Blvd between Laurel Creek Rd and Marburger Ave to 8"/10" lines	2024-2025	10	1506	840	1,265,040	17	9	27,600	248,400	2,107,960
		2024-2025	12	668	890	594,520					
CCIP_3	upsize existing 12" line in Lyall Way between manholes 442624A and 442624C to 18"	2025-2026	18	146	990	144,540	3	2	27,600	55,200	199,740
CCIP_6	1. Abandon existing 10" line segment in Elmer St connecting to the 18" line in Ralston Ave 2. Upsize and regrade existing 18" in Ralston Ave between Elmer St and Old County Rd to 21"	2027-2028	21	846	1,200	1,015,200	3	2	27,600	55,200	1,070,400
CCIP_7	upsize and regrade existing 18" line in Waltermire St between 6th St and Old County Rd to 21"	2027-2028	21	101	1,200	121,200	9	5	27,600	138,000	259,200
CCIP_4	upsize existing 6" line west of Tahoe Dr and Bryce Ct to 10"	2030 - 2034	10	400	840	336,000	3	2	27,600	55,200	391,200
CCIP_5	1. Abandon existing 6" line in Kedith and the 12" line in Ralston Ave northeast of Kedith St that connects to 21" 2. add a new 12" line in Kedith St between Ralston Ave and O'Neill Ave to redirect flow to discharge into the 21" line in O'Neil Ave 3. upsize existing 21" line at the corner of Ralston Ave and Dairy Ln to 27"	2030 - 2034	12	750	890	667,500	8	4	27,600	110,400	1,486,300
		2030 - 2034	27	460	1,540	708,400					
CCIP_8A	1. upsize existing 21" line in Karen Rd to 27" 2. upsize the existing 27" line in Harbor Blvd between manholes 4013423D and 403423E to 30"	2028-2030	27	784	1,540	1,207,360	3	2	27,600	55,200	1,414,750
		2028-2030	30	89	1,710	152,190					
CCIP_8B	1. add a new 27"parallel line crossing Hwy 101 northeast of Karen Rd via microtunneling connecting to existing 18" line in Shoreway Rd. 2. upsizing existing 18" line in Shoreway Rd between the new 27" line and the existing 27" line to 27"	2028-2030	27	392	6,340	2,485,280	4	2	27,600	55,200	2,863,880
		2028-2030	27	210	1,540	323,400					
CCIP_9	1. upsize existing 8" line in Hallmark Dr between Lake Rd and Comstock Cir to 10" 2. upsize existing 6" line in Comstock Cir east of Hallmark Dr to 8"	2030-2034	8	1756	650	1,141,400	9	5	27,600	138,000	1,869,920
		2030-2034	10	703	840	590,520					
CCIP_12	upsize existing 8" line in El Camino Real southeast of North Rd to 12"	2030-2034	12	167	890	148,630	3	2	27,600	55,200	203,830

Table 9-7. Cost Estimation and Phasing for Capacity Related Improvements

Gravity Main & Manholes			**Gravity Main**				**Manhole**				
CIP Project	Project Description	Phase	Size (in.)	Length (ft)	Unit Cost ($)	Cost ($)	Total # of Connected Manholes	Estimated # of Manhole Replacement	Unit Cost ($)	Costs ($)	**Total Costs ($)**
CCIP_10	upsize existing 8"/6" inlet pipe to Haskins PS to 10"	2035 - 2039	10	326	840	273,840	3	2	27,600	55,200	329,040
CCIP_11	upsize existing 8" line north of Water Dog Lake between manholes 433408 and 433410 to 10"	2035 - 2039	10	201	840	168,840	3	2	27,600	55,200	224,040
CCIP_13	upsize existing 10" line southeast of Continentals Way between manholes 453708 and 453712 to 12"	2035 - 2039	12	549	890	488,610	4	2	27,600	55,200	543,810
CCIP_14	1. upsize existing 8" line south of Continentals Way between manholes 433415 and 453701 to 10" 2. upsize existing 10" line south of Continentals Way between manholes 453702 and 453703 to 12"	2035 - 2039	10	327	840	274,680	5	3	27,600	82,800	563,960
		2035 - 2039	12	232	890	206,480					
CCIP_15	upsize existing 6" line in Hiller St between Crestview Ave and Sussex Ct to 8"	2035 - 2039	8	357	650	232,050	2	1	27,600	27,600	259,650
CCIP_16	upsize existing 6" line in Cipriani Blvd between Monserat Ave and Prindle Rd to 8"	2035 - 2039	8	418	650	271,700	4	2	27,600	55,200	326,900
Lift Station											
CIP Project	Project Description	Phase	Quantity		Unit Cost	Costs					
San Juan LS	upgrade San Juan LS with 2+ 1 Pumps, firm capacity meeting ultimate PWWF of 2 mgd.	2025 - 2027	1		5,000,000	5,000,000					

Notes:

1. Unit cost for the 27" parallel line crossing Hwy 101 which accounts for costs of microtunneling.
2. Assumed San Juan LS upgrade has similar costs compared to the North Rd LS, which was budgeted with $5 Million in the City's Adopted Fiscal Year 2022 Budget.

Table 9-8. CIP Cost Estimations by Planning Year

Project	CIP Type	Facility Type	2024	2025	2026	2027	2028	2029	2030-2034	2035-2039	Total
CCIP_1	Capacity	Gravity Main and Manhole	$ 115,515	$ 269,535							**$ 385,050**
CCIP_2	Capacity	Gravity Main and Manhole	$ 632,388	$ 1,475,572							**$ 2,107,960**
CCIP_3	Capacity	Gravity Main and Manhole		$ 59,922	$ 139,818						**$ 199,740**
CCIP_4	Capacity	Gravity Main and Manhole							$ 391,200		**$ 391,200**
CCIP_5	Capacity	Gravity Main and Manhole							$ 1,486,300		**$ 1,486,300**
CCIP_6	Capacity	Gravity Main and Manhole				$ 321,120	$ 749,280				**$ 1,070,400**
CCIP_7	Capacity	Gravity Main and Manhole				$ 77,760	$ 181,440				**$ 259,200**
CCIP_8	Capacity	Gravity Main and Manhole					$ 1,283,589	$ 1,497,521	$ 1,497,521		**$ 4,278,630**
CCIP_9	Capacity	Gravity Main and Manhole							$ 1,869,920		**$ 1,869,920**
CCIP_10	Capacity	Gravity Main and Manhole								$ 329,040	**$ 329,040**
CCIP_11	Capacity	Gravity Main and Manhole								$ 224,040	**$ 224,040**
CCIP_12	Capacity	Gravity Main and Manhole							$ 203,830		**$ 203,830**
CCIP_13	Capacity	Gravity Main and Manhole								$ 543,810	**$ 543,810**
CCIP_14	Capacity	Gravity Main and Manhole								$ 563,960	**$ 563,960**
CCIP_15	Capacity	Gravity Main and Manhole								$ 259,650	**$ 259,650**
CCIP_16	Capacity	Gravity Main and Manhole								$ 326,900	**$ 326,900**
San Juan LS	Capacity	Lift Station		$ 1,500,000	$ 1,750,000	$ 1,750,000					**$ 5,000,000**
Rehabilitation Batch 1	Condition	Gravity Main and Manhole		$ 990,745	$ 2,311,737						**$ 3,302,482**
Rehabilitation Batch 2	Condition	Gravity Main and Manhole			$ 1,098,912	$ 2,564,129					**$ 3,663,041**
Rehabilitation Batch 3	Condition	Gravity Main and Manhole				$ 911,278	$ 2,126,314				**$ 3,037,592**
Rehabilitation Batch 4	Condition	Gravity Main and Manhole					$ 996,163	$ 2,324,379			**$ 3,320,542**
Rehabilitation Batch 5	Condition	Gravity Main and Manhole					$ -	$ 1,250,847	$ 2,918,644		**$ 4,169,491**
Rehabilitation Batch 6	Condition	Gravity Main and Manhole							$ 11,838,813		**$ 11,838,813**
Rehabilitation Batch 7	Condition	Gravity Main and Manhole								$ 9,133,505	**$ 9,133,505**
Hiller LS	Condition	Lift Station	$ 567,000	$ 1,323,000							**$ 1,890,000**
Island Park LS	Condition	Lift Station		$ 810,000	$ 945,000	$ 945,000					**$ 2,700,000**
Ralston Ranch LS	Condition	Lift Station							$ 1,320,000		**$ 1,320,000**
Sport Complex FM	Condition	Force Main		$ 44,160	$ 51,520	$ 51,520					**$ 147,200**
Island Park FM	Condition	Force Main		$ 511,560	$ 596,820	$ 596,820					**$ 1,705,200**
San Juan FM	Condition	Force Main		$ 878,274	$ 1,024,653	$ 1,024,653					**$ 2,927,580**
Hiller FM Condition Assessment	Condition	Others		$ 200,000							**$ 200,000**
Total			**$ 1,314,903**	**$ 8,062,768**	**$ 7,918,461**	**$ 8,242,279**	**$ 5,336,786**	**$ 5,072,747**	**$ 21,526,227**	**$ 11,380,905**	**$ 68,855,076**

Table 9-9. Capital Improvement Cost Estimates Summary

Phase	Improvement Type	Facility Type	Capital Cost ($)	Total Baseline Capital Costs ($)
2024-2029	Capacity-Related	Gravity Main & Manhole	6,803,460	35,948,000
		Lift Station	5,000,000	
	Condition Related	Gravity Main & Manhole	14,574,504	
		Lift Station	4,590,000	
		Force Main	4,779,980	
		Others	200,000	
2030-2034	Capacity-Related	Gravity Main & Manhole	5,448,771	21,526,000
	Condition Related	Gravity Main & Manhole	14,757,457	
		Lift Station	1,320,000	
2035-2039	Capacity-Related	Gravity Main & Manhole	2,247,400	11,381,000
	Condition Related	Gravity Main & Manhole	9,133,505	
Total ($)				**68,855,000**

Notes:

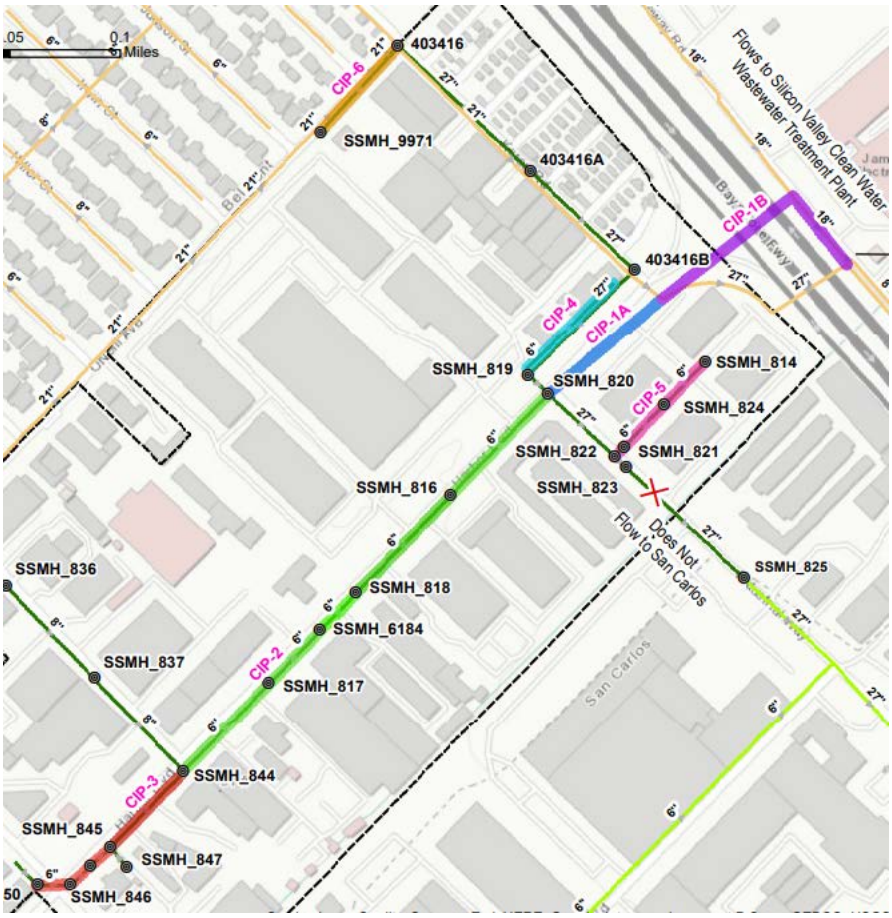
1. Costs are rounded to the nearest thousands.

Harbor Industrial Sewer Maintenance District (HSMD)

Sanitary Sewer Master Plan

FINAL

JANUARY 2024



an Ardurra Company

Harbor Industrial
Sewer Maintenance District (HISMD)
Sanitary Sewer Master Plan

FINAL

Prepared for:

City of Belmont

1 Twin Pines Lane, Suite 385

Belmont, CA 94002

January 29, 2024

Prepared by:

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Table of Contents

Executive Summary **ES-1**

Findings *ES-1*

Recommendations *ES-2*

1. Introduction **1**

1.1. Background and Purpose *1*

1.2. Scope and Authorization *1*

1.3. Data Sources *1*

2. Existing System Description **4**

2.1. Study Area *4*

2.1.1. Existing Land Use 4

2.1.2. Future Developments 4

2.2. Existing Sewer System Facilities *8*

3. Wastewater Flow Characteristics and Projections **9**

3.1. Wastewater Flow Components *9*

3.1.1. Average Dry Weather Flow 9

3.1.2. Peak Dry Weather Flow 9

3.1.3. Peak Wet Weather Flow 9

3.2. Flow Monitoring *9*

3.2.1. Temporary Flow Monitoring Sites 9

3.2.2. Flow Monitoring Results 9

4. Sanitary Sewer Design Criteria **13**

5. Capacity Evaluation and Condition Assessment **14**

5.1. Capacity Evaluation *14*

5.2. Condition Assessment *14*

6. Capital Improvement Program **18**

6.1. Capacity-Related Improvements *18*

6.2. Condition-Related Improvements *18*

6.3. Cost Estimates *20*

6.4. Recommended Capital Improvement Plan *21*

Figures

Figure ES-1. Vicinity Map ES-3
Figure ES-2. Recommended Capital Improvement Projects ES-4
Figure 1-1. Existing HISMD System 3
Figure 2-1. Existing San Mateo County Unincorporated Area Zone Designations 6
Figure 2-2. Anticipated Future Developments in HISMD 7
Figure 3-1. Temporary Flow Monitoring Locations 10
Figure 3-2. HISMD Parcels Discharging to Belmont and San Carlos Systems 11
Figure 5-1. Capacity Deficient Pipes Under Future PWWF 16
Figure 5-2. 2017 CCTV Inspection Structural Defects 17
Figure 6-1. Recommended Capacity-Related Improvements 19
Figure 6-2. Structure Defect Score by Pipe Material 20
Figure 6-3. Recommended 10-Year Capital Improvement Projects 23

Tables

Table ES-1. Recommended 10-Year Capital Project Cost Estimates (FY 2023 – FY 2033) ES-5
Table 2-1. Anticipated Future Developments in HIA 5
Table 3-1. Estimated Indoor Water Use for HISMD Service Boundary 12
Table 3-2. Estimated Existing ADWF for HISMD Service Boundary 12
Table 4-1. Planning Criteria for Gravity Mains 13
Table 5-1. Pipes not CCTV-ed 14
Table 5-2. Pipes Recently Replaced or Rehabilitated by County 15
Table 6-1. Pipe Replacement Unit Costs 21
Table 6-2. Manhole Rehabilitation Unit Costs 21
Table 6-3. Other Construction Unit Costs 21
Table 6-4. Flow Control & Monitoring Vault Construction Unit Costs 21
Table 6-5. Recommended 10-Year Capital Project Cost Estimates (FY 2023 – FY 2033) 24

Appendices

Appendix A – 2017 CCTV Report by Pro-Pipe for San Mateo County

Appendix B – NASSCO PACP Reference & Defect Codes

Appendix C – Condition Assessment Results

Appendix D – Field Survey Data

Appendix E – Hydraulic Model Results

Abbreviations

ADWF	Average Dry Weather Flow
ASCE	American Society of Civil Engineers
BWF	Base Wastewater Flow
CCTV	Closed Circuit Television
CIP	Capital Improvement Program
City (or Belmont)	City of Belmont
CMMS	Computerized Maintenance Management System
DSMH	Downstream manhole
du	dwelling unit
DWF	Dry Weather Flow
EPA	Environmental Protection Agency
Facility ID	Unique identifier geodatabase assigned to a facility like pipe, manhole, etc.
FAR	Floor Area Ratio
FOG	Fats, Oils and Grease
fps	feet per second
FY	Fiscal Year (e.g., FY 2023 is July 1, 2023, to June 30, 2024)
GIS	Geographic Information System
gpd	gallons per day
Grade	NASSCO defect grade
GWI	Groundwater Infiltration
HIA-San Carlos Capacity Agreement	1982 Sanitary Sewerage Treatment Capacity Rights and Services agreement between HISMD and San Carlos
HISMD/HIA	Harbor Industrial Sanitary Municipal District/ Harbor Industrial Area
I/I	infiltration and inflow
IEC	Infrastructure Engineering Corporation (now Ardurra)
LAFCO	Local Agency Formation Commission
lf	lineal feet
Master Plan Update	Sanitary Sewer Master Plan
mg	million gallons
mgd	million gallons per day
mgd/ac	million gallons per day/acre
MPRI	Maintenance Pipe Rating Index
NASSCO	National Association of Sewer Service Companies
O&M	Operations and Maintenance
OPR	O&M Pipe Ratings
OPRI	Operational Pipe Rating Index
PACP	Pipeline Assessment and Certification Program
PVC	Poly-vinyl chloride
PWWF	Peak Wet Weather Flow
QMR	Quick Maintenance Rating
QSR	Quick Structural Rating
RCP	Reinforced Concrete Pipe
RDI/I	Rainfall Dependent Infiltration and Inflow
Regional Board Quality Control	San Francisco Bay Regional Water Board
San Carlos	City of San Carlos

Abbreviations

SPR	Structural Pipe Ratings
SPRI	Structural Pipe Rating Index
SPRR	Southern Pacific Railroad
SSMP	Sewer System Management Plan
SSO	Sanitary Sewer Overflow
sq. ft.	square feet
SVCW	Silicon Valley Clean Water, Wastewater Treatment Plant
SWRCB	State Water Resources Control Board
U.S.	United States
USEPA	United States Environmental Protection Agency
USMH	Upstream manhole

Executive Summary

The City of Belmont (City), in the County of San Mateo, California, has retained the services of Infrastructure Engineering Company (IEC), an Ardurra Company to prepare a sewer master plan for the Harbor Industrial Sewer Maintenance District (HISMD)[1]. The term Harbor Industrial Area (HIA) is used interchangeably with HISMD and an overview of its service area and adjoining municipalities are shown in Figure ES-1. At present, HISMD is owned and governed by the San Mateo County Board of Supervisors (County), but the City has plans to annex the collection system into its service area. This report presents the findings, conclusions, and recommendations regarding the existing and projected state of the HISMD collection system. A 10-year Capital Improvement Plan (CIP) for the HISMD sewer system is developed as shown in Table ES-1 to help determine improvement costs associated with the annexation process.

The general process to prepare the sewer system master plan consisted of evaluating capacity limitations alongside structural deficiencies of the sewer system. Based on deficiencies found, system improvements like rehabilitation, cleaning, remove and replace, and construction of new mains and manholes are recommended. The improvement plan's purpose is to develop capital projects over a 10-year planning horizon and recommend system maintenance procedures to achieve an optimal operating collection system - highly reliable for the most affordable cost. Most system improvements are anticipated to be funded by developers.

A series of field inspections were performed to gather information on the collection system. Field survey and investigations were carried out by both IEC and City staff to fill data gaps as well as determine data discrepancies between GIS and actual sewer network layout. Flow monitoring was also performed to determine flow characteristics of the system. Closed-Circuit Television (CCTV) inspection data was used to identify data discrepancies and deficiencies in the sewer system. Hydraulic modeling was performed to develop a listing of capacity deficiencies. Projects were developed and prioritized based on deficiencies found and capital costs were prepared for a 10-year planning horizon.

Findings

The existing system is estimated to be about 70 years old. The existing pipes in HISMD were found to be in overall fair condition per 2017 CCTV assessment performed by Pro-pipe® and continues to degrade. One Sanitary Sewer Overflow (SSO) occurred in 2018 per County in the 6-inch line along Harbor Boulevard between manholes “SSMH_844” and “SSMH_817” due to debris (e.g., grease, toilet paper, baby wipes, and paper towels). The 2017 CCTV condition assessment indicated severe structural defects in mains along Elmer Street and Old County Road. However, these mains were rehabilitated by the County in 2019. The rest of the system exhibited low to moderate structural defects except for 275 feet of six-inch main on O’Neill Ave which scored a high structural defect rating. Issues found in this main included joint offsets, fractures, sags, roots, grease and sediment deposits. The CCTV inspections also found that maintenance-related issues like grease and sediment deposits were prevalent throughout the system. Details of the CCTV inspections can be found in Appendix A - 2017 CCTV Report by Pro-Pipe for San Mateo County.

IEC analyzed HISMD flows with respect to existing capacity agreements in the area. The City’s and HISMD’s future average dry weather flow (ADWF) are estimated to be 2.5 mgd and 0.35 mgd respectively. Part of HISMD flows into the City’s system and the pipes generally along Harbor Boulevard and Industrial Way flow into the City of San Carlos system. All flows will ultimately enter the Silicon Valley Clean Water (SVCW) plant, a Joint Powers Authority (JPA) serving the City, San Carlos, Redwood City, and West Bay Sanitary District communities. Upon annexation, the combined City and HISMD flows are expected to exceed the City’s maximum capacity allocation with SVCW.

Based on the 1982 capacity agreement[2] between San Carlos and HISMD, the allowable average dry weather flow into San Carlos from HISMD is 0.33 mgd. At the time of this report, a 30% reduction of these flows, that is, approximately 0.099 mgd commensurate with the percentage area of HISMD that was annexed into San Carlos in the late 1990’s is to be allowed from HISMD to San Carlos. It is estimated that future ADWF from HISMD into the San Carlos system will be approximately 0.30 mgd which would exceed the new 0.099 mgd threshold. Model results predict that the existing collection system will exhibit capacity deficiencies under future wet weather sewer loading.

[1] A concurrent sewer master plan for the main Belmont system is being prepared

[2] Capacity rights agreement between San Carlos and HSIMD on January 5th, 1982, Section 2

With rising interest in redevelopment projects in the area, capacity deficiencies are predicted to occur in the existing 6-inch pipes along Harbor Boulevard up till it meets the 27-inch on Industrial Way. With future flows no longer going into San Carlos, sewer backup is expected along the 27-inch on Industrial Way and capacity related improvement projects will be required. Manhole inspections were not done as part of the 2017 inspections nor done as part of this project. Therefore, it is recommended that manhole inspections be performed prior to any main replacement work to assess each manhole's structural integrity in anticipation of future flows.

Recommendations

Due to the capacity limitation and structural defect findings mentioned above, six (6) capital improvement projects are recommended for the HISMD system as shown in Figure ES-2. Projects CIP-1 and CIP-2 are recommended to mitigate capacity deficiencies due to future peak wet weather conditions. Project CIP-1 includes two sub-projects; CIP-1A and CIP-1B. CIP-1A will include construction of a new 18-inch main from the existing manhole "SSMH_820" to an existing City manhole "403423E" on Karen Road. CIP-1B will include construction of a new 27-inch under US Highway 101 from manhole "403423E" to connect to existing City manhole "403700H" on Shoreway Road. From manhole "403700H", about 210 feet of the existing 18-inch is recommended to be upsized to 27-inch on Shoreway Road. Since CIP-1B mitigates both City and HISMD future flows, the cost for this project will be shared between the City and HISMD CIPs based on contributing flows. Project CIP-2 and CIP-3 will include upsizing of all existing 6-inch mains along Harbor Boulevard to 12-inch and 8-inch mains. Project CIP-1 is recommended to be completed first in order to convey anticipated near-term redevelopment flows from the HISMD area to the SVCW plant. To adhere to the capacity agreement with San Carlos, the 27-inch along Industrial Way is recommended to be capped or abandoned once CIP-1 is completed. Alternatively, the City could install a vault that allows flow control and monitoring capabilities along this 27-inch. Due to uncertainties related to quantity and location of future sewer loads from redevelopment projects, it is recommended that the capacity evaluation be updated as more refined sewer loadings become available for the HISMD area.

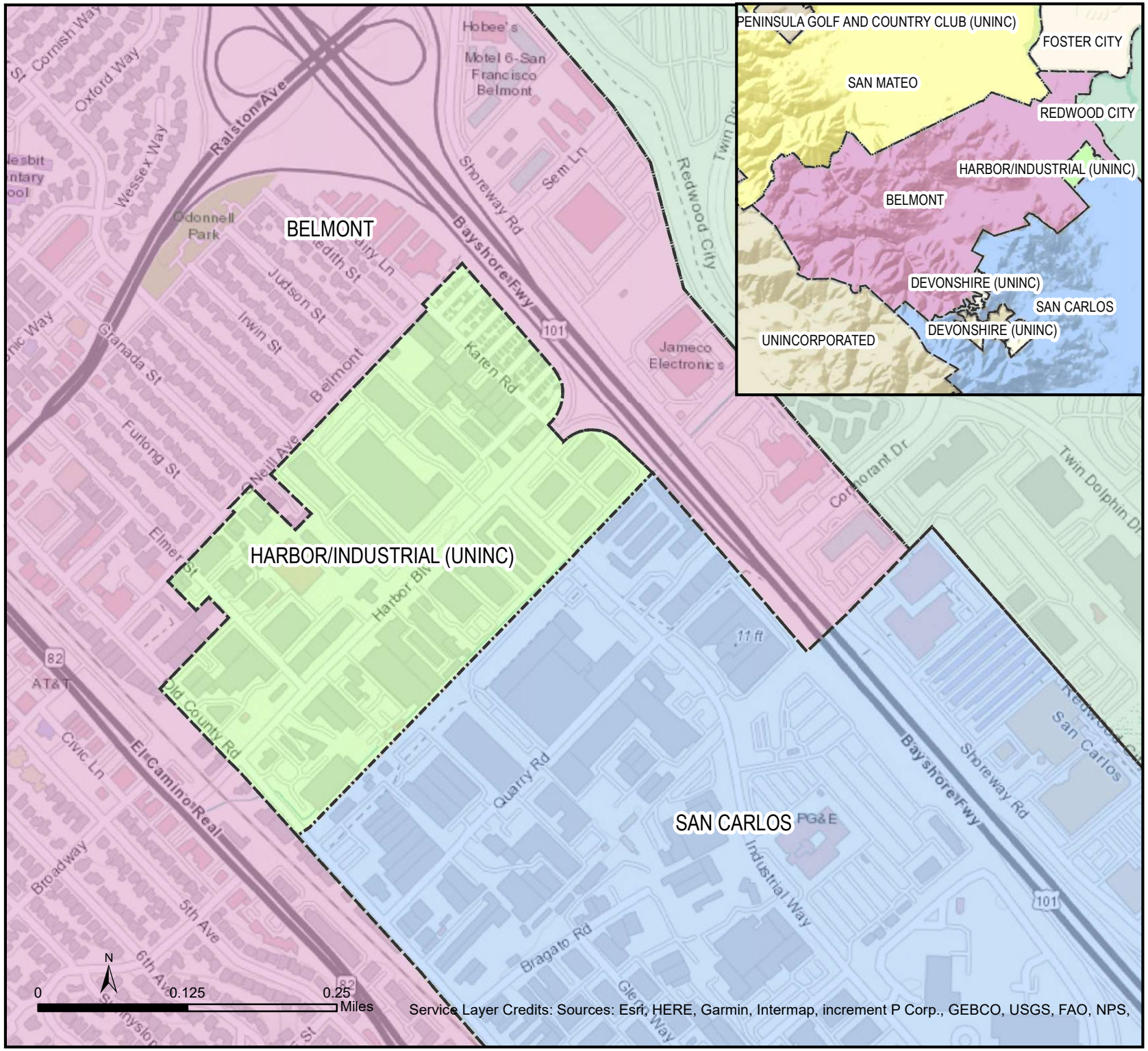
The City's historic maintenance records show that VCP's in the system have high structural defect scores and a propensity to develop cracks as they age. Structural defects can increase inflow/infiltration (I/I) occurrences. As such, Project CIP-3 is recommended to partly address redevelopment flows and partly address further structural deterioration of the existing approximately 70-year-old, 6-inch VCP pipes from Old County Road to Elmer Street along Harbor Boulevard.

Project CIP-4 was created to abandon the existing 6-inch main that is atop the existing 27-inch main between Industrial Way and Karen Road along Harbor Boulevard per County staff. Maintenance/cleaning of this main will be difficult due to the current configuration so it is recommended that laterals be connected to the new 18-inch main instead, as the area develops.

Like CIP-3, Project CIP-5 is recommended to replace older deteriorating six-inch VCP pipes with newer 8-inch PVC pipes in order to minimize I/I occurrences. It is recommended that the City connect to the new 18-inch on Harbor Boulevard instead of the existing 27-inch on Industrial Way because it is anticipated that flows will no longer be directed to San Carlos in the near future.

Project C-6 is recommended to address structural defects found from the 2017 CCTV inspection results. The six-inch along O'Neill has several joint offsets and fractures and is recommended to be upsized to an 8-inch PVC.

Total CIP cost is estimated at about $8.6 million which includes the optional vault cost of $1.3 million under CIP-1. Cost for FY 2023 – 2027 is estimated at $8.4 million and for FY 2028-2032 is estimated at 0.2 million in 2023 cost. Please note that CIP-1B is a shared project with the City, so HISMD's shared cost to CIP-1B only amounts to about $320,000 based on its 11% ADWF contribution. Detailed descriptions of each CIP project and cost estimation methodology are included in Section 6. Table ES-1 is a summary of the CIP recommendations and costs for HISMD rounded to the nearest one thousand.



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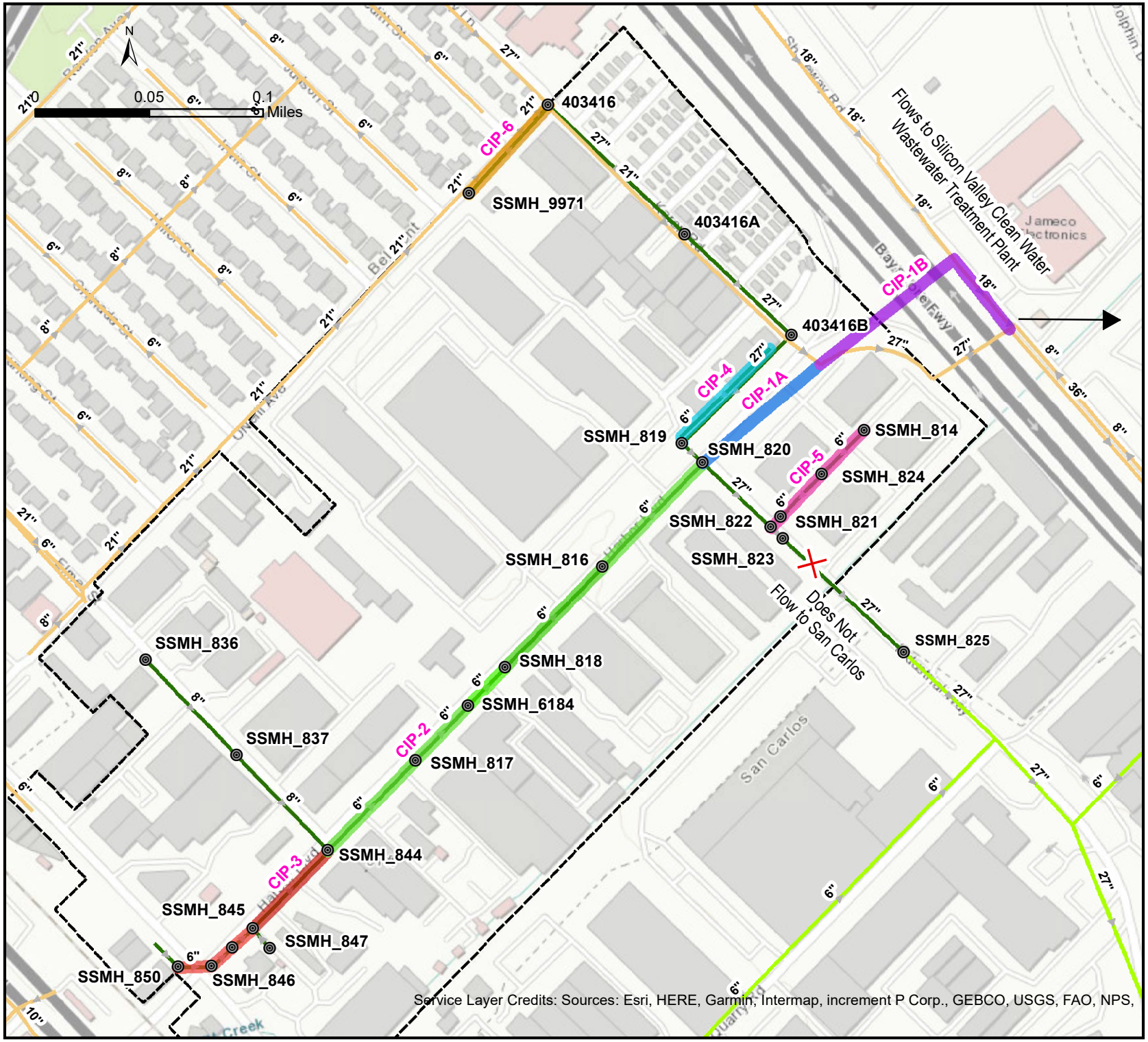
City of Belmont
Vicinity Map
Figure ES-1



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Legend

- Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary

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City of Belmont

Recommended CIP

Figure ES-2

Table ES-1. Recommended 10-Year Capital Project Cost Estimates (FY 2023 – FY 2033)

Project ID	Category	Purpose	Project Description	Existing Diameter (in.)	Estimated Capital Costs ($)[1]						Phase
					8 in. length (ft)	12 in. length (ft)	18 in. length (ft)	27 in. length (ft)	Manhole Count	Total ($)	
CIP-1 (CIP-1A)	Capacity-Related	Mitigate Capacity Deficiencies along Harbor Boulevard during Future Peak Wet Weather Flow Conditions	Install new ~350 feet of 18-inch main from SSMH_820 to City manhole 403423E (on Karen).	-	-	-	350	-	0	2,027,000	2023-2027
CIP-1 (CIP-1B)	Capacity-Related	Mitigate Capacity Deficiencies from HISMD and City during Future Peak Wet Weather Flow Conditions. As a result, this project will be a shared cost between HIA and City CIPs	1. Micro tunnel new ~400 feet of 27-inch main from City existing manhole 403423E (on Karen) to City manhole 403700H (on Shoreway). 2. Upsize 210 feet of existing 18-inch on Shoreway from manhole 403700H.	18	-	-	-	610	2	2,915,000 [2]	2023-2027
CIP-1 (Optional)	Vault	To Control and Monitor Flows into San Carlos	Construct 8x8 feet vault with flow control device and permanent flow meter in existing manhole SSMH_825 on Industrial Way	-	-	-	-	-	-	1,267,500	2023-2027
CIP-2	Capacity-Related	Mitigate Capacity Deficiencies along Harbor Boulevard during Future Peak Wet Weather Flow Conditions	Upsize ~ 1300 feet of six-inch mains along Harbor Boulevard from Elmer till 27-inch trunk sewer on Industrial Way; starting from manhole SSMH_844 to SSMH_820 to 12-inch PVC. Assume all manholes will need to be replaced.	6	-	1,300	-	-	6	1,323,000	2023-2027
CIP-3	Capacity-Related	Mitigate Capacity Deficiencies along Harbor Boulevard during Future Peak Wet Weather Flow Conditions	Upsize ~ 250 feet of six-inch main with an 8-inch PVC from manhole SSMH_847 to SSMH_844 along Harbor Boulevard. Assume all manholes will need to be replaced.	6	250	-	-	-	1	191,000	2023-2027
	Condition-Related	Replace older, structurally deteriorating, 6-inch VCP pipes and reduce I/I	Upsize ~ 250 feet of six-inch main with an 8-inch PVC from manhole SSMH_850 to SSMH_847 along Harbor Boulevard. Assume all manholes will need to be replaced.	6	250	-	-	-	3	246,000	2023-2027
CIP-5	Condition-Related	Replace older, structurally deteriorating, 6-inch VCP pipes and reduce I/I	Upsize ~300-feet of existing 6-inch VCP to 8-inch. Install ~ 180 feet of 8-inch to connect to the 18-inch on Harbor instead of connecting to the existing 27-inch on Industrial Way.	6	480	-	-	-	3	395,000	2023-2027
5-Yr CIP Total ($)										**8,365,000**	
CIP-4	Condition-Related	Reduce maintenance related issues.	Abandon existing ~300-feet of 6-inch VCP that is on top of 27-inch per County. Assume reconnect 5 laterals from the abandoned 6-inch main to the new 18-inch main on Harbor Boulevard.	6	-	-	-	-	0	26,000	2028-2033
CIP-6	Condition-Related	Address severe structural deterioration from 2017 CCTV	Upsize ~300-feet of existing 6-inch VCP to 8-inch on O'Neill Ave.	6	300	-	-	-	1	223,000	2028-2033
10-Yr CIP Total ($)										**249,000**	
TOTAL					**1,280**	**1,300**	**560**	**400**	**16**	**$8,614,000**	

1. Costs are based on 2023 unit costs described in Section 6.3 and rounded to nearest thousand dollars
2. HISMD shared cost amounts to approximately $320,000 based on 11% ADWF contribution. It is estimated that two manholes will need to be replaced along this alignment.

1. Introduction

This section introduces the sewer master planning process for the HISMD sewer system.

1.1. Background and Purpose

The HISMD is one of ten sewer maintenance and sanitation districts administered by the County of San Mateo (County) to serve unincorporated areas of the County. HISMD was formed on December 18, 1951, and is located between City of Belmont (City) and City of San Carlos (San Carlos) bounded by Harbor Boulevard to the south-east, S.P.R.R. Co./Old County Road to the south-west, O'Neill Avenue to the north-west and the Bayshore Freeway (US 101) to the north-east. Figure 1-1 shows the existing HISMD service area boundary that is surrounded by the City of Belmont and San Carlos sewer systems. The HISMD system is currently owned and maintained by the County. There are approximately 63 lateral connections that convey sewage to the Silicon Valley Clean Water (SVCW) wastewater treatment plant mainly via San Carlos system and some via City system.

There is high interest in redevelopment projects in the HISMD area. The City has recently filed an application with the Local Agency Formation Commission (LAFCO) to annex a portion of HISMD that lies within the City's Sphere of Influence[3]. The City would like to expand annexation to include the entire HISMD area in the future. The purpose of this HISMD Sewer Master Plan (HISMD Master Plan) is to assess sanitary sewer infrastructure improvements required and related costs prior to the annexation of HISMD by the City.

1.2. Scope and Authorization

Work on the HISMD Master Plan was performed under an Architectural and Engineering Services Agreement (AESA) entered between Infrastructure Engineering Corporation (IEC), now Ardurra, and the City of Belmont, on February 19th, 2021. The following activities encompassed the scope of the project:

Field Data Collection and Review: Field surveys and investigations were carried out by both IEC and City staff to fill data gaps in invert elevations as well as determine data discrepancies between GIS and actual sewer network in HIA. Flow monitoring was performed to determine flow characteristics of the system.

Capacity Evaluation: A hydraulic model was built and calibrated in the InfoSWMM software environment using the above field data. The model was then used to evaluate existing and future hydraulic deficiencies in the system.

Condition Assessment Evaluation: Closed-Circuit Television (CCTV) inspection data performed in 2017 for the HISMD system was reviewed to evaluate and identify structural and maintenance deficiencies in the sewer system.

Master Plan Documentation: Projects were developed to mitigate existing structural and capacity limitations as well as to mitigate future capacity deficiencies from anticipated developments. Capital costs were developed using recent bid costs from the City and neighboring agencies, and improvement projects were prioritized based on business risk for a 10-year planning horizon. A master plan that documents findings, recommendations, and a 10-year Capital Improvement Plan (CIP) was developed.

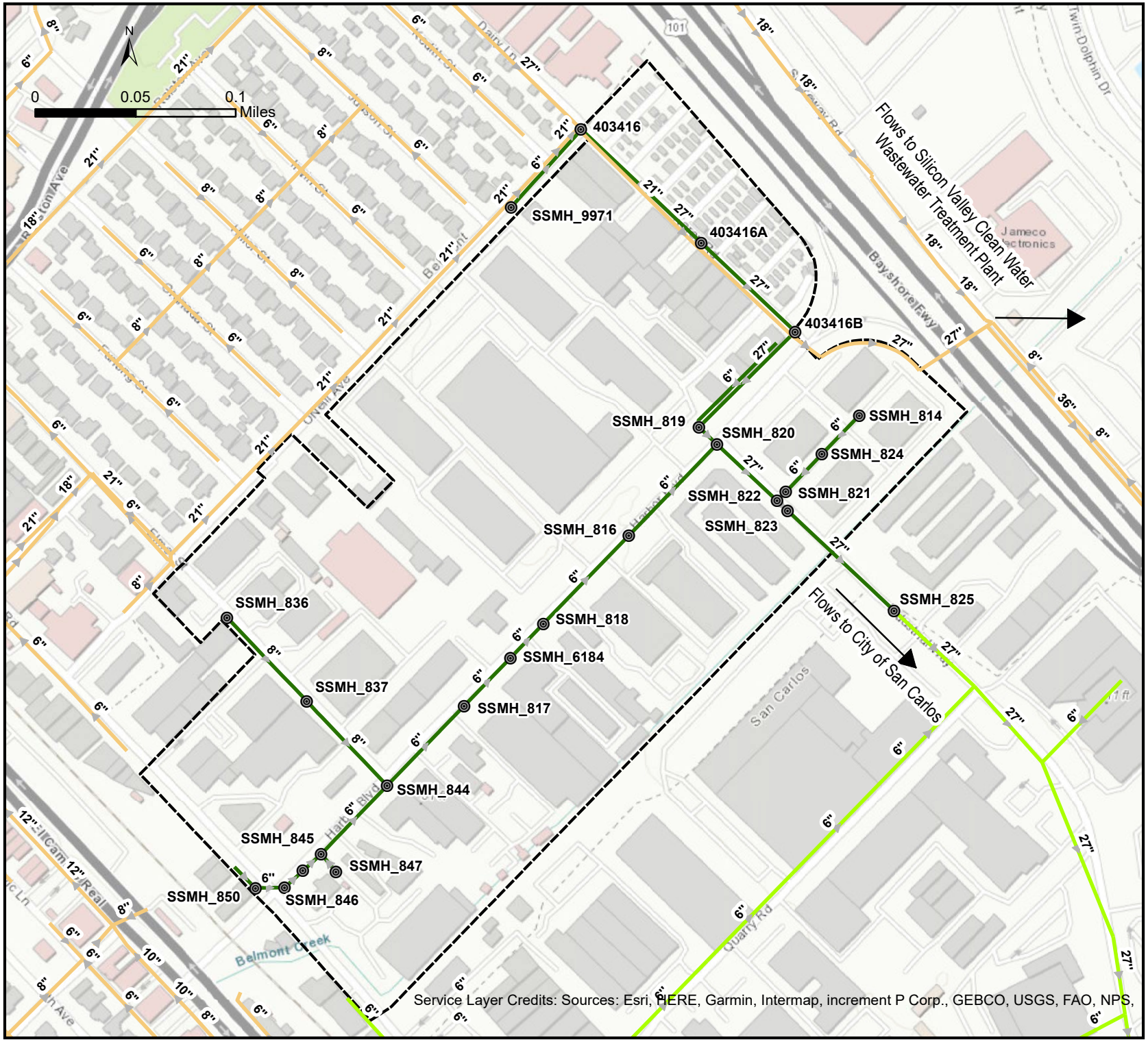
1.3. Data Sources

This Master Plan is developed using various data and information, including but not limited to the following:

- City of Belmont Sanitary Sewer Rehabilitation Master Plan prepared by RMC Water and Environment, September 2007 (2007 City of Belmont SMP)
- City of San Carlos Sewer Collection System Master Plan prepared by RMC Water and Environment, January 2013

[3] LAFCO File 20-10: 608 Harbor Boulevard Annexation

- County of San Mateo Harbor Industrial-Scenic Heights-Oak Knoll-Kensington Square Sewer Master Plan prepared by Brown and Caldwell, July 2000 (2000 County SMP)
- Mapping data from City and County GIS files, City As-builts
- Field survey of manholes, and field data investigation by City operators, communications with County staff, and field visit on 5/17/2022.
- San Mateo County CCTV inspection report prepared by Pro-Pipe, 2017 (2017 CCTV Report)
- BKF Engineers Technical Memorandums:
    - 608 Harbor Blvd, Belmont, CA – Sewer Discharge to Harbor Industrial Sewer Maintenance District
    - 601 Harbor – Harbor Boulevard Sanitary Sewer Main Capacity Analysis, January 23, 2023
    - 608 Harbor Blvd – Sewer Improvements Coordination Memo, October 19, 2021LAFCO Application: LAFCO File 20-10: 608 Harbor Boulevard Annexation
- Water consumption billing data from Mid-Peninsula Water District
- IEC Flow Monitoring data
- JPA Agreement - ARTICLE VII – Ownership, Maximum Capacity rights, Transfers and Enforcement
- San Mateo County Zoning Regulations, January 2022
- City of Redwood City Engineering Standards, Volume III: Design Criteria



Legend

- Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary

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City of Belmont

Existing HISMD System

Figure 1-1

2. Existing System Description

The general characteristics of the HISMD sanitary sewer system are described in this section. This description is the basis for evaluation of the system and to determine the system's ability to convey the City's current and future wastewater flows.

2.1. Study Area

The study area is bounded by Belmont Creek to the southeast, S.P.R.R. Co./Old County Road to the south-west, O'Neill Avenue to the northwest and Karen Road to the north-east. The topography is relatively flat and slopes southwest to northeast decreasing in elevation from about 30 ft. to 12 ft. Belmont Creek, a stream that flows west-northeast through the City of Belmont to the head of Belmont Slough, flows along the south-eastern boundary of HISMD and San Carlos city limit.

2.1.1. Existing Land Use

As shown in Figure 2-1, HISMD consists of mainly commercial and light industrial land use types currently designated by the County as Zone M-2 (Heavy Industrial District)[4]. HISMD also includes a small residential area north-east of Karen Road consisting of a mobile home park, that is currently designated as Zone C-2 (General Commercial Districts). According to the County website, HISMD population in 1990 was about 118 which is most probably referring to the area occupied by mobile homes. All flows from the mobile homes enter the 27-inch on Karen Road[5].

2.1.2. Future Developments

As mentioned, the area is seeing an increase in redevelopment projects. It is anticipated that a majority of future developments will connect to sewers along Old County Road and Harbor Boulevard. Figure 2-2 and Table 2-1 show anticipated future development flows in the system. A summary description of each redevelopment project proposed is listed below:

- 601 Harbor – is proposed to be a bio-tech life sciences building with mainly offices and a three-level subterranean parking space with 950 lots. The new development will occupy a space of approximately 380,700 square feet (sq. ft.) at about 65-75 feet in height with four stories. The development will connect to sewers along Harbor Boulevard[6].
- Bio Tech/R&D/Life Sciences Campus – is also proposed to be a bio-tech, research and development (R&D) or life sciences buildings. The development is anticipated to occupy approximately 5.5 acres spread over three parcels (120 Industrial Road, 425 and 435 Harbor Boulevard) and occupy a space of about 830,000 sq. ft. The FAR for this development is estimated to be 3.4. The development will connect to sewers along Harbor Boulevard.
- Belmont Village is a proposed mixed-use area in the Belmont main system of which a small portion of parcels as shown in Figure 2-2 will most likely connect to Old County Road and Harbor Boulevard sewer lines. For details on Belmont Village proposed development details, please refer to 2023 Belmont Sewer Master Plan.
- HIA Parcels – the FAR assumption for redevelopment projects for the rest of the HISMD system that will ultimately discharge into the San Carlos system in the long-term is estimated to be 3.0.

[4] Zoning Regulations, County of San Mateo, January 2022
[5] The 27-inch on Karen Road is slated for CIP in the Belmont Sewer Master Plan
[6] Technical Memorandum: 601 Harbor – Harbor Boulevard Sanitary Sewer Main Capacity Analysis, BKF Engineers, January 23, 2023

Table 2-1. Anticipated Future Developments in HIA

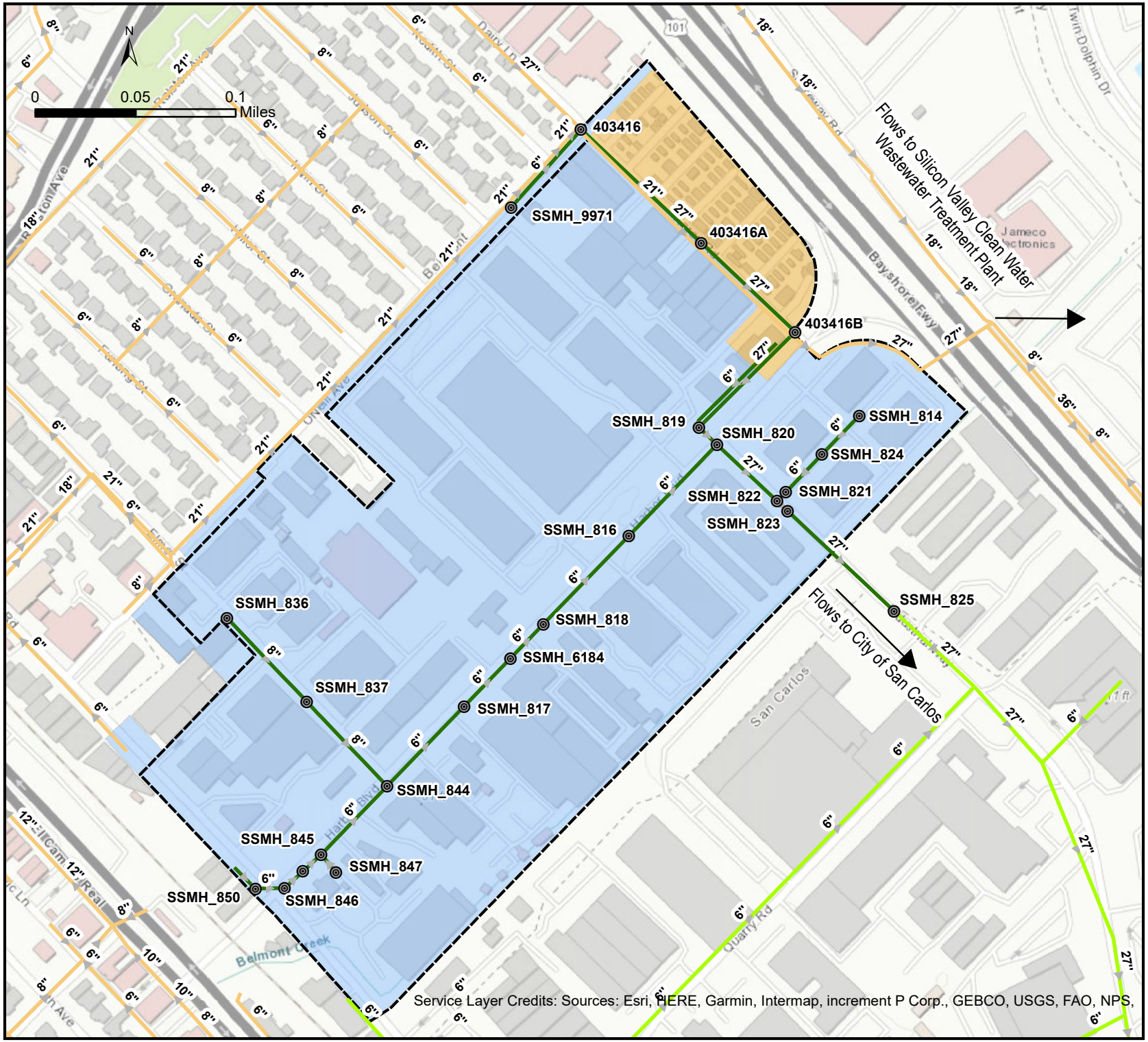
Project #	Name	Location	Life Sciences / Lab (sq. ft.)[1]	Commercial / Office (sq. ft.)[1]	Existing Flow (gpd)	Development Flow (gpd)	Estimated Project Realization
1	601 Harbor BioTech	601-605 Harbor Blvd/ Old County	190,350	190,350	1,944	59,865	Near-Term (within 5 Years)
2	Biotech/R&D/Life Sciences Campus	120 Industrial Road; 425 Harbor Boulevard; 435 Harbor Boulevard	622,500	207,500	1,525	148,051 [2]	Near-Term (within 5 Years)
3	Belmont Village	Parcels contributing to HIA only	Refer to Table 2-9 (Belmont Sewer Master Plan) for Belmont Village Proposed Development Details		246	500	Long-Term (within 10 – 20 Years)
4	The rest of parcels within HIA boundary not proposed for development		Estimated Existing FAR = 0.8 Proposed FAR = 3.0		31,648	118,680 [3]	Long-Term (within 10 – 20 Years)
Total [4]					**35,363**	**327,096**	

[1] Life Science/Lab demand factor based on City of Redwood City's domestic water demand for Research & Development sites of 0.21 gpd/sf x 95% (return to sewer ratio), Attachment Q, Engineering Standards. Commercial demand factor is based on City Design Criteria of 0.115 gpd/sf.

[2] Assumes Lab and Office flows to be 75% and 25% respectively

[3] Existing flow x 3.0/0.8

[4] Includes all remaining parcels bounded by and designated as existing HIA service area discharging into Belmont and San Carlos Systems



Legend

Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary

Current San Mateo County Planning Zones

- C-2 (General Commercial Districts)
- M-1 (Heavy Industrial Districts)

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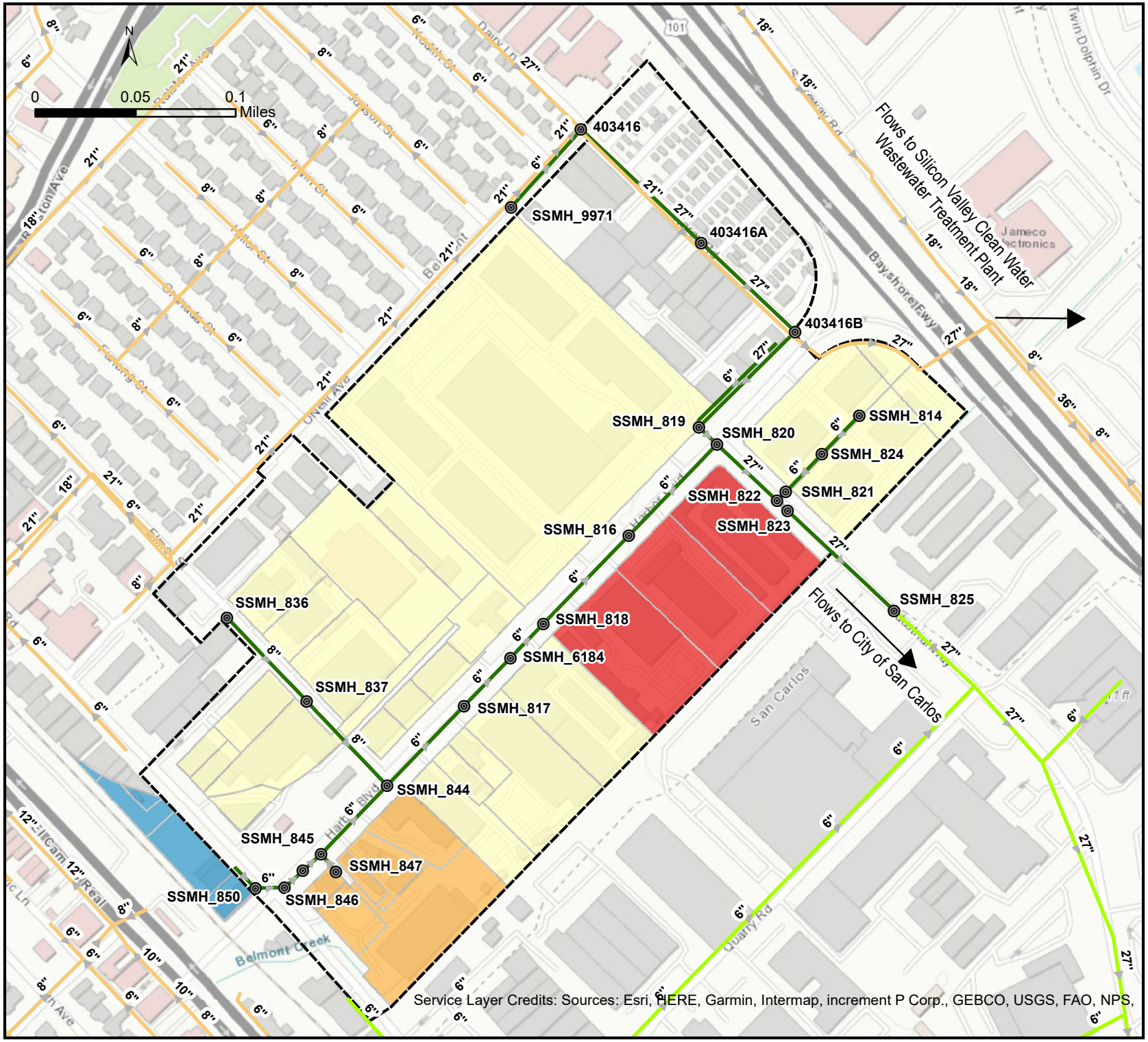
Existing San Mateo County Unicorporated Area Zone Designations

Figure 2-1



Legend

- Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary

Future Development Parcels

- HIA Parcels (FAR 3.0)
- Belmont Village
- 601 Harbor BioTech
- 425 Harbor BioTech

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Anticipated Future Developments in HISMD

Figure 2-2

2.2. Existing Sewer System Facilities

The HISMD collection system is approximately 2 miles of gravity mains that consists of 6-inch vitrified clay pipe (VCP), 21-inch, and 27-inch diameter pipes along Karen Road, Harbor Boulevard, and Industrial Way. Due to insufficient data on year of installation, pipe age is assumed to be about 70 years old which ties the construction date of the system to the early 1950s or shortly after the formation of HISMD in 1951.

A 275-foot six-inch main conveys flow from HISMD parcels along O'Neill Avenue to a vault-like structure at the intersection of Karen Road and O'Neill Avenue. The inlet of this vault includes the 6-inch from O'Neill, 21-inch City main, and 27-inch County main collecting wastewater from mostly City parcels. The outlet pipes to this vault are approximately 777 feet of parallel 27-inch and 21-inch mains along Karen Road. The 27-inch main on Karen Road between O'Neill Avenue and Harbor Boulevard is made of reinforced concrete material. Since most of the flow in the 27-inch is from City parcels upstream, this 27-inch is not evaluated in the HISMD Master Plan as it is slated for capital improvement in the concurrent Belmont Sewer Master Plan. The 6-inch pipe on O'Neill Avenue is modeled and evaluated in this master plan.

Approximately 2,400 feet of six-inch VCP mains collect wastewater starting from Old County Road and Elmer Street and along Harbor Boulevard to connect to a 27-inch trunk main on Industrial Way at manhole "SSMH_820". The 27-inch pipelines along Harbor Boulevard and Industrial Way are made of unreinforced concrete material. All flows from Harbor Boulevard and flows from manhole "SSMH_820" enter the San Carlos system.

Another 302 feet long six-inch main that runs above and parallel to the 27-inch on Harbor Boulevard from Karen Road to Industrial Way, collects wastewater from nearby businesses and connects to the 27-inch on Industrial Way at manhole "SSMH 819". This 358-foot 27-inch pipe segment between Karen Road and Industrial Way is relatively flat. Very low to no HISMD flow enters this trunk main at manhole "SSMH_819" and into manhole "403423D" which is adjacent to the "El Metate" restaurant at 120 Harbor Blvd. However, flows from the Shoreway lift station[7] (across US 101) are known to occasionally back up into this 27-inch main[8] and eventually flows in reverse to San Carlos when the wet well at the Shoreway lift station undergoes maintenance. However, it is anticipated that when the lift station is removed in the near future, issues attributed to lift station maintenance activities will cease to exist as well.

County ownership ends and San Carlos ownership begins about halfway between manholes "SSMH_825" and "SSMH_823" (See Figure 2-1).

In 2019, new 8-inch PVC pipes were installed along Elmer Street by the County as part of a capital improvement plan. At the same time, two older six-inch VCP segments at the intersection of Old County Road and Harbor Boulevard were rehabilitated by the County. One segment, between a flushing inlet and manhole "SSMH_850", was rehabilitated via Cured-In-Place Pipe (CIPP) methodology and the segment between manholes "SSMH_850" and "SSMH_846" was replaced with a new six-inch PVC pipe. Per County, the system experienced an SSO on 6/18/2018 between manholes "SSMH_844" and "SSMH_817" along Harbor Boulevard. The SSO was attributed to debris in the pipe (i.e., grease, toilet paper, baby wipes, and paper towels).

There are no existing sewage lift stations within HISMD and all wastewater from the area flows by gravity to the Silicon Valley Clean Water (SVCW) wastewater treatment plant located in Redwood Shores.

[7] Shoreway Lift Station is owned and operated by Silicon Valley Clean Water and is also referred to as Belmont Pump Station
[8] Also sometimes referred to as a "passive overflow" per discussion with SVCW

3. Wastewater Flow Characteristics and Projections

3.1. Wastewater Flow Components

3.1.1. Average Dry Weather Flow

The Average Dry Weather Flow (ADWF) includes base wastewater flow (BWF) and groundwater infiltration (GWI). BWF is domestic (or sanitary) wastewater flow from residential, commercial, institutional, and industrial wastewater. GWI is defined as groundwater entering the collection system through pipe joints and manhole walls due to structural defects or improper construction. The HISMD's ADWF was determined based on the flow monitoring data and billing data provided for the HISMD service area.

3.1.2. Peak Dry Weather Flow

Domestic sewer flows vary throughout the day due to different customer water use patterns. Peak Dry Weather Flow (PDWF) is the highest flow during dry period and is determined by multiplying a peaking factor to the ADWF.

3.1.3. Peak Wet Weather Flow

Peak Wet Weather Flow (PWWF) is estimated as Peak Dry Weather Flow (PDWF) plus Peak Design Rainfall Dependent Infiltration/Inflow (RDII). Peak RDII was derived from the data collected from the flow monitoring studies. Estimated peak RDII of the observed storm event was then used to estimate the Peak Design RDII for a 10-year 24-hour storm event.

3.2. Flow Monitoring

3.2.1. Temporary Flow Monitoring Sites

IEC performed a temporary flow monitoring study between November 15th, 2021, and April 20th, 2022, at the City's main system and the HISMD system. For HISMD flow evaluation, one flow meter was placed in City manhole "SSMH_403423D" and another meter was placed in HISMD manhole "SSMH_825". At about the same time, a temporary flow monitoring study was performed by BKF Engineers (BKF) in the HISMD system for the 608 Harbor Blvd development. Both IEC and BKF flow meter locations reviewed for this analysis are shown in Figure 3-1.

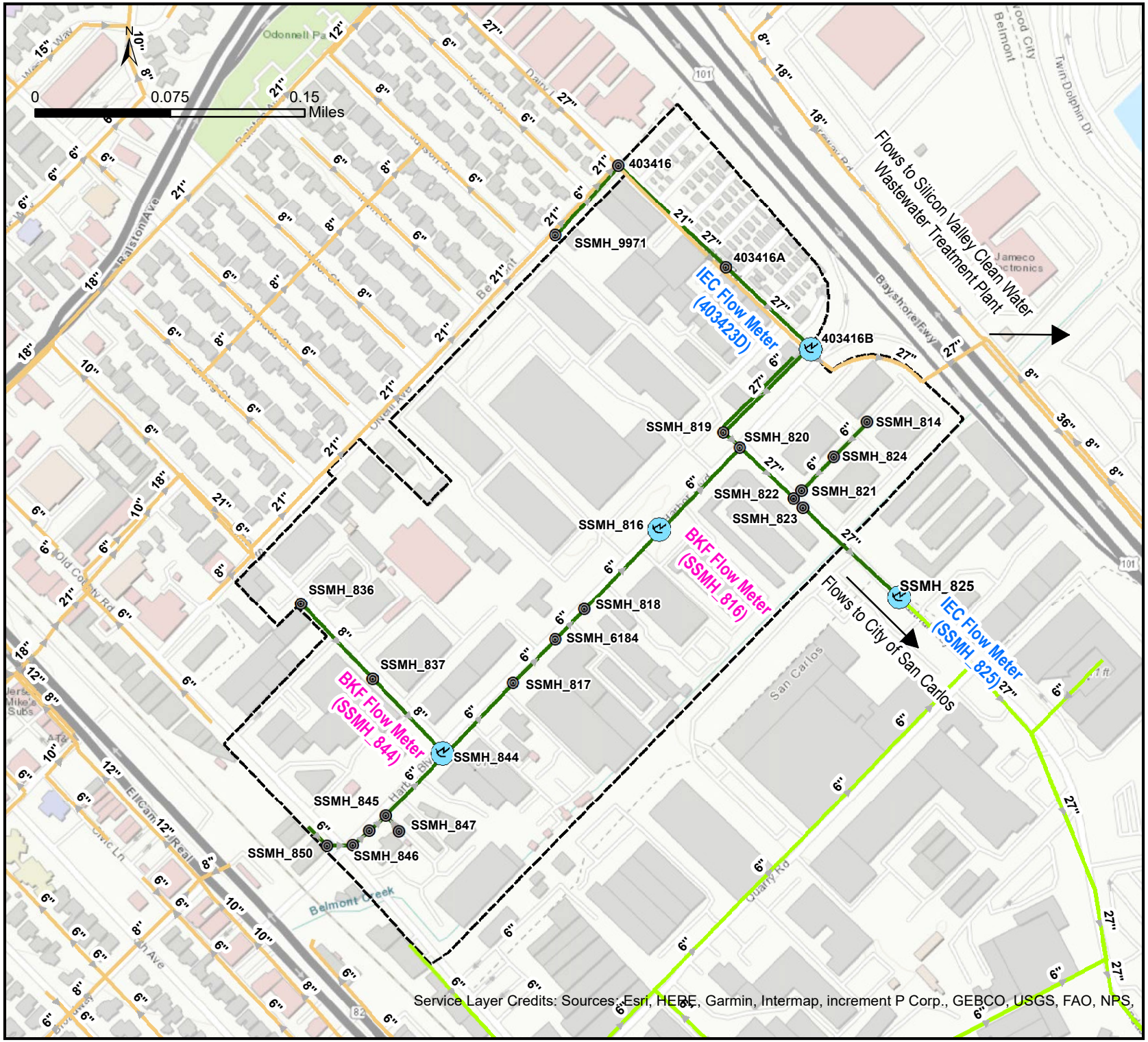
3.2.2. Flow Monitoring Results

Flow monitoring data collected by IEC and BKF engineers (BKF) was evaluated against the billing data between November 2019 and April 2020 provided by Mid-Peninsula Water District (MPWD) to determine the ADWF, PDWF, and PWWF for the HISMD area.

3.2.2.1. Dry Weather Flow Data

The average indoor water usage for HISMD is estimated from the provided billing data. Indoor water use excludes landscaping irrigation water use which is assumed to not return to the sewer system. As shown in Figure 3-2, sewer flows from a few parcels within the HISMD service boundary flow into the City's sewer system while the remaining parcels discharge flows into the San Carlos sewer system. Per County, all flows from the largest parcel (APN: 46010270) within the HISMD service boundary discharges to manhole "SSMH-819" on Harbor Boulevard which mostly discharges to the San Carlos system.

From billing data, the average indoor water use of the HISMD service area is estimated to be 0.037 mgd. As shown in Table 3-1, the average indoor water use of parcels in HISMD discharging into the Belmont system is approximately 0.015 mgd and the average indoor water use of parcels discharging into the San Carlos system is approximately 0.0216 mgd.



Legend

- Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary
- Flow Meter Manhole

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Temporary Flow Monitoring Locations

Figure 3-1

Legend

- Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary
- to Belmont System
- to San Carlos System

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City of Belmont

Parcels Discharging to Belmont and San Carlos Systems

Figure 3-2

Table 3-1. Estimated Indoor Water Use for HISMD Service Boundary

Parcels Discharging to	Average Indoor Water Use (mgd)
Belmont System	0.0150
San Carlos System	0.0216
Total	**0.0366**

A flow meter was installed at manhole "SSMH-825" from the IEC flow monitoring study to collect flow data from parcels discharging to the San Carlos system. Observed ADWF at manhole "SSMH_825" was determined to be 0.13 mgd, which is much higher than the estimated average indoor water use of the parcels discharging into HISMD system and therefore, deemed unreliable and subsequently omitted from the analysis. The observed ADWF at manhole "SSMH_823" from the BKF flow monitoring, which is the nearest upstream manhole of "SSMH_825" is estimated to be 0.0116 mgd, which is approximately 60% of return-to-sewer ratio and is relatively low for commercial and industrial land use types. Flow data at upstream manholes from BKF show consistency in mass balance, therefore, the flow data from BKF was used to determine peaking factors and peak RDII.

For planning purpose, the ADWF for parcels discharging into the San Carlos system, including the largest parcel in the HISMD service boundary, was determined by using the water consumption data with an assumption of 100% return-to-sewer ratio, that is, 0.0216 mgd. Based on the historical influent flow records at the Belmont Pump Station, a return-to-sewer ratio of 90% was assumed for parcels discharging into the Belmont system, that is, 0.015 mgd, as shown in Table 3-2.

Table 3-2. Estimated Existing ADWF for HISMD Service Boundary

Parcels Discharging to	ADWF (mgd)
Belmont System	0.0138
San Carlos System	0.0216
Total	**0.0354**

Total existing ADWF flows discharging into San Carlos is less than the maximum allowed flow threshold of 0.099 mgd being discussed between HISMD and San Carlos. Future ADWF flows discharging into San Carlos system is estimated to be 0.30 mgd and was allocated to the model based on proposed developments described in Table 2-1.

Observed PDWF at manhole "SSMH_823" is estimated to be 0.052 mgd, with a peaking factor of 4.6 to the observed ADWF.

3.2.2.2. Rainfall Data

The BKF flow monitoring study obtained rainfall data from four publicly available private weather stations (PWS) from Weather Underground. Collected flow data at Site 1 and Site 2 (into manhole "SSMH_844") of the BKF Flow Monitoring Study during the week of 12/27/21 to 1/2/22 showed distinct response to the rain events and are selected for RDII analysis. The most significant rain event observed during this week is on 12/27/21 with a total precipitation of 0.655 inches.

3.2.2.3. Wet Weather Flow Data

Observed Peak RDII on 12/27/21 is determined for Site 1 and Site 2. Once Observed Peak RDII is determined, it is used to estimate the Peak Design RDII for a 10-year 24-hour storm assuming RDII is linearly proportional to precipitation. According to the NOAA Atlas 14 Volume 6 Version 2 Point Precipitation Frequency Estimates, a 10-year 24-hour storm within the City's vicinity has a total precipitation of 3.64 inches, which is approximately 5.56 times the precipitation observed on 12/27/21. This factor is applied to the observed Peak RDII resulting in the Peak Design RDII. The Peak Design RDII is then divided by the meter site tributary area to estimate RDII on a per-acre basis. Peak Design RDII per acre estimated from both meter sites are close, resulting in approximately 0.0157 mgd/ac. The remaining study area is assumed to have a similar RDII response. The Peak Design RDII discharging into the San Carlos system is estimated to be 0.55 mgd based on the tributary area. The Peak Design RDII is allocated in proportion to the tributary acreage to the model manholes within the HISMD system for PWWF analysis.

4. Sanitary Sewer Design Criteria

As part of the concurrent Belmont Sewer Master Plan, the City's design criteria were reviewed, and the same planning criteria is applied to the HISMD collection system. The City's design criteria were compared against those criteria used by other Bay Area agencies and related industry standards (2nd Ed. WEF Manual of Practice no. FD-5 Gravity Sanitary Sewer Design and Construction published by the American Society of Civil Engineers (ASCE) and the Water Environment Federation (WEF)).

This section presents the summary of planning criteria recommended and subsequently used for hydraulic analysis, evaluation of system capacity, and sizing of capital improvements to mitigate deficiencies and accommodate future growth. Details of the design criteria development and a comparison of planning criteria with other agencies are included in Appendix B – Sewer Design Criteria of the 2022 Belmont Sewer Master Plan Report.

The planning criteria used to evaluate the capacity of the gravity sewers in HISMD are presented in Table 4-1.

Table 4-1. Planning Criteria for Gravity Mains

Design Criteria	Parameter
For existing gravity mains 12 inches or smaller in size	maximum depth to Diameter ratio (d/D) shall not exceed 0.7 under PWWF condition
For existing gravity mains greater than 12 inches in size	maximum d/D shall not exceed 0.85 under PWWF condition
For new gravity mains 12 inches or smaller in size	maximum d/D shall not exceed 0.5 under PWWF condition
For new gravity mains greater than 12 inches in size	maximum d/D shall not exceed 0.75 under PWWF condition
Minimum velocity	2 fps when flowing half full
Maximum velocity	10 fps
Minimum size for new pipe	8 inches
Manning's n	0.013

For new manholes in HISMD, the following design criteria shall be applied per Section 3.04 of the Sewer Design Criteria:

Location:
1. At intersections of where two or more sewer mains join.
2. At change in grade, pipe size, or material.
3. At accessible locations for maintenance and emergency service.

Spacing:
1. Maximum spacing of 300 feet on sewers 21-inches or smaller in diameter.
2. Maximum spacing of 400 feet on sewers larger than 21-inches in diameter.

Other Requirements:
1. No laterals shall be connected to manholes.
2. Manholes shall not be located in areas where access would be restricted.
3. No inside drop connection shall be allowed.

5. Capacity Evaluation and Condition Assessment

A hydraulic model was built and calibrated in the InfoSWMM software environment using flow monitoring data detailed in Section 3 and field survey data conducted in 2022 (See Appendix D - Field Survey Data). The calibrated model was used to evaluate hydraulic deficiencies in the system under existing and future PDWF and PWWF scenarios. Model output results for existing and future scenarios including post-improvements are included in Appendix E – Model Results.

A review of the 2017 CCTV inspection performed by Pro-Pipe® was done by IEC to assess the extent of structural deficiencies and prioritize improvements in the HISMD system. CCTV results are included in Appendix A – 2017 CCTV Report by Pro-Pipe for San Mateo County. The CCTV report review performed by IEC is included in Appendix C – Condition Assessment Results.

The following includes a description of the capacity evaluation and condition assessment analysis completed.

5.1. Capacity Evaluation

As referenced in Section 3.2, most flows from HISMD discharges via County pipes into the San Carlos system with the exception of the 6-inch main on O'Neill Avenue which flows to the 27-inch trunk line on Karen Road.

Based on Section 2 of the Sanitary Sewerage Treatment Capacity Rights and Services agreement between HISMD and San Carlos on January 5th, 1982, a total flow of 0.33 mgd can enter the San Carlos system from HISMD. At the time of this report, a 30% reduction of these flows which is proportional to the percentage area of HISMD that was annexed into San Carlos in the late 1990's was in discussion. Flow analysis results under future ADWF scenario shows that the maximum flow into San Carlos would be approximately 0.30 mgd which would exceed the new 0.099 mgd threshold.

Model results indicate that the existing system does not exhibit any deficiencies under existing or future PDWF conditions. Per City planning design criteria presented in Table 4-1, maximum depth-to-diameter ratio (d/D) shall not exceed 0.7 under PWWF condition for existing gravity mains 12-inches or smaller. Based on this criterion, model results under existing PWWF scenario indicates a d/D of 0.75 for the six-inch main along Harbor Boulevard between manhole "SSMH_816" and manhole "SSMH_820" (intersection of Industrial Way and Harbor Boulevard). Furthermore, model results under future PWWF scenario projects that pipes from Old County Road, Elmer Street, and along Harbor Boulevard till the 27-inch on Industrial Way will be capacity-deficient and experience d/D greater than 0.70 as shown in Figure 5-1. Future scenarios assume that flows will not enter the San Carlos system.

5.2. Condition Assessment

In 2017, a closed-circuit television (CCTV) inspection was performed on approximately twenty-six mains in the HISMD area by Pro-Pipe® for the County of San Mateo. No manhole condition assessments were done. The inspection reports per pipe segment CCTV-ed are included in Appendix A – 2017 CCTV Report. Table 5-1 shows a list of pipes that were not CCTV-ed. It is recommended that these pipes be CCTV-ed in the near future to assess pipe conditions.

Table 5-1. Pipes Not CCTV-ed

GIS Main Facility ID	CCTV Status	Location Description
SSMH_847-SSMH_845	Not CCTV-ed in 2017	6-inch off Harbor Boulevard and north of Old County Road
403423D-SSMH_819	Not CCTV-ed in 2017	6-inch parallel and above flat 27-inch segment along Harbor Boulevard

Defects per pipeline segment were described and coded per NASSCO's Pipeline Assessment Certification Program (PACP) standards. The NASSCO reference and defect codes used in the CCTV report are included in Appendix B. Since the raw data to create the reports was not available, an estimation of defect scores per pipe was calculated to rank severity of pipe defects to prioritize for improvements. Scoring details are included in Appendix C – Condition Assessment Results.

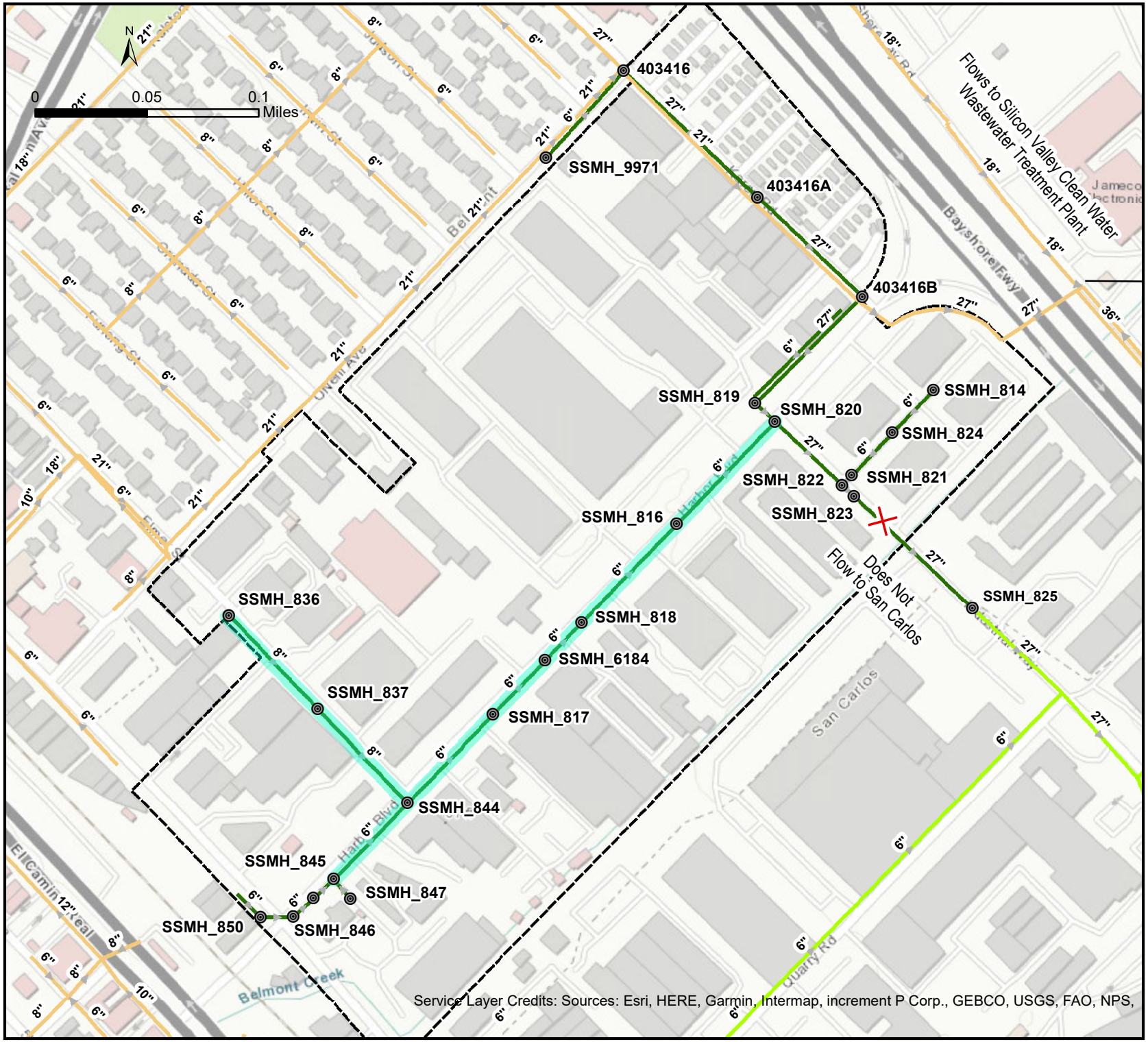
Results of the CCTV scoring which were graded as low to very high depending on count and severity of structural defects. Most pipes along Harbor Industrial Boulevard are graded as having medium to high structural defects. Per NASSCO rating, this means that the pipes have several moderate structural defects that if not addressed, will likely cause the pipes to fail within 10 to 20 years. The 280-foot six-inch pipe along O'Neill Ave exhibited severe structural defects that included joint offsets, fractures, sags, and roots including grease and sediment deposits. This means that if defects are not addressed, the pipe will likely fail within 5 to 10 years. Pipes along Elmer and Old County had severe structural issues; however, per County, these pipes were rehabilitated in 2019. These pipes are listed in Table 5-2.

Table 5-2. Pipes Recently Replaced or Rehabilitated by County

GIS Main Facility ID	Rehabilitation Status	Location Description
SSMH_837-SSMH_844	CCTV-ed in 2017; replaced in 2019 to 8-inch by County	6-inch along Elmer Street
SSMH_836-SSMH_837	CCTV-ed in 2017; replaced in 2019 to 8-inch by County	6-inch along Elmer Street
SSFI_9917-SSFI_9918	CCTV-ed in 2017; 6-inch rehabilitated via CIPP in 2019 by County	6-inch off Old County Road
SSIL_849-SSMH_850	CCTV-ed in 2017; 6-inch rehabilitated via CIPP in 2019 by County	6-inch at intersection of Old County Road and Harbor Boulevard

The 6-inch connecting to the 27-inch trunk on Industrial Way between "SSMH_821" and "SSMH_822" was noted to have a moderate sag and several grease deposits; therefore, was graded as having a medium structural defect. The 27-inch trunk on Industrial Way between manholes "SSMH_822" and "SSMH_823" had an "infiltration dripper" within 8-inches of a joint; hence, graded as having a low structural defect grade.

Maintenance issues related to sediment deposits, roots, and grease were prevalent in HISMD pipes in general.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,

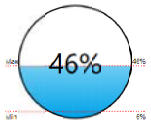
Legend

- Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary
- d/D > 0.7

Example Depth to Diameter Ratio (d/D) of 0.46



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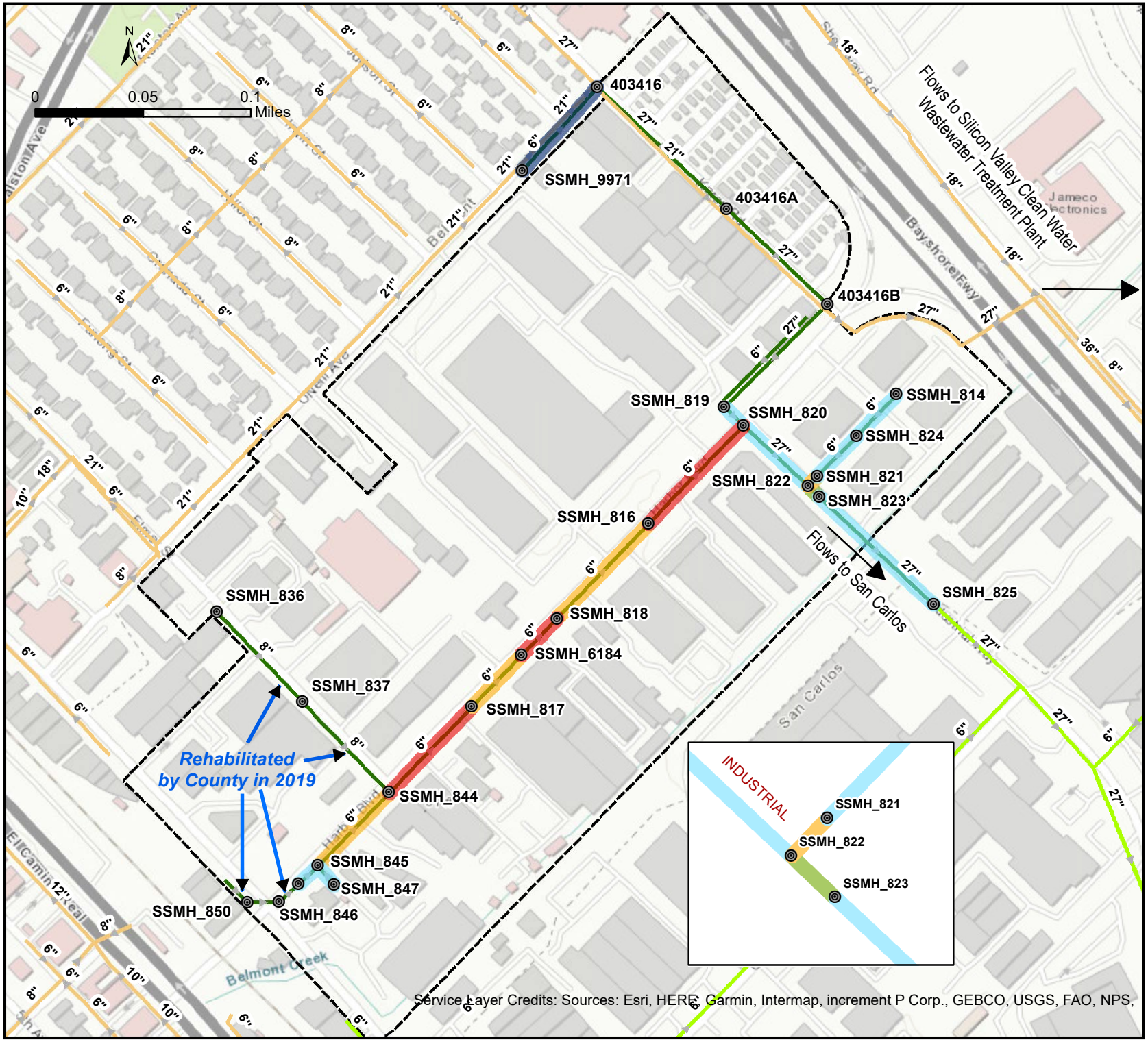
Future PWWF Capacity Deficiencies

Figure 5-1



Legend

Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary

Structural Defect Grade

- No Defects
- Low
- Medium
- High
- Very High

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2017 CCTV Structural Defects

Figure 5-2

6. Capital Improvement Program

6.1. Capacity-Related Improvements

As mentioned in Section 5.1, most mains along Harbor Boulevard will exceed d/D of 0.70 during future PWWF conditions. Surcharge conditions in pipes are further exacerbated with backup due to future flows not discharging to San Carlos.

Per City design criteria, maximum d/D shall not exceed 0.5 under PWWF condition for new gravity mains 12-inches or smaller in size. Based on these parameters, most mains along Harbor Boulevard will exceed d/D of 0.70 during future PWWF conditions. Existing pipes exhibiting a d/D greater than 0.70 were upsized in the hydraulic model, one by one, till the d/D of each pipe was less than 0.5. To mitigate these capacity-related deficiencies, Projects CIP-1 and CIP-2 are recommended as shown in Figure 6-1.

Project CIP-1 is divided into two sub-projects; CIP-1A and CIP-1B. CIP-1A will include construction of a new 18-inch main from the existing manhole “SSMH_820” to an existing City manhole “403423E” on Karen Road. CIP-1B will include construction of a new 27-inch under US Highway 101 from manhole “403423E” to connect to an existing City system manhole “403700H” on Shoreway Road. From manhole “403700H”, about 210 feet of the existing 18-inch is recommended to be upsized to 27-inch on Shoreway Road. Since CIP-1B mitigates both City and HISMD future flows, the cost for this project will be shared between the City and HISMD CIPs based on contributing flows. To adhere to the capacity agreement with San Carlos, the 27-inch along Industrial Way is recommended to be capped or abandoned once CIP-1 is completed. Alternatively, the City could install a vault that allows flow control and monitoring capabilities along this 27-inch.

Project CIP-2 will include upsizing about 1,300 feet of existing 6-inch VCP mains along Harbor Boulevard to 12-inch mains from “SSMH_844” (Elmer Street) to “SSMH_820” (Industrial Way). Project CIP-1 is recommended to be completed first in order to transport near-term redevelopment flows from the HISMD area. Downstream effects to the City system due to this 18-inch tie-in will need to be evaluated as part of the Belmont Sewer Master Plan. An additional 250 feet of six-inch main is recommended to be upsized between manholes “SSMH_844” and “SSMH_847” located east of Elmer Street under CIP-3 to increase capacities due to future redevelopments.

Model result tables for existing and future dry and wet-weather scenarios as well as profile plots pre- and post- improvements along Harbor Industrial are located in Appendix E – Hydraulic Model Results.

Finally, due to uncertainties related to location and quantity of future sewer loads from redevelopment projects, it is recommended that the capacity evaluation be updated as more refined sewer loadings become available for the HISMD area.

6.2. Condition-Related Improvements

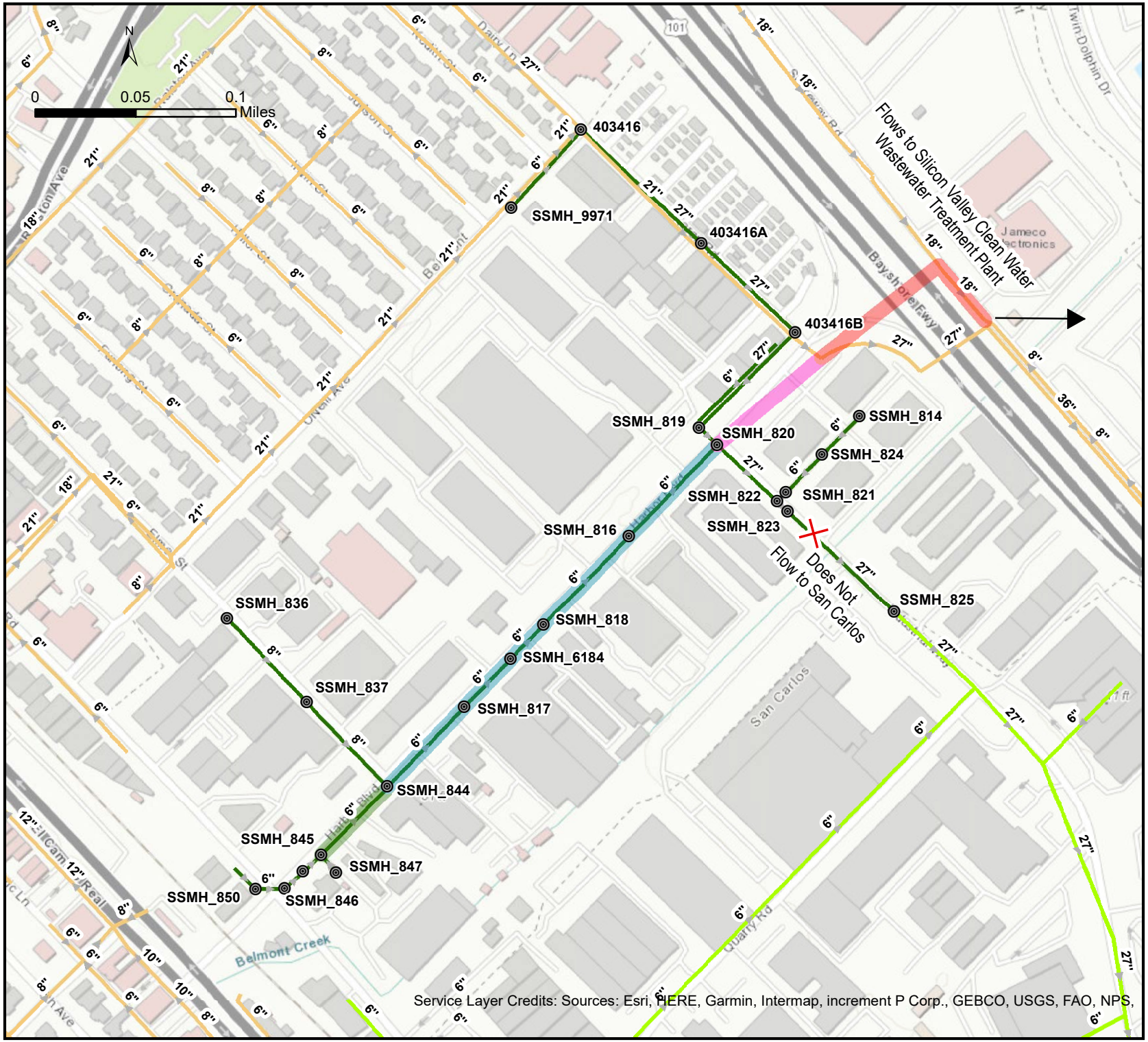
The last CCTV inspection in HISMD was conducted six years ago and pipes with moderate to high structural defect counts as shown in Figure 5-2 are continuing to deteriorate. The City’s historic maintenance records (refer to Figure 5-3) show that VCP’s in the system have high structural defect scores and due to age, the 70-year-old six-inch mains have a propensity to develop cracks and increase I/I occurrences. As such, Project CIP-3, -5, and -6 are recommended to address further structural deterioration of the existing old 6-inch VCP pipes and reduce I/I.

Project CIP-3 includes upsizing approximately 250-feet of 6-inch VCP mains to 8-inch PVC mains from Old County Road to Elmer Street along Harbor Boulevard.

Project CIP-4 is to abandon the existing 6-inch main that is atop the existing 27-inch main between Industrial Way and Karen Road along Harbor Boulevard per County staff. Maintenance/cleaning of this main will be difficult due to this configuration so it is recommended that laterals be connected to the new 18-inch main instead as the area develops.

Similar to CIP-3, Project CIP-5 is recommended to replace approximately 250-feet of older, structurally deteriorating, six-inch VCP pipes to reduce I/I. When upsizing the existing 6-inch VCP to 8-inch PVC, the City should consider connecting to the new 18-inch on Harbor Boulevard instead of the existing 27-inch on Industrial Way; therefore, it is recommended that the project be done at around or at the same time as CIP-1.

Project CIP-6 is recommended to address structural defects found from the 2017 CCTV inspection results. The 300-feet six-inch pipe along O’Neill Avenue has several joint offsets, sags, and fractures and is recommended to be upsized to an 8-inch PVC.



Legend

Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos

Capacity Improvements

- Upsize to 12-inch
- Upsize to 8-inch
- New 18-inch
- New 27-inch

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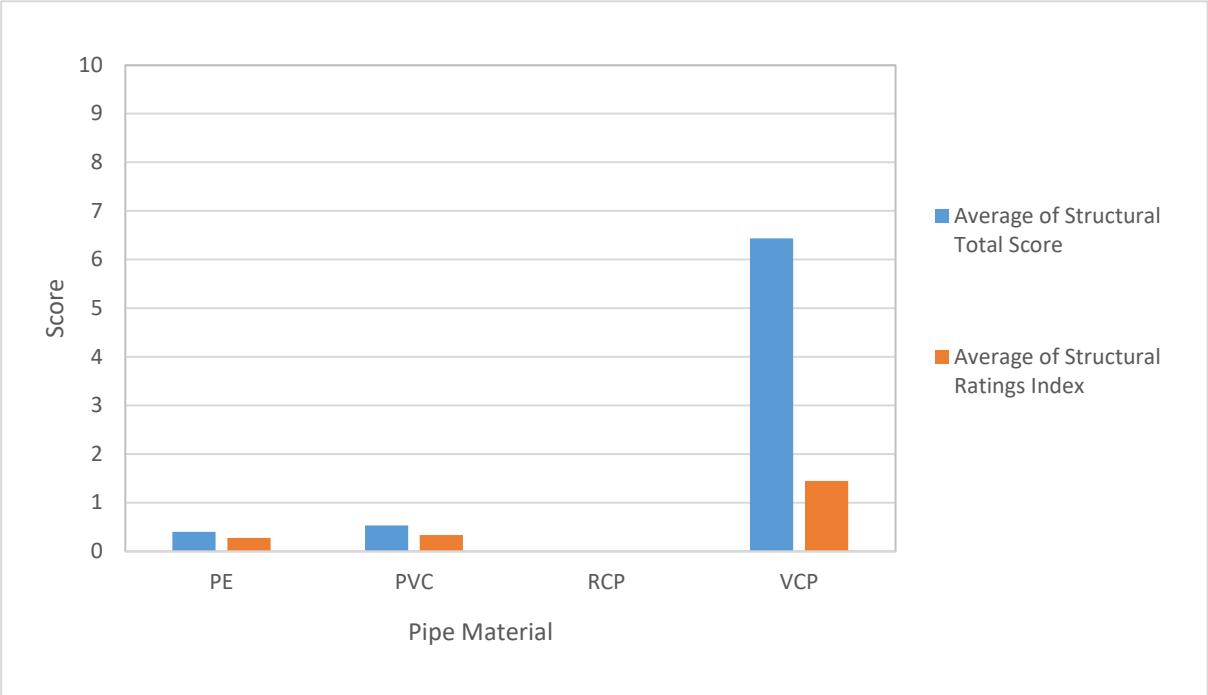
Recommended Capacity Improvements

Figure 6-1

Figure 6-2. Structure Defect Score by Pipe Material



(Source: Belmont System Maintenance Data)

6.3. Cost Estimates

Tables 6-1, 6-2, and 6-3 includes unit costs associated with pipe and manhole replacement and rehabilitation work. Planning-level unit costs were developed based on local bid results between 2018 and 2023 and similar studies completed in the past 5 years. The cost estimates in this study are provided for planning purposes and represent "Class 4 for Studies or Feasibility Report" level costs as established by the American Association of Cost Engineers (AACE), with an accuracy of +50% to -30%. Construction unit costs shown herein represent the typical construction unit cost for the individual item of work (e.g., partial lining, point repair, replacement, etc.) plus additional costs associated with a typical construction project such as mobilization, demobilization, permits, traffic control, sheeting, bypassing, shoring and bracing, easement site restoration, and lateral repairs, etc. Capital unit costs include construction costs plus 30% contingency for costs associated with engineering, construction management and inspection, and project administration and legal activities. Capital unit costs presented herein are in 2023 U.S. Dollars. Since prices of material and labor fluctuate with time, costs should be re-estimated during the preliminary design of a project to confirm budget amounts.

Tables 6-1 and 6-2 were used to estimate pipe upsizing projects using open trench methodology and manhole installation projects. Table 6-3 includes unit cost estimates from the City's March 2023 bid comparison for 6-inch main abandonment and lateral reconnection projects. Unit costs from Table 6-3 were used to estimate costs for the six-inch pipe abandonment and lateral reconnection work for CIP-4. It is assumed that five (5) laterals will need to be reconnected to the new 18-inch main. CIP-4 can be combined with CIP-1 depending on development trends in the area.

Table 6-3 also includes cost estimates for micro tunneling per IEC's 2023 project estimates. For Project CIP-1, IEC reviewed cost estimates for micro tunneling and bore and jack methodologies under U.S. Highway 101. The costs for both methodologies, including contingencies for construction and administrative costs, ranged from about $2 million to $4 million. It is unclear which methodology is best suited at a planning-level stage, and for this reason, the more conservative cost is used for this CIP estimate. An additional optional cost for CIP-1 includes construction of a flow control and monitoring vault along Industrial Way. This vault is assumed to be constructed in the existing manhole "SSMH_825" on Industrial Way. The vault is estimated to be about 8-feet by 8-feet to provide access and room for flow control device such as a slide gate and a permanent flow meter to control and monitor flows into San Carlos. The cost for this vault is estimated to be 1.3 million dollars as shown in Table 6-4.

Table 6-1. Pipe Replacement Unit Costs

Pipe Size (in)	Construction Unit Costs ($/lf)	Capital Unit Cost ($/lf)
6	477	620
8	500	650
10	646	840
12	685	890
15	715	930
18	762	990
21	923	1,200
24	1054	1,370
27	1185	1,540

Table 6-2. Manhole Rehabilitation Unit Costs

Rehabilitation Method	Construction Unit Costs ($ ea.)	Capital Unit Cost ($ ea.)
Rehab/Repair	10,385	13,500
Replacement	21,250	27,625

Table 6-3. Other Construction Unit Costs

Method	Construction Unit Cost	Capital Unit Cost
Micro tunneling	$3,700/lf	$4,800/lf
6-inch Pipe Abandonment	$20/lf	$26/lf
6-inch Lateral Reconnection	$2,679 each	$3,500 each

Table 6-4. Flow Control & Monitoring Vault Construction Unit Costs

Method	Construction Unit Cost ($ ea.)	Capital Unit Cost ($ ea.)
Flow Control Vault in existing Manhole SSMH_825	960,000	1,248,000
Permanent Flow Meter Installation	15,000	19,500

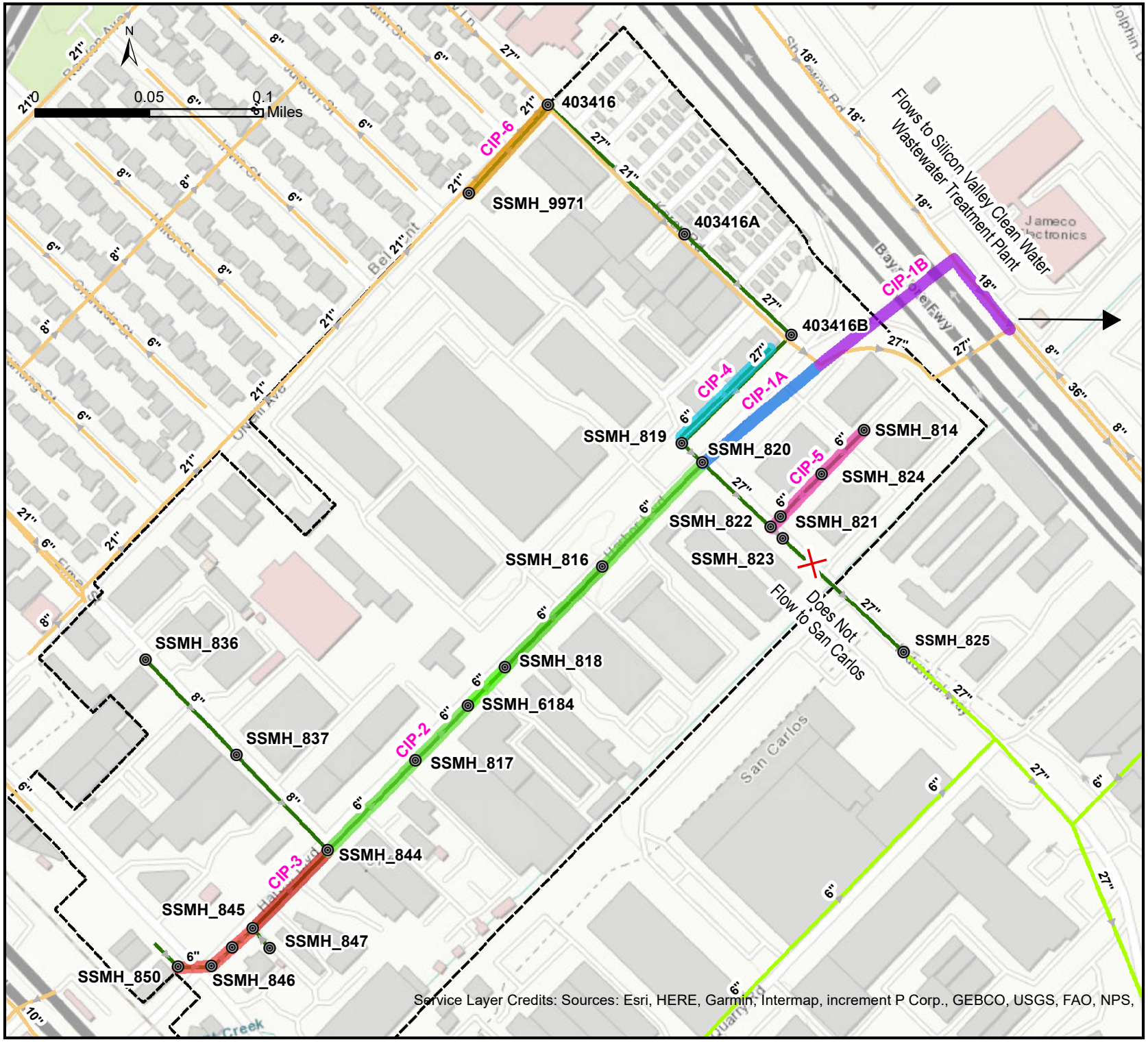
6.4. Recommended Capital Improvement Plan

Table 6-5 shows the 10-Year Capital Improvement Program (CIP) for HISMD with detailed descriptions and costs phased per fiscal year beginning in June. Due to HISMD's aging manholes, it is recommended that manholes be inspected and replaced if necessary, during main improvements. Manholes not listed for CIP are recommended to be inspected per NASSCO standards and assessed for structural integrity. Figure 6-2 shows CIP projects that address capacity and condition-related main deficiencies in the system.

Table 6-5 provides details on purpose and description of each recommended project, 2023 construction cost, source(s) of cost estimation as well as project phasing. All costs have been rounded to the nearest one thousand dollars.

Total CIP cost is estimated at about $8.6 million which includes the $1.3 million optional vault cost under CIP-1. While CIP-1A mitigates capacity deficiencies for HISMD future flows, CIP-1B mitigates effects of both HISMD and City future flows. Per the City's Sewer Design Guide, developers are responsible for shared costs of the system improvements. HISMD's shared cost to CIP-1B amounts to about $320,000 based on its 11% ADWF contribution.

Total cost for FY 2023 – 2027 is estimated at $8.4 million with most of the cost attributed to project CIP-1. Cost for FY 2028-2032 is estimated at 0.2 million. Detailed descriptions of each CIP project and cost estimation methodology are included in Section 6.



Legend

- Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary

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Recommended 10-Year Capital Improvement Projects

Figure 6-3

Table 6-5. Recommended 10-Year Capital Project Cost Estimates (FY 2023 – FY 2033)

Project ID	Category	Purpose	Project Description	Existing Diameter (in.)	Estimated Capital Costs ($)[1]						Total Length (feet)	Phase	Cost Source
					8 in. length (ft)	12 in. length (ft)	18 in. length (ft)	27 in. length (ft)	Manhole Count	Total ($)			
CIP-1 (CIP-1A)	Capacity-Related	Mitigate Capacity Deficiencies along Harbor Boulevard during Future Peak Wet Weather Flow Conditions	Micro tunnel new ~350 feet of 18-inch main from SSMH_820 to City manhole 403423E (on Karen).	-	-	-	350	-	0	2,027,000	350	2023-2027	Unit Costs from Table 6-1 and Table 6-3
CIP-1 (CIP-1B)	Capacity-Related	Mitigate Capacity Deficiencies from HISMD and City during Future Peak Wet Weather Flow Conditions. As a result, this project will be a shared cost between HIA and City CIPs	1. Micro tunnel new ~400 feet of 27-inch main from City existing manhole 403423E (on Karen) to City manhole 403700H (on Shoreway). 2. Upsize 210 feet of existing 18-inch on Shoreway from manhole 403700H.	18	-	-	-	610	2	2,915,000 [2]	610	2023-2027	Unit Costs from Tables 6-1, 6-2, and 6-3
CIP-1 (Optional)	Vault	To Control and Monitor Flows into San Carlos	Construct 8x8 feet vault with flow control device and permanent flow meter in existing manhole SSMH_825 on Industrial Way	-	-	-	-	-	-	1,267,000	-	2023-2027	Unit Costs from Table 6-4 (IEC planning-level estimates)
CIP-2	Capacity-Related	Mitigate Capacity Deficiencies along Harbor Boulevard during Future Peak Wet Weather Flow Conditions	Upsize ~ 1300 feet of six-inch mains along Harbor Boulevard from Elmer till 27-inch trunk sewer on Industrial Way; starting from manhole SSMH_844 to SSMH_820 to 12-inch PVC. Assume all manholes will need to be replaced.	6	-	1,300	-	-	6	1,323,000	1300	2023-2027	Unit Costs from Tables 6-1 and 6-2
CIP-3	Capacity-Related	Mitigate Capacity Deficiencies along Harbor Boulevard during Future Peak Wet Weather Flow Conditions	Upsize ~ 250 feet of six-inch main with an 8-inch PVC from manhole SSMH_847 to SSMH_844 along Harbor Boulevard. Assume all manholes will need to be replaced.	6	250	-	-	-	1	191,000	250	2023-2027	Unit Costs from Tables 6-1 and 6-2
	Condition-Related	Replace older, structurally deteriorating, 6-inch VCP pipes and reduce I/I	Upsize ~ 250 feet of six-inch main with an 8-inch PVC from manhole SSMH_850 to SSMH_847 along Harbor Boulevard. Assume all manholes will need to be replaced.	6	250	-	-	-	3	246,000	250	2023-2027	Unit Costs from Tables 6-1 and 6-2
CIP-5	Condition-Related	Replace older, structurally deteriorating, 6-inch VCP pipes and reduce I/I	Upsize ~300-feet of existing 6-inch VCP to 8-inch. Install ~ 180 feet of 8-inch to connect to the 18-inch on Harbor instead of connecting to the existing 27-inch on Industrial Way.	6	480	-	-	-	3	395,000	480	2023-2027	Unit Costs from Tables 6-1 and 6-2
5-Yr CIP Total ($)										**8,365,000**	**3,240**		
CIP-4	Condition-Related	Reduce maintenance related issues.	Abandon existing ~300-feet of 6-inch VCP that is on top of 27-inch per County. Assume reconnect 5 laterals from the abandoned 6-inch main to the new 18-inch main on Harbor Boulevard.	6	-	-	-	-	0	26,000	300	2028-2033	Unit Costs from Table 6-3
CIP-6	Condition-Related	Address severe structural deterioration from 2017 CCTV	Upsize ~300-feet of existing 6-inch VCP to 8-inch on O'Neill Ave.	6	300	-	-	-	1	223,000	300	2028-2033	Unit Costs from Tables 6-1 and 6-2
10-Yr CIP Total ($)										**249,000**	**600**		
TOTAL					**1,280**	**1,300**	**560**	**400**	**16**	**$8,614,000**	**3,840[3]**		

1. Costs are based on 2023 unit costs described in Section 6.3 and rounded to nearest thousand dollars
2. HISMD shared cost amounts to approximately $320,000 based on 11% ADWF contribution. It is estimated that two manholes will need to be replaced along this alignment.
3. Total length includes 300 feet of abandoned main for CIP-4

Appendix B. Sewer Design Guide

Sewer Design Guide

August 2023

City of Belmont
Public Works Department

1 Twin Pines Lane, Suite 385

Belmont, CA 94002-3890

Acronyms

ADWF	Average Dry Weather Flow
City	City of Belmont
d/D	depth of flow over the diameter of the pipe
DIP	Ductile Iron Pipe
fps	feet per second
HDPE	High Density Polyethylene
PDWF	Peak Dry Weather Flow
PWWF	Peak Wet Weather Flow
PVC	Polyvinyl chloride
VCP	Vitrified Clay Pipe
GWI	Groundwater Infiltration
RDII	Rainfall Dependent Infiltration/Inflow

Section I. Introduction

The purpose of this Sewer Design Criteria is to establish planning and design criteria of the City's sanitary sewer system. All sanitary sewer facilities within the City shall be designed in accordance with the design standards recommended herein based on accepted engineering principles and industry best practices as well as City's Standard Details for design specifications. References used to develop this Sewer Design Guide include, but are not limited to the list below:

1. American Society of Civil Engineers (ASCE) Manuals and Reports on Engineering Practice No. 60/ Water Environment Federation (WEF) Manual of Practice No. FD-5 Gravity Sanitary Sewer Design and Construction
2. City of Redwood Sanitary Sewer System Design Criteria
3. West Bay Sanitary District Standard Specifications for Design and Construction of Sanitary Sewer Collection and Conveyance Facilities
4. Sacramento Area Sewer District Standards and Specifications
5. Marin County Sanitary District No. 2 (Town of Corte Madera) Sewer Standard Specifications and Drawings
6. Novato Sanitary District Standard Specifications and Drawings Addendum No. 1
7. Sausalito-Marin City Sanitary District Standards for the Design and Construction of Sewers in Bay Mud

Section II. Sewer Analysis and Impact Fees

In all existing and newly developed areas where new sanitary sewer pipelines or laterals are required, the design shall include the provisions that the sewer system size and capacity can adequately accommodate the ultimate anticipated conditions and population growth identified in the Buildout of the Belmont General Plan and Belmont Village Specific Plan (BVSP) or its successor whenever applicable. Under no condition shall any type of storm drain system be connected to the sanitary sewer system.

All new development or redevelopment projects will require submittal of a sewer impact study to ensure that the existing system has adequate capacity to accommodate the proposed development. The sewer impact study prepared by the Developer shall determine impacts to the existing system both locally and cumulatively based on the latest sewer model data and including the following components:

1. Determine if there are any deficiencies under peak wet weather flow (PWWF) condition
2. Determine the improvements necessary to accommodate the development flows.
3. Determine the associated improvement cost estimates based on the unit costs provided in the 2021 Sewer System master Plan or its successor and adjusted for inflation. If there are any recent construction projects, the unit costs from the latest bids may be used.

Section 2.01 Study Area

The impact analysis must include both collector and trunk systems. Further, the impact analysis must be expanded to include impact on the downstream sewer pipelines and/or pump stations, as described below.

(a) Scenario #1. Small development consisting of 1 or 2 dwellings
Applicant shall analyze the sewer main to the nearest minor trunkline. The minor trunkline is defined as a 10-inch sewer main. If the development takes place along the corridor with major trunklines, the Developer shall analyze the system to at least 1/2 mile downstream. If the analyzed pipe shows capacity deficiency ((details listed in Section 3.02 (e)) either under existing or future PWWF conditions, the Developer shall analyze it further downstream until reaching the pipe that shows adequate capacity to handle the development flows in addition to the existing and planned future PWWF.

(b) Scenario #2. Large size development consisting of more than 2 dwellings, commercial, or industrial development

1. Applicant shall analyze all components of the sewer system to the nearest pump station. If analysis shows that the pump station is under capacity to accept flows from the proposed development under PWWF condition, the Developer shall also analyze the downstream system starting from the force main to the gravity trunkline that shows sufficient capacity to accept flows.
2. If there are no pump stations located within a 1/2 mile, the Developer shall analyze the sewer system downstream to the major trunkline. The major trunkline is defined as a 15-inch sewer main. If the development takes place along the corridor with major trunklines, the developer shall analyze the system for 1/2 mile downstream. If the analyzed pipe has capacity deficiencies, the developer shall analyze the system downstream to the gravity trunkline that shows sufficient capacity to accept the development flows in addition to the existing and planned future PWWF.

In addition to conducting a sewer impact study, the Developer shall video inspect the existing gravity pipes to assess the structural and flow conditions, and determine if any repairs are needed to be done to accept future flows. The Developer shall submit the video and inspection report to the City, and fix any defects in the existing sewer main that may include, but not limited to cracks, offsets, bellies, etc.

Section 2.02 Flow Estimation

As part of the Sewer Impact Study, sewer flows from the proposed development and of the facilities that will be impacted should be estimated for capacity analysis. Below are the terminology used in this Section.

(a) Average Dry Weather Flow (ADWF)
ADWF is the average daily sanitary flows including groundwater infiltration (GWI)

(b) Groundwater Infiltration (GWI)
GWI is groundwater that enters into the sewer system through defects in pipes, pipe joints, and manholes.

(c) Peak Dry Weather Flow (PDWF)
PDWF is the highest hourly flow during dry weather day with GWI.

(d) Peak Wet Weather Flow (PWWF)
PWWF is the highest hourly flow during a significant rain event. PWWF includes sanitary flow, GWI, and Rainfall Dependent Infiltration and Inflow (RDII).

(e) Rainfall Dependent Infiltration and Inflow (RDII)
RDII consists of rainfall that enters the sewer system through sources such as manhole covers, cross connections between storm drains and sanitary sewers.

(f) Sewer Generation Factors
ADWF can be estimated based on land use type and the sewer generation factors listed in Table 2.02-1. For developments with land use type not specified herein, methodology of flow estimation should be documented and approved by the City.

Table 2.02-1 Sewer Generation Factors by Land Use Type

Land Use Type	Zoning Code	Recommended Sewer Generation Factor	Unit
Single-Family Residential	R1A, R1B, R1C, R1E, R1H	160	gpd/unit
		1120 [1]	gpd/ac
Hillside Residential	HRO1, HRO2, HRO3	325	gpd/unit
		470 [2]	gpd/ac
Duplex/Medium-Density Residential	R2	160	gpd/unit
		1600 [3]	gpd/ac
Multi-family/High Desnity Residential	R3, R4, VHDR	160	gpd/unit
		4800 [4]	gpd/ac
Office	E1, E2.1, E2.2	125	gpd/1,000 sf
		2700 [5]	gpd/ac
Commercial	NC, SC, RC	110	gpd/1,000 sf
		2400 [5]	gpd/ac
Institution and Public Facility	SE, PS, PF	35	gpd/1,000 sf
		760 [5]	gpd/ac
Mixed Use	PD, VC, VSC, VCMU, HIA	140	gpd/1,000 sf
		3050 [5]	gpd/ac
Hotel		100 [6]	gpd/room
Research and Development		200 [6]	gpd/1,000 sf

Notes:
1. assumed a residential density of 7 du/ac.

2. assumed a residential density of 1.45 du/ac.
3. assumed a residential density of 10 du/ac.
4. assumed a residential density of 30 du/ac.
5. assumed a FAR of 0.5
6. based on sewer generation factors used by agencies in California.

(g) Peaking Factors

PDWF and PWWF shall be determined based on the latest sewer model and will be provided by the City.

(h) Capacity

For flow projections and determination of the need for capacity improvements, the Developer shall consider the following criteria:

1. Tributary areas
2. Land use type
3. PWWF
4. Design criteria for existing and new gravity sewer mains
5. Condition of pipes and connections of the existing system downstream of the development

Tributary area of a sewer shall include all areas that will contribute flow to the sewer. Capacity of gravity sewers, force mains, and pump stations shall be sufficient to carry the existing and future PWWF of the tributary area. Development flows shall be estimated based on the sewer generation factors listed in Table 2.02-1. If the sewer generation factor of the proposed land use type is not listed in Table 2.02-1, the Developer shall document the methodology of flow estimation for the City's review and approval. The City will provide the latest sewer model to the applicant. The Developer shall use these criteria to estimate design flows as accurately as possible. Calculations shall be submitted to the Department of Public Works (DPW) for approval and accompanied by the sewer model output performed by the Developer. Based on the model results, the Developer shall determine the type of improvements and cost estimates required to bring the existing system to accept additional capacity, and shall submit that to DPW for review, amendment, and approval.

(i) Capacity Improvements

Upon receipt of the sewer impact study prepared by the Developer, the City will review the sewer impact study and run the hydraulic model to validate the findings from the study.

(j) Sewer Impact Fees/Share Costs

Any repairs that need to be performed to the existing sewer system and capacity related improvements, as determined by the City, are the responsibility of the Developer and shall be completed as part of their development project prior to project completion.

For the capacity related off-site improvements, the Developer's share costs are determined by the following method:

Run computer model in ADWF condition (no peaking) and take the percentage of the sewage flow rate that is attributed to the development compared to the total flow in the sewer system. The developer pays their percentage of the total improvement cost proportional to ratio of the development ADWF over the total ADWF of the facilities recommended for improvement in addition to their connection fees. This is their fair share contribution/ sewer impact fee.

The developers may construct improvements to the sewer system themselves in lieu of paying the sewer impact fee. The design of the improvements shall be done by the Developer's engineer and it shall be approved by the City staff prior to building permit approval.

Section III. Sewer System Design

Section 3.01 General

This section establishes certain standards for design and construction of gravity sewer mains, sewer laterals, pump stations, and force mains.

Section 3.02 Gravity Sewers

(a) Size

The minimum diameter for gravity sewer mains shall be 8-inch.

(b) Manning's n

For gravity flow, use the manning's formula to determine the relation of slope, design flow, velocity, and diameter. The design "n" value shall be 0.013.

(c) Velocity

The minimum design velocity shall be 2 fps when the sewer is flowing half-full for self-cleansing purposes. The maximum design velocity shall be 10 fps using the design PWWF. If obtaining the specified minimum velocity is not possible, the capacity criteria shall be predominant.

(d) Slopes

Slope shall be calculated by dividing the difference in elevation at each end of the pipe by the linear length of the pipe. The minimum slope of gravity sewer shall be designed to provide a minimum velocity of 2 fps at pipes flowing half full. Table 3.03-1 shows the minimum slopes by size based on a minimum velocity of 2 fps with the pipe flowing half full with the considerations of construction tolerance and future minor settlements or sags. Slopes less than those listed in Table 3.03-1 shall not be used.

Table 3.03-1. Minimum Slope by Pipe Diameter

Pipe Diameter (in.)	Slope (%)
6	0.50
8	0.50
10	0.25
12	0.20
15	0.15
18	0.12
21	0.10
24	0.10
27	0.10
30	0.10
33	0.10
36	0.10

(e) Capacity

For existing gravity sewers, the maximum d/D of gravity sewers 12-inch or smaller in diameter shall not exceed 0.7 under PWWF condition; the maximum d/D of gravity sewers greater than 12-inch in diameter shall not exceed 0.85 under PWWF condition.

For new gravity sewers or improved gravity sewer as part of project, the maximum d/D of gravity sewers 12-inch or smaller in diameter shall not exceed 0.5 under PWWF condition. Maximum d/D of gravity sewers greater than 12-inch in diameter shall not exceed 0.75 under PWWF condition.

(f) Depth of Cover

The minimum depth of cover of the gravity sewers within street rights-of-way shall be 5 feet from the surface to the top of the pipe, and the minimum depth of cover of the gravity sewers within easement, sidewalks, and other rights-of-way not expected to become streets shall be 2 feet from the surface to the top of the pipe.

(g) Clearance

In compliance with the California Waterworks Standards, gravity sewers must clear underneath water pipelines with a minimum vertical clearance of 1 foot and a minimum horizontal clearance of 10 feet. Minimum vertical clearance and minimum horizontal clearance from other utilities shall be one foot and 5 feet, respectively.

(h) Location

Sewers shall be located along the street centerline within the public street right-of-way where possible. If it is necessary to locate sewers in easements, such easement shall be at least 10 feet in width. Wider easements may be required for sewers 24 inches or larger in diameter. Design engineer shall provide a design report or letter report to the City to demonstrate the justification for locating a sewer within an easement.

(i) Alignment

1. Sewer shall be located parallel or perpendicular to the street centerline if possible.

2. Curved alignment is not recommended. If a curved alignment is necessary, a design report or letter report will be required from the design engineer to document the justifications for utilizing a curved alignment.

3. Where a curved alignment is utilized, the curved alignment shall be designed with radii of curvature necessary to limit deflection to 50% of the manufacturer's recommended allowable deflection. Additional requirements listed below may also be needed:
    a. Slope greater than minimum slope requirement
    b. Manhole spacing of less than 300 feet
    c. Provide a licensed professional land surveyor or engineer to continuously monitor installation of the curved pipe during construction
    d. Video inspection the curve pipes prior to final acceptance

(j) Materials

Gravity sewers shall be constructed of PVC or HDPE pipe conforming to the City's Sewer Specifications. Any deviation from the specifications must be approved by the City Engineer or his/her designee in written format prior to such materials being used in the work.

(k) Siphons

Inverted siphons shall not be allowed.

(l) Sewer Line Abandonment

Abandoned sewer line shall be plugged and grouted.

(m) Other Requirements

1. pavement restoration shall conform to the City's pavement restoration standards and Standard Trench Detail.

Section 3.03 Gravity Sewer Lateral

(a) Size

Laterals shall be a minimum of 4 inches in diameter for single-family residential use and a minimum of 6 inches in diameter for multi-family residential, commercial, and industrial uses.

(b) Slope

Laterals shall be designed with a minimum slope of 2% for 4-inch sewers and 1% for 6-inch sewers, or with a slope to provide a minimum velocity of 2 fps.

(c) Depth of Cover

Laterals shall have a minimum depth of cover of 3 feet from the property line to connection to sewer main.

(d) Cleanout

A cleanout shall be installed for each lateral a maximum of 5 feet within the property line conforming to the City's Standard Details. The cleanout shall be the same size as the lateral.

(e) Connections

Lateral connections to sewers shall be made with manufactured wye branches. Other types of connections may be allowed on a case-by-case basis.

(f) Backwater Device

Backflow preventer is required for all houses.

(g) Material

Gravity sewers laterals shall be constructed of the same material as the connecting gravity sewer conforming to the City's Sewer Specifications. Any deviation from the specifications must be approved by the City Engineer in written format prior to such materials being used in the work.

(h) Other Requirements

Only one lateral is allowed per parcel.

Section 3.04 Manhole

(a) Locations

1. At intersections of where two or more sewer mains join
2. At change in grade, pipe size, or material
3. At accessible locations for maintenance and emergency service

(b) Spacing

1. Maximum spacing of 300 feet on sewers 21-inches or smaller in diameter
2. Maximum spacing of 400 feet on sewers larger than 21-inches in diameter

(c) Manhole Abandonment

Abandoned manhole shall be filled with concrete and paved.

(d) Other Requirements

1. No laterals shall be connected to manholes.
2. Manholes shall not be located in areas where access would be restricted.
3. No inside drop connection shall be allowed

Section 3.05 Pump Station

(a) Size

1. Pumps shall be sized with firm capacity sufficient to accommodate the PWWF flows.
2. Consider the potential for future expansion of the lift stations to accommodate future needs.

Section 3.06 Force Main

(a) "C" Factor

Force mains shall be designed using a Hazen Williams roughness coefficient ("C" factor) of 130.

(b) Velocity

Force mains shall be sized to provide minimum velocities of at least 3 fps (under PDWF condition) and maximum velocities not exceeding 8 fps (under PWWF condition).

(c) Depth of Cover

Force mains shall have a minimum depth of cover of 4 feet as measured from finished surface to the top of the pipe.

(d) Profile

Force mains shall be designed with uniform slope whenever feasible. Suitable air and/or vacuum release valves shall be installed at the high points.

(e) Access Vault

Air and/or vacuum release valves and other valves that may not be easily accessible as determined by city staff shall be installed inside a vault to allow access for maintenance.

(f) Clearance

1. Force mains must meet the State of California, Department of Public Health, California Regulations Related to Drinking Water, and Title 22 of the California Code of Regulation, Section 64572, "Water main Separation" Requirements. Force mains shall be at least 10 feet horizontally from and 1.5 feet vertically underneath water pipelines.
2. Force mains must have a minimum horizontal clearance of 5 feet from non-potable or dry utilities and a minimum vertical clearance of one foot.

(g) Discharge Connection

Force mains shall connect to a transition manhole with its centerline perpendicular to the manhole wall and at an invert elevation matching the spring line of the gravity pipe to ensure a smooth transition of flow to the gravity sewers.

(h) Materials

1. Force mains shall be constructed of pressure rated DIP, HDPE, or PVC conforming to the City's Sewer Specifications.
2. Pipes within the wet wells must be of coated and lined DIP material.
3. Force mains shall be encased per Caltrans standards

Section 3.07 Sewer System in Bay Mud

Developer shall determine whether or not the Project site is underlain by Bay Mud based on geotechnical report prepared by an approved geotechnical engineer with substantiating evidence in the form of test boring logs. If the Project is found to be underlain by Bay Mud, the Developer's engineer shall follow the criteria below for sewer system design.

(a) Gravity Sewer

1. Gravity sewers shall be designed to slope toward areas of maximum predicted settlement.
2. The installed grading of all sewers shall be at least 150% of the allowable slope per **Table 3.03-1**
3. The predicted grade of all sewers after 50 years shall be a 150% of the allowable slope per **Table 3.03-1**
4. All sewers in Bay Mud shall be installed on bedding consisting of a minimum of 12" of crushed rock ¼" or 1-1/2" placed over geofabric laid at the bottom of the trench and extending up each side of the trench to be wrapped over the top of the pipe zone material a minimum of 12" above the top of the pipe
5. The depth of cover over the pipe shall not be less than 4 feet or greater than 10 feet.
6. The vertical clearance between the sewers and adjacent buried utilities or other underground features shall be 1 foot plus 3 times the predicted 50-year settlement of the sewers at the location.
7. Gravity sewers shall connect to pump stations or manholes through a PVC high deflection coupling located no more than 1 foot outside the structure.
8. The invert elevation of any sewer connecting to a pump station shall be a minimum of 6 inches lower than the invert elevation of the nearest upstream manhole.
9. All sewer lines connecting to a pile supported structure shall connect through a flexible telescoping or rotational type of joint to remain watertight through the predicted range of movement over 50 years of settlement between the structure and soil.

(b) Gravity Sewer Lateral

All sewer laterals under pile-supported structures shall not be buried but shall be positively fixed to the pile supported grade beams so they will remain fixed with the structure.

(c) Force Main

1. Force mains shall be designed with uniform slope upward toward the point of discharge. The uniform grade shall be demonstrated after the predicted 50-year settlement has occurred. The force mains shall not have air release valves and be designed to carry the projected PWWF together with any accumulation of air that may occur as the result of settlement.
2. All pressure lines connecting to a pump station structure shall exit the structure through a suitable flexible joint or ball joint.

(d) Pump Station

Pump stations shall be located as closed as possible to the area of maximum predicted settlement if required and shall not be pile supported.

Appendix C. Planning Criteria Comparison Matrix

Appendix C. Design Criteria Comparison Matrix

Facility Type	Criteria	West Bay Sanitary District[1]	Sacramento Area Sewer District[2]	City of Redwood City[3]	Marin County Sanitary District No. 2[4]	ASCE Manual No. 60	Recommendation for the City of Belmont
Gravity Main	Minimum Diameter	8-inch	8-inch	8-inch except dead end lines of less than 300 ft can be 6 inches in diameter	8-inch	6-inch	8-inch
	Manning's n	0.013	0.013	0.013	0.013	depends on material type, recommended design value for most design codes and reference sources is 0.013	0.013
	Velocity	min. velocity = 2 fps full or one-half full pipe	min. velocity = 2fps at half-full pipe max. velocity = 8 fps	min. velocity = 2 fps max. velocity = 10 fps		Traditional approach min. velocity = 2fps at full pipe new approach: Tractive Force Approach, using design minimum flow maximum velcity 10-15 fps	min. velocity = 2 fps at half-full pipe max. velocity = 10 fps
	Pipe Capacity Criteria (Design Criteria)	New Pipes, - Max. d/D under PWWF = 0.67 for 10-inch and smaller pipes - Max. d/D under PWWF = 0.8 for 12-inch and greater pipes	New pipes, - pipes carried less than 1 mgd of PWWF, max. d/D = 0.7 - pipes carried more than 1 mgd of PWWF, max. d/D =1	maximum d/D = 0.75		Max. d/D = 50% for 15-inch or smaller pipe Max. d/D = 75% for pipes greater than 15-inch in diameter	For existing pipes, - max. d/D = 0.7 for 12-inch or smaller pipes - max. d/D = 0.85 for pipes greater than 12" For new pipes, - max. d/D = 0.5 for 12-inch or smaller pipes - max. d/D = 0.75 for pipes greater than 12"
	Minimum Slope	minimum slope shall be required to obtain 2 fps when flowing full or one-half full	8" (serving less than 6 ESDs) 0.7% 8" 0.35% 10" 0.25% 12"0.2% 15" 0.15% 18" 0.12% 21" 0.11% > 21" 0.1%	6" 0.5% 8" 0.35% 10" 0.25% 12" 0.2% 15" 0.15% 18" 0.12%	The slope of the sewer shall be such that the velocity of flow in the pipe when flowing full shall be equal to or greater than 2 fps. 6" 0.6% 8" 0.4% 10" 0.28% 12" 0.22% 15" 0.15% 18" 0.12% 21" 0.1% 24" 0.08%	Traditional approach min. velocity = 2fps at full pipe new approach: Tractive Force Approach, using design minimum flow maximum velcity 10-15 fps	6" 0.5% 8" 0.5% 10" 0.25% 12"0.2% 15" 0.15% 18" 0.12% 21" 0.11% > 21" 0.1% or slope can provide 2 fps min. velocity
	Depth of Cover	minimum of 3 ft; If it is impossible to obtain the specified minimum depth, the sewer shall be either PVC-C900 DR 18 or ductile iron pipe for the entire length from manhole to manhole.	1' <depth <19', deep enough to provide a 2% min. slope for the lateral	at least 3'	-min. 3' for sewer within street rights-of-way - min. 3.5' for sewer within easements or other rights-of-way not expected to become streets.	2.5'	min. of 5 ft
	Min. Vertical Clearance		- 1 foot from all other utilities and improvements			-located under all other utilities except storm sewers - 18 inches between the water mains and the sewer mains	- minimum of 1.5 ft under water mains - minimum verticle clearance of 1 foot from other utilities
	Min. Horizontal Clearance			-10 feet between water lines and sewer lines - 5 feet between all other utilities	-min. 10 ft from domestic water lines and 24 inches from all other utilities		- 10 feet from water mains - 5 feet from other utilities
	Location		- 6 feet south or east of street centerlines (minor and primary street) - 1st drive lane south or east of street centerlines (Large Streets) - min. width of all sewer easement over mains is 20 ft.	- 5 feet south or west of the street right-of-way centerline - if located in easement, min. 15 feet wide easement	- all easements shall be 15' in width and shall be centered on the sewer line; 10 feet easements may be provided under special circumstances		- 5 feet south or west of the street right-of-way centerline - if located in easement, min. 15 feet wide easement

Appendix C. Design Criteria Comparison Matrix

Facility Type	Criteria	West Bay Sanitary District[1]	Sacramento Area Sewer District[2]	City of Redwood City[3]	Marin County Sanitary District No. 2[4]	ASCE Manual No. 60	Recommendation for the City of Belmont
	Alignment		- parallel or perpendicular to the street centerline wherever possible - min. radius for line 8"-12" in diameter must be 191 ft using 6-foot section pipe. - use a larger radius where necessary to avoid joint deflection in excess of 75% of the pipe manufacturer's recommended max. - For pipes larger than 12-inch in diameter, use radius to avoid defelction in excess of 75% of the pipe manufacturer's recommended max.	- sewers 24 inches or less in diameter should be laid on straight alignment and uniform grade between consecutive manholes. - Horizontal and veritcle curves are not recommended. Limited use of such designs will be considered and require documentation. -Radii of curvature must be of sufficient length to limit deflection to 1/2 the manufacturer's recommended allowable deflection. - curved alignment shall has slope greater than minimum slope for the size of pipe; manhole spacing less than 300 feet; continuous monitoring of installation by licensed professional land surveyor or engineer during construction; video inspection prior to final acceptance.	- Horizontal curves may be used on curved streets when the alignment can be kept concentric with street improvements and when pipe deflection requirements can be met. -Vertical curves may be used in hilly terrain, when permitted by the District, in order to reduce the number of required manholes. - The deflection in the joint between any two successive pipe sections shall not exceed 70% of the maximum deflection as recommended in writing by the pipe manufacturer. - Where sewer lines are to be installed within street rights-of-way, they shall, wherever practical, be designed and installed five (5) feet off the center line of the existing or future street (usually the side opposite the water line). - In streets in hilly areas, the sewer shall be installed on the uphill side of the street where possible. Where practical, all sewer lines within easements shall be designed and installed with not less than five (5) feet	- curved alignment is acceptable for large-diameter sewers. - radius of curvature can be determined based on deflection angle per pipe joint, pipe diameter, and pipe section length.	- parallel or perpendicular to the street centerline whereever possible - curved alignment shall be designed with radii of curvature necessary to limit deflection to 50% of the manuafcturer's recommended allowable deflection.
	Material	- (C5.02) extra strength vitrified clay or PVC C900 DR 25 for main lines in general - any acceptable pipe material may be used in accordance with the indicated strength, bedding, and trench width requirements and subject to the specfications, standard details, and general regulations of the District.	unless approved by SASD, use VCP for gravity pipelines	-PVC conforming to the City's Standard Technical Specifications	-PVC plastic pipe, polyethylene pipe, ductile iron pipe, cast iron pipe, or reinforced concrete	-Rigid pipe: concrete pipes/ VCP pipes - Flexible pipe: DIP, Thermoplastic pipe, Thermoset Plastic Pipe; Corrugated Steel Pipe	- PVC or extra strength VCP pipe conforming to the City's Sewer Specification (placeholders)
	Siphon	Siphon shall be avoided if at all possible.					Siphon shall be avoided if at all possible
	Size	min. of 4-inch for lateral serving commercial/industrial/multiple family living unit, min. of 6-inch [14]	min. of 4-inch for single family residential min. of 6-inch for multi-family and commercial min. of more than 6-inch for schools and other developments expected to contribute high sewage flows	min. 4" in diameter for single family rediences and 6" for commercial, duplex, and multi-family lots	min. 4-inch or same size as the building plumbing stub, whichever is greater., min. 6" for connection with more than 150 fixture units	4-6 inches in diameter	min. of 4-inch for lateral serving commercial/industrial/multiple family living unit, min. of 6-inch 14
	Slope	4-inch 2% 6-inch 1%	2%	4-inch 2% 6-inch 1%		2%	4-inch 2% 6-inch 1%
	Velocity	2 fps when flowing full or one-half full					2 fps when flowing one-half full
Lateral	Verticle Clearance	3'	4-5' to crown of pipe measured from wxisting ground surface or edge of adjacent roadway whatever is lower	3'		3'-6'	3 '
	Cleanout	with a cleanout installed at the property line as shown on District Standard Drawing No.7. shall be same size as the lateral	- install cleanouts for all lower laterals that do not require a manhole at the property or easement line as specified in the SASD Sewer Ordinance	installed with a cleanout per City Standard Detail S-1			installed a cleanout at property line per City Standard Detail
	Connection	manufactured wye or tee branch	Use a manufactured wye fitting of the same materials			wye or tee branches	wye or tee branches
	Backflow Prevention Device	required for houses having a finished floor elevation less than 12" above the top elevation of the nearest upstream structure	required when a structure has a finished floor elevation or any wastewater drainage fixure in any space that is lower than the nearest upstream manhole or flusher branch			where the house plubmbing discharges to the house sewers	required for structures having a finished floor elevation 1 foot less than the nearest upstream manhole or flusher
	Material	lateral sewers shall be of the same material as the main sewer to which they are connected.	VCP, ABS Schedule 40 solid pipe (cellular or foam core is not allowed), HDPE DR 17, PVC C900, and SDR 26.	not specified	-PVC plastic pipe, polyethylene pipe, ductile iron pipe, cast iron pipe, or reinforced concrete	Materials, joints, and workmanship for service laterals should be equalto those of the street sewer	
	# of Lateral		a separate and independent lateral for every lot, building, and structure	one lateral is allowed per parcel			one lateral is allowed per parcel

Appendix C. Design Criteria Comparison Matrix

Facility Type	Criteria	West Bay Sanitary District[1]	Sacramento Area Sewer District[2]	City of Redwood City[3]	Marin County Sanitary District No. 2[4]	ASCE Manual No. 60	Recommendation for the City of Belmont
Manhole	Location	- every line or grade change - point where the sewer changes size or material	- intersections of all main lines - at all changes in main line size - at the end of all main lines terminating with a cul-de-sac having five or more fronting lots - at the end of all permanent main lines 120 feet or more in length - at the end of temporary main lines more than 200 feet in length	- where two or more sewer mains joint - at intermediate points on long pipe runs, maximum spacing of 300 feet - where the conduit changes in size - at sharp curves or angle points in excess of 10 degrees - points where an abrupt change of the grade occurs	- at all intersections of sewer lines, all vertical or horizontal angle points, at intervals not greater than 350' - near the center of street intersections - at the terminus of all main sewers in street	- junctions of sanitary sewers - at any change in grade, pipe size, or alignment, except in curved alignments - at locations that provide ready access to the sewer for precentive maintenance and emergency service	- intersections of two or more sewer mains - at change in grade, pipe size, or alignment, except in curved alignments
	Spacing	max. 300 feet on sewers 21-inches in diameter and smaller, and 400 feet on sewers larger than 21-inches in diameter	-400 feet for all straight collector main lines -500 feet for trunk main lines - 200 feet on a continuous curve of 191 foot radius - spacing will be adjusted proportionately for curved main lines of radius between 191 ft and 400 ft	300 feet less than 300 feet for curved alignments	intervals not greater than 350'	- 400 feet for sewers 15 inches or less - 500-600 feet for sewers 18 to 30 inches - 1000 feet for larger sewers	-max. 300 feet on sewers 21-inches in diameter and smaller, and 400 feet on sewers larger than 21-inches in diameter
Lift Station	Lift Station Criteria	Firm Capacity					Firm Capacity
Force Main	Size	-2-inch for grinder pump system - 3-inch for septic tank effluent pumping systems, - 4-inch for raw wastewater pump stations					
	Velocity Criteria	- Max. velocity = 8 fps minimum velocity of 2 fps	Min. velocity = 3fps max. velocity = 6 fps				Normal velocity = 3fps Max. velocity = 8 fps
	Hazen-Williams Roughness Coefficient	100 for non-plastic pipe 130 for plastic pipe	130			100 - 140	130
	Material	any pressure pipe material listed in Article C5.02	pressure rated DIP, HDPE, PVC, or approved equal			reinforced concrete pressure pipe, prestressed concrete pressure pipes, DIP, thermoplastic pipe (ABS, PE, PVC)	pressure rated DIP, HDPE, PVC, or approved equal
	Profile	- uniform slope preventing high spots formining possible pocket traps - if high spots cannot be prevented, suitable air and/or vacuum release valve shall be installed at the high points	-min depth of cover of 4 feet '-continuous upward slope from the pump station to the discharge point whenever feasible	- min. depth of cover of 3 feet		- air lease valves at high points	- min. depth of cover of 4 feet - uniform slope whenever feasible - suitable air and/or vacuum release valve shall be installed at the high points
	Connection	Each forcemain shall terminate in a vented transition structure designed to provide hydraulic characteristics compatible with the pump performance curve	must enter the transition manhole with its centerline perpendicular to the manhole wall and at an invert elevation matching the spring line of the gravity pipeline to ensure a smooth transition of flow to the gravity collection system				terminate in a transition manhole with its centerline perpendicular to the manhole wall and at an invert elevation matching the spring line of the gravity pipeline to ensure a smooth transition of flow to the gravity collection system
	Access Point	Not specified	Not specified	Not specified		Not specified	air release/vacuum valves and other valves at difficultly accessible locations shall be installed in a vault for access for maintenance

Source:
1. WBSD Standard Specifications for Design and Construction of Sanitary Sewer Collection and Converyance Facilities (June 2015)
2. Sacramento Area Sewer District Standards and Specifications (April 16, 2021)
3. City of Redwood City Engineering Standards Volume III Design Criteria
4. Town of Corte Madera Sewer Standard Specifications and Drawings 20180801

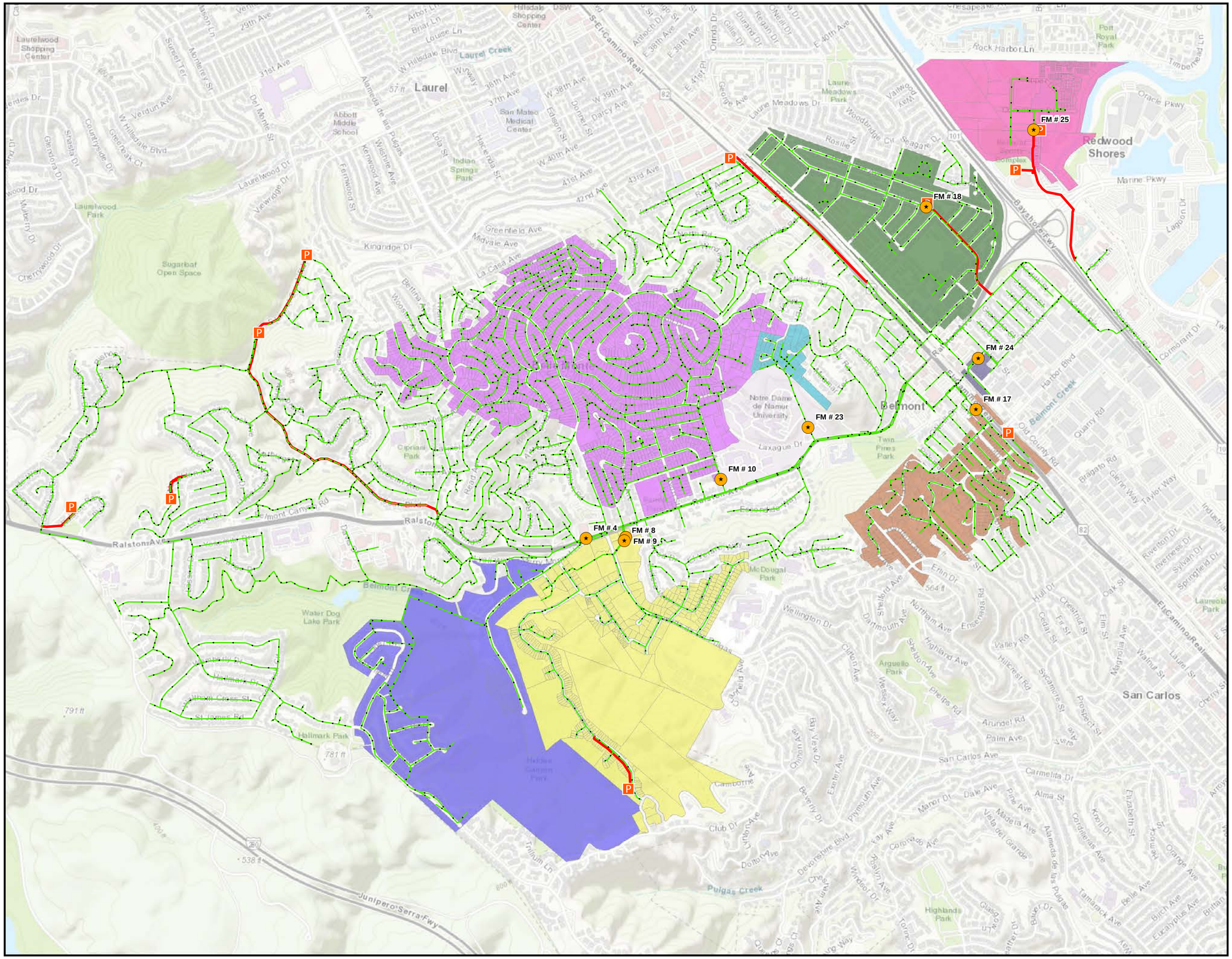
Appendix D. Sewer Generation Factors Calculations

Appendix D1. Sewer Generation Factor Calculations

Zoning Code	Zoning Description	Acres	Percent	Residential Density (Dwelling Units per Acre)[1]	Max. Floor Area Ratio (FAR)[1]
CMU	Corridor Mixed Use (CMU)	57.4	1.9%	45 - 60	1.75 - 2.2
E1	Professional Office (E1)	0.3	0.0%	-	1.5
E2.1	Executive Office (E2.1)	1.7	0.1%	-	1.5
E2.2	Executive Office & Warehouse (E2.2)	17.8	0.6%	-	1.5
HIA-1	Harbor Industrial Area-1 (HIA-1)	4.7	0.2%	not specified	5
HIA-2	Harbor Industrial Area-2 (HIA-2)	54.5	1.8%	not specified	5
HRO1	Hillside Res. & Open Space (unsubdivided) (HRO1)	71.2	2.4%	Determined by slope	-
HRO2	Hillside Res. & Open Space (subdivided) (HRO2)	64.2	2.1%	Determined by slope	-
HRO3	Hillside Res. & Open Space (Western Hills) (HRO3)	114.3	3.8%	Determined by slope	-
HWY	HWY 101 (HWY)	54.6	1.8%	-	-
NC	Neighborhood Commercial (NC)	16.3	0.5%	-	1.5
OS	Open Space (OS)	353.1	11.7%	-	
PD	Planned Unit Development (PD)	333.6	11.1%	Up to 30 as a conditional use	2
PF	Public Facility (PF)	3.8	0.1%	-	-
PP	Park/Plaza (PP)	5.3	0.2%	-	-
PS	Public Space (PS)	160.8	5.3%	-	-
R1A	Single Family Residential- 9600 sq. ft./D.U. (R1A)	215.4	7.1%	1-7	-
R1B	Single Family Residential- 6000 sq. ft./D.U. (R1B)	874.1	29.0%	1-7	-
R1C	Single Family Residential- 5000 sq.ft./D.U. (R1C)	239.2	7.9%	1-7	-
R1E	Single Family Residential- 1 acre/D.U. (R1E)	14.7	0.5%	1-7	-
R1H	Single Family Residential- 1/2 acre/D.U. (R1H)	61.0	2.0%	1-7	-
R2	Duplex- 3000 sq.ft./D.U. (R2)	18.9	0.6%	8-20	-
R3	Multi-Family Residential- 1950 sq.ft./D.U. (R3)	31.5	1.0%	8-20	-
R4	Multi-Family Residential- 1450 sq.ft./D.U. (R4)	94.0	3.1%	21-30	-
RC	Regional Commercial (RC)	44.1	1.5%	-	1.8
S-1/R1B	Special (Setback) Combining (S-1/R1B)	9.1	0.3%	-	-
SC	Service Commercial (SC)	24.9	0.8%	-	1.5
SE	School and Other Educational Uses (SE)	2.7	0.1%	-	-
VC	Village Core (VC)	28.3	0.9%	-	2 - 2.5
VCMU	Village Corridor Mixed Use (VCMU)	29.7	1.0%	-	2 - 2.5
VCS	Village Station Core (VCS)	9.2	0.3%	-	1.5 - 2
VHDR	Village High Density Residential (VHDR)	6.4	0.2%	45 - 60	-
Total		3016.9	100.0%		

Sources:

1. Table 2-4 of 2035 General Plan.



Legend

- Flow Meter Site
- Pump Station
- Gravity Main
- Force Main

Tributary Area

- #4
- #8 and #9
- #10
- #17
- #18
- #23
- #24
- #25

N

0 875 1,750 Feet

Infrastructure ENGINEERING CORPORATION

City of Belmont
2023 Sewer Master Plan Update

Selected Meters and Corresponding Tributary Areas for Sewer Generation Factors Calculation

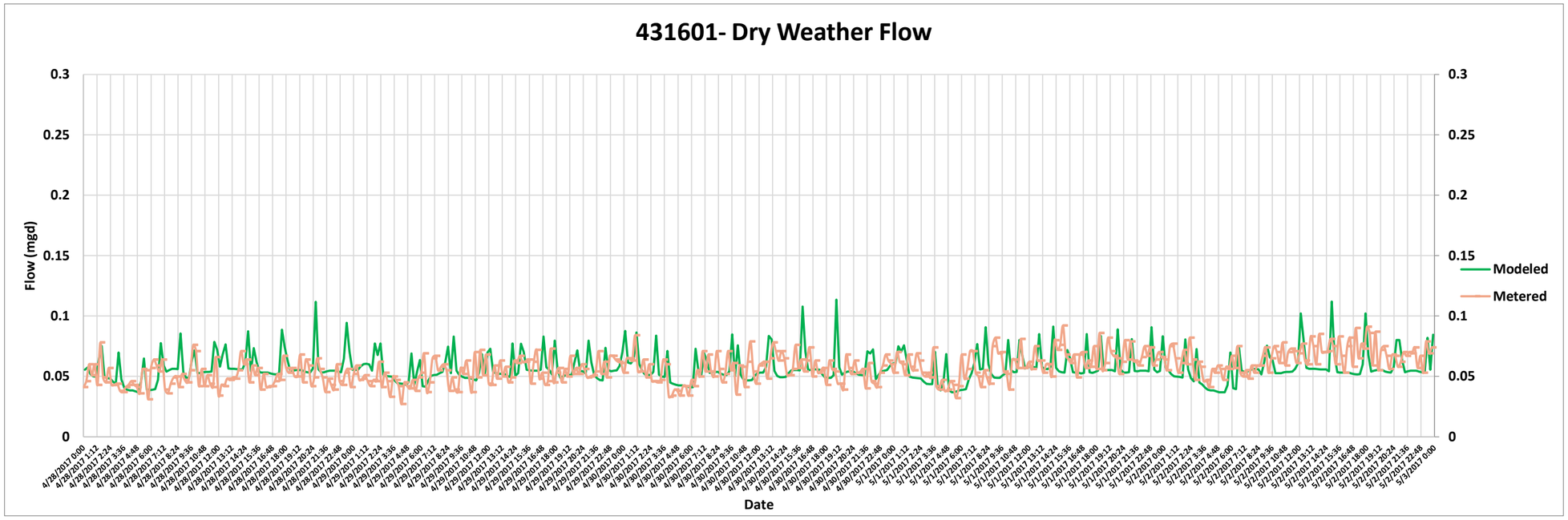
Appendix D

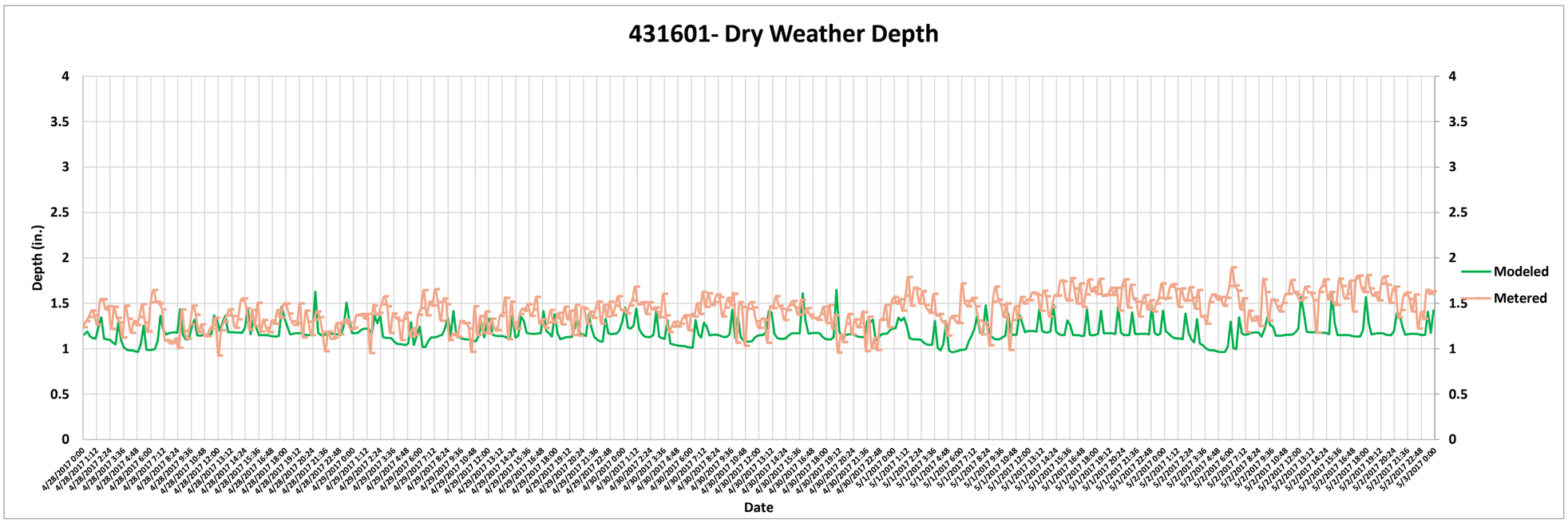
Appendix D2. Sewer Generation Factor Calculations

2021-2022 Flow Meter	Metered Area Land Use Type	Acres	Land Use % to Total	Units	Building Area (sq. ft)	Residential Density	FAR	11/2019-4/2020 AverageWater Use (gpd)	11/2019-4/2020 AverageWater Use excluding Irrigation Use (gpd)	Assumed RTS	Calculated ADWF (mgd)	Sewer Generation Factors gpd/unit	gpd/ac	gpd/1000 sf	Notes
442701A	PS	5.45	2.1%	0	0			0	0	0	0.0000				
Meter #4	HRO3	15.99	6.3%	32	143,677	2.0	0.206	5,812	5,812	0.5	0.0029	91	181	20	
Near 2100 Ralston Ave	OS	154.74	60.9%	0	0			0	0	0	0.0000				
	PD	68.47	27.0%	498	1,223,774	7.3	0.410	63,305	62,027	0.64	0.0405	81	591	33	
	R3	9.26	3.6%	344	387,308	37.2	0.960	39,803	39,782	0.723	0.0288	84	3111	74	
Total		***253.90***	***100%***	***874***	***1,754,759***			***108,920***	***107,621***		***0.0722***				
Metered ADWF (mgd)	***0.0722***														
450415/450409	PS	30.77	12.4%	2	480,825	0.1	0.359	18,636	16,926	0.85	0.0158	7900	514	33	
Meters # 8 & #9	E1	0.24	0.1%	4	5,161	16.9	0.500	279	279	0.88	0.0002	50	843	39	
Near 1011 Alameda De Las Pulgas/	E2.1	1.00	0.4%	1	53,928	1.0	1.237	7,912	7,912	0.85	0.0067	6700	6694	124	
Near 2043 Ralston Ave	HRO3	99.06	39.9%	4	23,844	0.0	0.006	2,109	2,109	0.60	0.0013	325	13	55	
	NC	8.44	3.4%	63	176,597	7.5	0.480	13,181	13,181	0.85	0.0112	178	1327	63	
	OS	34.25	13.8%	0	0			0	0	0.00	0.0000				
	PD	28.37	11.4%	171	644,037	6.0	0.521	29,967	29,967	0.80	0.0240	140	846	37	
	R1B	16.79	6.8%	98	236,094	5.8	0.323	17,423	17,423	0.77	0.0134	137	798	57	
	R4	27.59	11.1%	712	1,132,780	25.8	0.943	96,540	96,375	0.88	0.0850	119	3081	75	
	SC	2.06	0.8%	40	72,432	19.4	0.808	8,742	8,742	0.88	0.0077	193	3742	106	
Total		***248.56***	***100%***	***1095***	***2,825,700***			***194,789***	***192,915***		***0.1653***				
Metered ADWF (mgd)	***0.165***														
443205	PS	5.87	2.0%	4	49,818	0.68	0.195	1,418	304	0.2	0.0003	75	51	6	
Meter #10	R1C	52.95	18.3%	417	994,305	7.88	0.431	65,323	65,323	0.773	0.0505	121	954	51	
In Nortre Dame Ave approximately	PD	6.67	2.3%	2	56,324	0.30	0.194	7,386	2,392	0.3	0.0022	1100	330	39	
120 ft south of Clee St	R1B	224.23	77.4%	1158	3,229,678	5.16	0.331	210,285	210,199	0.76	0.1598	138	713	49	
Total		***289.72***	***100%***	***1581***	***4,330,124***			***284,412***	***278,218***		***0.2128***				
Metered ADWF (mgd)	***0.213***														
443606	PS	0.22	1.7%	0	0	-	-	0	0	0	0				
Meter #23	R1A	6.93	51.1%	18	67,282	2.6	0.22	3,905	3,905	0.4	0.00139	77	200	21	
In Nortre Dame De Namur University	R1B	4.38	32.3%	28	75,931	6.4	0.40	5,808	5,808	0.4	0.00207	74	473	27	
approximately 200 ft north of Laxague Dr	R1E	2.03	15.0%	0	0	-	-	0	0	0	0				
Total		***13.56***	***100%***	***46***	***143,214***			***9,712***	***9,712***		***0.00346***				
Metered ADWF (mgd)	***0.003***														
452404	R1C	21.94	27.6%	163	443,091	7.4	0.464	25,939	25,939	0.51	0.01323	81	603	30	
Meter #17	VCMU	1.16	1.5%	3	1,375	2.6	0.027	251	251	0.75	0.00019	63	162	137	
Near 1334 El Camino Real	From San Carlos	11.37	14.3%	50	165,000	4.4	0.333	8,750	8,750	0.52	0.00455	91	400	28	
	CMU	4.39	5.5%	43	98,769	9.8	0.516	6,609	6,609	0.75	0.00496	115	1128	50	
	R1A	39.24	49.4%	116	423,006	3.0	0.247	21,332	21,332	0.463	0.00988	85	252	23	
	VC	1.38	1.7%	11	28,868	7.9	0.479	2,022	2,022	0.75	0.00152	138	1096	53	
Total		***79.48***	***100%***	***386***	***1,160,109***			***64,903***	***64,903***		***0.03432***				
Metered ADWF (mgd)	***0.034***														
4028PS (Hiller PS)	PS	12.71	9.9%	2	101,393	0.2	0.183	6,009	0	0	0.00000				
Meter #18	R1C	54.42	42.5%	429	964,178	7.9	0.407	61,431	61,151	0.651	0.03999	93	735	41	
In Hiller St approximately 180 ft west	R2	5.32	4.1%	58	82,767	10.9	0.357	7,070	6,745	0.75	0.00530	91	997	64	
of Cambridge St	VCMU	1.65	1.3%	40	65,445	24.2	0.909	3,379	3,379	0.88	0.00297	74	1799	45	
	VHDR	3.77	2.9%	113	135,989	30.0	0.828	10,292	8,372	0.88	0.00906	80	2402	67	
	PD	5.97	4.7%	22	117,797	3.7	0.453	4,238	4,238	0.8	0.00339	154	568	29	
	PF	0.30	0.2%	2	12,636	6.7	0.972	279	279	0.88	0.00025	123	824	19	
	R1B	1.96	1.5%	12	40,519	6.1	0.476	2,688	2,688	0.651	0.00175	146	895	43	
	R3	2.02	1.6%	81	61,681	40.1	0.701	8,734	8,734	0.88	0.00769	95	3805	125	
	R4	20.56	16.0%	460	733,316	22.4	0.819	93,009	93,009	0.76	0.07069	154	3438	96	
	SC	12.44	9.7%	131	367,839	10.5	0.679	7,304	7,304	0.88	0.00643	49	517	17	
	VCS	7.02	5.5%	87	218,891	12.4	0.715	10,830	10,830	0.88	0.00953	110	1357	44	
Total		***128.14***	***100%***	***1437***	***2,902,451***			***215,262***	***206,730***		***0.15704***				
Metered ADWF (mgd)	***0.157***														
403317	VCMU	3.21	89.3%	27	98,841	8.4	0.708	2,828	2,828	0.85	0.00240	89	749	24	1. metered flow may be inaccurate
Meter #24	VHDR	0.38	10.7%	10	16,002	26.1	0.960	1,369	1,369	0.85	0.00116	116	3041	73	due to minimal flow
Near 641 Waltermire St															
Total		***3.59***	***100%***	***37***	***114,843***			***4,196***	***4,196***		***0.00357***				
Metered ADWF (mgd)	***0.000***														
403610	PS	12.76	15.4%	1	10,521	0.1	0.019	234	234	0.5	0.00012	117	9	11	1. metered flow may be inaccurate
Meter #25	OS	22.61	27.3%	1	1,144	0.0	0.001	0	0	0	0.00000				as it is higher than water use.
In Island Pkwy approximately	PD	47.52	57.3%	130	1,026,615	2.7	0.496	53,683	30,465	0.5	0.02684	206	565	26	
330 ft south of Concourse Dr															
Total		***82.90***	***100%***	***132***	***1,038,280***			***53,917***	***30,699***		***0.02696***				
Metered ADWF (mgd)	***0.065***														

Appendix E. Dry Weather Calibration Results

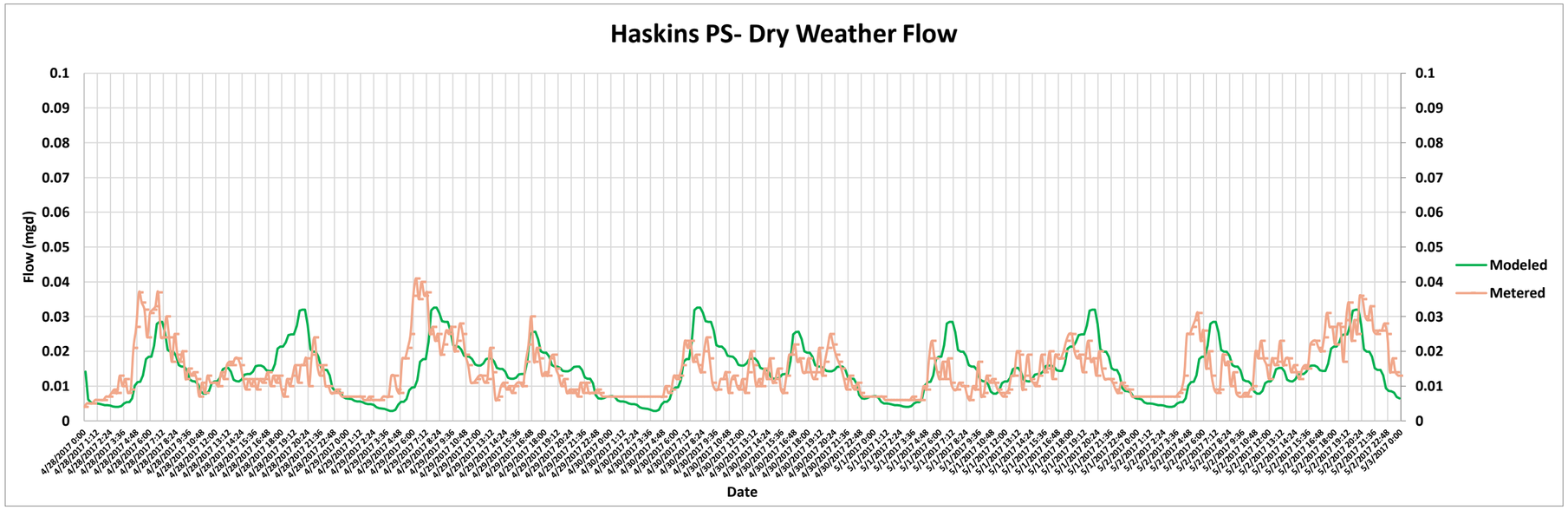
431601 (Basin 15) Dry Weather Calibration

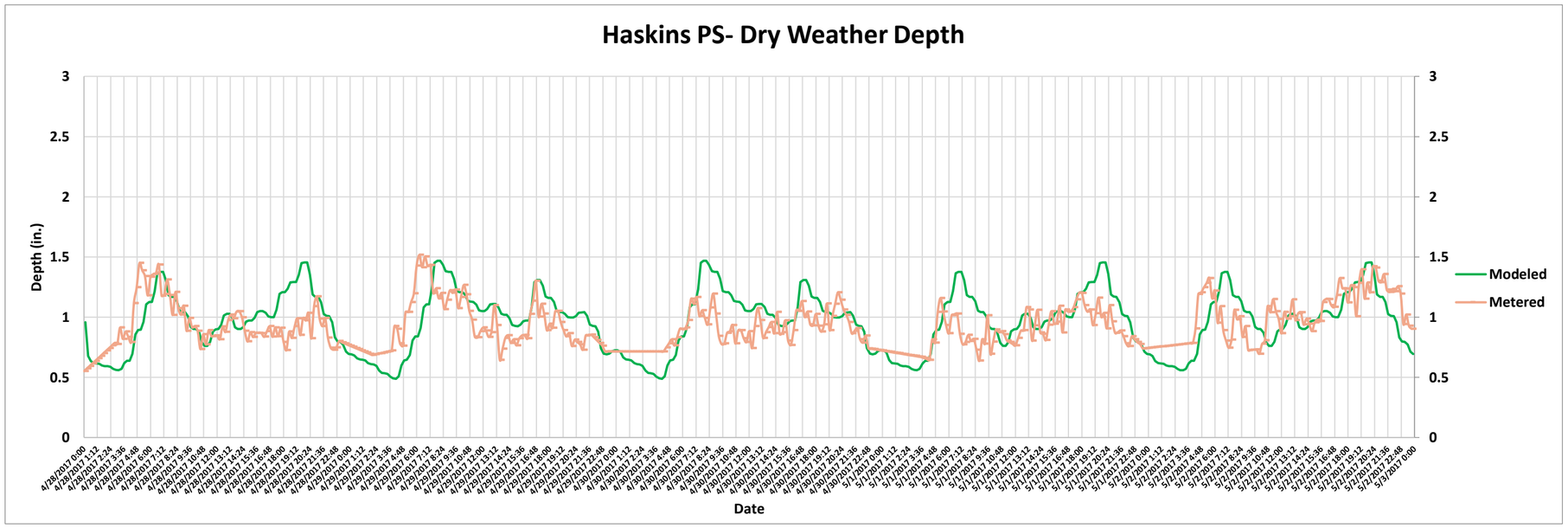




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.114	0.092	23.4%	0.022
Average Flow (mgd)	0.057	0.057	-0.1%	0.000
Max. Depth (in.)	1.648	1.897	-13.1%	-0.249
Average Depth (in.)	1.177	1.419	-17.0%	-0.241

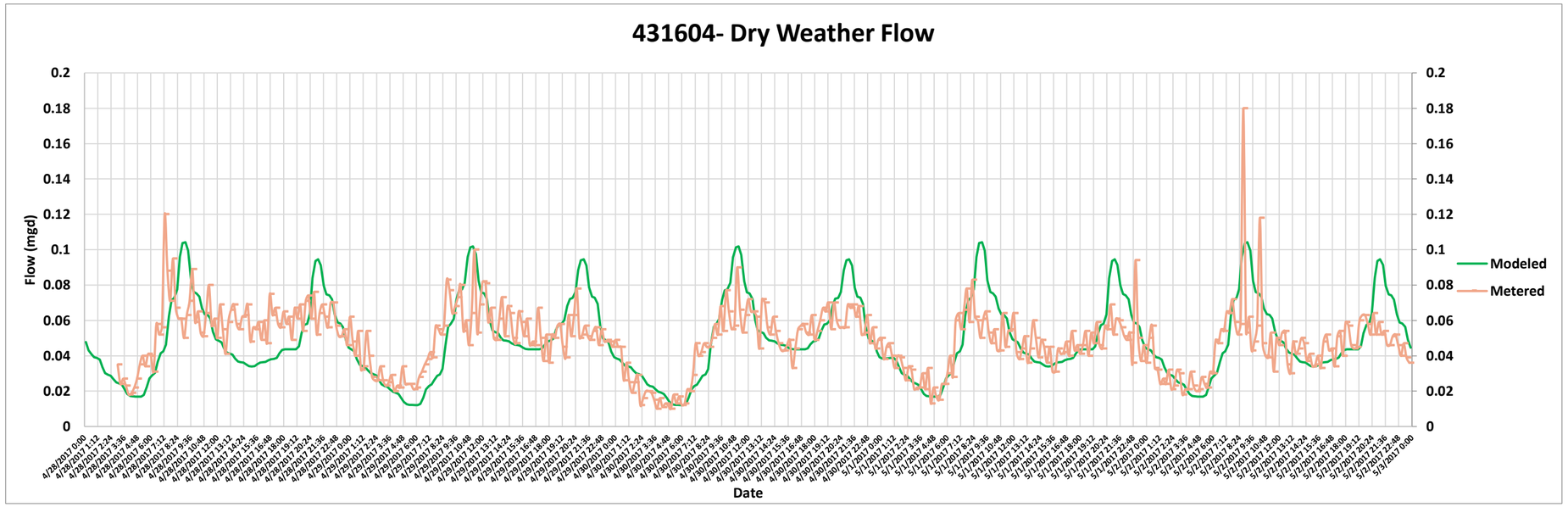
Haskins (Basin 14) Dry Weather Calibration

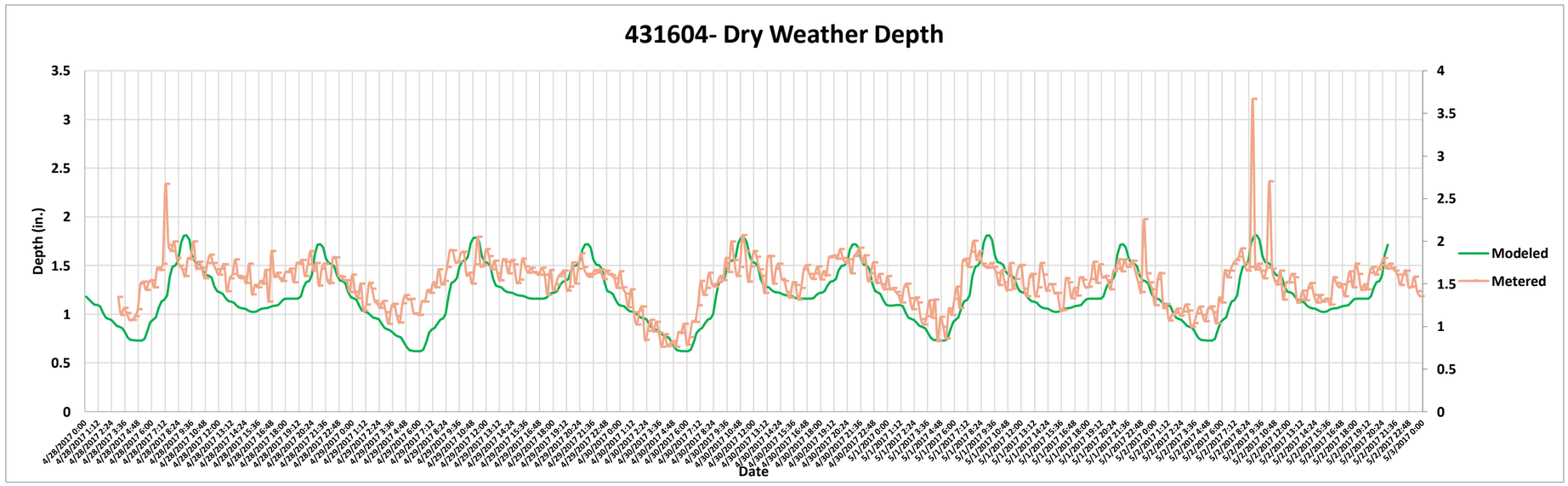




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.033	0.041	-20.5%	-0.008
Average Flow (mgd)	0.014	0.014	-0.2%	0.000
Max. Depth (in.)	1.468	1.516	-3.1%	-0.048
Average Depth (in.)	0.964	0.926	4.0%	0.037

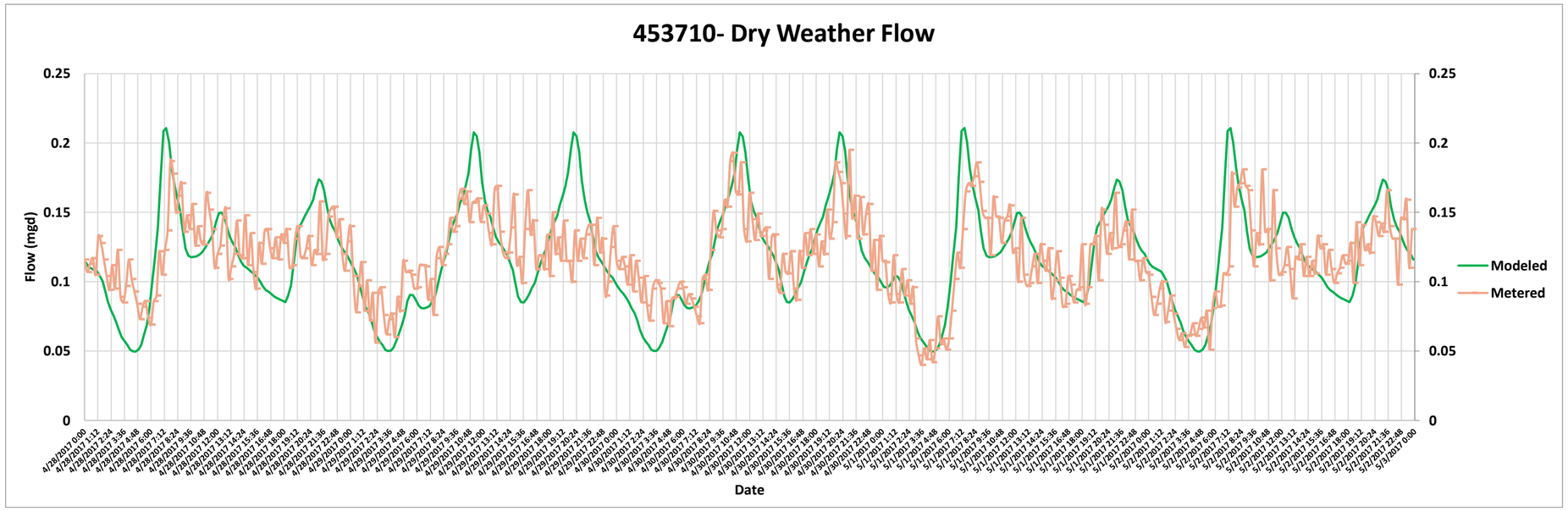
431604 (Basin 13) Dry Weather Calibration

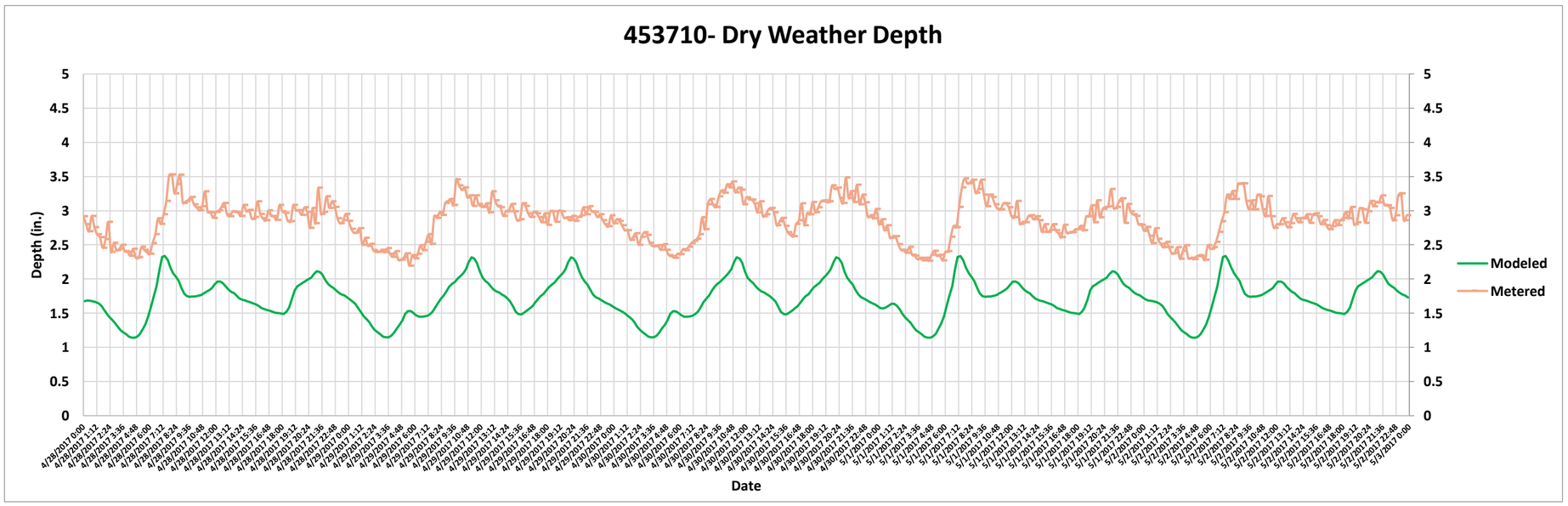




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.104	0.180	-42.1%	-0.076
Average Flow (mgd)	0.049	0.049	0.0%	0.000
Max. Depth (in.)	2.070	3.212	-35.6%	-1.142
Average Depth (in.)	1.356	1.331	1.9%	0.025

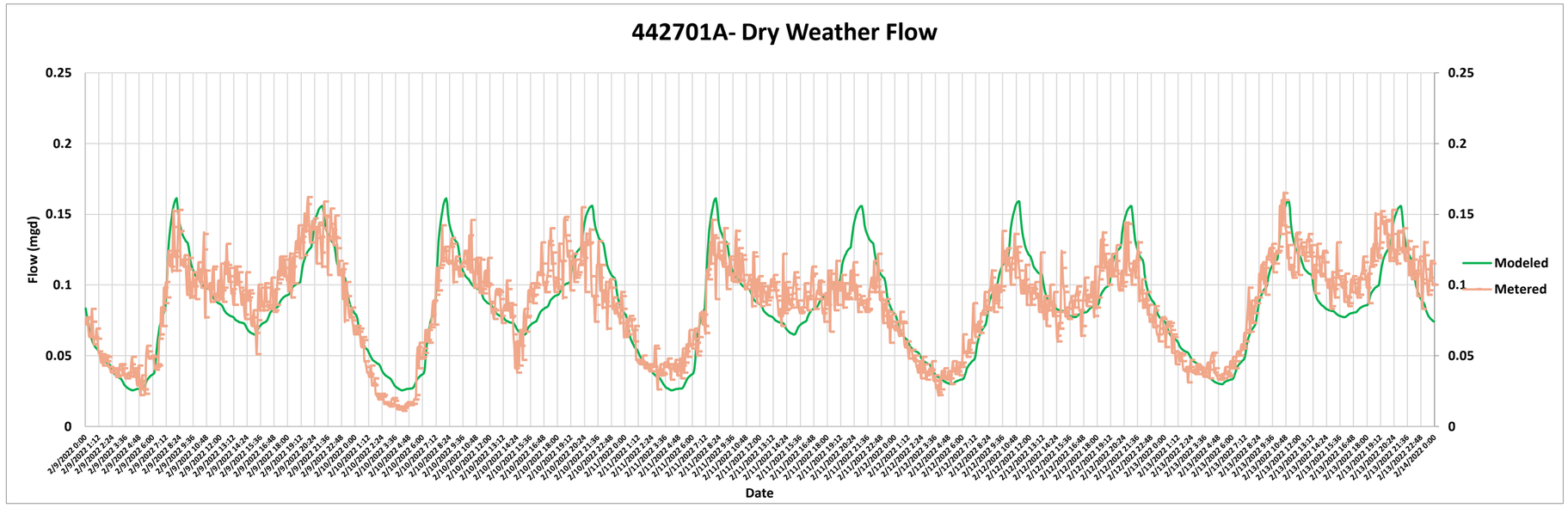
453710 (Basin 12) Dry Weather Calibration

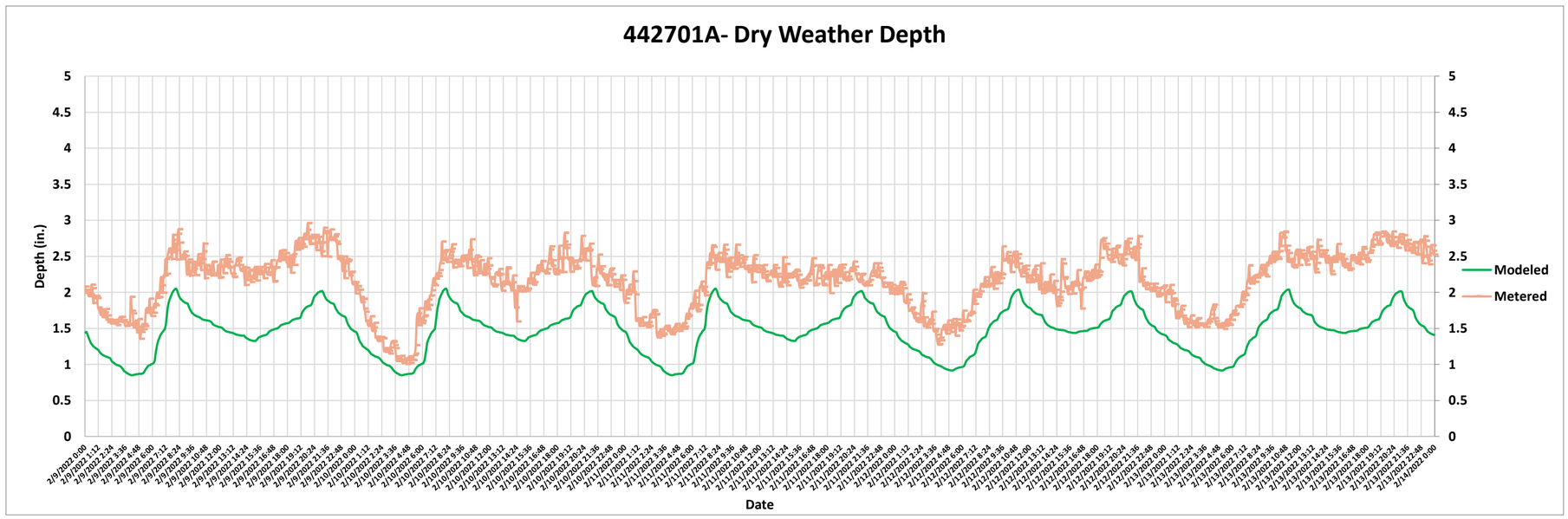




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.211	0.195	8.1%	0.016
Average Flow (mgd)	0.117	0.118	-0.4%	0.000
Max. Depth (in.)	2.335	3.528	-33.8%	-1.193
Average Depth (in.)	1.717	2.858	-39.9%	-1.141

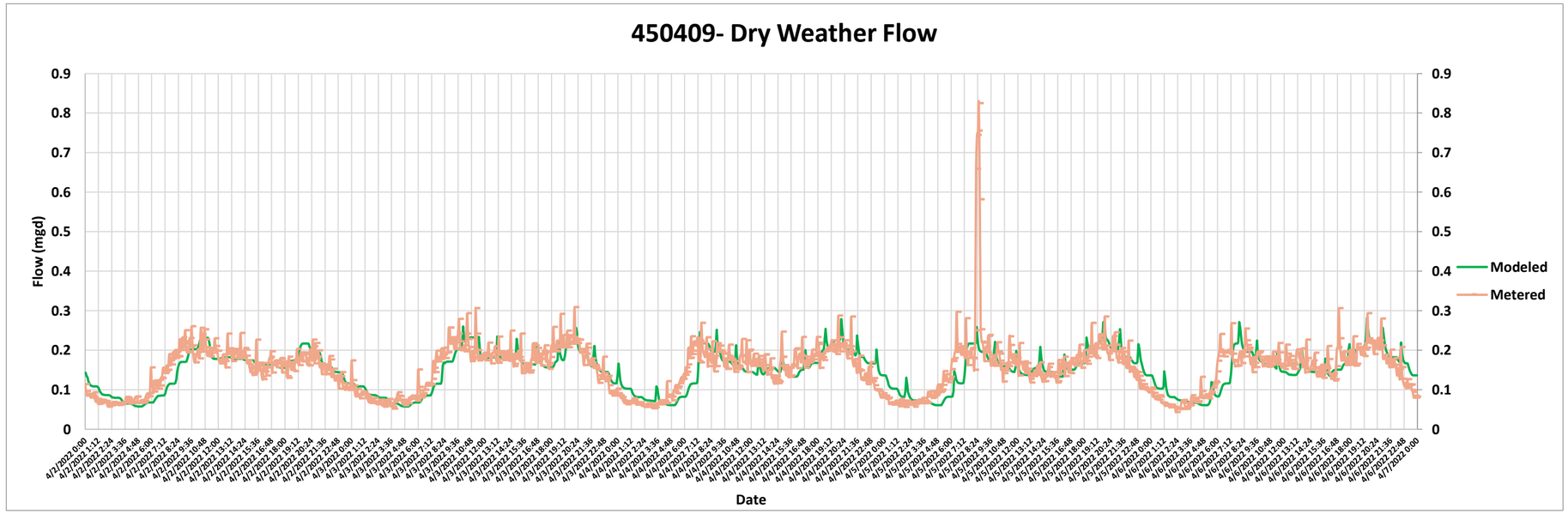
442701 (Basin 11) Dry Weather Calibration

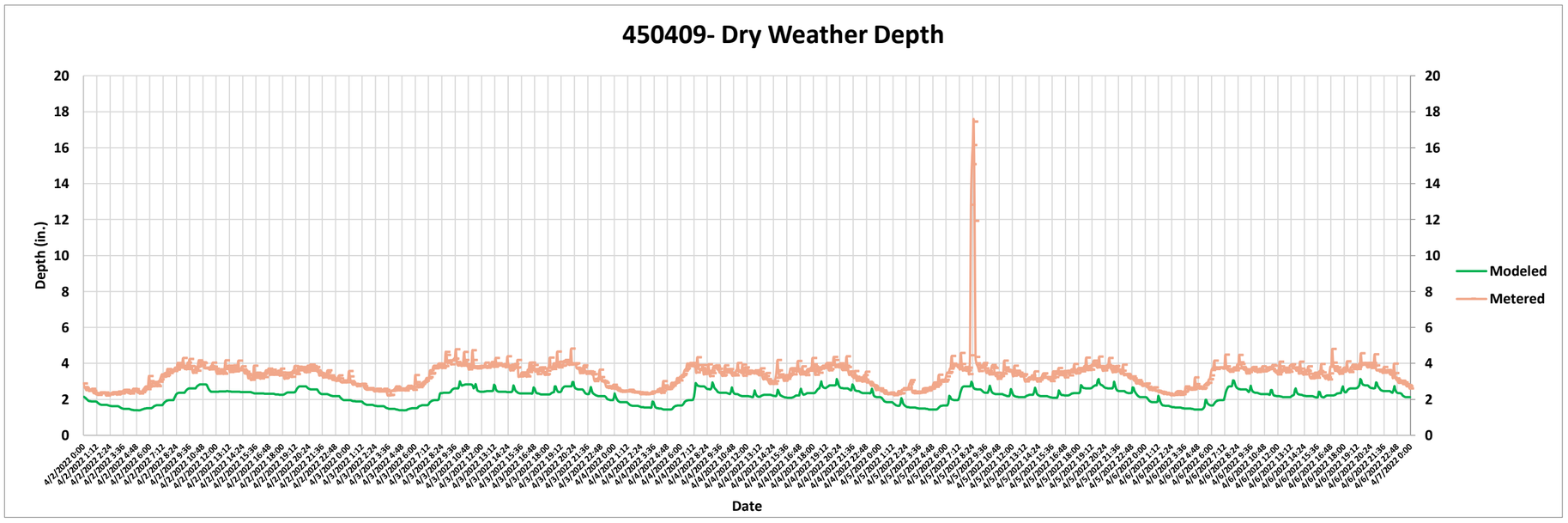




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.161	0.165	-2.2%	-0.004
Average Flow (mgd)	0.085	0.086	-1.2%	-0.001
Max. Depth (in.)	2.052	2.960	-30.7%	-0.908
Average Depth (in.)	1.472	2.151	-31.6%	-0.679

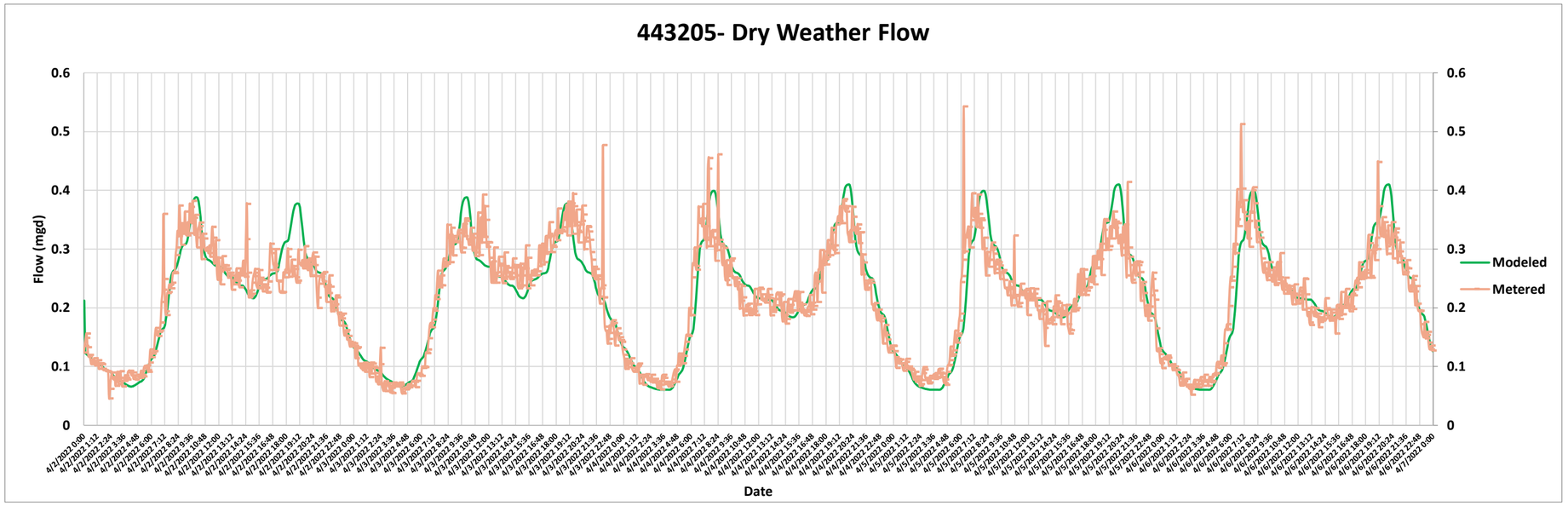
450409 (Basin 9) Dry Weather Calibration

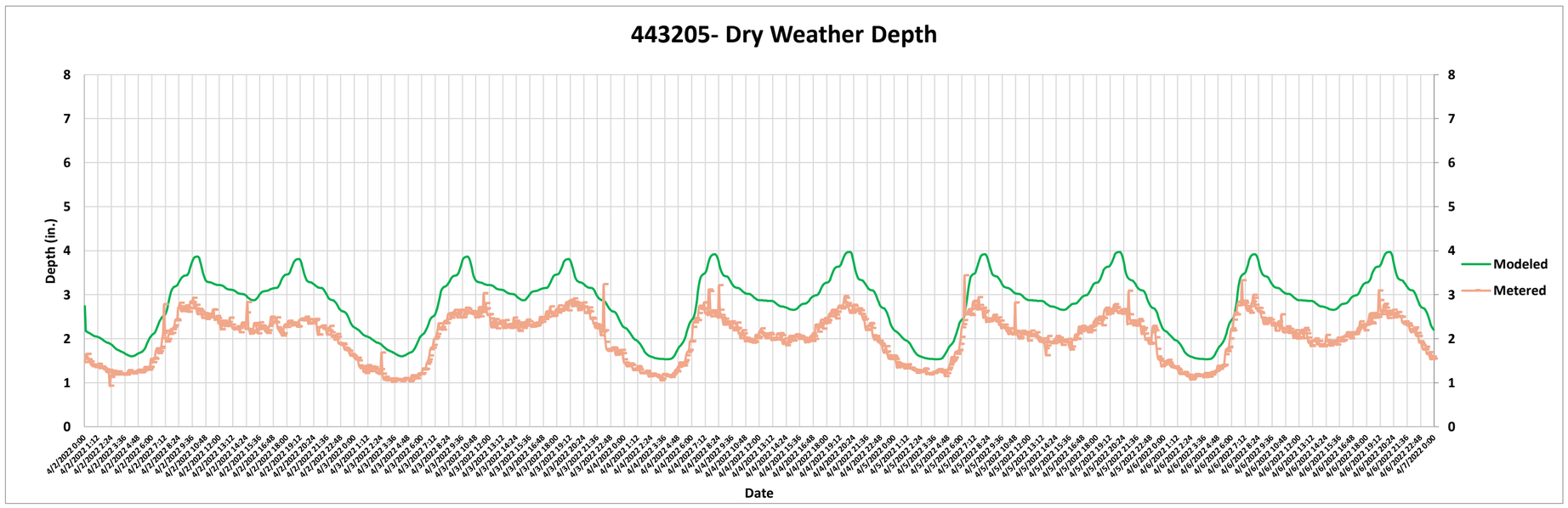




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.281	0.825	-65.9%	-0.544
Average Flow (mgd)	0.148	0.152	-2.7%	-0.004
Max. Depth (in.)	3.134	17.438	-82.0%	-14.304
Average Depth (in.)	2.185	3.348	-34.7%	-1.162

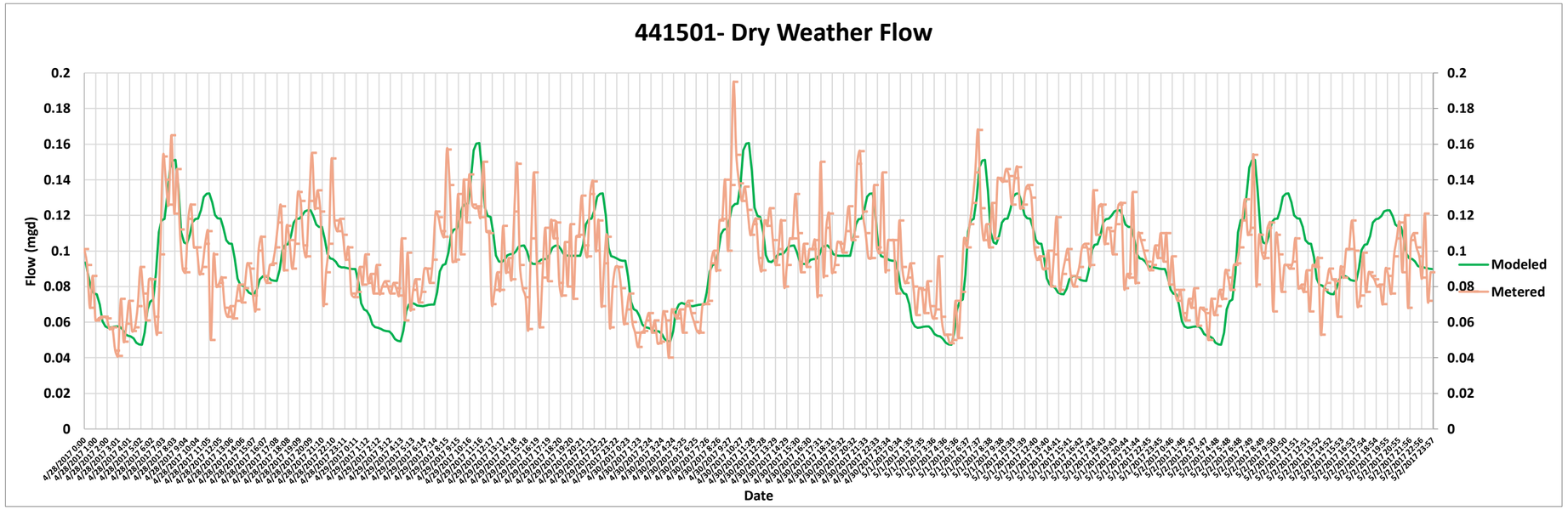
443205 (Basin 8) Dry Weather Calibration

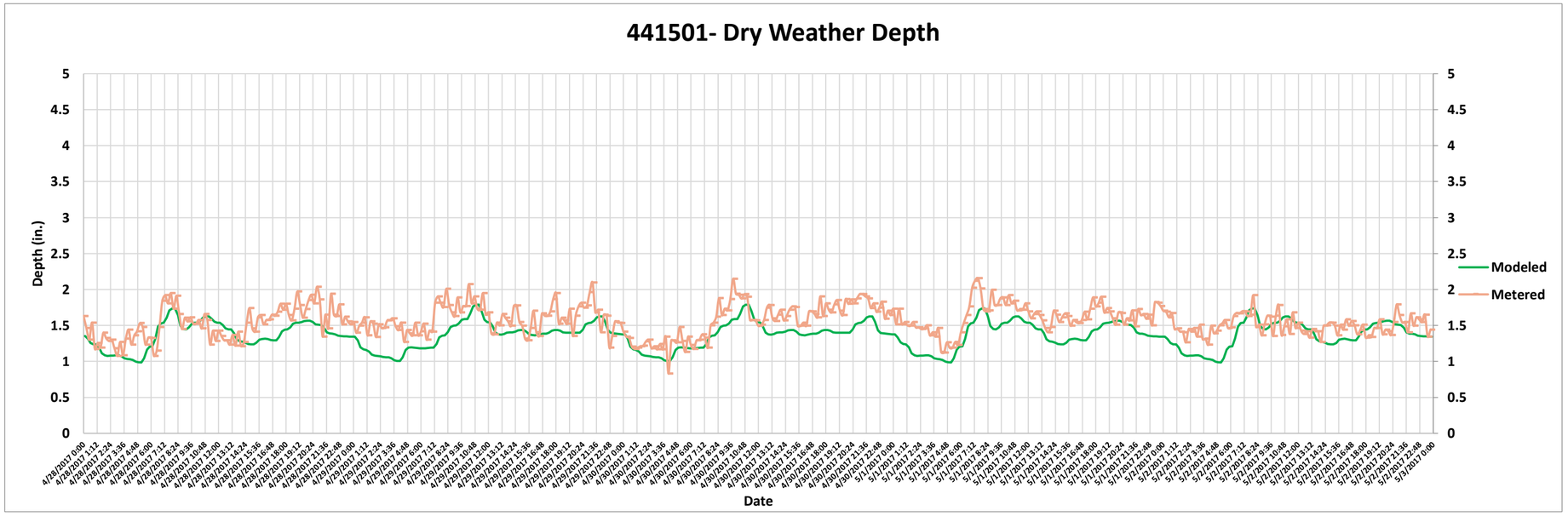




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.410	0.543	-24.5%	-0.133
Average Flow (mgd)	0.216	0.216	0.0%	0.000
Max. Depth (in.)	3.972	3.434	15.7%	0.538
Average Depth (in.)	2.799	2.033	37.7%	0.766

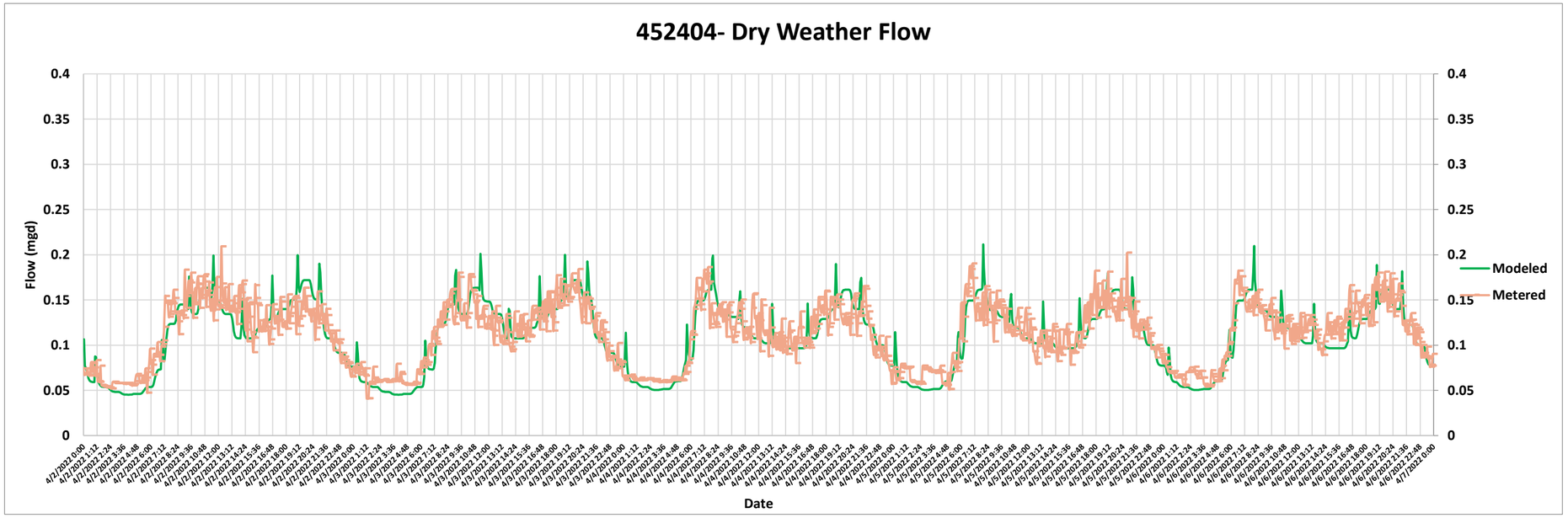
441501(Basin 6) Dry Weather Calibration

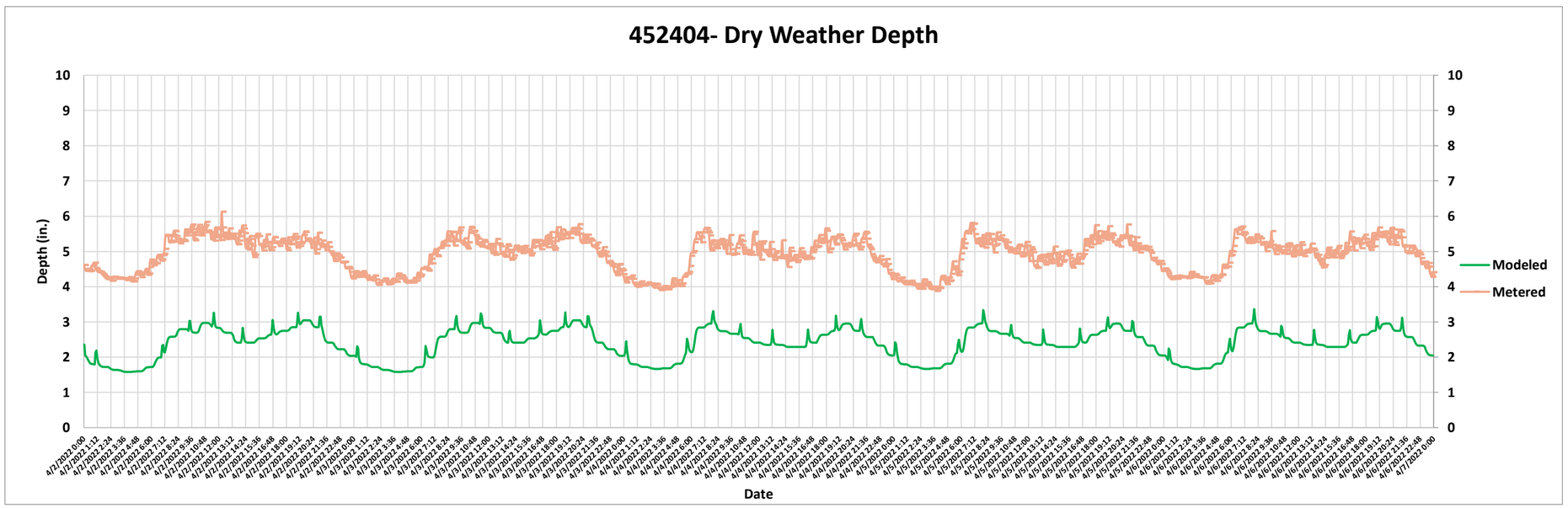




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.161	0.195	-17.6%	-0.034
Average Flow (mgd)	0.095	0.095	-0.3%	0.000
Max. Depth (in.)	1.790	2.157	-17.0%	-0.367
Average Depth (in.)	1.366	1.562	-12.6%	-0.197

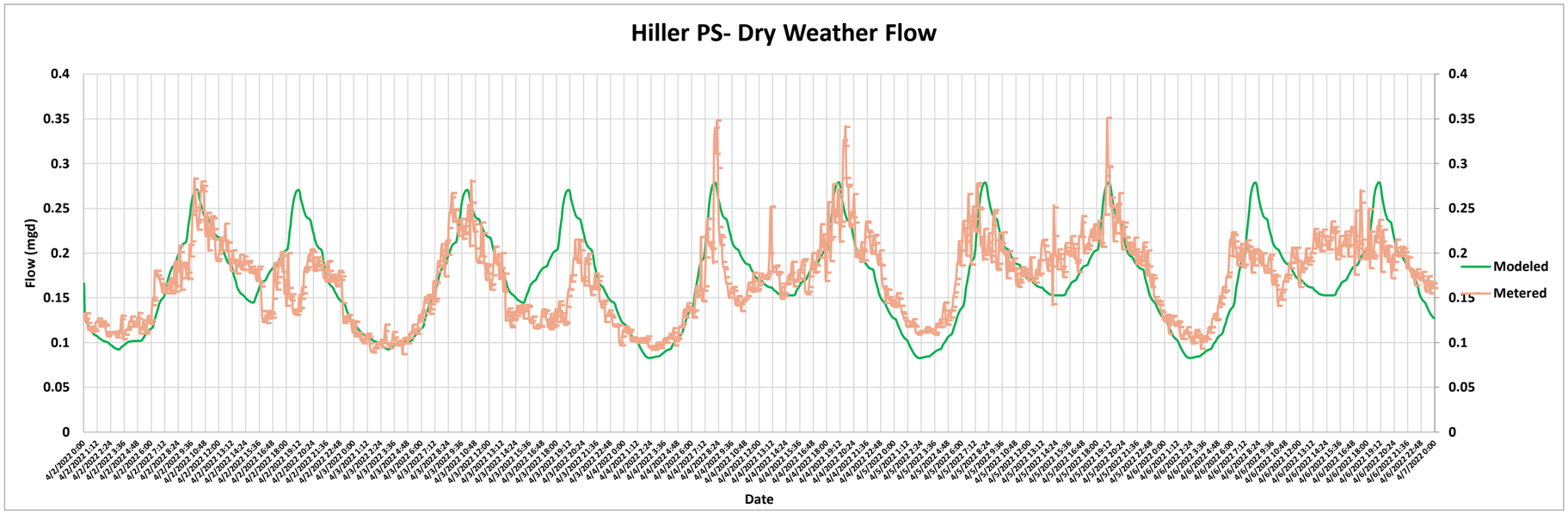
452404(Basin 4) Dry Weather Calibration

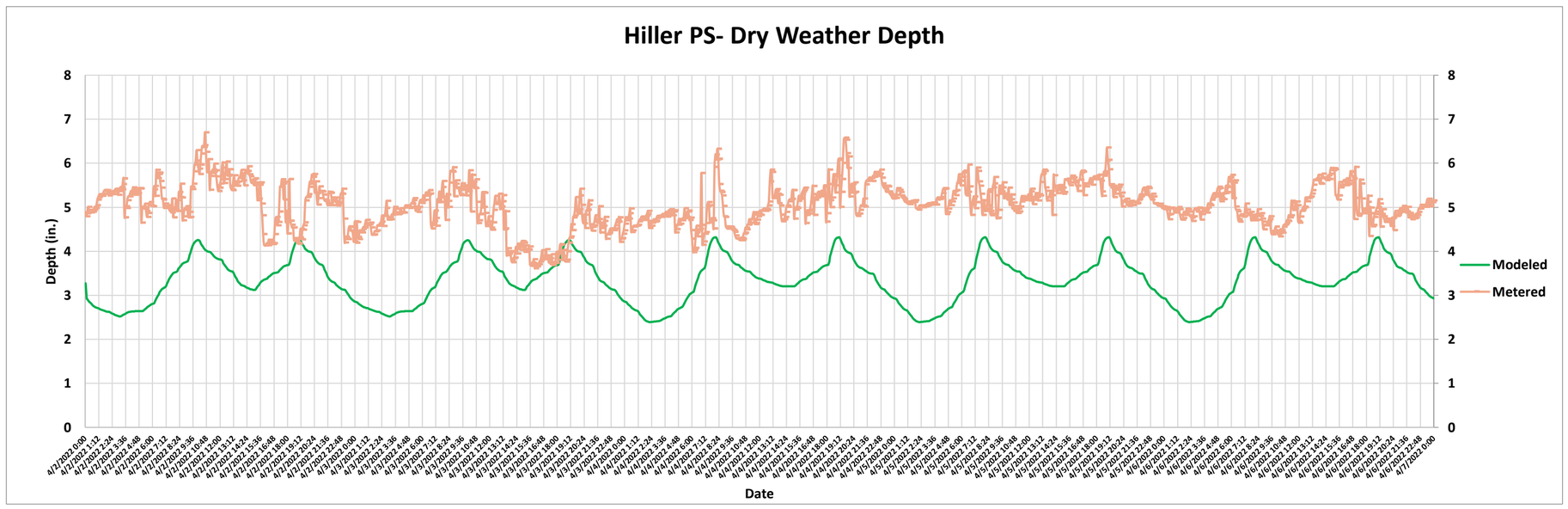




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.211	0.209	1.2%	0.002
Average Flow (mgd)	0.109	0.112	-3.1%	-0.004
Max. Depth (in.)	3.364	6.120	-45.0%	-2.756
Average Depth (in.)	2.386	4.916	-51.5%	-2.530

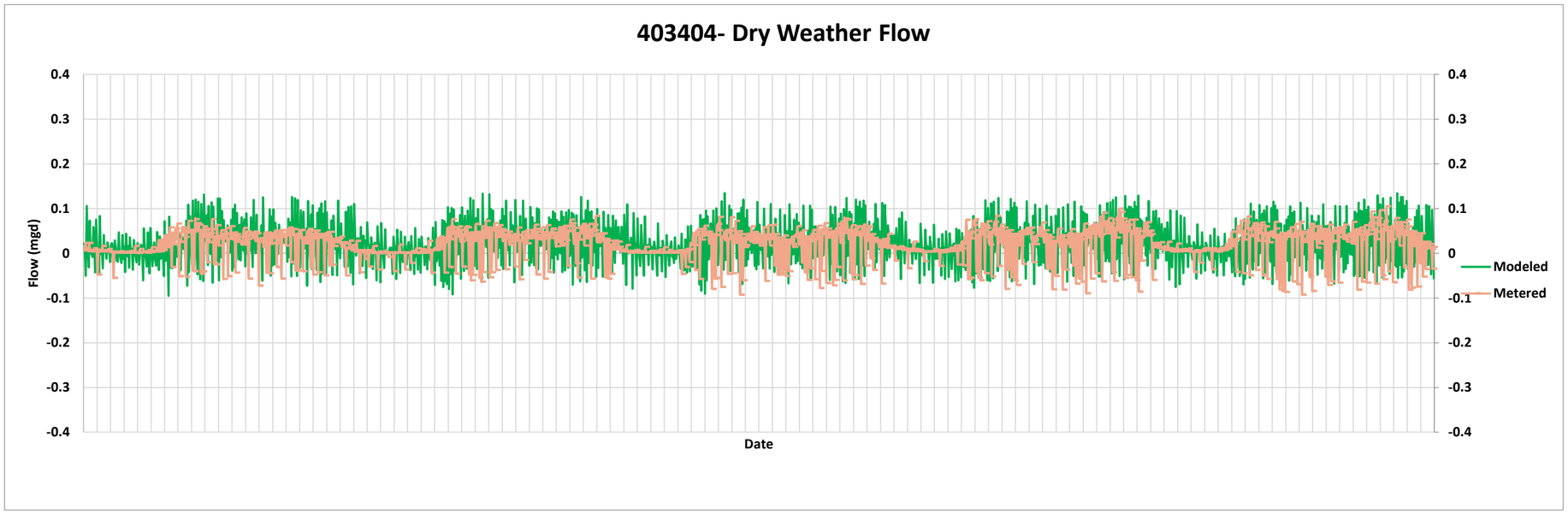
Hiller PS (Basin 3) Dry Weather Calibration

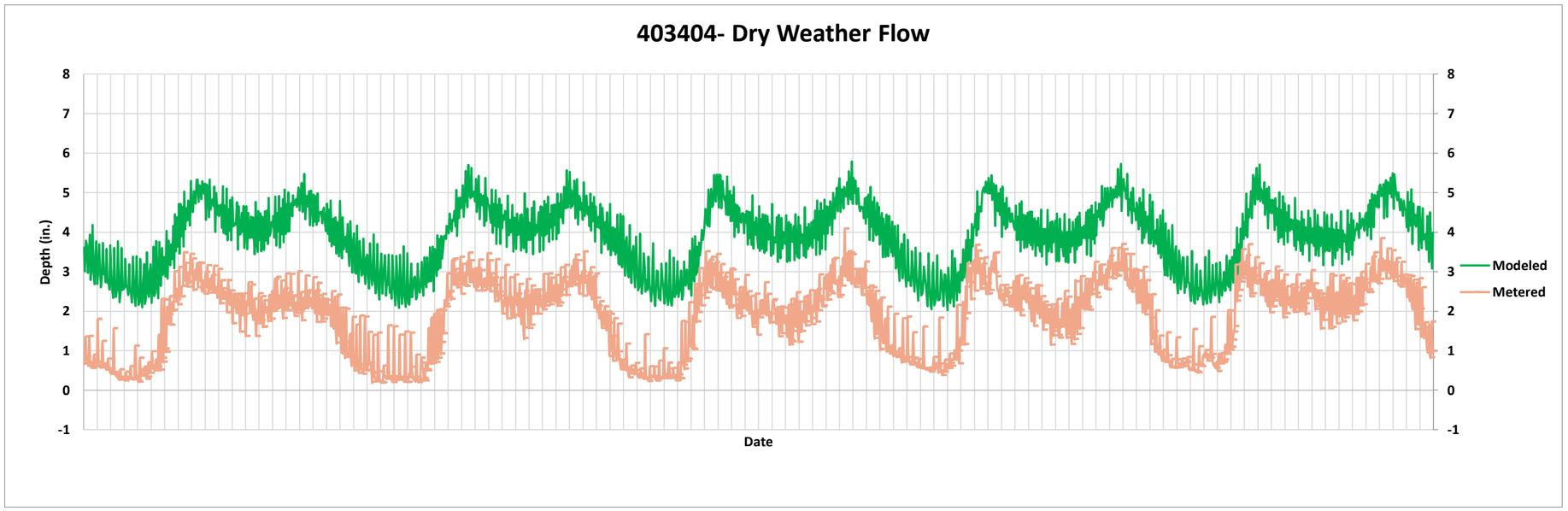




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.279	0.351	-20.5%	-0.072
Average Flow (mgd)	0.170	0.170	0.1%	0.000
Max. Depth (in.)	4.319	6.705	-35.6%	-2.386
Average Depth (in.)	3.338	5.049	-33.9%	-1.711

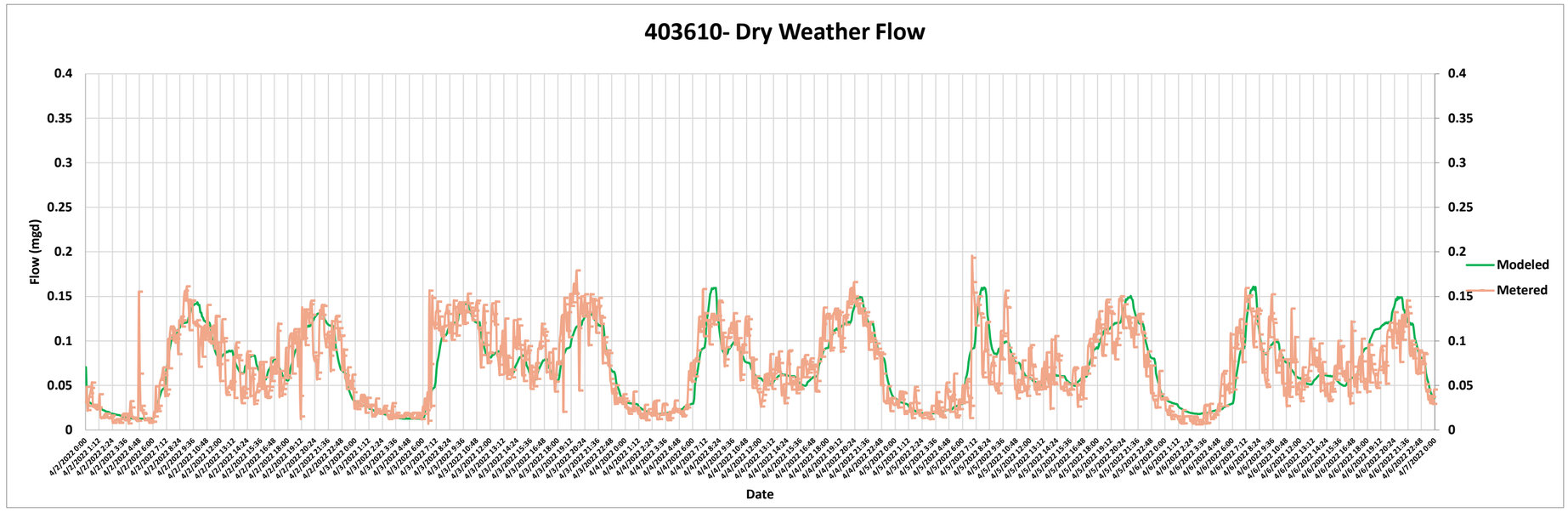
403404 (Basin 2) Dry Weather Calibration

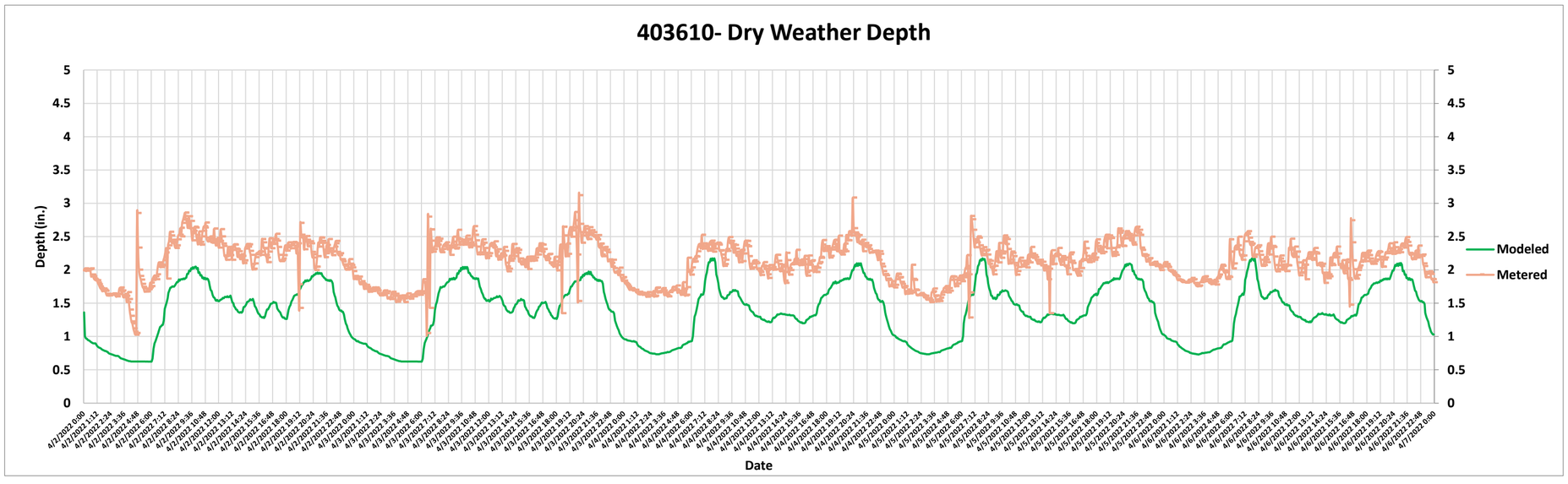




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.134	0.105	28.0%	0.029
Average Flow (mgd)	0.022	0.020	7.5%	0.002
Max. Depth (in.)	5.789	4.089	41.6%	1.700
Average Depth (in.)	3.909	1.890	106.8%	2.019

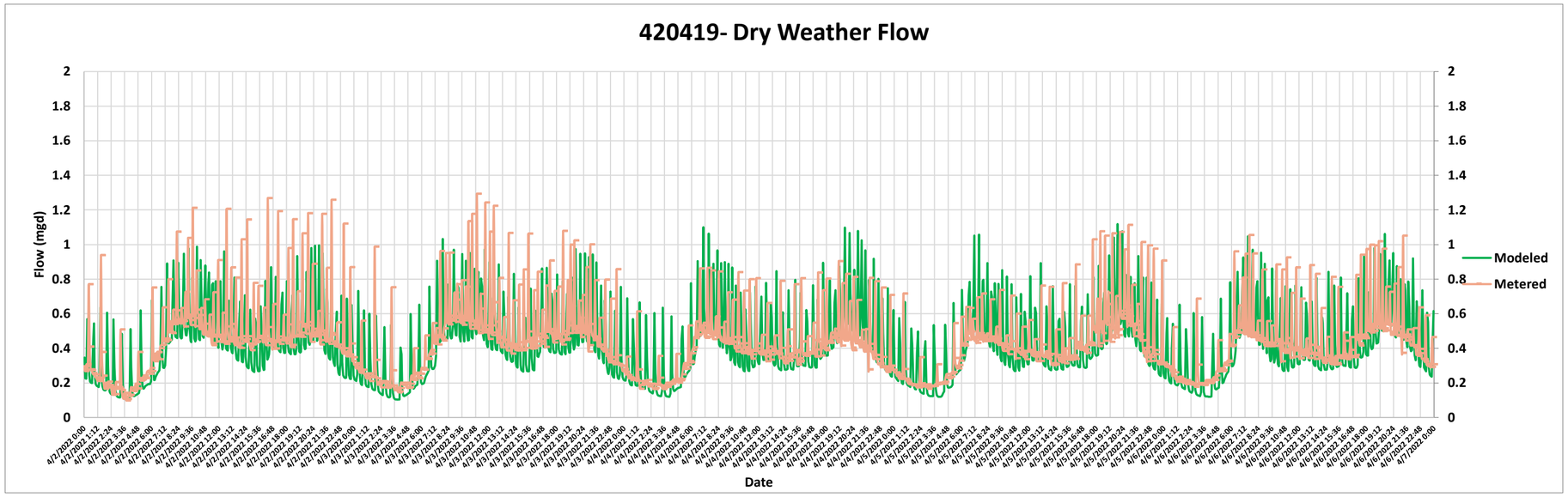
403610 (Basin 1) Dry Weather Calibration

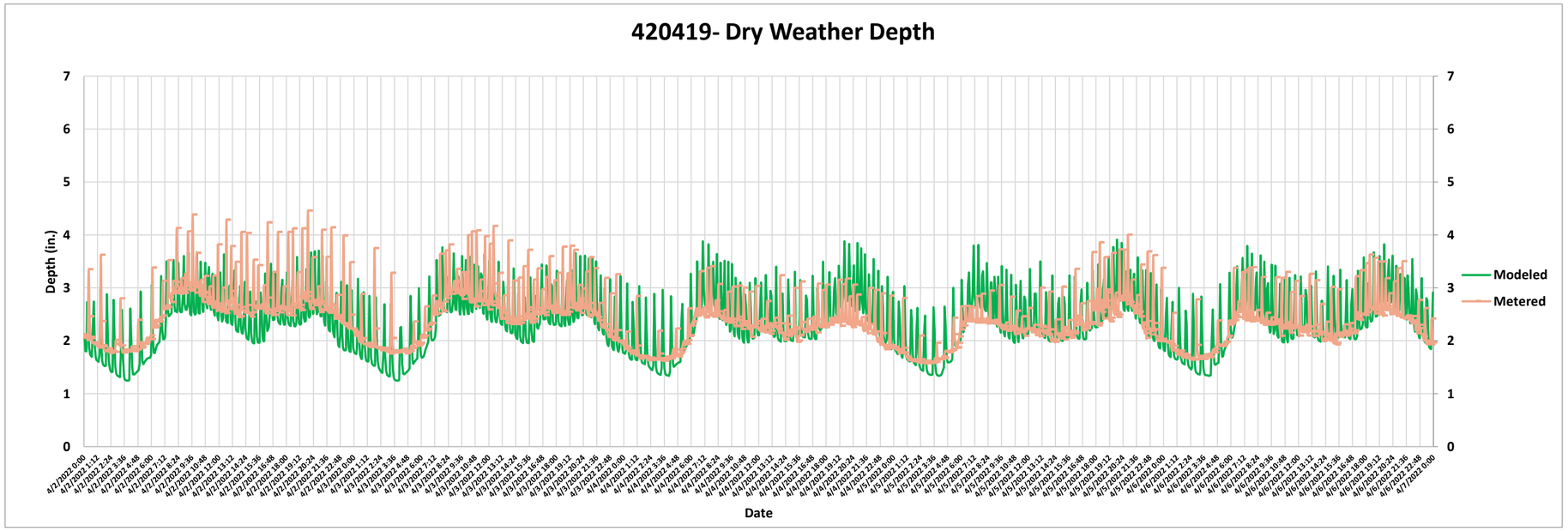




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.160	0.193	-17.3%	-0.033
Average Flow (mgd)	0.067	0.071	-5.4%	-0.004
Max. Depth (in.)	2.172	3.119	-30.4%	-0.947
Average Depth (in.)	1.319	2.112	-37.6%	-0.793

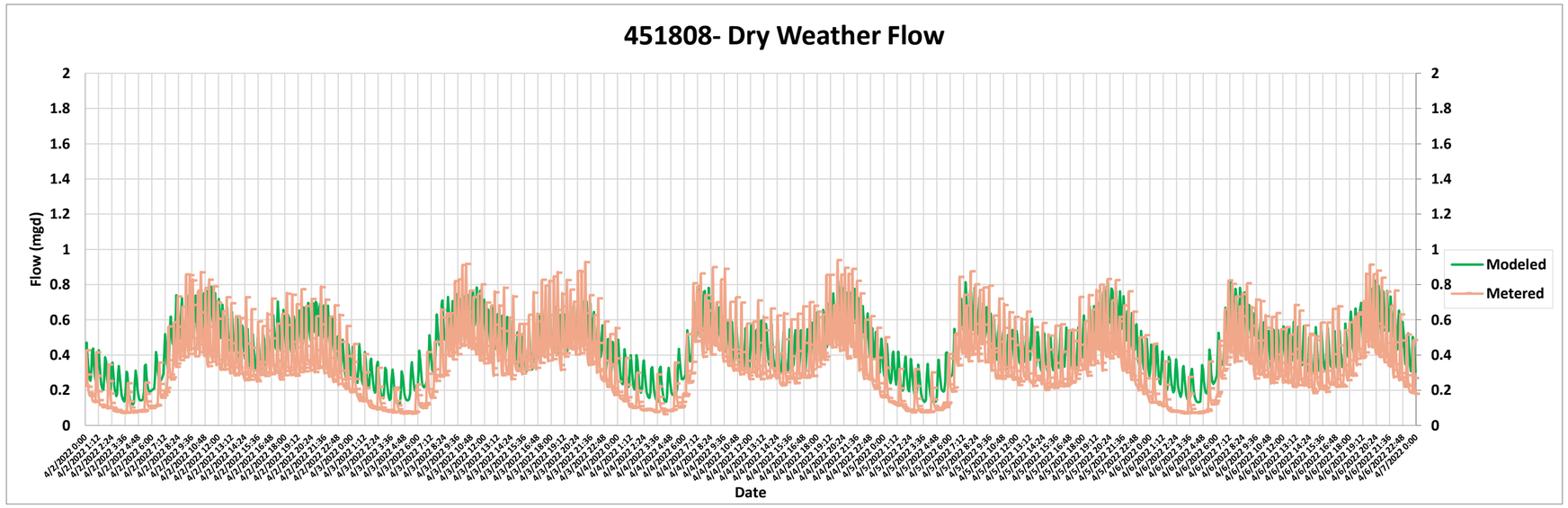
420419 (Trunk Line) Dry Weather Calibration

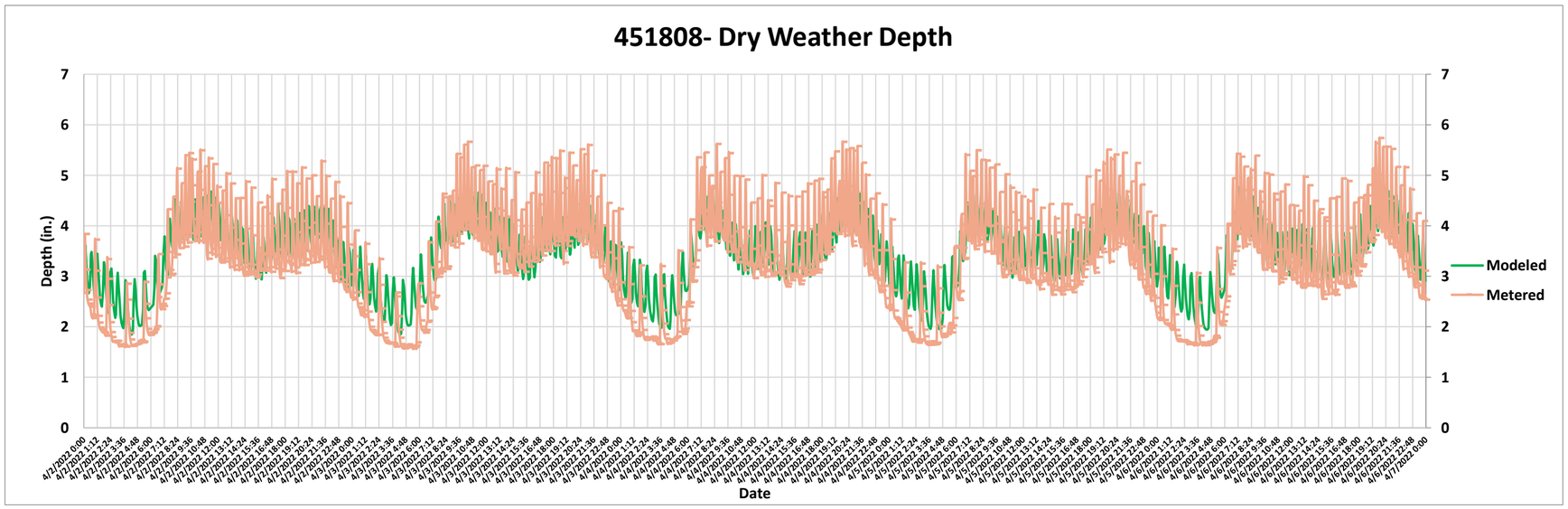




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	1.118	1.294	-13.6%	-0.176
Average Flow (mgd)	0.425	0.434	-2.1%	-0.009
Max. Depth (in.)	3.913	4.459	-12.2%	-0.546
Average Depth (in.)	2.364	2.387	-0.9%	-0.022

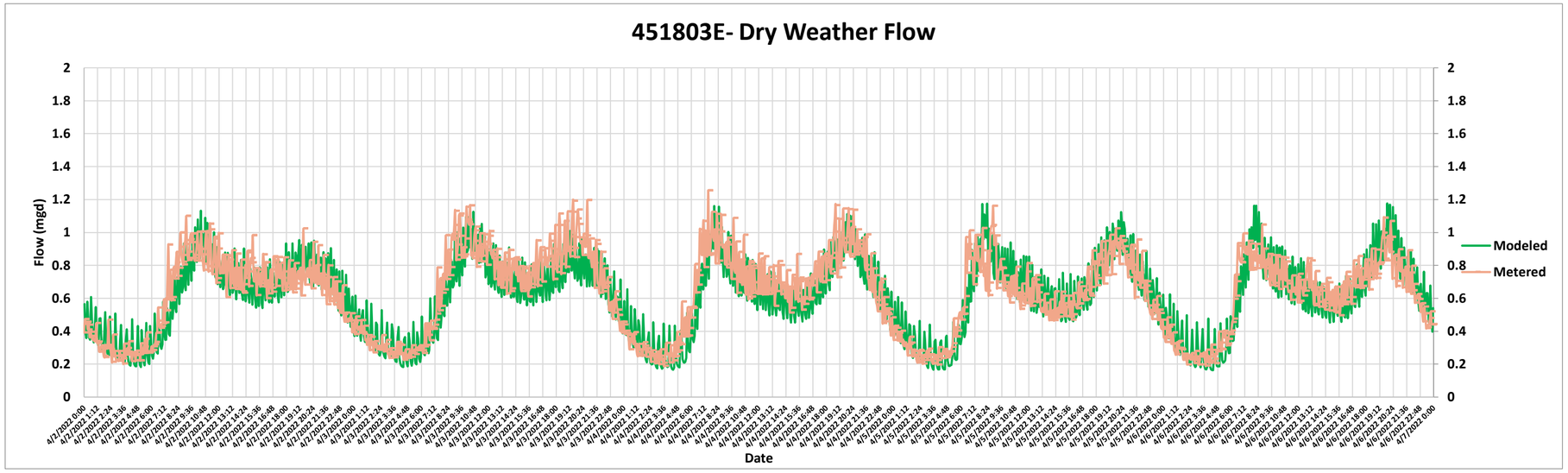
451808 (Trunk Line) Dry Weather Calibration

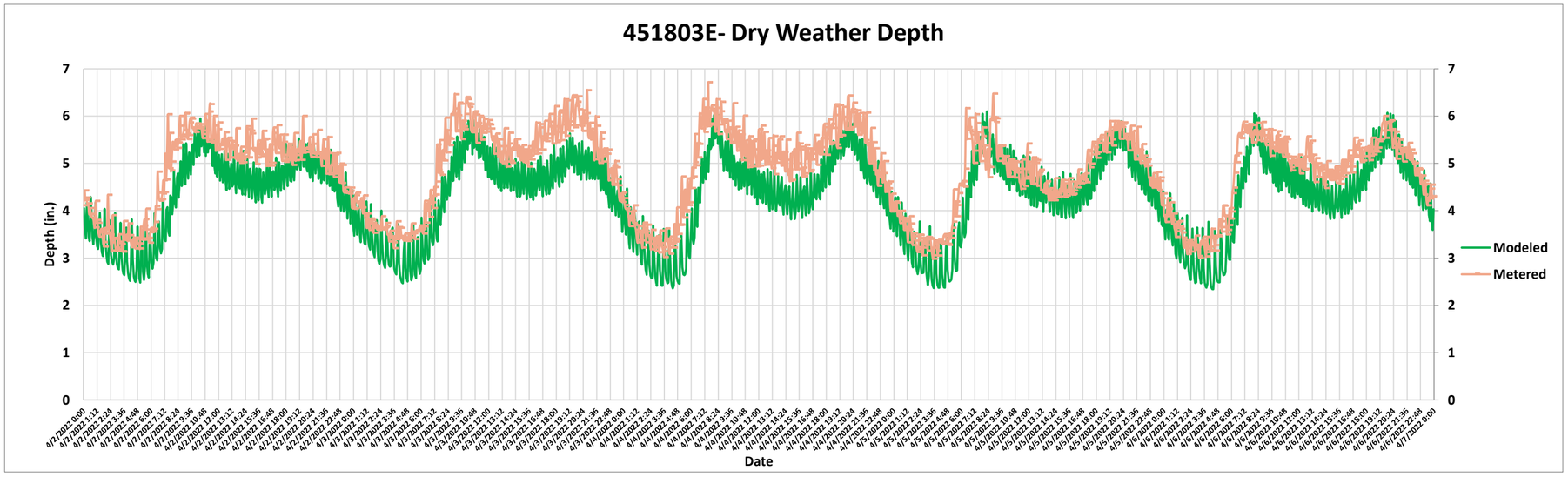




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.823	0.938	-12.2%	-0.115
Average Flow (mgd)	0.440	0.344	28.1%	0.097
Max. Depth (in.)	4.781	5.731	-16.6%	-0.950
Average Depth (in.)	3.436	3.279	4.8%	0.157

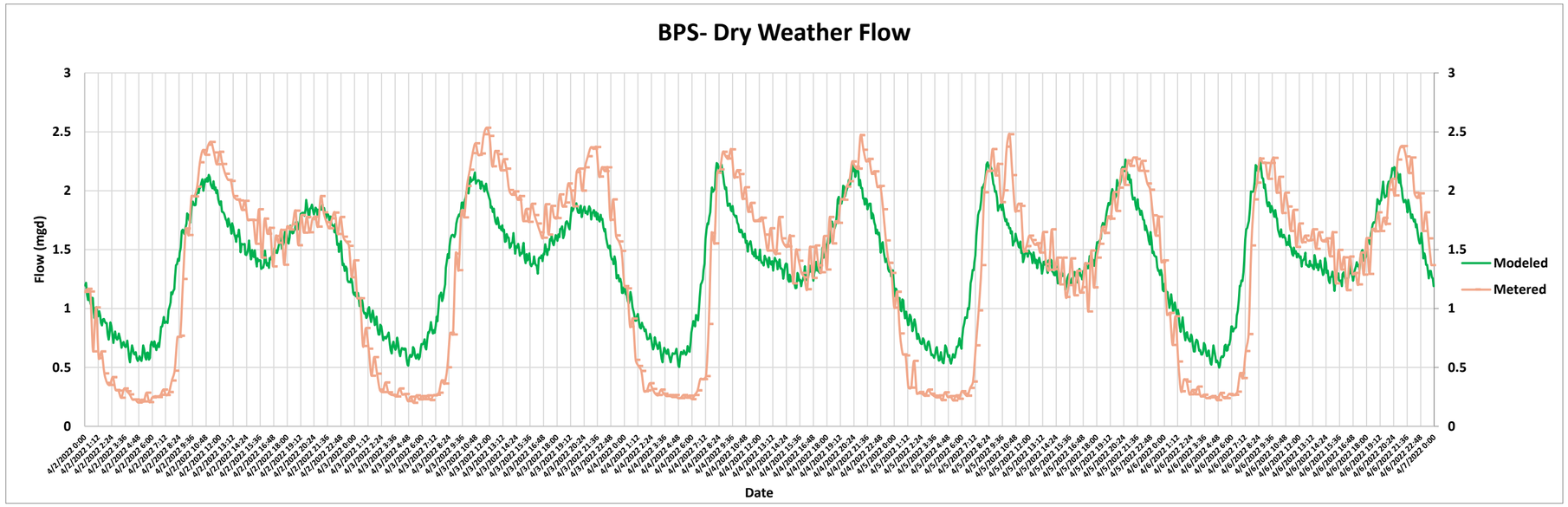
451803E (Trunk Line) Dry Weather Calibration

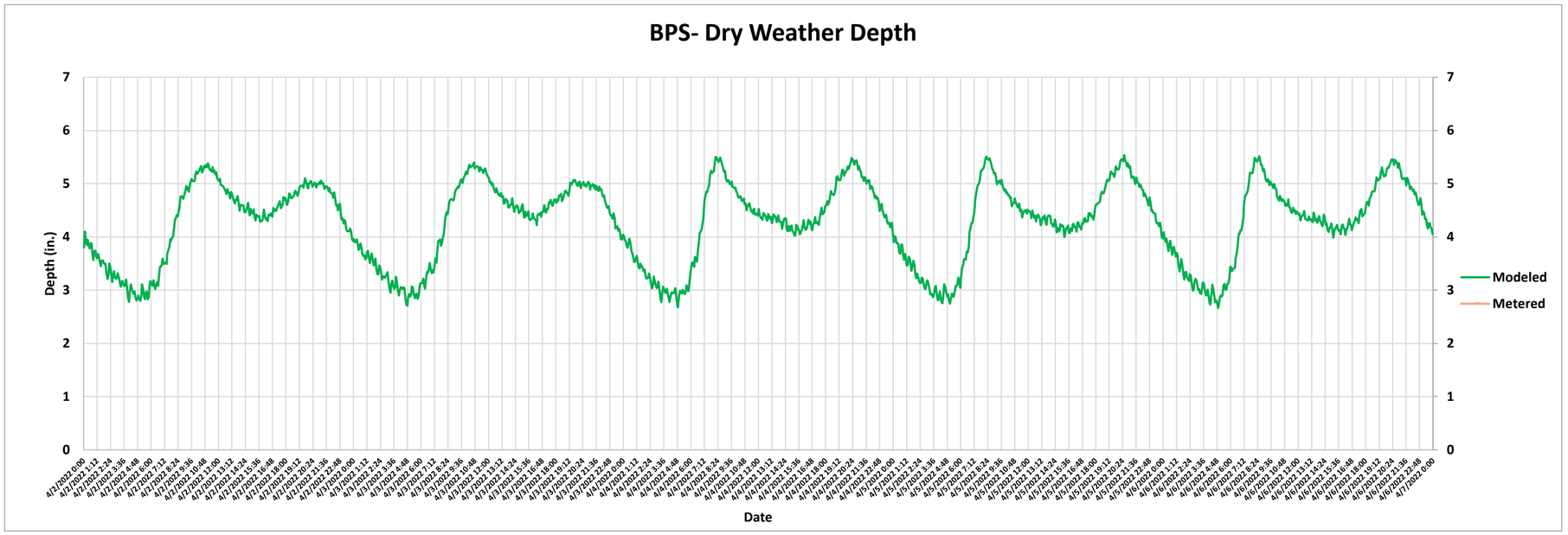




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	1.177	1.256	-6.3%	-0.079
Average Flow (mgd)	0.613	0.632	-3.0%	-0.019
Max. Depth (in.)	6.099	6.715	-9.2%	-0.616
Average Depth (in.)	4.324	4.844	-10.7%	-0.520

BPS Dry Weather Calibration

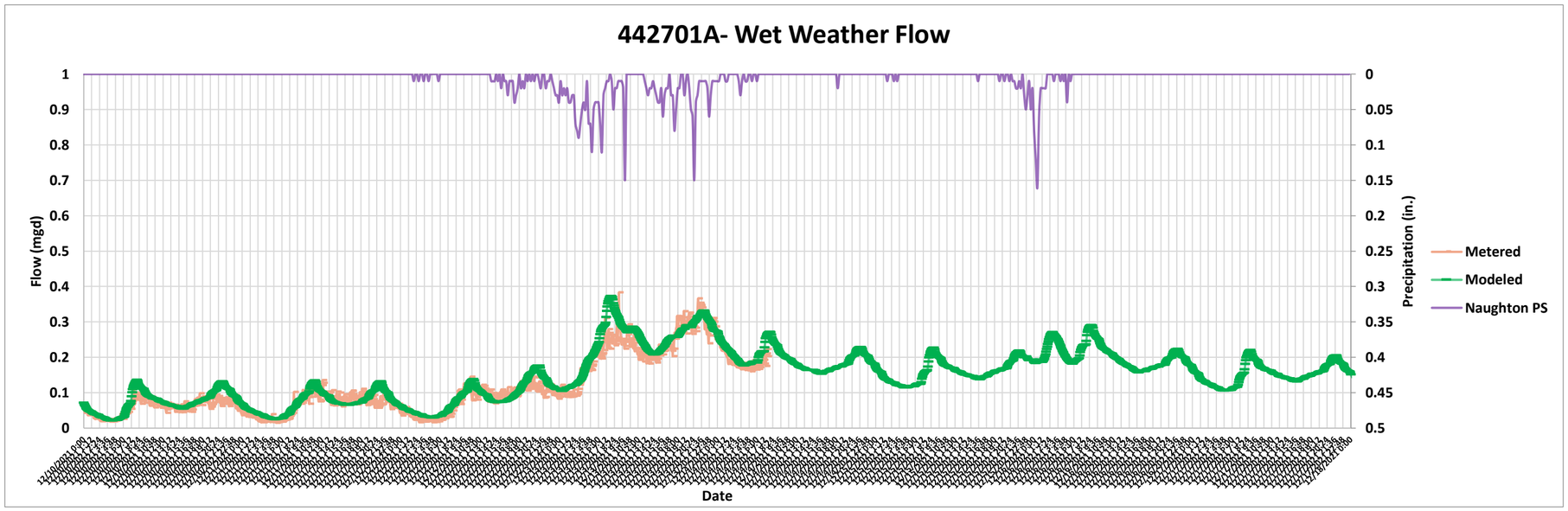


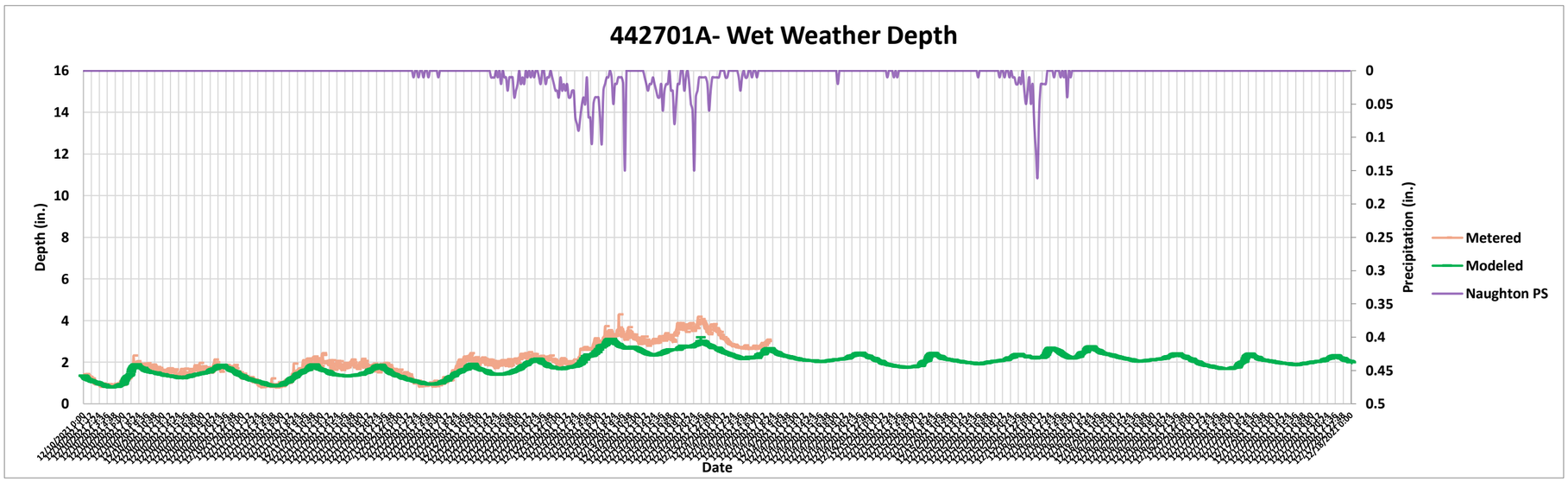


	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	2.265	2.535	-10.7%	-0.270
Average Flow (mgd)	1.379	1.345	2.5%	0.034
Max. Depth (in.)	5.537	-	-	-
Average Depth (in.)	4.280	-	-	-

Appendix F. Wet Weather Calibration Results

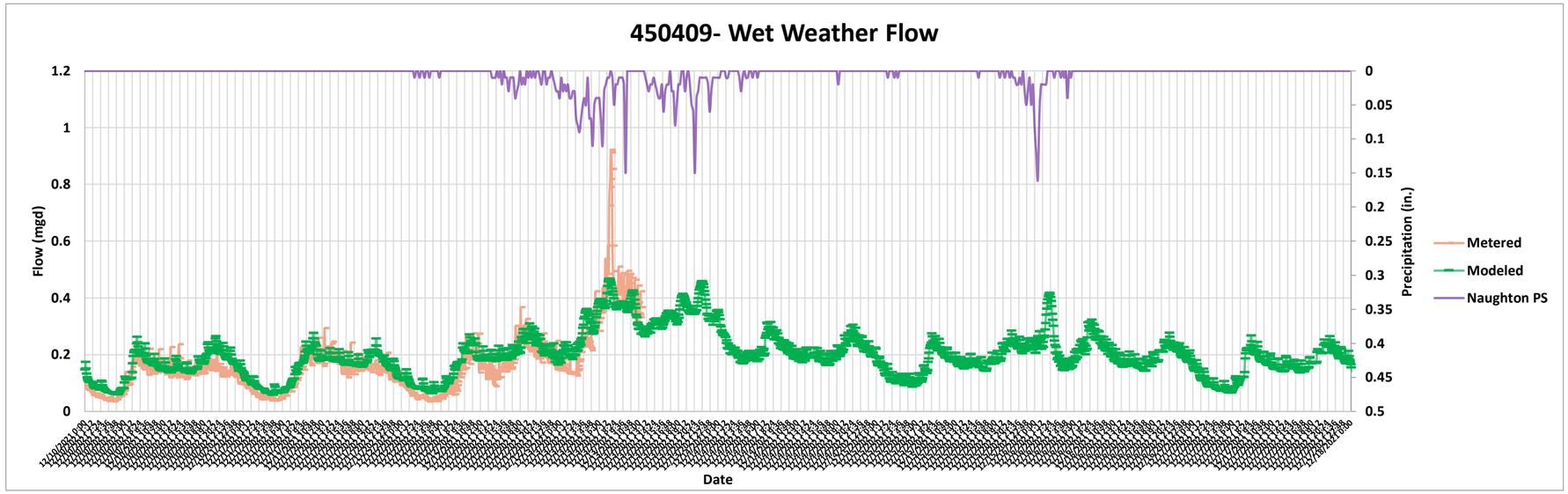
442701A (Basin 11) Wet Weather Calibration

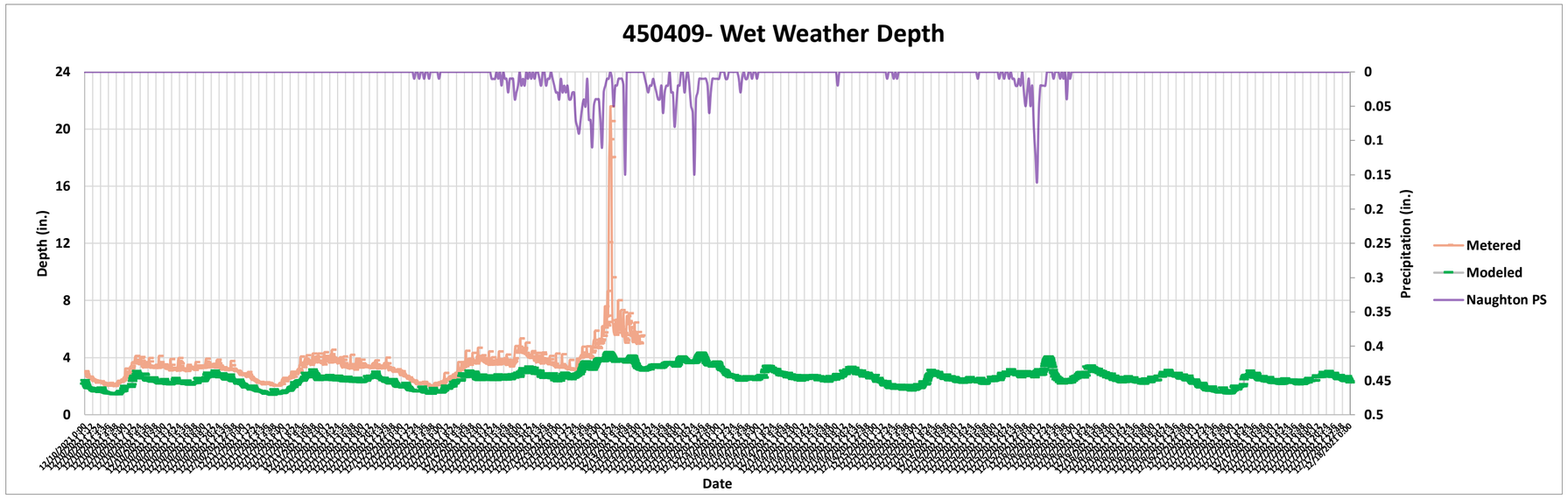




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.373	0.383	-2.7%	-0.010
Average Flow (mgd)	0.126	0.113	11.2%	0.013
Max Depth (in.)	3.184	4.290	-25.8%	-1.106
Average Depth (in.)	1.728	2.033	-15.0%	-0.305

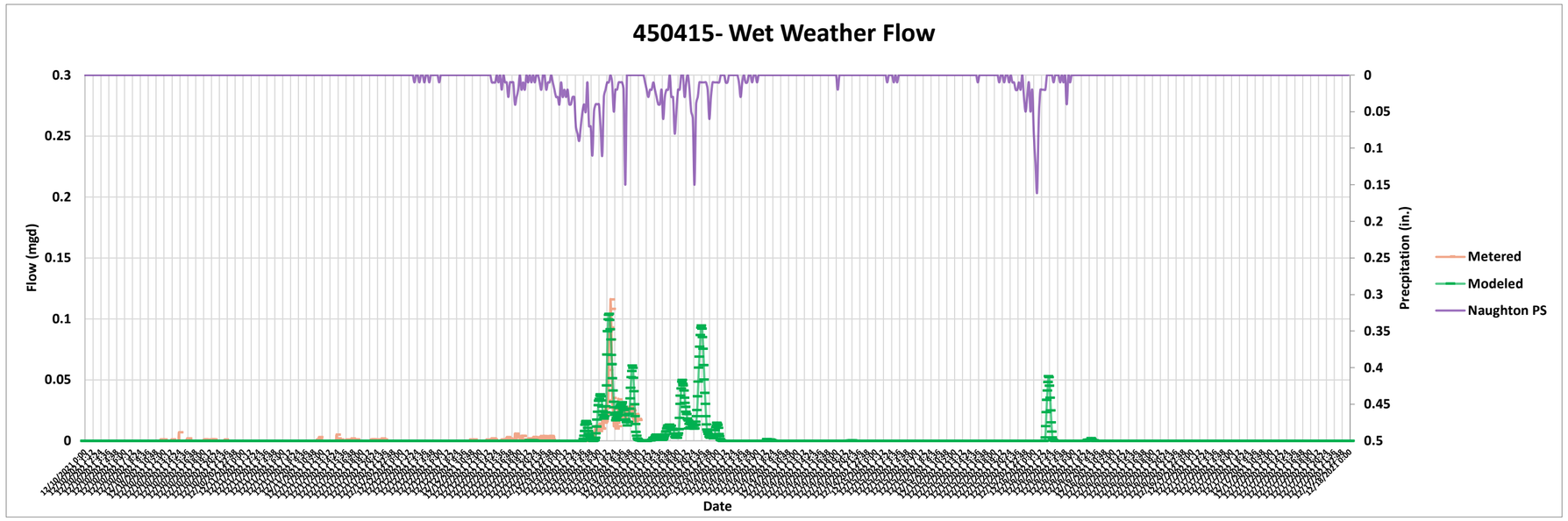
450409 (Basin 9) Wet Weather Calibration

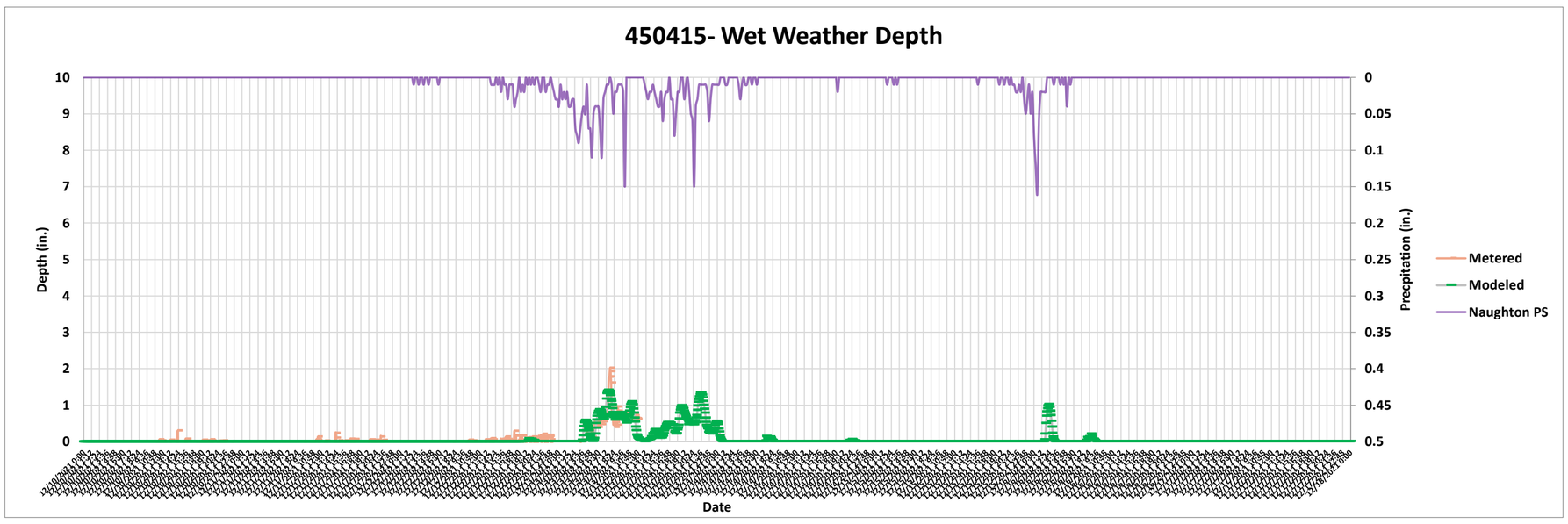




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.467	0.921	-49.3%	-0.454
Average Flow (mgd)	0.182	0.163	11.5%	0.019
Max Depth (in.)	4.371	21.560	-79.7%	-17.189
Average Depth (in.)	2.434	3.508	-30.6%	-1.075

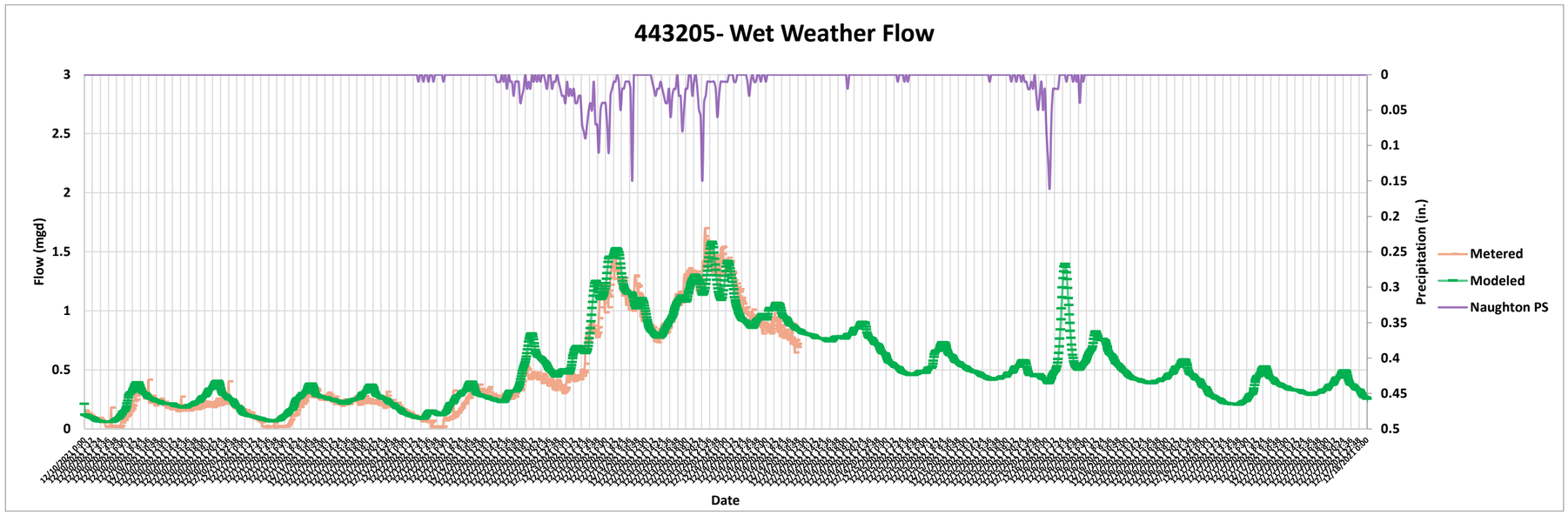
450415 (Basin 9) Wet Weather Calibration

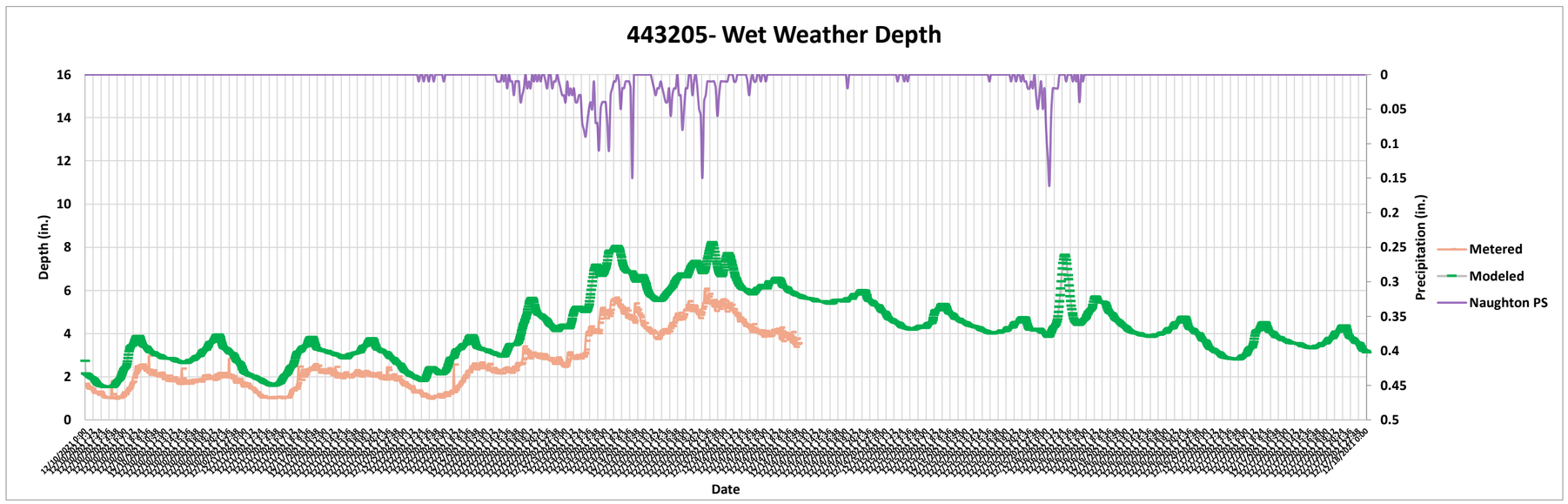




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.104	0.116	-10.1%	-0.012
Average Flow (mgd)	0.022	0.012	88.7%	0.010
Max Depth (in.)	1.421	2.020	-29.7%	-0.599
Average Depth (in.)	0.069	0.319	-78.2%	-0.250

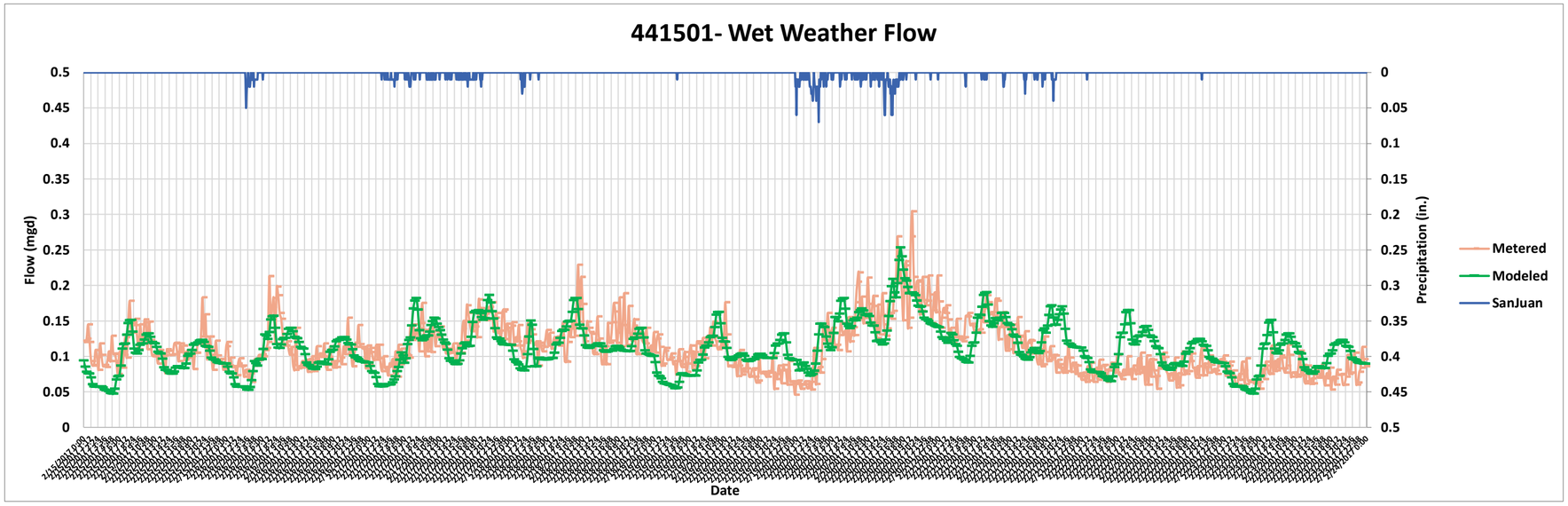
443205 (Basin 8) Wet Weather Calibration

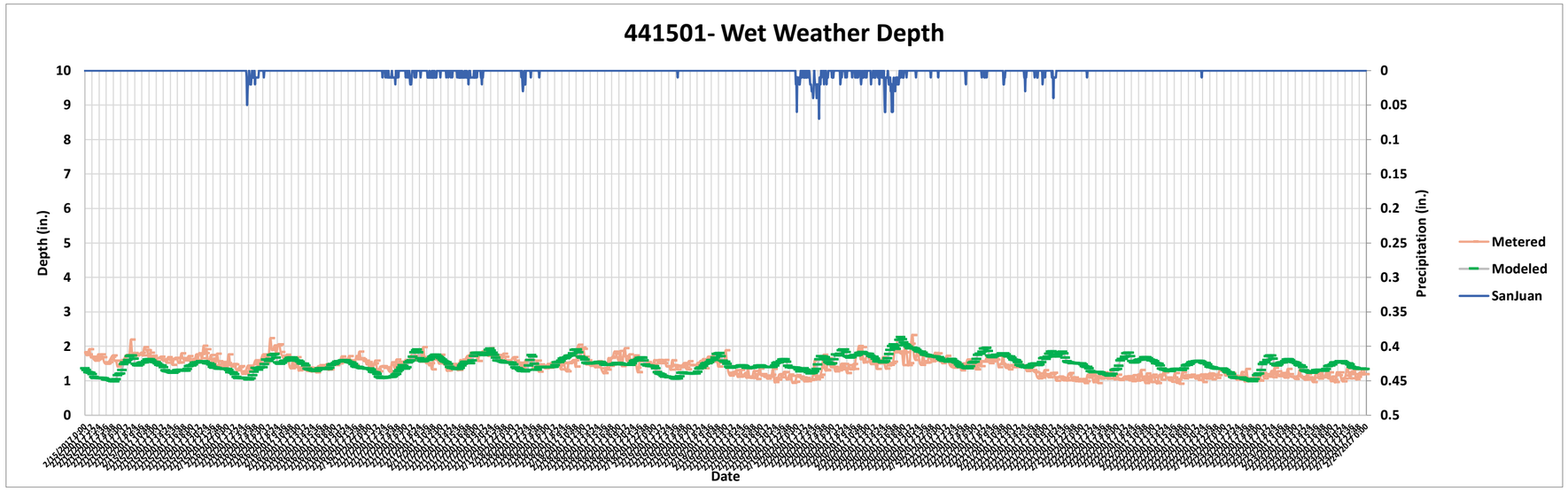




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	1.584	1.700	-6.8%	-0.116
Average Flow (mgd)	0.507	0.466	8.9%	0.041
Max Depth (in.)	8.232	6.080	35.4%	2.152
Average Depth (in.)	4.110	2.737	50.2%	1.373

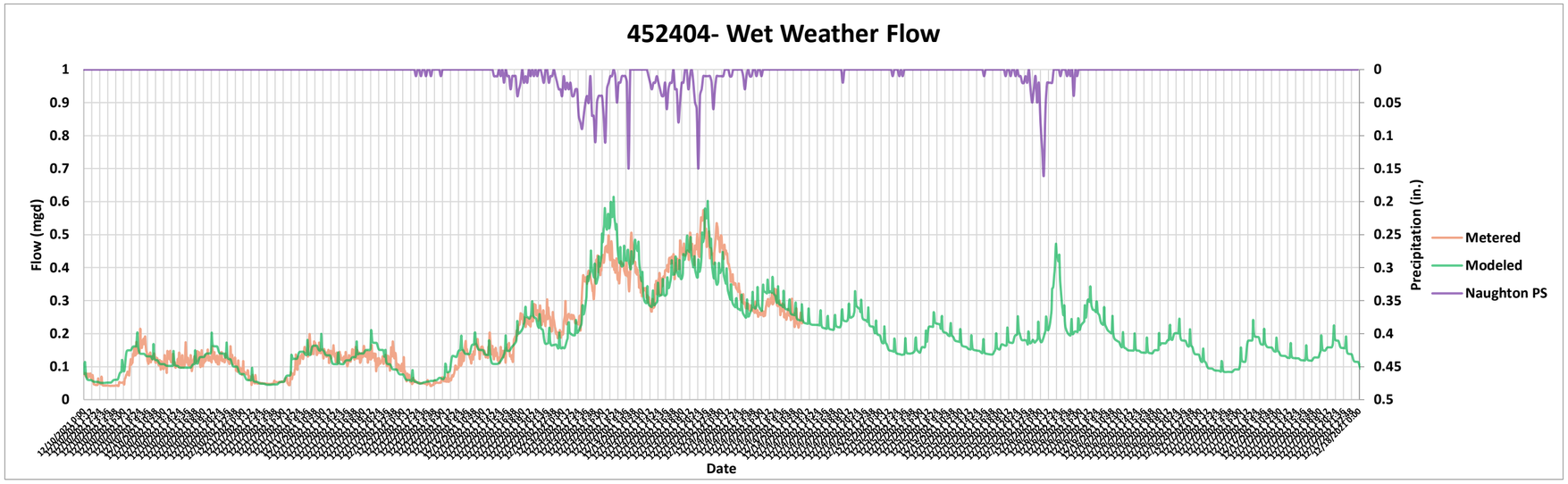
441501 (Basin 6) Wet Weather Calibration

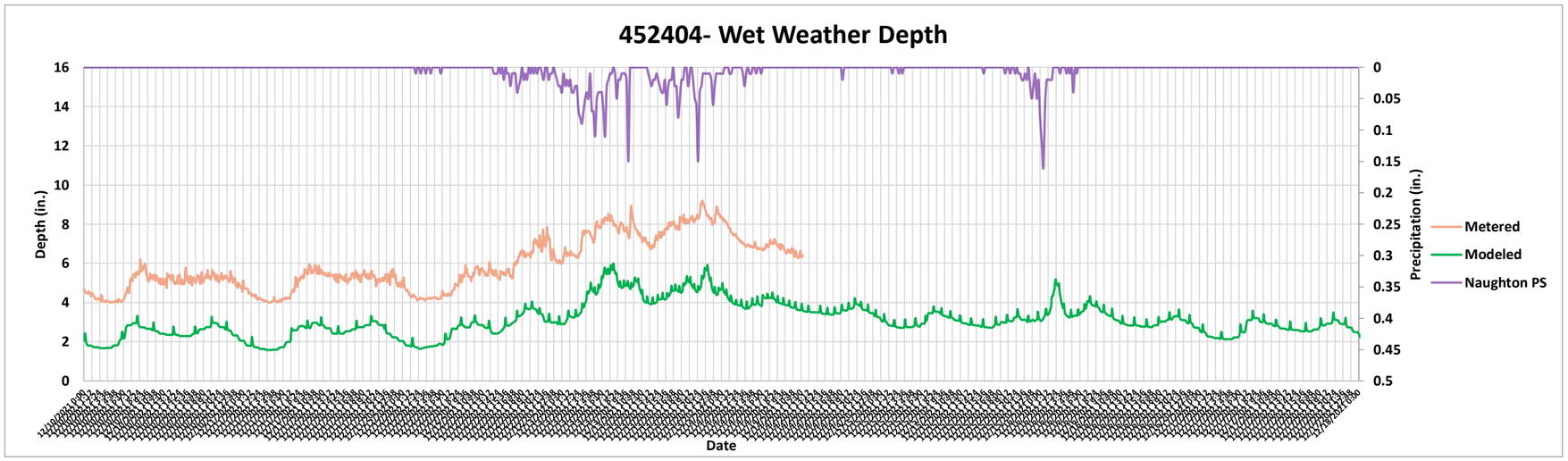




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.253	0.304	-16.7%	-0.051
Average Flow (mgd)	0.111	0.111	0.7%	0.001
Max Depth (in.)	1.999	2.328	-14.1%	-0.329
Average Depth (in.)	1.646	1.416	16.2%	0.230

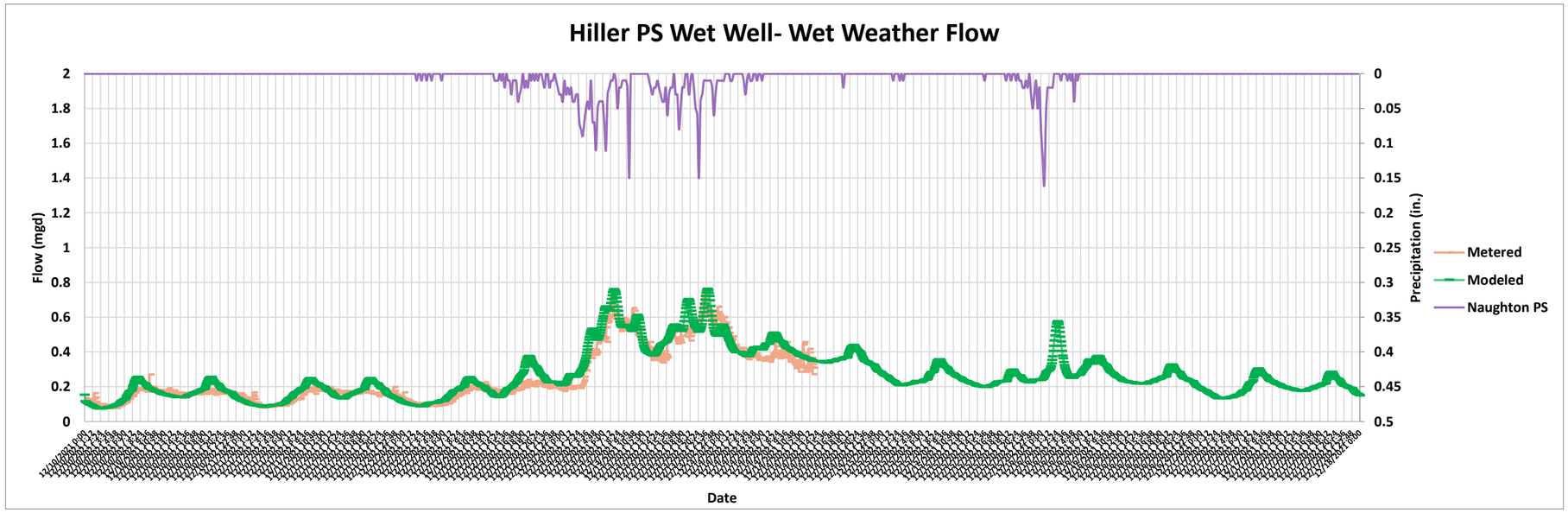
452404 (Basin 4) Wet Weather Calibration

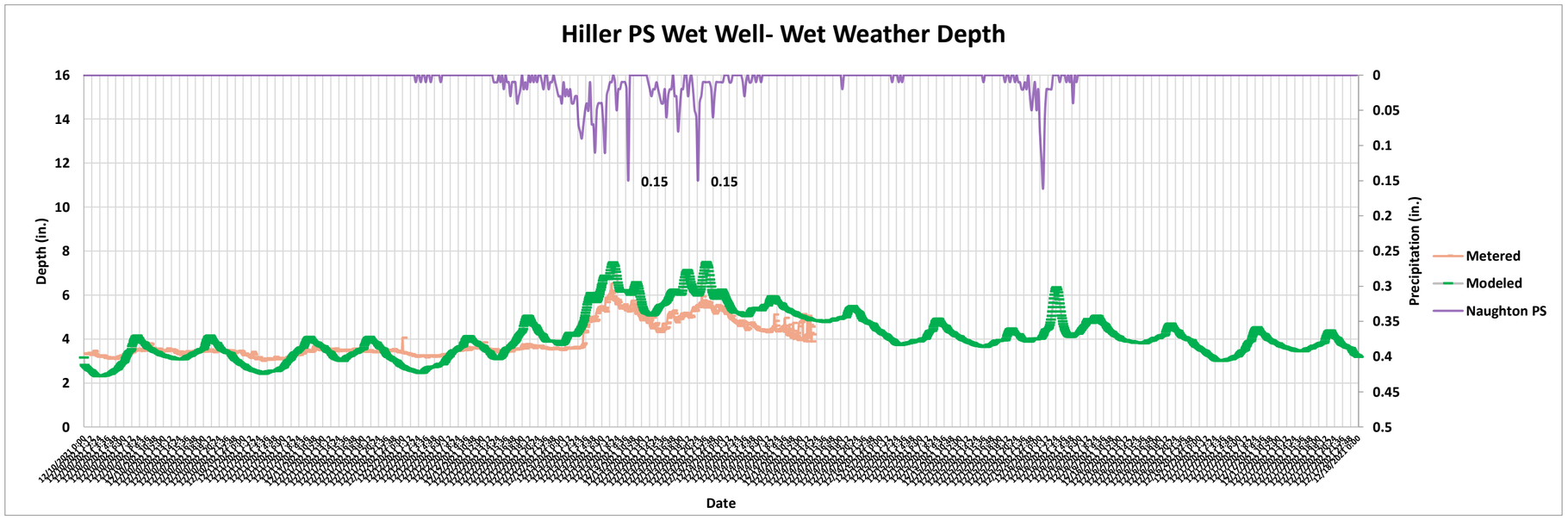




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.615	0.574	7.1%	0.041
Average Flow (mgd)	0.197	0.198	-1.0%	-0.002
Max Depth (in.)	5.998	9.190	-34.7%	-3.192
Average Depth (in.)	3.115	5.911	-47.3%	-2.796

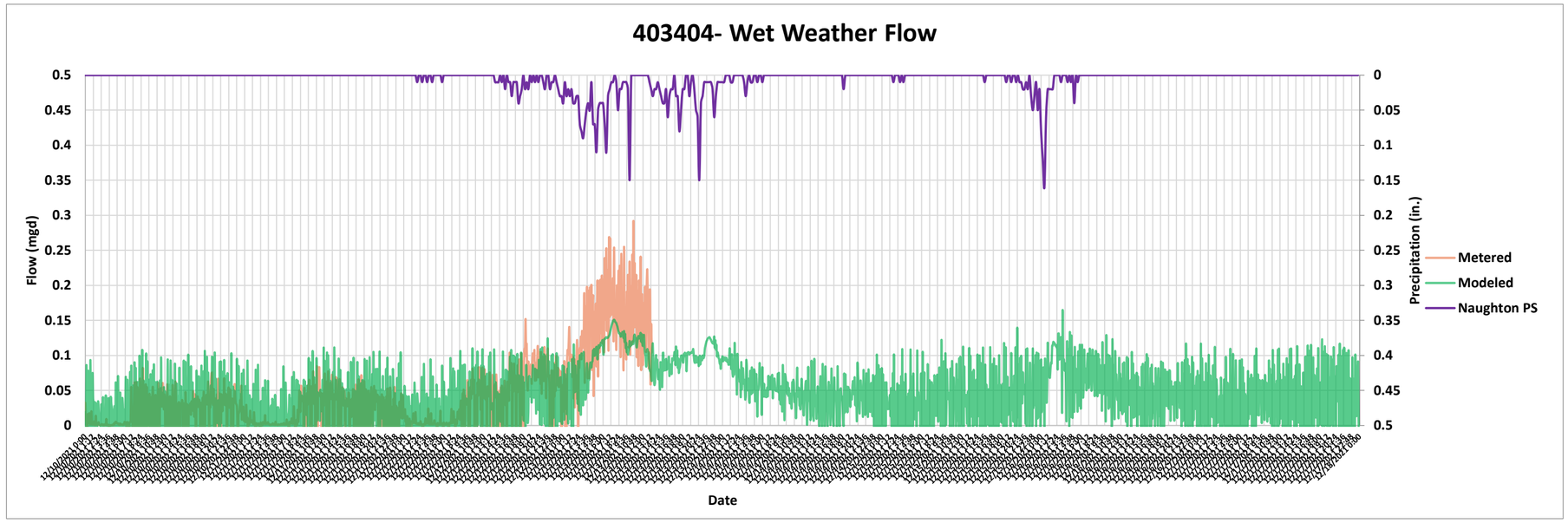
Hiller PS (Basin 3) Wet Weather Calibration

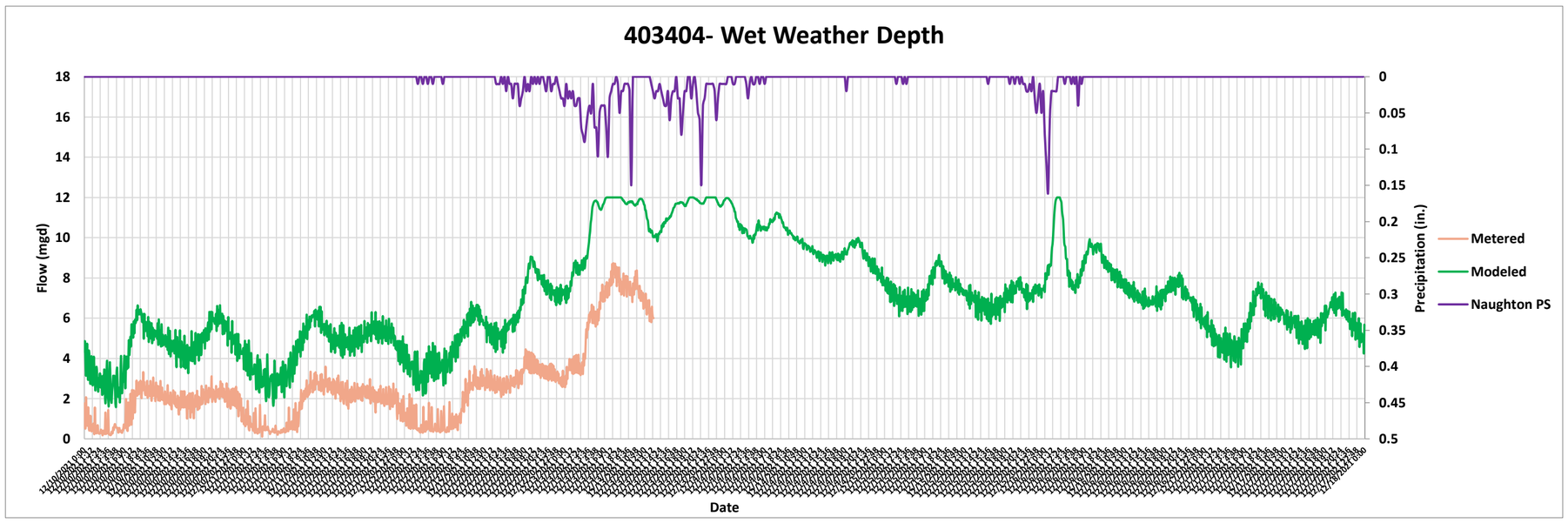




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.763	0.753	1.3%	0.010
Average Flow (mgd)	0.274	0.252	8.6%	0.022
Max Depth (in.)	7.488	6.520	14.8%	0.968
Average Depth (in.)	4.127	3.896	5.9%	0.231

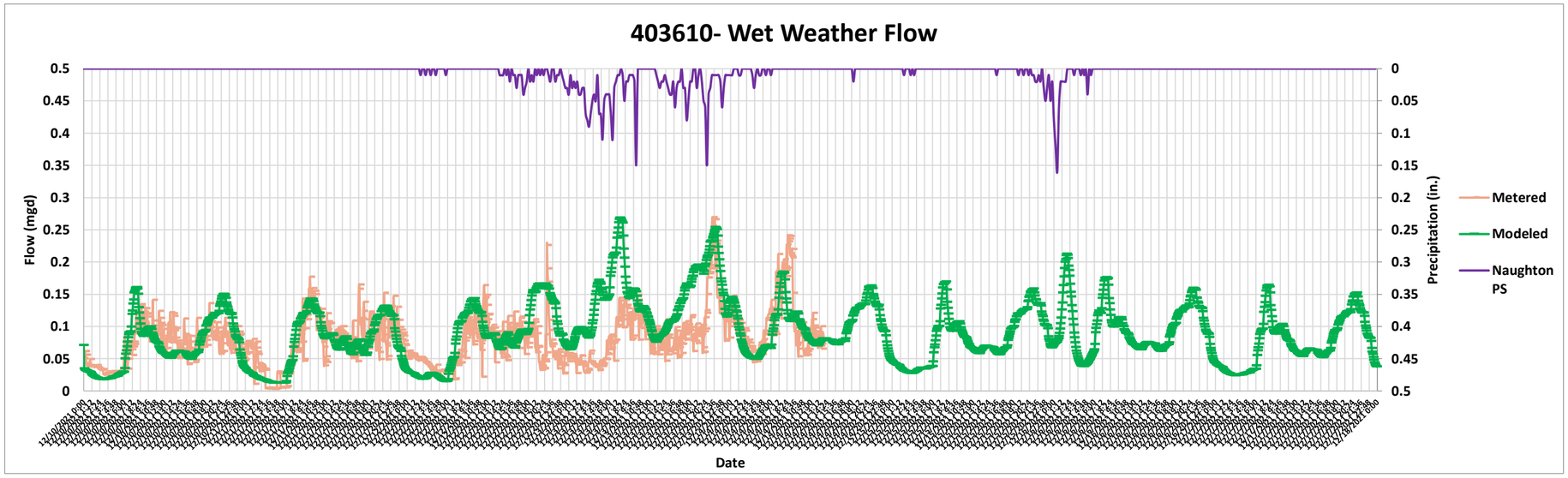
403404 (Basin 2) Wet Weather Calibration

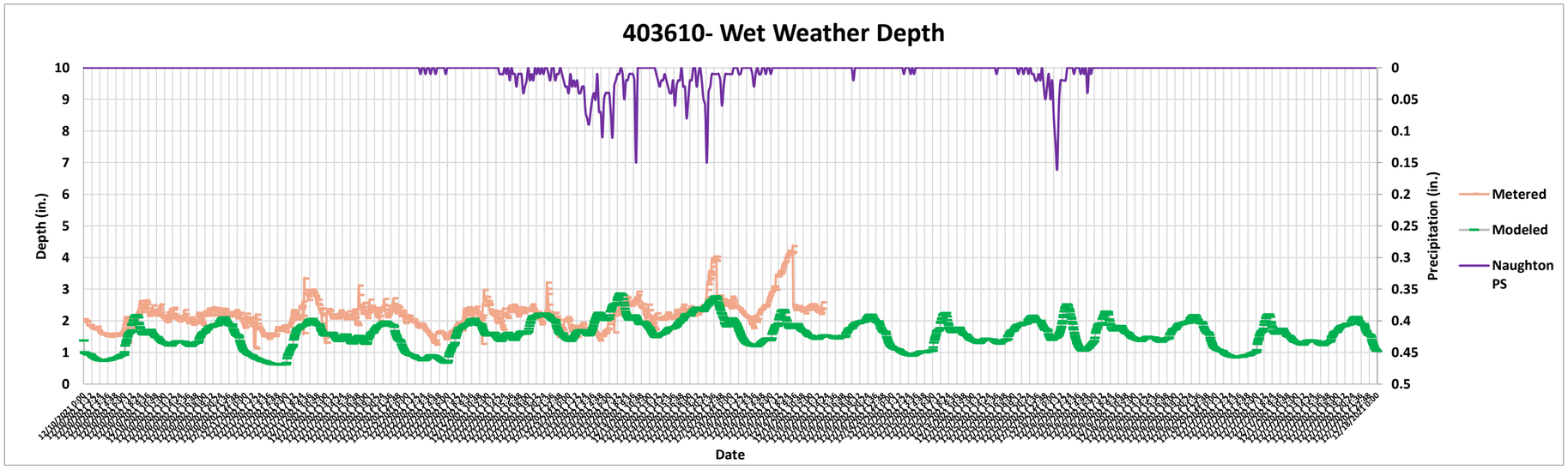




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.151	0.292	-48.3%	-0.141
Average Flow (mgd)	0.034	0.040	-15.9%	-0.006
Max Depth (in.)	12.000	8.730	37.5%	3.270
Average Depth (in.)	5.766	2.517	129.0%	3.248

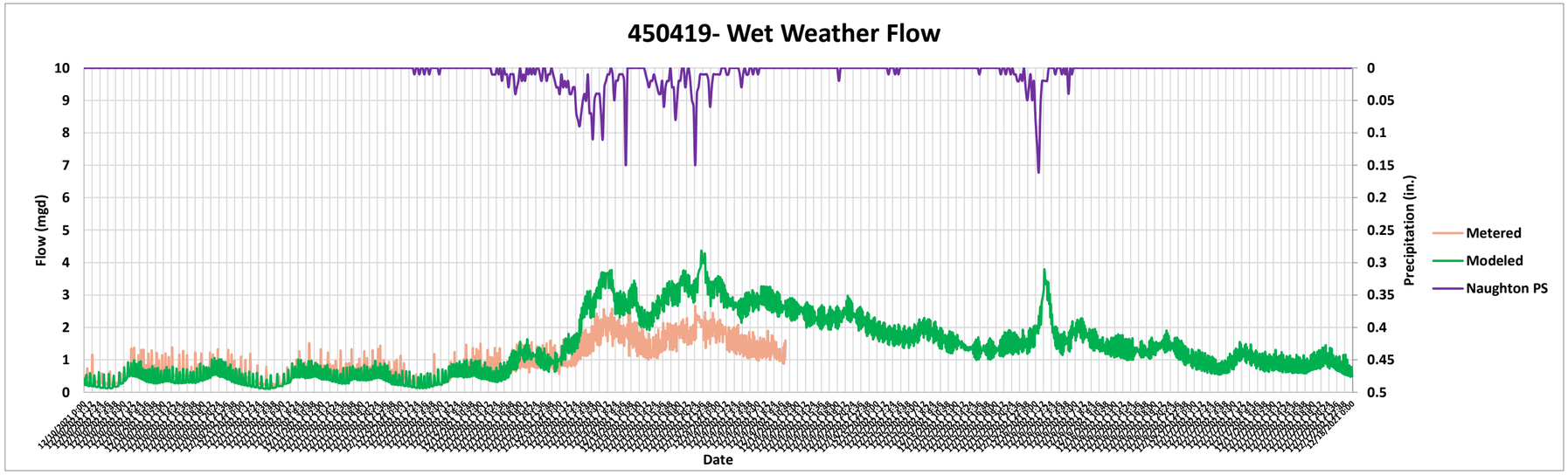
403610 (Basin 1) Wet Weather Calibration

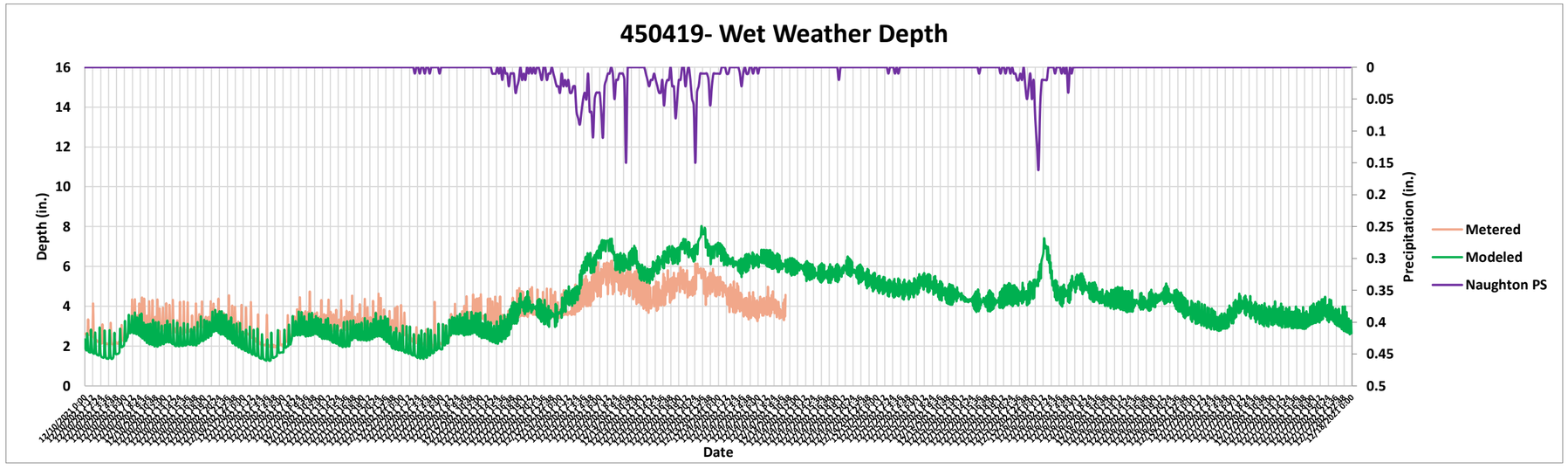




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	0.269	0.269	-0.1%	0.000
Average Flow (mgd)	0.093	0.080	16.8%	0.013
Max Depth (in.)	2.852	4.360	-34.6%	-1.508
Average Depth (in.)	1.574	2.185	-28.0%	-0.611

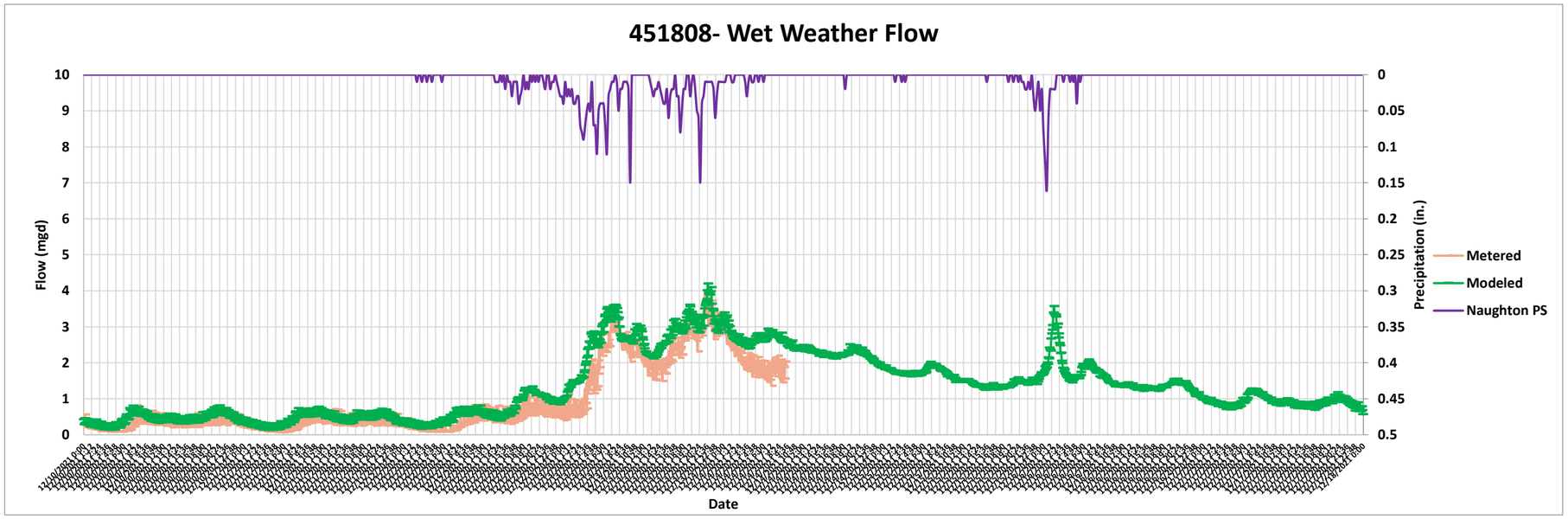
450419 (Trunk Line) Wet Weather Calibration

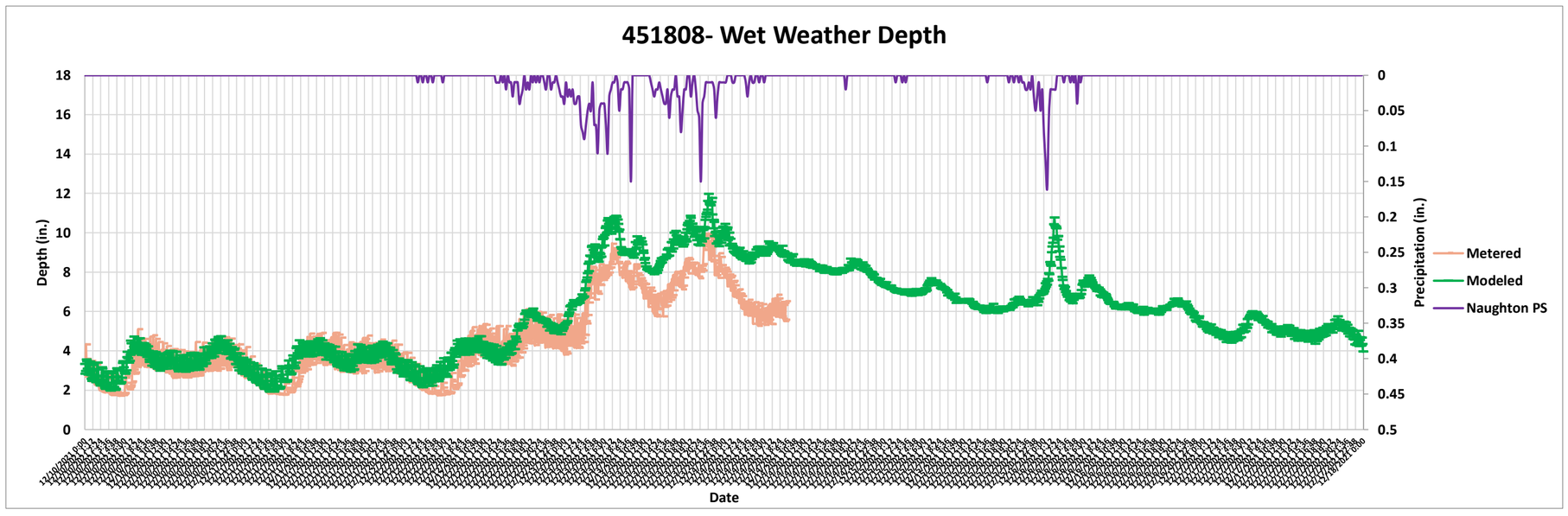




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	4.363	2.660	64.0%	1.703
Average Flow (mgd)	1.240	0.923	34.3%	0.317
Max Depth (in.)	8.018	6.280	27.7%	1.738
Average Depth (in.)	3.728	3.543	5.2%	0.185

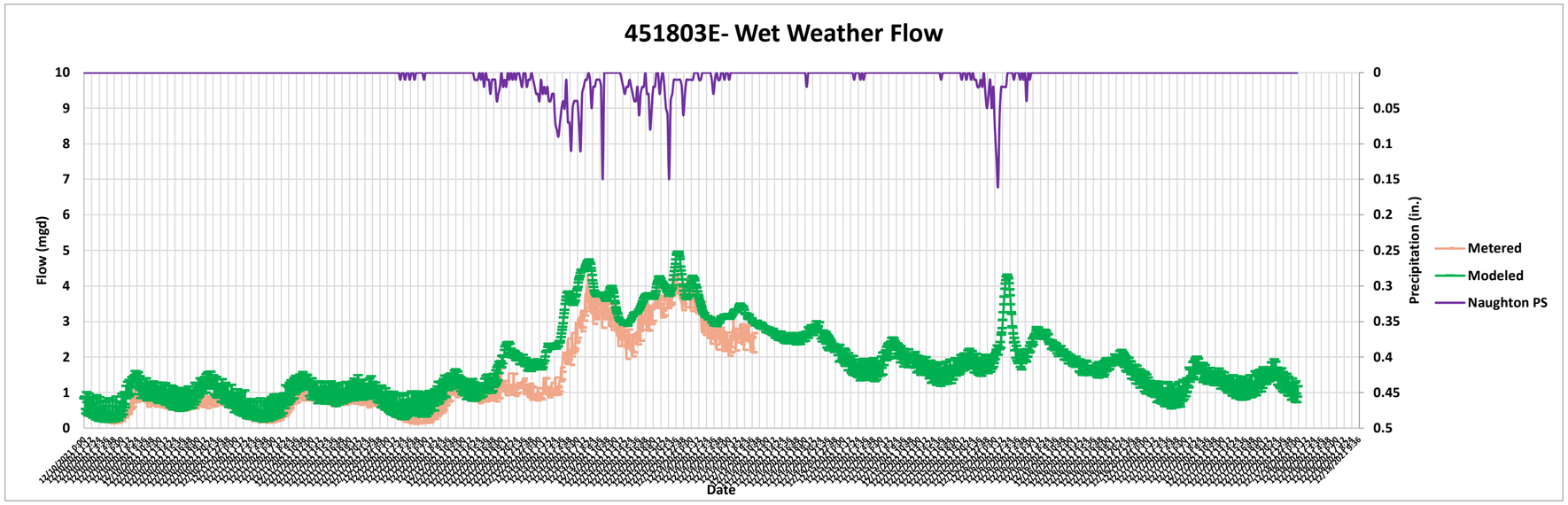
451808 (Trunk Line) Wet Weather Calibration

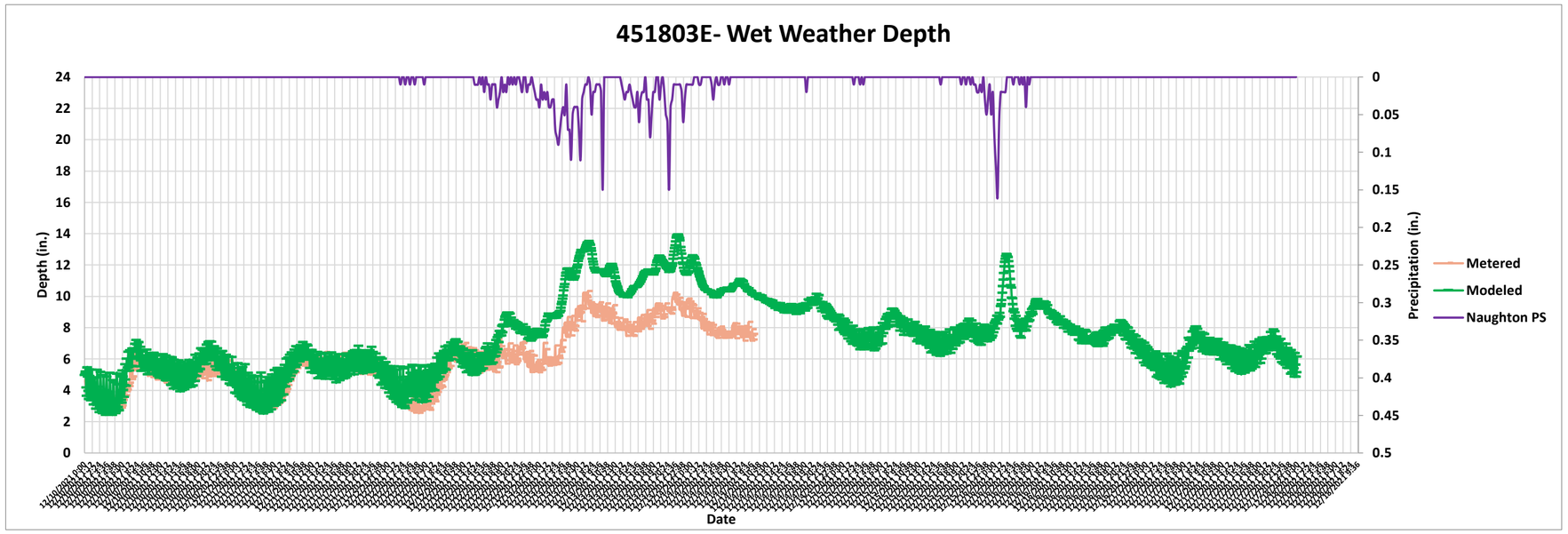




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	4.201	3.950	6.4%	0.251
Average Flow (mgd)	1.204	0.921	30.7%	0.283
Max Depth (in.)	11.965	10.020	19.4%	1.945
Average Depth (in.)	5.366	4.486	19.6%	0.881

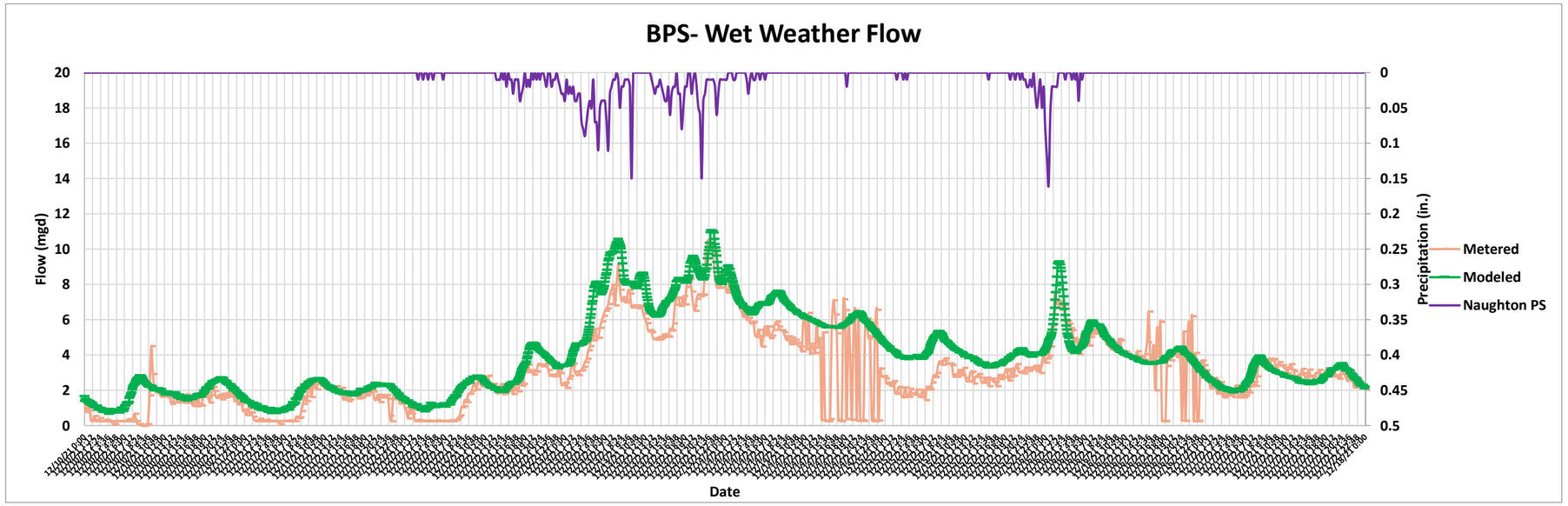
451803E (Trunk Line) Wet Weather Calibration

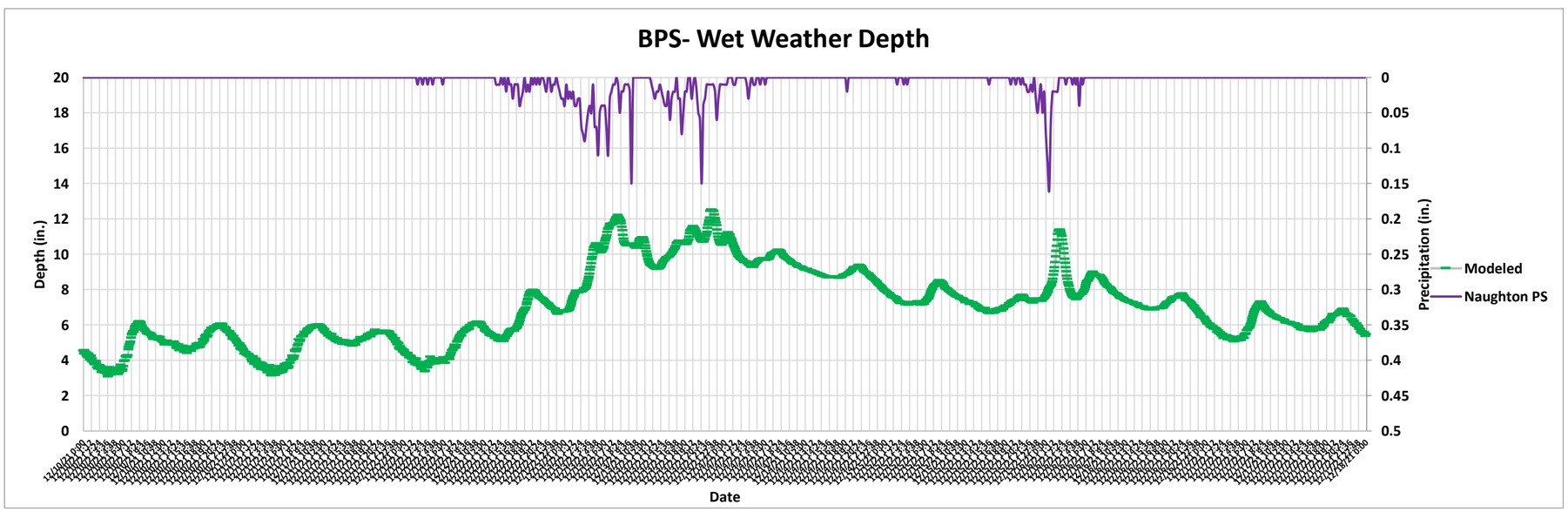




	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	4.963	4.420	12.3%	0.543
Average Flow (mgd)	1.776	1.346	31.9%	0.429
Max Depth (in.)	13.938	10.340	34.8%	3.598
Average Depth (in.)	7.222	5.968	21.0%	1.254

BPS Wet Weather Calibration





	Model	Meter	Percent Difference	Absolute Diff.
Peak Flow (mgd)	11.075	10.540	5.1%	0.535
Average Flow (mgd)	3.925	3.105	26.4%	0.820
Max Depth (in.)	12.518	-	-	-
Average Depth (in.)	7.005	-	-	-

Appendix G. Model Results

G1. Model Results for Existing PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
10	450804	450803	6	90.0	7.4	0.013	0.004	Free Surface	0.048	No	6	No
100	431206LH	431205	6	181.5	4.5	0.013	0.014	Free Surface	0.140	No	6	No
1000	432204	432203	6	146.2	4.6	0.013	0.264	Free Surface	0.701	No	6	Yes
1001	432220	432219	6	227.5	18.7	0.013	0.080	Free Surface	0.161	No	6	No
1003	441422	441421	6	283.2	2.1	0.013	0.194	Free Surface	0.424	No	6	No
1004	445116	445114A	6	258.8	7.6	0.013	0.004	Free Surface	0.062	No	6	No
1005	441421	441408	6	92.1	2.1	0.013	0.200	Free Surface	0.429	No	6	No
1006	441513	441512	6	300.4	6.8	0.013	0.002	Free Surface	0.040	No	6	No
1007	441512	441511	6	51.0	8.4	0.013	0.004	Free Surface	0.100	No	6	No
1008	441514	441511	6	125.0	11.5	0.013	0.023	Free Surface	0.126	No	6	No
1009	441518	441517	6	201.3	3.1	0.013	0.014	Free Surface	0.109	No	6	No
101	403106	403106A	6	33.3	4.6	0.013	0.023	Free Surface	0.132	No	6	No
1010	441501	441519	8	195.5	3.0	0.013	0.577	Free Surface	0.455	No	8	No
1011	402412	402506	6	277.5	0.4	0.013	0.012	Free Surface	0.173	No	6	No
1012	402411	402412	6	282.7	0.5	0.013	0.005	Free Surface	0.129	No	6	No
1013	450107	450106	6	139.3	15.6	0.013	0.010	Free Surface	0.059	No	6	No
1014	450801	450201	10	307.7	0.6	0.013	0.202	Free Surface	0.244	No	10	No
1015	450106	450104	6	44.3	6.9	0.013	0.016	Free Surface	0.137	No	6	No
1016	450101	450102	8	131.4	4.1	0.013	0.321	Free Surface	0.338	No	8	No
1017	433413	433414	8	287.0	4.2	0.013	0.969	Free Surface	0.589	No	8	No
1018	450214	450215	6	142.5	7.9	0.013	0.091	Free Surface	0.215	No	6	No
1019	433414	433415	8	72.6	4.4	0.013	0.971	Free Surface	0.538	No	8	No
102	431203	431204	6	323.1	7.5	0.013	0.079	Free Surface	0.191	No	6	No
1020	433415	433416	8	100.5	8.4	0.013	0.974	Free Surface	0.655	No	8	No
1021	453705	453706	10	225.9	1.9	0.013	0.997	Free Surface	0.458	No	10	No
1022	450211	450210	6	161.3	12.9	0.013	0.326	Free Surface	0.423	No	6	No
1023	450215	450202	6	184.0	6.2	0.013	0.104	Free Surface	0.420	No	6	No
1024	450104	450105	8	192.4	1.6	0.013	0.040	Free Surface	0.136	No	8	No
1025	453719	453718	8	351.5	13.9	0.013	0.023	Free Surface	0.066	No	8	No
1027	453718	453717	8	320.3	13.3	0.013	0.028	Free Surface	0.080	No	8	No
1028	454415	454414	6	220.9	5.7	0.013	0.003	Free Surface	0.044	No	6	No
1029	450504	450503	6	238.6	8.3	0.013	0.004	Free Surface	0.073	No	6	No
103	433313	433309	6	156.2	8.5	0.013	0.344	Free Surface	0.399	No	6	No
1030	450503	450610	6	365.1	13.0	0.013	0.026	Free Surface	0.152	No	6	No
1032	454424	454425	6	406.2	2.3	0.013	0.013	Free Surface	0.101	No	6	No
1033	454302	454304	8	326.9	9.5	0.013	0.117	Free Surface	0.158	No	8	No
1034	454425	454426	6	94.0	6.9	0.013	0.015	Free Surface	0.080	No	6	No
1035	450501	450222	6	127.1	7.7	0.013	0.015	Free Surface	0.098	No	6	No
1036	454305	454301	8	43.5	11.4	0.013	0.136	Free Surface	0.201	No	8	No
1037	454304	454301	8	51.9	6.2	0.013	0.117	Free Surface	0.206	No	8	No
1038	454301	450301	8	50.7	5.5	0.013	0.248	Free Surface	0.273	No	8	No
1039	450220	450219	6	94.8	15.4	0.013	0.009	Free Surface	0.075	No	6	No
104	431118LH	431117	6	233.4	10.1	0.013	0.004	Free Surface	0.075	No	6	No
1040	454427	454428	6	121.7	1.6	0.013	0.016	Free Surface	0.123	No	6	No
1041	450219	450218	6	165.2	13.9	0.013	0.025	Free Surface	0.127	No	6	No
1042	450222	450218	6	138.1	4.5	0.013	0.019	Free Surface	0.135	No	6	No
1043	450221	450220	6	78.4	2.8	0.013	0.006	Free Surface	0.065	No	6	No
1044	450301	450302	8	142.5	2.8	0.013	0.248	Free Surface	0.307	No	8	No
1045	450813	450812	6	150.7	17.5	0.013	0.034	Free Surface	0.136	No	6	No
1048	450203	450204	10	266.3	1.3	0.013	0.119	Free Surface	0.301	No	10	No
105	430717	NAUGHTON_WW	4	201.2	1.8	0.013	0.008	Free Surface	0.556	No	4	No
1050	450206	450205	10	142.9	1.9	0.013	0.384	Free Surface	0.317	No	10	No
1052	442441	442442	6	57.6	31.4	0.013	0.007	Free Surface	0.051	No	6	No
1053	442442	442443	6	11.0	23.5	0.013	0.012	Free Surface	0.068	No	6	No
1054	442443	442436	6	132.5	8.7	0.013	0.013	Free Surface	0.102	No	6	No
1055	431709	431708	6	161.0	10.2	0.013	0.478	Free Surface	0.497	No	6	No
1056	440420	440420A	6	73.6	8.6	0.013	0.002	Free Surface	0.049	No	6	No
1057	440422	440421	6	148.6	8.3	0.013	0.005	Free Surface	0.047	No	6	No
1058	443320	443321	6	170.1	6.3	0.013	0.105	Free Surface	0.229	No	6	No
1059	440106	440105	6	133.5	8.3	0.013	0.002	Free Surface	0.067	No	6	No
106	430504	430503	6	70.7	53.0	0.013	0.018	Free Surface	0.060	No	6	No
1060	440116	440431	6	138.3	26.6	0.013	0.242	Free Surface	0.243	No	6	No
1061	440836	440820	6	158.8	4.8	0.013	0.001	Free Surface	0.055	No	6	No
1062	440804	440802	6	85.1	3.2	0.013	0.007	Free Surface	0.081	No	6	No
1063	440820	440833	6	13.8	39.5	0.013	0.036	Free Surface	0.097	No	6	No
1064	440833	440829	6	79.2	17.2	0.013	0.036	Free Surface	0.112	No	6	No
1065	440828	440829	6	154.3	5.1	0.013	0.006	Free Surface	0.089	No	6	No
1067	440542	440543	6	121.8	5.3	0.013	0.051	Free Surface	0.155	No	6	No
1068	440530	440833	6	187.4	5.8	0.013	0.001	Free Surface	0.063	No	6	No
1069	440834	440804	6	103.0	8.2	0.013	0.007	Free Surface	0.067	No	6	No
107	430408	430407	6	98.1	11.6	0.013	0.266	Free Surface	0.296	No	6	No
1070	440541	440542	6	95.2	7.0	0.013	0.035	Free Surface	0.154	No	6	No
1071	441203	441204	6	239.6	10.9	0.013	0.004	Free Surface	0.049	No	6	No
1072	440529	440528	6	105.1	4.3	0.013	0.002	Free Surface	0.122	No	6	No
1073	440516	440531	6	143.5	8.7	0.013	0.062	Free Surface	0.177	No	6	No
1074	440538	440539	6	312.1	0.2	0.013	0.002	Free Surface	0.083	No	6	No
1075	440539	440540	6	150.9	8.2	0.013	0.027	Free Surface	0.119	No	6	No
1076	440209	440210	6	222.1	0.4	0.013	0.175	Free Surface	0.626	No	6	Yes
1077	440426LH	440425	6	48.6	18.7	0.013	0.003	Free Surface	0.031	No	6	No
1078	440424	440425	8	105.1	17.2	0.013	0.008	Free Surface	0.037	No	8	No
1079	440425	440427	6	78.6	13.1	0.013	0.013	Free Surface	0.070	No	6	No
108	431411	431410	6	213.2	8.1	0.013	0.047	Free Surface	0.166	No	6	No
1080	440214	440211	6	246.7	4.9	0.013	0.008	Free Surface	0.155	No	6	No
1081	440409	440408	6	146.3	14.7	0.013	0.010	Free Surface	0.095	No	6	No
1082	440420A	440418	6	269.1	8.4	0.013	0.009	Free Surface	0.066	No	6	No
1083	443318	443317	6	150.6	4.4	0.013	0.038	Free Surface	0.160	No	6	No
1084	440921	443318	8	202.6	1.0	0.013	0.033	Free Surface	0.131	No	8	No
1085	450418A	450418	8	86.1	1.8	0.013	0.005	Free Surface	0.046	No	8	No
1086	450901	450925	12	103.5	2.4	0.013	0.665	Free Surface	0.293	No	12	No
1087	452723	452724	6	245.9	9.0	0.013	0.009	Free Surface	0.111	No	6	No
1088	452726LH	452725	6	92.0	0.6	0.013	0.004	Free Surface	0.063	No	6	No
1089	442708	442707	6	206.7	1.0	0.013	0.011	Free Surface	0.111	No	6	No
109	431409	431410	6	176.3	4.9	0.013	0.107	Free Surface	0.225	No	6	No
1090	442428	442429	6	80.8	3.7	0.013	0.024	Free Surface	0.117	No	6	No
1091	441413	441412	6	164.2	16.6	0.013	0.006	Free Surface	0.079	No	6	No
1092	452713	452711	6	285.9	6.7	0.013	0.005	Free Surface	0.066	No	6	No
1093	442711	442712	6	112.0	1.5	0.013	0.003	Free Surface	0.063	No	6	No
1094	441113LH	441112	6	134.8	6.0	0.013	0.011	Free Surface	0.083	No	6	No
1095	441922	441923	6	268.6	0.2	0.013	0.006	Free Surface	0.100	No	6	No
1096	441104	441103	6	109.6	23.5	0.013	0.018	Free Surface	0.084	No	6	No
1097	441207	441102	6	220.8	8.5	0.013	0.023	Free Surface	0.091	No	6	No
1098	443821	441606	6	139.9	1.5	0.013	0.054	Free Surface	0.204	No	6	No
1099	441112	441111	8	231.9	8.1	0.013	0.020	Free Surface	0.082	No	8	No
11	433417	453701	8	126.0	8.2	0.013	0.977	Free Surface	0.523	No	8	No
110	451116LH	451115	6	158.7	1.1	0.013	0.002	Free Surface	0.053	No	6	No
1100	443811	443809	6	54.5	1.8	0.013	0.003	Free Surface	0.060	No	6	No
1101	443809	443821	6	123.3	11.4	0.013	0.010	Free Surface	0.159	No	6	No
1102	443820	443821	6	131.6	0.0	0.013	0.041	Free Surface	0.391	No	6	No
1103	441105	441114	6	274.2	0.0	0.013	0.018	Free Surface	0.270	No	6	No
1104	443810	443809	6	40.5	16.5	0.013	0.003	Free Surface	0.048	No	6	No
1105	441133	441130	6	297.8	4.0	0.013	0.009	Free Surface	0.092	No	6	No
1106	441137	441021	6	174.5	9.2	0.013	0.140	Free Surface	0.253	No	6	No
1107	441138	441137	6	130.0	32.6	0.013	0.012	Free Surface	0.147	No	6	No
1108	402707	402706	6	249.9	1.2	0.013	0.004	Free Surface	0.093	No	6	No
1109	441124	441123	6	346.8	7.1	0.013	0.124	Free Surface	0.259	No	6	No
111	431412	431411	6	128.2	2.7	0.013	0.042	Free Surface	0.168	No	6	No
1110	441123	441122	6	87.7	5.1	0.013	0.127	Free Surface	0.255	No	6	No
1111	441121	441137	6	114.4	6.8	0.013	0.129	Free Surface	0.247	No	6	No
1112	451019	451011	6	299.3	0.6	0.013	0.058	Free Surface	0.324	No	6	No
1113	451012	451011	8	193.3	12.2	0.013	0.176	Free Surface	0.290	No	8	No
1114	443210WYE	450904	6	217.8	1.0	0.013	0.008	Free Surface	0.099	No	6	No
1115	450910	451001	24	371.7	1.6	0.013	3.519	Free Surface	0.323	No	24	No
1116	452525	452526	6	110.1	6.8	0.013	0.019	Free Surface	0.095	No	6	No
1118	452711	452710	6	303.5	6.8	0.013	0.011	Free Surface	0.074	No	6	No
1119	443211	443210WYE	6	67.6	2.7	0.013	0.006	Free Surface	0.085	No	6	No
112	433807LH	433806	6	67.9	4.5	0.013	0.002	Free Surface	0.095	No	6	No
1120	443111	443110	6	258.7	1.3	0.013	0.012	Free Surface	0.145	No	6	No
1121	452526	452527	6	180.9	12.2	0.013	0.021	Free Surface	0.093	No	6	No
1122	452010	452011	6	152.4	25.3	0.013	0.062	Free Surface	0.126	No	6	No
1124	443205	450905	15	222.7	0.4	0.013	2.155	Free Surface	0.666	No	15	No
1125	452710	452607	6	108.5	17.9	0.013	0.015	Free Surface	0.085	No	6	No
1126	451006	451007	18	354.8	1.0	0.013	3.329	Free Surface	0.480	No	18	No
1127	443110	443110A	6	150.6	2.5	0.013	0.037	Free Surface	0.285	No	6	No
1128	443215	443214	8	313.9	0.6	0.013	0.010	Free Surface	0.123	No	8	No
1129	433420	433422	6	297.6	3.1	0.013	0.108	Free Surface	0.226	No	6	No
113	431408	431409	6	165.3	0.3	0.013	0.103	Free Surface	0.404	No	6	No
1131	442619	442602	6	135.5	1.4	0.013	0.021	Free Surface	0.130	No	6	No
1132	442620	442619	6	178.6	5.2	0.013	0.002	Free Surface	0.101	No	6	No
1133	453722	453723	8	179.7	8.2	0.013	0.084	Free Surface	0.129	No	8	No
1134	453723	453724	8	228.4	11.3	0.013	0.084	Free Surface	0.127	No	8	No
1135	442612	442611	6	211.5	14.1	0.013	0.124	Free Surface	0.213	No	6	No
1136	442611	442610	6	268.2	10.6	0.013	0.127	Free Surface	0.240	No	6	No
1137	442613	442612	6	203.4	11.0	0.013	0.118	Free Surface	0.209	No	6	No
1138	442701	442701A	15	168.5	5.1	0.013	1.787	Free Surface	0.295	No	15	No
1139	442616	442618	6	54.2	21.5	0.013	0.010	Free Surface	0.067	No	6	No
1140	442816	442702	6	102.4	12.7	0.013	0.175	Free Surface	0.253	No	6	No
1141	442514	442513	6	68.8	15.7	0.013	0.004	Free Surface	0.052	No	6	No
1142	442724	442706	6	216.6	9.4	0.013	0.012	Free Surface	0.092	No	6	No
1143	442516	442502	8	115.1	14.2	0.013	0.005	Free Surface	0.030	No	8	No
1144	442610	442703	6	254.1	8.6	0.013	0.155	Free Surface	0.413	No	6	No
1145	442703	442816	6	31.9	13.4	0.013	0.160	Free Surface	0.241	No	6	No
1146	442506	442508	6	190.7	9.8	0.013	0.002	Free Surface	0.035	No	6	No
1147	442721	442612	6	208.0	1.2	0.013	0.005	Free Surface	0.142	No	6	No
1148	442412	442411	6	199.1	3.6	0.013	0.002	Free Surface	0.066	No	6	No
1149	442411	442409	6	192.9	18.3	0.013	0.025	Free Surface	0.171	No	6	No
115	453716	453716C	8	28.9	8.6	0.013	0.175	Free Surface	0.181	No	8	No
1150	443021	443020	6	308.0	5.9	0.013	0.008	Free Surface	0.079	No	6	No
1151	440537	440542	6	130.1	4.7	0.013	0.013	Free Surface	0.134	No	6	No
1152	432501	432502	6	174.9	8.1	0.013	0.015	Free Surface	0.204	No	6	No
1153	440536	440537	6	130.6	4.4	0.013	0.010	Free Surface	0.085	No	6	No
1154	440535	440536	6	129.0	10.7	0.013	0.004	Free Surface	0.060	No	6	No
1155	440534LH	440533	6	109.0	4.0	0.013	0.003	Free Surface	0.127	No	6	No
1156	440801LH	432501	6	243.3	7.6	0.013	0.014	Free Surface	0.083	No	6	No
1157	440531	440532	6	121.6	6.3	0.013	0.072	Free Surface	0.221	No	6	No
1158	440533	440531	6	82.5	0.0	0.013	0.007	Free Surface	0.198	No	6	No
1159	440516	440828	6	141.0	2.0	0.013	0.003	Free Surface	0.055	No	6	No
116	431415	431414	6	207.8	2.9	0.013	0.028	Free Surface	0.155	No	6	No
1160	450411	450901	12	120.0	3.0	0.013	0.546	Free Surface	0.250	No	12	No
1161	443106LH	443104	8	81.9	1.4	0.013	0.004	Free Surface	0.054	No	8	No
1162	432902	432903	6	63.4	4.3	0.013	0.098	Free Surface	0.212	No	6	No
1163	442415	442414	6	138.1	9.1	0.013	0.007	Free Surface	0.062	No	6	No
1164	442414	442411	6	77.4	37.7	0.013	0.021	Free Surface	0.078	No	6	No
1165	442447	442434	6	146.1	13.3	0.013	0.007	Free Surface	0.089	No	6	No
1166	442448LH	442449	6	87.8	7.5	0.013	0.003	Free Surface	0.041	No	6	No
1167	442449	442429	6	138.6	9.4	0.013	0.004	Free Surface	0.072	No	6	No
1168	442416	442414	6	104.4	3.9	0.013	0.013	Free Surface	0.084	No	6	No
1169	441025LH	441024	6	274.4	10.8	0.013	0.029	Free Surface	0.117	No	6	No
117	431414	431412	6	188.5	2.7	0.013	0.035	Free Surface	0.177	No	6	No
1172	443022	450410	6	326.5	2.3	0.013	0.008	Free Surface	0.083	No	6	No
1175	443002	450411	8	273.1	1.5	0.013	0.013	Free Surface	0.199	No	8	No
1176	433205	433204	6	235.4	4.1	0.013	0.044	Free Surface	0.209	No	6	No

G1. Model Results for Existing PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
1177	443019	443015	6	116.6	5.3	0.013	0.025	Free Surface	0.136	No	6	No
1178	443015	443014	6	50.4	3.7	0.013	0.035	Free Surface	0.179	No	6	No
1179	433204	433203	6	224.6	1.8	0.013	0.061	Free Surface	0.217	No	6	No
118	453726	453725	8	98.9	20.1	0.013	0.044	Free Surface	0.079	No	8	No
1181	443014	443013	6	188.4	1.2	0.013	0.037	Free Surface	0.204	No	6	No
1182	433207	433208	6	371.4	1.2	0.013	0.010	Free Surface	0.133	No	6	No
1183	431813	431814	6	124.4	58.0	0.013	0.033	Free Surface	0.102	No	6	No
1184	443003LH	443002	8	264.1	1.0	0.013	0.004	Free Surface	0.068	No	8	No
1185	443012	443013	8	92.9	9.4	0.013	0.007	Free Surface	0.040	No	8	No
1186	443005	443004	6	54.2	4.1	0.013	0.012	Free Surface	0.142	No	6	No
1187	443013	443004	8	158.9	0.9	0.013	0.046	Free Surface	0.160	No	8	No
1188	442804	442803	6	241.3	13.7	0.013	0.005	Free Surface	0.048	No	6	No
1189	443011	443012	8	236.0	11.0	0.013	0.005	Free Surface	0.037	No	8	No
119	453725	453716	8	188.6	5.0	0.013	0.147	Free Surface	0.198	No	8	No
1190	443006	443005	6	149.2	8.1	0.013	0.009	Free Surface	0.078	No	6	No
1191	442808	442808	6	184.2	3.2	0.013	0.018	Free Surface	0.187	No	6	No
1192	433102	433101	6	125.2	0.8	0.013	0.005	Free Surface	0.094	No	6	No
1193	443010	443011	6	78.7	10.6	0.013	0.004	Free Surface	0.044	No	6	No
1195	454414	454413	6	89.5	8.4	0.013	0.004	Free Surface	0.042	No	6	No
1196	454413	454411	6	152.8	18.2	0.013	0.004	Free Surface	0.178	No	6	No
1197	453724	453725	8	210.2	12.7	0.013	0.102	Free Surface	0.164	No	8	No
1198	433421	433420	6	398.0	0.2	0.013	0.064	Free Surface	0.397	No	6	No
12	433416	433417	8	100.8	2.3	0.013	0.077	Free Surface	0.657	No	8	No
120	450807	450808	6	225.4	15.8	0.013	0.061	Free Surface	0.168	No	6	No
1200	442609LH	442608	6	169.5	2.2	0.013	0.003	Free Surface	0.052	No	6	No
1202	442602	442603	8	77.4	6.6	0.013	0.022	Free Surface	0.078	No	8	No
1203	442705LH	442702	6	183.9	7.9	0.013	0.008	Free Surface	0.160	No	6	No
1204	442702	442701	6	146.4	12.3	0.013	0.183	Free Surface	0.257	No	6	No
1205	442622	442621	6	88.6	4.1	0.013	0.004	Free Surface	0.049	No	6	No
1206	442618	442619	6	127.1	10.1	0.013	0.015	Free Surface	0.121	No	6	No
1207	442450LH	442428	6	110.2	9.3	0.013	0.002	Free Surface	0.084	No	6	No
1208	442830	442812	4	175.1	6.3	0.013	0.003	Free Surface	0.125	No	4	No
1209	433201	431801	6	129.0	4.2	0.013	0.142	Free Surface	0.319	No	6	No
1210	443020	443019	6	497.4	10.7	0.013	0.019	Free Surface	0.104	No	6	No
1211	442805LH	442804	6	113.4	4.8	0.013	0.001	Free Surface	0.038	No	6	No
1212	442440LH	442441	6	170.7	7.7	0.013	0.003	Free Surface	0.042	No	6	No
1213	443105	443104	8	184.8	0.6	0.013	0.006	Free Surface	0.065	No	8	No
1214	443104	443103	6	103.5	10.3	0.013	0.014	Free Surface	0.102	No	6	No
1215	440305	432913	6	142.1	16.9	0.013	0.005	Free Surface	0.138	No	6	No
1216	440306LH	440305	6	71.6	9.0	0.013	0.003	Free Surface	0.039	No	6	No
1217	442813	442812	6	143.5	2.8	0.013	0.007	Free Surface	0.099	No	6	No
1218	442417	442416	6	106.7	20.2	0.013	0.010	Free Surface	0.077	No	6	No
1219	440201	432812	6	242.4	8.3	0.013	0.004	Free Surface	0.137	No	6	No
1220	432901	432902	6	270.8	3.2	0.013	0.087	Free Surface	0.264	No	6	No
1221	442418	442417	6	155.5	3.7	0.013	0.005	Free Surface	0.060	No	6	No
1222	442454LH	442455	6	52.3	12.0	0.013	0.001	Free Surface	0.025	No	6	No
1223	442917	442918	6	155.5	5.3	0.013	0.012	Free Surface	0.092	No	6	No
1224	443331	443330	6	17.7	11.4	0.013	0.003	Free Surface	0.060	No	6	No
1225	442423	442422	6	64.0	7.4	0.013	0.001	Free Surface	0.022	No	6	No
1226	442921	440906	6	144.0	17.1	0.013	0.013	Free Surface	0.065	No	6	No
1227	443332	443331	6	147.0	5.6	0.013	0.003	Free Surface	0.039	No	6	No
1228	440906	440907	6	51.5	31.6	0.013	0.016	Free Surface	0.085	No	6	No
1229	442909	443302	6	249.4	1.3	0.013	0.056	Free Surface	0.250	No	6	No
123	450808	450809	6	120.0	4.4	0.013	0.063	Free Surface	0.252	No	6	No
1230	432802	432801	6	259.6	0.9	0.013	0.016	Free Surface	0.125	No	6	No
1231	442402	442403	6	282.6	4.5	0.013	0.006	Free Surface	0.072	No	6	No
1232	440213	432810	6	207.9	12.8	0.013	0.004	Free Surface	0.041	No	6	No
1233	440911	442909	6	132.0	1.1	0.013	0.045	Free Surface	0.241	No	6	No
1234	432724	432725	6	96.2	6.0	0.013	0.060	Free Surface	0.182	No	6	No
1235	440904	440903	6	300.7	3.1	0.013	0.018	Free Surface	0.121	No	6	No
1237	443325	443324	6	138.6	1.2	0.013	0.008	Free Surface	0.085	No	6	No
1238	443323LH	443324	6	49.0	3.3	0.013	0.004	Free Surface	0.061	No	6	No
1239	432728	432810	6	250.6	9.7	0.013	0.088	Free Surface	0.209	No	6	No
124	450921	450920	6	153.3	1.0	0.013	0.005	Free Surface	0.089	No	6	No
1240	440908	440924	6	51.3	34.1	0.013	0.026	Free Surface	0.093	No	6	No
1241	440207	440208	6	168.2	7.8	0.013	0.131	Free Surface	0.230	No	6	No
1242	440320	440208	6	124.7	32.5	0.013	0.015	Free Surface	0.133	No	6	No
1243	440909	440910	6	93.2	2.1	0.013	0.037	Free Surface	0.164	No	6	No
1244	440924	440922	6	40.2	15.5	0.013	0.035	Free Surface	0.129	No	6	No
1245	440922	440909	6	50.1	4.0	0.013	0.035	Free Surface	0.170	No	6	No
1246	440208	440209	6	94.0	19.1	0.013	0.148	Free Surface	0.467	No	6	No
1247	440325	440325A	6	109.1	2.5	0.013	0.023	Free Surface	0.187	No	6	No
1248	440324	440325	6	279.0	1.9	0.013	0.018	Free Surface	0.134	No	6	No
1249	440421	440420A	6	52.7	43.9	0.013	0.008	Free Surface	0.055	No	6	No
125	442501	453715	10	296.7	9.3	0.013	1.904	Free Surface	0.465	No	10	No
1250	443319	443320	6	198.2	4.9	0.013	0.097	Free Surface	0.233	No	6	No
1251	440923LH	440924	6	162.7	10.2	0.013	0.009	Free Surface	0.085	No	6	No
1252	440410	440409	6	158.2	0.6	0.013	0.008	Free Surface	0.098	No	6	No
1253	440902	440903	10	263.6	0.6	0.013	0.982	Free Surface	0.627	No	10	Yes
1254	440912	443319	8	298.8	3.2	0.013	0.091	Free Surface	0.175	No	8	No
1255	440211	440207	6	318.2	7.7	0.013	0.127	Free Surface	0.247	No	6	No
1256	440423	440424	8	132.5	10.2	0.013	0.003	Free Surface	0.032	No	8	No
1257	440215	440216	6	158.5	2.3	0.013	0.005	Free Surface	0.075	No	6	No
1259	440429	440417	6	158.7	13.4	0.013	0.023	Free Surface	0.106	No	6	No
126	430801	430802	8	277.4	3.0	0.013	0.012	Free Surface	0.073	No	8	No
1260	440418	440417	6	128.1	10.3	0.013	0.009	Free Surface	0.093	No	6	No
1261	440408	440407	6	144.1	2.1	0.013	0.016	Free Surface	0.105	No	6	No
1262	440103	440104	6	139.4	21.9	0.013	0.013	Free Surface	0.076	No	6	No
1263	440913	440912	8	240.0	4.9	0.013	0.084	Free Surface	0.161	No	8	No
1264	440427	440428	6	54.1	14.1	0.013	0.013	Free Surface	0.077	No	6	No
1265	440901	440902	10	308.8	3.7	0.013	0.491	Free Surface	0.615	No	10	No
1266	440608LH	440607	6	139.2	2.4	0.013	0.004	Free Surface	0.182	No	6	No
1267	440723LH	440722	6	57.8	16.9	0.013	0.004	Free Surface	0.045	No	6	No
1268	440132	440131	8	248.1	2.8	0.013	0.005	Free Surface	0.070	No	8	No
1269	440639	440601	6	206.7	3.4	0.013	0.037	Free Surface	0.161	No	6	No
127	431417	431405	6	244.7	0.5	0.013	0.007	Free Surface	0.181	No	6	No
1270	440124	440123	6	221.6	0.5	0.013	0.002	Free Surface	0.095	No	6	No
1271	440626	440628	6	191.4	1.6	0.013	0.038	Free Surface	0.192	No	6	No
1272	440627LH	440626	6	95.1	25.4	0.013	0.005	Free Surface	0.117	No	6	No
1273	440133LH	440134	6	239.8	11.4	0.013	0.007	Free Surface	0.065	No	6	No
1274	440817	432536	6	165.2	5.1	0.013	0.009	Free Surface	0.149	No	6	No
1275	440830	440831	6	188.3	2.7	0.013	0.005	Free Surface	0.084	No	6	No
1276	440823	440824	6	159.6	5.5	0.013	0.004	Free Surface	0.050	No	6	No
1277	440803	432529	6	130.6	11.7	0.013	0.016	Free Surface	0.093	No	6	No
1278	432508ALH	432508A	6	177.5	15.0	0.013	0.004	Free Surface	0.045	No	6	No
1279	440614	440615	6	360.9	7.8	0.013	0.005	Free Surface	0.067	No	6	No
128	430802	430803	8	287.3	2.0	0.013	0.013	Free Surface	0.076	No	8	No
1280	440816	440817	6	115.1	7.1	0.013	0.005	Free Surface	0.065	No	6	No
1281	440550	440551	6	242.7	6.9	0.013	0.005	Free Surface	0.055	No	6	No
1282	440822LH	440823	6	81.5	11.5	0.013	0.001	Free Surface	0.036	No	6	No
1283	440544	440545	6	281.3	7.5	0.013	0.072	Free Surface	0.184	No	6	No
1284	441202	440622	6	194.5	0.5	0.013	0.018	Free Surface	0.196	No	6	No
1285	440548	440830	6	178.8	7.3	0.013	0.001	Free Surface	0.046	No	6	No
1286	440827	440826	6	400.5	3.0	0.013	0.134	Free Surface	0.302	No	6	No
1287	440733	441202	6	137.8	0.7	0.013	0.014	Free Surface	0.161	No	6	No
1288	432507	SSFI 21	6	22.7	9.1	0.013	0.005	Free Surface	0.055	No	6	No
1289	432506LH	432505	6	152.0	3.8	0.013	0.000	Free Surface	0.000	No	6	No
129	431001LH	431002	6	155.8	1.5	0.013	0.003	Free Surface	0.076	No	6	No
1291	440819	440818	6	298.7	5.5	0.013	0.004	Free Surface	0.053	No	6	No
1292	440815LH	440816	6	122.8	4.1	0.013	0.002	Free Surface	0.045	No	6	No
1293	432505	432503	6	139.4	9.1	0.013	0.009	Free Surface	0.081	No	6	No
1294	432504	432503	6	59.9	3.1	0.013	0.001	Free Surface	0.062	No	6	No
1295	440837	440821	6	117.2	12.3	0.013	0.001	Free Surface	0.084	No	6	No
1296	440216	440104	6	220.5	4.4	0.013	0.010	Free Surface	0.085	No	6	No
1297	440413LH	440412	6	43.9	16.9	0.013	0.003	Free Surface	0.032	No	6	No
1298	440412	440407	6	152.3	19.9	0.013	0.006	Free Surface	0.045	No	6	No
1299	440104	440105	6	51.8	22.8	0.013	0.028	Free Surface	0.094	No	6	No
13	433402	433403	8	139.1	2.7	0.013	0.842	Free Surface	0.593	No	8	No
1300	440403	440402	6	300.4	5.5	0.013	0.029	Free Surface	0.413	No	6	No
1302	440407	440404	6	56.8	25.7	0.013	0.025	Free Surface	0.092	No	6	No
1303	440430	440429	6	111.9	16.9	0.013	0.005	Free Surface	0.066	No	6	No
1304	440417	440416	6	193.3	7.8	0.013	0.032	Free Surface	0.254	No	6	No
1305	440920	440921	8	154.1	5.1	0.013	0.028	Free Surface	0.118	No	8	No
1306	440914	440913	6	250.7	4.0	0.013	0.068	Free Surface	0.204	No	6	No
1307	440210	440116	6	293.9	2.5	0.013	0.177	Free Surface	0.380	No	6	No
1308	440404	440401	6	229.5	14.5	0.013	0.030	Free Surface	0.102	No	6	No
1309	440401	440402	8	77.0	3.4	0.013	0.938	Free Surface	0.576	No	8	No
1310	440915	440914	6	217.7	6.5	0.013	0.061	Free Surface	0.191	No	6	No
1311	440105	440115	6	164.0	22.2	0.013	0.034	Free Surface	0.098	No	6	No
1312	440115	440116	6	114.3	1.1	0.013	0.064	Free Surface	0.278	No	6	No
1313	440705	440706	6	250.1	2.5	0.013	0.051	Free Surface	0.192	No	6	No
1314	440416	440415	6	67.8	8.8	0.013	0.338	Free Surface	0.386	No	6	No
1315	440704	440705	6	141.9	0.3	0.013	0.045	Free Surface	0.289	No	6	No
1316	440102	440103	6	324.1	0.9	0.013	0.011	Free Surface	0.098	No	6	No
1317	440415	440414	6	103.5	10.9	0.013	0.370	Free Surface	0.445	No	6	No
1318	440101	440102	6	165.7	5.4	0.013	0.004	Free Surface	0.091	No	6	No
1319	440431	440129	6	133.7	29.4	0.013	0.247	Free Surface	0.308	No	6	No
132	442615	442616	8	69.3	20.9	0.013	0.003	Free Surface	0.023	No	8	No
1320	440129	440416	6	139.4	7.8	0.013	0.305	Free Surface	0.381	No	6	No
1321	440707	440704	6	75.4	33.4	0.013	0.009	Free Surface	0.209	No	6	No
1322	440703	440704	6	139.9	1.0	0.013	0.036	Free Surface	0.291	No	6	No
1323	440917	440916	6	100.5	1.0	0.013	0.058	Free Surface	0.247	No	6	No
1324	440114	440115	6	198.0	0.1	0.013	0.630	Free Surface	0.542	No	6	Yes
1325	440107	440108	6	104.6	1.2	0.013	0.002	Free Surface	0.050	No	6	No
1326	440918	440918A	8	241.7	3.9	0.013	0.018	Free Surface	0.080	No	8	No
1327	440702	440703	6	202.1	8.2	0.013	0.033	Free Surface	0.167	No	6	No
1328	440128	440129	6	132.9	2.6	0.013	0.059	Free Surface	0.295	No	6	No
1329	440708LH	440707	6	246.1	0.9	0.013	0.003	Free Surface	0.062	No	6	No
133	442617LH	442616	6	102.4	15.7	0.013	0.004	Free Surface	0.038	No	6	No
1330	440633	440917	6	92.3	6.5	0.013	0.058	Free Surface	0.228	No	6	No
1331	440130	440415	8	230.5	1.0	0.013	0.028	Free Surface	0.129	No	8	No
1332	440604	440401	8	268.4	6.9	0.013	0.906	Free Surface	0.465	No	8	No
1333	440701	440702	6	79.4	16.8	0.013	0.030	Free Surface	0.111	No	6	No
1334	440724	440701	6	338.9	3.2	0.013	0.025	Free Surface	0.121	No	6	No
1335	440721	440724	6	280.0	3.7	0.013	0.018	Free Surface	0.126	No	6	No
1336	440632	440918	6	101.1	10.0	0.013	0.009	Free Surface	0.081	No	6	No
1337	440414	440136	6	219.4	4.4	0.013	0.170	Free Surface	0.476	No	6	No
1338	440109	440108	6	226.8	1.1	0.013	0.013	Free Surface	0.128	No	6	No
1339	440607	440604	8	270.6	2.5	0.013	0.139	Free Surface	0.308	No	8	No
134	442720	442613	6	121.9	6.5	0.013	0.011	Free Surface	0.145	No	6	No
1340	440406	440603	6	142.4	5.8	0.013	0.013	Free Surface	0.086	No	6	No
1341	440603	440604	8	146.2	9.8	0.013	0.751	Free Surface	0.381	No	8	No
1342	440136	440137	6	158.1	7.4	0.013	0.382	Free Surface	0.420	No	6	No
1343	440631	440632	6	108.1	10.4	0.013	0.004	Free Surface	0.052	No	6	No
1344	440118	440143	6	170.7	19.6	0.013	0.018	Free Surface	0.153	No	6	No
1345	440143	440128	6	207.2	2.0	0.013	0.058	Free Surface	0.223	No	6	No
1346	440112	440113	6	159.4	0.1	0.013	0.006	Free Surface	0.175	No	6	No
1347	440722	440721	6	104.7	18.1	0.013	0.008	Free Surface	0.081	No	6	No
1348	440111	440112	6	147.0	8.4	0.013	0.001	Free Surface	0.092	No	6	No
1349	440137	440602	8	155.4	7.0	0.013	0.395	Free Surface	0.297	No	8	No
135	442614	442616	8	73.8	56.1	0.013	0.003	Free Surface	0.017	No	8	No

G1. Model Results for Existing PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
1350	440602	440603	8	103.6	6.0	0.013	0.737	Free Surface	0.417	No	8	No
1351	440720	440721	6	136.3	3.9	0.013	0.009	Free Surface	0.095	No	6	No
1352	440135	440136	6	289.7	4.3	0.013	0.011	Free Surface	0.265	No	6	No
1353	440635	440634	6	264.1	6.5	0.013	0.055	Free Surface	0.190	No	6	No
1354	440127	440143	6	225.6	4.0	0.013	0.040	Free Surface	0.195	No	6	No
1355	440122	440121	6	157.3	15.0	0.013	0.005	Free Surface	0.052	No	6	No
1356	432512	432511	6	192.4	7.6	0.013	0.075	Free Surface	0.195	No	6	No
1357	440131	440130	8	394.1	2.2	0.013	0.021	Free Surface	0.111	No	8	No
1358	440121	440120	6	116.9	9.1	0.013	0.009	Free Surface	0.078	No	6	No
1359	440119	440120	6	185.4	0.9	0.013	0.003	Free Surface	0.082	No	6	No
136	430712	430713	6	69.5	0.6	0.013	0.038	Free Surface	0.289	No	6	No
1360	440120	440127	6	220.9	11.7	0.013	0.022	Free Surface	0.126	No	6	No
1361	440719	440720	6	214.7	4.3	0.013	0.009	Free Surface	0.080	No	6	No
1362	440629	440635	6	142.6	3.9	0.013	0.055	Free Surface	0.178	No	6	No
1363	440630	440629	6	126.2	33.1	0.013	0.009	Free Surface	0.120	No	6	No
1364	440617	440616	6	161.3	8.3	0.013	0.017	Free Surface	0.104	No	6	No
1365	440616	440609	6	164.8	4.6	0.013	0.024	Free Surface	0.215	No	6	No
1366	440123	440120	6	66.3	0.5	0.013	0.007	Free Surface	0.108	No	6	No
1367	440601	440602	6	227.9	5.2	0.013	0.318	Free Surface	0.431	No	6	No
1368	432511	432510	6	261.9	5.6	0.013	0.079	Free Surface	0.204	No	6	No
1369	440636	440637	6	384.0	3.7	0.013	0.008	Free Surface	0.083	No	6	No
1370	440713	440714	8	28.2	1.4	0.013	0.027	Free Surface	0.110	No	8	No
1371	440718LH	450807	6	46.0	4.1	0.013	0.003	Free Surface	0.043	No	6	No
1372	440715	440714	8	92.4	22.7	0.013	0.014	Free Surface	0.071	No	8	No
1373	440618	440617	6	227.5	5.7	0.013	0.015	Free Surface	0.089	No	6	No
1374	440134	440135	6	276.4	4.5	0.013	0.009	Free Surface	0.081	No	6	No
1375	440717	440716	8	29.3	35.5	0.013	0.005	Free Surface	0.046	No	8	No
1376	440716	440715	8	144.2	1.9	0.013	0.008	Free Surface	0.055	No	8	No
1377	440610	440609	6	377.7	5.3	0.013	0.097	Free Surface	0.270	No	6	No
1378	440126	440127	6	351.3	1.4	0.013	0.011	Free Surface	0.134	No	6	No
1379	440619	440618	6	215.0	3.1	0.013	0.011	Free Surface	0.091	No	6	No
138	432013LH	432014	6	155.4	4.3	0.013	0.012	Free Surface	0.077	No	6	No
1380	432510	432509	6	252.1	7.1	0.013	0.084	Free Surface	0.195	No	6	No
1381	440832	440639	6	161.4	9.6	0.013	0.029	Free Surface	0.136	No	6	No
1382	440125	440124	6	118.4	0.5	0.013	0.000	Free Surface	0.043	No	6	No
1383	440125	440126	6	122.7	18.8	0.013	0.001	Free Surface	0.064	No	6	No
1384	440623	440626	6	106.2	1.3	0.013	0.033	Free Surface	0.192	No	6	No
1385	440624	440623	6	102.1	22.0	0.013	0.008	Free Surface	0.118	No	6	No
1386	440734	440735	6	52.9	11.8	0.013	0.023	Free Surface	0.132	No	6	No
1387	440625	440624	6	149.5	2.9	0.013	0.004	Free Surface	0.052	No	6	No
1388	440637	440638	6	343.8	5.8	0.013	0.015	Free Surface	0.126	No	6	No
1389	440638	440734	6	236.0	1.1	0.013	0.018	Free Surface	0.128	No	6	No
139	403418	403417	6	368.2	0.2	0.013	0.022	Free Surface	0.636	No	6	Yes
1390	440826	440140	6	141.5	5.0	0.013	0.143	Free Surface	0.639	No	6	No
1391	440615	440639	6	259.3	2.5	0.013	0.008	Free Surface	0.122	No	6	No
1392	440141	440140	6	233.5	11.0	0.013	0.131	Free Surface	0.608	No	6	No
1393	440142	440141	6	113.0	10.5	0.013	0.126	Free Surface	0.222	No	6	No
1394	440620	440619	6	187.3	11.3	0.013	0.007	Free Surface	0.074	No	6	No
1395	432527	432523	6	191.5	13.0	0.013	0.007	Free Surface	0.072	No	6	No
1396	440831	440832	6	166.7	3.2	0.013	0.014	Free Surface	0.106	No	6	No
1397	432536	440142	6	190.4	9.4	0.013	0.121	Free Surface	0.222	No	6	No
1398	440824	440826	6	145.9	9.9	0.013	0.005	Free Surface	0.166	No	6	No
1399	440545	440610	6	272.7	8.9	0.013	0.082	Free Surface	0.209	No	6	No
14	433402	433402	8	53.6	3.9	0.013	0.842	Free Surface	0.560	No	8	No
140	442511	442335	6	76.9	41.6	0.013	0.013	Free Surface	0.077	No	6	No
1400	432509	432535	6	165.8	10.3	0.013	0.088	Free Surface	0.185	No	6	No
1401	432535	432536	6	29.6	17.2	0.013	0.110	Free Surface	0.203	No	6	No
1402	440825	440141	6	114.1	3.1	0.013	0.004	Free Surface	0.139	No	6	No
1403	440551	440613	6	98.8	10.4	0.013	0.008	Free Surface	0.083	No	6	No
1404	432529	432535	6	88.5	4.9	0.013	0.019	Free Surface	0.145	No	6	No
1405	440621	440620	6	108.7	13.8	0.013	0.004	Free Surface	0.048	No	6	No
1406	440818	440142	6	117.5	3.5	0.013	0.004	Free Surface	0.138	No	6	No
1407	440622	440623	6	292.2	0.5	0.013	0.025	Free Surface	0.202	No	6	No
1408	440821	440827	6	102.6	8.0	0.013	0.046	Free Surface	0.232	No	6	No
1409	440543	440543A	6	17.8	20.3	0.013	0.061	Free Surface	0.145	No	6	No
141	431107	431108	6	137.9	2.0	0.013	0.029	Free Surface	0.160	No	6	No
1410	441201LH	440543	6	228.3	0.6	0.013	0.009	Free Surface	0.125	No	6	No
1411	440546	440543A	6	397.6	4.2	0.013	0.000	Free Surface	0.079	No	6	No
1412	440829	440821	6	22.0	17.0	0.013	0.044	Free Surface	0.131	No	6	No
1413	440802	440803	6	269.7	4.1	0.013	0.011	Free Surface	0.083	No	6	No
1414	432503	432502	6	222.3	2.2	0.013	0.011	Free Surface	0.210	No	6	No
1415	440532	440827	6	261.3	2.3	0.013	0.077	Free Surface	0.286	No	6	No
1416	440547	440532	6	218.7	2.1	0.013	0.001	Free Surface	0.146	No	6	No
1417	440528	440527	6	102.2	1.5	0.013	0.039	Free Surface	0.194	No	6	No
1418	440527	440516	6	60.7	2.5	0.013	0.039	Free Surface	0.173	No	6	No
1419	440520	440521	6	59.2	2.2	0.013	0.000	Free Surface	0.041	No	6	No
142	442301	442504	6	174.5	5.4	0.013	0.037	Free Surface	0.143	No	6	No
1420	440533	440528	6	106.2	5.7	0.013	0.037	Free Surface	0.174	No	6	No
1421	441213	441212	6	230.3	10.8	0.013	0.006	Free Surface	0.060	No	6	No
1422	440501	440502	6	205.0	5.6	0.013	0.002	Free Surface	0.055	No	6	No
1423	440514	440515	6	239.4	8.6	0.013	0.013	Free Surface	0.080	No	6	No
1424	440513	440512	6	256.5	1.8	0.013	0.005	Free Surface	0.066	No	6	No
1425	440502	440503	6	100.2	4.5	0.013	0.008	Free Surface	0.071	No	6	No
1428	440504	440503	6	154.8	1.2	0.013	0.002	Free Surface	0.058	No	6	No
1429	441001LH	441002	6	185.5	3.8	0.013	0.004	Free Surface	0.062	No	6	No
143	431010	431012	6	62.2	4.0	0.013	0.014	Free Surface	0.104	No	6	No
1430	440507	440506	6	303.1	0.8	0.013	0.003	Free Surface	0.078	No	6	No
1431	440505	440514	6	150.6	6.1	0.013	0.013	Free Surface	0.081	No	6	No
1432	440506	440505	6	134.2	4.5	0.013	0.012	Free Surface	0.085	No	6	No
1433	441003LH	441002	6	187.6	1.1	0.013	0.018	Free Surface	0.149	No	6	No
1434	441013	441016	8	354.3	8.9	0.013	0.119	Free Surface	0.154	No	8	No
1435	441011	441010	6	54.7	11.0	0.013	0.074	Free Surface	0.180	No	6	No
144	430713	430714	6	190.8	0.4	0.013	0.040	Free Surface	0.222	No	6	No
1441	455003	HASTINGS, WW	6	270.5	2.6	0.013	0.135	Free Surface	0.326	No	6	No
1443	454901	454902	6	149.6	3.8	0.013	0.001	Free Surface	0.038	No	6	No
1444	450104A	450104	6	167.6	2.1	0.013	0.020	Free Surface	0.158	No	6	No
1445	453707	453708	10	75.8	3.7	0.013	1.021	Free Surface	0.474	No	10	No
1446	450111	450112	6	36.7	6.8	0.013	0.000	Free Surface	0.000	No	6	No
1447	450102	450103	8	356.6	1.7	0.013	0.343	Free Surface	0.457	No	8	No
1448	454803	454804	8	178.0	9.9	0.013	0.288	Free Surface	0.223	No	8	No
1449	442913	442914	6	233.2	4.2	0.013	0.010	Free Surface	0.109	No	6	No
145	430707	430708	6	97.2	18.3	0.013	0.004	Free Surface	0.054	No	6	No
1450	440307	442307	6	248.9	1.6	0.013	0.009	Free Surface	0.110	No	6	No
1451	442436	442435	6	166.0	8.7	0.013	0.037	Free Surface	0.140	No	6	No
1452	452504	452504A	6	106.8	2.6	0.013	0.001	Free Surface	0.047	No	6	No
1453	443503	443502	6	163.2	0.9	0.013	0.049	Free Surface	0.383	No	6	No
1454	442102	442103	6	113.8	6.8	0.013	0.031	Free Surface	0.129	No	6	No
1455	441827LH	441827	6	138.7	3.2	0.013	0.001	Free Surface	0.029	No	6	No
1456	441824	441822	6	94.5	2.1	0.013	0.006	Free Surface	0.073	No	6	No
1457	441823	441821	6	114.7	13.0	0.013	0.002	Free Surface	0.069	No	6	No
1458	402408	402407	6	350.3	1.5	0.013	0.001	Free Surface	0.122	No	6	No
1459	441518A	441518	6	141.7	19.4	0.013	0.006	Free Surface	0.073	No	6	No
146	442727LH	442726	6	46.3	6.5	0.013	0.002	Free Surface	0.051	No	6	No
1460	441406	441407	8	287.1	3.0	0.013	0.269	Free Surface	0.303	No	8	No
1461	441408	441407	6	131.8	16.7	0.013	0.283	Free Surface	0.297	No	6	No
1464	VMH_47	402414	6	64.9	4.9	0.013	0.000	Free Surface	0.027	No	6	No
1465	441511	441505	6	154.4	1.8	0.013	0.026	Free Surface	0.281	No	6	No
1466	441506	441505	8	249.6	0.4	0.013	0.335	Free Surface	0.576	No	8	Yes
1468	402414	402501	6	88.4	3.7	0.013	0.004	Free Surface	0.124	No	6	No
147	442512	442511	6	132.8	10.4	0.013	0.004	Free Surface	0.048	No	6	No
1470	402501	402502	6	356.7	0.4	0.013	0.083	Free Surface	0.708	No	6	Yes
1471	441517	441504	6	261.0	4.4	0.013	0.021	Free Surface	0.558	No	6	No
1472	441505	441504	8	168.8	2.2	0.013	0.381	Free Surface	0.697	No	8	No
1474	402407	402406	6	364.0	1.3	0.013	0.043	Free Surface	0.213	No	6	No
1475	441520	441502	15	17.9	1.2	0.013	0.544	Free Surface	0.264	No	15	No
1478	441504	441503	8	157.6	0.1	0.013	0.405	Free Surface	0.779	No	8	Yes
148	432110	432109	6	38.9	5.1	0.013	0.005	Free Surface	0.059	No	6	No
1480	402406	402405	6	218.5	1.6	0.013	0.044	Free Surface	0.218	No	6	No
1481	402404	402501	6	375.6	0.3	0.013	0.074	Free Surface	0.390	No	6	No
1482	402416LH	402415	6	126.9	0.8	0.013	0.000	Free Surface	0.052	No	6	No
1483	402410LH	402404	6	134.2	0.5	0.013	0.002	Free Surface	0.065	No	6	No
1484	402415	402401	6	115.1	0.4	0.013	0.003	Free Surface	0.101	No	6	No
1485	402405	402403	6	275.5	1.5	0.013	0.050	Free Surface	0.284	No	6	No
1487	402409LH	402403	6	116.8	0.6	0.013	0.003	Free Surface	0.208	No	6	No
1488	402401	402402	6	273.3	0.4	0.013	0.007	Free Surface	0.132	No	6	No
1489	450805LH	450804	6	164.5	2.4	0.013	0.001	Free Surface	0.041	No	6	No
149	430705	430704	6	172.8	7.7	0.013	0.310	Free Surface	0.384	No	6	No
1490	450818LH	450817	6	149.8	7.2	0.013	0.004	Free Surface	0.055	No	6	No
1491	451118	451119	6	115.4	9.1	0.013	0.002	Free Surface	0.039	No	6	No
1492	451111	451110	6	258.9	7.2	0.013	0.012	Free Surface	0.080	No	6	No
1493	450816LH	450815	6	94.3	6.7	0.013	0.003	Free Surface	0.046	No	6	No
1494	451117LH	451118	6	92.7	0.7	0.013	0.001	Free Surface	0.035	No	6	No
1495	450824LH	450823	6	76.5	0.4	0.013	0.002	Free Surface	0.073	No	6	No
1496	450822	450823	6	106.4	4.2	0.013	0.012	Free Surface	0.086	No	6	No
1497	450611	450612	6	245.3	0.6	0.013	0.002	Free Surface	0.090	No	6	No
1499	454804	454805	8	303.5	14.7	0.013	0.289	Free Surface	0.210	No	8	No
15	431504	431503	8	187.6	2.2	0.013	0.630	Free Surface	0.517	No	8	No
150	432008	432007	6	149.7	7.7	0.013	0.146	Free Surface	0.245	No	6	No
1500	454814	454813	6	152.8	0.7	0.013	0.004	Free Surface	0.073	No	6	No
1501	451107	451106	6	151.9	2.3	0.013	0.067	Free Surface	0.212	No	6	No
1502	451106	451105	6	27.1	8.7	0.013	0.068	Free Surface	0.230	No	6	No
1503	454815	454814	6	139.8	0.7	0.013	0.003	Free Surface	0.073	No	6	No
1504	454805	454806	8	144.4	14.6	0.013	0.290	Free Surface	0.210	No	8	No
1505	454811	454806	6	166.4	2.9	0.013	0.010	Free Surface	0.185	No	6	No
1506	454813	454811	6	216.3	1.9	0.013	0.004	Free Surface	0.079	No	6	No
1507	454812	454811	6	111.1	1.1	0.013	0.005	Free Surface	0.084	No	6	No
1508	451108	451105	6	196.2	3.0	0.013	0.023	Free Surface	0.210	No	6	No
1509	454806	454807	8	113.2	15.8	0.013	0.300	Free Surface	0.211	No	8	No
151	432014	432009	6	104.4	46.1	0.013	0.018	Free Surface	0.152	No	6	No
1510	454306	454305	8	430.1	0.6	0.013	0.136	Free Surface	0.262	No	8	No
1511	450602	450603	8	85.2	0.5	0.013	0.119	Free Surface	0.275	No	8	No
1512	450603	450604	8	56.5	3.2	0.013	0.119	Free Surface	0.246	No	8	No
1513	451109	451108	6	259.9	7.1	0.013	0.020	Free Surface	0.115	No	6	No
1514	450802	450602	6	311.9	6.3	0.013	0.026	Free Surface	0.293	No	6	No
1515	451121	450802	6	202.7	4.0	0.013	0.012	Free Surface	0.103	No	6	No
1516	451120	451121	6	127.2	6.9	0.013	0.009	Free Surface	0.080	No	6	No
1517	450820	450802	6	292.9	12.8	0.013	0.004	Free Surface	0.079	No	6	No
1518	450305	450107	6	195.0	7.0	0.013	0.000	Free Surface	0.030	No	6	No
1519	451110	451109	6	321.1	10.1	0.013	0.016	Free Surface	0.090	No	6	No
152	432009	432008	6	259.8	8.1	0.013	0.139	Free Surface	0.258	No	6	No
1520	450803	450802	6	266.2	13.8	0.013	0.007	Free Surface	0.084	No	6	No
1521	451119	451120	6	333.6	14.3	0.013	0.006	Free Surface	0.060	No	6	No
1522	450105	450209A	8	145.9	2.4	0.013	0.041	Free Surface	0.116	No	8	No
1523	450108	450103	6	53.9	1.1	0.013	0.005	Free Surface	0.084	No	6	No
1524	450110LH	450102	8	256.6	6.5	0.013	0.019	Free Surface	0.234	No	8	No
1525	450109	450108	6	191.5	3.0	0.013	0.005	Free Surface	0.074	No	6	No
1528	442801	450417	6	164.1	4.0	0.013	0.180	Free Surface	0.339	No	6	No
1529	442510	442335	6	207.9	0.5	0.013	0.006	Free Surface	0.104	No	6	No
153	430605	430604	8	355.2	1.2	0.013	0.268	Free Surface	0.343	No	8	No
1530	442333	442332	6	227.7	3.5	0.013	0.024	Free Surface	0.162	No	6	No
1531	442332	442613	6	210.2	12.5	0.013	0.107	Free Surface	0.205	No	6	No

G1. Model Results for Existing PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
1532	442335	442334	6	60.0	6.7	0.013	0.020	Free Surface	0.102	No	6	No
1533	442334	442333	6	194.8	6.0	0.013	0.021	Free Surface	0.117	No	6	No
1534	452736	452737	6	201.9	2.6	0.013	0.004	Free Surface	0.066	No	6	No
1535	441714	441601	8	51.4	2.9	0.013	0.146	Free Surface	0.324	No	8	No
1536	403007	403006	6	252.9	0.4	0.013	0.008	Free Surface	0.142	No	6	No
1537	441703	441704	6	132.4	8.4	0.013	0.010	Free Surface	0.081	No	6	No
1538	402705	402704	6	268.9	0.3	0.013	0.017	Free Surface	0.196	No	6	No
1539	441416	441417	6	221.6	2.3	0.013	0.002	Free Surface	0.083	No	6	No
154	441012LH	441011	6	243.4	5.0	0.013	0.013	Free Surface	0.127	No	6	No
1540	441418	441417	6	161.6	12.7	0.013	0.017	Free Surface	0.102	No	6	No
1541	441709	441708	6	48.8	9.4	0.013	0.004	Free Surface	0.047	No	6	No
1542	441402	441402A	6	55.8	8.8	0.013	0.382	Free Surface	0.465	No	6	No
1543	441412	441411	6	271.8	10.1	0.013	0.030	Free Surface	0.125	No	6	No
1544	442305	442304	6	295.1	0.8	0.013	0.029	Free Surface	0.188	No	6	No
1545	442328	442329	6	112.9	0.9	0.013	0.062	Free Surface	0.303	No	6	No
1546	452705	452704	6	81.8	10.1	0.013	0.003	Free Surface	0.066	No	6	No
1547	442728	442714	6	92.5	21.6	0.013	0.004	Free Surface	0.051	No	6	No
1548	442419	442420	6	100.1	15.6	0.013	0.005	Free Surface	0.064	No	6	No
1549	440315	440316	6	217.9	8.3	0.013	0.009	Free Surface	0.069	No	6	No
155	402712	402702	6	152.5	2.5	0.013	0.094	Free Surface	0.273	No	6	No
1550	442404	442405	6	202.3	3.2	0.013	0.026	Free Surface	0.132	No	6	No
1551	442456	442427	8	156.2	5.1	0.013	0.002	Free Surface	0.053	No	8	No
1552	443324	443301	6	162.6	21.3	0.013	0.015	Free Surface	0.287	No	6	No
1553	440910	440911	6	136.0	7.8	0.013	0.042	Free Surface	0.185	No	6	No
1554	450113	450112	6	190.9	3.5	0.013	0.008	Free Surface	0.078	No	6	No
1555	450117	450116	6	30.0	5.3	0.013	0.001	Free Surface	0.026	No	6	No
1556	450115	450115A	6	123.1	3.9	0.013	0.008	Free Surface	0.072	No	6	No
1558	450911	450806	6	136.2	8.1	0.013	0.037	Free Surface	0.130	No	6	No
1559	450806	450807	6	231.2	17.4	0.013	0.056	Free Surface	0.136	No	6	No
1560	452720	04C142M	6	116.9	5.0	0.013	0.048	Free Surface	0.165	No	6	No
1562	442508	442509	6	165.1	4.3	0.013	0.002	Free Surface	0.059	No	6	No
1563	VMH_B6	452721	6	96.2	0.1	0.013	0.000	Free Surface	0.025	No	6	No
1564	452721	452722	8	157.1	0.8	0.013	0.002	Free Surface	0.040	No	8	No
1565	452735LH	452734	6	99.0	0.9	0.013	0.002	Free Surface	0.059	No	6	No
1566	442706	442610	6	116.2	8.6	0.013	0.027	Free Surface	0.183	No	6	No
1567	450811	450901	8	292.2	0.4	0.013	0.120	Free Surface	0.324	No	8	No
1568	450417	450420	18	258.4	3.8	0.013	0.000	Free Surface	0.000	No	18	No
1569	450420	450410	12	27.9	0.2	0.013	0.003	Free Surface	0.057	No	12	No
157	430905	430904	6	141.5	0.5	0.013	0.018	Free Surface	0.204	No	6	No
1570	442707	442706	6	68.8	3.3	0.013	0.013	Free Surface	0.103	No	6	No
1572	442815	442816	6	108.9	0.1	0.013	0.013	Free Surface	0.229	No	6	No
1573	442725	442724	6	108.3	3.7	0.013	0.009	Free Surface	0.076	No	6	No
1574	442408	442409	6	59.1	5.2	0.013	0.032	Free Surface	0.193	No	6	No
1575	442430	442431	6	58.3	11.8	0.013	0.046	Free Surface	0.169	No	6	No
1578	441908	441907	6	196.9	9.2	0.013	0.051	Free Surface	0.195	No	6	No
1579	441131	441130	6	211.6	4.6	0.013	0.011	Free Surface	0.093	No	6	No
158	430903	430904	6	108.9	6.0	0.013	0.283	Free Surface	0.388	No	6	No
1580	442513	442511	6	206.8	4.8	0.013	0.007	Free Surface	0.060	No	6	No
1581	442722	442721	6	205.0	3.1	0.013	0.003	Free Surface	0.063	No	6	No
1582	442457LH	442446	6	19.7	8.3	0.013	0.003	Free Surface	0.046	No	6	No
1583	442446	442447	6	47.7	6.0	0.013	0.005	Free Surface	0.053	No	6	No
1584	442407	442408	6	153.5	1.2	0.013	0.030	Free Surface	0.168	No	6	No
1585	442406	442407	6	115.5	1.7	0.013	0.030	Free Surface	0.186	No	6	No
1586	442429	442430	6	99.2	13.8	0.013	0.029	Free Surface	0.117	No	6	No
1587	443025	442905	6	157.2	1.7	0.013	0.001	Free Surface	0.039	No	6	No
1588	440308	440307	6	269.3	7.6	0.013	0.006	Free Surface	0.075	No	6	No
1589	452502	452427	8	222.4	0.4	0.013	0.084	Free Surface	0.084	No	8	No
159	432915LH	432914	6	112.3	4.6	0.013	0.004	Free Surface	0.073	No	6	No
1590	441414	441412	6	141.6	13.8	0.013	0.018	Free Surface	0.096	No	6	No
1591	403002	403001	8	256.5	0.4	0.013	0.057	Free Surface	0.224	No	8	No
1592	403203	403002	8	190.7	0.6	0.013	0.019	Free Surface	0.119	No	8	No
1593	402706	402705	6	245.1	1.3	0.013	0.011	Free Surface	0.173	No	6	No
1594	441022	441402	6	106.7	9.4	0.013	0.379	Free Surface	0.407	No	6	No
1595	441702	441703	6	157.7	1.4	0.013	0.006	Free Surface	0.076	No	6	No
1596	403004	403003	8	113.4	1.2	0.013	0.030	Free Surface	0.176	No	8	No
1597	441602	441601	8	239.7	4.6	0.013	0.203	Free Surface	0.329	No	8	No
1599	442626	442604	6	165.0	2.5	0.013	0.036	Free Surface	0.171	No	6	No
16	431503	431502	8	163.0	3.9	0.013	0.784	Free Surface	0.539	No	8	No
160	430706	430705	6	154.9	7.7	0.013	0.315	Free Surface	0.382	No	6	No
1600	402801	403007	6	102.8	0.5	0.013	0.004	Free Surface	0.106	No	6	No
1601	403008	402801	6	63.1	1.8	0.013	0.002	Free Surface	0.065	No	6	No
1602	402809	402801	6	49.0	1.2	0.013	0.002	Free Surface	0.066	No	6	No
1602	402809	402801	6	49.0	1.2	0.013	0.002	Free Surface	0.066	No	6	No
1603	441701	441420	6	271.7	16.3	0.013	0.010	Free Surface	0.072	No	6	No
1605	441411	441410	6	197.6	6.5	0.013	0.039	Free Surface	0.193	No	6	No
1606	441601	441712	8	305.4	2.0	0.013	0.388	Free Surface	0.389	No	8	No
1607	441708	441707	6	109.6	10.5	0.013	0.006	Free Surface	0.058	No	6	No
1608	402607LHB	402606	6	56.8	3.5	0.013	0.001	Free Surface	0.038	No	6	No
1609	441420	441420A	6	59.4	10.7	0.013	0.018	Free Surface	0.105	No	6	No
161	431621LH	431622	6	160.0	5.4	0.013	0.007	Free Surface	0.063	No	6	No
1611	402803	402808	6	92.5	1.2	0.013	0.007	Free Surface	0.162	No	6	No
1612	452101	452024	6	134.9	6.6	0.013	0.018	Free Surface	0.147	No	6	No
1613	442331	442332	6	273.6	5.9	0.013	0.081	Free Surface	0.201	No	6	No
1614	442802	442801	6	249.6	2.4	0.013	0.163	Free Surface	0.356	No	6	No
1615	452724	452727	6	120.4	0.7	0.013	0.014	Free Surface	0.123	No	6	No
1616	442814	442815	6	343.4	1.1	0.013	0.009	Free Surface	0.158	No	6	No
1617	452715	452714	6	78.2	2.9	0.013	0.002	Free Surface	0.038	No	6	No
1618	442304	442303	6	328.4	2.8	0.013	0.032	Free Surface	0.141	No	6	No
1619	442709	442708	6	195.8	11.1	0.013	0.007	Free Surface	0.089	No	6	No
162	430210	430209	6	169.4	7.1	0.013	0.414	Free Surface	0.436	No	6	No
1620	452714	452713	6	22.8	12.3	0.013	0.003	Free Surface	0.045	No	6	No
1621	442806	442802	6	194.7	8.2	0.013	0.153	Free Surface	0.317	No	6	No
1622	442330	442331	6	198.7	1.0	0.013	0.078	Free Surface	0.275	No	6	No
1623	452727	452728	6	204.4	6.4	0.013	0.015	Free Surface	0.089	No	6	No
1624	442723	442711	6	157.6	1.5	0.013	0.000	Free Surface	0.028	No	6	No
1625	442324	442325	6	223.6	6.5	0.013	0.006	Free Surface	0.056	No	6	No
1626	442325	442329	6	98.6	44.4	0.013	0.014	Free Surface	0.185	No	6	No
1627	442803	442802	6	301.0	12.8	0.013	0.007	Free Surface	0.213	No	6	No
1628	452009	452010	6	102.2	25.3	0.013	0.058	Free Surface	0.125	No	6	No
1629	452706	452705	6	156.2	16.2	0.013	0.002	Free Surface	0.032	No	6	No
163	431623	431631	6	98.1	49.5	0.013	0.066	Free Surface	0.196	No	6	No
1630	452728	452525	6	189.5	7.7	0.013	0.017	Free Surface	0.095	No	6	No
1632	452704	452703	6	68.4	0.7	0.013	0.005	Free Surface	0.075	No	6	No
1633	443016	443015	6	315.1	7.6	0.013	0.010	Free Surface	0.112	No	6	No
1634	442438	442437	8	106.6	0.9	0.013	0.019	Free Surface	0.104	No	8	No
1635	442327	442328	6	173.4	0.6	0.013	0.062	Free Surface	0.309	No	6	No
1636	452524	452523	6	299.9	3.6	0.013	0.002	Free Surface	0.045	No	6	No
1637	442306	442305	6	248.2	1.9	0.013	0.025	Free Surface	0.183	No	6	No
1639	443017	443016	6	179.1	14.6	0.013	0.003	Free Surface	0.053	No	6	No
164	431622	431623	6	62.6	8.5	0.013	0.009	Free Surface	0.064	No	6	No
1640	442808	442807	6	321.0	5.6	0.013	0.128	Free Surface	0.262	No	6	No
1641	442437	442436	8	150.6	2.5	0.013	0.022	Free Surface	0.093	No	8	No
1642	442308	442306	6	145.3	5.0	0.013	0.015	Free Surface	0.123	No	6	No
1643	490102	490101	6	82.9	1.6	0.013	0.007	Free Surface	0.109	No	6	No
1644	454303	454302	8	326.2	7.4	0.013	0.088	Free Surface	0.144	No	8	No
1645	442509	442510	6	267.4	0.7	0.013	0.004	Free Surface	0.094	No	6	No
1646	452707LH	452706	6	53.3	3.0	0.013	0.002	Free Surface	0.032	No	6	No
1647	442807	442806	6	297.7	6.0	0.013	0.134	Free Surface	0.262	No	6	No
1648	442329	442330	6	163.3	0.9	0.013	0.076	Free Surface	0.330	No	6	No
1649	452702LH	452701	6	62.3	18.1	0.013	0.003	Free Surface	0.045	No	6	No
1650	452703	452701	6	186.3	8.7	0.013	0.007	Free Surface	0.057	No	6	No
1651	452531	452419	6	97.3	9.9	0.013	0.003	Free Surface	0.035	No	6	No
1652	443007	443006	6	103.2	1.2	0.013	0.007	Free Surface	0.083	No	6	No
1653	443018LH	443017	6	114.6	2.0	0.013	0.003	Free Surface	0.049	No	6	No
1654	443008	443007	6	34.3	4.9	0.013	0.007	Free Surface	0.082	No	6	No
1655	442307	442306	6	136.9	0.8	0.013	0.011	Free Surface	0.139	No	6	No
1656	442410	442327	6	237.9	0.2	0.013	0.060	Free Surface	0.400	No	6	No
1657	442409	442410	6	85.8	1.4	0.013	0.059	Free Surface	0.361	No	6	No
1658	442433	442432	6	188.9	8.4	0.013	0.050	Free Surface	0.165	No	6	No
1659	442435	442434	6	146.8	6.1	0.013	0.042	Free Surface	0.139	No	6	No
166	430214	430213	6	64.1	50.8	0.013	0.057	Free Surface	0.105	No	6	No
1660	442434	442433	6	54.3	15.6	0.013	0.048	Free Surface	0.137	No	6	No
1661	442432	442431	6	126.3	3.9	0.013	0.051	Free Surface	0.194	No	6	No
1662	442431	442808	6	198.4	8.3	0.013	0.097	Free Surface	0.233	No	6	No
1663	443009	443008	6	276.4	12.0	0.013	0.004	Free Surface	0.054	No	6	No
1664	442445	442435	6	121.8	28.0	0.013	0.005	Free Surface	0.094	No	6	No
1665	442812	442430	6	137.4	1.9	0.013	0.016	Free Surface	0.127	No	6	No
1666	442905	442906	6	319.7	6.8	0.013	0.045	Free Surface	0.210	No	6	No
1667	442424	442425	6	162.8	14.0	0.013	0.002	Free Surface	0.040	No	6	No
1668	442903	442905	6	297.9	13.2	0.013	0.023	Free Surface	0.091	No	6	No
1669	442901	442902	6	250.6	14.7	0.013	0.007	Free Surface	0.061	No	6	No
167	431627	431628	6	202.2	5.9	0.013	0.007	Free Surface	0.175	No	6	No
1670	442902	442903	6	128.0	15.6	0.013	0.015	Free Surface	0.081	No	6	No
1671	442425	442426	6	221.7	9.0	0.013	0.005	Free Surface	0.063	No	6	No
1672	442906	442907	6	254.0	1.6	0.013	0.067	Free Surface	0.243	No	6	No
1673	442455	442425	6	68.9	57.4	0.013	0.003	Free Surface	0.038	No	6	No
1674	442426	442427	6	370.8	8.7	0.013	0.012	Free Surface	0.092	No	6	No
1675	442427	442428	6	180.1	5.1	0.013	0.021	Free Surface	0.121	No	6	No
1676	440309	440308	6	292.0	10.5	0.013	0.003	Free Surface	0.045	No	6	No
1677	442915	442905	6	229.6	1.0	0.013	0.017	Free Surface	0.149	No	6	No
1678	442405	442406	8	293.1	4.0	0.013	0.029	Free Surface	0.111	No	8	No
1679	442451	442427	6	267.7	20.9	0.013	0.005	Free Surface	0.074	No	6	No
168	430203	430204	6	137.6	14.0	0.013	0.461	Free Surface	0.408	No	6	No
1680	440310	440311	6	109.8	10.2	0.013	0.001	Free Surface	0.040	No	6	No
1681	442914	442915	6	172.6	1.1	0.013	0.015	Free Surface	0.142	No	6	No
1682	443304	443305	12	317.1	1.0	0.013	1.079	Free Surface	0.486	No	12	No
1683	440314	440315	6	151.9	11.2	0.013	0.005	Free Surface	0.055	No	6	No
1684	440311	440322	6	317.3	8.2	0.013	0.006	Free Surface	0.075	No	6	No
1685	440313	440314	6	63.3	0.4	0.013	0.001	Free Surface	0.045	No	6	No
1686	440709	440710	6	92.7	5.7	0.013	0.005	Free Surface	0.068	No	6	No
1687	442107	442108	6	87.9	25.6	0.013	0.025	Free Surface	0.082	No	6	No
1688	443421	443420	6	71.5	6.8	0.013	0.008	Free Surface	0.088	No	6	No
1689	443420	441803	6	174.1	20.8	0.013	0.041	Free Surface	0.109	No	6	No
169	431626LH	431625	6	80.9	0.5	0.013	0.043	Free Surface	0.264	No	6	No
1690	443411	443410	6	316.5	6.7	0.013	0.007	Free Surface	0.075	No	6	No
1691	441804	441803	6	35.3	1.8	0.013	0.281	Free Surface	0.566	No	6	No
1692	442912LH	442911	6	199.2	5.6	0.013	0.006	Free Surface	0.052	No	6	No
1693	443302	443303	10	170.4	11.8	0.013	1.064	Free Surface	0.496	No	10	No
1694	440312	440311	6	257.3	8.6	0.013	0.002	Free Surface	0.041	No	6	No
1695	440322	440323	6	237.4	3.3	0.013	0.012	Free Surface	0.094	No	6	No
1696	442911	442910	6	67.9	31.2	0.013	0.008	Free Surface	0.055	No	6	No
1697	442910	442913	6	132.1	8.0	0.013	0.009	Free Surface	0.074	No	6	No
1698	440205	440204	6	199.5	0.5	0.013	0.003	Free Surface	0.081	No	6	No
1699	443301	443302	10	86.2	12.5	0.013	1.007	Free Surface	0.305	No	10	No
17	433412	433413	8	193.2	7.6	0.013	0.966	Free Surface	0.515	No	8	No
170	432003	432004	6	132.5	6.7	0.013	0.106	Free Surface	0.194	No	6	No
1700	440905	440904	6	166.4	2.5	0.013	0.005	Free Surface	0.092	No	6	No
1701	442401	442402	6	174.8	11.5	0.013	0.002	Free Surface	0.046	No	6	No
1702	440907	440908	6	189.0	6.0	0.013	0.019	Free Surface	0.093	No	6	No
1703	440206	440207	6	147.6	7.5	0.013	0.002	Free Surface	0.143	No	6	No
1704	440323	440324	6	203.3	6.0	0.013	0.015	Free Surface	0.111	No	6	No

G1. Model Results for Existing PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
1705	440411	440410	6	126.8	3.9	0.013	0.004	Free Surface	0.095	No	6	No
1706	443502	443501	6	206.0	0.2	0.013	0.059	Free Surface	0.342	No	6	No
1707	443513	443309	6	142.3	5.3	0.013	0.010	Free Surface	0.078	No	6	No
1708	443321	443321LH	8	243.7	5.0	0.013	0.113	Free Surface	0.181	No	8	No
1709	443512	443513	6	123.7	13.8	0.013	0.004	Free Surface	0.060	No	6	No
171	440303	440302	6	141.5	4.9	0.013	0.036	Free Surface	0.141	No	6	No
1710	443603	443602	8	99.7	8.6	0.013	0.051	Free Surface	0.101	No	8	No
1711	443509	443504	6	113.3	2.6	0.013	0.013	Free Surface	0.115	No	6	No
1712	443504	443503	6	117.3	10.3	0.013	0.040	Free Surface	0.191	No	6	No
1713	443505	443504	6	115.7	7.1	0.013	0.024	Free Surface	0.117	No	6	No
1714	443506	443505	6	57.4	12.3	0.013	0.022	Free Surface	0.100	No	6	No
1715	443507	443506	6	182.1	10.9	0.013	0.009	Free Surface	0.077	No	6	No
1716	443322LH	443312	8	299.9	4.1	0.013	0.125	Free Surface	0.261	No	8	No
1717	443312	443311	8	156.6	11.0	0.013	0.613	Free Surface	0.330	No	8	No
1718	443510	443509	6	163.7	12.9	0.013	0.013	Free Surface	0.088	No	6	No
1719	443511	443510	6	207.4	4.1	0.013	0.006	Free Surface	0.067	No	6	No
172	432923A	432916	6	158.0	0.7	0.013	0.052	Free Surface	0.230	No	6	No
1720	443410	443409	6	134.6	4.4	0.013	0.012	Free Surface	0.087	No	6	No
1721	443418	443419	6	198.3	2.5	0.013	0.019	Free Surface	0.117	No	6	No
1722	443422	443421	6	174.1	14.9	0.013	0.005	Free Surface	0.055	No	6	No
1723	441805	441804	6	142.6	1.3	0.013	0.080	Free Surface	0.420	No	6	No
1724	441838	441805	6	157.4	1.3	0.013	0.025	Free Surface	0.231	No	6	No
1726	441312	441310	6	154.7	3.2	0.013	0.004	Free Surface	0.089	No	6	No
1727	442114	442113	6	89.9	19.7	0.013	0.004	Free Surface	0.063	No	6	No
1728	441306	441308	6	315.9	5.8	0.013	0.059	Free Surface	0.194	No	6	No
1729	442202	442203	16	259.7	0.8	0.013	1.558	Free Surface	0.376	No	16	No
1731	441313LH	441310	6	163.8	1.0	0.013	0.005	Free Surface	0.102	No	6	No
1732	441106LH	441107	6	127.4	4.1	0.013	0.004	Free Surface	0.051	No	6	No
1733	441924	441912	6	43.5	20.0	0.013	0.025	Free Surface	0.100	No	6	No
1734	443508	443506	6	130.0	12.2	0.013	0.010	Free Surface	0.078	No	6	No
1735	443604	443603	8	273.7	17.3	0.013	0.044	Free Surface	0.093	No	8	No
1736	443316	443315	6	127.5	1.5	0.013	0.050	Free Surface	0.190	No	6	No
1737	443605	443604	8	89.3	23.3	0.013	0.004	Free Surface	0.053	No	8	No
1738	443315	443313	6	123.9	20.2	0.013	0.054	Free Surface	0.124	No	6	No
1739	443313	443312	6	279.5	27.4	0.013	0.060	Free Surface	0.282	No	6	No
174	432007	432005	6	155.1	15.1	0.013	0.152	Free Surface	0.267	No	6	No
1740	443405	443404	6	110.5	10.5	0.013	0.010	Free Surface	0.087	No	6	No
1741	442115	442116	6	143.5	1.8	0.013	0.001	Free Surface	0.043	No	6	No
1742	443407	443406	6	72.1	1.0	0.013	0.003	Free Surface	0.081	No	6	No
1743	443406	443404	6	110.3	17.8	0.013	0.030	Free Surface	0.103	No	6	No
1745	443414	443415	6	219.4	10.2	0.013	0.007	Free Surface	0.064	No	6	No
1747	443408	443406	6	52.8	16.0	0.013	0.024	Free Surface	0.093	No	6	No
1748	441821	441820	6	67.0	1.5	0.013	0.011	Free Surface	0.109	No	6	No
1749	441822	441821	6	32.5	3.1	0.013	0.007	Free Surface	0.090	No	6	No
175	432004	432005	6	75.0	67.1	0.013	0.112	Free Surface	0.222	No	6	No
1750	441834	441837	6	123.3	0.8	0.013	0.024	Free Surface	0.222	No	6	No
1751	443426	443408	6	62.3	26.8	0.013	0.022	Free Surface	0.083	No	6	No
1752	441828	441827	6	133.5	1.3	0.013	0.014	Free Surface	0.127	No	6	No
1753	441835	441834	6	141.0	2.6	0.013	0.012	Free Surface	0.142	No	6	No
1754	440710	440711	6	105.2	3.6	0.013	0.009	Free Surface	0.105	No	6	No
1755	441819	441820	6	344.3	11.4	0.013	0.008	Free Surface	0.083	No	6	No
1756	442112	442111	6	129.3	17.3	0.013	0.014	Free Surface	0.070	No	6	No
1757	443417	443418	6	189.6	10.5	0.013	0.010	Free Surface	0.097	No	6	No
1758	442105	442106	6	247.7	9.0	0.013	0.037	Free Surface	0.123	No	6	No
1759	443413	443414	6	331.2	7.9	0.013	0.006	Free Surface	0.056	No	6	No
176	432005	432006	6	112.1	11.9	0.013	0.265	Free Surface	0.344	No	6	No
1760	441826	441824	6	225.9	10.7	0.013	0.003	Free Surface	0.056	No	6	No
1761	440711	440712	6	177.0	0.7	0.013	0.010	Free Surface	0.114	No	6	No
1762	442113	442112	6	176.1	3.4	0.013	0.010	Free Surface	0.078	No	6	No
1763	442109	442107	6	99.4	5.2	0.013	0.024	Free Surface	0.104	No	6	No
1764	443419	443420	6	168.9	9.8	0.013	0.026	Free Surface	0.107	No	6	No
1765	443427	443411	6	50.2	2.0	0.013	0.002	Free Surface	0.051	No	6	No
1768	443423	443424	6	264.3	4.8	0.013	0.007	Free Surface	0.090	No	6	No
1769	441806	441805	6	182.5	0.6	0.013	0.056	Free Surface	0.304	No	6	No
177	432816	432815	6	64.8	3.4	0.013	0.009	Free Surface	0.115	No	6	No
1770	443424	440728	6	115.6	1.5	0.013	0.013	Free Surface	0.197	No	6	No
1771	441307	441306	6	22.0	17.7	0.013	0.057	Free Surface	0.154	No	6	No
1772	441931	441932	6	127.4	16.8	0.013	0.005	Free Surface	0.048	No	6	No
1773	440728	440729	6	133.2	6.2	0.013	0.153	Free Surface	0.360	No	6	No
1774	443808	443807	6	277.9	8.2	0.013	0.005	Free Surface	0.054	No	6	No
1775	403116	403115	6	245.7	0.4	0.013	0.008	Free Surface	0.120	No	6	No
1776	442206	442206A	6	162.2	1.5	0.013	0.012	Free Surface	0.117	No	6	No
1778	441913	441912	6	112.1	8.2	0.013	0.011	Free Surface	0.093	No	6	No
1779	441132LH	441131	6	113.8	9.8	0.013	0.007	Free Surface	0.069	No	6	No
178	431703	431702	6	199.5	2.1	0.013	0.628	Exceeds Capacity	1.000	No	6	Yes
1780	443806	443805	6	130.5	13.2	0.013	0.017	Free Surface	0.092	No	6	No
1781	441916	441913	6	43.4	7.7	0.013	0.004	Free Surface	0.057	No	6	No
1782	441107	441108	6	143.1	10.6	0.013	0.006	Free Surface	0.119	No	6	No
1783	441108	441109	6	146.6	1.7	0.013	0.035	Free Surface	0.177	No	6	No
1784	441917LH	441916	6	86.5	7.4	0.013	0.003	Free Surface	0.041	No	6	No
1786	441907	441906	6	276.2	1.8	0.013	0.056	Free Surface	0.209	No	6	No
1787	441111	441108	6	80.6	4.4	0.013	0.028	Free Surface	0.158	No	6	No
1788	443801	443802	6	110.9	16.0	0.013	0.001	Free Surface	0.031	No	6	No
179	440202	440304	6	174.0	4.2	0.013	0.032	Free Surface	0.133	No	6	No
1790	443805	443804	6	169.2	6.8	0.013	0.022	Free Surface	0.120	No	6	No
1791	441205	441105	6	269.1	4.3	0.013	0.013	Free Surface	0.268	No	6	No
1792	441204	441205	6	125.2	9.6	0.013	0.008	Free Surface	0.076	No	6	No
1793	441130	441128	6	187.9	14.1	0.013	0.031	Free Surface	0.116	No	6	No
1794	441129LH	441128	6	189.2	7.5	0.013	0.008	Free Surface	0.096	No	6	No
1795	441918LH	441919	6	85.3	1.7	0.013	0.002	Free Surface	0.052	No	6	No
1796	443802	443803	6	77.1	20.9	0.013	0.004	Free Surface	0.046	No	6	No
1797	441919	441920	6	51.9	3.8	0.013	0.004	Free Surface	0.048	No	6	No
1798	441920	441921	8	98.7	36.5	0.013	0.007	Free Surface	0.028	No	8	No
1799	441921	441910	6	168.8	4.1	0.013	0.007	Free Surface	0.120	No	6	No
18	431520	431509	8	251.4	3.5	0.013	0.624	Free Surface	0.729	No	8	Yes
180	431720	431703	6	137.0	2.7	0.013	0.209	Backwater	1.000	No	6	Yes
1800	441128	441127	6	114.0	12.1	0.013	0.045	Free Surface	0.246	No	6	No
1801	441309	441127	6	199.5	2.2	0.013	0.062	Free Surface	0.296	No	6	No
1802	443804	443820	6	123.1	4.6	0.013	0.031	Free Surface	0.282	No	6	No
1803	443803	443820	6	138.0	20.5	0.013	0.009	Free Surface	0.271	No	6	No
1804	441127	441126	6	140.5	1.1	0.013	0.108	Free Surface	0.415	No	6	No
1805	402402	402403	6	217.6	0.5	0.013	0.011	Free Surface	0.241	No	6	No
1806	441136LH	441126A	6	96.4	35.1	0.013	0.004	Free Surface	0.244	No	6	No
1807	441134	441133	6	137.2	1.2	0.013	0.003	Free Surface	0.070	No	6	No
1808	441103	441119	6	111.6	6.6	0.013	0.018	Free Surface	0.121	No	6	No
1809	441114	441119	6	243.2	35.4	0.013	0.041	Free Surface	0.121	No	6	No
181	440316	440202	6	130.6	10.2	0.013	0.012	Free Surface	0.108	No	6	No
1810	441102	441101	6	35.5	36.4	0.013	0.023	Free Surface	0.088	No	6	No
1812	441115LH	441114	6	182.2	0.3	0.013	0.017	Free Surface	0.155	No	6	No
1813	441923	442001	6	194.6	29.9	0.013	0.008	Free Surface	0.049	No	6	No
1814	403121	403201	6	332.6	0.3	0.013	0.005	Free Surface	0.124	No	6	No
1815	441120LH	441119	6	126.8	4.0	0.013	0.010	Free Surface	0.113	No	6	No
1816	443812LH	443813	8	90.9	0.1	0.013	0.006	Free Surface	0.103	No	8	No
1817	443813	441606	6	168.5	13.6	0.013	0.006	Free Surface	0.101	No	6	No
1818	441606	441605	8	136.8	9.6	0.013	0.067	Free Surface	0.132	No	8	No
1819	441116	441115LH	6	81.6	1.8	0.013	0.015	Free Surface	0.166	No	6	No
182	433109	431713	6	208.1	9.0	0.013	0.068	Free Surface	0.183	No	6	No
1822	441126	441126A	6	106.3	0.5	0.013	0.109	Free Surface	0.461	No	6	No
1823	441117	441116	6	245.8	0.6	0.013	0.012	Free Surface	0.134	No	6	No
1824	441118LH	441117	6	155.0	0.3	0.013	0.004	Free Surface	0.125	No	6	No
1825	441017	441016	6	82.5	12.8	0.013	0.006	Free Surface	0.047	No	6	No
1826	441101	441016	6	198.7	11.5	0.013	0.028	Free Surface	0.104	No	6	No
1827	441016	441018	6	69.3	11.2	0.013	0.153	Free Surface	0.241	No	6	No
1828	441135LH	SSTA_9953	6	99.1	25.3	0.013	0.006	Free Surface	0.253	No	6	No
1829	441018	441019	6	60.6	11.1	0.013	0.155	Free Surface	0.292	No	6	No
183	431702	431701	6	131.0	3.4	0.013	0.632	Backwater	1.000	No	6	Yes
1830	441119	441019	6	255.1	18.3	0.013	0.071	Free Surface	0.244	No	6	No
1831	441605	441604	8	265.7	13.1	0.013	0.137	Free Surface	0.161	No	8	No
1832	441138	441138	6	170.8	4.3	0.013	0.004	Free Surface	0.055	No	6	No
1834	442002	442003	6	45.2	29.0	0.013	0.016	Free Surface	0.118	No	6	No
1835	441125	SSTA_9953	6	93.8	1.1	0.013	0.115	Free Surface	0.422	No	6	No
1836	441122	441121	6	222.5	9.0	0.013	0.128	Free Surface	0.242	No	6	No
1838	441021	441401	6	121.4	6.3	0.013	0.140	Free Surface	0.322	No	6	No
1839	442003	442004	6	191.3	4.2	0.013	0.048	Free Surface	0.309	No	6	No
184	431714	431716	6	148.2	7.4	0.013	0.049	Free Surface	0.177	No	6	No
1840	442005	442004	6	364.2	0.8	0.013	0.098	Free Surface	0.412	No	6	No
1841	441604	441603	8	312.6	14.1	0.013	0.190	Free Surface	0.174	No	8	No
1842	441603	441603A	8	98.6	13.2	0.013	0.190	Free Surface	0.175	No	8	No
1843	441401	441022	6	114.7	11.2	0.013	0.372	Free Surface	0.391	No	6	No
1844	441415	441414	6	154.1	7.4	0.013	0.010	Free Surface	0.076	No	6	No
1845	402802	402803	6	131.9	1.1	0.013	0.003	Free Surface	0.077	No	6	No
1846	403005	403004	8	118.6	0.3	0.013	0.027	Free Surface	0.157	No	8	No
1848	441024	441023	6	159.7	14.0	0.013	0.046	Free Surface	0.129	No	6	No
1849	402608	402606	6	56.4	3.5	0.013	0.002	Free Surface	0.041	No	6	No
1850	402804	402803	6	110.0	2.0	0.013	0.002	Free Surface	0.068	No	6	No
1851	441023	441404	6	123.5	16.6	0.013	0.055	Free Surface	0.313	No	6	No
1852	441403	441404	6	195.6	9.1	0.013	0.388	Free Surface	0.453	No	6	No
1853	441711	441710	6	111.2	15.9	0.013	0.017	Free Surface	0.298	No	6	No
1854	441712	441710	8	155.5	3.4	0.013	0.392	Free Surface	0.373	No	8	No
1855	441707	441706	6	173.1	15.5	0.013	0.012	Free Surface	0.116	No	6	No
1856	441706	441705	6	35.4	0.5	0.013	0.015	Free Surface	0.149	No	6	No
1857	441704	441705	6	267.3	15.4	0.013	0.027	Free Surface	0.114	No	6	No
1858	441419	441409	6	143.2	17.4	0.013	0.024	Free Surface	0.186	No	6	No
1859	402606	402605	8	105.9	4.7	0.013	0.004	Free Surface	0.054	No	8	No
186	433110	433109	6	200.0	10.1	0.013	0.050	Free Surface	0.155	No	6	No
1860	441705	441509	6	121.0	10.7	0.013	0.045	Free Surface	0.134	No	6	No
1861	441710	441713	8	114.0	2.7	0.013	0.410	Free Surface	0.384	No	8	No
1862	441510	441508	6	230.7	6.2	0.013	0.022	Free Surface	0.130	No	6	No
1863	441509	441508	6	33.5	10.0	0.013	0.046	Free Surface	0.143	No	6	No
1864	402805	402806	6	345.5	0.5	0.013	0.006	Free Surface	0.135	No	6	No
1865	441404	441405	6	137.2	3.2	0.013	0.267	Free Surface	0.401	No	6	No
1868	402605	402604A	8	132.0	1.0	0.013	0.009	Free Surface	0.110	No	8	No
187	451828B	451826A	6	134.4	5.6	0.013	0.005	Free Surface	0.084	No	6	No
1870	441405	441406	8	371.0	8.6	0.013	0.267	Free Surface	0.267	No	8	No
1873	441507	441506	6	48.4	2.9	0.013	0.081	Free Surface	0.522	No	6	No
1875	441508	441507	6	326.5	14.5	0.013	0.068	Free Surface	0.197	No	6	No
1876	441713	441506	12	321.5	1.7	0.013	0.410	Free Surface	0.331	No	12	No
1877	450819LH	450820	6	71.1	11.3	0.013	0.002	Free Surface	0.037	No	6	No
1878	451115	450822	6	264.1	11.4	0.013	0.007	Free Surface	0.072	No	6	No
1879	450817	450813	6	318.6	19.3	0.013	0.013	Free Surface	0.084	No	6	No
188	442918	442906	6	123.5	4.5	0.013	0.016	Free Surface	0.185	No	6	No
1880	450916	450915	6	135.6	0.7	0.013	0.006	Free Surface	0.084	No	6	No
1881	451207LH	451206	6	91.1	1.0	0.013	0.002	Free Surface	0.063	No	6	No
1882	451202	451201	6	105.3	8.1	0.013	0.121	Free Surface	0.231	No	6	No
1883	451015	451014	6	314.0	12.3	0.013	0.145	Free Surface	0.228	No	6	No
1884	452001	452002	6	109.9	6.9	0.013	0.027	Free Surface	0.115	No	6	No
1885	402901	402704	15	268.4	0.3	0.013	0.320	Free Surface	0.242	No	8	No
1886	402714	402713	6	206.0	1.7	0.013	0.011	Free Surface	0.107	No	6	No
1887	452801	452020	6	29.0	33.0	0.013	0.005	Free Surface	0.173	No	6	No
1888	452803	452020	6	253.9	6.6	0.013	0.013	Free Surface	0.082	No	6	No
1889	452709	452708	6	193.1	8.3	0.013	0.001	Free Surface	0.028	No	6	No

G1. Model Results for Existing PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
1892	442908LH	442907	6	178.2	4.1	0.013	0.004	Free Surface	0.135	No	6	No
1893	443221	443221B	8	96.6	2.8	0.013	0.005	Free Surface	0.072	No	8	No
1894	443309	443308	8	90.8	9.3	0.013	0.636	Free Surface	0.598	No	8	No
1895	443501	443308	6	61.8	6.5	0.013	0.060	Free Surface	0.173	No	6	No
1896	450815	450814	8	242.0	39.4	0.013	0.009	Free Surface	0.051	No	8	No
1897	451221	451220	6	66.9	3.6	0.013	0.011	Free Surface	0.132	No	6	No
1898	450814	450813	6	181.7	8.6	0.013	0.016	Free Surface	0.094	No	6	No
1899	451112	451111	6	252.0	5.6	0.013	0.008	Free Surface	0.073	No	6	No
19	433802	433802	6	168.2	6.1	0.013	0.001	Free Surface	0.041	No	6	No
190	442919	442918	6	51.4	2.2	0.013	0.001	Free Surface	0.067	No	6	No
1900	450823	450806	6	168.5	10.5	0.013	0.015	Free Surface	0.106	No	6	No
1901	451308	451221	6	277.1	13.9	0.013	0.005	Free Surface	0.068	No	6	No
1902	451114LH	451112	6	171.4	0.6	0.013	0.002	Free Surface	0.063	No	6	No
1903	451113	451112	6	217.6	0.9	0.013	0.003	Free Surface	0.067	No	6	No
1904	451215	451214	6	200.9	9.8	0.013	0.076	Free Surface	0.171	No	6	No
1905	451216	451209	6	348.6	1.6	0.013	0.005	Free Surface	0.073	No	6	No
1906	451216	451215	6	67.0	8.8	0.013	0.074	Free Surface	0.177	No	6	No
1907	450912	450911	6	295.7	1.9	0.013	0.028	Free Surface	0.149	No	6	No
1908	451209	451203	6	78.0	22.0	0.013	0.020	Free Surface	0.105	No	6	No
1909	451208LH	451209	6	166.1	1.1	0.013	0.014	Free Surface	0.109	No	6	No
191	442453LH	442452	6	64.2	14.4	0.013	0.003	Free Surface	0.038	No	6	No
1910	451218	451216	6	156.2	4.7	0.013	0.067	Free Surface	0.190	No	6	No
1911	451220	451218	6	274.8	0.4	0.013	0.015	Free Surface	0.189	No	6	No
1912	450812	450809	6	156.0	2.9	0.013	0.038	Free Surface	0.238	No	6	No
1913	451305	451218	6	222.6	11.9	0.013	0.025	Free Surface	0.150	No	6	No
1914	450913	450912	6	101.5	11.4	0.013	0.020	Free Surface	0.129	No	6	No
1915	451203	451202	6	64.4	3.7	0.013	0.027	Free Surface	0.183	No	6	No
1916	451214	451202	6	188.9	12.8	0.013	0.077	Free Surface	0.199	No	6	No
1917	451206	451205	6	200.7	0.7	0.013	0.004	Free Surface	0.087	No	6	No
1918	451219	451218	6	161.2	5.2	0.013	0.024	Free Surface	0.160	No	6	No
1919	451205	451204	6	82.6	1.0	0.013	0.005	Free Surface	0.072	No	6	No
192	442452	442426	6	150.0	28.4	0.013	0.007	Free Surface	0.059	No	6	No
1920	451204	451203	6	195.6	10.6	0.013	0.005	Free Surface	0.091	No	6	No
1921	450918	450917	6	67.6	0.9	0.013	0.012	Free Surface	0.130	No	6	No
1922	451302	451219	6	119.4	2.3	0.013	0.019	Free Surface	0.122	No	6	No
1923	451303	451302	6	223.7	16.1	0.013	0.012	Free Surface	0.096	No	6	No
1924	451016A	451201	6	119.2	0.8	0.013	0.014	Free Surface	0.186	No	6	No
1925	450919	450918	6	40.4	1.0	0.013	0.009	Free Surface	0.118	No	6	No
1926	450920	450919	6	104.2	1.0	0.013	0.006	Free Surface	0.101	No	6	No
1927	450810	450811	8	192.6	0.2	0.013	0.117	Free Surface	0.375	No	8	No
1928	451018LH	451017	6	60.3	0.8	0.013	0.004	Free Surface	0.087	No	6	No
1929	452423	452422	6	167.1	5.9	0.013	0.002	Free Surface	0.038	No	6	No
193	432921LH	432817	6	91.4	1.2	0.013	0.004	Free Surface	0.062	No	6	No
1930	443108	443216	6	559.2	1.9	0.013	0.076	Free Surface	0.265	No	6	No
1931	452417	452416	6	205.4	8.2	0.013	0.034	Free Surface	0.155	No	6	No
1932	452034	452032	6	81.2	11.9	0.013	0.005	Free Surface	0.057	No	6	No
1933	450902	450907	12	19.4	5.9	0.013	0.000	Free Surface	0.000	No	12	No
1934	452017	452610	6	143.4	14.7	0.013	0.004	Free Surface	0.055	No	6	No
1935	452615	452601	6	224.2	8.8	0.013	0.295	Free Surface	0.386	No	6	No
1936	452605	452601	6	122.8	9.3	0.013	0.032	Free Surface	0.266	No	6	No
1937	443103	443101	6	416.2	3.8	0.013	0.024	Free Surface	0.126	No	6	No
1938	452422	452424	6	152.0	8.4	0.013	0.003	Free Surface	0.075	No	6	No
1939	443216	443203	10	253.4	1.1	0.013	0.209	Free Surface	0.344	No	10	No
194	432801	432901	6	265.7	12.3	0.013	0.023	Free Surface	0.171	No	6	No
1940	443203	443204	15	152.1	0.5	0.013	2.076	Free Surface	0.599	No	15	No
1941	443217	443216	6	107.2	2.2	0.013	0.126	Free Surface	0.334	No	6	No
1942	452420	452421	6	320.4	4.7	0.013	0.010	Free Surface	0.131	No	6	No
1943	452601	452602	6	133.9	6.3	0.013	0.328	Free Surface	0.419	No	6	No
1944	452604	452602	6	332.5	6.1	0.013	0.004	Free Surface	0.235	No	6	No
1945	402902	402901	15	255.1	0.5	0.013	5.301	Free Surface	0.241	No	8	No
1946	402715	402714	6	200.1	1.7	0.013	0.005	Free Surface	0.089	No	6	No
1947	402613	402612	6	192.4	1.8	0.013	0.028	Free Surface	0.170	No	6	No
1948	402718LH	402612	6	100.0	0.9	0.013	0.003	Free Surface	0.121	No	6	No
1949	402611	402611	6	234.1	1.8	0.013	0.033	Free Surface	0.181	No	6	No
195	442403	442404	6	82.1	4.7	0.013	0.010	Free Surface	0.109	No	6	No
1950	402704	402703	15	173.8	0.9	0.013	0.342	Free Surface	0.301	No	8	No
1951	402702	402703	10	136.1	0.4	0.013	0.430	Free Surface	0.583	No	10	Yes
1952	450922	451022	6	240.4	1.5	0.013	0.010	Free Surface	0.127	No	6	No
1953	451022	451021	6	299.9	1.1	0.013	0.019	Free Surface	0.228	No	6	No
1954	451021	451020	6	301.6	0.3	0.013	0.030	Free Surface	0.257	No	6	No
1955	452025	452024	6	77.4	14.3	0.013	0.090	Free Surface	0.185	No	6	No
1956	450923	450908	6	333.4	1.5	0.013	0.005	Free Surface	0.074	No	6	No
1957	450902	443225	12	276.1	1.4	0.013	0.674	Free Surface	0.336	No	12	No
1958	451014	451013	6	267.4	14.5	0.013	0.153	Free Surface	0.222	No	6	No
1959	452033LH	452032	6	147.9	6.9	0.013	0.002	Free Surface	0.051	No	6	No
196	442420	442421	6	245.7	3.8	0.013	0.009	Free Surface	0.073	No	6	No
1960	443225	450903	12	120.1	1.9	0.013	0.675	Free Surface	0.312	No	12	No
1961	452029	452028	6	30.6	104.6	0.013	0.005	Free Surface	0.042	No	6	No
1962	450908	450909	24	457.9	1.7	0.013	4.002	Free Surface	0.313	No	24	No
1963	450903	450904	12	352.7	1.6	0.013	0.678	Free Surface	0.330	No	12	No
1964	452030	452029	6	66.5	1.4	0.013	0.004	Free Surface	0.052	No	6	No
1965	451020	451019	6	298.2	1.7	0.013	0.047	Free Surface	0.257	No	6	No
1966	452028	452027	6	70.4	9.4	0.013	0.007	Free Surface	0.056	No	6	No
1968	451013	451012	8	163.7	13.9	0.013	0.168	Free Surface	0.168	No	8	No
197	442421	442404	6	142.4	24.4	0.013	0.013	Free Surface	0.100	No	6	No
1970	450904	450905	12	346.7	1.7	0.013	0.691	Free Surface	0.355	No	12	No
1971	450910	450905	15	16.8	0.6	0.013	0.500	Free Surface	0.353	No	15	No
1972	452802LH	452801	6	250.7	14.3	0.013	0.003	Free Surface	0.034	No	6	No
1973	452701	452611	6	49.6	23.4	0.013	0.011	Free Surface	0.062	No	6	No
1974	452527	452418	6	154.8	9.5	0.013	0.021	Free Surface	0.128	No	6	No
1975	451217LH	451216	6	109.3	1.4	0.013	0.005	Free Surface	0.124	No	6	No
1976	450914	450913	6	159.9	12.7	0.013	0.016	Free Surface	0.084	No	6	No
1977	450915	450914	6	165.1	5.1	0.013	0.008	Free Surface	0.074	No	6	No
1978	451201	451015	6	202.5	11.0	0.013	0.139	Free Surface	0.229	No	6	No
1979	451017	451016	6	213.9	0.7	0.013	0.006	Free Surface	0.114	No	6	No
198	443303	443304	10	159.1	1.0	0.013	1.075	Free Surface	0.627	No	10	No
1980	451016	451016A	6	238.2	0.6	0.013	0.011	Free Surface	0.136	No	6	No
1981	441830	441829	6	194.8	0.9	0.013	0.005	Free Surface	0.076	No	6	No
1982	442117	442110	6	100.0	5.2	0.013	0.000	Free Surface	0.040	No	6	No
1983	442110	442109	6	174.2	15.2	0.013	0.018	Free Surface	0.102	No	6	No
1984	441803	441802	6	280.4	1.9	0.013	0.322	Free Surface	0.588	No	6	No
1985	442209	442208	6	200.5	14.7	0.013	0.003	Free Surface	0.034	No	6	No
1986	451608	451606	6	110.0	0.8	0.013	0.035	Free Surface	0.223	No	6	No
1988	441816LH	441817	6	114.9	4.4	0.013	0.007	Free Surface	0.061	No	6	No
1989	403104	403304	6	238.5	0.6	0.013	0.003	Free Surface	0.073	No	6	No
199	432804	432805	6	256.5	0.2	0.013	0.003	Free Surface	0.110	No	6	No
1990	451613LH	451611	6	389.5	10.1	0.013	0.000	Free Surface	0.058	No	6	No
1991	443416	443417	6	231.5	5.5	0.013	0.004	Free Surface	0.058	No	6	No
1992	403326	403301	6	375.5	0.8	0.013	0.007	Free Surface	0.117	No	6	No
1993	451603	451602	16	249.4	0.9	0.013	1.518	Free Surface	0.386	No	16	No
1994	451605	451605A	6	56.3	1.5	0.013	0.183	Free Surface	0.447	No	6	No
1995	403102	403102A	6	43.0	0.5	0.013	0.007	Free Surface	0.114	No	6	No
1996	403305	403306	18	11.2	2.2	0.013	3.888	Free Surface	0.764	No	18	No
1997	403332	403306	18	14.0	0.3	0.013	1.791	Free Surface	0.489	No	18	No
1998	442222	442220	6	79.4	12.6	0.013	0.011	Free Surface	0.077	No	6	No
1999	442216	442215	6	136.2	8.0	0.013	0.002	Free Surface	0.034	No	6	No
2	455010	455009	6	70.7	1.0	0.013	0.050	Free Surface	0.252	No	6	No
20	431502	431506	6	282.4	1.6	0.013	0.626	Exceeds Capacity	1.000	No	6	Yes
200	442422	442421	6	59.7	4.9	0.013	0.001	Free Surface	0.042	No	6	No
2000	442207	442204	6	187.4	8.9	0.013	0.155	Free Surface	0.347	No	6	No
2001	451604	451603	16	300.9	2.2	0.013	1.548	Free Surface	0.329	No	16	No
2002	403101	403102	6	301.4	0.8	0.013	0.007	Free Surface	0.097	No	6	No
2003	441815	441929	6	66.1	13.5	0.013	0.001	Free Surface	0.035	No	6	No
2004	442213	442212	6	146.4	5.8	0.013	0.002	Free Surface	0.041	No	6	No
2005	440735	440727	6	222.7	9.8	0.013	0.072	Free Surface	0.212	No	6	No
2006	441303	441304	8	258.1	3.5	0.013	0.192	Free Surface	0.236	No	8	No
2007	450415	450416	10	231.1	0.6	0.013	0.186	Free Surface	0.230	No	10	No
2008	452112	452111	6	29.2	16.0	0.013	0.012	Free Surface	0.064	No	6	No
2009	452722	452723	8	223.0	4.8	0.013	0.006	Free Surface	0.045	No	8	No
201	432805	432806	6	266.9	2.3	0.013	0.018	Free Surface	0.144	No	6	No
2010	452806	452717	6	209.7	7.4	0.013	0.003	Free Surface	0.051	No	6	No
2011	452734	452733	6	207.1	2.8	0.013	0.005	Free Surface	0.063	No	6	No
2012	452515	452514	6	93.9	5.5	0.013	0.000	Free Surface	0.021	No	6	No
2013	452512	452511	6	62.4	16.0	0.013	0.005	Free Surface	0.072	No	6	No
2014	452725	452724	6	79.9	27.3	0.013	0.004	Free Surface	0.098	No	6	No
2015	452002	452003	6	178.8	8.0	0.013	0.029	Free Surface	0.125	No	6	No
2016	452032	452031	6	79.9	6.9	0.013	0.009	Free Surface	0.067	No	6	No
2017	452108	452025	6	154.6	17.2	0.013	0.088	Free Surface	0.169	No	6	No
2018	452511	452511A	6	98.9	10.4	0.013	0.025	Free Surface	0.099	No	6	No
202	443329	443303	6	61.4	12.9	0.013	0.008	Free Surface	0.529	No	6	No
2022	452503	452424	6	231.2	2.8	0.013	0.006	Free Surface	0.092	No	6	No
2023	452733	452732	6	111.8	10.3	0.013	0.008	Free Surface	0.061	No	6	No
2024	452003	452004	6	55.3	6.5	0.013	0.035	Free Surface	0.128	No	6	No
2025	452510	452509	6	15.5	6.4	0.013	0.025	Free Surface	0.288	No	6	No
2026	452732	452731	6	54.8	7.1	0.013	0.008	Free Surface	0.072	No	6	No
2027	452530	452511	6	209.4	5.2	0.013	0.018	Free Surface	0.104	No	6	No
2028	450907	450908	21	269.4	1.4	0.013	3.985	Free Surface	0.394	No	21	No
2029	452737	452519	6	195.0	5.1	0.013	0.009	Free Surface	0.076	No	6	No
203	443330	443329	6	100.1	2.0	0.013	0.007	Free Surface	0.072	No	6	No
2030	452006	452007	6	38.4	30.1	0.013	0.045	Free Surface	0.125	No	6	No
204	440919	440920	8	154.0	10.1	0.013	0.026	Free Surface	0.080	No	8	No
2041	452035	452034	6	54.0	27.9	0.013	0.002	Free Surface	0.036	No	6	No
2042	452634	452017	6	398.0	2.2	0.013	0.002	Free Surface	0.043	No	6	No
2043	443101	443218	6	447.1	0.6	0.013	0.111	Free Surface	0.429	No	6	No
2044	402710	402711	6	288.5	0.7	0.013	0.084	Free Surface	0.378	No	6	No
2045	450909	450910	24	346.8	1.5	0.013	4.015	Free Surface	0.322	No	24	No
2046	452011	452012	6	195.0	7.3	0.013	0.067	Free Surface	0.166	No	6	No
2047	451002	451003	21	318.3	1.0	0.013	3.566	Free Surface	0.386	No	21	No
2048	451011	451010	8	259.5	0.6	0.013	0.244	Free Surface	0.433	No	8	No
2049	451007	451008	18	369.8	1.4	0.013	3.336	Free Surface	0.481	No	18	No
205	440916	440915	6	83.6	3.6	0.013	0.060	Free Surface	0.190	No	6	No
2050	443214	443214A	6	148.0	3.1	0.013	0.061	Free Surface	0.237	No	6	No
2051	452019	452018	6	275.0	2.4	0.013	0.199	Free Surface	0.386	No	6	No
2052	452013	452014	6	143.3	7.4	0.013	0.075	Free Surface	0.171	No	6	No
2053	451003	451004	21	416.0	1.9	0.013	3.559	Free Surface	0.345	No	21	No
2055	452611	452417	6	89.1	10.5	0.013	0.011	Free Surface	0.096	No	6	No
2056	452418	452417	6	101.1	1.5	0.013	0.022	Free Surface	0.142	No	6	No
2057	452608	452606	6	217.6	1.3	0.013	0.003	Free Surface	0.079	No	6	No
2058	452607	452606	6	248.4	6.2	0.013	0.019	Free Surface	0.100	No	6	No
2059	452419	452420	6	52.9	11.1	0.013	0.003	Free Surface	0.056	No	6	No
206	440605	440604	8	165.2	0.9	0.013	0.014	Free Surface	0.096	No	8	No
2060	452528	452420	6	164.9	11.9	0.013	0.002	Free Surface	0.052	No	6	No
2061	452018	452615	6	77.7	10.5	0.013	0.292	Free Surface	0.349	No	6	No
2062	443213	443204	8	355.2	1.1	0.013	0.073	Free Surface	0.200	No	8	No
2063	443204	443205	15	262.8	0.6	0.013	2.153	Free Surface	0.657	No	15	No
2064	452014	452015	6	171.6	23.7	0.013	0.081	Free Surface	0.156	No	6	No
2065	452015	452016	6	214.3	17.5	0.013	0.087	Free Surface	0.159	No	6	No
2066	451010	451009	8	140.1	0.6	0.013	0.248	Free Surface	0.442	No	8	No
2067	451008	451009	21	217.8	0.4	0.013	3.340	Free Surface	0.487	No	21	No
2068	452617	452605	6	144.4	5.1	0.013	0.004	Free Surface	0.084	No	6	No
2069	452606	452605	6	108.5	12.7	0.013	0.026	Free Surface	0.108	No	6	No

G1. Model Results for Existing PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
207	440606	440605	8	185.0	5.7	0.013	0.005	Free Surface	0.067	No	8	No
2070	443218	443217	6	163.8	1.0	0.013	0.122	Free Surface	0.402	No	6	No
2071	452602	452603	6	115.9	6.3	0.013	0.336	Free Surface	0.417	No	6	No
2072	452416	452603	6	306.5	1.7	0.013	0.036	Free Surface	0.298	No	6	No
2073	452610	451822A	6	181.4	3.8	0.013	0.007	Free Surface	0.075	No	6	No
2074	442907	443101	6	250.4	4.4	0.013	0.078	Free Surface	0.216	No	6	No
2075	452415	452603	6	96.2	1.0	0.013	0.002	Free Surface	0.230	No	6	No
2076	452424	452425	6	305.2	2.2	0.013	0.014	Free Surface	0.182	No	6	No
2077	451906	451903	21	180.7	0.4	0.013	3.576	Free Surface	0.509	No	21	No
2078	451907	451904	21	77.5	0.7	0.013	3.742	Free Surface	0.458	No	21	No
2079	452603	452401	8	152.1	5.4	0.013	0.374	Free Surface	0.310	No	8	No
208	440117LH	440117A	6	123.9	0.3	0.013	0.006	Free Surface	0.147	No	6	No
2080	452421	452401	6	295.8	0.3	0.013	0.015	Free Surface	0.301	No	6	No
2082	452427	452426	8	310.1	0.2	0.013	0.005	Free Surface	0.081	No	8	No
2083	451827	451826	6	167.2	4.4	0.013	0.017	Free Surface	0.123	No	6	No
2084	452613	451826	6	368.8	4.7	0.013	0.002	Free Surface	0.088	No	6	No
2085	452414	452401	6	95.7	3.2	0.013	0.001	Free Surface	0.226	No	6	No
2086	451405	451404	6	263.3	0.3	0.013	0.000	Free Surface	0.000	No	6	No
2087	451404	451403	6	113.2	0.6	0.013	0.000	Free Surface	0.000	No	6	No
2088	443201	443202	12	181.3	5.4	0.013	1.830	Free Surface	0.403	No	12	No
2089	451826	451825	6	155.7	3.2	0.013	0.029	Free Surface	0.160	No	6	No
209	440108	440113	6	164.0	25.6	0.013	0.020	Free Surface	0.133	No	6	No
2090	452612	451825	6	421.4	4.0	0.013	0.005	Free Surface	0.118	No	6	No
2091	443222	443221	8	72.2	10.4	0.013	0.003	Free Surface	0.037	No	8	No
2092	452401	452402	8	279.4	5.6	0.013	0.393	Free Surface	0.394	No	8	No
2093	452425	452425A	6	294.8	0.1	0.013	0.019	Free Surface	0.411	No	6	No
2094	443606	451907	8	261.9	7.2	0.013	0.051	Free Surface	0.107	No	8	No
2095	443223	443201	6	201.7	2.6	0.013	0.005	Free Surface	0.269	No	6	No
2096	451704	451705	18	167.8	1.3	0.013	3.811	Free Surface	0.519	No	18	No
2097	443305	443306	12	287.0	1.0	0.013	1.087	Free Surface	0.491	No	12	No
2098	452402	452403	8	119.3	1.4	0.013	0.420	Free Surface	0.475	No	8	No
2099	452426	452403A	10	101.3	0.7	0.013	0.154	Free Surface	0.478	No	10	No
21	454904	454905	6	241.4	12.3	0.013	0.272	Free Surface	0.311	No	6	No
210	440113	440114	6	179.4	0.8	0.013	0.026	Free Surface	0.532	No	6	No
2100	452411	452402	6	129.8	0.8	0.013	0.007	Free Surface	0.365	No	6	No
2101	451004	451005	21	123.5	1.7	0.013	3.577	Free Surface	0.429	No	21	No
2102	443107	443108	6	88.8	1.1	0.013	0.003	Free Surface	0.163	No	6	No
2104	452409	452405	10	121.7	2.9	0.013	0.005	Free Surface	0.122	No	10	No
2105	452404	452405C	12	231.9	0.3	0.013	0.498	Free Surface	0.473	No	12	No
2106	451819A	451817	6	245.0	0.7	0.013	0.011	Free Surface	0.128	No	6	No
2108	451416	451417	6	276.7	8.7	0.013	0.009	Free Surface	0.101	No	6	No
2109	443425	443402	8	109.0	3.9	0.013	0.380	Free Surface	0.348	No	8	No
211	440406	440406	6	217.1	0.6	0.013	0.007	Free Surface	0.097	No	6	No
2110	451821	451821A	6	234.4	0.5	0.013	0.002	Free Surface	0.087	No	6	No
2111	451820	451820A	8	274.9	1.3	0.013	0.024	Free Surface	0.093	No	8	No
2112	451813	403309	21	108.2	0.8	0.013	4.284	Free Surface	0.527	No	21	No
2113	452408	403316	6	277.0	0.3	0.013	0.007	Free Surface	0.133	No	6	No
2114	451508	451507	6	150.9	13.2	0.013	0.006	Free Surface	0.066	No	6	No
2115	442104	442102	6	188.2	1.0	0.013	0.022	Free Surface	0.152	No	6	No
2116	441801	443401	8	223.3	10.7	0.013	0.372	Free Surface	0.298	No	8	No
2117	441837	441801	6	237.0	0.4	0.013	0.032	Free Surface	0.238	No	6	No
2118	403321	403322	6	217.9	0.6	0.013	0.006	Free Surface	0.106	No	6	No
2119	451803D	451602	21	70.7	0.2	0.013	4.138	Free Surface	0.601	No	21	No
212	440634	440633	6	90.2	2.8	0.013	0.056	Free Surface	0.192	No	6	No
2120	451803A	451803B	21	34.4	1.0	0.013	3.914	Free Surface	0.451	No	21	No
2121	441832	441831	6	94.4	0.7	0.013	0.002	Free Surface	0.066	No	6	No
2122	441831	441828	6	169.6	2.2	0.013	0.005	Free Surface	0.099	No	6	No
2123	440712	440713	6	229.7	9.4	0.013	0.022	Free Surface	0.131	No	6	No
2124	451614	451614A	6	284.0	7.5	0.013	0.003	Free Surface	0.051	No	6	No
2126	403304	403305	18	399.6	1.0	0.013	5.518	Free Surface	0.809	No	18	Yes
2127	443306	443307	12	383.3	1.1	0.013	1.094	Free Surface	0.435	No	12	No
2128	443307	443201	12	183.7	7.3	0.013	1.804	Free Surface	0.369	No	12	No
2129	451825	452412	6	285.6	2.7	0.013	0.041	Free Surface	0.225	No	6	No
213	440613A	440602	6	309.8	2.5	0.013	0.023	Free Surface	0.370	No	6	No
2130	452412A	452412	6	180.7	1.6	0.013	0.012	Free Surface	0.192	No	6	No
2131	443333	443334	6	297.3	4.0	0.013	0.006	Free Surface	0.093	No	6	No
2132	443334	443308	6	421.7	1.7	0.013	0.015	Free Surface	0.120	No	6	No
2133	443308	443307	8	135.8	8.9	0.013	0.713	Free Surface	0.466	No	8	No
2134	443607	443606	8	297.6	10.4	0.013	0.051	Free Surface	0.098	No	8	No
2135	452403	452404	12	290.7	0.3	0.013	0.504	Free Surface	0.442	No	12	No
2136	451818	451817	6	83.1	4.3	0.013	0.004	Free Surface	0.088	No	6	No
2137	443327	443328	6	260.6	1.7	0.013	0.001	Free Surface	0.056	No	6	No
2138	452412	452413	6	185.7	0.9	0.013	0.057	Free Surface	0.274	No	6	No
2139	452413	451822	6	17.9	0.9	0.013	0.058	Free Surface	0.274	No	6	No
214	440628	440629	6	204.7	2.3	0.013	0.043	Free Surface	0.190	No	6	No
2141	443328	443310	6	295.0	5.1	0.013	0.009	Free Surface	0.283	No	6	No
2142	443310	443309	8	215.1	7.5	0.013	0.626	Free Surface	0.370	No	8	No
2143	451817	451816	6	127.3	1.6	0.013	0.015	Free Surface	0.227	No	6	No
2144	443311	443310	8	140.3	11.4	0.013	0.616	Free Surface	0.349	No	8	No
2145	451504	451407	6	354.4	7.6	0.013	0.058	Free Surface	0.181	No	6	No
2146	451808	451809	18	275.6	1.0	0.013	3.685	Free Surface	0.532	No	18	No
2147	451506LH	451510	8	165.5	0.4	0.013	0.000	Free Surface	0.029	No	8	No
2149	451819	451819A	6	197.2	1.0	0.013	0.002	Free Surface	0.089	No	6	No
215	440512	440511	6	173.4	13.7	0.013	0.009	Free Surface	0.075	No	6	No
2150	451807	451808	18	295.3	0.6	0.013	3.686	Free Surface	0.612	No	18	No
2153	451802	451829	15	14.2	10.9	0.013	0.000	Free Surface	0.282	No	15	No
2154	451415	451414	6	236.8	13.9	0.013	0.013	Free Surface	0.077	No	6	No
2155	451410	451409	6	284.1	25.1	0.013	0.042	Free Surface	0.118	No	6	No
2156	452405	452405A	12	11.2	1.2	0.013	0.005	Free Surface	0.105	No	12	No
2157	451510	451505	8	220.5	3.9	0.013	0.010	Free Surface	0.058	No	8	No
2159	451503	451504	6	181.1	9.0	0.013	0.056	Free Surface	0.158	No	6	No
2162	442111	442110	6	75.1	19.7	0.013	0.017	Free Surface	0.076	No	6	No
2163	403103	403304	21	63.9	0.6	0.013	5.619	Free Surface	0.605	No	21	No
2164	442210	442209	6	50.6	13.0	0.013	0.001	Free Surface	0.029	No	6	No
2165	451602	451803E	21	217.5	0.3	0.013	5.641	Free Surface	0.728	No	21	No
2166	441829	441828	6	245.6	5.8	0.013	0.007	Free Surface	0.096	No	6	No
2167	442108	442219	6	113.2	19.2	0.013	0.026	Free Surface	0.107	No	6	No
2168	442220	442219	6	178.4	4.4	0.013	0.013	Free Surface	0.107	No	6	No
2169	403301	403302	8	234.3	2.0	0.013	0.023	Free Surface	0.164	No	8	No
217	441209	441207	6	86.6	12.3	0.013	0.007	Free Surface	0.082	No	6	No
2170	403327	403302	6	374.2	1.3	0.013	0.007	Free Surface	0.198	No	6	No
2171	441931LH	441901	6	133.2	7.0	0.013	0.002	Free Surface	0.039	No	6	No
2172	441305	441804	8	99.1	7.0	0.013	0.199	Free Surface	0.309	No	8	No
2173	442215	442214	6	50.5	8.5	0.013	0.003	Free Surface	0.042	No	6	No
2174	403323	403301	6	274.0	1.0	0.013	0.007	Free Surface	0.115	No	6	No
2175	403105	403106	6	212.2	0.8	0.013	0.007	Free Surface	0.109	No	6	No
2176	441304	441305	8	115.3	5.7	0.013	0.197	Free Surface	0.216	No	8	No
2177	442214	442212	6	53.2	8.4	0.013	0.004	Free Surface	0.046	No	6	No
2178	442204	442204A	6	63.3	1.5	0.013	0.176	Free Surface	0.442	No	6	No
2179	442208	442207	6	340.5	14.3	0.013	0.003	Free Surface	0.145	No	6	No
218	LH441208	441207	6	94.1	22.7	0.013	0.009	Free Surface	0.080	No	6	No
2180	403107	403108	6	176.5	1.7	0.013	0.038	Free Surface	0.203	No	6	No
2181	403325	403303	8	273.1	1.3	0.013	0.008	Free Surface	0.066	No	8	No
2182	442205	442205A	6	183.8	1.5	0.013	0.019	Free Surface	0.146	No	6	No
2183	441915	441914	6	101.0	20.3	0.013	0.003	Free Surface	0.038	No	6	No
2184	441110	441307	6	374.1	13.4	0.013	0.053	Free Surface	0.135	No	6	No
2185	443807	443806	6	206.9	14.2	0.013	0.009	Free Surface	0.069	No	6	No
2186	441904	441905A	6	172.0	13.0	0.013	0.017	Free Surface	0.080	No	6	No
2187	441905	441905A	6	34.3	1.4	0.013	0.069	Free Surface	0.249	No	6	No
2189	403120	403109	6	110.4	2.1	0.013	0.004	Free Surface	0.181	No	6	No
219	440557	440516	6	207.9	15.1	0.013	0.005	Free Surface	0.104	No	6	No
2190	403307	403308	21	317.0	1.0	0.013	3.685	Free Surface	0.767	No	21	Yes
2191	441925	441924	6	201.2	13.1	0.013	0.023	Free Surface	0.089	No	6	No
2192	402904	402905	6	299.7	0.3	0.013	0.003	Free Surface	0.093	No	6	No
2193	440732	440733	6	231.6	0.9	0.013	0.006	Free Surface	0.120	No	6	No
2194	451810	451810A	18	56.5	0.3	0.013	5.549	Exceeds Capacity	1.000	No	18	Yes
2195	443317	443316	6	314.3	3.6	0.013	0.043	Free Surface	0.210	No	6	No
2196	451811	451812	18	61.5	3.1	0.013	4.284	Free Surface	0.584	No	18	No
2197	451414	451411	6	175.7	10.4	0.013	0.018	Free Surface	0.098	No	6	No
2198	451411	451410	6	178.8	15.4	0.013	0.036	Free Surface	0.108	No	6	No
2199	443403	443312	8	180.1	6.4	0.013	0.424	Free Surface	0.323	No	8	No
22	454905	454906	6	227.6	14.5	0.013	0.295	Free Surface	0.363	No	6	No
220	440517	440518	6	151.2	6.5	0.013	0.000	Free Surface	0.050	No	6	No
2200	443402	443403	8	279.3	3.5	0.013	0.382	Free Surface	0.336	No	8	No
2201	451812	451813	18	60.2	0.5	0.013	4.284	Free Surface	0.656	No	18	No
2202	451802A	451802	6	170.0	0.5	0.013	0.024	Free Surface	0.199	No	6	No
2203	451509	451411	6	83.2	14.6	0.013	0.011	Free Surface	0.087	No	6	No
2204	451802	451803	18	285.9	1.6	0.013	3.911	Free Surface	0.470	No	18	No
2205	443604A	443604	6	156.9	9.4	0.013	0.040	Free Surface	0.121	No	6	No
2206	451413	451509	6	96.8	7.7	0.013	0.007	Free Surface	0.063	No	6	No
2207	443404	443403	6	154.1	22.4	0.013	0.043	Free Surface	0.263	No	6	No
2208	443401	443425	8	78.0	3.9	0.013	0.379	Free Surface	0.338	No	8	No
2209	440706	443314	6	198.4	4.1	0.013	0.051	Free Surface	0.192	No	6	No
221	440509	440510	6	144.2	25.1	0.013	0.006	Free Surface	0.084	No	6	No
2210	451417	442104	6	165.8	1.9	0.013	0.020	Free Surface	0.157	No	6	No
2211	451502	451503	6	414.4	8.2	0.013	0.049	Free Surface	0.151	No	6	No
2212	403320	403321	6	28.9	1.6	0.013	0.002	Free Surface	0.073	No	6	No
2215	451803	451803A	18	150.5	1.5	0.013	3.914	Free Surface	0.495	No	18	No
2217	442101	442102	6	80.3	5.6	0.013	0.008	Free Surface	0.097	No	6	No
2218	403312	403313	21	265.9	1.0	0.013	4.315	Free Surface	0.458	No	21	No
2219	451803E	403103	21	220.4	0.5	0.013	5.612	Free Surface	0.646	No	21	No
222	440524	440518	6	101.7	12.8	0.013	0.026	Free Surface	0.099	No	6	No
2223	441818	442101	6	84.3	6.9	0.013	0.006	Free Surface	0.062	No	6	No
2224	451501	451502	6	401.0	8.5	0.013	0.042	Free Surface	0.142	No	6	No
2225	443415	441802	6	373.7	5.2	0.013	0.008	Free Surface	0.071	No	6	No
2226	441801	441801	8	150.5	3.9	0.013	0.336	Free Surface	0.297	No	8	No
2228	451611	451609	6	137.1	7.8	0.013	0.022	Free Surface	0.112	No	6	No
223	441214	441006	6	79.7	11.9	0.013	0.012	Free Surface	0.080	No	6	No
2230	442106	451501	6	115.8	12.4	0.013	0.038	Free Surface	0.128	No	6	No
2231	451615LH	451507	6	335.5	11.3	0.013	0.008	Free Surface	0.071	No	6	No
2232	441817	441819	6	152.5	1.8	0.013	0.002	Free Surface	0.053	No	6	No
2233	441817	441818	6	107.6	10.9	0.013	0.006	Free Surface	0.052	No	6	No
2234	451609	451608	6	84.2	9.0	0.013	0.034	Free Surface	0.172	No	6	No
2235	442212	442211	6	124.9	24.8	0.013	0.007	Free Surface	0.160	No	6	No
2236	442211	442207	6	181.9	6.6	0.013	0.150	Free Surface	0.265	No	6	No
2237	441812	441811	6	216.9	2.0	0.013	0.009	Free Surface	0.126	No	6	No
2238	441836	441811	6	169.6	2.2	0.013	0.011	Free Surface	0.130	No	6	No
2239	441901	441902	6	145.8	15.1	0.013	0.005	Free Surface	0.058	No	6	No
224	440511	440510	6	101.9	3.7	0.013	0.012	Free Surface	0.110	No	6	No
2240	441814	441813	6	143.0	4.5	0.013	0.011	Free Surface	0.079	No	6	No
2241	403302	403303	8	235.4	0.3	0.013	0.046	Free Surface	0.204	No	8	No
2242	403328	403303	8	374.9	0.4	0.013	0.006	Free Surface	0.078	No	8	No
2244	403324	403302	6	272.8	1.6	0.013	0.007	Free Surface	0.195	No	6	No
2245	442217	442211	6	90.3	11.1	0.013	0.143	Free Surface	0.254	No	6	No
2246	441302	441303	8	181.5	12.9	0.013	0.181	Free Surface	0.211	No	8	No
2247	441811	441810	6	57.2	0.9	0.013	0.019	Free Surface	0.175	No	6	No
2248	441807	441806	6	223.4	0.9	0.013	0.051	Free Surface	0.286	No	6	No
2249	442219	442219A	6	40.2	11.3	0.013	0.039	Free Surface	0.122	No	6	No
225	440510	440539	6	105.8	3.8	0.013	0.024	Free Surface	0.127	No	6	No
2250	442218	442217	6	260.4	7.3	0.013	0.140	Free Surface	0.247	No	6	No
2251	441808	441807	6	68.7	0.7	0.013	0.048	Free Surface	0.263	No	6	No

G1. Model Results for Existing PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
2252	441813	441808	6	66.3	15.5	0.013	0.014	Free Surface	0.168	No	6	No
2253	403106A	403107	6	249.9	2.3	0.013	0.025	Free Surface	0.169	No	6	No
2254	403306	403307	18	428.1	1.4	0.013	5.677	Free Surface	0.625	No	18	No
2255	441301	441302	8	168.2	4.4	0.013	0.175	Free Surface	0.203	No	8	No
2256	402203	451604	16	248.8	2.4	0.013	1.545	Free Surface	0.303	No	16	No
2257	403303	403401	8	234.0	0.5	0.013	0.070	Free Surface	0.262	No	8	No
2258	441932	441902	6	174.9	16.5	0.013	0.009	Free Surface	0.063	No	6	No
2259	440729	441301	8	48.6	0.7	0.013	0.159	Free Surface	0.331	No	8	No
226	440812	440809	6	208.1	0.7	0.013	0.004	Free Surface	0.122	No	6	No
2260	441902	441903	6	131.2	16.0	0.013	0.015	Free Surface	0.073	No	6	No
2261	441809	441808	6	159.5	0.6	0.013	0.031	Free Surface	0.244	No	6	No
2262	441810	441809	6	229.6	0.7	0.013	0.023	Free Surface	0.205	No	6	No
2263	441903	441904	6	5.7	15.3	0.013	0.016	Free Surface	0.077	No	6	No
2264	402905	403101	6	299.0	0.3	0.013	0.004	Free Surface	0.099	No	6	No
2265	441927	441926	6	134.0	15.0	0.013	0.003	Free Surface	0.046	No	6	No
2266	442223	442218	6	136.5	7.5	0.013	0.006	Free Surface	0.236	No	6	No
2267	441929	441928	6	266.3	5.5	0.013	0.004	Free Surface	0.060	No	6	No
2268	441926	441925	6	89.7	8.3	0.013	0.006	Free Surface	0.074	No	6	No
2269	441928	441925	6	238.1	12.5	0.013	0.012	Free Surface	0.081	No	6	No
2270	441914	441913	6	161.2	21.3	0.013	0.006	Free Surface	0.057	No	6	No
2271	442009	442206	6	76.1	1.5	0.013	0.010	Free Surface	0.108	No	6	No
2272	441308	441309	6	334.0	3.0	0.013	0.062	Free Surface	0.220	No	6	No
2273	441906	441905	6	243.4	7.9	0.013	0.069	Free Surface	0.235	No	6	No
2274	442201A	442202	16	292.0	1.3	0.013	1.587	Free Surface	0.406	No	16	No
2275	403119LH	403118	4	221.9	0.6	0.013	0.014	Free Surface	0.290	No	4	No
2276	403109	403110	6	240.4	0.7	0.013	0.052	Free Surface	0.252	No	6	No
2277	403308	403411	21	517.9	1.4	0.013	7.276	Free Surface	0.564	No	21	No
2279	403115	403114	6	166.4	5.0	0.013	0.016	Free Surface	0.097	No	6	No
228	440552	440553	6	99.3	7.5	0.013	0.002	Free Surface	0.087	No	6	No
2280	402721	402904	6	300.1	0.2	0.013	0.002	Free Surface	0.081	No	6	No
2281	403118	403117	6	217.5	4.5	0.013	0.077	Free Surface	0.218	No	6	No
2282	403117	403114	6	133.9	4.1	0.013	0.080	Free Surface	0.223	No	6	No
2283	403402	403403	8	381.1	0.2	0.013	0.110	Free Surface	0.337	No	8	No
2284	442008	442009	6	275.2	1.5	0.013	0.004	Free Surface	0.086	No	6	No
2285	402906	403118	6	250.1	0.2	0.013	0.062	Free Surface	0.352	No	6	No
2286	402908	402907	6	164.0	0.5	0.013	0.062	Free Surface	0.357	No	6	No
2287	402907	402906	6	53.0	0.4	0.013	0.062	Free Surface	0.341	No	6	No
2289	403110	403111	8	207.7	1.8	0.013	0.053	Free Surface	0.152	No	8	No
229	440515	440516	6	159.3	12.8	0.013	0.018	Free Surface	0.123	No	6	No
2290	403114	403113	15	264.1	0.6	0.013	0.096	Free Surface	0.117	No	6	No
2291	403113	403111	15	133.6	1.0	0.013	0.109	Free Surface	0.113	No	6	No
2292	402719	402720	6	172.4	0.3	0.013	0.000	Free Surface	0.046	No	6	No
2293	403111	403112	15	214.0	1.1	0.013	0.164	Free Surface	0.183	No	8	No
2294	442007A	442007	6	230.7	17.7	0.013	0.068	Free Surface	0.176	No	6	No
2295	402720	402721	6	300.5	0.3	0.013	0.001	Free Surface	0.066	No	6	No
2296	442007	442006	6	88.6	3.9	0.013	0.068	Free Surface	0.275	No	6	No
2297	402903	VMH_72	15	149.3	0.3	0.013	0.238	Free Surface	0.231	No	8	No
2298	403605	403604	6	236.0	0.2	0.013	0.044	Free Surface	0.363	No	6	No
2299	403603	403604	8	237.6	0.2	0.013	0.044	Free Surface	0.225	No	8	No
230	440519	440518	6	257.9	5.3	0.013	0.002	Free Surface	0.067	No	6	No
2300	403602	403603	8	270.2	0.2	0.013	0.041	Free Surface	0.254	No	8	No
2301	442006	442005	6	349.5	0.7	0.013	0.078	Free Surface	0.360	No	6	No
2302	403112	402903	15	242.9	0.2	0.013	0.169	Free Surface	0.196	No	8	No
2303	402724LH	402723	6	224.3	0.4	0.013	0.081	Free Surface	0.372	No	6	No
2304	402902B	VMH_72	6	191.4	3.7	0.013	0.046	Free Surface	0.390	No	6	No
2305	402723	402722	6	134.8	1.1	0.013	0.082	Free Surface	0.301	No	6	No
2306	403202	403203	6	178.5	0.8	0.013	0.015	Free Surface	0.155	No	6	No
2307	402716	402715	6	114.2	1.7	0.013	0.004	Free Surface	0.068	No	6	No
2308	402615	402613	6	256.9	1.8	0.013	0.026	Free Surface	0.160	No	6	No
2309	402703	HILLER_WW	15	62.9	0.2	0.015	0.773	Free Surface	0.411	No	10	No
231	440518	440553	6	98.0	13.5	0.013	0.028	Free Surface	0.121	No	6	No
2310	402610	402611	6	235.5	0.9	0.013	0.004	Free Surface	0.129	No	6	No
2311	402713	402701	6	199.3	2.5	0.013	0.015	Free Surface	0.555	No	6	No
2312	402701	402702	10	278.9	0.1	0.013	0.137	Free Surface	0.540	No	10	Yes
2313	402604	402604A	6	119.0	3.6	0.013	0.045	Free Surface	0.184	No	6	No
2314	402609	402603	6	387.0	0.5	0.013	0.011	Free Surface	0.228	No	6	No
2315	402611	402505	6	250.9	2.4	0.013	0.042	Free Surface	0.551	No	6	No
2316	402505	402701	10	277.2	0.1	0.013	0.317	Free Surface	0.623	No	10	Yes
2317	402504	402505	10	364.3	0.1	0.013	0.216	Free Surface	0.506	No	10	Yes
2318	403009	403005	6	361.2	0.3	0.013	0.027	Free Surface	0.241	No	6	No
2319	403803	403804	6	135.7	2.4	0.013	0.003	Free Surface	0.050	No	6	No
232	441007	441008	8	198.9	11.6	0.013	0.018	Free Surface	0.067	No	8	No
2320	403805	403804	6	115.5	0.5	0.013	0.002	Free Surface	0.093	No	6	No
2321	403803	403802	6	203.4	1.4	0.013	0.002	Free Surface	0.050	No	6	No
2322	402503	402504	10	358.6	0.7	0.013	0.207	Free Surface	0.374	No	10	No
2323	402806	402807	6	349.4	0.5	0.013	0.015	Free Surface	0.178	No	6	No
2324	402603	402503	6	256.5	0.9	0.013	0.076	Free Surface	0.397	No	6	No
2325	402510	402505	6	258.0	0.5	0.013	0.055	Free Surface	0.617	No	6	No
2326	402807A	402510	6	25.0	0.8	0.013	0.046	Free Surface	0.283	No	6	No
2327	403801	403802	6	127.4	0.5	0.013	0.002	Free Surface	0.053	No	6	No
2328	402502	402503	8	285.9	0.1	0.013	0.095	Free Surface	0.680	No	8	Yes
2329	402509	402510	6	343.6	1.8	0.013	0.005	Free Surface	0.193	No	6	No
233	430218	430217	6	106.9	7.3	0.013	0.044	Free Surface	0.185	No	6	No
2330	403802	403808	6	161.1	0.5	0.013	0.007	Free Surface	0.128	No	6	No
2331	403804	403806	6	237.9	0.5	0.013	0.008	Free Surface	0.137	No	6	No
2332	402507	402503	6	256.7	0.4	0.013	0.031	Free Surface	0.362	No	6	No
2334	403502	403501	8	180.6	0.4	0.013	0.000	Free Surface	0.000	No	8	No
2335	403808	403807	6	257.9	0.5	0.013	0.012	Free Surface	0.158	No	6	No
2336	403806	403807	6	150.9	0.5	0.013	0.013	Free Surface	0.162	No	6	No
2337	402506	402507	6	278.2	0.5	0.013	0.020	Free Surface	0.217	No	6	No
2338	403810	403809	6	101.6	0.5	0.013	0.007	Free Surface	0.194	No	6	No
2339	403807	403809	6	259.9	0.5	0.013	0.030	Free Surface	0.253	No	6	No
2342	453708	453709	10	112.8	1.8	0.013	1.021	Free Surface	0.694	No	10	No
2343	450201	450202	10	110.3	4.8	0.013	0.204	Free Surface	0.270	No	10	No
2344	450112	450101	6	261.6	11.1	0.013	0.014	Free Surface	0.242	No	6	No
2346	450608	450801	10	109.5	1.8	0.013	0.190	Free Surface	0.264	No	10	No
2347	453702	453703	10	231.8	0.6	0.013	0.987	Free Surface	0.714	No	10	Yes
2348	450202	450203	10	150.9	0.7	0.013	0.318	Free Surface	0.334	No	10	No
2349	452105	452815	6	77.1	41.7	0.013	0.015	Free Surface	0.066	No	6	No
235	432605	432604	6	126.1	19.1	0.013	0.038	Free Surface	0.147	No	6	No
2350	450209A	450209	6	15.4	13.1	0.013	0.047	Free Surface	0.366	No	6	No
2352	450413	450414	10	187.8	0.7	0.013	0.177	Free Surface	0.230	No	10	No
2353	452203LH	452202	6	145.6	0.5	0.013	0.008	Free Surface	0.115	No	6	No
2354	452811	452812	6	281.9	7.3	0.013	0.009	Free Surface	0.123	No	6	No
2355	452109	452108	6	91.3	42.6	0.013	0.007	Free Surface	0.039	No	6	No
2356	452111	452108	6	159.5	4.2	0.013	0.012	Free Surface	0.088	No	6	No
2357	452514	452513	6	71.0	10.6	0.013	0.004	Free Surface	0.043	No	6	No
2358	452805	452804	6	258.0	8.8	0.013	0.009	Free Surface	0.069	No	6	No
2359	452513	452512	6	109.4	11.3	0.013	0.005	Free Surface	0.043	No	6	No
236	430219	430218	6	120.3	14.2	0.013	0.008	Free Surface	0.100	No	6	No
2363	440903	440903A	10	154.2	11.1	0.013	0.990	Free Surface	0.312	No	10	No
2365	452410	452409	6	264.6	0.6	0.013	0.003	Free Surface	0.068	No	6	No
2366	LH450209B	450209A	6	101.1	8.4	0.013	0.006	Free Surface	0.091	No	6	No
2367	453709	453710	10	313.3	1.2	0.017	1.024	Free Surface	0.594	No	10	No
2368	452815	452813	6	137.3	22.4	0.013	0.019	Free Surface	0.081	No	6	No
2369	452106	452105	6	267.8	14.7	0.013	0.014	Free Surface	0.065	No	6	No
237	430411	430412	6	192.2	10.7	0.013	0.036	Free Surface	0.153	No	6	No
2370	453727	453726	8	49.0	42.6	0.013	0.028	Free Surface	0.066	No	8	No
2371	452813	452812	6	146.1	13.3	0.013	0.021	Free Surface	0.134	No	6	No
2372	453728	453727	8	82.8	8.7	0.013	0.000	Free Surface	0.027	No	8	No
2374	450207	450206	10	502.6	1.4	0.013	0.370	Free Surface	0.314	No	10	No
2375	450204	450413	10	12.6	5.7	0.013	0.178	Free Surface	0.216	No	10	No
2376	452107	452106	6	137.1	9.7	0.013	0.005	Free Surface	0.061	No	6	No
2377	450205	450204	8	34.3	1.8	0.013	0.382	Free Surface	0.418	No	8	No
2378	452812	452720	6	138.4	1.9	0.013	0.034	Free Surface	0.172	No	6	No
2379	452104	452103	6	120.0	8.7	0.013	0.002	Free Surface	0.067	No	6	No
238	433107	431712	6	143.7	51.2	0.013	0.112	Free Surface	0.193	No	6	No
2380	452116	452115	6	242.1	1.1	0.013	0.004	Free Surface	0.060	No	6	No
2381	452814	452813	6	485.1	7.8	0.013	0.002	Free Surface	0.060	No	6	No
2382	452719	452720	6	280.2	5.7	0.013	0.012	Free Surface	0.123	No	6	No
2383	452810	452809	6	52.6	22.3	0.013	0.002	Free Surface	0.038	No	6	No
2384	452809	452811	6	115.5	10.0	0.013	0.005	Free Surface	0.058	No	6	No
2385	452115	452113	6	69.7	65.7	0.013	0.007	Free Surface	0.054	No	6	No
2386	452115	452114	6	219.8	8.5	0.013	0.002	Free Surface	0.033	No	6	No
2387	452807LH	452806	6	89.0	9.6	0.013	0.003	Free Surface	0.041	No	6	No
2388	452103	452102	6	291.2	1.1	0.013	0.007	Free Surface	0.089	No	6	No
2389	452114	452112	6	41.4	79.3	0.013	0.005	Free Surface	0.047	No	6	No
239	433106	433107	6	75.8	2.3	0.013	0.002	Free Surface	0.094	No	6	No
2390	450410	450410	10	193.2	0.4	0.013	0.520	Free Surface	0.537	No	10	Yes
2391	452201	452001	6	127.7	7.6	0.013	0.022	Free Surface	0.109	No	6	No
2392	452113	452112	6	197.6	3.1	0.013	0.007	Free Surface	0.069	No	6	No
2393	452808	452718	6	56.7	2.5	0.013	0.002	Free Surface	0.043	No	6	No
2394	452718	452719	6	195.7	7.4	0.013	0.004	Free Surface	0.064	No	6	No
2395	452730	452729	6	91.3	15.1	0.013	0.003	Free Surface	0.054	No	6	No
2396	452731	452729	6	115.0	4.6	0.013	0.010	Free Surface	0.076	No	6	No
2397	452817	452818	6	152.6	1.4	0.013	0.009	Free Surface	0.102	No	6	No
2398	452004	452005	6	144.4	11.3	0.013	0.038	Free Surface	0.119	No	6	No
2399	452005	452006	6	111.4	17.3	0.013	0.041	Free Surface	0.110	No	6	No
24	453604	453605	6	273.5	1.5	0.013	0.000	Free Surface	0.064	No	6	No
240	431802	431806	6	215.7	10.1	0.013	0.127	Free Surface	0.680	No	6	No
2401	452717	452716	6	235.7	7.3	0.013	0.007	Free Surface	0.062	No	6	No
2402	452026	452024	6	125.8	9.1	0.013	0.015	Free Surface	0.139	No	6	No
2404	452804	452712	6	286.8	9.1	0.013	0.012	Free Surface	0.087	No	6	No
2405	452519	452518	6	175.4	6.1	0.013	0.012	Free Surface	0.090	No	6	No
2406	452729	452520	6	188.8	14.9	0.013	0.015	Free Surface	0.078	No	6	No
2407	452520	452518	6	38.6	14.5	0.013	0.019	Free Surface	0.092	No	6	No
241	433015	431639	6	172.3	4.4	0.013	0.097	Free Surface	0.271	No	6	No
2412	452027	452026	6	128.1	11.7	0.013	0.013	Free Surface	0.076	No	6	No
2413	452024	452023	6	214.5	16.1	0.013	0.123	Free Surface	0.211	No	6	No
2414	452518	452517	6	177.7	17.9	0.013	0.032	Free Surface	0.137	No	6	No
2415	452529LH	452517	6	231.0	0.9	0.013	0.011	Free Surface	0.150	No	6	No
2416	452517	452516	6	135.2	4.3	0.013	0.050	Free Surface	0.282	No	6	No
2419	452023	452022	6	220.6	9.8	0.013	0.126	Free Surface	0.238	No	6	No
242	431640	431639	6	248.5	6.3	0.013	0.119	Free Surface	0.272	No	6	No
2420	452516	452507	6	61.5	0.3	0.013	0.052	Free Surface	0.287	No	6	No
2421	452507	452508	6	193.4	5.8	0.013	0.065	Free Surface	0.208	No	6	No
2422	452819	452820	6	236.7	7.7	0.013	0.043	Free Surface	0.137	No	6	No
2423	452708	452607	6	335.0	7.3	0.013	0.002	Free Surface	0.069	No	6	No
2424	452020	452019	6	110.0	4.0	0.013	0.153	Free Surface	0.372	No	6	No
2425	452022	452021	6	79.5	7.6	0.013	0.128	Free Surface	0.232	No	6	No
2426	452021	452020	6	392.9	13.7	0.013	0.133	Free Surface	0.213	No	6	No
2427	452523	452506	8	154.6	13.4	0.013	0.008	Free Surface	0.050	No	8	No
2428	452506	452507	6	117.3	5.1	0.013	0.011	Free Surface	0.133	No	6	No
2429	452505	452506	6	336.9	1.6	0.013	0.003	Free Surface	0.070	No	6	No
243	443602	443607	8	209.2	10.4	0.013	0.051	Free Surface	0.098	No	8	No
2430	452204	452204A	6	122.1	37.5	0.013	0.011	Free Surface	0.055	No	6	No
2431	451306	451305	6	293.0	16.7	0.013	0.020	Free Surface	0.090	No	6	No
2432	451307	451306	6	52.9	13.9	0.013	0.014	Free Surface	0.077	No	6	No
2433	451304LH	451303	6	153.3	3.7	0.013	0.009	Free Surface	0.074	No	6	No
2434	452202	452201	6	227.9	4.8	0.013	0.015	Free Surface	0.099	No	6	No
2435	452031	452108	6	336.4	18.2	0.013	0.014	Free Surface	0.068	No	6	No

G1. Model Results for Existing PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
2436	452102	452101	6	324.8	8.5	0.013	0.013	Free Surface	0.087	No	6	No
2437	452521	452520	6	60.4	10.2	0.013	0.002	Free Surface	0.058	No	6	No
2438	452818	452818WYE	6	208.8	4.3	0.013	0.016	Free Surface	0.114	No	6	No
2439	452508	452509	6	397.2	2.7	0.013	0.070	Free Surface	0.346	No	6	No
244	452714	452713	6	164.6	5.5	0.013	0.002	Free Surface	0.042	No	6	No
2441	452012	452013	6	145.4	17.7	0.013	0.071	Free Surface	0.172	No	6	No
2442	452501	452502	6	210.4	0.4	0.013	0.000	Free Surface	0.041	No	6	No
2446	431636	431643	6	181.3	29.2	0.013	0.202	Free Surface	0.222	No	6	No
2449	451408	451407	6	54.3	9.8	0.013	0.059	Free Surface	0.177	No	6	No
245	432604	432601	6	32.5	3.1	0.013	0.040	Free Surface	0.156	No	6	No
2454	403315	403406	21	233.9	0.9	0.013	4.323	Free Surface	0.474	No	21	No
2455	403407	403708	21	230.9	1.1	0.013	4.322	Free Surface	0.475	No	21	No
2457	403421	403401	6	274.2	0.1	0.013	0.009	Free Surface	0.275	No	6	No
2458	403419	403402	6	374.2	0.1	0.013	0.006	Free Surface	0.376	No	6	No
2463	403313	403314	21	234.5	1.3	0.013	4.320	Free Surface	0.415	No	21	No
2469	432406	432402	12	34.1	2.1	0.013	1.251	Free Surface	0.423	No	12	No
247	403423E	403423C	27	535.1	0.2	0.013	10.834	Exceeds Capacity	1.000	No	27	Yes
2470	431644	432406	12	253.2	0.7	0.013	1.251	Free Surface	0.582	No	12	Yes
2471	403314	403315	21	234.7	1.5	0.013	4.324	Free Surface	0.406	No	21	No
2473	403406	403407	21	237.1	0.7	0.013	4.323	Free Surface	0.478	No	21	No
2475	403420	403401	6	374.9	0.1	0.013	0.007	Free Surface	0.271	No	6	No
2477	403415	VMH-92	27	455.1	0.7	0.013	6.850	Free Surface	0.535	No	27	No
2479	403414	403414	21	90.2	0.3	0.013	4.290	Free Surface	0.750	No	21	Yes
248	450609	450606	8	201.7	8.7	0.013	0.009	Free Surface	0.126	No	8	No
2480	403403	403404	12	235.5	1.1	0.013	0.116	Free Surface	0.574	No	12	No
2481	403404	403405	12	35.5	0.2	0.013	0.271	Backwater	1.000	No	12	Yes
2482	403405	403413	12	27.0	0.2	0.013	0.307	Backwater	1.000	No	12	Yes
249	450605	450606	10	93.0	0.8	0.013	0.170	Free Surface	0.219	No	10	No
2492	452408A	452408	6	255.1	0.6	0.013	0.004	Free Surface	0.110	No	6	No
2493	441827A	441827	6	303.7	2.2	0.013	0.003	Free Surface	0.053	No	6	No
2494	450705	451107	6	226.8	2.9	0.013	0.000	Free Surface	0.127	No	6	No
2497	431612	431610	6	33.5	5.4	0.013	0.240	Free Surface	0.366	No	6	No
2498	433410	433411	8	239.8	3.6	0.013	0.870	Free Surface	0.512	No	8	No
2499	433411	433412	8	50.6	8.6	0.013	0.872	Free Surface	0.448	No	8	No
25	454001	453601	6	126.9	3.5	0.013	0.092	Free Surface	0.271	No	6	No
250	454807	454808	8	214.2	14.8	0.013	0.299	Free Surface	0.215	No	8	No
2500	440526	440525	6	153.7	2.1	0.013	0.004	Free Surface	0.069	No	6	No
2502	433101	433103	6	61.0	53.2	0.013	0.062	Free Surface	0.133	No	6	No
2506	451705	451801	18	474.5	0.9	0.013	3.873	Free Surface	0.566	No	18	No
251	450218	450217	6	100.2	5.3	0.013	0.047	Free Surface	0.266	No	6	No
2513	451008	451004	15	32.0	9.6	0.013	0.000	Free Surface	0.153	No	15	No
2514	433206	433205	6	365.0	6.1	0.013	0.019	Free Surface	0.133	No	6	No
2516	433202	433201	6	49.9	6.0	0.013	0.142	Free Surface	0.284	No	6	No
2519	450419	450906	18	351.8	3.2	0.013	3.979	Free Surface	0.394	No	18	No
252	450606	450607	10	43.4	4.4	0.013	0.178	Free Surface	0.195	No	10	No
2520	450416	450419	12	28.2	6.0	0.013	0.186	Free Surface	0.350	No	12	No
2521	450420	450419	12	37.0	9.7	0.013	0.006	Free Surface	0.256	No	12	No
2522	450418	450411	8	48.7	4.3	0.013	0.005	Free Surface	0.193	No	8	No
2524	441410	441409	6	324.5	1.2	0.013	0.053	Free Surface	0.265	No	6	No
2525	442001	442001WYE	6	160.0	14.2	0.013	0.008	Free Surface	0.069	No	6	No
2528	402808	402901	6	358.3	0.2	0.013	0.012	Free Surface	0.183	No	6	No
2529	403006	402902	6	226.7	0.6	0.013	0.015	Free Surface	0.154	No	6	No
253	454808	454809	8	214.2	14.7	0.013	0.303	Free Surface	0.213	No	8	No
2530	403001	402903	8	249.7	0.5	0.013	0.065	Free Surface	0.228	No	8	No
2535	451904	451905	18	238.6	2.7	0.013	3.742	Free Surface	0.412	No	18	No
2536	451903	451907	21	37.0	2.4	0.013	3.695	Free Surface	0.393	No	21	No
2537	451009	451906	21	247.5	0.5	0.013	3.577	Free Surface	0.498	No	21	No
2538	451005	451901	21	260.0	0.3	0.013	3.567	Free Surface	0.545	No	21	No
2539	451001	451002	21	47.5	1.0	0.013	3.520	Free Surface	0.414	No	21	No
254	450607	450608	10	143.0	1.4	0.013	0.179	Free Surface	0.218	No	10	No
2540	450905	451006	18	379.3	1.7	0.013	3.326	Free Surface	0.467	No	18	No
2541	451901	451902	21	293.3	0.6	0.013	3.563	Free Surface	0.472	No	21	No
2542	451902	451401	21	394.4	1.2	0.013	3.559	Free Surface	0.387	No	21	No
2543	450925	450902	12	206.6	2.9	0.013	0.674	Free Surface	0.280	No	12	No
2544	450906	450907	20	330.6	2.2	0.013	3.978	Free Surface	0.375	No	20	No
2545	403201	403202	6	153.3	0.4	0.013	0.010	Free Surface	0.145	No	6	No
2546	403309	403310	21	59.7	0.4	0.013	4.282	Free Surface	0.574	No	21	No
255	450612	450608	6	200.6	1.4	0.013	0.012	Free Surface	0.234	No	6	No
2551	403316	403317	6	273.4	0.9	0.013	0.011	Free Surface	0.116	No	6	No
2552	451816	451816A	6	202.1	0.1	0.013	0.016	Free Surface	0.242	No	6	No
2553	451822	451822A	6	57.6	0.3	0.013	0.058	Free Surface	0.334	No	6	No
2555	451829	451807	18	29.8	7.3	0.013	3.687	Free Surface	0.305	No	18	No
2556	451505	451802	8	62.3	2.4	0.013	0.011	Free Surface	0.069	No	8	No
2557	451801	451802	18	298.4	2.6	0.013	3.878	Free Surface	0.411	No	18	No
2558	451806	451829	18	326.0	1.9	0.013	3.686	Free Surface	0.439	No	18	No
2559	451702A	451806	18	122.5	1.8	0.013	3.687	Free Surface	0.445	No	18	No
256	454809	454809A	8	52.2	17.3	0.013	0.302	Free Surface	0.204	No	8	No
2560	452716	452712	6	218.4	10.6	0.013	0.010	Free Surface	0.082	No	6	No
2568	431645	431644	12	316.2	1.8	0.013	1.263	Free Surface	0.462	No	12	No
257	442704LH	442703	6	122.2	19.4	0.013	0.006	Free Surface	0.138	No	6	No
2579	450414	450415	12	107.5	2.3	0.013	0.177	Free Surface	0.153	No	12	No
258	450410	450411	12	247.6	3.7	0.013	0.527	Free Surface	0.233	No	12	No
2580	450204	450409A	10	199.8	0.5	0.013	0.522	Free Surface	0.482	No	10	No
259	442916	442917	6	187.6	2.2	0.013	0.007	Free Surface	0.081	No	6	No
2591	443225	450908	6	15.9	6.2	0.013	0.000	Free Surface	0.000	No	6	No
26	453901	453601	6	95.2	9.7	0.013	0.032	Free Surface	0.204	No	6	No
260	453720LH	453719	8	149.7	12.4	0.013	0.023	Free Surface	0.064	No	8	No
261	453717	453716	8	111.7	4.8	0.013	0.028	Free Surface	0.145	No	8	No
264	403423D	403423E	27	88.5	0.4	0.013	10.840	Backwater	1.000	No	27	Yes
267	442719	442720	6	268.4	2.7	0.013	0.006	Free Surface	0.073	No	6	No
268	432102	432103	6	44.1	0.9	0.013	0.029	Free Surface	0.200	No	6	No
269	430708	430709	6	112.6	2.6	0.013	0.006	Free Surface	0.159	No	6	No
27	453602	453601	6	161.4	4.1	0.013	0.023	Free Surface	0.207	No	6	No
270	430709	430710	6	112.7	0.5	0.013	0.034	Free Surface	0.251	No	6	No
272	432101	432102	6	122.8	1.0	0.013	0.027	Free Surface	0.190	No	6	No
273	431012	431105	6	100.1	3.1	0.013	0.017	Free Surface	0.113	No	6	No
274	433308	433307	6	213.8	1.0	0.013	0.002	Free Surface	0.062	No	6	No
276	432103	432104	6	81.8	0.9	0.013	0.031	Free Surface	0.205	No	6	No
277	433315	433314	6	238.9	6.1	0.013	0.371	Free Surface	0.476	No	6	No
279	431829	432101	6	154.4	0.7	0.013	0.024	Free Surface	0.187	No	6	No
28	453604	453603	6	273.3	9.5	0.013	0.008	Free Surface	0.072	No	6	No
280	442718LH	442719	6	93.7	2.2	0.013	0.003	Free Surface	0.060	No	6	No
281	431111	431112	6	223.9	3.6	0.013	0.006	Free Surface	0.077	No	6	No
282	432112	432111	6	122.6	56.9	0.013	0.010	Free Surface	0.068	No	6	No
283	432106	432105	6	162.4	0.9	0.013	0.032	Free Surface	0.236	No	6	No
284	431104	431103	6	60.9	2.5	0.013	0.018	Free Surface	0.118	No	6	No
285	430714	430715	6	191.2	14.2	0.013	0.041	Free Surface	0.132	No	6	No
286	432109	432106	6	295.3	19.9	0.013	0.012	Free Surface	0.112	No	6	No
287	432105	432106	6	52.5	0.9	0.013	0.045	Free Surface	0.215	No	6	No
288	442710LH	442709	6	163.6	9.0	0.013	0.003	Free Surface	0.046	No	6	No
289	431112	431113	6	399.2	4.0	0.013	0.011	Free Surface	0.086	No	6	No
29	453603	453602	6	268.0	9.6	0.013	0.016	Free Surface	0.102	No	6	No
290	433307	433306	6	211.9	4.2	0.013	0.007	Free Surface	0.095	No	6	No
292	430715	NAUGHTON_WW	6	86.1	8.2	0.013	0.047	Free Surface	0.394	No	6	No
293	431110	431205	6	393.3	8.1	0.013	0.060	Free Surface	0.177	No	6	No
294	433314	433313	6	186.9	4.1	0.013	0.347	Free Surface	0.454	No	6	No
295	432106	432107	6	200.0	8.3	0.013	0.063	Free Surface	0.205	No	6	No
296	442715	442714	6	47.0	23.9	0.013	0.007	Free Surface	0.056	No	6	No
297	442714	442713	6	107.7	10.2	0.013	0.010	Free Surface	0.093	No	6	No
298	431113	431114	6	134.4	8.2	0.013	0.015	Free Surface	0.096	No	6	No
3	455009	455001	6	174.0	1.5	0.013	0.051	Free Surface	0.199	No	6	No
30	433722	433721	6	99.2	1.6	0.013	0.004	Free Surface	0.072	No	6	No
300	433306	433305	6	211.3	1.2	0.013	0.012	Free Surface	0.113	No	6	No
3002	440428	440429	6	14.4	9.5	0.013	0.017	Free Surface	0.088	No	6	No
3004	452509	04C161M	6	45.6	0.4	0.013	0.095	Free Surface	0.421	No	6	No
3006	441603A	441602	8	67.2	15.2	0.013	0.203	Free Surface	0.205	No	8	No
3008	442001WYE	442002	6	115.8	11.0	0.013	0.016	Free Surface	0.074	No	6	No
3010	442000F	442001WYE	8	102.1	9.1	0.013	0.008	Free Surface	0.052	No	8	No
3012	442000D	442000E	8	146.9	3.2	0.013	0.003	Free Surface	0.042	No	8	No
3014	403508	403504	8	179.1	0.4	0.013	0.003	Free Surface	0.075	No	8	No
3016	403507	403506	8	45.3	0.4	0.013	0.004	Free Surface	0.063	No	8	No
3018	403509	403507	8	123.8	0.6	0.013	0.002	Free Surface	0.054	No	8	No
302	433312	433311	6	72.3	0.8	0.013	0.003	Free Surface	0.061	No	6	No
3020	403510	403511	8	239.8	0.6	0.013	0.021	Free Surface	0.129	No	8	No
3022	403505	403510	8	140.6	0.6	0.013	0.018	Free Surface	0.121	No	8	No
3024	402807	402807A	6	320.3	0.5	0.013	0.021	Free Surface	0.223	No	6	No
303	432908	432909	6	139.1	2.3	0.013	0.016	Free Surface	0.225	No	6	No
3034	441503	441520	12	20.9	0.8	0.013	0.544	Free Surface	0.355	No	12	No
304	432909	432910	6	102.1	1.4	0.013	0.101	Free Surface	0.509	No	6	No
3042	04C034M	EL_CAMINO_REAL_WW	6	11.0	4.5	0.013	0.017	Free Surface	0.103	No	6	No
3046	400026	ISLAND_PARK_BBALL_WW	10	3.5	2.9	0.013	0.034	Free Surface	0.083	No	10	No
3048	IPPS	ISLAND_PARK_WW	10	9.2	16.3	0.013	0.324	Free Surface	0.382	No	10	No
305	442311LH	442310	6	207.1	0.3	0.013	0.003	Free Surface	0.070	No	6	No
306	431103	431102	6	265.5	5.8	0.013	0.021	Free Surface	0.099	No	6	No
307	433311	433310	6	106.8	5.2	0.013	0.005	Free Surface	0.064	No	6	No
308	433310	433309	6	192.7	5.0	0.013	0.008	Free Surface	0.245	No	6	No
31	454801	454802	6	250.5	9.1	0.013	0.288	Free Surface	0.394	No	6	No
310	432107	432001	6	236.5	3.2	0.013	0.084	Free Surface	0.280	No	6	No
311	432911	432910	6	131.5	9.0	0.013	0.170	Free Surface	0.476	No	6	No
312	442310	442309	6	100.1	7.6	0.013	0.004	Free Surface	0.068	No	6	No
313	431117	431115	6	304.9	0.9	0.013	0.008	Free Surface	0.132	No	6	No
314	431114	431115	6	148.6	7.7	0.013	0.025	Free Surface	0.134	No	6	No
315	UH430718	430717	4	78.3	3.6	0.013	0.002	Free Surface	0.108	No	4	No
316	433305	433304	6	221.1	3.3	0.013	0.015	Free Surface	0.109	No	6	No
317	442326	442325	6	212.0	3.5	0.013	0.004	Free Surface	0.053	No	6	No
319	432001	432002	6	158.6	1.9	0.013	0.085	Free Surface	0.235	No	6	No
32	453606	453607	6	232.5	8.6	0.013	0.199	Free Surface	0.464	No	6	No
320	430610	430609	8	138.3	0.6	0.013	0.026	Free Surface	0.137	No	8	No
321	442810	442809	6	162.2	5.3	0.013	0.016	Free Surface	0.105	No	6	No
322	433304	433303	6	218.6	4.0	0.013	0.020	Free Surface	0.125	No	6	No
323	442811	442810	6	190.2	16.3	0.013	0.005	Free Surface	0.069	No	6	No
324	430609	430608	8	212.5	1.8	0.013	0.342	Free Surface	0.391	No	8	No
325	433301	430706	6	177.5	11.3	0.013	0.321	Free Surface	0.367	No	6	No
326	442309	442308	6	213.8	2.3	0.013	0.009	Free Surface	0.091	No	6	No
327	454906	454907	6	165.0	5.1	0.013	0.278	Free Surface	0.378	No	6	No
328	454104	453905	6	275.6	4.9	0.013	0.043	Free Surface	0.276	No	6	No
329	454217	453905	6	151.3	1.1	0.013	0.126	Free Surface	0.394	No	6	No
33	454802	454803	6	77.2	5.3	0.013	0.286	Free Surface	0.378	No	6	No
330	453904	453905	6	239.3	0.8	0.013	0.004	Free Surface	0.078	No	6	No
331	433717	433716	6	71.9	6.2	0.013	0.012	Free Surface	0.192	No	6	No
332	433720	433717	6	148.2	6.2	0.013	0.006	Free Surface	0.070	No	6	No
333	453502	453501	6	241.4	1.3	0.013	0.404	Free Surface	0.757	No	6	Yes
334	431413	431412	6	248.3	5.6	0.013	0.005	Free Surface	0.121	No	6	No
335	450809	450810	6	49.2	1.8	0.013	0.101	Free Surface	0.460	No	6	No
336	431405	431406	6	269.3	3.2	0.013	0.088	Free Surface	0.263	No	6	No
337	402722	402710	6	27.4	1.8	0.013	0.084	Free Surface	0.320	No	6	No
338	442000C	442000B	6	78.9	5.0	0.013	0.004	Free Surface	0.062	No	6	No
34	433718	433717	6	281.5	11.2	0.013	0.004	Free Surface	0.061	No	6	No
340	403610	IPPS	10	109.8	0.5	0.013	0.278	Free Surface	0.297	No	10	No
343	403607	403610	10	321.0	0.3	0.013	0.263	Free Surface	0.416	No	10	No
344	403608	403607	8	242.0	0.3	0.013	0.109	Free Surface	0.329	No	8	No

G1. Model Results for Existing PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
345	403606	403607	8	144.1	0.5	0.013	0.099	Free Surface	0.308	No	8	No
346	403604	403606	8	239.6	0.5	0.013	0.099	Free Surface	0.282	No	8	No
348	403601	403602	8	246.0	0.2	0.013	0.000	Free Surface	0.118	No	8	No
349	440503	440525	6	102.8	11.0	0.013	0.012	Free Surface	0.074	No	6	No
35	453601	453502	6	272.5	4.8	0.013	0.148	Free Surface	0.561	No	6	No
350	441006	441005	6	147.8	8.8	0.013	0.018	Free Surface	0.123	No	6	No
351	402708	402707	6	77.3	1.2	0.013	0.002	Free Surface	0.059	No	6	No
354	402709	402722	6	53.6	1.9	0.013	0.002	Free Surface	0.161	No	6	No
355	441008	441009	8	162.0	6.5	0.013	0.021	Free Surface	0.070	No	8	No
356	441026	441004	6	116.4	19.8	0.013	0.002	Free Surface	0.071	No	6	No
358	441009	441010	8	69.4	16.0	0.013	0.025	Free Surface	0.104	No	8	No
359	441010	441013	8	230.0	8.3	0.013	0.101	Free Surface	0.149	No	8	No
36	453612	453502	6	260.8	1.3	0.013	0.251	Free Surface	0.694	No	6	No
360	441004	441011	6	220.6	36.2	0.013	0.059	Free Surface	0.140	No	6	No
361	442000A	441603A	6	210.8	11.1	0.013	0.013	Free Surface	0.153	No	6	No
362	441404	441422A	6	20.4	2.5	0.013	0.175	Free Surface	0.366	No	6	No
363	403009C	403009	6	99.1	1.6	0.013	0.008	Free Surface	0.090	No	6	No
364	453402	453403	8	288.8	4.0	0.013	0.136	Free Surface	0.202	No	8	No
366	450217	450216	6	320.3	0.4	0.013	0.055	Free Surface	0.278	No	6	No
367	453703	453704	10	102.8	1.2	0.013	0.997	Free Surface	0.535	No	10	No
368	453401	453402	8	340.1	6.0	0.013	0.136	Free Surface	0.189	No	8	No
369	453704	453705	10	99.7	5.3	0.013	0.997	Free Surface	0.475	No	10	No
37	453611	453612	6	236.0	4.5	0.013	0.243	Free Surface	0.472	No	6	No
370	450212	450213	6	181.7	4.9	0.013	0.006	Free Surface	0.123	No	6	No
371	450216	450213	6	84.1	6.6	0.013	0.069	Free Surface	0.184	No	6	No
372	450304	IEC MH-110	8	293.0	11.7	0.013	0.320	Free Surface	0.234	No	8	No
374	450213	450214	6	171.1	11.8	0.013	0.091	Free Surface	0.192	No	6	No
375	450210	450209	6	205.1	3.1	0.013	0.326	Free Surface	0.554	No	6	No
378	450209	450208	10	120.1	1.2	0.013	0.367	Free Surface	0.296	No	10	No
379	442608	442607	6	275.1	15.1	0.013	0.006	Free Surface	0.048	No	6	No
38	453610	453611	6	417.5	7.1	0.013	0.234	Free Surface	0.361	No	6	No
380	442623	442622	8	194.5	3.9	0.013	0.003	Free Surface	0.038	No	8	No
381	453721LH	453730A	8	126.0	12.3	0.013	0.000	Free Surface	0.039	No	8	No
382	431406	431408	6	387.9	2.5	0.013	0.097	Free Surface	0.412	No	6	No
383	430803	433316	8	301.5	2.7	0.013	0.014	Free Surface	0.080	No	8	No
385	432114	432113	6	221.7	4.6	0.013	0.006	Free Surface	0.065	No	6	No
386	431013	431010	6	102.0	11.9	0.013	0.013	Free Surface	0.085	No	6	No
387	442726	442725	6	117.6	1.7	0.013	0.004	Free Surface	0.072	No	6	No
388	431108	431109	6	186.5	6.6	0.013	0.048	Free Surface	0.148	No	6	No
389	431109	431110	6	98.0	13.8	0.013	0.015	Free Surface	0.151	No	6	No
39	433712	433711	6	128.6	9.9	0.013	0.002	Free Surface	0.039	No	6	No
390	430710	430711	6	106.5	0.5	0.013	0.036	Free Surface	0.260	No	6	No
391	432113	432112	6	36.0	15.4	0.013	0.011	Free Surface	0.055	No	6	No
392	432010	432009	6	144.2	10.9	0.013	0.117	Free Surface	0.229	No	6	No
393	430703LH	430702	6	62.1	10.4	0.013	0.007	Free Surface	0.062	No	6	No
394	431209	430908	6	289.8	4.6	0.013	0.031	Free Surface	0.184	No	6	No
395	442712	442713	6	52.7	1.5	0.013	0.004	Free Surface	0.095	No	6	No
396	442717	442715	6	161.2	4.9	0.013	0.003	Free Surface	0.043	No	6	No
397	442716	442715	6	51.6	8.5	0.013	0.004	Free Surface	0.043	No	6	No
398	431204	431203	6	191.2	9.2	0.013	0.088	Free Surface	0.201	No	6	No
399	433309	433301	6	161.1	6.4	0.013	0.312	Free Surface	0.380	No	6	No
4	455001	455002	6	254.1	11.7	0.013	0.058	Free Surface	0.205	No	6	No
40	433715	433714	6	115.1	0.9	0.013	0.071	Free Surface	0.356	No	6	No
400	431207LH	431208	6	84.5	10.9	0.013	0.005	Free Surface	0.148	No	6	No
400026	430728	430727	8	347.0	4.9	0.013	0.005	Free Surface	0.039	No	8	No
400028	430727	430726	8	92.8	16.8	0.013	0.012	Free Surface	0.045	No	8	No
400030	430726	430725	8	115.9	4.3	0.013	0.015	Free Surface	0.068	No	8	No
400034	430722	430721	8	192.8	0.4	0.013	0.103	Free Surface	0.302	No	8	No
400038	430720	430721	8	304.2	0.3	0.013	0.009	Free Surface	0.098	No	8	No
400040	430721	RALSTON WW	8	26.0	0.3	0.013	0.115	Free Surface	0.317	No	8	No
400042	433426	433427	8	96.3	3.3	0.013	0.002	Free Surface	0.034	No	8	No
400044	433427	433428	8	111.6	2.5	0.013	0.004	Free Surface	0.066	No	8	No
400046	433428	433429	8	308.9	0.3	0.013	0.006	Free Surface	0.087	No	8	No
400048	433431	433434	8	70.2	2.1	0.013	0.021	Free Surface	0.106	No	8	No
400050	433434	433435	8	48.8	1.0	0.013	0.021	Free Surface	0.109	No	8	No
400052	433435	433423	8	222.5	3.2	0.013	0.026	Free Surface	0.087	No	8	No
400054	433425	433424	8	219.4	4.5	0.013	0.003	Free Surface	0.034	No	8	No
400056	433424	433423	8	132.5	7.2	0.013	0.005	Free Surface	0.055	No	8	No
400058	433423	453730	8	109.0	15.4	0.013	0.034	Free Surface	0.093	No	8	No
40006	433433	433435	8	173.0	0.2	0.013	0.003	Free Surface	0.083	No	8	No
400060	453730	453730A	8	30.0	2.6	0.013	0.034	Free Surface	0.170	No	8	No
40008	433432	433433	8	56.6	2.3	0.013	0.001	Free Surface	0.046	No	8	No
40012	430207	430201	6	30.0	13.0	0.013	0.411	Free Surface	0.477	No	6	No
40014	430201	430202	6	154.8	4.9	0.013	0.461	Free Surface	0.518	No	6	No
40018	431009	431111	6	361.2	0.5	0.013	0.003	Free Surface	0.073	No	6	No
40020	430413	430414	6	77.1	12.0	0.013	0.121	Free Surface	0.216	No	6	No
40022	430414	430901	6	262.5	12.0	0.013	0.134	Free Surface	0.259	No	6	No
40026	432308	432307	6	214.2	19.5	0.013	0.061	Free Surface	0.137	No	6	No
40028	432307	432306	6	60.8	16.6	0.013	0.062	Free Surface	0.157	No	6	No
40030	431603	432401	8	250.3	1.9	0.013	0.017	Free Surface	0.092	No	8	No
40038	451809	451809A	18	63.5	6.1	0.013	3.685	Free Surface	0.660	No	18	No
40040	451809B	451810	18	193.4	0.2	0.013	3.688	Free Surface	0.852	No	18	Yes
40044	402403	402403A	6	135.6	0.5	0.013	0.065	Free Surface	0.333	No	6	No
40046	402403A	402404	6	87.9	0.7	0.013	0.068	Free Surface	0.354	No	6	No
40048	450502	450501	6	191.1	9.9	0.013	0.008	Free Surface	0.073	No	6	No
40062	431633	431608A	6	81.3	1.2	0.013	0.309	Backwater	1.000	No	6	Yes
40064	454601	454508	6	62.9	3.6	0.013	0.001	Free Surface	0.029	No	6	No
40066	454508	454402	6	129.6	7.0	0.013	0.002	Free Surface	0.041	No	6	No
40068	454303C	454303B	6	301.7	3.2	0.013	0.074	Free Surface	0.220	No	6	No
40070	454303B	454303A	6	291.9	5.7	0.013	0.080	Free Surface	0.203	No	6	No
40072	454303A	454303	8	211.0	5.6	0.013	0.086	Free Surface	0.144	No	8	No
40074	450115A	450113	6	58.7	6.6	0.013	0.008	Free Surface	0.072	No	6	No
40080	432111	432105	6	34.1	5.0	0.013	0.014	Free Surface	0.092	No	6	No
40082	431814	431815	6	36.4	63.4	0.013	0.088	Free Surface	0.121	No	6	No
40084	431813	431805	6	41.1	77.5	0.013	0.088	Free Surface	0.135	No	6	No
40086	431609	431608	6	44.2	4.0	0.013	0.649	Backwater	1.000	No	6	Yes
40088	451827A	451827	6	205.5	8.8	0.013	0.014	Free Surface	0.091	No	6	No
40090	450409A	450409	10	161.4	1.3	0.015	0.522	Free Surface	0.469	No	10	No
40092	441905A	442223	6	154.4	7.0	0.013	0.086	Free Surface	0.206	No	6	No
40096	441514A	441514	6	153.2	10.0	0.013	0.013	Free Surface	0.085	No	6	No
40098	SSTA_9953	441124	6	52.9	0.9	0.013	0.121	Free Surface	0.352	No	6	No
401	432916	432919	6	21.5	16.5	0.013	0.058	Free Surface	0.173	No	6	No
40102	443004	443004A	6	379.4	4.3	0.013	0.062	Free Surface	0.204	No	6	No
40106	403009B	403009	6	100.2	0.2	0.013	0.003	Free Surface	0.266	No	6	No
40108	441420A	441510	6	185.1	2.5	0.013	0.018	Free Surface	0.117	No	6	No
40110	441126A	441125	6	165.9	0.6	0.013	0.113	Free Surface	0.418	No	6	No
40112	440525	440524	6	10.4	18.0	0.013	0.018	Free Surface	0.087	No	6	No
40114	433203	433202	6	296.4	7.4	0.013	0.072	Free Surface	0.226	No	6	No
40116	450116	450115	6	213.2	6.2	0.013	0.001	Free Surface	0.052	No	6	No
40118	442621	442618	6	133.9	23.1	0.013	0.005	Free Surface	0.060	No	6	No
40120	443110A	443214	6	164.8	0.2	0.013	0.040	Free Surface	0.304	No	6	No
40124	441402A	441403	6	145.7	4.8	0.013	0.184	Free Surface	0.465	No	6	No
40126	441417A	441419	6	72.8	2.6	0.013	0.024	Free Surface	0.119	No	6	No
40128	440736	440725	6	187.8	2.6	0.013	0.055	Free Surface	0.195	No	6	No
40134	440714	440735	6	200.0	11.4	0.013	0.044	Free Surface	0.150	No	6	No
40144	442701A	442701B	15	184.8	4.3	0.013	2.104	Free Surface	0.346	No	15	No
40146	450103	450103A	10	925.3	0.4	0.015	0.348	Free Surface	0.404	No	10	No
40148	433316A	433315	6	100.2	8.9	0.013	0.383	Free Surface	0.425	No	6	No
40150	442701C	450417	15	58.4	6.1	0.013	2.104	Free Surface	0.307	No	15	No
40154	431114A	431114	6	203.0	2.1	0.013	0.006	Free Surface	0.091	No	6	No
40160	453730A	453722	8	175.0	12.4	0.013	0.034	Free Surface	0.106	No	8	No
40161	433013A	433012	6	166.3	13.3	0.013	0.036	Free Surface	0.150	No	6	No
40162	433429	433430	8	80.0	0.8	0.013	0.009	Free Surface	0.094	No	8	No
40163	431105	431104	6	58.9	3.1	0.013	0.018	Free Surface	0.120	No	6	No
40164	433430	433431	8	75.0	0.8	0.013	0.016	Free Surface	0.100	No	8	No
40165	431401A	431402	6	88.3	8.2	0.013	0.047	Free Surface	0.172	No	6	No
40166	432613	432614	6	205.0	4.0	0.013	0.002	Free Surface	0.049	No	6	No
40167	431309A	431302	6	70.6	15.9	0.013	0.110	Free Surface	0.487	No	6	No
40168	432508A	432507	8	30.9	6.6	0.013	0.005	Free Surface	0.037	No	8	No
40169	SSFI_21	432505	6	105.2	9.1	0.013	0.008	Free Surface	0.061	No	6	No
40173	440918A	440919	8	86.1	3.9	0.013	0.021	Free Surface	0.077	No	8	No
40175	443903A	443301	10	144.8	11.1	0.013	0.991	Free Surface	0.309	No	10	No
40179	443214A	443213	6	147.7	1.3	0.013	0.064	Free Surface	0.266	No	6	No
40181	VMH_72	402902	15	103.6	0.3	0.013	0.283	Free Surface	0.230	No	8	No
40183	403003	403002	8	142.0	0.2	0.013	0.034	Free Surface	0.205	No	8	No
40186	455108LH	455107	6	236.6	0.4	0.013	0.002	Free Surface	0.076	No	6	No
40187	403809	403811	6	142.2	0.5	0.013	0.041	Free Surface	0.262	No	6	No
40188	455107	455105	6	225.8	0.4	0.013	0.004	Free Surface	0.102	No	6	No
40189	442000E	442000F	8	92.9	3.2	0.013	0.006	Free Surface	0.045	No	8	No
40190	455106	455105	6	255.1	3.9	0.013	0.001	Free Surface	0.072	No	6	No
40191	451809A	451809B	18	225.3	0.5	0.013	3.688	Backwater	1.000	No	18	Yes
40192	455105	455104	6	271.0	0.4	0.013	0.007	Free Surface	0.146	No	6	No
40193	451814	451811	18	61.4	0.0	0.013	4.285	Free Surface	0.796	No	18	Yes
40194	455104	455103	6	176.2	0.4	0.013	0.015	Free Surface	0.178	No	6	No
40195	451820A	451814	8	18.3	17.5	0.013	0.024	Free Surface	0.287	No	8	No
40196	455103	455101	6	176.1	0.4	0.013	0.017	Free Surface	0.185	No	6	No
40198	455102LH	455101	6	217.7	5.8	0.013	0.001	Free Surface	0.108	No	6	No
40199	452016	452016A	6	62.0	25.3	0.013	0.090	Free Surface	0.156	No	6	No
402	432914	432916	6	141.1	0.7	0.013	0.006	Free Surface	0.114	No	6	No
40200	455101	454606	6	154.0	0.4	0.013	0.018	Free Surface	0.279	No	6	No
40201	452016A	452016B	6	63.7	20.0	0.013	0.090	Free Surface	0.161	No	6	No
40203	452016B	452018	6	107.1	20.3	0.013	0.092	Free Surface	0.190	No	6	No
40205	452412B	452412A	6	182.9	2.8	0.013	0.006	Free Surface	0.091	No	6	No
40207	452425A	452402	6	24.9	0.1	0.013	0.022	Free Surface	0.602	No	6	Yes
40208	454608	454609	6	182.9	0.4	0.013	0.025	Free Surface	0.189	No	6	No
40209	452504A	452503	6	185.1	2.3	0.013	0.004	Free Surface	0.066	No	6	No
40211	452511A	452510	6	70.2	14.4	0.013	0.025	Free Surface	0.104	No	6	No
40213	451402A	451701	18	70.4	2.5	0.013	3.566	Free Surface	0.396	No	18	No
40214	442701B	442701C	15	120.9	3.4	0.013	2.104	Free Surface	0.357	No	15	No
40215	442219A	442218	6	221.4	13.8	0.013	0.041	Free Surface	0.191	No	6	No
40217	451614A	451609	6	135.5	7.3	0.013	0.008	Free Surface	0.092	No	6	No
40218	440543A	440544	6	75.1	9.4	0.013	0.061	Free Surface	0.170	No	6	No
40219	442204A	451605	6	231.1	1.5	0.013	0.182	Free Surface	0.447	No	6	No
40220	441422A	441422B	6	63.6	15.3	0.013	0.175	Free Surface	0.322	No	6	No
40221	451605A	451606	6	34.7	1.5	0.013	0.183	Free Surface	0.446	No	6	No
40222	441422B	441422	6	206.2	2.1	0.013	0.183	Free Surface	0.413	No	6	No
40224	441408	441408	6	147.1	0.9	0.013	0.082	Free Surface	0.336	No	6	No
40225	443221A	443202	8	225.8	2.8	0.013	0.024	Free Surface	0.412	No	8	No
40226	441409BLH	441409B	6	145.5	3.4	0.013	0.004	Free Surface	0.194	No	6	No
40227	442000B	442000A	6	101.4	3.9	0.013	0.008	Free Surface	0.073	No	6	No
40228	441506	441506A	12	7.8	1.3	0.013	0.155	Free Surface	0.258	No	12	No
40229	442000	442000A	6	189.1	1.0	0.013	0.005	Free Surface	0.079	No	6	No
40230	441505	441505A	12	9.3	1.5	0.013	0.022	Free Surface	0.097	No	12	No
40232	441506A	441505A	12	247.7	0.4	0.013	0.161	Free Surface	0.222	No	12	No
40233	442223A	442223	8	136.7	1.5	0.013	0.003	Free Surface	0.057	No	8	No
40234	441505A	441503	12	329.1	1.1	0.013	0.140	Free Surface	0.248	No	12	No
40235	450503A	450503	8	122.5	0.9	0.013	0.006	Free Surface	0.069	No	8	No
40236	441834A	441834	6	136.9	1.5	0.013	0.007	Free Surface	0.136	No	6	No
40237	454809A	454809B	8	50.7	20.1	0.013	0.301	Free Surface	0.207	No	8	No
40239	454809B	450304	8	393.7	14.0	0.013	0.299	Free Surface	0.225	No	8	No
40240	442206A	442205	6	83.5	1.5	0.013	0.014	Free Surface	0.132	No	6	No

G1. Model Results for Existing PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
40241	LH450104B	450104	6	145.0	4.5	0.013	0.004	Free Surface	0.117	No	6	No
40242	442205A	442204	6	206.3	1.5	0.013	0.022	Free Surface	0.295	No	6	No
40244	403102A	403105	6	54.3	0.7	0.013	0.007	Free Surface	0.104	No	6	No
40245	453716B	453716C	8	313.7	14.7	0.013	0.012	Free Surface	0.103	No	8	No
40246	451803E	451803C	21	261.2	1.0	0.013	3.913	Free Surface	0.400	No	21	No
40247	440137B	440137A	6	224.0	1.8	0.013	0.005	Free Surface	0.089	No	6	No
40248	451803C	451803D	21	88.5	2.7	0.013	3.925	Free Surface	0.482	No	21	No
40249	440137A	440137	6	92.1	2.2	0.013	0.012	Free Surface	0.219	No	6	No
40251	452204A	451307	6	26.4	29.9	0.013	0.014	Free Surface	0.066	No	6	No
40254	451822A	451816A	6	210.6	0.3	0.013	0.060	Free Surface	0.357	No	6	No
40256	451821A	451821B	6	159.0	0.8	0.013	0.009	Free Surface	0.129	No	6	No
40258	451821B	451820	6	69.0	1.4	0.013	0.019	Free Surface	0.155	No	6	No
40259	403700K	01C035M	30	55.4	1.3	0.013	11.263	Free Surface	0.421	No	30	No
40260	451816A	451815	6	18.4	1.3	0.013	0.078	Free Surface	0.297	No	6	No
40264	451810A	451814	18	28.3	2.1	0.013	4.262	Free Surface	0.964	No	18	Yes
40266	452405C	452405A	12	22.3	2.0	0.013	0.497	Free Surface	0.299	No	12	No
40267	404809	404808	6	22.1	1.8	0.013	0.003	Free Surface	0.208	No	6	No
40268	452405A	452405B	12	30.4	0.3	0.013	0.318	Free Surface	0.312	No	12	No
40269	404806A	404806	6	15.4	2.0	0.013	0.004	Free Surface	0.178	No	6	No
40270	452405B	451810A	12	241.7	0.5	0.013	0.321	Free Surface	0.655	No	12	Yes
40272	452403A	452403	10	206.3	0.2	0.013	0.114	Free Surface	0.358	No	10	No
40280	430723	430722	8	223.0	0.4	0.013	0.097	Free Surface	0.295	No	8	No
40282	454603	454606A	6	497.9	2.8	0.013	0.003	Free Surface	0.122	No	6	No
40284	452012A	452012	6	148.5	8.1	0.013	0.005	Free Surface	0.098	No	6	No
40286	402508	402507	6	302.1	0.5	0.013	0.006	Free Surface	0.175	No	6	No
40288	403501	402510	8	349.7	0.4	0.013	0.000	Free Surface	0.118	No	8	No
40290	402604A	402603	6	231.0	3.8	0.013	0.058	Free Surface	0.255	No	6	No
40292	VMH_13	433431	8	128.4	0.8	0.013	0.002	Free Surface	0.066	No	8	No
40294	453716C	453712	8	174.8	18.2	0.013	0.189	Free Surface	0.289	No	8	No
40296	453716A	453716B	8	285.2	6.3	0.013	0.005	Free Surface	0.041	No	8	No
403	431203	431202	6	110.1	6.7	0.013	0.092	Free Surface	0.211	No	6	No
40310	433206A	433206B	0	180.5	5.2	0.013	1.598	Free Surface	-1.000	No	12	No
40312	433206B	442501	12	358.8	7.3	0.013	1.638	Free Surface	0.365	No	12	No
40314	440325A	440209	6	144.5	0.4	0.013	0.028	Free Surface	0.483	No	6	No
40316	443004A	443108	6	295.1	3.5	0.013	0.067	Free Surface	0.239	No	6	No
40318	440402A	440901	10	254.9	3.4	0.013	0.977	Free Surface	0.379	No	10	No
40320	440402	440402A	10	101.2	3.5	0.013	0.970	Free Surface	0.446	No	10	No
40322	440901	440902	10	307.4	3.8	0.013	0.493	Free Surface	0.615	No	10	No
40326	404822	404821	6	323.5	0.2	0.013	0.007	Free Surface	0.151	No	6	No
40332	404821	404818	6	104.0	0.3	0.013	0.011	Free Surface	0.195	No	6	No
40334	404816	404817	6	99.1	0.3	0.013	0.004	Free Surface	0.125	No	6	No
40336	404817	404818	6	82.5	0.3	0.013	0.008	Free Surface	0.186	No	6	No
40338	404818	404819	6	87.5	0.2	0.013	0.020	Free Surface	0.229	No	6	No
40340	404819	404820	6	29.2	0.3	0.013	0.022	Free Surface	0.237	No	6	No
40342	404820	404820A	6	192.2	0.2	0.013	0.023	Free Surface	0.243	No	6	No
40348	404820A	404801	6	87.8	0.3	0.013	0.024	Free Surface	0.248	No	6	No
40350	404801	404802	6	38.7	0.2	0.013	0.025	Free Surface	0.292	No	6	No
40352	404802	404803	6	281.7	0.2	0.013	0.025	Free Surface	0.262	No	6	No
40354	404803	404803A	6	247.6	0.2	0.013	0.026	Free Surface	0.336	No	6	No
40356	404814	404813	6	261.1	0.3	0.013	0.015	Free Surface	0.205	No	6	No
40358	404813	404815	6	19.1	0.3	0.013	0.018	Free Surface	0.217	No	6	No
40360	404815	404812	6	152.5	0.2	0.013	0.019	Free Surface	0.221	No	6	No
40362	404812	404811	6	68.3	0.3	0.013	0.020	Free Surface	0.226	No	6	No
40364	404811	404810	6	41.4	0.2	0.013	0.021	Free Surface	0.233	No	6	No
40366	404810	404808	6	65.0	0.2	0.013	0.022	Free Surface	0.300	No	6	No
40368	404809A	404809	6	274.9	0.7	0.013	0.001	Free Surface	0.048	No	6	No
40370	404808	404807	6	26.7	0.3	0.013	0.026	Free Surface	0.427	No	6	No
40372	404807	404806	6	98.5	0.0	0.013	0.026	Free Surface	0.342	No	6	No
40374	404806B	404806A	6	145.2	0.7	0.013	0.004	Free Surface	0.074	No	6	No
40376	404806	404805	6	122.1	0.2	0.013	0.033	Free Surface	0.531	No	6	Yes
40378	404805	404804	6	118.8	0.2	0.013	0.035	Free Surface	0.498	No	6	No
40382	403416A	403423D	27	13.7	20.2	0.013	5.156	Free Surface	0.581	No	27	No
404	432002	432003	6	241.7	31.8	0.013	0.104	Free Surface	0.204	No	6	No
405	431115	431116	6	224.6	3.5	0.013	0.037	Free Surface	0.163	No	6	No
406	430608	430607A	8	203.5	1.6	0.013	0.289	Free Surface	0.370	No	8	No
407	433303	433302	6	186.1	2.9	0.013	0.024	Free Surface	0.141	No	6	No
408	433302	433301	6	222.5	3.1	0.013	0.029	Free Surface	0.248	No	6	No
409	442413LH	442442	6	135.0	31.9	0.013	0.005	Free Surface	0.047	No	6	No
41	433711	433710	6	75.8	7.7	0.013	0.004	Free Surface	0.050	No	6	No
410	431202	431201	6	307.5	7.1	0.013	0.092	Free Surface	0.203	No	6	No
411	430607A	430606	8	109.5	1.2	0.013	0.264	Free Surface	0.386	No	8	No
412	431208	431209	6	251.6	0.2	0.013	0.014	Free Surface	0.193	No	6	No
414	430606	430605A	8	129.3	1.2	0.013	0.263	Free Surface	0.383	No	8	No
415	431116	430605	6	222.0	3.2	0.013	0.040	Free Surface	0.169	No	6	No
416	442444	442445	6	51.3	24.1	0.013	0.004	Free Surface	0.034	No	6	No
417	430907	432010	6	116.7	24.7	0.013	0.111	Free Surface	0.189	No	6	No
418	431201	430906	6	335.8	11.9	0.013	0.104	Free Surface	0.199	No	6	No
419	430906	430907	6	46.0	12.9	0.013	0.107	Free Surface	0.186	No	6	No
42	433710	433709	6	85.5	7.8	0.013	0.005	Free Surface	0.055	No	6	No
420	430704	430511	6	225.8	7.7	0.013	0.329	Free Surface	0.399	No	6	No
421	430702	430701	6	114.3	7.1	0.013	0.009	Free Surface	0.092	No	6	No
422	430604	430603	6	183.7	6.4	0.013	0.260	Free Surface	0.363	No	6	No
423	430511	430510	6	110.4	7.7	0.013	0.323	Free Surface	0.374	No	6	No
424	430701	430504	6	136.2	4.1	0.013	0.017	Free Surface	0.089	No	6	No
425	430911LH	430912	6	161.7	2.4	0.013	0.009	Free Surface	0.109	No	6	No
426	430908	430909	6	242.4	1.3	0.013	0.043	Free Surface	0.196	No	6	No
427	430603	430602	6	177.8	7.0	0.013	0.262	Free Surface	0.356	No	6	No
428	430510	430509	6	223.5	12.4	0.013	0.320	Free Surface	0.341	No	6	No
429	430503	430502	6	58.9	9.9	0.013	0.021	Free Surface	0.094	No	6	No
43	433713LH	433711	6	121.7	2.2	0.013	0.001	Free Surface	0.041	No	6	No
430	430909	430910	6	98.8	7.4	0.013	0.054	Free Surface	0.168	No	6	No
431	430602	430601	6	247.0	7.5	0.013	0.264	Free Surface	0.348	No	6	No
432	430912	430411	6	434.3	4.3	0.013	0.027	Free Surface	0.126	No	6	No
433	430509	430508	6	107.2	12.1	0.013	0.316	Free Surface	0.378	No	6	No
434	431613	431612	6	51.4	40.1	0.013	0.241	Free Surface	0.292	No	6	No
435	440318	440317	8	322.7	3.3	0.013	0.003	Free Surface	0.043	No	8	No
436	430508	430507	6	108.1	6.6	0.013	0.317	Free Surface	0.392	No	6	No
437	430506	430505	6	121.9	3.2	0.013	0.002	Free Surface	0.049	No	6	No
438	430601	430409	6	187.1	8.3	0.013	0.266	Free Surface	0.416	No	6	No
439	430902	430903	6	186.6	6.7	0.013	0.265	Free Surface	0.376	No	6	No
44	454411	454412	6	235.9	3.1	0.013	0.116	Free Surface	0.250	No	6	No
440	452414	524128	6	87.5	4.5	0.013	0.002	Free Surface	0.053	No	6	No
441	430502	430501	6	329.2	13.2	0.013	0.024	Free Surface	0.102	No	6	No
442	430505	430501	6	88.8	6.1	0.013	0.006	Free Surface	0.083	No	6	No
443	430408	430408	6	177.5	3.0	0.013	0.165	Free Surface	0.411	No	6	No
444	430410LH	430408	6	294.6	6.5	0.013	0.005	Free Surface	0.192	No	6	No
445	430904	431901	6	294.3	70.1	0.013	0.306	Free Surface	0.221	No	6	No
446	430412	430413	6	210.7	2.7	0.013	0.045	Free Surface	0.186	No	6	No
447	430910	430413	6	423.4	7.7	0.013	0.069	Free Surface	0.193	No	6	No
448	433113	433112	6	211.0	10.9	0.013	0.023	Free Surface	0.107	No	6	No
449	443326	443301	6	357.3	3.5	0.013	0.002	Free Surface	0.272	No	6	No
45	454431	454425	6	54.7	37.7	0.013	0.001	Free Surface	0.053	No	6	No
450	440319	440320	6	114.5	1.3	0.013	0.006	Free Surface	0.073	No	6	No
451	440321	440320	6	112.6	4.0	0.013	0.005	Free Surface	0.059	No	6	No
452	431601	431608	6	51.7	9.8	0.013	0.139	Backwater	1.000	No	6	Yes
453	430507	430101	6	181.6	7.8	0.013	0.307	Free Surface	0.378	No	6	No
455	430901	430902	6	164.5	14.1	0.013	0.262	Free Surface	0.330	No	6	No
456	431639	431638	6	164.4	10.0	0.013	0.221	Free Surface	0.292	No	6	No
457	431608	431608A	6	77.5	3.6	0.013	0.916	Exceeds Capacity	1.000	No	6	Yes
458	430501	430103	6	147.6	12.5	0.013	0.032	Free Surface	0.110	No	6	No
46	451105	451104	8	196.9	1.5	0.013	0.093	Free Surface	0.204	No	8	No
461	431635	431634	6	136.9	19.3	0.013	0.007	Free Surface	0.070	No	6	No
462	430103	430102	8	163.0	2.2	0.013	0.061	Free Surface	0.155	No	8	No
463	430102	430101	6	53.1	35.4	0.013	0.091	Free Surface	0.141	No	6	No
465	431632	431633	6	155.8	39.7	0.013	0.093	Free Surface	0.569	No	6	No
466	430109	430102	6	62.2	8.3	0.013	0.030	Free Surface	0.116	No	6	No
467	431608A	431607	6	101.3	4.3	0.013	0.740	Backwater	1.000	No	6	Yes
468	431631	431632	6	68.0	3.6	0.013	0.089	Free Surface	0.210	No	6	No
469	430407	430406	6	169.0	29.2	0.013	0.268	Free Surface	0.245	No	6	No
47	433714	433708	6	156.7	0.3	0.013	0.071	Free Surface	0.426	No	6	No
470	432735LH	432727	6	222.1	10.7	0.013	0.003	Free Surface	0.050	No	6	No
471	432727	432726	6	118.8	11.4	0.013	0.009	Free Surface	0.130	No	6	No
472	432727A	432727	6	103.5	1.0	0.013	0.002	Free Surface	0.054	No	6	No
473	430209	430208	6	123.1	11.9	0.013	0.413	Free Surface	0.429	No	6	No
474	430110	430109	6	256.1	6.6	0.013	0.027	Free Surface	0.116	No	6	No
475	431630	431631	6	161.3	4.8	0.013	0.021	Free Surface	0.196	No	6	No
476	430104	430103	6	286.7	0.4	0.013	0.024	Free Surface	0.216	No	6	No
477	430406	430405	6	139.3	44.0	0.013	0.271	Free Surface	0.232	No	6	No
478	430105	430104	6	94.0	8.0	0.013	0.004	Free Surface	0.095	No	6	No
479	431607	431606	6	212.7	1.4	0.013	0.749	Exceeds Capacity	1.000	No	6	Yes
48	453501	431302	8	461.3	1.0	0.013	0.414	Free Surface	0.553	No	8	No
480	431628	431629	6	64.8	0.0	0.013	0.011	Free Surface	0.185	No	6	No
481	430405	430404	6	101.8	40.2	0.013	0.271	Free Surface	0.240	No	6	No
482	430208	430207	6	168.9	7.8	0.013	0.413	Free Surface	0.424	No	6	No
483	432721	432715	6	153.4	2.9	0.013	0.010	Free Surface	0.115	No	6	No
484	431629	431630	6	109.3	8.9	0.013	0.015	Free Surface	0.097	No	6	No
485	432316LH	432315	6	204.0	5.8	0.013	0.005	Free Surface	0.064	No	6	No
486	432225	432224	6	171.3	9.3	0.013	0.027	Free Surface	0.186	No	6	No
487	440140	440601	6	322.8	10.9	0.013	0.273	Free Surface	0.326	No	6	No
488	432305	432304	6	109.1	7.2	0.013	0.068	Free Surface	0.163	No	6	No
489	432328	432318	6	74.7	63.0	0.013	0.003	Free Surface	0.056	No	6	No
49	451104	450601	8	223.6	2.3	0.013	0.093	Free Surface	0.187	No	8	No
490	432524	432521	8	111.4	6.6	0.013	0.013	Free Surface	0.057	No	8	No
491	432534	432533	6	104.1	14.6	0.013	0.000	Free Surface	0.111	No	6	No
492	432521	432533	8	22.4	38.5	0.013	0.031	Free Surface	0.058	No	8	No
493	432532	432533	8	54.5	14.9	0.013	0.002	Free Surface	0.094	No	8	No
494	432531	432532	8	90.8	17.6	0.013	0.002	Free Surface	0.021	No	8	No
495	403401	403402	8	236.3	0.5	0.013	0.094	Free Surface	0.367	No	8	No
496	432304	432303	6	120.5	26.1	0.013	0.071	Free Surface	0.134	No	6	No
497	430212	430201	6	28.3	23.4	0.013	0.062	Free Surface	0.351	No	6	No
498	431624	431623	6	295.5	6.6	0.013	0.055	Free Surface	0.165	No	6	No
499	430106	430104	6	197.4	1.3	0.013	0.017	Free Surface	0.136	No	6	No
50	454412	454432	6	214.5	24.5	0.013	0.117	Free Surface	0.165	No	6	No
500	431625	431624	6	159.6	3.1	0.013	0.042	Free Surface	0.174	No	6	No
501	430213	430212	6	106.2	55.1	0.013	0.062	Free Surface	0.116	No	6	No
502	430202	430203	6	156.4	9.4	0.013	0.459	Free Surface	0.433	No	6	No
503	430404	430302	6	164.9	36.8	0.013	0.295	Free Surface	0.373	No	6	No
504	430204	430205	6	150.1	13.1	0.013	0.472	Free Surface	0.479	No	6	No
505	431604	431602	6	123.3	2.2	0.017	0.704	Free Surface	0.980	No	6	Yes
507	430205	430206	6	157.9	5.1	0.013	0.470	Free Surface	0.572	No	6	No
508	430302	430206	6	62.0	2.5	0.013	0.289	Free Surface	0.500	No	6	No
509	430111	430110	6	385.4	3.5	0.013	0.020	Free Surface	0.118	No	6	No
51	454426	454427	6	87.3	24.1	0.013	0.016	Free Surface	0.099	No	6	No
510	430107	430106	6	204.5	3.6	0.013	0.012	Free Surface	0.114	No	6	No
511	430206	430310	10	297.5	3.3	0.013	0.736	Free Surface	0.365	No	10	No
512	430310	430401	10	197.4	3.5	0.013	0.747	Free Surface	0.450	No	10	No
513	431602	431645	12	37.8	1.9	0.013	1.262	Free Surface	0.438	No	12	No
514	430216	430215	6	198.6	10.2	0.013	0.002	Free Surface	0.093	No	6	No
515	430215	430214	6	98.1	11.7	0.013	0.057	Free Surface	0.131	No	6	No
516	430401	430402	10	257.7	1.2	0.013	0.743	Free Surface	0.445	No	10	No
519	430217	430215	6	113.9	1.7	0.013	0.052	Free Surface	0.226	No	6	

G1. Model Results for Existing PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
52	454429	454432	6	236.7	10.0	0.013	0.018	Free Surface	0.118	No	6	No
520	430112	430111	6	158.2	11.1	0.013	0.015	Free Surface	0.099	No	6	No
521	430108LH	430107	6	159.7	0.4	0.013	0.008	Free Surface	0.119	No	6	No
522	443409	443426	6	98.5	11.8	0.013	0.018	Free Surface	0.081	No	6	No
523	432607	432605	6	245.7	7.5	0.013	0.028	Free Surface	0.112	No	6	No
524	440699LH	440630	6	54.1	17.1	0.013	0.005	Free Surface	0.045	No	6	No
529	432326	432324	6	154.9	3.9	0.013	0.000	Free Surface	0.018	No	6	No
53	450601	450602	8	83.8	2.5	0.013	0.093	Free Surface	0.269	No	8	No
530	432221	432214	6	121.4	25.5	0.013	0.003	Free Surface	0.042	No	6	No
531	432528LH	432538	6	112.9	9.1	0.013	0.003	Free Surface	0.042	No	6	No
532	432208	432207	6	48.9	7.1	0.013	0.068	Free Surface	0.236	No	6	No
533	432224	432207	6	183.1	0.9	0.013	0.054	Free Surface	0.266	No	6	No
534	432519	08C649L	6	128.5	6.6	0.013	0.014	Free Surface	0.091	No	6	No
535	432538	432527	6	67.8	12.6	0.013	0.006	Free Surface	0.051	No	6	No
536	440613	440613A	6	454.4	4.2	0.013	0.018	Free Surface	0.122	No	6	No
537	432207	432206	6	236.8	4.6	0.013	0.145	Free Surface	0.358	No	6	No
538	08C649L	08C648M	6	132.2	13.5	0.013	0.026	Free Surface	0.096	No	6	No
54	454428	454429	6	179.6	3.2	0.013	0.016	Free Surface	0.100	No	6	No
540	440814	440813	6	205.2	11.7	0.013	0.004	Free Surface	0.095	No	6	No
541	440813	440820	6	99.7	5.8	0.013	0.035	Free Surface	0.118	No	6	No
542	440555	440813	6	101.8	7.9	0.013	0.003	Free Surface	0.095	No	6	No
543	440805	440806	6	209.5	10.0	0.013	0.002	Free Surface	0.098	No	6	No
544	440835	440834	6	121.3	1.2	0.013	0.003	Free Surface	0.061	No	6	No
545	440540	440541	6	43.6	5.0	0.013	0.028	Free Surface	0.129	No	6	No
546	440806	440521	6	91.3	1.6	0.013	0.022	Free Surface	0.124	No	6	No
547	440521	440813	6	100.6	23.2	0.013	0.024	Free Surface	0.116	No	6	No
548	441216	440541	6	182.8	1.3	0.013	0.003	Free Surface	0.096	No	6	No
55	450610	450604	6	170.0	2.2	0.013	0.050	Free Surface	0.299	No	6	No
550	440808	440807	6	85.4	6.8	0.013	0.015	Free Surface	0.085	No	6	No
551	440807	440806	6	97.8	12.9	0.013	0.018	Free Surface	0.124	No	6	No
552	440554	440553	6	198.5	7.6	0.013	0.004	Free Surface	0.095	No	6	No
553	440521	440521	6	99.8	14.4	0.013	0.003	Free Surface	0.058	No	6	No
554	441215	441214	6	157.7	14.6	0.013	0.007	Free Surface	0.060	No	6	No
555	440508	440509	6	62.6	11.4	0.013	0.002	Free Surface	0.037	No	6	No
557	440523	440524	6	289.2	6.9	0.013	0.004	Free Surface	0.073	No	6	No
558	441210	441209	6	100.0	3.0	0.013	0.006	Free Surface	0.062	No	6	No
56	433703	433702	6	184.0	35.5	0.013	0.086	Free Surface	0.201	No	6	No
560	440809	440808	6	110.1	0.5	0.013	0.012	Free Surface	0.125	No	6	No
561	403417	403404	6	378.6	0.1	0.013	0.055	Backwater	1.000	No	6	Yes
562	440810	440809	6	168.3	5.4	0.013	0.003	Free Surface	0.101	No	6	No
563	403414	403415	27	310.0	0.5	0.013	6.953	Free Surface	0.480	No	27	No
565	403411	403412	21	200.0	1.1	0.013	6.902	Free Surface	0.761	No	21	Yes
566	403412	403413	21	11.0	1.2	0.013	6.601	Free Surface	0.920	No	21	Yes
567	441002	441004	6	170.6	40.2	0.013	0.025	Free Surface	0.093	No	6	No
568	441005	441004	6	238.5	2.1	0.013	0.025	Free Surface	0.135	No	6	No
569	403503	403504	8	51.8	0.6	0.013	0.002	Free Surface	0.070	No	8	No
57	450604	450605	10	161.0	1.0	0.013	0.169	Free Surface	0.253	No	10	No
570	403009A	403009B	6	66.8	0.3	0.013	0.002	Free Surface	0.270	No	6	No
575	403511	402807A	8	141.3	0.6	0.013	0.022	Free Surface	0.161	No	8	No
578	403504	403505	8	203.9	0.6	0.013	0.012	Free Surface	0.107	No	8	No
579	403506	403505	8	160.7	0.6	0.013	0.004	Free Surface	0.088	No	8	No
58	433707	433706	6	132.6	0.4	0.013	0.001	Free Surface	0.055	No	6	No
584	454609	454710	6	206.3	4.4	0.013	0.031	Free Surface	0.144	No	6	No
585	454603	454610	6	270.4	0.5	0.013	0.001	Free Surface	0.051	No	6	No
586	454610	454609	6	251.0	5.5	0.013	0.004	Free Surface	0.095	No	6	No
587	454602	454603	6	299.9	2.3	0.013	0.002	Free Surface	0.049	No	6	No
588	454710	454709	6	258.0	3.9	0.013	0.034	Free Surface	0.216	No	6	No
589	454711	454709	6	201.6	0.5	0.013	0.007	Free Surface	0.196	No	6	No
59	433706	433705	6	97.9	0.4	0.013	0.002	Free Surface	0.091	No	6	No
590	454611	454610	6	228.0	4.0	0.013	0.001	Free Surface	0.042	No	6	No
591	454712LH	454711	6	186.7	0.5	0.013	0.002	Free Surface	0.085	No	6	No
592	454601	454602	6	217.5	2.7	0.013	0.001	Free Surface	0.036	No	6	No
593	454708	454707	6	224.6	5.9	0.013	0.003	Free Surface	0.143	No	6	No
594	454709	454707	6	192.8	0.5	0.013	0.043	Free Surface	0.263	No	6	No
597	454611	454503	6	222.3	6.8	0.013	0.002	Free Surface	0.033	No	6	No
598	454503	454701	6	132.6	6.0	0.013	0.002	Free Surface	0.044	No	6	No
599	454402	454401	6	122.3	3.5	0.013	0.003	Free Surface	0.049	No	6	No
6	454909	454910	6	80.4	2.2	0.013	0.006	Free Surface	0.080	No	6	No
60	433705	433704	6	146.3	0.4	0.013	0.007	Free Surface	0.140	No	6	No
601	454701	454702	6	251.2	5.0	0.013	0.005	Free Surface	0.060	No	6	No
602	454215	454214	6	220.0	0.2	0.013	0.001	Free Surface	0.070	No	6	No
603	454702	454703	6	282.9	3.7	0.013	0.006	Free Surface	0.170	No	6	No
604	454707	454703	6	273.1	1.1	0.013	0.049	Free Surface	0.259	No	6	No
605	454706	454703	6	79.1	1.2	0.013	0.014	Free Surface	0.199	No	6	No
606	454206	454205	6	149.7	6.1	0.013	0.054	Free Surface	0.174	No	6	No
607	454214	454213	6	199.3	9.4	0.013	0.016	Free Surface	0.090	No	6	No
608	454401	454430	6	106.7	3.7	0.013	0.004	Free Surface	0.055	No	6	No
609	454213	454212	6	140.5	11.2	0.013	0.023	Free Surface	0.109	No	6	No
61	453403	454306	8	256.5	3.6	0.013	0.136	Free Surface	0.287	No	8	No
610	454204	454203	6	71.6	2.8	0.013	0.007	Free Surface	0.115	No	6	No
611	454205	454203	6	131.8	5.5	0.013	0.058	Free Surface	0.169	No	6	No
612	454107	454005	6	379.2	1.1	0.013	0.019	Free Surface	0.178	No	6	No
613	454106	454107	6	401.0	2.7	0.013	0.007	Free Surface	0.115	No	6	No
614	454106	454005	6	423.5	1.4	0.013	0.005	Free Surface	0.079	No	6	No
615	454216	454214	6	128.6	0.4	0.013	0.013	Free Surface	0.132	No	6	No
616	433404	433405	8	333.0	3.6	0.013	0.859	Free Surface	0.529	No	8	No
617	433408	433409	8	95.9	1.1	0.013	0.867	Free Surface	0.797	No	8	Yes
618	431518	431519	6	218.5	7.7	0.013	0.005	Free Surface	0.056	No	6	No
619	433403	433404	8	150.0	2.8	0.013	0.845	Free Surface	0.580	No	8	No
62	431514	431513	8	99.1	7.3	0.013	0.618	Free Surface	0.404	No	8	No
620	433409	433410	8	70.7	2.8	0.013	0.868	Free Surface	0.595	No	8	No
621	453706	453707	10	127.9	7.8	0.013	1.005	Free Surface	0.384	No	10	No
622	431522	431523	6	196.8	1.0	0.013	0.017	Free Surface	0.131	No	6	No
623	433406	433407	8	262.1	2.4	0.013	0.862	Free Surface	0.587	No	8	No
624	433407	433408	8	269.2	4.5	0.013	0.864	Free Surface	0.756	No	8	Yes
625	431305	431304	6	303.5	11.3	0.013	0.005	Free Surface	0.055	No	6	No
626	454704	454507	6	276.4	0.6	0.013	0.070	Free Surface	0.347	No	6	No
627	454703	454704	6	132.8	1.3	0.013	0.069	Free Surface	0.305	No	6	No
628	454212	454211	6	168.1	5.8	0.013	0.028	Free Surface	0.135	No	6	No
629	454503	454502	6	329.9	12.2	0.013	0.003	Free Surface	0.164	No	6	No
63	433702	433701	6	134.6	3.0	0.013	0.091	Free Surface	0.245	No	6	No
630	454504	454502	6	157.1	1.3	0.013	0.076	Free Surface	0.293	No	6	No
631	454211	454209	6	171.1	3.8	0.013	0.033	Free Surface	0.157	No	6	No
632	454005	454004	6	363.0	2.3	0.013	0.047	Free Surface	0.189	No	6	No
633	454203	454202	6	170.4	12.2	0.013	0.066	Free Surface	0.179	No	6	No
634	454505	454504	6	104.5	1.9	0.013	0.073	Free Surface	0.274	No	6	No
635	454507	454505	6	238.4	0.6	0.013	0.072	Free Surface	0.309	No	6	No
636	454006	454005	6	203.0	1.3	0.013	0.018	Free Surface	0.173	No	6	No
637	454210	454209	6	100.0	1.0	0.013	0.011	Free Surface	0.142	No	6	No
638	454209	454201	6	316.4	4.9	0.013	0.048	Free Surface	0.193	No	6	No
639	454007A	454004	6	185.3	4.2	0.013	0.004	Free Surface	0.115	No	6	No
64	431301	431514	8	224.1	4.8	0.013	0.616	Free Surface	0.399	No	8	No
640	454430	454403	6	337.9	7.1	0.013	0.007	Free Surface	0.062	No	6	No
642	454105	454104	6	288.5	8.2	0.013	0.014	Free Surface	0.119	No	6	No
643	454202	454201	6	159.8	4.7	0.013	0.071	Free Surface	0.211	No	6	No
644	454002	454001	6	383.9	13.8	0.013	0.082	Free Surface	0.208	No	6	No
645	454419	454420	6	130.8	15.0	0.013	0.004	Free Surface	0.042	No	6	No
646	454407	454408	6	286.6	20.6	0.013	0.100	Free Surface	0.165	No	6	No
647	433724	433723	6	116.7	3.0	0.013	0.004	Free Surface	0.056	No	6	No
648	454417	454419	6	169.7	3.5	0.013	0.004	Free Surface	0.047	No	6	No
649	454418	454417	6	132.9	6.2	0.013	0.002	Free Surface	0.045	No	6	No
65	433701	431309	6	43.6	8.6	0.013	0.093	Free Surface	0.181	No	6	No
650	454420	454421	6	141.1	15.3	0.013	0.006	Free Surface	0.052	No	6	No
651	433723	433722	6	66.6	3.0	0.013	0.004	Free Surface	0.062	No	6	No
652	454408	454409	6	107.2	30.0	0.013	0.110	Free Surface	0.256	No	6	No
653	454416	454417	6	67.2	3.7	0.013	0.000	Free Surface	0.037	No	6	No
654	454421	454423	6	124.9	14.7	0.013	0.009	Free Surface	0.082	No	6	No
655	454409	454410	6	107.8	2.0	0.013	0.111	Free Surface	0.277	No	6	No
656	433721	433720	6	115.9	1.7	0.013	0.006	Free Surface	0.076	No	6	No
658	454423	454424	6	123.9	10.1	0.013	0.010	Free Surface	0.089	No	6	No
659	454422	454421	6	332.2	3.2	0.013	0.002	Free Surface	0.049	No	6	No
66	431309	431302	6	55.1	38.3	0.013	0.093	Free Surface	0.464	No	6	No
660	433716	433715	6	84.8	0.9	0.013	0.071	Free Surface	0.307	No	6	No
661	453608	453609	6	356.0	0.2	0.013	0.213	Free Surface	0.881	No	6	Yes
662	453607	453608	6	252.0	0.6	0.013	0.205	Free Surface	0.818	No	6	Yes
663	433709	433708	6	141.6	7.8	0.013	0.007	Free Surface	0.254	No	6	No
664	433708	433704	6	130.7	0.4	0.013	0.078	Free Surface	0.307	No	6	No
665	433704	433703	6	72.5	19.5	0.013	0.086	Free Surface	0.150	No	6	No
666	433727LH	433603	6	142.8	6.6	0.013	0.007	Free Surface	0.130	No	6	No
667	431303	431309A	6	105.2	15.9	0.013	0.108	Free Surface	0.186	No	6	No
668	433601	431303	6	221.0	8.8	0.013	0.097	Free Surface	0.196	No	6	No
669	433603	433602	6	217.0	6.7	0.013	0.079	Free Surface	0.192	No	6	No
67	431302	431301	8	253.2	1.8	0.013	0.615	Free Surface	0.510	No	8	No
670	433602	433601	6	419.0	10.2	0.013	0.088	Free Surface	0.196	No	6	No
671	433604	433603	6	139.1	2.4	0.013	0.071	Free Surface	0.225	No	6	No
672	431520	431521	6	107.5	5.8	0.013	0.011	Free Surface	0.099	No	6	No
673	454432	453401	6	438.5	59.3	0.013	0.136	Free Surface	0.195	No	6	No
674	431519	431520	6	113.4	10.7	0.013	0.009	Free Surface	0.071	No	6	No
675	431304	431303	6	167.3	11.8	0.013	0.010	Free Surface	0.125	No	6	No
676	433405	433406	8	128.3	5.1	0.013	0.860	Free Surface	0.577	No	8	No
677	433802	433803	6	132.5	2.8	0.013	0.004	Free Surface	0.058	No	6	No
678	454404	454405	6	230.2	1.0	0.013	0.094	Free Surface	0.304	No	6	No
679	454405	454406	6	147.9	5.5	0.013	0.096	Free Surface	0.226	No	6	No
68	431513	431512	8	176.8	4.0	0.013	0.618	Free Surface	0.452	No	8	No
680	454406	454407	6	166.9	2.6	0.013	0.098	Free Surface	0.238	No	6	No
681	433420	433420	6	125.6	3.2	0.013	0.014	Free Surface	0.211	No	6	No
682	431402	431403	6	247.8	3.8	0.013	0.061	Free Surface	0.236	No	6	No
683	433808	431308	6	158.4	6.2	0.013	0.034	Free Surface	0.157	No	6	No
684	442505	442516	6	121.6	2.8	0.013	0.003	Free Surface	0.046	No	6	No
685	452110	452108	6	278.2	55.7	0.013	0.055	Free Surface	0.100	No	6	No
686	442303	442302	6	149.9	9.9	0.013	0.034	Free Surface	0.122	No	6	No
687	431818	431817	6	56.5	9.3	0.013	0.048	Free Surface	0.177	No	6	No
688	431819	431818	6	153.0	4.2	0.013	0.027	Free Surface	0.137	No	6	No
689	442321LH	442320	6	94.6	24.5	0.013	0.004	Free Surface	0.041	No	6	No
69	431512	431511	8	154.5	3.2	0.013	0.622	Free Surface	0.471	No	8	No
690	451403	451703	18	219.8	3.5	0.013	3.811	Free Surface	0.375	No	18	No
691	451402	451402	24	403.1	1.2	0.013	3.566	Free Surface	0.319	No	24	No
692	451402	451402A	18	121.9	2.2	0.013	3.567	Free Surface	0.409	No	18	No
693	451406	451701	10	17.5	26.0	0.013	0.133	Free Surface	0.277	No	10	No
694	433111	433110	6	87.8	6.5	0.013	0.040	Free Surface	0.142	No	6	No
696	433803	433805	6	54.1	8.1	0.013	0.007	Free Surface	0.139	No	6	No
697	431517	431516	6	193.9	11.5	0.013	0.004	Free Surface	0.064	No	6	No
698	453710	453712	10	122.5	10.4	0.013	1.026	Free Surface	0.322	No	10	No
699	431416LH	431415	6	163.3	9.6	0.013	0.004	Free Surface	0.094	No	6	No
7	454910	454904	6	175.0	2.0	0.013	0.008	Free Surface	0.202	No	6	No
70	431511	431510	8	93.5	3.1	0.013	0.622	Free Surface	0.466	No	8	No
700	431523	431415	6	265.3	6.0	0.013	0.021	Free Surface	0.126	No	6	No
701	433805	433806	6	143.6	0.7	0.013	0.030	Free Surface	0.188	No	6	No
702	431305	431306	6	259.1	1.5	0.013	0.002	Free Surface	0.059	No	6	No
703	431806	433808	6	152.2	3.3	0.013	0.033	Free Surface	0.145	No	6	No
704	431403	431404	6	360.8	1.6	0.013	0.069	Free Surface	0.249	No	6	No

G1. Model Results for Existing PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
705	431308	431307	6	162.4	1.8	0.013	0.034	Free Surface	0.176	No	6	No
706	431306	431307	6	290.4	2.4	0.013	0.006	Free Surface	0.122	No	6	No
707	431307	431401	6	277.1	4.0	0.013	0.043	Free Surface	0.155	No	6	No
708	431401	431401A	6	69.3	8.3	0.013	0.043	Free Surface	0.142	No	6	No
709	431409	431405	6	281.9	3.6	0.013	0.075	Free Surface	0.236	No	6	No
71	431505	431504	8	110.2	3.5	0.013	0.630	Free Surface	0.495	No	8	No
710	431006	431007	6	67.6	1.5	0.013	0.012	Free Surface	0.114	No	6	No
711	431005	431006	6	106.2	1.6	0.013	0.012	Free Surface	0.112	No	6	No
712	431407	431406	6	61.4	3.9	0.013	0.003	Free Surface	0.161	No	6	No
713	433418	433419	6	272.4	0.4	0.013	0.014	Free Surface	0.147	No	6	No
715	442507	442506	6	55.6	4.8	0.013	0.001	Free Surface	0.032	No	6	No
716	431806	431705	6	65.2	7.2	0.013	0.360	Backwater	1.000	No	6	Yes
717	432006	431804	6	201.2	7.0	0.013	0.268	Free Surface	0.343	No	6	No
718	432903	433108	6	136.3	40.6	0.013	0.098	Free Surface	0.142	No	6	No
719	432904LH	432905	6	224.4	2.7	0.013	0.002	Free Surface	0.049	No	6	No
72	451701	451702	10	204.2	2.4	0.013	0.988	Free Surface	0.602	No	10	No
721	442302	442301	6	191.6	8.2	0.013	0.035	Free Surface	0.134	No	6	No
723	LH433214	LH433213	6	126.2	3.1	0.013	0.003	Free Surface	0.070	No	6	No
724	LH433213	442504	6	142.0	0.4	0.013	0.003	Free Surface	0.077	No	6	No
726	431708	431707	6	290.9	5.5	0.013	0.492	Free Surface	0.773	No	6	Yes
727	431706	431705	6	116.6	1.5	0.013	0.469	Exceeds Capacity	1.000	No	6	Yes
728	431707	431706	6	107.0	2.5	0.013	0.503	Backwater	1.000	No	6	Yes
73	431506	431505	6	177.2	2.3	0.013	0.629	Free Surface	0.807	No	6	Yes
730	440304	440303	6	97.7	8.9	0.013	0.033	Free Surface	0.133	No	6	No
731	431705	431704	6	172.7	3.2	0.013	0.759	Exceeds Capacity	1.000	No	6	Yes
732	431713	431711	6	276.5	7.1	0.013	0.082	Free Surface	0.274	No	6	No
733	431704	431703	6	71.3	4.6	0.013	0.705	Backwater	1.000	No	6	Yes
734	442004	441714	8	302.8	0.8	0.013	0.145	Free Surface	0.280	No	8	No
735	402617LH	442626	6	211.4	0.9	0.013	0.035	Free Surface	0.196	No	6	No
736	441407	441417A	6	194.7	3.5	0.013	0.022	Free Surface	0.138	No	6	No
737	442316	442504	6	47.7	10.5	0.013	0.023	Free Surface	0.097	No	6	No
738	452816LH	452817	6	207.0	9.0	0.013	0.006	Free Surface	0.079	No	6	No
739	442312	442313	6	44.4	24.1	0.013	0.004	Free Surface	0.046	No	6	No
74	431502	431501	8	219.2	2.6	0.013	0.784	Free Surface	0.584	No	8	No
740	442313	442314	6	157.6	4.7	0.013	0.005	Free Surface	0.062	No	6	No
741	431824	431822	6	86.0	2.2	0.013	0.002	Free Surface	0.041	No	6	No
742	431823	431822	6	54.6	7.1	0.013	0.002	Free Surface	0.037	No	6	No
743	431812	431811	6	103.5	22.7	0.013	0.015	Free Surface	0.082	No	6	No
744	442315	442316	6	131.2	36.9	0.013	0.021	Free Surface	0.084	No	6	No
745	442314	442315	6	162.5	11.6	0.013	0.010	Free Surface	0.067	No	6	No
746	431828	431829	6	74.0	0.9	0.013	0.017	Free Surface	0.169	No	6	No
747	431827	431828	6	75.4	0.9	0.013	0.016	Free Surface	0.147	No	6	No
748	431826	431827	6	75.8	0.9	0.013	0.012	Free Surface	0.136	No	6	No
749	431822	431821	6	127.7	23.0	0.013	0.005	Free Surface	0.062	No	6	No
75	431501	433401	8	205.2	2.9	0.013	0.843	Free Surface	0.560	No	8	No
750	431811	431810	6	110.4	7.7	0.013	0.020	Free Surface	0.123	No	6	No
751	442317	442315	6	115.6	1.2	0.013	0.009	Free Surface	0.090	No	6	No
752	431825	431826	6	127.7	0.9	0.013	0.011	Free Surface	0.126	No	6	No
753	431821	431825	6	45.2	3.3	0.013	0.009	Free Surface	0.103	No	6	No
754	431809	431808	6	64.1	4.7	0.013	0.035	Free Surface	0.131	No	6	No
755	431817	431816	6	47.4	2.7	0.013	0.050	Free Surface	0.176	No	6	No
756	431816	431814	6	171.5	14.2	0.013	0.055	Free Surface	0.134	No	6	No
757	442319	442318	6	63.7	15.7	0.013	0.001	Free Surface	0.035	No	6	No
758	431820	431819	6	205.5	2.0	0.013	0.005	Free Surface	0.099	No	6	No
759	433208	433209	6	82.7	2.0	0.013	0.027	Free Surface	0.159	No	6	No
76	431410	431503	6	200.3	32.6	0.013	0.157	Free Surface	0.428	No	6	No
760	431808	431807	6	63.3	22.7	0.013	0.041	Free Surface	0.132	No	6	No
762	431807	431805	6	81.5	4.9	0.013	0.043	Free Surface	0.157	No	6	No
763	433209	433210	6	162.4	3.6	0.013	0.039	Free Surface	0.203	No	6	No
764	432920	432909	6	126.0	3.1	0.013	0.083	Free Surface	0.288	No	6	No
765	432907	432908	6	364.0	6.4	0.013	0.011	Free Surface	0.098	No	6	No
766	452820	452821	6	77.4	10.4	0.013	0.043	Free Surface	0.136	No	6	No
767	442320	442322	6	96.5	15.1	0.013	0.005	Free Surface	0.052	No	6	No
768	433103	433202	6	137.4	12.1	0.013	0.071	Free Surface	0.216	No	6	No
769	442336	442322	6	87.6	6.4	0.013	0.003	Free Surface	0.051	No	6	No
77	431508	431508	8	157.1	3.0	0.013	0.624	Backwater	1.000	No	8	Yes
770	432906	432907	6	211.8	0.9	0.013	0.008	Free Surface	0.095	No	6	No
771	431801	431710	6	90.1	9.6	0.013	0.282	Free Surface	0.350	No	6	No
772	431803	431802	6	86.3	6.2	0.013	0.322	Free Surface	0.397	No	6	No
773	431804	431803	6	46.4	12.7	0.013	0.269	Free Surface	0.369	No	6	No
774	VMH_21	440301	6	74.7	1.3	0.013	0.010	Free Surface	0.123	No	6	No
775	431710	431709	6	62.8	7.9	0.013	0.282	Free Surface	0.403	No	6	No
776	454506	454505	6	144.8	5.7	0.013	0.000	Free Surface	0.011	No	6	No
777	454103	454104	6	338.6	0.7	0.013	0.023	Free Surface	0.178	No	6	No
778	454102	454103	6	424.2	0.3	0.013	0.012	Free Surface	0.181	No	6	No
779	454502	454501	6	212.6	1.4	0.013	0.082	Free Surface	0.305	No	6	No
78	431508	431507	8	33.0	1.5	0.013	0.625	Backwater	1.000	No	8	Yes
780	454101	454006	6	220.1	0.8	0.013	0.011	Free Surface	0.124	No	6	No
781	454101	454102	6	308.6	5.0	0.013	0.000	Free Surface	0.083	No	6	No
782	454004	454003	6	299.3	5.9	0.013	0.059	Free Surface	0.199	No	6	No
783	454201	454217	6	179.8	10.4	0.013	0.124	Free Surface	0.306	No	6	No
784	454403	454404	6	193.1	11.3	0.013	0.010	Free Surface	0.223	No	6	No
785	454501	454404	6	181.0	1.1	0.013	0.082	Free Surface	0.349	No	6	No
786	454410	454411	6	138.9	12.0	0.013	0.112	Free Surface	0.260	No	6	No
787	453609	453610	6	233.6	0.6	0.013	0.224	Free Surface	0.549	No	6	No
788	431516	431402	6	305.2	3.8	0.013	0.011	Free Surface	0.142	No	6	No
789	431007	431008	6	81.2	1.5	0.013	0.012	Free Surface	0.111	No	6	No
79	431804	433803	6	71.4	11.1	0.013	0.002	Free Surface	0.044	No	6	No
790	432815	432923A	6	201.9	7.4	0.013	0.048	Free Surface	0.238	No	6	No
791	432814	432815	6	31.5	5.1	0.013	0.038	Free Surface	0.148	No	6	No
792	432813LH	432814	6	57.0	11.0	0.013	0.001	Free Surface	0.082	No	6	No
793	432812	432913	6	300.5	7.0	0.013	0.109	Free Surface	0.231	No	6	No
794	431810	431809	6	116.3	3.1	0.013	0.030	Free Surface	0.152	No	6	No
795	442318	442317	6	114.2	4.9	0.013	0.004	Free Surface	0.081	No	6	No
796	431805	431801	6	160.1	50.7	0.013	0.136	Free Surface	0.248	No	6	No
797	433210	433101	6	157.0	2.2	0.013	0.053	Free Surface	0.174	No	6	No
798	442322	VMH_21	6	68.4	15.3	0.013	0.010	Free Surface	0.082	No	6	No
799	432922	432919	6	304.6	8.1	0.013	0.016	Free Surface	0.148	No	6	No
8	454903	454904	6	216.0	9.1	0.013	0.310	Free Surface	0.362	No	6	No
80	433422	433412	6	195.6	60.1	0.013	0.108	Free Surface	0.379	No	6	No
800	432919	432920	6	177.3	5.2	0.013	0.080	Free Surface	0.227	No	6	No
801	432912	432911	6	244.3	4.7	0.013	0.169	Free Surface	0.297	No	6	No
802	440301	432912	6	115.5	11.2	0.013	0.052	Free Surface	0.234	No	6	No
803	432905	432906	6	198.5	3.0	0.013	0.004	Free Surface	0.085	No	6	No
805	431711	431709	6	50.9	4.0	0.013	0.193	Free Surface	0.400	No	6	No
806	440302	440301	6	218.3	7.5	0.013	0.039	Free Surface	0.139	No	6	No
807	431712	431711	6	31.6	5.5	0.013	0.112	Free Surface	0.299	No	6	No
808	432913	432912	6	82.8	7.0	0.013	0.117	Free Surface	0.281	No	6	No
809	433108	433107	6	34.2	51.9	0.013	0.104	Free Surface	0.141	No	6	No
81	454003	454002	6	240.9	4.0	0.013	0.072	Free Surface	0.195	No	6	No
810	451826A	451826	6	29.5	0.8	0.013	0.009	Free Surface	0.130	No	6	No
811	440203	440202	6	186.2	1.7	0.013	0.020	Free Surface	0.142	No	6	No
812	451905	451706	18	376.2	1.0	0.013	3.812	Free Surface	0.484	No	18	No
813	440317	440203	6	125.5	4.1	0.013	0.007	Free Surface	0.104	No	6	No
814	431719	431720	6	170.8	27.7	0.013	0.117	Free Surface	0.583	No	6	No
815	432811	432812	6	240.8	8.3	0.013	0.101	Free Surface	0.219	No	6	No
816	451706	451403	18	102.5	4.3	0.013	3.811	Free Surface	0.365	No	18	No
817	431718	431719	8	111.0	11.7	0.013	0.107	Free Surface	0.133	No	8	No
818	431716	431718	8	231.2	7.7	0.013	0.105	Free Surface	0.146	No	8	No
819	451418	451406	6	280.0	3.8	0.013	0.009	Free Surface	0.119	No	6	No
82	454907	454908	6	252.5	12.1	0.013	0.293	Free Surface	0.315	No	6	No
820	451703	451704	18	126.1	1.9	0.013	3.811	Free Surface	0.445	No	18	No
821	431717	431716	6	212.5	10.0	0.013	0.047	Free Surface	0.170	No	6	No
822	432817	432816	6	300.5	9.8	0.013	0.005	Free Surface	0.064	No	6	No
823	433118	431714	6	220.8	5.1	0.013	0.035	Free Surface	0.147	No	6	No
824	432809	432814	6	370.6	8.1	0.013	0.034	Free Surface	0.136	No	6	No
825	432808	432809	6	24.7	3.4	0.013	0.025	Free Surface	0.129	No	6	No
826	451701	451702	18	247.9	2.9	0.013	3.684	Free Surface	0.399	No	18	No
827	451702	451705	12	45.5	0.2	0.013	0.000	Free Surface	0.000	No	12	No
828	431611	431610	6	145.4	1.0	0.013	0.580	Exceeds Capacity	1.000	No	6	Yes
829	431701	431611	6	118.9	2.9	0.013	0.641	Exceeds Capacity	1.000	No	6	Yes
83	453904	453903	6	367.8	1.6	0.013	0.006	Free Surface	0.088	No	6	No
830	440204	440203	6	182.2	3.1	0.013	0.010	Free Surface	0.113	No	6	No
831	433112	433111	6	141.9	7.9	0.013	0.030	Free Surface	0.130	No	6	No
832	431636	431717	6	225.2	1.6	0.013	0.040	Free Surface	0.178	No	6	No
833	451421	451406	8	164.9	3.1	0.013	0.124	Free Surface	0.172	No	8	No
834	432602	432601	6	237.0	7.8	0.013	0.009	Free Surface	0.096	No	6	No
835	432606LH	432605	6	103.9	1.2	0.013	0.005	Free Surface	0.091	No	6	No
836	440110	440109	6	152.4	28.2	0.013	0.006	Free Surface	0.085	No	6	No
837	442103	442105	6	200.8	5.8	0.013	0.033	Free Surface	0.131	No	6	No
838	432513	432512	6	173.5	1.6	0.013	0.005	Free Surface	0.130	No	6	No
839	432514LH	432513	6	92.7	11.3	0.013	0.003	Free Surface	0.056	No	6	No
84	453903	453902	6	314.1	5.8	0.013	0.017	Free Surface	0.098	No	6	No
840	433117	433118	6	197.9	0.8	0.013	0.019	Free Surface	0.156	No	6	No
841	432806	432807	6	174.7	1.3	0.013	0.021	Free Surface	0.133	No	6	No
842	432807	432808	6	119.6	9.4	0.013	0.024	Free Surface	0.117	No	6	No
843	431614	431613	6	128.3	14.7	0.013	0.241	Free Surface	0.260	No	6	No
844	431643	431614	6	103.9	25.6	0.013	0.208	Free Surface	0.264	No	6	No
845	432810	432811	8	282.6	4.1	0.013	0.098	Free Surface	0.164	No	8	No
846	451407	451421	8	102.8	10.4	0.013	0.121	Free Surface	0.188	No	8	No
847	433116LH	433117	6	97.2	17.5	0.013	0.009	Free Surface	0.113	No	6	No
848	431637	431636	6	143.5	11.3	0.013	0.242	Free Surface	0.273	No	6	No
849	431638	431637	6	288.2	13.1	0.013	0.231	Free Surface	0.306	No	6	No
85	433726	433725	6	187.2	3.0	0.013	0.002	Free Surface	0.046	No	6	No
850	431615	431614	6	57.6	21.7	0.013	0.032	Free Surface	0.197	No	6	No
851	431634	431615	6	121.9	2.5	0.013	0.010	Free Surface	0.093	No	6	No
852	431616	431615	6	63.6	52.7	0.013	0.019	Free Surface	0.078	No	6	No
853	431610	431609	6	322.0	3.8	0.013	0.646	Backwater	1.000	No	6	Yes
854	431619LH	431618	6	75.8	2.5	0.013	0.004	Free Surface	0.071	No	6	No
855	431617	431616	6	72.3	13.7	0.013	0.016	Free Surface	0.071	No	6	No
856	431618	431617	6	119.8	4.2	0.013	0.011	Free Surface	0.083	No	6	No
857	451702	451702A	18	330.6	1.8	0.013	3.682	Free Surface	0.443	No	18	No
858	433115LH	433114	6	167.6	10.2	0.013	0.007	Free Surface	0.098	No	6	No
859	433114	433113	6	175.3	1.1	0.013	0.014	Free Surface	0.118	No	6	No
86	453905	453606	6	360.9	2.8	0.013	0.181	Free Surface	0.343	No	6	No
860	432803LH	432802	6	151.0	11.8	0.013	0.004	Free Surface	0.099	No	6	No
861	432725	432726	6	366.0	5.3	0.013	0.065	Free Surface	0.194	No	6	No
862	440212	440211	6	293.4	5.1	0.013	0.009	Free Surface	0.158	No	6	No
863	431620LH	431617	6	98.6	6.9	0.013	0.002	Free Surface	0.058	No	6	No
864	433006	432724	6	104.2	2.2	0.013	0.057	Free Surface	0.204	No	6	No
865	432726	432728	6	137.9	6.1	0.013	0.076	Free Surface	0.195	No	6	No
866	433007LH	433008	6	176.9	2.8	0.013	0.008	Free Surface	0.129	No	6	No
867	432730	432728	6	152.4	8.0	0.013	0.007	Free Surface	0.124	No	6	No
868	433009	433008	6	85.0	13.3	0.013	0.022	Free Surface	0.133	No	6	No
869	433022	431640	6	50.7	9.8	0.013	0.008	Free Surface	0.151	No	6	No
87	454810	454801	6	173.1	1.3	0.013	0.009	Free Surface	0.226	No	6	No
870	433012	433015	6	350.4	9.0	0.013	0.084	Free Surface	0.214	No	6	No
871	433008	433012	6	255.7	1.9	0.013	0.034	Free Surface	0.183	No	6	No
872	432737	432722	6	103.5	0.3	0.013	0.005	Free Surface	0.107	No	6	No
873	432722	432721	6	43.4	1.4	0.013	0.009	Free Surface	0.095	No	6	No
874	432723	433006	6	177.6	9.3	0.013	0.003	Free Surface	0.134	No	6	No

G1. Model Results for Existing PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
875	433020	433009	6	93.5	26.1	0.013	0.014	Free Surface	0.076	No	6	No
876	433011	433010	6	111.5	2.5	0.013	0.006	Free Surface	0.069	No	6	No
877	433010	433020	6	18.9	14.0	0.013	0.010	Free Surface	0.061	No	6	No
878	432729	432730	6	160.1	4.1	0.013	0.003	Free Surface	0.052	No	6	No
879	433021LH	433022	6	126.4	2.7	0.013	0.004	Free Surface	0.059	No	6	No
88	454908	454801	6	214.2	17.7	0.013	0.289	Free Surface	0.320	No	6	No
880	432716	432719	6	178.8	8.2	0.013	0.058	Free Surface	0.205	No	6	No
881	432717	432716	6	59.5	16.6	0.013	0.012	Free Surface	0.112	No	6	No
882	432626	440211	6	295.2	6.2	0.013	0.100	Free Surface	0.233	No	6	No
883	432712	432715	6	135.2	9.2	0.013	0.033	Free Surface	0.130	No	6	No
884	433013	433013A	6	106.2	14.0	0.013	0.029	Free Surface	0.107	No	6	No
885	433003	433004	6	121.0	1.7	0.013	0.045	Free Surface	0.225	No	6	No
886	432715	432716	6	70.5	7.9	0.013	0.044	Free Surface	0.151	No	6	No
887	432719	432720	6	240.3	1.4	0.013	0.059	Free Surface	0.267	No	6	No
888	433004	433005	6	192.1	1.0	0.013	0.047	Free Surface	0.274	No	6	No
889	433005	433006	6	352.0	0.6	0.013	0.051	Free Surface	0.270	No	6	No
89	433725	433724	6	197.7	1.0	0.013	0.004	Free Surface	0.055	No	6	No
890	432732	432731	6	141.5	1.4	0.013	0.010	Free Surface	0.113	No	6	No
891	432614	432517	6	149.7	9.7	0.013	0.007	Free Surface	0.072	No	6	No
892	432516	432515	6	159.5	4.8	0.013	0.062	Free Surface	0.189	No	6	No
893	432214	432209	6	87.4	13.2	0.013	0.008	Free Surface	0.095	No	6	No
894	432312	432311	6	251.3	5.7	0.013	0.025	Free Surface	0.113	No	6	No
895	432615LH	432616	6	160.8	11.3	0.013	0.003	Free Surface	0.038	No	6	No
896	432619LH	432619	6	108.3	15.5	0.013	0.006	Free Surface	0.090	No	6	No
897	432321LH	432320	6	179.0	12.7	0.013	0.004	Free Surface	0.051	No	6	No
898	432306	432305	6	167.8	7.4	0.013	0.065	Free Surface	0.183	No	6	No
899	432525	432524	8	262.1	11.8	0.013	0.010	Free Surface	0.050	No	8	No
9	431521	431522	6	199.5	1.9	0.013	0.015	Free Surface	0.137	No	6	No
90	453902	453901	6	254.9	13.5	0.013	0.028	Free Surface	0.108	No	6	No
900	432320	432319	6	148.8	17.8	0.013	0.011	Free Surface	0.063	No	6	No
901	441310	441311	6	168.5	1.2	0.013	0.012	Free Surface	0.125	No	6	No
902	432319	432318	6	82.7	18.5	0.013	0.013	Free Surface	0.077	No	6	No
903	432522	432521	8	236.5	22.5	0.013	0.018	Free Surface	0.054	No	8	No
904	432223LH	432216	6	155.4	46.0	0.013	0.005	Free Surface	0.047	No	6	No
905	433016	431640	6	301.3	1.1	0.013	0.103	Free Surface	0.314	No	6	No
906	431641LH	431642	8	192.8	4.4	0.013	0.055	Free Surface	0.152	No	8	No
907	431642	433016	6	63.1	4.1	0.013	0.092	Free Surface	0.311	No	6	No
908	432711	432712	6	85.3	6.6	0.013	0.028	Free Surface	0.118	No	6	No
909	432713	432712	6	160.7	7.5	0.013	0.005	Free Surface	0.084	No	6	No
91	453605	453606	6	299.5	0.7	0.013	0.010	Free Surface	0.210	No	6	No
910	432720	432625	6	130.4	1.2	0.013	0.061	Free Surface	0.239	No	6	No
911	432625	432626	6	156.3	9.2	0.013	0.092	Free Surface	0.210	No	6	No
912	432718	432717	6	218.7	4.5	0.013	0.008	Free Surface	0.068	No	6	No
913	431606	431605	6	106.3	3.4	0.013	0.741	Exceeds Capacity	1.000	No	6	Yes
914	431605	431604	6	124.5	5.6	0.013	0.695	Backwater	1.000	No	6	Yes
915	433019	433019WYE	6	100.9	7.6	0.013	0.006	Free Surface	0.071	No	6	No
917	432730	432711	6	165.3	2.4	0.013	0.024	Free Surface	0.132	No	6	No
918	432603	432602	6	99.3	4.6	0.013	0.006	Free Surface	0.064	No	6	No
919	432624	432625	6	173.2	9.0	0.013	0.030	Free Surface	0.155	No	6	No
92	450917	450810	6	146.0	1.0	0.013	0.013	Free Surface	0.372	No	6	No
920	433014LH	433013	6	288.3	7.0	0.013	0.013	Free Surface	0.090	No	6	No
921	432405	432404	6	141.1	2.1	0.013	0.009	Free Surface	0.089	No	6	No
922	432404	433019WYE	6	119.0	21.6	0.013	0.025	Free Surface	0.086	No	6	No
923	433002	433003	6	299.6	5.0	0.013	0.040	Free Surface	0.180	No	6	No
924	432708	432709	6	164.8	5.8	0.013	0.011	Free Surface	0.086	No	6	No
925	432709	432710	6	149.9	7.0	0.013	0.018	Free Surface	0.120	No	6	No
926	432403	432404	6	307.1	1.5	0.013	0.008	Free Surface	0.091	No	6	No
927	432707LH	432708	6	130.6	1.5	0.013	0.005	Free Surface	0.075	No	6	No
928	432623	432624	6	200.6	10.4	0.013	0.026	Free Surface	0.109	No	6	No
929	432622	432623	6	121.5	10.6	0.013	0.023	Free Surface	0.100	No	6	No
93	431011	431106	6	277.0	2.7	0.013	0.009	Free Surface	0.105	No	6	No
930	432621	432622	6	233.6	0.9	0.013	0.021	Free Surface	0.140	No	6	No
931	433001	433002	6	160.6	0.9	0.013	0.031	Free Surface	0.182	No	6	No
932	432731	432621	6	160.0	1.8	0.013	0.015	Free Surface	0.152	No	6	No
933	432601	432516	6	88.0	17.9	0.013	0.051	Free Surface	0.157	No	6	No
934	432314	432313	6	140.6	5.3	0.013	0.004	Free Surface	0.061	No	6	No
935	432517	432516	6	140.2	2.2	0.013	0.008	Free Surface	0.138	No	6	No
936	432609	432608	6	23.2	23.0	0.013	0.006	Free Surface	0.079	No	6	No
937	432608	432607	6	201.2	4.0	0.013	0.021	Free Surface	0.117	No	6	No
938	443314	440736	6	190.1	2.6	0.013	0.054	Free Surface	0.210	No	6	No
939	432706LH	432705	6	232.5	5.3	0.013	0.005	Free Surface	0.058	No	6	No
94	431008	431013	6	234.9	3.0	0.013	0.013	Free Surface	0.090	No	6	No
940	432610	432608	6	125.2	1.3	0.013	0.013	Free Surface	0.121	No	6	No
941	432701	433001	6	320.7	0.5	0.013	0.028	Free Surface	0.222	No	6	No
942	432613A	432613	6	86.0	4.0	0.013	0.000	Free Surface	0.021	No	6	No
943	432515	432512	6	131.6	5.7	0.013	0.067	Free Surface	0.188	No	6	No
944	432628	432518	6	25.1	10.5	0.013	0.004	Free Surface	0.056	No	6	No
946	432313	432312	6	240.1	10.5	0.013	0.012	Free Surface	0.095	No	6	No
947	432324	432312	6	123.1	31.5	0.013	0.005	Free Surface	0.077	No	6	No
948	432702	432701	6	108.3	0.9	0.013	0.025	Free Surface	0.206	No	6	No
949	432703	432702	6	160.5	1.5	0.013	0.018	Free Surface	0.159	No	6	No
95	430711	430712	6	103.3	0.5	0.013	0.038	Free Surface	0.260	No	6	No
950	432705	432703	6	123.0	16.7	0.013	0.012	Free Surface	0.100	No	6	No
951	443412	443413	6	139.4	7.1	0.013	0.004	Free Surface	0.049	No	6	No
952	440609	440607	6	189.6	3.1	0.013	0.132	Free Surface	0.306	No	6	No
953	432733	432732	6	229.1	0.8	0.013	0.005	Free Surface	0.097	No	6	No
954	440725	440726	6	275.8	5.8	0.013	0.059	Free Surface	0.223	No	6	No
955	432704	432703	6	174.4	4.9	0.013	0.002	Free Surface	0.088	No	6	No
956	432734	432610	6	298.1	2.0	0.013	0.004	Free Surface	0.096	No	6	No
957	432518	432519	6	315.8	4.6	0.013	0.008	Free Surface	0.078	No	6	No
958	432327	432308	6	75.7	6.8	0.013	0.019	Free Surface	0.115	No	6	No
959	432311	432310	6	74.5	10.7	0.013	0.028	Free Surface	0.107	No	6	No
96	433316	433316A	6	110.3	2.5	0.013	0.016	Free Surface	0.268	No	6	No
960	432611	08C638M	6	262.8	2.8	0.013	0.008	Free Surface	0.081	No	6	No
961	432209	432208	6	190.2	19.8	0.013	0.065	Free Surface	0.158	No	6	No
962	440726	440727	6	219.2	1.1	0.013	0.061	Free Surface	0.262	No	6	No
963	432619	432618	6	87.3	1.0	0.013	0.011	Free Surface	0.097	No	6	No
964	432526LH	432525	8	192.3	10.7	0.013	0.005	Free Surface	0.039	No	8	No
965	432309	432308	6	129.8	13.3	0.013	0.043	Free Surface	0.128	No	6	No
966	432310	432309	6	76.5	19.9	0.013	0.040	Free Surface	0.116	No	6	No
967	432618	432617	6	129.5	25.2	0.013	0.013	Free Surface	0.061	No	6	No
968	432616	432617	6	146.4	8.2	0.013	0.003	Free Surface	0.102	No	6	No
969	432315	432212	8	156.8	56.7	0.013	0.036	Free Surface	0.069	No	8	No
97	431106	431107	6	142.3	2.8	0.013	0.020	Free Surface	0.144	No	6	No
970	432213	432212	6	48.1	68.0	0.013	0.003	Free Surface	0.067	No	6	No
971	440727	440728	6	132.7	7.1	0.013	0.136	Free Surface	0.266	No	6	No
972	432210	432209	6	260.3	14.1	0.013	0.053	Free Surface	0.136	No	6	No
973	VMH_20	08C649L	6	40.9	7.4	0.013	0.004	Free Surface	0.071	No	6	No
975	432211	432210	6	171.3	2.4	0.013	0.045	Free Surface	0.169	No	6	No
976	432212	432211	6	108.8	19.8	0.013	0.041	Free Surface	0.157	No	6	No
977	432530LH	432522	6	269.0	10.8	0.013	0.003	Free Surface	0.052	No	6	No
978	432523	432522	6	35.3	2.9	0.013	0.009	Free Surface	0.079	No	6	No
98	441014	06C236M	6	176.7	1.4	0.013	0.009	Free Surface	0.101	No	6	No
980	432215LH	432211	6	57.7	12.7	0.013	0.001	Free Surface	0.115	No	6	No
982	432206	432205	6	185.3	1.6	0.013	0.171	Free Surface	0.418	No	6	No
983	432216	432205	6	173.1	20.2	0.013	0.011	Free Surface	0.236	No	6	No
984	441109	441110	6	246.9	3.7	0.013	0.040	Free Surface	0.153	No	6	No
986	432303	432302	6	156.0	32.6	0.013	0.073	Free Surface	0.127	No	6	No
987	441930	441906	6	399.7	21.7	0.013	0.009	Free Surface	0.113	No	6	No
988	432318	432317	6	305.7	12.4	0.013	0.020	Free Surface	0.082	No	6	No
989	432317	432218	6	153.4	42.4	0.013	0.027	Free Surface	0.080	No	6	No
99	402711	402712	6	286.0	0.7	0.013	0.089	Free Surface	0.334	No	6	No
990	432302	432301	6	120.1	45.2	0.013	0.077	Free Surface	0.134	No	6	No
992	432205	432204	6	243.9	2.6	0.013	0.205	Free Surface	0.407	No	6	No
993	432218	432204	6	184.0	37.3	0.013	0.033	Free Surface	0.243	No	6	No
994	432301	432220	6	53.7	22.7	0.013	0.079	Free Surface	0.150	No	6	No
996	432203	432202	6	172.5	0.5	0.013	0.290	Free Surface	0.842	No	6	Yes
997	432219	432202	6	287.9	14.2	0.013	0.084	Free Surface	0.168	No	6	No
998	432202	HASKINS_WW	8	28.0	0.1	0.011	0.377	Free Surface	0.621	No	8	Yes
C-1030	433019WYE	431642	6	90.7	48.1	0.013	0.038	Free Surface	0.162	No	6	No
C-1148	431002	431005	6	308.1	1.5	0.013	0.008	Free Surface	0.102	No	6	No
C-1156	442503A	442503	8	122.5	4.0	0.013	0.335	Free Surface	0.315	No	8	No
C-1345	441311	441301	6	62.0	1.0	0.013	0.013	Free Surface	0.130	No	6	No
C-1512	402602	402502	6	305.7	3.1	0.013	0.005	Free Surface	0.394	No	6	No
C-1519	443219	443221B	8	241.1	1.9	0	0.010	Free Surface	0.079	No	8	No
C-1694	441212	441007	6	305.0	11.7	0.013	0.011	Free Surface	0.073	No	6	No
C-1703	490101	HASTINGS_WW	6	171.4	0.4	0.013	0.008	Free Surface	0.119	No	6	No
C-1730	441407A	441501	8	248.4	4.2	0.013	0.552	Free Surface	0.430	No	8	No
C-1764	403304	403305	8	404.0	1.2	0.013	0.126	Free Surface	0.631	No	8	No
C-185	454902	455001	6	223.2	13.3	0.013	0.005	Free Surface	0.095	No	6	No
C-1893	442606	442701	12	445.2	5.5	0.013	3.144	Free Surface	0.494	No	12	No
C-1972	440731	440729	6	265.5	9.1	0.013	0.005	Free Surface	0.245	No	6	No
C-1984	442116	441820	6	30.1	3.3	0.013	0.003	Free Surface	0.079	No	6	No
C-1986	441820	443604A	6	151.0	5.1	0.013	0.021	Free Surface	0.122	No	6	No
C-2013	441912	441910	6	208.6	14.0	0.013	0.037	Free Surface	0.141	No	6	No
C-2063	441019	441401	6	130.3	6.2	0.013	0.228	Free Surface	0.361	No	6	No
C-2124	443202A	443203	12	70.0	1.9	0.013	1.869	Free Surface	0.596	No	12	No
C-2190	403310	403310A	21	274.8	0.8	0.013	4.284	Free Surface	0.493	No	21	No
C-2191	403311	403319	6	253.9	0.4	0	0.017	Free Surface	0.205	No	6	No
C-2302	403108	403108A	6	143.3	1.4	0.013	0.043	Free Surface	0.221	No	6	No
C-234	433211	442504A	6	129.1	0.9	0.013	0.272	Free Surface	0.676	No	6	No
C-2361	403708	403709	21	70.7	1.5	0.013	4.321	Free Surface	0.412	No	21	No
C-238	403410	460101	27	435.9	0.1	0	5.161	Free Surface	0.638	No	27	No
C-2384	452007	45200BCO	6	255.3	12.5	0.013	0.050	Free Surface	0.117	No	6	No
C-2389	452821	452019	6	74.8	8.1	0.013	0.044	Free Surface	0.286	No	6	No
C-239	403423	403423D	21	283.8	0.4	0.013	5.971	Free Surface	0.920	No	21	Yes
C-2406	442503	442502	8	310.0	7.6	0.013	0.337	Free Surface	0.290	No	8	No
C-2424	453729	450118	12	241.8	11.4	0.013	3.109	Free Surface	0.441	No	12	No
C-2441	403330	403311	6	350.4	0.4	0	0.012	Free Surface	0.149	No	6	No
C-2442	403318	403312	21	299.6	0.6	0	4.303	Free Surface	0.455	No	21	No
C-2443	403319	403332	10	261.9	0.4	0.013	0.038	Free Surface	0.539	No	10	Yes
C-2476	450114	442624	12	237.2	5.4	0.013	3.116	Free Surface	0.548	No	12	No
C-2508	430725	430723	8	177.1	0.5	0.013	0.019	Free Surface	0.151	No	8	No
C-2514	430403	430403A	10	95.7	4.0	0.013	0.765	Free Surface	0.357	No	10	No
C-2526	453712	453729	12	52.5	9.6	0.013	1.209	Free Surface	0.279	No	12	No
C-2539	450118	450114	12	219.8	5.4	0.013	3.109	Free Surface	0.547	No	12	No
C-2562	404803A	403609	6	31.5	0.3	0.013	0.064	Free Surface	0.361	No	6	No
C-2563	VMH-92	403410	27	11.9	0.0	0.013	5.207	Free Surface	0.619	No	27	No
C-2564	403423	VMH-92	21	6.1	0.9	0.013	1.985	Free Surface	0.821	No	21	Yes
C-2565	450303	450101	8	333.2	3.5	0.013	0.298	Free Surface	0.307	No	8	No
C-2566	440117A	440118	6	97.5	0.3	0.013	0.012	Free Surface	0.127	No	6	No
C-2569	452818WYE	452819	6	120.3	10.7	0.013	0.041	Free Surface	0.135	No	6	No
C-2570	441909	441908	6	178.4	4.3	0.013	0.048	Free Surface	0.162	No	6	No
C-2572	451606	451615	12	7.7	2.1	0.01	0.218	Free Surface	0.171	No	12	No
C-2573	451615	451803D	12	241.7	1.5	0.013	0.218	Free Surface	0.378	No	12	No
C-2574	430607	430607A	8	19.8	1.2	0.013	0.001	Free Surface	0.017	No	8	No
C-2575	430605A	430605	8	21.4	0.6	0.013	0.250	Free Surface	0.447	No	8	No
C-2576	450302A	450303	8	143.1	2.4	0.013	0.270	Free Surface	0.316	No	8	No
C-2577	452008CO	452008BD	6	4.6	96.5	0.013	0.055	Free Surface	0.102	No	6	No
C-2578	452008BD	452008BDA	6	41.0	27.3	0.013	0.055	Free Surface	0.117	No	6	No
C-2579	452008BDA	452008BDB	6	33.4	30.7	0.013	0.056	Free Surface	0.115	No	6	No

G1. Model Results for Existing PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
C-2580	452008BDB	452009	6	9.9	12.9	0.013	0.056	Free Surface	0.139	No	6	No
C-2581	454606	454606A	6	497.9	0.1	0.013	0.019	Free Surface	0.281	No	6	No
C-2587	403703E	403703D	8	225.0	0.7	0	0.024	Free Surface	0.114	No	8	No
C-2588	403703D	403703C	8	105.0	0.7	0	0.023	Free Surface	0.137	No	8	No
C-2589	403703C	403703B	8	200.0	0.7	0	0.046	Free Surface	0.172	No	8	No
C-2590	403703B	403700K	8	300.0	0.7	0.013	0.049	Free Surface	0.185	No	8	No
C-2592	452712	452818WYE	6	46.0	10.7	0.013	0.024	Free Surface	0.113	No	6	No
C-2593	403423C	403700K	27	220.0	0.0	0.013	10.832	Free Surface	0.818	No	27	Yes
C-2594	441910	441909	6	39.7	4.3	0.013	0.047	Free Surface	0.174	No	6	No
C-2595	451802B	451802A	6	127.4	5.8	0.013	0.021	Free Surface	0.107	No	6	No
C-2596	451802C	451802B	6	159.9	5.8	0	0.006	Free Surface	0.080	No	6	No
C-2598	403605A	403605	6	80.0	0.2	0.013	0.030	Free Surface	0.318	No	6	No
C-2602	403108A	403109	6	35.8	1.4	0.013	0.048	Free Surface	0.264	No	6	No
C-2604	403310A	403318	18	128.1	0.8	0.013	4.303	Free Surface	0.613	No	18	No
C-2605	403317	403310A	10	40.8	1.5	0.013	0.013	Free Surface	0.061	No	10	No
C-2606	404804	404803A	8	106.4	0.4	0.013	0.036	Free Surface	0.248	No	8	No
C-2610	454506B	454406	6	89.4	2.4	0.013	0.001	Free Surface	0.062	No	6	No
C-2611	454506A	454506B	6	101.4	5.7	0.013	0.001	Free Surface	0.027	No	6	No
C-2612	454506	454506A	6	63.2	5.7	0.013	0.001	Free Surface	0.024	No	6	No
C-2615	455002	455003	6	198.3	2.6	0.013	0.089	Free Surface	0.294	No	6	No
C-2621	403709	403423	21	45.0	3.6	0.013	4.321	Free Surface	0.436	No	21	No
C-2624	450302	450302A	8	146.6	2.4	0.013	0.266	Free Surface	0.320	No	8	No
C-2627	430101	430210	6	239.2	11.7	0.013	0.396	Free Surface	0.432	No	6	No
C-2647	44140B	441518A	6	16.1	1.9	0.013	0.000	Free Surface	0.000	No	6	No
C-2658	431601	431602	10	68.3	1.8	0.013	0.783	Free Surface	0.447	No	10	No
C-2667	441409	441409B	6	124.6	0.9	0	0.078	Free Surface	0.310	No	6	No
C-2679	453715	453731	8	120.0	21.2	0.013	1.904	Free Surface	0.507	No	8	No
C-2727	451815	451815A	6	194.9	1.8	0.013	0.101	Free Surface	0.308	No	6	No
C-2728	403322	403304	6	218.3	1.6	0.013	0.013	Free Surface	0.115	No	6	No
C-2741	432401C	SAN_JUAN_WW	8	8.7	1.3	0.013	9.811	Exceeds Capacity	1.000	No	8	Yes
C-2746	432401	432401A	8	79.7	1.9	0.013	0.021	Free Surface	0.097	No	8	No
C-2747	432402	432401C	8	29.0	1.2	0.013	1.303	Exceeds Capacity	1.000	No	8	Yes
C-2758	443202	443202A	12	206.3	1.9	0.013	1.865	Free Surface	0.549	No	12	No
C-2786	403700B	403700C	18	55.0	0.3	0.013	0.382	Free Surface	0.221	No	18	No
C-2787	403700C	403700D	18	70.0	0.3	0.013	0.380	Free Surface	0.223	No	18	No
C-2788	403700D	403700E	18	305.0	0.3	0.013	0.388	Free Surface	0.228	No	18	No
C-2790	403700A	403700B	18	330.0	0.2	0.013	0.380	Free Surface	0.226	No	18	No
C-2792	403700E	403700F	18	140.0	0.3	0.013	0.385	Free Surface	0.211	No	18	No
C-2793	403700F	403700G	18	10.0	1.2	0.013	0.389	Free Surface	0.190	No	18	No
C-2794	403700G	403700H	18	290.0	0.3	0.013	0.388	Free Surface	0.226	No	18	No
C-2795	403700H	403700I	18	190.0	0.3	0.013	0.398	Free Surface	0.333	No	18	No
C-2796	403700J	403700K	18	20.0	1.5	0.013	0.469	Free Surface	0.538	No	18	No
C-2797	451815A	451810	6	24.8	9.1	0.013	0.101	Free Surface	0.205	No	6	No
C-2799	441931LH	441931	6	256.2	25.6	0.013	0.003	Free Surface	0.036	No	6	No
C-2806	454606A	454608	6	113.4	0.6	0.013	0.022	Free Surface	0.216	No	6	No
C-2813	442624	442624A	12	233.0	5.4	0.013	3.116	Free Surface	0.774	No	12	Yes
C-2814	442624A	442624B	12	113.6	0.8	0.013	3.117	Exceeds Capacity	1.000	No	12	Yes
C-2815	442624B	442624C	12	32.9	0.0	0.013	3.119	Free Surface	0.953	No	12	Yes
C-2816	442604	442624C	8	277.1	4.2	0.013	0.022	Free Surface	0.271	No	8	No
C-2817	442624C	442606	12	275.0	5.5	0.013	3.138	Free Surface	0.583	No	12	No
C-2818	442504A	442503A	6	24.0	4.1	0.013	0.272	Free Surface	0.421	No	6	No
C-2819	442504	442503A	8	27.0	4.0	0.013	0.063	Free Surface	0.226	No	8	No
C-2822	451507	451507A	6	25.5	10.9	0.013	0.017	Free Surface	0.083	No	6	No
C-2823	451507A	451611	6	121.0	10.9	0.013	0.017	Free Surface	0.093	No	6	No
C-2833	432401B	432401C	8	5.4	49.7	0.013	0.721	Free Surface	0.608	No	8	No
C-2834	432401A	432402	8	42.7	3.5	0.013	0.022	Free Surface	0.400	No	8	No
C-2840	403332	403305	10	8.2	1.3	0.013	1.756	Backwater	1.000	No	10	Yes
C-2847	453731	453729	10	61.2	21.2	0.013	1.904	Free Surface	0.372	No	10	No
C-2848	403605B	403605A	6	270.0	0.2	0.013	0.025	Free Surface	0.275	No	6	No
C-2853	460101	403416A	27	341.1	0.1	0.013	5.141	Free Surface	0.413	No	27	No
C-2855	441407	441407A	8	34.8	2.9	0.013	0.552	Free Surface	0.448	No	8	No
C-2856	430403A	431601	10	133.1	3.9	0.013	0.774	Free Surface	0.359	No	10	No
C-404	451409	451408	6	259.2	14.7	0.013	0.052	Free Surface	0.144	No	6	No
C-515	431102	430610	8	160.7	11.3	0.013	0.024	Free Surface	0.104	No	8	No
C-572	430402	430403	10	321.2	4.0	0.013	0.747	Free Surface	0.354	No	10	No
C-578	442607	442606	6	120.0	13.0	0.013	0.008	Free Surface	0.528	No	6	No
C-586	432910	433211	6	265.0	0.8	0.013	0.272	Free Surface	0.688	No	6	No
C-588	442713	442438	6	244.4	2.2	0.013	0.016	Free Surface	0.136	No	6	No
C-655	442603	442604	8	168.7	4.3	0.013	0.022	Free Surface	0.082	No	8	No
C-657	450208	450207	10	85.3	5.0	0.013	0.369	Free Surface	0.279	No	10	No
C-663	442502	442501	8	112.7	4.7	0.013	0.356	Free Surface	0.442	No	8	No
CDT-13	432617	OFALL-12	6	500.0	0.5	0.01	0.020	Free Surface	0.164	No	6	No
CDT-15	432533	OFALL-14	6	500.0	0.4	0.01	0.033	Free Surface	0.222	No	6	No
CDT-17	432502	OFALL-16	6	500.0	0.2	0.013	0.025	Free Surface	0.258	No	6	No
CDT-19	450103A	442701A	12	600.7	1.2	0.013	0.348	Free Surface	0.250	No	12	No
IEC_GM-100	442701	450417B	10	41.8	7.2	0.013	1.535	Free Surface	0.443	No	10	No
IEC_GM-102	450417B	450417A	10	321.5	4.3	0.013	1.535	Free Surface	0.513	No	10	No
IEC_GM-104	450417A	450417	10	192.9	6.6	0.013	1.535	Free Surface	0.454	No	10	No
IEC_GM-106	450417	450419	18	294.9	2.5	0.013	3.820	Free Surface	0.414	No	18	No
IEC_GM-110	441827	441827B	8	47.8	6.0	0.013	0.019	Free Surface	0.068	No	8	No
IEC_GM-112	441827B	443604A	8	129.8	8.3	0.013	0.019	Free Surface	0.064	No	8	No
IEC_GM-114	452406B	452403	6	101.1	0.1	0.01	0.009	Free Surface	0.678	No	6	Yes
IEC_GM-116	443221B	443221A	8	151.1	1.5	0.013	0.019	Free Surface	0.096	No	8	No
IEC_GM-120	IEC_MH-110	450211	8	141.0	11.7	0.013	0.321	Free Surface	0.245	No	8	No
IEC_GM-122	452405A	451810	8	271.0	0.2	0.013	0.179	Free Surface	0.524	No	8	Yes
IEC_GM-124	441502	441519	15	61.1	0.4	0.013	0.548	Free Surface	0.313	No	15	No
IEC_GM-126	441519	NORTH_ROAD_WW_N	15	22.4	0.6	0.013	1.124	Free Surface	0.402	No	15	No
IEC_GM-134	403609	403608	8	270.2	0.7	0.013	0.094	Free Surface	0.318	No	8	No

G2. Model Results for 2028 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
10	450804	450803	6	90.0	7.4	0.013	0.004	Free Surface	0.048	No	6	No
100	431206LH	431205	6	181.5	4.5	0.013	0.014	Free Surface	0.140	No	6	No
1000	432204	432203	6	146.2	4.6	0.013	0.264	Free Surface	0.701	No	6	Yes
1001	432220	432219	6	227.5	18.7	0.013	0.081	Free Surface	0.161	No	6	No
1003	441422	441421	6	283.2	2.1	0.013	0.195	Free Surface	0.425	No	6	No
1004	441516	441514A	6	258.8	7.6	0.013	0.004	Free Surface	0.062	No	6	No
1005	441421	441408	6	92.1	2.1	0.013	0.201	Free Surface	0.430	No	6	No
1006	441513	441512	6	300.4	6.8	0.013	0.002	Free Surface	0.040	No	6	No
1007	441512	441511	6	51.0	8.4	0.013	0.004	Free Surface	0.101	No	6	No
1008	441514	441511	6	125.0	11.5	0.013	0.023	Free Surface	0.126	No	6	No
1009	441518	441517	6	201.3	3.1	0.013	0.014	Free Surface	0.109	No	6	No
101	403106	403106A	6	33.3	4.6	0.013	0.024	Free Surface	0.133	No	6	No
1010	441501	441519	8	195.5	3.0	0.013	0.579	Free Surface	0.456	No	8	No
1011	402412	402506	6	277.5	0.4	0.013	0.012	Free Surface	0.174	No	6	No
1012	402411	402412	6	282.7	0.5	0.013	0.005	Free Surface	0.129	No	6	No
1013	450107	450106	6	139.3	15.6	0.013	0.010	Free Surface	0.060	No	6	No
1014	450801	450201	10	307.7	0.6	0.013	0.206	Free Surface	0.246	No	10	No
1015	450106	450104	6	44.3	6.9	0.013	0.016	Free Surface	0.138	No	6	No
1016	450101	450102	8	131.4	4.1	0.013	0.325	Free Surface	0.341	No	8	No
1017	433413	433414	8	287.0	4.2	0.013	0.993	Free Surface	0.599	No	8	No
1018	450214	450215	6	142.5	7.9	0.013	0.092	Free Surface	0.217	No	6	No
1019	433414	433415	8	72.8	4.4	0.013	0.995	Free Surface	0.546	No	8	No
102	431205	431204	6	323.1	7.5	0.013	0.079	Free Surface	0.191	No	6	No
1020	433415	433416	8	100.5	8.4	0.013	0.997	Free Surface	0.669	No	8	No
1021	453705	453706	10	225.9	1.9	0.013	1.017	Free Surface	0.463	No	10	No
1022	450211	450210	6	161.3	12.9	0.013	0.328	Free Surface	0.425	No	6	No
1023	450215	450202	6	184.0	6.2	0.013	0.106	Free Surface	0.424	No	6	No
1024	450104	450105	8	192.4	1.6	0.013	0.041	Free Surface	0.137	No	8	No
1025	453719	453718	8	351.5	13.9	0.013	0.023	Free Surface	0.067	No	8	No
1027	453718	453717	8	320.3	13.3	0.013	0.029	Free Surface	0.080	No	8	No
1028	454415	454414	6	220.9	5.7	0.013	0.003	Free Surface	0.044	No	6	No
1029	450504	450503	6	238.6	8.3	0.013	0.005	Free Surface	0.073	No	6	No
103	433313	433309	6	156.2	8.5	0.013	0.345	Free Surface	0.399	No	6	No
1030	450503	450610	6	365.1	13.0	0.013	0.027	Free Surface	0.153	No	6	No
1032	454424	454425	6	406.2	2.3	0.013	0.014	Free Surface	0.102	No	6	No
1033	454302	454304	8	326.9	9.5	0.013	0.117	Free Surface	0.158	No	8	No
1034	454425	454426	6	94.0	6.9	0.013	0.015	Free Surface	0.080	No	6	No
1035	450501	450222	6	127.1	7.7	0.013	0.015	Free Surface	0.098	No	6	No
1036	454305	454301	8	43.5	11.4	0.013	0.138	Free Surface	0.203	No	8	No
1037	454304	454301	8	51.9	6.2	0.013	0.117	Free Surface	0.207	No	8	No
1038	454301	450301	8	50.7	5.5	0.013	0.251	Free Surface	0.274	No	8	No
1039	450220	450219	6	94.8	15.4	0.013	0.009	Free Surface	0.076	No	6	No
104	431118LH	431117	6	233.4	10.1	0.013	0.004	Free Surface	0.075	No	6	No
1040	454427	454428	6	121.7	1.6	0.013	0.016	Free Surface	0.123	No	6	No
1041	450219	450218	6	165.2	13.9	0.013	0.025	Free Surface	0.128	No	6	No
1042	450222	450218	6	138.1	4.5	0.013	0.020	Free Surface	0.136	No	6	No
1043	450221	450220	6	78.4	2.8	0.013	0.006	Free Surface	0.066	No	6	No
1044	450301	450302	8	142.5	2.8	0.013	0.251	Free Surface	0.308	No	8	No
1045	450813	450812	6	150.7	17.5	0.013	0.034	Free Surface	0.136	No	6	No
1048	450203	450204	10	266.3	1.3	0.013	0.324	Free Surface	0.303	No	10	No
105	430717	NAUGHTON_WW	4	201.2	1.8	0.013	0.008	Free Surface	0.555	No	4	No
1050	450206	450205	10	142.9	1.9	0.013	0.388	Free Surface	0.319	No	10	No
1052	442441	442442	6	57.6	31.4	0.013	0.007	Free Surface	0.051	No	6	No
1053	442442	442443	6	11.0	23.5	0.013	0.012	Free Surface	0.068	No	6	No
1054	442443	442436	6	132.5	8.7	0.013	0.013	Free Surface	0.102	No	6	No
1055	431709	431708	6	161.0	10.2	0.013	0.479	Free Surface	0.498	No	6	No
1056	440420	440420A	6	73.6	8.6	0.013	0.002	Free Surface	0.049	No	6	No
1057	440422	440421	6	148.6	8.3	0.013	0.005	Free Surface	0.047	No	6	No
1058	443320	443321	6	170.1	6.3	0.013	0.105	Free Surface	0.230	No	6	No
1059	440106	440105	6	133.5	8.3	0.013	0.002	Free Surface	0.067	No	6	No
106	430504	430503	6	70.7	53.0	0.013	0.018	Free Surface	0.060	No	6	No
1060	440116	440431	6	138.3	26.6	0.013	0.244	Free Surface	0.244	No	6	No
1061	440836	440820	6	158.8	4.8	0.013	0.001	Free Surface	0.055	No	6	No
1062	440804	440802	6	85.1	3.2	0.013	0.007	Free Surface	0.082	No	6	No
1063	440820	440833	6	13.8	39.5	0.013	0.036	Free Surface	0.097	No	6	No
1064	440833	440829	6	79.2	17.2	0.013	0.036	Free Surface	0.113	No	6	No
1065	440828	440829	6	164.3	5.1	0.013	0.006	Free Surface	0.089	No	6	No
1067	440542	440543	6	121.8	5.3	0.013	0.052	Free Surface	0.155	No	6	No
1068	440530	440833	6	187.4	5.8	0.013	0.001	Free Surface	0.064	No	6	No
1069	440834	440804	6	103.0	8.2	0.013	0.007	Free Surface	0.068	No	6	No
107	430408	430407	6	98.1	11.6	0.013	0.262	Free Surface	0.294	No	6	No
1070	440541	440542	6	95.2	7.0	0.013	0.035	Free Surface	0.155	No	6	No
1071	441203	441204	6	239.6	10.9	0.013	0.004	Free Surface	0.049	No	6	No
1072	440529	440528	6	105.1	4.3	0.013	0.002	Free Surface	0.123	No	6	No
1073	440516	440531	6	143.5	8.7	0.013	0.063	Free Surface	0.177	No	6	No
1074	440538	440539	6	312.1	0.2	0.013	0.002	Free Surface	0.084	No	6	No
1075	440539	440540	6	150.9	8.2	0.013	0.027	Free Surface	0.119	No	6	No
1076	440209	440210	6	222.1	0.4	0.013	0.176	Free Surface	0.629	No	6	Yes
1077	440426LH	440425	6	48.6	18.7	0.013	0.003	Free Surface	0.031	No	6	No
1078	440424	440425	8	105.1	17.2	0.013	0.008	Free Surface	0.037	No	8	No
1079	440425	440427	6	78.6	13.1	0.013	0.013	Free Surface	0.071	No	6	No
108	431411	431410	6	213.2	8.1	0.013	0.048	Free Surface	0.167	No	6	No
1080	440214	440211	6	246.7	4.9	0.013	0.008	Free Surface	0.155	No	6	No
1081	440409	440408	6	146.3	14.7	0.013	0.010	Free Surface	0.095	No	6	No
1082	440420A	440418	6	269.1	8.4	0.013	0.010	Free Surface	0.066	No	6	No
1083	443318	443317	6	150.6	4.4	0.013	0.038	Free Surface	0.161	No	6	No
1084	440921	443318	8	202.6	1.0	0.013	0.033	Free Surface	0.131	No	8	No
1085	450418A	450418	8	86.1	1.8	0.013	0.005	Free Surface	0.046	No	8	No
1086	450901	450925	12	103.5	2.4	0.013	0.670	Free Surface	0.294	No	12	No
1087	452723	452724	6	245.9	9.0	0.013	0.009	Free Surface	0.112	No	6	No
1088	452726LH	452725	6	92.0	0.6	0.013	0.004	Free Surface	0.063	No	6	No
1089	442708	442707	6	206.7	1.0	0.013	0.011	Free Surface	0.111	No	6	No
109	431409	431410	6	176.3	4.9	0.013	0.108	Free Surface	0.225	No	6	No
1090	442428	442429	6	80.8	3.7	0.013	0.024	Free Surface	0.118	No	6	No
1091	441413	441412	6	164.2	16.6	0.013	0.006	Free Surface	0.079	No	6	No
1092	452713	452711	6	285.9	6.7	0.013	0.005	Free Surface	0.066	No	6	No
1093	442711	442712	6	112.0	1.5	0.013	0.003	Free Surface	0.063	No	6	No
1094	441113LH	441112	6	134.8	6.0	0.013	0.011	Free Surface	0.083	No	6	No
1095	441922	441923	6	268.6	0.2	0.013	0.006	Free Surface	0.100	No	6	No
1096	441104	441103	6	109.6	23.5	0.013	0.018	Free Surface	0.084	No	6	No
1097	441207	441102	6	220.8	8.5	0.013	0.023	Free Surface	0.091	No	6	No
1098	443821	441606	6	139.9	1.5	0.013	0.054	Free Surface	0.204	No	6	No
1099	441112	441111	8	231.9	8.1	0.013	0.020	Free Surface	0.082	No	8	No
11	433417	453701	8	126.0	8.2	0.013	0.999	Free Surface	0.530	No	8	No
110	451116LH	451115	6	158.7	1.1	0.013	0.002	Free Surface	0.054	No	6	No
1100	443811	443809	6	54.5	1.8	0.013	0.003	Free Surface	0.060	No	6	No
1101	443809	443821	6	123.3	11.4	0.013	0.010	Free Surface	0.159	No	6	No
1102	443820	443821	6	131.6	0.0	0.013	0.042	Free Surface	0.392	No	6	No
1103	441105	441114	6	274.2	0.0	0.013	0.018	Free Surface	0.270	No	6	No
1104	443810	443809	6	40.5	16.5	0.013	0.003	Free Surface	0.049	No	6	No
1105	441133	441130	6	297.8	4.0	0.013	0.009	Free Surface	0.092	No	6	No
1106	441137	441021	6	174.5	9.2	0.013	0.141	Free Surface	0.254	No	6	No
1107	441138	441137	6	130.0	32.6	0.013	0.012	Free Surface	0.147	No	6	No
1108	402707	402706	6	249.9	1.2	0.013	0.004	Free Surface	0.094	No	6	No
1109	441124	441123	6	146.8	7.1	0.013	0.124	Free Surface	0.260	No	6	No
111	431412	431411	6	128.2	2.7	0.013	0.043	Free Surface	0.168	No	6	No
1110	441123	441122	6	87.7	5.1	0.013	0.127	Free Surface	0.255	No	6	No
1111	441121	441137	6	114.4	6.8	0.013	0.130	Free Surface	0.247	No	6	No
1112	451019	451011	6	299.3	0.6	0.013	0.059	Free Surface	0.325	No	6	No
1113	451012	451011	8	193.3	12.2	0.013	0.177	Free Surface	0.291	No	8	No
1114	443210WYE	450904	6	217.8	1.0	0.013	0.008	Free Surface	0.100	No	6	No
1115	450910	451001	24	371.7	1.6	0.013	3.461	Free Surface	0.320	No	24	No
1116	452525	452526	6	110.1	6.8	0.013	0.019	Free Surface	0.096	No	6	No
1118	452711	452710	6	303.5	6.8	0.013	0.011	Free Surface	0.074	No	6	No
1119	443211	443210WYE	6	67.6	2.7	0.013	0.006	Free Surface	0.086	No	6	No
112	433807LH	433806	6	67.9	4.5	0.013	0.002	Free Surface	0.095	No	6	No
1120	443111	443110	6	258.7	1.3	0.013	0.012	Free Surface	0.145	No	6	No
1121	452526	452527	6	180.9	12.2	0.013	0.022	Free Surface	0.093	No	6	No
1122	452010	452011	6	152.4	25.3	0.013	0.063	Free Surface	0.128	No	6	No
1124	443205	450905	15	222.7	0.4	0.013	2.169	Free Surface	0.668	No	15	No
1125	452710	452607	6	108.5	17.9	0.013	0.015	Free Surface	0.085	No	6	No
1126	451006	451007	18	354.8	1.0	0.013	3.351	Free Surface	0.482	No	18	No
1127	443110	443110A	6	150.6	2.5	0.013	0.037	Free Surface	0.286	No	6	No
1128	443215	443214	8	313.9	0.6	0.013	0.010	Free Surface	0.124	No	8	No
1129	433420	433422	6	297.6	3.1	0.013	0.126	Free Surface	0.245	No	6	No
113	431408	431409	6	165.3	0.3	0.013	0.104	Free Surface	0.405	No	6	No
1131	442619	442602	6	135.5	1.4	0.013	0.021	Free Surface	0.131	No	6	No
1132	442620	442619	6	178.6	5.2	0.013	0.002	Free Surface	0.102	No	6	No
1133	453722	453723	8	179.7	8.2	0.013	0.086	Free Surface	0.130	No	8	No
1134	453723	453724	8	228.4	11.3	0.013	0.086	Free Surface	0.128	No	8	No
1135	442612	442611	6	211.5	14.1	0.013	0.125	Free Surface	0.214	No	6	No
1136	442611	442610	6	268.2	10.6	0.013	0.128	Free Surface	0.241	No	6	No
1137	442613	442612	6	203.4	11.0	0.013	0.119	Free Surface	0.210	No	6	No
1138	442701	442701A	15	168.5	5.1	0.013	1.732	Free Surface	0.291	No	15	No
1139	442616	442618	6	54.2	21.5	0.013	0.010	Free Surface	0.067	No	6	No
1140	442816	442702	6	102.4	12.7	0.013	0.176	Free Surface	0.254	No	6	No
1141	442514	442513	6	68.8	15.7	0.013	0.004	Free Surface	0.052	No	6	No
1142	442724	442706	6	216.6	9.4	0.013	0.012	Free Surface	0.092	No	6	No
1143	442516	442502	8	115.1	14.2	0.013	0.005	Free Surface	0.030	No	8	No
1144	442610	442703	6	254.1	8.6	0.013	0.156	Free Surface	0.414	No	6	No
1145	442703	442816	6	31.9	13.4	0.013	0.162	Free Surface	0.243	No	6	No
1146	442506	442508	6	190.7	9.8	0.013	0.002	Free Surface	0.035	No	6	No
1147	442721	442612	6	208.0	1.2	0.013	0.005	Free Surface	0.143	No	6	No
1148	442412	442411	6	199.1	3.6	0.013	0.002	Free Surface	0.066	No	6	No
1149	442411	442409	6	192.9	18.3	0.013	0.026	Free Surface	0.171	No	6	No
115	453716	453716C	8	28.9	8.6	0.013	0.178	Free Surface	0.183	No	8	No
1150	443021	443020	6	308.0	5.9	0.013	0.009	Free Surface	0.079	No	6	No
1151	440537	440542	6	130.1	4.7	0.013	0.014	Free Surface	0.135	No	6	No
1152	432501	432502	6	174.9	8.1	0.013	0.015	Free Surface	0.204	No	6	No
1153	440536	440537	6	130.6	4.4	0.013	0.010	Free Surface	0.086	No	6	No
1154	440535	440536	6	129.0	10.7	0.013	0.004	Free Surface	0.061	No	6	No
1155	440534LH	440533	6	109.0	4.0	0.013	0.003	Free Surface	0.128	No	6	No
1156	440801LH	432501	6	243.3	7.6	0.013	0.014	Free Surface	0.083	No	6	No
1157	440531	440532	6	121.6	6.3	0.013	0.072	Free Surface	0.222	No	6	No
1158	440533	440531	6	82.5	0.0	0.013	0.007	Free Surface	0.199	No	6	No
1159	440556	440828	6	141.0	2.0	0.013	0.003	Free Surface	0.056	No	6	No
116	431414	431414	6	207.8	2.9	0.013	0.028	Free Surface	0.156	No	6	No
1160	450411	450901	12	120.0	3.0	0.013	0.550	Free Surface	0.251	No	12	No
1161	443106LH	443104	8	81.9	1.4	0.013	0.004	Free Surface	0.054	No	8	No
1162	432902	432903	6	63.4	4.3	0.013	0.098	Free Surface	0.212	No	6	No
1163	442415	442414	6	138.1	9.1	0.013	0.007	Free Surface	0.062	No	6	No
1164	442414	442411	6	77.4	37.7	0.013	0.021	Free Surface	0.079	No	6	No
1165	442447	442434	6	146.1	13.3	0.013	0.007	Free Surface	0.089	No	6	No
1166	442448LH	442449	6	87.8	7.5	0.013	0.003	Free Surface	0.041	No	6	No
1167	442449	442429	6	138.6	9.4	0.013	0.004	Free Surface	0.072	No	6	No
1168	442416	442414	6	104.4	3.9	0.013	0.013	Free Surface	0.084	No	6	No
1169	441025LH	441024	6	274.4	10.8	0.013	0.029	Free Surface	0.117	No	6	No
117	431414	431412	6	188.5	2.7	0.013	0.036	Free Surface	0.178	No	6	No
1172	443022	450410	6	326.5	2.3	0.013	0.008	Free Surface	0.083	No	6	No
1175	443002	450411	8	273.1	1.5	0.013	0.013	Free Surface	0.199	No	8	No
1176	433205	433204	6	235.4	4.1	0.013	0.044	Free Surface	0.209	No	6	No

G2. Model Results for 2028 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
1177	443019	443015	6	116.6	5.3	0.013	0.025	Free Surface	0.137	No	6	No
1178	443015	443014	6	50.4	3.7	0.013	0.036	Free Surface	0.179	No	6	No
1179	433204	433203	6	224.6	1.8	0.013	0.062	Free Surface	0.218	No	6	No
118	453726	453725	8	98.9	20.1	0.013	0.045	Free Surface	0.080	No	8	No
1181	443014	443013	6	188.4	1.2	0.013	0.037	Free Surface	0.205	No	6	No
1182	433207	433208	6	371.4	1.2	0.013	0.010	Free Surface	0.133	No	6	No
1183	431813	431814	6	124.4	58.0	0.013	0.033	Free Surface	0.102	No	6	No
1184	443003LH	443002	8	264.1	1.0	0.013	0.005	Free Surface	0.069	No	8	No
1185	443012	443013	8	92.9	9.4	0.013	0.007	Free Surface	0.041	No	8	No
1186	443005	443004	6	54.2	4.1	0.013	0.012	Free Surface	0.142	No	6	No
1187	443013	443004	8	158.9	0.9	0.013	0.046	Free Surface	0.160	No	8	No
1188	442804	442803	6	241.3	13.7	0.013	0.005	Free Surface	0.048	No	6	No
1189	443011	443012	8	236.0	11.0	0.013	0.005	Free Surface	0.037	No	8	No
119	453725	453716	8	188.6	5.0	0.013	0.149	Free Surface	0.200	No	8	No
1190	443006	443005	6	149.2	8.1	0.013	0.010	Free Surface	0.078	No	6	No
1191	442809	442808	6	184.2	3.2	0.013	0.018	Free Surface	0.188	No	6	No
1192	433102	433101	6	125.2	0.8	0.013	0.005	Free Surface	0.094	No	6	No
1193	443010	443011	6	78.7	10.6	0.013	0.004	Free Surface	0.044	No	6	No
1195	454414	454413	6	89.5	8.4	0.013	0.004	Free Surface	0.043	No	6	No
1196	454413	454411	6	152.8	18.2	0.013	0.004	Free Surface	0.179	No	6	No
1197	453724	453725	8	210.2	12.7	0.013	0.104	Free Surface	0.165	No	8	No
1198	433421	433420	6	398.0	0.2	0.013	0.064	Free Surface	0.404	No	6	No
12	433416	433417	8	100.8	2.3	0.013	0.999	Free Surface	0.671	No	8	No
120	450807	450808	6	225.4	15.8	0.013	0.061	Free Surface	0.168	No	6	No
1200	442609LH	442608	6	169.5	2.2	0.013	0.003	Free Surface	0.052	No	6	No
1202	442602	442603	8	77.4	6.6	0.013	0.022	Free Surface	0.078	No	8	No
1203	442705LH	442702	6	183.9	7.9	0.013	0.008	Free Surface	0.160	No	6	No
1204	442702	442701	6	146.4	12.3	0.013	0.185	Free Surface	0.258	No	6	No
1205	442621	442621	6	88.6	4.1	0.013	0.004	Free Surface	0.049	No	6	No
1206	442618	442619	6	127.1	10.1	0.013	0.015	Free Surface	0.121	No	6	No
1207	442450LH	442428	6	110.2	9.3	0.013	0.002	Free Surface	0.084	No	6	No
1208	442830	442812	4	175.1	6.3	0.013	0.003	Free Surface	0.125	No	4	No
1209	433201	431801	6	129.0	4.2	0.013	0.143	Free Surface	0.320	No	6	No
1210	443020	443019	6	497.4	10.7	0.013	0.019	Free Surface	0.104	No	6	No
1211	442805LH	442804	6	113.4	4.8	0.013	0.001	Free Surface	0.038	No	6	No
1212	442440LH	442441	6	170.7	7.7	0.013	0.003	Free Surface	0.042	No	6	No
1213	443105	443104	8	184.8	0.6	0.013	0.006	Free Surface	0.065	No	8	No
1214	443104	443103	6	103.5	10.3	0.013	0.014	Free Surface	0.102	No	6	No
1215	440305	432913	6	142.1	16.9	0.013	0.005	Free Surface	0.138	No	6	No
1216	440306LH	440305	6	71.6	9.0	0.013	0.003	Free Surface	0.039	No	6	No
1217	442813	442812	6	143.5	2.8	0.013	0.007	Free Surface	0.100	No	6	No
1218	442417	442416	6	106.7	20.2	0.013	0.010	Free Surface	0.078	No	6	No
1219	440201	432812	6	242.4	8.3	0.013	0.004	Free Surface	0.138	No	6	No
1220	432901	432902	6	270.8	3.2	0.013	0.087	Free Surface	0.264	No	6	No
1221	442418	442417	6	155.5	3.7	0.013	0.005	Free Surface	0.060	No	6	No
1222	442454LH	442455	6	52.3	12.0	0.013	0.001	Free Surface	0.026	No	6	No
1223	442917	442918	6	155.5	5.3	0.013	0.012	Free Surface	0.093	No	6	No
1224	443331	443330	6	17.7	11.4	0.013	0.003	Free Surface	0.061	No	6	No
1225	442423	442422	6	64.0	7.4	0.013	0.001	Free Surface	0.022	No	6	No
1226	442921	440906	6	144.0	17.1	0.013	0.013	Free Surface	0.065	No	6	No
1227	443332	443331	6	147.0	5.6	0.013	0.003	Free Surface	0.039	No	6	No
1228	440906	440907	6	51.5	31.6	0.013	0.016	Free Surface	0.085	No	6	No
1229	442909	443302	6	249.4	1.3	0.013	0.056	Free Surface	0.251	No	6	No
123	450808	450809	6	120.0	4.4	0.013	0.064	Free Surface	0.253	No	6	No
1230	432802	432801	6	259.6	0.9	0.013	0.016	Free Surface	0.126	No	6	No
1231	442402	442403	6	282.6	4.5	0.013	0.006	Free Surface	0.072	No	6	No
1232	440213	432810	6	207.9	12.8	0.013	0.004	Free Surface	0.041	No	6	No
1233	440911	442909	6	132.0	1.1	0.013	0.045	Free Surface	0.241	No	6	No
1234	432724	432725	6	96.2	6.0	0.013	0.061	Free Surface	0.183	No	6	No
1235	440904	440403	6	300.7	3.1	0.013	0.018	Free Surface	0.122	No	6	No
1237	443325	443324	6	138.6	1.2	0.013	0.008	Free Surface	0.085	No	6	No
1238	443323LH	443324	6	49.0	3.3	0.013	0.004	Free Surface	0.061	No	6	No
1239	432728	432810	6	250.6	9.7	0.013	0.089	Free Surface	0.210	No	6	No
124	450921	450920	6	153.3	1.0	0.013	0.005	Free Surface	0.089	No	6	No
1240	440908	440924	6	51.3	34.1	0.013	0.026	Free Surface	0.093	No	6	No
1241	440207	440208	6	168.2	7.8	0.013	0.132	Free Surface	0.231	No	6	No
1242	440320	440208	6	124.7	32.5	0.013	0.015	Free Surface	0.133	No	6	No
1243	440909	440910	6	93.2	2.1	0.013	0.038	Free Surface	0.165	No	6	No
1244	440924	440922	6	40.2	15.5	0.013	0.035	Free Surface	0.129	No	6	No
1245	440922	440909	6	50.1	4.0	0.013	0.035	Free Surface	0.170	No	6	No
1246	440208	440209	6	94.0	19.1	0.013	0.149	Free Surface	0.469	No	6	No
1247	440325	440325A	6	109.1	2.5	0.013	0.023	Free Surface	0.188	No	6	No
1248	440324	440325	6	279.0	1.9	0.013	0.018	Free Surface	0.134	No	6	No
1249	440421	440420A	6	52.7	43.9	0.013	0.008	Free Surface	0.055	No	6	No
125	442501	453715	10	296.7	9.3	0.013	1.786	Free Surface	0.448	No	10	No
1250	443319	443320	6	198.2	4.9	0.013	0.098	Free Surface	0.234	No	6	No
1251	440923LH	440924	6	162.7	10.2	0.013	0.009	Free Surface	0.085	No	6	No
1252	440410	440409	6	158.2	0.6	0.013	0.008	Free Surface	0.098	No	6	No
1253	440902	440903	10	263.6	0.6	0.013	0.988	Free Surface	0.636	No	10	Yes
1254	440912	443319	8	298.8	3.2	0.013	0.092	Free Surface	0.176	No	8	No
1255	440211	440207	6	318.2	7.7	0.013	0.128	Free Surface	0.248	No	6	No
1256	440423	440424	8	132.5	10.2	0.013	0.003	Free Surface	0.032	No	8	No
1257	440215	440216	6	158.5	2.3	0.013	0.006	Free Surface	0.076	No	6	No
1259	440429	440417	6	158.7	13.4	0.013	0.023	Free Surface	0.107	No	6	No
126	430801	430802	8	277.4	3.0	0.013	0.012	Free Surface	0.073	No	8	No
1260	440418	440417	6	128.1	10.3	0.013	0.010	Free Surface	0.093	No	6	No
1261	440408	440407	6	144.1	2.1	0.013	0.016	Free Surface	0.105	No	6	No
1262	440103	440104	6	139.4	21.9	0.013	0.013	Free Surface	0.076	No	6	No
1263	440913	440912	8	240.0	4.9	0.013	0.084	Free Surface	0.161	No	8	No
1264	440427	440428	6	54.1	14.1	0.013	0.013	Free Surface	0.077	No	6	No
1265	440901	440902	10	308.8	3.7	0.013	0.495	Free Surface	0.623	No	10	No
1266	440608LH	440607	6	139.2	2.4	0.013	0.004	Free Surface	0.183	No	6	No
1267	440723LH	440722	6	57.8	16.9	0.013	0.004	Free Surface	0.045	No	6	No
1268	440132	440131	8	248.1	2.8	0.013	0.005	Free Surface	0.070	No	8	No
1269	440639	440601	6	206.7	3.4	0.013	0.038	Free Surface	0.161	No	6	No
127	431417	431405	6	244.7	0.5	0.013	0.007	Free Surface	0.181	No	6	No
1270	440124	440123	6	221.6	0.5	0.013	0.002	Free Surface	0.095	No	6	No
1271	440626	440628	6	191.4	1.6	0.013	0.038	Free Surface	0.192	No	6	No
1272	440627LH	440626	6	95.1	25.4	0.013	0.005	Free Surface	0.117	No	6	No
1273	440133LH	440134	6	239.8	11.4	0.013	0.007	Free Surface	0.065	No	6	No
1274	440817	432536	6	165.2	5.1	0.013	0.010	Free Surface	0.150	No	6	No
1275	440830	440831	6	188.3	2.7	0.013	0.005	Free Surface	0.084	No	6	No
1276	440823	440824	6	159.6	5.5	0.013	0.004	Free Surface	0.050	No	6	No
1277	440803	432529	6	130.6	11.7	0.013	0.016	Free Surface	0.093	No	6	No
1278	432508LH	432508A	6	177.5	15.0	0.013	0.004	Free Surface	0.045	No	6	No
1279	440614	440615	6	360.9	7.8	0.013	0.005	Free Surface	0.067	No	6	No
128	430802	430803	8	287.3	2.0	0.013	0.013	Free Surface	0.076	No	8	No
1280	440816	440817	6	115.1	7.1	0.013	0.006	Free Surface	0.065	No	6	No
1281	440550	440551	6	242.7	6.9	0.013	0.005	Free Surface	0.055	No	6	No
1282	440822LH	440823	6	81.5	11.5	0.013	0.001	Free Surface	0.036	No	6	No
1283	440544	440545	6	281.3	7.5	0.013	0.072	Free Surface	0.185	No	6	No
1284	441202	440622	6	194.5	0.5	0.013	0.018	Free Surface	0.197	No	6	No
1285	440548	440830	6	178.8	7.3	0.013	0.001	Free Surface	0.047	No	6	No
1286	440827	440826	6	400.5	3.0	0.013	0.136	Free Surface	0.303	No	6	No
1287	440733	441202	6	137.8	0.7	0.013	0.014	Free Surface	0.161	No	6	No
1288	432507	SSFI. 21	6	22.7	9.1	0.013	0.005	Free Surface	0.055	No	6	No
1289	432506LH	432505	6	152.0	3.8	0.013	0.000	Free Surface	0.000	No	6	No
129	431001LH	431002	6	155.8	1.5	0.013	0.003	Free Surface	0.076	No	6	No
1291	440818	440818	6	298.7	5.5	0.013	0.004	Free Surface	0.053	No	6	No
1292	440815LH	440816	6	122.8	4.1	0.013	0.002	Free Surface	0.045	No	6	No
1293	432505	432503	6	139.4	9.1	0.013	0.009	Free Surface	0.082	No	6	No
1294	432504	432503	6	59.9	3.1	0.013	0.001	Free Surface	0.062	No	6	No
1295	440837	440821	6	117.2	12.3	0.013	0.001	Free Surface	0.085	No	6	No
1296	440216	440104	6	220.5	4.4	0.013	0.010	Free Surface	0.085	No	6	No
1297	440413LH	440412	6	43.9	16.9	0.013	0.003	Free Surface	0.032	No	6	No
1298	440412	440407	6	152.3	19.9	0.013	0.006	Free Surface	0.045	No	6	No
1299	440104	440105	6	51.8	22.8	0.013	0.028	Free Surface	0.094	No	6	No
13	433402	433403	8	139.1	2.7	0.013	0.850	Free Surface	0.597	No	8	No
1300	440403	440402	6	300.4	5.5	0.013	0.029	Free Surface	0.415	No	6	No
1302	440407	440404	6	56.8	25.7	0.013	0.025	Free Surface	0.092	No	6	No
1303	440430	440429	6	111.9	16.9	0.013	0.005	Free Surface	0.066	No	6	No
1304	440417	440416	6	193.3	7.8	0.013	0.032	Free Surface	0.255	No	6	No
1305	440920	440921	8	154.1	5.1	0.013	0.028	Free Surface	0.118	No	8	No
1306	440914	440913	6	250.7	4.0	0.013	0.069	Free Surface	0.204	No	6	No
1307	440210	440116	6	293.9	2.5	0.013	0.178	Free Surface	0.381	No	6	No
1308	440404	440401	6	229.5	14.5	0.013	0.031	Free Surface	0.103	No	6	No
1309	440401	440402	8	77.0	3.4	0.013	0.945	Free Surface	0.579	No	8	No
1310	440915	440914	6	217.7	6.5	0.013	0.061	Free Surface	0.192	No	6	No
1311	440105	440115	6	164.0	22.2	0.013	0.034	Free Surface	0.098	No	6	No
1312	440115	440116	6	114.3	1.1	0.013	0.064	Free Surface	0.279	No	6	No
1313	440705	440706	6	250.1	2.5	0.013	0.051	Free Surface	0.193	No	6	No
1314	440416	440415	6	67.8	8.8	0.013	0.340	Free Surface	0.387	No	6	No
1315	440704	440705	6	141.9	0.3	0.013	0.045	Free Surface	0.290	No	6	No
1316	440102	440103	6	324.1	0.9	0.013	0.011	Free Surface	0.098	No	6	No
1317	440415	440414	6	103.5	10.9	0.013	0.372	Free Surface	0.447	No	6	No
1318	440101	440102	6	165.7	5.4	0.013	0.004	Free Surface	0.091	No	6	No
1319	440431	440129	6	133.7	29.4	0.013	0.248	Free Surface	0.309	No	6	No
132	442615	442616	8	69.3	20.9	0.013	0.003	Free Surface	0.023	No	8	No
1320	440129	440416	6	139.4	7.8	0.013	0.307	Free Surface	0.383	No	6	No
1321	440707	440704	6	75.4	33.4	0.013	0.009	Free Surface	0.210	No	6	No
1322	440703	440704	6	139.9	1.0	0.013	0.036	Free Surface	0.292	No	6	No
1323	440917	440916	6	100.5	1.0	0.013	0.058	Free Surface	0.248	No	6	No
1324	440114	440115	6	198.0	0.1	0.013	0.630	Free Surface	0.542	No	6	Yes
1325	440107	440108	6	104.6	1.2	0.013	0.002	Free Surface	0.050	No	6	No
1326	440918	440918A	8	241.7	3.9	0.013	0.018	Free Surface	0.080	No	8	No
1327	440702	440703	6	202.1	8.2	0.013	0.034	Free Surface	0.168	No	6	No
1328	440128	440129	6	132.9	2.6	0.013	0.059	Free Surface	0.296	No	6	No
1329	440708LH	440707	6	246.1	0.9	0.013	0.003	Free Surface	0.062	No	6	No
133	442617LH	442616	6	102.4	15.7	0.013	0.004	Free Surface	0.038	No	6	No
1330	440633	440917	6	92.3	6.5	0.013	0.058	Free Surface	0.229	No	6	No
1331	440130	440415	8	230.5	1.0	0.013	0.028	Free Surface	0.129	No	8	No
1332	440604	440401	8	268.4	6.9	0.013	0.913	Free Surface	0.467	No	8	No
1333	440701	440702	6	79.4	16.8	0.013	0.030	Free Surface	0.111	No	6	No
1334	440724	440701	6	338.9	3.2	0.013	0.025	Free Surface	0.121	No	6	No
1335	440721	440724	6	280.0	3.7	0.013	0.018	Free Surface	0.127	No	6	No
1336	440632	440918	6	101.1	10.0	0.013	0.009	Free Surface	0.082	No	6	No
1337	440414	440136	6	219.4	4.4	0.013	0.372	Free Surface	0.478	No	6	No
1338	440109	440108	6	226.8	1.1	0.013	0.013	Free Surface	0.128	No	6	No
1339	440607	440604	8	270.6	2.5	0.013	0.140	Free Surface	0.310	No	8	No
134	442720	442613	6	121.9	6.5	0.013	0.011	Free Surface	0.145	No	6	No
1340	440406	440603	6	142.4	5.8	0.013	0.013	Free Surface	0.086	No	6	No
1341	440603	440604	8	146.2	9.8	0.013	0.757	Free Surface	0.382	No	8	No
1342	440136	440137	6	158.1	7.4	0.013	0.385	Free Surface	0.422	No	6	No
1343	440631	440632	6	108.1	10.4	0.013	0.004	Free Surface	0.052	No	6	No
1344	440118	440143	6	170.7	19.6	0.013	0.018	Free Surface	0.153	No	6	No
1345	440143	440128	6	207.2	2.0	0.013	0.058	Free Surface	0.224	No	6	No
1346	440112	440113	6	159.4	0.1	0.013	0.006	Free Surface	0.176	No	6	No
1347	440722	440721	6	104.7	18.1	0.013	0.008	Free Surface	0.082	No	6	No
1348	440111	440112	6	147.0	8.4	0.013	0.001	Free Surface	0.092	No	6	No
1349	440137	440602	8	155.4	7.0	0.013	0.398	Free Surface	0.298	No	8	No
135	442614	442616	8	73.8	56.1	0.013	0.003	Free Surface	0.017	No	8	No

G2. Model Results for 2028 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
1350	440602	440603	8	103.6	6.0	0.013	0.743	Free Surface	0.419	No	8	No
1351	440720	440721	6	136.3	3.9	0.013	0.010	Free Surface	0.095	No	6	No
1352	440135	440136	6	289.7	4.3	0.013	0.012	Free Surface	0.266	No	6	No
1353	440635	440634	6	264.1	6.5	0.013	0.055	Free Surface	0.191	No	6	No
1354	440127	440143	6	225.6	4.0	0.013	0.040	Free Surface	0.196	No	6	No
1355	440122	440121	6	157.3	15.0	0.013	0.005	Free Surface	0.053	No	6	No
1356	432512	432511	6	192.4	7.6	0.013	0.076	Free Surface	0.196	No	6	No
1357	440131	440130	8	394.1	2.2	0.013	0.021	Free Surface	0.112	No	8	No
1358	440121	440120	6	116.9	9.1	0.013	0.009	Free Surface	0.078	No	6	No
1359	440119	440120	6	185.4	0.9	0.013	0.003	Free Surface	0.082	No	6	No
136	430712	430713	6	69.5	0.6	0.013	0.039	Free Surface	0.290	No	6	No
1360	440120	440127	6	220.9	11.7	0.013	0.022	Free Surface	0.127	No	6	No
1361	440719	440720	6	214.7	4.3	0.013	0.010	Free Surface	0.080	No	6	No
1362	440629	440635	6	142.6	3.9	0.013	0.055	Free Surface	0.179	No	6	No
1363	440630	440629	6	126.2	33.1	0.013	0.009	Free Surface	0.120	No	6	No
1364	440617	440616	6	161.3	8.3	0.013	0.017	Free Surface	0.104	No	6	No
1365	440616	440609	6	164.8	4.6	0.013	0.024	Free Surface	0.215	No	6	No
1366	440123	440120	6	66.3	0.5	0.013	0.008	Free Surface	0.108	No	6	No
1367	440601	440602	6	227.9	5.2	0.013	0.321	Free Surface	0.433	No	6	No
1368	432511	432510	6	261.9	5.6	0.013	0.079	Free Surface	0.204	No	6	No
1369	440636	440637	6	384.0	3.7	0.013	0.008	Free Surface	0.084	No	6	No
1370	440713	440714	8	28.2	1.4	0.013	0.027	Free Surface	0.110	No	8	No
1371	440718LH	440717	6	46.0	4.1	0.013	0.003	Free Surface	0.043	No	6	No
1372	440715	440714	8	92.4	22.7	0.013	0.014	Free Surface	0.071	No	8	No
1373	440618	440617	6	227.5	5.7	0.013	0.015	Free Surface	0.090	No	6	No
1374	440134	440135	6	276.4	4.5	0.013	0.009	Free Surface	0.082	No	6	No
1375	440717	440716	8	29.3	35.5	0.013	0.005	Free Surface	0.046	No	8	No
1376	440716	440715	8	144.2	1.9	0.013	0.008	Free Surface	0.055	No	8	No
1377	440610	440609	6	377.7	5.3	0.013	0.098	Free Surface	0.271	No	6	No
1378	440126	440127	6	351.3	1.4	0.013	0.011	Free Surface	0.134	No	6	No
1379	440619	440618	6	215.0	3.1	0.013	0.011	Free Surface	0.092	No	6	No
138	432013LH	432014	6	155.4	4.3	0.013	0.012	Free Surface	0.077	No	6	No
1380	432510	432509	6	252.1	7.1	0.013	0.085	Free Surface	0.196	No	6	No
1381	440832	440639	6	161.4	9.6	0.013	0.030	Free Surface	0.137	No	6	No
1382	440125	440124	6	118.4	0.5	0.013	0.000	Free Surface	0.043	No	6	No
1383	440125	440126	6	122.7	18.8	0.013	0.001	Free Surface	0.064	No	6	No
1384	440623	440626	6	106.2	1.3	0.013	0.033	Free Surface	0.192	No	6	No
1385	440624	440623	6	102.1	22.0	0.013	0.008	Free Surface	0.119	No	6	No
1386	440734	440735	6	52.9	11.8	0.013	0.023	Free Surface	0.133	No	6	No
1387	440625	440624	6	149.5	2.9	0.013	0.004	Free Surface	0.052	No	6	No
1388	440637	440638	6	343.8	5.8	0.013	0.015	Free Surface	0.127	No	6	No
1389	440638	440734	6	236.0	1.1	0.013	0.018	Free Surface	0.129	No	6	No
139	403418	403417	6	368.2	0.2	0.013	0.023	Free Surface	0.667	No	6	Yes
1390	440826	440140	6	141.5	5.0	0.013	0.144	Free Surface	0.640	No	6	No
1391	440615	440639	6	259.3	2.5	0.013	0.008	Free Surface	0.122	No	6	No
1392	440141	440140	6	233.5	11.0	0.013	0.132	Free Surface	0.609	No	6	No
1393	440142	440141	6	113.0	10.5	0.013	0.127	Free Surface	0.223	No	6	No
1394	440620	440619	6	187.3	11.3	0.013	0.007	Free Surface	0.075	No	6	No
1395	432527	432523	6	191.5	13.0	0.013	0.007	Free Surface	0.072	No	6	No
1396	440831	440832	6	166.7	3.2	0.013	0.014	Free Surface	0.106	No	6	No
1397	432536	440142	6	190.4	9.4	0.013	0.122	Free Surface	0.223	No	6	No
1398	440824	440826	6	145.9	9.9	0.013	0.006	Free Surface	0.167	No	6	No
1399	440545	440610	6	272.7	8.9	0.013	0.083	Free Surface	0.209	No	6	No
14	433402	433401	8	53.6	3.9	0.013	0.450	Free Surface	0.563	No	8	No
140	442511	442335	6	76.9	41.6	0.013	0.013	Free Surface	0.077	No	6	No
1400	432509	432535	6	165.8	10.3	0.013	0.089	Free Surface	0.186	No	6	No
1401	432535	432536	6	29.6	17.2	0.013	0.110	Free Surface	0.204	No	6	No
1402	440825	440141	6	114.1	3.1	0.013	0.004	Free Surface	0.140	No	6	No
1403	440551	440613	6	98.8	10.4	0.013	0.008	Free Surface	0.083	No	6	No
1404	432529	432535	6	88.5	4.9	0.013	0.020	Free Surface	0.146	No	6	No
1405	440621	440620	6	108.7	13.8	0.013	0.004	Free Surface	0.048	No	6	No
1406	440818	440142	6	117.5	3.5	0.013	0.004	Free Surface	0.139	No	6	No
1407	440622	440623	6	292.2	0.5	0.013	0.025	Free Surface	0.202	No	6	No
1408	440821	440827	6	102.6	8.0	0.013	0.047	Free Surface	0.233	No	6	No
1409	440543	440543A	6	17.8	20.3	0.013	0.061	Free Surface	0.146	No	6	No
141	431107	431108	6	137.9	2.0	0.013	0.029	Free Surface	0.161	No	6	No
1410	441201LH	440543	6	228.3	0.6	0.013	0.009	Free Surface	0.125	No	6	No
1411	440546	440543A	6	397.6	4.2	0.013	0.000	Free Surface	0.080	No	6	No
1412	440829	440821	6	22.0	17.0	0.013	0.044	Free Surface	0.131	No	6	No
1413	440802	440803	6	269.7	4.1	0.013	0.011	Free Surface	0.083	No	6	No
1414	432503	432502	6	222.3	2.2	0.013	0.011	Free Surface	0.211	No	6	No
1415	440532	440827	6	261.3	2.3	0.013	0.078	Free Surface	0.287	No	6	No
1416	440547	440532	6	218.7	2.1	0.013	0.002	Free Surface	0.146	No	6	No
1417	440528	440527	6	102.2	1.5	0.013	0.040	Free Surface	0.195	No	6	No
1418	440527	440516	6	60.7	2.5	0.013	0.040	Free Surface	0.173	No	6	No
1419	440520	440521	6	59.2	2.2	0.013	0.000	Free Surface	0.042	No	6	No
142	442301	442504	6	174.5	5.4	0.013	0.037	Free Surface	0.143	No	6	No
1420	440553	440528	6	106.2	5.7	0.013	0.038	Free Surface	0.175	No	6	No
1421	441213	441212	6	230.3	10.8	0.013	0.006	Free Surface	0.060	No	6	No
1422	440501	440502	6	205.0	5.6	0.013	0.002	Free Surface	0.055	No	6	No
1423	440514	440515	6	239.4	8.6	0.013	0.013	Free Surface	0.080	No	6	No
1424	440513	440512	6	256.5	1.8	0.013	0.005	Free Surface	0.066	No	6	No
1425	440502	440503	6	100.2	4.5	0.013	0.008	Free Surface	0.071	No	6	No
1428	440504	440503	6	154.8	1.2	0.013	0.002	Free Surface	0.058	No	6	No
1429	441001LH	441002	6	185.5	3.8	0.013	0.004	Free Surface	0.062	No	6	No
143	431010	431012	6	62.2	4.0	0.013	0.014	Free Surface	0.104	No	6	No
1430	440507	440506	6	303.1	0.8	0.013	0.003	Free Surface	0.078	No	6	No
1431	440505	440514	6	150.6	6.1	0.013	0.013	Free Surface	0.081	No	6	No
1432	440506	440505	6	134.2	4.5	0.013	0.012	Free Surface	0.085	No	6	No
1433	441003LH	441002	6	187.6	1.1	0.013	0.018	Free Surface	0.149	No	6	No
1434	441013	441016	8	354.3	8.9	0.013	0.120	Free Surface	0.154	No	8	No
1435	441011	441010	6	54.7	11.0	0.013	0.074	Free Surface	0.181	No	6	No
144	430713	430714	6	190.8	0.4	0.013	0.041	Free Surface	0.222	No	6	No
1441	455003	HASTINGS_WW	6	270.5	2.6	0.013	0.135	Free Surface	0.326	No	6	No
1443	454901	454902	6	149.6	3.8	0.013	0.001	Free Surface	0.038	No	6	No
1444	450104A	450104	6	167.6	2.1	0.013	0.020	Free Surface	0.160	No	6	No
1445	453707	453708	10	75.8	3.7	0.013	1.042	Free Surface	0.480	No	10	No
1446	450111	450112	6	36.7	6.8	0.013	0.000	Free Surface	0.000	No	6	No
1447	450102	450103	8	356.6	1.7	0.013	0.347	Free Surface	0.462	No	8	No
1448	454803	454804	8	178.0	9.9	0.013	0.290	Free Surface	0.224	No	8	No
1449	442913	442914	6	233.2	4.2	0.013	0.010	Free Surface	0.109	No	6	No
145	430707	430708	6	97.2	18.3	0.013	0.004	Free Surface	0.054	No	6	No
1450	440307	442307	6	248.9	1.6	0.013	0.009	Free Surface	0.111	No	6	No
1451	442436	442435	6	166.0	8.7	0.013	0.037	Free Surface	0.140	No	6	No
1452	452504	452504A	6	106.8	2.6	0.013	0.001	Free Surface	0.048	No	6	No
1453	443503	443502	6	163.2	0.9	0.013	0.049	Free Surface	0.384	No	6	No
1454	442102	442103	6	113.8	6.8	0.013	0.032	Free Surface	0.130	No	6	No
1455	441827LH	441827	6	138.7	3.2	0.013	0.001	Free Surface	0.029	No	6	No
1456	441824	441822	6	94.5	2.1	0.013	0.006	Free Surface	0.074	No	6	No
1457	441823	441821	6	114.7	13.0	0.013	0.002	Free Surface	0.070	No	6	No
1458	402408	402407	6	350.3	1.5	0.013	0.001	Free Surface	0.123	No	6	No
1459	441518A	441518	6	141.7	19.4	0.013	0.006	Free Surface	0.073	No	6	No
146	442727LH	442726	6	46.3	6.5	0.013	0.002	Free Surface	0.051	No	6	No
1460	441406	441407	8	287.1	3.0	0.013	0.270	Free Surface	0.304	No	8	No
1461	441408	441407	6	131.8	16.7	0.013	0.285	Free Surface	0.298	No	6	No
1464	VMH_47	402414	6	64.9	4.9	0.013	0.000	Free Surface	0.027	No	6	No
1465	441511	441505	6	154.4	1.8	0.013	0.027	Free Surface	0.294	No	6	No
1466	441506	441505	8	249.6	0.4	0.013	0.360	Free Surface	0.603	No	8	Yes
1468	402414	402501	6	88.4	3.7	0.013	0.004	Free Surface	0.126	No	6	No
147	442512	442511	6	132.8	10.4	0.013	0.004	Free Surface	0.049	No	6	No
1470	402501	402502	6	356.7	0.4	0.013	0.084	Free Surface	0.709	No	6	Yes
1471	441517	441504	6	261.0	4.4	0.013	0.022	Free Surface	0.558	No	6	No
1472	441505	441504	8	168.8	2.2	0.013	0.415	Free Surface	0.707	No	8	Yes
1474	402407	402406	6	364.0	1.3	0.013	0.043	Free Surface	0.214	No	6	No
1475	441520	441502	15	17.9	1.2	0.013	0.597	Free Surface	0.278	No	15	No
1478	441504	441503	8	157.6	0.1	0.013	0.439	Free Surface	0.791	No	8	Yes
148	432110	432109	6	38.9	5.1	0.013	0.005	Free Surface	0.059	No	6	No
1480	402406	402405	6	218.5	1.6	0.013	0.045	Free Surface	0.220	No	6	No
1481	402404	402501	6	375.6	0.3	0.013	0.075	Free Surface	0.393	No	6	No
1482	402416LH	402415	6	126.9	0.8	0.013	0.000	Free Surface	0.052	No	6	No
1483	402410LH	402404	6	134.2	0.5	0.013	0.002	Free Surface	0.065	No	6	No
1484	402415	402401	6	115.1	0.4	0.013	0.003	Free Surface	0.102	No	6	No
1485	402405	402403	6	275.5	1.5	0.013	0.051	Free Surface	0.286	No	6	No
1487	402409LH	402403	6	116.8	0.6	0.013	0.003	Free Surface	0.210	No	6	No
1488	402401	402402	6	273.3	0.4	0.013	0.007	Free Surface	0.133	No	6	No
1489	450805LH	450804	6	164.5	2.4	0.013	0.001	Free Surface	0.041	No	6	No
149	430705	430704	6	172.8	7.7	0.013	0.310	Free Surface	0.385	No	6	No
1490	450818LH	450817	6	149.8	7.2	0.013	0.004	Free Surface	0.055	No	6	No
1491	451118	451119	6	115.4	9.1	0.013	0.002	Free Surface	0.040	No	6	No
1492	451111	451110	6	258.9	7.2	0.013	0.012	Free Surface	0.080	No	6	No
1493	450816LH	450815	6	94.3	6.7	0.013	0.003	Free Surface	0.046	No	6	No
1494	451117LH	451118	6	92.7	0.7	0.013	0.001	Free Surface	0.035	No	6	No
1495	450824LH	450823	6	76.5	0.4	0.013	0.002	Free Surface	0.074	No	6	No
1496	450822	450823	6	106.4	4.2	0.013	0.012	Free Surface	0.086	No	6	No
1497	450611	450612	6	245.3	0.6	0.013	0.002	Free Surface	0.091	No	6	No
1499	454804	454805	8	303.5	14.7	0.013	0.291	Free Surface	0.211	No	8	No
15	431504	431503	8	187.6	2.2	0.013	0.635	Free Surface	0.519	No	8	No
150	432008	432007	6	149.7	7.7	0.013	0.146	Free Surface	0.245	No	6	No
1500	454814	454813	6	152.8	0.7	0.013	0.004	Free Surface	0.073	No	6	No
1501	451107	451106	6	151.9	2.3	0.013	0.068	Free Surface	0.214	No	6	No
1502	451106	451105	6	27.1	8.7	0.013	0.069	Free Surface	0.232	No	6	No
1503	454815	454814	6	139.8	0.7	0.013	0.003	Free Surface	0.073	No	6	No
1504	454805	454806	8	144.4	14.6	0.013	0.292	Free Surface	0.211	No	8	No
1505	454811	454806	6	166.4	2.9	0.013	0.011	Free Surface	0.186	No	6	No
1506	454813	454811	6	216.3	1.9	0.013	0.005	Free Surface	0.079	No	6	No
1507	454812	454811	6	111.1	1.1	0.013	0.005	Free Surface	0.085	No	6	No
1508	451108	451105	6	196.2	3.0	0.013	0.023	Free Surface	0.212	No	6	No
1509	454806	454807	8	113.2	15.8	0.013	0.303	Free Surface	0.212	No	8	No
151	432014	432009	6	104.4	46.1	0.013	0.018	Free Surface	0.152	No	6	No
1510	454306	454305	8	430.1	0.6	0.013	0.138	Free Surface	0.264	No	8	No
1511	450602	450603	8	85.2	0.5	0.013	0.121	Free Surface	0.277	No	8	No
1512	450603	450604	8	56.5	3.2	0.013	0.121	Free Surface	0.248	No	8	No
1513	451109	451108	6	259.9	7.1	0.013	0.020	Free Surface	0.116	No	6	No
1514	450802	450602	6	311.9	6.3	0.013	0.027	Free Surface	0.296	No	6	No
1515	451121	450802	6	202.7	4.0	0.013	0.012	Free Surface	0.104	No	6	No
1516	451120	451121	6	127.2	6.9	0.013	0.010	Free Surface	0.080	No	6	No
1517	450820	450802	6	292.9	12.8	0.013	0.004	Free Surface	0.080	No	6	No
1518	450305	450107	6	195.0	7.0	0.013	0.000	Free Surface	0.030	No	6	No
1519	451110	451109	6	321.1	10.1	0.013	0.016	Free Surface	0.091	No	6	No
152	432009	432008	6	259.8	8.1	0.013	0.139	Free Surface	0.258	No	6	No
1520	450803	450802	6	266.2	13.8	0.013	0.007	Free Surface	0.084	No	6	No
1521	451119	451120	6	333.6	14.3	0.013	0.007	Free Surface	0.060	No	6	No
1522	450105	450209A	8	145.9	2.4	0.013	0.042	Free Surface	0.117	No	8	No
1523	450108	450103	6	53.9	1.1	0.013	0.006	Free Surface	0.088	No	6	No
1524	450110LH	450102	8	256.6	6.5	0.013	0.019	Free Surface	0.236	No	8	No
1525	450109	450108	6	191.5	3.0	0.013	0.005	Free Surface	0.075	No	6	No
1528	442801	450417	6	164.1	4.0	0.013	0.182	Free Surface	0.341	No	6	No
1529	442510	442335	6	207.9	0.5	0.013	0.006	Free Surface	0.104	No	6	No
153	430605	430604	8	355.2	1.2	0.013	0.261	Free Surface	0.338	No	8	No
1530	442332	442332	6	127.7	3.5	0.013	0.024	Free Surface	0.163	No	6	No
1531	442332	442613	6	210.2	12.5	0.013	0.109	Free Surface	0.206	No	6	No

G2. Model Results for 2028 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
1532	442335	442334	6	60.0	6.7	0.013	0.020	Free Surface	0.103	No	6	No
1533	442334	442333	6	194.8	6.0	0.013	0.021	Free Surface	0.117	No	6	No
1534	452736	452737	6	201.9	2.6	0.013	0.004	Free Surface	0.066	No	6	No
1535	441714	441601	8	51.4	2.9	0.013	0.162	Free Surface	0.335	No	8	No
1536	403007	403006	6	252.9	0.4	0.013	0.008	Free Surface	0.143	No	6	No
1537	441703	441704	6	132.4	8.4	0.013	0.010	Free Surface	0.083	No	6	No
1538	402705	402704	6	268.9	0.3	0.013	0.017	Free Surface	0.196	No	6	No
1539	441416	441417	6	221.6	2.3	0.013	0.002	Free Surface	0.083	No	6	No
154	441012LH	441011	6	243.4	5.0	0.013	0.013	Free Surface	0.127	No	6	No
1540	441418	441417	6	161.6	12.7	0.013	0.017	Free Surface	0.102	No	6	No
1541	441709	441708	6	48.8	9.4	0.013	0.004	Free Surface	0.047	No	6	No
1542	441402	441402A	6	55.8	8.8	0.013	0.384	Free Surface	0.466	No	6	No
1543	441412	441411	6	271.8	10.1	0.013	0.030	Free Surface	0.125	No	6	No
1544	442305	442304	6	295.1	0.8	0.013	0.029	Free Surface	0.189	No	6	No
1545	442328	442329	6	112.9	0.9	0.013	0.063	Free Surface	0.304	No	6	No
1546	452705	452704	6	81.8	10.1	0.013	0.003	Free Surface	0.066	No	6	No
1547	442728	442714	6	92.5	21.6	0.013	0.004	Free Surface	0.051	No	6	No
1548	442419	442420	6	100.1	15.6	0.013	0.005	Free Surface	0.064	No	6	No
1549	440315	440316	6	217.9	8.3	0.013	0.009	Free Surface	0.069	No	6	No
155	402712	402702	6	152.5	2.5	0.013	0.095	Free Surface	0.275	No	6	No
1550	442404	442405	6	202.3	3.2	0.013	0.026	Free Surface	0.133	No	6	No
1551	442456	442427	8	156.2	5.1	0.013	0.002	Free Surface	0.053	No	8	No
1552	443324	443301	6	162.6	21.3	0.013	0.015	Free Surface	0.287	No	6	No
1553	440910	440911	6	136.0	7.8	0.013	0.042	Free Surface	0.185	No	6	No
1554	450113	450112	6	190.9	3.5	0.013	0.008	Free Surface	0.079	No	6	No
1555	450117	450116	6	30.0	5.3	0.013	0.001	Free Surface	0.026	No	6	No
1556	450115	450115A	6	123.1	3.9	0.013	0.009	Free Surface	0.073	No	6	No
1558	450911	450806	6	136.2	8.1	0.013	0.037	Free Surface	0.131	No	6	No
1559	450806	450807	6	231.7	17.4	0.013	0.056	Free Surface	0.136	No	6	No
1560	452720	04C142M	6	116.9	5.0	0.013	0.049	Free Surface	0.166	No	6	No
1562	442508	442509	6	165.1	4.3	0.013	0.002	Free Surface	0.060	No	6	No
1563	VMH_86	452721	6	96.2	0.1	0.013	0.000	Free Surface	0.025	No	6	No
1564	452721	452722	8	157.1	0.8	0.013	0.002	Free Surface	0.040	No	8	No
1565	452735LH	452734	6	99.0	0.9	0.013	0.002	Free Surface	0.059	No	6	No
1566	442706	442610	6	116.2	8.6	0.013	0.027	Free Surface	0.184	No	6	No
1567	450811	450901	8	292.2	0.4	0.013	0.120	Free Surface	0.325	No	8	No
1568	450417	450420	18	258.4	3.8	0.013	0.000	Free Surface	0.000	No	18	No
1569	450420	450410	12	27.9	0.2	0.013	0.004	Free Surface	0.058	No	12	No
157	430905	430904	6	141.5	0.5	0.013	0.018	Free Surface	0.204	No	6	No
1570	442707	442706	6	68.8	3.3	0.013	0.013	Free Surface	0.104	No	6	No
1572	442815	442816	6	108.9	0.1	0.013	0.014	Free Surface	0.230	No	6	No
1573	442725	442724	6	108.3	3.7	0.013	0.009	Free Surface	0.077	No	6	No
1574	442408	442409	6	59.1	5.2	0.013	0.032	Free Surface	0.194	No	6	No
1575	442430	442431	6	58.3	11.8	0.013	0.047	Free Surface	0.170	No	6	No
1578	441908	441907	6	196.9	9.2	0.013	0.052	Free Surface	0.196	No	6	No
1579	441131	441130	6	211.6	4.6	0.013	0.011	Free Surface	0.093	No	6	No
158	430903	430904	6	108.9	6.0	0.013	0.284	Free Surface	0.388	No	6	No
1580	442513	442511	6	206.8	4.8	0.013	0.007	Free Surface	0.061	No	6	No
1581	442722	442721	6	205.0	3.1	0.013	0.003	Free Surface	0.063	No	6	No
1582	442457LH	442446	6	19.7	8.3	0.013	0.003	Free Surface	0.046	No	6	No
1583	442446	442447	6	47.7	6.0	0.013	0.005	Free Surface	0.053	No	6	No
1584	442407	442408	6	153.5	1.2	0.013	0.031	Free Surface	0.169	No	6	No
1585	442406	442407	6	115.5	1.7	0.013	0.030	Free Surface	0.187	No	6	No
1586	442429	442430	6	99.2	13.8	0.013	0.029	Free Surface	0.117	No	6	No
1587	443025	442905	6	157.2	1.7	0.013	0.001	Free Surface	0.040	No	6	No
1588	440308	440307	6	269.3	7.6	0.013	0.006	Free Surface	0.075	No	6	No
1589	452502	452427	8	222.4	0.4	0.013	0.004	Free Surface	0.084	No	8	No
159	432915LH	432914	6	112.3	4.6	0.013	0.004	Free Surface	0.073	No	6	No
1590	441414	441412	6	141.6	13.8	0.013	0.019	Free Surface	0.097	No	6	No
1591	403002	403001	8	256.5	0.4	0.013	0.058	Free Surface	0.225	No	8	No
1592	403203	403002	8	190.7	0.6	0.013	0.019	Free Surface	0.119	No	8	No
1593	402706	402705	6	245.1	1.3	0.013	0.011	Free Surface	0.174	No	6	No
1594	441022	441402	6	106.7	9.4	0.013	0.380	Free Surface	0.408	No	6	No
1595	441702	441703	6	157.7	1.4	0.013	0.006	Free Surface	0.076	No	6	No
1596	403004	403003	8	113.4	1.2	0.013	0.030	Free Surface	0.177	No	8	No
1597	441602	441601	8	239.7	4.6	0.013	0.204	Free Surface	0.334	No	8	No
1599	442626	402604	6	165.0	2.5	0.013	0.036	Free Surface	0.173	No	6	No
16	431503	431502	8	163.0	3.9	0.013	0.791	Free Surface	0.542	No	8	No
160	430706	430705	6	154.9	7.7	0.013	0.316	Free Surface	0.383	No	6	No
1600	402801	403007	6	102.8	0.5	0.013	0.004	Free Surface	0.106	No	6	No
1601	403008	402801	6	63.1	1.8	0.013	0.002	Free Surface	0.066	No	6	No
1602	402809	402801	6	49.0	1.2	0.013	0.002	Free Surface	0.066	No	6	No
1603	441701	441420	6	271.7	16.3	0.013	0.010	Free Surface	0.072	No	6	No
1605	441411	441410	6	197.6	6.5	0.013	0.039	Free Surface	0.193	No	6	No
1606	441601	441712	8	305.4	2.0	0.013	0.406	Free Surface	0.398	No	8	No
1607	441708	441707	6	109.6	10.5	0.013	0.006	Free Surface	0.058	No	6	No
1608	402607LHB	402606	6	56.8	3.5	0.013	0.001	Free Surface	0.038	No	6	No
1609	441420	441420A	6	59.4	10.7	0.013	0.018	Free Surface	0.105	No	6	No
161	431621LH	431622	6	160.0	5.4	0.013	0.007	Free Surface	0.063	No	6	No
1611	402803	402808	6	92.5	1.2	0.013	0.007	Free Surface	0.162	No	6	No
1612	452101	452024	6	134.9	6.6	0.013	0.018	Free Surface	0.151	No	6	No
1613	442331	442332	6	273.6	5.9	0.013	0.082	Free Surface	0.202	No	6	No
1614	442802	442801	6	249.6	2.4	0.013	0.164	Free Surface	0.358	No	6	No
1615	452724	452727	6	120.4	0.7	0.013	0.014	Free Surface	0.124	No	6	No
1616	442814	442815	6	343.4	1.1	0.013	0.009	Free Surface	0.159	No	6	No
1617	452715	452714	6	78.2	2.9	0.013	0.002	Free Surface	0.039	No	6	No
1618	442304	442303	6	328.4	2.8	0.013	0.032	Free Surface	0.142	No	6	No
1619	442709	442708	6	195.8	11.1	0.013	0.007	Free Surface	0.090	No	6	No
162	430210	430209	6	169.4	7.1	0.013	0.416	Free Surface	0.438	No	6	No
1620	452714	452713	6	22.8	12.3	0.013	0.003	Free Surface	0.045	No	6	No
1621	442806	442802	6	194.7	8.2	0.013	0.154	Free Surface	0.318	No	6	No
1622	442330	442331	6	198.7	1.0	0.013	0.079	Free Surface	0.276	No	6	No
1623	452727	452728	6	204.4	6.4	0.013	0.015	Free Surface	0.089	No	6	No
1624	442723	442711	6	157.6	1.5	0.013	0.000	Free Surface	0.028	No	6	No
1625	442324	442325	6	223.6	6.5	0.013	0.006	Free Surface	0.056	No	6	No
1626	442325	442329	6	98.6	44.4	0.013	0.014	Free Surface	0.186	No	6	No
1627	442803	442802	6	301.0	12.8	0.013	0.007	Free Surface	0.214	No	6	No
1628	452009	452010	6	102.2	25.3	0.013	0.060	Free Surface	0.126	No	6	No
1629	452706	452705	6	156.2	16.2	0.013	0.002	Free Surface	0.032	No	6	No
163	431623	431631	6	98.1	49.5	0.013	0.066	Free Surface	0.196	No	6	No
1630	452728	452525	6	189.5	7.7	0.013	0.017	Free Surface	0.096	No	6	No
1632	452704	452703	6	68.4	0.7	0.013	0.005	Free Surface	0.075	No	6	No
1633	443016	443015	6	315.1	7.6	0.013	0.010	Free Surface	0.112	No	6	No
1634	442438	442437	8	106.6	0.9	0.013	0.020	Free Surface	0.104	No	8	No
1635	442327	442328	6	173.4	0.6	0.013	0.062	Free Surface	0.311	No	6	No
1636	452524	452523	6	299.9	3.6	0.013	0.002	Free Surface	0.045	No	6	No
1637	442306	442305	6	248.2	1.9	0.013	0.026	Free Surface	0.184	No	6	No
1639	443017	443016	6	179.1	14.6	0.013	0.003	Free Surface	0.054	No	6	No
164	431622	431623	6	62.6	8.5	0.013	0.009	Free Surface	0.064	No	6	No
1640	442808	442807	6	321.0	5.6	0.013	0.129	Free Surface	0.263	No	6	No
1641	442437	442436	8	150.6	2.5	0.013	0.022	Free Surface	0.094	No	8	No
1642	442308	442306	6	145.3	5.0	0.013	0.015	Free Surface	0.124	No	6	No
1643	490102	490101	6	82.9	1.6	0.013	0.007	Free Surface	0.110	No	6	No
1644	454303	454302	8	326.2	7.4	0.013	0.088	Free Surface	0.145	No	8	No
1645	442509	442510	6	267.4	0.7	0.013	0.004	Free Surface	0.094	No	6	No
1646	452707LH	452706	6	53.3	3.0	0.013	0.002	Free Surface	0.032	No	6	No
1647	442807	442806	6	297.7	6.0	0.013	0.136	Free Surface	0.263	No	6	No
1648	442329	442330	6	163.3	0.9	0.013	0.076	Free Surface	0.332	No	6	No
1649	452702LH	452701	6	92.3	18.1	0.013	0.003	Free Surface	0.045	No	6	No
1650	452703	452701	6	186.3	8.7	0.013	0.007	Free Surface	0.057	No	6	No
1651	452531	452419	6	97.3	9.9	0.013	0.003	Free Surface	0.036	No	6	No
1652	443007	443006	6	103.2	1.2	0.013	0.007	Free Surface	0.083	No	6	No
1653	443018LH	443017	6	114.6	2.0	0.013	0.003	Free Surface	0.049	No	6	No
1654	443008	443007	6	34.3	4.9	0.013	0.007	Free Surface	0.082	No	6	No
1655	442307	442306	6	136.9	0.8	0.013	0.011	Free Surface	0.140	No	6	No
1656	442410	442327	6	237.9	0.2	0.013	0.061	Free Surface	0.402	No	6	No
1657	442409	442410	6	85.8	1.4	0.013	0.060	Free Surface	0.363	No	6	No
1658	442433	442432	6	188.9	8.4	0.013	0.050	Free Surface	0.166	No	6	No
1659	442435	442434	6	146.8	6.1	0.013	0.042	Free Surface	0.140	No	6	No
166	430214	430213	6	64.1	50.8	0.013	0.058	Free Surface	0.106	No	6	No
1660	442434	442433	6	54.3	15.6	0.013	0.049	Free Surface	0.138	No	6	No
1661	442432	442431	6	126.3	3.9	0.013	0.052	Free Surface	0.195	No	6	No
1662	442431	442808	6	198.4	8.3	0.013	0.098	Free Surface	0.234	No	6	No
1663	443009	443008	6	276.4	12.0	0.013	0.004	Free Surface	0.054	No	6	No
1664	442445	442435	6	121.8	28.0	0.013	0.005	Free Surface	0.094	No	6	No
1665	442812	442430	6	137.4	1.9	0.013	0.016	Free Surface	0.127	No	6	No
1666	442905	442906	6	319.7	6.8	0.013	0.046	Free Surface	0.210	No	6	No
1667	442424	442425	6	162.8	14.0	0.013	0.002	Free Surface	0.041	No	6	No
1668	442903	442905	6	297.9	13.2	0.013	0.023	Free Surface	0.092	No	6	No
1669	442901	442902	6	250.6	14.7	0.013	0.007	Free Surface	0.061	No	6	No
167	431627	431628	6	202.2	5.9	0.013	0.007	Free Surface	0.175	No	6	No
1670	442902	442903	6	128.0	15.6	0.013	0.015	Free Surface	0.082	No	6	No
1671	442425	442426	6	221.7	9.0	0.013	0.006	Free Surface	0.063	No	6	No
1672	442906	442907	6	254.0	1.6	0.013	0.067	Free Surface	0.244	No	6	No
1673	442455	442425	6	68.9	57.4	0.013	0.003	Free Surface	0.038	No	6	No
1674	442426	442427	6	370.8	8.7	0.013	0.012	Free Surface	0.093	No	6	No
1675	442427	442428	6	180.1	5.1	0.013	0.021	Free Surface	0.121	No	6	No
1676	440309	440308	6	292.0	10.5	0.013	0.003	Free Surface	0.046	No	6	No
1677	442915	442905	6	229.6	1.0	0.013	0.017	Free Surface	0.149	No	6	No
1678	442405	442406	8	293.1	4.0	0.013	0.030	Free Surface	0.112	No	8	No
1679	442451	442427	6	267.7	20.9	0.013	0.005	Free Surface	0.074	No	6	No
168	430203	430204	6	137.6	14.0	0.013	0.467	Free Surface	0.411	No	6	No
1680	440310	440311	6	109.8	10.2	0.013	0.001	Free Surface	0.040	No	6	No
1681	442914	442915	6	172.6	1.1	0.013	0.015	Free Surface	0.142	No	6	No
1682	443304	443305	12	317.1	1.0	0.013	1.085	Free Surface	0.488	No	12	No
1683	440314	440315	6	151.9	11.2	0.013	0.005	Free Surface	0.056	No	6	No
1684	440311	440322	6	317.3	8.2	0.013	0.006	Free Surface	0.075	No	6	No
1685	440313	440314	6	63.3	0.4	0.013	0.001	Free Surface	0.045	No	6	No
1686	440709	440710	6	92.7	5.7	0.013	0.005	Free Surface	0.068	No	6	No
1687	442107	442108	6	87.9	25.6	0.013	0.025	Free Surface	0.083	No	6	No
1688	443421	443420	6	71.5	6.8	0.013	0.008	Free Surface	0.088	No	6	No
1689	443420	441803	6	174.1	20.8	0.013	0.041	Free Surface	0.109	No	6	No
169	431626LH	431625	6	80.9	0.5	0.013	0.043	Free Surface	0.265	No	6	No
1690	443411	443410	6	316.5	6.7	0.013	0.007	Free Surface	0.075	No	6	No
1691	441804	441803	6	35.3	1.8	0.013	0.282	Free Surface	0.568	No	6	No
1692	442912LH	442911	6	199.2	5.6	0.013	0.006	Free Surface	0.053	No	6	No
1693	443302	443303	10	170.4	11.8	0.013	1.070	Free Surface	0.498	No	10	No
1694	440312	440311	6	257.3	8.6	0.013	0.002	Free Surface	0.041	No	6	No
1695	440322	440323	6	237.4	3.3	0.013	0.013	Free Surface	0.094	No	6	No
1696	442911	442910	6	67.9	31.2	0.013	0.008	Free Surface	0.056	No	6	No
1697	442910	442913	6	132.1	8.0	0.013	0.009	Free Surface	0.074	No	6	No
1698	440205	440204	6	199.5	0.5	0.013	0.003	Free Surface	0.082	No	6	No
1699	443301	443302	10	86.2	12.5	0.013	1.013	Free Surface	0.306	No	10	No
17	433412	433413	8	193.2	7.6	0.013	0.991	Free Surface	0.523	No	8	No
170	432003	432004	6	132.5	6.7	0.013	0.106	Free Surface	0.194	No	6	No
1700	440905	440904	6	166.4	2.5	0.013	0.005	Free Surface	0.092	No	6	No
1701	442401	442402	6	174.8	11.5	0.013	0.002	Free Surface	0.046	No	6	No
1702	440907	440908	6	189.0	6.0	0.013	0.019	Free Surface	0.093	No	6	No
1703	440206	440207	6	147.6	7.5	0.013	0.002	Free Surface	0.143	No	6	No
1704	440323	440324	6	203.3	6.0	0.013	0.015	Free Surface	0.111	No	6	No
1705	440411	440410	6	126.8	3.9	0.013	0.004	Free Surface	0.095	No	6	No

G2. Model Results for 2028 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
1706	443502	443501	6	206.0	0.2	0.013	0.060	Free Surface	0.343	No	6	No
1707	443513	443309	6	142.3	5.3	0.013	0.010	Free Surface	0.079	No	6	No
1708	443321	443322LH	8	243.7	5.0	0.013	0.114	Free Surface	0.182	No	8	No
1709	443512	443513	6	123.7	13.8	0.013	0.004	Free Surface	0.060	No	6	No
171	440303	440302	6	141.5	4.9	0.013	0.036	Free Surface	0.142	No	6	No
1710	443603	443602	8	99.7	8.6	0.013	0.051	Free Surface	0.101	No	8	No
1711	443509	443504	6	113.3	2.6	0.013	0.014	Free Surface	0.116	No	6	No
1712	443504	443503	6	117.3	10.3	0.013	0.040	Free Surface	0.192	No	6	No
1713	443505	443504	6	115.7	7.1	0.013	0.024	Free Surface	0.117	No	6	No
1714	443506	443505	6	57.4	12.3	0.013	0.022	Free Surface	0.100	No	6	No
1715	443507	443506	6	182.1	10.9	0.013	0.009	Free Surface	0.077	No	6	No
1716	443322LH	443312	8	299.9	4.1	0.013	0.126	Free Surface	0.262	No	8	No
1717	443312	443311	8	156.6	11.0	0.013	0.616	Free Surface	0.331	No	8	No
1718	443510	443509	6	163.7	12.9	0.013	0.014	Free Surface	0.088	No	6	No
1719	443511	443510	6	207.4	4.1	0.013	0.006	Free Surface	0.067	No	6	No
172	432923A	432916	6	158.0	0.7	0.013	0.053	Free Surface	0.231	No	6	No
1720	443410	443409	6	134.6	4.4	0.013	0.012	Free Surface	0.087	No	6	No
1721	443418	443419	6	198.3	2.5	0.013	0.019	Free Surface	0.117	No	6	No
1722	443422	443421	6	174.1	14.9	0.013	0.005	Free Surface	0.055	No	6	No
1723	441805	441804	6	142.6	1.3	0.013	0.081	Free Surface	0.421	No	6	No
1724	441838	441805	6	157.4	1.3	0.013	0.025	Free Surface	0.232	No	6	No
1726	441312	441310	6	154.7	3.2	0.013	0.004	Free Surface	0.089	No	6	No
1727	442114	442113	6	89.9	19.7	0.013	0.004	Free Surface	0.064	No	6	No
1728	441306	441308	6	315.9	5.8	0.013	0.060	Free Surface	0.195	No	6	No
1729	442202	442203	16	259.7	0.8	0.013	1.566	Free Surface	0.377	No	16	No
1731	441313LH	441310	6	163.8	1.0	0.013	0.005	Free Surface	0.102	No	6	No
1732	441106LH	441107	6	127.4	4.1	0.013	0.004	Free Surface	0.051	No	6	No
1733	441924	441912	6	43.1	20.0	0.013	0.025	Free Surface	0.100	No	6	No
1734	443508	443506	6	130.0	12.2	0.013	0.010	Free Surface	0.078	No	6	No
1735	443604	443603	8	273.7	17.3	0.013	0.044	Free Surface	0.093	No	8	No
1736	443316	443315	6	127.5	1.5	0.013	0.050	Free Surface	0.190	No	6	No
1737	443605	443604	8	89.3	23.3	0.013	0.004	Free Surface	0.053	No	8	No
1738	443315	443313	6	123.9	20.2	0.013	0.055	Free Surface	0.124	No	6	No
1739	443313	443312	6	279.5	27.4	0.013	0.060	Free Surface	0.283	No	6	No
174	432007	432005	6	155.1	15.1	0.013	0.152	Free Surface	0.267	No	6	No
1740	443405	443404	6	110.5	10.5	0.013	0.010	Free Surface	0.088	No	6	No
1741	442115	442116	6	143.5	1.8	0.013	0.001	Free Surface	0.043	No	6	No
1742	443407	443406	6	72.1	1.0	0.013	0.003	Free Surface	0.081	No	6	No
1743	443406	443404	6	110.3	17.8	0.013	0.030	Free Surface	0.103	No	6	No
1745	443414	443415	6	219.4	10.2	0.013	0.007	Free Surface	0.064	No	6	No
1747	443408	443406	6	52.8	16.0	0.013	0.024	Free Surface	0.093	No	6	No
1748	441821	441820	6	67.0	1.5	0.013	0.011	Free Surface	0.109	No	6	No
1749	441822	441821	6	32.5	3.1	0.013	0.007	Free Surface	0.091	No	6	No
175	432004	432005	6	75.0	67.1	0.013	0.112	Free Surface	0.222	No	6	No
1750	441834	441837	6	123.3	0.8	0.013	0.024	Free Surface	0.223	No	6	No
1751	443426	443408	6	62.3	26.8	0.013	0.023	Free Surface	0.083	No	6	No
1752	441828	441827	6	133.5	1.3	0.013	0.014	Free Surface	0.128	No	6	No
1753	441835	441834	6	141.0	2.6	0.013	0.012	Free Surface	0.142	No	6	No
1754	440710	440711	6	105.2	3.6	0.013	0.009	Free Surface	0.105	No	6	No
1755	441819	441820	6	344.3	11.4	0.013	0.008	Free Surface	0.083	No	6	No
1756	442112	442111	6	129.3	17.3	0.013	0.014	Free Surface	0.070	No	6	No
1757	443417	443418	6	189.6	10.5	0.013	0.010	Free Surface	0.097	No	6	No
1758	442105	442106	6	247.7	9.0	0.013	0.037	Free Surface	0.124	No	6	No
1759	443413	443414	6	331.2	7.9	0.013	0.006	Free Surface	0.056	No	6	No
176	432005	432006	6	112.1	11.9	0.013	0.265	Free Surface	0.345	No	6	No
1760	441826	441824	6	225.9	10.7	0.013	0.003	Free Surface	0.056	No	6	No
1761	440711	440712	6	177.0	0.7	0.013	0.010	Free Surface	0.114	No	6	No
1762	442113	442112	6	176.1	3.4	0.013	0.010	Free Surface	0.079	No	6	No
1763	442109	442107	6	99.4	5.2	0.013	0.024	Free Surface	0.104	No	6	No
1764	443419	443420	6	168.9	9.8	0.013	0.026	Free Surface	0.107	No	6	No
1765	443427	443411	6	50.2	2.0	0.013	0.002	Free Surface	0.051	No	6	No
1768	443423	443424	6	264.3	4.8	0.013	0.007	Free Surface	0.091	No	6	No
1769	441806	441805	6	182.5	0.6	0.013	0.056	Free Surface	0.305	No	6	No
177	432816	432815	6	64.8	3.4	0.013	0.009	Free Surface	0.116	No	6	No
1770	443424	440728	6	115.6	1.5	0.013	0.013	Free Surface	0.198	No	6	No
1771	441307	441306	6	22.0	17.7	0.013	0.058	Free Surface	0.155	No	6	No
1772	441931	441932	6	127.4	16.8	0.013	0.005	Free Surface	0.048	No	6	No
1773	440728	440729	6	133.2	6.2	0.013	0.154	Free Surface	0.361	No	6	No
1774	443808	443807	6	277.9	8.2	0.013	0.005	Free Surface	0.054	No	6	No
1775	403116	403115	6	245.7	0.4	0.013	0.008	Free Surface	0.120	No	6	No
1776	442206	442206A	6	162.2	1.5	0.013	0.026	Free Surface	0.166	No	6	No
1778	441913	441912	6	112.1	8.2	0.013	0.011	Free Surface	0.093	No	6	No
1779	441132LH	441131	6	113.8	9.8	0.013	0.007	Free Surface	0.069	No	6	No
178	431702	431702	6	199.5	2.1	0.013	0.628	Exceeds Capacity	1.000	No	6	Yes
1780	443806	443805	6	130.5	13.2	0.013	0.017	Free Surface	0.092	No	6	No
1781	441916	441913	6	43.4	7.7	0.013	0.004	Free Surface	0.058	No	6	No
1782	441107	441108	6	143.1	10.6	0.013	0.006	Free Surface	0.119	No	6	No
1783	441108	441109	6	146.6	1.7	0.013	0.035	Free Surface	0.177	No	6	No
1784	441917LH	441916	6	86.5	7.4	0.013	0.003	Free Surface	0.042	No	6	No
1786	441907	441906	6	276.2	1.8	0.013	0.057	Free Surface	0.210	No	6	No
1787	441111	441108	6	80.8	4.4	0.013	0.028	Free Surface	0.158	No	6	No
1788	443801	443802	6	110.9	16.0	0.013	0.001	Free Surface	0.031	No	6	No
179	440202	440304	6	174.0	4.2	0.013	0.032	Free Surface	0.134	No	6	No
1790	443805	443804	6	169.2	6.8	0.013	0.022	Free Surface	0.120	No	6	No
1791	441205	441105	6	269.1	4.3	0.013	0.013	Free Surface	0.268	No	6	No
1792	441204	441205	6	125.2	9.6	0.013	0.008	Free Surface	0.076	No	6	No
1793	441130	441128	6	187.9	14.1	0.013	0.031	Free Surface	0.116	No	6	No
1794	441129LH	441128	6	189.2	7.5	0.013	0.008	Free Surface	0.096	No	6	No
1795	441918LH	441919	6	85.3	1.7	0.013	0.002	Free Surface	0.052	No	6	No
1796	443802	443803	6	77.1	20.9	0.013	0.004	Free Surface	0.046	No	6	No
1797	441919	441920	6	51.9	3.8	0.013	0.004	Free Surface	0.048	No	6	No
1798	441920	441921	8	98.7	36.5	0.013	0.007	Free Surface	0.028	No	8	No
1799	441921	441910	6	168.8	4.1	0.013	0.007	Free Surface	0.120	No	6	No
18	431510	431509	8	251.4	3.5	0.013	0.626	Free Surface	0.729	No	8	Yes
180	431720	431703	6	137.0	2.7	0.013	1.203	Backwater	1.000	No	6	Yes
1800	441128	441127	6	114.0	12.1	0.013	0.045	Free Surface	0.247	No	6	No
1801	441309	441127	6	199.5	2.2	0.013	0.062	Free Surface	0.297	No	6	No
1802	443804	443820	6	123.1	4.6	0.013	0.031	Free Surface	0.283	No	6	No
1803	443803	443820	6	138.0	20.5	0.013	0.009	Free Surface	0.271	No	6	No
1804	441127	441126	6	140.5	1.1	0.013	0.108	Free Surface	0.416	No	6	No
1805	402402	402403	6	217.6	0.5	0.013	0.011	Free Surface	0.242	No	6	No
1806	441136LH	441126A	6	96.4	35.1	0.013	0.005	Free Surface	0.245	No	6	No
1807	441134	441133	6	137.2	1.2	0.013	0.003	Free Surface	0.070	No	6	No
1808	441103	441119	6	111.6	6.6	0.013	0.018	Free Surface	0.121	No	6	No
1809	441114	441119	6	243.2	35.4	0.013	0.042	Free Surface	0.121	No	6	No
181	440316	440202	6	130.6	10.2	0.013	0.012	Free Surface	0.109	No	6	No
1810	441102	441101	6	35.5	36.4	0.013	0.023	Free Surface	0.088	No	6	No
1812	441115LH	441114	6	182.2	0.3	0.013	0.017	Free Surface	0.155	No	6	No
1813	441923	442001	6	194.6	29.9	0.013	0.008	Free Surface	0.049	No	6	No
1814	403121	403201	6	332.6	0.3	0.013	0.005	Free Surface	0.124	No	6	No
1815	441120LH	441119	6	126.8	4.0	0.013	0.010	Free Surface	0.113	No	6	No
1816	443812LH	443813	8	90.9	0.1	0.013	0.006	Free Surface	0.103	No	8	No
1817	443813	441606	6	168.5	13.6	0.013	0.006	Free Surface	0.101	No	6	No
1818	441606	441605	8	136.8	9.6	0.013	0.068	Free Surface	0.133	No	8	No
1819	441116	441115LH	6	81.6	1.8	0.013	0.015	Free Surface	0.167	No	6	No
182	433109	431713	6	208.1	9.0	0.013	0.068	Free Surface	0.183	No	6	No
1822	441126	441126A	6	106.3	0.5	0.013	0.110	Free Surface	0.462	No	6	No
1823	441117	441116	6	245.8	0.6	0.013	0.013	Free Surface	0.134	No	6	No
1824	441118LH	441117	6	155.0	0.3	0.013	0.005	Free Surface	0.125	No	6	No
1825	441017	441016	6	82.5	12.8	0.013	0.006	Free Surface	0.048	No	6	No
1826	441101	441016	6	198.7	11.5	0.013	0.028	Free Surface	0.104	No	6	No
1827	441016	441018	6	69.3	11.2	0.013	0.153	Free Surface	0.241	No	6	No
1828	441135LH	SSTA_9953	6	99.1	25.3	0.013	0.006	Free Surface	0.253	No	6	No
1829	441018	441019	6	60.6	11.1	0.013	0.155	Free Surface	0.292	No	6	No
183	431702	431701	6	131.0	3.4	0.013	0.632	Backwater	1.000	No	6	Yes
1830	441119	441019	6	255.1	18.3	0.013	0.071	Free Surface	0.144	No	6	No
1831	441605	441604	8	265.7	13.1	0.013	0.138	Free Surface	0.162	No	8	No
1832	441139	441138	6	170.8	4.3	0.013	0.004	Free Surface	0.055	No	6	No
1834	442002	442003	6	45.2	29.0	0.013	0.016	Free Surface	0.130	No	6	No
1835	441125	SSTA_9953	6	93.8	1.1	0.013	0.116	Free Surface	0.423	No	6	No
1836	441122	441121	6	222.5	9.0	0.013	0.128	Free Surface	0.242	No	6	No
1838	441021	441401	6	121.4	6.3	0.013	0.141	Free Surface	0.323	No	6	No
1839	442003	442004	6	191.3	4.2	0.013	0.063	Free Surface	0.334	No	6	No
184	431714	431716	6	148.2	7.4	0.013	0.049	Free Surface	0.177	No	6	No
1840	442005	442004	6	364.2	0.8	0.013	0.098	Free Surface	0.424	No	6	No
1841	441604	441603	8	312.6	14.1	0.013	0.191	Free Surface	0.175	No	8	No
1842	441603	441603A	8	98.6	13.2	0.013	0.191	Free Surface	0.176	No	8	No
1843	441401	441022	6	114.7	11.2	0.013	0.374	Free Surface	0.392	No	6	No
1844	441415	441414	6	154.1	7.4	0.013	0.010	Free Surface	0.077	No	6	No
1845	402802	402803	6	131.9	1.1	0.013	0.003	Free Surface	0.078	No	6	No
1846	403005	403004	8	118.6	0.3	0.013	0.028	Free Surface	0.158	No	8	No
1848	441024	441023	6	159.7	14.0	0.013	0.046	Free Surface	0.129	No	6	No
1849	402608	402606	6	56.4	3.5	0.013	0.002	Free Surface	0.041	No	6	No
1850	402804	402803	6	110.0	2.0	0.013	0.002	Free Surface	0.068	No	6	No
1851	441023	441404	6	123.5	16.6	0.013	0.056	Free Surface	0.314	No	6	No
1852	441403	441404	6	195.6	9.1	0.013	0.389	Free Surface	0.454	No	6	No
1853	441711	441710	6	111.2	15.9	0.013	0.045	Free Surface	0.338	No	6	No
1854	441712	441710	8	155.5	3.4	0.013	0.409	Free Surface	0.390	No	8	No
1855	441707	441706	6	173.1	15.5	0.013	0.013	Free Surface	0.116	No	6	No
1856	441706	441705	6	35.4	0.5	0.013	0.015	Free Surface	0.151	No	6	No
1857	441704	441705	6	267.3	15.4	0.013	0.028	Free Surface	0.117	No	6	No
1858	441419	441409	6	143.2	17.4	0.013	0.024	Free Surface	0.186	No	6	No
1859	402606	402605	8	105.9	4.7	0.013	0.004	Free Surface	0.054	No	8	No
186	433110	433109	6	200.0	10.1	0.013	0.050	Free Surface	0.156	No	6	No
1860	441705	441509	6	121.0	10.7	0.013	0.046	Free Surface	0.137	No	6	No
1861	441710	441713	8	114.0	2.7	0.013	0.461	Free Surface	0.409	No	8	No
1862	441510	441508	6	230.7	6.2	0.013	0.023	Free Surface	0.131	No	6	No
1863	441509	441508	6	33.5	10.0	0.013	0.048	Free Surface	0.146	No	6	No
1864	402805	402806	6	345.5	0.5	0.013	0.006	Free Surface	0.135	No	6	No
1865	441404	441405	6	137.2	3.2	0.013	0.268	Free Surface	0.402	No	6	No
1868	402605	402604A	8	132.0	1.0	0.013	0.009	Free Surface	0.111	No	8	No
187	451826B	451826A	6	134.4	5.6	0.013	0.005	Free Surface	0.084	No	6	No
1870	441405	441406	8	371.0	8.6	0.013	0.268	Free Surface	0.268	No	8	No
1873	441507	441506	6	48.4	2.9	0.013	0.083	Free Surface	0.547	No	6	No
1875	441508	441507	6	326.5	14.5	0.013	0.070	Free Surface	0.200	No	6	No
1876	441713	441506	12	321.5	1.7	0.013	0.461	Free Surface	0.351	No	12	No
1877	450819LH	450820	6	71.1	11.3	0.013	0.002	Free Surface	0.037	No	6	No
1878	451115	450822	6	264.1	11.4	0.013	0.007	Free Surface	0.073	No	6	No
1879	450817	450813	6	318.6	19.3	0.013	0.013	Free Surface	0.084	No	6	No
188	442918	442906	6	123.5	4.5	0.013	0.017	Free Surface	0.186	No	6	No
1880	450916	450915	6	135.6	0.7	0.013	0.006	Free Surface	0.084	No	6	No
1881	451207LH	451206	6	91.1	1.0	0.013	0.002	Free Surface	0.063	No	6	No
1882	451202	451201	6	105.3	8.1	0.013	0.122	Free Surface	0.232	No	6	No
1883	451015	451014	6	314.0	12.3	0.013	0.146	Free Surface	0.229	No	6	No
1884	452001	452002	6	109.9	6.9	0.013	0.027	Free Surface	0.115	No	6	No
1885	402901	402704	15	268.4	0.3	0.013	0.416	Free Surface	0.277	No	8	No
1886	402714	402713	6	206.0	1.7	0.013	0.011	Free Surface	0.107	No	6	No
1887	452801	452020	6	29.0	33.0	0.013	0.005	Free Surface	0.179	No	6	No
1888	452803	452020	6	253.9	6.6	0.013	0.013	Free Surface	0.083	No	6	No
1889	452709	452708	6	193.1	8.3	0.013	0.001	Free Surface	0.028	No	6	No
1892	442908LH	442907	6	178.2	4.1	0.013	0.004	Free Surface	0.135	No	6	No

G2. Model Results for 2028 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
1893	443221	443221B	8	96.6	2.8	0.013	0.005	Free Surface	0.072	No	8	No
1894	443309	443308	8	90.8	9.3	0.013	0.640	Free Surface	0.600	No	8	No
1895	443501	443308	6	61.8	6.5	0.013	0.061	Free Surface	0.173	No	6	No
1896	450815	450814	8	242.0	19.4	0.013	0.009	Free Surface	0.051	No	8	No
1897	451221	451220	6	66.9	3.6	0.013	0.011	Free Surface	0.132	No	6	No
1898	450814	450813	6	181.7	8.6	0.013	0.016	Free Surface	0.095	No	6	No
1899	451112	451111	6	252.0	5.6	0.013	0.008	Free Surface	0.073	No	6	No
19	433801	433802	6	168.2	6.1	0.013	0.001	Free Surface	0.041	No	6	No
190	442919	442918	6	51.4	2.2	0.013	0.001	Free Surface	0.067	No	6	No
1900	450823	450806	6	168.5	10.5	0.013	0.016	Free Surface	0.106	No	6	No
1901	451308	451221	6	277.1	13.9	0.013	0.005	Free Surface	0.068	No	6	No
1902	451114LH	451112	6	171.4	0.6	0.013	0.002	Free Surface	0.063	No	6	No
1903	451113	451112	6	217.6	0.9	0.013	0.003	Free Surface	0.068	No	6	No
1904	451215	451214	6	200.9	9.8	0.013	0.076	Free Surface	0.172	No	6	No
1905	451210	451209	6	348.6	1.6	0.013	0.005	Free Surface	0.074	No	6	No
1906	451216	451215	6	67.0	8.8	0.013	0.074	Free Surface	0.178	No	6	No
1907	450912	450911	6	295.7	1.9	0.013	0.028	Free Surface	0.149	No	6	No
1908	451209	451203	6	78.0	22.0	0.013	0.020	Free Surface	0.106	No	6	No
1909	451208LH	451209	6	166.1	1.1	0.013	0.014	Free Surface	0.109	No	6	No
191	442453LH	442452	6	64.2	14.4	0.013	0.003	Free Surface	0.038	No	6	No
1910	451218	451216	6	156.2	4.7	0.013	0.068	Free Surface	0.191	No	6	No
1911	451220	451218	6	274.8	0.4	0.013	0.015	Free Surface	0.190	No	6	No
1912	450812	450809	6	156.0	2.9	0.013	0.038	Free Surface	0.239	No	6	No
1913	451305	451218	6	222.6	11.9	0.013	0.025	Free Surface	0.151	No	6	No
1914	450913	450912	6	101.5	11.4	0.013	0.020	Free Surface	0.129	No	6	No
1915	451203	451202	6	64.4	3.7	0.013	0.027	Free Surface	0.184	No	6	No
1916	451214	451202	6	188.9	12.8	0.013	0.077	Free Surface	0.199	No	6	No
1917	451206	451205	6	200.7	0.7	0.013	0.004	Free Surface	0.087	No	6	No
1918	451219	451218	6	161.2	5.2	0.013	0.024	Free Surface	0.160	No	6	No
1919	451205	451204	6	82.6	1.0	0.013	0.006	Free Surface	0.072	No	6	No
192	442452	442426	6	150.0	28.4	0.013	0.007	Free Surface	0.059	No	6	No
1920	451204	451203	6	195.6	10.6	0.013	0.006	Free Surface	0.092	No	6	No
1921	450918	450917	6	67.6	0.9	0.013	0.012	Free Surface	0.130	No	6	No
1922	451302	451219	6	119.4	2.3	0.013	0.019	Free Surface	0.122	No	6	No
1923	451303	451302	6	223.7	16.1	0.013	0.012	Free Surface	0.096	No	6	No
1924	451016A	451201	6	119.2	0.8	0.013	0.014	Free Surface	0.186	No	6	No
1925	450919	450918	6	40.4	1.0	0.013	0.009	Free Surface	0.118	No	6	No
1926	450920	450919	6	104.2	1.0	0.013	0.006	Free Surface	0.101	No	6	No
1927	450810	450811	8	192.6	0.2	0.013	0.118	Free Surface	0.376	No	8	No
1928	451018LH	451017	6	60.3	0.8	0.013	0.004	Free Surface	0.087	No	6	No
1929	452423	452422	6	167.1	5.9	0.013	0.002	Free Surface	0.038	No	6	No
193	432921LH	432817	6	91.4	1.2	0.013	0.004	Free Surface	0.063	No	6	No
1930	443108	443216	6	559.2	1.9	0.013	0.077	Free Surface	0.266	No	6	No
1931	452417	452416	6	205.4	8.2	0.013	0.034	Free Surface	0.155	No	6	No
1932	452034	452032	6	81.2	11.9	0.013	0.005	Free Surface	0.057	No	6	No
1933	450902	450907	12	19.4	5.9	0.013	0.000	Free Surface	0.000	No	12	No
1934	452017	452610	6	143.4	14.7	0.013	0.004	Free Surface	0.056	No	6	No
1935	452615	452601	6	224.2	8.8	0.013	0.307	Free Surface	0.395	No	6	No
1936	452605	452601	6	122.8	9.3	0.013	0.033	Free Surface	0.271	No	6	No
1937	443103	443101	6	416.2	3.8	0.013	0.024	Free Surface	0.126	No	6	No
1938	452422	452424	6	152.0	8.4	0.013	0.003	Free Surface	0.076	No	6	No
1939	443216	443203	10	253.4	1.1	0.013	0.211	Free Surface	0.346	No	10	No
194	432801	432901	6	265.7	12.3	0.013	0.023	Free Surface	0.171	No	6	No
1940	443204	443204	15	152.1	0.5	0.013	2.089	Free Surface	0.602	No	15	No
1941	443217	443216	6	107.2	2.2	0.013	0.127	Free Surface	0.336	No	6	No
1942	452420	452421	6	320.4	4.7	0.013	0.010	Free Surface	0.131	No	6	No
1943	452601	452602	6	133.9	6.3	0.013	0.341	Free Surface	0.429	No	6	No
1944	452604	452602	6	332.5	6.1	0.013	0.004	Free Surface	0.240	No	6	No
1945	402902	402901	15	255.1	0.5	0.013	0.397	Free Surface	0.276	No	8	No
1946	402715	402714	6	200.1	1.7	0.013	0.005	Free Surface	0.089	No	6	No
1947	402613	402612	6	192.4	1.8	0.013	0.028	Free Surface	0.170	No	6	No
1948	402718LH	402612	6	100.0	0.9	0.013	0.003	Free Surface	0.121	No	6	No
1949	402612	402611	6	234.1	1.8	0.013	0.033	Free Surface	0.181	No	6	No
195	442403	442404	6	82.1	4.7	0.013	0.010	Free Surface	0.110	No	6	No
1950	402704	402703	15	173.8	0.9	0.013	0.438	Free Surface	0.322	No	8	No
1951	402702	402703	10	136.1	0.4	0.013	0.435	Free Surface	0.606	No	10	Yes
1952	450922	451022	6	240.4	1.5	0.013	0.010	Free Surface	0.128	No	6	No
1953	451022	451021	6	299.9	1.1	0.013	0.019	Free Surface	0.228	No	6	No
1954	451021	451020	6	301.6	0.3	0.013	0.031	Free Surface	0.258	No	6	No
1955	452025	452024	6	77.4	14.3	0.013	0.101	Free Surface	0.194	No	6	No
1956	450923	450908	6	333.4	1.5	0.013	0.005	Free Surface	0.074	No	6	No
1957	450902	443225	12	276.1	1.4	0.013	0.678	Free Surface	0.338	No	12	No
1958	451014	451013	6	267.4	14.5	0.013	0.154	Free Surface	0.223	No	6	No
1959	452033LH	452032	6	147.9	6.9	0.013	0.002	Free Surface	0.051	No	6	No
196	442420	442421	6	245.7	3.8	0.013	0.009	Free Surface	0.073	No	6	No
1960	443225	450903	12	120.1	1.9	0.013	0.680	Free Surface	0.313	No	12	No
1961	452029	452028	6	30.6	104.6	0.013	0.005	Free Surface	0.042	No	6	No
1962	450908	450909	24	457.9	1.7	0.013	3.929	Free Surface	0.310	No	24	No
1963	450903	450904	12	352.7	1.6	0.013	0.682	Free Surface	0.331	No	12	No
1964	452030	452029	6	66.5	1.4	0.013	0.004	Free Surface	0.052	No	6	No
1965	451020	451019	6	298.2	1.7	0.013	0.047	Free Surface	0.258	No	6	No
1966	452028	452027	6	70.4	9.4	0.013	0.007	Free Surface	0.056	No	6	No
1968	451013	451012	8	163.7	13.9	0.013	0.169	Free Surface	0.168	No	8	No
197	442421	442404	6	142.4	24.4	0.013	0.013	Free Surface	0.100	No	6	No
1970	450904	450905	12	346.7	1.7	0.013	0.696	Free Surface	0.357	No	12	No
1971	450910	450905	15	16.8	0.6	0.013	0.489	Free Surface	0.349	No	15	No
1972	452802LH	452801	6	250.7	14.3	0.013	0.003	Free Surface	0.034	No	6	No
1973	452701	452611	6	49.6	23.4	0.013	0.011	Free Surface	0.062	No	6	No
1974	452527	452418	6	154.8	9.5	0.013	0.022	Free Surface	0.128	No	6	No
1975	451217LH	451216	6	109.3	1.4	0.013	0.005	Free Surface	0.125	No	6	No
1976	450914	450913	6	159.9	12.7	0.013	0.016	Free Surface	0.084	No	6	No
1977	450915	450914	6	165.1	5.1	0.013	0.008	Free Surface	0.074	No	6	No
1978	451201	451015	6	202.5	11.0	0.013	0.139	Free Surface	0.230	No	6	No
1979	451017	451016	6	219.9	0.7	0.013	0.006	Free Surface	0.114	No	6	No
198	443303	443304	10	159.1	1.0	0.013	1.081	Free Surface	0.629	No	10	No
1980	451016	451016A	6	238.2	0.6	0.013	0.011	Free Surface	0.136	No	6	No
1981	441830	441829	6	194.8	0.9	0.013	0.005	Free Surface	0.077	No	6	No
1982	442117	442110	6	100.0	5.2	0.013	0.000	Free Surface	0.040	No	6	No
1983	442110	442109	6	174.2	15.2	0.013	0.018	Free Surface	0.102	No	6	No
1984	441803	441802	6	280.4	1.9	0.013	0.324	Free Surface	0.590	No	6	No
1985	442209	442208	6	200.5	14.7	0.013	0.005	Free Surface	0.042	No	6	No
1986	451608	451606	6	110.0	0.8	0.013	0.046	Free Surface	0.256	No	6	No
1988	441816LH	441817	6	114.9	4.4	0.013	0.007	Free Surface	0.061	No	6	No
1989	403104	403304	6	238.5	0.6	0.013	0.003	Free Surface	0.073	No	6	No
199	432804	432805	6	256.5	0.2	0.013	0.003	Free Surface	0.110	No	6	No
1990	451613LH	451611	6	389.5	10.1	0.013	0.000	Free Surface	0.061	No	6	No
1991	443416	443417	6	231.5	5.5	0.013	0.004	Free Surface	0.059	No	6	No
1992	403326	403301	6	375.5	0.8	0.013	0.007	Free Surface	0.117	No	6	No
1993	451603	451602	16	249.4	0.9	0.013	1.542	Free Surface	0.389	No	16	No
1994	451605	451605A	6	56.3	1.5	0.013	0.198	Free Surface	0.470	No	6	No
1995	403102	403102A	6	43.0	0.5	0.013	0.007	Free Surface	0.114	No	6	No
1996	403305	403306	18	11.2	2.2	0.013	3.951	Free Surface	0.770	No	18	No
1997	403332	403306	18	14.0	0.3	0.013	1.816	Free Surface	0.494	No	18	No
1998	442222	442220	6	79.4	12.6	0.013	0.011	Free Surface	0.078	No	6	No
1999	442216	442215	6	136.2	8.0	0.013	0.002	Free Surface	0.034	No	6	No
2	455010	455009	6	70.7	1.0	0.013	0.050	Free Surface	0.252	No	6	No
20	431507	431506	6	282.4	1.6	0.013	0.631	Exceeds Capacity	1.000	No	6	Yes
200	442422	442421	6	59.7	4.9	0.013	0.001	Free Surface	0.042	No	6	No
2000	442207	442204	6	187.4	8.9	0.013	0.158	Free Surface	0.359	No	6	No
2001	451604	451603	16	300.9	2.2	0.013	1.561	Free Surface	0.332	No	16	No
2002	403101	403102	6	301.4	0.8	0.013	0.007	Free Surface	0.097	No	6	No
2003	441815	441929	6	66.1	13.5	0.013	0.001	Free Surface	0.035	No	6	No
2004	442213	442212	6	146.4	5.8	0.013	0.002	Free Surface	0.041	No	6	No
2005	440735	440727	6	222.7	9.8	0.013	0.072	Free Surface	0.213	No	6	No
2006	441303	441304	8	258.1	3.5	0.013	0.193	Free Surface	0.237	No	8	No
2007	450415	450416	10	231.1	0.6	0.013	0.192	Free Surface	0.234	No	10	No
2008	452112	452111	6	29.2	16.0	0.013	0.012	Free Surface	0.064	No	6	No
2009	452722	452723	8	223.0	4.8	0.013	0.006	Free Surface	0.045	No	8	No
201	432805	432806	6	266.9	2.3	0.013	0.018	Free Surface	0.144	No	6	No
2010	452806	452717	6	209.7	7.4	0.013	0.003	Free Surface	0.051	No	6	No
2011	452734	452733	6	207.1	2.8	0.013	0.005	Free Surface	0.063	No	6	No
2012	452515	452514	6	93.9	5.5	0.013	0.000	Free Surface	0.021	No	6	No
2013	452512	452511	6	62.4	16.0	0.013	0.005	Free Surface	0.073	No	6	No
2014	452725	452724	6	79.9	27.3	0.013	0.004	Free Surface	0.098	No	6	No
2015	452002	452003	6	178.8	8.0	0.013	0.029	Free Surface	0.125	No	6	No
2016	452032	452031	6	79.9	6.9	0.013	0.009	Free Surface	0.067	No	6	No
2017	452108	452025	6	154.6	17.2	0.013	0.098	Free Surface	0.178	No	6	No
2018	452511	452511A	6	98.9	10.4	0.013	0.026	Free Surface	0.100	No	6	No
202	443329	443303	6	61.4	12.9	0.013	0.008	Free Surface	0.529	No	6	No
2022	452503	452424	6	231.2	2.8	0.013	0.006	Free Surface	0.092	No	6	No
2023	452733	452732	6	111.8	10.3	0.013	0.008	Free Surface	0.062	No	6	No
2024	452003	452004	6	55.3	6.5	0.013	0.035	Free Surface	0.129	No	6	No
2025	452510	452509	6	15.5	6.4	0.013	0.026	Free Surface	0.290	No	6	No
2026	452732	452731	6	54.8	7.1	0.013	0.008	Free Surface	0.072	No	6	No
2027	452530	452511	6	209.4	5.2	0.013	0.019	Free Surface	0.104	No	6	No
2028	450907	450908	21	269.4	1.4	0.013	3.905	Free Surface	0.390	No	21	No
2029	452737	452519	6	195.0	5.1	0.013	0.009	Free Surface	0.077	No	6	No
203	443330	443329	6	100.1	2.0	0.013	0.007	Free Surface	0.072	No	6	No
2030	452006	452007	6	38.4	30.1	0.013	0.045	Free Surface	0.125	No	6	No
204	440919	440920	8	154.0	10.1	0.013	0.026	Free Surface	0.080	No	8	No
2041	452035	452034	6	54.0	27.9	0.013	0.002	Free Surface	0.036	No	6	No
2042	452614	452017	6	398.0	2.2	0.013	0.002	Free Surface	0.043	No	6	No
2043	443101	443218	6	447.1	0.6	0.013	0.111	Free Surface	0.431	No	6	No
2044	402710	402711	6	288.5	0.7	0.013	0.086	Free Surface	0.383	No	6	No
2045	450909	450910	24	346.8	1.5	0.013	3.945	Free Surface	0.319	No	24	No
2046	452011	452012	6	195.0	7.3	0.013	0.068	Free Surface	0.168	No	6	No
2047	451002	451003	21	318.3	1.0	0.013	3.511	Free Surface	0.383	No	21	No
2048	451011	451010	8	259.5	0.6	0.013	0.245	Free Surface	0.434	No	8	No
2049	451007	451008	18	369.8	1.4	0.013	3.360	Free Surface	0.483	No	18	No
205	440916	440915	6	83.6	3.6	0.013	0.060	Free Surface	0.191	No	6	No
2050	443214	443214A	6	148.0	3.1	0.013	0.061	Free Surface	0.238	No	6	No
2051	452019	452018	6	275.0	2.4	0.013	0.210	Free Surface	0.397	No	6	No
2052	452013	452014	6	143.3	7.4	0.013	0.076	Free Surface	0.173	No	6	No
2053	451003	451004	21	416.0	1.9	0.013	3.511	Free Surface	0.342	No	21	No
2055	452611	452417	6	89.1	10.5	0.013	0.011	Free Surface	0.096	No	6	No
2056	452418	452417	6	101.1	1.5	0.013	0.022	Free Surface	0.142	No	6	No
2057	452608	452606	6	217.6	1.3	0.013	0.003	Free Surface	0.079	No	6	No
2058	452607	452606	6	248.4	6.2	0.013	0.019	Free Surface	0.100	No	6	No
2059	452419	452420	6	52.9	11.1	0.013	0.003	Free Surface	0.056	No	6	No
206	440605	440604	8	165.2	0.9	0.013	0.014	Free Surface	0.096	No	8	No
2060	452528	452420	6	164.9	11.9	0.013	0.002	Free Surface	0.052	No	6	No
2061	452018	452615	6	77.7	10.5	0.013	0.305	Free Surface	0.357	No	6	No
2062	443213	443204	8	355.2	1.1	0.013	0.073	Free Surface	0.201	No	8	No
2063	443204	443205	15	262.8	0.6	0.013	2.166	Free Surface	0.660	No	15	No
2064	452014	452015	6	171.6	23.7	0.013	0.083	Free Surface	0.157	No	6	No
2065	452015	452016	6	214.3	17.5	0.013	0.089	Free Surface	0.160	No	6	No
2066	451010	451009	8	140.1	0.6	0.013	0.249	Free Surface	0.443	No	8	No
2067	451008	451009	21	217.8	0.4	0.013	3.364	Free Surface	0.489	No	21	No
2068	452617	452605	6	144.4	5.1	0.013	0.004	Free Surface	0.084	No	6	No
2069	452606	452605	6	108.5	12.7	0.013	0.026	Free Surface	0.108	No	6	No
207	440606	440605	8	185.0	5.7	0.013	0.005	Free Surface	0.068	No	8	No

G2. Model Results for 2028 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
2070	443218	443217	6	163.8	1.0	0.013	0.123	Free Surface	0.403	No	6	No
2071	452602	452603	6	115.9	6.3	0.013	0.349	Free Surface	0.426	No	6	No
2072	452416	452603	6	306.5	1.7	0.013	0.036	Free Surface	0.302	No	6	No
2073	452610	451827A	6	181.4	3.8	0.013	0.007	Free Surface	0.075	No	6	No
2074	442907	443101	6	250.4	4.4	0.013	0.078	Free Surface	0.217	No	6	No
2075	452415	452603	6	96.2	1.0	0.013	0.002	Free Surface	0.234	No	6	No
2076	452424	452425	6	305.2	2.2	0.013	0.014	Free Surface	0.183	No	6	No
2077	451906	451903	21	180.7	0.4	0.013	3.611	Free Surface	0.512	No	21	No
2078	451907	451904	21	77.5	0.7	0.013	3.784	Free Surface	0.461	No	21	No
2079	452603	452401	8	152.1	5.4	0.013	0.387	Free Surface	0.316	No	8	No
208	440117LH	440117A	6	123.9	0.3	0.013	0.006	Free Surface	0.148	No	6	No
2080	452421	452401	6	295.8	0.3	0.013	0.015	Free Surface	0.305	No	6	No
2082	452427	452426	8	310.1	0.2	0.013	0.005	Free Surface	0.081	No	8	No
2083	451827	451826	6	167.2	4.4	0.013	0.017	Free Surface	0.124	No	6	No
2084	452613	451826	6	368.8	4.7	0.013	0.002	Free Surface	0.088	No	6	No
2085	452414	452401	6	95.7	3.2	0.013	0.001	Free Surface	0.229	No	6	No
2086	451405	451404	6	263.3	0.3	0.013	0.000	Free Surface	0.000	No	6	No
2087	451404	451403	6	113.2	0.6	0.013	0.000	Free Surface	0.000	No	6	No
2088	443201	443202	12	181.3	5.4	0.013	1.841	Free Surface	0.404	No	12	No
2089	451826	451825	6	155.7	3.2	0.013	0.029	Free Surface	0.161	No	6	No
209	440108	440113	6	164.0	25.6	0.013	0.020	Free Surface	0.133	No	6	No
2090	452612	451825	6	421.4	4.0	0.013	0.005	Free Surface	0.119	No	6	No
2091	443222	443221	8	72.2	10.4	0.013	0.003	Free Surface	0.037	No	8	No
2092	452401	452402	8	279.4	5.6	0.013	0.406	Free Surface	0.405	No	8	No
2093	452425	452425A	6	294.8	0.1	0.013	0.019	Free Surface	0.422	No	6	No
2094	443606	451907	8	261.9	7.2	0.013	0.051	Free Surface	0.107	No	8	No
2095	443223	443201	6	201.7	2.6	0.013	0.005	Free Surface	0.270	No	6	No
2096	451704	451705	18	167.8	1.3	0.013	3.854	Free Surface	0.523	No	18	No
2097	443305	443306	12	287.0	1.0	0.013	1.094	Free Surface	0.492	No	12	No
2098	452402	452403	8	119.3	1.4	0.013	0.445	Free Surface	0.492	No	8	No
2099	452426	452403A	10	101.3	0.7	0.013	0.154	Free Surface	0.479	No	10	No
21	454904	454905	6	241.4	12.3	0.013	0.275	Free Surface	0.313	No	6	No
210	440113	440114	6	179.4	0.8	0.013	0.026	Free Surface	0.533	No	6	No
2100	452411	452402	6	129.8	0.8	0.013	0.018	Free Surface	0.408	No	6	No
2101	451004	451005	21	123.5	1.7	0.013	3.530	Free Surface	0.425	No	21	No
2102	443107	443108	6	88.8	1.1	0.013	0.003	Free Surface	0.163	No	6	No
2104	452409	452405	10	121.7	2.9	0.013	0.016	Free Surface	0.213	No	10	No
2105	452404	452405C	16	231.9	0.3	0.013	0.506	Free Surface	0.282	No	12	No
2106	451819A	451817	6	245.0	0.7	0.013	0.011	Free Surface	0.128	No	6	No
2108	451416	451417	6	276.7	8.7	0.013	0.010	Free Surface	0.101	No	6	No
2109	443425	443402	8	109.0	3.9	0.013	0.383	Free Surface	0.349	No	8	No
211	440405	440406	6	217.1	0.6	0.013	0.007	Free Surface	0.097	No	6	No
2110	451821	451821A	6	234.4	0.5	0.013	0.002	Free Surface	0.087	No	6	No
2111	451820	451820A	8	274.9	1.3	0.013	0.024	Free Surface	0.094	No	8	No
2112	451813	403309	21	108.2	0.8	0.013	4.308	Free Surface	0.529	No	21	No
2113	452408	403316	6	277.0	0.3	0.013	0.007	Free Surface	0.134	No	6	No
2114	451508	451507	6	150.9	13.2	0.013	0.008	Free Surface	0.073	No	6	No
2115	442104	442102	6	188.2	1.0	0.013	0.022	Free Surface	0.152	No	6	No
2116	441801	443401	8	223.3	10.7	0.013	0.374	Free Surface	0.299	No	8	No
2117	441837	441801	6	237.0	0.4	0.013	0.032	Free Surface	0.239	No	6	No
2118	403321	403322	6	217.9	0.6	0.013	0.006	Free Surface	0.107	No	6	No
2119	451803D	451602	21	70.7	0.2	0.013	4.206	Free Surface	0.606	No	21	No
212	440634	440633	6	90.2	2.8	0.013	0.056	Free Surface	0.193	No	6	No
2120	451803A	451803B	21	34.4	1.0	0.013	3.956	Free Surface	0.453	No	21	No
2121	441832	441831	6	94.4	0.7	0.013	0.002	Free Surface	0.066	No	6	No
2122	441831	441828	6	169.6	2.2	0.013	0.005	Free Surface	0.099	No	6	No
2123	440712	440713	6	229.7	9.4	0.013	0.022	Free Surface	0.131	No	6	No
2124	451614	451614A	6	284.0	7.5	0.013	0.003	Free Surface	0.051	No	6	No
2126	403304	403305	18	399.6	1.0	0.013	5.589	Free Surface	0.816	No	18	Yes
2127	443306	443307	12	383.3	1.1	0.013	1.100	Free Surface	0.436	No	12	No
2128	443307	443201	12	183.7	7.3	0.013	1.815	Free Surface	0.370	No	12	No
2129	451825	452412	6	285.6	2.7	0.013	0.041	Free Surface	0.226	No	6	No
213	440613A	440602	6	309.8	2.5	0.013	0.023	Free Surface	0.372	No	6	No
2130	452412A	452412	6	180.7	1.6	0.013	0.012	Free Surface	0.193	No	6	No
2131	443333	443334	6	297.3	4.0	0.013	0.006	Free Surface	0.093	No	6	No
2132	443334	443308	6	421.7	1.7	0.013	0.015	Free Surface	0.121	No	6	No
2133	443308	443307	8	135.8	8.9	0.013	0.717	Free Surface	0.468	No	8	No
2134	443607	443606	8	297.6	10.4	0.013	0.051	Free Surface	0.098	No	8	No
2135	452403	452404	16	290.7	0.3	0.013	0.520	Free Surface	0.303	No	12	No
2136	451818	451817	6	83.1	4.3	0.013	0.004	Free Surface	0.088	No	6	No
2137	443327	443328	6	260.6	1.7	0.013	0.001	Free Surface	0.056	No	6	No
2138	452412	452413	6	185.7	0.9	0.013	0.058	Free Surface	0.275	No	6	No
2139	452413	451822	6	17.9	0.9	0.013	0.058	Free Surface	0.275	No	6	No
214	440628	440629	6	204.7	2.3	0.013	0.043	Free Surface	0.191	No	6	No
2141	443328	443310	6	295.0	5.1	0.013	0.009	Free Surface	0.284	No	6	No
2142	443310	443309	8	215.1	7.5	0.013	0.630	Free Surface	0.371	No	8	No
2143	451817	451816	6	127.3	1.6	0.013	0.015	Free Surface	0.228	No	6	No
2144	443311	443310	8	140.3	11.4	0.013	0.620	Free Surface	0.351	No	8	No
2145	451504	451407	6	354.4	7.6	0.013	0.060	Free Surface	0.184	No	6	No
2146	451808	451809	18	275.6	1.0	0.013	3.673	Free Surface	0.531	No	18	No
2147	451506LH	451510	8	165.5	0.4	0.013	0.000	Free Surface	0.029	No	8	No
2149	451819	451819A	6	197.2	1.0	0.013	0.002	Free Surface	0.090	No	6	No
215	440512	440511	6	173.4	13.7	0.013	0.009	Free Surface	0.075	No	6	No
2150	451807	451808	18	295.3	0.6	0.013	3.673	Free Surface	0.610	No	18	No
2153	451802	451829	15	14.2	10.9	0.013	0.000	Free Surface	0.284	No	15	No
2154	451415	451414	6	236.8	13.9	0.013	0.013	Free Surface	0.077	No	6	No
2155	451410	451409	6	284.1	25.1	0.013	0.043	Free Surface	0.119	No	6	No
2156	452405	452405A	12	11.2	1.2	0.013	0.018	Free Surface	0.235	No	12	No
2157	451510	451505	8	220.5	3.9	0.013	0.010	Free Surface	0.058	No	8	No
2159	451503	451504	6	181.1	9.0	0.013	0.058	Free Surface	0.162	No	6	No
2162	442111	442110	6	75.1	19.7	0.013	0.017	Free Surface	0.077	No	6	No
2163	403303	403304	21	63.9	0.6	0.013	5.704	Free Surface	0.610	No	21	No
2164	442210	442209	6	50.6	13.0	0.013	0.001	Free Surface	0.033	No	6	No
2165	451602	451803E	21	217.5	0.3	0.013	5.722	Free Surface	0.736	No	21	No
2166	441829	441828	6	245.6	5.8	0.013	0.007	Free Surface	0.096	No	6	No
2167	442108	442219	6	113.2	19.2	0.013	0.027	Free Surface	0.107	No	6	No
2168	442220	442219	6	178.4	4.4	0.013	0.013	Free Surface	0.108	No	6	No
2169	403301	403302	8	234.3	2.0	0.013	0.023	Free Surface	0.165	No	8	No
217	441209	441207	6	86.6	12.3	0.013	0.007	Free Surface	0.082	No	6	No
2170	403327	403302	6	374.2	1.3	0.013	0.007	Free Surface	0.199	No	6	No
2171	441933LH	441901	6	133.2	7.0	0.013	0.002	Free Surface	0.040	No	6	No
2172	441305	441804	8	99.1	7.0	0.013	0.201	Free Surface	0.310	No	8	No
2173	442215	442214	6	50.5	8.5	0.013	0.003	Free Surface	0.042	No	6	No
2174	403323	403301	6	274.0	1.0	0.013	0.007	Free Surface	0.115	No	6	No
2175	403105	403106	6	212.2	0.8	0.013	0.007	Free Surface	0.110	No	6	No
2176	441304	441305	8	115.3	5.7	0.013	0.198	Free Surface	0.217	No	8	No
2177	442214	442212	6	53.2	8.4	0.013	0.004	Free Surface	0.046	No	6	No
2178	442204	442204A	6	63.3	1.5	0.013	0.192	Free Surface	0.464	No	6	No
2179	442208	442207	6	340.5	14.3	0.013	0.005	Free Surface	0.150	No	6	No
218	LH441208	441207	6	94.1	22.7	0.013	0.009	Free Surface	0.081	No	6	No
2180	403107	403108	6	176.5	1.7	0.013	0.039	Free Surface	0.204	No	6	No
2181	403325	403303	8	273.1	1.3	0.013	0.008	Free Surface	0.066	No	8	No
2182	442205	442205A	6	183.8	1.5	0.013	0.032	Free Surface	0.186	No	6	No
2183	441915	441914	6	101.0	20.3	0.013	0.003	Free Surface	0.038	No	6	No
2184	441130	441307	6	374.1	13.4	0.013	0.053	Free Surface	0.135	No	6	No
2185	443807	443806	6	206.9	14.2	0.013	0.009	Free Surface	0.069	No	6	No
2186	441904	441905A	6	172.0	13.0	0.013	0.017	Free Surface	0.080	No	6	No
2187	441905	441905A	6	34.3	1.4	0.013	0.070	Free Surface	0.249	No	6	No
2189	403120	403109	6	110.4	2.1	0.013	0.004	Free Surface	0.182	No	6	No
219	440557	440516	6	207.9	15.1	0.013	0.005	Free Surface	0.104	No	6	No
2190	403307	403308	21	317.0	1.0	0.013	5.808	Free Surface	0.774	No	21	Yes
2191	441925	441924	6	201.2	13.1	0.013	0.023	Free Surface	0.090	No	6	No
2192	402904	402905	6	299.7	0.3	0.013	0.003	Free Surface	0.093	No	6	No
2193	440732	440733	6	231.6	0.9	0.013	0.007	Free Surface	0.121	No	6	No
2194	451810	451810A	18	56.5	0.3	0.013	4.059	Exceeds Capacity	1.000	No	18	Yes
2195	443317	443316	6	314.3	3.6	0.013	0.043	Free Surface	0.211	No	6	No
2196	451811	451812	18	61.5	3.1	0.013	4.308	Free Surface	0.586	No	18	No
2197	451414	451411	6	175.7	10.4	0.013	0.018	Free Surface	0.099	No	6	No
2198	451411	451410	6	178.8	15.4	0.013	0.036	Free Surface	0.108	No	6	No
2199	443403	443312	8	180.1	6.4	0.013	0.427	Free Surface	0.324	No	8	No
22	454905	454906	6	227.6	14.5	0.013	0.298	Free Surface	0.365	No	6	No
220	440517	440518	6	151.2	6.5	0.013	0.000	Free Surface	0.050	No	6	No
2200	443402	443403	8	279.3	3.5	0.013	0.385	Free Surface	0.337	No	8	No
2201	451812	451813	18	60.2	0.5	0.013	4.308	Free Surface	0.658	No	18	No
2202	451802A	451802	6	170.0	0.5	0.013	0.025	Free Surface	0.201	No	6	No
2203	451509	451411	6	83.2	14.6	0.013	0.011	Free Surface	0.088	No	6	No
2204	451802	451803	18	285.9	1.6	0.013	3.954	Free Surface	0.473	No	18	No
2205	443604A	443604	6	156.9	9.4	0.013	0.040	Free Surface	0.122	No	6	No
2206	451413	451509	6	96.8	7.7	0.013	0.007	Free Surface	0.063	No	6	No
2207	443404	443403	6	154.1	22.4	0.013	0.043	Free Surface	0.264	No	6	No
2208	443401	443425	8	78.0	3.9	0.013	0.382	Free Surface	0.339	No	8	No
2209	440706	443314	6	198.4	4.1	0.013	0.051	Free Surface	0.192	No	6	No
221	440509	440510	6	144.2	25.1	0.013	0.006	Free Surface	0.084	No	6	No
2210	451417	442104	6	165.8	1.9	0.013	0.020	Free Surface	0.157	No	6	No
2211	451502	451503	6	414.4	8.2	0.013	0.052	Free Surface	0.154	No	6	No
2212	403320	403321	6	28.9	1.6	0.013	0.002	Free Surface	0.073	No	6	No
2215	451803	451803A	18	150.5	1.5	0.013	3.956	Free Surface	0.498	No	18	No
2217	442101	442102	6	80.3	5.6	0.013	0.008	Free Surface	0.097	No	6	No
2218	403312	403313	21	265.9	1.0	0.013	4.453	Free Surface	0.467	No	21	No
2219	451803E	403103	21	220.4	0.5	0.013	5.698	Free Surface	0.653	No	21	No
222	440524	440518	6	101.7	12.8	0.013	0.026	Free Surface	0.099	No	6	No
2223	441818	442101	6	84.3	6.9	0.013	0.006	Free Surface	0.062	No	6	No
2224	451501	451502	6	401.0	8.5	0.013	0.043	Free Surface	0.144	No	6	No
2225	443415	441802	6	373.7	5.2	0.013	0.008	Free Surface	0.071	No	6	No
2226	441802	441801	8	150.5	3.9	0.013	0.338	Free Surface	0.298	No	8	No
2228	451611	451609	6	137.1	7.8	0.013	0.025	Free Surface	0.117	No	6	No
223	441214	441006	6	79.7	11.9	0.013	0.013	Free Surface	0.080	No	6	No
2230	442106	451501	6	115.8	12.4	0.013	0.038	Free Surface	0.128	No	6	No
2231	451615LH	451507	6	335.5	11.3	0.013	0.009	Free Surface	0.075	No	6	No
2232	441817	441819	6	152.5	1.8	0.013	0.002	Free Surface	0.053	No	6	No
2233	441817	441818	6	107.6	10.9	0.013	0.006	Free Surface	0.052	No	6	No
2234	451609	451608	6	84.2	9.0	0.013	0.037	Free Surface	0.191	No	6	No
2235	442212	442211	6	124.9	24.8	0.013	0.007	Free Surface	0.161	No	6	No
2236	442211	442207	6	181.9	6.6	0.013	0.151	Free Surface	0.267	No	6	No
2237	441812	441811	6	216.9	2.0	0.013	0.009	Free Surface	0.126	No	6	No
2238	441836	441811	6	169.6	2.2	0.013	0.011	Free Surface	0.131	No	6	No
2239	441901	441902	6	145.8	15.1	0.013	0.005	Free Surface	0.058	No	6	No
224	440511	440510	6	101.9	3.7	0.013	0.013	Free Surface	0.110	No	6	No
2240	441814	441813	6	143.0	4.5	0.013	0.011	Free Surface	0.079	No	6	No
2241	403302	403303	8	235.4	0.3	0.013	0.046	Free Surface	0.205	No	8	No
2242	403328	403303	8	374.9	0.4	0.013	0.006	Free Surface	0.078	No	8	No
2244	403324	403302	6	272.8	1.6	0.013	0.007	Free Surface	0.196	No	6	No
2245	442217	442211	6	90.3	11.1	0.013	0.144	Free Surface	0.255	No	6	No
2246	441302	441303	8	181.5	12.9	0.013	0.182	Free Surface	0.211	No	8	No
2247	441811	441810	6	57.2	0.9	0.013	0.020	Free Surface	0.176	No	6	No
2248	441807	441806	6	223.4	0.9	0.013	0.051	Free Surface	0.287	No	6	No
2249	442219	442219A	6	40.2	11.3	0.013	0.040	Free Surface	0.123	No	6	No
225	440510	440539	6	105.8	3.8	0.013	0.025	Free Surface	0.128	No	6	No
2250	442218	442217	6	260.4	7.3	0.013	0.141	Free Surface	0.248	No	6	No
2251	441808	441807	6	68.7	0.7	0.013	0.048	Free Surface	0.264	No	6	No
2252	441813	441808	6	66.3	15.5	0.013	0.014	Free Surface	0.168	No	6	No

G2. Model Results for 2028 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
2253	403106A	403107	6	249.9	2.3	0.013	0.026	Free Surface	0.169	No	6	No
2254	403306	403307	18	428.1	1.4	0.013	5.757	Free Surface	0.633	No	18	No
2255	441301	441302	8	168.2	4.4	0.013	0.176	Free Surface	0.204	No	8	No
2256	442203	451604	16	248.8	2.4	0.013	1.556	Free Surface	0.304	No	16	No
2257	403303	403401	8	234.0	0.5	0.013	0.070	Free Surface	0.263	No	8	No
2258	441932	441902	6	174.9	16.5	0.013	0.009	Free Surface	0.063	No	6	No
2259	440729	441301	8	48.6	0.7	0.013	0.160	Free Surface	0.332	No	8	No
226	440812	440809	6	208.1	0.7	0.013	0.004	Free Surface	0.123	No	6	No
2260	441902	441903	6	131.2	16.0	0.013	0.015	Free Surface	0.073	No	6	No
2261	441809	441808	6	159.5	0.6	0.013	0.031	Free Surface	0.245	No	6	No
2262	441810	441809	6	229.6	0.7	0.013	0.023	Free Surface	0.206	No	6	No
2263	441903	441904	6	5.7	15.3	0.013	0.016	Free Surface	0.077	No	6	No
2264	402905	403101	6	299.0	0.3	0.013	0.004	Free Surface	0.099	No	6	No
2265	441927	441926	6	134.0	15.0	0.013	0.003	Free Surface	0.046	No	6	No
2266	442223	442218	6	136.5	7.5	0.013	0.096	Free Surface	0.237	No	6	No
2267	441929	441928	6	266.3	5.5	0.013	0.004	Free Surface	0.060	No	6	No
2268	441926	441925	6	89.7	8.3	0.013	0.006	Free Surface	0.075	No	6	No
2269	441928	441925	6	238.1	12.5	0.013	0.012	Free Surface	0.081	No	6	No
2270	441914	441913	6	161.2	21.3	0.013	0.006	Free Surface	0.057	No	6	No
2271	442009	442206	6	76.1	1.5	0.013	0.023	Free Surface	0.159	No	6	No
2272	441308	441309	6	334.0	3.0	0.013	0.062	Free Surface	0.221	No	6	No
2273	441906	441905	6	243.4	7.9	0.013	0.069	Free Surface	0.236	No	6	No
2274	442201A	442202	16	292.0	1.3	0.013	1.591	Free Surface	0.408	No	16	No
2275	403119LH	403118	4	221.9	0.6	0.013	0.074	Free Surface	0.587	No	4	No
2276	403109	403110	6	240.4	0.7	0.013	0.052	Free Surface	0.254	No	6	No
2277	403308	403411	21	517.9	1.4	0.013	7.512	Free Surface	0.578	No	21	No
2279	403115	403114	6	166.4	5.0	0.013	0.016	Free Surface	0.098	No	6	No
228	440552	440553	6	99.3	7.5	0.013	0.002	Free Surface	0.088	No	6	No
2280	402721	402904	6	300.1	0.2	0.013	0.002	Free Surface	0.081	No	6	No
2281	403118	403117	6	217.5	4.5	0.013	0.132	Free Surface	0.285	No	6	No
2282	403117	403114	6	133.9	4.1	0.013	0.135	Free Surface	0.290	No	6	No
2283	403402	403403	8	381.1	0.2	0.013	0.111	Free Surface	0.339	No	8	No
2284	442008	442009	6	275.2	1.5	0.013	0.004	Free Surface	0.112	No	6	No
2285	402906	403118	6	250.1	0.2	0.013	0.063	Free Surface	0.380	No	6	No
2286	402908	402907	6	164.0	0.5	0.013	0.063	Free Surface	0.359	No	6	No
2287	402907	402906	6	53.0	0.4	0.013	0.063	Free Surface	0.343	No	6	No
2289	403110	403111	8	207.7	1.8	0.013	0.054	Free Surface	0.153	No	8	No
229	440515	440516	6	159.3	12.8	0.013	0.018	Free Surface	0.124	No	6	No
2290	403114	403113	15	264.1	0.6	0.013	0.151	Free Surface	0.151	No	6	No
2291	403113	403111	15	133.6	1.0	0.013	0.204	Free Surface	0.152	No	6	No
2292	402719	402720	6	172.4	0.3	0.013	0.000	Free Surface	0.047	No	6	No
2293	403111	403112	15	214.0	1.1	0.013	0.258	Free Surface	0.226	No	8	No
2294	442007A	442007	6	230.7	17.7	0.013	0.068	Free Surface	0.176	No	6	No
2295	402720	402721	6	300.5	0.3	0.013	0.001	Free Surface	0.066	No	6	No
2296	442007	442006	6	88.6	3.9	0.013	0.068	Free Surface	0.275	No	6	No
2297	402903	VMH_72	15	149.3	0.3	0.013	0.333	Free Surface	0.270	No	8	No
2298	403605	403604	6	236.0	0.2	0.013	0.135	Free Surface	0.668	No	6	Yes
2299	403603	403604	8	237.6	0.2	0.013	0.110	Free Surface	0.357	No	8	No
230	440519	440518	6	257.9	5.3	0.013	0.002	Free Surface	0.067	No	6	No
2300	403602	403603	8	270.2	0.2	0.013	0.071	Free Surface	0.370	No	8	No
2301	442006	442005	6	349.5	0.7	0.013	0.078	Free Surface	0.360	No	6	No
2302	403112	402903	15	242.9	0.2	0.013	0.263	Free Surface	0.243	No	8	No
2303	402724LH	402723	6	224.3	0.4	0.013	0.083	Free Surface	0.377	No	6	No
2304	402902B	VMH_72	6	191.4	3.7	0.013	0.046	Free Surface	0.438	No	6	No
2305	402723	402722	6	134.8	1.1	0.013	0.084	Free Surface	0.305	No	6	No
2306	403202	403203	6	178.5	0.8	0.013	0.015	Free Surface	0.156	No	6	No
2307	402716	402715	6	114.2	1.7	0.013	0.004	Free Surface	0.068	No	6	No
2308	402615	402613	6	256.9	1.8	0.013	0.027	Free Surface	0.161	No	6	No
2309	402703	HILLER_WW	15	72.9	0.1	0.013	0.874	Free Surface	0.432	No	10	No
231	440518	440553	6	98.0	13.5	0.013	0.028	Free Surface	0.121	No	6	No
2310	402610	402611	6	235.5	0.9	0.013	0.004	Free Surface	0.129	No	6	No
2311	402713	402701	6	199.3	2.5	0.013	0.015	Free Surface	0.555	No	6	No
2312	402701	402702	10	278.9	0.1	0.013	0.340	Free Surface	0.564	No	10	Yes
2313	402604	402604A	6	119.0	3.6	0.013	0.045	Free Surface	0.185	No	6	No
2314	402609	402603	6	387.0	0.5	0.013	0.011	Free Surface	0.229	No	6	No
2315	402611	402505	6	250.9	2.4	0.013	0.042	Free Surface	0.554	No	6	No
2316	402505	402701	10	277.2	0.1	0.013	0.330	Free Surface	0.626	No	10	Yes
2317	402504	402505	10	364.3	0.1	0.013	0.218	Free Surface	0.509	No	10	Yes
2318	403009	403005	6	361.2	0.3	0.013	0.028	Free Surface	0.243	No	6	No
2319	403803	403804	6	135.7	2.4	0.013	0.003	Free Surface	0.050	No	6	No
232	441007	441008	8	198.9	11.6	0.013	0.018	Free Surface	0.067	No	8	No
2320	403805	403804	6	115.5	0.5	0.013	0.002	Free Surface	0.093	No	6	No
2321	403803	403802	6	203.4	1.4	0.013	0.002	Free Surface	0.050	No	6	No
2322	402503	402504	10	358.6	0.7	0.013	0.209	Free Surface	0.376	No	10	No
2323	402806	402807	6	349.4	0.5	0.013	0.015	Free Surface	0.179	No	6	No
2324	402603	402503	6	256.5	0.9	0.013	0.077	Free Surface	0.400	No	6	No
2325	402510	402505	6	258.0	0.5	0.013	0.055	Free Surface	0.620	No	6	No
2326	402807A	402510	6	25.0	0.8	0.013	0.046	Free Surface	0.284	No	6	No
2327	403801	403802	6	127.4	0.5	0.013	0.002	Free Surface	0.054	No	6	No
2328	402502	402503	8	285.9	0.1	0.013	0.096	Free Surface	0.681	No	8	Yes
2329	402509	402510	6	343.6	1.8	0.013	0.005	Free Surface	0.193	No	6	No
233	430218	430217	6	106.9	7.3	0.013	0.045	Free Surface	0.187	No	6	No
2330	403802	403808	6	161.1	0.5	0.013	0.007	Free Surface	0.129	No	6	No
2331	403804	403806	6	237.9	0.5	0.013	0.008	Free Surface	0.137	No	6	No
2332	402507	402503	6	256.7	0.4	0.013	0.031	Free Surface	0.364	No	6	No
2334	403502	403501	8	180.6	0.4	0.013	0.000	Free Surface	0.000	No	8	No
2335	403808	403807	6	257.9	0.5	0.013	0.012	Free Surface	0.158	No	6	No
2336	403806	403807	6	150.9	0.5	0.013	0.013	Free Surface	0.162	No	6	No
2337	402506	402507	6	278.2	0.5	0.013	0.020	Free Surface	0.218	No	6	No
2338	403810	403809	6	101.6	0.5	0.013	0.007	Free Surface	0.195	No	6	No
2339	403807	403809	6	259.9	0.5	0.013	0.030	Free Surface	0.254	No	6	No
2342	453708	453709	10	112.8	1.8	0.013	1.042	Free Surface	0.709	No	10	Yes
2343	450201	450202	10	110.3	4.8	0.013	0.207	Free Surface	0.272	No	10	No
2344	450112	450101	6	261.6	11.1	0.013	0.014	Free Surface	0.243	No	6	No
2346	450608	450801	10	109.5	1.8	0.013	0.193	Free Surface	0.266	No	10	No
2347	453702	453703	10	231.8	0.6	0.013	1.007	Free Surface	0.726	No	10	Yes
2348	450202	450203	10	150.9	0.7	0.013	0.323	Free Surface	0.337	No	10	No
2349	452105	452815	6	77.1	41.7	0.013	0.015	Free Surface	0.066	No	6	No
235	433605	432604	6	126.1	19.1	0.013	0.038	Free Surface	0.147	No	6	No
2350	450209A	450209	6	15.4	13.1	0.013	0.048	Free Surface	0.369	No	6	No
2352	450413	450414	10	187.8	0.7	0.013	0.183	Free Surface	0.234	No	10	No
2353	452201LH	452202	6	145.6	0.5	0.013	0.008	Free Surface	0.115	No	6	No
2354	452811	452812	6	281.9	7.3	0.013	0.009	Free Surface	0.123	No	6	No
2355	452109	452108	6	91.3	42.6	0.013	0.007	Free Surface	0.039	No	6	No
2356	452111	452108	6	159.5	4.2	0.013	0.012	Free Surface	0.088	No	6	No
2357	452514	452513	6	71.0	10.6	0.013	0.004	Free Surface	0.044	No	6	No
2358	452805	452804	6	258.0	8.8	0.013	0.009	Free Surface	0.069	No	6	No
2359	452513	452512	6	109.4	11.3	0.013	0.005	Free Surface	0.043	No	6	No
236	430219	430218	6	120.3	14.2	0.013	0.009	Free Surface	0.101	No	6	No
2363	440903	440903A	10	154.2	11.1	0.013	0.996	Free Surface	0.313	No	10	No
2365	452410	452409	6	264.6	0.6	0.013	0.014	Free Surface	0.131	No	6	No
2366	LH450209B	450209A	6	101.1	8.4	0.013	0.006	Free Surface	0.092	No	6	No
2367	453709	453710	10	313.3	1.2	0.017	1.044	Free Surface	0.607	No	10	No
2368	452815	452813	6	137.3	22.4	0.013	0.019	Free Surface	0.081	No	6	No
2369	452106	452105	6	267.8	14.7	0.013	0.014	Free Surface	0.065	No	6	No
237	430411	430412	6	192.2	10.7	0.013	0.036	Free Surface	0.153	No	6	No
2370	453727	453726	8	49.0	42.6	0.013	0.029	Free Surface	0.067	No	8	No
2371	452813	452812	6	146.1	13.3	0.013	0.021	Free Surface	0.134	No	6	No
2372	453728	453727	8	82.8	8.7	0.013	0.000	Free Surface	0.027	No	8	No
2374	450207	450206	10	502.6	1.4	0.013	0.374	Free Surface	0.316	No	10	No
2375	450204	450413	10	12.6	5.7	0.013	0.184	Free Surface	0.220	No	10	No
2376	452107	452106	6	137.1	9.7	0.013	0.005	Free Surface	0.061	No	6	No
2377	450205	450204	8	34.3	1.8	0.013	0.387	Free Surface	0.421	No	8	No
2378	452812	452720	6	138.4	1.9	0.013	0.035	Free Surface	0.173	No	6	No
2379	452104	452103	6	120.0	8.7	0.013	0.002	Free Surface	0.067	No	6	No
238	433107	431712	6	143.7	51.2	0.013	0.112	Free Surface	0.193	No	6	No
2380	452116	452115	6	242.1	1.1	0.013	0.004	Free Surface	0.060	No	6	No
2381	452814	452813	6	485.1	7.8	0.013	0.002	Free Surface	0.061	No	6	No
2382	452719	452720	6	280.2	5.7	0.013	0.012	Free Surface	0.124	No	6	No
2383	452810	452809	6	52.6	22.3	0.013	0.002	Free Surface	0.038	No	6	No
2384	452809	452811	6	115.5	10.0	0.013	0.005	Free Surface	0.058	No	6	No
2385	452115	452113	6	69.7	65.7	0.013	0.007	Free Surface	0.054	No	6	No
2386	452115	452114	6	219.8	8.5	0.013	0.002	Free Surface	0.033	No	6	No
2387	452807LH	452806	6	89.0	9.6	0.013	0.003	Free Surface	0.041	No	6	No
2388	452103	452102	6	291.2	1.1	0.013	0.007	Free Surface	0.090	No	6	No
2389	452114	452112	6	41.4	79.3	0.013	0.005	Free Surface	0.047	No	6	No
239	433106	433107	6	75.8	2.3	0.013	0.002	Free Surface	0.094	No	6	No
2390	450409	450410	10	193.2	0.4	0.013	0.524	Free Surface	0.539	No	10	Yes
2391	452201	452001	6	127.7	7.6	0.013	0.022	Free Surface	0.109	No	6	No
2392	452113	452112	6	197.6	3.1	0.013	0.007	Free Surface	0.069	No	6	No
2393	452808	452718	6	56.7	2.5	0.013	0.002	Free Surface	0.044	No	6	No
2394	452718	452719	6	195.7	7.4	0.013	0.004	Free Surface	0.064	No	6	No
2395	452730	452729	6	91.3	15.1	0.013	0.003	Free Surface	0.054	No	6	No
2396	452731	452729	6	115.0	4.6	0.013	0.010	Free Surface	0.077	No	6	No
2397	452817	452818	6	152.6	1.4	0.013	0.009	Free Surface	0.102	No	6	No
2398	452004	452005	6	144.4	11.3	0.013	0.038	Free Surface	0.119	No	6	No
2399	452005	452006	6	111.4	17.3	0.013	0.041	Free Surface	0.110	No	6	No
24	453604	453605	6	273.5	1.5	0.013	0.000	Free Surface	0.064	No	6	No
240	431802	431806	6	215.7	10.1	0.013	0.328	Free Surface	0.681	No	6	No
2401	452717	452716	6	235.7	7.3	0.013	0.007	Free Surface	0.063	No	6	No
2402	452026	452024	6	125.8	9.1	0.013	0.015	Free Surface	0.143	No	6	No
2404	452804	452712	6	286.8	9.1	0.013	0.012	Free Surface	0.087	No	6	No
2405	452519	452518	6	175.4	6.1	0.013	0.012	Free Surface	0.091	No	6	No
2406	452729	452520	6	188.8	14.9	0.013	0.015	Free Surface	0.078	No	6	No
2407	452520	452518	6	38.6	14.5	0.013	0.020	Free Surface	0.092	No	6	No
241	433015	431639	6	172.3	4.4	0.013	0.097	Free Surface	0.271	No	6	No
2412	452027	452026	6	128.1	11.7	0.013	0.013	Free Surface	0.076	No	6	No
2413	452024	452023	6	214.5	16.1	0.013	0.134	Free Surface	0.220	No	6	No
2414	452518	452517	6	177.7	17.9	0.013	0.033	Free Surface	0.138	No	6	No
2415	452529LH	452517	6	231.0	0.9	0.013	0.012	Free Surface	0.151	No	6	No
2416	452517	452516	6	135.2	4.3	0.013	0.050	Free Surface	0.283	No	6	No
2419	452023	452022	6	220.6	9.8	0.013	0.136	Free Surface	0.248	No	6	No
242	431640	431639	6	248.5	6.3	0.013	0.119	Free Surface	0.273	No	6	No
2420	452516	452507	6	61.5	0.3	0.013	0.053	Free Surface	0.288	No	6	No
2421	452507	452508	6	193.4	5.8	0.013	0.066	Free Surface	0.209	No	6	No
2422	452819	452820	6	236.7	7.7	0.013	0.043	Free Surface	0.137	No	6	No
2423	452708	452607	6	335.0	7.3	0.013	0.002	Free Surface	0.069	No	6	No
2424	452020	452019	6	110.0	4.0	0.013	0.164	Free Surface	0.384	No	6	No
2425	452022	452021	6	79.5	7.6	0.013	0.138	Free Surface	0.241	No	6	No
2426	452021	452020	6	392.9	13.7	0.013	0.144	Free Surface	0.221	No	6	No
2427	452523	452506	8	154.6	13.4	0.013	0.008	Free Surface	0.050	No	8	No
2428	452506	452507	6	117.3	5.1	0.013	0.011	Free Surface	0.133	No	6	No
2429	452505	452506	6	336.9	1.6	0.013	0.003	Free Surface	0.070	No	6	No
243	443602	443607	8	209.2	10.4	0.013	0.051	Free Surface	0.099	No	8	No
2430	452204	452204A	6	122.1	37.5	0.013	0.011	Free Surface	0.055	No	6	No
2431	451306	451305	6	293.0	16.7	0.013	0.020	Free Surface	0.090	No	6	No
2432	451307	451306	6	52.9	13.9	0.013	0.014	Free Surface	0.077	No	6	No
2433	451304LH	451303	6	153.3	3.7	0.013	0.009	Free Surface	0.074	No	6	No
2434	452202	452201	6	227.9	4.8	0.013	0.015	Free Surface	0.099	No	6	No
2435	452031	452108	6	336.4	18.2	0.013	0.014	Free Surface	0.068	No	6	No
2436	452102	452101	6	324.8	8.5	0.013	0.013	Free Surface	0.087	No	6	No

G2. Model Results for 2028 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
2437	452521	452520	6	60.4	10.2	0.013	0.002	Free Surface	0.058	No	6	No
2438	452818	452818WYE	6	208.8	4.3	0.013	0.016	Free Surface	0.114	No	6	No
2439	452508	452509	6	397.2	2.7	0.013	0.070	Free Surface	0.348	No	6	No
244	432714	432713	6	164.6	5.5	0.013	0.002	Free Surface	0.042	No	6	No
2441	452012	452013	6	145.4	17.7	0.013	0.073	Free Surface	0.174	No	6	No
2442	452501	452502	6	210.4	0.4	0.013	0.000	Free Surface	0.041	No	6	No
2446	431636	431643	6	181.3	29.2	0.013	0.203	Free Surface	0.222	No	6	No
2449	451408	451407	6	54.3	9.8	0.013	0.060	Free Surface	0.179	No	6	No
245	432604	432601	6	32.5	3.1	0.013	0.041	Free Surface	0.156	No	6	No
2454	403315	403406	21	233.9	0.9	0.013	4.463	Free Surface	0.483	No	21	No
2455	403407	403708	21	230.9	1.1	0.013	4.462	Free Surface	0.484	No	21	No
2457	403421	403401	6	274.2	0.1	0.013	0.009	Free Surface	0.276	No	6	No
2458	403419	403402	6	374.2	0.1	0.013	0.006	Free Surface	0.378	No	6	No
2463	403313	403314	21	234.5	1.3	0.013	4.458	Free Surface	0.423	No	21	No
2469	432406	432402	12	34.1	2.1	0.013	1.233	Free Surface	0.420	No	12	No
247	403423E	403423C	27	135.1	0.2	0.013	11.170	Exceeds Capacity	1.000	No	27	Yes
2470	431644	432406	12	253.2	0.7	0.013	1.234	Free Surface	0.577	No	12	Yes
2471	403314	403315	21	234.7	1.5	0.013	4.463	Free Surface	0.414	No	21	No
2473	403406	403407	21	237.1	0.7	0.013	4.463	Free Surface	0.487	No	21	No
2475	403420	403401	6	374.9	0.1	0.013	0.007	Free Surface	0.273	No	6	No
2477	403415	VMH-92	27	455.1	0.7	0.013	7.015	Free Surface	0.616	No	27	No
2479	403413	403414	21	90.2	0.3	0.013	7.284	Free Surface	0.788	No	21	Yes
248	450609	450606	8	201.7	8.7	0.013	0.009	Free Surface	0.127	No	8	No
2480	403403	403404	12	235.5	1.1	0.013	0.117	Free Surface	0.574	No	12	No
2481	403404	403405	12	35.5	0.2	0.013	0.266	Backwater	1.000	No	12	Yes
2482	403405	403413	12	27.0	0.2	0.013	0.323	Backwater	1.000	No	12	Yes
249	450605	450606	10	93.0	0.8	0.013	0.172	Free Surface	0.220	No	10	No
2492	452408A	452408	6	255.1	0.6	0.013	0.004	Free Surface	0.111	No	6	No
2493	441827	441827	6	303.7	2.2	0.013	0.003	Free Surface	0.093	No	6	No
2494	450705	451107	6	226.8	2.9	0.013	0.000	Free Surface	0.128	No	6	No
2497	431612	431610	6	33.5	5.4	0.013	0.241	Free Surface	0.366	No	6	No
2498	433410	433411	8	239.8	3.6	0.013	0.879	Free Surface	0.515	No	8	No
2499	433411	433412	8	50.6	8.6	0.013	0.881	Free Surface	0.453	No	8	No
25	454001	453601	6	126.9	3.5	0.013	0.093	Free Surface	0.272	No	6	No
250	454807	454808	8	214.2	14.8	0.013	0.301	Free Surface	0.215	No	8	No
2500	440526	440525	6	153.7	2.1	0.013	0.004	Free Surface	0.070	No	6	No
2502	433101	433103	6	61.0	53.2	0.013	0.062	Free Surface	0.134	No	6	No
2506	451705	451801	18	474.5	0.9	0.013	3.917	Free Surface	0.570	No	18	No
251	450218	450217	6	100.2	5.3	0.013	0.047	Free Surface	0.267	No	6	No
2513	451008	451004	15	32.0	9.6	0.013	0.000	Free Surface	0.151	No	15	No
2514	433206	433205	6	365.0	6.1	0.013	0.019	Free Surface	0.133	No	6	No
2516	433202	433201	6	49.9	6.0	0.013	0.143	Free Surface	0.284	No	6	No
2519	450419	450906	18	351.8	3.2	0.013	3.897	Free Surface	0.390	No	18	No
252	450606	450607	10	43.4	4.4	0.013	0.181	Free Surface	0.196	No	10	No
2520	450416	450419	12	28.2	6.0	0.013	0.192	Free Surface	0.348	No	12	No
2521	450420	450419	12	37.0	9.7	0.013	0.006	Free Surface	0.253	No	12	No
2522	450418	450411	8	48.7	4.3	0.013	0.005	Free Surface	0.194	No	8	No
2524	441410	441409	6	324.5	1.2	0.013	0.054	Free Surface	0.266	No	6	No
2525	442001	442001WYE	6	160.0	14.2	0.013	0.008	Free Surface	0.069	No	6	No
2528	402808	402901	6	358.3	0.2	0.013	0.012	Free Surface	0.183	No	6	No
2529	403006	402902	6	226.7	0.6	0.013	0.015	Free Surface	0.154	No	6	No
253	454808	454809	8	214.2	14.7	0.013	0.305	Free Surface	0.214	No	8	No
2530	403001	402903	8	249.7	0.5	0.013	0.066	Free Surface	0.229	No	8	No
2535	451904	451905	18	238.6	2.7	0.013	3.784	Free Surface	0.416	No	18	No
2536	451903	451907	21	37.0	2.4	0.013	3.735	Free Surface	0.395	No	21	No
2537	451009	451906	21	247.5	0.5	0.013	3.611	Free Surface	0.500	No	21	No
2538	451005	451901	21	260.0	0.3	0.013	3.529	Free Surface	0.542	No	21	No
2539	451001	451002	21	47.5	1.0	0.013	3.464	Free Surface	0.410	No	21	No
254	450607	450608	10	143.0	1.4	0.013	0.181	Free Surface	0.219	No	10	No
2540	450905	451006	18	379.3	1.7	0.013	3.346	Free Surface	0.469	No	18	No
2541	451901	451902	21	293.3	0.6	0.013	3.528	Free Surface	0.469	No	21	No
2542	451902	451401	21	394.4	1.2	0.013	3.528	Free Surface	0.385	No	21	No
2543	450925	450902	12	206.6	2.9	0.013	0.679	Free Surface	0.281	No	12	No
2544	450906	450907	20	330.6	2.2	0.013	3.897	Free Surface	0.371	No	20	No
2545	403201	403202	6	153.3	0.4	0.013	0.010	Free Surface	0.145	No	6	No
2546	403309	403310	21	59.7	0.4	0.013	4.308	Free Surface	0.576	No	21	No
255	450612	450608	6	200.6	1.4	0.013	0.012	Free Surface	0.236	No	6	No
2551	403316	403317	6	273.4	0.9	0.013	0.011	Free Surface	0.117	No	6	No
2552	451816	451816A	6	202.1	0.1	0.013	0.016	Free Surface	0.243	No	6	No
2553	451822	451822A	6	57.6	0.3	0.013	0.058	Free Surface	0.335	No	6	No
2555	451829	451807	18	29.8	7.3	0.013	3.672	Free Surface	0.305	No	18	No
2556	451505	451802	8	62.3	2.4	0.013	0.012	Free Surface	0.069	No	8	No
2557	451801	451802	18	298.4	2.6	0.013	3.922	Free Surface	0.413	No	18	No
2558	451806	451829	18	326.0	1.9	0.013	3.672	Free Surface	0.438	No	18	No
2559	451702A	451806	18	122.5	1.8	0.013	3.672	Free Surface	0.444	No	18	No
256	454809	454809A	8	52.2	17.3	0.013	0.304	Free Surface	0.205	No	8	No
2560	452716	452712	6	218.4	10.6	0.013	0.010	Free Surface	0.082	No	6	No
2568	431645	431644	12	316.2	1.8	0.013	1.242	Free Surface	0.457	No	12	No
257	442704LH	442703	6	122.2	19.4	0.013	0.006	Free Surface	0.139	No	6	No
2579	450414	450415	12	107.5	2.3	0.013	0.182	Free Surface	0.156	No	12	No
258	450410	450411	12	247.6	3.7	0.013	0.531	Free Surface	0.234	No	12	No
2580	450204	450409A	10	199.8	0.5	0.013	0.526	Free Surface	0.484	No	10	No
259	442916	442917	6	187.6	2.2	0.013	0.007	Free Surface	0.081	No	6	No
2591	443225	450908	6	15.9	6.2	0.013	0.000	Free Surface	0.000	No	6	No
26	453901	453601	6	95.2	9.7	0.013	0.032	Free Surface	0.205	No	6	No
260	453720LH	453719	8	149.7	12.4	0.013	0.023	Free Surface	0.064	No	8	No
261	453717	453716	8	111.7	4.8	0.013	0.029	Free Surface	0.146	No	8	No
264	403423E	403423E	27	88.5	0.4	0.013	11.177	Backwater	1.000	No	27	Yes
267	442719	442720	6	268.4	2.7	0.013	0.006	Free Surface	0.073	No	6	No
268	432102	432103	6	44.1	0.9	0.013	0.029	Free Surface	0.200	No	6	No
269	430708	430709	6	112.6	2.6	0.013	0.006	Free Surface	0.160	No	6	No
27	453602	453601	6	161.4	4.1	0.013	0.023	Free Surface	0.207	No	6	No
270	430709	430710	6	112.7	0.5	0.013	0.034	Free Surface	0.251	No	6	No
272	432101	432102	6	122.8	1.0	0.013	0.027	Free Surface	0.190	No	6	No
273	431012	431105	6	100.1	3.1	0.013	0.017	Free Surface	0.113	No	6	No
274	433308	433307	6	213.8	1.0	0.013	0.002	Free Surface	0.062	No	6	No
276	432103	432104	6	81.8	0.9	0.013	0.031	Free Surface	0.205	No	6	No
277	433315	433314	6	238.9	6.1	0.013	0.371	Free Surface	0.477	No	6	No
279	431829	432101	6	154.4	0.7	0.013	0.024	Free Surface	0.187	No	6	No
28	453604	453603	6	273.3	9.5	0.013	0.008	Free Surface	0.073	No	6	No
280	442718LH	442719	6	93.7	2.2	0.013	0.003	Free Surface	0.060	No	6	No
281	431111	431112	6	223.9	3.6	0.013	0.006	Free Surface	0.078	No	6	No
282	432112	432111	6	122.6	56.9	0.013	0.010	Free Surface	0.068	No	6	No
283	432104	432105	6	162.4	0.9	0.013	0.032	Free Surface	0.236	No	6	No
284	431104	431103	6	60.9	2.5	0.013	0.018	Free Surface	0.118	No	6	No
285	430714	430715	6	191.2	14.2	0.013	0.042	Free Surface	0.132	No	6	No
286	432109	432106	6	295.3	19.9	0.013	0.012	Free Surface	0.113	No	6	No
287	432105	432106	6	52.5	0.9	0.013	0.045	Free Surface	0.216	No	6	No
288	442710LH	442709	6	163.6	9.0	0.013	0.003	Free Surface	0.047	No	6	No
289	431112	431113	6	399.2	4.0	0.013	0.011	Free Surface	0.086	No	6	No
29	453603	453602	6	268.0	9.6	0.013	0.016	Free Surface	0.102	No	6	No
290	433307	433306	6	211.9	4.2	0.013	0.007	Free Surface	0.095	No	6	No
292	430715	NAUGHTON_WW	6	86.1	8.2	0.013	0.047	Free Surface	0.395	No	6	No
293	431110	431205	6	393.3	8.1	0.013	0.060	Free Surface	0.177	No	6	No
294	433314	433313	6	186.9	4.1	0.013	0.348	Free Surface	0.454	No	6	No
295	432106	432107	6	200.0	8.3	0.013	0.063	Free Surface	0.205	No	6	No
296	442715	442714	6	47.0	23.9	0.013	0.007	Free Surface	0.056	No	6	No
297	442714	442713	6	107.7	10.2	0.013	0.010	Free Surface	0.093	No	6	No
298	431113	431114	6	134.4	8.2	0.013	0.015	Free Surface	0.097	No	6	No
3	455009	455001	6	174.0	1.5	0.013	0.051	Free Surface	0.199	No	6	No
30	433722	433721	6	99.2	1.6	0.013	0.004	Free Surface	0.073	No	6	No
300	433306	433305	6	211.3	1.2	0.013	0.012	Free Surface	0.113	No	6	No
3002	440428	440429	6	14.4	9.5	0.013	0.017	Free Surface	0.088	No	6	No
3004	452509	04C161M	6	45.6	0.4	0.013	0.096	Free Surface	0.424	No	6	No
3006	441608A	441602	8	67.2	15.2	0.013	0.204	Free Surface	0.205	No	8	No
3008	442001WYE	442002	6	115.8	11.0	0.013	0.016	Free Surface	0.074	No	6	No
3010	442000F	442001WYE	8	102.1	9.1	0.013	0.008	Free Surface	0.052	No	8	No
3012	442000D	442000E	8	146.9	3.2	0.013	0.003	Free Surface	0.042	No	8	No
3014	403508	403504	8	179.1	0.4	0.013	0.003	Free Surface	0.075	No	8	No
3016	403507	403506	8	45.3	0.4	0.013	0.004	Free Surface	0.064	No	8	No
3018	403509	403507	8	123.8	0.6	0.013	0.002	Free Surface	0.054	No	8	No
302	433312	433311	6	72.3	0.8	0.013	0.003	Free Surface	0.061	No	6	No
3020	403510	403511	8	239.8	0.6	0.013	0.021	Free Surface	0.130	No	8	No
3022	403505	403510	8	140.6	0.6	0.013	0.018	Free Surface	0.122	No	8	No
3024	402807	402807A	6	320.3	0.5	0.013	0.022	Free Surface	0.224	No	6	No
303	432908	432909	6	139.1	2.3	0.013	0.016	Free Surface	0.227	No	6	No
3034	441503	441520	12	20.9	0.8	0.013	0.597	Free Surface	0.373	No	12	No
304	432909	432910	6	102.1	1.4	0.013	0.102	Free Surface	0.512	No	6	No
3042	04C014M	EL_CAMINO_REAL_WW	6	11.0	4.5	0.013	0.017	Free Surface	0.103	No	6	No
3046	400026	ISLAND_PARK_BBALL_WW	10	3.5	2.9	0.013	0.034	Free Surface	0.084	No	10	No
3048	IPPS	ISLAND_PARK_WW	10	9.2	16.3	0.013	0.608	Free Surface	0.423	No	10	No
305	442311LH	442310	6	207.1	0.3	0.013	0.003	Free Surface	0.070	No	6	No
306	431103	431102	6	265.5	5.8	0.013	0.021	Free Surface	0.100	No	6	No
307	433311	433310	6	106.8	5.2	0.013	0.005	Free Surface	0.064	No	6	No
308	433310	433309	6	192.7	5.0	0.013	0.008	Free Surface	0.246	No	6	No
31	454801	454802	6	250.5	9.1	0.013	0.290	Free Surface	0.396	No	6	No
310	432107	432001	6	236.5	3.2	0.013	0.084	Free Surface	0.281	No	6	No
311	432911	432910	6	131.5	9.0	0.013	0.172	Free Surface	0.479	No	6	No
312	442310	442309	6	100.1	7.6	0.013	0.005	Free Surface	0.069	No	6	No
313	431117	431115	6	304.9	0.9	0.013	0.008	Free Surface	0.132	No	6	No
314	431114	431115	6	148.6	7.7	0.013	0.025	Free Surface	0.134	No	6	No
315	LH430718	430717	4	78.3	3.6	0.013	0.002	Free Surface	0.107	No	4	No
316	433305	433304	6	221.1	3.3	0.013	0.015	Free Surface	0.110	No	6	No
317	442326	442325	6	212.0	3.5	0.013	0.004	Free Surface	0.053	No	6	No
319	432001	432002	6	158.6	1.9	0.013	0.086	Free Surface	0.235	No	6	No
32	453606	453607	6	232.5	8.6	0.013	0.199	Free Surface	0.465	No	6	No
320	430610	430609	8	138.3	0.6	0.013	0.026	Free Surface	0.138	No	8	No
321	442810	442809	6	162.2	5.3	0.013	0.016	Free Surface	0.105	No	6	No
322	433304	433303	6	218.6	4.0	0.013	0.020	Free Surface	0.125	No	6	No
323	442811	442810	6	190.2	16.3	0.013	0.005	Free Surface	0.070	No	6	No
324	430609	430608	8	212.5	1.8	0.013	0.342	Free Surface	0.391	No	8	No
325	433301	430706	6	177.5	11.3	0.013	0.322	Free Surface	0.368	No	6	No
326	442309	442308	6	213.8	2.3	0.013	0.009	Free Surface	0.091	No	6	No
327	454906	454907	6	165.0	5.1	0.013	0.280	Free Surface	0.379	No	6	No
328	454104	453905	6	275.6	4.9	0.013	0.044	Free Surface	0.277	No	6	No
329	454217	453905	6	151.3	1.1	0.013	0.126	Free Surface	0.394	No	6	No
33	454802	454803	6	77.2	5.3	0.013	0.288	Free Surface	0.380	No	6	No
330	453904	453905	6	239.3	0.8	0.013	0.004	Free Surface	0.078	No	6	No
331	433717	433716	6	71.9	6.2	0.013	0.012	Free Surface	0.192	No	6	No
332	433720	433717	6	148.2	6.2	0.013	0.006	Free Surface	0.070	No	6	No
333	453502	453501	6	241.4	1.3	0.013	0.406	Free Surface	0.761	No	6	Yes
334	431413	431412	6	248.3	5.6	0.013	0.005	Free Surface	0.121	No	6	No
335	450809	450810	6	49.2	1.8	0.013	0.102	Free Surface	0.461	No	6	No
336	431405	431406	6	269.3	3.2	0.013	0.089	Free Surface	0.264	No	6	No
337	402722	402710	6	27.4	1.8	0.013	0.085	Free Surface	0.324	No	6	No
338	442000C	442000B	6	78.9	5.0	0.013	0.004	Free Surface	0.062	No	6	No
34	433718	433717	6	281.5	11.2	0.013	0.004	Free Surface	0.061	No	6	No
340	403610	IPPS	10	109.8	0.5	0.013	0.554	Free Surface	0.439	No	10	No
343	403607	403610	10	121.0	0.3	0.013	0.522	Free Surface	0.622	No	10	Yes
344	403608	403607	8	242.0	0.3	0.013	0.208	Free Surface	0.472	No	8	No
345	403606	403607	8	144.1	0.5	0.013	0.255	Free Surface	0.539	No	8	Yes

G2. Model Results for 2028 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
346	403604	403606	8	239.6	0.5	0.013	0.255	Free Surface	0.467	No	8	No
348	403601	403602	8	246.0	0.2	0.013	0.000	Free Surface	0.156	No	8	No
349	440503	440525	6	102.8	11.0	0.013	0.012	Free Surface	0.074	No	6	No
35	453601	453502	6	272.5	4.8	0.013	0.149	Free Surface	0.564	No	6	No
350	441005	441005	6	147.8	8.8	0.013	0.018	Free Surface	0.123	No	6	No
351	402708	402707	6	77.1	1.2	0.013	0.002	Free Surface	0.059	No	6	No
354	402709	402722	6	53.6	1.9	0.013	0.002	Free Surface	0.162	No	6	No
355	441008	441009	8	162.0	6.5	0.013	0.022	Free Surface	0.070	No	8	No
356	441026	441004	6	116.4	19.8	0.013	0.002	Free Surface	0.071	No	6	No
358	441009	441010	8	69.4	16.0	0.013	0.025	Free Surface	0.104	No	8	No
359	441010	441013	8	230.0	8.3	0.013	0.101	Free Surface	0.150	No	8	No
36	453612	453502	6	260.8	1.3	0.013	0.252	Free Surface	0.697	No	6	No
360	441004	441011	6	220.6	36.2	0.013	0.059	Free Surface	0.141	No	6	No
361	442000A	441603A	6	210.8	11.1	0.013	0.013	Free Surface	0.153	No	6	No
362	441404	441422A	6	20.4	2.5	0.013	0.176	Free Surface	0.367	No	6	No
363	403009C	403009	6	99.1	1.6	0.013	0.008	Free Surface	0.091	No	6	No
364	453402	453403	8	288.8	4.0	0.013	0.137	Free Surface	0.203	No	8	No
366	450217	450216	6	320.3	0.4	0.013	0.056	Free Surface	0.280	No	6	No
367	453703	453704	10	102.8	1.2	0.013	1.017	Free Surface	0.542	No	10	No
368	453401	453402	8	340.1	6.0	0.013	0.137	Free Surface	0.191	No	8	No
369	453704	453705	10	99.7	5.3	0.013	1.017	Free Surface	0.481	No	10	No
37	453611	453612	6	236.0	4.5	0.013	0.244	Free Surface	0.473	No	6	No
370	450212	450213	6	181.7	4.9	0.013	0.007	Free Surface	0.124	No	6	No
371	450216	450213	6	84.1	6.6	0.013	0.070	Free Surface	0.185	No	6	No
372	450304	IEC_MH-110	8	293.0	11.7	0.013	0.322	Free Surface	0.235	No	8	No
374	450213	450214	6	171.1	11.8	0.013	0.092	Free Surface	0.194	No	6	No
375	450210	450209	6	205.1	3.1	0.013	0.328	Free Surface	0.557	No	6	No
378	450209	450208	10	120.1	1.2	0.013	0.371	Free Surface	0.298	No	10	No
379	442608	442607	6	275.1	15.1	0.013	0.006	Free Surface	0.049	No	6	No
38	453610	453611	6	417.5	7.1	0.013	0.235	Free Surface	0.361	No	6	No
380	442623	442622	8	194.5	3.9	0.013	0.003	Free Surface	0.038	No	8	No
381	453721LH	453730A	8	126.0	12.3	0.013	0.000	Free Surface	0.039	No	8	No
382	431406	431408	6	387.9	2.5	0.013	0.098	Free Surface	0.413	No	6	No
383	430803	433316	8	301.5	2.7	0.013	0.014	Free Surface	0.080	No	8	No
385	432114	432113	6	221.7	4.6	0.013	0.006	Free Surface	0.065	No	6	No
386	431013	431010	6	102.0	11.9	0.013	0.013	Free Surface	0.085	No	6	No
387	442726	442725	6	117.6	1.7	0.013	0.004	Free Surface	0.072	No	6	No
388	431108	431109	6	186.5	6.6	0.013	0.048	Free Surface	0.148	No	6	No
389	431109	431110	6	98.0	13.8	0.013	0.055	Free Surface	0.151	No	6	No
39	433712	433711	6	128.6	9.9	0.013	0.002	Free Surface	0.039	No	6	No
390	430710	430711	6	106.5	0.5	0.013	0.036	Free Surface	0.261	No	6	No
391	432113	432112	6	36.0	15.4	0.013	0.011	Free Surface	0.055	No	6	No
392	432010	432009	6	144.2	10.9	0.013	0.117	Free Surface	0.230	No	6	No
393	430703LH	430702	6	62.1	10.4	0.013	0.007	Free Surface	0.062	No	6	No
394	431209	430908	6	289.8	4.6	0.013	0.031	Free Surface	0.184	No	6	No
395	442712	442713	6	52.7	1.5	0.013	0.004	Free Surface	0.095	No	6	No
396	442717	442715	6	161.2	4.9	0.013	0.003	Free Surface	0.043	No	6	No
397	442716	442715	6	51.6	8.5	0.013	0.004	Free Surface	0.044	No	6	No
398	431204	431203	6	191.2	9.2	0.013	0.088	Free Surface	0.202	No	6	No
399	433309	433301	6	161.1	6.4	0.013	0.312	Free Surface	0.380	No	6	No
4	455001	455002	6	254.1	11.7	0.013	0.058	Free Surface	0.205	No	6	No
40	433715	433714	6	115.1	0.9	0.013	0.071	Free Surface	0.357	No	6	No
400	431207LH	431208	6	84.5	10.9	0.013	0.005	Free Surface	0.148	No	6	No
400026	430728	430727	8	347.0	4.9	0.013	0.005	Free Surface	0.039	No	8	No
400028	430727	430726	8	92.8	16.8	0.013	0.012	Free Surface	0.045	No	8	No
400030	430726	430725	8	115.9	4.3	0.013	0.015	Free Surface	0.068	No	8	No
400034	430722	430721	8	192.8	0.4	0.013	0.104	Free Surface	0.303	No	8	No
400038	430720	430721	8	304.2	0.3	0.013	0.009	Free Surface	0.098	No	8	No
400040	430721	RALSTON_WW	8	26.0	0.3	0.013	0.116	Free Surface	0.318	No	8	No
400042	433426	433427	8	96.3	3.3	0.013	0.002	Free Surface	0.035	No	8	No
400044	433427	433428	8	111.6	2.5	0.013	0.004	Free Surface	0.066	No	8	No
400046	433428	433429	8	308.9	0.3	0.013	0.006	Free Surface	0.087	No	8	No
400048	433431	433434	8	70.2	2.1	0.013	0.021	Free Surface	0.107	No	8	No
400050	433434	433435	8	48.8	1.0	0.013	0.022	Free Surface	0.110	No	8	No
400052	433435	433423	8	222.5	3.2	0.013	0.027	Free Surface	0.087	No	8	No
400054	433425	433424	8	219.4	4.5	0.013	0.003	Free Surface	0.034	No	8	No
400056	433424	433423	8	132.5	7.2	0.013	0.005	Free Surface	0.056	No	8	No
400058	433423	453730	8	109.0	15.4	0.013	0.034	Free Surface	0.093	No	8	No
40006	433433	433435	8	173.0	0.2	0.013	0.003	Free Surface	0.084	No	8	No
400060	453730	453730A	8	30.0	2.6	0.013	0.034	Free Surface	0.170	No	8	No
40008	433432	433433	8	56.6	2.3	0.013	0.001	Free Surface	0.046	No	8	No
40012	430207	430201	6	30.0	13.0	0.013	0.414	Free Surface	0.481	No	6	No
40014	430201	430202	6	154.8	4.9	0.013	0.467	Free Surface	0.523	No	6	No
40018	431009	431111	6	361.2	0.5	0.013	0.003	Free Surface	0.073	No	6	No
40020	430413	430414	6	77.1	12.0	0.013	0.122	Free Surface	0.216	No	6	No
40022	430414	430901	6	262.5	12.0	0.013	0.135	Free Surface	0.259	No	6	No
40026	432308	432307	6	214.2	19.5	0.013	0.061	Free Surface	0.137	No	6	No
40028	432307	432306	6	50.8	16.6	0.013	0.063	Free Surface	0.158	No	6	No
40030	431603	432401	8	250.3	1.9	0.013	0.017	Free Surface	0.092	No	8	No
40038	451809	451809A	18	63.5	6.1	0.013	3.673	Free Surface	0.659	No	18	No
40040	451809B	451810	18	193.4	0.2	0.013	3.676	Free Surface	0.857	No	18	Yes
40044	402403	402403A	6	135.6	0.5	0.013	0.066	Free Surface	0.335	No	6	No
40046	402403A	402404	6	87.9	0.7	0.013	0.069	Free Surface	0.357	No	6	No
40048	450502	450501	6	191.1	9.9	0.013	0.008	Free Surface	0.073	No	6	No
40062	431633	431608A	6	81.3	1.2	0.013	0.308	Backwater	1.000	No	6	Yes
40064	454601	454508	6	62.9	3.6	0.013	0.001	Free Surface	0.030	No	6	No
40066	454508	454402	6	129.6	7.0	0.013	0.002	Free Surface	0.041	No	6	No
40068	454303C	454303B	6	301.7	3.2	0.013	0.074	Free Surface	0.220	No	6	No
40070	454303B	454303A	6	291.9	5.7	0.013	0.080	Free Surface	0.203	No	6	No
40072	454303A	454303	8	211.0	5.6	0.013	0.086	Free Surface	0.144	No	8	No
40074	450115A	450113	6	58.7	6.6	0.013	0.009	Free Surface	0.073	No	6	No
40080	432111	432105	6	34.1	5.0	0.013	0.014	Free Surface	0.092	No	6	No
40082	431814	431815	6	36.4	63.4	0.013	0.088	Free Surface	0.121	No	6	No
40084	431815	431805	6	41.1	77.5	0.013	0.088	Free Surface	0.135	No	6	No
40086	431609	431608	6	44.2	4.0	0.013	0.448	Backwater	1.000	No	6	Yes
40088	451827A	451827	6	205.5	8.8	0.013	0.014	Free Surface	0.091	No	6	No
40090	450409A	450409	10	161.4	1.3	0.015	0.526	Free Surface	0.472	No	10	No
40092	441905A	442223	6	154.4	7.0	0.013	0.087	Free Surface	0.207	No	6	No
40096	441514A	441514	6	153.2	10.0	0.013	0.013	Free Surface	0.085	No	6	No
40098	SSTA_9953	441124	6	52.9	0.9	0.013	0.122	Free Surface	0.353	No	6	No
401	432916	432919	6	21.5	16.5	0.013	0.058	Free Surface	0.173	No	6	No
40102	443004	443004A	6	379.4	4.3	0.013	0.063	Free Surface	0.205	No	6	No
40106	403009B	403009	6	100.2	0.2	0.013	0.003	Free Surface	0.266	No	6	No
40108	441420A	441510	6	185.1	2.5	0.013	0.018	Free Surface	0.117	No	6	No
40110	441126A	441125	6	165.9	0.6	0.013	0.114	Free Surface	0.419	No	6	No
40112	440525	440524	6	10.4	18.0	0.013	0.019	Free Surface	0.088	No	6	No
40114	433203	433202	6	296.4	7.4	0.013	0.072	Free Surface	0.227	No	6	No
40116	450116	450115	6	213.2	6.2	0.013	0.001	Free Surface	0.052	No	6	No
40118	442621	442618	6	133.9	23.1	0.013	0.005	Free Surface	0.060	No	6	No
40120	443110A	443214	6	164.8	0.2	0.013	0.040	Free Surface	0.305	No	6	No
40124	441402A	441403	6	145.7	4.8	0.013	0.386	Free Surface	0.466	No	6	No
40126	441417A	441419	6	72.8	2.6	0.013	0.024	Free Surface	0.120	No	6	No
40128	440736	440725	6	187.8	2.6	0.013	0.055	Free Surface	0.196	No	6	No
40134	440714	440735	6	200.0	11.4	0.013	0.044	Free Surface	0.150	No	6	No
40144	442701A	442701B	15	184.8	4.3	0.013	2.052	Free Surface	0.342	No	15	No
40146	450303	450103A	10	925.3	0.4	0.015	0.353	Free Surface	0.407	No	10	No
40148	433316A	433315	6	100.2	8.9	0.013	0.386	Free Surface	0.425	No	6	No
40150	442701C	450417	15	58.4	6.1	0.013	2.052	Free Surface	0.303	No	15	No
40154	431114A	431114	6	203.0	2.1	0.013	0.006	Free Surface	0.092	No	6	No
40160	453730A	453722	8	175.0	12.4	0.013	0.034	Free Surface	0.107	No	8	No
40161	433013A	433012	6	166.3	13.3	0.013	0.036	Free Surface	0.150	No	6	No
40162	433429	433430	8	80.0	0.8	0.013	0.009	Free Surface	0.095	No	8	No
40163	431105	431104	6	58.9	3.1	0.013	0.018	Free Surface	0.120	No	6	No
40164	433430	433431	8	75.0	0.8	0.013	0.016	Free Surface	0.101	No	8	No
40165	431401A	431402	6	88.3	8.2	0.013	0.047	Free Surface	0.172	No	6	No
40166	432613	432614	6	205.0	4.0	0.013	0.002	Free Surface	0.049	No	6	No
40167	431309A	431302	6	70.6	15.9	0.013	0.111	Free Surface	0.489	No	6	No
40168	432508A	432507	8	30.9	6.6	0.013	0.005	Free Surface	0.037	No	8	No
40169	SSFI_21	432505	6	105.2	9.1	0.013	0.008	Free Surface	0.061	No	6	No
40173	440918A	440919	8	86.1	3.9	0.013	0.021	Free Surface	0.078	No	8	No
40175	440903A	443301	10	144.8	11.1	0.013	0.997	Free Surface	0.310	No	10	No
40179	443214A	443213	6	147.7	1.3	0.013	0.064	Free Surface	0.267	No	6	No
40181	VMH_72	402902	15	103.6	0.3	0.013	0.378	Free Surface	0.265	No	8	No
40183	403003	403002	8	142.0	0.2	0.013	0.034	Free Surface	0.206	No	8	No
40186	455108LH	455107	6	236.6	0.4	0.013	0.002	Free Surface	0.077	No	6	No
40187	403809	403811	6	142.2	0.5	0.013	0.041	Free Surface	0.262	No	6	No
40188	455107	455105	6	225.8	0.4	0.013	0.004	Free Surface	0.103	No	6	No
40189	442000E	442000F	8	92.9	3.2	0.013	0.006	Free Surface	0.045	No	8	No
40190	455106	455105	6	255.1	3.9	0.013	0.001	Free Surface	0.072	No	6	No
40191	451809A	451809B	18	225.3	0.5	0.013	3.676	Backwater	1.000	No	18	Yes
40192	455105	455104	6	271.0	0.4	0.013	0.007	Free Surface	0.146	No	6	No
40193	451814	451811	18	61.4	0.0	0.013	4.308	Free Surface	0.799	No	18	Yes
40194	455104	455103	6	176.2	0.4	0.013	0.016	Free Surface	0.178	No	6	No
40195	451820A	451814	8	18.3	17.5	0.013	0.024	Free Surface	0.289	No	8	No
40196	455103	455101	6	176.1	0.4	0.013	0.017	Free Surface	0.186	No	6	No
40198	455102LH	455101	6	217.7	5.8	0.013	0.001	Free Surface	0.108	No	6	No
40199	452016	452016A	6	62.0	25.3	0.013	0.092	Free Surface	0.157	No	6	No
402	432914	432916	6	141.1	0.7	0.013	0.006	Free Surface	0.114	No	6	No
40200	455101	454606	6	154.0	0.4	0.013	0.018	Free Surface	0.280	No	6	No
40201	452016A	452016B	6	63.7	20.0	0.013	0.092	Free Surface	0.162	No	6	No
40203	452016B	452018	6	107.1	20.3	0.013	0.094	Free Surface	0.194	No	6	No
40205	452412B	452412A	6	182.9	2.8	0.013	0.006	Free Surface	0.091	No	6	No
40207	452425A	452402	6	24.9	0.1	0.013	0.022	Free Surface	0.623	No	6	Yes
40208	454608	454609	6	182.9	0.4	0.013	0.025	Free Surface	0.190	No	6	No
40209	452504A	452503	6	185.1	2.3	0.013	0.004	Free Surface	0.066	No	6	No
40211	452511A	452510	6	70.2	14.4	0.013	0.026	Free Surface	0.105	No	6	No
40213	451402A	451701	18	70.4	2.5	0.013	3.541	Free Surface	0.394	No	18	No
40214	442701B	442701C	15	120.9	3.4	0.013	2.052	Free Surface	0.352	No	15	No
40215	442219A	442218	6	221.4	13.8	0.013	0.041	Free Surface	0.192	No	6	No
40217	451614A	451609	6	135.5	7.3	0.013	0.008	Free Surface	0.095	No	6	No
40218	440543A	440544	6	75.1	9.4	0.013	0.061	Free Surface	0.171	No	6	No
40219	442204A	451605	6	231.1	1.5	0.013	0.198	Free Surface	0.468	No	6	No
40220	441422A	441422B	6	63.6	15.3	0.013	0.176	Free Surface	0.322	No	6	No
40221	451605A	451606	6	34.7	1.5	0.013	0.202	Free Surface	0.471	No	6	No
40222	441422B	441422	6	206.2	2.1	0.013	0.184	Free Surface	0.414	No	6	No
40224	441409B	441408	6	147.1	0.9	0.013	0.082	Free Surface	0.336	No	6	No
40225	443221A	443202	8	225.8	2.8	0.013	0.024	Free Surface	0.414	No	8	No
40226	441409BLH	441409B	6	145.5	3.4	0.013	0.004	Free Surface	0.195	No	6	No
40227	442000B	442000A	6	101.4	3.9	0.013	0.008	Free Surface	0.073	No	6	No
40228	441506	441506A	12	7.8	1.3	0.013	0.183	Free Surface	0.277	No	12	No
40229	442000	442000A	6	189.1	1.0	0.013	0.005	Free Surface	0.079	No	6	No
40230	441505	441505A	12	9.3	1.5	0.013	0.030	Free Surface	0.109	No	12	No
40232	441506A	441505A	12	247.7	0.4	0.013	0.189	Free Surface	0.240	No	12	No
40233	442223A	442223	8	136.7	1.5	0.013	0.003	Free Surface	0.057	No	8	No
40234	441505A	441503	12	329.1	1.1	0.013	0.159	Free Surface	0.263	No	12	No
40235	450503A	450503	8	122.5	0.9	0.013	0.006	Free Surface	0.069	No	8	No
40236	441834A	441834	6	136.9	1.5	0.013	0.007	Free Surface	0.137	No	6	No
40237	454809A	454809B	8	50.7	20.1	0.013	0.303	Free Surface	0.208	No	8	No
40239	454809B	450304	8	193.7	14.0	0.013	0.301	Free Surface	0.226	No	8	No
40240	442206A	442205	6	83.5	1.5	0.013	0.027	Free Surface	0.175	No	6	No
40241	LH450104B	450104	6	145.0	4.5	0.013	0.004	Free Surface	0.118	No	6	No

G2. Model Results for 2028 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
40242	442205A	442204	6	206.3	1.5	0.013	0.035	Free Surface	0.325	No	6	No
40244	403102A	403105	6	54.3	0.7	0.013	0.007	Free Surface	0.105	No	6	No
40245	453716B	453716C	8	313.7	14.7	0.013	0.012	Free Surface	0.104	No	8	No
40246	451803B	451803C	21	261.2	1.0	0.013	3.956	Free Surface	0.403	No	21	No
40247	440137B	440137A	6	224.0	1.8	0.013	0.005	Free Surface	0.089	No	6	No
40248	451803C	451803D	21	88.5	2.7	0.013	3.966	Free Surface	0.486	No	21	No
40249	440137A	440137	6	92.1	2.2	0.013	0.012	Free Surface	0.220	No	6	No
40251	452204A	451307	6	26.4	29.9	0.013	0.014	Free Surface	0.066	No	6	No
40254	451821A	451816A	6	210.6	0.3	0.013	0.061	Free Surface	0.358	No	6	No
40256	451821A	451821B	6	159.0	0.8	0.013	0.009	Free Surface	0.130	No	6	No
40258	451821B	451820	6	69.0	1.4	0.013	0.020	Free Surface	0.157	No	6	No
40260	451816A	451815	6	18.4	1.3	0.013	0.078	Free Surface	0.298	No	6	No
40264	451810A	451814	18	28.3	2.1	0.013	4.288	Free Surface	0.966	No	18	Yes
40266	452405C	452405A	16	22.3	0.8	0.013	0.510	Free Surface	0.289	No	12	No
40267	404809	404808	6	22.1	1.8	0.013	0.003	Free Surface	0.209	No	6	No
40268	452405A	452405B	12	30.4	2.2	0.013	0.250	Free Surface	0.229	No	12	No
40269	404806A	404806	6	15.4	2.0	0.013	0.004	Free Surface	0.179	No	6	No
40270	452405B	451810A	12	241.7	0.5	0.013	0.253	Free Surface	0.637	No	12	Yes
40272	452403A	452403	10	206.3	0.2	0.013	0.113	Free Surface	0.331	No	10	No
40280	430723	430722	8	223.0	0.4	0.013	0.098	Free Surface	0.297	No	8	No
40282	454603	454606A	6	497.9	2.8	0.013	0.003	Free Surface	0.122	No	6	No
40284	452012A	452012	6	148.5	8.1	0.013	0.005	Free Surface	0.099	No	6	No
40286	402502B	402507	6	302.1	0.5	0.013	0.006	Free Surface	0.176	No	6	No
40288	403501	402510	8	349.7	0.4	0.013	0.000	Free Surface	0.118	No	8	No
40290	402604A	402603	6	231.0	3.8	0.013	0.059	Free Surface	0.257	No	6	No
40292	VMH_13	431431	8	128.4	0.8	0.013	0.002	Free Surface	0.067	No	8	No
40294	453716C	453712	8	174.8	18.2	0.013	0.192	Free Surface	0.292	No	8	No
40296	453716A	453716B	8	285.2	6.3	0.013	0.005	Free Surface	0.042	No	8	No
403	431203	431202	6	110.1	6.7	0.013	0.092	Free Surface	0.211	No	6	No
40310	433206A	433206B	12	180.5	5.2	0.013	1.540	Free Surface	0.358	No	12	No
40312	433206B	442501	12	358.8	7.3	0.013	1.486	Free Surface	0.351	No	12	No
40314	440325A	440209	6	144.5	0.4	0.013	0.028	Free Surface	0.485	No	6	No
40316	443004A	443108	6	295.1	3.5	0.013	0.068	Free Surface	0.240	No	6	No
40318	440402A	440901	10	254.9	3.4	0.013	0.984	Free Surface	0.380	No	10	No
40320	440402	440402A	10	101.2	3.5	0.013	0.978	Free Surface	0.447	No	10	No
40322	440901	440902	10	307.4	3.8	0.013	0.496	Free Surface	0.623	No	10	No
40326	404822	404821	6	323.5	0.2	0.013	0.008	Free Surface	0.152	No	6	No
40332	404821	404818	6	104.0	0.3	0.013	0.011	Free Surface	0.197	No	6	No
40334	404816	404817	6	99.1	0.3	0.013	0.004	Free Surface	0.126	No	6	No
40336	404817	404818	6	82.5	0.3	0.013	0.009	Free Surface	0.188	No	6	No
40338	404818	404819	6	87.5	0.2	0.013	0.021	Free Surface	0.231	No	6	No
40340	404819	404820	6	29.2	0.3	0.013	0.022	Free Surface	0.239	No	6	No
40342	404820	404820A	6	192.2	0.2	0.013	0.024	Free Surface	0.245	No	6	No
40348	404820A	404801	6	87.8	0.3	0.013	0.024	Free Surface	0.250	No	6	No
40350	404801	404802	6	38.7	0.2	0.013	0.025	Free Surface	0.295	No	6	No
40352	404802	404803	6	281.7	0.2	0.013	0.026	Free Surface	0.265	No	6	No
40354	404803	404803A	6	247.6	0.2	0.013	0.027	Free Surface	0.339	No	6	No
40356	404814	404813	6	261.1	0.3	0.013	0.016	Free Surface	0.206	No	6	No
40358	404813	404815	6	19.1	0.3	0.013	0.018	Free Surface	0.218	No	6	No
40360	404815	404812	6	152.5	0.2	0.013	0.019	Free Surface	0.222	No	6	No
40362	404812	404811	6	68.3	0.3	0.013	0.020	Free Surface	0.227	No	6	No
40364	404811	404810	6	41.4	0.2	0.013	0.021	Free Surface	0.234	No	6	No
40366	404810	404808	6	65.0	0.2	0.013	0.022	Free Surface	0.302	No	6	No
40368	404809A	404809	6	274.9	0.7	0.013	0.001	Free Surface	0.048	No	6	No
40370	404808	404807	6	26.7	0.3	0.013	0.026	Free Surface	0.429	No	6	No
40372	404807	404806	6	98.5	0.0	0.013	0.026	Free Surface	0.344	No	6	No
40374	404806B	404806A	6	145.2	0.7	0.013	0.004	Free Surface	0.075	No	6	No
40376	404806	404805	6	122.1	0.2	0.013	0.034	Free Surface	0.532	No	6	Yes
40378	404805	404804	6	118.8	0.2	0.013	0.035	Free Surface	0.499	No	6	No
40382	403416A	403423D	27	13.7	20.2	0.013	7.094	Free Surface	0.595	No	27	No
404	432002	432003	6	241.7	31.8	0.013	0.104	Free Surface	0.205	No	6	No
405	431115	431116	6	224.6	3.5	0.013	0.037	Free Surface	0.164	No	6	No
406	430608	430607A	8	203.5	1.6	0.013	0.290	Free Surface	0.370	No	8	No
407	433303	433302	6	186.1	2.9	0.013	0.024	Free Surface	0.141	No	6	No
408	433302	433301	6	222.5	3.1	0.013	0.030	Free Surface	0.248	No	6	No
409	442413LH	442442	6	135.0	31.9	0.013	0.005	Free Surface	0.047	No	6	No
41	433711	433710	6	75.8	7.7	0.013	0.004	Free Surface	0.050	No	6	No
410	431202	431201	6	307.5	7.1	0.013	0.092	Free Surface	0.203	No	6	No
411	430607A	430606	8	109.5	1.2	0.013	0.265	Free Surface	0.386	No	8	No
412	431208	431209	6	251.6	0.2	0.013	0.014	Free Surface	0.193	No	6	No
414	430606	430605A	8	129.3	1.2	0.013	0.259	Free Surface	0.380	No	8	No
415	431116	430605	6	222.0	3.2	0.013	0.041	Free Surface	0.170	No	6	No
416	442444	442445	6	51.3	24.1	0.013	0.004	Free Surface	0.035	No	6	No
417	430907	432010	6	116.7	24.7	0.013	0.111	Free Surface	0.190	No	6	No
418	431201	430906	6	335.8	11.9	0.013	0.104	Free Surface	0.199	No	6	No
419	430906	430907	6	46.0	12.9	0.013	0.108	Free Surface	0.186	No	6	No
42	433710	433709	6	85.5	7.8	0.013	0.005	Free Surface	0.055	No	6	No
420	430704	430511	6	225.8	7.7	0.013	0.329	Free Surface	0.399	No	6	No
421	430702	430701	6	114.3	7.1	0.013	0.009	Free Surface	0.092	No	6	No
422	430604	430603	6	183.7	6.4	0.013	0.254	Free Surface	0.358	No	6	No
423	430511	430510	6	110.4	7.7	0.013	0.323	Free Surface	0.374	No	6	No
424	430701	430504	6	136.2	4.1	0.013	0.017	Free Surface	0.089	No	6	No
425	430911LH	430912	6	161.7	2.4	0.013	0.009	Free Surface	0.110	No	6	No
426	430908	430909	6	242.4	1.3	0.013	0.043	Free Surface	0.196	No	6	No
427	430603	430602	6	177.8	7.0	0.013	0.256	Free Surface	0.352	No	6	No
428	430510	430509	6	223.5	12.4	0.013	0.320	Free Surface	0.341	No	6	No
429	430503	430502	6	58.9	9.9	0.013	0.021	Free Surface	0.094	No	6	No
43	433713LH	433711	6	121.7	2.2	0.013	0.001	Free Surface	0.041	No	6	No
430	430909	430910	6	98.8	7.4	0.013	0.054	Free Surface	0.168	No	6	No
431	430602	430601	6	247.0	7.5	0.013	0.258	Free Surface	0.344	No	6	No
432	430912	430411	6	434.3	4.3	0.013	0.027	Free Surface	0.126	No	6	No
433	430509	430508	6	107.2	12.1	0.013	0.316	Free Surface	0.377	No	6	No
434	431613	431612	6	51.4	40.1	0.013	0.242	Free Surface	0.293	No	6	No
435	440318	440317	8	322.7	3.3	0.013	0.003	Free Surface	0.044	No	8	No
436	430508	430507	6	108.1	6.6	0.013	0.317	Free Surface	0.392	No	6	No
437	430506	430505	6	121.9	3.2	0.013	0.002	Free Surface	0.050	No	6	No
438	430601	430409	6	187.1	8.3	0.013	0.261	Free Surface	0.412	No	6	No
439	430902	430903	6	186.6	6.7	0.013	0.266	Free Surface	0.376	No	6	No
44	454411	454412	6	235.9	3.1	0.013	0.118	Free Surface	0.251	No	6	No
440	452414	452412B	6	87.5	4.5	0.013	0.002	Free Surface	0.053	No	6	No
441	430502	430501	6	329.2	13.2	0.013	0.024	Free Surface	0.102	No	6	No
442	430505	430501	6	88.8	6.1	0.013	0.006	Free Surface	0.083	No	6	No
443	430409	430408	6	177.5	3.0	0.013	0.261	Free Surface	0.408	No	6	No
444	430410LH	430408	6	294.6	6.5	0.013	0.005	Free Surface	0.192	No	6	No
445	430904	431901	6	294.3	70.1	0.013	0.307	Free Surface	0.221	No	6	No
446	430412	430413	6	210.7	2.7	0.013	0.045	Free Surface	0.186	No	6	No
447	430910	430413	6	423.4	7.7	0.013	0.069	Free Surface	0.194	No	6	No
448	433113	433112	6	211.0	10.9	0.013	0.023	Free Surface	0.107	No	6	No
449	443326	443301	6	357.3	3.5	0.013	0.002	Free Surface	0.273	No	6	No
45	454431	454425	6	54.7	37.7	0.013	0.001	Free Surface	0.054	No	6	No
450	440319	440320	6	114.5	1.3	0.013	0.006	Free Surface	0.074	No	6	No
451	440321	440320	6	112.6	4.0	0.013	0.005	Free Surface	0.059	No	6	No
452	431901	431608	6	51.7	9.8	0.013	0.342	Backwater	1.000	No	6	Yes
453	430507	430101	6	181.6	7.8	0.013	0.306	Free Surface	0.377	No	6	No
455	430901	430902	6	164.5	14.1	0.013	0.262	Free Surface	0.331	No	6	No
456	431639	431638	6	164.4	10.0	0.013	0.221	Free Surface	0.293	No	6	No
457	431608	431608A	6	77.5	3.6	0.013	0.914	Exceeds Capacity	1.000	No	6	Yes
458	430501	430103	6	147.6	12.5	0.013	0.033	Free Surface	0.110	No	6	No
46	451105	451104	8	136.9	1.5	0.013	0.094	Free Surface	0.205	No	8	No
461	431635	431634	6	136.9	19.3	0.013	0.007	Free Surface	0.070	No	6	No
462	430103	430102	8	163.0	2.2	0.013	0.061	Free Surface	0.155	No	8	No
463	430102	430101	6	53.1	35.4	0.013	0.092	Free Surface	0.142	No	6	No
465	431632	431633	6	155.8	39.7	0.013	0.093	Free Surface	0.569	No	6	No
466	430109	430102	6	62.2	8.3	0.013	0.030	Free Surface	0.116	No	6	No
467	431608A	431607	6	101.3	4.3	0.013	0.741	Backwater	1.000	No	6	Yes
468	431631	431632	6	68.0	3.6	0.013	0.089	Free Surface	0.210	No	6	No
469	430407	430406	6	169.0	29.2	0.013	0.265	Free Surface	0.243	No	6	No
47	433714	433708	6	156.7	0.3	0.013	0.071	Free Surface	0.426	No	6	No
470	432735LH	432727	6	222.1	10.7	0.013	0.003	Free Surface	0.050	No	6	No
471	432727	432726	6	118.8	11.4	0.013	0.009	Free Surface	0.131	No	6	No
472	432727A	432727	6	103.5	1.0	0.013	0.002	Free Surface	0.054	No	6	No
473	430209	430208	6	123.1	11.9	0.013	0.416	Free Surface	0.431	No	6	No
474	430110	430109	6	256.1	6.6	0.013	0.027	Free Surface	0.116	No	6	No
475	431630	431631	6	161.3	4.8	0.013	0.021	Free Surface	0.197	No	6	No
476	430104	430103	6	286.7	0.4	0.013	0.024	Free Surface	0.216	No	6	No
477	430406	430405	6	139.3	44.0	0.013	0.269	Free Surface	0.231	No	6	No
478	430105	430104	6	94.0	8.0	0.013	0.004	Free Surface	0.095	No	6	No
479	431607	431606	6	212.7	1.4	0.013	0.748	Exceeds Capacity	1.000	No	6	Yes
48	453501	431302	8	461.3	1.0	0.013	0.416	Free Surface	0.554	No	8	No
480	431628	431629	6	64.8	0.0	0.013	0.011	Free Surface	0.186	No	6	No
481	430405	430404	6	101.8	40.2	0.013	0.268	Free Surface	0.240	No	6	No
482	430208	430207	6	168.9	7.8	0.013	0.415	Free Surface	0.425	No	6	No
483	432721	432715	6	153.4	2.9	0.013	0.010	Free Surface	0.116	No	6	No
484	431629	431630	6	109.3	8.9	0.013	0.015	Free Surface	0.097	No	6	No
485	432316LH	432315	6	204.0	5.8	0.013	0.005	Free Surface	0.064	No	6	No
486	432225	432224	6	171.3	9.3	0.013	0.027	Free Surface	0.186	No	6	No
487	440140	440601	6	322.8	10.9	0.013	0.276	Free Surface	0.327	No	6	No
488	432305	432304	6	109.1	7.2	0.013	0.068	Free Surface	0.164	No	6	No
489	432328	432318	6	74.7	63.0	0.013	0.003	Free Surface	0.056	No	6	No
49	451104	450601	8	223.6	2.3	0.013	0.094	Free Surface	0.188	No	8	No
490	432524	432521	8	111.4	6.6	0.013	0.013	Free Surface	0.057	No	8	No
491	432534	432533	6	104.1	14.6	0.013	0.000	Free Surface	0.111	No	6	No
492	432521	432533	8	22.4	38.5	0.013	0.031	Free Surface	0.058	No	8	No
493	432532	432533	8	54.5	14.9	0.013	0.002	Free Surface	0.094	No	8	No
494	432531	432532	8	90.8	17.6	0.013	0.002	Free Surface	0.021	No	8	No
495	403401	401402	8	236.3	0.5	0.013	0.095	Free Surface	0.369	No	8	No
496	432304	432303	6	120.5	26.1	0.013	0.072	Free Surface	0.134	No	6	No
497	430212	430201	6	28.3	23.4	0.013	0.063	Free Surface	0.353	No	6	No
498	431624	431623	6	295.5	6.6	0.013	0.055	Free Surface	0.165	No	6	No
499	430106	430104	6	197.4	1.3	0.013	0.017	Free Surface	0.137	No	6	No
50	454412	454432	6	214.5	24.5	0.013	0.119	Free Surface	0.166	No	6	No
500	431625	431624	6	159.6	3.1	0.013	0.042	Free Surface	0.174	No	6	No
501	430213	430212	6	106.2	55.1	0.013	0.063	Free Surface	0.117	No	6	No
502	430202	430203	6	156.4	9.4	0.013	0.466	Free Surface	0.436	No	6	No
503	430404	430302	6	164.9	36.8	0.013	0.296	Free Surface	0.374	No	6	No
504	430204	430205	6	150.1	13.1	0.013	0.478	Free Surface	0.482	No	6	No
505	431602	431602	6	123.3	2.2	0.013	0.705	Free Surface	0.980	No	6	Yes
507	430205	430206	6	157.9	5.1	0.013	0.475	Free Surface	0.576	No	6	No
508	430302	430206	6	62.0	2.5	0.013	0.291	Free Surface	0.502	No	6	No
509	430111	430110	6	385.4	3.5	0.013	0.020	Free Surface	0.118	No	6	No
51	454426	454427	6	87.3	24.1	0.013	0.016	Free Surface	0.100	No	6	No
510	430107	430106	6	204.5	3.6	0.013	0.012	Free Surface	0.114	No	6	No
511	430206	430310	10	297.5	3.3	0.013	0.729	Free Surface	0.363	No	10	No
512	430310	430401	10	197.4	3.5	0.013	0.741	Free Surface	0.450	No	10	No
513	431602	431645	12	37.8	1.9	0.013	1.243	Free Surface	0.434	No	12	No
514	430216	430215	6	198.6	10.2	0.013	0.002	Free Surface	0.094	No	6	No
515	430215	430214	6	98.1	11.7	0.013	0.058	Free Surface	0.132	No	6	No
516	430401	430402	10	257.7	1.2	0.013	0.744	Free Surface	0.446	No	10	No
519	430217	430215	6	113.9	1.7	0.013	0.053	Free Surface	0.227	No	6	No
52	454429	454432	6	236.7	10.0	0.013	0.018	Free Surface	0.119	No	6	No
520	430112	430111	6	158.2	11.1	0.013	0.015	Free Surface	0.099	No	6	No

G2. Model Results for 2028 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
521	430108LH	430107	6	159.7	0.4	0.013	0.008	Free Surface	0.119	No	6	No
522	443409	443426	6	98.5	11.8	0.013	0.018	Free Surface	0.081	No	6	No
523	432607	432605	6	245.7	7.5	0.013	0.028	Free Surface	0.112	No	6	No
524	440699LH	440630	6	54.1	17.1	0.013	0.005	Free Surface	0.045	No	6	No
529	432329	432324	6	154.9	3.9	0.013	0.000	Free Surface	0.018	No	6	No
53	450601	450602	8	83.8	2.5	0.013	0.094	Free Surface	0.271	No	8	No
530	432221	432214	6	121.4	25.5	0.013	0.003	Free Surface	0.042	No	6	No
531	432528LH	432538	6	112.9	9.1	0.013	0.003	Free Surface	0.043	No	6	No
532	432208	432207	6	48.9	7.1	0.013	0.069	Free Surface	0.237	No	6	No
533	432224	432207	6	183.1	0.9	0.013	0.054	Free Surface	0.267	No	6	No
534	432519	08C649L	6	128.5	6.6	0.013	0.014	Free Surface	0.091	No	6	No
535	432538	432527	6	67.8	12.6	0.013	0.006	Free Surface	0.051	No	6	No
536	440613	440613A	6	454.4	4.2	0.013	0.018	Free Surface	0.122	No	6	No
537	432207	432206	6	236.8	4.6	0.013	0.146	Free Surface	0.359	No	6	No
538	08C649L	08C648M	6	132.2	13.5	0.013	0.026	Free Surface	0.096	No	6	No
54	454428	454429	6	179.6	3.2	0.013	0.017	Free Surface	0.101	No	6	No
540	440814	440813	6	205.2	11.7	0.013	0.004	Free Surface	0.095	No	6	No
541	440813	440820	6	99.7	5.8	0.013	0.035	Free Surface	0.119	No	6	No
542	440555	440813	6	101.8	7.9	0.013	0.003	Free Surface	0.095	No	6	No
543	440805	440806	6	209.5	10.0	0.013	0.002	Free Surface	0.098	No	6	No
544	440835	440834	6	121.3	1.2	0.013	0.003	Free Surface	0.061	No	6	No
545	440540	440541	6	43.6	5.0	0.013	0.028	Free Surface	0.129	No	6	No
546	440806	440521	6	91.3	1.6	0.013	0.022	Free Surface	0.124	No	6	No
547	440521	440813	6	100.6	23.2	0.013	0.025	Free Surface	0.117	No	6	No
548	441216	440541	6	182.8	1.3	0.013	0.003	Free Surface	0.096	No	6	No
55	450610	450604	6	170.0	2.2	0.013	0.051	Free Surface	0.301	No	6	No
550	440808	440807	6	85.4	6.8	0.013	0.015	Free Surface	0.086	No	6	No
551	440807	440806	6	97.8	12.9	0.013	0.018	Free Surface	0.124	No	6	No
552	440554	440553	6	198.5	7.6	0.013	0.005	Free Surface	0.095	No	6	No
553	440522	440521	6	99.8	14.4	0.013	0.003	Free Surface	0.058	No	6	No
554	441215	441214	6	157.7	14.6	0.013	0.007	Free Surface	0.060	No	6	No
555	440508	440509	6	62.6	11.4	0.013	0.002	Free Surface	0.037	No	6	No
557	440523	440524	6	289.2	6.9	0.013	0.004	Free Surface	0.073	No	6	No
558	441210	441209	6	100.0	3.0	0.013	0.006	Free Surface	0.062	No	6	No
56	433703	433702	6	184.0	35.5	0.013	0.086	Free Surface	0.202	No	6	No
560	440809	440808	6	110.1	0.5	0.013	0.012	Free Surface	0.126	No	6	No
561	403417	403404	6	378.6	0.1	0.013	0.055	Backwater	1.000	No	6	Yes
562	440810	440809	6	168.3	5.4	0.013	0.003	Free Surface	0.102	No	6	No
563	403414	403415	27	310.0	0.5	0.013	7.161	Free Surface	0.488	No	27	No
565	403411	403412	21	200.0	1.1	0.013	7.180	Free Surface	0.780	No	21	Yes
566	403412	403413	21	11.0	1.2	0.013	7.191	Free Surface	0.942	No	21	Yes
567	441002	441004	6	170.6	40.2	0.013	0.025	Free Surface	0.093	No	6	No
568	441005	441004	6	238.5	2.1	0.013	0.025	Free Surface	0.135	No	6	No
569	403503	403504	8	51.8	0.6	0.013	0.002	Free Surface	0.070	No	8	No
57	450604	450605	10	161.0	1.0	0.013	0.171	Free Surface	0.255	No	10	No
570	403009A	403009B	6	66.8	0.3	0.013	0.002	Free Surface	0.270	No	6	No
575	403511	402807A	8	141.3	0.6	0.013	0.022	Free Surface	0.162	No	8	No
578	403504	403505	8	203.9	0.6	0.013	0.012	Free Surface	0.107	No	8	No
579	403506	403505	8	160.7	0.6	0.013	0.004	Free Surface	0.089	No	8	No
58	433707	433706	6	132.6	0.4	0.013	0.001	Free Surface	0.056	No	6	No
584	454609	454710	6	206.3	4.4	0.013	0.032	Free Surface	0.145	No	6	No
585	454603	454610	6	270.4	0.5	0.013	0.001	Free Surface	0.051	No	6	No
586	454610	454609	6	251.0	5.5	0.013	0.005	Free Surface	0.096	No	6	No
587	454602	454603	6	299.9	2.3	0.013	0.002	Free Surface	0.049	No	6	No
588	454710	454709	6	258.0	3.9	0.013	0.035	Free Surface	0.217	No	6	No
589	454711	454709	6	201.6	0.5	0.013	0.007	Free Surface	0.198	No	6	No
59	433706	433705	6	97.9	0.4	0.013	0.002	Free Surface	0.092	No	6	No
590	454611	454610	6	228.0	4.0	0.013	0.001	Free Surface	0.043	No	6	No
591	454712LH	454711	6	186.7	0.5	0.013	0.002	Free Surface	0.085	No	6	No
592	454601	454602	6	217.5	2.7	0.013	0.001	Free Surface	0.036	No	6	No
593	454708	454707	6	224.6	5.9	0.013	0.003	Free Surface	0.144	No	6	No
594	454709	454707	6	192.8	0.5	0.013	0.043	Free Surface	0.264	No	6	No
597	454611	454503	6	222.3	6.8	0.013	0.002	Free Surface	0.034	No	6	No
598	454503	454701	6	132.6	6.0	0.013	0.002	Free Surface	0.044	No	6	No
599	454402	454401	6	122.3	3.5	0.013	0.003	Free Surface	0.049	No	6	No
6	454909	454910	6	80.4	2.2	0.013	0.006	Free Surface	0.080	No	6	No
60	433705	433704	6	146.3	0.4	0.013	0.007	Free Surface	0.141	No	6	No
601	454701	454702	6	251.2	5.0	0.013	0.005	Free Surface	0.060	No	6	No
602	454215	454214	6	220.0	0.2	0.013	0.001	Free Surface	0.070	No	6	No
603	454702	454703	6	282.9	3.7	0.013	0.006	Free Surface	0.171	No	6	No
604	454707	454703	6	273.1	1.1	0.013	0.050	Free Surface	0.261	No	6	No
605	454706	454703	6	79.1	1.2	0.013	0.014	Free Surface	0.200	No	6	No
606	454206	454205	6	149.7	6.1	0.013	0.054	Free Surface	0.174	No	6	No
607	454214	454213	6	199.3	9.4	0.013	0.016	Free Surface	0.090	No	6	No
608	454401	454430	6	106.7	3.7	0.013	0.004	Free Surface	0.056	No	6	No
609	454213	454212	6	140.5	11.2	0.013	0.023	Free Surface	0.109	No	6	No
61	453403	454306	8	256.5	3.6	0.013	0.137	Free Surface	0.289	No	8	No
610	454204	454203	6	71.6	2.8	0.013	0.007	Free Surface	0.115	No	6	No
611	454205	454203	6	131.8	5.5	0.013	0.058	Free Surface	0.169	No	6	No
612	454107	454005	6	379.2	1.1	0.013	0.020	Free Surface	0.179	No	6	No
613	454106	454107	6	401.0	2.7	0.013	0.007	Free Surface	0.116	No	6	No
614	454106	454105	6	423.5	1.4	0.013	0.005	Free Surface	0.079	No	6	No
615	454216	454214	6	128.6	0.4	0.013	0.013	Free Surface	0.132	No	6	No
616	433404	433405	8	333.0	3.6	0.013	0.867	Free Surface	0.532	No	8	No
617	433408	433409	8	95.9	1.1	0.013	0.876	Free Surface	0.799	No	8	Yes
618	431518	431519	6	218.5	7.7	0.013	0.005	Free Surface	0.056	No	6	No
619	433403	433404	8	150.0	2.8	0.013	0.853	Free Surface	0.584	No	8	No
62	431514	431513	8	99.1	7.3	0.013	0.621	Free Surface	0.405	No	8	No
620	433409	433410	8	70.7	2.8	0.013	0.877	Free Surface	0.599	No	8	No
621	453706	453707	10	127.9	7.8	0.013	1.025	Free Surface	0.388	No	10	No
622	431522	431523	6	196.8	1.0	0.013	0.017	Free Surface	0.131	No	6	No
623	433406	433407	8	262.1	2.4	0.013	0.871	Free Surface	0.591	No	8	No
624	433407	433408	8	269.2	4.5	0.013	0.872	Free Surface	0.757	No	8	Yes
625	431305	431304	6	303.5	11.3	0.013	0.005	Free Surface	0.056	No	6	No
626	454704	454507	6	276.4	0.6	0.013	0.071	Free Surface	0.349	No	6	No
627	454703	454704	6	132.8	1.3	0.013	0.070	Free Surface	0.306	No	6	No
628	454212	454211	6	168.1	5.8	0.013	0.028	Free Surface	0.135	No	6	No
629	454503	454502	6	326.9	12.2	0.013	0.003	Free Surface	0.165	No	6	No
63	433702	433701	6	134.6	3.0	0.013	0.091	Free Surface	0.245	No	6	No
630	454504	454502	6	157.1	1.3	0.013	0.076	Free Surface	0.295	No	6	No
631	454211	454209	6	171.1	3.8	0.013	0.033	Free Surface	0.157	No	6	No
632	454005	454004	6	363.0	2.3	0.013	0.047	Free Surface	0.190	No	6	No
633	454203	454202	6	170.4	12.2	0.013	0.067	Free Surface	0.180	No	6	No
634	454505	454504	6	104.5	1.9	0.013	0.074	Free Surface	0.276	No	6	No
635	454507	454505	6	238.4	0.6	0.013	0.073	Free Surface	0.311	No	6	No
636	454006	454005	6	203.0	1.3	0.013	0.018	Free Surface	0.173	No	6	No
637	454210	454209	6	100.0	1.0	0.013	0.011	Free Surface	0.143	No	6	No
638	454209	454201	6	316.4	4.9	0.013	0.048	Free Surface	0.193	No	6	No
639	454007A	454004	6	185.3	4.2	0.013	0.005	Free Surface	0.116	No	6	No
64	431301	431514	8	224.1	4.8	0.013	0.619	Free Surface	0.400	No	8	No
640	454430	454403	6	337.9	7.1	0.013	0.007	Free Surface	0.062	No	6	No
642	454105	454104	6	288.5	8.2	0.013	0.014	Free Surface	0.119	No	6	No
643	454202	454201	6	159.8	4.7	0.013	0.071	Free Surface	0.212	No	6	No
644	454002	454001	6	383.9	13.8	0.013	0.083	Free Surface	0.209	No	6	No
645	454419	454420	6	130.8	15.0	0.013	0.004	Free Surface	0.043	No	6	No
646	454407	454408	6	286.6	20.6	0.013	0.101	Free Surface	0.166	No	6	No
647	433724	433723	6	116.7	3.0	0.013	0.004	Free Surface	0.056	No	6	No
648	454417	454419	6	169.7	3.5	0.013	0.004	Free Surface	0.047	No	6	No
649	454418	454417	6	132.9	6.2	0.013	0.002	Free Surface	0.045	No	6	No
65	433701	431309	6	43.6	8.6	0.013	0.093	Free Surface	0.181	No	6	No
650	454420	454421	6	141.1	15.3	0.013	0.006	Free Surface	0.053	No	6	No
651	433723	433722	6	66.6	3.0	0.013	0.004	Free Surface	0.062	No	6	No
652	454408	454409	6	107.2	30.0	0.013	0.112	Free Surface	0.258	No	6	No
653	454416	454417	6	67.2	3.7	0.013	0.000	Free Surface	0.037	No	6	No
654	454421	454423	6	124.9	14.7	0.013	0.009	Free Surface	0.063	No	6	No
655	454409	454410	6	107.8	2.0	0.013	0.112	Free Surface	0.279	No	6	No
656	433721	433720	6	115.9	1.7	0.013	0.006	Free Surface	0.077	No	6	No
658	454423	454424	6	123.9	10.1	0.013	0.010	Free Surface	0.089	No	6	No
659	454422	454421	6	332.2	3.2	0.013	0.002	Free Surface	0.049	No	6	No
66	431309	431302	6	55.1	38.3	0.013	0.093	Free Surface	0.465	No	6	No
660	433716	433715	6	84.8	0.9	0.013	0.071	Free Surface	0.308	No	6	No
661	453608	453609	6	356.0	0.2	0.013	0.214	Free Surface	0.882	No	6	Yes
662	453607	453608	6	252.0	0.6	0.013	0.206	Free Surface	0.819	No	6	Yes
663	433709	433708	6	141.6	7.8	0.013	0.007	Free Surface	0.255	No	6	No
664	433708	433704	6	130.7	0.4	0.013	0.078	Free Surface	0.308	No	6	No
665	433704	433703	6	72.5	19.5	0.013	0.086	Free Surface	0.150	No	6	No
666	433727LH	433603	6	142.8	6.6	0.013	0.007	Free Surface	0.130	No	6	No
667	431303	431309A	6	105.2	15.9	0.013	0.109	Free Surface	0.186	No	6	No
668	433601	431303	6	221.0	8.8	0.013	0.097	Free Surface	0.196	No	6	No
669	433603	433602	6	217.0	6.7	0.013	0.079	Free Surface	0.192	No	6	No
67	431302	431301	8	253.2	1.8	0.013	0.617	Free Surface	0.511	No	8	No
670	433602	433601	6	419.0	10.2	0.013	0.088	Free Surface	0.197	No	6	No
671	433604	433603	6	139.1	2.4	0.013	0.071	Free Surface	0.225	No	6	No
672	431520	431521	6	107.5	5.8	0.013	0.011	Free Surface	0.099	No	6	No
673	454432	453401	6	438.5	59.3	0.013	0.137	Free Surface	0.196	No	6	No
674	431519	431520	6	113.4	10.7	0.013	0.009	Free Surface	0.071	No	6	No
675	431304	431303	6	167.3	11.8	0.013	0.011	Free Surface	0.125	No	6	No
676	433405	433406	8	128.3	5.1	0.013	0.869	Free Surface	0.581	No	8	No
677	433802	433803	6	132.5	2.8	0.013	0.004	Free Surface	0.058	No	6	No
678	454404	454405	6	230.2	1.0	0.013	0.096	Free Surface	0.307	No	6	No
679	454405	454406	6	147.9	5.5	0.013	0.097	Free Surface	0.228	No	6	No
68	431513	431512	8	176.8	4.0	0.013	0.621	Free Surface	0.453	No	8	No
680	454406	454407	6	166.9	2.6	0.013	0.099	Free Surface	0.240	No	6	No
681	433419	433420	6	125.6	3.2	0.013	0.032	Free Surface	0.248	No	6	No
682	431402	431403	6	247.8	3.8	0.013	0.062	Free Surface	0.237	No	6	No
683	433808	431308	6	158.4	6.2	0.013	0.034	Free Surface	0.157	No	6	No
684	442505	442516	6	121.6	2.8	0.013	0.003	Free Surface	0.046	No	6	No
685	452110	452108	6	278.2	55.7	0.013	0.065	Free Surface	0.109	No	6	No
686	442303	442302	6	149.9	9.9	0.013	0.034	Free Surface	0.122	No	6	No
687	431818	431817	6	56.5	9.3	0.013	0.048	Free Surface	0.177	No	6	No
688	431819	431818	6	153.0	4.2	0.013	0.027	Free Surface	0.137	No	6	No
689	442321LH	442320	6	94.6	24.5	0.013	0.004	Free Surface	0.041	No	6	No
69	431511	431511	8	154.5	3.2	0.013	0.624	Free Surface	0.473	No	8	No
690	451403	451703	18	219.8	3.5	0.013	3.854	Free Surface	0.377	No	18	No
691	451401	451402	24	403.3	1.2	0.013	3.541	Free Surface	0.318	No	24	No
692	451402	451402A	18	121.9	2.2	0.013	3.541	Free Surface	0.407	No	18	No
693	451406	451701	10	17.5	26.0	0.013	0.136	Free Surface	0.276	No	10	No
694	433111	433110	6	87.8	6.5	0.013	0.041	Free Surface	0.142	No	6	No
696	433803	433805	6	54.1	8.1	0.013	0.007	Free Surface	0.139	No	6	No
697	431517	431516	6	193.9	11.5	0.013	0.004	Free Surface	0.064	No	6	No
698	453710	453712	10	122.5	10.4	0.013	1.047	Free Surface	0.326	No	10	No
699	431416LH	431415	6	163.3	9.6	0.013	0.004	Free Surface	0.094	No	6	No
7	454910	454904	6	175.0	2.0	0.013	0.008	Free Surface	0.203	No	6	No
70	431511	431510	8	93.5	3.1	0.013	0.624	Free Surface	0.467	No	8	No
700	431523	431415	6	265.3	6.0	0.013	0.021	Free Surface	0.126	No	6	No
701	433805	433806	6	143.6	0.7	0.013	0.030	Free Surface	0.189	No	6	No
702	431305	431306	6	259.1	1.5	0.013	0.002	Free Surface	0.059	No	6	No
703	433806	433808	6	152.2	3.3	0.013	0.033	Free Surface	0.145	No	6	No
704	431403	431404	6	360.8	1.6	0.013	0.069	Free Surface	0.249	No	6	No
705	431308	431307	6	162.4	1.8	0.013	0.034	Free Surface	0.176	No	6	No
706	431306	431307	6	290.4	2.4	0.013	0.006	Free Surface	0.122	No	6	No

G2. Model Results for 2028 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
707	431307	431401	6	277.1	4.0	0.013	0.043	Free Surface	0.155	No	6	No
708	431401	431401A	6	69.3	8.3	0.013	0.043	Free Surface	0.142	No	6	No
709	431404	431405	6	281.9	3.6	0.013	0.076	Free Surface	0.236	No	6	No
71	431505	431504	8	110.2	3.5	0.013	0.635	Free Surface	0.497	No	8	No
710	431006	431007	6	67.6	1.5	0.013	0.012	Free Surface	0.114	No	6	No
711	431005	431006	6	106.2	1.6	0.013	0.012	Free Surface	0.112	No	6	No
712	431407	431406	6	61.4	3.9	0.013	0.003	Free Surface	0.162	No	6	No
713	433418	433419	6	272.4	0.4	0.013	0.032	Free Surface	0.216	No	6	No
715	442507	442506	6	55.6	4.8	0.013	0.001	Free Surface	0.032	No	6	No
716	431806	431705	6	65.2	7.2	0.013	0.362	Backwater	1.000	No	6	Yes
717	432006	431804	6	201.2	7.0	0.013	0.268	Free Surface	0.343	No	6	No
718	432903	433108	6	136.3	40.6	0.013	0.098	Free Surface	0.142	No	6	No
719	432904LH	432905	6	224.4	2.7	0.013	0.002	Free Surface	0.050	No	6	No
72	453701	453702	10	204.2	2.4	0.013	1.008	Free Surface	0.611	No	10	No
721	442302	442301	6	191.6	8.2	0.013	0.035	Free Surface	0.135	No	6	No
723	LH433214	LH433213	6	126.2	3.1	0.013	0.003	Free Surface	0.070	No	6	No
724	LH433213	442504	6	142.0	0.4	0.013	0.003	Free Surface	0.077	No	6	No
726	431708	431707	6	290.9	5.5	0.013	0.493	Free Surface	0.774	No	6	Yes
727	431706	431705	6	116.6	1.5	0.013	0.469	Exceeds Capacity	1.000	No	6	Yes
728	431707	431706	6	107.0	2.5	0.013	0.504	Backwater	1.000	No	6	Yes
73	431506	431505	6	177.2	2.3	0.013	0.633	Free Surface	0.808	No	6	Yes
730	440304	440303	6	97.7	8.9	0.013	0.034	Free Surface	0.134	No	6	No
731	431705	431704	6	172.7	3.2	0.013	0.743	Exceeds Capacity	1.000	No	6	Yes
732	431713	431711	6	276.5	7.1	0.013	0.082	Free Surface	0.275	No	6	No
733	431704	431703	6	71.3	4.6	0.013	0.705	Backwater	1.000	No	6	Yes
734	442004	441714	8	302.8	0.8	0.013	0.161	Free Surface	0.295	No	8	No
735	402617LH	442626	6	211.4	0.9	0.013	0.035	Free Surface	0.197	No	6	No
736	441417	441417A	6	194.7	3.5	0.013	0.022	Free Surface	0.138	No	6	No
737	442316	442504	6	47.7	10.5	0.013	0.023	Free Surface	0.098	No	6	No
738	452816LH	452817	6	207.0	9.0	0.013	0.006	Free Surface	0.079	No	6	No
739	442312	442313	6	44.4	24.1	0.013	0.004	Free Surface	0.047	No	6	No
74	431502	431501	8	219.2	2.6	0.013	0.791	Free Surface	0.588	No	8	No
740	442313	442314	6	157.6	4.7	0.013	0.005	Free Surface	0.062	No	6	No
741	431824	431822	6	86.0	2.2	0.013	0.002	Free Surface	0.041	No	6	No
742	431823	431822	6	54.6	7.1	0.013	0.002	Free Surface	0.037	No	6	No
743	431812	431811	6	103.5	22.7	0.013	0.015	Free Surface	0.082	No	6	No
744	442315	442316	6	131.2	36.9	0.013	0.022	Free Surface	0.084	No	6	No
745	442314	442315	6	162.5	11.6	0.013	0.010	Free Surface	0.067	No	6	No
746	431828	431829	6	74.0	0.9	0.013	0.017	Free Surface	0.169	No	6	No
747	431827	431828	6	75.4	0.9	0.013	0.016	Free Surface	0.147	No	6	No
748	431826	431827	6	75.8	0.9	0.013	0.012	Free Surface	0.136	No	6	No
749	431822	431821	6	127.7	23.0	0.013	0.005	Free Surface	0.062	No	6	No
75	431501	434401	8	205.2	2.9	0.013	0.851	Free Surface	0.564	No	8	No
750	431811	431810	6	110.4	7.7	0.013	0.020	Free Surface	0.123	No	6	No
751	442317	442315	6	115.6	1.2	0.013	0.009	Free Surface	0.090	No	6	No
752	431825	431826	6	127.7	0.9	0.013	0.011	Free Surface	0.126	No	6	No
753	431821	431825	6	45.2	3.3	0.013	0.009	Free Surface	0.103	No	6	No
754	431809	431808	6	64.1	4.7	0.013	0.035	Free Surface	0.131	No	6	No
755	431817	431816	6	47.4	2.7	0.013	0.050	Free Surface	0.177	No	6	No
756	431816	431814	6	171.5	14.2	0.013	0.055	Free Surface	0.134	No	6	No
757	442319	442318	6	63.7	15.7	0.013	0.001	Free Surface	0.035	No	6	No
758	431820	431819	6	205.5	2.0	0.013	0.005	Free Surface	0.099	No	6	No
759	433208	433209	6	82.7	2.0	0.013	0.027	Free Surface	0.159	No	6	No
76	431410	431503	6	200.3	32.6	0.013	0.158	Free Surface	0.430	No	6	No
760	431808	431807	6	63.3	22.7	0.013	0.041	Free Surface	0.132	No	6	No
762	431807	431805	6	81.5	4.9	0.013	0.043	Free Surface	0.157	No	6	No
763	433209	433210	6	162.4	3.6	0.013	0.039	Free Surface	0.203	No	6	No
764	432920	432909	6	126.0	3.1	0.013	0.084	Free Surface	0.290	No	6	No
765	432907	432908	6	364.0	6.4	0.013	0.012	Free Surface	0.099	No	6	No
766	452820	452821	6	77.4	10.4	0.013	0.043	Free Surface	0.136	No	6	No
767	442320	442322	6	96.5	15.1	0.013	0.006	Free Surface	0.052	No	6	No
768	433103	433202	6	137.4	12.1	0.013	0.072	Free Surface	0.216	No	6	No
769	442336	442322	6	87.6	6.4	0.013	0.003	Free Surface	0.051	No	6	No
77	431509	431508	8	157.1	3.0	0.013	0.628	Backwater	1.000	No	8	Yes
770	432906	432907	6	211.8	0.9	0.013	0.008	Free Surface	0.095	No	6	No
771	431801	431710	6	90.1	9.6	0.013	0.283	Free Surface	0.351	No	6	No
772	431803	431802	6	86.3	6.2	0.013	0.323	Free Surface	0.398	No	6	No
773	431804	431803	6	46.4	12.7	0.013	0.270	Free Surface	0.369	No	6	No
774	VMH_21	440301	6	74.7	1.3	0.013	0.010	Free Surface	0.124	No	6	No
775	431710	431709	6	62.8	7.9	0.013	0.283	Free Surface	0.404	No	6	No
776	454506	454505	6	144.8	5.7	0.013	0.000	Free Surface	0.011	No	6	No
777	454103	454104	6	338.6	0.7	0.013	0.024	Free Surface	0.178	No	6	No
778	454102	454103	6	424.2	0.3	0.013	0.012	Free Surface	0.181	No	6	No
779	454502	454501	6	212.6	1.4	0.013	0.083	Free Surface	0.307	No	6	No
78	431508	431507	8	83.0	1.5	0.013	0.630	Backwater	1.000	No	8	Yes
780	454101	454006	6	220.1	0.8	0.013	0.011	Free Surface	0.124	No	6	No
781	454101	454102	6	308.6	5.0	0.013	0.000	Free Surface	0.083	No	6	No
782	454004	454003	6	299.3	5.9	0.013	0.060	Free Surface	0.200	No	6	No
783	454201	454217	6	179.8	10.4	0.013	0.124	Free Surface	0.307	No	6	No
784	454403	454404	6	193.1	11.3	0.013	0.010	Free Surface	0.225	No	6	No
785	454501	454404	6	181.0	1.1	0.013	0.083	Free Surface	0.351	No	6	No
786	454410	454411	6	138.9	12.0	0.013	0.113	Free Surface	0.262	No	6	No
787	453609	453610	6	233.6	0.6	0.013	0.225	Free Surface	0.550	No	6	No
788	431516	431402	6	305.2	3.8	0.013	0.011	Free Surface	0.143	No	6	No
789	431007	431008	6	81.2	1.5	0.013	0.012	Free Surface	0.111	No	6	No
79	433804	433803	6	71.4	11.1	0.013	0.002	Free Surface	0.044	No	6	No
790	432815	432923A	6	201.9	7.4	0.013	0.048	Free Surface	0.239	No	6	No
791	432814	432815	6	31.5	5.1	0.013	0.038	Free Surface	0.149	No	6	No
792	432813LH	432814	6	57.0	11.0	0.013	0.001	Free Surface	0.082	No	6	No
793	432812	432913	6	300.5	7.0	0.013	0.110	Free Surface	0.233	No	6	No
794	431810	431809	6	116.3	3.1	0.013	0.030	Free Surface	0.152	No	6	No
795	442318	442317	6	114.2	4.9	0.013	0.004	Free Surface	0.081	No	6	No
796	431805	431801	6	160.1	50.7	0.013	0.136	Free Surface	0.249	No	6	No
797	433210	433101	6	157.0	2.2	0.013	0.053	Free Surface	0.174	No	6	No
798	442322	VMH_21	6	68.4	15.3	0.013	0.010	Free Surface	0.082	No	6	No
799	432922	432919	6	304.6	8.1	0.013	0.016	Free Surface	0.149	No	6	No
8	454903	454904	6	216.0	9.1	0.013	0.314	Free Surface	0.365	No	6	No
80	433422	433412	6	195.6	60.1	0.013	0.126	Free Surface	0.388	No	6	No
800	432919	432920	6	177.3	5.2	0.013	0.081	Free Surface	0.228	No	6	No
801	432912	432911	6	244.3	4.7	0.013	0.171	Free Surface	0.299	No	6	No
802	440301	432912	6	115.5	11.2	0.013	0.053	Free Surface	0.236	No	6	No
803	432905	432906	6	198.5	3.0	0.013	0.004	Free Surface	0.086	No	6	No
805	431711	431709	6	50.9	4.0	0.013	0.193	Free Surface	0.400	No	6	No
806	440302	440301	6	218.3	7.5	0.013	0.040	Free Surface	0.139	No	6	No
807	431712	431711	6	31.6	5.5	0.013	0.112	Free Surface	0.299	No	6	No
808	432913	432912	6	82.8	7.0	0.013	0.118	Free Surface	0.283	No	6	No
809	433108	433107	6	34.2	51.9	0.013	0.104	Free Surface	0.141	No	6	No
81	454003	454002	6	240.9	4.0	0.013	0.072	Free Surface	0.196	No	6	No
810	451826A	451826	6	29.5	0.8	0.013	0.009	Free Surface	0.130	No	6	No
811	440203	440202	6	186.2	1.7	0.013	0.020	Free Surface	0.143	No	6	No
812	451905	451706	18	376.2	1.0	0.013	3.855	Free Surface	0.487	No	18	No
813	440317	440203	6	125.5	4.1	0.013	0.007	Free Surface	0.105	No	6	No
814	431719	431720	6	170.8	27.7	0.013	0.118	Free Surface	0.583	No	6	No
815	432811	432812	6	240.8	8.3	0.013	0.102	Free Surface	0.220	No	6	No
816	451706	451403	18	102.5	4.3	0.013	3.854	Free Surface	0.368	No	18	No
817	431718	431719	8	111.0	11.7	0.013	0.107	Free Surface	0.133	No	8	No
818	431716	431718	8	231.2	7.7	0.013	0.105	Free Surface	0.146	No	8	No
819	451418	451406	6	280.0	3.8	0.013	0.009	Free Surface	0.120	No	6	No
82	454907	454908	6	252.5	12.1	0.013	0.295	Free Surface	0.317	No	6	No
820	451703	451704	18	126.1	1.9	0.013	3.854	Free Surface	0.448	No	18	No
821	431717	431716	6	212.5	10.0	0.013	0.047	Free Surface	0.171	No	6	No
822	432817	432816	6	300.5	9.8	0.013	0.005	Free Surface	0.064	No	6	No
823	433118	431714	6	220.8	5.1	0.013	0.035	Free Surface	0.147	No	6	No
824	432809	432814	6	370.6	8.1	0.013	0.034	Free Surface	0.136	No	6	No
825	432808	432809	6	24.7	3.4	0.013	0.025	Free Surface	0.129	No	6	No
826	451701	451702	18	247.9	2.9	0.013	3.668	Free Surface	0.398	No	18	No
827	451702	451705	12	45.5	0.2	0.013	0.000	Free Surface	0.000	No	12	No
828	431611	431610	6	145.4	1.0	0.013	0.580	Exceeds Capacity	1.000	No	6	Yes
829	431701	431611	6	118.9	2.9	0.013	0.640	Exceeds Capacity	1.000	No	6	Yes
83	453904	453903	6	367.8	1.6	0.013	0.006	Free Surface	0.088	No	6	No
830	440204	440203	6	182.2	3.1	0.013	0.010	Free Surface	0.113	No	6	No
831	433112	433111	6	141.9	7.9	0.013	0.030	Free Surface	0.130	No	6	No
832	431636	431717	6	225.2	1.6	0.013	0.041	Free Surface	0.178	No	6	No
833	451421	451406	8	164.9	3.1	0.013	0.127	Free Surface	0.174	No	8	No
834	432602	432601	6	237.0	7.8	0.013	0.009	Free Surface	0.096	No	6	No
835	432606LH	432605	6	103.9	1.2	0.013	0.005	Free Surface	0.092	No	6	No
836	440110	440109	6	152.4	28.2	0.013	0.006	Free Surface	0.085	No	6	No
837	442103	442105	6	200.8	5.8	0.013	0.033	Free Surface	0.131	No	6	No
838	432513	432512	6	173.5	1.6	0.013	0.005	Free Surface	0.131	No	6	No
839	432514LH	432513	6	92.7	11.3	0.013	0.003	Free Surface	0.056	No	6	No
84	453903	453902	6	314.1	5.8	0.013	0.017	Free Surface	0.099	No	6	No
840	433117	433118	6	197.9	0.8	0.013	0.019	Free Surface	0.156	No	6	No
841	432806	432807	6	174.7	1.3	0.013	0.021	Free Surface	0.133	No	6	No
842	432807	432808	6	119.6	9.4	0.013	0.024	Free Surface	0.117	No	6	No
843	431614	431613	6	128.3	14.7	0.013	0.242	Free Surface	0.260	No	6	No
844	431643	431614	6	103.9	25.6	0.013	0.208	Free Surface	0.265	No	6	No
845	432810	432811	8	282.6	4.1	0.013	0.099	Free Surface	0.165	No	8	No
846	451407	451421	8	102.8	10.4	0.013	0.125	Free Surface	0.191	No	8	No
847	433116LH	433117	6	97.2	17.5	0.013	0.009	Free Surface	0.113	No	6	No
848	431637	431636	6	143.5	11.3	0.013	0.242	Free Surface	0.273	No	6	No
849	431638	431637	6	288.2	13.1	0.013	0.232	Free Surface	0.307	No	6	No
85	433726	433725	6	187.2	3.0	0.013	0.002	Free Surface	0.047	No	6	No
850	431615	431614	6	57.6	21.7	0.013	0.032	Free Surface	0.197	No	6	No
851	431634	431615	6	121.9	2.5	0.013	0.010	Free Surface	0.093	No	6	No
852	431616	431615	6	63.6	52.7	0.013	0.019	Free Surface	0.078	No	6	No
853	431610	431609	6	322.0	5.8	0.013	0.646	Backwater	1.000	No	6	Yes
854	431619LH	431618	6	75.8	2.5	0.013	0.004	Free Surface	0.071	No	6	No
855	431617	431616	6	72.3	13.7	0.013	0.016	Free Surface	0.071	No	6	No
856	431618	431617	6	119.8	4.2	0.013	0.011	Free Surface	0.083	No	6	No
857	451702	451702A	18	330.6	1.8	0.013	3.667	Free Surface	0.442	No	18	No
858	433115LH	433114	6	167.6	10.2	0.013	0.007	Free Surface	0.098	No	6	No
859	433114	433113	6	175.3	1.1	0.013	0.014	Free Surface	0.118	No	6	No
86	453905	453906	6	360.9	2.8	0.013	0.181	Free Surface	0.344	No	6	No
860	432803LH	432802	6	151.0	11.8	0.013	0.004	Free Surface	0.100	No	6	No
861	432725	432726	6	366.0	5.3	0.013	0.065	Free Surface	0.195	No	6	No
862	440212	440211	6	293.4	5.1	0.013	0.010	Free Surface	0.158	No	6	No
863	431620LH	431617	6	98.6	6.9	0.013	0.002	Free Surface	0.068	No	6	No
864	433006	432724	6	104.2	2.2	0.013	0.057	Free Surface	0.205	No	6	No
865	432726	432728	6	137.9	6.1	0.013	0.077	Free Surface	0.196	No	6	No
866	433007LH	433008	6	176.9	2.8	0.013	0.008	Free Surface	0.129	No	6	No
867	432730	432728	6	152.4	8.0	0.013	0.007	Free Surface	0.125	No	6	No
868	433009	433008	6	85.0	13.3	0.013	0.022	Free Surface	0.134	No	6	No
869	433022	431640	6	50.7	9.8	0.013	0.008	Free Surface	0.151	No	6	No
87	454810	454801	6	173.1	1.3	0.013	0.009	Free Surface	0.227	No	6	No
870	433012	433015	6	350.4	9.0	0.013	0.084	Free Surface	0.215	No	6	No
871	433008	433012	6	255.7	1.9	0.013	0.034	Free Surface	0.183	No	6	No
872	432737	432722	6	103.5	0.3	0.013	0.005	Free Surface	0.107	No	6	No
873	432722	432721	6	43.4	1.4	0.013	0.009	Free Surface	0.096	No	6	No
874	432723	433006	6	177.6	9.3	0.013	0.003	Free Surface	0.135	No	6	No
875	433020	433009	6	93.5	26.1	0.013	0.014	Free Surface	0.076	No	6	No
876	433011	433010	6	111.5	2.5	0.013	0.006	Free Surface	0.069	No	6	No

G2. Model Results for 2028 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
877	433010	433020	6	18.9	14.0	0.013	0.010	Free Surface	0.061	No	6	No
878	432729	432730	6	160.1	4.1	0.013	0.003	Free Surface	0.052	No	6	No
879	433021LH	433022	6	126.4	2.7	0.013	0.004	Free Surface	0.059	No	6	No
88	454908	454801	6	214.2	17.7	0.013	0.292	Free Surface	0.321	No	6	No
880	432716	432719	6	178.8	8.2	0.013	0.058	Free Surface	0.206	No	6	No
881	432717	432716	6	59.5	16.6	0.013	0.013	Free Surface	0.113	No	6	No
882	432626	440211	6	295.2	6.2	0.013	0.101	Free Surface	0.233	No	6	No
883	432712	432715	6	135.2	9.2	0.013	0.033	Free Surface	0.130	No	6	No
884	433013	433013A	6	106.2	14.0	0.013	0.029	Free Surface	0.107	No	6	No
885	433003	433004	6	121.0	1.7	0.013	0.045	Free Surface	0.226	No	6	No
886	432715	432716	6	70.5	7.9	0.013	0.044	Free Surface	0.151	No	6	No
887	432719	432720	6	240.3	1.4	0.013	0.059	Free Surface	0.268	No	6	No
888	433004	433005	6	192.1	1.0	0.013	0.047	Free Surface	0.275	No	6	No
889	433005	433006	6	352.0	0.6	0.013	0.052	Free Surface	0.271	No	6	No
89	433725	433724	6	197.7	3.0	0.013	0.004	Free Surface	0.055	No	6	No
890	432732	432731	6	141.5	1.4	0.013	0.011	Free Surface	0.114	No	6	No
891	432614	432517	6	149.7	9.7	0.013	0.007	Free Surface	0.073	No	6	No
892	432516	432515	6	159.5	4.8	0.013	0.063	Free Surface	0.190	No	6	No
893	432214	432209	6	87.4	13.2	0.013	0.008	Free Surface	0.095	No	6	No
894	432312	432311	6	251.3	5.7	0.013	0.025	Free Surface	0.114	No	6	No
895	432615LH	432616	6	160.8	11.3	0.013	0.003	Free Surface	0.039	No	6	No
896	432619LH	432619	6	108.3	15.5	0.013	0.006	Free Surface	0.090	No	6	No
897	432321LH	441520	6	179.0	12.7	0.013	0.005	Free Surface	0.051	No	6	No
898	432306	432305	6	167.8	7.4	0.013	0.066	Free Surface	0.183	No	6	No
899	432525	432524	8	262.1	11.8	0.013	0.010	Free Surface	0.050	No	8	No
9	431521	431522	6	199.5	1.9	0.013	0.015	Free Surface	0.137	No	6	No
90	453902	453901	6	254.9	13.5	0.013	0.028	Free Surface	0.109	No	6	No
900	432320	432319	6	148.8	17.8	0.013	0.011	Free Surface	0.063	No	6	No
901	441310	441311	6	168.5	1.2	0.013	0.012	Free Surface	0.125	No	6	No
902	432319	432318	6	224.7	18.5	0.013	0.014	Free Surface	0.078	No	6	No
903	432522	432521	8	236.5	22.5	0.013	0.019	Free Surface	0.055	No	8	No
904	432223LH	432216	6	155.4	46.0	0.013	0.005	Free Surface	0.047	No	6	No
905	433016	431640	6	301.3	1.1	0.013	0.103	Free Surface	0.314	No	6	No
906	431641LH	431642	8	192.8	4.4	0.013	0.055	Free Surface	0.152	No	8	No
907	431642	433016	6	63.1	4.1	0.013	0.092	Free Surface	0.311	No	6	No
908	432711	432712	6	85.3	6.6	0.013	0.028	Free Surface	0.119	No	6	No
909	432713	432712	6	160.7	7.5	0.013	0.005	Free Surface	0.084	No	6	No
91	453605	453606	6	299.5	0.7	0.013	0.010	Free Surface	0.210	No	6	No
910	432720	432625	6	130.4	1.2	0.013	0.061	Free Surface	0.240	No	6	No
911	432625	432626	6	156.3	9.2	0.013	0.092	Free Surface	0.211	No	6	No
912	432718	432717	6	218.7	4.5	0.013	0.008	Free Surface	0.068	No	6	No
913	431606	431605	6	106.3	3.4	0.013	0.723	Exceeds Capacity	1.000	No	6	Yes
914	431605	431604	6	124.5	5.6	0.013	1.695	Backwater	1.000	No	6	Yes
915	433019	433019WYE	6	100.9	7.6	0.013	0.006	Free Surface	0.071	No	6	No
917	432710	432711	6	165.3	2.4	0.013	0.024	Free Surface	0.133	No	6	No
918	432603	432602	6	99.3	4.6	0.013	0.006	Free Surface	0.065	No	6	No
919	432624	432625	6	173.2	9.0	0.013	0.030	Free Surface	0.155	No	6	No
92	450917	450810	6	146.0	1.0	0.013	0.014	Free Surface	0.373	No	6	No
920	433014LH	433013	6	288.3	7.0	0.013	0.013	Free Surface	0.090	No	6	No
921	432405	432404	6	141.1	2.1	0.013	0.009	Free Surface	0.089	No	6	No
922	432404	433019WYE	6	119.0	21.6	0.013	0.025	Free Surface	0.086	No	6	No
923	433002	433003	6	299.6	5.0	0.013	0.040	Free Surface	0.181	No	6	No
924	432708	432709	6	164.8	5.8	0.013	0.011	Free Surface	0.086	No	6	No
925	432709	432710	6	149.9	7.0	0.013	0.018	Free Surface	0.120	No	6	No
926	432403	432404	6	307.1	1.5	0.013	0.008	Free Surface	0.091	No	6	No
927	432707LH	432708	6	130.6	1.5	0.013	0.005	Free Surface	0.075	No	6	No
928	432623	432624	6	200.6	10.4	0.013	0.027	Free Surface	0.109	No	6	No
929	432622	432623	6	121.5	10.6	0.013	0.023	Free Surface	0.100	No	6	No
93	431011	431106	6	277.0	2.7	0.013	0.009	Free Surface	0.105	No	6	No
930	432621	432622	6	233.6	0.9	0.013	0.021	Free Surface	0.140	No	6	No
931	433001	433002	6	160.6	0.9	0.013	0.032	Free Surface	0.183	No	6	No
932	432731	432621	6	160.0	1.8	0.013	0.015	Free Surface	0.152	No	6	No
933	432601	432516	6	88.0	17.9	0.013	0.051	Free Surface	0.157	No	6	No
934	432314	432313	6	140.6	5.3	0.013	0.004	Free Surface	0.061	No	6	No
935	432517	432516	6	140.2	2.2	0.013	0.009	Free Surface	0.139	No	6	No
936	432609	432608	6	23.2	23.0	0.013	0.006	Free Surface	0.080	No	6	No
937	432608	432607	6	201.2	4.0	0.013	0.021	Free Surface	0.117	No	6	No
938	443314	440736	6	190.1	2.6	0.013	0.054	Free Surface	0.210	No	6	No
939	432706LH	432705	6	232.5	5.3	0.013	0.005	Free Surface	0.059	No	6	No
94	431008	431013	6	234.9	3.0	0.013	0.014	Free Surface	0.091	No	6	No
940	432610	432608	6	125.2	1.3	0.013	0.014	Free Surface	0.122	No	6	No
941	432701	433001	6	320.7	0.5	0.013	0.028	Free Surface	0.223	No	6	No
942	432613A	432613	6	86.0	4.0	0.013	0.000	Free Surface	0.021	No	6	No
943	432515	432512	6	131.6	5.7	0.013	0.068	Free Surface	0.188	No	6	No
944	432628	432518	6	25.1	10.5	0.013	0.004	Free Surface	0.056	No	6	No
946	432313	432312	6	240.1	10.5	0.013	0.012	Free Surface	0.095	No	6	No
947	432324	432312	6	123.1	31.5	0.013	0.005	Free Surface	0.078	No	6	No
948	432702	432701	6	108.3	0.9	0.013	0.025	Free Surface	0.207	No	6	No
949	432703	432702	6	160.5	1.5	0.013	0.018	Free Surface	0.160	No	6	No
95	430711	430712	6	103.3	0.5	0.013	0.038	Free Surface	0.261	No	6	No
950	432705	432703	6	123.0	16.7	0.013	0.012	Free Surface	0.100	No	6	No
951	443412	443413	6	139.4	7.1	0.013	0.004	Free Surface	0.050	No	6	No
952	440609	440607	6	189.6	3.1	0.013	0.133	Free Surface	0.307	No	6	No
953	432733	432732	6	229.1	0.8	0.013	0.005	Free Surface	0.097	No	6	No
954	440725	440726	6	275.8	5.8	0.013	0.059	Free Surface	0.224	No	6	No
955	432704	432703	6	174.4	4.9	0.013	0.003	Free Surface	0.089	No	6	No
956	432734	432610	6	298.1	2.0	0.013	0.004	Free Surface	0.096	No	6	No
957	432518	432519	6	315.8	4.6	0.013	0.008	Free Surface	0.078	No	6	No
958	432327	432308	6	75.7	6.8	0.013	0.019	Free Surface	0.115	No	6	No
959	432311	432310	6	74.5	10.7	0.013	0.029	Free Surface	0.108	No	6	No
96	433316	433316A	6	110.3	2.5	0.013	0.016	Free Surface	0.269	No	6	No
960	432611	08C638M	6	262.8	2.8	0.013	0.008	Free Surface	0.081	No	6	No
961	432209	432208	6	190.2	19.8	0.013	0.065	Free Surface	0.159	No	6	No
962	440726	440727	6	219.2	1.1	0.013	0.061	Free Surface	0.263	No	6	No
963	432619	432618	6	87.3	1.0	0.013	0.011	Free Surface	0.097	No	6	No
964	432526LH	432525	8	192.3	10.7	0.013	0.005	Free Surface	0.039	No	8	No
965	432309	432308	6	129.8	13.3	0.013	0.043	Free Surface	0.129	No	6	No
966	432310	432309	6	76.5	19.9	0.013	0.040	Free Surface	0.116	No	6	No
967	432618	432617	6	129.5	25.2	0.013	0.014	Free Surface	0.062	No	6	No
968	432616	432617	6	146.4	8.2	0.013	0.003	Free Surface	0.102	No	6	No
969	432315	432212	8	156.8	56.7	0.013	0.036	Free Surface	0.069	No	8	No
97	431106	431107	6	142.3	2.8	0.013	0.021	Free Surface	0.145	No	6	No
970	432213	432212	6	48.1	68.0	0.013	0.003	Free Surface	0.067	No	6	No
971	440727	440728	6	132.7	7.1	0.013	0.137	Free Surface	0.267	No	6	No
972	432210	432209	6	260.3	14.1	0.013	0.053	Free Surface	0.136	No	6	No
973	VMH_20	08C649L	6	40.9	7.4	0.013	0.004	Free Surface	0.071	No	6	No
975	432211	432210	6	171.3	2.4	0.013	0.045	Free Surface	0.170	No	6	No
976	432212	432211	6	108.8	19.8	0.013	0.041	Free Surface	0.157	No	6	No
977	432530LH	432522	6	269.0	10.8	0.013	0.003	Free Surface	0.053	No	6	No
978	432523	432522	6	35.3	2.9	0.013	0.009	Free Surface	0.079	No	6	No
98	441014	06C236M	6	176.7	1.4	0.013	0.009	Free Surface	0.101	No	6	No
980	432215LH	432211	6	57.7	12.7	0.013	0.001	Free Surface	0.115	No	6	No
982	432206	432205	6	185.3	1.6	0.013	0.171	Free Surface	0.418	No	6	No
983	432216	432205	6	173.1	20.2	0.013	0.011	Free Surface	0.236	No	6	No
984	441109	441110	6	246.9	3.7	0.013	0.040	Free Surface	0.153	No	6	No
986	432303	432302	6	156.0	32.6	0.013	0.073	Free Surface	0.127	No	6	No
987	441930	441906	6	399.7	21.7	0.013	0.009	Free Surface	0.114	No	6	No
988	432318	432317	6	305.7	12.4	0.013	0.020	Free Surface	0.082	No	6	No
989	432317	432218	6	153.4	42.4	0.013	0.027	Free Surface	0.080	No	6	No
99	402711	402712	6	286.0	0.7	0.013	0.091	Free Surface	0.338	No	6	No
990	432302	432301	6	120.1	45.2	0.013	0.077	Free Surface	0.134	No	6	No
992	432205	432204	6	243.9	2.6	0.013	0.206	Free Surface	0.407	No	6	No
993	432218	432204	6	184.0	37.3	0.013	0.033	Free Surface	0.243	No	6	No
994	432301	432220	6	53.7	22.7	0.013	0.079	Free Surface	0.150	No	6	No
996	432203	432202	6	172.5	0.5	0.013	0.290	Free Surface	0.842	No	6	Yes
997	432219	432202	6	287.9	14.2	0.013	0.084	Free Surface	0.168	No	6	No
998	432202	HASKINS_WW	8	28.0	0.1	0.011	0.378	Free Surface	0.623	No	8	Yes
C-1030	433019WYE	431642	6	90.7	48.1	0.013	0.038	Free Surface	0.163	No	6	No
C-1148	431002	431005	6	308.1	1.5	0.013	0.008	Free Surface	0.102	No	6	No
C-1156	442503A	442503	8	122.5	4.0	0.013	0.338	Free Surface	0.316	No	8	No
C-1345	441311	441301	6	62.0	1.0	0.013	0.013	Free Surface	0.130	No	6	No
C-1512	402602	402502	6	305.7	3.1	0.013	0.005	Free Surface	0.397	No	6	No
C-1519	443219	443221B	8	241.1	1.9	0	0.010	Free Surface	0.079	No	8	No
C-1694	441212	441007	6	305.0	11.7	0.013	0.011	Free Surface	0.073	No	6	No
C-1703	490101	HASTINGS_WW	6	171.4	0.4	0.013	0.008	Free Surface	0.120	No	6	No
C-1730	441407A	441501	8	248.4	4.2	0.013	0.555	Free Surface	0.431	No	8	No
C-1764	403304	403305	8	404.0	1.2	0.013	0.140	Free Surface	0.638	No	8	No
C-185	454902	455001	6	223.2	13.3	0.013	0.005	Free Surface	0.096	No	6	No
C-1893	442606	442701	12	445.2	5.5	0.013	3.043	Free Surface	0.484	No	12	No
C-1972	440731	440729	6	265.5	9.1	0.013	0.005	Free Surface	0.246	No	6	No
C-1984	442116	441820	6	30.1	3.3	0.013	0.003	Free Surface	0.079	No	6	No
C-1986	441820	443604A	6	151.0	5.1	0.013	0.021	Free Surface	0.123	No	6	No
C-2013	441912	441910	6	208.6	14.0	0.013	0.038	Free Surface	0.142	No	6	No
C-2063	441019	441401	6	130.3	6.2	0.013	0.228	Free Surface	0.361	No	6	No
C-2124	443202A	443203	12	70.0	1.9	0.013	1.880	Free Surface	0.599	No	12	No
C-2190	403310	403310A	21	274.8	0.8	0.013	4.310	Free Surface	0.495	No	21	No
C-2191	403311	403319	6	253.9	0.4	0	0.017	Free Surface	0.206	No	6	No
C-2302	403108	403108A	6	143.3	1.4	0.013	0.043	Free Surface	0.222	No	6	No
C-234	433211	442504A	6	129.1	0.9	0.013	0.275	Free Surface	0.681	No	6	No
C-2361	403708	403709	21	70.7	1.5	0.013	4.462	Free Surface	0.421	No	21	No
C-238	403410	460101	27	435.9	0.1	0	7.100	Free Surface	0.783	No	27	Yes
C-2384	452007	452008CO	6	255.3	12.5	0.013	0.050	Free Surface	0.117	No	6	No
C-2389	452821	452019	6	74.8	8.1	0.013	0.044	Free Surface	0.293	No	6	No
C-239	403423	403423D	21	783.8	0.4	0.013	5.308	Backwater	1.000	No	21	Yes
C-2406	442503	442502	8	310.0	7.6	0.013	0.340	Free Surface	0.288	No	8	No
C-2424	453729	450118	12	241.8	11.4	0.013	3.007	Free Surface	0.432	No	12	No
C-2441	403330	403311	6	350.4	0.4	0	0.012	Free Surface	0.150	No	6	No
C-2442	403318	403312	21	299.6	0.6	0	4.330	Free Surface	0.460	No	21	No
C-2443	403319	403332	10	261.9	0.4	0.013	0.039	Free Surface	0.542	No	10	Yes
C-2476	450114	442624	12	237.2	5.4	0.013	3.014	Free Surface	0.537	No	12	No
C-2508	430725	430723	8	177.1	0.5	0.013	0.019	Free Surface	0.152	No	8	No
C-2514	430403	430403A	10	95.7	4.0	0.013	0.774	Free Surface	0.360	No	10	No
C-2526	453712	453729	12	52.5	9.6	0.013	1.233	Free Surface	0.282	No	12	No
C-2539	450118	450114	12	219.8	5.4	0.013	3.007	Free Surface	0.536	No	12	No
C-2562	404803A	403609	6	31.5	0.3	0.013	0.064	Free Surface	0.364	No	6	No
C-2563	VMH-92	403410	27	11.9	0.0	0.013	7.145	Free Surface	0.776	No	27	Yes
C-2564	403423	VMH-92	21	6.1	0.9	0.013	1.833	Backwater	1.000	No	21	Yes
C-2565	450303	450101	8	333.2	3.5	0.013	0.302	Free Surface	0.309	No	8	No
C-2566	440117A	440118	6	97.5	0.3	0.013	0.012	Free Surface	0.128	No	6	No
C-2569	452819WYE	452819	6	120.3	10.7	0.013	0.041	Free Surface	0.135	No	6	No
C-2570	441909	441908	6	178.4	4.3	0.013	0.049	Free Surface	0.163	No	6	No
C-2572	451606	451615	12	7.7	2.1	0.01	0.250	Free Surface	0.182	No	12	No
C-2573	451615	451803D	12	241.7	1.5	0.013	0.250	Free Surface	0.389	No	12	No
C-2574	430607	430607A	8	19.8	1.2	0.013	0.001	Free Surface	0.017	No	8	No
C-2575	430605A	430605	8	21.4	0.6	0.013	0.246	Free Surface	0.444	No	8	No
C-2576	450302A	450303	8	143.1	2.4	0.013	0.273	Free Surface	0.317	No	8	No
C-2577	452008CO	452008BD	6	4.6	96.5	0.013	0.056	Free Surface	0.104	No	6	No
C-2578	452008BD	452008BDA	6	41.0	27.3	0.013	0.056	Free Surface	0.119	No	6	No
C-2579	452008BDA	452008BDB	6	33.4	30.7	0.013	0.058	Free Surface	0.117	No	6	No
C-2580	452008BDB	452009	6	9.9	12.9	0.013	0.058	Free Surface	0.141	No	6	No
C-2581	454606	454606A	6	497.9	0.1	0.013	0.020	Free Surface	0.283	No	6	No

G2. Model Results for 2028 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
C-2584	403423C	IEC_MH-116	27	512.0	0.0	0.013	11.169	Free Surface	0.823	No	30	Yes
C-2585	403700K	IEC_MH-116	27	10.5	3.8	0.013	2.410	Free Surface	0.600	No	27	No
C-2586	IEC_MH-116	OFALL-18	36	46.0	0.3	0.013	13.186	Free Surface	0.506	No	36	No
C-2587	403703E	403703D	8	225.0	0.7	0	0.024	Free Surface	0.114	No	8	No
C-2588	403703D	403703C	8	105.0	0.7	0	0.023	Free Surface	0.137	No	8	No
C-2589	403703C	403703B	8	200.0	0.7	0	0.047	Free Surface	0.172	No	8	No
C-2590	403703B	403700K	8	300.0	0.7	0.013	0.049	Free Surface	0.186	No	8	No
C-2592	452712	452818WYE	6	46.0	10.7	0.013	0.025	Free Surface	0.113	No	6	No
C-2594	441910	441909	6	39.7	4.3	0.013	0.047	Free Surface	0.174	No	6	No
C-2595	451802B	451802A	6	127.4	5.8	0.013	0.021	Free Surface	0.108	No	6	No
C-2596	451802C	451802B	6	159.9	5.8	0	0.007	Free Surface	0.081	No	6	No
C-2598	403602A	403602G	6	80.0	0.2	0.013	0.068	Free Surface	0.595	No	6	Yes
C-2602	403108A	403109	6	35.8	1.4	0.013	0.049	Free Surface	0.266	No	6	No
C-2604	403310A	403318	18	128.1	0.8	0.013	4.330	Free Surface	0.615	No	18	No
C-2605	403317	403310A	10	40.8	1.5	0.013	0.013	Free Surface	0.061	No	10	No
C-2606	404804	404803A	8	106.4	0.4	0.013	0.036	Free Surface	0.250	No	8	No
C-2610	454506B	454406	6	89.4	2.4	0.013	0.001	Free Surface	0.063	No	6	No
C-2611	454506A	454506B	6	101.4	5.7	0.013	0.001	Free Surface	0.027	No	6	No
C-2612	454506	454506A	6	63.2	5.7	0.013	0.001	Free Surface	0.024	No	6	No
C-2615	455002	455003	6	198.3	2.6	0.013	0.089	Free Surface	0.295	No	6	No
C-2621	403709	403423	21	45.0	3.6	0.013	4.462	Free Surface	0.542	No	21	No
C-2624	450302	450302A	8	146.6	2.4	0.013	0.269	Free Surface	0.322	No	8	No
C-2627	430101	430210	6	239.2	11.7	0.013	0.397	Free Surface	0.433	No	6	No
C-2647	441408	441518A	6	16.1	1.9	0.013	0.000	Free Surface	0.000	No	6	No
C-2658	431601	431602	10	68.3	1.8	0.013	0.797	Free Surface	0.452	No	10	No
C-2667	441409	441409B	6	124.6	0.9	0	0.079	Free Surface	0.311	No	6	No
C-2679	453715	453731	8	120.0	21.2	0.013	1.786	Free Surface	0.488	No	8	No
C-2727	451815	451815A	6	194.9	1.8	0.013	0.101	Free Surface	0.310	No	6	No
C-2728	403322	403304	6	218.3	1.6	0.013	0.013	Free Surface	0.115	No	6	No
C-2741	432401C	SAN_JUAN_WW	8	8.7	1.3	0.013	5.858	Exceeds Capacity	1.000	No	8	Yes
C-2746	432401	432401A	8	79.7	1.9	0.013	0.021	Free Surface	0.097	No	8	No
C-2747	432402	432401C	8	29.0	1.2	0.013	1.290	Exceeds Capacity	1.000	No	8	Yes
C-2758	443202	443202A	12	206.3	1.9	0.013	1.876	Free Surface	0.551	No	12	No
C-2786	403700B	403700C	18	55.0	0.3	0.013	0.617	Free Surface	0.282	No	18	No
C-2787	403700C	403700D	18	70.0	0.3	0.013	0.616	Free Surface	0.306	No	18	No
C-2788	403700D	403700E	18	305.0	0.3	0.013	0.823	Free Surface	0.333	No	18	No
C-2790	403700A	403700B	18	330.0	0.2	0.013	0.615	Free Surface	0.288	No	18	No
C-2792	403700E	403700F	18	140.0	0.3	0.013	0.821	Free Surface	0.309	No	18	No
C-2793	403700F	403700G	18	10.0	1.2	0.013	0.825	Free Surface	0.279	No	18	No
C-2794	403700G	403700H	18	290.0	0.3	0.013	0.833	Free Surface	0.329	No	18	No
C-2795	403700H	403700J	21	190.0	0.3	0.013	0.918	Free Surface	0.359	No	18	No
C-2796	403700J	403700K	21	20.0	1.5	0.013	2.368	Free Surface	0.458	No	18	No
C-2797	451815A	451810	6	24.8	9.1	0.013	0.101	Free Surface	0.206	No	6	No
C-2799	441931LH	441931	6	256.2	25.6	0.013	0.003	Free Surface	0.037	No	6	No
C-2806	454606A	454608	6	113.4	0.6	0.013	0.023	Free Surface	0.218	No	6	No
C-2813	442624	442624A	12	233.0	5.4	0.013	3.014	Free Surface	0.768	No	12	Yes
C-2814	442624A	442624B	12	113.6	0.8	0.013	3.015	Exceeds Capacity	1.000	No	12	Yes
C-2815	442624B	442624C	12	32.9	0.0	0.013	3.017	Free Surface	0.948	No	12	Yes
C-2816	442604	442624C	8	277.1	4.2	0.013	0.022	Free Surface	0.263	No	8	No
C-2817	442624C	442606	12	275.0	5.5	0.013	3.036	Free Surface	0.571	No	12	No
C-2818	442504A	442503A	6	24.0	4.1	0.013	0.275	Free Surface	0.423	No	6	No
C-2819	442504	442503A	8	27.0	4.0	0.013	0.064	Free Surface	0.227	No	8	No
C-2822	451507	451507A	6	25.5	10.9	0.013	0.019	Free Surface	0.089	No	6	No
C-2823	451507A	451611	6	121.0	10.9	0.013	0.019	Free Surface	0.099	No	6	No
C-2833	432401B	432401C	8	5.4	49.7	0.013	0.777	Free Surface	0.610	No	8	No
C-2834	432401A	432402	8	42.7	3.5	0.013	0.021	Free Surface	0.383	No	8	No
C-2840	403332	403305	10	8.2	1.3	0.013	1.779	Backwater	1.000	No	10	Yes
C-2847	453731	453729	10	61.2	21.2	0.013	1.786	Free Surface	0.360	No	10	No
C-2848	403605B	403605A	6	270.0	0.2	0.013	0.025	Free Surface	0.359	No	6	No
C-2853	460101	403416A	27	341.1	0.1	0.013	7.077	Free Surface	0.493	No	27	No
C-2855	441407	441407A	8	34.8	2.9	0.013	0.555	Free Surface	0.449	No	8	No
C-2856	430403A	431601	10	133.1	3.9	0.013	0.786	Free Surface	0.361	No	10	No
C-404	451409	451408	6	259.2	14.7	0.013	0.052	Free Surface	0.144	No	6	No
C-515	431102	430610	8	160.7	11.3	0.013	0.024	Free Surface	0.104	No	8	No
C-572	430402	430403	10	321.2	4.0	0.013	0.751	Free Surface	0.355	No	10	No
C-578	442607	442606	6	120.0	13.0	0.013	0.008	Free Surface	0.528	No	6	No
C-586	432910	432211	6	265.0	0.8	0.013	0.274	Free Surface	0.694	No	6	No
C-588	442713	442438	6	244.4	2.2	0.013	0.017	Free Surface	0.137	No	6	No
C-655	442603	442604	8	168.7	4.3	0.013	0.022	Free Surface	0.082	No	8	No
C-657	450208	450207	10	85.3	5.0	0.013	0.373	Free Surface	0.280	No	10	No
C-663	442502	442501	8	112.7	4.7	0.013	0.345	Free Surface	0.433	No	8	No
CDT-13	432617	OFALL-12	6	500.0	0.5	0.01	0.020	Free Surface	0.165	No	6	No
CDT-15	432533	OFALL-14	6	500.0	0.4	0.01	0.033	Free Surface	0.222	No	6	No
CDT-17	432502	OFALL-16	6	500.0	0.2	0.013	0.025	Free Surface	0.259	No	6	No
CDT-19	450103A	442701A	12	600.7	1.2	0.013	0.353	Free Surface	0.252	No	12	No
IEC_GM-100	442701	450417B	10	41.8	7.2	0.013	1.491	Free Surface	0.435	No	10	No
IEC_GM-102	450417B	450417A	10	321.5	4.3	0.013	1.491	Free Surface	0.504	No	10	No
IEC_GM-104	450417A	450417	10	192.9	6.6	0.013	1.491	Free Surface	0.447	No	10	No
IEC_GM-106	450417	450419	18	294.9	2.5	0.013	3.728	Free Surface	0.408	No	18	No
IEC_GM-110	441827	441827B	8	47.8	6.0	0.013	0.019	Free Surface	0.068	No	8	No
IEC_GM-112	441827B	443604A	8	129.8	8.3	0.013	0.019	Free Surface	0.065	No	8	No
IEC_GM-114	452406B	452403	6	101.1	0.1	0.01	0.006	Free Surface	0.582	No	6	Yes
IEC_GM-116	443221B	443221A	8	151.1	1.5	0.013	0.019	Free Surface	0.096	No	8	No
IEC_GM-120	IEC_MH-110	450211	8	141.0	11.7	0.013	0.323	Free Surface	0.246	No	8	No
IEC_GM-122	452405A	451810	8	271.0	0.2	0.013	0.272	Free Surface	0.631	No	8	Yes
IEC_GM-124	441502	441519	15	61.1	0.4	0.013	0.602	Free Surface	0.326	No	15	No
IEC_GM-126	441519	NORTH_ROAD_WW_N	15	22.4	0.6	0.013	1.180	Free Surface	0.413	No	15	No
IEC_GM-134	403609	403608	8	270.2	0.7	0.013	0.150	Free Surface	0.431	No	8	No

G3. Model Results for 2043 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
10	450804	450803	6	90.0	7.4	0.013	0.004	Free Surface	0.050	No	6	No
100	431206LH	431205	6	181.5	4.5	0.013	0.014	Free Surface	0.141	No	6	No
1000	432204	432203	6	146.2	4.6	0.013	0.267	Free Surface	0.702	No	6	Yes
1001	432220	432219	6	227.5	18.7	0.013	0.082	Free Surface	0.163	No	6	No
1003	441422	441421	6	283.2	2.1	0.013	0.198	Free Surface	0.429	No	6	No
1004	441516	441514A	6	258.8	7.6	0.013	0.005	Free Surface	0.062	No	6	No
1005	441421	441408	6	92.1	2.1	0.013	0.204	Free Surface	0.434	No	6	No
1006	441513	441512	6	300.4	6.8	0.013	0.002	Free Surface	0.040	No	6	No
1007	441512	441511	6	51.0	8.4	0.013	0.004	Free Surface	0.109	No	6	No
1008	441514	441511	6	125.0	11.5	0.013	0.029	Free Surface	0.140	No	6	No
1009	441518	441517	6	201.3	3.1	0.013	0.014	Free Surface	0.110	No	6	No
101	403106	403106A	6	33.3	4.6	0.013	0.032	Free Surface	0.156	No	6	No
1010	441501	441519	8	195.5	3.0	0.013	0.588	Free Surface	0.460	No	8	No
1011	402412	402506	6	277.5	0.4	0.013	0.013	Free Surface	0.177	No	6	No
1012	402411	402412	6	282.7	0.5	0.013	0.005	Free Surface	0.131	No	6	No
1013	450107	450106	6	139.3	15.6	0.013	0.011	Free Surface	0.062	No	6	No
1014	450801	450201	10	307.7	0.6	0.013	0.214	Free Surface	0.251	No	10	No
1015	450106	450104	6	44.3	6.9	0.013	0.018	Free Surface	0.140	No	6	No
1016	450101	450102	8	131.4	4.1	0.013	0.343	Free Surface	0.351	No	8	No
1017	433413	433414	8	287.0	4.2	0.013	1.033	Free Surface	0.615	No	8	No
1018	450214	450215	6	142.5	7.9	0.013	0.099	Free Surface	0.225	No	6	No
1019	433414	433415	8	72.6	4.4	0.013	1.035	Free Surface	0.561	No	8	No
102	431201	431204	6	323.1	7.5	0.013	0.080	Free Surface	0.192	No	6	No
1020	433415	433416	8	100.5	8.4	0.013	1.038	Free Surface	0.703	No	8	Yes
1021	453705	453706	10	225.9	1.9	0.013	1.055	Free Surface	0.474	No	10	No
1022	450211	450210	6	161.3	12.9	0.013	0.333	Free Surface	0.429	No	6	No
1023	450215	450202	6	184.0	6.2	0.013	0.114	Free Surface	0.441	No	6	No
1024	450104	450105	8	192.4	1.6	0.013	0.041	Free Surface	0.139	No	8	No
1025	453719	453718	8	351.5	13.9	0.013	0.025	Free Surface	0.069	No	8	No
1027	453718	453717	8	320.3	13.3	0.013	0.031	Free Surface	0.084	No	8	No
1028	454415	454414	6	220.9	5.7	0.013	0.003	Free Surface	0.045	No	6	No
1029	450504	450503	6	238.6	8.3	0.013	0.005	Free Surface	0.076	No	6	No
103	433313	433309	6	156.2	8.5	0.013	0.345	Free Surface	0.399	No	6	No
1030	450503	450610	6	365.1	13.0	0.013	0.029	Free Surface	0.159	No	6	No
1032	454424	454425	6	406.2	2.3	0.013	0.014	Free Surface	0.105	No	6	No
1033	454302	454304	8	326.9	9.5	0.013	0.121	Free Surface	0.161	No	8	No
1034	454425	454426	6	94.0	6.9	0.013	0.016	Free Surface	0.083	No	6	No
1035	450501	450222	6	127.1	7.7	0.013	0.016	Free Surface	0.101	No	6	No
1036	454305	454301	8	43.5	11.4	0.013	0.145	Free Surface	0.207	No	8	No
1037	454304	454301	8	51.9	6.2	0.013	0.121	Free Surface	0.211	No	8	No
1038	454301	450301	8	50.7	5.5	0.013	0.261	Free Surface	0.280	No	8	No
1039	450220	450219	6	94.8	15.4	0.013	0.010	Free Surface	0.078	No	6	No
104	431118LH	431117	6	233.4	10.1	0.013	0.005	Free Surface	0.076	No	6	No
1040	454427	454428	6	121.7	1.6	0.013	0.017	Free Surface	0.127	No	6	No
1041	450219	450218	6	165.2	13.9	0.013	0.027	Free Surface	0.131	No	6	No
1042	450222	450218	6	138.1	4.5	0.013	0.021	Free Surface	0.140	No	6	No
1043	450221	450220	6	78.4	2.8	0.013	0.007	Free Surface	0.069	No	6	No
1044	450301	450302	8	142.5	2.8	0.013	0.261	Free Surface	0.315	No	8	No
1045	450813	450812	6	150.7	17.5	0.013	0.035	Free Surface	0.138	No	6	No
1048	450203	450204	10	266.3	1.3	0.013	0.349	Free Surface	0.316	No	10	No
105	430717	NAUGHTON_WW	4	201.2	1.8	0.013	0.007	Free Surface	0.559	No	4	No
1050	450206	450205	10	142.9	1.9	0.013	0.392	Free Surface	0.321	No	10	No
1052	442441	442442	6	57.6	31.4	0.013	0.007	Free Surface	0.052	No	6	No
1053	442442	442443	6	11.0	23.5	0.013	0.013	Free Surface	0.069	No	6	No
1054	442443	442436	6	132.5	8.7	0.013	0.013	Free Surface	0.104	No	6	No
1055	431709	431708	6	161.0	10.2	0.013	0.482	Free Surface	0.499	No	6	No
1056	440420	440420A	6	73.6	8.6	0.013	0.002	Free Surface	0.050	No	6	No
1057	440422	440421	6	148.6	8.3	0.013	0.005	Free Surface	0.048	No	6	No
1058	443320	443321	6	170.1	6.3	0.013	0.109	Free Surface	0.234	No	6	No
1059	440106	440105	6	133.5	8.3	0.013	0.002	Free Surface	0.068	No	6	No
106	430504	430503	6	70.7	53.0	0.013	0.018	Free Surface	0.061	No	6	No
1060	440116	440431	6	138.3	26.6	0.013	0.250	Free Surface	0.247	No	6	No
1061	440836	440820	6	158.8	4.8	0.013	0.001	Free Surface	0.056	No	6	No
1062	440804	440802	6	85.1	3.2	0.013	0.008	Free Surface	0.083	No	6	No
1063	440820	440833	6	13.8	39.5	0.013	0.037	Free Surface	0.099	No	6	No
1064	440833	440829	6	79.2	17.2	0.013	0.038	Free Surface	0.115	No	6	No
1065	440828	440829	6	154.3	5.1	0.013	0.006	Free Surface	0.091	No	6	No
1067	440542	440543	6	121.8	5.3	0.013	0.053	Free Surface	0.158	No	6	No
1068	440530	440833	6	187.4	5.8	0.013	0.001	Free Surface	0.065	No	6	No
1069	440834	440804	6	103.0	8.2	0.013	0.008	Free Surface	0.069	No	6	No
107	430408	430407	6	98.1	11.6	0.013	0.272	Free Surface	0.300	No	6	No
1070	440541	440542	6	95.2	7.0	0.013	0.036	Free Surface	0.157	No	6	No
1071	441203	441204	6	239.6	10.9	0.013	0.004	Free Surface	0.050	No	6	No
1072	440529	440528	6	105.1	4.3	0.013	0.002	Free Surface	0.126	No	6	No
1073	440516	440531	6	143.5	8.7	0.013	0.065	Free Surface	0.181	No	6	No
1074	440538	440539	6	312.1	0.2	0.013	0.002	Free Surface	0.085	No	6	No
1075	440539	440540	6	150.9	8.2	0.013	0.028	Free Surface	0.121	No	6	No
1076	440209	440210	6	222.1	0.4	0.013	0.181	Free Surface	0.640	No	6	Yes
1077	440426LH	440425	6	48.6	18.7	0.013	0.003	Free Surface	0.031	No	6	No
1078	440424	440425	8	105.1	17.2	0.013	0.008	Free Surface	0.038	No	8	No
1079	440425	440427	6	78.6	13.1	0.013	0.014	Free Surface	0.071	No	6	No
108	431411	431410	6	213.2	8.1	0.013	0.049	Free Surface	0.169	No	6	No
1080	440214	440211	6	246.7	4.9	0.013	0.008	Free Surface	0.158	No	6	No
1081	440409	440408	6	146.3	14.7	0.013	0.010	Free Surface	0.096	No	6	No
1082	440420A	440418	6	269.1	8.4	0.013	0.010	Free Surface	0.067	No	6	No
1083	443318	443317	6	150.6	4.4	0.013	0.039	Free Surface	0.162	No	6	No
1084	440921	443318	8	202.6	1.0	0.013	0.034	Free Surface	0.133	No	8	No
1085	450418A	450418	8	86.1	1.8	0.013	0.009	Free Surface	0.059	No	8	No
1086	450901	450925	12	103.5	2.4	0.013	0.691	Free Surface	0.299	No	12	No
1087	452723	452724	6	245.9	9.0	0.013	0.009	Free Surface	0.113	No	6	No
1088	452726LH	452725	6	92.0	0.6	0.013	0.004	Free Surface	0.063	No	6	No
1089	442708	442707	6	206.7	1.0	0.013	0.011	Free Surface	0.113	No	6	No
109	431409	431410	6	176.3	4.9	0.013	0.110	Free Surface	0.228	No	6	No
1090	442428	442429	6	80.8	3.7	0.013	0.025	Free Surface	0.120	No	6	No
1091	441413	441412	6	164.2	16.6	0.013	0.006	Free Surface	0.080	No	6	No
1092	452713	452711	6	285.9	6.7	0.013	0.005	Free Surface	0.067	No	6	No
1093	442711	442712	6	112.0	1.5	0.013	0.003	Free Surface	0.064	No	6	No
1094	441113LH	441112	6	134.8	6.0	0.013	0.011	Free Surface	0.083	No	6	No
1095	441922	441923	6	268.6	0.2	0.013	0.006	Free Surface	0.100	No	6	No
1096	441104	441103	6	109.6	23.5	0.013	0.018	Free Surface	0.084	No	6	No
1097	441207	441102	6	220.8	8.5	0.013	0.023	Free Surface	0.090	No	6	No
1098	443821	441606	6	139.9	1.5	0.013	0.054	Free Surface	0.205	No	6	No
1099	441112	441111	8	231.9	8.1	0.013	0.020	Free Surface	0.082	No	8	No
11	433417	453701	8	126.0	8.2	0.013	1.038	Free Surface	0.542	No	8	No
110	451116LH	451115	6	158.7	1.1	0.013	0.002	Free Surface	0.055	No	6	No
1100	443811	443809	6	54.5	1.8	0.013	0.003	Free Surface	0.060	No	6	No
1101	443809	443821	6	123.3	11.4	0.013	0.010	Free Surface	0.160	No	6	No
1102	443820	443821	6	131.6	0.0	0.013	0.042	Free Surface	0.394	No	6	No
1103	441105	441114	6	274.2	0.0	0.013	0.018	Free Surface	0.273	No	6	No
1104	443810	443809	6	40.5	16.5	0.013	0.003	Free Surface	0.049	No	6	No
1105	441133	441130	6	297.8	4.0	0.013	0.009	Free Surface	0.092	No	6	No
1106	441137	441021	6	174.5	9.2	0.013	0.143	Free Surface	0.255	No	6	No
1107	441138	441137	6	130.0	32.6	0.013	0.012	Free Surface	0.148	No	6	No
1108	402707	402706	6	249.9	1.2	0.013	0.005	Free Surface	0.095	No	6	No
1109	441124	441123	6	346.8	7.1	0.013	0.126	Free Surface	0.262	No	6	No
111	431412	431411	6	128.2	2.7	0.013	0.044	Free Surface	0.170	No	6	No
1110	441123	441122	6	87.7	5.1	0.013	0.129	Free Surface	0.257	No	6	No
1111	441121	441137	6	114.4	6.8	0.013	0.131	Free Surface	0.249	No	6	No
1112	451019	451011	6	299.3	0.6	0.013	0.060	Free Surface	0.331	No	6	No
1113	451012	451011	8	193.3	12.2	0.013	0.181	Free Surface	0.294	No	8	No
1114	443210WYE	450904	6	217.8	1.0	0.013	0.008	Free Surface	0.102	No	6	No
1115	450910	451001	24	371.7	1.6	0.013	1.874	Free Surface	0.339	No	24	No
1116	452525	452526	6	110.1	6.8	0.013	0.020	Free Surface	0.097	No	6	No
1118	452711	452710	6	303.5	6.8	0.013	0.012	Free Surface	0.075	No	6	No
1119	443211	443210WYE	6	67.6	2.7	0.013	0.006	Free Surface	0.088	No	6	No
112	433807LH	433806	6	67.9	4.5	0.013	0.002	Free Surface	0.096	No	6	No
1120	443111	443110	6	258.7	1.3	0.013	0.013	Free Surface	0.147	No	6	No
1121	452526	452527	6	180.9	12.2	0.013	0.022	Free Surface	0.094	No	6	No
1122	452010	452011	6	152.4	25.3	0.013	0.064	Free Surface	0.129	No	6	No
1124	443205	450905	15	222.7	0.4	0.013	2.233	Free Surface	0.682	No	15	No
1125	452710	452607	6	108.5	17.9	0.013	0.015	Free Surface	0.086	No	6	No
1126	451006	451007	18	354.8	1.0	0.013	3.449	Free Surface	0.490	No	18	No
1127	443110	443110A	6	150.6	2.5	0.013	0.038	Free Surface	0.289	No	6	No
1128	443215	443214	8	313.9	0.6	0.013	0.010	Free Surface	0.125	No	8	No
1129	433420	433422	6	297.6	3.1	0.013	0.134	Free Surface	0.252	No	6	No
113	431408	431409	6	165.3	0.3	0.013	0.106	Free Surface	0.411	No	6	No
1131	442619	442602	6	135.5	1.4	0.013	0.022	Free Surface	0.133	No	6	No
1132	442620	442619	6	178.6	5.2	0.013	0.003	Free Surface	0.103	No	6	No
1133	453722	453723	8	179.7	8.2	0.013	0.091	Free Surface	0.134	No	8	No
1134	453723	453724	8	228.4	11.3	0.013	0.091	Free Surface	0.132	No	8	No
1135	442612	442611	6	211.5	14.1	0.013	0.131	Free Surface	0.218	No	6	No
1136	442611	442610	6	268.2	10.6	0.013	0.134	Free Surface	0.246	No	6	No
1137	442613	442612	6	203.4	11.0	0.013	0.125	Free Surface	0.215	No	6	No
1138	442701	442701A	15	168.5	5.1	0.013	2.014	Free Surface	0.314	No	15	No
1139	442616	442618	6	54.2	21.5	0.013	0.010	Free Surface	0.069	No	6	No
1140	442816	442702	6	102.4	12.7	0.013	0.184	Free Surface	0.260	No	6	No
1141	442514	442513	6	68.8	15.7	0.013	0.004	Free Surface	0.053	No	6	No
1142	442724	442706	6	216.6	9.4	0.013	0.013	Free Surface	0.094	No	6	No
1143	442516	442502	8	115.1	14.2	0.013	0.005	Free Surface	0.030	No	8	No
1144	442610	442703	6	254.1	8.6	0.013	0.163	Free Surface	0.420	No	6	No
1145	442703	442816	6	31.9	13.4	0.013	0.169	Free Surface	0.248	No	6	No
1146	442506	442508	6	190.7	9.8	0.013	0.002	Free Surface	0.036	No	6	No
1147	442721	442612	6	208.0	1.2	0.013	0.005	Free Surface	0.146	No	6	No
1148	442412	442411	6	199.1	3.6	0.013	0.003	Free Surface	0.068	No	6	No
1149	442411	442409	6	192.9	18.3	0.013	0.027	Free Surface	0.175	No	6	No
115	453716	453716C	8	28.9	8.6	0.013	0.191	Free Surface	0.189	No	8	No
1150	443021	443020	6	308.0	5.9	0.013	0.009	Free Surface	0.080	No	6	No
1151	440537	440542	6	130.1	4.7	0.013	0.014	Free Surface	0.137	No	6	No
1152	432501	432502	6	174.9	8.1	0.013	0.015	Free Surface	0.201	No	6	No
1153	440536	440537	6	130.6	4.4	0.013	0.010	Free Surface	0.087	No	6	No
1154	440535	440536	6	129.0	10.7	0.013	0.004	Free Surface	0.062	No	6	No
1155	440534LH	440533	6	109.0	4.0	0.013	0.003	Free Surface	0.130	No	6	No
1156	440801LH	432501	6	243.3	7.6	0.013	0.014	Free Surface	0.084	No	6	No
1157	440531	440532	6	121.6	6.3	0.013	0.075	Free Surface	0.226	No	6	No
1158	440533	440531	6	82.5	0.0	0.013	0.007	Free Surface	0.202	No	6	No
1159	440516	440828	6	141.0	2.0	0.013	0.003	Free Surface	0.057	No	6	No
116	431415	431414	6	207.8	2.9	0.013	0.029	Free Surface	0.158	No	6	No
1160	450411	450901	12	120.0	3.0	0.013	0.567	Free Surface	0.255	No	12	No
1161	443106LH	443104	8	81.9	1.4	0.013	0.005	Free Surface	0.055	No	8	No
1162	432902	432903	6	63.4	4.3	0.013	0.098	Free Surface	0.212	No	6	No
1163	442415	442414	6	138.1	9.1	0.013	0.007	Free Surface	0.063	No	6	No
1164	442414	442411	6	77.4	37.7	0.013	0.022	Free Surface	0.080	No	6	No
1165	442447	442434	6	146.1	13.3	0.013	0.007	Free Surface	0.091	No	6	No
1166	442448LH	442449	6	87.8	7.5	0.013	0.003	Free Surface	0.042	No	6	No
1167	442449	442429	6	138.6	9.4	0.013	0.004	Free Surface	0.073	No	6	No
1168	442416	442414	6	104.4	3.9	0.013	0.013	Free Surface	0.086	No	6	No
1169	441025LH	441024	6	274.4	10.8	0.013	0.031	Free Surface	0.120	No	6	No
117	431414	431412	6	188.5	2.7	0.013	0.036	Free Surface	0.180	No	6	No
1172	443022	450410	6	326.5	2.3	0.013	0.008	Free Surface	0.085	No	6	No
1175	443002	450411	8	273.1	1.5	0.013	0.014	Free Surface	0.203	No	8	No
1176	433205	433204	6	235.4	4.1	0.013	0.044	Free Surface	0.210	No	6	No

G3. Model Results for 2043 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
1177	443019	443015	6	116.6	5.3	0.013	0.026	Free Surface	0.139	No	6	No
1178	443015	443014	6	50.4	3.7	0.013	0.037	Free Surface	0.182	No	6	No
1179	433204	433203	6	224.6	1.8	0.013	0.062	Free Surface	0.219	No	6	No
118	453726	453725	8	98.9	20.1	0.013	0.049	Free Surface	0.083	No	8	No
1181	443014	443013	6	188.4	1.2	0.013	0.038	Free Surface	0.208	No	6	No
1182	433207	433208	6	371.4	1.2	0.013	0.011	Free Surface	0.134	No	6	No
1183	431813	431814	6	124.4	58.0	0.013	0.034	Free Surface	0.102	No	6	No
1184	443003LH	443002	8	264.1	1.0	0.013	0.005	Free Surface	0.070	No	8	No
1185	443012	443013	8	92.9	9.4	0.013	0.008	Free Surface	0.041	No	8	No
1186	443005	443004	6	54.2	4.1	0.013	0.012	Free Surface	0.144	No	6	No
1187	443013	443004	8	158.9	0.9	0.013	0.048	Free Surface	0.163	No	8	No
1188	442804	442803	6	241.3	13.7	0.013	0.005	Free Surface	0.049	No	6	No
1189	443011	443012	8	236.0	11.0	0.013	0.005	Free Surface	0.037	No	8	No
119	453725	453716	8	188.6	5.0	0.013	0.160	Free Surface	0.207	No	8	No
1190	443006	443005	6	149.2	8.1	0.013	0.010	Free Surface	0.079	No	6	No
1191	442808	442608	6	184.2	3.2	0.013	0.019	Free Surface	0.191	No	6	No
1192	433102	433101	6	125.2	0.8	0.013	0.005	Free Surface	0.094	No	6	No
1193	443010	443011	6	78.7	10.6	0.013	0.004	Free Surface	0.044	No	6	No
1195	454414	454413	6	89.5	8.4	0.013	0.004	Free Surface	0.044	No	6	No
1196	454413	454411	6	152.8	18.2	0.013	0.005	Free Surface	0.184	No	6	No
1197	453724	453725	8	210.2	12.7	0.013	0.111	Free Surface	0.171	No	8	No
1198	433421	433420	6	398.0	0.2	0.013	0.065	Free Surface	0.409	No	6	No
12	433416	433417	8	100.8	2.3	0.013	1.038	Free Surface	0.705	No	8	Yes
120	450807	450808	6	225.4	15.8	0.013	0.063	Free Surface	0.171	No	6	No
1200	442609LH	442608	6	169.5	2.2	0.013	0.003	Free Surface	0.053	No	6	No
1202	442602	442603	8	77.4	6.6	0.013	0.023	Free Surface	0.079	No	8	No
1203	442705LH	442702	6	183.9	7.9	0.013	0.009	Free Surface	0.164	No	6	No
1204	442702	442701	6	146.4	12.3	0.013	0.194	Free Surface	0.264	No	6	No
1205	442622	442621	6	88.6	4.1	0.013	0.005	Free Surface	0.050	No	6	No
1206	442618	442619	6	127.1	10.1	0.013	0.016	Free Surface	0.124	No	6	No
1207	442450LH	442428	6	110.2	9.3	0.013	0.002	Free Surface	0.085	No	6	No
1208	442830	442812	4	175.1	6.3	0.013	0.003	Free Surface	0.129	No	4	No
1209	433201	431801	6	129.0	4.2	0.013	0.144	Free Surface	0.320	No	6	No
1210	443020	443019	6	497.4	10.7	0.013	0.020	Free Surface	0.106	No	6	No
1211	442805LH	442804	6	113.4	4.8	0.013	0.002	Free Surface	0.039	No	6	No
1212	442440LH	442441	6	170.7	7.7	0.013	0.003	Free Surface	0.042	No	6	No
1213	443105	443104	8	184.8	0.6	0.013	0.006	Free Surface	0.066	No	8	No
1214	443104	443103	6	103.5	10.3	0.013	0.015	Free Surface	0.104	No	6	No
1215	440305	432913	6	142.1	16.9	0.013	0.005	Free Surface	0.141	No	6	No
1216	440306LH	440305	6	71.6	9.0	0.013	0.003	Free Surface	0.040	No	6	No
1217	442813	442812	6	143.5	2.8	0.013	0.008	Free Surface	0.103	No	6	No
1218	442417	442416	6	106.7	20.2	0.013	0.010	Free Surface	0.079	No	6	No
1219	440203	432812	6	242.4	8.3	0.013	0.005	Free Surface	0.140	No	6	No
1220	432901	432902	6	270.8	3.2	0.013	0.087	Free Surface	0.264	No	6	No
1221	442418	442417	6	155.5	3.7	0.013	0.006	Free Surface	0.061	No	6	No
1222	442454LH	442455	6	52.3	12.0	0.013	0.001	Free Surface	0.026	No	6	No
1223	442917	442918	6	155.5	5.3	0.013	0.013	Free Surface	0.094	No	6	No
1224	443331	443330	6	17.7	11.4	0.013	0.003	Free Surface	0.062	No	6	No
1225	442423	442422	6	64.0	7.4	0.013	0.001	Free Surface	0.023	No	6	No
1226	442921	440906	6	144.0	17.1	0.013	0.014	Free Surface	0.066	No	6	No
1227	443332	443331	6	147.0	5.6	0.013	0.003	Free Surface	0.039	No	6	No
1228	440906	440907	6	51.5	31.6	0.013	0.016	Free Surface	0.085	No	6	No
1229	442909	443302	6	249.4	1.3	0.013	0.058	Free Surface	0.254	No	6	No
123	450808	450809	6	120.0	4.4	0.013	0.066	Free Surface	0.257	No	6	No
1230	432802	432801	6	259.6	0.9	0.013	0.016	Free Surface	0.126	No	6	No
1231	442402	442403	6	282.6	4.5	0.013	0.006	Free Surface	0.073	No	6	No
1232	440213	432810	6	207.9	12.8	0.013	0.004	Free Surface	0.042	No	6	No
1233	440911	442909	6	132.0	1.1	0.013	0.046	Free Surface	0.244	No	6	No
1234	432724	432725	6	96.2	6.0	0.013	0.063	Free Surface	0.187	No	6	No
1235	440904	440903	6	300.7	3.1	0.013	0.019	Free Surface	0.124	No	6	No
1237	443325	443324	6	138.6	1.2	0.013	0.008	Free Surface	0.087	No	6	No
1238	443323LH	443324	6	49.0	3.3	0.013	0.004	Free Surface	0.062	No	6	No
1239	432728	432810	6	250.6	9.7	0.013	0.093	Free Surface	0.214	No	6	No
124	450921	450920	6	153.3	1.0	0.013	0.006	Free Surface	0.090	No	6	No
1240	440908	440924	6	51.3	34.1	0.013	0.027	Free Surface	0.094	No	6	No
1241	440207	440208	6	168.2	7.8	0.013	0.136	Free Surface	0.234	No	6	No
1242	440320	440208	6	124.7	32.5	0.013	0.015	Free Surface	0.135	No	6	No
1243	440909	440910	6	93.2	2.1	0.013	0.038	Free Surface	0.166	No	6	No
1244	440924	440922	6	40.2	15.5	0.013	0.036	Free Surface	0.130	No	6	No
1245	440922	440909	6	50.1	4.0	0.013	0.036	Free Surface	0.171	No	6	No
1246	440208	440209	6	94.0	19.1	0.013	0.153	Free Surface	0.478	No	6	No
1247	440325	440325A	6	109.1	2.5	0.013	0.024	Free Surface	0.190	No	6	No
1248	440324	440325	6	279.0	1.9	0.013	0.019	Free Surface	0.136	No	6	No
1249	440421	440420A	6	52.7	43.9	0.013	0.008	Free Surface	0.056	No	6	No
125	442501	453715	10	296.7	9.3	0.013	2.429	Free Surface	0.536	No	10	No
1250	443319	443320	6	198.2	4.9	0.013	0.101	Free Surface	0.238	No	6	No
1251	440923LH	440924	6	162.7	10.2	0.013	0.009	Free Surface	0.086	No	6	No
1252	440410	440409	6	158.2	0.6	0.013	0.009	Free Surface	0.099	No	6	No
1253	440902	440903	10	263.6	0.6	0.013	1.025	Free Surface	0.659	No	10	Yes
1254	440912	443319	8	298.8	3.2	0.013	0.095	Free Surface	0.179	No	8	No
1255	440211	440207	6	318.2	7.7	0.013	0.132	Free Surface	0.251	No	6	No
1256	440423	440424	8	132.5	10.2	0.013	0.003	Free Surface	0.033	No	8	No
1257	440215	440216	6	158.5	2.3	0.013	0.006	Free Surface	0.077	No	6	No
1259	440429	440417	6	158.7	13.4	0.013	0.023	Free Surface	0.108	No	6	No
126	430801	430802	8	277.4	3.0	0.013	0.012	Free Surface	0.073	No	8	No
1260	440418	440417	6	128.1	10.3	0.013	0.010	Free Surface	0.095	No	6	No
1261	440408	440407	6	144.1	2.1	0.013	0.016	Free Surface	0.106	No	6	No
1262	440103	440104	6	139.4	21.9	0.013	0.014	Free Surface	0.077	No	6	No
1263	440913	440912	8	240.0	4.9	0.013	0.087	Free Surface	0.164	No	8	No
1264	440427	440428	6	54.1	14.1	0.013	0.014	Free Surface	0.078	No	6	No
1265	440901	440902	10	308.8	3.7	0.013	0.510	Free Surface	0.646	No	10	No
1266	440608LH	440607	6	139.2	2.4	0.013	0.004	Free Surface	0.185	No	6	No
1267	440723LH	440722	6	57.8	16.9	0.013	0.004	Free Surface	0.045	No	6	No
1268	440132	440131	8	248.1	2.8	0.013	0.005	Free Surface	0.071	No	8	No
1269	440639	440601	6	206.7	3.4	0.013	0.039	Free Surface	0.165	No	6	No
127	431417	431405	6	244.7	0.5	0.013	0.007	Free Surface	0.183	No	6	No
1270	440124	440123	6	221.6	0.5	0.013	0.002	Free Surface	0.096	No	6	No
1271	440626	440628	6	191.4	1.6	0.013	0.039	Free Surface	0.195	No	6	No
1272	440627LH	440626	6	95.1	25.4	0.013	0.005	Free Surface	0.119	No	6	No
1273	440133LH	440134	6	239.8	11.4	0.013	0.007	Free Surface	0.066	No	6	No
1274	440817	432536	6	165.2	5.1	0.013	0.010	Free Surface	0.152	No	6	No
1275	440830	440831	6	188.3	2.7	0.013	0.006	Free Surface	0.085	No	6	No
1276	440823	440824	6	159.6	5.5	0.013	0.004	Free Surface	0.050	No	6	No
1277	440803	432529	6	130.6	11.7	0.013	0.016	Free Surface	0.095	No	6	No
1278	432508ALH	432508A	6	177.5	15.0	0.013	0.004	Free Surface	0.045	No	6	No
1279	440614	440615	6	360.9	7.8	0.013	0.005	Free Surface	0.068	No	6	No
128	430802	430803	8	287.3	2.0	0.013	0.014	Free Surface	0.076	No	8	No
1280	440816	440817	6	115.1	7.1	0.013	0.006	Free Surface	0.066	No	6	No
1281	440550	440551	6	242.7	6.9	0.013	0.005	Free Surface	0.056	No	6	No
1282	440822LH	440823	6	81.5	11.5	0.013	0.001	Free Surface	0.037	No	6	No
1283	440544	440545	6	281.3	7.5	0.013	0.075	Free Surface	0.188	No	6	No
1284	441202	440622	6	194.5	0.5	0.013	0.018	Free Surface	0.200	No	6	No
1285	440548	440830	6	178.8	7.3	0.013	0.001	Free Surface	0.047	No	6	No
1286	440827	440826	6	400.5	3.0	0.013	0.141	Free Surface	0.309	No	6	No
1287	440733	441202	6	137.8	0.7	0.013	0.014	Free Surface	0.164	No	6	No
1288	432507	SSFI 21	6	22.7	9.1	0.013	0.005	Free Surface	0.052	No	6	No
1289	432506LH	432505	6	152.0	3.8	0.013	0.000	Free Surface	0.000	No	6	No
129	431001LH	431002	6	155.8	1.5	0.013	0.003	Free Surface	0.077	No	6	No
1291	440819	440818	6	298.7	5.5	0.013	0.004	Free Surface	0.054	No	6	No
1292	440815LH	440816	6	122.8	4.1	0.013	0.002	Free Surface	0.046	No	6	No
1293	432505	432503	6	139.4	9.1	0.013	0.008	Free Surface	0.075	No	6	No
1294	432504	432503	6	59.9	3.1	0.013	0.001	Free Surface	0.058	No	6	No
1295	440837	440821	6	117.2	12.3	0.013	0.001	Free Surface	0.086	No	6	No
1296	440216	440104	6	220.5	4.4	0.013	0.010	Free Surface	0.086	No	6	No
1297	440413LH	440412	6	43.9	16.9	0.013	0.003	Free Surface	0.033	No	6	No
1298	440412	440407	6	152.3	19.9	0.013	0.006	Free Surface	0.046	No	6	No
1299	440104	440105	6	51.8	22.8	0.013	0.029	Free Surface	0.095	No	6	No
13	433402	433403	8	139.1	2.7	0.013	0.876	Free Surface	0.609	No	8	No
1300	440403	440402	6	300.4	5.5	0.013	0.030	Free Surface	0.422	No	6	No
1302	440407	440404	6	56.8	25.7	0.013	0.025	Free Surface	0.093	No	6	No
1303	440430	440429	6	111.9	16.9	0.013	0.005	Free Surface	0.067	No	6	No
1304	440417	440416	6	193.3	7.8	0.013	0.033	Free Surface	0.258	No	6	No
1305	440920	440921	8	154.1	5.1	0.013	0.029	Free Surface	0.119	No	8	No
1306	440914	440913	6	250.7	4.0	0.013	0.071	Free Surface	0.208	No	6	No
1307	440210	440116	6	293.9	2.5	0.013	0.182	Free Surface	0.386	No	6	No
1308	440404	440401	6	229.5	14.5	0.013	0.031	Free Surface	0.103	No	6	No
1309	440401	440402	8	77.0	3.4	0.013	0.974	Free Surface	0.590	No	8	No
1310	440915	440914	6	217.7	6.5	0.013	0.063	Free Surface	0.195	No	6	No
1311	440105	440115	6	164.0	22.2	0.013	0.035	Free Surface	0.099	No	6	No
1312	440115	440116	6	114.3	1.1	0.013	0.066	Free Surface	0.282	No	6	No
1313	440705	440706	6	250.1	2.5	0.013	0.052	Free Surface	0.195	No	6	No
1314	440416	440415	6	67.8	8.8	0.013	0.349	Free Surface	0.393	No	6	No
1315	440704	440705	6	141.9	0.3	0.013	0.046	Free Surface	0.294	No	6	No
1316	440102	440103	6	324.1	0.9	0.013	0.011	Free Surface	0.099	No	6	No
1317	440415	440414	6	103.5	10.9	0.013	0.382	Free Surface	0.454	No	6	No
1318	440101	440102	6	165.7	5.4	0.013	0.004	Free Surface	0.092	No	6	No
1319	440431	440129	6	133.7	29.4	0.013	0.255	Free Surface	0.313	No	6	No
132	442615	442616	8	69.3	20.9	0.013	0.003	Free Surface	0.024	No	8	No
1320	440129	440416	6	139.4	7.8	0.013	0.315	Free Surface	0.388	No	6	No
1321	440707	440704	6	75.4	33.4	0.013	0.010	Free Surface	0.213	No	6	No
1322	440703	440704	6	139.9	1.0	0.013	0.037	Free Surface	0.297	No	6	No
1323	440917	440916	6	100.5	1.0	0.013	0.060	Free Surface	0.252	No	6	No
1324	440114	440115	6	198.0	0.1	0.013	0.631	Free Surface	0.546	No	6	Yes
1325	440107	440108	6	104.6	1.2	0.013	0.002	Free Surface	0.051	No	6	No
1326	440918	440918A	8	241.7	3.9	0.013	0.019	Free Surface	0.081	No	8	No
1327	440702	440703	6	202.1	8.2	0.013	0.035	Free Surface	0.170	No	6	No
1328	440128	440129	6	132.9	2.6	0.013	0.061	Free Surface	0.301	No	6	No
1329	440708LH	440707	6	246.1	0.9	0.013	0.003	Free Surface	0.062	No	6	No
133	442617LH	442616	6	102.4	15.7	0.013	0.004	Free Surface	0.039	No	6	No
1330	440633	440917	6	92.3	6.5	0.013	0.060	Free Surface	0.233	No	6	No
1331	440130	440415	8	230.5	1.0	0.013	0.029	Free Surface	0.131	No	8	No
1332	440604	440401	8	268.4	6.9	0.013	0.941	Free Surface	0.475	No	8	No
1333	440701	440702	6	79.4	16.8	0.013	0.031	Free Surface	0.113	No	6	No
1334	440724	440701	6	338.9	3.2	0.013	0.026	Free Surface	0.122	No	6	No
1335	440721	440724	6	280.0	3.7	0.013	0.018	Free Surface	0.128	No	6	No
1336	440632	440918	6	101.1	10.0	0.013	0.009	Free Surface	0.083	No	6	No
1337	440414	440136	6	219.4	4.4	0.013	0.182	Free Surface	0.486	No	6	No
1338	440109	440108	6	226.8	1.1	0.013	0.013	Free Surface	0.129	No	6	No
1339	440607	440604	8	270.6	2.5	0.013	0.144	Free Surface	0.316	No	8	No
134	442720	442613	6	121.9	6.5	0.013	0.011	Free Surface	0.149	No	6	No
1340	440406	440603	6	142.4	5.8	0.013	0.014	Free Surface	0.087	No	6	No
1341	440603	440604	8	146.2	9.8	0.013	0.781	Free Surface	0.389	No	8	No
1342	440136	440137	6	158.1	7.4	0.013	0.395	Free Surface	0.428	No	6	No
1343	440631	440632	6	108.1	10.4	0.013	0.004	Free Surface	0.053	No	6	No
1344	440118	440143	6	170.7	19.6	0.013	0.019	Free Surface	0.155	No	6	No
1345	440143	440128	6	207.2	2.0	0.013	0.060	Free Surface	0.227	No	6	No
1346	440112	440113	6	159.4	0.1	0.013	0.006	Free Surface	0.178	No	6	No
1347	440722	440721	6	104.7	18.1	0.013	0.009	Free Surface	0.082	No	6	No
1348	440111	440112	6	147.0	8.4	0.013	0.001	Free Surface	0.093	No	6	No
1349	440137	440602	8	155.4	7.0	0.013	0.408	Free Surface	0.302	No	8	No
135	442614	442616	8	73.8	56.1	0.013	0.003	Free Surface	0.018	No	8	No

G3. Model Results for 2043 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
1350	440602	440603	8	103.6	6.0	0.013	0.766	Free Surface	0.426	No	8	No
1351	440720	440721	6	136.3	3.9	0.013	0.010	Free Surface	0.096	No	6	No
1352	440135	440136	6	289.7	4.3	0.013	0.012	Free Surface	0.270	No	6	No
1353	440635	440634	6	264.1	6.5	0.013	0.057	Free Surface	0.194	No	6	No
1354	440127	440143	6	225.6	4.0	0.013	0.041	Free Surface	0.199	No	6	No
1355	440122	440121	6	157.3	15.0	0.013	0.005	Free Surface	0.053	No	6	No
1356	432512	432511	6	192.4	7.6	0.013	0.078	Free Surface	0.199	No	6	No
1357	440131	440130	8	394.1	2.2	0.013	0.022	Free Surface	0.113	No	8	No
1358	440121	440120	6	116.9	9.1	0.013	0.009	Free Surface	0.079	No	6	No
1359	440119	440120	6	185.4	0.9	0.013	0.003	Free Surface	0.083	No	6	No
136	430712	430713	6	69.5	0.6	0.013	0.039	Free Surface	0.291	No	6	No
1360	440120	440127	6	220.9	11.7	0.013	0.023	Free Surface	0.128	No	6	No
1361	440719	440720	6	214.7	4.3	0.013	0.010	Free Surface	0.081	No	6	No
1362	440629	440635	6	142.6	3.9	0.013	0.057	Free Surface	0.182	No	6	No
1363	440630	440629	6	126.2	33.1	0.013	0.010	Free Surface	0.122	No	6	No
1364	440617	440616	6	161.3	8.3	0.013	0.018	Free Surface	0.106	No	6	No
1365	440616	440609	6	164.8	4.6	0.013	0.025	Free Surface	0.219	No	6	No
1366	440123	440120	6	66.3	0.5	0.013	0.008	Free Surface	0.110	No	6	No
1367	440601	440602	6	227.9	5.2	0.013	0.132	Free Surface	0.442	No	6	No
1368	432511	432510	6	261.9	5.6	0.013	0.082	Free Surface	0.207	No	6	No
1369	440636	440637	6	384.0	3.7	0.013	0.009	Free Surface	0.085	No	6	No
1370	440713	440714	8	28.2	1.4	0.013	0.028	Free Surface	0.112	No	8	No
1371	440718LH	440717	6	46.0	4.1	0.013	0.004	Free Surface	0.044	No	6	No
1372	440715	440714	8	92.4	22.7	0.013	0.014	Free Surface	0.072	No	8	No
1373	440618	440617	6	227.5	5.7	0.013	0.015	Free Surface	0.091	No	6	No
1374	440134	440135	6	276.4	4.5	0.013	0.010	Free Surface	0.083	No	6	No
1375	440717	440716	8	29.3	35.5	0.013	0.005	Free Surface	0.046	No	8	No
1376	440716	440715	8	144.2	1.9	0.013	0.008	Free Surface	0.056	No	8	No
1377	440610	440609	6	377.7	5.3	0.013	0.101	Free Surface	0.275	No	6	No
1378	440126	440127	6	351.3	1.4	0.013	0.011	Free Surface	0.136	No	6	No
1379	440619	440618	6	215.0	3.1	0.013	0.012	Free Surface	0.093	No	6	No
138	432013LH	432014	6	155.4	4.3	0.013	0.012	Free Surface	0.077	No	6	No
1380	432510	432509	6	252.1	7.1	0.013	0.087	Free Surface	0.199	No	6	No
1381	440832	440639	6	161.4	9.6	0.013	0.031	Free Surface	0.139	No	6	No
1382	440125	440124	6	118.4	0.5	0.013	0.000	Free Surface	0.044	No	6	No
1383	440125	440126	6	122.7	18.8	0.013	0.001	Free Surface	0.065	No	6	No
1384	440623	440626	6	106.2	1.3	0.013	0.034	Free Surface	0.195	No	6	No
1385	440624	440623	6	102.1	22.0	0.013	0.008	Free Surface	0.121	No	6	No
1386	440734	440735	6	52.9	11.8	0.013	0.024	Free Surface	0.134	No	6	No
1387	440625	440624	6	149.5	2.9	0.013	0.004	Free Surface	0.053	No	6	No
1388	440637	440638	6	343.8	5.8	0.013	0.015	Free Surface	0.129	No	6	No
1389	440638	440734	6	236.0	1.1	0.013	0.019	Free Surface	0.131	No	6	No
139	403418	403417	6	368.2	0.2	0.013	0.027	Free Surface	0.757	No	6	Yes
1390	440826	440140	6	141.5	5.0	0.013	0.149	Free Surface	0.645	No	6	No
1391	440615	440639	6	259.3	2.5	0.013	0.008	Free Surface	0.125	No	6	No
1392	440141	440140	6	233.5	11.0	0.013	0.136	Free Surface	0.614	No	6	No
1393	440142	440141	6	113.0	10.5	0.013	0.131	Free Surface	0.226	No	6	No
1394	440620	440619	6	187.3	11.3	0.013	0.008	Free Surface	0.076	No	6	No
1395	432527	432523	6	191.5	13.0	0.013	0.008	Free Surface	0.073	No	6	No
1396	440831	440832	6	166.7	3.2	0.013	0.014	Free Surface	0.108	No	6	No
1397	432536	440142	6	190.4	9.4	0.013	0.126	Free Surface	0.227	No	6	No
1398	440824	440826	6	145.9	9.9	0.013	0.006	Free Surface	0.170	No	6	No
1399	440545	440610	6	272.7	8.9	0.013	0.086	Free Surface	0.213	No	6	No
14	433401	433402	8	53.6	3.9	0.013	0.876	Free Surface	0.574	No	8	No
140	442511	442335	6	76.9	41.6	0.013	0.013	Free Surface	0.078	No	6	No
1400	432509	432535	6	165.8	10.3	0.013	0.092	Free Surface	0.189	No	6	No
1401	432535	432536	6	29.6	17.2	0.013	0.114	Free Surface	0.207	No	6	No
1402	440825	440141	6	114.1	3.1	0.013	0.004	Free Surface	0.142	No	6	No
1403	440551	440613	6	98.8	10.4	0.013	0.008	Free Surface	0.084	No	6	No
1404	432529	432535	6	88.5	4.9	0.013	0.020	Free Surface	0.148	No	6	No
1405	440621	440620	6	108.7	13.8	0.013	0.004	Free Surface	0.049	No	6	No
1406	440818	440142	6	117.5	3.5	0.013	0.004	Free Surface	0.141	No	6	No
1407	440622	440623	6	292.2	0.5	0.013	0.026	Free Surface	0.206	No	6	No
1408	440821	440827	6	102.6	8.0	0.013	0.048	Free Surface	0.238	No	6	No
1409	440543	440543A	6	17.8	20.3	0.013	0.063	Free Surface	0.148	No	6	No
141	431107	431108	6	137.9	2.0	0.013	0.029	Free Surface	0.161	No	6	No
1410	441201LH	440543	6	228.3	0.6	0.013	0.009	Free Surface	0.127	No	6	No
1411	440546	440543A	6	397.6	4.2	0.013	0.000	Free Surface	0.081	No	6	No
1412	440829	440821	6	22.0	17.0	0.013	0.046	Free Surface	0.134	No	6	No
1413	440802	440803	6	269.7	4.1	0.013	0.012	Free Surface	0.085	No	6	No
1414	432503	432502	6	222.3	2.2	0.013	0.009	Free Surface	0.204	No	6	No
1415	440532	440827	6	261.3	2.3	0.013	0.081	Free Surface	0.293	No	6	No
1416	440547	440532	6	218.7	2.1	0.013	0.002	Free Surface	0.149	No	6	No
1417	440528	440527	6	102.2	1.5	0.013	0.041	Free Surface	0.199	No	6	No
1418	440527	440516	6	60.7	2.5	0.013	0.041	Free Surface	0.177	No	6	No
1419	440520	440521	6	59.2	2.2	0.013	0.000	Free Surface	0.042	No	6	No
142	442301	442504	6	174.5	5.4	0.013	0.039	Free Surface	0.146	No	6	No
1420	440533	440528	6	106.2	5.7	0.013	0.039	Free Surface	0.179	No	6	No
1421	441213	441212	6	230.3	10.8	0.013	0.006	Free Surface	0.060	No	6	No
1422	440501	440502	6	205.0	5.6	0.013	0.002	Free Surface	0.056	No	6	No
1423	440514	440515	6	239.4	8.6	0.013	0.014	Free Surface	0.081	No	6	No
1424	440513	440512	6	256.5	1.8	0.013	0.005	Free Surface	0.067	No	6	No
1425	440502	440503	6	100.2	4.5	0.013	0.008	Free Surface	0.073	No	6	No
1428	440504	440503	6	154.8	1.2	0.013	0.002	Free Surface	0.059	No	6	No
1429	441001LH	441002	6	185.5	3.8	0.013	0.004	Free Surface	0.062	No	6	No
143	431010	431012	6	62.2	4.0	0.013	0.015	Free Surface	0.105	No	6	No
1430	440507	440506	6	303.1	0.8	0.013	0.003	Free Surface	0.079	No	6	No
1431	440505	440514	6	150.6	6.1	0.013	0.013	Free Surface	0.082	No	6	No
1432	440506	440505	6	134.2	4.5	0.013	0.012	Free Surface	0.086	No	6	No
1433	441003LH	441002	6	187.6	1.1	0.013	0.018	Free Surface	0.150	No	6	No
1434	441013	441016	8	354.3	8.9	0.013	0.121	Free Surface	0.155	No	8	No
1435	441011	441010	6	54.7	11.0	0.013	0.075	Free Surface	0.182	No	6	No
144	430713	430714	6	190.8	0.4	0.013	0.041	Free Surface	0.223	No	6	No
1441	455003	HASTINGS, WW	6	270.5	2.6	0.013	0.136	Free Surface	0.328	No	6	No
1443	454901	454902	6	149.6	3.8	0.013	0.001	Free Surface	0.040	No	6	No
1444	450104A	450104	6	167.6	2.1	0.013	0.022	Free Surface	0.163	No	6	No
1445	453707	453708	10	75.8	3.7	0.013	1.082	Free Surface	0.490	No	10	No
1446	450112	450112	6	36.7	6.8	0.013	0.000	Free Surface	0.000	No	6	No
1447	450102	450103	8	356.6	1.7	0.013	0.367	Free Surface	0.479	No	8	No
1448	454803	454804	8	178.0	9.9	0.013	0.290	Free Surface	0.224	No	8	No
1449	442913	442914	6	233.2	4.2	0.013	0.011	Free Surface	0.110	No	6	No
145	430707	430708	6	97.2	18.3	0.013	0.004	Free Surface	0.054	No	6	No
1450	440307	442307	6	248.9	1.6	0.013	0.009	Free Surface	0.113	No	6	No
1451	442436	442435	6	166.0	8.7	0.013	0.039	Free Surface	0.143	No	6	No
1452	452504	452504A	6	106.8	2.6	0.013	0.004	Free Surface	0.068	No	6	No
1453	443503	443502	6	163.2	0.9	0.013	0.051	Free Surface	0.392	No	6	No
1454	442102	442103	6	113.8	6.8	0.013	0.033	Free Surface	0.131	No	6	No
1455	441827LH	441827	6	138.7	3.2	0.013	0.001	Free Surface	0.029	No	6	No
1456	441824	441822	6	94.5	2.1	0.013	0.006	Free Surface	0.074	No	6	No
1457	441823	441821	6	114.7	13.0	0.013	0.002	Free Surface	0.070	No	6	No
1458	402408	402407	6	350.3	1.5	0.013	0.001	Free Surface	0.127	No	6	No
1459	441518A	441518	6	141.7	19.4	0.013	0.006	Free Surface	0.074	No	6	No
146	442727LH	442726	6	46.3	6.5	0.013	0.003	Free Surface	0.052	No	6	No
1460	441406	441407	8	287.1	3.0	0.013	0.275	Free Surface	0.307	No	8	No
1461	441408	441407	6	131.8	16.7	0.013	0.289	Free Surface	0.300	No	6	No
1464	VMH_47	402414	6	64.9	4.9	0.013	0.000	Free Surface	0.028	No	6	No
1465	441511	441505	6	154.4	1.8	0.013	0.032	Free Surface	0.320	No	6	No
1466	441506	441505	8	249.6	0.4	0.013	0.388	Free Surface	0.635	No	8	Yes
1468	402414	402501	6	88.4	3.7	0.013	0.004	Free Surface	0.132	No	6	No
147	442512	442511	6	132.8	10.4	0.013	0.005	Free Surface	0.050	No	6	No
1470	402501	402502	6	356.7	0.4	0.013	0.088	Free Surface	0.715	No	6	Yes
1471	441517	441504	6	261.0	4.4	0.013	0.022	Free Surface	0.558	No	6	No
1472	441505	441504	8	168.8	2.2	0.013	0.465	Free Surface	0.720	No	8	Yes
1474	402407	402406	6	364.0	1.3	0.013	0.046	Free Surface	0.221	No	6	No
1475	441520	441502	15	17.9	1.2	0.013	0.683	Free Surface	0.298	No	15	No
1478	441504	441503	8	157.6	0.1	0.013	0.493	Free Surface	0.810	No	8	Yes
148	432110	432109	6	38.9	5.1	0.013	0.005	Free Surface	0.059	No	6	No
1480	402406	402405	6	218.5	1.6	0.013	0.048	Free Surface	0.227	No	6	No
1481	402404	402501	6	375.6	0.3	0.013	0.079	Free Surface	0.406	No	6	No
1482	402416LH	402415	6	126.9	0.8	0.013	0.000	Free Surface	0.052	No	6	No
1483	402410LH	402404	6	134.2	0.5	0.013	0.002	Free Surface	0.065	No	6	No
1484	402415	402401	6	115.1	0.4	0.013	0.003	Free Surface	0.103	No	6	No
1485	402405	402403	6	275.5	1.5	0.013	0.054	Free Surface	0.295	No	6	No
1487	402409LH	402403	6	116.8	0.6	0.013	0.003	Free Surface	0.215	No	6	No
1488	402401	402402	6	273.3	0.4	0.013	0.007	Free Surface	0.135	No	6	No
1489	450805LH	450804	6	164.5	2.4	0.013	0.002	Free Surface	0.042	No	6	No
149	430705	430704	6	172.8	7.7	0.013	0.313	Free Surface	0.388	No	6	No
1490	450818LH	450817	6	149.8	7.2	0.013	0.004	Free Surface	0.056	No	6	No
1491	451118	451119	6	115.4	9.1	0.013	0.002	Free Surface	0.041	No	6	No
1492	451111	451110	6	258.9	7.2	0.013	0.013	Free Surface	0.082	No	6	No
1493	450816LH	450815	6	94.3	6.7	0.013	0.003	Free Surface	0.047	No	6	No
1494	451117LH	451118	6	92.7	0.7	0.013	0.001	Free Surface	0.036	No	6	No
1495	450824LH	450823	6	76.5	0.4	0.013	0.002	Free Surface	0.075	No	6	No
1496	450822	450823	6	106.4	4.2	0.013	0.013	Free Surface	0.088	No	6	No
1497	450611	450612	6	245.3	0.6	0.013	0.003	Free Surface	0.094	No	6	No
1499	454804	454805	8	303.5	14.7	0.013	0.291	Free Surface	0.211	No	8	No
15	431504	431503	8	187.6	2.2	0.013	0.650	Free Surface	0.527	No	8	No
150	432008	432007	6	149.7	7.7	0.013	0.147	Free Surface	0.246	No	6	No
1500	454814	454813	6	152.8	0.7	0.013	0.004	Free Surface	0.076	No	6	No
1501	451107	451106	6	151.9	2.3	0.013	0.071	Free Surface	0.219	No	6	No
1502	451106	451105	6	27.1	8.7	0.013	0.072	Free Surface	0.238	No	6	No
1503	454815	454814	6	139.8	0.7	0.013	0.003	Free Surface	0.076	No	6	No
1504	454805	454806	8	144.4	14.6	0.013	0.293	Free Surface	0.212	No	8	No
1505	454811	454806	6	166.4	2.9	0.013	0.011	Free Surface	0.187	No	6	No
1506	454813	454811	6	216.3	1.9	0.013	0.005	Free Surface	0.081	No	6	No
1507	454812	454811	6	111.1	1.1	0.013	0.005	Free Surface	0.086	No	6	No
1508	451108	451105	6	196.2	3.0	0.013	0.025	Free Surface	0.218	No	6	No
1509	454806	454807	8	113.2	15.8	0.013	0.304	Free Surface	0.213	No	8	No
151	432014	432009	6	104.4	46.1	0.013	0.018	Free Surface	0.152	No	6	No
1510	454306	454305	8	430.1	0.6	0.013	0.145	Free Surface	0.271	No	8	No
1511	450602	450603	8	85.2	0.5	0.013	0.127	Free Surface	0.285	No	8	No
1512	450603	450604	8	56.5	3.2	0.013	0.127	Free Surface	0.255	No	8	No
1513	451109	451108	6	259.9	7.1	0.013	0.021	Free Surface	0.119	No	6	No
1514	450802	450602	6	311.9	6.3	0.013	0.028	Free Surface	0.304	No	6	No
1515	451121	450802	6	202.7	4.0	0.013	0.013	Free Surface	0.107	No	6	No
1516	451120	451121	6	127.2	6.9	0.013	0.010	Free Surface	0.083	No	6	No
1517	450820	450802	6	292.9	12.8	0.013	0.005	Free Surface	0.082	No	6	No
1518	450305	450107	6	195.0	7.0	0.013	0.000	Free Surface	0.031	No	6	No
1519	451110	451109	6	321.1	10.1	0.013	0.017	Free Surface	0.094	No	6	No
152	432009	432008	6	259.8	8.1	0.013	0.140	Free Surface	0.259	No	6	No
1520	450803	450802	6	266.2	13.8	0.013	0.007	Free Surface	0.087	No	6	No
1521	451119	451120	6	333.6	14.3	0.013	0.007	Free Surface	0.062	No	6	No
1522	450105	450209A	8	145.9	2.4	0.013	0.043	Free Surface	0.116	No	8	No
1523	450108	450103	6	53.9	1.1	0.013	0.006	Free Surface	0.105	No	6	No
1524	450110LH	450102	8	256.6	6.5	0.013	0.021	Free Surface	0.244	No	8	No
1525	450109	450108	6	191.5	3.0	0.013	0.006	Free Surface	0.078	No	6	No
1528	442801	450417	6	164.1	4.0	0.013	0.189	Free Surface	0.348	No	6	No
1529	442510	442335	6	207.9	0.5	0.013	0.006	Free Surface	0.107	No	6	No
153	430605	430604	8	355.2	1.2	0.013	0.274	Free Surface	0.347	No	8	No
1530	442333	442332	6	227.7	3.5	0.013	0.025	Free Surface	0.166	No	6	No
1531	442332	442613	6	210.2	12.5	0.013	0.113	Free Surface	0.210	No	6	No

G3. Model Results for 2043 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
1532	442335	442334	6	60.0	6.7	0.013	0.021	Free Surface	0.105	No	6	No
1533	442334	442333	6	194.8	6.0	0.013	0.022	Free Surface	0.120	No	6	No
1534	452736	452737	6	201.9	2.6	0.013	0.004	Free Surface	0.067	No	6	No
1535	441714	441601	8	51.4	2.9	0.013	0.199	Free Surface	0.365	No	8	No
1536	403007	403006	6	252.9	0.4	0.013	0.008	Free Surface	0.145	No	6	No
1537	441703	441704	6	132.4	8.4	0.013	0.010	Free Surface	0.083	No	6	No
1538	402705	402704	6	268.9	0.3	0.013	0.018	Free Surface	0.200	No	6	No
1539	441416	441417	6	221.6	2.3	0.013	0.002	Free Surface	0.084	No	6	No
154	441012LH	441011	6	243.4	5.0	0.013	0.013	Free Surface	0.128	No	6	No
1540	441418	441417	6	161.6	12.7	0.013	0.017	Free Surface	0.103	No	6	No
1541	441709	441708	6	48.8	9.4	0.013	0.004	Free Surface	0.047	No	6	No
1542	441402	441402A	6	55.8	8.8	0.013	0.388	Free Surface	0.469	No	6	No
1543	441412	441411	6	271.8	10.1	0.013	0.030	Free Surface	0.126	No	6	No
1544	442305	442304	6	295.1	0.8	0.013	0.030	Free Surface	0.193	No	6	No
1545	442328	442329	6	112.9	0.9	0.013	0.065	Free Surface	0.311	No	6	No
1546	452705	452704	6	81.8	10.1	0.013	0.003	Free Surface	0.067	No	6	No
1547	442728	442714	6	92.5	21.6	0.013	0.004	Free Surface	0.052	No	6	No
1548	442419	442420	6	100.1	15.6	0.013	0.005	Free Surface	0.065	No	6	No
1549	440315	440316	6	217.9	8.3	0.013	0.010	Free Surface	0.071	No	6	No
155	402712	402702	6	152.5	2.5	0.013	0.103	Free Surface	0.287	No	6	No
1550	442404	442405	6	202.3	3.2	0.013	0.027	Free Surface	0.136	No	6	No
1551	442456	442427	8	156.2	5.1	0.013	0.002	Free Surface	0.053	No	8	No
1552	443324	443301	6	162.6	21.3	0.013	0.015	Free Surface	0.293	No	6	No
1553	440910	440911	6	136.0	7.8	0.013	0.042	Free Surface	0.187	No	6	No
1554	450113	450112	6	190.9	3.5	0.013	0.009	Free Surface	0.082	No	6	No
1555	450117	450116	6	30.0	5.3	0.013	0.001	Free Surface	0.027	No	6	No
1556	450115	450115A	6	123.1	3.9	0.013	0.009	Free Surface	0.076	No	6	No
1558	450911	450806	6	136.2	8.1	0.013	0.038	Free Surface	0.133	No	6	No
1559	450806	450807	6	231.2	17.4	0.013	0.058	Free Surface	0.138	No	6	No
1560	452720	04C142M	6	116.9	5.0	0.013	0.050	Free Surface	0.168	No	6	No
1562	442508	442509	6	165.1	4.3	0.013	0.002	Free Surface	0.061	No	6	No
1563	VMH_B6	452721	6	96.2	0.1	0.013	0.000	Free Surface	0.025	No	6	No
1564	452721	452722	8	157.1	0.8	0.013	0.002	Free Surface	0.040	No	8	No
1565	452735LH	452734	6	99.0	0.9	0.013	0.002	Free Surface	0.060	No	6	No
1566	442706	442610	6	116.2	8.6	0.013	0.028	Free Surface	0.188	No	6	No
1567	450811	450901	8	292.2	0.4	0.013	0.124	Free Surface	0.331	No	8	No
1568	450417	450420	18	258.4	3.8	0.013	0.000	Free Surface	0.000	No	18	No
1569	450420	450410	12	27.9	0.2	0.013	0.004	Free Surface	0.061	No	12	No
157	430905	430904	6	141.5	0.5	0.013	0.018	Free Surface	0.204	No	6	No
1570	442707	442706	6	68.8	3.3	0.013	0.013	Free Surface	0.106	No	6	No
1572	442815	442816	6	108.9	0.1	0.013	0.014	Free Surface	0.235	No	6	No
1573	442725	442724	6	108.3	3.7	0.013	0.009	Free Surface	0.078	No	6	No
1574	442408	442409	6	59.1	5.2	0.013	0.033	Free Surface	0.198	No	6	No
1575	442430	442431	6	58.3	11.8	0.013	0.049	Free Surface	0.173	No	6	No
1578	441908	441907	6	196.9	9.2	0.013	0.054	Free Surface	0.199	No	6	No
1579	441131	441130	6	211.6	4.6	0.013	0.011	Free Surface	0.094	No	6	No
158	430903	430904	6	108.9	6.0	0.013	0.285	Free Surface	0.389	No	6	No
1580	442513	442511	6	206.8	4.8	0.013	0.007	Free Surface	0.062	No	6	No
1581	442722	442721	6	205.0	3.1	0.013	0.003	Free Surface	0.065	No	6	No
1582	442457LH	442446	6	19.7	8.3	0.013	0.003	Free Surface	0.047	No	6	No
1583	442446	442447	6	47.7	6.0	0.013	0.005	Free Surface	0.055	No	6	No
1584	442407	442408	6	153.5	1.2	0.013	0.032	Free Surface	0.172	No	6	No
1585	442406	442407	6	115.5	1.7	0.013	0.032	Free Surface	0.191	No	6	No
1586	442429	442430	6	99.2	13.8	0.013	0.030	Free Surface	0.119	No	6	No
1587	443025	442905	6	157.2	1.7	0.013	0.001	Free Surface	0.040	No	6	No
1588	440308	440307	6	269.3	7.6	0.013	0.006	Free Surface	0.077	No	6	No
1589	452502	452427	8	222.4	0.4	0.013	0.012	Free Surface	0.138	No	8	No
159	432915LH	432914	6	112.3	4.6	0.013	0.005	Free Surface	0.075	No	6	No
1590	441414	441412	6	141.6	13.8	0.013	0.019	Free Surface	0.097	No	6	No
1591	403002	403001	8	256.5	0.4	0.013	0.060	Free Surface	0.230	No	8	No
1592	403203	403002	8	190.7	0.6	0.013	0.020	Free Surface	0.121	No	8	No
1593	402706	402705	6	245.1	1.3	0.013	0.012	Free Surface	0.177	No	6	No
1594	441022	441402	6	106.7	9.4	0.013	0.384	Free Surface	0.410	No	6	No
1595	441702	441703	6	157.7	1.4	0.013	0.006	Free Surface	0.077	No	6	No
1596	403004	403003	8	113.4	1.2	0.013	0.032	Free Surface	0.182	No	8	No
1597	441602	441601	8	239.7	4.6	0.013	0.210	Free Surface	0.353	No	8	No
1599	442626	402604	6	165.0	2.5	0.013	0.039	Free Surface	0.179	No	6	No
16	431503	431502	8	163.0	3.9	0.013	0.813	Free Surface	0.551	No	8	No
160	430706	430705	6	154.9	7.7	0.013	0.318	Free Surface	0.384	No	6	No
1600	402801	403007	6	102.8	0.5	0.013	0.004	Free Surface	0.108	No	6	No
1601	403008	402801	6	63.1	1.8	0.013	0.002	Free Surface	0.066	No	6	No
1602	402809	402801	6	49.0	1.2	0.013	0.002	Free Surface	0.067	No	6	No
1602	402809	402801	6	49.0	1.2	0.013	0.002	Free Surface	0.067	No	6	No
1603	441701	441420	6	271.7	16.3	0.013	0.010	Free Surface	0.073	No	6	No
1605	441411	441410	6	197.6	6.5	0.013	0.039	Free Surface	0.195	No	6	No
1606	441601	441712	8	305.4	2.0	0.013	0.462	Free Surface	0.428	No	8	No
1607	441708	441707	6	109.6	10.5	0.013	0.006	Free Surface	0.058	No	6	No
1608	402607LHB	402606	6	56.8	3.5	0.013	0.001	Free Surface	0.038	No	6	No
1609	441420	441420A	6	59.4	10.7	0.013	0.018	Free Surface	0.106	No	6	No
161	431621LH	431622	6	160.0	5.4	0.013	0.007	Free Surface	0.064	No	6	No
1611	402803	402808	6	92.5	1.2	0.013	0.007	Free Surface	0.165	No	6	No
1612	452101	452024	6	134.9	6.6	0.013	0.019	Free Surface	0.152	No	6	No
1613	442331	442332	6	273.6	5.9	0.013	0.085	Free Surface	0.207	No	6	No
1614	442802	442801	6	249.6	2.4	0.013	0.170	Free Surface	0.365	No	6	No
1615	452724	452727	6	120.4	0.7	0.013	0.014	Free Surface	0.125	No	6	No
1616	442814	442815	6	343.4	1.1	0.013	0.010	Free Surface	0.162	No	6	No
1617	452715	452714	6	78.2	2.9	0.013	0.002	Free Surface	0.039	No	6	No
1618	442304	442303	6	328.4	2.8	0.013	0.034	Free Surface	0.145	No	6	No
1619	442709	442708	6	195.8	11.1	0.013	0.007	Free Surface	0.091	No	6	No
162	430210	430209	6	169.4	7.1	0.013	0.421	Free Surface	0.440	No	6	No
1620	452714	452713	6	22.8	12.3	0.013	0.003	Free Surface	0.045	No	6	No
1621	442806	442802	6	194.7	8.2	0.013	0.160	Free Surface	0.324	No	6	No
1622	442330	442331	6	198.7	1.0	0.013	0.082	Free Surface	0.282	No	6	No
1623	452727	452728	6	204.4	6.4	0.013	0.015	Free Surface	0.090	No	6	No
1624	442723	442711	6	157.6	1.5	0.013	0.000	Free Surface	0.028	No	6	No
1625	442324	442325	6	223.6	6.5	0.013	0.006	Free Surface	0.057	No	6	No
1626	442325	442329	6	98.6	44.4	0.013	0.015	Free Surface	0.190	No	6	No
1627	442803	442802	6	301.0	12.8	0.013	0.007	Free Surface	0.218	No	6	No
1628	452009	452010	6	102.2	25.3	0.013	0.061	Free Surface	0.127	No	6	No
1629	452706	452705	6	156.2	16.2	0.013	0.002	Free Surface	0.032	No	6	No
163	431623	431631	6	98.1	49.5	0.013	0.066	Free Surface	0.196	No	6	No
1630	452728	452525	6	189.5	7.7	0.013	0.018	Free Surface	0.097	No	6	No
1632	452704	452703	6	68.4	0.7	0.013	0.005	Free Surface	0.076	No	6	No
1633	443016	443015	6	315.1	7.6	0.013	0.011	Free Surface	0.114	No	6	No
1634	442438	442437	8	106.6	0.9	0.013	0.020	Free Surface	0.107	No	8	No
1635	442327	442328	6	173.4	0.6	0.013	0.065	Free Surface	0.317	No	6	No
1636	452524	452523	6	299.9	3.6	0.013	0.002	Free Surface	0.046	No	6	No
1637	442306	442305	6	248.2	1.9	0.013	0.027	Free Surface	0.188	No	6	No
1639	443017	443016	6	179.1	14.6	0.013	0.003	Free Surface	0.055	No	6	No
164	431622	431623	6	62.6	8.5	0.013	0.009	Free Surface	0.064	No	6	No
1640	442808	442807	6	321.0	5.6	0.013	0.134	Free Surface	0.269	No	6	No
1641	442437	442436	8	150.6	2.5	0.013	0.023	Free Surface	0.096	No	8	No
1642	442308	442306	6	145.3	5.0	0.013	0.016	Free Surface	0.127	No	6	No
1643	490102	490101	6	82.9	1.6	0.013	0.007	Free Surface	0.113	No	6	No
1644	454303	454302	8	326.2	7.4	0.013	0.089	Free Surface	0.146	No	8	No
1645	442509	442510	6	267.4	0.7	0.013	0.004	Free Surface	0.096	No	6	No
1646	452707LH	452706	6	53.3	3.0	0.013	0.002	Free Surface	0.032	No	6	No
1647	442807	442806	6	297.7	6.0	0.013	0.141	Free Surface	0.268	No	6	No
1648	442329	442330	6	163.3	0.9	0.013	0.080	Free Surface	0.339	No	6	No
1649	452702LH	452701	6	62.3	18.1	0.013	0.003	Free Surface	0.045	No	6	No
1650	452703	452701	6	186.3	8.7	0.013	0.007	Free Surface	0.058	No	6	No
1651	452531	452419	6	97.3	9.9	0.013	0.003	Free Surface	0.036	No	6	No
1652	443007	443006	6	103.2	1.2	0.013	0.007	Free Surface	0.084	No	6	No
1653	443018LH	443017	6	114.6	2.0	0.013	0.003	Free Surface	0.050	No	6	No
1654	443008	443007	6	34.3	4.9	0.013	0.007	Free Surface	0.083	No	6	No
1655	442307	442306	6	136.9	0.8	0.013	0.011	Free Surface	0.143	No	6	No
1656	442410	442327	6	237.9	0.2	0.013	0.063	Free Surface	0.410	No	6	No
1657	442409	442410	6	85.8	1.4	0.013	0.062	Free Surface	0.370	No	6	No
1658	442433	442432	6	188.9	8.4	0.013	0.052	Free Surface	0.169	No	6	No
1659	442435	442434	6	146.8	6.1	0.013	0.044	Free Surface	0.143	No	6	No
166	430214	430213	6	64.1	50.8	0.013	0.058	Free Surface	0.106	No	6	No
1660	442434	442433	6	54.3	15.6	0.013	0.051	Free Surface	0.141	No	6	No
1661	442432	442431	6	126.3	3.9	0.013	0.054	Free Surface	0.199	No	6	No
1662	442431	442808	6	198.4	8.3	0.013	0.103	Free Surface	0.239	No	6	No
1663	443009	443008	6	276.4	12.0	0.013	0.004	Free Surface	0.055	No	6	No
1664	442445	442435	6	121.8	28.0	0.013	0.005	Free Surface	0.096	No	6	No
1665	442812	442430	6	137.4	1.9	0.013	0.017	Free Surface	0.131	No	6	No
1666	442905	442906	6	319.7	6.8	0.013	0.047	Free Surface	0.213	No	6	No
1667	442424	442425	6	162.8	14.0	0.013	0.002	Free Surface	0.041	No	6	No
1668	442903	442905	6	297.9	13.2	0.013	0.024	Free Surface	0.093	No	6	No
1669	442901	442902	6	250.6	14.7	0.013	0.007	Free Surface	0.062	No	6	No
167	431627	431628	6	202.2	5.9	0.013	0.007	Free Surface	0.176	No	6	No
1670	442902	442903	6	128.0	15.6	0.013	0.015	Free Surface	0.083	No	6	No
1671	442425	442426	6	221.7	9.0	0.013	0.006	Free Surface	0.064	No	6	No
1672	442906	442907	6	254.0	1.6	0.013	0.069	Free Surface	0.247	No	6	No
1673	442455	442425	6	68.9	57.4	0.013	0.003	Free Surface	0.039	No	6	No
1674	442426	442427	6	370.8	8.7	0.013	0.013	Free Surface	0.094	No	6	No
1675	442427	442428	6	180.1	5.1	0.013	0.021	Free Surface	0.123	No	6	No
1676	440309	440308	6	292.0	10.5	0.013	0.003	Free Surface	0.047	No	6	No
1677	442915	442905	6	229.6	1.0	0.013	0.018	Free Surface	0.151	No	6	No
1678	442405	442406	8	293.1	4.0	0.013	0.031	Free Surface	0.114	No	8	No
1679	442451	442427	6	267.7	20.9	0.013	0.005	Free Surface	0.075	No	6	No
168	430203	430204	6	137.6	14.0	0.013	0.468	Free Surface	0.411	No	6	No
1680	440310	440311	6	109.8	10.2	0.013	0.002	Free Surface	0.040	No	6	No
1681	442914	442915	6	172.6	1.1	0.013	0.015	Free Surface	0.144	No	6	No
1682	443304	443305	12	317.1	1.0	0.013	1.126	Free Surface	0.498	No	12	No
1683	440314	440315	6	151.9	11.2	0.013	0.005	Free Surface	0.057	No	6	No
1684	440311	440322	6	317.3	8.2	0.013	0.006	Free Surface	0.075	No	6	No
1685	440313	440314	6	63.3	0.4	0.013	0.001	Free Surface	0.046	No	6	No
1686	440709	440710	6	92.7	5.7	0.013	0.005	Free Surface	0.068	No	6	No
1687	442107	442108	6	87.9	25.6	0.013	0.026	Free Surface	0.084	No	6	No
1688	443421	443420	6	71.5	6.8	0.013	0.009	Free Surface	0.089	No	6	No
1689	443420	441803	6	174.1	20.8	0.013	0.042	Free Surface	0.110	No	6	No
169	431626LH	431625	6	80.9	0.5	0.013	0.043	Free Surface	0.265	No	6	No
1690	443411	443410	6	316.5	6.7	0.013	0.007	Free Surface	0.076	No	6	No
1691	441804	441803	6	35.3	1.8	0.013	0.290	Free Surface	0.578	No	6	No
1692	442912LH	442911	6	199.2	5.6	0.013	0.006	Free Surface	0.053	No	6	No
1693	443302	443303	10	170.4	11.8	0.013	1.111	Free Surface	0.511	No	10	No
1694	440312	440311	6	257.3	8.6	0.013	0.002	Free Surface	0.042	No	6	No
1695	440322	440323	6	237.4	3.3	0.013	0.013	Free Surface	0.095	No	6	No
1696	442911	442910	6	67.9	31.2	0.013	0.008	Free Surface	0.056	No	6	No
1697	442910	442913	6	132.1	8.0	0.013	0.009	Free Surface	0.075	No	6	No
1698	440205	440204	6	199.5	0.5	0.013	0.003	Free Surface	0.083	No	6	No
1699	443301	443302	10	86.2	12.5	0.013	1.051	Free Surface	0.311	No	10	No
17	433412	433413	8	193.2	7.6	0.013	1.032	Free Surface	0.535	No	8	No
170	432003	432004	6	132.5	6.7	0.013	0.107	Free Surface	0.195	No	6	No
1700	440905	440904	6	166.4	2.5	0.013	0.005	Free Surface	0.094	No	6	No
1701	442401	442402	6	174.8	11.5	0.013	0.002	Free Surface	0.046	No	6	No
1702	440907	440908	6	189.0	6.0	0.013	0.019	Free Surface	0.093	No	6	No
1703	430206	440207	6	147.6	7.5	0.013	0.002	Free Surface	0.145	No	6	No
1704	440323	440324	6	203.3	6.0	0.013	0.016	Free Surface	0.112	No	6	No

G3. Model Results for 2043 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
1705	440411	440410	6	126.8	3.9	0.013	0.004	Free Surface	0.096	No	6	No
1706	443502	443501	6	206.0	0.2	0.013	0.062	Free Surface	0.350	No	6	No
1707	443513	443309	6	142.3	5.3	0.013	0.011	Free Surface	0.080	No	6	No
1708	443321	443321LH	8	243.7	5.0	0.013	0.118	Free Surface	0.185	No	8	No
1709	443512	443513	6	123.7	13.8	0.013	0.005	Free Surface	0.061	No	6	No
171	440303	440302	6	141.5	4.9	0.013	0.038	Free Surface	0.145	No	6	No
1710	443603	443602	8	99.7	8.6	0.013	0.052	Free Surface	0.102	No	8	No
1711	443509	443504	6	113.3	2.6	0.013	0.014	Free Surface	0.117	No	6	No
1712	443504	443503	6	117.3	10.3	0.013	0.041	Free Surface	0.194	No	6	No
1713	443505	443504	6	115.7	7.1	0.013	0.024	Free Surface	0.119	No	6	No
1714	443506	443505	6	57.4	12.3	0.013	0.023	Free Surface	0.101	No	6	No
1715	443507	443506	6	182.1	10.9	0.013	0.009	Free Surface	0.078	No	6	No
1716	443322LH	443312	8	299.9	4.1	0.013	0.129	Free Surface	0.266	No	8	No
1717	443312	443311	8	156.6	11.0	0.013	0.633	Free Surface	0.336	No	8	No
1718	443510	443509	6	163.7	12.9	0.013	0.014	Free Surface	0.089	No	6	No
1719	443511	443510	6	207.4	4.1	0.013	0.006	Free Surface	0.068	No	6	No
172	432923A	432916	6	158.0	0.7	0.013	0.055	Free Surface	0.236	No	6	No
1720	443410	443409	6	134.6	4.4	0.013	0.013	Free Surface	0.089	No	6	No
1721	443418	443419	6	198.3	2.5	0.013	0.019	Free Surface	0.118	No	6	No
1722	443422	443421	6	174.1	14.9	0.013	0.005	Free Surface	0.056	No	6	No
1723	441805	441804	6	142.6	1.3	0.013	0.083	Free Surface	0.428	No	6	No
1724	441838	441805	6	157.4	1.3	0.013	0.025	Free Surface	0.234	No	6	No
1726	441312	441310	6	154.7	3.2	0.013	0.005	Free Surface	0.091	No	6	No
1727	442114	442113	6	89.9	19.7	0.013	0.004	Free Surface	0.065	No	6	No
1728	441306	441308	6	315.9	5.8	0.013	0.060	Free Surface	0.196	No	6	No
1729	442202	442203	16	259.7	0.8	0.013	1.607	Free Surface	0.383	No	16	No
1731	441313LH	441310	6	163.8	1.0	0.013	0.006	Free Surface	0.103	No	6	No
1732	441106LH	441107	6	127.4	4.1	0.013	0.004	Free Surface	0.051	No	6	No
1733	441924	441912	6	43.5	20.0	0.013	0.026	Free Surface	0.102	No	6	No
1734	443508	443506	6	130.0	12.2	0.013	0.011	Free Surface	0.079	No	6	No
1735	443604	443603	8	273.7	17.3	0.013	0.045	Free Surface	0.094	No	8	No
1736	443316	443315	6	127.5	1.5	0.013	0.051	Free Surface	0.192	No	6	No
1737	443605	443604	8	89.3	23.3	0.013	0.004	Free Surface	0.054	No	8	No
1738	443315	443313	6	123.9	20.2	0.013	0.056	Free Surface	0.126	No	6	No
1739	443313	443312	6	279.5	27.4	0.013	0.062	Free Surface	0.287	No	6	No
174	432007	432005	6	155.1	15.1	0.013	0.153	Free Surface	0.268	No	6	No
1740	443405	443404	6	110.5	10.5	0.013	0.011	Free Surface	0.089	No	6	No
1741	442115	442116	6	143.5	1.8	0.013	0.001	Free Surface	0.043	No	6	No
1742	443407	443406	6	72.1	1.0	0.013	0.003	Free Surface	0.082	No	6	No
1743	443406	443404	6	110.3	17.8	0.013	0.031	Free Surface	0.105	No	6	No
1745	443414	443415	6	219.4	10.2	0.013	0.008	Free Surface	0.065	No	6	No
1747	443408	443406	6	52.8	16.0	0.013	0.025	Free Surface	0.094	No	6	No
1748	441821	441820	6	67.0	1.5	0.013	0.011	Free Surface	0.110	No	6	No
1749	441822	441821	6	32.5	3.1	0.013	0.007	Free Surface	0.091	No	6	No
175	432004	432005	6	75.0	67.1	0.013	0.113	Free Surface	0.223	No	6	No
1750	441834	441837	6	123.3	0.8	0.013	0.025	Free Surface	0.225	No	6	No
1751	443426	443408	6	62.3	26.8	0.013	0.023	Free Surface	0.084	No	6	No
1752	441828	441827	6	133.5	1.3	0.013	0.015	Free Surface	0.129	No	6	No
1753	441835	441834	6	141.0	2.6	0.013	0.012	Free Surface	0.144	No	6	No
1754	440710	440711	6	105.2	3.6	0.013	0.009	Free Surface	0.106	No	6	No
1755	441819	441820	6	344.3	11.4	0.013	0.008	Free Surface	0.084	No	6	No
1756	442112	442111	6	129.3	17.3	0.013	0.014	Free Surface	0.072	No	6	No
1757	443417	443418	6	189.6	10.5	0.013	0.010	Free Surface	0.098	No	6	No
1758	442105	442106	6	247.7	9.0	0.013	0.038	Free Surface	0.125	No	6	No
1759	443413	443414	6	331.2	7.9	0.013	0.006	Free Surface	0.057	No	6	No
176	432005	432006	6	112.1	11.9	0.013	0.267	Free Surface	0.346	No	6	No
1760	441824	441824	6	225.9	10.7	0.013	0.003	Free Surface	0.057	No	6	No
1761	440711	440712	6	177.0	0.7	0.013	0.010	Free Surface	0.115	No	6	No
1762	442113	442112	6	176.1	3.4	0.013	0.010	Free Surface	0.080	No	6	No
1763	442109	442107	6	99.4	5.2	0.013	0.025	Free Surface	0.106	No	6	No
1764	443419	443420	6	168.9	9.8	0.013	0.027	Free Surface	0.108	No	6	No
1765	443427	443411	6	50.2	2.0	0.013	0.002	Free Surface	0.052	No	6	No
1768	443423	443424	6	264.3	4.8	0.013	0.007	Free Surface	0.093	No	6	No
1769	441806	441805	6	182.5	0.6	0.013	0.058	Free Surface	0.309	No	6	No
177	432816	432815	6	64.8	3.4	0.013	0.009	Free Surface	0.118	No	6	No
1770	443424	440728	6	115.6	1.5	0.013	0.013	Free Surface	0.201	No	6	No
1771	441307	441306	6	22.0	17.7	0.013	0.058	Free Surface	0.156	No	6	No
1772	441931	441932	6	127.4	16.8	0.013	0.005	Free Surface	0.049	No	6	No
1773	440728	440729	6	133.2	6.2	0.013	0.158	Free Surface	0.366	No	6	No
1774	443808	443807	6	277.9	8.2	0.013	0.005	Free Surface	0.054	No	6	No
1775	403116	403115	6	245.7	0.4	0.013	0.019	Free Surface	0.178	No	6	No
1776	442206	442206A	6	162.2	1.5	0.013	0.039	Free Surface	0.210	No	6	No
1778	441913	441912	6	112.1	8.2	0.013	0.011	Free Surface	0.095	No	6	No
1779	441132LH	441131	6	113.8	9.8	0.013	0.007	Free Surface	0.070	No	6	No
178	431703	431702	6	199.5	2.1	0.013	0.628	Exceeds Capacity	1.000	No	6	Yes
1780	443806	443805	6	130.5	13.2	0.013	0.017	Free Surface	0.092	No	6	No
1781	441916	441913	6	43.4	7.7	0.013	0.004	Free Surface	0.059	No	6	No
1782	441107	441108	6	143.1	10.6	0.013	0.006	Free Surface	0.120	No	6	No
1783	441108	441109	6	146.6	1.7	0.013	0.035	Free Surface	0.179	No	6	No
1784	441917LH	441916	6	86.5	7.4	0.013	0.003	Free Surface	0.042	No	6	No
1786	441907	441906	6	276.2	1.8	0.013	0.059	Free Surface	0.214	No	6	No
1787	441111	441108	6	80.6	4.4	0.013	0.028	Free Surface	0.159	No	6	No
1788	443801	443802	6	110.9	16.0	0.013	0.001	Free Surface	0.031	No	6	No
179	440202	440304	6	174.0	4.2	0.013	0.033	Free Surface	0.136	No	6	No
1790	443805	443804	6	169.2	6.8	0.013	0.022	Free Surface	0.121	No	6	No
1791	441205	441105	6	269.1	4.3	0.013	0.014	Free Surface	0.271	No	6	No
1792	441204	441205	6	125.2	9.6	0.013	0.008	Free Surface	0.077	No	6	No
1793	441130	441128	6	187.9	14.1	0.013	0.031	Free Surface	0.117	No	6	No
1794	441129LH	441128	6	189.2	7.5	0.013	0.008	Free Surface	0.096	No	6	No
1795	441918LH	441919	6	85.3	1.7	0.013	0.002	Free Surface	0.053	No	6	No
1796	443802	443803	6	77.1	20.9	0.013	0.004	Free Surface	0.046	No	6	No
1797	441919	441920	6	51.9	3.8	0.013	0.004	Free Surface	0.049	No	6	No
1798	441920	441921	8	98.7	36.5	0.013	0.007	Free Surface	0.029	No	8	No
1799	441921	441910	6	168.8	4.1	0.013	0.008	Free Surface	0.122	No	6	No
18	431520	431509	8	251.4	3.5	0.013	0.638	Free Surface	0.732	No	8	Yes
180	431720	431703	6	137.0	2.7	0.013	0.198	Backwater	1.000	No	6	Yes
1800	441128	441127	6	114.0	12.1	0.013	0.045	Free Surface	0.248	No	6	No
1801	441309	441127	6	199.5	2.2	0.013	0.063	Free Surface	0.299	No	6	No
1802	443804	443820	6	123.1	4.6	0.013	0.032	Free Surface	0.285	No	6	No
1803	443803	443820	6	138.0	20.5	0.013	0.009	Free Surface	0.273	No	6	No
1804	441127	441126	6	140.5	1.1	0.013	0.110	Free Surface	0.419	No	6	No
1805	402402	402403	6	217.6	0.5	0.013	0.012	Free Surface	0.248	No	6	No
1806	441136LH	441126A	6	96.4	35.1	0.013	0.005	Free Surface	0.247	No	6	No
1807	441134	441133	6	137.2	1.2	0.013	0.003	Free Surface	0.070	No	6	No
1808	441103	441119	6	111.6	6.6	0.013	0.018	Free Surface	0.122	No	6	No
1809	441114	441119	6	243.2	35.4	0.013	0.042	Free Surface	0.122	No	6	No
181	440316	440202	6	130.6	10.2	0.013	0.013	Free Surface	0.111	No	6	No
1810	441102	441101	6	35.5	36.4	0.013	0.023	Free Surface	0.087	No	6	No
1812	441115LH	441114	6	182.2	0.3	0.013	0.017	Free Surface	0.156	No	6	No
1813	441923	442001	6	194.6	29.9	0.013	0.008	Free Surface	0.050	No	6	No
1814	403121	403201	6	332.6	0.3	0.013	0.005	Free Surface	0.126	No	6	No
1815	441120LH	441119	6	126.8	4.0	0.013	0.010	Free Surface	0.114	No	6	No
1816	443812LH	443813	8	90.9	0.1	0.013	0.007	Free Surface	0.104	No	8	No
1817	443813	441606	6	168.5	13.6	0.013	0.007	Free Surface	0.102	No	6	No
1818	441606	441605	8	136.8	9.6	0.013	0.068	Free Surface	0.134	No	8	No
1819	441116	441115LH	6	81.6	1.8	0.013	0.015	Free Surface	0.168	No	6	No
182	433109	431713	6	208.1	9.0	0.013	0.068	Free Surface	0.184	No	6	No
1822	441126	441126A	6	106.3	0.5	0.013	0.111	Free Surface	0.465	No	6	No
1823	441117	441116	6	245.8	0.6	0.013	0.013	Free Surface	0.135	No	6	No
1824	441118LH	441117	6	155.0	0.3	0.013	0.005	Free Surface	0.126	No	6	No
1825	441017	441016	6	82.5	12.8	0.013	0.006	Free Surface	0.048	No	6	No
1826	441101	441016	6	198.7	11.5	0.013	0.027	Free Surface	0.102	No	6	No
1827	441016	441018	6	69.3	11.2	0.013	0.154	Free Surface	0.242	No	6	No
1828	441135LH	SSTA_9953	6	99.1	25.3	0.013	0.007	Free Surface	0.255	No	6	No
1829	441018	441019	6	60.6	11.1	0.013	0.156	Free Surface	0.294	No	6	No
183	431702	431701	6	131.0	3.4	0.013	0.632	Backwater	1.000	No	6	Yes
1830	441119	441019	6	255.1	18.3	0.013	0.072	Free Surface	0.245	No	6	No
1831	441605	441604	8	265.7	13.1	0.013	0.143	Free Surface	0.164	No	8	No
1832	441138	441138	6	170.8	4.3	0.013	0.005	Free Surface	0.055	No	6	No
1834	442002	442003	6	45.2	29.0	0.013	0.016	Free Surface	0.134	No	6	No
1835	441125	SSTA_9953	6	93.8	1.1	0.013	0.117	Free Surface	0.426	No	6	No
1836	441122	441121	6	222.5	9.0	0.013	0.130	Free Surface	0.244	No	6	No
1838	441021	441401	6	121.4	6.3	0.013	0.143	Free Surface	0.325	No	6	No
1839	442003	442004	6	191.3	4.2	0.013	0.067	Free Surface	0.364	No	6	No
184	431714	431716	6	148.2	7.4	0.013	0.050	Free Surface	0.178	No	6	No
1840	442005	442004	6	364.2	0.8	0.013	0.130	Free Surface	0.483	No	6	No
1841	441604	441603	8	312.6	14.1	0.013	0.197	Free Surface	0.177	No	8	No
1842	441603	441603A	8	98.6	13.2	0.013	0.197	Free Surface	0.178	No	8	No
1843	441401	441022	6	114.7	11.2	0.013	0.378	Free Surface	0.394	No	6	No
1844	441415	441414	6	154.1	7.4	0.013	0.010	Free Surface	0.077	No	6	No
1845	402802	402803	6	131.9	1.1	0.013	0.003	Free Surface	0.079	No	6	No
1846	403005	403004	8	118.6	0.3	0.013	0.029	Free Surface	0.163	No	8	No
1848	441024	441023	6	159.7	14.0	0.013	0.048	Free Surface	0.132	No	6	No
1849	402608	402606	6	56.4	3.5	0.013	0.002	Free Surface	0.042	No	6	No
1850	402804	402803	6	110.0	2.0	0.013	0.002	Free Surface	0.070	No	6	No
1851	441023	441404	6	123.5	16.6	0.013	0.058	Free Surface	0.318	No	6	No
1852	441403	441404	6	195.6	9.1	0.013	0.394	Free Surface	0.458	No	6	No
1853	441711	441710	6	111.2	15.9	0.013	0.047	Free Surface	0.359	No	6	No
1854	441712	441710	8	155.5	3.4	0.013	0.465	Free Surface	0.418	No	8	No
1855	441707	441706	6	173.1	15.5	0.013	0.013	Free Surface	0.117	No	6	No
1856	441706	441705	6	35.4	0.5	0.013	0.015	Free Surface	0.152	No	6	No
1857	441704	441705	6	267.3	15.4	0.013	0.029	Free Surface	0.117	No	6	No
1858	441419	441409	6	143.2	17.4	0.013	0.024	Free Surface	0.187	No	6	No
1859	402606	402605	8	105.9	4.7	0.013	0.004	Free Surface	0.055	No	8	No
186	433110	433109	6	200.0	10.1	0.013	0.050	Free Surface	0.156	No	6	No
1860	441705	441509	6	121.0	10.7	0.013	0.047	Free Surface	0.138	No	6	No
1861	441710	441713	8	114.0	2.7	0.013	0.519	Free Surface	0.436	No	8	No
1862	441510	441508	6	230.7	6.2	0.013	0.023	Free Surface	0.132	No	6	No
1863	441509	441508	6	33.5	10.0	0.013	0.048	Free Surface	0.147	No	6	No
1864	402805	402806	6	345.5	0.5	0.013	0.006	Free Surface	0.137	No	6	No
1865	441404	441405	6	137.2	3.2	0.013	0.272	Free Surface	0.406	No	6	No
1868	402605	402604A	8	132.0	1.0	0.013	0.009	Free Surface	0.114	No	8	No
187	451826B	451826A	6	134.4	5.6	0.013	0.005	Free Surface	0.085	No	6	No
1870	441405	441406	8	371.0	8.6	0.013	0.272	Free Surface	0.270	No	8	No
1873	441507	441506	6	48.4	2.9	0.013	0.090	Free Surface	0.580	No	6	No
1875	441508	441507	6	326.5	14.5	0.013	0.071	Free Surface	0.205	No	6	No
1876	441713	441506	12	321.5	1.7	0.013	0.520	Free Surface	0.373	No	12	No
1877	450819LH	450820	6	71.1	11.3	0.013	0.002	Free Surface	0.038	No	6	No
1878	451115	450822	6	264.1	11.4	0.013	0.007	Free Surface	0.074	No	6	No
1879	450817	450813	6	318.6	19.3	0.013	0.013	Free Surface	0.085	No	6	No
188	442918	442906	6	123.5	4.5	0.013	0.017	Free Surface	0.189	No	6	No
1880	450916	450915	6	135.6	0.7	0.013	0.006	Free Surface	0.085	No	6	No
1881	451207LH	451206	6	91.1	1.0	0.013	0.002	Free Surface	0.064	No	6	No
1882	451202	451201	6	105.3	8.1	0.013	0.125	Free Surface	0.234	No	6	No
1883	451015	451014	6	314.0	12.3	0.013	0.149	Free Surface	0.231	No	6	No
1884	452001	452002	6	109.9	6.9	0.013	0.027	Free Surface	0.116	No	6	No
1885	402901	402704	15	268.4	0.3	0.013	0.479	Free Surface	0.298	No	8	No
1886	402714	402713	6	206.0	1.7	0.013	0.011	Free Surface	0.109	No	6	No
1887	452801	452020	6	29.0	33.0	0.013	0.005	Free Surface	0.180	No	6	No
1888	452803	452020	6	253.9	6.6	0.013	0.013	Free Surface	0.083	No	6	No
1889	452709	452708	6	193.1	8.3	0.013	0.001	Free Surface	0.029	No	6	No

G3. Model Results for 2043 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
1892	442908LH	442907	6	178.2	4.1	0.013	0.004	Free Surface	0.137	No	6	No
1893	443221	443221B	8	96.6	2.8	0.013	0.006	Free Surface	0.073	No	8	No
1894	443309	443308	8	90.8	9.3	0.013	0.657	Free Surface	0.605	No	8	No
1895	443501	443308	6	61.8	6.5	0.013	0.063	Free Surface	0.177	No	6	No
1896	450815	450814	8	242.0	39.4	0.013	0.009	Free Surface	0.052	No	8	No
1897	451221	451220	6	66.9	3.6	0.013	0.012	Free Surface	0.135	No	6	No
1898	450814	450813	6	181.7	8.6	0.013	0.017	Free Surface	0.096	No	6	No
1899	451112	451111	6	252.0	5.6	0.013	0.008	Free Surface	0.075	No	6	No
19	433802	433802	6	168.2	6.1	0.013	0.001	Free Surface	0.042	No	6	No
190	442919	442918	6	51.4	2.2	0.013	0.001	Free Surface	0.068	No	6	No
1900	450823	450806	6	168.5	10.5	0.013	0.016	Free Surface	0.108	No	6	No
1901	451308	451221	6	277.1	13.9	0.013	0.006	Free Surface	0.069	No	6	No
1902	451114LH	451112	6	171.4	0.6	0.013	0.002	Free Surface	0.065	No	6	No
1903	451113	451112	6	217.6	0.9	0.013	0.003	Free Surface	0.070	No	6	No
1904	451215	451214	6	200.9	9.8	0.013	0.078	Free Surface	0.174	No	6	No
1905	451216	451209	6	348.6	1.6	0.013	0.005	Free Surface	0.074	No	6	No
1906	451216	451215	6	67.0	8.8	0.013	0.076	Free Surface	0.181	No	6	No
1907	450912	450911	6	295.7	1.9	0.013	0.029	Free Surface	0.151	No	6	No
1908	451209	451203	6	78.0	22.0	0.013	0.021	Free Surface	0.106	No	6	No
1909	451208LH	451209	6	166.1	1.1	0.013	0.014	Free Surface	0.110	No	6	No
191	442453LH	442452	6	64.2	14.4	0.013	0.003	Free Surface	0.039	No	6	No
1910	451218	451216	6	156.2	4.7	0.013	0.070	Free Surface	0.193	No	6	No
1911	451220	451218	6	274.8	0.4	0.013	0.016	Free Surface	0.192	No	6	No
1912	450812	450809	6	156.0	2.9	0.013	0.040	Free Surface	0.243	No	6	No
1913	451305	451218	6	222.6	11.9	0.013	0.026	Free Surface	0.153	No	6	No
1914	450913	450912	6	101.5	11.4	0.013	0.021	Free Surface	0.131	No	6	No
1915	451203	451202	6	64.4	3.7	0.013	0.027	Free Surface	0.185	No	6	No
1916	451214	451202	6	188.9	12.8	0.013	0.080	Free Surface	0.202	No	6	No
1917	451206	451205	6	200.7	0.7	0.013	0.004	Free Surface	0.088	No	6	No
1918	451219	451218	6	161.2	5.2	0.013	0.024	Free Surface	0.162	No	6	No
1919	451205	451204	6	82.6	1.0	0.013	0.006	Free Surface	0.073	No	6	No
192	442452	442426	6	150.0	28.4	0.013	0.007	Free Surface	0.061	No	6	No
1920	451204	451203	6	195.6	10.6	0.013	0.006	Free Surface	0.093	No	6	No
1921	450918	450917	6	67.6	0.9	0.013	0.012	Free Surface	0.132	No	6	No
1922	451302	451219	6	119.4	2.3	0.013	0.019	Free Surface	0.123	No	6	No
1923	451303	451302	6	223.7	16.1	0.013	0.012	Free Surface	0.096	No	6	No
1924	451016A	451201	6	119.2	0.8	0.013	0.015	Free Surface	0.188	No	6	No
1925	450919	450918	6	40.4	1.0	0.013	0.009	Free Surface	0.120	No	6	No
1926	450920	450919	6	104.2	1.0	0.013	0.006	Free Surface	0.102	No	6	No
1927	450810	450811	8	192.6	0.2	0.013	0.122	Free Surface	0.383	No	8	No
1928	451018LH	451017	6	60.3	0.8	0.013	0.004	Free Surface	0.088	No	6	No
1929	452423	452422	6	167.1	5.9	0.013	0.002	Free Surface	0.039	No	6	No
193	432921LH	432817	6	91.4	1.2	0.013	0.004	Free Surface	0.064	No	6	No
1930	443108	443216	6	559.2	1.9	0.013	0.079	Free Surface	0.270	No	6	No
1931	452417	452416	6	205.4	8.2	0.013	0.035	Free Surface	0.157	No	6	No
1932	452034	452032	6	81.2	11.9	0.013	0.005	Free Surface	0.058	No	6	No
1933	450902	450907	12	19.4	5.9	0.013	0.000	Free Surface	0.000	No	12	No
1934	452017	452610	6	143.4	14.7	0.013	0.004	Free Surface	0.056	No	6	No
1935	452615	452601	6	224.2	8.8	0.013	0.312	Free Surface	0.398	No	6	No
1936	452605	452601	6	122.8	9.3	0.013	0.033	Free Surface	0.273	No	6	No
1937	443103	443101	6	416.2	3.8	0.013	0.025	Free Surface	0.128	No	6	No
1938	452422	452424	6	152.0	8.4	0.013	0.003	Free Surface	0.081	No	6	No
1939	443216	443203	10	253.4	1.1	0.013	0.217	Free Surface	0.357	No	10	No
194	432801	432901	6	265.7	12.3	0.013	0.024	Free Surface	0.171	No	6	No
1940	443203	443204	15	152.1	0.5	0.013	2.153	Free Surface	0.614	No	15	No
1941	443217	443216	6	107.2	2.2	0.013	0.131	Free Surface	0.342	No	6	No
1942	452420	452421	6	320.4	4.7	0.013	0.010	Free Surface	0.133	No	6	No
1943	452601	452602	6	133.9	6.3	0.013	0.347	Free Surface	0.432	No	6	No
1944	452604	452602	6	332.5	6.1	0.013	0.004	Free Surface	0.242	No	6	No
1945	402902	402901	15	255.1	0.5	0.013	0.459	Free Surface	0.297	No	8	No
1946	402715	402714	6	200.1	1.7	0.013	0.005	Free Surface	0.091	No	6	No
1947	402613	402612	6	192.4	1.8	0.013	0.039	Free Surface	0.197	No	6	No
1948	402718LH	402612	6	100.0	0.9	0.013	0.003	Free Surface	0.134	No	6	No
1949	402611	402611	6	234.1	1.8	0.013	0.044	Free Surface	0.205	No	6	No
195	442403	442404	6	82.1	4.7	0.013	0.011	Free Surface	0.112	No	6	No
1950	402704	402703	15	173.8	0.9	0.013	0.502	Free Surface	0.343	No	8	No
1951	402702	402703	10	136.1	0.4	0.013	0.467	Free Surface	0.637	No	10	Yes
1952	450922	451022	6	240.4	1.5	0.013	0.010	Free Surface	0.129	No	6	No
1953	451022	451021	6	299.9	1.1	0.013	0.020	Free Surface	0.231	No	6	No
1954	451021	451020	6	301.6	0.3	0.013	0.031	Free Surface	0.260	No	6	No
1955	452025	452024	6	77.4	14.3	0.013	0.103	Free Surface	0.196	No	6	No
1956	450923	450908	6	333.4	1.5	0.013	0.005	Free Surface	0.075	No	6	No
1957	450902	443225	12	276.1	1.4	0.013	0.699	Free Surface	0.343	No	12	No
1958	451014	451013	6	267.4	14.5	0.013	0.157	Free Surface	0.225	No	6	No
1959	452033LH	452032	6	147.9	6.9	0.013	0.002	Free Surface	0.052	No	6	No
196	442420	442421	6	245.7	3.8	0.013	0.010	Free Surface	0.075	No	6	No
1960	443225	450903	12	120.1	1.9	0.013	0.701	Free Surface	0.318	No	12	No
1961	452029	452028	6	30.6	104.6	0.013	0.005	Free Surface	0.042	No	6	No
1962	450908	450909	24	457.9	1.7	0.013	4.436	Free Surface	0.331	No	24	No
1963	450903	450904	12	352.7	1.6	0.013	0.703	Free Surface	0.337	No	12	No
1964	452030	452029	6	66.5	1.4	0.013	0.004	Free Surface	0.052	No	6	No
1965	451020	451019	6	298.2	1.7	0.013	0.048	Free Surface	0.261	No	6	No
1966	452028	452027	6	70.4	9.4	0.013	0.007	Free Surface	0.056	No	6	No
1968	451013	451012	8	163.7	13.9	0.013	0.172	Free Surface	0.170	No	8	No
197	442421	442404	6	142.4	24.4	0.013	0.014	Free Surface	0.102	No	6	No
1970	450904	450905	12	346.7	1.7	0.013	0.717	Free Surface	0.365	No	12	No
1971	450910	450905	15	16.8	0.6	0.013	0.569	Free Surface	0.374	No	15	No
1972	452802LH	452801	6	250.7	14.3	0.013	0.003	Free Surface	0.034	No	6	No
1973	452701	452611	6	49.6	23.4	0.013	0.011	Free Surface	0.063	No	6	No
1974	452527	452418	6	154.8	9.5	0.013	0.022	Free Surface	0.130	No	6	No
1975	451217LH	451216	6	109.3	1.4	0.013	0.005	Free Surface	0.127	No	6	No
1976	450914	450913	6	159.9	12.7	0.013	0.017	Free Surface	0.085	No	6	No
1977	450915	450914	6	165.1	5.1	0.013	0.008	Free Surface	0.075	No	6	No
1978	451201	451015	6	202.5	11.0	0.013	0.142	Free Surface	0.232	No	6	No
1979	451017	451016	6	213.9	0.7	0.013	0.006	Free Surface	0.114	No	6	No
198	443303	443304	10	159.1	1.0	0.013	1.122	Free Surface	0.645	No	10	No
1980	451016	451016A	6	238.2	0.6	0.013	0.011	Free Surface	0.137	No	6	No
1981	441830	441829	6	194.8	0.9	0.013	0.005	Free Surface	0.078	No	6	No
1982	442117	442110	6	100.0	5.2	0.013	0.000	Free Surface	0.041	No	6	No
1983	442110	442109	6	174.2	15.2	0.013	0.019	Free Surface	0.104	No	6	No
1984	441803	441802	6	280.4	1.9	0.013	0.333	Free Surface	0.600	No	6	No
1985	442209	442208	6	200.5	14.7	0.013	0.005	Free Surface	0.042	No	6	No
1986	451608	451606	6	110.0	0.8	0.013	0.051	Free Surface	0.269	No	6	No
1988	441816LH	441817	6	114.9	4.4	0.013	0.007	Free Surface	0.061	No	6	No
1989	403104	403304	6	238.5	0.6	0.013	0.011	Free Surface	0.128	No	6	No
199	432804	432805	6	256.5	0.2	0.013	0.003	Free Surface	0.112	No	6	No
1990	451613LH	451611	6	389.5	10.1	0.013	0.000	Free Surface	0.062	No	6	No
1991	443416	443417	6	231.5	5.5	0.013	0.005	Free Surface	0.059	No	6	No
1992	403326	403301	6	375.5	0.8	0.013	0.007	Free Surface	0.122	No	6	No
1993	451603	451602	16	249.4	0.9	0.013	1.612	Free Surface	0.399	No	16	No
1994	451605	451605A	6	56.3	1.5	0.013	0.246	Free Surface	0.534	No	6	No
1995	403102	403102A	6	43.0	0.5	0.013	0.012	Free Surface	0.145	No	6	No
1996	403305	403306	18	11.2	2.2	0.013	4.245	Free Surface	0.799	No	18	No
1997	403332	403306	18	14.0	0.3	0.013	1.918	Free Surface	0.518	No	18	No
1998	442222	442220	6	79.4	12.6	0.013	0.011	Free Surface	0.078	No	6	No
1999	442216	442215	6	136.2	8.0	0.013	0.002	Free Surface	0.034	No	6	No
2	455010	455009	6	70.7	1.0	0.013	0.050	Free Surface	0.252	No	6	No
20	431502	431506	6	282.4	1.6	0.013	0.645	Exceeds Capacity	1.000	No	6	Yes
200	442422	442421	6	59.7	4.9	0.013	0.001	Free Surface	0.043	No	6	No
2000	442207	442204	6	187.4	8.9	0.013	0.175	Free Surface	0.395	No	6	No
2001	451604	451603	16	300.9	2.2	0.013	1.622	Free Surface	0.340	No	16	No
2002	403101	403102	6	301.4	0.8	0.013	0.010	Free Surface	0.117	No	6	No
2003	441815	441929	6	66.1	13.5	0.013	0.001	Free Surface	0.036	No	6	No
2004	442213	442212	6	146.4	5.8	0.013	0.002	Free Surface	0.042	No	6	No
2005	440735	440727	6	222.7	9.8	0.013	0.074	Free Surface	0.215	No	6	No
2006	441303	441304	8	258.1	3.5	0.013	0.198	Free Surface	0.240	No	8	No
2007	450415	450416	10	231.1	0.6	0.013	0.234	Free Surface	0.259	No	10	No
2008	452112	452111	6	29.2	16.0	0.013	0.012	Free Surface	0.065	No	6	No
2009	452722	452723	8	223.0	4.8	0.013	0.006	Free Surface	0.045	No	8	No
201	432805	432806	6	266.9	2.3	0.013	0.018	Free Surface	0.146	No	6	No
2010	452806	452717	6	209.7	7.4	0.013	0.003	Free Surface	0.052	No	6	No
2011	452734	452733	6	207.1	2.8	0.013	0.005	Free Surface	0.064	No	6	No
2012	452515	452514	6	93.9	5.5	0.013	0.000	Free Surface	0.021	No	6	No
2013	452512	452511	6	62.4	16.0	0.013	0.005	Free Surface	0.075	No	6	No
2014	452725	452724	6	79.9	27.3	0.013	0.005	Free Surface	0.099	No	6	No
2015	452002	452003	6	178.8	8.0	0.013	0.029	Free Surface	0.126	No	6	No
2016	452032	452031	6	79.9	6.9	0.013	0.009	Free Surface	0.068	No	6	No
2017	452108	452025	6	154.6	17.2	0.013	0.100	Free Surface	0.180	No	6	No
2018	452511	452511A	6	98.9	10.4	0.013	0.028	Free Surface	0.103	No	6	No
202	443329	443303	6	61.4	12.9	0.013	0.009	Free Surface	0.529	No	6	No
2022	452503	452424	6	231.2	2.8	0.013	0.009	Free Surface	0.104	No	6	No
2023	452733	452732	6	111.8	10.3	0.013	0.008	Free Surface	0.063	No	6	No
2024	452003	452004	6	55.3	6.5	0.013	0.035	Free Surface	0.130	No	6	No
2025	452510	452509	6	15.5	6.4	0.013	0.028	Free Surface	0.301	No	6	No
2026	452732	452731	6	54.8	7.1	0.013	0.008	Free Surface	0.073	No	6	No
2027	452530	452511	6	209.4	5.2	0.013	0.020	Free Surface	0.108	No	6	No
2028	450907	450908	21	269.4	1.4	0.013	4.428	Free Surface	0.418	No	21	No
2029	452737	452519	6	195.0	5.1	0.013	0.009	Free Surface	0.078	No	6	No
203	443330	443329	6	100.1	2.0	0.013	0.007	Free Surface	0.073	No	6	No
2030	452006	452007	6	38.4	30.1	0.013	0.045	Free Surface	0.126	No	6	No
204	440919	440920	8	154.0	10.1	0.013	0.026	Free Surface	0.081	No	8	No
2041	452035	452034	6	54.0	27.9	0.013	0.002	Free Surface	0.037	No	6	No
2042	452614	452017	6	398.0	2.2	0.013	0.002	Free Surface	0.043	No	6	No
2043	443101	443218	6	447.1	0.6	0.013	0.115	Free Surface	0.438	No	6	No
2044	402710	402711	6	288.5	0.7	0.013	0.094	Free Surface	0.401	No	6	No
2045	450909	450910	24	346.8	1.5	0.013	4.442	Free Surface	0.340	No	24	No
2046	452011	452012	6	195.0	7.3	0.013	0.069	Free Surface	0.169	No	6	No
2047	451002	451003	21	318.3	1.0	0.013	3.918	Free Surface	0.406	No	21	No
2048	451011	451010	8	259.5	0.6	0.013	0.250	Free Surface	0.439	No	8	No
2049	451007	451008	18	369.8	1.4	0.013	3.459	Free Surface	0.492	No	18	No
205	440916	440915	6	83.6	3.6	0.013	0.062	Free Surface	0.194	No	6	No
2050	443214	443214A	6	148.0	3.1	0.013	0.063	Free Surface	0.241	No	6	No
2051	452019	452018	6	275.0	2.4	0.013	0.214	Free Surface	0.400	No	6	No
2052	452013	452014	6	143.3	7.4	0.013	0.077	Free Surface	0.174	No	6	No
2053	451003	451004	21	416.0	1.9	0.013	3.895	Free Surface	0.362	No	21	No
2055	452611	452417	6	89.1	10.5	0.013	0.011	Free Surface	0.097	No	6	No
2056	452418	452417	6	101.1	1.5	0.013	0.023	Free Surface	0.144	No	6	No
2057	452608	452606	6	217.6	1.3	0.013	0.003	Free Surface	0.080	No	6	No
2058	452607	452606	6	248.4	6.2	0.013	0.020	Free Surface	0.101	No	6	No
2059	452419	452420	6	52.9	11.1	0.013	0.003	Free Surface	0.057	No	6	No
206	440605	440604	8	165.2	0.9	0.013	0.015	Free Surface	0.098	No	8	No
2060	452528	452420	6	164.9	11.9	0.013	0.002	Free Surface	0.053	No	6	No
2061	452018	452615	6	77.7	10.5	0.013	0.310	Free Surface	0.360	No	6	No
2062	443213	443204	8	355.2	1.1	0.013	0.075	Free Surface	0.203	No	8	No
2063	443204	443205	15	262.8	0.6	0.013	2.231	Free Surface	0.675	No	15	No
2064	452014	452015	6	171.6	23.7	0.013	0.084	Free Surface	0.158	No	6	No
2065	452015	452016	6	214.3	17.5	0.013	0.090	Free Surface	0.161	No	6	No
2066	451010	451009	8	140.1	0.6	0.013	0.255	Free Surface	0.449	No	8	No
2067	451008	451009	21	217.8	0.4	0.013	3.462	Free Surface	0.498	No	21	No
2068	452617	452605	6	144.4	5.1	0.013	0.004	Free Surface	0.085	No	6	No
2069	452606	452605	6	108.5	12.7	0.013	0.027	Free Surface	0.109	No	6	No

G3. Model Results for 2043 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
207	440606	440605	8	185.0	5.7	0.013	0.005	Free Surface	0.068	No	8	No
2070	443218	443217	6	163.8	1.0	0.013	0.127	Free Surface	0.410	No	6	No
2071	452602	452603	6	115.9	6.3	0.013	0.355	Free Surface	0.430	No	6	No
2072	452416	452603	6	306.5	1.7	0.013	0.037	Free Surface	0.305	No	6	No
2073	452610	451822A	6	181.4	3.8	0.013	0.007	Free Surface	0.076	No	6	No
2074	442907	443101	6	250.4	4.4	0.013	0.081	Free Surface	0.220	No	6	No
2075	452415	452603	6	96.2	1.0	0.013	0.002	Free Surface	0.237	No	6	No
2076	452424	452425	6	305.2	2.2	0.013	0.017	Free Surface	0.206	No	6	No
2077	451906	451903	21	180.7	0.4	0.013	3.713	Free Surface	0.520	No	21	No
2078	451907	451904	21	77.5	0.7	0.013	3.902	Free Surface	0.469	No	21	No
2079	452603	452401	8	152.1	5.4	0.013	0.393	Free Surface	0.319	No	8	No
208	440117LH	440117A	6	123.9	0.3	0.013	0.006	Free Surface	0.150	No	6	No
2080	452421	452401	6	295.8	0.3	0.013	0.016	Free Surface	0.308	No	6	No
2082	452427	452426	8	310.1	0.2	0.013	0.015	Free Surface	0.136	No	8	No
2083	451827	451826	6	167.2	4.4	0.013	0.017	Free Surface	0.125	No	6	No
2084	452613	451826	6	368.8	4.7	0.013	0.002	Free Surface	0.090	No	6	No
2085	452414	452401	6	95.7	3.2	0.013	0.001	Free Surface	0.232	No	6	No
2086	451405	451404	6	263.3	0.3	0.013	0.000	Free Surface	0.000	No	6	No
2087	451404	451403	6	113.2	0.6	0.013	0.000	Free Surface	0.000	No	6	No
2088	443201	443202	12	181.3	5.4	0.013	1.903	Free Surface	0.411	No	12	No
2089	451826	451825	6	155.7	3.2	0.013	0.030	Free Surface	0.165	No	6	No
209	440108	440113	6	164.0	25.6	0.013	0.020	Free Surface	0.134	No	6	No
2090	452612	451825	6	421.4	4.0	0.013	0.005	Free Surface	0.122	No	6	No
2091	443222	443221	8	72.2	10.4	0.013	0.003	Free Surface	0.037	No	8	No
2092	452401	452402	8	279.4	5.6	0.013	0.413	Free Surface	0.412	No	8	No
2093	452425	452425A	6	294.8	0.1	0.013	0.025	Free Surface	0.449	No	6	No
2094	443606	451907	8	261.9	7.2	0.013	0.052	Free Surface	0.108	No	8	No
2095	443223	443201	6	201.7	2.6	0.013	0.005	Free Surface	0.278	No	6	No
2096	451704	451705	18	167.8	1.3	0.013	3.974	Free Surface	0.534	No	18	No
2097	443305	443306	12	287.0	1.0	0.013	1.133	Free Surface	0.503	No	12	Yes
2098	452402	452403	8	119.3	1.4	0.013	0.462	Free Surface	0.503	No	8	No
2099	452426	452403A	10	101.3	0.7	0.013	0.168	Free Surface	0.511	No	10	Yes
21	454904	454905	6	241.4	12.3	0.013	0.271	Free Surface	0.311	No	6	No
210	440113	440114	6	179.4	0.8	0.013	0.027	Free Surface	0.536	No	6	No
2100	452411	452402	6	129.8	0.8	0.013	0.020	Free Surface	0.419	No	6	No
2101	451004	451005	21	123.5	1.7	0.013	3.918	Free Surface	0.454	No	21	No
2102	443107	443108	6	88.8	1.1	0.013	0.003	Free Surface	0.166	No	6	No
2104	452409	452405	10	121.7	2.9	0.013	0.019	Free Surface	0.226	No	10	No
2105	452404	452405C	16	231.9	0.3	0.013	0.583	Free Surface	0.303	No	12	No
2106	451819A	451817	6	245.0	0.7	0.013	0.042	Free Surface	0.240	No	6	No
2108	451416	451417	6	276.7	8.7	0.013	0.010	Free Surface	0.103	No	6	No
2109	443425	443402	8	109.0	3.9	0.013	0.393	Free Surface	0.354	No	8	No
211	440406	440406	6	217.1	0.6	0.013	0.007	Free Surface	0.099	No	6	No
2110	451821	451821A	6	234.4	0.5	0.013	0.008	Free Surface	0.147	No	6	No
2111	451820	451820A	8	274.9	1.3	0.013	0.058	Free Surface	0.144	No	8	No
2112	451813	403309	21	108.2	0.8	0.013	4.738	Free Surface	0.561	No	21	No
2113	452408	403316	6	277.0	0.3	0.013	0.015	Free Surface	0.191	No	6	No
2114	451508	451507	6	150.9	13.2	0.013	0.009	Free Surface	0.074	No	6	No
2115	442104	442102	6	188.2	1.0	0.013	0.023	Free Surface	0.154	No	6	No
2116	441801	443401	8	223.3	10.7	0.013	0.184	Free Surface	0.303	No	8	No
2117	441837	441801	6	237.0	0.4	0.013	0.032	Free Surface	0.241	No	6	No
2118	403321	403322	6	217.9	0.6	0.013	0.016	Free Surface	0.177	No	6	No
2119	451803D	451602	21	70.7	0.2	0.013	4.463	Free Surface	0.626	No	21	No
212	440634	440633	6	90.2	2.8	0.013	0.058	Free Surface	0.196	No	6	No
2120	451803A	451803B	21	34.4	1.0	0.013	4.137	Free Surface	0.465	No	21	No
2121	441832	441831	6	94.4	0.7	0.013	0.002	Free Surface	0.067	No	6	No
2122	441831	441828	6	169.6	2.2	0.013	0.005	Free Surface	0.100	No	6	No
2123	440712	440713	6	229.7	9.4	0.013	0.022	Free Surface	0.132	No	6	No
2124	451614	451614A	6	284.0	7.5	0.013	0.003	Free Surface	0.053	No	6	No
2126	403304	403305	18	399.6	1.0	0.013	5.907	Free Surface	0.844	No	18	Yes
2127	443306	443307	12	383.3	1.1	0.013	1.140	Free Surface	0.445	No	12	No
2128	443307	443201	12	183.7	7.3	0.013	1.875	Free Surface	0.377	No	12	No
2129	451825	452412	6	285.6	2.7	0.013	0.044	Free Surface	0.241	No	6	No
213	440613A	440602	6	309.8	2.5	0.013	0.024	Free Surface	0.378	No	6	No
2130	452412A	452412	6	180.7	1.6	0.013	0.017	Free Surface	0.215	No	6	No
2131	443333	443334	6	297.3	4.0	0.013	0.006	Free Surface	0.095	No	6	No
2132	443334	443308	6	421.7	1.7	0.013	0.015	Free Surface	0.123	No	6	No
2133	443308	443307	8	135.8	8.9	0.013	0.738	Free Surface	0.475	No	8	No
2134	443607	443606	8	297.6	10.4	0.013	0.052	Free Surface	0.099	No	8	No
2135	452403	452404	16	290.7	0.3	0.013	0.589	Free Surface	0.324	No	12	No
2136	451818	451817	6	83.1	4.3	0.013	0.010	Free Surface	0.154	No	6	No
2137	443327	443328	6	260.6	1.7	0.013	0.001	Free Surface	0.057	No	6	No
2138	452412	452413	6	185.7	0.9	0.013	0.068	Free Surface	0.299	No	6	No
2139	452413	451822	6	17.9	0.9	0.013	0.069	Free Surface	0.301	No	6	No
214	440628	440629	6	204.7	2.3	0.013	0.045	Free Surface	0.194	No	6	No
2141	443328	443310	6	295.0	5.1	0.013	0.009	Free Surface	0.288	No	6	No
2142	443310	443309	8	215.1	7.5	0.013	0.646	Free Surface	0.377	No	8	No
2143	451817	451816	6	127.3	1.6	0.013	0.052	Free Surface	0.409	No	6	No
2144	443311	443310	8	140.3	11.4	0.013	0.636	Free Surface	0.356	No	8	No
2145	451504	451407	6	354.4	7.6	0.013	0.062	Free Surface	0.186	No	6	No
2146	451808	451809	18	275.6	1.0	0.013	3.979	Free Surface	0.557	No	18	No
2147	451506LH	451510	8	165.5	0.4	0.013	0.000	Free Surface	0.033	No	8	No
2149	451819	451819A	6	197.2	1.0	0.013	0.006	Free Surface	0.171	No	6	No
215	440512	440511	6	173.4	13.7	0.013	0.009	Free Surface	0.076	No	6	No
2150	451807	451808	18	295.3	0.6	0.013	3.984	Free Surface	0.643	No	18	No
2153	451802	451829	15	14.2	10.9	0.013	0.000	Free Surface	0.291	No	15	No
2154	451415	451414	6	236.8	13.9	0.013	0.013	Free Surface	0.078	No	6	No
2155	451410	451409	6	284.1	25.1	0.013	0.044	Free Surface	0.121	No	6	No
2156	452405	452405A	12	11.2	1.2	0.013	0.026	Free Surface	0.252	No	12	No
2157	451510	451505	8	220.5	3.9	0.013	0.014	Free Surface	0.067	No	8	No
2159	451503	451504	6	181.1	9.0	0.013	0.060	Free Surface	0.163	No	6	No
2162	442111	442110	6	75.1	19.7	0.013	0.018	Free Surface	0.078	No	6	No
2163	403103	403304	21	63.9	0.6	0.013	6.052	Free Surface	0.635	No	21	No
2164	442210	442209	6	50.6	13.0	0.013	0.001	Free Surface	0.033	No	6	No
2165	451602	451803E	21	217.5	0.3	0.013	4.658	Free Surface	0.772	No	21	Yes
2166	441829	441828	6	245.6	5.8	0.013	0.007	Free Surface	0.097	No	6	No
2167	442108	442219	6	113.2	19.2	0.013	0.027	Free Surface	0.109	No	6	No
2168	442220	442219	6	178.4	4.4	0.013	0.013	Free Surface	0.109	No	6	No
2169	403301	403302	8	234.3	2.0	0.013	0.026	Free Surface	0.172	No	8	No
217	441209	441207	6	86.6	12.3	0.013	0.008	Free Surface	0.082	No	6	No
2170	403327	403302	6	374.2	1.3	0.013	0.007	Free Surface	0.205	No	6	No
2171	441933LH	441901	6	133.2	7.0	0.013	0.002	Free Surface	0.040	No	6	No
2172	441305	441804	8	99.1	7.0	0.013	0.206	Free Surface	0.315	No	8	No
2173	442215	442214	6	50.5	8.5	0.013	0.003	Free Surface	0.043	No	6	No
2174	403323	403301	6	274.0	1.0	0.013	0.009	Free Surface	0.127	No	6	No
2175	403105	403106	6	212.2	0.8	0.013	0.012	Free Surface	0.134	No	6	No
2176	441304	441305	8	115.3	5.7	0.013	0.204	Free Surface	0.220	No	8	No
2177	442214	442212	6	53.2	8.4	0.013	0.005	Free Surface	0.047	No	6	No
2178	442204	442204A	6	63.3	1.5	0.013	0.234	Free Surface	0.524	No	6	No
2179	442208	442207	6	340.5	14.3	0.013	0.005	Free Surface	0.157	No	6	No
218	LH441208	441207	6	94.1	22.7	0.013	0.008	Free Surface	0.078	No	6	No
2180	403107	403108	6	176.5	1.7	0.013	0.056	Free Surface	0.247	No	6	No
2181	403325	403303	8	273.1	1.3	0.013	0.008	Free Surface	0.067	No	8	No
2182	442205	442205A	6	183.8	1.5	0.013	0.060	Free Surface	0.252	No	6	No
2183	441915	441914	6	101.0	20.3	0.013	0.003	Free Surface	0.039	No	6	No
2184	441110	441307	6	374.1	13.4	0.013	0.054	Free Surface	0.136	No	6	No
2185	443807	443806	6	206.9	14.2	0.013	0.010	Free Surface	0.070	No	6	No
2186	441904	441905A	6	172.0	13.0	0.013	0.017	Free Surface	0.081	No	6	No
2187	441905	441905A	6	34.3	1.4	0.013	0.072	Free Surface	0.254	No	6	No
2189	403120	403109	6	110.4	2.1	0.013	0.011	Free Surface	0.241	No	6	No
219	440557	440516	6	207.9	15.1	0.013	0.005	Free Surface	0.106	No	6	No
2190	403307	403308	21	317.0	1.0	0.013	4.245	Free Surface	0.806	No	21	Yes
2191	441925	441924	6	201.2	13.1	0.013	0.024	Free Surface	0.091	No	6	No
2192	402904	402905	6	299.7	0.3	0.013	0.003	Free Surface	0.097	No	6	No
2193	440732	440733	6	231.6	0.9	0.013	0.007	Free Surface	0.122	No	6	No
2194	451810	451810A	18	56.5	0.3	0.013	4.438	Exceeds Capacity	1.000	No	18	Yes
2195	443317	443316	6	314.3	3.6	0.013	0.044	Free Surface	0.213	No	6	No
2196	451811	451812	18	61.5	3.1	0.013	4.740	Free Surface	0.623	No	18	No
2197	451414	451411	6	175.7	10.4	0.013	0.018	Free Surface	0.100	No	6	No
2198	451411	451410	6	178.8	15.4	0.013	0.037	Free Surface	0.110	No	6	No
2199	443403	443312	8	180.1	6.4	0.013	0.438	Free Surface	0.329	No	8	No
22	454905	454906	6	227.6	14.5	0.013	0.295	Free Surface	0.363	No	6	No
220	440517	440518	6	151.2	6.5	0.013	0.000	Free Surface	0.051	No	6	No
2200	443402	443403	8	279.3	3.5	0.013	0.395	Free Surface	0.342	No	8	No
2201	451812	451813	18	60.2	0.5	0.013	4.739	Free Surface	0.700	No	18	No
2202	451802A	451802	6	170.0	0.5	0.013	0.035	Free Surface	0.241	No	6	No
2203	451509	451411	6	83.2	14.6	0.013	0.012	Free Surface	0.089	No	6	No
2204	451802	451803	18	285.9	1.6	0.013	4.131	Free Surface	0.485	No	18	No
2205	443604A	443604	6	156.9	9.4	0.013	0.041	Free Surface	0.123	No	6	No
2206	451413	451509	6	96.8	7.7	0.013	0.008	Free Surface	0.064	No	6	No
2207	443404	443403	6	154.1	22.4	0.013	0.044	Free Surface	0.268	No	6	No
2208	443401	443425	8	78.0	3.9	0.013	0.392	Free Surface	0.343	No	8	No
2209	440706	443314	6	198.4	4.1	0.013	0.052	Free Surface	0.195	No	6	No
221	440509	440510	6	144.2	25.1	0.013	0.006	Free Surface	0.086	No	6	No
2210	451417	442104	6	165.8	1.9	0.013	0.020	Free Surface	0.160	No	6	No
2211	451502	451503	6	414.4	8.2	0.013	0.053	Free Surface	0.156	No	6	No
2212	403320	403321	6	28.9	1.6	0.013	0.007	Free Surface	0.123	No	6	No
2215	451803	451803A	18	150.5	1.5	0.013	4.136	Free Surface	0.510	No	18	No
2217	442101	442102	6	80.3	5.6	0.013	0.008	Free Surface	0.098	No	6	No
2218	403312	403313	21	265.9	1.0	0.013	4.625	Free Surface	0.495	No	21	No
2219	451803E	403103	21	220.4	0.5	0.013	6.045	Free Surface	0.678	No	21	No
222	440524	440518	6	101.7	12.8	0.013	0.027	Free Surface	0.101	No	6	No
2223	441818	442101	6	84.3	6.9	0.013	0.006	Free Surface	0.062	No	6	No
2224	451501	451502	6	401.0	8.5	0.013	0.044	Free Surface	0.146	No	6	No
2225	443415	441802	6	373.7	5.2	0.013	0.009	Free Surface	0.072	No	6	No
2226	441801	441801	8	150.5	3.9	0.013	0.347	Free Surface	0.302	No	8	No
2228	451611	451609	6	137.1	7.8	0.013	0.026	Free Surface	0.122	No	6	No
223	441214	441006	6	79.7	11.9	0.013	0.013	Free Surface	0.081	No	6	No
2230	442106	451501	6	115.8	12.4	0.013	0.039	Free Surface	0.130	No	6	No
2231	451615LH	451507	6	335.5	11.3	0.013	0.009	Free Surface	0.076	No	6	No
2232	441817	441819	6	152.5	1.8	0.013	0.002	Free Surface	0.053	No	6	No
2233	441817	441818	6	107.6	10.9	0.013	0.006	Free Surface	0.052	No	6	No
2234	451609	451608	6	84.2	9.0	0.013	0.042	Free Surface	0.201	No	6	No
2235	442212	442211	6	124.9	24.8	0.013	0.008	Free Surface	0.168	No	6	No
2236	442211	442207	6	181.9	6.6	0.013	0.167	Free Surface	0.281	No	6	No
2237	441812	441811	6	216.9	2.0	0.013	0.009	Free Surface	0.128	No	6	No
2238	441836	441811	6	169.6	2.2	0.013	0.011	Free Surface	0.133	No	6	No
2239	441901	441902	6	145.8	15.1	0.013	0.005	Free Surface	0.059	No	6	No
224	440511	440510	6	101.9	3.7	0.013	0.013	Free Surface	0.112	No	6	No
2240	441814	441813	6	143.0	4.5	0.013	0.012	Free Surface	0.080	No	6	No
2241	403302	403303	8	235.4	0.3	0.013	0.050	Free Surface	0.213	No	8	No
2242	403328	403303	8	374.9	0.4	0.013	0.007	Free Surface	0.079	No	8	No
2244	403324	403302	6	272.8	1.6	0.013	0.007	Free Surface	0.202	No	6	No
2245	442217	442211	6	90.3	11.1	0.013	0.159	Free Surface	0.268	No	6	No
2246	441302	441303	8	181.5	12.9	0.013	0.187	Free Surface	0.214	No	8	No
2247	441811	441810	6	57.2	0.9	0.013	0.020	Free Surface	0.179	No	6	No
2248	441807	441806	6	223.4	0.9	0.013	0.053	Free Surface	0.292	No	6	No
2249	442219	442219A	6	40.2	11.3	0.013	0.041	Free Surface	0.124	No	6	No
225	440510	440539	6	105.8	3.8	0.013	0.025	Free Surface	0.129	No	6	No
2250	442218	442217	6	260.4	7.3	0.013	0.156	Free Surface	0.261	No	6	No
2251	441808	441807	6	68.7	0.7	0.013	0.049	Free Surface	0.268	No	6	No

G3. Model Results for 2043 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
2252	441813	441808	6	66.3	15.5	0.013	0.014	Free Surface	0.171	No	6	No
2253	403106A	403107	6	249.9	2.3	0.013	0.036	Free Surface	0.201	No	6	No
2254	403306	403307	18	428.1	1.4	0.013	6.167	Free Surface	0.688	No	18	No
2255	441301	441302	8	168.2	4.4	0.013	0.181	Free Surface	0.207	No	8	No
2256	422203	451604	16	248.8	2.4	0.013	1.599	Free Surface	0.309	No	16	No
2257	403303	403401	8	234.0	0.5	0.013	0.075	Free Surface	0.271	No	8	No
2258	441932	441902	6	174.9	16.5	0.013	0.009	Free Surface	0.064	No	6	No
2259	440729	441301	8	48.6	0.7	0.013	0.165	Free Surface	0.336	No	8	No
226	440812	440809	6	208.1	0.7	0.013	0.005	Free Surface	0.126	No	6	No
2260	441902	441903	6	131.2	16.0	0.013	0.015	Free Surface	0.074	No	6	No
2261	441809	441808	6	159.5	0.6	0.013	0.032	Free Surface	0.249	No	6	No
2262	441810	441809	6	229.6	0.7	0.013	0.024	Free Surface	0.209	No	6	No
2263	441903	441904	6	5.7	15.3	0.013	0.016	Free Surface	0.078	No	6	No
2264	402905	403101	6	299.0	0.3	0.013	0.005	Free Surface	0.113	No	6	No
2265	441927	441926	6	134.0	15.0	0.013	0.004	Free Surface	0.047	No	6	No
2266	442223	441928	6	136.5	7.5	0.013	0.107	Free Surface	0.249	No	6	No
2267	441929	441928	6	266.3	5.5	0.013	0.004	Free Surface	0.061	No	6	No
2268	441926	441925	6	89.7	8.3	0.013	0.007	Free Surface	0.076	No	6	No
2269	441928	441925	6	238.1	12.5	0.013	0.013	Free Surface	0.082	No	6	No
2270	441914	441913	6	161.2	21.3	0.013	0.006	Free Surface	0.058	No	6	No
2271	442009	442206	6	76.1	1.5	0.013	0.036	Free Surface	0.197	No	6	No
2272	441308	441309	6	334.0	3.0	0.013	0.063	Free Surface	0.222	No	6	No
2273	441906	441905	6	243.4	7.9	0.013	0.071	Free Surface	0.240	No	6	No
2274	442201A	442202	16	292.0	1.3	0.013	1.627	Free Surface	0.413	No	16	No
2275	403119LH	403118	4	221.9	0.6	0.013	0.088	Free Surface	0.723	No	4	Yes
2276	403109	403110	6	240.4	0.7	0.013	0.081	Free Surface	0.318	No	6	No
2277	403308	403411	21	517.9	1.4	0.013	7.951	Free Surface	0.602	No	21	No
2279	403115	403114	6	166.4	5.0	0.013	0.031	Free Surface	0.133	No	6	No
228	440552	440553	6	99.3	7.5	0.013	0.002	Free Surface	0.089	No	6	No
2280	402721	402904	6	300.1	0.2	0.013	0.002	Free Surface	0.081	No	6	No
2281	403118	403117	6	217.5	4.5	0.013	0.149	Free Surface	0.302	No	6	No
2282	403117	403114	6	133.9	4.1	0.013	0.151	Free Surface	0.307	No	6	No
2283	403402	403403	8	381.1	0.2	0.013	0.117	Free Surface	0.348	No	8	No
2284	442008	442009	6	275.2	1.5	0.013	0.014	Free Surface	0.157	No	6	No
2285	402906	403118	6	250.1	0.2	0.013	0.066	Free Surface	0.393	No	6	No
2286	402908	402907	6	164.0	0.5	0.013	0.066	Free Surface	0.369	No	6	No
2287	402907	402906	6	53.0	0.4	0.013	0.066	Free Surface	0.352	No	6	No
2289	403110	403111	8	207.7	1.8	0.013	0.083	Free Surface	0.189	No	8	No
229	440515	440516	6	159.3	12.8	0.013	0.019	Free Surface	0.126	No	6	No
2290	403114	403113	15	264.1	0.6	0.013	0.181	Free Surface	0.164	No	6	No
2291	403113	403111	15	133.6	1.0	0.013	0.238	Free Surface	0.164	No	6	No
2292	402719	402720	6	172.4	0.3	0.013	0.000	Free Surface	0.047	No	6	No
2293	403111	403112	15	214.0	1.1	0.013	0.321	Free Surface	0.251	No	8	No
2294	442007A	442007	6	230.7	17.7	0.013	0.069	Free Surface	0.178	No	6	No
2295	402720	402721	6	300.5	0.3	0.013	0.001	Free Surface	0.067	No	6	No
2296	442007	442006	6	88.6	3.9	0.013	0.069	Free Surface	0.293	No	6	No
2297	402903	VMH_72	15	149.3	0.3	0.013	0.394	Free Surface	0.292	No	8	No
2298	403605	403604	6	236.0	0.2	0.013	0.136	Free Surface	0.668	No	6	Yes
2299	403603	403604	8	237.6	0.2	0.013	0.110	Free Surface	0.357	No	8	No
230	440519	440518	6	257.9	5.3	0.013	0.002	Free Surface	0.068	No	6	No
2300	403602	403603	8	270.2	0.2	0.013	0.071	Free Surface	0.370	No	8	No
2301	442006	442005	6	349.5	0.7	0.013	0.093	Free Surface	0.408	No	6	No
2302	403112	402903	15	242.9	0.2	0.013	0.324	Free Surface	0.269	No	8	No
2303	402724LH	402723	6	224.3	0.4	0.013	0.090	Free Surface	0.396	No	6	No
2304	402902B	VMH_72	6	191.4	3.7	0.013	0.046	Free Surface	0.467	No	6	No
2305	402723	402722	6	134.8	1.1	0.013	0.091	Free Surface	0.319	No	6	No
2306	403202	403203	6	178.5	0.8	0.013	0.016	Free Surface	0.158	No	6	No
2307	402716	402715	6	114.2	1.7	0.013	0.004	Free Surface	0.069	No	6	No
2308	402615	402613	6	256.9	1.8	0.013	0.037	Free Surface	0.188	No	6	No
2309	402703	HILLER_WW	15	72.9	0.1	0.013	0.969	Free Surface	0.456	No	10	No
231	440518	440553	6	98.0	13.5	0.013	0.029	Free Surface	0.123	No	6	No
2310	402610	402611	6	235.5	0.9	0.013	0.004	Free Surface	0.141	No	6	No
2311	402713	402701	6	199.3	2.5	0.013	0.015	Free Surface	0.556	No	6	No
2312	402701	402702	10	278.9	0.1	0.013	0.364	Free Surface	0.587	No	10	Yes
2313	402604	402604A	6	119.0	3.6	0.013	0.049	Free Surface	0.191	No	6	No
2314	402609	402603	6	387.0	0.5	0.013	0.011	Free Surface	0.235	No	6	No
2315	402611	402505	6	250.9	2.4	0.013	0.053	Free Surface	0.586	No	6	No
2316	402505	402701	10	277.2	0.1	0.013	0.344	Free Surface	0.652	No	10	Yes
2317	402504	402505	10	364.3	0.1	0.013	0.229	Free Surface	0.529	No	10	Yes
2318	403009	403005	6	361.2	0.3	0.013	0.029	Free Surface	0.250	No	6	No
2319	403803	403804	6	135.7	2.4	0.013	0.003	Free Surface	0.051	No	6	No
232	441007	441008	8	198.9	11.6	0.013	0.019	Free Surface	0.068	No	8	No
2320	403805	403804	6	115.5	0.5	0.013	0.002	Free Surface	0.095	No	6	No
2321	403803	403802	6	203.4	1.4	0.013	0.002	Free Surface	0.051	No	6	No
2322	402503	402504	10	358.6	0.7	0.013	0.220	Free Surface	0.386	No	10	No
2323	402806	402807	6	349.4	0.5	0.013	0.016	Free Surface	0.182	No	6	No
2324	402603	402503	6	256.5	0.9	0.013	0.081	Free Surface	0.410	No	6	No
2325	402510	402505	6	258.0	0.5	0.013	0.057	Free Surface	0.644	No	6	No
2326	402807A	402510	6	25.0	0.8	0.013	0.048	Free Surface	0.289	No	6	No
2327	403801	403802	6	127.4	0.5	0.013	0.002	Free Surface	0.055	No	6	No
2328	402502	402503	8	285.9	0.1	0.013	0.100	Free Surface	0.685	No	8	Yes
2329	402509	402510	6	343.6	1.8	0.013	0.005	Free Surface	0.197	No	6	No
233	430218	430217	6	106.9	7.3	0.013	0.045	Free Surface	0.187	No	6	No
2330	403802	403808	6	161.1	0.5	0.013	0.007	Free Surface	0.131	No	6	No
2331	403804	403806	6	237.9	0.5	0.013	0.008	Free Surface	0.139	No	6	No
2332	402507	402503	6	256.7	0.4	0.013	0.033	Free Surface	0.372	No	6	No
2334	403502	403501	8	180.6	0.4	0.013	0.000	Free Surface	0.000	No	8	No
2335	403808	403807	6	257.9	0.5	0.013	0.012	Free Surface	0.161	No	6	No
2336	403806	403807	6	150.9	0.5	0.013	0.013	Free Surface	0.165	No	6	No
2337	402506	402507	6	278.2	0.5	0.013	0.021	Free Surface	0.221	No	6	No
2338	403810	403809	6	101.6	0.5	0.013	0.007	Free Surface	0.198	No	6	No
2339	403807	403809	6	259.9	0.5	0.013	0.031	Free Surface	0.258	No	6	No
2342	453708	453709	10	112.8	1.8	0.013	1.082	Free Surface	0.743	No	10	Yes
2343	450201	450202	10	110.3	4.8	0.013	0.219	Free Surface	0.283	No	10	No
2344	450112	450101	6	261.6	11.1	0.013	0.016	Free Surface	0.251	No	6	No
2346	450608	450801	10	109.5	1.8	0.013	0.206	Free Surface	0.272	No	10	No
2347	453702	453703	10	231.8	0.6	0.013	1.047	Free Surface	0.749	No	10	Yes
2348	450202	450203	10	150.9	0.7	0.013	0.348	Free Surface	0.351	No	10	No
2349	452105	452815	6	77.1	41.7	0.013	0.015	Free Surface	0.066	No	6	No
235	432605	432604	6	126.1	19.1	0.013	0.039	Free Surface	0.149	No	6	No
2350	450209A	450209	6	15.4	13.1	0.013	0.044	Free Surface	0.367	No	6	No
2352	450413	450414	10	187.8	0.7	0.013	0.201	Free Surface	0.246	No	10	No
2353	452203LH	452202	6	145.6	0.5	0.013	0.008	Free Surface	0.116	No	6	No
2354	452811	452812	6	281.9	7.3	0.013	0.009	Free Surface	0.125	No	6	No
2355	452109	452108	6	91.3	42.6	0.013	0.007	Free Surface	0.039	No	6	No
2356	452111	452108	6	159.5	4.2	0.013	0.012	Free Surface	0.089	No	6	No
2357	452514	452513	6	71.0	10.6	0.013	0.004	Free Surface	0.045	No	6	No
2358	452805	452804	6	258.0	8.8	0.013	0.009	Free Surface	0.070	No	6	No
2359	452513	452512	6	109.4	11.3	0.013	0.005	Free Surface	0.044	No	6	No
236	430219	430218	6	120.3	14.2	0.013	0.009	Free Surface	0.101	No	6	No
2363	440903	440903A	10	154.2	11.1	0.013	1.033	Free Surface	0.320	No	10	No
2365	452410	452409	6	264.6	0.6	0.013	0.016	Free Surface	0.140	No	6	No
2366	LH450209B	450209A	6	101.1	8.4	0.013	0.001	Free Surface	0.074	No	6	No
2367	453709	453710	10	313.3	1.2	0.017	1.078	Free Surface	0.639	No	10	No
2368	452815	452813	6	137.3	22.4	0.013	0.019	Free Surface	0.082	No	6	No
2369	452106	452105	6	267.8	14.7	0.013	0.014	Free Surface	0.066	No	6	No
237	430411	430412	6	192.2	10.7	0.013	0.036	Free Surface	0.153	No	6	No
2370	453727	453726	8	49.0	42.6	0.013	0.031	Free Surface	0.069	No	8	No
2371	452813	452812	6	146.1	13.3	0.013	0.021	Free Surface	0.135	No	6	No
2372	453728	453727	8	82.8	8.7	0.013	0.000	Free Surface	0.028	No	8	No
2374	450207	450206	10	502.6	1.4	0.013	0.377	Free Surface	0.317	No	10	No
2375	450204	450413	10	12.6	5.7	0.013	0.202	Free Surface	0.231	No	10	No
2376	452107	452106	6	137.1	9.7	0.013	0.005	Free Surface	0.061	No	6	No
2377	450205	450204	8	34.3	1.8	0.013	0.391	Free Surface	0.423	No	8	No
2378	452812	452720	6	138.4	1.9	0.013	0.035	Free Surface	0.175	No	6	No
2379	452104	452103	6	120.0	8.7	0.013	0.002	Free Surface	0.068	No	6	No
238	433107	431712	6	143.7	51.2	0.013	0.113	Free Surface	0.194	No	6	No
2380	452116	452115	6	242.1	1.1	0.013	0.005	Free Surface	0.061	No	6	No
2381	452814	452813	6	485.1	7.8	0.013	0.002	Free Surface	0.061	No	6	No
2382	452719	452720	6	280.2	5.7	0.013	0.012	Free Surface	0.125	No	6	No
2383	452810	452809	6	52.6	22.3	0.013	0.002	Free Surface	0.038	No	6	No
2384	452809	452811	6	115.5	10.0	0.013	0.006	Free Surface	0.059	No	6	No
2385	452115	452113	6	69.7	65.7	0.013	0.007	Free Surface	0.055	No	6	No
2386	452115	452114	6	219.8	8.5	0.013	0.002	Free Surface	0.033	No	6	No
2387	452807LH	452806	6	89.0	9.6	0.013	0.003	Free Surface	0.041	No	6	No
2388	452103	452102	6	291.2	1.1	0.013	0.008	Free Surface	0.090	No	6	No
2389	452114	452112	6	41.4	79.3	0.013	0.005	Free Surface	0.048	No	6	No
239	433106	433107	6	75.8	2.3	0.013	0.002	Free Surface	0.095	No	6	No
2390	450410	450410	10	193.2	0.4	0.013	0.536	Free Surface	0.546	No	10	Yes
2391	452201	452001	6	127.7	7.6	0.013	0.023	Free Surface	0.110	No	6	No
2392	452113	452112	6	197.6	3.1	0.013	0.007	Free Surface	0.070	No	6	No
2393	452808	452718	6	56.7	2.5	0.013	0.002	Free Surface	0.044	No	6	No
2394	452718	452719	6	195.7	7.4	0.013	0.004	Free Surface	0.065	No	6	No
2395	452730	452729	6	91.3	15.1	0.013	0.003	Free Surface	0.055	No	6	No
2396	452731	452729	6	115.0	4.6	0.013	0.010	Free Surface	0.078	No	6	No
2397	452817	452818	6	152.6	1.4	0.013	0.010	Free Surface	0.103	No	6	No
2398	452004	452005	6	144.4	11.3	0.013	0.039	Free Surface	0.120	No	6	No
2399	452005	452006	6	111.4	17.3	0.013	0.042	Free Surface	0.111	No	6	No
24	453604	453605	6	273.5	1.5	0.013	0.000	Free Surface	0.065	No	6	No
240	431802	431806	6	215.7	10.1	0.013	0.130	Free Surface	0.682	No	6	No
2401	452717	452716	6	235.7	7.3	0.013	0.007	Free Surface	0.063	No	6	No
2402	452026	452024	6	125.8	9.1	0.013	0.015	Free Surface	0.144	No	6	No
2404	452804	452712	6	286.8	9.1	0.013	0.013	Free Surface	0.088	No	6	No
2405	452519	452518	6	175.4	6.1	0.013	0.012	Free Surface	0.092	No	6	No
2406	452729	452520	6	188.8	14.9	0.013	0.015	Free Surface	0.079	No	6	No
2407	452520	452518	6	38.6	14.5	0.013	0.020	Free Surface	0.093	No	6	No
241	433015	431639	6	172.3	4.4	0.013	0.098	Free Surface	0.272	No	6	No
2412	452027	452026	6	128.1	11.7	0.013	0.013	Free Surface	0.076	No	6	No
2413	452024	452023	6	214.5	16.1	0.013	0.136	Free Surface	0.221	No	6	No
2414	452518	452517	6	177.7	17.9	0.013	0.034	Free Surface	0.140	No	6	No
2415	452529LH	452517	6	231.0	0.9	0.013	0.012	Free Surface	0.154	No	6	No
2416	452517	452516	6	135.2	4.3	0.013	0.052	Free Surface	0.289	No	6	No
2419	452023	452022	6	220.6	9.8	0.013	0.138	Free Surface	0.250	No	6	No
242	431640	431639	6	248.5	6.3	0.013	0.119	Free Surface	0.273	No	6	No
2420	452516	452507	6	61.5	0.3	0.013	0.055	Free Surface	0.296	No	6	No
2421	452507	452508	6	193.4	5.8	0.013	0.071	Free Surface	0.216	No	6	No
2422	452819	452820	6	236.7	7.7	0.013	0.044	Free Surface	0.138	No	6	No
2423	452708	452607	6	335.0	7.3	0.013	0.002	Free Surface	0.069	No	6	No
2424	452020	452019	6	110.0	4.0	0.013	0.166	Free Surface	0.388	No	6	No
2425	452022	452021	6	79.5	7.6	0.013	0.140	Free Surface	0.243	No	6	No
2426	452021	452020	6	392.9	13.7	0.013	0.146	Free Surface	0.223	No	6	No
2427	452523	452506	8	154.6	13.4	0.013	0.008	Free Surface	0.051	No	8	No
2428	452506	452507	6	117.3	5.1	0.013	0.012	Free Surface	0.137	No	6	No
2429	452505	452506	6	336.9	1.6	0.013	0.003	Free Surface	0.071	No	6	No
243	443602	443607	8	209.2	10.4	0.013	0.052	Free Surface	0.100	No	8	No
2430	452204	452204A	6	122.1	37.5	0.013	0.011	Free Surface	0.055	No	6	No
2431	451306	451305	6	293.0	16.7	0.013	0.021	Free Surface	0.091	No	6	No
2432	451307	451306	6	52.9	13.9	0.013	0.014	Free Surface	0.078	No	6	No
2433	451304LH	451303	6	153.3	3.7	0.013	0.009	Free Surface	0.074	No	6	No
2434	452202	452201	6	227.9	4.8	0.013	0.016	Free Surface	0.100	No	6	No
2435	452031	452108	6	336.4	18.2	0.013	0.015	Free Surface	0.069	No	6	No

G3. Model Results for 2043 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
2436	452102	452101	6	324.8	8.5	0.013	0.013	Free Surface	0.088	No	6	No
2437	452521	452520	6	60.4	10.2	0.013	0.002	Free Surface	0.059	No	6	No
2438	452818	452818WYE	6	208.8	4.3	0.013	0.016	Free Surface	0.115	No	6	No
2439	452508	452509	6	397.2	2.7	0.013	0.076	Free Surface	0.363	No	6	No
244	452714	432713	6	164.6	5.5	0.013	0.002	Free Surface	0.042	No	6	No
2441	452012	452013	6	145.4	17.7	0.013	0.074	Free Surface	0.175	No	6	No
2442	452501	452502	6	210.4	0.4	0.013	0.000	Free Surface	0.070	No	6	No
2446	431636	431643	6	181.3	29.2	0.013	0.204	Free Surface	0.223	No	6	No
2449	451408	451407	6	54.3	9.8	0.013	0.062	Free Surface	0.181	No	6	No
245	432604	432601	6	32.5	3.1	0.013	0.042	Free Surface	0.159	No	6	No
2454	403315	403406	21	233.9	0.9	0.013	4.940	Free Surface	0.513	No	21	No
2455	403407	403708	21	230.9	1.1	0.013	4.940	Free Surface	0.512	No	21	No
2457	403421	403401	6	274.2	0.1	0.013	0.009	Free Surface	0.283	No	6	No
2458	403419	403402	6	374.2	0.1	0.013	0.007	Free Surface	0.387	No	6	No
2463	403313	403314	21	234.5	1.3	0.013	4.935	Free Surface	0.448	No	21	No
2469	432406	432402	12	34.1	2.1	0.013	1.268	Free Surface	0.427	No	12	No
247	403423E	403423C	27	535.1	0.2	0.013	14.138	Exceeds Capacity	1.000	No	27	Yes
2470	431644	432406	12	253.2	0.7	0.013	1.268	Free Surface	0.587	No	12	Yes
2471	403314	403315	21	234.7	1.5	0.013	4.942	Free Surface	0.438	No	21	No
2473	403406	403407	21	237.1	0.7	0.013	4.969	Free Surface	0.523	No	21	No
2475	403420	403401	6	374.9	0.1	0.013	0.007	Free Surface	0.279	No	6	No
2477	403415	VMH-92	27	455.1	0.7	0.013	7.371	Free Surface	0.744	No	27	No
2479	403414	403414	21	90.2	0.3	0.013	7.807	Free Surface	0.828	No	21	Yes
248	450609	450606	8	201.7	8.7	0.013	0.009	Free Surface	0.131	No	8	No
2480	403403	403404	12	235.5	1.1	0.013	0.123	Free Surface	0.576	No	12	No
2481	403404	403405	12	35.5	0.2	0.013	0.140	Backwater	1.000	No	12	Yes
2482	403405	403413	12	27.0	0.2	0.013	0.398	Backwater	1.000	No	12	Yes
249	450605	450606	10	93.0	0.8	0.013	0.183	Free Surface	0.227	No	10	No
2492	452408A	452408	6	255.1	0.6	0.013	0.008	Free Surface	0.154	No	6	No
2493	441827A	441827	6	303.7	2.2	0.013	0.003	Free Surface	0.054	No	6	No
2494	450705	451107	6	226.8	2.9	0.013	0.000	Free Surface	0.131	No	6	No
2497	431612	431610	6	33.5	5.4	0.013	0.243	Free Surface	0.368	No	6	No
2498	433410	433411	8	239.8	3.6	0.013	0.907	Free Surface	0.525	No	8	No
2499	433411	433412	8	50.6	8.6	0.013	0.910	Free Surface	0.462	No	8	No
25	454001	453601	6	126.9	3.5	0.013	0.095	Free Surface	0.275	No	6	No
250	454807	454808	8	214.2	14.8	0.013	0.303	Free Surface	0.216	No	8	No
2500	440526	440525	6	153.7	2.1	0.013	0.004	Free Surface	0.071	No	6	No
2502	433101	433103	6	61.0	53.2	0.013	0.062	Free Surface	0.134	No	6	No
2506	451705	451801	18	474.5	0.9	0.013	4.066	Free Surface	0.583	No	18	No
251	450218	450217	6	100.2	5.3	0.013	0.050	Free Surface	0.275	No	6	No
2513	451008	451004	15	32.0	9.6	0.013	0.000	Free Surface	0.165	No	15	No
2514	433206	433205	6	365.0	6.1	0.013	0.020	Free Surface	0.134	No	6	No
2516	433202	433201	6	49.9	6.0	0.013	0.144	Free Surface	0.285	No	6	No
2519	450419	450906	18	351.8	3.2	0.013	4.431	Free Surface	0.418	No	18	No
252	450606	450607	10	43.4	4.4	0.013	0.193	Free Surface	0.202	No	10	No
2520	450416	450419	12	28.2	6.0	0.013	0.234	Free Surface	0.376	No	12	No
2521	450420	450419	12	37.0	9.7	0.013	0.006	Free Surface	0.275	No	12	No
2522	450418	450411	8	48.7	4.3	0.013	0.009	Free Surface	0.202	No	8	No
2524	441410	441409	6	324.5	1.2	0.013	0.054	Free Surface	0.268	No	6	No
2525	442001	442001WYE	6	160.0	14.2	0.013	0.008	Free Surface	0.070	No	6	No
2528	402808	402901	6	358.3	0.2	0.013	0.013	Free Surface	0.187	No	6	No
2529	403006	402902	6	226.7	0.6	0.013	0.016	Free Surface	0.157	No	6	No
253	454808	454809	8	214.2	14.7	0.013	0.307	Free Surface	0.215	No	8	No
2530	403001	402903	8	249.7	0.5	0.013	0.068	Free Surface	0.234	No	8	No
2535	451904	451905	18	238.6	2.7	0.013	3.902	Free Surface	0.426	No	18	No
2536	451903	451907	21	37.0	2.4	0.013	3.852	Free Surface	0.402	No	21	No
2537	451009	451906	21	247.5	0.5	0.013	3.713	Free Surface	0.508	No	21	No
2538	451005	451901	21	260.0	0.3	0.013	3.885	Free Surface	0.574	No	21	No
2539	451001	451002	21	47.5	1.0	0.013	3.870	Free Surface	0.437	No	21	No
254	450607	450608	10	143.0	1.4	0.013	0.193	Free Surface	0.226	No	10	No
2540	450905	451006	18	379.3	1.7	0.013	3.444	Free Surface	0.477	No	18	No
2541	451901	451902	21	293.3	0.6	0.013	3.873	Free Surface	0.495	No	21	No
2542	451902	451401	21	394.4	1.2	0.013	3.861	Free Surface	0.405	No	21	No
2543	450925	450902	12	206.6	2.9	0.013	0.700	Free Surface	0.286	No	12	No
2544	450906	450907	20	330.6	2.2	0.013	4.426	Free Surface	0.398	No	20	No
2545	403201	403202	6	153.3	0.4	0.013	0.010	Free Surface	0.148	No	6	No
2546	403309	403310	21	59.7	0.4	0.013	4.737	Free Surface	0.608	No	21	No
255	450612	450608	6	200.6	1.4	0.013	0.013	Free Surface	0.245	No	6	No
2551	403316	403317	6	273.4	0.9	0.013	0.024	Free Surface	0.166	No	6	No
2552	451816	451816A	6	202.1	0.1	0.013	0.055	Free Surface	0.439	No	6	No
2553	451822	451822A	6	57.6	0.3	0.013	0.069	Free Surface	0.367	No	6	No
2555	451829	451807	18	29.8	7.3	0.013	3.992	Free Surface	0.320	No	18	No
2556	451505	451802	8	62.3	2.4	0.013	0.018	Free Surface	0.084	No	8	No
2557	451801	451802	18	298.4	2.6	0.013	4.083	Free Surface	0.423	No	18	No
2558	451806	451829	18	326.0	1.9	0.013	3.992	Free Surface	0.459	No	18	No
2559	451702A	451806	18	122.5	1.8	0.013	3.997	Free Surface	0.466	No	18	No
256	454809	454809A	8	52.2	17.3	0.013	0.306	Free Surface	0.205	No	8	No
2560	452716	452712	6	218.4	10.6	0.013	0.010	Free Surface	0.083	No	6	No
2568	431645	431644	12	316.2	1.8	0.013	1.284	Free Surface	0.466	No	12	No
257	442704LH	442703	6	122.2	19.4	0.013	0.006	Free Surface	0.142	No	6	No
2579	450414	450415	12	107.5	2.3	0.013	0.201	Free Surface	0.175	No	12	No
258	450410	450411	12	247.6	3.7	0.013	0.544	Free Surface	0.237	No	12	No
2580	450204	450409A	10	199.8	0.5	0.013	0.537	Free Surface	0.491	No	10	No
259	442916	442917	6	187.6	2.2	0.013	0.007	Free Surface	0.082	No	6	No
2591	443225	450908	6	15.9	6.2	0.013	0.000	Free Surface	0.000	No	6	No
26	453901	453601	6	95.2	9.7	0.013	0.033	Free Surface	0.207	No	6	No
260	453720LH	453719	8	149.7	12.4	0.013	0.025	Free Surface	0.067	No	8	No
261	453717	453716	8	111.7	4.8	0.013	0.031	Free Surface	0.152	No	8	No
264	403423D	403423E	27	88.5	0.4	0.013	14.138	Exceeds Capacity	1.000	No	27	Yes
267	442719	442720	6	268.4	2.7	0.013	0.006	Free Surface	0.075	No	6	No
268	432102	432103	6	44.1	0.9	0.013	0.029	Free Surface	0.201	No	6	No
269	430708	430709	6	112.6	2.6	0.013	0.006	Free Surface	0.160	No	6	No
27	453602	453601	6	161.4	4.1	0.013	0.023	Free Surface	0.210	No	6	No
270	430709	430710	6	112.7	0.5	0.013	0.034	Free Surface	0.252	No	6	No
272	432101	432102	6	122.8	1.0	0.013	0.027	Free Surface	0.191	No	6	No
273	431012	431105	6	100.1	3.1	0.013	0.017	Free Surface	0.114	No	6	No
274	433308	433307	6	213.8	1.0	0.013	0.002	Free Surface	0.063	No	6	No
276	432103	432104	6	81.8	0.9	0.013	0.031	Free Surface	0.206	No	6	No
277	433315	433314	6	238.9	6.1	0.013	0.371	Free Surface	0.477	No	6	No
279	431829	432101	6	154.4	0.7	0.013	0.024	Free Surface	0.188	No	6	No
28	453604	453603	6	273.3	9.5	0.013	0.009	Free Surface	0.073	No	6	No
280	442718LH	442719	6	93.7	2.2	0.013	0.003	Free Surface	0.061	No	6	No
281	431111	431112	6	223.9	3.6	0.013	0.006	Free Surface	0.079	No	6	No
282	432112	432111	6	122.6	56.9	0.013	0.011	Free Surface	0.069	No	6	No
283	432106	432105	6	162.4	0.9	0.013	0.033	Free Surface	0.237	No	6	No
284	431104	431103	6	60.9	2.5	0.013	0.019	Free Surface	0.119	No	6	No
285	430714	430715	6	191.2	14.2	0.013	0.042	Free Surface	0.133	No	6	No
286	432109	432106	6	295.3	19.9	0.013	0.012	Free Surface	0.113	No	6	No
287	432105	432106	6	52.5	0.9	0.013	0.046	Free Surface	0.217	No	6	No
288	442710LH	442709	6	163.6	9.0	0.013	0.003	Free Surface	0.047	No	6	No
289	431112	431113	6	399.2	4.0	0.013	0.012	Free Surface	0.087	No	6	No
29	453603	453602	6	268.0	9.6	0.013	0.016	Free Surface	0.103	No	6	No
290	433307	433306	6	211.9	4.2	0.013	0.007	Free Surface	0.096	No	6	No
292	430715	NAUGHTON_WW	6	86.1	8.2	0.013	0.047	Free Surface	0.396	No	6	No
293	431110	431205	6	393.3	8.1	0.013	0.061	Free Surface	0.178	No	6	No
294	433314	433313	6	186.9	4.1	0.013	0.348	Free Surface	0.454	No	6	No
295	432106	432107	6	200.0	8.3	0.013	0.064	Free Surface	0.206	No	6	No
296	442715	442714	6	47.0	23.9	0.013	0.007	Free Surface	0.057	No	6	No
297	442714	442713	6	107.7	10.2	0.013	0.011	Free Surface	0.095	No	6	No
298	431113	431114	6	134.4	8.2	0.013	0.015	Free Surface	0.098	No	6	No
3	455009	455001	6	174.0	1.5	0.013	0.051	Free Surface	0.200	No	6	No
30	433722	433721	6	99.2	1.6	0.013	0.005	Free Surface	0.074	No	6	No
300	433306	433305	6	211.3	1.2	0.013	0.012	Free Surface	0.115	No	6	No
3002	440428	440429	6	14.4	9.5	0.013	0.017	Free Surface	0.089	No	6	No
3004	452509	04C161M	6	45.6	0.4	0.013	0.103	Free Surface	0.441	No	6	No
3006	441603A	441602	8	67.2	15.2	0.013	0.210	Free Surface	0.208	No	8	No
3008	442001WYE	442002	6	115.8	11.0	0.013	0.016	Free Surface	0.075	No	6	No
3010	442000F	442001WYE	8	102.1	9.1	0.013	0.008	Free Surface	0.053	No	8	No
3012	442000D	442000E	8	146.9	3.2	0.013	0.003	Free Surface	0.042	No	8	No
3014	403508	403504	8	179.1	0.4	0.013	0.003	Free Surface	0.076	No	8	No
3016	403507	403506	8	45.3	0.4	0.013	0.005	Free Surface	0.065	No	8	No
3018	403509	403507	8	123.8	0.6	0.013	0.002	Free Surface	0.055	No	8	No
302	433312	433311	6	72.3	0.8	0.013	0.003	Free Surface	0.062	No	6	No
3020	403510	403511	8	239.8	0.6	0.013	0.022	Free Surface	0.132	No	8	No
3022	403505	403510	8	140.6	0.6	0.013	0.019	Free Surface	0.124	No	8	No
3024	402807	402807A	6	320.3	0.5	0.013	0.022	Free Surface	0.227	No	6	No
303	432908	432909	6	139.1	2.3	0.013	0.017	Free Surface	0.232	No	6	No
3034	441503	441520	12	20.9	0.8	0.013	0.683	Free Surface	0.401	No	12	No
304	432909	432910	6	102.1	1.4	0.013	0.107	Free Surface	0.527	No	6	No
3042	04C034M	EL_CAMINO_REAL_WW	6	11.0	4.5	0.013	0.045	Free Surface	0.163	No	6	No
3046	400026	ISLAND_PARK_BBALL_WW	10	3.5	2.9	0.013	0.036	Free Surface	0.086	No	10	No
3048	IPP5	ISLAND_PARK_WW	10	9.2	16.3	0.013	0.612	Free Surface	0.423	No	10	No
305	442311LH	442310	6	207.1	0.3	0.013	0.003	Free Surface	0.072	No	6	No
306	431103	431102	6	265.5	5.8	0.013	0.021	Free Surface	0.100	No	6	No
307	433311	433310	6	106.8	5.2	0.013	0.005	Free Surface	0.065	No	6	No
308	433310	433309	6	192.7	5.0	0.013	0.008	Free Surface	0.247	No	6	No
31	454801	454802	6	250.5	9.1	0.013	0.289	Free Surface	0.395	No	6	No
310	432107	432001	6	236.5	3.2	0.013	0.085	Free Surface	0.282	No	6	No
311	432911	432910	6	131.5	9.0	0.013	0.180	Free Surface	0.494	No	6	No
312	442310	442309	6	100.1	7.6	0.013	0.005	Free Surface	0.070	No	6	No
313	431117	431115	6	304.9	0.9	0.013	0.008	Free Surface	0.134	No	6	No
314	431114	431115	6	148.6	7.7	0.013	0.026	Free Surface	0.136	No	6	No
315	UH430718	430717	4	78.3	3.6	0.013	0.002	Free Surface	0.105	No	4	No
316	433305	433304	6	221.1	3.3	0.013	0.016	Free Surface	0.111	No	6	No
317	442326	442325	6	212.0	3.5	0.013	0.004	Free Surface	0.055	No	6	No
319	432001	432002	6	158.6	1.9	0.013	0.086	Free Surface	0.236	No	6	No
32	453606	453607	6	232.5	8.6	0.013	0.203	Free Surface	0.471	No	6	No
320	430610	430609	8	138.3	0.6	0.013	0.026	Free Surface	0.139	No	8	No
321	442810	442809	6	162.2	5.3	0.013	0.016	Free Surface	0.106	No	6	No
322	433304	433303	6	218.6	4.0	0.013	0.021	Free Surface	0.127	No	6	No
323	442811	442810	6	190.2	16.3	0.013	0.005	Free Surface	0.070	No	6	No
324	430609	430608	8	212.5	1.8	0.013	0.343	Free Surface	0.391	No	8	No
325	433301	430706	6	177.5	11.3	0.013	0.324	Free Surface	0.370	No	6	No
326	442309	442308	6	213.8	2.3	0.013	0.009	Free Surface	0.093	No	6	No
327	454906	454907	6	165.0	5.1	0.013	0.278	Free Surface	0.378	No	6	No
328	454104	453905	6	275.6	4.9	0.013	0.045	Free Surface	0.279	No	6	No
329	454217	453905	6	151.3	1.1	0.013	0.128	Free Surface	0.397	No	6	No
33	454802	454803	6	77.2	5.3	0.013	0.288	Free Surface	0.380	No	6	No
330	453904	453905	6	239.3	0.8	0.013	0.004	Free Surface	0.079	No	6	No
331	433717	433716	6	71.9	6.2	0.013	0.013	Free Surface	0.194	No	6	No
332	433720	433717	6	148.2	6.2	0.013	0.007	Free Surface	0.072	No	6	No
333	453502	453501	6	241.4	1.3	0.013	0.414	Free Surface	0.777	No	6	Yes
334	431413	431412	6	248.3	5.6	0.013	0.005	Free Surface	0.122	No	6	No
335	450809	450810	6	49.2	1.8	0.013	0.106	Free Surface	0.469	No	6	No
336	431405	431406	6	269.3	3.2	0.013	0.091	Free Surface	0.267	No	6	No
337	402722	402710	6	27.4	1.8	0.013	0.093	Free Surface	0.339	No	6	No
338	442000C	442000B	6	78.9	5.0	0.013	0.004	Free Surface	0.063	No	6	No
34	433718	433717	6	281.5	11.2	0.013	0.004	Free Surface	0.063	No	6	No
340	403610	IPP5	10	109.8	0.5	0.013	0.561	Free Surface	0.440	No	10	No
343	403607	403610	10	121.0	0.3	0.013	0.527	Free Surface	0.627	No	10	Yes
344	403608	403607	8	242.0	0.3	0.013	0.211	Free Surface	0.478	No	8	No

G3. Model Results for 2043 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
345	403606	403607	8	144.1	0.5	0.013	0.255	Free Surface	0.542	No	8	Yes
346	403604	403606	8	239.6	0.5	0.013	0.255	Free Surface	0.467	No	8	No
348	403601	403602	8	246.0	0.2	0.013	0.000	Free Surface	0.156	No	8	No
349	440503	440525	6	102.8	11.0	0.013	0.013	Free Surface	0.076	No	6	No
35	453601	453502	6	272.5	4.8	0.013	0.153	Free Surface	0.577	No	6	No
350	441006	441005	6	147.8	8.8	0.013	0.018	Free Surface	0.124	No	6	No
351	402708	402707	6	77.3	1.2	0.013	0.002	Free Surface	0.060	No	6	No
354	402709	402722	6	53.6	1.9	0.013	0.002	Free Surface	0.169	No	6	No
355	441008	441009	8	162.0	6.5	0.013	0.022	Free Surface	0.070	No	8	No
356	441026	441004	6	116.4	19.8	0.013	0.002	Free Surface	0.071	No	6	No
358	441009	441010	8	69.4	16.0	0.013	0.026	Free Surface	0.105	No	8	No
359	441010	441013	8	230.0	8.3	0.013	0.103	Free Surface	0.150	No	8	No
36	453612	453502	6	290.8	1.3	0.013	0.257	Free Surface	0.713	No	6	Yes
360	441004	441011	6	220.6	36.2	0.013	0.060	Free Surface	0.141	No	6	No
361	442000A	441603A	6	210.8	11.1	0.013	0.013	Free Surface	0.156	No	6	No
362	441404	441422A	6	20.4	2.5	0.013	0.178	Free Surface	0.370	No	6	No
363	403009C	403009	6	99.1	1.6	0.013	0.008	Free Surface	0.093	No	6	No
364	453402	453403	8	288.8	4.0	0.013	0.145	Free Surface	0.208	No	8	No
366	450217	450216	6	320.3	0.4	0.013	0.060	Free Surface	0.289	No	6	No
367	453703	453704	10	102.8	1.2	0.013	1.056	Free Surface	0.556	No	10	No
368	453401	453402	8	340.1	6.0	0.013	0.145	Free Surface	0.195	No	8	No
369	453704	453705	10	99.7	5.3	0.013	1.056	Free Surface	0.492	No	10	No
37	453611	453612	6	236.0	4.5	0.013	0.249	Free Surface	0.478	No	6	No
370	450212	450213	6	181.7	4.9	0.013	0.007	Free Surface	0.128	No	6	No
371	450216	450213	6	84.1	6.6	0.013	0.075	Free Surface	0.191	No	6	No
372	450304	IEC_MH-110	8	293.0	11.7	0.013	0.326	Free Surface	0.236	No	8	No
374	450213	450214	6	171.1	11.8	0.013	0.099	Free Surface	0.200	No	6	No
375	450210	450209	6	205.1	3.1	0.013	0.334	Free Surface	0.561	No	6	No
378	450209	450208	10	120.1	1.2	0.013	0.373	Free Surface	0.299	No	10	No
379	442608	442607	6	275.1	15.1	0.013	0.007	Free Surface	0.050	No	6	No
38	453610	453611	6	417.5	7.1	0.013	0.240	Free Surface	0.365	No	6	No
380	442623	442622	8	194.5	3.9	0.013	0.003	Free Surface	0.039	No	8	No
381	453721LH	453730A	8	126.0	12.3	0.013	0.000	Free Surface	0.039	No	8	No
382	431406	431408	6	387.9	2.5	0.013	0.100	Free Surface	0.419	No	6	No
383	430803	433316	8	301.5	2.7	0.013	0.015	Free Surface	0.080	No	8	No
385	432114	432113	6	221.7	4.6	0.013	0.006	Free Surface	0.065	No	6	No
386	431013	431010	6	102.0	11.9	0.013	0.014	Free Surface	0.086	No	6	No
387	442726	442725	6	117.6	1.7	0.013	0.004	Free Surface	0.074	No	6	No
388	431108	431109	6	186.5	6.6	0.013	0.049	Free Surface	0.149	No	6	No
389	431109	431110	6	98.0	13.8	0.013	0.055	Free Surface	0.151	No	6	No
39	433712	433711	6	128.6	9.9	0.013	0.002	Free Surface	0.040	No	6	No
390	430710	430711	6	106.5	0.5	0.013	0.037	Free Surface	0.262	No	6	No
391	432113	432112	6	36.0	15.4	0.013	0.011	Free Surface	0.055	No	6	No
392	432010	432009	6	144.2	10.9	0.013	0.118	Free Surface	0.231	No	6	No
393	430703LH	430702	6	62.1	10.4	0.013	0.007	Free Surface	0.063	No	6	No
394	431209	430908	6	289.8	4.6	0.013	0.031	Free Surface	0.185	No	6	No
395	442712	442713	6	52.7	1.5	0.013	0.005	Free Surface	0.097	No	6	No
396	442717	442715	6	161.2	4.9	0.013	0.003	Free Surface	0.044	No	6	No
397	442716	442715	6	51.6	8.5	0.013	0.004	Free Surface	0.045	No	6	No
398	431204	431203	6	191.2	9.2	0.013	0.089	Free Surface	0.202	No	6	No
399	433309	433301	6	161.1	6.4	0.013	0.313	Free Surface	0.381	No	6	No
4	455001	455002	6	254.1	11.7	0.013	0.059	Free Surface	0.206	No	6	No
40	433715	433714	6	115.1	0.9	0.013	0.072	Free Surface	0.358	No	6	No
400	431207LH	431208	6	84.5	10.9	0.013	0.006	Free Surface	0.149	No	6	No
400026	430728	430727	8	347.0	4.9	0.013	0.005	Free Surface	0.040	No	8	No
400028	430727	430726	8	92.8	16.8	0.013	0.012	Free Surface	0.045	No	8	No
400030	430726	430725	8	115.9	4.3	0.013	0.015	Free Surface	0.069	No	8	No
400034	430722	430721	8	192.8	0.4	0.013	0.104	Free Surface	0.304	No	8	No
400038	430720	430721	8	304.2	0.3	0.013	0.009	Free Surface	0.099	No	8	No
400040	430721	RALSTON_WW	8	26.0	0.3	0.013	0.116	Free Surface	0.319	No	8	No
400042	433426	433427	8	96.3	3.3	0.013	0.002	Free Surface	0.036	No	8	No
400044	433427	433428	8	111.6	2.5	0.013	0.004	Free Surface	0.069	No	8	No
400046	433428	433429	8	308.9	0.3	0.013	0.007	Free Surface	0.090	No	8	No
400048	433431	433434	8	70.2	2.1	0.013	0.021	Free Surface	0.107	No	8	No
400050	433434	433435	8	48.8	1.0	0.013	0.022	Free Surface	0.110	No	8	No
400052	433435	433423	8	222.5	3.2	0.013	0.027	Free Surface	0.088	No	8	No
400054	433425	433424	8	219.4	4.5	0.013	0.003	Free Surface	0.035	No	8	No
400056	433424	433423	8	132.5	7.2	0.013	0.006	Free Surface	0.056	No	8	No
400058	433423	453730	8	109.0	15.4	0.013	0.035	Free Surface	0.094	No	8	No
40006	433433	433435	8	173.0	0.2	0.013	0.004	Free Surface	0.085	No	8	No
400060	453730	453730A	8	30.0	2.6	0.013	0.035	Free Surface	0.171	No	8	No
40008	433432	433433	8	56.6	2.3	0.013	0.001	Free Surface	0.047	No	8	No
40012	430207	430201	6	30.0	13.0	0.013	0.418	Free Surface	0.482	No	6	No
40014	430201	430202	6	154.8	4.9	0.013	0.468	Free Surface	0.523	No	6	No
40018	431009	431111	6	361.2	0.5	0.013	0.003	Free Surface	0.074	No	6	No
40020	430413	430414	6	77.1	12.0	0.013	0.122	Free Surface	0.217	No	6	No
40022	430414	430901	6	262.5	12.0	0.013	0.136	Free Surface	0.260	No	6	No
40026	432308	432307	6	214.2	19.5	0.013	0.062	Free Surface	0.138	No	6	No
40028	432307	432306	6	60.8	16.6	0.013	0.064	Free Surface	0.159	No	6	No
40030	431603	432401	8	250.3	1.9	0.013	0.017	Free Surface	0.092	No	8	No
40038	451809	451809A	18	63.5	6.1	0.013	3.979	Free Surface	0.666	No	18	No
40040	451809B	451810	18	193.4	0.2	0.013	3.983	Free Surface	0.908	No	18	Yes
40044	402403	402403A	6	135.6	0.5	0.013	0.070	Free Surface	0.344	No	6	No
40046	402403A	402404	6	87.9	0.7	0.013	0.073	Free Surface	0.368	No	6	No
40048	450502	450501	6	191.1	9.9	0.013	0.008	Free Surface	0.074	No	6	No
40062	431633	431608A	6	81.3	1.2	0.013	0.306	Backwater	1.000	No	6	Yes
40064	454601	454508	6	62.9	3.6	0.013	0.001	Free Surface	0.031	No	6	No
40066	454508	454402	6	129.6	7.0	0.013	0.002	Free Surface	0.042	No	6	No
40068	454303C	454303B	6	301.7	3.2	0.013	0.074	Free Surface	0.221	No	6	No
40070	454303B	454303A	6	291.9	5.7	0.013	0.081	Free Surface	0.204	No	6	No
40072	454303A	454303	8	211.0	5.6	0.013	0.087	Free Surface	0.145	No	8	No
40074	450115A	450113	6	58.7	6.6	0.013	0.009	Free Surface	0.076	No	6	No
40080	432111	432105	6	34.1	5.0	0.013	0.014	Free Surface	0.092	No	6	No
40082	431814	431815	6	36.4	63.4	0.013	0.088	Free Surface	0.121	No	6	No
40084	431813	431805	6	41.1	77.5	0.013	0.088	Free Surface	0.135	No	6	No
40086	431609	431608	6	44.2	4.0	0.013	0.648	Backwater	1.000	No	6	Yes
40088	451827A	451827	6	205.5	8.8	0.013	0.014	Free Surface	0.092	No	6	No
40090	450409A	450409	10	161.4	1.3	0.015	0.537	Free Surface	0.479	No	10	No
40092	441905A	442223	6	154.4	7.0	0.013	0.089	Free Surface	0.214	No	6	No
40096	441514A	441514	6	153.2	10.0	0.013	0.014	Free Surface	0.091	No	6	No
40098	SSTA_9953	441124	6	52.9	0.9	0.013	0.123	Free Surface	0.356	No	6	No
401	432918	432919	6	21.5	16.5	0.013	0.061	Free Surface	0.177	No	6	No
40102	443004	443004A	6	379.4	4.3	0.013	0.065	Free Surface	0.208	No	6	No
40106	403009B	403009	6	100.2	0.2	0.013	0.003	Free Surface	0.268	No	6	No
40108	441420A	441510	6	185.1	2.5	0.013	0.018	Free Surface	0.118	No	6	No
40110	441126A	441125	6	165.9	0.6	0.013	0.115	Free Surface	0.422	No	6	No
40112	440525	440524	6	10.4	18.0	0.013	0.019	Free Surface	0.089	No	6	No
40114	433203	433202	6	296.4	7.4	0.013	0.073	Free Surface	0.228	No	6	No
40116	450116	450115	6	213.2	6.2	0.013	0.001	Free Surface	0.054	No	6	No
40118	442621	442618	6	133.9	23.1	0.013	0.005	Free Surface	0.061	No	6	No
40120	443110A	443214	6	164.8	0.2	0.013	0.041	Free Surface	0.308	No	6	No
40124	441402A	441403	6	145.7	4.8	0.013	0.390	Free Surface	0.469	No	6	No
40126	441417A	441419	6	72.8	2.6	0.013	0.024	Free Surface	0.120	No	6	No
40128	440736	440725	6	187.8	2.6	0.013	0.057	Free Surface	0.198	No	6	No
40134	440714	440735	6	200.0	11.4	0.013	0.045	Free Surface	0.152	No	6	No
40144	442701A	442701B	15	184.8	4.3	0.013	2.323	Free Surface	0.365	No	15	No
40146	450103	450103A	10	925.3	0.4	0.015	0.373	Free Surface	0.421	No	10	No
40148	433316A	433315	6	100.2	8.9	0.013	0.382	Free Surface	0.424	No	6	No
40150	442701C	450417	15	58.4	6.1	0.013	2.222	Free Surface	0.323	No	15	No
40154	431114A	431114	6	203.0	2.1	0.013	0.006	Free Surface	0.093	No	6	No
40160	453730A	453722	8	175.0	12.4	0.013	0.035	Free Surface	0.109	No	8	No
40161	433013A	433012	6	166.3	13.3	0.013	0.037	Free Surface	0.151	No	6	No
40162	433429	433430	8	80.0	0.8	0.013	0.010	Free Surface	0.098	No	8	No
40163	431105	431104	6	58.9	3.1	0.013	0.018	Free Surface	0.121	No	6	No
40164	433430	433431	8	75.0	0.8	0.013	0.017	Free Surface	0.103	No	8	No
40165	431401A	431402	6	88.3	8.2	0.013	0.048	Free Surface	0.174	No	6	No
40166	432613	432614	6	205.0	4.0	0.013	0.002	Free Surface	0.050	No	6	No
40167	431309A	431302	6	70.6	15.9	0.013	0.112	Free Surface	0.494	No	6	No
40168	432508A	432507	8	30.9	6.6	0.013	0.005	Free Surface	0.038	No	8	No
40169	SSFI_21	432505	6	105.2	9.1	0.013	0.006	Free Surface	0.054	No	6	No
40173	440918A	440919	8	86.1	3.9	0.013	0.021	Free Surface	0.079	No	8	No
40175	443903A	443301	10	144.8	11.1	0.013	1.034	Free Surface	0.316	No	10	No
40179	443214A	443213	6	147.7	1.3	0.013	0.066	Free Surface	0.270	No	6	No
40181	VMH_72	402902	15	103.6	0.3	0.013	0.439	Free Surface	0.285	No	8	No
40183	403003	403002	8	142.0	0.2	0.013	0.036	Free Surface	0.212	No	8	No
40186	455108LH	455107	6	236.6	0.4	0.013	0.002	Free Surface	0.079	No	6	No
40187	403809	403811	6	142.2	0.5	0.013	0.042	Free Surface	0.266	No	6	No
40188	455107	455105	6	225.8	0.4	0.013	0.004	Free Surface	0.106	No	6	No
40189	442000E	442000F	8	92.9	3.2	0.013	0.006	Free Surface	0.046	No	8	No
40190	455106	455105	6	255.1	3.9	0.013	0.001	Free Surface	0.075	No	6	No
40191	451809A	451809B	18	225.3	0.5	0.013	3.981	Backwater	1.000	No	18	Yes
40192	455105	455104	6	271.0	0.4	0.013	0.007	Free Surface	0.150	No	6	No
40193	451814	451811	18	61.4	0.0	0.013	4.740	Free Surface	0.846	No	18	Yes
40194	455104	455103	6	176.2	0.4	0.013	0.016	Free Surface	0.182	No	6	No
40195	451820A	451814	8	18.3	17.5	0.013	0.058	Free Surface	0.374	No	8	No
40196	455103	455101	6	176.1	0.4	0.013	0.018	Free Surface	0.190	No	6	No
40198	455102LH	455101	6	217.7	5.8	0.013	0.001	Free Surface	0.111	No	6	No
40199	452016	452016A	6	62.0	25.3	0.013	0.093	Free Surface	0.158	No	6	No
402	432914	432916	6	141.1	0.7	0.013	0.006	Free Surface	0.117	No	6	No
40200	455101	454606	6	154.0	0.4	0.013	0.019	Free Surface	0.287	No	6	No
40201	452016A	452016B	6	63.7	20.0	0.013	0.093	Free Surface	0.163	No	6	No
40203	452016B	452018	6	107.1	20.3	0.013	0.095	Free Surface	0.196	No	6	No
40205	452412B	452412A	6	182.9	2.8	0.013	0.006	Free Surface	0.103	No	6	No
40207	452425A	452402	6	24.9	0.1	0.013	0.030	Free Surface	0.639	No	6	Yes
40208	454608	454609	6	182.9	0.4	0.013	0.026	Free Surface	0.195	No	6	No
40209	452504A	452503	6	185.1	2.3	0.013	0.006	Free Surface	0.081	No	6	No
40211	452511A	452510	6	70.2	14.4	0.013	0.028	Free Surface	0.108	No	6	No
40213	451402A	451701	18	70.4	2.5	0.013	3.865	Free Surface	0.413	No	18	No
40214	442701B	442701C	15	120.9	3.4	0.013	2.322	Free Surface	0.376	No	15	No
40215	442219A	442218	6	221.4	13.8	0.013	0.042	Free Surface	0.199	No	6	No
40217	451614A	451609	6	135.5	7.3	0.013	0.008	Free Surface	0.100	No	6	No
40218	440543A	440544	6	75.1	9.4	0.013	0.063	Free Surface	0.174	No	6	No
40219	442204A	451605	6	231.1	1.5	0.013	0.245	Free Surface	0.531	No	6	No
40220	441422A	441422B	6	63.6	15.3	0.013	0.178	Free Surface	0.325	No	6	No
40221	451605A	451606	6	34.7	1.5	0.013	0.250	Free Surface	0.535	No	6	No
40222	441422B	441422	6	206.2	2.1	0.013	0.187	Free Surface	0.417	No	6	No
40224	441408	441408	6	147.1	0.9	0.013	0.083	Free Surface	0.339	No	6	No
40225	443221A	443202	8	225.8	2.8	0.013	0.024	Free Surface	0.422	No	8	No
40226	441409BLH	441409B	6	145.5	3.4	0.013	0.004	Free Surface	0.196	No	6	No
40227	442000B	442000A	6	101.4	3.9	0.013	0.008	Free Surface	0.074	No	6	No
40228	441506	441506A	12	7.8	1.3	0.013	0.221	Free Surface	0.305	No	12	No
40229	442000	442000A	6	189.1	1.0	0.013	0.005	Free Surface	0.080	No	6	No
40230	441505	441505A	12	9.3	1.5	0.013	0.046	Free Surface	0.126	No	12	No
40232	441506A	441505A	12	247.7	0.4	0.013	0.236	Free Surface	0.269	No	12	No
40233	442223A	442223	8	136.7	1.5	0.013	0.003	Free Surface	0.061	No	8	No
40234	441505A	441503	12	329.1	1.1	0.013	0.190	Free Surface	0.285	No	12	No
40235	450503A	450503	8	122.5	0.9	0.013	0.006	Free Surface	0.071	No	8	No
40236	441834A	441834	6	136.9	1.5	0.013	0.007	Free Surface	0.138	No	6	No
40237	454809A	454809B	8	50.7	20.1	0.013	0.305	Free Surface	0.208	No	8	No
40239	454809B	450304	8	193.7	14.0	0.013	0.303	Free Surface	0.227	No	8	No
40240	442206A	442205	6	83.5	1.5	0.013	0.047	Free Surface	0.234	No	6	No

G3. Model Results for 2043 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
40241	LH450104B	450104	6	145.0	4.5	0.013	0.001	Free Surface	0.106	No	6	No
40242	442205A	442204	6	206.3	1.5	0.013	0.063	Free Surface	0.382	No	6	No
40244	403102A	403105	6	54.3	0.7	0.013	0.012	Free Surface	0.133	No	6	No
40245	453716B	453716C	8	313.7	14.7	0.013	0.013	Free Surface	0.108	No	8	No
40246	451803B	451803C	21	261.2	1.0	0.013	4.137	Free Surface	0.413	No	21	No
40247	440137B	440137A	6	224.0	1.8	0.013	0.006	Free Surface	0.090	No	6	No
40248	451803C	451803D	21	88.5	2.7	0.013	4.167	Free Surface	0.502	No	21	No
40249	440137A	440137	6	92.1	2.2	0.013	0.013	Free Surface	0.224	No	6	No
40251	452204A	451307	6	26.4	29.9	0.013	0.014	Free Surface	0.067	No	6	No
40254	451822A	451816A	6	210.6	0.3	0.013	0.077	Free Surface	0.406	No	6	No
40256	451821A	451821B	6	159.0	0.8	0.013	0.021	Free Surface	0.185	No	6	No
40258	451821B	451820	6	69.0	1.4	0.013	0.036	Free Surface	0.228	No	6	No
40260	451816A	451815	6	18.4	1.3	0.013	0.132	Free Surface	0.392	No	6	No
40264	451810A	451814	18	28.3	2.1	0.013	4.687	Free Surface	0.996	No	18	Yes
40266	452405C	452405A	16	22.3	0.8	0.013	0.588	Free Surface	0.304	No	12	No
40267	404809	404808	6	22.1	1.8	0.013	0.003	Free Surface	0.215	No	6	No
40268	452405A	452405B	12	30.4	2.2	0.013	0.297	Free Surface	0.249	No	12	No
40269	404806A	404806	6	15.4	2.0	0.013	0.005	Free Surface	0.184	No	6	No
40270	452405B	451810A	12	241.7	0.5	0.013	0.300	Free Surface	0.649	No	12	Yes
40272	452403A	452403	10	206.3	0.2	0.013	0.152	Free Surface	0.373	No	10	No
40280	430723	430722	8	223.0	0.4	0.013	0.098	Free Surface	0.297	No	8	No
40282	454603	454606A	6	497.9	2.8	0.013	0.003	Free Surface	0.126	No	6	No
40284	452012A	452012	6	148.5	8.1	0.013	0.005	Free Surface	0.099	No	6	No
40286	402508	402507	6	302.1	0.5	0.013	0.006	Free Surface	0.179	No	6	No
40288	403501	402510	8	349.7	0.4	0.013	0.000	Free Surface	0.120	No	8	No
40290	402604A	402603	6	231.0	3.8	0.013	0.063	Free Surface	0.265	No	6	No
40292	VMH_13	433431	8	128.4	0.8	0.013	0.001	Free Surface	0.058	No	8	No
40294	453716C	453712	8	174.8	18.2	0.013	0.206	Free Surface	0.298	No	8	No
40296	453716A	453716B	8	285.2	6.3	0.013	0.005	Free Surface	0.043	No	8	No
403	431202	431202	6	110.1	6.7	0.013	0.093	Free Surface	0.212	No	6	No
40310	433206A	433206B	12	180.5	5.2	0.013	2.127	Free Surface	0.429	No	12	No
40312	433206B	442501	12	358.8	7.3	0.013	2.107	Free Surface	0.424	No	12	No
40314	440325A	440209	6	144.5	0.4	0.013	0.028	Free Surface	0.494	No	6	No
40316	443004A	443108	6	295.1	3.5	0.013	0.070	Free Surface	0.243	No	6	No
40318	440402A	440901	10	254.9	3.4	0.013	1.014	Free Surface	0.387	No	10	No
40320	440402	440402A	10	101.2	3.5	0.013	1.008	Free Surface	0.455	No	10	No
40322	440901	440902	10	307.4	3.8	0.013	0.511	Free Surface	0.646	No	10	No
40326	404822	404821	6	323.5	0.2	0.013	0.008	Free Surface	0.158	No	6	No
40332	404821	404818	6	104.0	0.3	0.013	0.012	Free Surface	0.204	No	6	No
40334	404816	404817	6	99.1	0.3	0.013	0.005	Free Surface	0.131	No	6	No
40336	404817	404818	6	82.5	0.3	0.013	0.009	Free Surface	0.194	No	6	No
40338	404818	404819	6	87.5	0.2	0.013	0.022	Free Surface	0.240	No	6	No
40340	404819	404820	6	29.2	0.3	0.013	0.024	Free Surface	0.248	No	6	No
40342	404820	404820A	6	192.2	0.2	0.013	0.025	Free Surface	0.254	No	6	No
40348	404820A	404801	6	87.8	0.3	0.013	0.026	Free Surface	0.260	No	6	No
40350	404801	404802	6	38.7	0.2	0.013	0.027	Free Surface	0.306	No	6	No
40352	404802	404803	6	281.7	0.2	0.013	0.028	Free Surface	0.275	No	6	No
40354	404803	404803A	6	247.6	0.2	0.013	0.029	Free Surface	0.351	No	6	No
40356	404814	404813	6	261.1	0.3	0.013	0.016	Free Surface	0.209	No	6	No
40358	404813	404815	6	19.1	0.3	0.013	0.019	Free Surface	0.221	No	6	No
40360	404815	404812	6	152.5	0.2	0.013	0.020	Free Surface	0.226	No	6	No
40362	404812	404811	6	68.3	0.3	0.013	0.021	Free Surface	0.231	No	6	No
40364	404811	404810	6	41.4	0.2	0.013	0.022	Free Surface	0.238	No	6	No
40366	404810	404808	6	65.0	0.2	0.013	0.023	Free Surface	0.308	No	6	No
40368	404809A	404809	6	274.9	0.7	0.013	0.001	Free Surface	0.050	No	6	No
40370	404808	404807	6	26.7	0.3	0.013	0.027	Free Surface	0.437	No	6	No
40372	404807	404806	6	98.5	0.0	0.013	0.028	Free Surface	0.350	No	6	No
40374	404806B	404806A	6	145.2	0.7	0.013	0.004	Free Surface	0.078	No	6	No
40376	404806	404805	6	122.1	0.2	0.013	0.015	Free Surface	0.541	No	6	Yes
40378	404805	404804	6	118.8	0.2	0.013	0.037	Free Surface	0.507	No	6	Yes
40382	403416A	403423D	27	13.7	20.2	0.013	8.320	Backwater	1.000	No	27	Yes
404	432002	432003	6	241.7	31.8	0.013	0.105	Free Surface	0.205	No	6	No
405	431115	431116	6	224.6	3.5	0.013	0.038	Free Surface	0.166	No	6	No
406	430608	430607A	8	203.5	1.6	0.013	0.293	Free Surface	0.372	No	8	No
407	433303	433302	6	186.1	2.9	0.013	0.025	Free Surface	0.143	No	6	No
408	433302	433301	6	222.5	3.1	0.013	0.030	Free Surface	0.250	No	6	No
409	442413LH	442442	6	135.0	31.9	0.013	0.005	Free Surface	0.048	No	6	No
41	433711	433710	6	75.8	7.7	0.013	0.005	Free Surface	0.051	No	6	No
410	431202	431201	6	307.5	7.1	0.013	0.093	Free Surface	0.204	No	6	No
411	430607A	430606	8	109.5	1.2	0.013	0.268	Free Surface	0.389	No	8	No
412	431208	431209	6	251.6	0.2	0.013	0.014	Free Surface	0.193	No	6	No
414	430606	430605A	8	129.3	1.2	0.013	0.268	Free Surface	0.387	No	8	No
415	431116	430605	6	222.0	3.2	0.013	0.042	Free Surface	0.172	No	6	No
416	442444	442445	6	51.3	24.1	0.013	0.004	Free Surface	0.036	No	6	No
417	430907	432010	6	116.7	24.7	0.013	0.112	Free Surface	0.191	No	6	No
418	431201	430906	6	335.8	11.9	0.013	0.105	Free Surface	0.200	No	6	No
419	430906	430907	6	46.0	12.9	0.013	0.108	Free Surface	0.187	No	6	No
42	433710	433709	6	85.5	7.8	0.013	0.006	Free Surface	0.057	No	6	No
420	430704	430511	6	225.8	7.7	0.013	0.334	Free Surface	0.402	No	6	No
421	430702	430701	6	114.3	7.1	0.013	0.009	Free Surface	0.093	No	6	No
422	430604	430603	6	183.7	6.4	0.013	0.266	Free Surface	0.367	No	6	No
423	430511	430510	6	110.4	7.7	0.013	0.328	Free Surface	0.377	No	6	No
424	430701	430504	6	136.2	4.1	0.013	0.017	Free Surface	0.089	No	6	No
425	430911LH	430912	6	161.7	2.4	0.013	0.009	Free Surface	0.110	No	6	No
426	430908	430909	6	242.4	1.3	0.013	0.043	Free Surface	0.197	No	6	No
427	430603	430602	6	177.8	7.0	0.013	0.268	Free Surface	0.360	No	6	No
428	430510	430509	6	223.5	12.4	0.013	0.325	Free Surface	0.344	No	6	No
429	430503	430502	6	58.9	9.9	0.013	0.021	Free Surface	0.095	No	6	No
43	433713LH	433711	6	121.7	2.2	0.013	0.001	Free Surface	0.042	No	6	No
430	430909	430910	6	98.8	7.4	0.013	0.054	Free Surface	0.169	No	6	No
431	430602	430601	6	247.0	7.5	0.013	0.269	Free Surface	0.352	No	6	No
432	430912	430411	6	434.3	4.3	0.013	0.028	Free Surface	0.126	No	6	No
433	430509	430508	6	107.2	12.1	0.013	0.322	Free Surface	0.381	No	6	No
434	431613	431612	6	51.4	40.1	0.013	0.243	Free Surface	0.294	No	6	No
435	440318	440317	8	322.7	3.3	0.013	0.003	Free Surface	0.044	No	8	No
436	430508	430507	6	108.1	6.6	0.013	0.323	Free Surface	0.396	No	6	No
437	430506	430505	6	121.9	3.2	0.013	0.002	Free Surface	0.050	No	6	No
438	430601	430409	6	187.1	8.3	0.013	0.272	Free Surface	0.421	No	6	No
439	430902	430903	6	186.6	6.7	0.013	0.267	Free Surface	0.377	No	6	No
44	454411	454412	6	235.9	3.1	0.013	0.124	Free Surface	0.258	No	6	No
440	452414	452412B	6	87.5	4.5	0.013	0.002	Free Surface	0.053	No	6	No
441	430502	430501	6	329.2	13.2	0.013	0.025	Free Surface	0.103	No	6	No
442	430505	430501	6	88.8	6.1	0.013	0.006	Free Surface	0.084	No	6	No
443	430409	430408	6	177.5	3.0	0.013	0.271	Free Surface	0.417	No	6	No
444	430410LH	430408	6	294.6	6.5	0.013	0.005	Free Surface	0.195	No	6	No
445	430904	431901	6	294.3	70.1	0.013	0.308	Free Surface	0.222	No	6	No
446	430412	430413	6	210.7	2.7	0.013	0.045	Free Surface	0.187	No	6	No
447	430910	430413	6	423.4	7.7	0.013	0.069	Free Surface	0.194	No	6	No
448	433113	433112	6	211.0	10.9	0.013	0.023	Free Surface	0.107	No	6	No
449	443326	443301	6	357.3	3.5	0.013	0.002	Free Surface	0.278	No	6	No
45	454431	454425	6	54.7	37.7	0.013	0.001	Free Surface	0.055	No	6	No
450	440319	440320	6	114.5	1.3	0.013	0.006	Free Surface	0.074	No	6	No
451	440321	440320	6	112.6	4.0	0.013	0.005	Free Surface	0.059	No	6	No
452	431901	431608	6	51.7	9.8	0.013	0.344	Backwater	1.000	No	6	Yes
453	430507	430101	6	181.6	7.8	0.013	0.112	Free Surface	0.381	No	6	No
455	430901	430902	6	164.5	14.1	0.013	0.263	Free Surface	0.331	No	6	No
456	431639	431638	6	164.4	10.0	0.013	0.222	Free Surface	0.294	No	6	No
457	431608	431608A	6	77.5	3.6	0.013	0.911	Exceeds Capacity	1.000	No	6	Yes
458	430501	430103	6	147.6	12.5	0.013	0.033	Free Surface	0.110	No	6	No
46	451105	451104	8	196.9	1.5	0.013	0.099	Free Surface	0.210	No	8	No
461	431635	431634	6	136.9	19.3	0.013	0.007	Free Surface	0.070	No	6	No
462	430103	430102	8	163.0	2.2	0.013	0.062	Free Surface	0.157	No	8	No
463	430102	430101	6	53.1	35.4	0.013	0.093	Free Surface	0.143	No	6	No
465	431632	431633	6	155.8	39.7	0.013	0.093	Free Surface	0.569	No	6	No
466	430109	430102	6	62.2	8.3	0.013	0.030	Free Surface	0.117	No	6	No
467	431608A	431607	6	101.3	4.3	0.013	0.743	Backwater	1.000	No	6	Yes
468	431631	431632	6	68.0	3.6	0.013	0.089	Free Surface	0.210	No	6	No
469	430407	430406	6	169.0	29.2	0.013	0.275	Free Surface	0.248	No	6	No
47	433714	433708	6	156.7	0.3	0.013	0.072	Free Surface	0.429	No	6	No
470	432735LH	432727	6	222.1	10.7	0.013	0.003	Free Surface	0.051	No	6	No
471	432727	432726	6	118.8	11.4	0.013	0.009	Free Surface	0.133	No	6	No
472	432727A	432727	6	103.5	1.0	0.013	0.002	Free Surface	0.055	No	6	No
473	430209	430208	6	123.1	11.9	0.013	0.420	Free Surface	0.433	No	6	No
474	430110	430109	6	256.1	6.6	0.013	0.027	Free Surface	0.117	No	6	No
475	431630	431631	6	161.3	4.8	0.013	0.021	Free Surface	0.197	No	6	No
476	430104	430103	6	286.7	0.4	0.013	0.025	Free Surface	0.218	No	6	No
477	430406	430405	6	139.3	44.0	0.013	0.278	Free Surface	0.235	No	6	No
478	430105	430104	6	94.0	8.0	0.013	0.004	Free Surface	0.096	No	6	No
479	431607	431606	6	212.7	1.4	0.013	0.751	Exceeds Capacity	1.000	No	6	Yes
48	453501	431302	8	461.3	1.0	0.013	0.424	Free Surface	0.561	No	8	No
480	431628	431629	6	64.8	0.0	0.013	0.011	Free Surface	0.186	No	6	No
481	430405	430404	6	101.8	40.2	0.013	0.277	Free Surface	0.243	No	6	No
482	430208	430207	6	168.9	7.8	0.013	0.419	Free Surface	0.428	No	6	No
483	432721	432715	6	153.4	2.9	0.013	0.011	Free Surface	0.117	No	6	No
484	431629	431630	6	109.3	8.9	0.013	0.015	Free Surface	0.097	No	6	No
485	432316H	432315	6	204.0	5.8	0.013	0.005	Free Surface	0.064	No	6	No
486	432225	432224	6	171.3	9.3	0.013	0.027	Free Surface	0.187	No	6	No
487	440140	440601	6	322.8	10.9	0.013	0.285	Free Surface	0.333	No	6	No
488	432305	432304	6	109.1	7.2	0.013	0.069	Free Surface	0.165	No	6	No
489	432328	432318	6	74.7	63.0	0.013	0.003	Free Surface	0.057	No	6	No
49	451104	450601	8	223.6	2.3	0.013	0.099	Free Surface	0.193	No	8	No
490	432524	432521	8	111.4	6.6	0.013	0.013	Free Surface	0.057	No	8	No
491	432534	432533	6	104.1	14.6	0.013	0.000	Free Surface	0.113	No	6	No
492	432521	432533	8	22.4	38.5	0.013	0.032	Free Surface	0.059	No	8	No
493	432532	432533	8	54.5	14.9	0.013	0.002	Free Surface	0.095	No	8	No
494	432531	432532	8	90.8	17.6	0.013	0.002	Free Surface	0.021	No	8	No
495	403401	403402	8	236.3	0.5	0.013	0.100	Free Surface	0.379	No	8	No
496	432304	432303	6	120.5	26.1	0.013	0.073	Free Surface	0.135	No	6	No
497	430212	430201	6	28.3	23.4	0.013	0.063	Free Surface	0.354	No	6	No
498	431624	431623	6	295.5	6.6	0.013	0.055	Free Surface	0.166	No	6	No
499	430106	430104	6	197.4	1.3	0.013	0.017	Free Surface	0.137	No	6	No
50	454412	454432	6	214.5	24.5	0.013	0.125	Free Surface	0.170	No	6	No
500	431625	431624	6	159.6	3.1	0.013	0.042	Free Surface	0.174	No	6	No
501	430213	430212	6	106.2	55.1	0.013	0.063	Free Surface	0.117	No	6	No
502	430202	430203	6	156.4	9.4	0.013	0.466	Free Surface	0.436	No	6	No
503	430404	430302	6	164.9	36.8	0.013	0.301	Free Surface	0.377	No	6	No
504	430204	430205	6	150.1	13.1	0.013	0.479	Free Surface	0.482	No	6	No
505	431604	431602	6	123.3	2.2	0.017	0.705	Free Surface	0.980	No	6	Yes
507	430205	430206	6	157.9	5.1	0.013	0.476	Free Surface	0.580	No	6	No
508	430302	430206	6	62.0	2.5	0.013	0.296	Free Surface	0.507	No	6	No
509	430111	430110	6	385.4	3.5	0.013	0.021	Free Surface	0.119	No	6	No
51	454426	454427	6	87.3	24.1	0.013	0.017	Free Surface	0.103	No	6	No
510	430107	430106	6	204.5	3.6	0.013	0.012	Free Surface	0.115	No	6	No
511	430206	430310	10	297.5	3.3	0.013	0.750	Free Surface	0.369	No	10	No
512	430310	430401	10	197.4	3.5	0.013	0.760	Free Surface	0.455	No	10	No
513	431602	431645	12	37.8	1.9	0.013	1.288	Free Surface	0.443	No	12	No
514	430216	430215	6	198.6	10.2	0.013	0.002	Free Surface	0.094	No	6	No
515	430215	430214	6	98.1	11.7	0.013	0.058	Free Surface	0.133	No	6	No
516	430401	430402	10	257.7	1.2	0.013	0.757	Free Surface	0.450	No	10	No
519	430217	430215	6	113.9	1.7	0.013	0.053	Free Surface	0.228	No	6	No
52	454429	454432	6	236.7	10.0	0.013	0.019	Free Surface	0.122	No	6	No

G3. Model Results for 2043 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
520	430112	430111	6	158.2	11.1	0.013	0.015	Free Surface	0.099	No	6	No
521	430108LH	430107	6	159.7	0.4	0.013	0.008	Free Surface	0.119	No	6	No
522	443409	443426	6	98.5	11.8	0.013	0.018	Free Surface	0.082	No	6	No
523	432607	432605	6	245.7	7.5	0.013	0.029	Free Surface	0.114	No	6	No
524	440699LH	440630	6	54.1	17.1	0.013	0.005	Free Surface	0.046	No	6	No
529	432226	432324	6	154.9	3.9	0.013	0.000	Free Surface	0.018	No	6	No
53	450601	450602	8	83.8	2.5	0.013	0.099	Free Surface	0.278	No	8	No
530	432221	432214	6	121.4	25.5	0.013	0.003	Free Surface	0.042	No	6	No
531	432528LH	432538	6	112.9	9.1	0.013	0.003	Free Surface	0.043	No	6	No
532	432208	432207	6	48.9	7.1	0.013	0.070	Free Surface	0.238	No	6	No
533	432224	432207	6	183.1	0.9	0.013	0.055	Free Surface	0.267	No	6	No
534	432519	08CS49L	6	128.5	6.6	0.013	0.014	Free Surface	0.091	No	6	No
535	432538	432527	6	67.8	12.6	0.013	0.006	Free Surface	0.052	No	6	No
536	440613	440613A	6	454.4	4.2	0.013	0.018	Free Surface	0.124	No	6	No
537	432207	432206	6	236.8	4.6	0.013	0.147	Free Surface	0.360	No	6	No
538	08CS49L	08CS49M	6	132.2	13.5	0.013	0.025	Free Surface	0.095	No	6	No
54	454428	454429	6	179.6	3.2	0.013	0.018	Free Surface	0.104	No	6	No
540	440814	440813	6	205.2	11.7	0.013	0.004	Free Surface	0.097	No	6	No
541	440813	440820	6	99.7	5.8	0.013	0.037	Free Surface	0.121	No	6	No
542	440555	440813	6	101.8	7.9	0.013	0.003	Free Surface	0.097	No	6	No
543	440805	440806	6	209.5	10.0	0.013	0.002	Free Surface	0.100	No	6	No
544	440835	440834	6	121.3	1.2	0.013	0.003	Free Surface	0.062	No	6	No
545	440540	440541	6	43.6	5.0	0.013	0.029	Free Surface	0.131	No	6	No
546	440806	440521	6	91.3	1.6	0.013	0.023	Free Surface	0.127	No	6	No
547	440521	440813	6	100.6	23.2	0.013	0.026	Free Surface	0.119	No	6	No
548	441216	440541	6	182.8	1.3	0.013	0.003	Free Surface	0.097	No	6	No
55	450610	450604	6	170.0	2.2	0.013	0.055	Free Surface	0.312	No	6	No
550	440808	440807	6	85.4	6.8	0.013	0.016	Free Surface	0.088	No	6	No
551	440807	440806	6	97.8	12.9	0.013	0.019	Free Surface	0.127	No	6	No
552	440534	440553	6	198.5	7.6	0.013	0.005	Free Surface	0.097	No	6	No
553	440522	440521	6	99.8	14.4	0.013	0.003	Free Surface	0.059	No	6	No
554	441215	441214	6	157.7	14.6	0.013	0.007	Free Surface	0.060	No	6	No
555	440508	440509	6	62.6	11.4	0.013	0.003	Free Surface	0.038	No	6	No
557	440523	440524	6	289.2	6.9	0.013	0.004	Free Surface	0.074	No	6	No
558	441210	441209	6	100.0	3.0	0.013	0.006	Free Surface	0.062	No	6	No
56	433703	433702	6	184.0	35.5	0.013	0.087	Free Surface	0.203	No	6	No
560	440809	440808	6	110.1	0.5	0.013	0.013	Free Surface	0.129	No	6	No
561	403417	403404	6	378.6	0.1	0.013	0.057	Backwater	1.000	No	6	Yes
562	440810	440809	6	168.3	5.4	0.013	0.003	Free Surface	0.105	No	6	No
563	403414	403415	27	310.0	0.5	0.013	7.670	Free Surface	0.509	No	27	No
565	403411	403412	21	200.0	1.1	0.013	7.646	Free Surface	0.812	No	21	Yes
566	403412	403413	21	11.0	1.2	0.013	7.745	Free Surface	0.971	No	21	Yes
567	441002	441004	6	170.6	40.2	0.013	0.025	Free Surface	0.094	No	6	No
568	441005	441004	6	238.5	2.1	0.013	0.025	Free Surface	0.136	No	6	No
569	403503	403504	8	51.8	0.6	0.013	0.002	Free Surface	0.071	No	8	No
57	450604	450605	10	161.0	1.0	0.013	0.182	Free Surface	0.263	No	10	No
570	403009A	403009B	6	66.8	0.3	0.013	0.002	Free Surface	0.272	No	6	No
575	403511	402807A	8	141.3	0.6	0.013	0.023	Free Surface	0.165	No	8	No
578	403504	403505	8	203.9	0.6	0.013	0.012	Free Surface	0.109	No	8	No
579	403506	403505	8	160.7	0.6	0.013	0.005	Free Surface	0.090	No	8	No
58	433707	433706	6	132.6	0.4	0.013	0.001	Free Surface	0.057	No	6	No
584	454609	454710	6	206.3	4.4	0.013	0.033	Free Surface	0.149	No	6	No
585	454603	454610	6	270.4	0.5	0.013	0.001	Free Surface	0.053	No	6	No
586	454460	454609	6	251.0	5.5	0.013	0.005	Free Surface	0.098	No	6	No
587	454602	454603	6	299.9	2.3	0.013	0.003	Free Surface	0.051	No	6	No
588	454710	454709	6	258.0	3.9	0.013	0.037	Free Surface	0.223	No	6	No
589	454711	454709	6	201.6	0.5	0.013	0.007	Free Surface	0.203	No	6	No
59	433706	433705	6	97.9	0.4	0.013	0.002	Free Surface	0.093	No	6	No
590	454611	454610	6	228.0	4.0	0.013	0.002	Free Surface	0.044	No	6	No
591	454712LH	454711	6	186.7	0.5	0.013	0.002	Free Surface	0.087	No	6	No
592	454601	454602	6	217.5	2.7	0.013	0.001	Free Surface	0.037	No	6	No
593	454708	454707	6	224.6	5.9	0.013	0.004	Free Surface	0.148	No	6	No
594	454709	454707	6	192.8	0.5	0.013	0.046	Free Surface	0.272	No	6	No
597	454611	454503	6	222.3	6.8	0.013	0.002	Free Surface	0.035	No	6	No
598	454503	454701	6	132.6	6.0	0.013	0.002	Free Surface	0.046	No	6	No
599	454402	454401	6	122.3	3.5	0.013	0.003	Free Surface	0.051	No	6	No
6	454909	454910	6	80.4	2.2	0.013	0.006	Free Surface	0.081	No	6	No
60	433705	433704	6	146.3	0.4	0.013	0.007	Free Surface	0.142	No	6	No
601	454701	454702	6	251.2	5.0	0.013	0.005	Free Surface	0.062	No	6	No
602	454215	454214	6	220.0	0.2	0.013	0.001	Free Surface	0.070	No	6	No
603	454702	454703	6	282.9	3.7	0.013	0.007	Free Surface	0.176	No	6	No
604	454707	454703	6	273.1	1.1	0.013	0.052	Free Surface	0.268	No	6	No
605	454706	454703	6	79.1	1.2	0.013	0.014	Free Surface	0.204	No	6	No
606	454206	454205	6	149.7	6.1	0.013	0.014	Free Surface	0.175	No	6	No
607	454214	454213	6	199.3	9.4	0.013	0.016	Free Surface	0.091	No	6	No
608	454401	454430	6	106.7	3.7	0.013	0.004	Free Surface	0.057	No	6	No
609	454213	454212	6	140.5	11.2	0.013	0.024	Free Surface	0.110	No	6	No
61	453403	454306	8	256.5	3.6	0.013	0.145	Free Surface	0.297	No	8	No
610	454204	454203	6	71.6	2.8	0.013	0.007	Free Surface	0.116	No	6	No
611	454205	454203	6	131.8	5.5	0.013	0.059	Free Surface	0.170	No	6	No
612	454107	454005	6	379.2	1.1	0.013	0.020	Free Surface	0.181	No	6	No
613	454106	454107	6	401.0	2.7	0.013	0.008	Free Surface	0.117	No	6	No
614	454106	454105	6	423.5	1.4	0.013	0.005	Free Surface	0.080	No	6	No
615	454216	454214	6	128.6	0.4	0.013	0.013	Free Surface	0.133	No	6	No
616	433404	433405	8	333.0	3.6	0.013	0.894	Free Surface	0.542	No	8	No
617	433408	433409	8	95.9	1.1	0.013	0.904	Free Surface	0.805	No	8	Yes
618	431518	431519	6	218.5	7.7	0.013	0.005	Free Surface	0.057	No	6	No
619	433403	433404	8	150.0	2.8	0.013	0.879	Free Surface	0.595	No	8	No
62	431514	431513	8	99.1	7.3	0.013	0.632	Free Surface	0.409	No	8	No
620	433409	433410	8	70.7	2.8	0.013	0.905	Free Surface	0.612	No	8	No
621	453706	453707	10	127.9	7.8	0.013	1.064	Free Surface	0.286	No	10	No
622	431522	431523	6	196.8	1.0	0.013	0.017	Free Surface	0.133	No	6	No
623	433406	433407	8	262.1	2.4	0.013	0.898	Free Surface	0.604	No	8	No
624	433407	433408	8	269.2	4.5	0.013	0.900	Free Surface	0.762	No	8	Yes
625	431305	431304	6	303.5	11.3	0.013	0.005	Free Surface	0.056	No	6	No
626	454704	454507	6	276.4	0.6	0.013	0.075	Free Surface	0.359	No	6	No
627	454703	454704	6	132.8	1.3	0.013	0.073	Free Surface	0.314	No	6	No
628	454212	454211	6	168.1	5.8	0.013	0.028	Free Surface	0.136	No	6	No
629	454503	454502	6	329.9	12.2	0.013	0.003	Free Surface	0.170	No	6	No
63	433702	433701	6	134.6	3.0	0.013	0.092	Free Surface	0.247	No	6	No
630	454504	454502	6	157.1	1.3	0.013	0.080	Free Surface	0.303	No	6	No
631	454211	454209	6	171.1	3.8	0.013	0.034	Free Surface	0.158	No	6	No
632	454005	454004	6	363.0	2.3	0.013	0.048	Free Surface	0.192	No	6	No
633	454203	454202	6	170.4	12.2	0.013	0.067	Free Surface	0.180	No	6	No
634	454505	454504	6	104.5	1.9	0.013	0.077	Free Surface	0.283	No	6	No
635	454507	454505	6	238.4	0.6	0.013	0.076	Free Surface	0.319	No	6	No
636	454006	454005	6	203.0	1.3	0.013	0.019	Free Surface	0.175	No	6	No
637	454210	454209	6	100.0	1.0	0.013	0.011	Free Surface	0.144	No	6	No
638	454209	454201	6	316.4	4.9	0.013	0.049	Free Surface	0.194	No	6	No
639	454007A	454004	6	185.3	4.2	0.013	0.005	Free Surface	0.117	No	6	No
64	431301	431514	8	224.1	4.8	0.013	0.631	Free Surface	0.404	No	8	No
640	454430	454403	6	337.9	7.1	0.013	0.007	Free Surface	0.064	No	6	No
642	454105	454104	6	288.5	8.2	0.013	0.014	Free Surface	0.121	No	6	No
643	454202	454201	6	159.8	4.7	0.013	0.072	Free Surface	0.213	No	6	No
644	454002	454001	6	383.9	13.8	0.013	0.085	Free Surface	0.212	No	6	No
645	454419	454420	6	130.8	15.0	0.013	0.004	Free Surface	0.044	No	6	No
646	454407	454408	6	286.6	20.6	0.013	0.107	Free Surface	0.170	No	6	No
647	433724	433723	6	116.7	3.0	0.013	0.004	Free Surface	0.057	No	6	No
648	454417	454419	6	169.7	3.5	0.013	0.004	Free Surface	0.048	No	6	No
649	454418	454417	6	132.9	6.2	0.013	0.002	Free Surface	0.047	No	6	No
65	433701	431309	6	43.6	8.6	0.013	0.095	Free Surface	0.183	No	6	No
650	454420	454421	6	141.1	15.3	0.013	0.007	Free Surface	0.055	No	6	No
651	433723	433722	6	66.6	3.0	0.013	0.004	Free Surface	0.063	No	6	No
652	454408	454409	6	107.2	30.0	0.013	0.117	Free Surface	0.265	No	6	No
653	454416	454417	6	67.2	3.7	0.013	0.000	Free Surface	0.039	No	6	No
654	454421	454423	6	124.9	14.7	0.013	0.010	Free Surface	0.065	No	6	No
655	454409	454410	6	107.8	2.0	0.013	0.118	Free Surface	0.286	No	6	No
656	433721	433720	6	115.9	1.7	0.013	0.006	Free Surface	0.079	No	6	No
658	454423	454424	6	123.9	10.1	0.013	0.011	Free Surface	0.092	No	6	No
659	454422	454421	6	332.2	3.2	0.013	0.002	Free Surface	0.051	No	6	No
66	431309	431302	6	55.1	38.3	0.013	0.095	Free Surface	0.471	No	6	No
660	433716	433715	6	84.8	0.9	0.013	0.071	Free Surface	0.309	No	6	No
661	453608	453609	6	356.0	0.2	0.013	0.218	Free Surface	0.888	No	6	Yes
662	453607	453608	6	252.0	0.6	0.013	0.209	Free Surface	0.823	No	6	Yes
663	433709	433708	6	141.6	7.8	0.013	0.007	Free Surface	0.257	No	6	No
664	433708	433704	6	130.7	0.4	0.013	0.079	Free Surface	0.310	No	6	No
665	433704	433703	6	72.5	19.5	0.013	0.087	Free Surface	0.151	No	6	No
666	433727LH	433603	6	142.8	6.6	0.013	0.007	Free Surface	0.130	No	6	No
667	431303	431309A	6	105.2	15.9	0.013	0.110	Free Surface	0.188	No	6	No
668	433601	431303	6	221.0	8.8	0.013	0.098	Free Surface	0.198	No	6	No
669	433603	433602	6	217.0	6.7	0.013	0.079	Free Surface	0.193	No	6	No
67	431302	431301	8	253.2	1.8	0.013	0.629	Free Surface	0.517	No	8	No
670	433602	433601	6	419.0	10.2	0.013	0.089	Free Surface	0.198	No	6	No
671	433604	433603	6	139.1	2.4	0.013	0.071	Free Surface	0.226	No	6	No
672	431520	431521	6	107.5	5.8	0.013	0.011	Free Surface	0.100	No	6	No
673	454432	433401	6	438.5	59.3	0.013	0.145	Free Surface	0.201	No	6	No
674	431519	431520	6	113.4	10.7	0.013	0.010	Free Surface	0.072	No	6	No
675	431304	431303	6	167.3	11.8	0.013	0.011	Free Surface	0.126	No	6	No
676	433405	433406	8	128.3	5.1	0.013	0.896	Free Surface	0.593	No	8	No
677	433802	433803	6	132.5	2.8	0.013	0.004	Free Surface	0.059	No	6	No
678	454404	454405	6	230.2	1.0	0.013	0.101	Free Surface	0.316	No	6	No
679	454405	454406	6	147.9	5.5	0.013	0.103	Free Surface	0.234	No	6	No
68	431513	431512	8	176.8	4.0	0.013	0.632	Free Surface	0.458	No	8	No
680	454406	454407	6	166.9	2.6	0.013	0.105	Free Surface	0.247	No	6	No
681	433419	433420	6	125.6	3.2	0.013	0.032	Free Surface	0.254	No	6	No
682	431402	431403	6	247.8	3.8	0.013	0.063	Free Surface	0.239	No	6	No
683	433808	431308	6	158.4	6.2	0.013	0.035	Free Surface	0.158	No	6	No
684	442505	442516	6	121.6	2.8	0.013	0.003	Free Surface	0.047	No	6	No
685	452110	452108	6	278.2	55.7	0.013	0.066	Free Surface	0.110	No	6	No
686	442303	442302	6	149.9	9.9	0.013	0.036	Free Surface	0.125	No	6	No
687	431818	431817	6	56.5	9.3	0.013	0.048	Free Surface	0.178	No	6	No
688	431819	431818	6	153.0	4.2	0.013	0.028	Free Surface	0.137	No	6	No
689	442321LH	442320	6	94.6	24.5	0.013	0.005	Free Surface	0.042	No	6	No
69	431512	431511	8	154.5	3.2	0.013	0.636	Free Surface	0.478	No	8	No
690	451403	451703	18	219.8	3.5	0.013	3.974	Free Surface	0.383	No	18	No
691	451401	451402	24	403.3	1.2	0.013	3.865	Free Surface	0.333	No	24	No
692	451402	451402A	18	121.9	2.2	0.013	3.866	Free Surface	0.428	No	18	No
693	451406	451701	10	17.5	26.0	0.013	0.140	Free Surface	0.294	No	10	No
694	433111	433110	6	87.8	6.5	0.013	0.041	Free Surface	0.143	No	6	No
696	433803	433805	6	54.1	8.1	0.013	0.007	Free Surface	0.140	No	6	No
697	431517	431516	6	193.9	11.5	0.013	0.004	Free Surface	0.065	No	6	No
698	453710	453712	10	122.5	10.4	0.013	1.081	Free Surface	0.331	No	10	No
699	431416LH	431415	6	163.3	9.6	0.013	0.004	Free Surface	0.095	No	6	No
7	454910	454904	6	175.0	2.0	0.013	0.008	Free Surface	0.202	No	6	No
70	431511	431510	8	93.5	3.1	0.013	0.636	Free Surface	0.472	No	8	No
700	431523	431415	6	265.3	6.0	0.013	0.022	Free Surface	0.128	No	6	No
701	433805	433806	6	143.6	0.7	0.013	0.030	Free Surface	0.190	No	6	No
702	431305	431306	6	259.1	1.5	0.013	0.002	Free Surface	0.060	No	6	No
703	433806	433808	6	152.2	3.3	0.013	0.034	Free Surface	0.146	No	6	No
704	431403	431404	6	360.8	1.6	0.013	0.071	Free Surface	0.252	No	6	No
705	431308	431307	6	162.4	1.8	0.013	0.035	Free Surface	0.177	No	6	No

G3. Model Results for 2043 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
706	431306	431307	6	290.4	2.4	0.013	0.006	Free Surface	0.123	No	6	No
707	431307	431401	6	277.1	4.0	0.013	0.044	Free Surface	0.156	No	6	No
708	431401	431401A	6	69.3	8.3	0.013	0.044	Free Surface	0.143	No	6	No
709	431404	431405	6	281.9	3.6	0.013	0.077	Free Surface	0.239	No	6	No
71	431501	431504	8	110.2	3.5	0.013	0.649	Free Surface	0.504	No	8	No
710	431006	431007	6	67.6	1.5	0.013	0.012	Free Surface	0.115	No	6	No
711	431005	431006	6	106.2	1.6	0.013	0.012	Free Surface	0.113	No	6	No
712	431407	431406	6	61.4	3.9	0.013	0.003	Free Surface	0.164	No	6	No
713	433418	433419	6	272.4	0.4	0.013	0.032	Free Surface	0.216	No	6	No
715	442507	442506	6	55.6	4.8	0.013	0.002	Free Surface	0.033	No	6	No
716	431806	431705	6	65.2	7.2	0.013	0.361	Backwater	1.000	No	6	Yes
717	432006	431804	6	201.2	7.0	0.013	0.270	Free Surface	0.344	No	6	No
718	432903	433108	6	136.3	40.6	0.013	0.098	Free Surface	0.142	No	6	No
719	432904LH	432905	6	224.4	2.7	0.013	0.002	Free Surface	0.051	No	6	No
72	453701	453702	10	204.2	2.4	0.013	1.048	Free Surface	0.630	No	10	No
721	442302	442301	6	191.6	8.2	0.013	0.037	Free Surface	0.138	No	6	No
723	LH433214	LH433213	6	126.2	3.1	0.013	0.002	Free Surface	0.058	No	6	No
724	LH433213	442504	6	142.0	0.4	0.013	0.002	Free Surface	0.063	No	6	No
726	431708	431707	6	290.9	5.5	0.013	0.496	Free Surface	0.775	No	6	Yes
727	431706	431705	6	116.6	1.5	0.013	0.467	Exceeds Capacity	1.000	No	6	Yes
728	431707	431706	6	107.0	2.5	0.013	0.507	Backwater	1.000	No	6	Yes
73	431506	431505	6	177.2	2.3	0.013	0.648	Free Surface	0.812	No	6	Yes
730	440304	440303	6	97.7	8.9	0.013	0.035	Free Surface	0.137	No	6	No
731	431705	431704	6	172.7	3.2	0.013	0.744	Exceeds Capacity	1.000	No	6	Yes
732	431713	431711	6	276.5	7.1	0.013	0.083	Free Surface	0.275	No	6	No
733	431704	431703	6	71.1	4.6	0.013	0.705	Backwater	1.000	No	6	Yes
734	442004	441714	8	302.8	0.8	0.013	0.197	Free Surface	0.328	No	8	No
735	402617LH	442626	6	211.4	0.9	0.013	0.038	Free Surface	0.205	No	6	No
736	441417	441417A	6	194.7	3.5	0.013	0.023	Free Surface	0.139	No	6	No
737	441416	442504	6	47.7	10.5	0.013	0.024	Free Surface	0.100	No	6	No
738	452816LH	452817	6	207.0	9.0	0.013	0.007	Free Surface	0.079	No	6	No
739	442312	442313	6	44.4	24.1	0.013	0.004	Free Surface	0.047	No	6	No
74	431502	431501	8	219.2	2.6	0.013	0.012	Free Surface	0.599	No	8	No
740	442313	442314	6	157.6	4.7	0.013	0.006	Free Surface	0.064	No	6	No
741	431824	431822	6	86.0	2.2	0.013	0.002	Free Surface	0.041	No	6	No
742	431823	431822	6	54.6	7.1	0.013	0.002	Free Surface	0.037	No	6	No
743	431812	431811	6	103.5	22.7	0.013	0.015	Free Surface	0.082	No	6	No
744	442315	442316	6	131.2	36.9	0.013	0.022	Free Surface	0.086	No	6	No
745	442314	442315	6	162.5	11.6	0.013	0.011	Free Surface	0.069	No	6	No
746	431828	431829	6	74.0	0.9	0.013	0.017	Free Surface	0.170	No	6	No
747	431827	431828	6	75.4	0.9	0.013	0.016	Free Surface	0.147	No	6	No
748	431826	431827	6	75.8	0.9	0.013	0.013	Free Surface	0.137	No	6	No
749	431822	431821	6	127.7	23.0	0.013	0.006	Free Surface	0.062	No	6	No
75	431501	433401	8	205.2	2.9	0.013	0.876	Free Surface	0.574	No	8	No
750	431811	431810	6	110.4	7.7	0.013	0.020	Free Surface	0.123	No	6	No
751	442317	442315	6	115.6	1.2	0.013	0.009	Free Surface	0.092	No	6	No
752	431825	431826	6	127.7	0.9	0.013	0.011	Free Surface	0.127	No	6	No
753	431821	431825	6	45.2	3.3	0.013	0.009	Free Surface	0.103	No	6	No
754	431809	431808	6	64.1	4.7	0.013	0.036	Free Surface	0.131	No	6	No
755	431817	431816	6	47.4	2.7	0.013	0.050	Free Surface	0.177	No	6	No
756	431816	431814	6	171.5	14.2	0.013	0.056	Free Surface	0.134	No	6	No
757	442319	442318	6	63.7	15.7	0.013	0.001	Free Surface	0.036	No	6	No
758	431820	431819	6	205.5	2.0	0.013	0.005	Free Surface	0.099	No	6	No
759	433208	433209	6	82.7	2.0	0.013	0.027	Free Surface	0.160	No	6	No
76	431410	431503	6	200.3	32.6	0.013	0.162	Free Surface	0.437	No	6	No
760	431808	431807	6	63.3	22.7	0.013	0.042	Free Surface	0.132	No	6	No
762	431807	431805	6	81.5	4.9	0.013	0.043	Free Surface	0.157	No	6	No
763	433209	433210	6	162.4	3.6	0.013	0.040	Free Surface	0.204	No	6	No
764	432920	432909	6	126.0	3.1	0.013	0.087	Free Surface	0.296	No	6	No
765	432907	432908	6	364.0	6.4	0.013	0.012	Free Surface	0.101	No	6	No
766	452820	452821	6	77.4	10.4	0.013	0.044	Free Surface	0.137	No	6	No
767	442320	442322	6	96.5	15.1	0.013	0.006	Free Surface	0.053	No	6	No
768	433103	433202	6	137.4	12.1	0.013	0.072	Free Surface	0.217	No	6	No
769	442336	442322	6	87.6	6.4	0.013	0.003	Free Surface	0.052	No	6	No
77	431509	431508	8	157.1	1.0	0.013	0.642	Backwater	1.000	No	8	Yes
770	432906	432907	6	211.8	0.9	0.013	0.009	Free Surface	0.098	No	6	No
771	431801	431710	6	90.1	9.6	0.013	0.284	Free Surface	0.352	No	6	No
772	431803	431802	6	86.3	6.2	0.013	0.325	Free Surface	0.399	No	6	No
773	431804	431803	6	46.4	12.7	0.013	0.272	Free Surface	0.371	No	6	No
774	VMH_21	440301	6	74.7	1.3	0.013	0.010	Free Surface	0.126	No	6	No
775	431710	431709	6	62.8	7.9	0.013	0.284	Free Surface	0.405	No	6	No
776	454506	454505	6	144.8	5.7	0.013	0.000	Free Surface	0.011	No	6	No
777	454103	454104	6	338.6	0.7	0.013	0.024	Free Surface	0.180	No	6	No
778	454102	454103	6	424.2	0.3	0.013	0.012	Free Surface	0.184	No	6	No
779	454502	454501	6	212.6	1.4	0.013	0.087	Free Surface	0.316	No	6	No
78	431508	431507	8	83.0	1.5	0.013	0.645	Backwater	1.000	No	8	Yes
780	454101	454006	6	220.1	0.8	0.013	0.011	Free Surface	0.126	No	6	No
781	454101	454102	6	308.6	5.0	0.013	0.000	Free Surface	0.084	No	6	No
782	454004	454003	6	299.3	5.9	0.013	0.061	Free Surface	0.203	No	6	No
783	454201	454217	6	179.8	10.4	0.013	0.126	Free Surface	0.309	No	6	No
784	454403	454404	6	193.1	11.3	0.013	0.011	Free Surface	0.232	No	6	No
785	454501	454404	6	181.0	1.1	0.013	0.088	Free Surface	0.362	No	6	No
786	454410	454411	6	138.9	12.0	0.013	0.119	Free Surface	0.269	No	6	No
787	453609	453610	6	233.6	0.6	0.013	0.229	Free Surface	0.558	No	6	No
788	431516	431402	6	305.2	3.8	0.013	0.011	Free Surface	0.144	No	6	No
789	431007	431008	6	81.2	1.5	0.013	0.012	Free Surface	0.112	No	6	No
79	433804	433803	6	71.4	11.1	0.013	0.002	Free Surface	0.045	No	6	No
790	432815	432923A	6	201.9	7.4	0.013	0.050	Free Surface	0.244	No	6	No
791	432814	432815	6	31.5	5.1	0.013	0.040	Free Surface	0.152	No	6	No
792	432813LH	432814	6	57.0	11.0	0.013	0.001	Free Surface	0.084	No	6	No
793	432812	432913	6	300.5	7.0	0.013	0.115	Free Surface	0.237	No	6	No
794	431810	431809	6	116.3	3.1	0.013	0.030	Free Surface	0.152	No	6	No
795	442318	442317	6	114.2	4.9	0.013	0.004	Free Surface	0.083	No	6	No
796	431805	431801	6	160.1	50.7	0.013	0.137	Free Surface	0.249	No	6	No
797	433210	433101	6	157.0	2.2	0.013	0.054	Free Surface	0.175	No	6	No
798	442322	VMH_21	6	68.4	15.3	0.013	0.010	Free Surface	0.084	No	6	No
799	432922	432919	6	304.6	8.1	0.013	0.017	Free Surface	0.152	No	6	No
8	454903	454904	6	216.0	9.1	0.013	0.409	Free Surface	0.362	No	6	No
80	433422	433412	6	195.6	60.1	0.013	0.134	Free Surface	0.395	No	6	No
800	432919	432920	6	177.3	5.2	0.013	0.084	Free Surface	0.232	No	6	No
801	432912	432911	6	244.3	4.7	0.013	0.178	Free Surface	0.306	No	6	No
802	440301	432912	6	115.5	11.2	0.013	0.055	Free Surface	0.241	No	6	No
803	432905	432906	6	198.5	3.0	0.013	0.005	Free Surface	0.088	No	6	No
805	431711	431709	6	50.9	4.0	0.013	0.194	Free Surface	0.401	No	6	No
806	440301	440301	6	218.3	7.5	0.013	0.042	Free Surface	0.142	No	6	No
807	431712	431711	6	31.6	5.5	0.013	0.113	Free Surface	0.299	No	6	No
808	432913	432912	6	82.8	7.0	0.013	0.123	Free Surface	0.289	No	6	No
809	433108	433107	6	34.2	51.9	0.013	0.104	Free Surface	0.141	No	6	No
81	454003	454002	6	240.9	4.0	0.013	0.074	Free Surface	0.198	No	6	No
810	451826A	451826	6	29.5	0.8	0.013	0.009	Free Surface	0.132	No	6	No
811	440203	440202	6	186.2	1.7	0.013	0.021	Free Surface	0.146	No	6	No
812	451905	451706	18	376.2	1.0	0.013	0.974	Free Surface	0.496	No	18	No
813	440317	440203	6	125.5	4.1	0.013	0.007	Free Surface	0.107	No	6	No
814	431719	431720	6	170.8	27.7	0.013	0.118	Free Surface	0.584	No	6	No
815	432811	432812	6	240.8	8.3	0.013	0.007	Free Surface	0.225	No	6	No
816	451706	451403	18	102.5	4.3	0.013	3.974	Free Surface	0.374	No	18	No
817	431718	431719	8	111.0	11.7	0.013	0.108	Free Surface	0.133	No	8	No
818	431716	431718	8	231.2	7.7	0.013	0.106	Free Surface	0.146	No	8	No
819	451418	451406	6	280.0	3.8	0.013	0.009	Free Surface	0.121	No	6	No
82	454907	454908	6	252.5	12.1	0.013	0.293	Free Surface	0.316	No	6	No
820	451703	451704	18	126.1	1.9	0.013	3.974	Free Surface	0.457	No	18	No
821	431717	431716	6	212.5	10.0	0.013	0.048	Free Surface	0.171	No	6	No
822	432817	432816	6	300.5	9.8	0.013	0.005	Free Surface	0.065	No	6	No
823	433118	431714	6	220.8	5.1	0.013	0.036	Free Surface	0.147	No	6	No
824	432809	432814	6	370.6	8.1	0.013	0.036	Free Surface	0.139	No	6	No
825	432808	432809	6	24.7	3.4	0.013	0.026	Free Surface	0.131	No	6	No
826	451701	451702	18	247.9	2.9	0.013	4.002	Free Surface	0.419	No	18	No
827	451702	451705	12	45.5	0.2	0.013	0.000	Free Surface	0.000	No	12	No
828	431611	431610	6	145.4	1.0	0.013	0.578	Exceeds Capacity	1.000	No	6	Yes
829	431701	431611	6	118.9	2.9	0.013	0.641	Exceeds Capacity	1.000	No	6	Yes
83	453904	453903	6	367.8	1.6	0.013	0.006	Free Surface	0.089	No	6	No
830	440204	440203	6	182.2	3.1	0.013	0.010	Free Surface	0.116	No	6	No
831	433112	433111	6	141.9	7.9	0.013	0.030	Free Surface	0.130	No	6	No
832	431636	431717	6	225.2	1.6	0.013	0.041	Free Surface	0.179	No	6	No
833	451421	451406	8	164.9	3.1	0.013	0.131	Free Surface	0.177	No	8	No
834	432602	432601	6	237.0	7.8	0.013	0.010	Free Surface	0.098	No	6	No
835	432606LH	432605	6	103.9	1.2	0.013	0.005	Free Surface	0.093	No	6	No
836	440110	440109	6	152.4	28.2	0.013	0.006	Free Surface	0.085	No	6	No
837	442105	442105	6	200.8	5.8	0.013	0.034	Free Surface	0.133	No	6	No
838	432513	432512	6	173.5	1.6	0.013	0.005	Free Surface	0.132	No	6	No
839	432514LH	432513	6	92.7	11.3	0.013	0.003	Free Surface	0.057	No	6	No
84	453903	453902	6	314.1	5.8	0.013	0.017	Free Surface	0.100	No	6	No
840	433117	433118	6	197.9	0.8	0.013	0.019	Free Surface	0.157	No	6	No
841	432806	432807	6	174.7	1.3	0.013	0.022	Free Surface	0.135	No	6	No
842	432807	432808	6	119.6	9.4	0.013	0.025	Free Surface	0.119	No	6	No
843	431614	431613	6	128.3	14.7	0.013	0.243	Free Surface	0.261	No	6	No
844	431643	431614	6	103.9	25.6	0.013	0.209	Free Surface	0.266	No	6	No
845	432810	432811	8	282.6	4.1	0.013	0.103	Free Surface	0.169	No	8	No
846	451407	451421	8	102.8	10.4	0.013	0.128	Free Surface	0.193	No	8	No
847	433116LH	433117	6	97.2	17.5	0.013	0.009	Free Surface	0.113	No	6	No
848	431637	431636	6	143.5	11.3	0.013	0.244	Free Surface	0.274	No	6	No
849	431638	431637	6	288.2	13.1	0.013	0.233	Free Surface	0.308	No	6	No
85	433726	433725	6	187.2	3.0	0.013	0.002	Free Surface	0.048	No	6	No
850	431615	431614	6	57.6	21.7	0.013	0.032	Free Surface	0.198	No	6	No
851	431634	431615	6	121.9	2.5	0.013	0.010	Free Surface	0.094	No	6	No
852	431616	431615	6	63.6	52.7	0.013	0.019	Free Surface	0.078	No	6	No
853	431630	431609	6	322.0	3.8	0.013	0.647	Backwater	1.000	No	6	Yes
854	431619LH	431618	6	75.8	2.5	0.013	0.004	Free Surface	0.072	No	6	No
855	431617	431616	6	72.3	13.7	0.013	0.016	Free Surface	0.071	No	6	No
856	431618	431617	6	119.8	4.2	0.013	0.011	Free Surface	0.084	No	6	No
857	451702	451702A	18	330.6	1.8	0.013	3.992	Free Surface	0.464	No	18	No
858	433115LH	433114	6	167.6	10.2	0.013	0.007	Free Surface	0.098	No	6	No
859	433114	433113	6	175.3	1.1	0.013	0.014	Free Surface	0.119	No	6	No
86	453905	453606	6	360.9	2.8	0.013	0.185	Free Surface	0.347	No	6	No
860	432803LH	432802	6	151.0	11.8	0.013	0.004	Free Surface	0.100	No	6	No
861	432725	432726	6	366.0	5.3	0.013	0.068	Free Surface	0.199	No	6	No
862	440211	440211	6	293.4	5.1	0.013	0.010	Free Surface	0.161	No	6	No
863	431620LH	431617	6	98.6	6.9	0.013	0.002	Free Surface	0.059	No	6	No
864	433006	432724	6	104.2	2.2	0.013	0.059	Free Surface	0.209	No	6	No
865	432726	432728	6	137.9	6.1	0.013	0.080	Free Surface	0.200	No	6	No
866	433007LH	433008	6	176.9	2.8	0.013	0.008	Free Surface	0.129	No	6	No
867	432730	432728	6	152.4	8.0	0.013	0.008	Free Surface	0.127	No	6	No
868	433009	433008	6	85.0	13.3	0.013	0.022	Free Surface	0.134	No	6	No
869	433022	431640	6	50.7	9.8	0.013	0.008	Free Surface	0.151	No	6	No
87	454810	454801	6	173.1	1.3	0.013	0.010	Free Surface	0.227	No	6	No
870	433012	433015	6	350.4	9.0	0.013	0.084	Free Surface	0.216	No	6	No
871	433008	433012	6	255.7	1.9	0.013	0.035	Free Surface	0.183	No	6	No
872	432737	432722	6	103.5	0.3	0.013	0.005	Free Surface	0.109	No	6	No
873	432722	432721	6	43.4	1.4	0.013	0.009	Free Surface	0.097	No	6	No
874	432723	433006	6	177.6	0.3	0.013	0.003	Free Surface	0.138	No	6	No
875	433020	433009	6	93.5	26.1	0.013	0.014	Free Surface	0.076	No	6	No

G3. Model Results for 2043 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
876	433011	433010	6	111.5	2.5	0.013	0.006	Free Surface	0.069	No	6	No
877	433010	433020	6	18.9	14.0	0.013	0.010	Free Surface	0.061	No	6	No
878	432729	432730	6	160.1	4.1	0.013	0.003	Free Surface	0.053	No	6	No
879	433021LH	433022	6	126.4	2.7	0.013	0.004	Free Surface	0.059	No	6	No
88	454808	454801	6	214.2	17.7	0.013	0.290	Free Surface	0.321	No	6	No
880	432716	432719	6	178.8	8.2	0.013	0.060	Free Surface	0.209	No	6	No
881	432717	432716	6	59.5	16.6	0.013	0.013	Free Surface	0.114	No	6	No
882	432626	440211	6	295.2	6.2	0.013	0.104	Free Surface	0.237	No	6	No
883	432712	432715	6	135.2	9.2	0.013	0.034	Free Surface	0.132	No	6	No
884	433013	433013A	6	106.2	14.0	0.013	0.029	Free Surface	0.108	No	6	No
885	433003	433004	6	121.0	1.7	0.013	0.047	Free Surface	0.231	No	6	No
886	432715	432716	6	70.5	7.9	0.013	0.045	Free Surface	0.153	No	6	No
887	432719	432720	6	240.3	1.4	0.013	0.061	Free Surface	0.272	No	6	No
888	433004	433005	6	192.1	1.0	0.013	0.049	Free Surface	0.281	No	6	No
889	433005	433006	6	352.0	0.6	0.013	0.054	Free Surface	0.276	No	6	No
89	431725	431724	6	197.7	3.0	0.013	0.004	Free Surface	0.056	No	6	No
890	432732	432731	6	141.5	1.4	0.013	0.011	Free Surface	0.115	No	6	No
891	432614	432517	6	149.7	9.7	0.013	0.007	Free Surface	0.074	No	6	No
892	432516	432515	6	159.5	4.8	0.013	0.065	Free Surface	0.193	No	6	No
893	432214	432209	6	87.4	13.2	0.013	0.008	Free Surface	0.096	No	6	No
894	432312	432311	6	251.3	5.7	0.013	0.026	Free Surface	0.115	No	6	No
895	432615LH	432616	6	160.8	11.3	0.013	0.003	Free Surface	0.039	No	6	No
896	432619LH	432619	6	108.3	15.5	0.013	0.007	Free Surface	0.091	No	6	No
897	432321LH	432320	6	179.0	12.7	0.013	0.005	Free Surface	0.052	No	6	No
898	432306	432305	6	167.8	7.4	0.013	0.067	Free Surface	0.185	No	6	No
899	432525	432524	8	262.1	11.8	0.013	0.010	Free Surface	0.051	No	8	No
9	431521	431522	6	199.5	1.9	0.013	0.015	Free Surface	0.139	No	6	No
90	453902	453901	6	254.9	13.5	0.013	0.029	Free Surface	0.110	No	6	No
900	432320	432319	6	148.8	17.8	0.013	0.011	Free Surface	0.064	No	6	No
901	441310	441311	6	168.5	1.2	0.013	0.013	Free Surface	0.127	No	6	No
902	432319	432318	6	82.7	18.5	0.013	0.014	Free Surface	0.079	No	6	No
903	432521	432521	8	236.5	22.5	0.013	0.019	Free Surface	0.055	No	8	No
904	432223LH	432216	6	155.4	46.0	0.013	0.005	Free Surface	0.047	No	6	No
905	433016	431640	6	301.3	1.1	0.013	0.104	Free Surface	0.315	No	6	No
906	431641LH	431642	8	192.8	4.4	0.013	0.055	Free Surface	0.152	No	8	No
907	431641	433016	6	63.1	4.1	0.013	0.092	Free Surface	0.312	No	6	No
908	432711	432712	6	85.3	6.6	0.013	0.029	Free Surface	0.120	No	6	No
909	432713	432712	6	160.7	7.5	0.013	0.005	Free Surface	0.085	No	6	No
91	453605	453606	6	299.5	0.7	0.013	0.011	Free Surface	0.212	No	6	No
910	432720	432625	6	130.4	1.2	0.013	0.063	Free Surface	0.243	No	6	No
911	432625	432626	6	156.3	9.2	0.013	0.095	Free Surface	0.213	No	6	No
912	432718	432717	6	218.7	4.5	0.013	0.008	Free Surface	0.069	No	6	No
913	431606	431605	6	106.3	3.4	0.013	0.723	Exceeds Capacity	1.000	No	6	Yes
914	431605	431604	6	124.5	5.6	0.013	0.695	Backwater	1.000	No	6	Yes
915	433019	433019WYE	6	100.9	7.6	0.013	0.006	Free Surface	0.072	No	6	No
917	432710	432711	6	165.3	2.4	0.013	0.025	Free Surface	0.134	No	6	No
918	432603	432602	6	99.3	4.6	0.013	0.066	Free Surface	0.066	No	6	No
919	432624	432625	6	173.2	9.0	0.013	0.031	Free Surface	0.157	No	6	No
92	450937	450810	6	146.0	1.0	0.013	0.014	Free Surface	0.379	No	6	No
920	433014LH	433013	6	288.3	7.0	0.013	0.013	Free Surface	0.091	No	6	No
921	432405	432404	6	141.1	2.1	0.013	0.009	Free Surface	0.089	No	6	No
922	432404	433019WYE	6	119.0	21.6	0.013	0.026	Free Surface	0.086	No	6	No
923	433002	433003	6	299.6	5.0	0.013	0.042	Free Surface	0.184	No	6	No
924	432708	432709	6	164.8	5.8	0.013	0.011	Free Surface	0.087	No	6	No
925	432709	432710	6	149.9	7.0	0.013	0.018	Free Surface	0.122	No	6	No
926	432403	432404	6	307.1	1.5	0.013	0.008	Free Surface	0.092	No	6	No
927	432707LH	432708	6	130.6	1.5	0.013	0.005	Free Surface	0.076	No	6	No
928	432623	432624	6	200.6	10.4	0.013	0.027	Free Surface	0.110	No	6	No
929	432622	432623	6	121.5	10.6	0.013	0.023	Free Surface	0.101	No	6	No
93	431011	431106	6	277.0	2.7	0.013	0.009	Free Surface	0.106	No	6	No
930	432621	432622	6	233.6	0.9	0.013	0.021	Free Surface	0.142	No	6	No
931	433001	433002	6	160.6	0.9	0.013	0.033	Free Surface	0.187	No	6	No
932	432731	432621	6	160.0	1.8	0.013	0.015	Free Surface	0.154	No	6	No
933	432601	432516	6	88.0	17.9	0.013	0.052	Free Surface	0.159	No	6	No
934	432314	432313	6	140.6	5.3	0.013	0.005	Free Surface	0.062	No	6	No
935	432517	432516	6	140.2	2.2	0.013	0.009	Free Surface	0.141	No	6	No
936	432609	432608	6	23.2	23.0	0.013	0.006	Free Surface	0.081	No	6	No
937	432608	432607	6	201.2	4.0	0.013	0.021	Free Surface	0.119	No	6	No
938	443314	440736	6	190.1	2.6	0.013	0.056	Free Surface	0.213	No	6	No
939	432706LH	432705	6	232.5	5.3	0.013	0.005	Free Surface	0.060	No	6	No
94	431008	431013	6	234.9	3.0	0.013	0.014	Free Surface	0.091	No	6	No
940	432610	432608	6	125.2	1.3	0.013	0.014	Free Surface	0.124	No	6	No
941	432701	433001	6	320.7	0.5	0.013	0.029	Free Surface	0.228	No	6	No
942	432613A	432613	6	86.0	4.0	0.013	0.000	Free Surface	0.021	No	6	No
943	432515	432512	6	131.6	5.7	0.013	0.070	Free Surface	0.191	No	6	No
944	432628	432518	6	25.1	10.5	0.013	0.004	Free Surface	0.057	No	6	No
946	432313	432312	6	240.1	10.5	0.013	0.012	Free Surface	0.097	No	6	No
947	432324	432312	6	123.1	31.5	0.013	0.005	Free Surface	0.079	No	6	No
948	432702	432701	6	108.3	0.9	0.013	0.026	Free Surface	0.211	No	6	No
949	432703	432702	6	160.5	1.5	0.013	0.019	Free Surface	0.163	No	6	No
95	430711	430712	6	103.3	0.5	0.013	0.038	Free Surface	0.262	No	6	No
950	432705	432703	6	123.0	16.7	0.013	0.012	Free Surface	0.102	No	6	No
951	443412	443413	6	139.4	7.1	0.013	0.004	Free Surface	0.050	No	6	No
952	440609	440607	6	189.6	3.1	0.013	0.138	Free Surface	0.312	No	6	No
953	432733	432732	6	229.1	0.8	0.013	0.005	Free Surface	0.098	No	6	No
954	440725	440726	6	275.8	5.8	0.013	0.061	Free Surface	0.227	No	6	No
955	432704	432703	6	174.4	4.9	0.013	0.003	Free Surface	0.091	No	6	No
956	432734	432610	6	298.1	2.0	0.013	0.005	Free Surface	0.098	No	6	No
957	432518	432519	6	315.8	4.6	0.013	0.008	Free Surface	0.079	No	6	No
958	432327	432308	6	75.7	6.8	0.013	0.019	Free Surface	0.116	No	6	No
959	432311	432310	6	74.5	10.7	0.013	0.029	Free Surface	0.109	No	6	No
96	433316	433316A	6	110.3	2.5	0.013	0.016	Free Surface	0.268	No	6	No
960	432611	08C638M	6	262.8	2.8	0.013	0.008	Free Surface	0.082	No	6	No
961	432209	432208	6	190.2	19.8	0.013	0.065	Free Surface	0.160	No	6	No
962	440726	440727	6	219.2	1.1	0.013	0.063	Free Surface	0.267	No	6	No
963	432619	432618	6	87.3	1.0	0.013	0.011	Free Surface	0.098	No	6	No
964	432526LH	432525	8	192.3	10.7	0.013	0.006	Free Surface	0.039	No	8	No
965	432309	432308	6	129.8	13.3	0.013	0.044	Free Surface	0.130	No	6	No
966	432310	432309	6	76.5	19.9	0.013	0.041	Free Surface	0.117	No	6	No
967	432618	432617	6	129.5	25.2	0.013	0.014	Free Surface	0.062	No	6	No
968	432616	432617	6	146.4	8.2	0.013	0.003	Free Surface	0.104	No	6	No
969	432315	432212	8	156.8	56.7	0.013	0.036	Free Surface	0.069	No	8	No
97	431106	431107	6	142.3	2.8	0.013	0.021	Free Surface	0.145	No	6	No
970	432213	432212	6	48.1	68.0	0.013	0.003	Free Surface	0.067	No	6	No
971	440727	440728	6	132.7	7.1	0.013	0.140	Free Surface	0.271	No	6	No
972	432210	432209	6	260.3	14.1	0.013	0.054	Free Surface	0.136	No	6	No
973	VMH_20	08C649L	6	40.9	7.4	0.013	0.003	Free Surface	0.068	No	6	No
975	432211	432210	6	171.3	2.4	0.013	0.045	Free Surface	0.170	No	6	No
976	432212	432211	6	108.8	19.8	0.013	0.042	Free Surface	0.158	No	6	No
977	432530LH	432522	6	269.0	10.8	0.013	0.003	Free Surface	0.053	No	6	No
978	432523	432522	6	35.3	2.9	0.013	0.010	Free Surface	0.081	No	6	No
98	441014	06C236M	6	176.7	1.4	0.013	0.009	Free Surface	0.102	No	6	No
980	432215LH	432211	6	57.7	12.7	0.013	0.001	Free Surface	0.115	No	6	No
982	432206	432205	6	185.3	1.6	0.013	0.172	Free Surface	0.420	No	6	No
983	432216	432205	6	173.1	20.2	0.013	0.012	Free Surface	0.237	No	6	No
984	441109	441110	6	246.9	3.7	0.013	0.041	Free Surface	0.154	No	6	No
986	432303	432302	6	156.0	32.6	0.013	0.075	Free Surface	0.128	No	6	No
987	441930	441906	6	399.7	21.7	0.013	0.009	Free Surface	0.115	No	6	No
988	432318	432317	6	305.7	12.4	0.013	0.020	Free Surface	0.083	No	6	No
989	432317	432218	6	153.4	42.4	0.013	0.027	Free Surface	0.081	No	6	No
99	402711	402712	6	286.0	0.7	0.013	0.099	Free Surface	0.354	No	6	No
990	432302	432301	6	120.1	45.2	0.013	0.079	Free Surface	0.135	No	6	No
992	432205	432204	6	243.9	2.6	0.013	0.207	Free Surface	0.409	No	6	No
993	432218	432204	6	184.0	37.3	0.013	0.034	Free Surface	0.245	No	6	No
994	432301	432220	6	53.7	22.7	0.013	0.081	Free Surface	0.151	No	6	No
996	432203	432202	6	172.5	0.5	0.013	0.293	Free Surface	0.843	No	6	Yes
997	432219	432202	6	287.9	14.2	0.013	0.086	Free Surface	0.170	No	6	No
998	432202	HASKINS_WW	8	28.0	0.1	0.011	0.382	Free Surface	0.627	No	8	Yes
C-1030	433019WYE	431642	6	90.7	48.1	0.013	0.039	Free Surface	0.163	No	6	No
C-1148	431002	431005	6	308.1	1.5	0.013	0.008	Free Surface	0.103	No	6	No
C-1156	442503A	442503	8	122.5	4.0	0.013	0.352	Free Surface	0.323	No	8	No
C-1345	441311	441301	6	62.0	1.0	0.013	0.013	Free Surface	0.132	No	6	No
C-1512	402602	402502	6	305.7	3.1	0.013	0.005	Free Surface	0.409	No	6	No
C-1519	443219	443221B	8	241.1	1.9	0	0.010	Free Surface	0.080	No	8	No
C-1694	441212	441007	6	305.0	11.7	0.013	0.012	Free Surface	0.074	No	6	No
C-1703	490101	HASTINGS_WW	6	171.4	0.4	0.013	0.009	Free Surface	0.124	No	6	No
C-1730	441407A	441501	8	248.4	4.2	0.013	0.563	Free Surface	0.435	No	8	No
C-1764	403304	403305	8	404.0	1.2	0.013	0.215	Free Surface	0.672	No	8	No
C-185	454902	455001	6	223.2	13.3	0.013	0.005	Free Surface	0.097	No	6	No
C-1893	442606	442701	12	445.2	5.5	0.013	3.541	Free Surface	0.533	No	12	No
C-1972	440731	440729	6	265.5	9.1	0.013	0.005	Free Surface	0.249	No	6	No
C-1984	442116	441820	6	30.1	3.3	0.013	0.003	Free Surface	0.079	No	6	No
C-1986	441820	443604A	6	151.0	5.1	0.013	0.021	Free Surface	0.124	No	6	No
C-2013	441912	441910	6	208.6	14.0	0.013	0.039	Free Surface	0.144	No	6	No
C-2063	441019	441401	6	130.3	6.2	0.013	0.230	Free Surface	0.363	No	6	No
C-2124	443202A	443203	12	70.0	1.9	0.013	1.938	Free Surface	0.612	No	12	No
C-2190	403310	403310A	21	274.8	0.8	0.013	4.746	Free Surface	0.527	No	21	No
C-2191	403311	403319	6	253.9	0.4	0	0.028	Free Surface	0.236	No	6	No
C-2302	403108	403108A	6	143.3	1.4	0.013	0.065	Free Surface	0.271	No	6	No
C-234	432211	442504A	6	129.1	0.9	0.013	0.287	Free Surface	0.701	No	6	Yes
C-2361	403708	403709	21	70.7	1.5	0.013	5.738	Free Surface	0.716	No	21	No
C-238	403410	460101	27	435.9	0.1	0	8.252	Exceeds Capacity	1.000	No	27	Yes
C-2384	452007	452008CO	6	255.3	12.5	0.013	0.051	Free Surface	0.118	No	6	No
C-2389	452821	452019	6	74.8	8.1	0.013	0.045	Free Surface	0.296	No	6	No
C-239	403423	403423D	21	783.8	0.4	0.013	4.527	Backwater	1.000	No	21	Yes
C-2406	442503	442502	8	310.0	7.6	0.013	0.353	Free Surface	0.293	No	8	No
C-2424	453729	450118	12	241.8	11.4	0.013	3.507	Free Surface	0.472	No	12	No
C-2441	403330	403311	6	350.4	0.4	0	0.022	Free Surface	0.194	No	6	No
C-2442	403318	403312	21	299.6	0.6	0	4.782	Free Surface	0.488	No	21	No
C-2443	403319	403332	10	261.9	0.4	0.013	0.044	Free Surface	0.563	No	10	Yes
C-2476	450114	442624	12	237.2	5.4	0.013	3.513	Free Surface	0.591	No	12	No
C-2508	430725	430723	8	177.1	0.5	0.013	0.019	Free Surface	0.153	No	8	No
C-2514	430403	430403A	10	95.7	4.0	0.013	0.779	Free Surface	0.361	No	10	No
C-2526	453712	453729	12	52.5	9.6	0.013	1.270	Free Surface	0.286	No	12	No
C-2539	450118	450114	12	219.8	5.4	0.013	3.507	Free Surface	0.591	No	12	No
C-2562	404803A	403609	6	31.5	0.3	0.013	0.069	Free Surface	0.376	No	6	No
C-2563	VMH-92	403410	27	11.9	0.0	0.013	8.560	Backwater	1.000	No	27	Yes
C-2564	403423	VMH-92	21	6.1	0.9	0.013	1.703	Backwater	1.000	No	21	Yes
C-2565	450303	450101	8	333.2	3.5	0.013	0.318	Free Surface	0.317	No	8	No
C-2566	440117A	440118	6	97.5	0.3	0.013	0.013	Free Surface	0.130	No	6	No
C-2569	452818WYE	452819	6	120.3	10.7	0.013	0.042	Free Surface	0.136	No	6	No
C-2570	441909	441908	6	178.4	4.3	0.013	0.051	Free Surface	0.166	No	6	No
C-2572	451606	451615	12	7.7	2.1	0.01	0.303	Free Surface	0.201	No	12	No
C-2573	451615	451803D	12	241.7	1.5	0.013	0.303	Free Surface	0.421	No	12	No
C-2574	430607	430607A	8	19.8	1.2	0.013	0.001	Free Surface	0.017	No	8	No
C-2575	430605A	430605	8	21.4	0.6	0.013	0.254	Free Surface	0.451	No	8	No
C-2576	450302A	450303	8	143.1	2.4	0.013	0.285	Free Surface	0.325	No	8	No
C-2577	452008CO	452008BD	6	4.6	96.5	0.013	0.057	Free Surface	0.104	No	6	No
C-2578	452008BD	452008BDA	6	41.0	27.3	0.013	0.057	Free Surface	0.120	No	6	No
C-2579	452008BDA	452008BDB	6	13.4	30.7	0.013	0.058	Free Surface	0.118	No	6	No
C-2580	452008BDB	452009	6	9.9	12.9	0.013	0.058	Free Surface	0.142	No	6	No

G3. Model Results for 2043 PWWF

ID	From MH	To MH	Size (in.)	Length(ft)	Slope (%)	Manning's n	Maximum Flow (mgd)	Maximum Flow Class	Max.Depth/Full Depth	Force Main	Existing Diameter	Deficient
C-2581	454606	454606A	6	497.9	0.1	0.013	0.020	Free Surface	0.289	No	6	No
C-2584	403423C	IEC_MH-116	27	512.0	0.0	0.013	14.141	Free Surface	0.864	No	30	Yes
C-2585	403700K	IEC_MH-116	27	10.5	3.8	0.013	3.049	Free Surface	0.692	No	27	No
C-2586	IEC_MH-116	OFALL-18	36	46.0	0.3	0.013	16.309	Free Surface	0.567	No	36	No
C-2587	403703E	403703D	8	225.0	0.7	0	0.024	Free Surface	0.114	No	8	No
C-2588	403703D	403703C	8	105.0	0.7	0	0.023	Free Surface	0.139	No	8	No
C-2589	403703C	403703B	8	200.0	0.7	0	0.048	Free Surface	0.175	No	8	No
C-2590	403703B	403700K	8	300.0	0.7	0.013	0.051	Free Surface	0.189	No	8	No
C-2592	452712	452818WYE	6	46.0	10.7	0.013	0.025	Free Surface	0.114	No	6	No
C-2594	441910	441909	6	39.7	4.3	0.013	0.049	Free Surface	0.177	No	6	No
C-2595	451802B	451802A	6	127.4	5.8	0.013	0.030	Free Surface	0.126	No	6	No
C-2596	451802C	451802B	6	159.9	5.8	0	0.010	Free Surface	0.096	No	6	No
C-2598	403603A	403605	6	80.0	0.2	0.013	0.068	Free Surface	0.595	No	6	Yes
C-2602	403108A	403109	6	35.8	1.4	0.013	0.071	Free Surface	0.331	No	6	No
C-2604	403310A	403318	18	128.1	0.8	0.013	4.782	Free Surface	0.659	No	18	No
C-2605	403317	403310A	10	40.8	1.5	0.013	0.027	Free Surface	0.087	No	10	No
C-2606	404804	404803A	8	106.4	0.4	0.013	0.038	Free Surface	0.257	No	8	No
C-2610	454506B	454406	6	89.4	2.4	0.013	0.002	Free Surface	0.068	No	6	No
C-2611	454506A	454506B	6	101.4	5.7	0.013	0.001	Free Surface	0.028	No	6	No
C-2612	454506	454506A	6	63.2	5.7	0.013	0.001	Free Surface	0.025	No	6	No
C-2615	455002	455003	6	198.3	2.6	0.013	0.090	Free Surface	0.296	No	6	No
C-2621	403709	403423	21	45.0	3.6	0.013	4.992	Backwater	1.000	No	21	Yes
C-2624	450302	450302A	8	146.6	2.4	0.013	0.281	Free Surface	0.329	No	8	No
C-2627	430101	430210	6	239.2	11.7	0.013	0.403	Free Surface	0.436	No	6	No
C-2647	441408	441518A	6	16.1	1.9	0.013	0.000	Free Surface	0.000	No	6	No
C-2658	431601	431602	10	68.3	1.8	0.013	0.798	Free Surface	0.452	No	10	No
C-2667	441409	441409B	6	124.6	0.9	0	0.080	Free Surface	0.313	No	6	No
C-2679	453715	453731	8	120.0	21.2	0.013	2.429	Free Surface	0.590	No	8	No
C-2727	451815	451815A	6	194.9	1.8	0.013	0.177	Free Surface	0.417	No	6	No
C-2728	403322	403304	6	218.3	1.6	0.013	0.037	Free Surface	0.192	No	6	No
C-2741	432401C	SAN_JUAN_WW	8	8.7	1.3	0.013	4.676	Exceeds Capacity	1.000	No	8	Yes
C-2746	432401	432401A	8	79.7	1.9	0.013	0.021	Free Surface	0.097	No	8	No
C-2747	432402	432401C	8	29.0	1.2	0.013	1.316	Exceeds Capacity	1.000	No	8	Yes
C-2758	443202	443202A	12	206.3	1.9	0.013	1.934	Free Surface	0.561	No	12	No
C-2786	403700B	403700C	18	55.0	0.3	0.013	0.939	Free Surface	0.350	No	18	No
C-2787	403700C	403700D	18	70.0	0.3	0.013	0.928	Free Surface	0.366	No	18	No
C-2788	403700D	403700E	18	305.0	0.3	0.013	1.107	Free Surface	0.386	No	18	No
C-2790	403700A	403700B	18	330.0	0.2	0.013	0.935	Free Surface	0.357	No	18	No
C-2792	403700E	403700F	18	140.0	0.3	0.013	1.080	Free Surface	0.356	No	18	No
C-2793	403700F	403700G	18	10.0	1.2	0.013	1.083	Free Surface	0.322	No	18	No
C-2794	403700G	403700H	18	290.0	0.3	0.013	1.079	Free Surface	0.373	No	18	No
C-2795	403700H	403700I	21	190.0	0.3	0.013	1.099	Free Surface	0.430	No	18	No
C-2796	403700I	403700K	21	20.0	1.5	0.013	2.939	Free Surface	0.576	No	18	No
C-2797	451815A	451810	6	24.8	9.1	0.013	0.177	Free Surface	0.272	No	6	No
C-2799	441931LH	441931	6	256.2	25.6	0.013	0.003	Free Surface	0.037	No	6	No
C-2806	454606A	454608	6	113.4	0.6	0.013	0.024	Free Surface	0.223	No	6	No
C-2813	442624	442624A	12	233.0	5.4	0.013	3.513	Free Surface	0.795	No	12	Yes
C-2814	442624A	442624B	12	113.6	0.8	0.013	3.514	Exceeds Capacity	1.000	No	12	Yes
C-2815	442624B	442624C	12	32.9	0.0	0.013	3.514	Free Surface	0.967	No	12	Yes
C-2816	442604	442624C	8	277.1	4.2	0.013	0.023	Free Surface	0.305	No	8	No
C-2817	442624C	442606	12	275.0	5.5	0.013	3.536	Free Surface	0.632	No	12	No
C-2818	442504A	442503A	6	24.0	4.1	0.013	0.287	Free Surface	0.433	No	6	No
C-2819	442504	442503A	8	27.0	4.0	0.013	0.065	Free Surface	0.231	No	8	No
C-2822	451507	451507A	6	25.5	10.9	0.013	0.020	Free Surface	0.090	No	6	No
C-2823	451507A	451611	6	121.0	10.9	0.013	0.020	Free Surface	0.100	No	6	No
C-2833	432401B	432401C	8	5.4	49.7	0.013	0.755	Free Surface	0.608	No	8	No
C-2834	432401A	432402	8	42.7	3.5	0.013	0.022	Free Surface	0.419	No	8	No
C-2840	403332	403305	10	8.2	1.3	0.013	1.876	Backwater	1.000	No	10	Yes
C-2847	453731	453729	10	61.2	21.2	0.013	2.429	Free Surface	0.425	No	10	No
C-2848	403605B	403605A	6	270.0	0.2	0.013	0.025	Free Surface	0.359	No	6	No
C-2853	460101	403416A	27	341.1	0.1	0.013	8.337	Exceeds Capacity	1.000	No	27	Yes
C-2855	441407	441407A	8	34.8	2.9	0.013	0.563	Free Surface	0.453	No	8	No
C-2856	430403A	431601	10	133.1	3.9	0.013	0.789	Free Surface	0.362	No	10	No
C-404	451409	451408	6	259.2	14.7	0.013	0.054	Free Surface	0.146	No	6	No
C-515	431102	430610	8	160.7	11.3	0.013	0.024	Free Surface	0.105	No	8	No
C-572	430402	430403	10	321.2	4.0	0.013	0.761	Free Surface	0.357	No	10	No
C-578	442607	442606	6	120.0	13.0	0.013	0.009	Free Surface	0.529	No	6	No
C-586	432910	433211	6	265.0	0.8	0.013	0.286	Free Surface	0.718	No	6	Yes
C-588	442713	442438	6	244.4	2.2	0.013	0.017	Free Surface	0.139	No	6	No
C-655	442603	442604	8	168.7	4.3	0.013	0.023	Free Surface	0.084	No	8	No
C-657	450208	450207	10	85.3	5.0	0.013	0.375	Free Surface	0.281	No	10	No
C-663	442502	442501	8	112.7	4.7	0.013	0.358	Free Surface	0.487	No	8	No
CDT-13	432617	OFALL-12	6	500.0	0.5	0.01	0.020	Free Surface	0.167	No	6	No
CDT-15	432533	OFALL-14	6	500.0	0.4	0.01	0.034	Free Surface	0.225	No	6	No
CDT-17	432502	OFALL-16	6	500.0	0.2	0.013	0.024	Free Surface	0.253	No	6	No
CDT-19	450103A	442701A	12	600.7	1.2	0.013	0.373	Free Surface	0.259	No	12	No
IEC_GM-100	442701	450417B	10	41.8	7.2	0.013	1.711	Free Surface	0.471	No	10	No
IEC_GM-102	450417B	450417A	10	321.5	4.3	0.013	1.710	Free Surface	0.548	No	10	No
IEC_GM-104	450417A	450417	10	192.9	6.6	0.013	1.710	Free Surface	0.483	No	10	No
IEC_GM-106	450417	450419	18	294.9	2.5	0.013	4.220	Free Surface	0.437	No	18	No
IEC_GM-110	441827	441827B	8	47.8	6.0	0.013	0.019	Free Surface	0.068	No	8	No
IEC_GM-112	441827B	443604A	8	129.8	8.3	0.013	0.019	Free Surface	0.065	No	8	No
IEC_GM-114	452406B	452403	6	101.1	0.1	0.01	0.007	Free Surface	0.633	No	6	Yes
IEC_GM-116	443221B	443221A	8	151.1	1.5	0.013	0.020	Free Surface	0.097	No	8	No
IEC_GM-120	IEC_MH-110	450211	8	141.0	11.7	0.013	0.328	Free Surface	0.247	No	8	No
IEC_GM-122	452405A	451810	8	271.0	0.2	0.013	0.307	Free Surface	0.746	No	8	Yes
IEC_GM-124	441502	441519	15	61.1	0.4	0.013	0.689	Free Surface	0.347	No	15	No
IEC_GM-126	441519	NORTH_ROAD_WW_N	15	22.4	0.6	0.013	1.277	Free Surface	0.432	No	15	No
IEC_GM-134	403609	403608	8	270.2	0.7	0.013	0.153	Free Surface	0.436	No	8	No

Appendix H. Defect Codes and Rehabilitation Actions

Appendix H. Defect Codes and Assigned Rehabilitation Actions

Defect Code	Default Score	Type	Description	Rehab. Method	Alternative Method	Clock Pos. Grade 1	Clock Pos. Grade 2	Clock Pos. Grade 3	Clock Pos. Grade 4	Value % Grade1	Value % Grade2	Value % Grade3	Value % Grade4	Alter. Rehab. Cutoff
ACB	0	CONSTRUCTION	Catch Basin			0	0	0	0	0	0	0	0	0
ACOH	0	CONSTRUCTION	Cleanout House			0	0	0	0	0	0	0	0	0
ACOM	0	CONSTRUCTION	Cleanout Mainline			0	0	0	0	0	0	0	0	0
ACOP	0	CONSTRUCTION	Cleanout Property line			0	0	0	0	0	0	0	0	0
ADP	0	CONSTRUCTION	Discharge Point			0	0	0	0	0	0	0	0	0
AEP	0	CONSTRUCTION	End of Pipe			0	0	0	0	0	0	0	0	0
AJB	0	CONSTRUCTION	Junction Box			0	0	0	0	0	0	0	0	0
AM	0	CONSTRUCTION	Meter			0	0	0	0	0	0	0	0	0
AMH	0	CONSTRUCTION	Manhole			0	0	0	0	0	0	0	0	0
AOC	0	CONSTRUCTION	Special Chamber			0	0	0	0	0	0	0	0	0
ATC	0	CONSTRUCTION	Tee Connection			0	0	0	0	0	0	0	0	0
AWA	0	CONSTRUCTION	Wastewater Access Device			0	0	0	0	0	0	0	0	0
AWW	0	CONSTRUCTION	Wet Well			0	0	0	0	0	0	0	0	0
B	4	STRUCTURAL	Broken	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
BSV	5	STRUCTURAL	Broken Soil Visible	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
BVV	5	STRUCTURAL	Broken Void Visible	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
CC	1	STRUCTURAL	Crack Circumferential			0	0	0	0	0	0	0	0	0
CH2	2	STRUCTURAL	Crack Longitudinal Hinge, 2			0	0	0	0	0	0	0	0	0
CH3	3	STRUCTURAL	Crack Longitudinal Hinge, 3	LINING	LINING	0	0	0	0	0	0	0	0	0
CH4	4	STRUCTURAL	Crack Longitudinal Hinge, 4	LINING	LINING	0	0	0	0	0	0	0	0	0
CL	2	STRUCTURAL	Crack Longitudinal			0	0	0	0	0	0	0	0	0
CM	3	STRUCTURAL	Crack Multiple	LINING	LINING	0	0	0	0	0	0	0	0	0
CS	2	STRUCTURAL	Crack Spiral			0	0	0	0	0	0	0	0	0
DAE	2	SERVICE	Deposits Attached Encrustation	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
DAGS	2	SERVICE	Deposits Attached Grease	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
DAR	2	SERVICE	Deposits Attached Ragging	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
DAZ	2	SERVICE	Deposits Attached Other	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
DB	3	STRUCTURAL	Displaced Brick	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
DFBI	5	STRUCTURAL	Deformed Flexible Bulging Inverse Curvature	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
DFBR	3	STRUCTURAL	Deformed Flexible Bulging Round	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	5	10	0
DFC	5	STRUCTURAL	Deformed Flexible Bulging Creasing	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
DFE	3	STRUCTURAL	Deformed Flexible Elliptical	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
DI	5	STRUCTURAL	Dropped Invert	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
DNF	2	SERVICE	Deposits Ingressed Fine	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
DNGV	2	SERVICE	Deposits Ingressed Gravel	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
DNZ	2	SERVICE	Deposits Ingressed Other	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
DR	4	STRUCTURAL	Deformed Rigid	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	5	0
DSC	2	SERVICE	Deposits Settled Compacted	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
DSF	2	SERVICE	Deposits Settled Fine	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
DSGV	2	SERVICE	Deposits Settled Gravel	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
DSZ	2	SERVICE	Deposits Settled Other	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
DTBI	5	STRUCTURAL	Deformed Brick Bulging Inverse Curvature	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
DTBR	4	STRUCTURAL	Deformed Brick Bulging Round	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	5	0
FC	2	STRUCTURAL	Fracture Circumferential			0	0	0	0	0	0	0	0	0
FH2	3	STRUCTURAL	Fracture Longitudinal Hinge, 2	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
FH3	4	STRUCTURAL	Fracture Longitudinal Hinge, 3	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
FH4	4	STRUCTURAL	Fracture Longitudinal Hinge, 4	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
FL	3	STRUCTURAL	Fracture Longitudinal	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
FM	4	STRUCTURAL	Fracture Multiple	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
FS	3	STRUCTURAL	Fracture Spiral	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
GRT	0	SERVICE	Grout at a Location			0	0	0	0	0	0	0	0	0
GTFJ	0	SERVICE	Grout Test Fail Joint			0	0	0	0	0	0	0	0	0
GTFL	0	SERVICE	Grout Test Fail Lateral			0	0	0	0	0	0	0	0	0
GTPJ	0	SERVICE	Grout Test Pass Joint			0	0	0	0	0	0	0	0	0
GTPL	0	SERVICE	Grout Test Pass Lateral			0	0	0	0	0	0	0	0	0
GTUJ	0	SERVICE	Grout Test Unable to Test Joint			0	0	0	0	0	0	0	0	0
GTUL	0	SERVICE	Grout Test Unable to Test Lateral			0	0	0	0	0	0	0	0	0
H	5	STRUCTURAL	Hole	POINT REPAIR	POINT REPAIR	0	0	0	1	0	0	0	0	0
HSV	5	STRUCTURAL	Hole Soil Visible	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
HVV	5	STRUCTURAL	Hole Void Visible	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0

Appendix H. Defect Codes and Assigned Rehabilitation Actions

Defect Code	Default Score	Type	Description	Rehab. Method	Alternative Method	Clock Pos. Grade 1	Clock Pos. Grade 2	Clock Pos. Grade 3	Clock Pos. Grade 4	Value % Grade1	Value % Grade2	Value % Grade3	Value % Grade4	Alter. Rehab. Cutoff
ID	3	SERVICE	Infil Dripper	LINING	LINING	0	0	0	0	0	0	0	0	0
IDB	3	SERVICE	Infiltration Dripper Barrel	LINING	LINING	0	0	0	0	0	0	0	0	0
IDC	3	SERVICE	Infiltration Dripper Connection	LINING	LINING	0	0	0	0	0	0	0	0	0
IDJ	3	SERVICE	Infiltration Dripper Joint	LINING	LINING	0	0	0	0	0	0	0	0	0
IDL	3	SERVICE	Infiltration Dripper Lateral	LINING	LINING	0	0	0	0	0	0	0	0	0
IG	5	SERVICE	Infil Gusher	LINING	LINING	0	0	0	0	0	0	0	0	0
IGB	5	SERVICE	Infiltration Gusher Barrel	LINING	LINING	0	0	0	0	0	0	0	0	0
IGC	5	SERVICE	Infiltration Gusher Connection	LINING	LINING	0	0	0	0	0	0	0	0	0
IGJ	5	SERVICE	Infiltration Gusher Joint	LINING	LINING	0	0	0	0	0	0	0	0	0
IGL	5	SERVICE	Infiltration Gusher Lateral	LINING	LINING	0	0	0	0	0	0	0	0	0
IR	4	SERVICE	Infil Runner	LINING	LINING	0	0	0	0	0	0	0	0	0
IRB	4	SERVICE	Infiltration Runner Barrel	LINING	LINING	0	0	0	0	0	0	0	0	0
IRC	4	SERVICE	Infiltration Runner Connection	LINING	LINING	0	0	0	0	0	0	0	0	0
IRJ	4	SERVICE	Infiltration Runner Joint	LINING	LINING	0	0	0	0	0	0	0	0	0
IRL	4	SERVICE	Infiltration Runner Lateral	LINING	LINING	0	0	0	0	0	0	0	0	0
IS	1	SERVICE	Infil Stain			0	0	0	0	0	0	0	0	0
ISB	1	SERVICE	Infiltration Stain Barrel			0	0	0	0	0	0	0	0	0
ISC	1	SERVICE	Infiltration Stain Connection			0	0	0	0	0	0	0	0	0
ISGT	2	CONSTRUCTION	Intruding Sealing Material Grout			0	0	0	0	0	10	20	30	0
ISJ	1	SERVICE	Infiltration Stain Joint			0	0	0	0	0	0	0	0	0
ISL	1	SERVICE	Infiltration Stain Lateral			0	0	0	0	0	0	0	0	0
ISSR	2	CONSTRUCTION	Intruding Sealing Material Sealing Ring			0	0	0	0	0	10	20	30	0
ISSRB	2	CONSTRUCTION	Intruding Sealing Material Sealing Ring Broken			0	0	0	0	0	10	20	30	0
ISSRH	2	CONSTRUCTION	Intruding Sealing Material Sealing Ring Hanging			0	0	0	0	0	10	20	30	0
ISSRL	2	CONSTRUCTION	Intruding Sealing Material Sealing Ring Loose/Poorly Fitting			0	0	0	0	0	10	20	30	0
ISZ	2	CONSTRUCTION	Intruding Sealing Material Other			0	0	0	0	0	10	20	30	0
IW	2	SERVICE	Infil Weeper			0	0	0	0	0	0	0	0	0
IWB	2	SERVICE	Infiltration Weeper Barrel			0	0	0	0	0	0	0	0	0
IWC	2	SERVICE	Infiltration Weeper Connection			0	0	0	0	0	0	0	0	0
IWJ	2	SERVICE	Infiltration Weeper Joint			0	0	0	0	0	0	0	0	0
IWL	2	SERVICE	Infiltration Weeper Lateral			0	0	0	0	0	0	0	0	0
JAL	4	STRUCTURAL	Joint Angular Large			0	0	0	0	0	0	0	0	0
JAM	3	STRUCTURAL	Joint Angular Medium			0	0	0	0	0	0	0	0	0
JAS	0	STRUCTURAL	Joint Angular Small			0	0	0	0	0	0	0	0	0
JOL	4	STRUCTURAL	Joint Offset Large	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
JOLD	4	STRUCTURAL	Joint Offset Large Defective	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
JOM	3	STRUCTURAL	Joint Offset Medium	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
JOMD	3	STRUCTURAL	Joint Offset Medium Defective	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
JOS	0	STRUCTURAL	Joint Offset Small			0	0	0	0	0	0	0	0	0
JOSD	0	STRUCTURAL	Joint Offset Small Defective			0	0	0	0	0	0	0	0	0
JSL	4	STRUCTURAL	Joint Separated Large	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
JSM	3	STRUCTURAL	Joint Separated Medium	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
JSS	0	STRUCTURAL	Joint Seprated Small			0	0	0	0	0	0	0	0	0
LD	1	CONSTRUCTION	Line Down			0	0	0	0	10	20	20	100	0
LFAC	0	STRUCTURAL	Lining Feature Abandoned Connection			0	0	0	0	0	0	0	0	0
LFAS	3	STRUCTURAL	Lining Feature Annular Space	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
LFB	3	STRUCTURAL	Lining Feature Blistered	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
LFCS	3	STRUCTURAL	Lining Feature Service Cut Shifted	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
LFD	3	STRUCTURAL	Lining Feature Detached	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
LFDC	3	STRUCTURAL	Lining Feature Discoloration	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
LFDE	3	STRUCTURAL	Lining Feature Defective End	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
LFDL	3	STRUCTURAL	Lining Feature Delaminating	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
LFOC	3	STRUCTURAL	Lining Feature Overcut Service	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
LFRS	3	STRUCTURAL	Lining Failure Resin slug	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
LFUC	3	STRUCTURAL	Lining Feature Undercut Service	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
LFW	3	STRUCTURAL	Lining Feature Wrinkled	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
LFZ	0	STRUCTURAL	Lining Feature Other			0	0	0	0	0	0	0	0	0
LL	1	CONSTRUCTION	Line Left			0	0	0	0	10	20	20	100	0
LLD	1	CONSTRUCTION	Line Left Down			0	0	0	0	10	20	20	100	0
LLU	1	CONSTRUCTION	Ling Left Up			0	0	0	0	10	20	20	100	0

Appendix H. Defect Codes and Assigned Rehabilitation Actions

Defect Code	Default Score	Type	Description	Rehab. Method	Alternative Method	Clock Pos. Grade 1	Clock Pos. Grade 2	Clock Pos. Grade 3	Clock Pos. Grade 4	Value % Grade1	Value % Grade2	Value % Grade3	Value % Grade4	Alter. Rehab. Cutoff
LR	1	CONSTRUCTION	Line Right			0	0	0	0	10	20	20	100	0
LRD	1	CONSTRUCTION	Line Right Down			0	0	0	0	10	20	20	100	0
LRU	1	CONSTRUCTION	Line Right Up			0	0	0	0	10	20	20	100	0
LU	1	CONSTRUCTION	Line Up			0	0	0	0	10	20	20	100	0
MB	4	STRUCTURAL	Missing Brick	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
MCU	4	MISCELLANEOUS	Miscellaneous Camera Underwater			0	0	0	0	0	0	0	0	0
MGO	0	MISCELLANEOUS	Miscellaneous General Observation			0	0	0	0	0	0	0	0	0
MGP	0	MISCELLANEOUS	Miscellaneous General Photograph			0	0	0	0	0	0	0	0	0
MJL	0	MISCELLANEOUS	Miscellaneous Pipe Joint Length Change			0	0	0	0	0	0	0	0	0
MLC	0	MISCELLANEOUS	Miscellaneous Lining Change			0	0	0	0	0	0	0	0	0
MMC	0	MISCELLANEOUS	Miscellaneous Material Change			0	0	0	0	0	0	0	0	0
MML	3	STRUCTURAL	Missing Mortar Large	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
MMM	3	STRUCTURAL	Missing Mortar Medium			0	0	0	0	0	0	0	0	0
MMS	2	STRUCTURAL	Missing Mortar Small			0	0	0	0	0	0	0	0	0
MSA	0	MISCELLANEOUS	Miscellaneous Survey Abandoned			0	0	0	0	0	0	0	0	0
MSC	0	MISCELLANEOUS	Miscellaneous Shape/Size Change			0	0	0	0	0	0	0	0	0
MWL	0	MISCELLANEOUS	Miscellaneous Water Level			0	0	0	0	0	0	0	0	0
MWLS	2	MISCELLANEOUS	Miscellaneous Water Level Sag	POINT REPAIR	POINT REPAIR	0	0	0	0	0	30	50	75	30
MWM	0	MISCELLANEOUS	Miscellaneous Water Mark			0	0	0	0	0	0	0	0	0
MYN	0	MISCELLANEOUS	Miscellaneous Dye Test Not Visible			0	0	0	0	0	0	0	0	0
MYV	0	MISCELLANEOUS	Miscellaneous Dye Test Visible			0	0	0	0	0	0	0	0	0
OBB	2	SERVICE	Obstruction Brick or Masonry	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
OBC	2	SERVICE	Obstruction Through Connection	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
OBI	5	SERVICE	Obstruction Intruding Through Wall	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
OBJ	2	SERVICE	Obstruction Wedged In The Joint	POINT REPAIR	POINT REPAIR	0	0	0	0	0	10	20	30	0
OBM	2	SERVICE	Obstruction Pipe Material in Invert	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
OBN	2	SERVICE	Obstruction Construction Debris	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
OBP	2	SERVICE	Obstruction External Pipe or Cable	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
OBR	2	SERVICE	Obstruction Rocks	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
OBS	2	SERVICE	Obstruction Built Into Structure	POINT REPAIR	POINT REPAIR	0	0	0	0	0	10	20	30	0
OBZ	2	SERVICE	Obstruction Other	CLEANING	CLEANING	0	0	0	0	0	10	20	30	0
RBB	5	SERVICE	Roots Ball Barrel	ROOT CONTROL	ROOT CONTROL	0	0	0	0	0	0	0	0	0
RBC	4	SERVICE	Roots Ball Connection	ROOT CONTROL	ROOT CONTROL	0	0	0	0	0	0	0	0	0
RBJ	4	SERVICE	Roots Ball Joint	ROOT CONTROL	ROOT CONTROL	0	0	0	0	0	0	0	0	0
RBL	4	SERVICE	Roots Ball Lateral	ROOT CONTROL	ROOT CONTROL	0	0	0	0	0	0	0	0	0
RFB	2	SERVICE	Roots Fine Barrel	CLEANING	CLEANING	0	0	0	0	0	0	0	0	0
RFC	1	SERVICE	Roots Fine Connection			0	0	0	0	0	0	0	0	0
RFJ	1	SERVICE	Roots Fine Joint			0	0	0	0	0	0	0	0	0
RFL	1	SERVICE	Roots Fine Lateral			0	0	0	0	0	0	0	0	0
RMB	4	SERVICE	Roots Medium Barrel	ROOT CONTROL	ROOT CONTROL	0	0	0	0	0	0	0	0	0
RMC	3	SERVICE	Roots Medium Connection	CLEANING	CLEANING	0	0	0	0	0	0	0	0	0
RMJ	3	SERVICE	Roots Medium Joint	CLEANING	CLEANING	0	0	0	0	0	0	0	0	0
RML	3	SERVICE	Roots Medium Lateral	CLEANING	CLEANING	0	0	0	0	0	0	0	0	0
RPL	0	STRUCTURAL	Point Repair Liner			0	0	0	0	0	0	0	0	0
RPLD	4	STRUCTURAL	Point Repaie Liner Defective	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
RPP	0	STRUCTURAL	Point Repair Patch			0	0	0	0	0	0	0	0	0
RPPD	4	STRUCTURAL	Point Repair Patch Patch Defective	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
RPR	0	STRUCTURAL	Point Repair Replacement			0	0	0	0	0	0	0	0	0
RPRD	4	STRUCTURAL	Point Repair Replacement Defective	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
RPZ	0	STRUCTURAL	Point Repair Other			0	0	0	0	0	0	0	0	0
RPZD	0	STRUCTURAL	Point Repair Other Defective			0	0	0	0	0	0	0	0	0
RTB	3	SERVICE	Roots Tap Barrel	CLEANING	CLEANING	0	0	0	0	0	0	0	0	0
RTC	2	SERVICE	Roots Tap Connection	CLEANING	CLEANING	0	0	0	0	0	0	0	0	0
RTJ	2	SERVICE	Roots Tap Joint	CLEANING	CLEANING	0	0	0	0	0	0	0	0	0
RTL	2	SERVICE	Roots Tap Lateral	CLEANING	CLEANING	0	0	0	0	0	0	0	0	0
SAM	4	STRUCTURAL	Surface Damage Aggregate Missing	LINING	LINING	0	0	0	0	0	0	0	0	0
SAP	3	STRUCTURAL	Surface Damage Aggregate Projecting	LINING	LINING	0	0	0	0	0	0	0	0	0
SAV	2	STRUCTURAL	Surface Damage Aggregate Visible			0	0	0	0	0	0	0	0	0
SCP	3	STRUCTURAL	Surface Corrosion Metal Pipe	LINING	LINING	0	0	0	0	0	0	0	0	0
SMW	5	STRUCTURAL	Surface Damage Missing Wall	LINING	LINING	0	0	0	0	0	0	0	0	0

Appendix H. Defect Codes and Assigned Rehabilitation Actions

Defect Code	Default Score	Type	Description	Rehab. Method	Alternative Method	Clock Pos. Grade 1	Clock Pos. Grade 2	Clock Pos. Grade 3	Clock Pos. Grade 4	Value % Grade1	Value % Grade2	Value % Grade3	Value % Grade4	Alter. Rehab. Cutoff
SRC	5	STRUCTURAL	Surface Damage Reinforcement Cement	LINING	LINING	0	0	0	0	0	0	0	0	0
SRI	1	STRUCTURAL	Surface Roughness Increased			0	0	0	0	0	0	0	0	0
SRP	5	STRUCTURAL	Surface Reinforcement Projecting	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
SRV	4	STRUCTURAL	Surface Damage Reinforcement Visible	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0
SSC	1	STRUCTURAL	Surface Spilling of Damage Coating			0	0	0	0	0	0	0	0	0
SSS	2	STRUCTURAL	Surface Damage Surface Spalling			0	0	0	0	0	0	0	0	0
SZ	0	STRUCTURAL	Surface Damage Other			0	0	0	0	0	0	0	0	0
TB	0	CONSTRUCTION	Tap Break-in			0	0	0	0	0	0	0	0	0
TBA	0	CONSTRUCTION	Tap Break-in Active			0	0	0	0	0	0	0	0	0
TBB	0	CONSTRUCTION	Tap Break-in Abandoned			0	0	0	0	0	0	0	0	0
TBC	0	CONSTRUCTION	Tap Break-in Capped			0	0	0	0	0	0	0	0	0
TBD	3	CONSTRUCTION	Tap Break-in Defective			0	0	0	0	0	0	0	0	0
TBI	2	CONSTRUCTION	Tap Break-in Intruding			0	0	0	0	0	10	20	30	0
TF	0	CONSTRUCTION	Tap Factory			0	0	0	0	0	0	0	0	0
TFA	0	CONSTRUCTION	Tap Factory Activity			0	0	0	0	0	0	0	0	0
TFB	0	CONSTRUCTION	Tap Factory Abandoned			0	0	0	0	0	0	0	0	0
TFC	0	CONSTRUCTION	Tap Factory Capped			0	0	0	0	0	0	0	0	0
TFD	3	CONSTRUCTION	Tap Factory Defective			0	0	0	0	0	0	0	0	0
TFI	2	CONSTRUCTION	Tap Factory Intruding			0	0	0	0	0	10	20	30	0
TR	0	CONSTRUCTION	Tap Rehabilitated			0	0	0	0	0	0	0	0	0
TRA	0	CONSTRUCTION	Tap Rehabilitated Activity			0	0	0	0	0	0	0	0	0
TRB	0	CONSTRUCTION	Tap Rehabilitated Abandoned			0	0	0	0	0	0	0	0	0
TRC	0	CONSTRUCTION	Tap Rehabilitated Capped			0	0	0	0	0	0	0	0	0
TRD	3	CONSTRUCTION	Tap Rehabilitated Defective			0	0	0	0	0	0	0	0	0
TRI	2	CONSTRUCTION	Tap Rehabilitated Intruding			0	0	0	0	0	10	20	30	0
TS	0	CONSTRUCTION	Tap Saddle			0	0	0	0	0	0	0	0	0
TSA	0	CONSTRUCTION	Tap Saddle Activity			0	0	0	0	0	0	0	0	0
TSB	0	CONSTRUCTION	Tap Saddle Abandoned			0	0	0	0	0	0	0	0	0
TSC	0	CONSTRUCTION	Tap Saddle Capped			0	0	0	0	0	0	0	0	0
TSD	3	CONSTRUCTION	Tap Saddle Defective			0	0	0	0	0	0	0	0	0
TSI	2	CONSTRUCTION	Tap Saddle Intruding			0	0	0	0	0	10	20	30	0
VC	1	SERVICE	Vermin Cockroach			0	0	0	0	0	0	0	0	0
VR	2	SERVICE	Vermin Rat			0	0	0	0	0	0	0	0	0
VZ	1	SERVICE	Vermin Other			0	0	0	0	0	0	0	0	0
WFC	2	STRUCTURAL	Weld Feature Circumferential			0	0	0	0	0	0	0	0	0
WFL	2	STRUCTURAL	Weld Feature Longitudinal			0	0	0	0	0	0	0	0	0
WFM	3	STRUCTURAL	Weld Feature Multiple	LINING	LINING	0	0	0	0	0	0	0	0	0
WFS	2	STRUCTURAL	Weld Feature Spiral			0	0	0	0	0	0	0	0	0
WFZ	0	STRUCTURAL	Weld Feature Other			0	0	0	0	0	0	0	0	0
X	5	STRUCTURAL	Collapse	POINT REPAIR	POINT REPAIR	0	0	0	0	0	0	0	0	0

Appendix I. LS and FM Condition Assessment Matrices

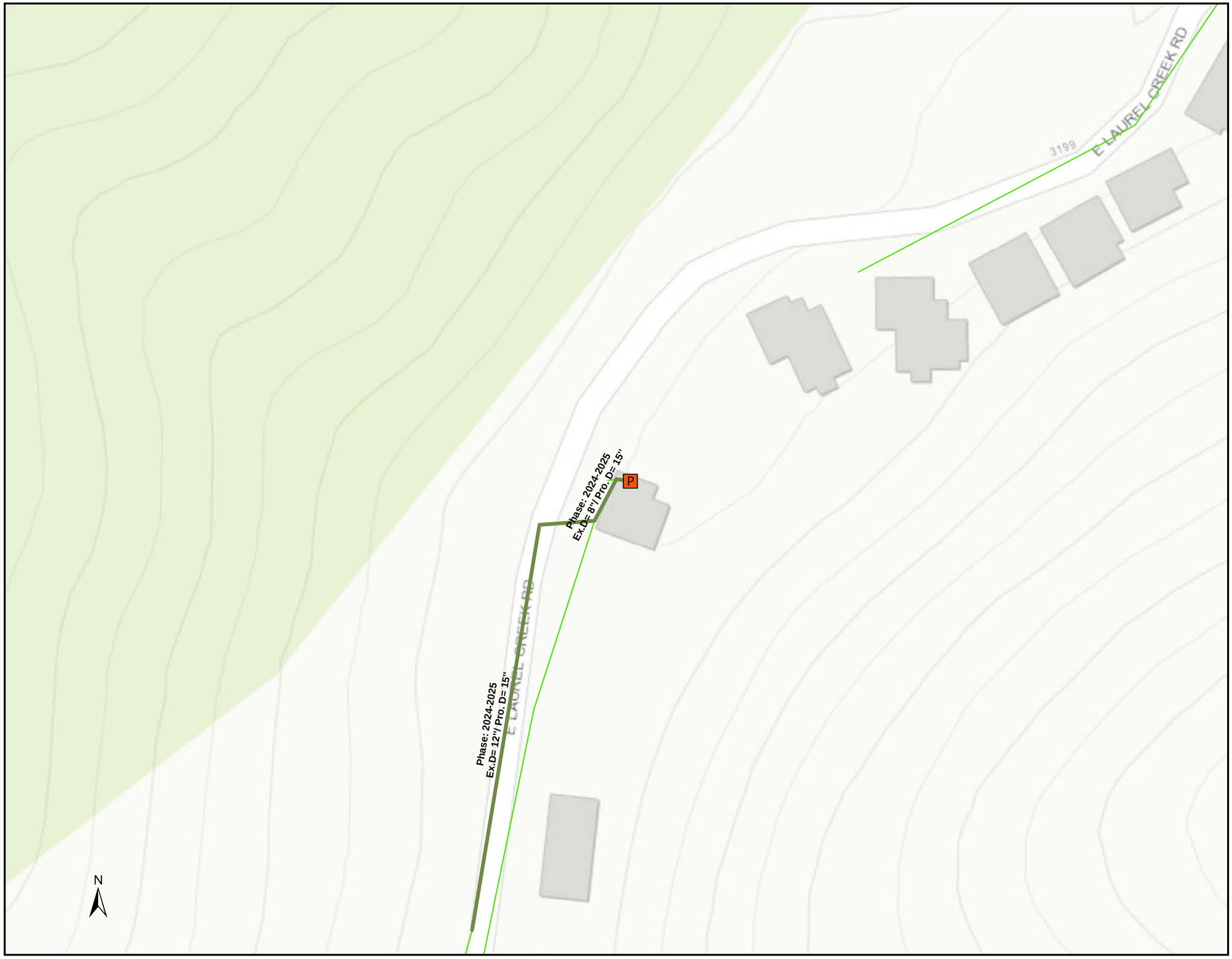
I1. Lift Station Condition Assessment Matrix

Lift Station	Sewer Basin	2017 Condition Assessment			Action taken by the City	
		Condition	Priority	2017 Recommendation	Action Taken	Notes
Island Park	1	in OK condition, difficult access, historical surcharge issue, corrosion on pipes, settling issue of the control panel slab.	1C	- recommended to relocate the pump - if not, install a flow meter, geotechnical investigation on settlement issue, redesign support system for control panel,add a mixer, add canopy, add safety grate, new access hatch, and replace generator.	1. regular maintenance (check pump condition weekly), FOG problem 2. Smoke test planned in 2022 (FOG, I/I) 3. budgeted in near-term CIP	1. FOG problem (observed from Wetwell) 2. High I/I
Sport Complex	1	in OK condition, electric code violation of the electrical system, no backup power, difficult access of valves	2B	- redesign electrical system, - add safety grate and temporary guardrail to wet well cover - Relocate valves into easier access location, - replace supports	No Action - Sport Complex Force Main may need to be upgraded when doing the Island Park Force Main improvement	does not use often
Hiller	3	in working condition, deep wetwell with significant II issue, no pump redundancy, no fall protection, considerable rust/deterioation on pipes/supports, can't access to certain valves, etc.	1D	- pump upsizing - add safety grate - replace structural supports, pipe supports and beams - reinstall new valves in vault or above grade - install canopy over eletrical panel - replace corroded pipe - install an articulated jib crane - pave driveway - install backup level control system - provide dedicated bypass connection with an isolation valve and a check valve - with addition actions to be considered.	1. In 65% design 2. completion anticipated by 2025	I/I issue
El Camino Real	4	-	-	-	1. Wet Well was rehabilitated to accommodate the new force main	
North Road	6	-	-	-	1. Upgrade and Relocation of the LS was completed in 2022 and is in service 2. 3 pumps with 2 pumps on during rainfall event	
Hastings	9	overall in good condition	3	optional actions to be considered in the future	No Action, regular maintenance	
Haskins	14	in good condition, bolts on pump guide rail support are rusting, no dedicated bypass connection	3	optional actions to be considered in the future	No Action, regular maintenance	
San Juan	14	in poor condition, undersized, rust found on wetwell and building, crane in wetwell is too low, wetwell shape creates short circuiting and has poor hydraulics, discharge piping valves inside wetwell	1B	- increase pumping capacity, - replace wetwell cover and grating - add a temporary pump onsite - add seismic restraints to the generator - wetwell piping upgrade - structural upgrades for rusted restraints and supports - relocate discharge valve - redesign bypass connection - add diaphragm seals to pressure indicators - or relocate the pump station	1. budget in the near-term CIP 2. creek slope stablization (on-going) 3. may need electrical operation upgrade	
Naughton	15	overall in good condition	3	optional actions to be considered in the future	No Action, regular maintenance	
Ralston Ranch	15	- rust inside wetwell, corroded access hatch framing, no backup level control system, access issues to valves, site access issue, etc.	2C	- Replace Access hatch - Reokace cirrided equipement within the wetwell - add backup level control system - install a valve vault and relocate valves - install a canopy over the electrical equipment - construct a driveway access - install flow meter - install bypass connection - with additional actions to be considered	1. budget in intermediate-term CIP	1. known rag problem (maybe on-going) 2. hard for maintenance 3. Pump model no longer manufactured

I2. Force Main Condition Assessment Matrix

Force Main	Sewer Basin	2015 Condition Assessment					2018 Cathodic Protection Testing Study		City Action	
		LoF	CoF	Risk Rating	Condition	Recommendation	Condition	Recommendation	Action Taken	Notes
Island Park/Sport Complex	1	High	Moderate	High	The PVC portion is in serviceable condition with low internal and external corrosion potential, more susceptible to structural fatigue failure due to pipe material but no immediate risk of failure found based on fatigue analysis. The CIP portion have high internal and external corrosion potential	-near-term: additional pipe wall analysis at predetermined locations; additional hydrogen sulfide monitoring; install Cathodic Protection on the CIP portion; soft start/stop pumps control and wet well level operation; hydraulic evaluation on pumps and HGL and installation of additional ARVs, condition based pipeline management model - Long-term: leak and gas pocket detection within 5-7 years	Cannot locate the metallic portions indicating not electrically continuous or no metallic material	Not recommend to install test stations	1. Anticipated to be replaced in 2024-2029	
Hiller	3	Low	Moderate	Low	serviceable condition, low internal and external condition, more susceptible to collapse and joint leakage due to its material	- Near-term: destructive testing at predetermined locations within the ACP portion of the force main. - Long-term: non-destructive assessment within 5-7 years, ovality testing of the HDPE portion (optional)			1. A condition assessment with destructive testing is anticipated in the near-term CIP	
El Camino Real	4	-	-	-	-	-	-	-	1. replaced in 2021 2. slightly change in alignment (change in material)	size = 4 inch
North Road	6	-	-	-	-	-	-	-	1. a new force main was completion in 2022 and is in service	upsize to 12"
Hastings	9	Low	Moderate	Low	serviceable condition, low internal and external corrosion potential	- Near-term: destructive testing at predetermined locations, soft start/stop pump controls - Long-term: non-destructive assessment within 5-7 years; Assess and Address Program			No Action, regular maintenance	
Haskins	14	Low	Moderate	Low	serviceable condition, low internal and external corrosion potential	- Near-term: destructive testing at predetermined locations - Long-term: non-destructive assessment within 5-7 years Assess and Address Program			No Action, regular maintenance	- have a few breaks in long past
San Juan	14	Moderate	High	Moderate	Serviceable, witn existing cathodic protection, low internal and external corrosion potential	- Near-term: soft start/stop pump controls to minimize pressure transients; condition based pipeline management model - Long-term: Pipe wall assessments within 5-7 years Assess and Address Program	Not electrically continuous; existing cathodic protection provide some level of cathodic protection but not sufficient per NAC SP0169	No further action is recommended due to the lack of electrical continuity, the relatively high current demand CP requirement, and the long pipe length	1. anticipate to be replaced in 2024-2029 2. regular checking for the CP system	
Naughton	15	Low	Low	Low	serviceable condition, low internal and external corrosion potential, more susceptible to structural fatigue failure due to pipe material but no immediate risk of failure based on fatigue analysis	no further action recommended			No action	
Ralston Ranch	15	Low	Low	Low	serviceable condition, low internal and external corrosion, more susceptible to structural fatigue failure due to pipe material, but no immediate risk of failure found based on fatigure analysis	no further action recommended			No Action	

Appendix J. Proposed Capacity-related Improvement Projects Zoom-In Maps



Legend

P San Juan Lift Station

Capacity-Related Improvement

CCIP_1

Gravity Main

Infrastructure ENGINEERING CORPORATION

City of Belmont
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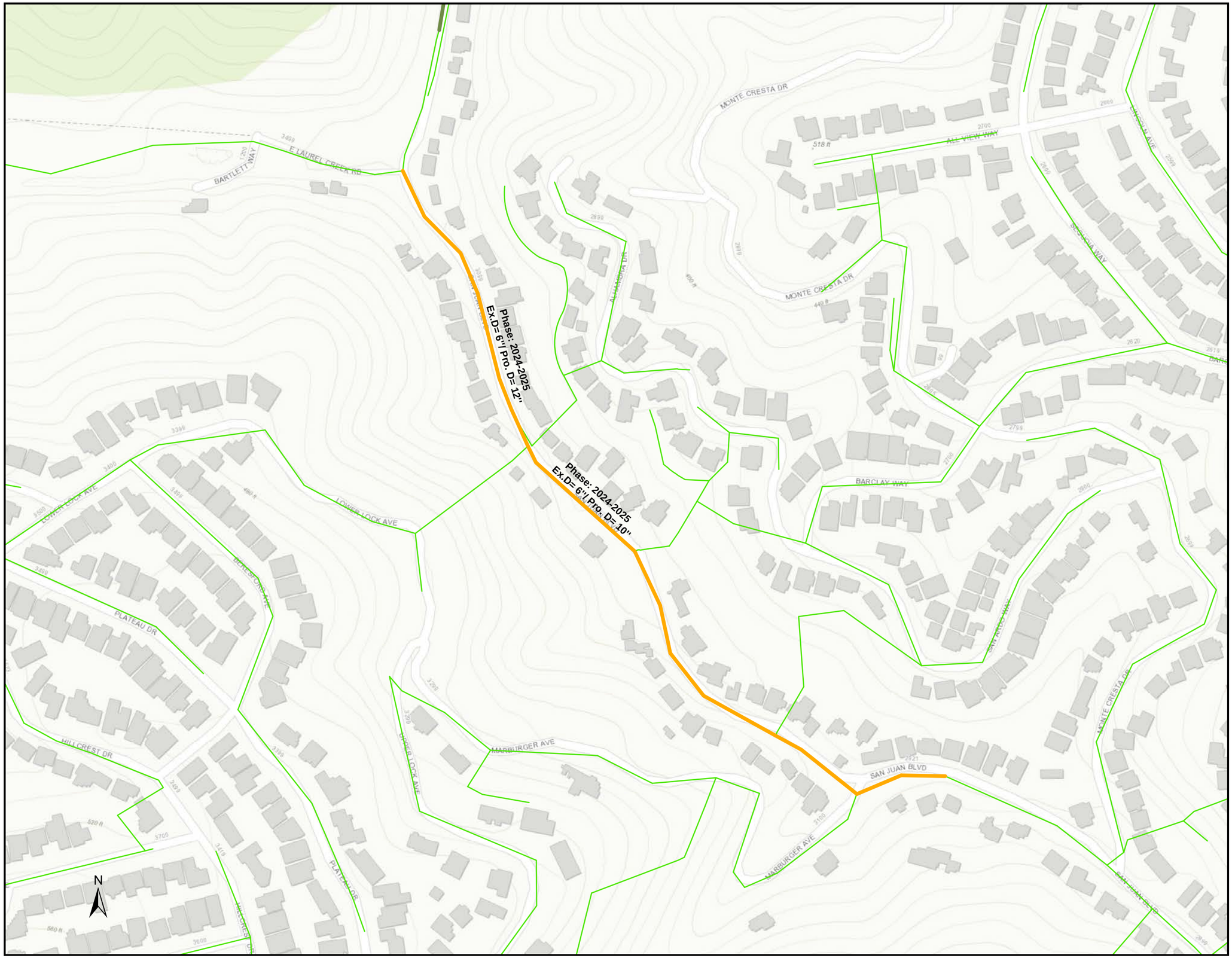
Proposed Capacity-Related CIP Projects

1



Legend

- San Juan Lift Station

Capacity-Related Improvement

- CCIP_1
- CCIP_2
- Gravity Main

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Proposed Capacity-Related CIP Projects

2

Legend

P San Juan Lift Station

Capacity-Related Improvement

CCIP_3

Gravity Main

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Proposed Capacity-Related CIP Projects

3

Legend

P San Juan Lift Station

Capacity-Related Improvement

CCIP_4

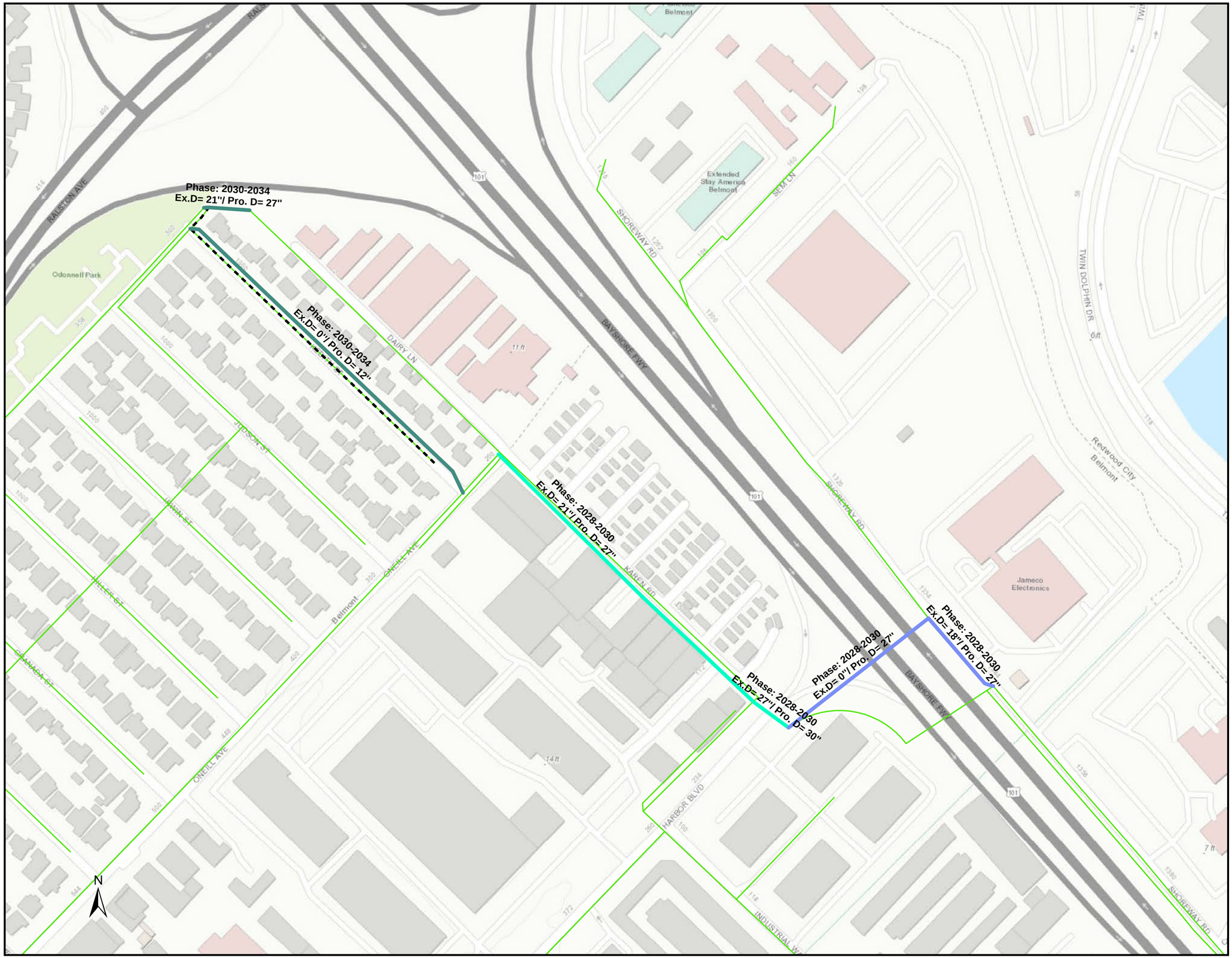
Gravity Main

Infrastructure ENGINEERING CORPORATION

City of Belmont
2023 Sewer Master Plan Update

Proposed Capacity-Related CIP Projects

4



Legend

- San Juan Lift Station

Capacity-Related Improvement

- CCIP_5
- CCIP_8A
- CCIP_8B
- Proposed to be abandoned
- Gravity Main

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Proposed Capacity-Related CIP Projects

5

Legend

- San Juan Lift Station

Capacity-Related Improvement

- CCIP_6
- Proposed to be abandoned
- Gravity Main

Infrastructure ENGINEERING CORPORATION

City of Belmont
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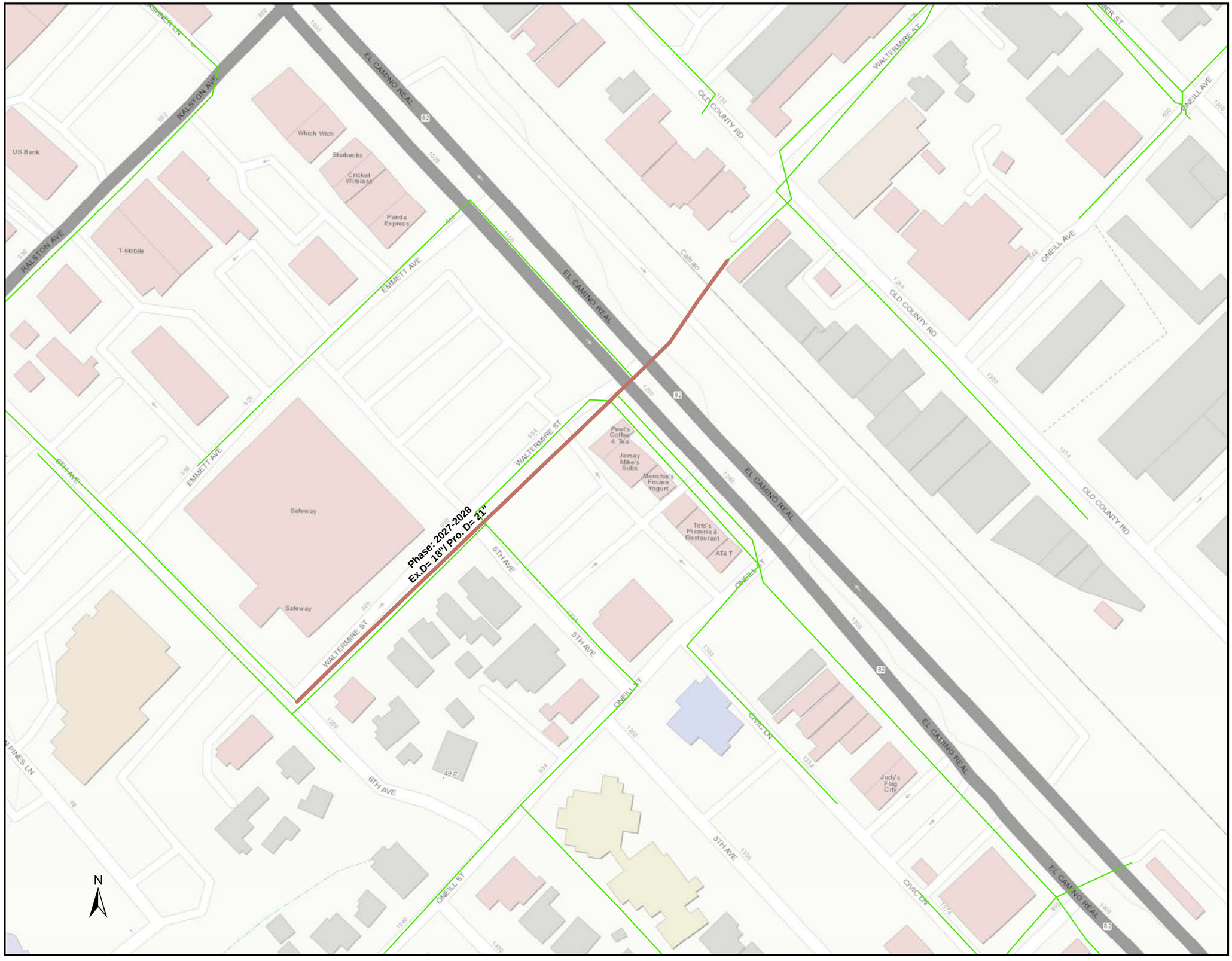
Proposed Capacity-Related CIP Projects

6



Legend

P San Juan Lift Station

Capacity-Related Improvement

CCIP_7

Gravity Main

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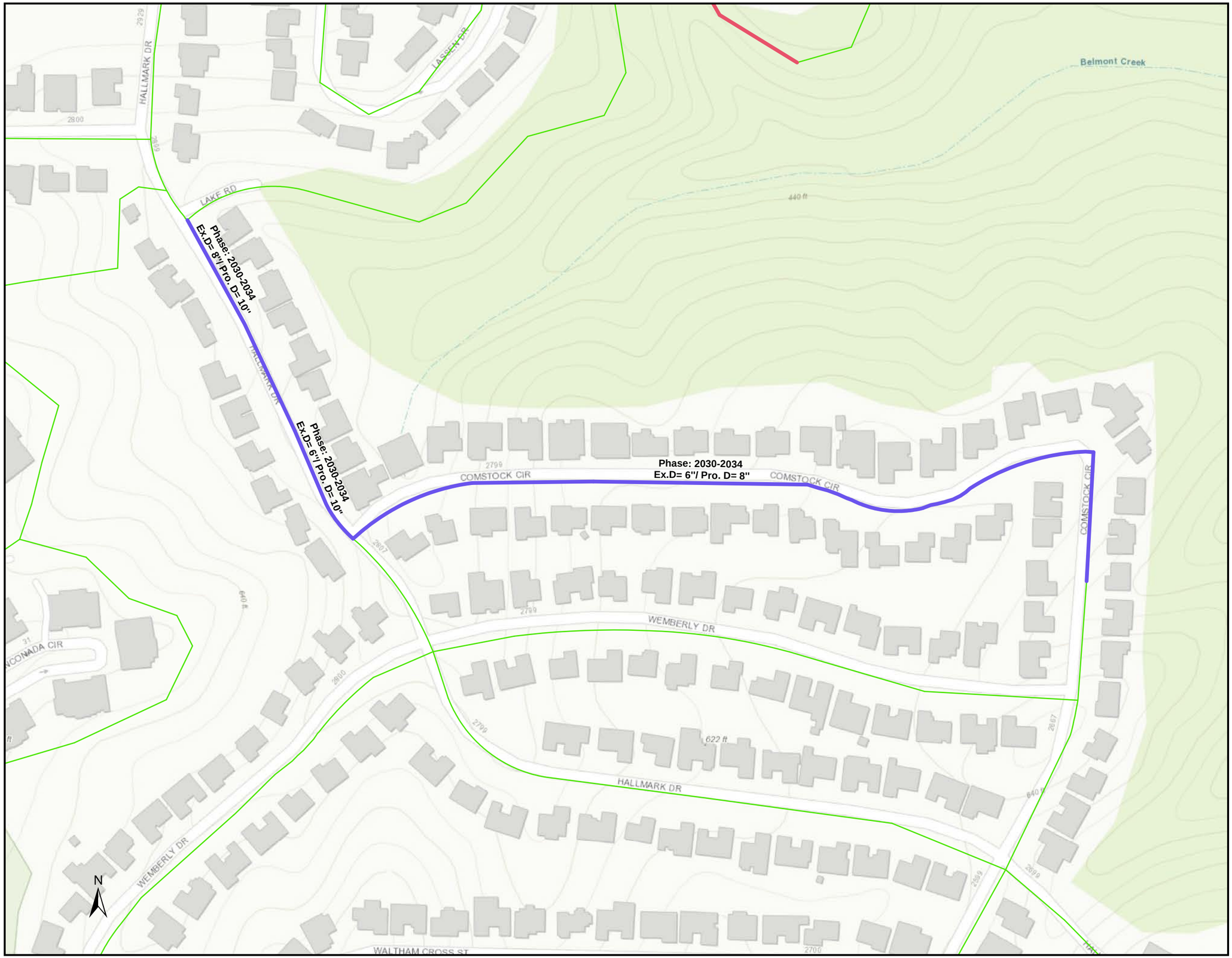
City of Belmont
2023 Sewer Master Plan Update

Proposed Capacity-Related CIP Projects

7



Legend

- San Juan Lift Station

Capacity-Related Improvement

- CCIP_4
- CCIP_9
- Gravity Main

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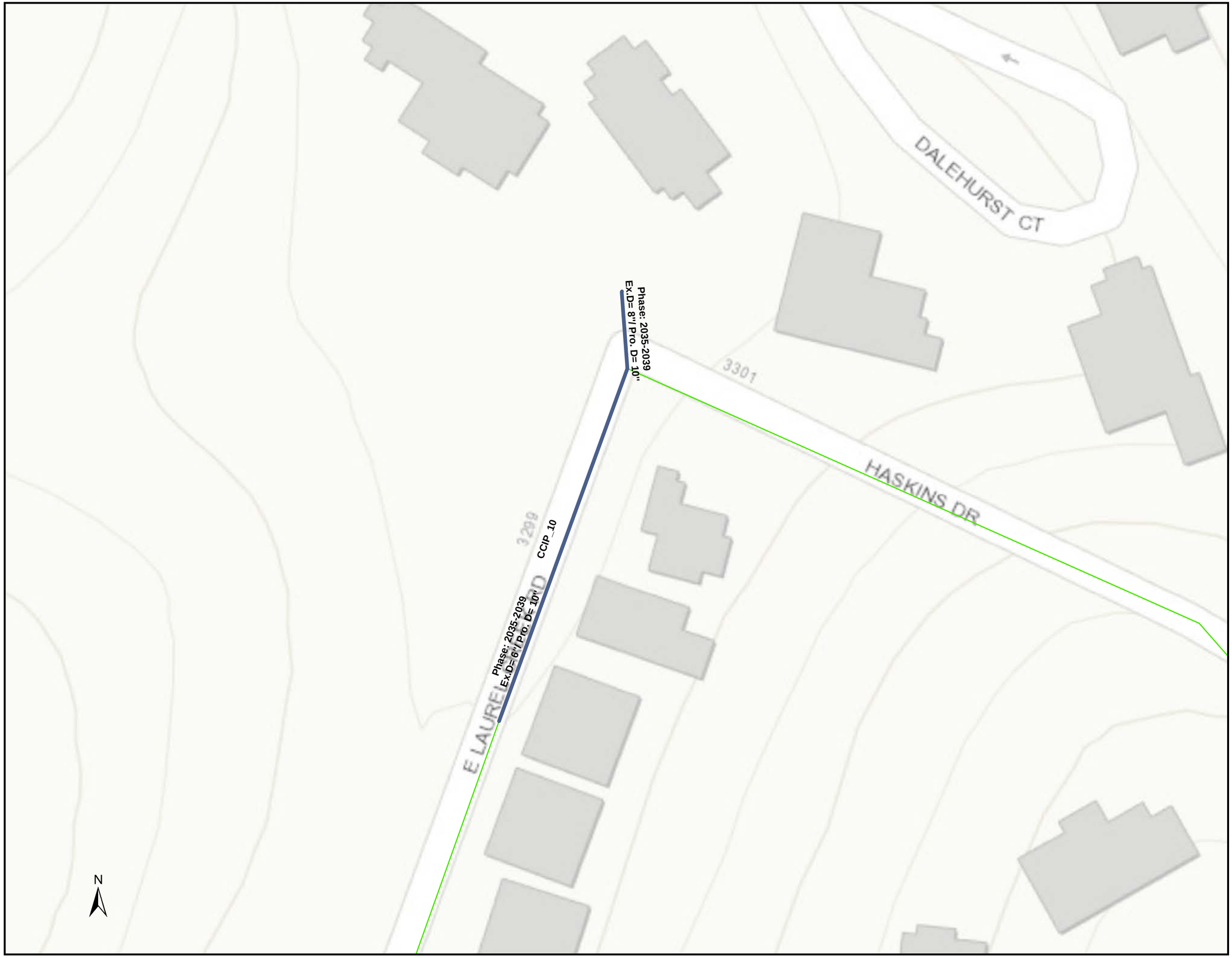
Proposed Capacity-Related CIP Projects

8



Legend

P San Juan Lift Station

Capacity-Related Improvement

CCIP_10

Gravity Main

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Proposed Capacity-Related CIP Projects

9

Legend

P San Juan Lift Station

Capacity-Related Improvement

CCIP_11

Gravity Main

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Proposed Capacity-Related CIP Projects

10

Legend

- San Juan Lift Station

Capacity-Related Improvement

- CCIP_12
- Gravity Main

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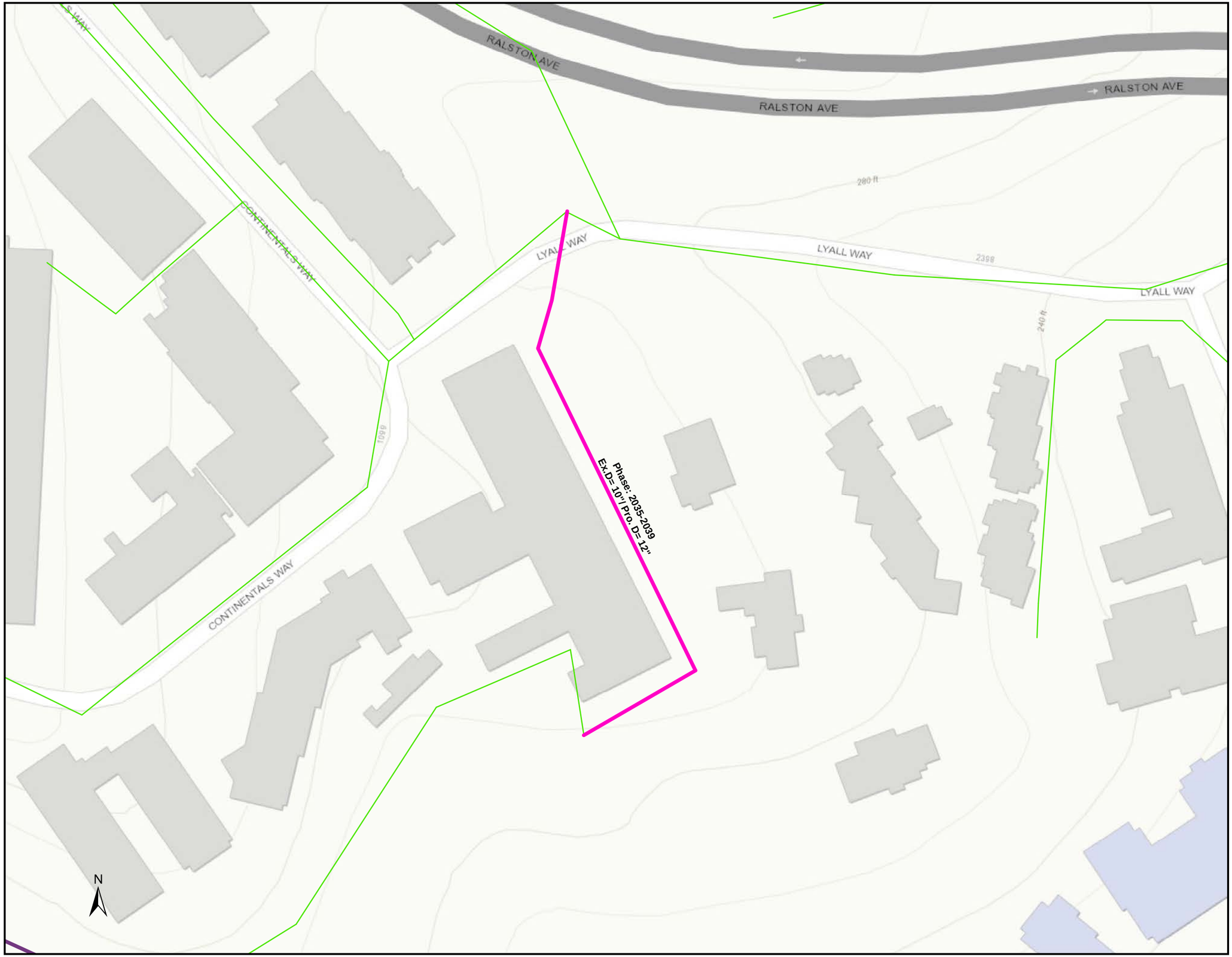
Proposed Capacity-Related CIP Projects

11



Legend

- San Juan Lift Station

Capacity-Related Improvement

- CCIP_13
- CCIP_14
- Gravity Main

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2023 Sewer Master Plan Update

Proposed Capacity-Related CIP Projects

12

Legend

P San Juan Lift Station

Capacity-Related Improvement

CCIP_14

Gravity Main

Infrastructure ENGINEERING CORPORATION

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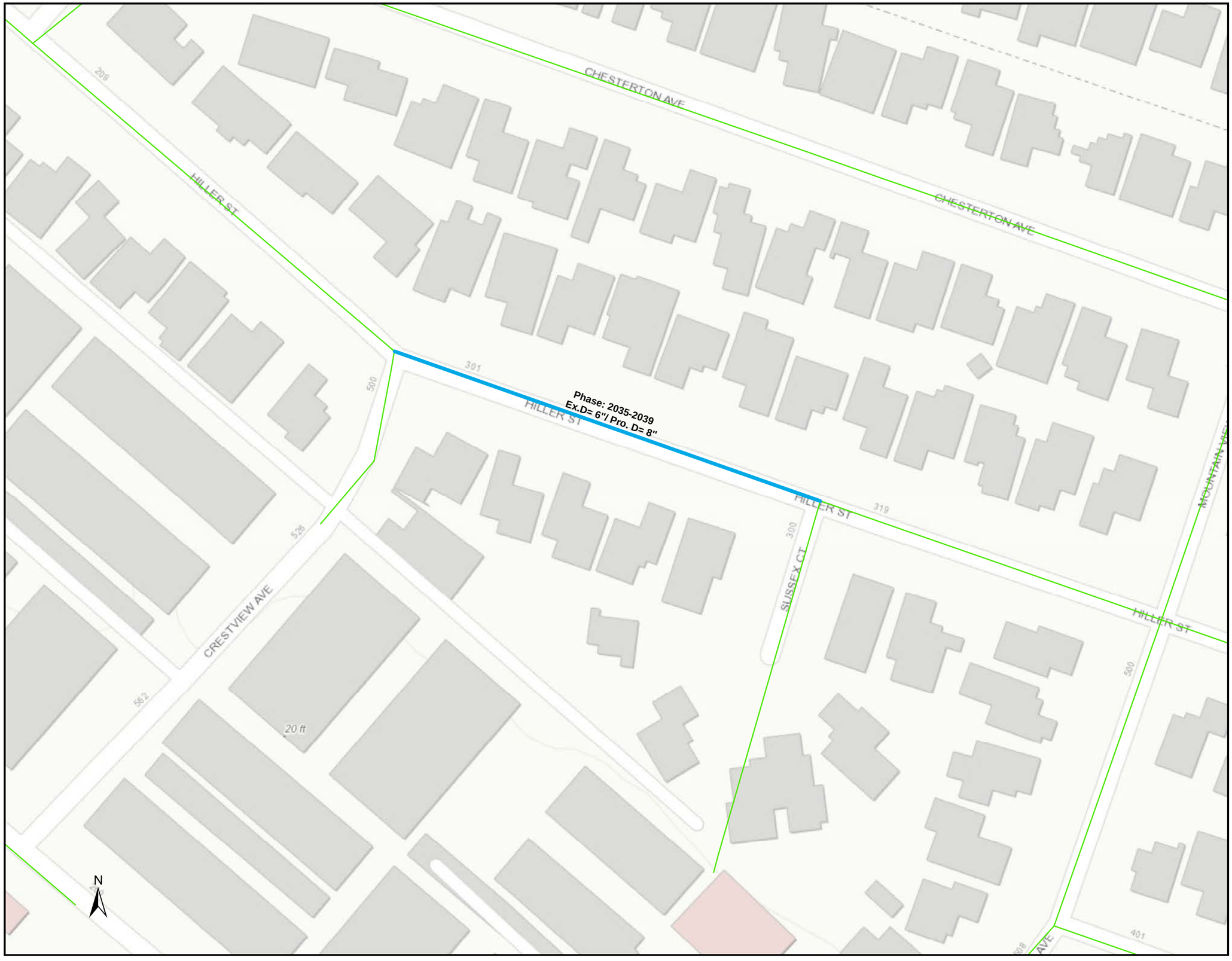
Proposed Capacity-Related CIP Projects

13



Legend

P San Juan Lift Station

Capacity-Related Improvement

CCIP_15

Gravity Main

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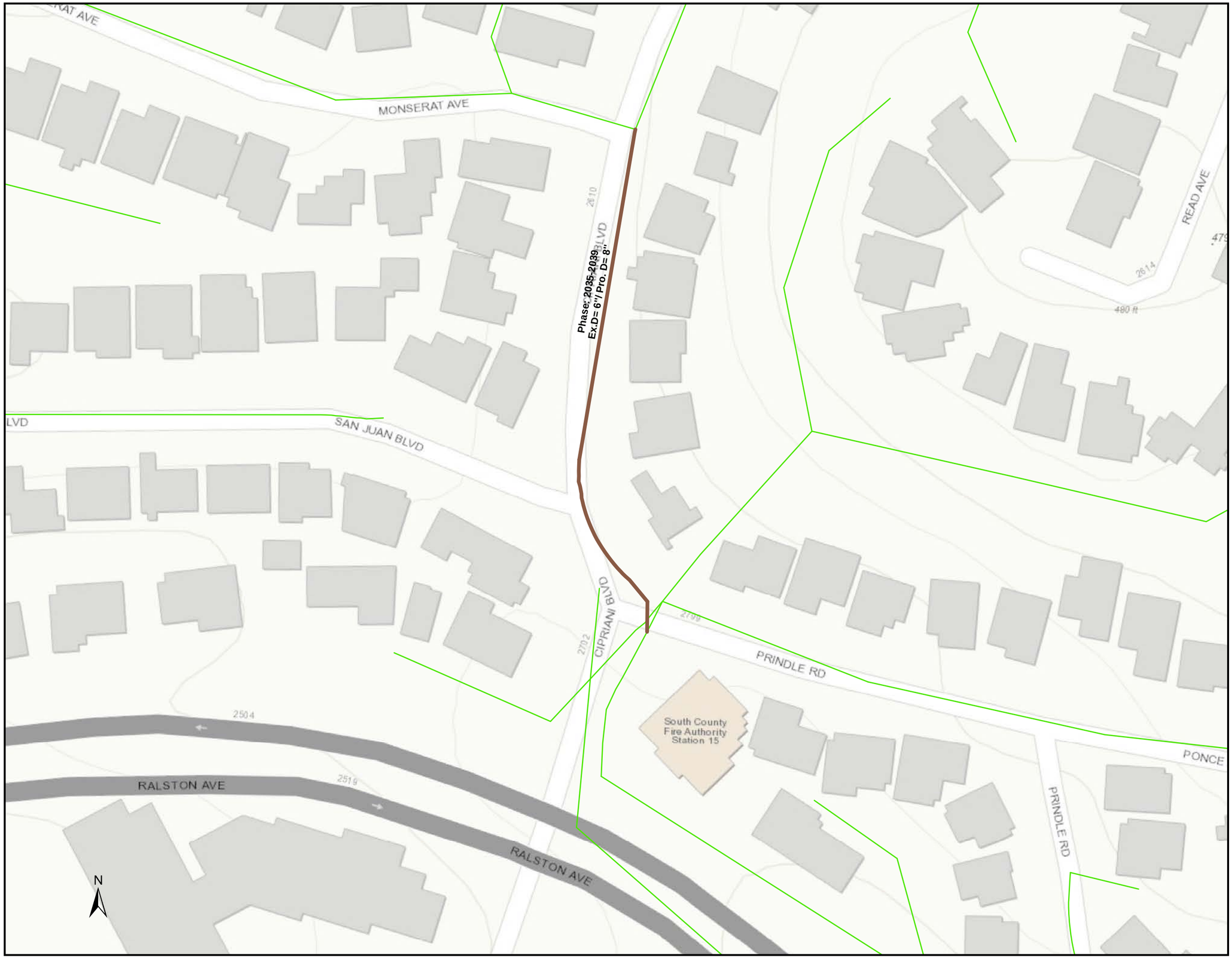
Proposed Capacity-Related CIP Projects

14



Legend

- San Juan Lift Station

Capacity-Related Improvement

- CCIP_16
- Gravity Main

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2023 Sewer Master Plan Update

Proposed Capacity-Related CIP Projects

15

Appendix K. Proposed Condition-related Improvement Projects Detail

Appendix K-1. Cost Estimations and Phasing for Condition Related CIP

Planning Year		2024-2025				2025-2026			
Gravity Main	Size (in.)	Rehab. Length (ft)	Rehab. # (EA.)	Unit Cost ($/LF or $/EA.)	Costs ($)	Rehab. Length (ft)	Rehab. # (EA.)	Unit Cost ($/LF)	Costs ($)
Defect Repair	6		47	18,720	879,840		32	18,720	599,040
	8		0	22,440	0		0	22,440	0
	10		0	25,260	0		0	25,260	0
	12		0	27,240	0		0	27,240	0
	15		0	30,660	0		0	30,660	0
	18		0	33,120	0		0	33,120	0
	21		0	34,800	0		0	34,800	0
	24		0	35,760	0		0	35,760	0
Defect Repair + Partial Lining	6	71	7	426 / 18,720	161,201	78	9	426 / 18,720	201,580
	10	0	0	510 / 25,260	0	12	1	510 / 25,260	31,380
	12	0	0	558 / 27,240	0	0	0	558 / 27,240	0
Partial Lining	6	12		426	5,197	6		426	2,556
	8	0		474	0	0		474	0
	10	0		510	0	0		510	0
	18	0		1,032	0	0		1,032	0
Replace	6	2092		620	1,296,974	2845		620	1,764,065
	8	0		650	0	0		650	0
	12	0		890	0	0		890	0
Investigation	6	1134		620	702,770	1159		620	718,580
	8	0		650	0	0		650	0
	10	0		840	0	139		840	116,340
	12	0		890	0	0		890	0
	15	0		930	0	0		930	0
	18	0		990	0	0		990	0
Gravity Main Subtotal ($)					**3,045,982**				**3,433,541**

Planning Year	2026-2027				2027-2028			
Gravity Main	Rehab. Length (ft)	Rehab. # (EA.)	Unit Cost ($/LF)	Costs ($)	Rehab. Length (ft)	Rehab. # (EA.)	Unit Cost ($/LF or $/EA.)	Costs ($)
Defect Repair		41	18,720	767,520		30	18,720	561,600
		1	22,440	22,440		2	22,440	44,880
		0	25,260	0		3	25,260	75,780
		0	27,240	0		0	27,240	0
		0	30,660	0		0	30,660	0
		0	33,120	0		0	33,120	0
		1	34,800	34,800		0	34,800	0
		0	35,760	0		0	35,760	0
Defect Repair + Partial Lining	25	3	426 / 18,720	66,767	40	9	426 / 18,720	185,350
	0	0	510 / 25,260	0	0	0	510 / 25,260	0
	0	0	558 / 27,240	0	0	0	558 / 27,240	0
Partial Lining	6		426	2,556	49		426	20,661
	0		474	0	0		474	0
	0		510	0	0		510	0
	0		1,032	0	0		1,032	0
Replace	1640		620	1,016,934	2779		620	1,723,042
	0		650	0	0		650	0
	0		890	0	37		890	32,849
Investigation	1330		620	824,600	424		620	262,880
	112		650	72,475	200		650	130,000
	0		840	0	0		840	0
	0		890	0	0		890	0
	0		930	0	0		930	0
	0		990	0	0		990	0
Gravity Main Subtotal ($)				**2,808,092**				**3,037,042**

Planning Year	2028-2029				2029-2034			
Gravity Main	Rehab. Length (ft)	Rehab. # (EA.)	Unit Cost ($/LF)	Costs ($)	Rehab. Length (ft)	Rehab. # (EA.)	Unit Cost ($/LF)	Costs ($)
Defect Repair		46	18,720	861,120		185	18,720	3,463,200
		4	22,440	89,760		4	22,440	89,760
		0	25,260	0		1	25,260	25,260
		0	27,240	0		2	27,240	54,480
		1	30,660	30,660		0	30,660	0
		0	33,120	0		0	33,120	0
		0	34,800	0		0	34,800	0
		0	35,760	0		0	35,760	0
Defect Repair + Partial Lining	28	4	426 / 18,720	86,851	79	18	426 / 18,720	370,784
	0	0	510 / 25,260	0	30	4	510 / 25,260	116,238
	0	0	558 / 27,240	0	0	0	558 / 27,240	0
Partial Lining	37		426	15,762	87		426	36,999
	6		474	2,844	0		474	0
	0		510	0	0		510	0
	0		1,032	0	0		1,032	0
Replace	1846		620	1,144,356	7953		620	4,930,902
	379		650	246,288	0		650	0
	0		890	0	0		890	0
Investigation	1280		620	793,600	2497		620	1,547,830
	294		650	190,775	316		650	205,400
	180		840	150,780	0		840	0
	0		890	0	14		890	12,460
	113		930	104,625	0		930	0
	143		990	141,570	0		990	0
Gravity Main Subtotal ($)				**3,858,991**				**10,853,313**

Planning Year	2034-2039			
Gravity Main	Rehab. Length (ft)	Rehab. # (EA.)	Unit Cost ($/LF or $/EA.)	Costs ($)
Defect Repair		171	18,720	3,201,120
		13	22,440	291,720
		4	25,260	101,040
		1	27,240	27,240
		0	30,660	0
		1	33,120	33,120
		2	34,800	69,600
		1	35,760	35,760
Defect Repair + Partial Lining	83	11	426 / 18,720	241,271
	0	0	510 / 25,260	0
	6	2	558 / 27,240	57,828
Partial Lining	156		426	66,541
	6		474	2,844
	6		510	3,060
	6		1,032	6,192
Replace	6518		620	3,281,599
	1011		650	656,990
	0		890	0
Investigation	334		620	207,080
	0		650	0
	0		840	0
	0		890	0
	0		930	0
	0		990	0
Gravity Main Subtotal ($)				**8,283,005**

Manhole		2024-2025 # of Connected Manhole	Estimated # of Rehab. Manhole	Unit Cost ($)	Costs ($)	2025-2026 Total # connected manhole	Estimated # of Rehab. Manhole	Unit Cost ($)	Costs ($)
Manhole rehabilitation + Lining		62	19	13,500	256,500	56	17	13,500	229,500
Manhole Subtotal ($)					**256,500**				**229,500**

Manhole	2026-2027 Total # connected manhole	Estimated # of Rehab. Manhole	Unit Cost ($)	Costs ($)	2027-2028 # of Connected Manhole	Estimated # of Rehab. Manhole	Unit Cost ($)	Costs ($)
Manhole rehabilitation + Lining	57	17	13,500	229,500	69	21	13,500	283,500
Manhole Subtotal ($)				**229,500**				**283,500**

Manhole	2028-2029 Total # connected manhole	Estimated # of Rehab. Manhole	Unit Cost ($)	Costs ($)	2029-2034 Total # connected manhole	Estimated # of Rehab. Manhole	Unit Cost ($)	Costs ($)
Manhole rehabilitation + Lining	75	23	13,500	310,500	242	73	13,500	985,500
Manhole Subtotal ($)				**310,500**				**985,500**

Manhole	2034-2039 # of Connected Manhole	Estimated # of Rehab. Manhole	Unit Cost ($)	Costs ($)
Manhole rehabilitation + Lining	210	63	13,500	850,500
Manhole Subtotal ($)				**850,500**

Lift Station	Name	Quantity	Unit Cost ($)	Costs ($)
Lift Station Rehabilitation	Hiller	1	1890000	1,890,000
	Island Park	1	2700000	2,700,000
Lift Station Subtotal ($)				**4,590,000**

Lift Station	Name	Quantity	Unit Cost ($)	Costs ($)
Lift Station Rehabilitation	Ralston Ranch	1	1320000	1,320,000
Lift Station Subtotal ($)				**1,320,000**

Force Main	Size	Name	Length (ft)	Unit Cost ($)	Costs ($)
Force main replacement	2	Sport Complex FM	320	460	147,200
	8	Island Park FM	3480	490	1,705,200
	12	San Juan	4962	590	2,927,580
Force Main Subtotal ($)					**4,779,980**

Others	Description	Unit Cost ($/ea.)	Costs ($)
	Hiller FM Condition Assessment	200000	**200,000**
Total ($)			**12,872,462**

Others	Description	Unit Cost ($/ea.)	Costs ($)
	Seismic Vulnerability Assessment	300000	**300,000**
Total ($)			**5,283,041**

Total ($)	
	3,037,592

Notes:
1. Gravity mains with risk scores 3 and above are included in the 15-yr CIP.
2. 30% of manholes connected gravity mains proposed to be rehabilitated are assumed to be rehabilitated as well.
3. Lift station and force main rehabilitation were based on the previous lift station and force main condition assessment studies as well as City staff insights.
4. Hiller LS is currently in the design phase, so associated unit cost excluded costs for design.

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
402401_402402	POINT REPAIR	101.6	114.5	12.9	EA	18,720	18,720	6	Lined VCP	273		1/1/2006	4
402401_402402	POINT REPAIR	206.6	212.6	6.0	EA	18,720	18,720	6	Lined VCP	273		1/1/2006	4
402401_402402 Total							37,440						
402404_402501	POINT REPAIR	110.2	127.3	17.1	EA	18,720	18,720	6	VCP	372		1/1/1950	4
402404_402501	POINT REPAIR	188.8	194.8	6.0	EA	18,720	18,720	6	VCP	372		1/1/1950	4
402404_402501 Total							37,440						
402406_402405	POINT REPAIR	20.2	26.2	6.0	EA	18,720	18,720	6	Lined VCP	219		1/1/1998	4
402406_402405 Total							18,720						
402407_402406	POINT REPAIR	317.8	323.3794	5.6	EA	18,720	18,720	6	VCP	323		1/1/1950	4
402407_402406 Total							18,720						
402409LH_402403	POINT REPAIR	36.13958	60.23958	24.1	EA	18,720	18,720	6	VCP	117		1/1/1950	4
402409LH_402403	POINT REPAIR	104.9396	116.9396	12.0	EA	18,720	18,720	6	VCP	117		1/1/1950	4
402409LH_402403 Total							37,440						
402410LH_402404	POINT REPAIR	0	134.0282	134.0	EA	18,720	18,720	6	Lined VCP	134		1/1/1998	4
402410LH_402404 Total							18,720						
402411_402412	POINT REPAIR	152.6	184.8	32.2	EA	18,720	18,720	6	HDPE	283		1/1/1993	4
402411_402412	POINT REPAIR	209.3	232.9	23.6	EA	18,720	18,720	6	HDPE	283		1/1/1993	4
402411_402412 Total							37,440						
402414_402501	POINT REPAIR	58.68504	64.68504	6.0	EA	18,720	18,720	6	VCP	65		1/1/1950	4
402414_402501 Total							18,720						
402416LH_402415	REPLACEMENT	0	126.8728	126.9	ft	620	78,661	6	VCP	127	4	1/1/1950	4
402416LH_402415	LATERAL REINSTATEMENT	0	0	0.0		0	0	6	VCP	127	0	1/1/1950	4
402416LH_402415	LATERAL REINSTATEMENT	1.6	1.6	0.0		0	0	6	VCP	127	0	1/1/1950	4
402416LH_402415	LATERAL REINSTATEMENT	8	8	0.0		0	0	6	VCP	127	0	1/1/1950	4
402416LH_402415	LATERAL REINSTATEMENT	27.6728	27.6728	0.0		0	0	6	VCP	127	0	1/1/1950	4
402416LH_402415 Total							78,661						
402507_402503	POINT REPAIR	45.1	60	14.9	EA	18,720	18,720	6	Lined VCP	227		1/1/2005	3
402507_402503 Total							18,720						
402508_402507	POINT REPAIR	0.4	6.4	6.0	EA	18,720	18,720	6	HDPE	212		1/1/2006	3
402508_402507	POINT REPAIR	203.7724	209.7724	6.0	EA	18,720	18,720	6	HDPE	212		1/1/2006	3
402508_402507 Total							37,440						
402509_402510	POINT REPAIR	0	13.2	13.2	EA	18,720	18,720	6	HDPE	344		1/1/1993	4
402509_402510	POINT REPAIR	228.7	234.7	6.0	EA	18,720	18,720	6	HDPE	344		1/1/1993	4
402509_402510	POINT REPAIR	340.1935	343.5935	3.4	EA	18,720	18,720	6	HDPE	344		1/1/1993	4
402509_402510 Total							56,160						
402510_402505	POINT REPAIR	0	4.9	4.9	EA	18,720	18,720	6	VCP	258		1/1/1950	4
402510_402505	POINT REPAIR	127	166.5	39.5	EA	18,720	18,720	6	VCP	258		1/1/1950	4
402510_402505	POINT REPAIR	217.2	223.2	6.0	EA	18,720	18,720	6	VCP	258		1/1/1950	4
402510_402505 Total							56,160						
402602_402502	LINING	14	20	6.0	ft	426	2,556	6	HDPE	147		1/1/1950	4
402602_402502	LINING	70.8	76.8	6.0	ft	426	2,556	6	HDPE	147		1/1/1950	4
402602_402502	POINT REPAIR	53	66.7	13.7	EA	18,720	18,720	6	HDPE	147		1/1/1950	4
402602_402502 Total							23,832						
402611_402505	REPLACEMENT	0	250.9568	251.0	ft	620	155,593	6	Lined VCP	251	6	1/1/2005	4
402611_402505	LATERAL REINSTATEMENT	14.7	14.7	0.0		0	0	6	Lined VCP	251	0	1/1/2005	4
402611_402505	LATERAL REINSTATEMENT	48.3	48.3	0.0		0	0	6	Lined VCP	251	0	1/1/2005	4
402611_402505	LATERAL REINSTATEMENT	77.2	77.2	0.0		0	0	6	Lined VCP	251	0	1/1/2005	4
402611_402505	LATERAL REINSTATEMENT	78.3	78.3	0.0		0	0	6	Lined VCP	251	0	1/1/2005	4
402611_402505	LATERAL REINSTATEMENT	101.2	101.2	0.0		0	0	6	Lined VCP	251	0	1/1/2005	4
402611_402505	LATERAL REINSTATEMENT	245.4	245.4	0.0		0	0	6	Lined VCP	251	0	1/1/2005	4
402611_402505 Total							155,593						

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
402612_402611	REPLACEMENT	0	234.1248	234.1	ft	620	145,157	6	Lined VCP	234	3	1/1/2001	4
402612_402611	LATERAL REINSTATEMENT	188.8248	188.8248	0.0		0	0	6	Lined VCP	234	0	1/1/2001	4
402612_402611	LATERAL REINSTATEMENT	147.7248	147.7248	0.0		0	0	6	Lined VCP	234	0	1/1/2001	4
402612_402611	LATERAL REINSTATEMENT	40.22484	40.22484	0.0		0	0	6	Lined VCP	234	0	1/1/2001	4
402612_402611 Total							145,157						
402613_402612	LINING	183.7218	189.7218	6.0	ft	426	2,556	6	Lined VCP	192		1/1/2005	4
402613_402612	POINT REPAIR	3.621817	9.621817	6.0	EA	18,720	18,720	6	Lined VCP	192		1/1/2005	4
402613_402612 Total							21,276						
402615_402613	REPLACEMENT	0	256.8725	256.9	ft	620	159,261	6	VCP	257	5	1/1/1950	4
402615_402613	LATERAL REINSTATEMENT	236.3725	236.3725	0.0		0	0	6	VCP	257	0	1/1/1950	4
402615_402613	LATERAL REINSTATEMENT	127.2725	127.2725	0.0		0	0	6	VCP	257	0	1/1/1950	4
402615_402613	LATERAL REINSTATEMENT	123.8725	123.8725	0.0		0	0	6	VCP	257	0	1/1/1950	4
402615_402613	LATERAL REINSTATEMENT	86.57251	86.57251	0.0		0	0	6	VCP	257	0	1/1/1950	4
402615_402613	LATERAL REINSTATEMENT	33.87251	33.87251	0.0		0	0	6	VCP	257	0	1/1/1950	4
402615_402613 Total							159,261						
402701_402702	LINING	91.5	97.5	6.0	ft	510	3,060	10	VCP	279		1/1/1950	4
402701_402702	LINING	189.1	195.1	6.0	ft	510	3,060	10	VCP	279		1/1/1950	4
402701_402702	POINT REPAIR	190.6	277.3	86.7	EA	25,260	25,260	10	VCP	279		1/1/1950	4
402701_402702 Total							31,380						
402705_402704	REPLACEMENT	0	268.8894	268.9	ft	620	166,711	6	PVC	269	7	1/1/1993	4
402705_402704	LATERAL REINSTATEMENT	2.2	2.2	0.0		0	0	6	PVC	269	0	1/1/1993	4
402705_402704	LATERAL REINSTATEMENT	29.5	29.5	0.0		0	0	6	PVC	269	0	1/1/1993	4
402705_402704	LATERAL REINSTATEMENT	53.1	53.1	0.0		0	0	6	PVC	269	0	1/1/1993	4
402705_402704	LATERAL REINSTATEMENT	102	102	0.0		0	0	6	PVC	269	0	1/1/1993	4
402705_402704	LATERAL REINSTATEMENT	118.3	118.3	0.0		0	0	6	PVC	269	0	1/1/1993	4
402705_402704	LATERAL REINSTATEMENT	152.9	152.9	0.0		0	0	6	PVC	269	0	1/1/1993	4
402705_402704	LATERAL REINSTATEMENT	265	265	0.0		0	0	6	PVC	269	0	1/1/1993	4
402705_402704 Total							166,711						
402713_402701	POINT REPAIR	191	197	6.0	EA	18,720	18,720	6	PVC	199		1/1/2005	3
402713_402701 Total							18,720						
402719_402720	POINT REPAIR	8.018856	74.21885	66.2	EA	18,720	18,720	6	VCP	172		1/1/1950	4
402719_402720 Total							18,720						
402720_402721	POINT REPAIR	11.8	24.8	13.0	EA	18,720	18,720	6	Lined VCP	301		1/1/2006	4
402720_402721	POINT REPAIR	140.7	162.5	21.8	EA	18,720	18,720	6	Lined VCP	301		1/1/2006	4
402720_402721	POINT REPAIR	166.7011	197.0011	30.3	EA	18,720	18,720	6	Lined VCP	301		1/1/2006	4
402720_402721 Total							56,160						
402722_402710	REPLACEMENT	0	27.39354	27.4	ft	620	16,984	6	HDPE	27	0	1/1/1993	4
402722_402710 Total							16,984						
402803_402808	POINT REPAIR	81.55164	87.55164	6.0	EA	18,720	18,720	6	HDPE	93		1/1/1993	3
402803_402808 Total							18,720						
402807_402807A	POINT REPAIR	72.6	78.6	6.0	EA	18,720	18,720	6	HDPE	345		1/1/1993	3
402807_402807A	POINT REPAIR	92.7	117.3	24.6	EA	18,720	18,720	6	HDPE	345		1/1/1993	3
402807_402807A Total							37,440						
402808_402901	REPLACEMENT	0	358.1506	358.2	ft	650	232,798	8	HDPE	358	10	1/1/1993	3
402808_402901	LATERAL REINSTATEMENT	7	7	0.0		0	0	8	HDPE	358	0	1/1/1993	3
402808_402901	LATERAL REINSTATEMENT	42	42	0.0		0	0	8	HDPE	358	0	1/1/1993	3
402808_402901	LATERAL REINSTATEMENT	72	72	0.0		0	0	8	HDPE	358	0	1/1/1993	3
402808_402901	LATERAL REINSTATEMENT	92	92	0.0		0	0	8	HDPE	358	0	1/1/1993	3
402808_402901	LATERAL REINSTATEMENT	126	126	0.0		0	0	8	HDPE	358	0	1/1/1993	3
402808_402901	LATERAL REINSTATEMENT	142.7	142.7	0.0		0	0	8	HDPE	358	0	1/1/1993	3
402808_402901	LATERAL REINSTATEMENT	180.3	180.3	0.0		0	0	8	HDPE	358	0	1/1/1993	3

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
402808_402901	LATERAL REINSTATEMENT	193.2	193.2	0.0		0	0	8	HDPE	358	0	1/1/1993	3
402808_402901	LATERAL REINSTATEMENT	243.7	243.7	0.0		0	0	8	HDPE	358	0	1/1/1993	3
402808_402901	LATERAL REINSTATEMENT	263.5	263.5	0.0		0	0	8	HDPE	358	0	1/1/1993	3
402808_402901 Total							232,798						
402902B_402902A	REPLACEMENT	0	191.2075	191.2	ft	620	118,549	6	VCP	191	1	1/1/1950	5
402902B_402902A	LATERAL REINSTATEMENT	31.7	31.7	0.0		0	0	6	VCP	191	0	1/1/1950	5
402902B_402902A Total							118,549						
402904_402905	REPLACEMENT	0	299.567	299.6	ft	620	185,732	6	VCP	300	4	1/1/1950	4
402904_402905	LATERAL REINSTATEMENT	88.3	88.3	0.0		0	0	6	VCP	300	0	1/1/1950	4
402904_402905	LATERAL REINSTATEMENT	94	94	0.0		0	0	6	VCP	300	0	1/1/1950	4
402904_402905	LATERAL REINSTATEMENT	188.6	188.6	0.0		0	0	6	VCP	300	0	1/1/1950	4
402904_402905	LATERAL REINSTATEMENT	273.8	273.8	0.0		0	0	6	VCP	300	0	1/1/1950	4
402904_402905 Total							185,732						
403006_402902	POINT REPAIR	190.3	196.3	6.0	EA	22,440	22,440	8	PVC	227		1/1/1993	4
403006_402902 Total							22,440						
403009_403005	POINT REPAIR	6.9	37.7	30.8	EA	18,720	18,720	6	VCP	361		1/1/1950	4
403009_403005	POINT REPAIR	202.5	229.4	26.9	EA	18,720	18,720	6	VCP	361		1/1/1950	4
403009_403005	POINT REPAIR	275.3	281.3	6.0	EA	18,720	18,720	6	VCP	361		1/1/1950	4
403009_403005 Total							56,160						
403101_403102	POINT REPAIR	289	295	6.0	EA	18,720	18,720	6	Lined VCP	301		1/1/2006	3
403101_403102 Total							18,720						
403102_403102A	REPLACEMENT	0	43.50594	43.5	ft	620	26,974	6	PVC	44	0	1/1/1950	3
403102_403102A Total							26,974						
403103_403304	POINT REPAIR	43.4	63.9873	20.6	EA	34,800	34,800	21	PVC	64		1/1/1970	3
403103_403304 Total							34,800						
403104_403304	POINT REPAIR	57.7	63.7	6.0	EA	18,720	18,720	6	VCP	239		1/1/1970	4
403104_403304	POINT REPAIR	107.7	113.7	6.0	EA	18,720	18,720	6	VCP	239		1/1/1970	4
403104_403304	POINT REPAIR	225.5	234.6	9.1	EA	18,720	18,720	6	VCP	239		1/1/1970	4
403104_403304 Total							56,160						
403105_403106	POINT REPAIR	68	74	6.0	EA	18,720	18,720	6	VCP	212		1/1/1950	4
403105_403106 Total							18,720						
403108_403108A	LINING	13.6	26.5	12.9	ft	426	5,495	6	VCP	135		1/1/1993	4
403108_403108A	POINT REPAIR	129.6	135	5.4	EA	18,720	18,720	6	VCP	135		1/1/1993	4
403108_403108A Total							24,215						
403108A_403109	REPLACEMENT	0	40	40.0	ft	620	24,800	6	PVC	40	1	1/1/1993	3
403108A_403109	LATERAL REINSTATEMENT	40.7	40	-0.7		0	0	6	PVC	40	0	1/1/1993	3
403108A_403109 Total							24,800						
403109_403110	POINT REPAIR	98.8	112.9	14.1	EA	18,720	18,720	6	VCP	155		1/1/1950	5
403109_403110	POINT REPAIR	131.8	137.8	6.0	EA	18,720	18,720	6	VCP	155		1/1/1950	5
403109_403110	POINT REPAIR	151.8556	154.8556	3.0	EA	18,720	18,720	6	VCP	155		1/1/1950	5
403109_403110 Total							56,160						
403116_403115	POINT REPAIR	145.806	161.006	15.2	EA	18,720	18,720	6	Lined VCP	246		1/1/2006	4
403116_403115	POINT REPAIR	176.006	196.706	20.7	EA	18,720	18,720	6	Lined VCP	246		1/1/2006	4
403116_403115	POINT REPAIR	242.106	245.606	3.5	EA	18,720	18,720	6	Lined VCP	246		1/1/2006	4
403116_403115 Total							56,160						
403201_403202	POINT REPAIR	21.3	27.3	6.0	EA	18,720	18,720	6	Lined VCP	153		1/1/2005	4
403201_403202	POINT REPAIR	86.4	98.7	12.3	EA	18,720	18,720	6	Lined VCP	153		1/1/2005	4
403201_403202	POINT REPAIR	140.6	153.3452	12.7	EA	18,720	18,720	6	Lined VCP	153		1/1/2005	4
403201_403202 Total							56,160						
403202_403203	REPLACEMENT	0	178.4924	178.5	ft	620	110,665	6	VCP	178	4	1/1/1950	4
403202_403203	LATERAL REINSTATEMENT	5	5	0.0		0	0	6	VCP	178	0	1/1/1950	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
403202_403203	LATERAL REINSTATEMENT	14.4	14.4	0.0		0	0	6	VCP	178	0	1/1/1950	4
403202_403203	LATERAL REINSTATEMENT	105.2	105.2	0.0		0	0	6	VCP	178	0	1/1/1950	4
403202_403203	LATERAL REINSTATEMENT	111	111	0.0		0	0	6	VCP	178	0	1/1/1950	4
403202_403203 Total							110,665						
403203_403002	POINT REPAIR	133.7536	190.8536	57.1	EA	22,440	22,440	8	VCP	191		1/1/1950	4
403203_403002 Total							22,440						
403323_403301	POINT REPAIR	216.3	222.3	6.0	EA	18,720	18,720	6	VCP	274		1/1/1970	4
403323_403301	POINT REPAIR	264.9	270.9	6.0	EA	18,720	18,720	6	VCP	274		1/1/1970	4
403323_403301 Total							37,440						
403324_403302	REPLACEMENT	0	272.9677	273.0	ft	620	169,240	6	VCP	273	10	1/1/1950	4
403324_403302	LATERAL REINSTATEMENT	233.8677	233.8677	0.0		0	0	6	VCP	273	0	1/1/1950	4
403324_403302	LATERAL REINSTATEMENT	230.3677	230.3677	0.0		0	0	6	VCP	273	0	1/1/1950	4
403324_403302	LATERAL REINSTATEMENT	182.8677	182.8677	0.0		0	0	6	VCP	273	0	1/1/1950	4
403324_403302	LATERAL REINSTATEMENT	179.9677	179.9677	0.0		0	0	6	VCP	273	0	1/1/1950	4
403324_403302	LATERAL REINSTATEMENT	129.1677	129.1677	0.0		0	0	6	VCP	273	0	1/1/1950	4
403324_403302	LATERAL REINSTATEMENT	125.9677	125.9677	0.0		0	0	6	VCP	273	0	1/1/1950	4
403324_403302	LATERAL REINSTATEMENT	75.06771	75.06771	0.0		0	0	6	VCP	273	0	1/1/1950	4
403324_403302	LATERAL REINSTATEMENT	72.26771	72.26771	0.0		0	0	6	VCP	273	0	1/1/1950	4
403324_403302	LATERAL REINSTATEMENT	17.3677	17.3677	0.0		0	0	6	VCP	273	0	1/1/1950	4
403324_403302	LATERAL REINSTATEMENT	17.3677	17.3677	0.0		0	0	6	VCP	273	0	1/1/1950	4
403324_403302 Total							169,240						
403420_403401	POINT REPAIR	312	375.0008	63.0	EA	18,720	18,720	6	VCP	375		1/1/1970	4
403420_403401 Total							18,720						
403421_403401	LINING	73.5	79.5	6.0	ft	426	2,556	6	VCP	110		1/1/1970	3
403421_403401 Total							2,556						
403604_403606	REPLACEMENT	0	36.87193	36.9	ft	650	23,967	8	PVC	37	0	1/1/1990	4
403604_403606 Total							23,967						
403609_403608	REPLACEMENT	0	269.8393	269.8	ft	650	175,396	8	PVC	270	0	1/1/1990	5
403609_403608 Total							175,396						
403803_403804	POINT REPAIR	0	5.5	5.5	EA	18,720	18,720	6	VCP	136		1/1/1980	4
403803_403804	POINT REPAIR	11.7	17.7	6.0	EA	18,720	18,720	6	VCP	136		1/1/1980	4
403803_403804	POINT REPAIR	93.2	99.2	6.0	EA	18,720	18,720	6	VCP	136		1/1/1980	4
403803_403804 Total							56,160						
403806_403804	POINT REPAIR	226.2	232.2	6.0	EA	18,720	18,720	6	VCP	238		1/1/1980	4
403806_403804 Total							18,720						
41022ALH_441022	REPLACEMENT	0	240	240.0	ft	620	148,800	6	PVC	240	8	1/1/1940	4
41022ALH_441022	LATERAL REINSTATEMENT	203.5	203.5	0.0		0	0	6	PVC	240	0	1/1/1940	4
41022ALH_441022	LATERAL REINSTATEMENT	182.8	182.8	0.0		0	0	6	PVC	240	0	1/1/1940	4
41022ALH_441022	LATERAL REINSTATEMENT	181.5	181.5	0.0		0	0	6	PVC	240	0	1/1/1940	4
41022ALH_441022	LATERAL REINSTATEMENT	167.7	167.7	0.0		0	0	6	PVC	240	0	1/1/1940	4
41022ALH_441022	LATERAL REINSTATEMENT	91	91	0.0		0	0	6	PVC	240	0	1/1/1940	4
41022ALH_441022	LATERAL REINSTATEMENT	52.7	52.7	0.0		0	0	6	PVC	240	0	1/1/1940	4
41022ALH_441022	LATERAL REINSTATEMENT	2.4	2.4	0.0		0	0	6	PVC	240	0	1/1/1940	4
41022ALH_441022	LATERAL REINSTATEMENT	24	24	0.0		0	0	6	PVC	240	0	1/1/1940	4
41022ALH_441022 Total							148,800						
430110_430109	POINT REPAIR	224.6	230.6	6.0	EA	18,720	18,720	6	VCP	256		1/1/1970	4
430110_430109 Total							18,720						
430206_430310	POINT REPAIR	141.8	217.8	76.0	EA	25,260	25,260	10	VCP	298		1/1/1958	3
430206_430310 Total							25,260						
430217_430215	POINT REPAIR	39.5	50	10.5	EA	18,720	18,720	6	VCP	114		1/1/1970	4
430217_430215 Total							18,720						

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
430219_430218	POINT REPAIR	44.5	50.5	6.0	EA	18,720	18,720	6	VCP	120		1/1/1970	4
430219_430218 Total							18,720						
430401_430402	POINT REPAIR	128.1	156	27.9	EA	25,260	25,260	10	VCP	258		1/1/1958	5
430401_430402 Total							25,260						
430406_430405	POINT REPAIR	0	3	3.0	EA	18,720	18,720	6	HDPE	139		1/1/2003	4
430406_430405 Total							18,720						
430410LH_430408	POINT REPAIR	7	13	6.0	EA	18,720	18,720	6	Lined VCP	295		1/1/1998	4
430410LH_430408	POINT REPAIR	232.5598	238.5598	6.0	EA	18,720	18,720	6	Lined VCP	295		1/1/1998	4
430410LH_430408 Total							37,440						
430412_430413	POINT REPAIR	63.5	69.5	6.0	EA	18,720	18,720	6	Lined VCP	211		1/1/1998	4
430412_430413	POINT REPAIR	114.5	153.1	38.6	EA	18,720	18,720	6	Lined VCP	211		1/1/1998	4
430412_430413	POINT REPAIR	167	181.5	14.5	EA	18,720	18,720	6	Lined VCP	211		1/1/1998	4
430412_430413 Total							56,160						
430413_430414	REPLACEMENT	0	339.4965	339.5	ft	620	210,488	6	PVC	339	2	1/1/1950	4
430413_430414	LATERAL REINSTATEMENT	22.2	22.2	0.0		0	0	6	PVC	339	0	1/1/1950	4
430413_430414	LATERAL REINSTATEMENT	72.5	72.5	0.0		0	0	6	PVC	339	0	1/1/1950	4
430413_430414 Total							210,488						
430414_430901	POINT REPAIR	128.3	134.3	6.0	EA	18,720	18,720	6	PVC	339		1/1/1950	3
430414_430901 Total							18,720						
430507_430101	POINT REPAIR	24.1	34.4	10.3	EA	18,720	18,720	6	Lined VCP	182		1/1/2002	4
430507_430101	POINT REPAIR	71	77	6.0	EA	18,720	18,720	6	Lined VCP	182		1/1/2002	4
430507_430101 Total							37,440						
430608_430607	POINT REPAIR	68.2	93.2	25.0	EA	22,440	22,440	8	HDPE	223		1/1/2019	3
430608_430607	POINT REPAIR	138.3	144.3	6.0	EA	22,440	22,440	8	HDPE	223		1/1/2019	3
430608_430607 Total							44,880						
430701_430504	POINT REPAIR	94.89669	100.8967	6.0	EA	18,720	18,720	6	VCP	136		1/1/1970	4
430701_430504	POINT REPAIR	112.1	118.1	6.0	EA	18,720	18,720	6	VCP	136		1/1/1970	4
430701_430504 Total							37,440						
430703LH_430702	POINT REPAIR	6.1	12.1	6.0	EA	18,720	18,720	6	VCP	62		1/1/1970	4
430703LH_430702 Total							18,720						
430706_430705	POINT REPAIR	9.5	19.8	10.3	EA	18,720	18,720	6	Lined VCP	155		1/1/2006	3
430706_430705 Total							18,720						
430708_430709	POINT REPAIR	100.9	106.9	6.0	EA	18,720	18,720	6	VCP	113		1/1/1970	4
430708_430709 Total							18,720						
430726_430725	POINT REPAIR	15.8	21.8	6.0	EA	22,440	22,440	8	PVC	116		1/1/1995	4
430726_430725 Total							22,440						
430902_430903	POINT REPAIR	35	41	6.0	EA	18,720	18,720	6	VCP	187		1/1/1950	3
430902_430903 Total							18,720						
430904_431901	REPLACEMENT	0	331	331.0	ft	650	215,150	8	HDPE	331	0	1/1/2016	3
430904_431901 Total							215,150						
430906_430907	POINT REPAIR	0	45.97508	46.0	EA	18,720	18,720	6	Lined VCP	46		1/1/1998	4
430906_430907 Total							18,720						
430910_430413	REPLACEMENT	0	423.3148	423.3	ft	620	262,455	6	VCP	423	13	1/1/1950	4
430910_430413	LATERAL REINSTATEMENT	16.2	16.2	0.0		0	0	6	VCP	423	0	1/1/1950	4
430910_430413	LATERAL REINSTATEMENT	26.1	26.1	0.0		0	0	6	VCP	423	0	1/1/1950	4
430910_430413	LATERAL REINSTATEMENT	64.5	64.5	0.0		0	0	6	VCP	423	0	1/1/1950	4
430910_430413	LATERAL REINSTATEMENT	78.4	78.4	0.0		0	0	6	VCP	423	0	1/1/1950	4
430910_430413	LATERAL REINSTATEMENT	120.8	120.8	0.0		0	0	6	VCP	423	0	1/1/1950	4
430910_430413	LATERAL REINSTATEMENT	130.8	130.8	0.0		0	0	6	VCP	423	0	1/1/1950	4
430910_430413	LATERAL REINSTATEMENT	169.5	169.5	0.0		0	0	6	VCP	423	0	1/1/1950	4
430910_430413	LATERAL REINSTATEMENT	179.5	179.5	0.0		0	0	6	VCP	423	0	1/1/1950	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
430910_430413	LATERAL REINSTATEMENT	217.5	217.5	0.0		0	0	6	VCP	423	0	1/1/1950	4
430910_430413	LATERAL REINSTATEMENT	231.6	231.6	0.0		0	0	6	VCP	423	0	1/1/1950	4
430910_430413	LATERAL REINSTATEMENT	264.5	264.5	0.0		0	0	6	VCP	423	0	1/1/1950	4
430910_430413	LATERAL REINSTATEMENT	282.2	282.2	0.0		0	0	6	VCP	423	0	1/1/1950	4
430910_430413	LATERAL REINSTATEMENT	308.1	308.1	0.0		0	0	6	VCP	423	0	1/1/1950	4
430910_430413 Total							262,455						
431012_431105	POINT REPAIR	0	70.3735	70.4	EA	18,720	18,720	6	HDPE	70		1/1/2003	4
431012_431105 Total							18,720						
431103_431102	POINT REPAIR	172.6	178.6	6.0	EA	18,720	18,720	6	HDPE	265		1/1/2003	3
431103_431102	POINT REPAIR	255.1	261.1	6.0	EA	18,720	18,720	6	HDPE	265		1/1/2003	3
431103_431102 Total							37,440						
431105_431104	REPLACEMENT	0	70.3735	70.4	ft	620	43,632	6	HDPE	70	4	1/1/2003	3
431105_431104	LATERAL REINSTATEMENT	60.9735	60.9735	0.0		0	0	6	HDPE	70	0	1/1/2003	3
431105_431104	LATERAL REINSTATEMENT	28.7735	28.7735	0.0		0	0	6	HDPE	70	0	1/1/2003	3
431105_431104	LATERAL REINSTATEMENT	20.3735	20.3735	0.0		0	0	6	HDPE	70	0	1/1/2003	3
431105_431104	LATERAL REINSTATEMENT	18.2735	18.2735	0.0		0	0	6	HDPE	70	0	1/1/2003	3
431105_431104 Total							43,632						
431107_431108	POINT REPAIR	17.1	23.1	6.0	EA	18,720	18,720	6	Lined VCP	138		1/1/1998	4
431107_431108	POINT REPAIR	78.4	92.6	14.2	EA	18,720	18,720	6	Lined VCP	138		1/1/1998	4
431107_431108	POINT REPAIR	135.1511	138.1511	3.0	EA	18,720	18,720	6	Lined VCP	138		1/1/1998	4
431107_431108 Total							56,160						
431109_431110	POINT REPAIR	60	66	6.0	EA	18,720	18,720	6	Lined VCP	98		1/1/1998	4
431109_431110 Total							18,720						
431112_431113	POINT REPAIR	394.9792	398.9792	4.0	EA	18,720	18,720	6	VCP	399		1/1/1970	4
431112_431113 Total							18,720						
431114A_431114	POINT REPAIR	252.3943	258.3943	6.0	EA	18,720	18,720	6	VCP	268		1/1/1950	4
431114A_431114 Total							18,720						
431115_431116	POINT REPAIR	20.2	26.2	6.0	EA	18,720	18,720	6	VCP	225		1/1/1950	4
431115_431116	POINT REPAIR	33.9	52.7	18.8	EA	18,720	18,720	6	VCP	225		1/1/1950	4
431115_431116	POINT REPAIR	149.4	163.3	13.9	EA	18,720	18,720	6	VCP	225		1/1/1950	4
431115_431116 Total							56,160						
431117_431115	POINT REPAIR	180.1087	186.1087	6.0	EA	18,720	18,720	6	VCP	305		1/1/1950	4
431117_431115	POINT REPAIR	279.3087	305.0087	25.7	EA	18,720	18,720	6	VCP	305		1/1/1950	4
431117_431115 Total							37,440						
431201_430906	POINT REPAIR	31.2	335.7853	304.6	EA	18,720	18,720	6	Lined VCP	336		1/1/2015	4
431201_430906 Total							18,720						
431202_431201	POINT REPAIR	2.8	305	302.2	EA	18,720	18,720	6	Lined VCP	307		1/1/2015	4
431202_431201 Total							18,720						
431203_431202	POINT REPAIR	106.3459	110.1459	3.8	EA	18,720	18,720	6	Lined VCP	110		1/1/1998	4
431203_431202 Total							18,720						
431207LH_431208	POINT REPAIR	0	84.35837	84.4	EA	18,720	18,720	6	HDPE	84		1/1/2003	3
431207LH_431208 Total							18,720						
431304_431303	POINT REPAIR	0	3	3.0	EA	18,720	18,720	6	Lined VCP	167		1/1/2001	3
431304_431303 Total							18,720						
431305_431304	POINT REPAIR	0	3	3.0	EA	18,720	18,720	6	Lined VCP	304		1/1/2001	3
431305_431304 Total							18,720						
431402_431403	POINT REPAIR	207.3	213.3	6.0	EA	18,720	18,720	6	HDPE	248		1/1/2003	3
431402_431403 Total							18,720						
431403_431404	POINT REPAIR	6	25.1	19.1	EA	18,720	18,720	6	HDPE	361		1/1/2003	3
431403_431404	POINT REPAIR	139.6	145.6	6.0	EA	18,720	18,720	6	HDPE	361		1/1/2003	3
431403_431404	POINT REPAIR	178.3	206.5	28.2	EA	18,720	18,720	6	HDPE	361		1/1/2003	3

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
431403_431404 Total							56,160						
431404_431405	REPLACEMENT	0	281.6557	281.7	ft	620	174,627	6	HDPE	282	7	1/1/2003	3
431404_431405	LATERAL REINSTATEMENT	20.7	20.7	0.0		0	0	6	HDPE	282	0	1/1/2003	3
431404_431405	LATERAL REINSTATEMENT	82.2	82.2	0.0		0	0	6	HDPE	282	0	1/1/2003	3
431404_431405	LATERAL REINSTATEMENT	83.9	83.9	0.0		0	0	6	HDPE	282	0	1/1/2003	3
431404_431405	LATERAL REINSTATEMENT	145.9	145.9	0.0		0	0	6	HDPE	282	0	1/1/2003	3
431404_431405	LATERAL REINSTATEMENT	194.8	194.8	0.0		0	0	6	HDPE	282	0	1/1/2003	3
431404_431405	LATERAL REINSTATEMENT	200.3	200.3	0.0		0	0	6	HDPE	282	0	1/1/2003	3
431404_431405	LATERAL REINSTATEMENT	264.6	264.6	0.0		0	0	6	HDPE	282	0	1/1/2003	3
431404_431405 Total							174,627						
431405_431406	POINT REPAIR	246	256.2	10.2	EA	18,720	18,720	6	HDPE	269		1/1/2003	3
431405_431406 Total							18,720						
431406_431408	POINT REPAIR	165.4	179.8	14.4	EA	18,720	18,720	6	VCP	388		1/1/1956	4
431406_431408	POINT REPAIR	190.6	203	12.4	EA	18,720	18,720	6	VCP	388		1/1/1956	4
431406_431408	POINT REPAIR	277.4	283.4	6.0	EA	18,720	18,720	6	VCP	388		1/1/1956	4
431406_431408 Total							56,160						
431408_431409	REPLACEMENT	0	165.2428	165.2	ft	620	102,451	6	VCP	165	4	1/1/1956	4
431408_431409	LATERAL REINSTATEMENT	139.6428	139.6428	0.0		0	0	6	VCP	165	0	1/1/1956	4
431408_431409	LATERAL REINSTATEMENT	16.2	16.2	0.0		0	0	6	VCP	165	0	1/1/1956	4
431408_431409	LATERAL REINSTATEMENT	67.6	67.6	0.0		0	0	6	VCP	165	0	1/1/1956	4
431408_431409	LATERAL REINSTATEMENT	131.8	131.8	0.0		0	0	6	VCP	165	0	1/1/1956	4
431408_431409 Total							102,451						
431516_431402	POINT REPAIR	60.8	66.8	6.0	EA	18,720	18,720	6	Lined VCP	305		1/1/2001	4
431516_431402	POINT REPAIR	289.6	295.6	6.0	EA	18,720	18,720	6	Lined VCP	305		1/1/2001	4
431516_431402 Total							37,440						
431517_431516	POINT REPAIR	38.39433	103.0943	64.7	EA	18,720	18,720	6	VCP	194		1/1/1950	4
431517_431516 Total							18,720						
431520_431521	POINT REPAIR	71.28313	88.08313	16.8	EA	18,720	18,720	6	Lined VCP	107		1/1/2001	3
431520_431521 Total							18,720						
431522_431523	POINT REPAIR	1.2	12.51886	11.3	EA	18,720	18,720	6	HDPE	197		1/1/2003	3
431522_431523 Total							18,720						
431601_431602	POINT REPAIR	9.3	30.9	21.6	EA	25,260	25,260	10	VCP	68		1/1/1993	3
431601_431602 Total							25,260						
431602_431645	REPLACEMENT	0	36.90909	36.9	ft	890	32,849	12	VCP	37	0	1/1/1981	4
431602_431645 Total							32,849						
431621LH_431622	POINT REPAIR	0	132.195	132.2	EA	18,720	18,720	6	PVC	132		1/1/1993	4
431621LH_431622 Total							18,720						
431622_431623	REPLACEMENT	0	62.57082	62.6	ft	620	38,794	6	VCP	63	1	1/1/1950	4
431622_431623	LATERAL REINSTATEMENT	25.8	25.8	0.0		0	0	6	VCP	63	0	1/1/1950	4
431622_431623 Total							38,794						
431624_431623	LINING	212.1	218.1	6.0	ft	426	2,556	6	VCP	295		1/1/1950	4
431624_431623	LINING	228.2	234.2	6.0	ft	426	2,556	6	VCP	295		1/1/1950	4
431624_431623	POINT REPAIR	274.6	280.6	6.0	EA	18,720	18,720	6	VCP	295		1/1/1950	4
431624_431623 Total							23,832						
431625_431624	POINT REPAIR	91.1	97.1	6.0	EA	18,720	18,720	6	VCP	159		1/1/1950	4
431625_431624	POINT REPAIR	110.8	121.4	10.6	EA	18,720	18,720	6	VCP	159		1/1/1950	4
431625_431624 Total							37,440						
431626LH_431625	POINT REPAIR	73.67835	79.67835	6.0	EA	18,720	18,720	6	VCP	81		1/1/1950	3
431626LH_431625 Total							18,720						
431631_431632	REPLACEMENT	0	68.08889	68.1	ft	620	42,215	6	VCP	68	1	1/1/1950	4
431631_431632	LATERAL REINSTATEMENT	67.1	67.1	0.0		0	0	6	VCP	68	0	1/1/1950	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
431631_431632 Total							42,215						
431635_431634	POINT REPAIR	29.56851	35.56851	6.0	EA	18,720	18,720	6	HDPE	95		1/1/2003	3
431635_431634 Total							18,720						
431636_431717	POINT REPAIR	70.5	76.5	6.0	EA	18,720	18,720	6	VCP	225		1/1/1950	4
431636_431717 Total							18,720						
431638_431637	POINT REPAIR	0.2946	219.9946	219.7	EA	18,720	18,720	6	Lined VCP	288		1/1/2015	4
431638_431637 Total							18,720						
431639_431638	POINT REPAIR	0	11.6	11.6	EA	18,720	18,720	6	VCP	164		1/1/1957	4
431639_431638 Total							18,720						
431708_431708A	POINT REPAIR	0	4	4.0	EA	18,720	18,720	6	PVC	107		1/1/2003	3
431708_431708A	POINT REPAIR	89.4	95.4	6.0	EA	18,720	18,720	6	PVC	107		1/1/2003	3
431708_431708A Total							37,440						
431708A_431707	REPLACEMENT	0	190	190.0	ft	620	117,800	6	HDPE	190	15	1/1/2003	4
431708A_431707	LATERAL REINSTATEMENT	24.8	24.8	0.0		0	0	6	HDPE	190	0	1/1/2003	4
431708A_431707	LATERAL REINSTATEMENT	26.2	26.2	0.0		0	0	6	HDPE	190	0	1/1/2003	4
431708A_431707	LATERAL REINSTATEMENT	34.2	34.2	0.0		0	0	6	HDPE	190	0	1/1/2003	4
431708A_431707	LATERAL REINSTATEMENT	51.7	51.7	0.0		0	0	6	HDPE	190	0	1/1/2003	4
431708A_431707	LATERAL REINSTATEMENT	55	55	0.0		0	0	6	HDPE	190	0	1/1/2003	4
431708A_431707	LATERAL REINSTATEMENT	64.6	64.6	0.0		0	0	6	HDPE	190	0	1/1/2003	4
431708A_431707	LATERAL REINSTATEMENT	68.1	68.1	0.0		0	0	6	HDPE	190	0	1/1/2003	4
431708A_431707	LATERAL REINSTATEMENT	75.3	75.3	0.0		0	0	6	HDPE	190	0	1/1/2003	4
431708A_431707	LATERAL REINSTATEMENT	76.6	76.6	0.0		0	0	6	HDPE	190	0	1/1/2003	4
431708A_431707	LATERAL REINSTATEMENT	79.5	79.5	0.0		0	0	6	HDPE	190	0	1/1/2003	4
431708A_431707	LATERAL REINSTATEMENT	98.8	98.8	0.0		0	0	6	HDPE	190	0	1/1/2003	4
431708A_431707	LATERAL REINSTATEMENT	157.8	157.8	0.0		0	0	6	HDPE	190	0	1/1/2003	4
431708A_431707	LATERAL REINSTATEMENT	139.8	139.8	0.0		0	0	6	HDPE	190	0	1/1/2003	4
431708A_431707	LATERAL REINSTATEMENT	130.5	130.5	0.0		0	0	6	HDPE	190	0	1/1/2003	4
431708A_431707	LATERAL REINSTATEMENT	111.9	111.9	0.0		0	0	6	HDPE	190	0	1/1/2003	4
431708A_431707 Total							117,800						
431709_431708	REPLACEMENT	0	160.8599	160.9	ft	620	99,733	6	HDPE	161	2	1/1/2003	3
431709_431708	LATERAL REINSTATEMENT	52.9	52.9	0.0		0	0	6	HDPE	161	0	1/1/2003	3
431709_431708	LATERAL REINSTATEMENT	102.8	102.8	0.0		0	0	6	HDPE	161	0	1/1/2003	3
431709_431708 Total							99,733						
431710_431709	LINING	35.6	41.6	6.0	ft	426	2,556	6	HDPE	63		1/1/2003	3
431710_431709	POINT REPAIR	53.7	59.7	6.0	EA	18,720	18,720	6	HDPE	63		1/1/2003	3
431710_431709 Total							21,276						
431713_431711	POINT REPAIR	0	4.6	4.6	EA	18,720	18,720	6	VCP	276		1/1/1950	4
431713_431711 Total							18,720						
431714_431716	POINT REPAIR	43.7	53.9	10.2	EA	18,720	18,720	6	VCP	148		1/1/1950	4
431714_431716	POINT REPAIR	89.5	95.5	6.0	EA	18,720	18,720	6	VCP	148		1/1/1950	4
431714_431716 Total							37,440						
431801_431710	REPLACEMENT	0	90.12544	90.1	ft	620	55,878	6	HDPE	90	3	1/1/2003	3
431801_431710	LATERAL REINSTATEMENT	18.8	18.8	0.0		0	0	6	HDPE	90	0	1/1/2003	3
431801_431710	LATERAL REINSTATEMENT	25.1	25.1	0.0		0	0	6	HDPE	90	0	1/1/2003	3
431801_431710	LATERAL REINSTATEMENT	52.4	52.4	0.0		0	0	6	HDPE	90	0	1/1/2003	3
431801_431710 Total							55,878						
431802_431806	REPLACEMENT	0	215.5509	215.6	ft	620	133,642	6	VCP	216	3	1/1/1956	4
431802_431806	LATERAL REINSTATEMENT	4	4	0.0		0	0	6	VCP	216	0	1/1/1956	4
431802_431806	LATERAL REINSTATEMENT	131.6	131.6	0.0		0	0	6	VCP	216	0	1/1/1956	4
431802_431806	LATERAL REINSTATEMENT	141.2	141.2	0.0		0	0	6	VCP	216	0	1/1/1956	4
431802_431806 Total							133,642						

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
431804_431803	REPLACEMENT	0	46.43196	46.4	ft	620	28,788	6	VCP	46	1	1/1/1950	4
431804_431803	LATERAL REINSTATEMENT	9.4	9.4	0.0		0	0	6	VCP	46	0	1/1/1950	4
431804_431803 Total							28,788						
431806_431705	REPLACEMENT	0	65.10723	65.1	ft	620	40,366	6	VCP	65	0	1/1/1956	4
431806_431705 Total							40,366						
431813_431814	REPLACEMENT	0	124.3908	124.4	ft	620	77,122	6	Lined VCP	124	2	1/1/1998	4
431813_431814	LATERAL REINSTATEMENT	63.8	63.8	0.0		0	0	6	Lined VCP	124	0	1/1/1998	4
431813_431814	LATERAL REINSTATEMENT	77.4	77.4	0.0		0	0	6	Lined VCP	124	0	1/1/1998	4
431813_431814 Total							77,122						
431821_431825	REPLACEMENT	0	45.23391	45.2	ft	620	28,045	6	Lined VCP	45	1	1/1/1995	3
431821_431825	LATERAL REINSTATEMENT	0	0	0.0		0	0	6	Lined VCP	45	0	1/1/1995	3
431821_431825 Total							28,045						
431827_431828	REPLACEMENT	0	75.75638	75.8	ft	620	46,969	6	VCP	76	1	1/1/1960	4
431827_431828	LATERAL REINSTATEMENT	51.65638	51.65638	0.0		0	0	6	VCP	76	0	1/1/1960	4
431827_431828 Total							46,969						
431829_432101	POINT REPAIR	0	3	3.0	EA	18,720	18,720	6	VCP	123		1/1/1960	3
431829_432101	POINT REPAIR	27.38833	49.28833	21.9	EA	18,720	18,720	6	VCP	123		1/1/1960	3
431829_432101 Total							37,440						
432004_432005	REPLACEMENT	0	74.93406	74.9	ft	620	46,459	6	Lined VCP	75	0	1/1/1998	4
432004_432005 Total							46,459						
432010_432009	POINT REPAIR	68.02043	74.02043	6.0	EA	18,720	18,720	6	VCP	145		1/1/1950	4
432010_432009 Total							18,720						
432101_432102	REPLACEMENT	0	79	79.0	ft	620	48,980	6	HDPE	79	3	1/1/2003	3
432101_432102	LATERAL REINSTATEMENT	9.3	9.3	0.0		0	0	6	HDPE	79	0	1/1/2003	3
432101_432102	LATERAL REINSTATEMENT	51.2	51.2	0.0		0	0	6	HDPE	79	0	1/1/2003	3
432101_432102	LATERAL REINSTATEMENT	76.4	76.4	0.0		0	0	6	HDPE	79	0	1/1/2003	3
432101_432102 Total							48,980						
432107_432001	REPLACEMENT	0	236.3857	236.4	ft	620	146,559	6	VCP	236	7	1/1/1960	4
432107_432001	LATERAL REINSTATEMENT	45.5	45.5	0.0		0	0	6	VCP	236	0	1/1/1960	4
432107_432001	LATERAL REINSTATEMENT	69	69	0.0		0	0	6	VCP	236	0	1/1/1960	4
432107_432001	LATERAL REINSTATEMENT	93	93	0.0		0	0	6	VCP	236	0	1/1/1960	4
432107_432001	LATERAL REINSTATEMENT	122.6	122.6	0.0		0	0	6	VCP	236	0	1/1/1960	4
432107_432001	LATERAL REINSTATEMENT	143.1	143.1	0.0		0	0	6	VCP	236	0	1/1/1960	4
432107_432001	LATERAL REINSTATEMENT	201.6	201.6	0.0		0	0	6	VCP	236	0	1/1/1960	4
432107_432001	LATERAL REINSTATEMENT	229	229	0.0		0	0	6	VCP	236	0	1/1/1960	4
432107_432001 Total							146,559						
432113_432112	REPLACEMENT	0	36.0486	36.0	ft	620	22,350	6	Lined VCP	36	0	1/1/1998	4
432113_432112 Total							22,350						
432114_432113	POINT REPAIR	118.1032	124.1032	6.0	EA	18,720	18,720	6	VCP	222		1/1/1960	4
432114_432113 Total							18,720						
432212_432211	LINING	91.13541	97.13541	6.0	ft	426	2,556	6	VCP	109		1/1/1970	4
432212_432211	POINT REPAIR	0	3	3.0	EA	18,720	18,720	6	VCP	109		1/1/1970	4
432212_432211	POINT REPAIR	103.5354	108.7354	5.2	EA	18,720	18,720	6	VCP	109		1/1/1970	4
432212_432211 Total							39,996						
432214_432209	POINT REPAIR	0	3	3.0	EA	18,720	18,720	6	PVC	87		1/1/1993	3
432214_432209	POINT REPAIR	84.46999	87.46999	3.0	EA	18,720	18,720	6	PVC	87		1/1/1993	3
432214_432209 Total							37,440						
432215LH_432211	POINT REPAIR	29.18866	35.18866	6.0	EA	18,720	18,720	6	VCP	58		1/1/1970	3
432215LH_432211 Total							18,720						
432218_432204	LINING	182.6	183.9533	1.4	ft	426	576	6	Lined VCP	184		1/1/2005	4
432218_432204 Total							576						

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
432223LH_432216	LINING	149.2512	155.2512	6.0	ft	426	2,556	6	VCP	156		1/1/1970	4
432223LH_432216	POINT REPAIR	148.6512	155.9512	7.3	EA	18,720	18,720	6	VCP	156		1/1/1970	4
432223LH_432216 Total							21,276						
432225_432224	POINT REPAIR	0	4.697193	4.7	EA	18,720	18,720	6	Lined VCP	171		1/1/2005	3
432225_432224	POINT REPAIR	99.9972	105.9972	6.0	EA	18,720	18,720	6	Lined VCP	171		1/1/2005	3
432225_432224	POINT REPAIR	129.7972	135.7972	6.0	EA	18,720	18,720	6	Lined VCP	171		1/1/2005	3
432225_432224 Total							56,160						
432302_432301	POINT REPAIR	76.37348	97.9	21.5	EA	18,720	18,720	6	PVC	120		1/1/1970	4
432302_432301	POINT REPAIR	101.5	107.5	6.0	EA	18,720	18,720	6	PVC	120		1/1/1970	4
432302_432301 Total							37,440						
432303_432302	POINT REPAIR	82.30377	85.30377	3.0	EA	18,720	18,720	6	PVC	85		1/1/1970	3
432303_432302 Total							18,720						
432304_432303	LINING	92.5	98.5	6.0	ft	426	2,556	6	HDPE	121		1/1/2018	3
432304_432303	POINT REPAIR	7.5	13.5	6.0	EA	18,720	18,720	6	HDPE	121		1/1/2018	3
432304_432303	POINT REPAIR	107.6	113.6	6.0	EA	18,720	18,720	6	HDPE	121		1/1/2018	3
432304_432303 Total							39,996						
432305_432304	POINT REPAIR	85.9	91.9	6.0	EA	18,720	18,720	6	VCP	109		1/1/1970	4
432305_432304 Total							18,720						
432314_432313	POINT REPAIR	11.63202	17.63202	6.0	EA	18,720	18,720	6	Lined VCP	141		1/1/1998	3
432314_432313 Total							18,720						
432321LH_432320	POINT REPAIR	6.100006	12.10001	6.0	EA	18,720	18,720	6	PVC	202		1/1/1993	3
432321LH_432320	POINT REPAIR	77	83	6.0	EA	18,720	18,720	6	PVC	202		1/1/1993	3
432321LH_432320	POINT REPAIR	113.6	119.6	6.0	EA	18,720	18,720	6	PVC	202		1/1/1993	3
432321LH_432320 Total							56,160						
432403_432404	REPLACEMENT	0	306.7906	306.8	ft	620	190,210	6	VCP	307	9	1/1/1950	4
432403_432404	LATERAL REINSTATEMENT	276.6906	276.6906	0.0		0	0	6	VCP	307	0	1/1/1950	4
432403_432404	LATERAL REINSTATEMENT	226.5906	226.5906	0.0		0	0	6	VCP	307	0	1/1/1950	4
432403_432404	LATERAL REINSTATEMENT	224.3906	224.3906	0.0		0	0	6	VCP	307	0	1/1/1950	4
432403_432404	LATERAL REINSTATEMENT	161.8906	161.8906	0.0		0	0	6	VCP	307	0	1/1/1950	4
432403_432404	LATERAL REINSTATEMENT	156.0906	156.0906	0.0		0	0	6	VCP	307	0	1/1/1950	4
432403_432404	LATERAL REINSTATEMENT	149.7906	149.7906	0.0		0	0	6	VCP	307	0	1/1/1950	4
432403_432404	LATERAL REINSTATEMENT	75.69062	75.69062	0.0		0	0	6	VCP	307	0	1/1/1950	4
432403_432404	LATERAL REINSTATEMENT	53.49063	53.49063	0.0		0	0	6	VCP	307	0	1/1/1950	4
432403_432404	LATERAL REINSTATEMENT	19.39063	19.39063	0.0		0	0	6	VCP	307	0	1/1/1950	4
432403_432404 Total							190,210						
432404_433019WYE	REPLACEMENT	0	118.8762	118.9	ft	620	73,703	6	VCP	119	3	1/1/1950	4
432404_433019WYE	LATERAL REINSTATEMENT	90	90	0.0		0	0	6	VCP	119	0	1/1/1950	4
432404_433019WYE	LATERAL REINSTATEMENT	91.3	91.3	0.0		0	0	6	VCP	119	0	1/1/1950	4
432404_433019WYE	LATERAL REINSTATEMENT	114	114	0.0		0	0	6	VCP	119	0	1/1/1950	4
32404_433019WYE Total							73,703						
432504_432503	POINT REPAIR	60	65	5.0	EA	18,720	18,720	6	VCP	65		1/1/1950	3
432504_432503 Total							18,720						
432505_432503	LINING	11.9	17.9	6.0	ft	426	2,556	6	VCP	139		1/1/1950	4
432505_432503 Total							2,556						
432510_432509	POINT REPAIR	0	5.9	5.9	EA	18,720	18,720	6	PVC	252		1/1/1940	3
432510_432509 Total							18,720						
432513_432512	POINT REPAIR	106.9	169	62.1	EA	18,720	18,720	6	VCP	174		1/1/1920	4
432513_432512 Total							18,720						
432518_432519	POINT REPAIR	270.8766	276.8766	6.0	EA	18,720	18,720	6	VCP	316		1/1/1920	4
432518_432519 Total							18,720						
432519_432520	POINT REPAIR	0	5.8	5.8	EA	18,720	18,720	6	VCP	132		1/1/1920	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
432519_432520 Total							18,720						
432520_SM4	LINING	3.9	9.9	6.0	ft	426	2,556	6	VCP	137		1/1/1920	4
432520_SM4 Total							2,556						
432530LH_432522	LINING	111.3	117.3	6.0	ft	426	2,556	6	PVC	273		1/1/1993	3
432530LH_432522	POINT REPAIR	109.4	116	6.6	EA	18,720	18,720	6	PVC	273		1/1/1993	3
432530LH_432522 Total							21,276						
432536_440142	POINT REPAIR	45.2	51.2	6.0	EA	18,720	18,720	6	PVC	190		1/1/1993	4
432536_440142 Total							18,720						
432538_432527	POINT REPAIR	57.7	63.7	6.0	EA	18,720	18,720	6	Lined VCP	72		1/1/1995	4
432538_432527 Total							18,720						
432603_432602	POINT REPAIR	84.8	95.5	10.7	EA	18,720	18,720	6	VCP	99		1/1/1920	4
432603_432602 Total							18,720						
432606LH_432605	REPLACEMENT	0	103.9123	103.9	ft	620	64,426	6	VCP	104	2	1/1/1920	4
432606LH_432605	LATERAL REINSTATEMENT	97.11231	97.11231	0.0		0	0	6	VCP	104	0	1/1/1920	4
432606LH_432605	LATERAL REINSTATEMENT	45.11231	45.11231	0.0		0	0	6	VCP	104	0	1/1/1920	4
432606LH_432605 Total							64,426						
432608_432607	POINT REPAIR	0	4.5	4.5	EA	18,720	18,720	6	PVC	201		1/1/1998	3
432608_432607	POINT REPAIR	55.3	61.3	6.0	EA	18,720	18,720	6	PVC	201		1/1/1998	3
432608_432607 Total							37,440						
432609_432608	REPLACEMENT	0	23.43993	23.4	ft	620	14,533	6	Lined VCP	23	2	1/1/1998	3
432609_432608	LATERAL REINSTATEMENT	18.03993	18.03993	0.0		0	0	6	Lined VCP	23	0	1/1/1998	3
432609_432608	LATERAL REINSTATEMENT	5.239931	5.239931	0.0		0	0	6	Lined VCP	23	0	1/1/1998	3
432609_432608 Total							14,533						
432610_432608	REPLACEMENT	0	125.322	125.3	ft	620	77,700	6	VCP	125	2	1/1/1920	4
432610_432608	LATERAL REINSTATEMENT	76.82196	76.82196	0.0		0	0	6	VCP	125	0	1/1/1920	4
432610_432608	LATERAL REINSTATEMENT	32.62197	32.62197	0.0		0	0	6	VCP	125	0	1/1/1920	4
432610_432608 Total							77,700						
432612_SM6	REPLACEMENT	0	114.2691	114.3	ft	620	70,847	6	VCP	114	0	1/1/1993	4
432612_SM6 Total							70,847						
432613A_432613	LINING	81.9	86	4.1	ft	426	1,747	6	VCP	86		1/1/1993	4
432613A_432613	POINT REPAIR	19.5	64.1	44.6	EA	18,720	18,720	6	VCP	86		1/1/1993	4
432613A_432613 Total							20,467						
432615LH_432616	LINING	0	13.5	13.5	ft	426	5,751	6	Lined VCP	191		1/1/2005	4
432615LH_432616	LINING	90.6	96.6	6.0	ft	426	2,556	6	Lined VCP	191		1/1/2005	4
432615LH_432616	POINT REPAIR	191.2	192.2	1.0	EA	18,720	18,720	6	Lined VCP	191		1/1/2005	4
432615LH_432616 Total							27,027						
432616_432617	LINING	0	4.1	4.1	ft	426	1,747	6	PVC	119		1/1/1993	3
432616_432617	POINT REPAIR	0	10	10.0	EA	18,720	18,720	6	PVC	119		1/1/1993	3
432616_432617 Total							20,467						
432619LH_432619	REPLACEMENT	0	131.9463	131.9	ft	620	81,807	6	PVC	132	7	1/1/2019	3
432619LH_432619	LATERAL REINSTATEMENT	91.74628	91.74628	0.0		0	0	6	PVC	132	0	1/1/2019	3
432619LH_432619	LATERAL REINSTATEMENT	68.04628	68.04628	0.0		0	0	6	PVC	132	0	1/1/2019	3
432619LH_432619	LATERAL REINSTATEMENT	13.94628	13.94628	0.0		0	0	6	PVC	132	0	1/1/2019	3
432619LH_432619	LATERAL REINSTATEMENT	0.9	0.9	0.0		0	0	6	PVC	132	0	1/1/2019	3
432619LH_432619	LATERAL REINSTATEMENT	74.3	74.3	0.0		0	0	6	PVC	132	0	1/1/2019	3
432619LH_432619	LATERAL REINSTATEMENT	127.5	127.5	0.0		0	0	6	PVC	132	0	1/1/2019	3
432619LH_432619	LATERAL REINSTATEMENT	131.9463	131.9463	0.0		0	0	6	PVC	132	0	1/1/2019	3
432619LH_432619	REPLACEMENT	0	42.30955	42.3	ft	620	26,232	6	PVC	42	7	1/1/2019	3
432619LH_432619	LATERAL REINSTATEMENT	91.74628	42.30955	-49.4		0	0	6	PVC	42	0	1/1/2019	3
432619LH_432619	LATERAL REINSTATEMENT	68.04628	42.30955	-25.7		0	0	6	PVC	42	0	1/1/2019	3
432619LH_432619	LATERAL REINSTATEMENT	13.94628	13.94628	0.0		0	0	6	PVC	42	0	1/1/2019	3

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
432619LH_432619	LATERAL REINSTATEMENT	0.9	0.9	0.0		0	0	6	PVC	42	0	1/1/2019	3
432619LH_432619	LATERAL REINSTATEMENT	74.3	42.30955	-32.0		0	0	6	PVC	42	0	1/1/2019	3
432619LH_432619	LATERAL REINSTATEMENT	127.5	42.30955	-85.2		0	0	6	PVC	42	0	1/1/2019	3
432619LH_432619	LATERAL REINSTATEMENT	131.9463	42.30955	-89.6		0	0	6	PVC	42	0	1/1/2019	3
432619LH_432619	REPLACEMENT	0	29.99946	30.0	ft	620	18,600	6	PVC	30	7	1/1/2022	3
432619LH_432619	LATERAL REINSTATEMENT	91.74628	29.99946	-61.7		0	0	6	PVC	30	0	1/1/2022	3
432619LH_432619	LATERAL REINSTATEMENT	68.04628	29.99946	-38.0		0	0	6	PVC	30	0	1/1/2022	3
432619LH_432619	LATERAL REINSTATEMENT	13.94628	13.94628	0.0		0	0	6	PVC	30	0	1/1/2022	3
432619LH_432619	LATERAL REINSTATEMENT	0.9	0.9	0.0		0	0	6	PVC	30	0	1/1/2022	3
432619LH_432619	LATERAL REINSTATEMENT	74.3	29.99946	-44.3		0	0	6	PVC	30	0	1/1/2022	3
432619LH_432619	LATERAL REINSTATEMENT	127.5	29.99946	-97.5		0	0	6	PVC	30	0	1/1/2022	3
432619LH_432619	LATERAL REINSTATEMENT	131.9463	29.99946	-101.9		0	0	6	PVC	30	0	1/1/2022	3
432619LH_432619 Total							126,638						
432621_432622	POINT REPAIR	0	17.4	17.4	EA	18,720	18,720	6	VCP	234		1/1/1920	4
432621_432622	POINT REPAIR	56.6	85.1	28.5	EA	18,720	18,720	6	VCP	234		1/1/1920	4
432621_432622	POINT REPAIR	107.9	122.5	14.6	EA	18,720	18,720	6	VCP	234		1/1/1920	4
432621_432622 Total							56,160						
432622_432623	POINT REPAIR	114	120	6.0	EA	18,720	18,720	6	Lined VCP	121		1/1/1995	4
432622_432623 Total							18,720						
432623_432624	POINT REPAIR	47.7	53.7	6.0	EA	18,720	18,720	6	Lined VCP	201		1/1/1998	4
432623_432624	POINT REPAIR	103.6	113.6	10.0	EA	18,720	18,720	6	Lined VCP	201		1/1/1998	4
432623_432624 Total							37,440						
432624_432625	LINING	122.6	134.7	12.1	ft	426	5,155	6	VCP	173		1/1/1920	4
432624_432625	POINT REPAIR	68.3	74.3	6.0	EA	18,720	18,720	6	VCP	173		1/1/1920	4
432624_432625	POINT REPAIR	92.4	98.4	6.0	EA	18,720	18,720	6	VCP	173		1/1/1920	4
432624_432625 Total							42,595						
432626_440211	LINING	270.4	276.4	6.0	ft	426	2,556	6	PVC	295		1/1/1993	3
432626_440211 Total							2,556						
432704_432703	LINING	45.7	51.7	6.0	ft	426	2,556	6	VCP	174		1/1/1920	4
432704_432703	LINING	69.5	75.5	6.0	ft	426	2,556	6	VCP	174		1/1/1920	4
432704_432703 Total							5,112						
432705_432703	REPLACEMENT	0	122.946	122.9	ft	620	76,227	6	VCP	123	3	1/1/1950	4
432705_432703	LATERAL REINSTATEMENT	14.9	14.9	0.0		0	0	6	VCP	123	0	1/1/1950	4
432705_432703	LATERAL REINSTATEMENT	45.4	45.4	0.0		0	0	6	VCP	123	0	1/1/1950	4
432705_432703	LATERAL REINSTATEMENT	78.8	78.8	0.0		0	0	6	VCP	123	0	1/1/1950	4
432705_432703 Total							76,227						
432706LH_432705	REPLACEMENT	0	232.5679	232.6	ft	620	144,192	6	VCP	233	7	1/1/1950	4
432706LH_432705	LATERAL REINSTATEMENT	213.5679	213.5679	0.0		0	0	6	VCP	233	0	1/1/1950	4
432706LH_432705	LATERAL REINSTATEMENT	168.6679	168.6679	0.0		0	0	6	VCP	233	0	1/1/1950	4
432706LH_432705	LATERAL REINSTATEMENT	155.5679	155.5679	0.0		0	0	6	VCP	233	0	1/1/1950	4
432706LH_432705	LATERAL REINSTATEMENT	150.5679	150.5679	0.0		0	0	6	VCP	233	0	1/1/1950	4
432706LH_432705	LATERAL REINSTATEMENT	106.2679	106.2679	0.0		0	0	6	VCP	233	0	1/1/1950	4
432706LH_432705	LATERAL REINSTATEMENT	39.56786	39.56786	0.0		0	0	6	VCP	233	0	1/1/1950	4
432706LH_432705	LATERAL REINSTATEMENT	8.867866	8.867866	0.0		0	0	6	VCP	233	0	1/1/1950	4
432706LH_432705 Total							144,192						
432707LH_432708	REPLACEMENT	0	130.5004	130.5	ft	620	80,910	6	VCP	131	7	1/1/1950	4
432707LH_432708	LATERAL REINSTATEMENT	122.6004	122.6004	0.0		0	0	6	VCP	131	0	1/1/1950	4
432707LH_432708	LATERAL REINSTATEMENT	75.40038	75.40038	0.0		0	0	6	VCP	131	0	1/1/1950	4
432707LH_432708	LATERAL REINSTATEMENT	38.70038	38.70038	0.0		0	0	6	VCP	131	0	1/1/1950	4
432707LH_432708	LATERAL REINSTATEMENT	36.80039	36.80039	0.0		0	0	6	VCP	131	0	1/1/1950	4
432707LH_432708	LATERAL REINSTATEMENT	34.70038	34.70038	0.0		0	0	6	VCP	131	0	1/1/1950	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
432707LH_432708	LATERAL REINSTATEMENT	14.00038	14.00038	0.0		0	0	6	VCP	131	0	1/1/1950	4
432707LH_432708	LATERAL REINSTATEMENT	8.800386	8.800386	0.0		0	0	6	VCP	131	0	1/1/1950	4
432707LH_432708 Total							80,910						
432708_432709	POINT REPAIR	0	4	4.0	EA	18,720	18,720	6	VCP	165		1/1/1950	4
432708_432709	POINT REPAIR	14.2	20.2	6.0	EA	18,720	18,720	6	VCP	165		1/1/1950	4
432708_432709 Total							37,440						
432709_432710	POINT REPAIR	119.6691	129.5691	9.9	EA	18,720	18,720	6	VCP	150		1/1/1950	4
432709_432710 Total							18,720						
432710_432711	POINT REPAIR	87.79058	93.79058	6.0	EA	18,720	18,720	6	VCP	165		1/1/1950	4
432710_432711 Total							18,720						
432712_432715	POINT REPAIR	125.8	131.8	6.0	EA	18,720	18,720	6	VCP	135		1/1/1950	4
432712_432715 Total							18,720						
432714_432713	LINING	0	3.3	3.3	ft	426	1,406	6	VCP	165		1/1/1950	4
432714_432713 Total							1,406						
432715_432716	REPLACEMENT	0	70.28726	70.3	ft	620	43,578	6	Lined VCP	70	2	1/1/1998	4
432715_432716	LATERAL REINSTATEMENT	21.6	21.6	0.0		0	0	6	Lined VCP	70	0	1/1/1998	4
432715_432716	LATERAL REINSTATEMENT	63.9	63.9	0.0		0	0	6	Lined VCP	70	0	1/1/1998	4
432715_432716 Total							43,578						
432721_432715	POINT REPAIR	10.94388	23.94388	13.0	EA	18,720	18,720	6	VCP	153		1/1/1950	4
432721_432715	POINT REPAIR	69.34389	90.84389	21.5	EA	18,720	18,720	6	VCP	153		1/1/1950	4
432721_432715 Total							37,440						
432725_432726	POINT REPAIR	0	66.17599	66.2	EA	18,720	18,720	6	Lined VCP	66		1/1/2015	4
432725_432726 Total							18,720						
432727_432726	REPLACEMENT	0	118.6756	118.7	ft	620	73,579	6	VCP	119	1	1/1/1950	4
432727_432726	LATERAL REINSTATEMENT	100.2756	100.2756	0.0		0	0	6	VCP	119	0	1/1/1950	4
432727_432726 Total							73,579						
432728_432810	REPLACEMENT	0	63.59205	63.6	ft	620	39,427	6	Lined VCP	64	12	1/1/2001	4
432728_432810	LATERAL REINSTATEMENT	32.4	32.4	0.0		0	0	6	Lined VCP	64	0	1/1/2001	4
432728_432810	LATERAL REINSTATEMENT	46.8	46.8	0.0		0	0	6	Lined VCP	64	0	1/1/2001	4
432728_432810	LATERAL REINSTATEMENT	61	61	0.0		0	0	6	Lined VCP	64	0	1/1/2001	4
432728_432810	LATERAL REINSTATEMENT	63.59205	63.59205	0.0		0	0	6	Lined VCP	64	0	1/1/2001	4
432728_432810	LATERAL REINSTATEMENT	63.59205	63.59205	0.0		0	0	6	Lined VCP	64	0	1/1/2001	4
432728_432810	LATERAL REINSTATEMENT	63.59205	63.59205	0.0		0	0	6	Lined VCP	64	0	1/1/2001	4
432728_432810	LATERAL REINSTATEMENT	63.59205	63.59205	0.0		0	0	6	Lined VCP	64	0	1/1/2001	4
432728_432810	LATERAL REINSTATEMENT	63.59205	63.59205	0.0		0	0	6	Lined VCP	64	0	1/1/2001	4
432728_432810	LATERAL REINSTATEMENT	63.59205	63.59205	0.0		0	0	6	Lined VCP	64	0	1/1/2001	4
432728_432810	LATERAL REINSTATEMENT	63.59205	63.59205	0.0		0	0	6	Lined VCP	64	0	1/1/2001	4
432728_432810	LATERAL REINSTATEMENT	63.59205	63.59205	0.0		0	0	6	Lined VCP	64	0	1/1/2001	4
432728_432810	LATERAL REINSTATEMENT	63.59205	63.59205	0.0		0	0	6	Lined VCP	64	0	1/1/2001	4
432728_432810 Total							39,427						
432729_432730	POINT REPAIR	146.3	157.3	11.0	EA	18,720	18,720	6	VCP	160		1/1/1920	4
432729_432730 Total							18,720						
432730_432728	POINT REPAIR	0	4.7	4.7	EA	18,720	18,720	6	VCP	152		1/1/1920	4
432730_432728 Total							18,720						
432731_432621	POINT REPAIR	41.3	52	10.7	EA	18,720	18,720	6	VCP	160		1/1/1920	4
432731_432621	POINT REPAIR	137.8	156.9	19.1	EA	18,720	18,720	6	VCP	160		1/1/1920	4
432731_432621 Total							37,440						
432732_432731	LINING	0	6.2	6.2	ft	426	2,641	6	VCP	141		1/1/1920	4
432732_432731 Total							2,641						
432733_432732	POINT REPAIR	0.8	6.8	6.0	EA	18,720	18,720	6	Lined VCP	229		1/1/1998	4
432733_432732	POINT REPAIR	98.9	104.9	6.0	EA	18,720	18,720	6	Lined VCP	229		1/1/1998	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
432733_432732 Total							37,440						
432734_432610	REPLACEMENT	0	298.0007	298.0	ft	620	184,760	6	PVC	298	1	1/1/1920	4
432734_432610	LATERAL REINSTATEMENT	147.5	147.5	0.0		0	0	6	PVC	298	0	1/1/1920	4
432734_432610 Total							184,760						
432803LH_432802	POINT REPAIR	22	28	6.0	EA	18,720	18,720	6	VCP	130		1/1/1957	4
432803LH_432802 Total							18,720						
432804_432805	POINT REPAIR	32.92669	50.92669	18.0	EA	18,720	18,720	6	VCP	256		1/1/1950	5
432804_432805	POINT REPAIR	55.82669	124.1267	68.3	EA	18,720	18,720	6	VCP	256		1/1/1950	5
432804_432805	POINT REPAIR	209.4267	215.4267	6.0	EA	18,720	18,720	6	VCP	256		1/1/1950	5
432804_432805 Total							56,160						
432806_432807	REPLACEMENT	0	174.6864	174.7	ft	620	108,306	6	VCP	175	4	1/1/1950	4
432806_432807	LATERAL REINSTATEMENT	165.6864	165.6864	0.0		0	0	6	VCP	175	0	1/1/1950	4
432806_432807	LATERAL REINSTATEMENT	106.5864	106.5864	0.0		0	0	6	VCP	175	0	1/1/1950	4
432806_432807	LATERAL REINSTATEMENT	58.48641	58.48641	0.0		0	0	6	VCP	175	0	1/1/1950	4
432806_432807	LATERAL REINSTATEMENT	15.78641	15.78641	0.0		0	0	6	VCP	175	0	1/1/1950	4
432806_432807 Total							108,306						
432807_432808	POINT REPAIR	66.1	72.1	6.0	EA	18,720	18,720	6	VCP	120		1/1/1950	4
432807_432808 Total							18,720						
432808_432809	REPLACEMENT	0	24.78244	24.8	ft	620	15,365	6	VCP	25	1	1/1/1950	4
432808_432809	LATERAL REINSTATEMENT	19.38244	19.38244	0.0		0	0	6	VCP	25	0	1/1/1950	4
432808_432809 Total							15,365						
432809_432814	REPLACEMENT	0	370.6844	370.7	ft	620	229,824	6	VCP	371	23	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	334.1844	334.1844	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	332.9844	332.9844	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	298.2844	298.2844	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	281.1844	281.1844	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	237.8844	237.8844	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	235.4844	235.4844	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	223.5844	223.5844	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	188.3844	188.3844	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	183.7844	183.7844	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	174.9844	174.9844	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	173.0844	173.0844	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	150.8844	150.8844	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	135.7844	135.7844	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	105.6844	105.6844	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	104.4844	104.4844	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	93.58438	93.58438	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	85.2844	85.2844	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	72.18439	72.18439	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	33.7844	33.7844	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	32.98438	32.98438	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	20.98438	20.98438	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	6.884402	6.884402	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814	LATERAL REINSTATEMENT	6.884402	6.884402	0.0		0	0	6	VCP	371	0	1/1/1950	4
432809_432814 Total							229,824						
432811_432812	LINING	135	141	6.0	ft	426	2,556	6	VCP	241		1/1/1920	4
432811_432812	LINING	163.3	169.3	6.0	ft	426	2,556	6	VCP	241		1/1/1920	4
432811_432812	LINING	193.3	199.3	6.0	ft	426	2,556	6	VCP	241		1/1/1920	4
432811_432812 Total							7,668						
432812_432913	LINING	139.1	145.1	6.0	ft	426	2,556	6	VCP	301		1/1/1920	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
432812_432913	LINING	177.9	183.9	6.0	ft	426	2,556	6	VCP	301		1/1/1920	4
432812_432913 Total							5,112						
432816_432815	POINT REPAIR	53.8	59.8	6.0	EA	18,720	18,720	6	VCP	65		1/1/1950	4
432816_432815 Total							18,720						
432817_432816	POINT REPAIR	18.4	29.1	10.7	EA	18,720	18,720	6	HDPE	301		1/1/1998	4
432817_432816	POINT REPAIR	40.5	46.5	6.0	EA	18,720	18,720	6	HDPE	301		1/1/1998	4
432817_432816 Total							37,440						
432901_432902	POINT REPAIR	72.4	266	193.6	EA	22,440	22,440	8	HDPE	266		1/1/2016	3
432901_432902 Total							22,440						
432904LH_432905	POINT REPAIR	17.32378	23.32378	6.0	EA	18,720	18,720	6	HDPE	224		1/1/2001	4
432904LH_432905	POINT REPAIR	113.9238	119.9238	6.0	EA	18,720	18,720	6	HDPE	224		1/1/2001	4
432904LH_432905	POINT REPAIR	195.9238	224.3238	28.4	EA	18,720	18,720	6	HDPE	224		1/1/2001	4
432904LH_432905 Total							56,160						
432906_432907	POINT REPAIR	0	3.5	3.5	EA	18,720	18,720	6	VCP	212		1/1/1940	4
432906_432907	POINT REPAIR	138.3	144.3	6.0	EA	18,720	18,720	6	VCP	212		1/1/1940	4
432906_432907 Total							37,440						
432908_432909	POINT REPAIR	106.1	117.1	11.0	EA	18,720	18,720	6	VCP	139		1/1/1940	3
432908_432909 Total							18,720						
432909_432910	REPLACEMENT	0	101.9732	102.0	ft	620	63,223	6	VCP	102	0	1/1/1940	4
432909_432910 Total							63,223						
432912_432911	LINING	236.8	242.8	6.0	ft	426	2,556	6	VCP	244		1/1/1926	4
432912_432911	POINT REPAIR	24.3	30.3	6.0	EA	18,720	18,720	6	VCP	244		1/1/1926	4
432912_432911 Total							21,276						
432913_432912	LINING	9.5	15.5	6.0	ft	426	2,556	6	Lined VCP	83		1/1/1998	3
432913_432912 Total							2,556						
432919_432920	POINT REPAIR	44.2	50.2	6.0	EA	18,720	18,720	6	Lined VCP	197		1/1/2001	3
432919_432920 Total							18,720						
432921LH_432817	POINT REPAIR	8.275829	17.27583	9.0	EA	18,720	18,720	6	VCP	91		1/1/1950	5
432921LH_432817 Total							18,720						
432922_432919	POINT REPAIR	262.4	268.4	6.0	EA	18,720	18,720	6	VCP	305		1/1/1940	4
432922_432919 Total							18,720						
433008_433012	LINING	0	4.5	4.5	ft	426	1,917	6	VCP	256		1/1/1957	4
433008_433012 Total							1,917						
433012_433015	POINT REPAIR	161.3	167.3	6.0	EA	18,720	18,720	6	VCP	350		1/1/1957	4
433012_433015 Total							18,720						
433013_433013A	POINT REPAIR	0	3.6	3.6	EA	18,720	18,720	6	VCP	272		1/1/1940	4
433013_433013A	POINT REPAIR	56.5	62.5	6.0	EA	18,720	18,720	6	VCP	272		1/1/1940	4
433013_433013A Total							37,440						
433013A_433012	POINT REPAIR	47.7	56.5	8.8	EA	18,720	18,720	6	VCP	272		1/1/1940	4
433013A_433012 Total							18,720						
433016_431640	POINT REPAIR	182.8	188.8	6.0	EA	18,720	18,720	6	VCP	301		1/1/1950	4
433016_431640 Total							18,720						
433020_433009	POINT REPAIR	74.99481	80.99481	6.0	EA	18,720	18,720	6	VCP	94		1/1/1940	4
433020_433009 Total							18,720						
433022_431640	POINT REPAIR	12.02707	21.22707	9.2	EA	18,720	18,720	6	VCP	51		1/1/1950	4
433022_431640 Total							18,720						
433101_433103	POINT REPAIR	58.02974	61.02974	3.0	EA	18,720	18,720	6	Lined VCP	61		1/1/2001	4
433101_433103 Total							18,720						
433102_433101	POINT REPAIR	9.366543	15.36654	6.0	EA	18,720	18,720	6	HDPE	125		1/1/2003	3
433102_433101	POINT REPAIR	26.76654	32.76654	6.0	EA	18,720	18,720	6	HDPE	125		1/1/2003	3
433102_433101 Total							37,440						

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
433106_433107	REPLACEMENT	0	75.68556	75.7	ft	620	46,925	6	PVC	76	3	1/1/1999	3
433106_433107	LATERAL REINSTATEMENT	7.7	7.7	0.0		0	0	6	PVC	76	0	1/1/1999	3
433106_433107	LATERAL REINSTATEMENT	76.7	75.68556	-1.0		0	0	6	PVC	76	0	1/1/1999	3
433106_433107	LATERAL REINSTATEMENT	78	75.68556	-2.3		0	0	6	PVC	76	0	1/1/1999	3
433106_433107 Total							46,925						
433107_431712	POINT REPAIR	140	143.6806	3.7	EA	18,720	18,720	6	VCP	144		1/1/1920	4
433107_431712 Total							18,720						
433109_431713	POINT REPAIR	149.4	155.4	6.0	EA	18,720	18,720	6	VCP	208		1/1/1950	3
433109_431713 Total							18,720						
433113_433112	LINING	140.6	146.6	6.0	ft	426	2,556	6	Lined VCP	211		1/1/2001	4
433113_433112	POINT REPAIR	159.6	165.6	6.0	EA	18,720	18,720	6	Lined VCP	211		1/1/2001	4
433113_433112 Total							21,276						
433117_433118	POINT REPAIR	60.33152	66.33152	6.0	EA	18,720	18,720	6	HDPE	198		1/1/2001	3
433117_433118	POINT REPAIR	113.5315	119.5315	6.0	EA	18,720	18,720	6	HDPE	198		1/1/2001	3
433117_433118 Total							37,440						
433118_431714	POINT REPAIR	99	125.5	26.5	EA	18,720	18,720	6	VCP	221		1/1/1950	4
433118_431714	POINT REPAIR	139.8	145.8	6.0	EA	18,720	18,720	6	VCP	221		1/1/1950	4
433118_431714 Total							37,440						
433201_431801	LINING	0	18	18.0	ft	426	7,668	6	VCP	129		1/1/1956	4
433201_431801 Total							7,668						
433203_433202	LINING	81.4	87.4	6.0	ft	426	2,556	6	VCP	296		1/1/1956	4
433203_433202	LINING	287.3	293.3	6.0	ft	426	2,556	6	VCP	296		1/1/1956	4
433203_433202 Total							5,112						
433204_433203	REPLACEMENT	0	224.4798	224.5	ft	620	139,177	6	Lined VCP	224	14	1/1/1995	4
433204_433203	LATERAL REINSTATEMENT	2.2	2.2	0.0		0	0	6	Lined VCP	224	0	1/1/1995	4
433204_433203	LATERAL REINSTATEMENT	3.2	3.2	0.0		0	0	6	Lined VCP	224	0	1/1/1995	4
433204_433203	LATERAL REINSTATEMENT	21.1	21.1	0.0		0	0	6	Lined VCP	224	0	1/1/1995	4
433204_433203	LATERAL REINSTATEMENT	40.9	40.9	0.0		0	0	6	Lined VCP	224	0	1/1/1995	4
433204_433203	LATERAL REINSTATEMENT	43.9	43.9	0.0		0	0	6	Lined VCP	224	0	1/1/1995	4
433204_433203	LATERAL REINSTATEMENT	49.2	49.2	0.0		0	0	6	Lined VCP	224	0	1/1/1995	4
433204_433203	LATERAL REINSTATEMENT	51	51	0.0		0	0	6	Lined VCP	224	0	1/1/1995	4
433204_433203	LATERAL REINSTATEMENT	70	70	0.0		0	0	6	Lined VCP	224	0	1/1/1995	4
433204_433203	LATERAL REINSTATEMENT	101	101	0.0		0	0	6	Lined VCP	224	0	1/1/1995	4
433204_433203	LATERAL REINSTATEMENT	144.6	144.6	0.0		0	0	6	Lined VCP	224	0	1/1/1995	4
433204_433203	LATERAL REINSTATEMENT	160.1	160.1	0.0		0	0	6	Lined VCP	224	0	1/1/1995	4
433204_433203	LATERAL REINSTATEMENT	167.6	167.6	0.0		0	0	6	Lined VCP	224	0	1/1/1995	4
433204_433203	LATERAL REINSTATEMENT	208.3	208.3	0.0		0	0	6	Lined VCP	224	0	1/1/1995	4
433204_433203	LATERAL REINSTATEMENT	215.3	215.3	0.0		0	0	6	Lined VCP	224	0	1/1/1995	4
433204_433203 Total							139,177						
433205_433204	POINT REPAIR	2.4	8.4	6.0	EA	18,720	18,720	6	VCP	235		1/1/1956	4
433205_433204	POINT REPAIR	114.3	120.3	6.0	EA	18,720	18,720	6	VCP	235		1/1/1956	4
433205_433204 Total							37,440						
433304_433303	POINT REPAIR	210.8	216.8	6.0	EA	18,720	18,720	6	Lined VCP	219		1/1/2002	4
433304_433303 Total							18,720						
433310_433309	LINING	31.9	37.9	6.0	ft	426	2,556	6	VCP	193		1/1/1970	4
433310_433309 Total							2,556						
433314_433313	LINING	16.1	22.1	6.0	ft	426	2,556	6	Lined VCP	187		1/1/1995	4
433314_433313 Total							2,556						
433404_433405	POINT REPAIR	211.1668	217.1668	6.0	EA	22,440	22,440	8	HDPE	333		1/1/2003	3
433404_433405 Total							22,440						
433418_433419	POINT REPAIR	131.8	137.8	6.0	EA	18,720	18,720	6	VCP	272		1/1/1950	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
433418_433419	POINT REPAIR	192.2	198.2	6.0	EA	18,720	18,720	6	VCP	272		1/1/1950	4
433418_433419	POINT REPAIR	239	245	6.0	EA	18,720	18,720	6	VCP	272		1/1/1950	4
433418_433419 Total							56,160						
433421_433420	POINT REPAIR	0	4	4.0	EA	18,720	18,720	6	Lined VCP	398		1/1/2001	4
433421_433420	POINT REPAIR	10.5	18.3	7.8	EA	18,720	18,720	6	Lined VCP	398		1/1/2001	4
433421_433420 Total							37,440						
433601_431303	REPLACEMENT	0	220.5157	220.5	ft	620	136,720	6	HDPE	221	4	1/1/2003	3
433601_431303	LATERAL REINSTATEMENT	151.5157	151.5157	0.0		0	0	6	HDPE	221	0	1/1/2003	3
433601_431303	LATERAL REINSTATEMENT	149.8157	149.8157	0.0		0	0	6	HDPE	221	0	1/1/2003	3
433601_431303	LATERAL REINSTATEMENT	94.51574	94.51574	0.0		0	0	6	HDPE	221	0	1/1/2003	3
433601_431303	LATERAL REINSTATEMENT	72.01574	72.01574	0.0		0	0	6	HDPE	221	0	1/1/2003	3
433601_431303 Total							136,720						
433602_433601	POINT REPAIR	233.9	239.9	6.0	EA	18,720	18,720	6	Lined VCP	419		1/1/2001	3
433602_433601 Total							18,720						
433603_433602	POINT REPAIR	44.7	50.7	6.0	EA	18,720	18,720	6	VCP	108		1/1/1960	3
433603_433602 Total							18,720						
433604_433603	POINT REPAIR	83.2	89.2	6.0	EA	18,720	18,720	6	VCP	139		1/1/1960	4
433604_433603 Total							18,720						
433702_433701	POINT REPAIR	39.8867	45.8867	6.0	EA	18,720	18,720	6	VCP	135		1/1/1960	4
433702_433701 Total							18,720						
433703_433702	POINT REPAIR	0	3.5	3.5	EA	18,720	18,720	6	VCP	184		1/1/1960	4
433703_433702 Total							18,720						
433704_433703	POINT REPAIR	64.7	70.7	6.0	EA	18,720	18,720	6	VCP	72		1/1/1960	4
433704_433703 Total							18,720						
433718_433717	POINT REPAIR	278.1	281.448	3.3	EA	18,720	18,720	6	VCP	281		1/1/1960	3
433718_433717 Total							18,720						
433727LH_433603	REPLACEMENT	0	142.9282	142.9	ft	620	88,615	6	VCP	143	7	1/1/1960	4
433727LH_433603	LATERAL REINSTATEMENT	138.7282	138.7282	0.0		0	0	6	VCP	143	0	1/1/1960	4
433727LH_433603	LATERAL REINSTATEMENT	128.7282	128.7282	0.0		0	0	6	VCP	143	0	1/1/1960	4
433727LH_433603	LATERAL REINSTATEMENT	79.42822	79.42822	0.0		0	0	6	VCP	143	0	1/1/1960	4
433727LH_433603	LATERAL REINSTATEMENT	11	11	0.0		0	0	6	VCP	143	0	1/1/1960	4
433727LH_433603	LATERAL REINSTATEMENT	28	28	0.0		0	0	6	VCP	143	0	1/1/1960	4
433727LH_433603	LATERAL REINSTATEMENT	42.1	42.1	0.0		0	0	6	VCP	143	0	1/1/1960	4
433727LH_433603	LATERAL REINSTATEMENT	73.8	73.8	0.0		0	0	6	VCP	143	0	1/1/1960	4
433727LH_433603 Total							88,615						
440102_440103	POINT REPAIR	242.1632	254.3632	12.2	EA	18,720	18,720	6	VCP	324		1/1/1920	3
440102_440103	POINT REPAIR	277.7632	291.8632	14.1	EA	18,720	18,720	6	VCP	324		1/1/1920	3
440102_440103	POINT REPAIR	300.3632	316.5632	16.2	EA	18,720	18,720	6	VCP	324		1/1/1920	3
440102_440103 Total							56,160						
440105_440115	POINT REPAIR	21	27	6.0	EA	18,720	18,720	6	HDPE	164		1/1/1998	3
440105_440115 Total							18,720						
440109_440108	POINT REPAIR	60.30637	68.90637	8.6	EA	18,720	18,720	6	HDPE	227		1/1/2005	3
440109_440108 Total							18,720						
440110_440109	POINT REPAIR	33.9	39.9	6.0	EA	18,720	18,720	6	VCP	122		1/1/1920	4
440110_440109 Total							18,720						
440111_440112	POINT REPAIR	59.2	65.2	6.0	EA	18,720	18,720	6	VCP	147		1/1/1920	4
440111_440112 Total							18,720						
440112_440113	POINT REPAIR	0	3.5	3.5	EA	18,720	18,720	6	VCP	159		1/1/1920	4
440112_440113 Total							18,720						
440113_440114	LINING	1.9	7.9	6.0	ft	426	2,556	6	PVC	91		1/1/1920	3
440113_440114	POINT REPAIR	87.66528	90.66528	3.0	EA	18,720	18,720	6	PVC	91		1/1/1920	3

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
440113_440114 Total							21,276						
440115_440116	POINT REPAIR	65.4	79.4	14.0	EA	18,720	18,720	6	VCP	114		1/1/1920	4
440115_440116 Total							18,720						
440118_440143	POINT REPAIR	59.1	65.1	6.0	EA	18,720	18,720	6	Lined VCP	166		1/1/2019	3
440118_440143 Total							18,720						
440120_440127	POINT REPAIR	114.578	120.578	6.0	EA	18,720	18,720	6	VCP	221		1/1/1920	4
440120_440127	POINT REPAIR	136.6779	142.6779	6.0	EA	18,720	18,720	6	VCP	221		1/1/1920	4
440120_440127	POINT REPAIR	161.878	169.278	7.4	EA	18,720	18,720	6	VCP	221		1/1/1920	4
440120_440127 Total							56,160						
440125_440126	LINING	70.18256	76.18256	6.0	ft	426	2,556	6	VCP	123		1/1/1920	4
440125_440126	POINT REPAIR	117.1826	122.9826	5.8	EA	18,720	18,720	6	VCP	123		1/1/1920	4
440125_440126 Total							21,276						
440126_440127	LINING	37.9	43.9	6.0	ft	426	2,556	6	Lined VCP	351		1/1/1995	4
440126_440127	LINING	225.1	231.1	6.0	ft	426	2,556	6	Lined VCP	351		1/1/1995	4
440126_440127	POINT REPAIR	28.2	34.2	6.0	EA	18,720	18,720	6	Lined VCP	351		1/1/1995	4
440126_440127 Total							23,832						
440127_440143	POINT REPAIR	0	3.5	3.5	EA	18,720	18,720	6	VCP	226		1/1/1920	4
440127_440143	POINT REPAIR	20.4	35.1	14.7	EA	18,720	18,720	6	VCP	226		1/1/1920	4
440127_440143	POINT REPAIR	55.3	68	12.7	EA	18,720	18,720	6	VCP	226		1/1/1920	4
440127_440143 Total							56,160						
440134_440135	POINT REPAIR	133.7	139.7	6.0	EA	18,720	18,720	6	Lined VCP	276		1/1/2007	4
440134_440135	POINT REPAIR	148.8	154.8	6.0	EA	18,720	18,720	6	Lined VCP	276		1/1/2007	4
440134_440135 Total							37,440						
440137B_440137A	LINING	219.3974	223.4974	4.1	ft	426	1,747	6	VCP	223		1/1/1999	3
440137B_440137A Total							1,747						
440141_440140	LINING	84.4	90.4	6.0	ft	426	2,556	6	Lined VCP	233		1/1/1995	4
440141_440140	LINING	106.4	112.4	6.0	ft	426	2,556	6	Lined VCP	233		1/1/1995	4
440141_440140	POINT REPAIR	177.2	183.2	6.0	EA	18,720	18,720	6	Lined VCP	233		1/1/1995	4
440141_440140 Total							23,832						
440143_440128	REPLACEMENT	0	206.9331	206.9	ft	620	128,298	6	VCP	207	8	1/1/1920	4
440143_440128	LATERAL REINSTATEMENT	30.6	30.6	0.0		0	0	6	VCP	207	0	1/1/1920	4
440143_440128	LATERAL REINSTATEMENT	81.8	81.8	0.0		0	0	6	VCP	207	0	1/1/1920	4
440143_440128	LATERAL REINSTATEMENT	89.9	89.9	0.0		0	0	6	VCP	207	0	1/1/1920	4
440143_440128	LATERAL REINSTATEMENT	206.5331	206.5331	0.0		0	0	6	VCP	207	0	1/1/1920	4
440143_440128	LATERAL REINSTATEMENT	183.6331	183.6331	0.0		0	0	6	VCP	207	0	1/1/1920	4
440143_440128	LATERAL REINSTATEMENT	170.0331	170.0331	0.0		0	0	6	VCP	207	0	1/1/1920	4
440143_440128	LATERAL REINSTATEMENT	138.4331	138.4331	0.0		0	0	6	VCP	207	0	1/1/1920	4
440143_440128	LATERAL REINSTATEMENT	115.6331	115.6331	0.0		0	0	6	VCP	207	0	1/1/1920	4
440143_440128 Total							128,298						
440202_440304	POINT REPAIR	170.6068	174.0068	3.4	EA	18,720	18,720	6	VCP	174		1/1/1920	4
440202_440304 Total							18,720						
440206_440207	POINT REPAIR	0	4.3	4.3	EA	18,720	18,720	6	VCP	109		1/1/1920	4
440206_440207 Total							18,720						
440208_440209	POINT REPAIR	80.7	86.7	6.0	EA	18,720	18,720	6	Lined VCP	94		1/1/1998	4
440208_440209 Total							18,720						
440211_440207	LINING	62.83081	65.83081	3.0	ft	426	1,278	6	HDPE	66		1/1/2005	4
440211_440207	POINT REPAIR	62.83081	65.83081	3.0	EA	18,720	18,720	6	HDPE	66		1/1/2005	4
440211_440207 Total							19,998						
440212_440211	LINING	21.04927	24.04927	3.0	ft	426	1,278	6	VCP	24		1/1/1920	4
440212_440211 Total							1,278						
440214_440211	LINING	10.8	16.8	6.0	ft	426	2,556	6	VCP	171		1/1/1920	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
440214_440211 Total							2,556						
440216_440104	POINT REPAIR	185.5	191.5	6.0	EA	18,720	18,720	6	VCP	220		1/1/1920	4
440216_440104 Total							18,720						
440302_440301	LINING	33.9	52.9	19.0	ft	426	8,094	6	VCP	213		1/1/1920	4
440302_440301 Total							8,094						
440304_440303	POINT REPAIR	0	3.1	3.1	EA	18,720	18,720	6	VCP	98		1/1/1920	4
440304_440303 Total							18,720						
440307_442307	POINT REPAIR	75.6	81.6	6.0	EA	18,720	18,720	6	VCP	249		1/1/1920	4
440307_442307 Total							18,720						
440309_440308	POINT REPAIR	34.8	40.8	6.0	EA	18,720	18,720	6	VCP	292		1/1/1920	4
440309_440308 Total							18,720						
440310_440311	POINT REPAIR	36.1	42.1	6.0	EA	18,720	18,720	6	VCP	110		1/1/1920	4
440310_440311 Total							18,720						
440311_440322	POINT REPAIR	84.08982	87.08982	3.0	EA	18,720	18,720	6	VCP	87		1/1/1920	4
440311_440322 Total							18,720						
440313_440314	LINING	11.86637	17.86637	6.0	ft	426	2,556	6	Lined VCP	63		1/1/1998	3
440313_440314 Total							2,556						
440315_440316	LINING	110.5	116.5	6.0	ft	426	2,556	6	VCP	218		1/1/1950	3
440315_440316 Total							2,556						
440320_440208	POINT REPAIR	0	68.96261	69.0	EA	18,720	18,720	6	VCP	69		1/1/1920	4
440320_440208 Total							18,720						
440323_440324	LINING	161.9396	164.9396	3.0	ft	426	1,278	6	VCP	165		1/1/1920	4
440323_440324	POINT REPAIR	70.5	76.5	6.0	EA	18,720	18,720	6	VCP	165		1/1/1920	4
440323_440324	POINT REPAIR	117.8	123.8	6.0	EA	18,720	18,720	6	VCP	165		1/1/1920	4
440323_440324 Total							38,718						
440324_440325	POINT REPAIR	13.9	19.9	6.0	EA	18,720	18,720	6	Lined VCP	279		1/1/1998	3
440324_440325	POINT REPAIR	240.3	254.6	14.3	EA	18,720	18,720	6	Lined VCP	279		1/1/1998	3
440324_440325 Total							37,440						
440325A_440209	POINT REPAIR	30.3	52.5	22.2	EA	18,720	18,720	6	VCP	253		1/1/1920	4
440325A_440209	POINT REPAIR	61.8	71.1	9.3	EA	18,720	18,720	6	VCP	253		1/1/1920	4
440325A_440209	POINT REPAIR	129.3	135.3	6.0	EA	18,720	18,720	6	VCP	253		1/1/1920	4
440325A_440209 Total							56,160						
440407_440404	REPLACEMENT	0	56.90607	56.9	ft	620	35,282	6	VCP	57	1	1/1/1920	4
440407_440404	LATERAL REINSTATEMENT	50.30607	50.30607	0.0		0	0	6	VCP	57	0	1/1/1920	4
440407_440404 Total							35,282						
440414_440136	LINING	91.2	97.2	6.0	ft	426	2,556	6	VCP	220		1/1/1920	4
440414_440136	POINT REPAIR	12.8	19.8	7.0	EA	18,720	18,720	6	VCP	220		1/1/1920	4
440414_440136 Total							21,276						
440415_440414	LINING	53.8	59.8	6.0	ft	426	2,556	6	VCP	104		1/1/1920	4
440415_440414 Total							2,556						
440416_440415	REPLACEMENT	0	67.89318	67.9	ft	620	42,094	6	HDPE	68	0	1/1/2005	3
440416_440415 Total							42,094						
440418_440417	REPLACEMENT	0	128.1863	128.2	ft	620	79,475	6	VCP	128	3	1/1/1920	4
440418_440417	LATERAL REINSTATEMENT	14	14	0.0		0	0	6	VCP	128	0	1/1/1920	4
440418_440417	LATERAL REINSTATEMENT	29.3	29.3	0.0		0	0	6	VCP	128	0	1/1/1920	4
440418_440417	LATERAL REINSTATEMENT	58.6	58.6	0.0		0	0	6	VCP	128	0	1/1/1920	4
440418_440417 Total							79,475						
440420A_440418	POINT REPAIR	244.5	250.5	6.0	EA	18,720	18,720	6	VCP	269		1/1/1999	4
440420A_440418 Total							18,720						
440421_440420A	REPLACEMENT	0	52.59788	52.6	ft	620	32,611	6	Lined VCP	53	0	1/1/1995	4
440421_440420A Total							32,611						

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
440422_440421	POINT REPAIR	26.79671	32.79671	6.0	EA	18,720	18,720	6	Lined VCP	149		1/1/1995	4
440422_440421	POINT REPAIR	92.89671	98.89671	6.0	EA	18,720	18,720	6	Lined VCP	149		1/1/1995	4
440422_440421 Total							37,440						
440425_440427	POINT REPAIR	6.8	12.8	6.0	EA	18,720	18,720	6	VCP	79		1/1/1920	3
440425_440427 Total							18,720						
440426LH_440425	POINT REPAIR	4.515259	10.51526	6.0	EA	18,720	18,720	6	VCP	49		1/1/1920	4
440426LH_440425 Total							18,720						
440427_440428	REPLACEMENT	0	68.42231	68.4	ft	620	42,422	6	VCP	68	0	1/1/1920	4
440427_440428 Total							42,422						
440428_440429	POINT REPAIR	53.22231	59.22231	6.0	EA	18,720	18,720	6	VCP	68		1/1/1920	4
440428_440429 Total							18,720						
440429_440417	LINING	80.98555	86.98555	6.0	ft	426	2,556	6	VCP	159		1/1/1920	4
440429_440417	POINT REPAIR	61.08554	67.08554	6.0	EA	18,720	18,720	6	VCP	159		1/1/1920	4
440429_440417	POINT REPAIR	122.9855	128.9855	6.0	EA	18,720	18,720	6	VCP	159		1/1/1920	4
440429_440417 Total							39,996						
440431_440129	POINT REPAIR	21.6	27.6	6.0	EA	18,720	18,720	6	HDPE	134		1/1/2005	4
440431_440129	POINT REPAIR	130.4	133.6136	3.2	EA	18,720	18,720	6	HDPE	134		1/1/2005	4
440431_440129 Total							37,440						
440504_440503	POINT REPAIR	0	5.3	5.3	EA	18,720	18,720	6	Lined VCP	155		1/1/1995	4
440504_440503 Total							18,720						
440505_440514	POINT REPAIR	35	41	6.0	EA	18,720	18,720	6	Lined VCP	151		1/1/1995	4
440505_440514 Total							18,720						
440506_440505	POINT REPAIR	124.6	134.4286	9.8	EA	18,720	18,720	6	HDPE	134		1/1/2003	3
440506_440505 Total							18,720						
440511_440510	LINING	83.06692	92.56692	9.5	ft	426	4,047	6	Lined VCP	102		1/1/2005	4
440511_440510	POINT REPAIR	0.86692	6.86692	6.0	EA	18,720	18,720	6	Lined VCP	102		1/1/2005	4
440511_440510 Total							22,767						
440518_440553	POINT REPAIR	90.9	96.9	6.0	EA	18,720	18,720	6	Lined VCP	98		1/1/2005	4
440518_440553 Total							18,720						
440521_440813	POINT REPAIR	52.1	58.1	6.0	EA	18,720	18,720	6	Lined VCP	101		1/1/1995	3
440521_440813	POINT REPAIR	94	100	6.0	EA	18,720	18,720	6	Lined VCP	101		1/1/1995	3
440521_440813 Total							37,440						
440528_440527	POINT REPAIR	0	10.2	10.2	EA	18,720	18,720	6	Lined VCP	102		1/1/2005	3
440528_440527	POINT REPAIR	80.2	100.3477	20.1	EA	18,720	18,720	6	Lined VCP	102		1/1/2005	3
440528_440527 Total							37,440						
440530_440833	POINT REPAIR	56.9	62.9	6.0	EA	18,720	18,720	6	HDPE	188		1/1/2005	3
440530_440833 Total							18,720						
440531_440532	LINING	98.8	104.8	6.0	ft	426	2,556	6	Lined VCP	122		1/1/2005	3
440531_440532 Total							2,556						
440537_440542	REPLACEMENT	0	130.1565	130.2	ft	620	80,697	6	VCP	130	4	1/1/1960	4
440537_440542	LATERAL REINSTATEMENT	104.1565	104.1565	0.0		0	0	6	VCP	130	0	1/1/1960	4
440537_440542	LATERAL REINSTATEMENT	82.15651	82.15651	0.0		0	0	6	VCP	130	0	1/1/1960	4
440537_440542	LATERAL REINSTATEMENT	35.15651	35.15651	0.0		0	0	6	VCP	130	0	1/1/1960	4
440537_440542	LATERAL REINSTATEMENT	3.156509	3.156509	0.0		0	0	6	VCP	130	0	1/1/1960	4
440537_440542 Total							80,697						
440544_440545	POINT REPAIR	244.5	247.91	3.4	EA	18,720	18,720	6	VCP	248		1/1/1960	4
440544_440545 Total							18,720						
440547_440532	POINT REPAIR	201.4	202.4	1.0	EA	18,720	18,720	6	Lined VCP	202		1/1/2007	4
440547_440532 Total							18,720						
440550_440551	REPLACEMENT	0	242.8889	242.9	ft	620	150,591	6	VCP	243	8	1/1/1920	3
440550_440551	LATERAL REINSTATEMENT	230.2889	230.2889	0.0		0	0	6	VCP	243	0	1/1/1920	3

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
440550_440551	LATERAL REINSTATEMENT	199.7889	199.7889	0.0		0	0	6	VCP	243	0	1/1/1920	3
440550_440551	LATERAL REINSTATEMENT	191.3889	191.3889	0.0		0	0	6	VCP	243	0	1/1/1920	3
440550_440551	LATERAL REINSTATEMENT	142.3889	142.3889	0.0		0	0	6	VCP	243	0	1/1/1920	3
440550_440551	LATERAL REINSTATEMENT	118.0889	118.0889	0.0		0	0	6	VCP	243	0	1/1/1920	3
440550_440551	LATERAL REINSTATEMENT	91.4889	91.4889	0.0		0	0	6	VCP	243	0	1/1/1920	3
440550_440551	LATERAL REINSTATEMENT	43.0889	43.0889	0.0		0	0	6	VCP	243	0	1/1/1920	3
440550_440551	LATERAL REINSTATEMENT	23.4889	23.4889	0.0		0	0	6	VCP	243	0	1/1/1920	3
440550_440551 Total							150,591						
440551_440613	POINT REPAIR	65.4	71.4	6.0	EA	18,720	18,720	6	VCP	99		1/1/1920	3
440551_440613 Total							18,720						
440557_440516	REPLACEMENT	0	265.3303	265.3	ft	620	164,505	6	VCP	265	3	1/1/1920	4
440557_440516	LATERAL REINSTATEMENT	2.4	2.4	0.0		0	0	6	VCP	265	0	1/1/1920	4
440557_440516	LATERAL REINSTATEMENT	163.7	163.7	0.0		0	0	6	VCP	265	0	1/1/1920	4
440557_440516	LATERAL REINSTATEMENT	166	166	0.0		0	0	6	VCP	265	0	1/1/1920	4
440557_440516 Total							164,505						
440609_440607	POINT REPAIR	162.1	168.1	6.0	EA	18,720	18,720	6	VCP	190		1/1/1960	3
440609_440607 Total							18,720						
440610_440609	POINT REPAIR	0	4.9	4.9	EA	18,720	18,720	6	VCP	378		1/1/1960	4
440610_440609 Total							18,720						
440613_440613A	REPLACEMENT	0	454.4098	454.4	ft	620	281,734	6	VCP	454	20	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	442.0098	442.0098	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	438.9098	438.9098	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	392.5098	392.5098	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	384.1098	384.1098	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	339.6098	339.6098	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	304.2098	304.2098	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	291.5098	291.5098	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	278.6098	278.6098	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	241.6098	241.6098	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	227.2098	227.2098	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	23.5	23.5	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	39.5	39.5	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	73.8	73.8	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	89.8	89.8	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	101.9	101.9	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	140.9	140.9	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	183.5	183.5	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	189.9	189.9	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	235.1	235.1	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A	LATERAL REINSTATEMENT	238.4	238.4	0.0		0	0	6	VCP	454	0	1/1/1920	4
440613_440613A Total							281,734						
440613A_440602	LINING	64.56849	70.56849	6.0	ft	426	2,556	6	VCP	310		1/1/1920	4
440613A_440602 Total							2,556						
440614_440615	POINT REPAIR	3.5	9.5	6.0	EA	18,720	18,720	6	PVC	361		1/1/1995	3
440614_440615 Total							18,720						
440616_440609	POINT REPAIR	36.6	42.6	6.0	EA	18,720	18,720	6	VCP	165		1/1/1960	3
440616_440609 Total							18,720						
440618_440617	REPLACEMENT	0	227.6391	227.6	ft	620	141,136	6	Lined VCP	228	5	1/1/1995	3
440618_440617	LATERAL REINSTATEMENT	17.8	17.8	0.0		0	0	6	Lined VCP	228	0	1/1/1995	3
440618_440617	LATERAL REINSTATEMENT	86.9	86.9	0.0		0	0	6	Lined VCP	228	0	1/1/1995	3
440618_440617	LATERAL REINSTATEMENT	137.5	137.5	0.0		0	0	6	Lined VCP	228	0	1/1/1995	3

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
440618_440617	LATERAL REINSTATEMENT	142.6	142.6	0.0		0	0	6	Lined VCP	228	0	1/1/1995	3
440618_440617	LATERAL REINSTATEMENT	214.4391	214.4391	0.0		0	0	6	Lined VCP	228	0	1/1/1995	3
440618_440617 Total							141,136						
440619_440618	REPLACEMENT	0	214.899	214.9	ft	620	133,237	6	VCP	215	6	1/1/1960	3
440619_440618	LATERAL REINSTATEMENT	13	13	0.0		0	0	6	VCP	215	0	1/1/1960	3
440619_440618	LATERAL REINSTATEMENT	39	39	0.0		0	0	6	VCP	215	0	1/1/1960	3
440619_440618	LATERAL REINSTATEMENT	81	81	0.0		0	0	6	VCP	215	0	1/1/1960	3
440619_440618	LATERAL REINSTATEMENT	138	138	0.0		0	0	6	VCP	215	0	1/1/1960	3
440619_440618	LATERAL REINSTATEMENT	140	140	0.0		0	0	6	VCP	215	0	1/1/1960	3
440619_440618	LATERAL REINSTATEMENT	192	192	0.0		0	0	6	VCP	215	0	1/1/1960	3
440619_440618 Total							133,237						
440620_440619	POINT REPAIR	0.1	12.7	12.6	EA	18,720	18,720	6	PVC	188		1/1/1993	3
440620_440619	POINT REPAIR	21.4	27.4	6.0	EA	18,720	18,720	6	PVC	188		1/1/1993	3
440620_440619 Total							37,440						
440621_440620	POINT REPAIR	103.4	108.5476	5.1	EA	18,720	18,720	6	VCP	109		1/1/1960	3
440621_440620 Total							18,720						
440623_440626	POINT REPAIR	0.7	6.7	6.0	EA	18,720	18,720	6	Lined VCP	106		1/1/1995	3
440623_440626 Total							18,720						
440627LH_440626	POINT REPAIR	83.38341	89.38341	6.0	EA	18,720	18,720	6	VCP	95		1/1/1950	4
440627LH_440626 Total							18,720						
440628_440629	POINT REPAIR	0	3	3.0	EA	18,720	18,720	6	Lined VCP	205		1/1/1995	4
440628_440629	POINT REPAIR	95.6	106.9	11.3	EA	18,720	18,720	6	Lined VCP	205		1/1/1995	4
440628_440629	POINT REPAIR	152.2	158.2	6.0	EA	18,720	18,720	6	Lined VCP	205		1/1/1995	4
440628_440629 Total							56,160						
440629_440635	POINT REPAIR	134.5	140.5	6.0	EA	18,720	18,720	6	Lined VCP	143		1/1/1995	3
440629_440635 Total							18,720						
440630_440629	POINT REPAIR	8	17	9.0	EA	18,720	18,720	6	VCP	126		1/1/1950	4
440630_440629 Total							18,720						
440631_440632	POINT REPAIR	55.23163	61.23163	6.0	EA	18,720	18,720	6	VCP	108		1/1/1950	4
440631_440632	POINT REPAIR	93.13164	99.13164	6.0	EA	18,720	18,720	6	VCP	108		1/1/1950	4
440631_440632 Total							37,440						
440701_440702	LINING	21.6	27.6	6.0	ft	426	2,556	6	VCP	80		1/1/1950	4
440701_440702 Total							2,556						
440702_440703	POINT REPAIR	132.7	138.7	6.0	EA	18,720	18,720	6	VCP	202		1/1/1950	4
440702_440703 Total							18,720						
440703_440704	POINT REPAIR	0	3.8	3.8	EA	18,720	18,720	6	VCP	140		1/1/1950	4
440703_440704 Total							18,720						
440704_440705	POINT REPAIR	15.4	21.4	6.0	EA	18,720	18,720	6	VCP	142		1/1/1950	4
440704_440705	POINT REPAIR	126.1	132.1	6.0	EA	18,720	18,720	6	VCP	142		1/1/1950	4
440704_440705	POINT REPAIR	136.2	141.9921	5.8	EA	18,720	18,720	6	VCP	142		1/1/1950	4
440704_440705 Total							56,160						
440705_440706	LINING	34.2	40.2	6.0	ft	426	2,556	6	VCP	250		1/1/1950	4
440705_440706 Total							2,556						
440706_443314	POINT REPAIR	0	3	3.0	EA	18,720	18,720	6	Lined VCP	170		1/1/1950	4
440706_443314	POINT REPAIR	110.4	116.4	6.0	EA	18,720	18,720	6	Lined VCP	170		1/1/1950	4
440706_443314	POINT REPAIR	167.1722	170.1722	3.0	EA	18,720	18,720	6	Lined VCP	170		1/1/1950	4
440706_443314 Total							56,160						
440712_440713	POINT REPAIR	35	41	6.0	EA	18,720	18,720	6	Lined VCP	146		1/1/2019	3
440712_440713	POINT REPAIR	142.6976	145.6976	3.0	EA	18,720	18,720	6	Lined VCP	146		1/1/2019	3
440712_440713 Total							37,440						
440722_440721	POINT REPAIR	6.734835	23.83483	17.1	EA	18,720	18,720	6	PVC	105		1/1/1993	3

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
440722_440721	POINT REPAIR	32.33483	38.33483	6.0	EA	18,720	18,720	6	PVC	105		1/1/1993	3
440722_440721 Total							37,440						
440725_440726	POINT REPAIR	65.9	71.9	6.0	EA	18,720	18,720	6	PVC	276		1/1/1950	3
440725_440726 Total							18,720						
440734_440735	POINT REPAIR	44.4	50.4	6.0	EA	18,720	18,720	6	VCP	53		1/1/1950	4
440734_440735 Total							18,720						
440803_432529	POINT REPAIR	104	110	6.0	EA	18,720	18,720	6	VCP	131		1/1/1920	4
440803_432529 Total							18,720						
440809_440808	LINING	83.7	89.7	6.0	ft	426	2,556	6	Lined VCP	110		1/1/2005	3
440809_440808 Total							2,556						
440822LH_440823	REPLACEMENT	0	81.44729	81.4	ft	620	50,497	6	VCP	81	3	1/1/1920	4
440822LH_440823	LATERAL REINSTATEMENT	58.04729	58.04729	0.0		0	0	6	VCP	81	0	1/1/1920	4
440822LH_440823	LATERAL REINSTATEMENT	53.84729	53.84729	0.0		0	0	6	VCP	81	0	1/1/1920	4
440822LH_440823	LATERAL REINSTATEMENT	11.94729	11.94729	0.0		0	0	6	VCP	81	0	1/1/1920	4
440822LH_440823 Total							50,497						
440823_440824	POINT REPAIR	32.7	42.2	9.5	EA	18,720	18,720	6	VCP	160		1/1/1920	4
440823_440824 Total							18,720						
440824_440826	POINT REPAIR	2.002214	8.202211	6.2	EA	18,720	18,720	6	PVC	146		1/1/1993	3
440824_440826	POINT REPAIR	126.4022	136.8022	10.4	EA	18,720	18,720	6	PVC	146		1/1/1993	3
440824_440826 Total							37,440						
440825_440141	POINT REPAIR	3.516862	9.516862	6.0	EA	18,720	18,720	6	VCP	114		1/1/1920	4
440825_440141 Total							18,720						
440832_440639	POINT REPAIR	89.46011	101.2601	11.8	EA	18,720	18,720	6	VCP	161		1/1/1920	4
440832_440639 Total							18,720						
440833_440829	LINING	44.27707	47.27707	3.0	ft	426	1,278	6	HDPE	47		1/1/1991	3
440833_440829 Total							1,278						
440834_440804	POINT REPAIR	95.09595	101.0959	6.0	EA	18,720	18,720	6	Lined VCP	103		1/1/2005	3
440834_440804 Total							18,720						
440901_440902	LINING	135.3	141.3	6.0	ft	510	3,060	10	PVC	245		1/1/1980	3
440901_440902 Total							3,060						
440904_440403	REPLACEMENT	0	300.681	300.7	ft	620	186,422	6	VCP	301	13	1/1/1980	4
440904_440403	LATERAL REINSTATEMENT	9.3	9.3	0.0		0	0	6	VCP	301	0	1/1/1980	4
440904_440403	LATERAL REINSTATEMENT	79.8	79.8	0.0		0	0	6	VCP	301	0	1/1/1980	4
440904_440403	LATERAL REINSTATEMENT	84.3	84.3	0.0		0	0	6	VCP	301	0	1/1/1980	4
440904_440403	LATERAL REINSTATEMENT	123.1	123.1	0.0		0	0	6	VCP	301	0	1/1/1980	4
440904_440403	LATERAL REINSTATEMENT	128.9	128.9	0.0		0	0	6	VCP	301	0	1/1/1980	4
440904_440403	LATERAL REINSTATEMENT	186.4	186.4	0.0		0	0	6	VCP	301	0	1/1/1980	4
440904_440403	LATERAL REINSTATEMENT	191.8	191.8	0.0		0	0	6	VCP	301	0	1/1/1980	4
440904_440403	LATERAL REINSTATEMENT	230.8	230.8	0.0		0	0	6	VCP	301	0	1/1/1980	4
440904_440403	LATERAL REINSTATEMENT	236.7	236.7	0.0		0	0	6	VCP	301	0	1/1/1980	4
440904_440403	LATERAL REINSTATEMENT	268	268	0.0		0	0	6	VCP	301	0	1/1/1980	4
440904_440403	LATERAL REINSTATEMENT	285.9	285.9	0.0		0	0	6	VCP	301	0	1/1/1980	4
440904_440403	LATERAL REINSTATEMENT	291.2	291.2	0.0		0	0	6	VCP	301	0	1/1/1980	4
440904_440403	LATERAL REINSTATEMENT	293.4	293.4	0.0		0	0	6	VCP	301	0	1/1/1980	4
440904_440403 Total							186,422						
440905_440904	POINT REPAIR	67.9	73.9	6.0	EA	18,720	18,720	6	VCP	166		1/1/1980	3
440905_440904 Total							18,720						
441002_441004	REPLACEMENT	0	170.6825	170.7	ft	620	105,823	6	Lined VCP	171	2	1/1/1998	4
441002_441004	LATERAL REINSTATEMENT	70.4	70.4	0.0		0	0	6	Lined VCP	171	0	1/1/1998	4
441002_441004	LATERAL REINSTATEMENT	100.1	100.1	0.0		0	0	6	Lined VCP	171	0	1/1/1998	4
441002_441004 Total							105,823						

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
441017_441016	POINT REPAIR	75.7	82.63857	6.9	EA	18,720	18,720	6	VCP	83		1/1/1950	4
441017_441016 Total							18,720						
441018_441019	REPLACEMENT	0	60.70556	60.7	ft	620	37,637	6	VCP	61	1	1/1/1950	4
441018_441019	LATERAL REINSTATEMENT	5.3	5.3	0.0		0	0	6	VCP	61	0	1/1/1950	4
441018_441019 Total							37,637						
441019_441401	POINT REPAIR	0	4.9	4.9	EA	18,720	18,720	6	HDPE	130		1/1/2005	3
441019_441401	POINT REPAIR	17.1	23.1	6.0	EA	18,720	18,720	6	HDPE	130		1/1/2005	3
441019_441401	POINT REPAIR	97.4	103.4	6.0	EA	18,720	18,720	6	HDPE	130		1/1/2005	3
441019_441401 Total							56,160						
441024_441023	LINING	64.4	70.4	6.0	ft	426	2,556	6	VCP	160		1/1/1970	4
441024_441023 Total							2,556						
441105_441114	REPLACEMENT	0	274.2214	274.2	ft	620	170,017	6	Lined VCP	274	5	1/1/2005	4
441105_441114	LATERAL REINSTATEMENT	30.2	30.2	0.0		0	0	6	Lined VCP	274	0	1/1/2005	4
441105_441114	LATERAL REINSTATEMENT	78.1	78.1	0.0		0	0	6	Lined VCP	274	0	1/1/2005	4
441105_441114	LATERAL REINSTATEMENT	126.2	126.2	0.0		0	0	6	Lined VCP	274	0	1/1/2005	4
441105_441114	LATERAL REINSTATEMENT	176.2	176.2	0.0		0	0	6	Lined VCP	274	0	1/1/2005	4
441105_441114	LATERAL REINSTATEMENT	227.3	227.3	0.0		0	0	6	Lined VCP	274	0	1/1/2005	4
441105_441114 Total							170,017						
441106LH_441107	POINT REPAIR	80.22326	90.32326	10.1	EA	18,720	18,720	6	VCP	127		1/1/1950	3
441106LH_441107 Total							18,720						
441107_441108	POINT REPAIR	66.66599	69.66599	3.0	EA	18,720	18,720	6	PVC	70		1/1/2002	3
441107_441108 Total							18,720						
441109_441110	POINT REPAIR	156.3	162.3	6.0	EA	18,720	18,720	6	Lined VCP	247		1/1/2006	4
441109_441110	POINT REPAIR	185.2	191.2	6.0	EA	18,720	18,720	6	Lined VCP	247		1/1/2006	4
441109_441110 Total							37,440						
441111_441108	POINT REPAIR	73.2	79.2	6.0	EA	18,720	18,720	6	HDPE	80		1/1/2005	4
441111_441108 Total							18,720						
441115LH_441114	POINT REPAIR	39.3	45.3	6.0	EA	18,720	18,720	6	VCP	182		1/1/1950	3
441115LH_441114 Total							18,720						
441116_441115LH	REPLACEMENT	0	81.34352	81.3	ft	620	50,433	6	HDPE	81	2	1/1/2005	3
441116_441115LH	LATERAL REINSTATEMENT	3.8	3.8	0.0		0	0	6	HDPE	81	0	1/1/2005	3
441116_441115LH	LATERAL REINSTATEMENT	61.4	61.4	0.0		0	0	6	HDPE	81	0	1/1/2005	3
441116_441115LH Total							50,433						
441129LH_441128	POINT REPAIR	89.94751	95.94751	6.0	EA	18,720	18,720	6	HDPE	189		1/1/1993	4
441129LH_441128	POINT REPAIR	137.4475	143.4475	6.0	EA	18,720	18,720	6	HDPE	189		1/1/1993	4
441129LH_441128 Total							37,440						
441131_441130	POINT REPAIR	37.9	43.9	6.0	EA	18,720	18,720	6	HDPE	203		1/1/2005	4
441131_441130	POINT REPAIR	109.1	115.1	6.0	EA	18,720	18,720	6	HDPE	203		1/1/2005	4
441131_441130	POINT REPAIR	175.8	181.8	6.0	EA	18,720	18,720	6	HDPE	203		1/1/2005	4
441131_441130 Total							56,160						
441133_441130	POINT REPAIR	207.9	213.9	6.0	EA	18,720	18,720	6	VCP	298		1/1/1950	4
441133_441130 Total							18,720						
441202_440622	REPLACEMENT	0	194.1644	194.2	ft	620	120,382	6	VCP	194	4	1/1/1950	4
441202_440622	LATERAL REINSTATEMENT	150.0644	150.0644	0.0		0	0	6	VCP	194	0	1/1/1950	4
441202_440622	LATERAL REINSTATEMENT	125.6644	125.6644	0.0		0	0	6	VCP	194	0	1/1/1950	4
441202_440622	LATERAL REINSTATEMENT	108.8644	108.8644	0.0		0	0	6	VCP	194	0	1/1/1950	4
441202_440622	LATERAL REINSTATEMENT	57.16438	57.16438	0.0		0	0	6	VCP	194	0	1/1/1950	4
441202_440622 Total							120,382						
441204_441205	REPLACEMENT	0	76.61993	76.6	ft	620	47,504	6	VCP	77	3	1/1/1950	4
441204_441205	LATERAL REINSTATEMENT	40.4	40.4	0.0		0	0	6	VCP	77	0	1/1/1950	4
441204_441205	LATERAL REINSTATEMENT	76.61993	76.61993	0.0		0	0	6	VCP	77	0	1/1/1950	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
441204_441205	LATERAL REINSTATEMENT	76.61993	76.61993	0.0		0	0	6	VCP	77	0	1/1/1950	4
441204_441205 Total							47,504						
441212_441007	POINT REPAIR	0	61.85156	61.9	EA	18,720	18,720	6	HDPE	62		1/1/2005	4
441212_441007 Total							18,720						
441307ALH_441307	REPLACEMENT	0	78	78.0	ft	620	48,360	6	VCP	78	0	1/1/1970	4
41307ALH_441307 Total							48,360						
441310_441311	REPLACEMENT	0	168.7283	168.7	ft	620	104,612	6	VCP	169	1	1/1/1940	4
441310_441311	LATERAL REINSTATEMENT	119.2283	119.2283	0.0		0	0	6	VCP	169	0	1/1/1940	4
441310_441311 Total							104,612						
441311_441301	REPLACEMENT	0	29.22308	29.2	ft	620	18,118	6	PVC	29	0	1/1/1991	3
441311_441301 Total							18,118						
441312_441310	REPLACEMENT	0	154.5807	154.6	ft	620	95,840	6	VCP	155	3	1/1/1940	4
441312_441310	LATERAL REINSTATEMENT	37	37	0.0		0	0	6	VCP	155	0	1/1/1940	4
441312_441310	LATERAL REINSTATEMENT	89	89	0.0		0	0	6	VCP	155	0	1/1/1940	4
441312_441310	LATERAL REINSTATEMENT	115	115	0.0		0	0	6	VCP	155	0	1/1/1940	4
441312_441310 Total							95,840						
441313LH_441310	REPLACEMENT	0	163.7553	163.8	ft	620	101,528	6	VCP	164	2	1/1/1940	4
441313LH_441310	LATERAL REINSTATEMENT	5	5	0.0		0	0	6	VCP	164	0	1/1/1940	4
441313LH_441310	LATERAL REINSTATEMENT	108	108	0.0		0	0	6	VCP	164	0	1/1/1940	4
441313LH_441310 Total							101,528						
441401_441022	LINING	68	74	6.0	ft	426	2,556	6	VCP	115		1/1/1940	4
441401_441022	POINT REPAIR	0	4.3	4.3	EA	18,720	18,720	6	VCP	115		1/1/1940	4
441401_441022	POINT REPAIR	29.6	35.6	6.0	EA	18,720	18,720	6	VCP	115		1/1/1940	4
441401_441022 Total							39,996						
441402_441402A	POINT REPAIR	0	11.8	11.8	EA	18,720	18,720	6	Lined VCP	202		1/1/2006	4
441402_441402A	POINT REPAIR	48.2	54.2	6.0	EA	18,720	18,720	6	Lined VCP	202		1/1/2006	4
441402_441402A Total							37,440						
441402A_441403	REPLACEMENT	0	201.5874	201.6	ft	620	124,984	6	PVC	202	1	1/1/2003	3
441402A_441403	LATERAL REINSTATEMENT	5.5	5.5	0.0		0	0	6	PVC	202	0	1/1/2003	3
441402A_441403 Total							124,984						
441403_441404	LINING	0.5	6.5	6.0	ft	426	2,556	6	VCP	196		1/1/1940	4
441403_441404	LINING	77.9	83.9	6.0	ft	426	2,556	6	VCP	196		1/1/1940	4
441403_441404	POINT REPAIR	165.4	171.4	6.0	EA	18,720	18,720	6	VCP	196		1/1/1940	4
441403_441404 Total							23,832						
441409BLH_441409B	POINT REPAIR	18.06374	24.06374	6.0	EA	18,720	18,720	6	VCP	146		1/1/1940	4
441409BLH_441409B	POINT REPAIR	118.0637	127.0637	9.0	EA	18,720	18,720	6	VCP	146		1/1/1940	4
41409BLH_441409B Total							37,440						
441419_441420A	REPLACEMENT	0	5.386684	5.4	ft	620	3,340	6	VCP	5	0	1/1/1940	4
441419_441420A Total							3,340						
441420_441420A	POINT REPAIR	48.4	54.4	6.0	EA	18,720	18,720	6	VCP	59		1/1/1940	3
441420_441420A Total							18,720						
441505A_441503	POINT REPAIR	312.7	318.7	6.0	EA	27,240	27,240	12	HDPE	329		1/1/1999	3
441505A_441503 Total							27,240						
441506_441505	POINT REPAIR	101.1	170.7	69.6	EA	22,440	22,440	8	PVC	250		1/1/1999	3
441506_441505	POINT REPAIR	180.2	249.5386	69.3	EA	22,440	22,440	8	PVC	250		1/1/1999	3
441506_441505 Total							44,880						
441508_441507	REPLACEMENT	0	326.6358	326.6	ft	620	202,514	6	HDPE	327	4	1/1/2005	3
441508_441507	LATERAL REINSTATEMENT	150.1	150.1	0.0		0	0	6	HDPE	327	0	1/1/2005	3
441508_441507	LATERAL REINSTATEMENT	201.1	201.1	0.0		0	0	6	HDPE	327	0	1/1/2005	3
441508_441507	LATERAL REINSTATEMENT	248.3	248.3	0.0		0	0	6	HDPE	327	0	1/1/2005	3
441508_441507	LATERAL REINSTATEMENT	250.1	250.1	0.0		0	0	6	HDPE	327	0	1/1/2005	3

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
441508_441507 Total							202,514						
441511_441505	POINT REPAIR	8.8	14.8	6.0	EA	18,720	18,720	6	VCP	154		1/1/1940	4
441511_441505 Total							18,720						
441601_441712	POINT REPAIR	299.9076	305.6076	5.7	EA	22,440	22,440	8	Lined VCP	306		1/1/1998	4
441601_441712 Total							22,440						
441701_441420	LINING	99.7	105.7	6.0	ft	426	2,556	6	VCP	272		1/1/1940	4
441701_441420	POINT REPAIR	6.9	12.9	6.0	EA	18,720	18,720	6	VCP	272		1/1/1940	4
441701_441420	POINT REPAIR	264.8	270.8	6.0	EA	18,720	18,720	6	VCP	272		1/1/1940	4
441701_441420 Total							39,996						
441702_441703	POINT REPAIR	17.4	42.3	24.9	EA	18,720	18,720	6	VCP	158		1/1/1940	4
441702_441703 Total							18,720						
441703_441704	POINT REPAIR	0	5	5.0	EA	18,720	18,720	6	VCP	132		1/1/1940	4
441703_441704 Total							18,720						
441704_441705	LINING	67.8	73.8	6.0	ft	426	2,556	6	Lined VCP	267		1/1/2005	4
441704_441705	POINT REPAIR	130	136	6.0	EA	18,720	18,720	6	Lined VCP	267		1/1/2005	4
441704_441705	POINT REPAIR	257.3	266.3	9.0	EA	18,720	18,720	6	Lined VCP	267		1/1/2005	4
441704_441705 Total							39,996						
441705_441509	POINT REPAIR	93.9	99.9	6.0	EA	18,720	18,720	6	VCP	121		1/1/1940	4
441705_441509 Total							18,720						
441710_441713	POINT REPAIR	20.2	35.1	14.9	EA	22,440	22,440	8	Lined VCP	112		1/1/2005	3
441710_441713 Total							22,440						
441713_441506	LINING	174	180	6.0	ft	558	3,348	12	VCP	323		1/1/1950	4
441713_441506	POINT REPAIR	181.4	201.4	20.0	EA	27,240	27,240	12	VCP	323		1/1/1950	4
441713_441506	POINT REPAIR	240.8	321.9	81.1	EA	27,240	27,240	12	VCP	323		1/1/1950	4
441713_441506 Total							57,828						
441805_441804	REPLACEMENT	0	142.7127	142.7	ft	620	88,482	6	Lined VCP	143	1	1/1/2005	4
441805_441804	LATERAL REINSTATEMENT	71.7	71.7	0.0		0	0	6	Lined VCP	143	0	1/1/2005	4
441805_441804 Total							88,482						
441806_441805	POINT REPAIR	171.8	177.8	6.0	EA	18,720	18,720	6	VCP	182		1/1/1980	4
441806_441805 Total							18,720						
441809_441808	LINING	92.15416	98.15416	6.0	ft	426	2,556	6	PVC	159		1/1/1993	3
441809_441808	LINING	122.7542	135.2542	12.5	ft	426	5,325	6	PVC	159		1/1/1993	3
441809_441808 Total							7,881						
441810_441809	POINT REPAIR	56	62	6.0	EA	18,720	18,720	6	Lined VCP	230		1/1/1995	4
441810_441809	POINT REPAIR	80.90626	86.90626	6.0	EA	18,720	18,720	6	Lined VCP	230		1/1/1995	4
441810_441809 Total							37,440						
441812_441811	LINING	62.1	68.1	6.0	ft	426	2,556	6	PVC	217		1/1/1993	3
441812_441811	POINT REPAIR	148.9	166.8	17.9	EA	18,720	18,720	6	PVC	217		1/1/1993	3
441812_441811 Total							21,276						
441817_441819	POINT REPAIR	78	91.6	13.6	EA	18,720	18,720	6	HDPE	153		1/1/1993	4
441817_441819 Total							18,720						
441821_441820	REPLACEMENT	0	66.92068	66.9	ft	620	41,491	6	VCP	67	2	1/1/1980	3
441821_441820	LATERAL REINSTATEMENT	39.1	39.1	0.0		0	0	6	VCP	67	0	1/1/1980	3
441821_441820	LATERAL REINSTATEMENT	42	42	0.0		0	0	6	VCP	67	0	1/1/1980	3
441821_441820 Total							41,491						
441827A_441827	POINT REPAIR	7	13	6.0	EA	18,720	18,720	6	VCP	304		1/1/1965	3
441827A_441827 Total							18,720						
441828_441827	LINING	0	3.8	3.8	ft	426	1,619	6	VCP	133		1/1/1980	3
441828_441827 Total							1,619						
441829_441828	POINT REPAIR	116.2	122.2	6.0	EA	18,720	18,720	6	VCP	245		1/1/1980	3
441829_441828 Total							18,720						

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
441830_441829	POINT REPAIR	0	4	4.0	EA	18,720	18,720	6	PVC	195		1/1/1993	4
441830_441829	POINT REPAIR	164.1	181.9	17.8	EA	18,720	18,720	6	PVC	195		1/1/1993	4
441830_441829 Total							37,440						
441834_441837	LINING	86.3	92.3	6.0	ft	426	2,556	6	VCP	124		1/1/1940	4
441834_441837 Total							2,556						
441834A_441834	LINING	133.004	136.904	3.9	ft	426	1,661	6	VCP	137		1/1/1974	4
441834A_441834	POINT REPAIR	0	3	3.0	EA	18,720	18,720	6	VCP	137		1/1/1974	4
441834A_441834 Total							20,381						
441835_441834	LINING	66.3	72.3	6.0	ft	426	2,556	6	VCP	141		1/1/1940	4
441835_441834	POINT REPAIR	0.6	13	12.4	EA	18,720	18,720	6	VCP	141		1/1/1940	4
441835_441834 Total							21,276						
441837_441801	REPLACEMENT	0	236.7072	236.7	ft	620	146,758	6	PVC	237	2	1/1/1999	3
441837_441801	LATERAL REINSTATEMENT	10.7	10.7	0.0		0	0	6	PVC	237	0	1/1/1999	3
441837_441801	LATERAL REINSTATEMENT	124.4	124.4	0.0		0	0	6	PVC	237	0	1/1/1999	3
441837_441801 Total							146,758						
441903_441904	REPLACEMENT	0	5.752488	5.8	ft	620	3,567	6	VCP	6	0	1/1/1950	4
441903_441904 Total							3,567						
441906_441905	POINT REPAIR	179.7	180.7	1.0	EA	18,720	18,720	6	VCP	178		1/1/1950	3
441906_441905 Total							18,720						
441907_441906	POINT REPAIR	44	50	6.0	EA	18,720	18,720	6	VCP	276		1/1/1950	4
441907_441906 Total							18,720						
441908_441907	POINT REPAIR	31.2	37.2	6.0	EA	18,720	18,720	6	HDPE	197		1/1/2005	4
441908_441907	POINT REPAIR	155.1	162.6	7.5	EA	18,720	18,720	6	HDPE	197		1/1/2005	4
441908_441907 Total							37,440						
441909_441908	POINT REPAIR	0	3.2	3.2	EA	18,720	18,720	6	VCP	71		1/1/1950	4
441909_441908 Total							18,720						
441912_441910	REPLACEMENT	0	54.9928	55.0	ft	620	34,096	6	VCP	55	1	1/1/1950	4
441912_441910	LATERAL REINSTATEMENT	42.9	42.9	0.0		0	0	6	VCP	55	0	1/1/1950	4
441912_441910 Total							34,096						
441913_441912	POINT REPAIR	66	72	6.0	EA	18,720	18,720	6	VCP	112		1/1/1950	4
441913_441912 Total							18,720						
441928_441925	POINT REPAIR	35.8	41.8	6.0	EA	18,720	18,720	6	VCP	238		1/1/1950	4
441928_441925 Total							18,720						
441931_441932	POINT REPAIR	89.9	95.9	6.0	EA	18,720	18,720	6	PVC	127		1/1/1971	3
441931_441932 Total							18,720						
441932_441902	LINING	92.6	98.6	6.0	ft	426	2,556	6	PVC	168		1/1/1993	4
441932_441902	POINT REPAIR	92.6	111.4	18.8	EA	18,720	18,720	6	PVC	168		1/1/1993	4
441932_441902 Total							21,276						
442002_442003	POINT REPAIR	0	5.9	5.9	EA	18,720	18,720	6	VCP	45		1/1/1950	4
442002_442003 Total							18,720						
442003_442004	POINT REPAIR	123.5	129.5	6.0	EA	18,720	18,720	6	VCP	191		1/1/1950	5
442003_442004 Total							18,720						
442004_441714	POINT REPAIR	0	3	3.0	EA	22,440	22,440	8	VCP	303		1/1/1955	4
442004_441714 Total							22,440						
442009_442206	REPLACEMENT	0	70.34162	70.3	ft	620	43,612	6	VCP	70	8	1/1/1950	4
442009_442206	LATERAL REINSTATEMENT	0.5	0.5	0.0		0	0	6	VCP	70	0	1/1/1950	4
442009_442206	LATERAL REINSTATEMENT	1.8	1.8	0.0		0	0	6	VCP	70	0	1/1/1950	4
442009_442206	LATERAL REINSTATEMENT	58	58	0.0		0	0	6	VCP	70	0	1/1/1950	4
442009_442206	LATERAL REINSTATEMENT	60	60	0.0		0	0	6	VCP	70	0	1/1/1950	4
442009_442206	LATERAL REINSTATEMENT	70.34162	70.34162	0.0		0	0	6	VCP	70	0	1/1/1950	4
442009_442206	LATERAL REINSTATEMENT	70.34162	70.34162	0.0		0	0	6	VCP	70	0	1/1/1950	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
442009_442206	LATERAL REINSTATEMENT	50.14162	50.14162	0.0		0	0	6	VCP	70	0	1/1/1950	4
442009_442206	LATERAL REINSTATEMENT	0	0	0.0		0	0	6	VCP	70	0	1/1/1950	4
442009_442206 Total							43,612						
442102_442103	POINT REPAIR	29.8	35.8	6.0	EA	18,720	18,720	6	HDPE	114		1/1/2005	4
442102_442103	POINT REPAIR	78.8	93.9	15.1	EA	18,720	18,720	6	HDPE	114		1/1/2005	4
442102_442103 Total							37,440						
442205_442205A	POINT REPAIR	117.5	123.5	6.0	EA	18,720	18,720	6	VCP	395		1/1/1950	4
442205_442205A Total							18,720						
442205A_442204	REPLACEMENT	0	394.5941	394.6	ft	620	244,648	6	VCP	395	3	1/1/1950	4
442205A_442204	LATERAL REINSTATEMENT	27.7	27.7	0.0		0	0	6	VCP	395	0	1/1/1950	4
442205A_442204	LATERAL REINSTATEMENT	41.9	41.9	0.0		0	0	6	VCP	395	0	1/1/1950	4
442205A_442204	LATERAL REINSTATEMENT	94.4	94.4	0.0		0	0	6	VCP	395	0	1/1/1950	4
442205A_442204 Total							244,648						
442206A_442205	LINING	0	3.6	3.6	ft	426	1,534	6	VCP	82		1/1/1950	4
442206A_442205	POINT REPAIR	39.9	47.7	7.8	EA	18,720	18,720	6	VCP	82		1/1/1950	4
442206A_442205 Total							20,254						
442208_442207	POINT REPAIR	196.7	202.7	6.0	EA	18,720	18,720	6	VCP	340		1/1/1950	4
442208_442207	POINT REPAIR	323	332.6	9.6	EA	18,720	18,720	6	VCP	340		1/1/1950	4
442208_442207	POINT REPAIR	336.7	340.4391	3.7	EA	18,720	18,720	6	VCP	340		1/1/1950	4
442208_442207 Total							56,160						
442211_442207	POINT REPAIR	37.3	70.5	33.2	EA	18,720	18,720	6	VCP	182		1/1/1950	4
442211_442207	POINT REPAIR	153.5	167.8	14.3	EA	18,720	18,720	6	VCP	182		1/1/1950	4
442211_442207	POINT REPAIR	177.3	182.1975	4.9	EA	18,720	18,720	6	VCP	182		1/1/1950	4
442211_442207 Total							56,160						
442218_442217	REPLACEMENT	0	260.4715	260.5	ft	620	161,492	6	PVC	260	5	1/1/1993	3
442218_442217	LATERAL REINSTATEMENT	2.9	2.9	0.0		0	0	6	PVC	260	0	1/1/1993	3
442218_442217	LATERAL REINSTATEMENT	22.5	22.5	0.0		0	0	6	PVC	260	0	1/1/1993	3
442218_442217	LATERAL REINSTATEMENT	120.8	120.8	0.0		0	0	6	PVC	260	0	1/1/1993	3
442218_442217	LATERAL REINSTATEMENT	132.1	132.1	0.0		0	0	6	PVC	260	0	1/1/1993	3
442218_442217	LATERAL REINSTATEMENT	178.3	178.3	0.0		0	0	6	PVC	260	0	1/1/1993	3
442218_442217 Total							161,492						
442223_442218	POINT REPAIR	106.3	112.3	6.0	EA	18,720	18,720	6	VCP	137		1/1/1950	4
442223_442218	POINT REPAIR	122	128	6.0	EA	18,720	18,720	6	VCP	137		1/1/1950	4
442223_442218 Total							37,440						
442301_442504	POINT REPAIR	109	115	6.0	EA	18,720	18,720	6	Lined VCP	192		1/1/1998	3
442301_442504	POINT REPAIR	162.6	168.6	6.0	EA	18,720	18,720	6	Lined VCP	192		1/1/1998	3
442301_442504 Total							37,440						
442320_442322	LINING	91.2	96.58255	5.4	ft	426	2,293	6	VCP	97		1/1/1960	4
442320_442322	POINT REPAIR	0	3	3.0	EA	18,720	18,720	6	VCP	97		1/1/1960	4
442320_442322	POINT REPAIR	29.3	35.3	6.0	EA	18,720	18,720	6	VCP	97		1/1/1960	4
442320_442322 Total							39,733						
442328_442329	POINT REPAIR	6	12	6.0	EA	18,720	18,720	6	VCP	113		1/1/1920	4
442328_442329	POINT REPAIR	34.8	49	14.2	EA	18,720	18,720	6	VCP	113		1/1/1920	4
442328_442329 Total							37,440						
442330_442331	REPLACEMENT	0	198.6029	198.6	ft	620	123,134	6	Lined VCP	199	6	1/1/1998	4
442330_442331	LATERAL REINSTATEMENT	0.6	0.6	0.0		0	0	6	Lined VCP	199	0	1/1/1998	4
442330_442331	LATERAL REINSTATEMENT	45.4	45.4	0.0		0	0	6	Lined VCP	199	0	1/1/1998	4
442330_442331	LATERAL REINSTATEMENT	198.6029	198.6029	0.0		0	0	6	Lined VCP	199	0	1/1/1998	4
442330_442331	LATERAL REINSTATEMENT	155.2029	155.2029	0.0		0	0	6	Lined VCP	199	0	1/1/1998	4
442330_442331	LATERAL REINSTATEMENT	108.4029	108.4029	0.0		0	0	6	Lined VCP	199	0	1/1/1998	4
442330_442331	LATERAL REINSTATEMENT	19.00287	19.00287	0.0		0	0	6	Lined VCP	199	0	1/1/1998	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
442330_442331 Total							123,134						
442331_442332	POINT REPAIR	62.5	68.5	6.0	EA	18,720	18,720	6	PVC	274		1/1/1998	3
442331_442332	POINT REPAIR	143.9	149.9	6.0	EA	18,720	18,720	6	PVC	274		1/1/1998	3
442331_442332	POINT REPAIR	247.4887	253.4887	6.0	EA	18,720	18,720	6	PVC	274		1/1/1998	3
442331_442332 Total							56,160						
442336_442322	LINING	42.37076	48.37076	6.0	ft	426	2,556	6	VCP	87		1/1/1960	3
442336_442322	LINING	80.17075	86.17075	6.0	ft	426	2,556	6	VCP	87		1/1/1960	3
442336_442322 Total							5,112						
442402_442403	POINT REPAIR	141.4	147.4	6.0	EA	18,720	18,720	6	VCP	283		1/1/1920	4
442402_442403 Total							18,720						
442410_442327	REPLACEMENT	0	237.8342	237.8	ft	620	147,457	6	VCP	238	4	1/1/1920	4
442410_442327	LATERAL REINSTATEMENT	182.4342	182.4342	0.0		0	0	6	VCP	238	0	1/1/1920	4
442410_442327	LATERAL REINSTATEMENT	135.7342	135.7342	0.0		0	0	6	VCP	238	0	1/1/1920	4
442410_442327	LATERAL REINSTATEMENT	124.2342	124.2342	0.0		0	0	6	VCP	238	0	1/1/1920	4
442410_442327	LATERAL REINSTATEMENT	75.23418	75.23418	0.0		0	0	6	VCP	238	0	1/1/1920	4
442410_442327 Total							147,457						
442424_442425	POINT REPAIR	146.2	152.2	6.0	EA	18,720	18,720	6	VCP	162		1/1/1920	4
442424_442425 Total							18,720						
442431_442808	POINT REPAIR	29.6	35.6	6.0	EA	18,720	18,720	6	Lined VCP	198		1/1/2007	3
442431_442808 Total							18,720						
442435_442434	LINING	61.5	67.5	6.0	ft	426	2,556	6	VCP	147		1/1/1950	3
442435_442434 Total							2,556						
442436_442435	POINT REPAIR	88.1	94.1	6.0	EA	18,720	18,720	6	Lined VCP	166		1/1/1998	4
442436_442435 Total							18,720						
442449_442429	POINT REPAIR	7.868768	13.86877	6.0	EA	18,720	18,720	6	Lined VCP	139		1/1/1998	4
442449_442429 Total							18,720						
442456_442427	POINT REPAIR	116.3206	134.5206	18.2	EA	22,440	22,440	8	Lined VCP	156		1/1/1998	4
442456_442427 Total							22,440						
442506_442508	REPLACEMENT	0	23.52974	23.5	ft	620	14,588	6	Lined VCP	24	2	1/1/1998	3
442506_442508	LATERAL REINSTATEMENT	23.52974	23.52974	0.0		0	0	6	Lined VCP	24	0	1/1/1998	3
442506_442508	LATERAL REINSTATEMENT	23.52974	23.52974	0.0		0	0	6	Lined VCP	24	0	1/1/1998	3
442506_442508 Total							14,588						
442508_442509	POINT REPAIR	0	54.72511	54.7	EA	18,720	18,720	6	Lined VCP	55		1/1/1998	4
442508_442509 Total							18,720						
442510_442335	POINT REPAIR	72.39234	104.7923	32.4	EA	18,720	18,720	6	Lined VCP	121		1/1/1998	4
442510_442335	POINT REPAIR	118.1923	121.1923	3.0	EA	18,720	18,720	6	Lined VCP	121		1/1/1998	4
442510_442335 Total							37,440						
442607_442606	POINT REPAIR	115.1	120	4.9	EA	18,720	18,720	6	VCP	120		1/1/1970	4
442607_442606 Total							18,720						
442608_442607	POINT REPAIR	15.7	21.7	6.0	EA	18,720	18,720	6	Lined VCP	275		1/1/1998	4
442608_442607	POINT REPAIR	57.4	63.4	6.0	EA	18,720	18,720	6	Lined VCP	275		1/1/1998	4
442608_442607	POINT REPAIR	271.6995	274.8995	3.2	EA	18,720	18,720	6	Lined VCP	275		1/1/1998	4
442608_442607 Total							56,160						
442612_442611	LINING	153.4	159.4	6.0	ft	426	2,556	6	HDPE	212		1/1/2005	3
442612_442611	LINING	202.9	208.9	6.0	ft	426	2,556	6	HDPE	212		1/1/2005	3
442612_442611 Total							5,112						
442614_442615	POINT REPAIR	69.6712	73.6712	4.0	EA	22,440	22,440	8	HDPE	74		1/1/2016	3
442614_442615 Total							22,440						
442615_442616	POINT REPAIR	62.27111	66.27111	4.0	EA	22,440	22,440	8	HDPE	66		1/1/2016	3
442615_442616 Total							22,440						
442616_442618	POINT REPAIR	1.174365	7.174365	6.0	EA	18,720	18,720	6	VCP	54		1/1/1920	3

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
442616_442618 Total							18,720						
442622_442621	REPLACEMENT	0	222.3582	222.4	ft	620	137,862	6	VCP	222	1	1/1/1920	4
442622_442621	LATERAL REINSTATEMENT	50	50	0.0		0	0	6	VCP	222	0	1/1/1920	4
442622_442621 Total							137,862						
442626_402604	POINT REPAIR	14.9	20.9	6.0	EA	18,720	18,720	6	HDPE	165		1/1/2003	3
442626_402604	POINT REPAIR	25.4	53.7	28.3	EA	18,720	18,720	6	HDPE	165		1/1/2003	3
442626_402604 Total							37,440						
442702_442701	POINT REPAIR	0	4	4.0	EA	18,720	18,720	6	Lined VCP	146		1/1/2001	4
442702_442701	POINT REPAIR	134.4	140.4	6.0	EA	18,720	18,720	6	Lined VCP	146		1/1/2001	4
442702_442701 Total							37,440						
442703_442816	REPLACEMENT	0	16.22718	16.2	ft	620	10,061	6	Lined VCP	16	1	1/1/1998	4
442703_442816	LATERAL REINSTATEMENT	16.22718	16.22718	0.0		0	0	6	Lined VCP	16	0	1/1/1998	4
442703_442816 Total							10,061						
442706_442610	POINT REPAIR	53.15464	59.15464	6.0	EA	18,720	18,720	6	Lined VCP	116		1/1/1998	3
442706_442610 Total							18,720						
442708_442707	LINING	44.80659	50.80659	6.0	ft	426	2,556	6	HDPE	207		1/1/1998	3
442708_442707	POINT REPAIR	117.9066	135.2066	17.3	EA	18,720	18,720	6	HDPE	207		1/1/1998	3
442708_442707 Total							21,276						
442709_442708	LINING	49.4	55.4	6.0	ft	426	2,556	6	VCP	196		1/1/1950	4
442709_442708	LINING	87.9	110.6	22.7	ft	426	9,670	6	VCP	196		1/1/1950	4
442709_442708	POINT REPAIR	91	97	6.0	EA	18,720	18,720	6	VCP	196		1/1/1950	4
442709_442708 Total							30,946						
442710LH_442709	POINT REPAIR	77.35166	83.35166	6.0	EA	18,720	18,720	6	VCP	163		1/1/1950	4
442710LH_442709	POINT REPAIR	119.7517	125.7517	6.0	EA	18,720	18,720	6	VCP	163		1/1/1950	4
442710LH_442709 Total							37,440						
442711_442712	POINT REPAIR	98	110.4	12.4	EA	18,720	18,720	6	VCP	112		1/1/1950	4
442711_442712 Total							18,720						
442712_442713	REPLACEMENT	0	52.8957	52.9	ft	620	32,795	6	Lined VCP	53	0	1/1/1998	4
442712_442713 Total							32,795						
442721_442612	REPLACEMENT	0	59.20021	59.2	ft	620	36,704	6	VCP	59	5	1/1/1950	4
442721_442612	LATERAL REINSTATEMENT	36.9	36.9	0.0		0	0	6	VCP	59	0	1/1/1950	4
442721_442612	LATERAL REINSTATEMENT	10.50021	10.50021	0.0		0	0	6	VCP	59	0	1/1/1950	4
442721_442612	LATERAL REINSTATEMENT	1.500208	1.500208	0.0		0	0	6	VCP	59	0	1/1/1950	4
442721_442612	LATERAL REINSTATEMENT	0	0	0.0		0	0	6	VCP	59	0	1/1/1950	4
442721_442612	LATERAL REINSTATEMENT	0	0	0.0		0	0	6	VCP	59	0	1/1/1950	4
442721_442612 Total							36,704						
442723_442711	REPLACEMENT	0	157.6124	157.6	ft	620	97,720	6	Lined VCP	158	5	1/1/1998	4
442723_442711	LATERAL REINSTATEMENT	6.6	6.6	0.0		0	0	6	Lined VCP	158	0	1/1/1998	4
442723_442711	LATERAL REINSTATEMENT	84.8	84.8	0.0		0	0	6	Lined VCP	158	0	1/1/1998	4
442723_442711	LATERAL REINSTATEMENT	134.3124	134.3124	0.0		0	0	6	Lined VCP	158	0	1/1/1998	4
442723_442711	LATERAL REINSTATEMENT	96.41235	96.41235	0.0		0	0	6	Lined VCP	158	0	1/1/1998	4
442723_442711	LATERAL REINSTATEMENT	17.71236	17.71236	0.0		0	0	6	Lined VCP	158	0	1/1/1998	4
442723_442711 Total							97,720						
442804_442803	POINT REPAIR	242.7	243.7	1.0	EA	18,720	18,720	6	VCP	241		1/1/1970	3
442804_442803 Total							18,720						
442808_442807	POINT REPAIR	106.9	151.3	44.4	EA	18,720	18,720	6	Lined VCP	321		1/1/2007	3
442808_442807	POINT REPAIR	222.2	231.4	9.2	EA	18,720	18,720	6	Lined VCP	321		1/1/2007	3
442808_442807	POINT REPAIR	308.3	318.9	10.6	EA	18,720	18,720	6	Lined VCP	321		1/1/2007	3
442808_442807 Total							56,160						
442814_442815	POINT REPAIR	305.381	311.381	6.0	EA	18,720	18,720	6	VCP	343		1/1/1950	4
442814_442815 Total							18,720						

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
442902_442903	REPLACEMENT	0	128.2189	128.2	ft	620	79,496	6	HDPE	128	5	1/1/1998	3
442902_442903	LATERAL REINSTATEMENT	126.8189	126.8189	0.0		0	0	6	HDPE	128	0	1/1/1998	3
442902_442903	LATERAL REINSTATEMENT	89.71885	89.71885	0.0		0	0	6	HDPE	128	0	1/1/1998	3
442902_442903	LATERAL REINSTATEMENT	86.21885	86.21885	0.0		0	0	6	HDPE	128	0	1/1/1998	3
442902_442903	LATERAL REINSTATEMENT	21.61885	21.61885	0.0		0	0	6	HDPE	128	0	1/1/1998	3
442902_442903	LATERAL REINSTATEMENT	13.51885	13.51885	0.0		0	0	6	HDPE	128	0	1/1/1998	3
442902_442903 Total							79,496						
442903_442905	POINT REPAIR	0	3.8	3.8	EA	18,720	18,720	6	VCP	298		1/1/1970	4
442903_442905	POINT REPAIR	128.1	134.1	6.0	EA	18,720	18,720	6	VCP	298		1/1/1970	4
442903_442905 Total							37,440						
442905_442906	LINING	122.1	128.1	6.0	ft	426	2,556	6	VCP	320		1/1/1970	4
442905_442906	POINT REPAIR	196.3	202.3	6.0	EA	18,720	18,720	6	VCP	320		1/1/1970	4
442905_442906 Total							21,276						
442906_442907	POINT REPAIR	137.2177	140.2177	3.0	EA	18,720	18,720	6	VCP	140		1/1/1970	4
442906_442907 Total							18,720						
442909_443302	REPLACEMENT	0	249.4233	249.4	ft	620	154,642	6	HDPE	249	4	1/1/2001	3
442909_443302	LATERAL REINSTATEMENT	201.6233	201.6233	0.0		0	0	6	HDPE	249	0	1/1/2001	3
442909_443302	LATERAL REINSTATEMENT	191.2233	191.2233	0.0		0	0	6	HDPE	249	0	1/1/2001	3
442909_443302	LATERAL REINSTATEMENT	137.7233	137.7233	0.0		0	0	6	HDPE	249	0	1/1/2001	3
442909_443302	LATERAL REINSTATEMENT	108.1233	108.1233	0.0		0	0	6	HDPE	249	0	1/1/2001	3
442909_443302 Total							154,642						
442917_442918	REPLACEMENT	0	155.1013	155.1	ft	620	96,163	6	HDPE	155	5	1/1/2001	3
442917_442918	LATERAL REINSTATEMENT	118.1013	118.1013	0.0		0	0	6	HDPE	155	0	1/1/2001	3
442917_442918	LATERAL REINSTATEMENT	116.4013	116.4013	0.0		0	0	6	HDPE	155	0	1/1/2001	3
442917_442918	LATERAL REINSTATEMENT	102.2013	102.2013	0.0		0	0	6	HDPE	155	0	1/1/2001	3
442917_442918	LATERAL REINSTATEMENT	95.50133	95.50133	0.0		0	0	6	HDPE	155	0	1/1/2001	3
442917_442918	LATERAL REINSTATEMENT	20.20134	20.20134	0.0		0	0	6	HDPE	155	0	1/1/2001	3
442917_442918 Total							96,163						
443004_443004A	LINING	8.4	16.5	8.1	ft	426	3,451	6	Lined VCP	403		1/1/1995	4
443004_443004A	POINT REPAIR	106.9	112.9	6.0	EA	18,720	18,720	6	Lined VCP	403		1/1/1995	4
443004_443004A	POINT REPAIR	325.8302	331.8302	6.0	EA	18,720	18,720	6	Lined VCP	403		1/1/1995	4
443004_443004A Total							40,891						
443005_443004	REPLACEMENT	0	54.11859	54.1	ft	620	33,554	6	VCP	54	0	1/1/1980	4
443005_443004 Total							33,554						
443007_443006	POINT REPAIR	92.4	98.4	6.0	EA	18,720	18,720	6	VCP	103		1/1/1970	4
443007_443006 Total							18,720						
443009_443008	POINT REPAIR	18.6	26.3	7.7	EA	18,720	18,720	6	VCP	277		1/1/1970	4
443009_443008	POINT REPAIR	217	223	6.0	EA	18,720	18,720	6	VCP	277		1/1/1970	4
443009_443008 Total							37,440						
443019_443015	POINT REPAIR	41.39277	47.39277	6.0	EA	18,720	18,720	6	Lined VCP	117		1/1/1995	4
443019_443015	POINT REPAIR	60.39277	66.39277	6.0	EA	18,720	18,720	6	Lined VCP	117		1/1/1995	4
443019_443015 Total							37,440						
443020_443019	REPLACEMENT	0	497.4373	497.4	ft	620	308,411	6	VCP	497	8	1/1/1970	3
443020_443019	LATERAL REINSTATEMENT	451.4373	451.4373	0.0		0	0	6	VCP	497	0	1/1/1970	3
443020_443019	LATERAL REINSTATEMENT	447.7373	447.7373	0.0		0	0	6	VCP	497	0	1/1/1970	3
443020_443019	LATERAL REINSTATEMENT	410.7373	410.7373	0.0		0	0	6	VCP	497	0	1/1/1970	3
443020_443019	LATERAL REINSTATEMENT	355.8373	355.8373	0.0		0	0	6	VCP	497	0	1/1/1970	3
443020_443019	LATERAL REINSTATEMENT	299.2373	299.2373	0.0		0	0	6	VCP	497	0	1/1/1970	3
443020_443019	LATERAL REINSTATEMENT	274.8373	274.8373	0.0		0	0	6	VCP	497	0	1/1/1970	3
443020_443019	LATERAL REINSTATEMENT	273.1373	273.1373	0.0		0	0	6	VCP	497	0	1/1/1970	3
443020_443019	LATERAL REINSTATEMENT	243.9373	243.9373	0.0		0	0	6	VCP	497	0	1/1/1970	3

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
443020_443019 Total							308,411						
443101_443218	REPLACEMENT	0	447.1582	447.2	ft	620	277,238	6	VCP	447	9	1/1/1980	4
443101_443218	LATERAL REINSTATEMENT	58.9	58.9	0.0		0	0	6	VCP	447	0	1/1/1980	4
443101_443218	LATERAL REINSTATEMENT	97.7	97.7	0.0		0	0	6	VCP	447	0	1/1/1980	4
443101_443218	LATERAL REINSTATEMENT	108.5	108.5	0.0		0	0	6	VCP	447	0	1/1/1980	4
443101_443218	LATERAL REINSTATEMENT	145.5	145.5	0.0		0	0	6	VCP	447	0	1/1/1980	4
443101_443218	LATERAL REINSTATEMENT	162.4	162.4	0.0		0	0	6	VCP	447	0	1/1/1980	4
443101_443218	LATERAL REINSTATEMENT	196.1	196.1	0.0		0	0	6	VCP	447	0	1/1/1980	4
443101_443218	LATERAL REINSTATEMENT	204.1	204.1	0.0		0	0	6	VCP	447	0	1/1/1980	4
443101_443218	LATERAL REINSTATEMENT	269.9	269.9	0.0		0	0	6	VCP	447	0	1/1/1980	4
443101_443218	LATERAL REINSTATEMENT	272.1	272.1	0.0		0	0	6	VCP	447	0	1/1/1980	4
443101_443218 Total							277,238						
443103_443101	POINT REPAIR	191.5005	194.5005	3.0	EA	18,720	18,720	6	Lined VCP	195		1/1/1998	3
443103_443101 Total							18,720						
443104_443103	POINT REPAIR	0	4.45664	4.5	EA	18,720	18,720	6	VCP	100		1/1/1980	4
443104_443103	POINT REPAIR	28.85664	34.85664	6.0	EA	18,720	18,720	6	VCP	100		1/1/1980	4
443104_443103 Total							37,440						
443202_443202A	POINT REPAIR	164.3	183.81	19.5	EA	30,660	30,660	15	VCP	184		1/1/1981	3
443202_443202A Total							30,660						
443222_443221	REPLACEMENT	0	72.19314	72.2	ft	650	46,926	8	PVC	72	5	1/1/1998	4
443222_443221	LATERAL REINSTATEMENT	65.49314	65.49314	0.0		0	0	8	PVC	72	0	1/1/1998	4
443222_443221	LATERAL REINSTATEMENT	14.49314	14.49314	0.0		0	0	8	PVC	72	0	1/1/1998	4
443222_443221	LATERAL REINSTATEMENT	12.79314	12.79314	0.0		0	0	8	PVC	72	0	1/1/1998	4
443222_443221	LATERAL REINSTATEMENT	10.09314	10.09314	0.0		0	0	8	PVC	72	0	1/1/1998	4
443222_443221	LATERAL REINSTATEMENT	8.593141	8.593141	0.0		0	0	8	PVC	72	0	1/1/1998	4
443222_443221 Total							46,926						
443311_443310	POINT REPAIR	104.1	110.1	6.0	EA	22,440	22,440	8	PVC	140		1/1/1993	4
443311_443310 Total							22,440						
443314_440736	LINING	4.3	10.3	6.0	ft	426	2,556	6	Lined VCP	378		1/1/2007	4
443314_440736	POINT REPAIR	87.5	93.5	6.0	EA	18,720	18,720	6	Lined VCP	378		1/1/2007	4
443314_440736	POINT REPAIR	126.8	132.8	6.0	EA	18,720	18,720	6	Lined VCP	378		1/1/2007	4
443314_440736 Total							39,996						
443317_443316	LINING	36.4	42.4	6.0	ft	426	2,556	6	VCP	209		1/1/1950	3
443317_443316	LINING	58.8	64.8	6.0	ft	426	2,556	6	VCP	209		1/1/1950	3
443317_443316	POINT REPAIR	204.5	208.9421	4.4	EA	18,720	18,720	6	VCP	209		1/1/1950	3
443317_443316 Total							23,832						
443326_443301	REPLACEMENT	0	357.6605	357.7	ft	620	221,750	6	HDPE	358	9	1/1/2003	3
443326_443301	LATERAL REINSTATEMENT	39.4	39.4	0.0		0	0	6	HDPE	358	0	1/1/2003	3
443326_443301	LATERAL REINSTATEMENT	43.9	43.9	0.0		0	0	6	HDPE	358	0	1/1/2003	3
443326_443301	LATERAL REINSTATEMENT	92.2	92.2	0.0		0	0	6	HDPE	358	0	1/1/2003	3
443326_443301	LATERAL REINSTATEMENT	142.2	142.2	0.0		0	0	6	HDPE	358	0	1/1/2003	3
443326_443301	LATERAL REINSTATEMENT	191.4	191.4	0.0		0	0	6	HDPE	358	0	1/1/2003	3
443326_443301	LATERAL REINSTATEMENT	195.6	195.6	0.0		0	0	6	HDPE	358	0	1/1/2003	3
443326_443301	LATERAL REINSTATEMENT	241.5	241.5	0.0		0	0	6	HDPE	358	0	1/1/2003	3
443326_443301	LATERAL REINSTATEMENT	319.3	319.3	0.0		0	0	6	HDPE	358	0	1/1/2003	3
443326_443301	LATERAL REINSTATEMENT	324.3	324.3	0.0		0	0	6	HDPE	358	0	1/1/2003	3
443326_443301 Total							221,750						
443407_443406	REPLACEMENT	0	72.01008	72.0	ft	620	44,646	6	VCP	72	1	1/1/1950	4
443407_443406	LATERAL REINSTATEMENT	1.310081	1.310081	0.0		0	0	6	VCP	72	0	1/1/1950	4
443407_443406 Total							44,646						
443422_443421	POINT REPAIR	119.1	125.1	6.0	EA	18,720	18,720	6	Lined VCP	174		1/1/2019	3

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
443422_443421 Total							18,720						
443502_443501	POINT REPAIR	195.933	201.933	6.0	EA	18,720	18,720	6	HDPE	206		1/1/2005	3
443502_443501 Total							18,720						
443503_443502	POINT REPAIR	0	4.2	4.2	EA	18,720	18,720	6	Lined VCP	163		1/1/2001	4
443503_443502 Total							18,720						
443507_443506	POINT REPAIR	64.3	83.4911	19.2	EA	18,720	18,720	6	Lined VCP	182		1/1/1995	3
443507_443506	POINT REPAIR	115.7911	121.7911	6.0	EA	18,720	18,720	6	Lined VCP	182		1/1/1995	3
443507_443506 Total							37,440						
443513_443309	LINING	105.9	127	21.1	ft	426	8,989	6	HDPE	142		1/1/2005	3
443513_443309 Total							8,989						
443804_443820	POINT REPAIR	3.789966	9.789966	6.0	EA	18,720	18,720	6	Lined VCP	123		1/1/2005	4
443804_443820	POINT REPAIR	34.28997	75.38996	41.1	EA	18,720	18,720	6	Lined VCP	123		1/1/2005	4
443804_443820 Total							37,440						
443813_441606	POINT REPAIR	64.22041	77.12041	12.9	EA	18,720	18,720	6	Lined VCP	169		1/1/2019	4
443813_441606 Total							18,720						
443821_441606	POINT REPAIR	2.8	44.7	41.9	EA	18,720	18,720	6	VCP	140		1/1/1950	4
443821_441606	POINT REPAIR	57	63	6.0	EA	18,720	18,720	6	VCP	140		1/1/1950	4
443821_441606	POINT REPAIR	97.5	116.3	18.8	EA	18,720	18,720	6	VCP	140		1/1/1950	4
443821_441606 Total							56,160						
450101_450102	POINT REPAIR	0	4.4	4.4	EA	22,440	22,440	8	VCP	131		1/1/1950	3
450101_450102 Total							22,440						
450103_450103A	POINT REPAIR	25.45196	66.95196	41.5	EA	25,260	25,260	10	VCP	303		1/1/1990	4
450103_450103A	POINT REPAIR	293.552	299.552	6.0	EA	25,260	25,260	10	VCP	303		1/1/1990	4
450103_450103A Total							50,520						
450103B_442701A	POINT REPAIR	9.5	69.4	59.9	EA	25,260	25,260	10	VCP	300		1/1/2005	3
450103B_442701A Total							25,260						
450104_450105	POINT REPAIR	4.9	10.9	6.0	EA	22,440	22,440	8	HDPE	192		1/1/2005	3
450104_450105 Total							22,440						
450108_450103	LINING	15.5426	21.5426	6.0	ft	426	2,556	6	VCP	54		1/1/1950	4
450108_450103	POINT REPAIR	42.4426	48.4426	6.0	EA	18,720	18,720	6	VCP	54		1/1/1950	4
450108_450103 Total							21,276						
450111_450112	REPLACEMENT	0	36.66647	36.7	ft	620	22,733	6	Lined VCP	37	1	1/1/1998	3
450111_450112	LATERAL REINSTATEMENT	16.66647	16.66647	0.0		0	0	6	Lined VCP	37	0	1/1/1998	3
450111_450112 Total							22,733						
450116_450115	POINT REPAIR	14.1	21.9	7.8	EA	18,720	18,720	6	Lined VCP	243		1/1/2001	4
450116_450115	POINT REPAIR	192.7	198.7	6.0	EA	18,720	18,720	6	Lined VCP	243		1/1/2001	4
450116_450115 Total							37,440						
450204_450409A	LINING	156.1	167.2	11.1	ft	510	5,661	10	VCP	199		1/1/1952	5
450204_450409A	POINT REPAIR	71.9	146.3	74.4	EA	25,260	25,260	10	VCP	199		1/1/1952	5
450204_450409A	POINT REPAIR	183.4	199.3971	16.0	EA	25,260	25,260	10	VCP	199		1/1/1952	5
450204_450409A Total							56,181						
450209_450208	POINT REPAIR	5.4	20.5	15.1	EA	25,260	25,260	10	HDPE	138		1/1/2005	3
450209_450208 Total							25,260						
450213_450214	LINING	96.6	102.6	6.0	ft	426	2,556	6	VCP	171		1/1/1970	3
450213_450214	LINING	131.8	137.8	6.0	ft	426	2,556	6	VCP	171		1/1/1970	3
450213_450214 Total							5,112						
450217_450216	REPLACEMENT	0	320.3991	320.4	ft	620	198,647	6	VCP	320	9	1/1/1970	4
450217_450216	LATERAL REINSTATEMENT	5.3	5.3	0.0		0	0	6	VCP	320	0	1/1/1970	4
450217_450216	LATERAL REINSTATEMENT	35	35	0.0		0	0	6	VCP	320	0	1/1/1970	4
450217_450216	LATERAL REINSTATEMENT	96.6	96.6	0.0		0	0	6	VCP	320	0	1/1/1970	4
450217_450216	LATERAL REINSTATEMENT	130.3	130.3	0.0		0	0	6	VCP	320	0	1/1/1970	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
450217_450216	LATERAL REINSTATEMENT	188.3	188.3	0.0		0	0	6	VCP	320	0	1/1/1970	4
450217_450216	LATERAL REINSTATEMENT	203	203	0.0		0	0	6	VCP	320	0	1/1/1970	4
450217_450216	LATERAL REINSTATEMENT	208.2	208.2	0.0		0	0	6	VCP	320	0	1/1/1970	4
450217_450216	LATERAL REINSTATEMENT	283.5	283.5	0.0		0	0	6	VCP	320	0	1/1/1970	4
450217_450216	LATERAL REINSTATEMENT	289.1	289.1	0.0		0	0	6	VCP	320	0	1/1/1970	4
450217_450216 Total							198,647						
450222_450218	POINT REPAIR	37.7	43.7	6.0	EA	18,720	18,720	6	VCP	138		1/1/1970	3
450222_450218 Total							18,720						
450304_450211	POINT REPAIR	274	280	6.0	EA	22,440	22,440	8	Lined VCP	434		1/1/2016	3
450304_450211 Total							22,440						
450305_450107	POINT REPAIR	190.1462	195.1462	5.0	EA	18,720	18,720	6	Lined VCP	195		1/1/2001	4
450305_450107 Total							18,720						
450409_450410	LINING	135.2	147.9	12.7	ft	510	6,477	10	Lined VCP	148		1/1/1952	5
450409_450410	POINT REPAIR	145.2992	148.2992	3.0	EA	25,260	25,260	10	Lined VCP	148		1/1/1952	5
450409_450410 Total							31,737						
450418_450411	REPLACEMENT	0	48.80889	48.8	ft	650	31,726	8	VCP	49	0	1/1/1998	4
450418_450411 Total							31,726						
450504_450503	POINT REPAIR	3.582283	31.68229	28.1	EA	18,720	18,720	6	Lined VCP	239		1/1/2015	4
450504_450503	POINT REPAIR	62.08228	96.58228	34.5	EA	18,720	18,720	6	Lined VCP	239		1/1/2015	4
450504_450503	POINT REPAIR	119.8823	166.1823	46.3	EA	18,720	18,720	6	Lined VCP	239		1/1/2015	4
450504_450503 Total							56,160						
450608_450801	LINING	55.9	61.9	6.0	ft	510	3,060	10	VCP	110		1/1/1952	5
450608_450801	POINT REPAIR	87.5	98.6	11.1	EA	25,260	25,260	10	VCP	110		1/1/1952	5
450608_450801 Total							28,320						
450609_450606	POINT REPAIR	43	49	6.0	EA	22,440	22,440	8	VCP	202		1/1/1950	4
450609_450606 Total							22,440						
450612_450608	LINING	80.6	90	9.4	ft	426	4,004	6	VCP	201		1/1/1950	5
450612_450608 Total							4,004						
450705_451107	LINING	173.9401	179.9401	6.0	ft	426	2,556	6	VCP	227		1/1/1952	5
450705_451107	LINING	218.9401	224.9401	6.0	ft	426	2,556	6	VCP	227		1/1/1952	5
450705_451107	POINT REPAIR	218.9401	224.9401	6.0	EA	18,720	18,720	6	VCP	227		1/1/1952	5
450705_451107 Total							23,832						
450801_450201	POINT REPAIR	169.4	190.3	20.9	EA	25,260	25,260	10	Lined VCP	268		1/1/2001	3
450801_450201 Total							25,260						
450803_450802	POINT REPAIR	172.8	178.8	6.0	EA	18,720	18,720	6	VCP	280		1/1/1970	4
450803_450802 Total							18,720						
450804_450803	POINT REPAIR	0	4.2	4.2	EA	18,720	18,720	6	VCP	67		1/1/1970	3
450804_450803 Total							18,720						
450805LH_450804	POINT REPAIR	83.55859	98.95859	15.4	EA	18,720	18,720	6	VCP	164		1/1/1970	4
450805LH_450804 Total							18,720						
450806_450807	REPLACEMENT	0	231.5255	231.5	ft	620	143,546	6	PVC	232	3	1/1/1970	3
450806_450807	LATERAL REINSTATEMENT	91.9	91.9	0.0		0	0	6	PVC	232	0	1/1/1970	3
450806_450807	LATERAL REINSTATEMENT	171.7	171.7	0.0		0	0	6	PVC	232	0	1/1/1970	3
450806_450807	LATERAL REINSTATEMENT	194.9	194.9	0.0		0	0	6	PVC	232	0	1/1/1970	3
450806_450807 Total							143,546						
450814_450813	LINING	76.7	89.7	13.0	ft	426	5,538	6	HDPE	169		1/1/2005	3
450814_450813	POINT REPAIR	166.0169	169.3	3.3	EA	18,720	18,720	6	HDPE	169		1/1/2005	3
450814_450813 Total							24,258						
450816LH_450815	POINT REPAIR	74.04092	80.04092	6.0	EA	18,720	18,720	6	VCP	94		1/1/1970	4
450816LH_450815 Total							18,720						
450817_450813	REPLACEMENT	0	265.5618	265.6	ft	620	164,648	6	Lined VCP	266	9	1/1/2005	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
450817_450813	LATERAL REINSTATEMENT	22.5	22.5	0.0		0	0	6	Lined VCP	266	0	1/1/2005	4
450817_450813	LATERAL REINSTATEMENT	27.9	27.9	0.0		0	0	6	Lined VCP	266	0	1/1/2005	4
450817_450813	LATERAL REINSTATEMENT	84.1	84.1	0.0		0	0	6	Lined VCP	266	0	1/1/2005	4
450817_450813	LATERAL REINSTATEMENT	86.4	86.4	0.0		0	0	6	Lined VCP	266	0	1/1/2005	4
450817_450813	LATERAL REINSTATEMENT	91.6	91.6	0.0		0	0	6	Lined VCP	266	0	1/1/2005	4
450817_450813	LATERAL REINSTATEMENT	150.7	150.7	0.0		0	0	6	Lined VCP	266	0	1/1/2005	4
450817_450813	LATERAL REINSTATEMENT	159.6	159.6	0.0		0	0	6	Lined VCP	266	0	1/1/2005	4
450817_450813	LATERAL REINSTATEMENT	233.6	233.6	0.0		0	0	6	Lined VCP	266	0	1/1/2005	4
450817_450813	LATERAL REINSTATEMENT	265.5618	265.5618	0.0		0	0	6	Lined VCP	266	0	1/1/2005	4
450817_450813 Total							164,648						
450819LH_450820	POINT REPAIR	68.05696	71.15696	3.1	EA	18,720	18,720	6	VCP	71		1/1/1970	4
450819LH_450820 Total							18,720						
450820_450802	REPLACEMENT	0	293.0131	293.0	ft	620	181,668	6	PVC	293	5	1/1/1970	3
450820_450802	LATERAL REINSTATEMENT	35.3	35.3	0.0		0	0	6	PVC	293	0	1/1/1970	3
450820_450802	LATERAL REINSTATEMENT	47.9	47.9	0.0		0	0	6	PVC	293	0	1/1/1970	3
450820_450802	LATERAL REINSTATEMENT	96	96	0.0		0	0	6	PVC	293	0	1/1/1970	3
450820_450802	LATERAL REINSTATEMENT	108.7	108.7	0.0		0	0	6	PVC	293	0	1/1/1970	3
450820_450802	LATERAL REINSTATEMENT	156.8	156.8	0.0		0	0	6	PVC	293	0	1/1/1970	3
450820_450802 Total							181,668						
450823_450806	POINT REPAIR	96	102	6.0	EA	18,720	18,720	6	PVC	169		1/1/2007	3
450823_450806	POINT REPAIR	151.9	165	13.1	EA	18,720	18,720	6	PVC	169		1/1/2007	3
450823_450806 Total							37,440						
450910_451001	POINT REPAIR	303	309	6.0	EA	35,760	35,760	24	HDPE	372		1/1/1992	3
450910_451001 Total							35,760						
450912_450911	POINT REPAIR	110.4	116.4	6.0	EA	18,720	18,720	6	VCP	296		1/1/1950	4
450912_450911	POINT REPAIR	233.9	239.9	6.0	EA	18,720	18,720	6	VCP	296		1/1/1950	4
450912_450911 Total							37,440						
450913_450912	POINT REPAIR	47.7	53.7	6.0	EA	18,720	18,720	6	Lined VCP	101		1/1/2005	4
450913_450912 Total							18,720						
450914_450913	POINT REPAIR	152	158	6.0	EA	18,720	18,720	6	PVC	160		1/1/1993	3
450914_450913 Total							18,720						
450922_451022	REPLACEMENT	0	240.2492	240.2	ft	620	148,955	6	Lined VCP	240	7	1/1/2001	4
450922_451022	LATERAL REINSTATEMENT	83	83	0.0		0	0	6	Lined VCP	240	0	1/1/2001	4
450922_451022	LATERAL REINSTATEMENT	85.8	85.8	0.0		0	0	6	Lined VCP	240	0	1/1/2001	4
450922_451022	LATERAL REINSTATEMENT	113.5	113.5	0.0		0	0	6	Lined VCP	240	0	1/1/2001	4
450922_451022	LATERAL REINSTATEMENT	114.9	114.9	0.0		0	0	6	Lined VCP	240	0	1/1/2001	4
450922_451022	LATERAL REINSTATEMENT	176.2	176.2	0.0		0	0	6	Lined VCP	240	0	1/1/2001	4
450922_451022	LATERAL REINSTATEMENT	183.4	183.4	0.0		0	0	6	Lined VCP	240	0	1/1/2001	4
450922_451022	LATERAL REINSTATEMENT	189.2	189.2	0.0		0	0	6	Lined VCP	240	0	1/1/2001	4
450922_451022 Total							148,955						
451003_451004	POINT REPAIR	254	260	6.0	EA	34,800	34,800	21	HDPE	416		1/1/2014	3
451003_451004	POINT REPAIR	340.5	364.9	24.4	EA	34,800	34,800	21	HDPE	416		1/1/2014	3
451003_451004 Total							69,600						
451007_451008	POINT REPAIR	293.015	364.515	71.5	EA	33,120	33,120	18	HDPE	370		1/1/2014	3
451007_451008 Total							33,120						
451019_451011	LINING	21.6	27.6	6.0	ft	426	2,556	6	VCP	300		1/1/1970	4
451019_451011	LINING	242.1	248.1	6.0	ft	426	2,556	6	VCP	300		1/1/1970	4
451019_451011	POINT REPAIR	264.7	270.7	6.0	EA	18,720	18,720	6	VCP	300		1/1/1970	4
451019_451011 Total							23,832						
451020_451019	REPLACEMENT	0	298.4545	298.5	ft	620	185,042	6	VCP	298	10	1/1/1970	4
451020_451019	LATERAL REINSTATEMENT	23.2	23.2	0.0		0	0	6	VCP	298	0	1/1/1970	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
451020_451019	LATERAL REINSTATEMENT	48.6	48.6	0.0		0	0	6	VCP	298	0	1/1/1970	4
451020_451019	LATERAL REINSTATEMENT	51.8	51.8	0.0		0	0	6	VCP	298	0	1/1/1970	4
451020_451019	LATERAL REINSTATEMENT	96.9	96.9	0.0		0	0	6	VCP	298	0	1/1/1970	4
451020_451019	LATERAL REINSTATEMENT	146.9	146.9	0.0		0	0	6	VCP	298	0	1/1/1970	4
451020_451019	LATERAL REINSTATEMENT	156	156	0.0		0	0	6	VCP	298	0	1/1/1970	4
451020_451019	LATERAL REINSTATEMENT	212.3	212.3	0.0		0	0	6	VCP	298	0	1/1/1970	4
451020_451019	LATERAL REINSTATEMENT	253.4	253.4	0.0		0	0	6	VCP	298	0	1/1/1970	4
451020_451019	LATERAL REINSTATEMENT	262.6	262.6	0.0		0	0	6	VCP	298	0	1/1/1970	4
451020_451019	LATERAL REINSTATEMENT	272	272	0.0		0	0	6	VCP	298	0	1/1/1970	4
451020_451019 Total							185,042						
451021_451020	REPLACEMENT	0	301.3508	301.4	ft	620	186,837	6	Lined VCP	301	7	1/1/1995	4
451021_451020	LATERAL REINSTATEMENT	39.2	39.2	0.0		0	0	6	Lined VCP	301	0	1/1/1995	4
451021_451020	LATERAL REINSTATEMENT	42.3	42.3	0.0		0	0	6	Lined VCP	301	0	1/1/1995	4
451021_451020	LATERAL REINSTATEMENT	143.4	143.4	0.0		0	0	6	Lined VCP	301	0	1/1/1995	4
451021_451020	LATERAL REINSTATEMENT	145.9	145.9	0.0		0	0	6	Lined VCP	301	0	1/1/1995	4
451021_451020	LATERAL REINSTATEMENT	243.5	243.5	0.0		0	0	6	Lined VCP	301	0	1/1/1995	4
451021_451020	LATERAL REINSTATEMENT	246.5	246.5	0.0		0	0	6	Lined VCP	301	0	1/1/1995	4
451021_451020	LATERAL REINSTATEMENT	267.6	267.6	0.0		0	0	6	Lined VCP	301	0	1/1/1995	4
451021_451020 Total							186,837						
451022_451021	REPLACEMENT	0	300.2393	300.2	ft	620	186,148	6	VCP	300	6	1/1/1970	4
451022_451021	LATERAL REINSTATEMENT	90	90	0.0		0	0	6	VCP	300	0	1/1/1970	4
451022_451021	LATERAL REINSTATEMENT	95.9	95.9	0.0		0	0	6	VCP	300	0	1/1/1970	4
451022_451021	LATERAL REINSTATEMENT	186.1	186.1	0.0		0	0	6	VCP	300	0	1/1/1970	4
451022_451021	LATERAL REINSTATEMENT	233.2393	233.2393	0.0		0	0	6	VCP	300	0	1/1/1970	4
451022_451021	LATERAL REINSTATEMENT	212.1393	212.1393	0.0		0	0	6	VCP	300	0	1/1/1970	4
451022_451021	LATERAL REINSTATEMENT	206.9393	206.9393	0.0		0	0	6	VCP	300	0	1/1/1970	4
451022_451021 Total							186,148						
451110_451109	LINING	227.3	233.3	6.0	ft	426	2,556	6	VCP	321		1/1/1970	4
451110_451109 Total							2,556						
451111_451110	LINING	3	9	6.0	ft	426	2,556	6	VCP	259		1/1/1970	4
451111_451110	LINING	49.8	61.4	11.6	ft	426	4,942	6	VCP	259		1/1/1970	4
451111_451110	POINT REPAIR	178.5917	184.5917	6.0	EA	18,720	18,720	6	VCP	259		1/1/1970	4
451111_451110 Total							26,218						
451112_451111	LINING	46.3	52.3	6.0	ft	426	2,556	6	VCP	252		1/1/1970	4
451112_451111	LINING	184.3	190.3	6.0	ft	426	2,556	6	VCP	252		1/1/1970	4
451112_451111	POINT REPAIR	239.4	245.4	6.0	EA	18,720	18,720	6	VCP	252		1/1/1970	4
451112_451111 Total							23,832						
451113_451112	POINT REPAIR	7.782608	17.38261	9.6	EA	18,720	18,720	6	VCP	218		1/1/1970	4
451113_451112	POINT REPAIR	150.0826	163.3826	13.3	EA	18,720	18,720	6	VCP	218		1/1/1970	4
451113_451112 Total							37,440						
451118_451119	POINT REPAIR	7.852995	13.853	6.0	EA	18,720	18,720	6	VCP	115		1/1/1970	4
451118_451119 Total							18,720						
451119_451120	REPLACEMENT	0	333.3792	333.4	ft	620	206,695	6	Lined VCP	333	9	1/1/2001	4
451119_451120	LATERAL REINSTATEMENT	54.6	54.6	0.0		0	0	6	Lined VCP	333	0	1/1/2001	4
451119_451120	LATERAL REINSTATEMENT	63.2	63.2	0.0		0	0	6	Lined VCP	333	0	1/1/2001	4
451119_451120	LATERAL REINSTATEMENT	122	122	0.0		0	0	6	Lined VCP	333	0	1/1/2001	4
451119_451120	LATERAL REINSTATEMENT	131	131	0.0		0	0	6	Lined VCP	333	0	1/1/2001	4
451119_451120	LATERAL REINSTATEMENT	188.3	188.3	0.0		0	0	6	Lined VCP	333	0	1/1/2001	4
451119_451120	LATERAL REINSTATEMENT	197.3	197.3	0.0		0	0	6	Lined VCP	333	0	1/1/2001	4
451119_451120	LATERAL REINSTATEMENT	255.9	255.9	0.0		0	0	6	Lined VCP	333	0	1/1/2001	4
451119_451120	LATERAL REINSTATEMENT	274.3	274.3	0.0		0	0	6	Lined VCP	333	0	1/1/2001	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
451119_451120	LATERAL REINSTATEMENT	322.4	322.4	0.0		0	0	6	Lined VCP	333	0	1/1/2001	4
451119_451120 Total							206,695						
451120_451121	LINING	0	3	3.0	ft	426	1,278	6	Lined VCP	127		1/1/2001	4
451120_451121	POINT REPAIR	63	69	6.0	EA	18,720	18,720	6	Lined VCP	127		1/1/2001	4
451120_451121	POINT REPAIR	96.1	102.1	6.0	EA	18,720	18,720	6	Lined VCP	127		1/1/2001	4
451120_451121 Total							38,718						
451121_450802	REPLACEMENT	0	202.4677	202.5	ft	620	125,530	6	Lined VCP	202	4	1/1/2005	4
451121_450802	LATERAL REINSTATEMENT	25.7	25.7	0.0		0	0	6	Lined VCP	202	0	1/1/2005	4
451121_450802	LATERAL REINSTATEMENT	48.5	48.5	0.0		0	0	6	Lined VCP	202	0	1/1/2005	4
451121_450802	LATERAL REINSTATEMENT	143.6	143.6	0.0		0	0	6	Lined VCP	202	0	1/1/2005	4
451121_450802	LATERAL REINSTATEMENT	155.6	155.6	0.0		0	0	6	Lined VCP	202	0	1/1/2005	4
451121_450802 Total							125,530						
451217LH_451216	POINT REPAIR	0	5.512621	5.5	EA	18,720	18,720	6	VCP	109		1/1/1970	4
451217LH_451216	POINT REPAIR	91.11262	97.11262	6.0	EA	18,720	18,720	6	VCP	109		1/1/1970	4
451217LH_451216 Total							37,440						
451304LH_451303	POINT REPAIR	0	5.837601	5.8	EA	18,720	18,720	6	VCP	153		1/1/1970	4
451304LH_451303	POINT REPAIR	147.3376	153.3376	6.0	EA	18,720	18,720	6	VCP	153		1/1/1970	4
451304LH_451303 Total							37,440						
451402A_451701	LINING	0	6	6.0	ft	1,032	6,192	18	PVC	145		1/1/2005	3
451402A_451701 Total							6,192						
451413_451509	REPLACEMENT	0	225	225.0	ft	620	139,500	6	PVC	225	4	1/1/2006	3
451413_451509	LATERAL REINSTATEMENT	28.7	28.7	0.0		0	0	6	PVC	225	0	1/1/2006	3
451413_451509	LATERAL REINSTATEMENT	63.5	63.5	0.0		0	0	6	PVC	225	0	1/1/2006	3
451413_451509	LATERAL REINSTATEMENT	108.3	108.3	0.0		0	0	6	PVC	225	0	1/1/2006	3
451413_451509	LATERAL REINSTATEMENT	158.5	158.5	0.0		0	0	6	PVC	225	0	1/1/2006	3
451413_451509 Total							139,500						
451415_451414	POINT REPAIR	0	7.2	7.2	EA	18,720	18,720	6	Lined VCP	237		1/1/2007	3
451415_451414 Total							18,720						
451421_451406	POINT REPAIR	133.5	139.5	6.0	EA	22,440	22,440	8	PVC	165		1/1/1930	4
451421_451406 Total							22,440						
451501_451502	POINT REPAIR	81.8	87.8	6.0	EA	18,720	18,720	6	Lined VCP	401		1/1/2007	4
451501_451502	POINT REPAIR	132.1	138.1	6.0	EA	18,720	18,720	6	Lined VCP	401		1/1/2007	4
451501_451502 Total							37,440						
451507_451507A	REPLACEMENT	0	25	25.0	ft	620	15,500	6	Lined VCP	25	0	1/1/1990	3
451507_451507A Total							15,500						
451508_451507	LINING	137.9	143.9	6.0	ft	426	2,556	6	VCP	151		1/1/1970	3
451508_451507 Total							2,556						
451605A_451606	POINT REPAIR	83.90518	87.20518	3.3	EA	18,720	18,720	6	VCP	87		1/1/1950	4
451605A_451606 Total							18,720						
451609_451608	REPLACEMENT	0	84.15652	84.2	ft	620	52,177	6	VCP	84	6	1/1/1990	4
451609_451608	LATERAL REINSTATEMENT	29.9	29.9	0.0		0	0	6	VCP	84	0	1/1/1990	4
451609_451608	LATERAL REINSTATEMENT	59.1	59.1	0.0		0	0	6	VCP	84	0	1/1/1990	4
451609_451608	LATERAL REINSTATEMENT	84.15652	84.15652	0.0		0	0	6	VCP	84	0	1/1/1990	4
451609_451608	LATERAL REINSTATEMENT	84.15652	84.15652	0.0		0	0	6	VCP	84	0	1/1/1990	4
451609_451608	LATERAL REINSTATEMENT	84.15652	84.15652	0.0		0	0	6	VCP	84	0	1/1/1990	4
451609_451608	LATERAL REINSTATEMENT	84.15652	84.15652	0.0		0	0	6	VCP	84	0	1/1/1990	4
451609_451608 Total							52,177						
451815_451815A	REPLACEMENT	0	256.01	256.0	ft	620	158,726	6	VCP	256	10	1/1/1978	4
451815_451815A	LATERAL REINSTATEMENT	20	20	0.0		0	0	6	VCP	256	0	1/1/1978	4
451815_451815A	LATERAL REINSTATEMENT	43	43	0.0		0	0	6	VCP	256	0	1/1/1978	4
451815_451815A	LATERAL REINSTATEMENT	65	65	0.0		0	0	6	VCP	256	0	1/1/1978	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
451815_451815A	LATERAL REINSTATEMENT	83.6	83.6	0.0		0	0	6	VCP	256	0	1/1/1978	4
451815_451815A	LATERAL REINSTATEMENT	87.8	87.8	0.0		0	0	6	VCP	256	0	1/1/1978	4
451815_451815A	LATERAL REINSTATEMENT	101.7	101.7	0.0		0	0	6	VCP	256	0	1/1/1978	4
451815_451815A	LATERAL REINSTATEMENT	130.9	130.9	0.0		0	0	6	VCP	256	0	1/1/1978	4
451815_451815A	LATERAL REINSTATEMENT	171.9	171.9	0.0		0	0	6	VCP	256	0	1/1/1978	4
451815_451815A	LATERAL REINSTATEMENT	190.4	190.4	0.0		0	0	6	VCP	256	0	1/1/1978	4
451815_451815A	LATERAL REINSTATEMENT	200	200	0.0		0	0	6	VCP	256	0	1/1/1978	4
451815_451815A Total							158,726						
451821B_451820	LINING	109.7	125.2	15.5	ft	426	6,603	6	VCP	462		1/1/1930	4
451821B_451820 Total							6,603						
451822A_451816A	POINT REPAIR	93.1	104.7	11.6	EA	18,720	18,720	6	VCP	217		1/1/1930	3
451822A_451816A	POINT REPAIR	173.1	199	25.9	EA	18,720	18,720	6	VCP	217		1/1/1930	3
451822A_451816A	POINT REPAIR	202.6	208.6	6.0	EA	18,720	18,720	6	VCP	217		1/1/1930	3
451822A_451816A Total							56,160						
451827_451826	POINT REPAIR	55	61	6.0	EA	18,720	18,720	6	PVC	167		1/1/2006	3
451827_451826	POINT REPAIR	124.3	130.3	6.0	EA	18,720	18,720	6	PVC	167		1/1/2006	3
451827_451826 Total							37,440						
452028_452027	POINT REPAIR	65.10129	70.30129	5.2	EA	18,720	18,720	6	Lined VCP	70		1/1/1995	4
452028_452027 Total							18,720						
452031_452108	POINT REPAIR	330.1	336.7668	6.7	EA	18,720	18,720	6	VCP	337		1/1/1970	4
452031_452108 Total							18,720						
452032_452031	REPLACEMENT	0	79.87509	79.9	ft	620	49,523	6	Lined VCP	80	0	1/1/1998	4
452032_452031 Total							49,523						
452101_452024	REPLACEMENT	0	134.853	134.9	ft	620	83,609	6	VCP	135	2	1/1/1970	4
452101_452024	LATERAL REINSTATEMENT	63.5	63.5	0.0		0	0	6	VCP	135	0	1/1/1970	4
452101_452024	LATERAL REINSTATEMENT	86.4	86.4	0.0		0	0	6	VCP	135	0	1/1/1970	4
452101_452024 Total							83,609						
452108_452025	POINT REPAIR	0	4.2	4.2	EA	18,720	18,720	6	HDPE	155		1/1/2005	3
452108_452025	POINT REPAIR	140.1	146.1	6.0	EA	18,720	18,720	6	HDPE	155		1/1/2005	3
452108_452025	POINT REPAIR	151	154.7043	3.7	EA	18,720	18,720	6	HDPE	155		1/1/2005	3
452108_452025 Total							56,160						
452109_452108	REPLACEMENT	0	91.41224	91.4	ft	620	56,676	6	VCP	91	1	1/1/1970	4
452109_452108	LATERAL REINSTATEMENT	0	0	0.0		0	0	6	VCP	91	0	1/1/1970	4
452109_452108 Total							56,676						
452111_452108	POINT REPAIR	85.39952	91.39952	6.0	EA	18,720	18,720	6	Lined VCP	159		1/1/2005	4
452111_452108	POINT REPAIR	130.2995	139.4995	9.2	EA	18,720	18,720	6	Lined VCP	159		1/1/2005	4
452111_452108 Total							37,440						
452403_452404	POINT REPAIR	86.8	111.3	24.5	EA	27,240	27,240	12	HDPE	291		1/1/1999	3
452403_452404	POINT REPAIR	275.3	287.9	12.6	EA	27,240	27,240	12	HDPE	291		1/1/1999	3
452403_452404 Total							54,480						
452408_403316	POINT REPAIR	0	3.2	3.2	EA	18,720	18,720	6	VCP	277		1/1/1970	4
452408_403316 Total							18,720						
452408A_452408	POINT REPAIR	86.14687	93.14687	7.0	EA	18,720	18,720	6	VCP	252		1/1/1970	4
452408A_452408	POINT REPAIR	239.6469	251.9469	12.3	EA	18,720	18,720	6	VCP	252		1/1/1970	4
452408A_452408 Total							37,440						
452410_452409	POINT REPAIR	176.9642	179.9642	3.0	EA	18,720	18,720	6	Lined VCP	180		1/1/2005	5
452410_452409 Total							18,720						
452411_452402	REPLACEMENT	0	129.7399	129.7	ft	620	80,439	6	Lined VCP	130	5	1/1/2005	5
452411_452402	LATERAL REINSTATEMENT	108.2399	108.2399	0.0		0	0	6	Lined VCP	130	0	1/1/2005	5
452411_452402	LATERAL REINSTATEMENT	81.23989	81.23989	0.0		0	0	6	Lined VCP	130	0	1/1/2005	5
452411_452402	LATERAL REINSTATEMENT	59.03989	59.03989	0.0		0	0	6	Lined VCP	130	0	1/1/2005	5

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
452411_452402	LATERAL REINSTATEMENT	56.93989	56.93989	0.0		0	0	6	Lined VCP	130	0	1/1/2005	5
452411_452402	LATERAL REINSTATEMENT	32.53989	32.53989	0.0		0	0	6	Lined VCP	130	0	1/1/2005	5
452411_452402 Total							80,439						
452415_452603	POINT REPAIR	36.9	42.9	6.0	EA	18,720	18,720	6	Lined VCP	96		1/1/2005	3
452415_452603 Total							18,720						
452417_452416	POINT REPAIR	195.2	201.2	6.0	EA	18,720	18,720	6	Lined VCP	205		1/1/2005	3
452417_452416 Total							18,720						
452418_452417	POINT REPAIR	87.6	93.6	6.0	EA	18,720	18,720	6	Lined VCP	101		1/1/2005	4
452418_452417 Total							18,720						
452420_452421	POINT REPAIR	315.9	320.4234	4.5	EA	18,720	18,720	6	Lined VCP	320		1/1/2006	3
452420_452421 Total							18,720						
452423_452422	POINT REPAIR	158.3097	164.3097	6.0	EA	18,720	18,720	6	HDPE	167		1/1/2001	3
452423_452422 Total							18,720						
452504_452504A	POINT REPAIR	189.6307	195.6307	6.0	EA	18,720	18,720	6	PVC	292		1/1/2006	3
452504_452504A	POINT REPAIR	231.5307	237.5307	6.0	EA	18,720	18,720	6	PVC	292		1/1/2006	3
452504_452504A Total							37,440						
452504A_452503	POINT REPAIR	163.4307	176.5307	13.1	EA	18,720	18,720	6	Lined VCP	292		1/1/2006	4
452504A_452503	POINT REPAIR	223.1307	229.1307	6.0	EA	18,720	18,720	6	Lined VCP	292		1/1/2006	4
452504A_452503	POINT REPAIR	252.0307	279.9307	27.9	EA	18,720	18,720	6	Lined VCP	292		1/1/2006	4
452504A_452503 Total							56,160						
452528_452420	POINT REPAIR	118.4	124.4	6.0	EA	18,720	18,720	6	Lined VCP	165		1/1/2006	4
452528_452420 Total							18,720						
452613_451826	LINING	356.1468	362.1468	6.0	ft	426	2,556	6	VCP	369		1/1/1970	4
452613_451826 Total							2,556						
452718_452719	POINT REPAIR	186.5389	192.5389	6.0	EA	18,720	18,720	6	VCP	195		1/1/1940	4
452718_452719 Total							18,720						
452719_452720	POINT REPAIR	94.7	100.7	6.0	EA	18,720	18,720	6	VCP	256		1/1/1940	4
452719_452720	POINT REPAIR	144	150	6.0	EA	18,720	18,720	6	VCP	256		1/1/1940	4
452719_452720 Total							37,440						
452728_452525	POINT REPAIR	0	138.6608	138.7	EA	18,720	18,720	6	Lined VCP	139		1/1/2005	4
452728_452525 Total							18,720						
452734_452733	POINT REPAIR	0	3.5	3.5	EA	18,720	18,720	6	Lined VCP	179		1/1/2006	3
452734_452733	POINT REPAIR	174.0565	178.5565	4.5	EA	18,720	18,720	6	Lined VCP	179		1/1/2006	3
452734_452733 Total							37,440						
452804_452712	POINT REPAIR	121.6	127.6	6.0	EA	18,720	18,720	6	Lined VCP	287		1/1/2005	4
452804_452712 Total							18,720						
452805_452804	POINT REPAIR	0	4.7	4.7	EA	18,720	18,720	6	Lined VCP	140		1/1/2006	4
452805_452804	POINT REPAIR	92.4	98.4	6.0	EA	18,720	18,720	6	Lined VCP	140		1/1/2006	4
452805_452804 Total							37,440						
452806_452717	POINT REPAIR	52.863	81.56299	28.7	EA	18,720	18,720	6	Lined VCP	210		1/1/2005	3
452806_452717 Total							18,720						
452815_452813	LINING	95.00994	101.0099	6.0	ft	426	2,556	6	VCP	137		1/1/1940	4
452815_452813	POINT REPAIR	133.8099	137.4099	3.6	EA	18,720	18,720	6	VCP	137		1/1/1940	4
452815_452813 Total							21,276						
453602_453601	POINT REPAIR	121.4	127.4	6.0	EA	18,720	18,720	6	Lined VCP	161		1/1/2001	4
453602_453601	POINT REPAIR	145.5	159.7	14.2	EA	18,720	18,720	6	Lined VCP	161		1/1/2001	4
453602_453601 Total							37,440						
453603_453602	POINT REPAIR	0	6	6.0	EA	18,720	18,720	6	VCP	268		1/1/1960	3
453603_453602 Total							18,720						
453604_453603	POINT REPAIR	0	4.8	4.8	EA	18,720	18,720	6	Lined VCP	273		1/1/2001	3
453604_453603 Total							18,720						

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
453605_453604	POINT REPAIR	212	273.8929	61.9	EA	18,720	18,720	6	VCP	274		1/1/1960	4
453605_453604 Total							18,720						
453716A_453716B	POINT REPAIR	247.3	253.3	6.0	EA	22,440	22,440	8	VCP	285		1/1/1973	4
453716A_453716B Total							22,440						
453716B_453716C	LINING	146.4	152.4	6.0	ft	474	2,844	8	VCP	314		1/1/1973	3
453716B_453716C Total							2,844						
453725_453716	POINT REPAIR	62.9	68.9	6.0	EA	22,440	22,440	8	VCP	189		1/1/1964	4
453725_453716 Total							22,440						
453901_453601	POINT REPAIR	44.9	50.9	6.0	EA	18,720	18,720	6	Lined VCP	95		1/1/2001	3
453901_453601 Total							18,720						
454004_454005	REPLACEMENT	0	268.924	268.9	ft	620	166,733	6	VCP	269	9	1/1/1960	4
454004_454005	LATERAL REINSTATEMENT	74.5	74.5	0.0		0	0	6	VCP	269	0	1/1/1960	4
454004_454005	LATERAL REINSTATEMENT	94.8	94.8	0.0		0	0	6	VCP	269	0	1/1/1960	4
454004_454005	LATERAL REINSTATEMENT	133.3	133.3	0.0		0	0	6	VCP	269	0	1/1/1960	4
454004_454005	LATERAL REINSTATEMENT	183.6	183.6	0.0		0	0	6	VCP	269	0	1/1/1960	4
454004_454005	LATERAL REINSTATEMENT	227.9	227.9	0.0		0	0	6	VCP	269	0	1/1/1960	4
454004_454005	LATERAL REINSTATEMENT	254.4	254.4	0.0		0	0	6	VCP	269	0	1/1/1960	4
454004_454005	LATERAL REINSTATEMENT	268.924	268.924	0.0		0	0	6	VCP	269	0	1/1/1960	4
454004_454005	LATERAL REINSTATEMENT	268.924	268.924	0.0		0	0	6	VCP	269	0	1/1/1960	4
454004_454005	LATERAL REINSTATEMENT	268.924	268.924	0.0		0	0	6	VCP	269	0	1/1/1960	4
454004_454005 Total							166,733						
454005_454006	REPLACEMENT	0	203.0623	203.1	ft	620	125,899	6	VCP	203	2	1/1/1960	4
454005_454006	LATERAL REINSTATEMENT	33.2	33.2	0.0		0	0	6	VCP	203	0	1/1/1960	4
454005_454006	LATERAL REINSTATEMENT	199.9	199.9	0.0		0	0	6	VCP	203	0	1/1/1960	4
454005_454006 Total							125,899						
454005_454107	REPLACEMENT	0	146.3805	146.4	ft	620	90,756	6	VCP	146	10	1/1/1960	4
454005_454107	LATERAL REINSTATEMENT	22.1	22.1	0.0		0	0	6	VCP	146	0	1/1/1960	4
454005_454107	LATERAL REINSTATEMENT	36	36	0.0		0	0	6	VCP	146	0	1/1/1960	4
454005_454107	LATERAL REINSTATEMENT	92.9	92.9	0.0		0	0	6	VCP	146	0	1/1/1960	4
454005_454107	LATERAL REINSTATEMENT	100.8	100.8	0.0		0	0	6	VCP	146	0	1/1/1960	4
454005_454107	LATERAL REINSTATEMENT	146.3805	146.3805	0.0		0	0	6	VCP	146	0	1/1/1960	4
454005_454107	LATERAL REINSTATEMENT	146.3805	146.3805	0.0		0	0	6	VCP	146	0	1/1/1960	4
454005_454107	LATERAL REINSTATEMENT	146.3805	146.3805	0.0		0	0	6	VCP	146	0	1/1/1960	4
454005_454107	LATERAL REINSTATEMENT	146.3805	146.3805	0.0		0	0	6	VCP	146	0	1/1/1960	4
454005_454107	LATERAL REINSTATEMENT	146.3805	146.3805	0.0		0	0	6	VCP	146	0	1/1/1960	4
454005_454107	LATERAL REINSTATEMENT	146.3805	146.3805	0.0		0	0	6	VCP	146	0	1/1/1960	4
454005_454107 Total							90,756						
454006_454101	REPLACEMENT	0	219.9656	220.0	ft	620	136,379	6	VCP	220	4	1/1/1960	4
454006_454101	LATERAL REINSTATEMENT	21.1	21.1	0.0		0	0	6	VCP	220	0	1/1/1960	4
454006_454101	LATERAL REINSTATEMENT	95.8	95.8	0.0		0	0	6	VCP	220	0	1/1/1960	4
454006_454101	LATERAL REINSTATEMENT	156.8	156.8	0.0		0	0	6	VCP	220	0	1/1/1960	4
454006_454101	LATERAL REINSTATEMENT	214.8	214.8	0.0		0	0	6	VCP	220	0	1/1/1960	4
454006_454101 Total							136,379						
454101_454102	POINT REPAIR	0	34.9	34.9	EA	18,720	18,720	6	VCP	309		1/1/1960	4
454101_454102	POINT REPAIR	70	76	6.0	EA	18,720	18,720	6	VCP	309		1/1/1960	4
454101_454102	POINT REPAIR	241.8	247.8	6.0	EA	18,720	18,720	6	VCP	309		1/1/1960	4
454101_454102 Total							56,160						
454102_454103	REPLACEMENT	0	424.2059	424.2	ft	620	263,008	6	Lined VCP	424	11	1/1/1998	4
454102_454103	LATERAL REINSTATEMENT	33	33	0.0		0	0	6	Lined VCP	424	0	1/1/1998	4
454102_454103	LATERAL REINSTATEMENT	71.5	71.5	0.0		0	0	6	Lined VCP	424	0	1/1/1998	4
454102_454103	LATERAL REINSTATEMENT	110.5	110.5	0.0		0	0	6	Lined VCP	424	0	1/1/1998	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
454102_454103	LATERAL REINSTATEMENT	149.3	149.3	0.0		0	0	6	Lined VCP	424	0	1/1/1998	4
454102_454103	LATERAL REINSTATEMENT	188.2	188.2	0.0		0	0	6	Lined VCP	424	0	1/1/1998	4
454102_454103	LATERAL REINSTATEMENT	231.9	231.9	0.0		0	0	6	Lined VCP	424	0	1/1/1998	4
454102_454103	LATERAL REINSTATEMENT	264.2	264.2	0.0		0	0	6	Lined VCP	424	0	1/1/1998	4
454102_454103	LATERAL REINSTATEMENT	315.1	315.1	0.0		0	0	6	Lined VCP	424	0	1/1/1998	4
454102_454103	LATERAL REINSTATEMENT	341.2	341.2	0.0		0	0	6	Lined VCP	424	0	1/1/1998	4
454102_454103	LATERAL REINSTATEMENT	398	398	0.0		0	0	6	Lined VCP	424	0	1/1/1998	4
454102_454103	LATERAL REINSTATEMENT	411.9	411.9	0.0		0	0	6	Lined VCP	424	0	1/1/1998	4
454102_454103 Total							263,008						
454103_454104	REPLACEMENT	0	277.5054	277.5	ft	620	172,053	6	Lined VCP	278	7	1/1/1998	4
454103_454104	LATERAL REINSTATEMENT	47.4	47.4	0.0		0	0	6	Lined VCP	278	0	1/1/1998	4
454103_454104	LATERAL REINSTATEMENT	67.6	67.6	0.0		0	0	6	Lined VCP	278	0	1/1/1998	4
454103_454104	LATERAL REINSTATEMENT	123.9	123.9	0.0		0	0	6	Lined VCP	278	0	1/1/1998	4
454103_454104	LATERAL REINSTATEMENT	169.2	169.2	0.0		0	0	6	Lined VCP	278	0	1/1/1998	4
454103_454104	LATERAL REINSTATEMENT	218.9	218.9	0.0		0	0	6	Lined VCP	278	0	1/1/1998	4
454103_454104	LATERAL REINSTATEMENT	263.7	263.7	0.0		0	0	6	Lined VCP	278	0	1/1/1998	4
454103_454104	LATERAL REINSTATEMENT	271.5	271.5	0.0		0	0	6	Lined VCP	278	0	1/1/1998	4
454103_454104 Total							172,053						
454104_453905	POINT REPAIR	41.6	47.6	6.0	EA	18,720	18,720	6	VCP	276		1/1/1960	4
454104_453905	POINT REPAIR	91.7	97.7	6.0	EA	18,720	18,720	6	VCP	276		1/1/1960	4
454104_453905 Total							37,440						
454105_454104	POINT REPAIR	11.4	17.4	6.0	EA	18,720	18,720	6	Lined VCP	289		1/1/1998	3
454105_454104	POINT REPAIR	92.7	98.7	6.0	EA	18,720	18,720	6	Lined VCP	289		1/1/1998	3
454105_454104 Total							37,440						
454106_454105	REPLACEMENT	0	423.3697	423.4	ft	620	262,489	6	HDPE	423	10	1/1/2002	3
454106_454105	LATERAL REINSTATEMENT	22.3	22.3	0.0		0	0	6	HDPE	423	0	1/1/2002	3
454106_454105	LATERAL REINSTATEMENT	72	72	0.0		0	0	6	HDPE	423	0	1/1/2002	3
454106_454105	LATERAL REINSTATEMENT	94.9	94.9	0.0		0	0	6	HDPE	423	0	1/1/2002	3
454106_454105	LATERAL REINSTATEMENT	155.6	155.6	0.0		0	0	6	HDPE	423	0	1/1/2002	3
454106_454105	LATERAL REINSTATEMENT	173.1	173.1	0.0		0	0	6	HDPE	423	0	1/1/2002	3
454106_454105	LATERAL REINSTATEMENT	231.1	231.1	0.0		0	0	6	HDPE	423	0	1/1/2002	3
454106_454105	LATERAL REINSTATEMENT	251.5	251.5	0.0		0	0	6	HDPE	423	0	1/1/2002	3
454106_454105	LATERAL REINSTATEMENT	314.2	314.2	0.0		0	0	6	HDPE	423	0	1/1/2002	3
454106_454105	LATERAL REINSTATEMENT	316.7	316.7	0.0		0	0	6	HDPE	423	0	1/1/2002	3
454106_454105	LATERAL REINSTATEMENT	366.5	366.5	0.0		0	0	6	HDPE	423	0	1/1/2002	3
454106_454105 Total							262,489						
454107_454106	REPLACEMENT	0	401.2961	401.3	ft	620	248,804	6	HDPE	401	9	1/1/2003	3
454107_454106	LATERAL REINSTATEMENT	80	80	0.0		0	0	6	HDPE	401	0	1/1/2003	3
454107_454106	LATERAL REINSTATEMENT	106.1	106.1	0.0		0	0	6	HDPE	401	0	1/1/2003	3
454107_454106	LATERAL REINSTATEMENT	147.2	147.2	0.0		0	0	6	HDPE	401	0	1/1/2003	3
454107_454106	LATERAL REINSTATEMENT	183.2	183.2	0.0		0	0	6	HDPE	401	0	1/1/2003	3
454107_454106	LATERAL REINSTATEMENT	220.3	220.3	0.0		0	0	6	HDPE	401	0	1/1/2003	3
454107_454106	LATERAL REINSTATEMENT	259.2	259.2	0.0		0	0	6	HDPE	401	0	1/1/2003	3
454107_454106	LATERAL REINSTATEMENT	297.6	297.6	0.0		0	0	6	HDPE	401	0	1/1/2003	3
454107_454106	LATERAL REINSTATEMENT	335.8	335.8	0.0		0	0	6	HDPE	401	0	1/1/2003	3
454107_454106	LATERAL REINSTATEMENT	368.2	368.2	0.0		0	0	6	HDPE	401	0	1/1/2003	3
454107_454106 Total							248,804						
454202_454201	POINT REPAIR	0	5.9	5.9	EA	18,720	18,720	6	VCP	160		1/1/1960	4
454202_454201	POINT REPAIR	145.7	151.7	6.0	EA	18,720	18,720	6	VCP	160		1/1/1960	4
454202_454201 Total							37,440						
454203_454202	POINT REPAIR	159.5	165.5	6.0	EA	18,720	18,720	6	VCP	170		1/1/1960	4

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
454203_454202 Total							18,720						
454204_454203	POINT REPAIR	0.1	6.1	6.0	EA	18,720	18,720	6	VCP	72		1/1/1960	3
454204_454203 Total							18,720						
454206_454205	POINT REPAIR	0	4.6	4.6	EA	18,720	18,720	6	VCP	122		1/1/1960	3
454206_454205 Total							18,720						
454210_454209	POINT REPAIR	49.92197	55.92197	6.0	EA	18,720	18,720	6	VCP	101		1/1/1960	3
454210_454209 Total							18,720						
454211_454209	POINT REPAIR	0	5.7	5.7	EA	18,720	18,720	6	VCP	171		1/1/1960	3
454211_454209 Total							18,720						
454213_454212	POINT REPAIR	51.5	57.5	6.0	EA	18,720	18,720	6	VCP	141		1/1/1960	4
454213_454212	POINT REPAIR	130.5	136.5	6.0	EA	18,720	18,720	6	VCP	141		1/1/1960	4
454213_454212 Total							37,440						
454214_454213	REPLACEMENT	0	199.1714	199.2	ft	620	123,486	6	VCP	199	1	1/1/1960	4
454214_454213	LATERAL REINSTATEMENT	71.5	71.5	0.0		0	0	6	VCP	199	0	1/1/1960	4
454214_454213 Total							123,486						
454303_454302	REPLACEMENT	0	272.7941	272.8	ft	650	177,316	8	VCP	273	5	1/1/1970	4
454303_454302	LATERAL REINSTATEMENT	22.8	22.8	0.0		0	0	8	VCP	273	0	1/1/1970	4
454303_454302	LATERAL REINSTATEMENT	211.2	211.2	0.0		0	0	8	VCP	273	0	1/1/1970	4
454303_454302	LATERAL REINSTATEMENT	239.5	239.5	0.0		0	0	8	VCP	273	0	1/1/1970	4
454303_454302	LATERAL REINSTATEMENT	277	272.7941	-4.2		0	0	8	VCP	273	0	1/1/1970	4
454303_454302	LATERAL REINSTATEMENT	272.7941	272.7941	0.0		0	0	8	VCP	273	0	1/1/1970	4
454303_454302 Total							177,316						
454304_454301	POINT REPAIR	0	3	3.0	EA	22,440	22,440	8	Lined VCP	52		1/1/2001	3
454304_454301 Total							22,440						
454305_454301	LINING	2	8	6.0	ft	474	2,844	8	VCP	43		1/1/1950	3
454305_454301 Total							2,844						
454402_454401	POINT REPAIR	0	3.6	3.6	EA	18,720	18,720	6	VCP	123		1/1/1960	3
454402_454401 Total							18,720						
454404_454405	POINT REPAIR	219.9	225.9	6.0	EA	18,720	18,720	6	VCP	230		1/1/1960	3
454404_454405 Total							18,720						
454406_454407	POINT REPAIR	140.1	155	14.9	EA	18,720	18,720	6	VCP	167		1/1/1960	3
454406_454407 Total							18,720						
454413_454411	POINT REPAIR	149.2	152.8717	3.7	EA	18,720	18,720	6	VCP	153		1/1/1960	4
454413_454411 Total							18,720						
454414_454413	POINT REPAIR	67.4	73.4	6.0	EA	18,720	18,720	6	VCP	90		1/1/1960	3
454414_454413 Total							18,720						
454415_454414	POINT REPAIR	70.2	76.2	6.0	EA	18,720	18,720	6	VCP	221		1/1/1960	3
454415_454414 Total							18,720						
454416_454417	POINT REPAIR	8.058862	14.05886	6.0	EA	18,720	18,720	6	VCP	68		1/1/1960	3
454416_454417 Total							18,720						
454417_454419	REPLACEMENT	0	169.5126	169.5	ft	620	105,098	6	VCP	170	3	1/1/1960	4
454417_454419	LATERAL REINSTATEMENT	55.2	55.2	0.0		0	0	6	VCP	170	0	1/1/1960	4
454417_454419	LATERAL REINSTATEMENT	67.6	67.6	0.0		0	0	6	VCP	170	0	1/1/1960	4
454417_454419	LATERAL REINSTATEMENT	102.6	102.6	0.0		0	0	6	VCP	170	0	1/1/1960	4
454417_454419 Total							105,098						
454418_454417	POINT REPAIR	30.04605	36.04605	6.0	EA	18,720	18,720	6	Lined VCP	133		1/1/2001	4
454418_454417	POINT REPAIR	55.44605	112.0461	56.6	EA	18,720	18,720	6	Lined VCP	133		1/1/2001	4
454418_454417	POINT REPAIR	121.7461	127.7461	6.0	EA	18,720	18,720	6	Lined VCP	133		1/1/2001	4
454418_454417 Total							56,160						
454419_454420	POINT REPAIR	128.0946	131.0946	3.0	EA	18,720	18,720	6	VCP	131		1/1/1960	4
454419_454420 Total							18,720						

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
454421_454423	POINT REPAIR	82.6	88.6	6.0	EA	18,720	18,720	6	VCP	126		1/1/1960	3
454421_454423 Total							18,720						
454424_454425	POINT REPAIR	103.6	121.1	17.5	EA	18,720	18,720	6	VCP	406		1/1/1960	3
454424_454425	POINT REPAIR	343.9	349.9	6.0	EA	18,720	18,720	6	VCP	406		1/1/1960	3
454424_454425 Total							37,440						
454425_454426	POINT REPAIR	61.2	68.9	7.7	EA	18,720	18,720	6	HDPE	94		1/1/2003	3
454425_454426 Total							18,720						
454431_454425	POINT REPAIR	50.63658	54.93658	4.3	EA	18,720	18,720	6	VCP	55		1/1/1960	4
454431_454425 Total							18,720						
454432_453401	POINT REPAIR	2	8	6.0	EA	18,720	18,720	6	VCP	439		1/1/1950	4
454432_453401 Total							18,720						
454503_454502	POINT REPAIR	230.4	236.4	6.0	EA	18,720	18,720	6	VCP	330		1/1/1960	4
454503_454502	POINT REPAIR	248.6	254.6	6.0	EA	18,720	18,720	6	VCP	330		1/1/1960	4
454503_454502 Total							37,440						
454503_454701	POINT REPAIR	93.6	99.6	6.0	EA	18,720	18,720	6	VCP	133		1/1/1960	4
454503_454701	POINT REPAIR	122	128	6.0	EA	18,720	18,720	6	VCP	133		1/1/1960	4
454503_454701 Total							37,440						
454505_454504	POINT REPAIR	101.3826	105.0826	3.7	EA	18,720	18,720	6	VCP	105		1/1/1960	3
454505_454504 Total							18,720						
454507_454505	POINT REPAIR	201.1317	237.3317	36.2	EA	18,720	18,720	6	VCP	238		1/1/1960	4
454507_454505 Total							18,720						
454601_454508	POINT REPAIR	0	62.909	62.9	EA	18,720	18,720	6	VCP	63		1/1/1960	4
454601_454508 Total							18,720						
454602_454603	POINT REPAIR	147.8	153.8	6.0	EA	18,720	18,720	6	HDPE	300		1/1/2003	3
454602_454603 Total							18,720						
454603_454606A	POINT REPAIR	62.8	65.68313	2.9	EA	18,720	18,720	6	VCP	66		1/1/1960	3
454603_454606A Total							18,720						
454603_454610	POINT REPAIR	22.1	28.1	6.0	EA	18,720	18,720	6	VCP	271		1/1/1960	4
454603_454610	POINT REPAIR	57	63	6.0	EA	18,720	18,720	6	VCP	271		1/1/1960	4
454603_454610	POINT REPAIR	130.2	141.3	11.1	EA	18,720	18,720	6	VCP	271		1/1/1960	4
454603_454610 Total							56,160						
454610_454609	POINT REPAIR	238.1	244.1	6.0	EA	18,720	18,720	6	VCP	251		1/1/1960	3
454610_454609 Total							18,720						
454611_454503	POINT REPAIR	40	46	6.0	EA	18,720	18,720	6	VCP	222		1/1/1960	4
454611_454503	POINT REPAIR	138.3	144.3	6.0	EA	18,720	18,720	6	VCP	222		1/1/1960	4
454611_454503 Total							37,440						
454611_454610	POINT REPAIR	53.6	59.6	6.0	EA	18,720	18,720	6	Lined VCP	229		1/1/2002	3
454611_454610 Total							18,720						
454707_454703	LINING	259.2	265.2	6.0	ft	426	2,556	6	VCP	273		1/1/1960	4
454707_454703	POINT REPAIR	255.5	268.1	12.6	EA	18,720	18,720	6	VCP	273		1/1/1960	4
454707_454703 Total							21,276						
454708_454707	POINT REPAIR	0.3	6.3	6.0	EA	18,720	18,720	6	VCP	225		1/1/1960	4
454708_454707	POINT REPAIR	212	218	6.0	EA	18,720	18,720	6	VCP	225		1/1/1960	4
454708_454707 Total							37,440						
454710_454709	POINT REPAIR	177	183	6.0	EA	18,720	18,720	6	Lined VCP	258		1/1/2002	4
454710_454709 Total							18,720						
454711_454709	POINT REPAIR	121.287	127.287	6.0	EA	18,720	18,720	6	Lined VCP	202		1/1/2002	4
454711_454709	POINT REPAIR	146.487	167.087	20.6	EA	18,720	18,720	6	Lined VCP	202		1/1/2002	4
454711_454709 Total							37,440						
454908_454801	POINT REPAIR	0	4.7	4.7	EA	18,720	18,720	6	Lined VCP	214		1/1/1998	3
454908_454801 Total							18,720						

Appendix K. Gravity Mains Final Rehabilitation Plan Details

ID	Repair Type	Begin	End	Rehab. Length (ft)	Unit	Unit Cost	Plan Cost	Pipe Size	Material	Pipe Length	um. of Latera	Install Date	Risk Score
455001_455002	POINT REPAIR	0	4.4	4.4	EA	18,720	18,720	6	Lined VCP	415		1/1/2002	3
455001_455002 Total							18,720						
455004_PS3	REPLACEMENT	0	30.42707	30.4	ft	620	18,865	6	HDPE	30	0	1/1/2003	3
455004_PS3 Total							18,865						
455101_454606	POINT REPAIR	129.7	135.7	6.0	EA	18,720	18,720	6	VCP	154		1/1/1960	4
455101_454606 Total							18,720						
455103_455101	POINT REPAIR	56.6	62.6	6.0	EA	18,720	18,720	6	VCP	176		1/1/1960	4
455103_455101	POINT REPAIR	87.6	103.3	15.7	EA	18,720	18,720	6	VCP	176		1/1/1960	4
455103_455101	POINT REPAIR	155.7	175	19.3	EA	18,720	18,720	6	VCP	176		1/1/1960	4
455103_455101 Total							56,160						
455107_455105	POINT REPAIR	45.3	51.3	6.0	EA	18,720	18,720	6	VCP	229		1/1/1960	4
455107_455105 Total							18,720						
455108LH_455107	POINT REPAIR	45.73027	51.73027	6.0	EA	18,720	18,720	6	VCP	237		1/1/1960	4
455108LH_455107	POINT REPAIR	162.9303	186.8303	23.9	EA	18,720	18,720	6	VCP	237		1/1/1960	4
455108LH_455107	POINT REPAIR	194.0303	200.0303	6.0	EA	18,720	18,720	6	VCP	237		1/1/1960	4
455108LH_455107 Total							56,160						
LH433213_442504	REPLACEMENT	0	130	130.0	ft	620	80,600	6	VCP	130	1	1/1/1953	5
LH433213_442504	LATERAL REINSTATEMENT	129.5	129.5	0.0		0	0	6	VCP	130	0	1/1/1953	5
LH433213_442504 Total							80,600						
LH450104B_450104	POINT REPAIR	168.3932	174.3932	6.0	EA	18,720	18,720	6	VCP	227		1/1/1970	4
H450104B_450104 Total							18,720						
Grand Total							28,884,925						

Appendix L. Sewer Near-term CIP Summary Sheet for 2024-2030

CIP	Category	FY	Design Cost	Construction Cost	Cost/FY	Note	Contributing Development(s)
San Juan LS	Capacity	FY 2023-2024			$0		None
San Juan LS	Capacity	FY 2024-2025	$1,500,000		$1,500,000	30% Total Cost	
San Juan LS	Capacity	FY 2025-2026		$1,750,000	$1,750,000	35% Total Cost	
San Juan LS	Capacity	FY 2026-2027		$1,750,000	$1,750,000	35% Total Cost	
San Juan LS	Capacity	FY 2027-2028			$0		
San Juan LS	Capacity	FY 2028-2029			$0		
San Juan LS	Capacity	FY 2029-2030			$0		
CCIP_1	Capacity	FY 2023-2024	$115,515		$115,515	30% Total Cost	None
CCIP_1	Capacity	FY 2024-2025		$269,535	$269,535	70% Total Cost	
CCIP_1	Capacity	FY 2025-2026			$0		
CCIP_1	Capacity	FY 2026-2027			$0		
CCIP_1	Capacity	FY 2027-2028			$0		
CCIP_1	Capacity	FY 2028-2029			$0		
CCIP_1	Capacity	FY 2029-2030			$0		
CCIP_2	Capacity	FY 2023-2024	$632,388		$632,388	30% Total Cost	None
CCIP_2	Capacity	FY 2024-2025		$1,475,572	$1,475,572	70% Total Cost	
CCIP_2	Capacity	FY 2025-2026			$0		
CCIP_2	Capacity	FY 2026-2027			$0		
CCIP_2	Capacity	FY 2027-2028			$0		
CCIP_2	Capacity	FY 2028-2029			$0		
CCIP_2	Capacity	FY 2029-2030			$0		
CCIP_3	Capacity	FY 2023-2024			$0		Davis St.
CCIP_3	Capacity	FY 2024-2025	$59,922		$59,922	30% Total Cost	
CCIP_3	Capacity	FY 2025-2026		$139,818	$139,818	70% Total Cost	Related: CCIP_13, CCIP_14
CCIP_3	Capacity	FY 2026-2027			$0		
CCIP_3	Capacity	FY 2027-2028			$0		
CCIP_3	Capacity	FY 2028-2029			$0		
CCIP_3	Capacity	FY 2029-2030			$0		
CCIP_4	Capacity	FY 2023-2024			$0		
CCIP_4	Capacity	FY 2024-2025			$0		
CCIP_4	Capacity	FY 2025-2026			$0		
CCIP_4	Capacity	FY 2026-2027			$0		
CCIP_4	Capacity	FY 2027-2028			$0		
CCIP_4	Capacity	FY 2028-2029			$0		
CCIP_4	Capacity	FY 2029-2030	$117,360		$117,360	30% Total Cost	
CCIP_5	Capacity	FY 2023-2024			$0		
CCIP_5	Capacity	FY 2024-2025			$0		
CCIP_5	Capacity	FY 2025-2026			$0		
CCIP_5	Capacity	FY 2026-2027			$0		
CCIP_5	Capacity	FY 2027-2028			$0		
CCIP_5	Capacity	FY 2028-2029			$0		
CCIP_5	Capacity	FY 2029-2030	$445,890		$445,890	30% Total Cost	
CCIP_6	Capacity	FY 2023-2024			$0		Belmont Village
CCIP_6	Capacity	FY 2024-2025			$0		
CCIP_6	Capacity	FY 2025-2026			$0		Related: CCIP_7
CCIP_6	Capacity	FY 2026-2027	$321,120		$321,120	30% Total Cost	
CCIP_6	Capacity	FY 2027-2028		$749,280	$749,280	70% Total Cost	
CCIP_6	Capacity	FY 2028-2029			$0		
CCIP_6	Capacity	FY 2029-2030			$0		
CCIP_7	Capacity	FY 2023-2024			$0		Belmont Village
CCIP_7	Capacity	FY 2024-2025			$0		
CCIP_7	Capacity	FY 2025-2026			$0		Related: CCIP_6
CCIP_7	Capacity	FY 2026-2027	$77,760		$77,760	30% Total Cost	
CCIP_7	Capacity	FY 2027-2028		$181,440	$181,440	70% Total Cost	
CCIP_7	Capacity	FY 2028-2029			$0		
CCIP_7	Capacity	FY 2029-2030			$0		
CCIP_8 (includes HIA CIP-1B	Capacity	FY 2023-2024			$0		Portion of HIA
CCIP_8 (includes HIA CIP-1B	Capacity	FY 2024-2025			$0		
CCIP_8 (includes HIA CIP-1B	Capacity	FY 2025-2026			$0		
CCIP_8 (includes HIA CIP-1B	Capacity	FY 2026-2027			$0		
CCIP_8 (includes HIA CIP-1B	Capacity	FY 2027-2028	$1,283,589		$1,283,589	30% Total Cost	
CCIP_8 (includes HIA CIP-1B	Capacity	FY 2028-2029		$1,497,521	$1,497,521	35% Total Cost	
CCIP_8 (includes HIA CIP-1B	Capacity	FY 2029-2030		$1,497,521	$1,497,521	35% Total Cost	
CCIP_9	Capacity	FY 2023-2024			$0		
CCIP_9	Capacity	FY 2024-2025			$0		
CCIP_9	Capacity	FY 2025-2026			$0		
CCIP_9	Capacity	FY 2026-2027			$0		
CCIP_9	Capacity	FY 2027-2028			$0		
CCIP_9	Capacity	FY 2028-2029			$0		
CCIP_9	Capacity	FY 2029-2030	$560,976		$560,976	30% Total Cost	
CCIP_10	Capacity	FY 2023-2024			$0		
CCIP_10	Capacity	FY 2024-2025			$0		
CCIP_10	Capacity	FY 2025-2026			$0		
CCIP_10	Capacity	FY 2026-2027			$0		
CCIP_10	Capacity	FY 2027-2028			$0		
CCIP_10	Capacity	FY 2028-2029			$0		
CCIP_10	Capacity	FY 2029-2030			$0		
CCIP_11	Capacity	FY 2023-2024			$0		
CCIP_11	Capacity	FY 2024-2025			$0		
CCIP_11	Capacity	FY 2025-2026			$0		
CCIP_11	Capacity	FY 2026-2027			$0		
CCIP_11	Capacity	FY 2027-2028			$0		
CCIP_11	Capacity	FY 2028-2029			$0		
CCIP_11	Capacity	FY 2029-2030			$0		
CCIP_12	Capacity	FY 2023-2024			$0		El Camino Real Corridor Mixed Use
CCIP_12	Capacity	FY 2024-2025			$0		
CCIP_12	Capacity	FY 2025-2026			$0		

CIP	Category	FY	Design Cost	Construction Cost	Cost/FY	Note	Contributing Development(s)
CCIP_12	Capacity	FY 2026-2027			$0		
CCIP_12	Capacity	FY 2027-2028			$0		
CCIP_12	Capacity	FY 2028-2029			$0		
CCIP_12	Capacity	FY 2029-2030	$61,149		$61,149	30% Total Cost	
CCIP_13	Capacity	FY 2023-2024			$0		Davis St.
CCIP_13	Capacity	FY 2024-2025			$0		
CCIP_13	Capacity	FY 2025-2026			$0		Related: CCIP_3, CCIP_14
CCIP_13	Capacity	FY 2026-2027			$0		
CCIP_13	Capacity	FY 2027-2028			$0		
CCIP_13	Capacity	FY 2028-2029			$0		
CCIP_13	Capacity	FY 2029-2030			$0		
CCIP_14	Capacity	FY 2023-2024			$0		Davis St.
CCIP_14	Capacity	FY 2024-2025			$0		
CCIP_14	Capacity	FY 2025-2026			$0		Related: CCIP_3, CCIP_13
CCIP_14	Capacity	FY 2026-2027			$0		
CCIP_14	Capacity	FY 2027-2028			$0		
CCIP_14	Capacity	FY 2028-2029			$0		
CCIP_14	Capacity	FY 2029-2030			$0		
San Juan FM	Condition	FY 2023-2024			$0		
San Juan FM	Condition	FY 2024-2025	$878,274		$878,274	30% Total Cost	
San Juan FM	Condition	FY 2025-2026		$1,024,653	$1,024,653	35% Total Cost	
San Juan FM	Condition	FY 2026-2027		$1,024,653	$1,024,653	35% Total Cost	
San Juan FM	Condition	FY 2027-2028			$0		
San Juan FM	Condition	FY 2028-2029			$0		
San Juan FM	Condition	FY 2029-2030			$0		
Island Park LS & FM	Condition	FY 2023-2024			$0		
Island Park LS & FM	Condition	FY 2024-2025	$1,321,560		$1,321,560	30% Total Cost	
Island Park LS & FM	Condition	FY 2025-2026		$1,541,820	$1,541,820	35% Total Cost	
Island Park LS & FM	Condition	FY 2026-2027		$1,541,820	$1,541,820	35% Total Cost	
Island Park LS & FM	Condition	FY 2027-2028			$0		
Island Park LS & FM	Condition	FY 2028-2029			$0		
Island Park LS & FM	Condition	FY 2029-2030			$0		
Sports Complex FM	Condition	FY 2023-2024			$0		
Sports Complex FM	Condition	FY 2024-2025	$44,160		$44,160	30% Total Cost	
Sports Complex FM	Condition	FY 2025-2026		$51,520	$51,520	35% Total Cost	
Sports Complex FM	Condition	FY 2026-2027		$51,520	$51,520	35% Total Cost	
Sports Complex FM	Condition	FY 2027-2028			$0		
Sports Complex FM	Condition	FY 2028-2029			$0		
Sports Complex FM	Condition	FY 2029-2030			$0		
Hiller LS	Condition	FY 2023-2024	$567,000		$567,000	30% Total Cost	
Hiller LS	Condition	FY 2024-2025		$1,323,000	$1,323,000	70% Total Cost	
Hiller LS	Condition	FY 2025-2026			$0		
Hiller LS	Condition	FY 2026-2027			$0		
Hiller LS	Condition	FY 2027-2028			$0		
Hiller LS	Condition	FY 2028-2029			$0		
Hiller LS	Condition	FY 2029-2030			$0		
Ralston Ranch LS	Condition	FY 2023-2024			$0		
Ralston Ranch LS	Condition	FY 2024-2025			$0		
Ralston Ranch LS	Condition	FY 2025-2026			$0		
Ralston Ranch LS	Condition	FY 2026-2027			$0		
Ralston Ranch LS	Condition	FY 2027-2028			$0		
Ralston Ranch LS	Condition	FY 2028-2029			$0		
Ralston Ranch LS	Condition	FY 2029-2030	$396,000		$396,000	30% Total Cost	
Pipeline Rehab Batch 1	Condition	FY 2023-2024			$0		
Pipeline Rehab Batch 1	Condition	FY 2024-2025	$990,745		$990,745	30% Total Cost	
Pipeline Rehab Batch 1	Condition	FY 2025-2026		$2,311,737	$2,311,737	70% Total Cost	
Pipeline Rehab Batch 1	Condition	FY 2026-2027			$0		
Pipeline Rehab Batch 1	Condition	FY 2027-2028			$0		
Pipeline Rehab Batch 1	Condition	FY 2028-2029			$0		
Pipeline Rehab Batch 1	Condition	FY 2029-2030			$0		
Pipeline Rehab Batch 2	Condition	FY 2023-2024			$0		
Pipeline Rehab Batch 2	Condition	FY 2024-2025			$0		
Pipeline Rehab Batch 2	Condition	FY 2025-2026	$1,098,912		$1,098,912	30% Total Cost	
Pipeline Rehab Batch 2	Condition	FY 2026-2027		$2,564,129	$2,564,129	70% Total Cost	
Pipeline Rehab Batch 2	Condition	FY 2027-2028			$0		
Pipeline Rehab Batch 2	Condition	FY 2028-2029			$0		
Pipeline Rehab Batch 2	Condition	FY 2029-2030			$0		
Pipeline Rehab Batch 3	Condition	FY 2023-2024			$0		
Pipeline Rehab Batch 3	Condition	FY 2024-2025			$0		
Pipeline Rehab Batch 3	Condition	FY 2025-2026			$0		
Pipeline Rehab Batch 3	Condition	FY 2026-2027	$911,278		$911,278	30% Total Cost	
Pipeline Rehab Batch 3	Condition	FY 2027-2028		$2,126,314	$2,126,314	70% Total Cost	
Pipeline Rehab Batch 3	Condition	FY 2028-2029			$0		
Pipeline Rehab Batch 3	Condition	FY 2029-2030			$0		
Pipeline Rehab Batch 4	Condition	FY 2023-2024			$0		
Pipeline Rehab Batch 4	Condition	FY 2024-2025			$0		
Pipeline Rehab Batch 4	Condition	FY 2025-2026			$0		
Pipeline Rehab Batch 4	Condition	FY 2026-2027			$0		
Pipeline Rehab Batch 4	Condition	FY 2027-2028	$996,163		$996,163	30% Total Cost	
Pipeline Rehab Batch 4	Condition	FY 2028-2029		$2,324,379	$2,324,379	70% Total Cost	
Pipeline Rehab Batch 4	Condition	FY 2029-2030			$0		
Pipeline Rehab Batch 5	Condition	FY 2023-2024			$0		
Pipeline Rehab Batch 5	Condition	FY 2024-2025			$0		
Pipeline Rehab Batch 5	Condition	FY 2025-2026			$0		
Pipeline Rehab Batch 5	Condition	FY 2026-2027			$0		
Pipeline Rehab Batch 5	Condition	FY 2027-2028			$0		
Pipeline Rehab Batch 5	Condition	FY 2028-2029	$1,250,847		$1,250,847	30% Total Cost	

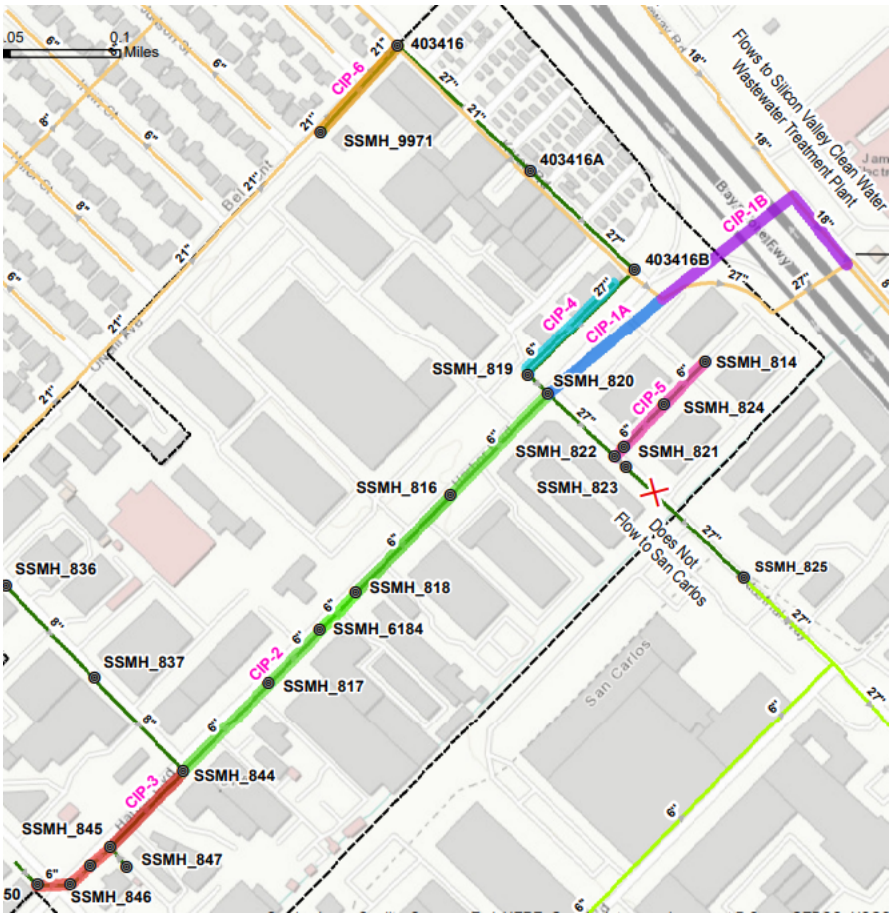
CIP	Category	FY	Design Cost	Construction Cost	Cost/FY	Note	Contributing Development(s)
Pipeline Rehab Batch 5	Condition	FY 2029-2030		$2,918,644	$2,918,644	70% Total Cost	
Pipeline Rehab Batch 6	Condition	FY 2023-2024			$0		
Pipeline Rehab Batch 6	Condition	FY 2024-2025			$0		
Pipeline Rehab Batch 6	Condition	FY 2025-2026			$0		
Pipeline Rehab Batch 6	Condition	FY 2026-2027			$0		
Pipeline Rehab Batch 6	Condition	FY 2027-2028			$0		
Pipeline Rehab Batch 6	Condition	FY 2028-2029			$0		
Pipeline Rehab Batch 6	Condition	FY 2029-2030	$710,329		$710,329	30% Total Cost	
Hiller FM Condition Assessm	Condition	FY 2023-2024			$0		
Hiller FM Condition Assessm	Condition	FY 2024-2025	$200,000		$200,000	Total Cost	
Hiller FM Condition Assessm	Condition	FY 2025-2026			$0		
Hiller FM Condition Assessm	Condition	FY 2026-2027			$0		
Hiller FM Condition Assessm	Condition	FY 2027-2028			$0		
Hiller FM Condition Assessm	Condition	FY 2028-2029			$0		
Hiller FM Condition Assessm	Condition	FY 2029-2030			$0		
Seismic Vulnerability Assess	Condition	FY 2023-2024			$0		
Seismic Vulnerability Assess	Condition	FY 2024-2025			$0		
Seismic Vulnerability Assess	Condition	FY 2025-2026	$300,000		$300,000	Total Cost	
Seismic Vulnerability Assess	Condition	FY 2026-2027			$0		
Seismic Vulnerability Assess	Condition	FY 2027-2028			$0		
Seismic Vulnerability Assess	Condition	FY 2028-2029			$0		
Seismic Vulnerability Assess	Condition	FY 2029-2030			$0		
HIA CIP-1A (w/Optional)	Capacity	FY 2023-2024			$0		
HIA CIP-1A (w/Optional)	Capacity	FY 2024-2025			$0		
HIA CIP-1A (w/Optional)	Capacity	FY 2025-2026			$0		
HIA CIP-1A (w/Optional)	Capacity	FY 2026-2027	$988,350		$988,350	30% Total Cost	
HIA CIP-1A (w/Optional)	Capacity	FY 2027-2028		$1,153,075	$1,153,075	35% Total Cost	
HIA CIP-1A (w/Optional)	Capacity	FY 2028-2029		$1,153,075	$1,153,075	35% Total Cost	
HIA CIP-1A (w/Optional)	Capacity	FY 2029-2030			$0		
HIA CIP-2	Capacity	FY 2023-2024			$0		
HIA CIP-2	Capacity	FY 2024-2025			$0		
HIA CIP-2	Capacity	FY 2025-2026			$0		
HIA CIP-2	Capacity	FY 2026-2027	$396,900		$396,900	30% Total Cost	
HIA CIP-2	Capacity	FY 2027-2028		$926,100	$926,100	70% Total Cost	
HIA CIP-2	Capacity	FY 2028-2029			$0		
HIA CIP-2	Capacity	FY 2029-2030			$0		
HIA CIP-3	Capacity	FY 2023-2024			$0		
HIA CIP-3	Capacity	FY 2024-2025			$0		
HIA CIP-3	Capacity	FY 2025-2026			$0		
HIA CIP-3	Capacity	FY 2026-2027	$57,300		$57,300	30% Total Cost	
HIA CIP-3	Capacity	FY 2027-2028		$133,700	$133,700	70% Total Cost	
HIA CIP-3	Capacity	FY 2028-2029			$0		
HIA CIP-3	Capacity	FY 2029-2030			$0		
HIA CIP-3	Condition	FY 2023-2024			$0		
HIA CIP-3	Condition	FY 2024-2025			$0		
HIA CIP-3	Condition	FY 2025-2026			$0		
HIA CIP-3	Condition	FY 2026-2027	$73,800		$73,800	30% Total Cost	
HIA CIP-3	Condition	FY 2027-2028		$172,200	$172,200	70% Total Cost	
HIA CIP-3	Condition	FY 2028-2029			$0		
HIA CIP-3	Condition	FY 2029-2030			$0		
HIA CIP-4	Condition	FY 2023-2024			$0		
HIA CIP-4	Condition	FY 2024-2025			$0		
HIA CIP-4	Condition	FY 2025-2026			$0		
HIA CIP-4	Condition	FY 2026-2027			$0		
HIA CIP-4	Condition	FY 2027-2028			$0		
HIA CIP-4	Condition	FY 2028-2029			$0		
HIA CIP-4	Condition	FY 2029-2030	$8,100		$8,100	otal Cost; can be combined with CIP-1	
HIA CIP-5	Condition	FY 2023-2024			$0		
HIA CIP-5	Condition	FY 2024-2025			$0		
HIA CIP-5	Condition	FY 2025-2026			$0		
HIA CIP-5	Condition	FY 2026-2027	$118,500		$118,500	30% Total Cost	
HIA CIP-5	Condition	FY 2027-2028		$276,500	$276,500	70% Total Cost	
HIA CIP-5	Condition	FY 2028-2029			$0		
HIA CIP-5	Condition	FY 2029-2030			$0		
HIA CIP-6	Condition	FY 2023-2024			$0		
HIA CIP-6	Condition	FY 2024-2025			$0		
HIA CIP-6	Condition	FY 2025-2026			$0		
HIA CIP-6	Condition	FY 2026-2027			$0		
HIA CIP-6	Condition	FY 2027-2028			$0		
HIA CIP-6	Condition	FY 2028-2029			$0		
HIA CIP-6	Condition	FY 2029-2030	$66,900		$66,900	30% Total Cost	

Harbor Industrial Sewer Maintenance District (HSMD)

Sanitary Sewer Master Plan

FINAL

JANUARY 2024



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Harbor Industrial Sewer Maintenance District (HISMD) Sanitary Sewer Master Plan

FINAL

Prepared for:

City of Belmont

1 Twin Pines Lane, Suite 385

Belmont, CA 94002

January 29, 2024

Prepared by:

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San Jose, CA 95112

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Table of Contents

Executive Summary **ES-1**

Findings *ES-1*

Recommendations *ES-2*

1. Introduction **1**

1.1. Background and Purpose *1*

1.2. Scope and Authorization *1*

1.3. Data Sources *1*

2. Existing System Description **4**

2.1. Study Area *4*

2.1.1. Existing Land Use 4

2.1.2. Future Developments 4

2.2. Existing Sewer System Facilities *8*

3. Wastewater Flow Characteristics and Projections **9**

3.1. Wastewater Flow Components *9*

3.1.1. Average Dry Weather Flow 9

3.1.2. Peak Dry Weather Flow 9

3.1.3. Peak Wet Weather Flow 9

3.2. Flow Monitoring *9*

3.2.1. Temporary Flow Monitoring Sites 9

3.2.2. Flow Monitoring Results 9

4. Sanitary Sewer Design Criteria **13**

5. Capacity Evaluation and Condition Assessment **14**

5.1. Capacity Evaluation *14*

5.2. Condition Assessment *14*

6. Capital Improvement Program **18**

6.1. Capacity-Related Improvements *18*

6.2. Condition-Related Improvements *18*

6.3. Cost Estimates *20*

6.4. Recommended Capital Improvement Plan *21*

Figures

Figure ES-1. Vicinity Map ES-3
Figure ES-2. Recommended Capital Improvement Projects ES-4
Figure 1-1. Existing HISMD System 3
Figure 2-1. Existing San Mateo County Unincorporated Area Zone Designations 6
Figure 2-2. Anticipated Future Developments in HISMD 7
Figure 3-1. Temporary Flow Monitoring Locations 10
Figure 3-2. HISMD Parcels Discharging to Belmont and San Carlos Systems 11
Figure 5-1. Capacity Deficient Pipes Under Future PWWF 16
Figure 5-2. 2017 CCTV Inspection Structural Defects 17
Figure 6-1. Recommended Capacity-Related Improvements 19
Figure 6-2. Structure Defect Score by Pipe Material 20
Figure 6-3. Recommended 10-Year Capital Improvement Projects 23

Tables

Table ES-1. Recommended 10-Year Capital Project Cost Estimates (FY 2023 – FY 2033) ES-5
Table 2-1. Anticipated Future Developments in HIA 5
Table 3-1. Estimated Indoor Water Use for HISMD Service Boundary 12
Table 3-2. Estimated Existing ADWF for HISMD Service Boundary 12
Table 4-1. Planning Criteria for Gravity Mains 13
Table 5-1. Pipes not CCTV-ed 14
Table 5-2. Pipes Recently Replaced or Rehabilitated by County 15
Table 6-1. Pipe Replacement Unit Costs 21
Table 6-2. Manhole Rehabilitation Unit Costs 21
Table 6-3. Other Construction Unit Costs 21
Table 6-4. Flow Control & Monitoring Vault Construction Unit Costs 21
Table 6-5. Recommended 10-Year Capital Project Cost Estimates (FY 2023 – FY 2033) 24

Appendices

Appendix A – 2017 CCTV Report by Pro-Pipe for San Mateo County

Appendix B – NASSCO PACP Reference & Defect Codes

Appendix C – Condition Assessment Results

Appendix D – Field Survey Data

Appendix E – Hydraulic Model Results

Abbreviations

ADWF	Average Dry Weather Flow
ASCE	American Society of Civil Engineers
BWF	Base Wastewater Flow
CCTV	Closed Circuit Television
CIP	Capital Improvement Program
City (or Belmont)	City of Belmont
CMMS	Computerized Maintenance Management System
DSMH	Downstream manhole
du	dwelling unit
DWF	Dry Weather Flow
EPA	Environmental Protection Agency
Facility ID	Unique identifier geodatabase assigned to a facility like pipe, manhole, etc.
FAR	Floor Area Ratio
FOG	Fats, Oils and Grease
fps	feet per second
FY	Fiscal Year (e.g., FY 2023 is July 1, 2023, to June 30, 2024)
GIS	Geographic Information System
gpd	gallons per day
Grade	NASSCO defect grade
GWI	Groundwater Infiltration
HIA-San Carlos Capacity Agreement	1982 Sanitary Sewerage Treatment Capacity Rights and Services agreement between HISMD and San Carlos
HISMD/HIA	Harbor Industrial Sanitary Municipal District/ Harbor Industrial Area
I/I	infiltration and inflow
IEC	Infrastructure Engineering Corporation (now Ardurra)
LAFCO	Local Agency Formation Commission
lf	lineal feet
Master Plan Update	Sanitary Sewer Master Plan
mg	million gallons
mgd	million gallons per day
mgd/ac	million gallons per day/acre
MPRI	Maintenance Pipe Rating Index
NASSCO	National Association of Sewer Service Companies
O&M	Operations and Maintenance
OPR	O&M Pipe Ratings
OPRI	Operational Pipe Rating Index
PACP	Pipeline Assessment and Certification Program
PVC	Poly-vinyl chloride
PWWF	Peak Wet Weather Flow
QMR	Quick Maintenance Rating
QSR	Quick Structural Rating
RCP	Reinforced Concrete Pipe
RDI/I	Rainfall Dependent Infiltration and Inflow
Regional Board Quality Control	San Francisco Bay Regional Water Board
San Carlos	City of San Carlos

Abbreviations

SPR	Structural Pipe Ratings
SPRI	Structural Pipe Rating Index
SPRR	Southern Pacific Railroad
SSMP	Sewer System Management Plan
SSO	Sanitary Sewer Overflow
sq. ft.	square feet
SVCW	Silicon Valley Clean Water, Wastewater Treatment Plant
SWRCB	State Water Resources Control Board
U.S.	United States
USEPA	United States Environmental Protection Agency
USMH	Upstream manhole

Executive Summary

The City of Belmont (City), in the County of San Mateo, California, has retained the services of Infrastructure Engineering Company (IEC), an Ardurra Company to prepare a sewer master plan for the Harbor Industrial Sewer Maintenance District (HISMD)[1]. The term Harbor Industrial Area (HIA) is used interchangeably with HISMD and an overview of its service area and adjoining municipalities are shown in Figure ES-1. At present, HISMD is owned and governed by the San Mateo County Board of Supervisors (County), but the City has plans to annex the collection system into its service area. This report presents the findings, conclusions, and recommendations regarding the existing and projected state of the HISMD collection system. A 10-year Capital Improvement Plan (CIP) for the HISMD sewer system is developed as shown in Table ES-1 to help determine improvement costs associated with the annexation process.

The general process to prepare the sewer system master plan consisted of evaluating capacity limitations alongside structural deficiencies of the sewer system. Based on deficiencies found, system improvements like rehabilitation, cleaning, remove and replace, and construction of new mains and manholes are recommended. The improvement plan's purpose is to develop capital projects over a 10-year planning horizon and recommend system maintenance procedures to achieve an optimal operating collection system - highly reliable for the most affordable cost. Most system improvements are anticipated to be funded by developers.

A series of field inspections were performed to gather information on the collection system. Field survey and investigations were carried out by both IEC and City staff to fill data gaps as well as determine data discrepancies between GIS and actual sewer network layout. Flow monitoring was also performed to determine flow characteristics of the system. Closed-Circuit Television (CCTV) inspection data was used to identify data discrepancies and deficiencies in the sewer system. Hydraulic modeling was performed to develop a listing of capacity deficiencies. Projects were developed and prioritized based on deficiencies found and capital costs were prepared for a 10-year planning horizon.

Findings

The existing system is estimated to be about 70 years old. The existing pipes in HISMD were found to be in overall fair condition per 2017 CCTV assessment performed by Pro-pipe® and continues to degrade. One Sanitary Sewer Overflow (SSO) occurred in 2018 per County in the 6-inch line along Harbor Boulevard between manholes “SSMH_844” and “SSMH_817” due to debris (e.g., grease, toilet paper, baby wipes, and paper towels). The 2017 CCTV condition assessment indicated severe structural defects in mains along Elmer Street and Old County Road. However, these mains were rehabilitated by the County in 2019. The rest of the system exhibited low to moderate structural defects except for 275 feet of six-inch main on O’Neill Ave which scored a high structural defect rating. Issues found in this main included joint offsets, fractures, sags, roots, grease and sediment deposits. The CCTV inspections also found that maintenance-related issues like grease and sediment deposits were prevalent throughout the system. Details of the CCTV inspections can be found in Appendix A - 2017 CCTV Report by Pro-Pipe for San Mateo County.

IEC analyzed HISMD flows with respect to existing capacity agreements in the area. The City’s and HISMD’s future average dry weather flow (ADWF) are estimated to be 2.5 mgd and 0.35 mgd respectively. Part of HISMD flows into the City’s system and the pipes generally along Harbor Boulevard and Industrial Way flow into the City of San Carlos system. All flows will ultimately enter the Silicon Valley Clean Water (SVCW) plant, a Joint Powers Authority (JPA) serving the City, San Carlos, Redwood City, and West Bay Sanitary District communities. Upon annexation, the combined City and HISMD flows are expected to exceed the City’s maximum capacity allocation with SVCW.

Based on the 1982 capacity agreement[2] between San Carlos and HISMD, the allowable average dry weather flow into San Carlos from HISMD is 0.33 mgd. At the time of this report, a 30% reduction of these flows, that is, approximately 0.099 mgd commensurate with the percentage area of HISMD that was annexed into San Carlos in the late 1990’s is to be allowed from HISMD to San Carlos. It is estimated that future ADWF from HISMD into the San Carlos system will be approximately 0.30 mgd which would exceed the new 0.099 mgd threshold. Model results predict that the existing collection system will exhibit capacity deficiencies under future wet weather sewer loading.

[1] A concurrent sewer master plan for the main Belmont system is being prepared
[2] Capacity rights agreement between San Carlos and HSIMD on January 5th, 1982, Section 2

With rising interest in redevelopment projects in the area, capacity deficiencies are predicted to occur in the existing 6-inch pipes along Harbor Boulevard up till it meets the 27-inch on Industrial Way. With future flows no longer going into San Carlos, sewer backup is expected along the 27-inch on Industrial Way and capacity related improvement projects will be required. Manhole inspections were not done as part of the 2017 inspections nor done as part of this project. Therefore, it is recommended that manhole inspections be performed prior to any main replacement work to assess each manhole's structural integrity in anticipation of future flows.

Recommendations

Due to the capacity limitation and structural defect findings mentioned above, six (6) capital improvement projects are recommended for the HISMD system as shown in Figure ES-2. Projects CIP-1 and CIP-2 are recommended to mitigate capacity deficiencies due to future peak wet weather conditions. Project CIP-1 includes two sub-projects; CIP-1A and CIP-1B. CIP-1A will include construction of a new 18-inch main from the existing manhole "SSMH_820" to an existing City manhole "403423E" on Karen Road. CIP-1B will include construction of a new 27-inch under US Highway 101 from manhole "403423E" to connect to existing City manhole "403700H" on Shoreway Road. From manhole "403700H", about 210 feet of the existing 18-inch is recommended to be upsized to 27-inch on Shoreway Road. Since CIP-1B mitigates both City and HISMD future flows, the cost for this project will be shared between the City and HISMD CIPs based on contributing flows. Project CIP-2 and CIP-3 will include upsizing of all existing 6-inch mains along Harbor Boulevard to 12-inch and 8-inch mains. Project CIP-1 is recommended to be completed first in order to convey anticipated near-term redevelopment flows from the HISMD area to the SVCW plant. To adhere to the capacity agreement with San Carlos, the 27-inch along Industrial Way is recommended to be capped or abandoned once CIP-1 is completed. Alternatively, the City could install a vault that allows flow control and monitoring capabilities along this 27-inch. Due to uncertainties related to quantity and location of future sewer loads from redevelopment projects, it is recommended that the capacity evaluation be updated as more refined sewer loadings become available for the HISMD area.

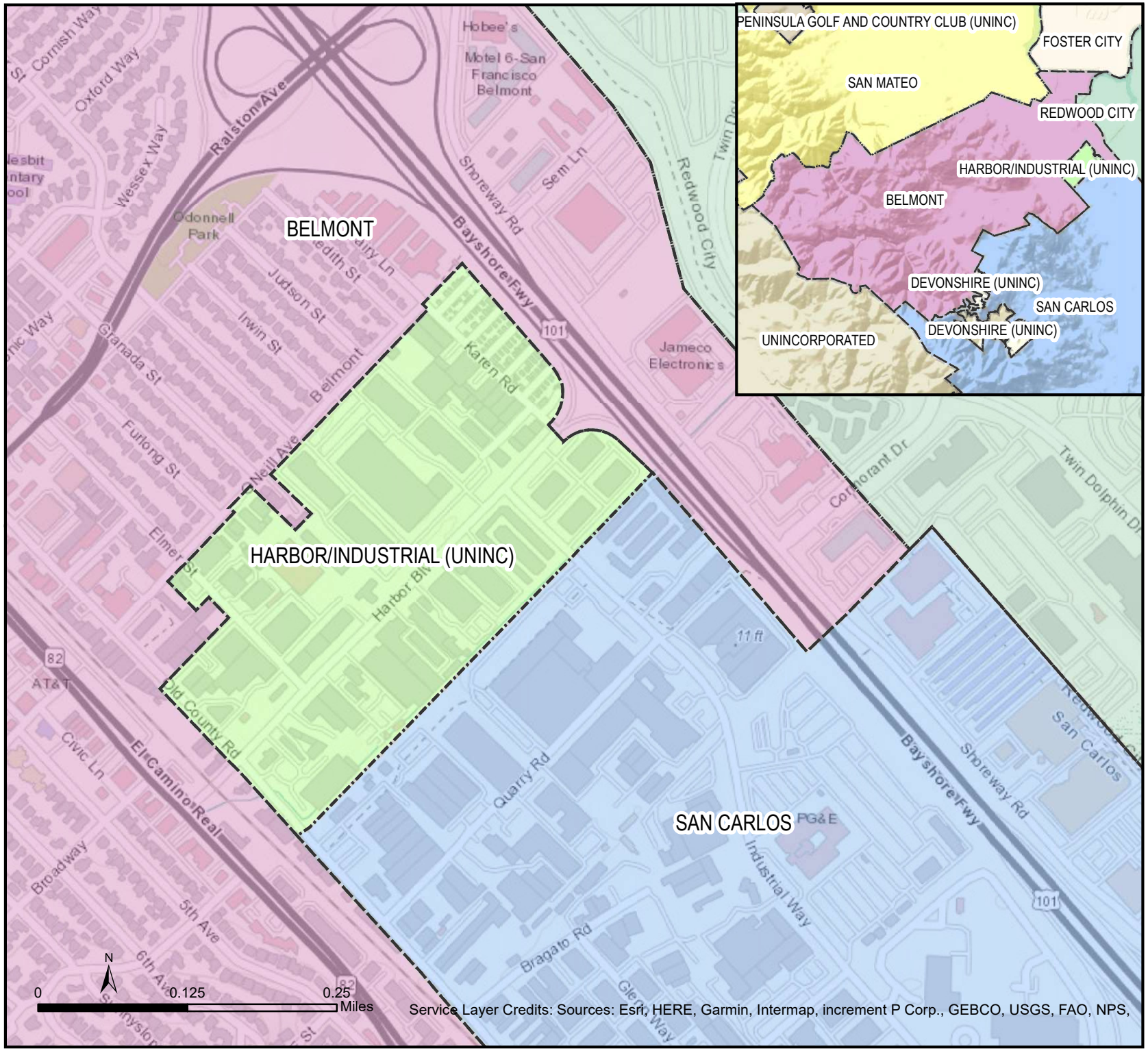
The City's historic maintenance records show that VCP's in the system have high structural defect scores and a propensity to develop cracks as they age. Structural defects can increase inflow/infiltration (I/I) occurrences. As such, Project CIP-3 is recommended to partly address redevelopment flows and partly address further structural deterioration of the existing approximately 70-year-old, 6-inch VCP pipes from Old County Road to Elmer Street along Harbor Boulevard.

Project CIP-4 was created to abandon the existing 6-inch main that is atop the existing 27-inch main between Industrial Way and Karen Road along Harbor Boulevard per County staff. Maintenance/cleaning of this main will be difficult due to the current configuration so it is recommended that laterals be connected to the new 18-inch main instead, as the area develops.

Like CIP-3, Project CIP-5 is recommended to replace older deteriorating six-inch VCP pipes with newer 8-inch PVC pipes in order to minimize I/I occurrences. It is recommended that the City connect to the new 18-inch on Harbor Boulevard instead of the existing 27-inch on Industrial Way because it is anticipated that flows will no longer be directed to San Carlos in the near future.

Project C-6 is recommended to address structural defects found from the 2017 CCTV inspection results. The six-inch along O'Neill has several joint offsets and fractures and is recommended to be upsized to an 8-inch PVC.

Total CIP cost is estimated at about $8.6 million which includes the optional vault cost of $1.3 million under CIP-1. Cost for FY 2023 – 2027 is estimated at $8.4 million and for FY 2028-2032 is estimated at 0.2 million in 2023 cost. Please note that CIP-1B is a shared project with the City, so HISMD's shared cost to CIP-1B only amounts to about $320,000 based on its 11% ADWF contribution. Detailed descriptions of each CIP project and cost estimation methodology are included in Section 6. Table ES-1 is a summary of the CIP recommendations and costs for HISMD rounded to the nearest one thousand.



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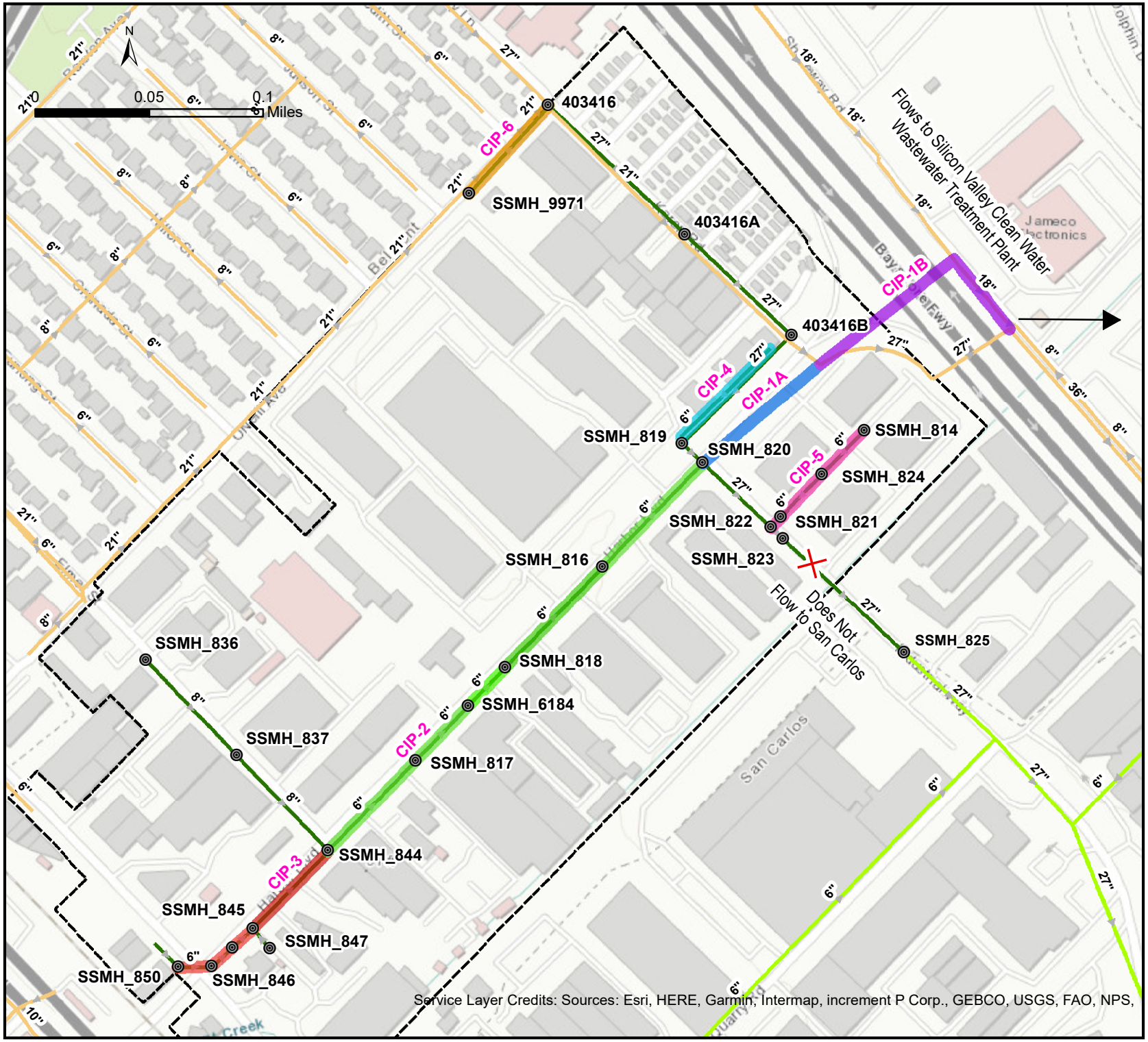
City of Belmont
Vicinity Map
Figure ES-1



Legend

- Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary

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City of Belmont

Recommended CIP

Figure ES-2

Table ES-1. Recommended 10-Year Capital Project Cost Estimates (FY 2023 – FY 2033)

Project ID	Category	Purpose	Project Description	Existing Diameter (in.)	Estimated Capital Costs ($)[1]						Phase
					8 in. length (ft)	12 in. length (ft)	18 in. length (ft)	27 in. length (ft)	Manhole Count	Total ($)	
CIP-1 (CIP-1A)	Capacity-Related	Mitigate Capacity Deficiencies along Harbor Boulevard during Future Peak Wet Weather Flow Conditions	Install new ~350 feet of 18-inch main from SSMH_820 to City manhole 403423E (on Karen).	-	-	-	350	-	0	2,027,000	2023-2027
CIP-1 (CIP-1B)	Capacity-Related	Mitigate Capacity Deficiencies from HISMD and City during Future Peak Wet Weather Flow Conditions. As a result, this project will be a shared cost between HIA and City CIPs	1. Micro tunnel new ~400 feet of 27-inch main from City existing manhole 403423E (on Karen) to City manhole 403700H (on Shoreway). 2. Upsize 210 feet of existing 18-inch on Shoreway from manhole 403700H.	18	-	-	-	610	2	2,915,000 [2]	2023-2027
CIP-1 (Optional)	Vault	To Control and Monitor Flows into San Carlos	Construct 8x8 feet vault with flow control device and permanent flow meter in existing manhole SSMH_825 on Industrial Way	-	-	-	-	-	-	1,267,500	2023-2027
CIP-2	Capacity-Related	Mitigate Capacity Deficiencies along Harbor Boulevard during Future Peak Wet Weather Flow Conditions	Upsize ~ 1300 feet of six-inch mains along Harbor Boulevard from Elmer till 27-inch trunk sewer on Industrial Way; starting from manhole SSMH_844 to SSMH_820 to 12-inch PVC. Assume all manholes will need to be replaced.	6	-	1,300	-	-	6	1,323,000	2023-2027
CIP-3	Capacity-Related	Mitigate Capacity Deficiencies along Harbor Boulevard during Future Peak Wet Weather Flow Conditions	Upsize ~ 250 feet of six-inch main with an 8-inch PVC from manhole SSMH_847 to SSMH_844 along Harbor Boulevard. Assume all manholes will need to be replaced.	6	250	-	-	-	1	191,000	2023-2027
	Condition-Related	Replace older, structurally deteriorating, 6-inch VCP pipes and reduce I/I	Upsize ~ 250 feet of six-inch main with an 8-inch PVC from manhole SSMH_850 to SSMH_847 along Harbor Boulevard. Assume all manholes will need to be replaced.	6	250	-	-	-	3	246,000	2023-2027
CIP-5	Condition-Related	Replace older, structurally deteriorating, 6-inch VCP pipes and reduce I/I	Upsize ~300-feet of existing 6-inch VCP to 8-inch. Install ~ 180 feet of 8-inch to connect to the 18-inch on Harbor instead of connecting to the existing 27-inch on Industrial Way.	6	480	-	-	-	3	395,000	2023-2027
5-Yr CIP Total ($)										**8,365,000**	
CIP-4	Condition-Related	Reduce maintenance related issues.	Abandon existing ~300-feet of 6-inch VCP that is on top of 27-inch per County. Assume reconnect 5 laterals from the abandoned 6-inch main to the new 18-inch main on Harbor Boulevard.	6	-	-	-	-	0	26,000	2028-2033
CIP-6	Condition-Related	Address severe structural deterioration from 2017 CCTV	Upsize ~300-feet of existing 6-inch VCP to 8-inch on O'Neill Ave.	6	300	-	-	-	1	223,000	2028-2033
10-Yr CIP Total ($)										**249,000**	
TOTAL					**1,280**	**1,300**	**560**	**400**	**16**	**$8,614,000**	

1. Costs are based on 2023 unit costs described in Section 6.3 and rounded to nearest thousand dollars
2. HISMD shared cost amounts to approximately $320,000 based on 11% ADWF contribution. It is estimated that two manholes will need to be replaced along this alignment.

1. Introduction

This section introduces the sewer master planning process for the HISMD sewer system.

1.1. Background and Purpose

The HISMD is one of ten sewer maintenance and sanitation districts administered by the County of San Mateo (County) to serve unincorporated areas of the County. HISMD was formed on December 18, 1951, and is located between City of Belmont (City) and City of San Carlos (San Carlos) bounded by Harbor Boulevard to the south-east, S.P.R.R. Co./Old County Road to the south-west, O'Neill Avenue to the north-west and the Bayshore Freeway (US 101) to the north-east. Figure 1-1 shows the existing HISMD service area boundary that is surrounded by the City of Belmont and San Carlos sewer systems. The HISMD system is currently owned and maintained by the County. There are approximately 63 lateral connections that convey sewage to the Silicon Valley Clean Water (SVCW) wastewater treatment plant mainly via San Carlos system and some via City system.

There is high interest in redevelopment projects in the HISMD area. The City has recently filed an application with the Local Agency Formation Commission (LAFCO) to annex a portion of HISMD that lies within the City's Sphere of Influence[3]. The City would like to expand annexation to include the entire HISMD area in the future. The purpose of this HISMD Sewer Master Plan (HISMD Master Plan) is to assess sanitary sewer infrastructure improvements required and related costs prior to the annexation of HISMD by the City.

1.2. Scope and Authorization

Work on the HISMD Master Plan was performed under an Architectural and Engineering Services Agreement (AESA) entered between Infrastructure Engineering Corporation (IEC), now Ardurra, and the City of Belmont, on February 19th, 2021. The following activities encompassed the scope of the project:

Field Data Collection and Review: Field surveys and investigations were carried out by both IEC and City staff to fill data gaps in invert elevations as well as determine data discrepancies between GIS and actual sewer network in HIA. Flow monitoring was performed to determine flow characteristics of the system.

Capacity Evaluation: A hydraulic model was built and calibrated in the InfoSWMM software environment using the above field data. The model was then used to evaluate existing and future hydraulic deficiencies in the system.

Condition Assessment Evaluation: Closed-Circuit Television (CCTV) inspection data performed in 2017 for the HISMD system was reviewed to evaluate and identify structural and maintenance deficiencies in the sewer system.

Master Plan Documentation: Projects were developed to mitigate existing structural and capacity limitations as well as to mitigate future capacity deficiencies from anticipated developments. Capital costs were developed using recent bid costs from the City and neighboring agencies, and improvement projects were prioritized based on business risk for a 10-year planning horizon. A master plan that documents findings, recommendations, and a 10-year Capital Improvement Plan (CIP) was developed.

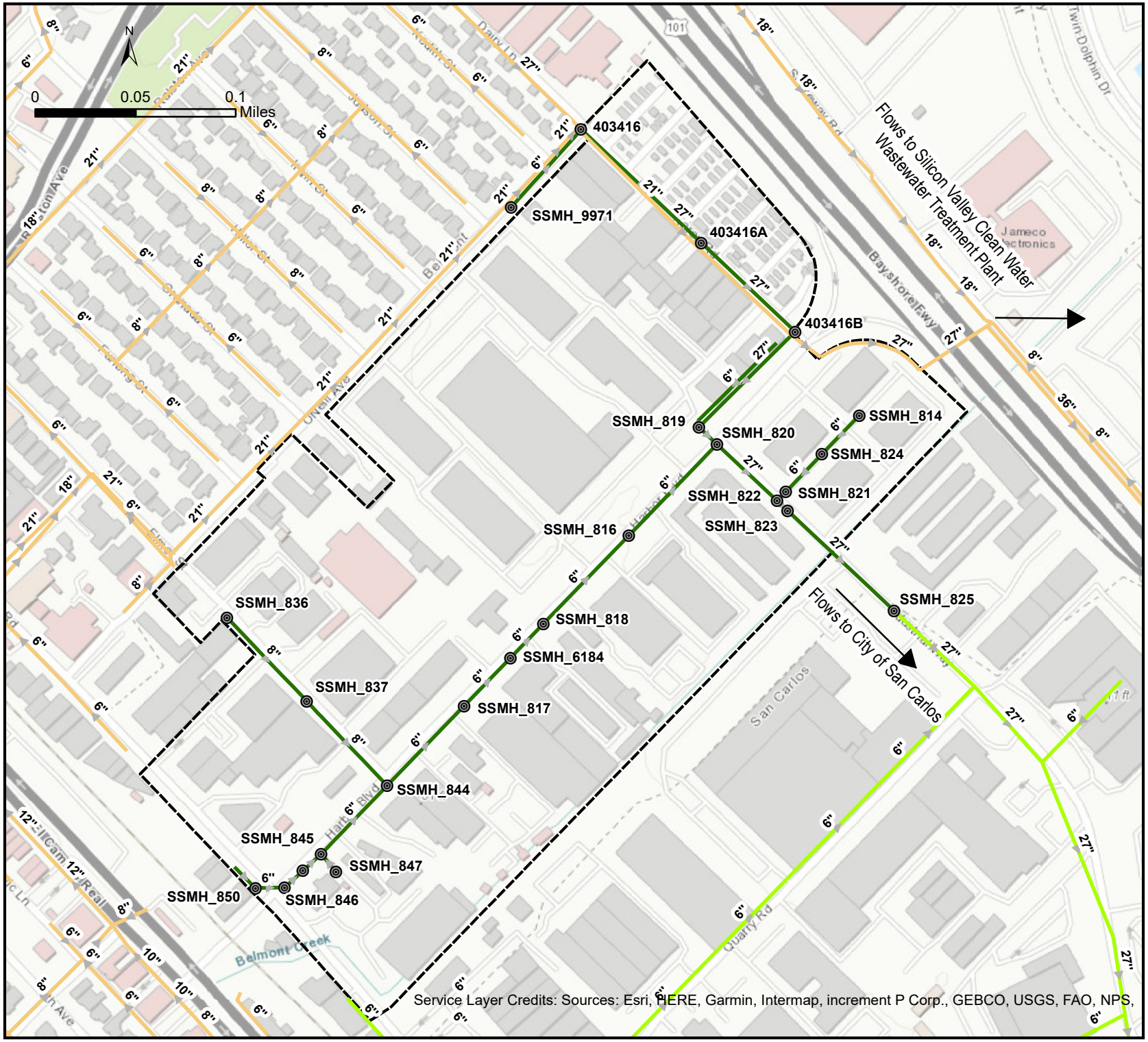
1.3. Data Sources

This Master Plan is developed using various data and information, including but not limited to the following:

- City of Belmont Sanitary Sewer Rehabilitation Master Plan prepared by RMC Water and Environment, September 2007 (2007 City of Belmont SMP)
- City of San Carlos Sewer Collection System Master Plan prepared by RMC Water and Environment, January 2013

[3] LAFCO File 20-10: 608 Harbor Boulevard Annexation

- County of San Mateo Harbor Industrial-Scenic Heights-Oak Knoll-Kensington Square Sewer Master Plan prepared by Brown and Caldwell, July 2000 (2000 County SMP)
- Mapping data from City and County GIS files, City As-builts
- Field survey of manholes, and field data investigation by City operators, communications with County staff, and field visit on 5/17/2022.
- San Mateo County CCTV inspection report prepared by Pro-Pipe, 2017 (2017 CCTV Report)
- BKF Engineers Technical Memorandums:
    - 608 Harbor Blvd, Belmont, CA – Sewer Discharge to Harbor Industrial Sewer Maintenance District
    - 601 Harbor – Harbor Boulevard Sanitary Sewer Main Capacity Analysis, January 23, 2023
    - 608 Harbor Blvd – Sewer Improvements Coordination Memo, October 19, 2021LAFCO Application: LAFCO File 20-10: 608 Harbor Boulevard Annexation
- Water consumption billing data from Mid-Peninsula Water District
- IEC Flow Monitoring data
- JPA Agreement - ARTICLE VII – Ownership, Maximum Capacity rights, Transfers and Enforcement
- San Mateo County Zoning Regulations, January 2022
- City of Redwood City Engineering Standards, Volume III: Design Criteria



Legend

- Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary

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City of Belmont

Existing HISMD System

Figure 1-1

2. Existing System Description

The general characteristics of the HISMD sanitary sewer system are described in this section. This description is the basis for evaluation of the system and to determine the system's ability to convey the City's current and future wastewater flows.

2.1. Study Area

The study area is bounded by Belmont Creek to the southeast, S.P.R.R. Co./Old County Road to the south-west, O'Neill Avenue to the northwest and Karen Road to the north-east. The topography is relatively flat and slopes southwest to northeast decreasing in elevation from about 30 ft. to 12 ft. Belmont Creek, a stream that flows west-northeast through the City of Belmont to the head of Belmont Slough, flows along the south-eastern boundary of HISMD and San Carlos city limit.

2.1.1. Existing Land Use

As shown in Figure 2-1, HISMD consists of mainly commercial and light industrial land use types currently designated by the County as Zone M-2 (Heavy Industrial District)[4]. HISMD also includes a small residential area north-east of Karen Road consisting of a mobile home park, that is currently designated as Zone C-2 (General Commercial Districts). According to the County website, HISMD population in 1990 was about 118 which is most probably referring to the area occupied by mobile homes. All flows from the mobile homes enter the 27-inch on Karen Road[5].

2.1.2. Future Developments

As mentioned, the area is seeing an increase in redevelopment projects. It is anticipated that a majority of future developments will connect to sewers along Old County Road and Harbor Boulevard. Figure 2-2 and Table 2-1 show anticipated future development flows in the system. A summary description of each redevelopment project proposed is listed below:

- 601 Harbor – is proposed to be a bio-tech life sciences building with mainly offices and a three-level subterranean parking space with 950 lots. The new development will occupy a space of approximately 380,700 square feet (sq. ft.) at about 65-75 feet in height with four stories. The development will connect to sewers along Harbor Boulevard[6].
- Bio Tech/R&D/Life Sciences Campus – is also proposed to be a bio-tech, research and development (R&D) or life sciences buildings. The development is anticipated to occupy approximately 5.5 acres spread over three parcels (120 Industrial Road, 425 and 435 Harbor Boulevard) and occupy a space of about 830,000 sq. ft. The FAR for this development is estimated to be 3.4. The development will connect to sewers along Harbor Boulevard.
- Belmont Village is a proposed mixed-use area in the Belmont main system of which a small portion of parcels as shown in Figure 2-2 will most likely connect to Old County Road and Harbor Boulevard sewer lines. For details on Belmont Village proposed development details, please refer to 2023 Belmont Sewer Master Plan.
- HIA Parcels – the FAR assumption for redevelopment projects for the rest of the HISMD system that will ultimately discharge into the San Carlos system in the long-term is estimated to be 3.0.

[4] Zoning Regulations, County of San Mateo, January 2022
[5] The 27-inch on Karen Road is slated for CIP in the Belmont Sewer Master Plan
[6] Technical Memorandum: 601 Harbor – Harbor Boulevard Sanitary Sewer Main Capacity Analysis, BKF Engineers, January 23, 2023

Table 2-1. Anticipated Future Developments in HIA

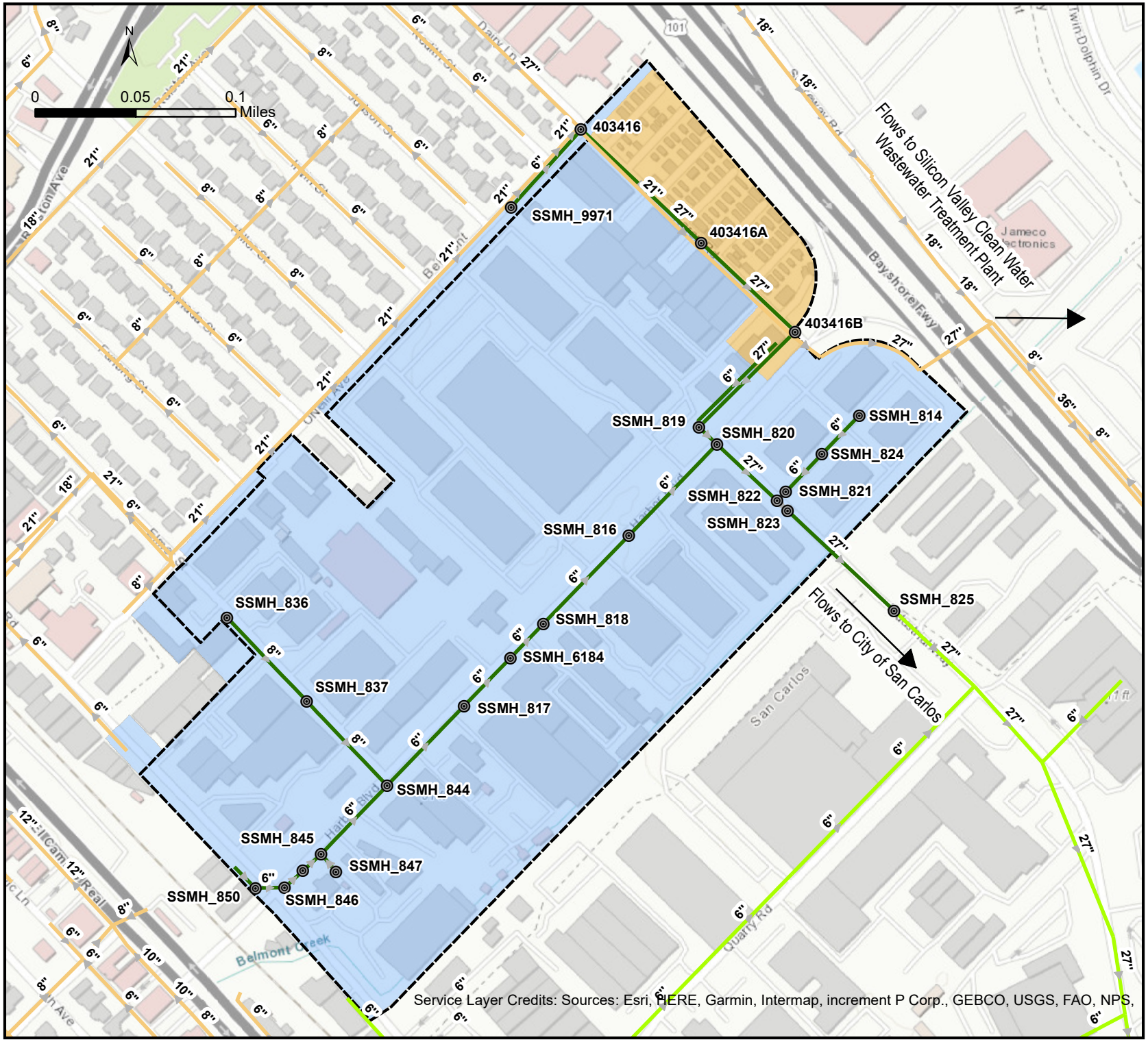
Project #	Name	Location	Life Sciences / Lab (sq. ft.)[1]	Commercial / Office (sq. ft.)[1]	Existing Flow (gpd)	Development Flow (gpd)	Estimated Project Realization
1	601 Harbor BioTech	601-605 Harbor Blvd/ Old County	190,350	190,350	1,944	59,865	Near-Term (within 5 Years)
2	Biotech/R&D/Life Sciences Campus	120 Industrial Road; 425 Harbor Boulevard; 435 Harbor Boulevard	622,500	207,500	1,525	148,051 [2]	Near-Term (within 5 Years)
3	Belmont Village	Parcels contributing to HIA only	Refer to Table 2-9 (Belmont Sewer Master Plan) for Belmont Village Proposed Development Details		246	500	Long-Term (within 10 – 20 Years)
4	The rest of parcels within HIA boundary not proposed for development		Estimated Existing FAR = 0.8 Proposed FAR = 3.0		31,648	118,680 [3]	Long-Term (within 10 – 20 Years)
Total [4]					**35,363**	**327,096**	

[1] Life Science/Lab demand factor based on City of Redwood City's domestic water demand for Research & Development sites of 0.21 gpd/sf x 95% (return to sewer ratio), Attachment Q, Engineering Standards. Commercial demand factor is based on City Design Criteria of 0.115 gpd/sf.

[2] Assumes Lab and Office flows to be 75% and 25% respectively

[3] Existing flow x 3.0/0.8

[4] Includes all remaining parcels bounded by and designated as existing HIA service area discharging into Belmont and San Carlos Systems



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,

Legend

Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary

Current San Mateo County Planning Zones

- C-2 (General Commercial Districts)
- M-1 (Heavy Industrial Districts)

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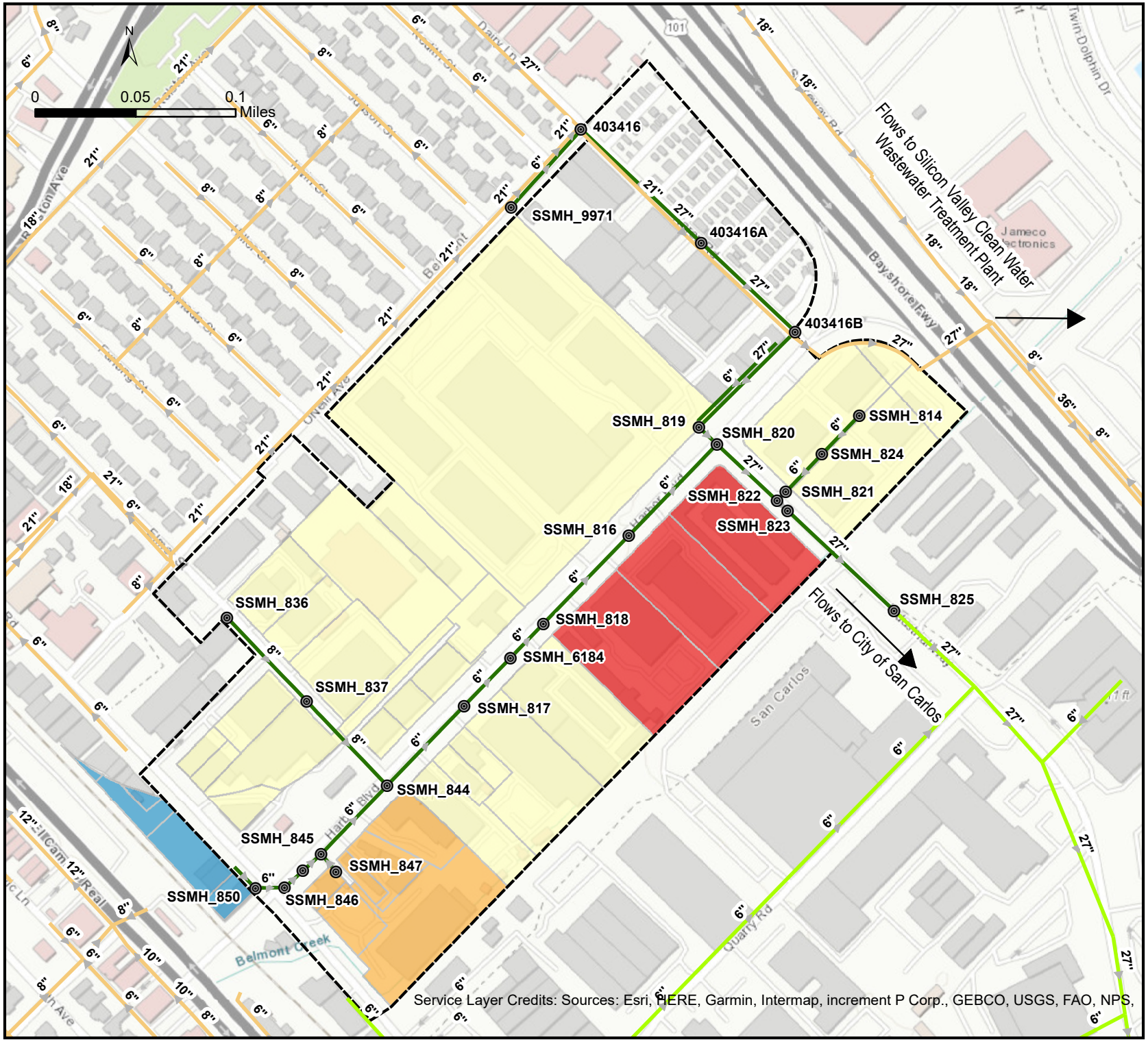
Existing San Mateo County Unincorporated Area Zone Designations

Figure 2-1



Legend

Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary

Future Development Parcels

- HIA Parcels (FAR 3.0)
- Belmont Village
- 601 Harbor BioTech
- 425 Harbor BioTech

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City of Belmont

Anticipated Future Developments in HISMD

Figure 2-2

2.2. Existing Sewer System Facilities

The HISMD collection system is approximately 2 miles of gravity mains that consists of 6-inch vitrified clay pipe (VCP), 21-inch, and 27-inch diameter pipes along Karen Road, Harbor Boulevard, and Industrial Way. Due to insufficient data on year of installation, pipe age is assumed to be about 70 years old which ties the construction date of the system to the early 1950s or shortly after the formation of HISMD in 1951.

A 275-foot six-inch main conveys flow from HISMD parcels along O'Neill Avenue to a vault-like structure at the intersection of Karen Road and O'Neill Avenue. The inlet of this vault includes the 6-inch from O'Neill, 21-inch City main, and 27-inch County main collecting wastewater from mostly City parcels. The outlet pipes to this vault are approximately 777 feet of parallel 27-inch and 21-inch mains along Karen Road. The 27-inch main on Karen Road between O'Neill Avenue and Harbor Boulevard is made of reinforced concrete material. Since most of the flow in the 27-inch is from City parcels upstream, this 27-inch is not evaluated in the HISMD Master Plan as it is slated for capital improvement in the concurrent Belmont Sewer Master Plan. The 6-inch pipe on O'Neill Avenue is modeled and evaluated in this master plan.

Approximately 2,400 feet of six-inch VCP mains collect wastewater starting from Old County Road and Elmer Street and along Harbor Boulevard to connect to a 27-inch trunk main on Industrial Way at manhole "SSMH_820". The 27-inch pipelines along Harbor Boulevard and Industrial Way are made of unreinforced concrete material. All flows from Harbor Boulevard and flows from manhole "SSMH_820" enter the San Carlos system.

Another 302 feet long six-inch main that runs above and parallel to the 27-inch on Harbor Boulevard from Karen Road to Industrial Way, collects wastewater from nearby businesses and connects to the 27-inch on Industrial Way at manhole "SSMH 819". This 358-foot 27-inch pipe segment between Karen Road and Industrial Way is relatively flat. Very low to no HISMD flow enters this trunk main at manhole "SSMH_819" and into manhole "403423D" which is adjacent to the "El Metate" restaurant at 120 Harbor Blvd. However, flows from the Shoreway lift station[7] (across US 101) are known to occasionally back up into this 27-inch main[8] and eventually flows in reverse to San Carlos when the wet well at the Shoreway lift station undergoes maintenance. However, it is anticipated that when the lift station is removed in the near future, issues attributed to lift station maintenance activities will cease to exist as well.

County ownership ends and San Carlos ownership begins about halfway between manholes "SSMH_825" and "SSMH_823" (See Figure 2-1).

In 2019, new 8-inch PVC pipes were installed along Elmer Street by the County as part of a capital improvement plan. At the same time, two older six-inch VCP segments at the intersection of Old County Road and Harbor Boulevard were rehabilitated by the County. One segment, between a flushing inlet and manhole "SSMH_850", was rehabilitated via Cured-In-Place Pipe (CIPP) methodology and the segment between manholes "SSMH_850" and "SSMH_846" was replaced with a new six-inch PVC pipe. Per County, the system experienced an SSO on 6/18/2018 between manholes "SSMH_844" and "SSMH_817" along Harbor Boulevard. The SSO was attributed to debris in the pipe (i.e., grease, toilet paper, baby wipes, and paper towels).

There are no existing sewage lift stations within HISMD and all wastewater from the area flows by gravity to the Silicon Valley Clean Water (SVCW) wastewater treatment plant located in Redwood Shores.

[7] Shoreway Lift Station is owned and operated by Silicon Valley Clean Water and is also referred to as Belmont Pump Station
[8] Also sometimes referred to as a "passive overflow" per discussion with SVCW

3. Wastewater Flow Characteristics and Projections

3.1. Wastewater Flow Components

3.1.1. Average Dry Weather Flow

The Average Dry Weather Flow (ADWF) includes base wastewater flow (BWF) and groundwater infiltration (GWI). BWF is domestic (or sanitary) wastewater flow from residential, commercial, institutional, and industrial wastewater. GWI is defined as groundwater entering the collection system through pipe joints and manhole walls due to structural defects or improper construction. The HISMD's ADWF was determined based on the flow monitoring data and billing data provided for the HISMD service area.

3.1.2. Peak Dry Weather Flow

Domestic sewer flows vary throughout the day due to different customer water use patterns. Peak Dry Weather Flow (PDWF) is the highest flow during dry period and is determined by multiplying a peaking factor to the ADWF.

3.1.3. Peak Wet Weather Flow

Peak Wet Weather Flow (PWWF) is estimated as Peak Dry Weather Flow (PDWF) plus Peak Design Rainfall Dependent Infiltration/Inflow (RDII). Peak RDII was derived from the data collected from the flow monitoring studies. Estimated peak RDII of the observed storm event was then used to estimate the Peak Design RDII for a 10-year 24-hour storm event.

3.2. Flow Monitoring

3.2.1. Temporary Flow Monitoring Sites

IEC performed a temporary flow monitoring study between November 15th, 2021, and April 20th, 2022, at the City's main system and the HISMD system. For HISMD flow evaluation, one flow meter was placed in City manhole "SSMH_403423D" and another meter was placed in HISMD manhole "SSMH_825". At about the same time, a temporary flow monitoring study was performed by BKF Engineers (BKF) in the HISMD system for the 608 Harbor Blvd development. Both IEC and BKF flow meter locations reviewed for this analysis are shown in Figure 3-1.

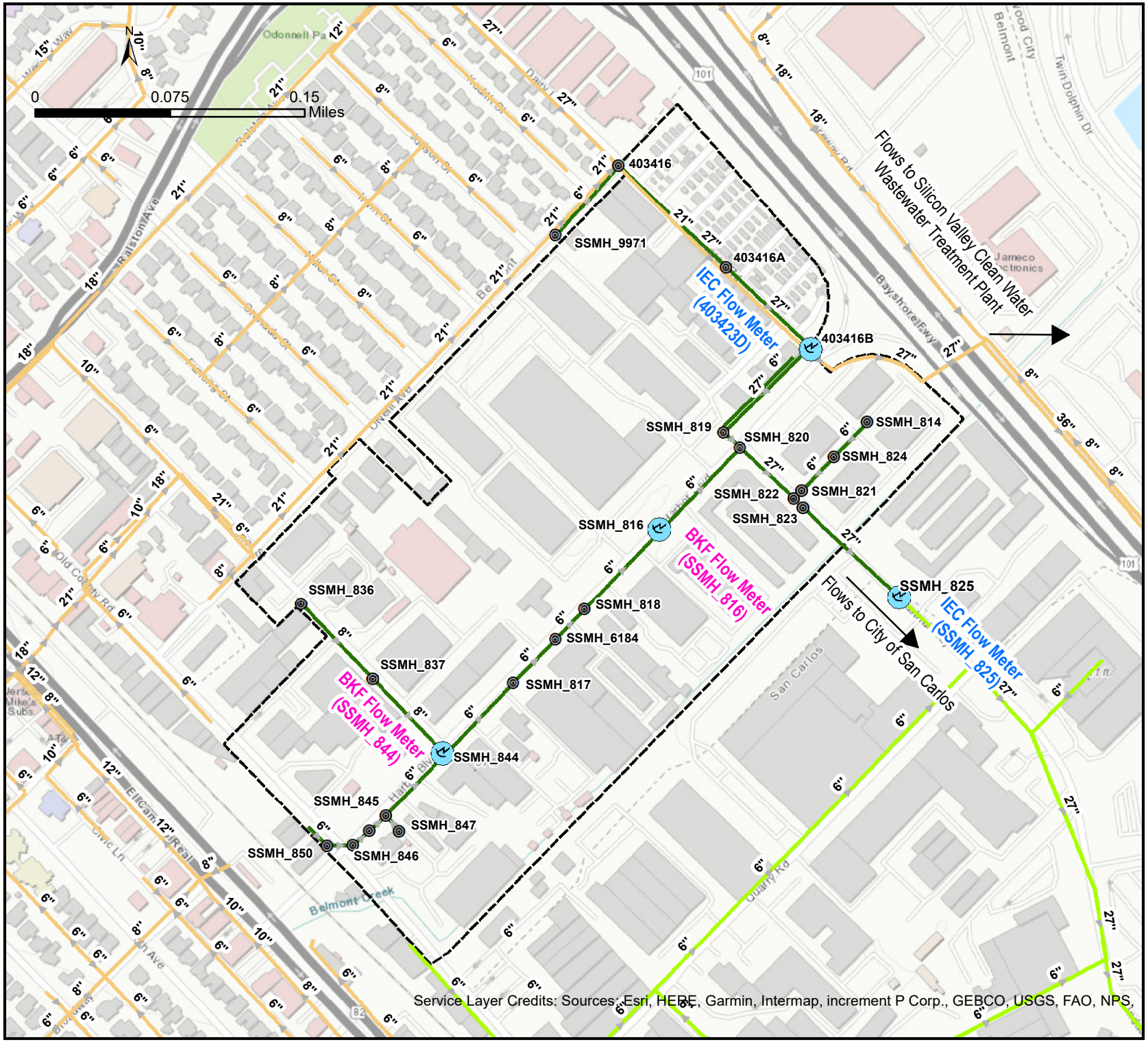
3.2.2. Flow Monitoring Results

Flow monitoring data collected by IEC and BKF engineers (BKF) was evaluated against the billing data between November 2019 and April 2020 provided by Mid-Peninsula Water District (MPWD) to determine the ADWF, PDWF, and PWWF for the HISMD area.

3.2.2.1. Dry Weather Flow Data

The average indoor water usage for HISMD is estimated from the provided billing data. Indoor water use excludes landscaping irrigation water use which is assumed to not return to the sewer system. As shown in Figure 3-2, sewer flows from a few parcels within the HISMD service boundary flow into the City's sewer system while the remaining parcels discharge flows into the San Carlos sewer system. Per County, all flows from the largest parcel (APN: 46010270) within the HISMD service boundary discharges to manhole "SSMH-819" on Harbor Boulevard which mostly discharges to the San Carlos system.

From billing data, the average indoor water use of the HISMD service area is estimated to be 0.037 mgd. As shown in Table 3-1, the average indoor water use of parcels in HISMD discharging into the Belmont system is approximately 0.015 mgd and the average indoor water use of parcels discharging into the San Carlos system is approximately 0.0216 mgd.



Legend

- Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary
- Flow Meter Manhole

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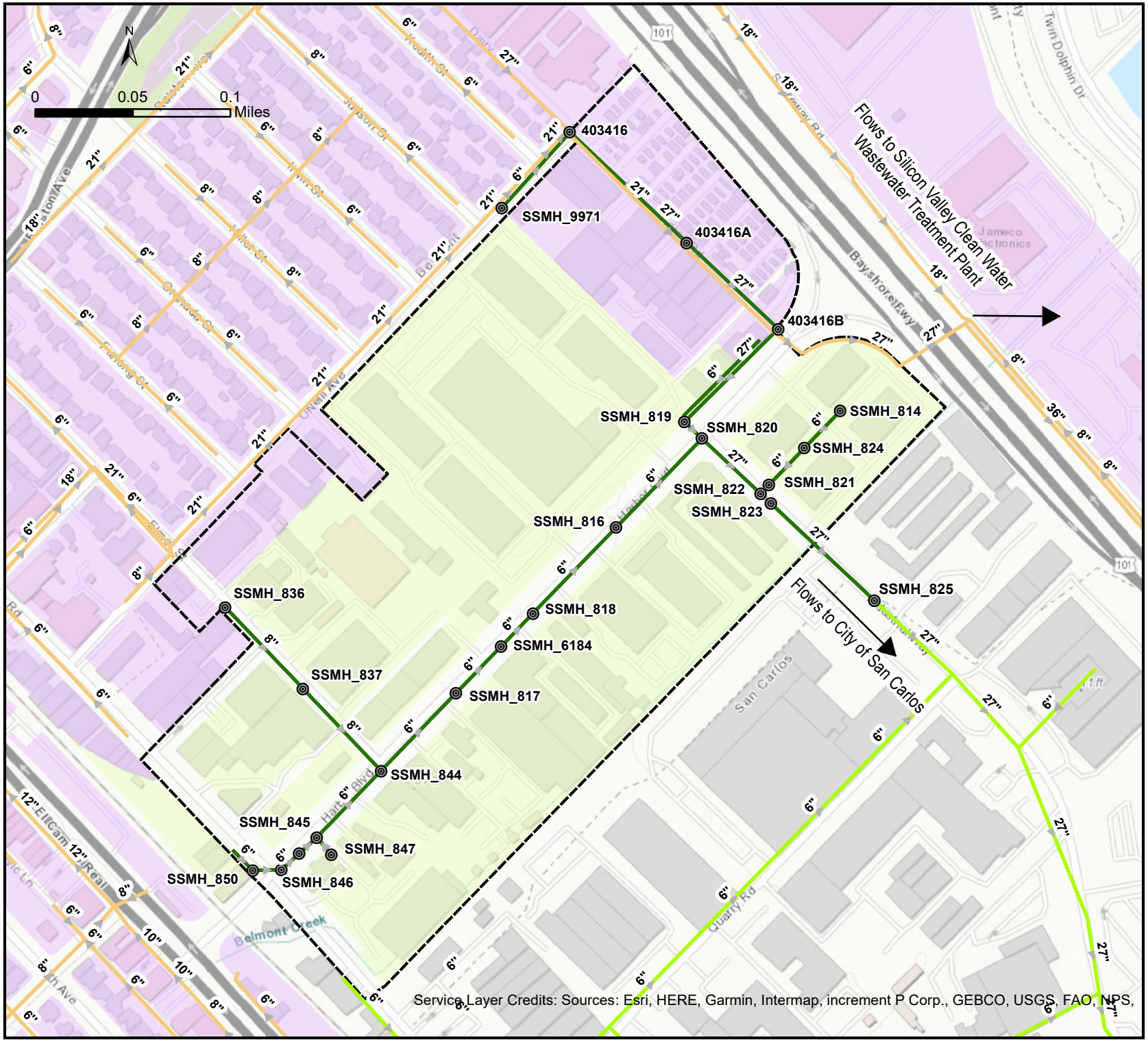
Temporary Flow Monitoring Locations

Figure 3-1



Legend

- Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary
- to Belmont System
- to San Carlos System

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Parcels Discharging to Belmont and San Carlos Systems

Figure 3-2

Table 3-1. Estimated Indoor Water Use for HISMD Service Boundary

Parcels Discharging to	Average Indoor Water Use (mgd)
Belmont System	0.0150
San Carlos System	0.0216
Total	**0.0366**

A flow meter was installed at manhole "SSMH-825" from the IEC flow monitoring study to collect flow data from parcels discharging to the San Carlos system. Observed ADWF at manhole "SSMH_825" was determined to be 0.13 mgd, which is much higher than the estimated average indoor water use of the parcels discharging into HISMD system and therefore, deemed unreliable and subsequently omitted from the analysis. The observed ADWF at manhole "SSMH_823" from the BKF flow monitoring, which is the nearest upstream manhole of "SSMH_825" is estimated to be 0.0116 mgd, which is approximately 60% of return-to-sewer ratio and is relatively low for commercial and industrial land use types. Flow data at upstream manholes from BKF show consistency in mass balance, therefore, the flow data from BKF was used to determine peaking factors and peak RDII.

For planning purpose, the ADWF for parcels discharging into the San Carlos system, including the largest parcel in the HISMD service boundary, was determined by using the water consumption data with an assumption of 100% return-to-sewer ratio, that is, 0.0216 mgd. Based on the historical influent flow records at the Belmont Pump Station, a return-to-sewer ratio of 90% was assumed for parcels discharging into the Belmont system, that is, 0.015 mgd, as shown in Table 3-2.

Table 3-2. Estimated Existing ADWF for HISMD Service Boundary

Parcels Discharging to	ADWF (mgd)
Belmont System	0.0138
San Carlos System	0.0216
Total	**0.0354**

Total existing ADWF flows discharging into San Carlos is less than the maximum allowed flow threshold of 0.099 mgd being discussed between HISMD and San Carlos. Future ADWF flows discharging into San Carlos system is estimated to be 0.30 mgd and was allocated to the model based on proposed developments described in Table 2-1.

Observed PDWF at manhole "SSMH_823" is estimated to be 0.052 mgd, with a peaking factor of 4.6 to the observed ADWF.

3.2.2.2. Rainfall Data

The BKF flow monitoring study obtained rainfall data from four publicly available private weather stations (PWS) from Weather Underground. Collected flow data at Site 1 and Site 2 (into manhole "SSMH_844") of the BKF Flow Monitoring Study during the week of 12/27/21 to 1/2/22 showed distinct response to the rain events and are selected for RDII analysis. The most significant rain event observed during this week is on 12/27/21 with a total precipitation of 0.655 inches.

3.2.2.3. Wet Weather Flow Data

Observed Peak RDII on 12/27/21 is determined for Site 1 and Site 2. Once Observed Peak RDII is determined, it is used to estimate the Peak Design RDII for a 10-year 24-hour storm assuming RDII is linearly proportional to precipitation. According to the NOAA Atlas 14 Volume 6 Version 2 Point Precipitation Frequency Estimates, a 10-year 24-hour storm within the City's vicinity has a total precipitation of 3.64 inches, which is approximately 5.56 times the precipitation observed on 12/27/21. This factor is applied to the observed Peak RDII resulting in the Peak Design RDII. The Peak Design RDII is then divided by the meter site tributary area to estimate RDII on a per-acre basis. Peak Design RDII per acre estimated from both meter sites are close, resulting in approximately 0.0157 mgd/ac. The remaining study area is assumed to have a similar RDII response. The Peak Design RDII discharging into the San Carlos system is estimated to be 0.55 mgd based on the tributary area. The Peak Design RDII is allocated in proportion to the tributary acreage to the model manholes within the HISMD system for PWWF analysis.

4. Sanitary Sewer Design Criteria

As part of the concurrent Belmont Sewer Master Plan, the City's design criteria were reviewed, and the same planning criteria is applied to the HISMD collection system. The City's design criteria were compared against those criteria used by other Bay Area agencies and related industry standards (2nd Ed. WEF Manual of Practice no. FD-5 Gravity Sanitary Sewer Design and Construction published by the American Society of Civil Engineers (ASCE) and the Water Environment Federation (WEF)).

This section presents the summary of planning criteria recommended and subsequently used for hydraulic analysis, evaluation of system capacity, and sizing of capital improvements to mitigate deficiencies and accommodate future growth. Details of the design criteria development and a comparison of planning criteria with other agencies are included in Appendix B – Sewer Design Criteria of the 2022 Belmont Sewer Master Plan Report.

The planning criteria used to evaluate the capacity of the gravity sewers in HISMD are presented in Table 4-1.

Table 4-1. Planning Criteria for Gravity Mains

Design Criteria	Parameter
For existing gravity mains 12 inches or smaller in size	maximum depth to Diameter ratio (d/D) shall not exceed 0.7 under PWWF condition
For existing gravity mains greater than 12 inches in size	maximum d/D shall not exceed 0.85 under PWWF condition
For new gravity mains 12 inches or smaller in size	maximum d/D shall not exceed 0.5 under PWWF condition
For new gravity mains greater than 12 inches in size	maximum d/D shall not exceed 0.75 under PWWF condition
Minimum velocity	2 fps when flowing half full
Maximum velocity	10 fps
Minimum size for new pipe	8 inches
Manning's n	0.013

For new manholes in HISMD, the following design criteria shall be applied per Section 3.04 of the Sewer Design Criteria:

Location:
1. At intersections of where two or more sewer mains join.
2. At change in grade, pipe size, or material.
3. At accessible locations for maintenance and emergency service.

Spacing:
1. Maximum spacing of 300 feet on sewers 21-inches or smaller in diameter.
2. Maximum spacing of 400 feet on sewers larger than 21-inches in diameter.

Other Requirements:
1. No laterals shall be connected to manholes.
2. Manholes shall not be located in areas where access would be restricted.
3. No inside drop connection shall be allowed.

5. Capacity Evaluation and Condition Assessment

A hydraulic model was built and calibrated in the InfoSWMM software environment using flow monitoring data detailed in Section 3 and field survey data conducted in 2022 (See Appendix D - Field Survey Data). The calibrated model was used to evaluate hydraulic deficiencies in the system under existing and future PDWF and PWWF scenarios. Model output results for existing and future scenarios including post-improvements are included in Appendix E – Model Results.

A review of the 2017 CCTV inspection performed by Pro-Pipe® was done by IEC to assess the extent of structural deficiencies and prioritize improvements in the HISMD system. CCTV results are included in Appendix A – 2017 CCTV Report by Pro-Pipe for San Mateo County. The CCTV report review performed by IEC is included in Appendix C – Condition Assessment Results.

The following includes a description of the capacity evaluation and condition assessment analysis completed.

5.1. Capacity Evaluation

As referenced in Section 3.2, most flows from HISMD discharges via County pipes into the San Carlos system with the exception of the 6-inch main on O'Neill Avenue which flows to the 27-inch trunk line on Karen Road.

Based on Section 2 of the Sanitary Sewerage Treatment Capacity Rights and Services agreement between HISMD and San Carlos on January 5th, 1982, a total flow of 0.33 mgd can enter the San Carlos system from HISMD. At the time of this report, a 30% reduction of these flows which is proportional to the percentage area of HISMD that was annexed into San Carlos in the late 1990's was in discussion. Flow analysis results under future ADWF scenario shows that the maximum flow into San Carlos would be approximately 0.30 mgd which would exceed the new 0.099 mgd threshold.

Model results indicate that the existing system does not exhibit any deficiencies under existing or future PDWF conditions. Per City planning design criteria presented in Table 4-1, maximum depth-to-diameter ratio (d/D) shall not exceed 0.7 under PWWF condition for existing gravity mains 12-inches or smaller. Based on this criterion, model results under existing PWWF scenario indicates a d/D of 0.75 for the six-inch main along Harbor Boulevard between manhole "SSMH_816" and manhole "SSMH_820" (intersection of Industrial Way and Harbor Boulevard). Furthermore, model results under future PWWF scenario projects that pipes from Old County Road, Elmer Street, and along Harbor Boulevard till the 27-inch on Industrial Way will be capacity-deficient and experience d/D greater than 0.70 as shown in Figure 5-1. Future scenarios assume that flows will not enter the San Carlos system.

5.2. Condition Assessment

In 2017, a closed-circuit television (CCTV) inspection was performed on approximately twenty-six mains in the HISMD area by Pro-Pipe® for the County of San Mateo. No manhole condition assessments were done. The inspection reports per pipe segment CCTV-ed are included in Appendix A – 2017 CCTV Report. Table 5-1 shows a list of pipes that were not CCTV-ed. It is recommended that these pipes be CCTV-ed in the near future to assess pipe conditions.

Table 5-1. Pipes Not CCTV-ed

GIS Main Facility ID	CCTV Status	Location Description
SSMH_847-SSMH_845	Not CCTV-ed in 2017	6-inch off Harbor Boulevard and north of Old County Road
403423D-SSMH_819	Not CCTV-ed in 2017	6-inch parallel and above flat 27-inch segment along Harbor Boulevard

Defects per pipeline segment were described and coded per NASSCO's Pipeline Assessment Certification Program (PACP) standards. The NASSCO reference and defect codes used in the CCTV report are included in Appendix B. Since the raw data to create the reports was not available, an estimation of defect scores per pipe was calculated to rank severity of pipe defects to prioritize for improvements. Scoring details are included in Appendix C – Condition Assessment Results.

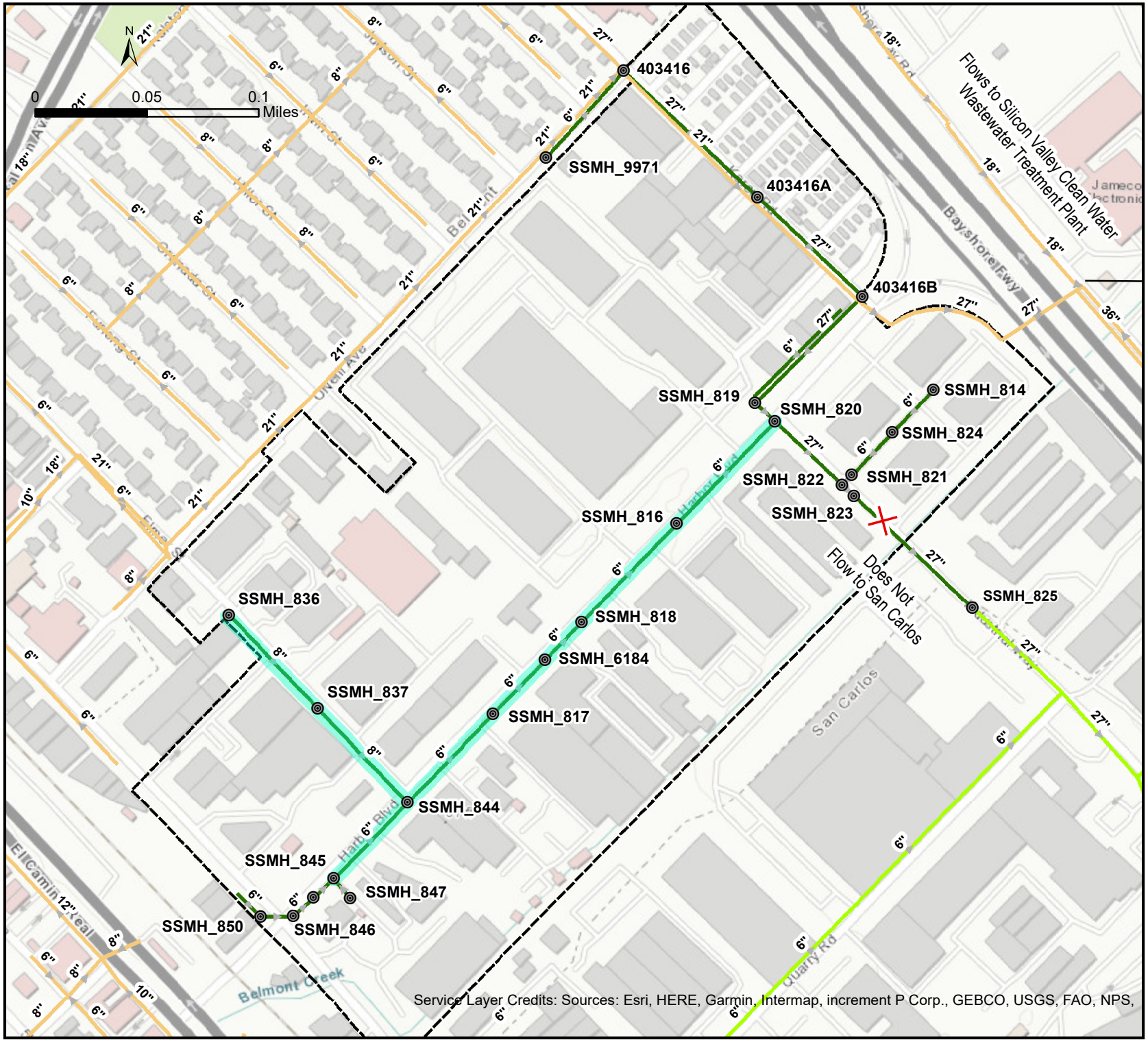
Results of the CCTV scoring which were graded as low to very high depending on count and severity of structural defects. Most pipes along Harbor Industrial Boulevard are graded as having medium to high structural defects. Per NASSCO rating, this means that the pipes have several moderate structural defects that if not addressed, will likely cause the pipes to fail within 10 to 20 years. The 280-foot six-inch pipe along O'Neill Ave exhibited severe structural defects that included joint offsets, fractures, sags, and roots including grease and sediment deposits. This means that if defects are not addressed, the pipe will likely fail within 5 to 10 years. Pipes along Elmer and Old County had severe structural issues; however, per County, these pipes were rehabilitated in 2019. These pipes are listed in Table 5-2.

Table 5-2. Pipes Recently Replaced or Rehabilitated by County

GIS Main Facility ID	Rehabilitation Status	Location Description
SSMH_837-SSMH_844	CCTV-ed in 2017; replaced in 2019 to 8-inch by County	6-inch along Elmer Street
SSMH_836-SSMH_837	CCTV-ed in 2017; replaced in 2019 to 8-inch by County	6-inch along Elmer Street
SSFI_9917-SSFI_9918	CCTV-ed in 2017; 6-inch rehabilitated via CIPP in 2019 by County	6-inch off Old County Road
SSIL_849-SSMH_850	CCTV-ed in 2017; 6-inch rehabilitated via CIPP in 2019 by County	6-inch at intersection of Old County Road and Harbor Boulevard

The 6-inch connecting to the 27-inch trunk on Industrial Way between "SSMH_821" and "SSMH_822" was noted to have a moderate sag and several grease deposits; therefore, was graded as having a medium structural defect. The 27-inch trunk on Industrial Way between manholes "SSMH_822" and "SSMH_823" had an "infiltration dripper" within 8-inches of a joint; hence, graded as having a low structural defect grade.

Maintenance issues related to sediment deposits, roots, and grease were prevalent in HISMD pipes in general.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,

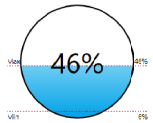
Legend

- Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary
- d/D > 0.7

Example Depth to Diameter Ratio (d/D) of 0.46



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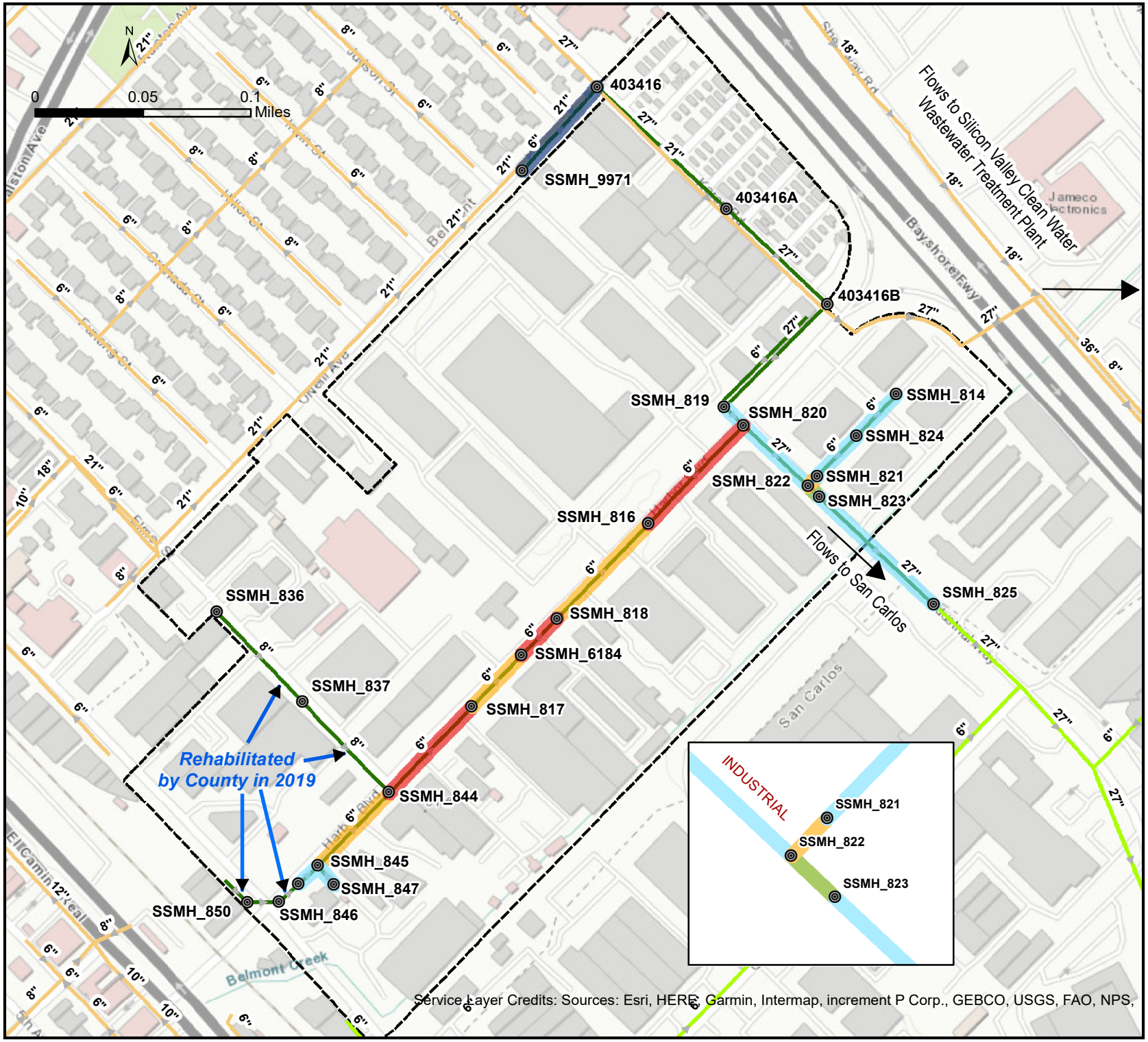
Future PWWF Capacity Deficiencies

Figure 5-1



Legend

Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary

Structural Defect Grade

- No Defects
- Low
- Medium
- High
- Very High

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2017 CCTV Structural Defects

Figure 5-2

6. Capital Improvement Program

6.1. Capacity-Related Improvements

As mentioned in Section 5.1, most mains along Harbor Boulevard will exceed d/D of 0.70 during future PWWF conditions. Surcharge conditions in pipes are further exacerbated with backup due to future flows not discharging to San Carlos.

Per City design criteria, maximum d/D shall not exceed 0.5 under PWWF condition for new gravity mains 12-inches or smaller in size. Based on these parameters, most mains along Harbor Boulevard will exceed d/D of 0.70 during future PWWF conditions. Existing pipes exhibiting a d/D greater than 0.70 were upsized in the hydraulic model, one by one, till the d/D of each pipe was less than 0.5. To mitigate these capacity-related deficiencies, Projects CIP-1 and CIP-2 are recommended as shown in Figure 6-1.

Project CIP-1 is divided into two sub-projects; CIP-1A and CIP-1B. CIP-1A will include construction of a new 18-inch main from the existing manhole “SSMH_820” to an existing City manhole “403423E” on Karen Road. CIP-1B will include construction of a new 27-inch under US Highway 101 from manhole “403423E” to connect to an existing City system manhole “403700H” on Shoreway Road. From manhole “403700H”, about 210 feet of the existing 18-inch is recommended to be upsized to 27-inch on Shoreway Road. Since CIP-1B mitigates both City and HISMD future flows, the cost for this project will be shared between the City and HISMD CIPs based on contributing flows. To adhere to the capacity agreement with San Carlos, the 27-inch along Industrial Way is recommended to be capped or abandoned once CIP-1 is completed. Alternatively, the City could install a vault that allows flow control and monitoring capabilities along this 27-inch.

Project CIP-2 will include upsizing about 1,300 feet of existing 6-inch VCP mains along Harbor Boulevard to 12-inch mains from “SSMH_844” (Elmer Street) to “SSMH_820” (Industrial Way). Project CIP-1 is recommended to be completed first in order to transport near-term redevelopment flows from the HISMD area. Downstream effects to the City system due to this 18-inch tie-in will need to be evaluated as part of the Belmont Sewer Master Plan. An additional 250 feet of six-inch main is recommended to be upsized between manholes “SSMH_844” and “SSMH_847” located east of Elmer Street under CIP-3 to increase capacities due to future redevelopments.

Model result tables for existing and future dry and wet-weather scenarios as well as profile plots pre- and post- improvements along Harbor Industrial are located in Appendix E – Hydraulic Model Results.

Finally, due to uncertainties related to location and quantity of future sewer loads from redevelopment projects, it is recommended that the capacity evaluation be updated as more refined sewer loadings become available for the HISMD area.

6.2. Condition-Related Improvements

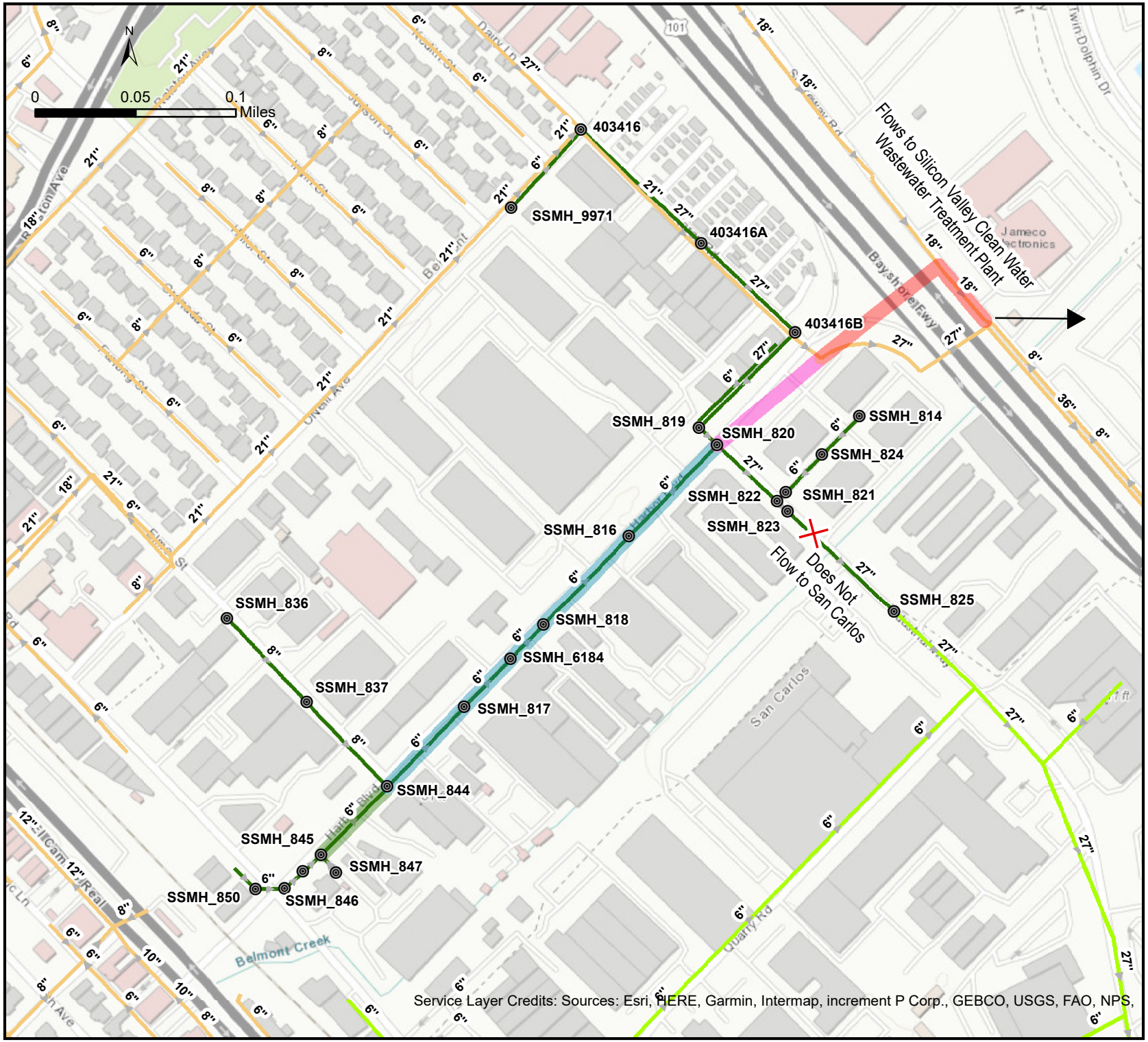
The last CCTV inspection in HISMD was conducted six years ago and pipes with moderate to high structural defect counts as shown in Figure 5-2 are continuing to deteriorate. The City’s historic maintenance records (refer to Figure 5-3) show that VCP’s in the system have high structural defect scores and due to age, the 70-year-old six-inch mains have a propensity to develop cracks and increase I/I occurrences. As such, Project CIP-3, -5, and -6 are recommended to address further structural deterioration of the existing old 6-inch VCP pipes and reduce I/I.

Project CIP-3 includes upsizing approximately 250-feet of 6-inch VCP mains to 8-inch PVC mains from Old County Road to Elmer Street along Harbor Boulevard.

Project CIP-4 is to abandon the existing 6-inch main that is atop the existing 27-inch main between Industrial Way and Karen Road along Harbor Boulevard per County staff. Maintenance/cleaning of this main will be difficult due to this configuration so it is recommended that laterals be connected to the new 18-inch main instead as the area develops.

Similar to CIP-3, Project CIP-5 is recommended to replace approximately 250-feet of older, structurally deteriorating, six-inch VCP pipes to reduce I/I. When upsizing the existing 6-inch VCP to 8-inch PVC, the City should consider connecting to the new 18-inch on Harbor Boulevard instead of the existing 27-inch on Industrial Way; therefore, it is recommended that the project be done at around or at the same time as CIP-1.

Project CIP-6 is recommended to address structural defects found from the 2017 CCTV inspection results. The 300-feet six-inch pipe along O’Neill Avenue has several joint offsets, sags, and fractures and is recommended to be upsized to an 8-inch PVC.



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,

Legend

Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos

Capacity Improvements

- Upsize to 12-inch
- Upsize to 8-inch
- New 18-inch
- New 27-inch

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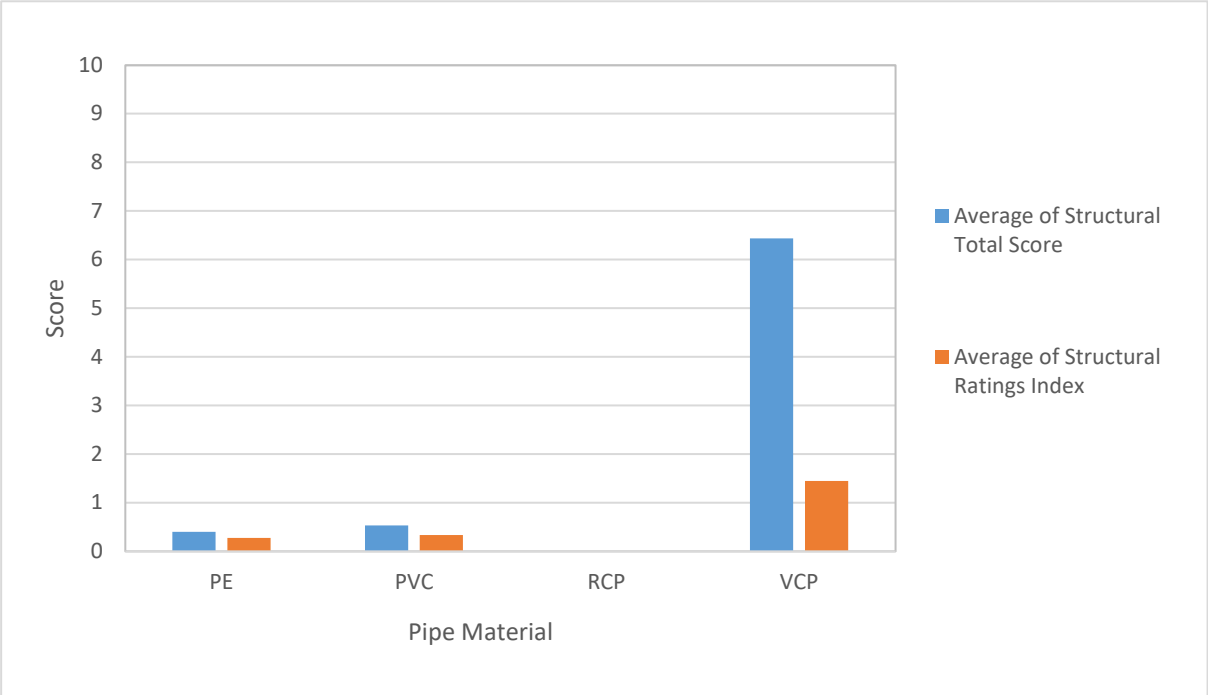
Recommended Capacity Improvements

Figure 6-1

Figure 6-2. Structure Defect Score by Pipe Material



(Source: Belmont System Maintenance Data)

6.3. Cost Estimates

Tables 6-1, 6-2, and 6-3 includes unit costs associated with pipe and manhole replacement and rehabilitation work. Planning-level unit costs were developed based on local bid results between 2018 and 2023 and similar studies completed in the past 5 years. The cost estimates in this study are provided for planning purposes and represent "Class 4 for Studies or Feasibility Report" level costs as established by the American Association of Cost Engineers (AACE), with an accuracy of +50% to -30%. Construction unit costs shown herein represent the typical construction unit cost for the individual item of work (e.g., partial lining, point repair, replacement, etc.) plus additional costs associated with a typical construction project such as mobilization, demobilization, permits, traffic control, sheeting, bypassing, shoring and bracing, easement site restoration, and lateral repairs, etc. Capital unit costs include construction costs plus 30% contingency for costs associated with engineering, construction management and inspection, and project administration and legal activities. Capital unit costs presented herein are in 2023 U.S. Dollars. Since prices of material and labor fluctuate with time, costs should be re-estimated during the preliminary design of a project to confirm budget amounts.

Tables 6-1 and 6-2 were used to estimate pipe upsizing projects using open trench methodology and manhole installation projects. Table 6-3 includes unit cost estimates from the City's March 2023 bid comparison for 6-inch main abandonment and lateral reconnection projects. Unit costs from Table 6-3 were used to estimate costs for the six-inch pipe abandonment and lateral reconnection work for CIP-4. It is assumed that five (5) laterals will need to be reconnected to the new 18-inch main. CIP-4 can be combined with CIP-1 depending on development trends in the area.

Table 6-3 also includes cost estimates for micro tunneling per IEC's 2023 project estimates. For Project CIP-1, IEC reviewed cost estimates for micro tunneling and bore and jack methodologies under U.S. Highway 101. The costs for both methodologies, including contingencies for construction and administrative costs, ranged from about $2 million to $4 million. It is unclear which methodology is best suited at a planning-level stage, and for this reason, the more conservative cost is used for this CIP estimate. An additional optional cost for CIP-1 includes construction of a flow control and monitoring vault along Industrial Way. This vault is assumed to be constructed in the existing manhole "SSMH_825" on Industrial Way. The vault is estimated to be about 8-feet by 8-feet to provide access and room for flow control device such as a slide gate and a permanent flow meter to control and monitor flows into San Carlos. The cost for this vault is estimated to be 1.3 million dollars as shown in Table 6-4.

Table 6-1. Pipe Replacement Unit Costs

Pipe Size (in)	Construction Unit Costs ($/lf)	Capital Unit Cost ($/lf)
6	477	620
8	500	650
10	646	840
12	685	890
15	715	930
18	762	990
21	923	1,200
24	1054	1,370
27	1185	1,540

Table 6-2. Manhole Rehabilitation Unit Costs

Rehabilitation Method	Construction Unit Costs ($ ea.)	Capital Unit Cost ($ ea.)
Rehab/Repair	10,385	13,500
Replacement	21,250	27,625

Table 6-3. Other Construction Unit Costs

Method	Construction Unit Cost	Capital Unit Cost
Micro tunneling	$3,700/lf	$4,800/lf
6-inch Pipe Abandonment	$20/lf	$26/lf
6-inch Lateral Reconnection	$2,679 each	$3,500 each

Table 6-4. Flow Control & Monitoring Vault Construction Unit Costs

Method	Construction Unit Cost ($ ea.)	Capital Unit Cost ($ ea.)
Flow Control Vault in existing Manhole SSMH_825	960,000	1,248,000
Permanent Flow Meter Installation	15,000	19,500

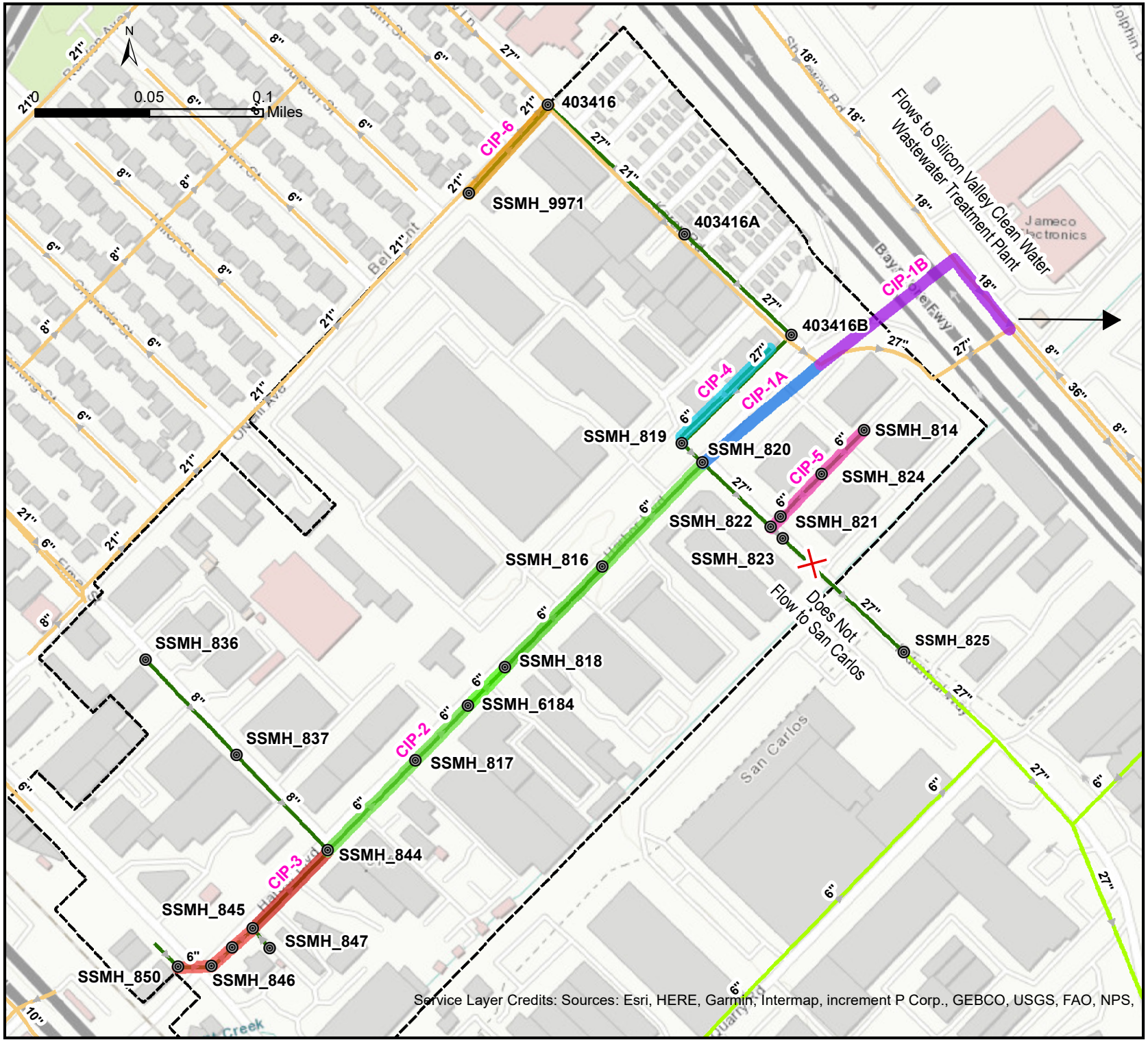
6.4. Recommended Capital Improvement Plan

Table 6-5 shows the 10-Year Capital Improvement Program (CIP) for HISMD with detailed descriptions and costs phased per fiscal year beginning in June. Due to HISMD's aging manholes, it is recommended that manholes be inspected and replaced if necessary, during main improvements. Manholes not listed for CIP are recommended to be inspected per NASSCO standards and assessed for structural integrity. Figure 6-2 shows CIP projects that address capacity and condition-related main deficiencies in the system.

Table 6-5 provides details on purpose and description of each recommended project, 2023 construction cost, source(s) of cost estimation as well as project phasing. All costs have been rounded to the nearest one thousand dollars.

Total CIP cost is estimated at about $8.6 million which includes the $1.3 million optional vault cost under CIP-1. While CIP-1A mitigates capacity deficiencies for HISMD future flows, CIP-1B mitigates effects of both HISMD and City future flows. Per the City's Sewer Design Guide, developers are responsible for shared costs of the system improvements. HISMD's shared cost to CIP-1B amounts to about $320,000 based on its 11% ADWF contribution.

Total cost for FY 2023 – 2027 is estimated at $8.4 million with most of the cost attributed to project CIP-1. Cost for FY 2028-2032 is estimated at 0.2 million. Detailed descriptions of each CIP project and cost estimation methodology are included in Section 6.



Legend

- Manhole ID (GIS)

Existing System

- HISMD
- City of Belmont
- City of San Carlos
- HISMD Boundary

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Recommended 10-Year Capital Improvement Projects

Figure 6-3

Table 6-5. Recommended 10-Year Capital Project Cost Estimates (FY 2023 – FY 2033)

Project ID	Category	Purpose	Project Description	Existing Diameter (in.)	Estimated Capital Costs ($)[1]						Total Length (feet)	Phase	Cost Source
					8 in. length (ft)	12 in. length (ft)	18 in. length (ft)	27 in. length (ft)	Manhole Count	Total ($)			
CIP-1 (CIP-1A)	Capacity-Related	Mitigate Capacity Deficiencies along Harbor Boulevard during Future Peak Wet Weather Flow Conditions	Micro tunnel new ~350 feet of 18-inch main from SSMH_820 to City manhole 403423E (on Karen).	-	-	-	350	-	0	2,027,000	350	2023-2027	Unit Costs from Table 6-1 and Table 6-3
CIP-1 (CIP-1B)	Capacity-Related	Mitigate Capacity Deficiencies from HISMD and City during Future Peak Wet Weather Flow Conditions. As a result, this project will be a shared cost between HIA and City CIPs	1. Micro tunnel new ~400 feet of 27-inch main from City existing manhole 403423E (on Karen) to City manhole 403700H (on Shoreway). 2. Upsize 210 feet of existing 18-inch on Shoreway from manhole 403700H.	18	-	-	-	610	2	2,915,000 [2]	610	2023-2027	Unit Costs from Tables 6-1, 6-2, and 6-3
CIP-1 (Optional)	Vault	To Control and Monitor Flows into San Carlos	Construct 8x8 feet vault with flow control device and permanent flow meter in existing manhole SSMH_825 on Industrial Way	-	-	-	-	-	-	1,267,000	-	2023-2027	Unit Costs from Table 6-4 (IEC planning-level estimates)
CIP-2	Capacity-Related	Mitigate Capacity Deficiencies along Harbor Boulevard during Future Peak Wet Weather Flow Conditions	Upsize ~ 1300 feet of six-inch mains along Harbor Boulevard from Elmer till 27-inch trunk sewer on Industrial Way; starting from manhole SSMH_844 to SSMH_820 to 12-inch PVC. Assume all manholes will need to be replaced.	6	-	1,300	-	-	6	1,323,000	1300	2023-2027	Unit Costs from Tables 6-1 and 6-2
CIP-3	Capacity-Related	Mitigate Capacity Deficiencies along Harbor Boulevard during Future Peak Wet Weather Flow Conditions	Upsize ~ 250 feet of six-inch main with an 8-inch PVC from manhole SSMH_847 to SSMH_844 along Harbor Boulevard. Assume all manholes will need to be replaced.	6	250	-	-	-	1	191,000	250	2023-2027	Unit Costs from Tables 6-1 and 6-2
	Condition-Related	Replace older, structurally deteriorating, 6-inch VCP pipes and reduce I/I	Upsize ~ 250 feet of six-inch main with an 8-inch PVC from manhole SSMH_850 to SSMH_847 along Harbor Boulevard. Assume all manholes will need to be replaced.	6	250	-	-	-	3	246,000	250	2023-2027	Unit Costs from Tables 6-1 and 6-2
CIP-5	Condition-Related	Replace older, structurally deteriorating, 6-inch VCP pipes and reduce I/I	Upsize ~300-feet of existing 6-inch VCP to 8-inch. Install ~ 180 feet of 8-inch to connect to the 18-inch on Harbor instead of connecting to the existing 27-inch on Industrial Way.	6	480	-	-	-	3	395,000	480	2023-2027	Unit Costs from Tables 6-1 and 6-2
5-Yr CIP Total ($)										**8,365,000**	**3,240**		
CIP-4	Condition-Related	Reduce maintenance related issues.	Abandon existing ~300-feet of 6-inch VCP that is on top of 27-inch per County. Assume reconnect 5 laterals from the abandoned 6-inch main to the new 18-inch main on Harbor Boulevard.	6	-	-	-	-	0	26,000	300	2028-2033	Unit Costs from Table 6-3
CIP-6	Condition-Related	Address severe structural deterioration from 2017 CCTV	Upsize ~300-feet of existing 6-inch VCP to 8-inch on O'Neill Ave.	6	300	-	-	-	1	223,000	300	2028-2033	Unit Costs from Tables 6-1 and 6-2
10-Yr CIP Total ($)										**249,000**	**600**		
TOTAL					**1,280**	**1,300**	**560**	**400**	**16**	**$8,614,000**	**3,840[3]**		

1. Costs are based on 2023 unit costs described in Section 6.3 and rounded to nearest thousand dollars
2. HISMD shared cost amounts to approximately $320,000 based on 11% ADWF contribution. It is estimated that two manholes will need to be replaced along this alignment.
3. Total length includes 300 feet of abandoned main for CIP-4

STAFF REPORT

Meeting Date:	February 11, 2025
Agency:	City of Belmont
Staff Contact:	Grace Castaneda, Finance Director, gcastaneda@belmont.gov Joanne Yung, Budget Manager, jyung@belmont.gov
Agenda Title:	Report on Mid-Year Financial Results as of December 31, 2024
Agenda Action:	Resolution

Recommendation

Adopt resolutions amending the City of Belmont and Belmont Fire Protection District (BFPD) fiscal year (FY) 2024-25 budgets.

Strategic Focus Area

Fiscal and Organizational Sustainability

Background

Summary

- The budget continues to reflect the ongoing takeaway of key revenue sources as a result of actions taken by the State of California.
- Property tax in-lieu of VLF (VLF) continues to be underfunded by the State, and the State is taking increasing actions to take away this key revenue source. Although Belmont received its FY 2022-23 shortfall reimbursement earlier this fiscal year, the State has not agreed to VLF reimbursements for FY 2023-24 and FY 2024-25.
- The Local 1% Sales Tax revenues are slightly lower than the adopted FY 2024-25 budget as the auto industry has shown signs of cooling off, and consumers are adjusting their spending behavior in an elevated inflationary environment. The revised estimates are consistent with long-term projections of reduced economic growth during the next few years.
- Development pipeline has a notable slowdown with many large-scale market rate developments deciding to not move forward given the current market conditions which feature high interest rates, escalating construction costs, and high commercial vacancies.
- While the General Fund balance in the mid-year review looks to be trending higher than the adopted FY 2024-25 budget target, it is largely due to personnel expenditure estimates that are not yet updated due to on-going labor agreement negotiations, while the budget target included merit increase assumptions based on recent trends. After the new labor agreements are finalized, personnel expenditure estimates will be recalculated and any budget augmentation requests that are needed will be presented to Council for approval at that time.
- The City has been working to prepare a Storm Water Master Plan to identify critical storm drain infrastructure needs, with flooding and storms events the City must explore new revenue sources

to address aging sewer and storm drain infrastructure maintenance to prepare for future storms and reduce flooding.

- The City must take action to ensure long-term financial sustainability and local control over revenue sources to prevent further cuts to City services including cuts to public safety, parks and public works, and other services.

Community Engagement

In the most recent Your Voice, Your Belmont community survey in 2022, approximately 1,000 residents participated, identifying the following City service priorities:

- Maintaining storm drains, reducing flooding, debris and pollution in City streets,
- Fixing potholes and repairing streets and sidewalks,
- Maintaining 911 emergency response times,
- Keeping public areas healthy safe and clean, and
- Maintaining senior services including health, nutrition and transportation programs.

In keeping with the Belmont tradition of resident engagement, the Your Voice, Your Belmont survey is targeted for an update in the coming months, capturing our community's evolving needs and ensuring these needs continue to be reflected in our budgeting process. Staff will keep the public and City Council apprised of updated survey results.

Analysis

The City prepares a mid-year review annually, analyzing the current budget at the six-month midpoint. The mid-year review serves to discuss the financial results of the organization from July through December and suggests corrective actions in the event expectations differ from results. This year's mid-year review provides important details on the City's financial status and includes the components outlined below.

Mid-Year Budget Presentation

The mid-year budget presentation summarizes year-to-date financial results, major revenue trends, fund balance forecasts, and an overview of financial challenges facing the City.

Summary Overview

- **General Fund balance is trending higher than budget target, but personnel expenditure estimates are not yet updated due to on-going labor agreement negotiations**. The General Fund ended December 31, 2024 with an unaudited fund balance of $33.6 million, excluding estimated fund transfers of $5 million, which will be accounted for at the end of the fiscal year. By comparison, the General Fund balance was $29.4 million on December 31, 2023, excluding fund transfers. However, the fund balance increase is largely due to personnel expenditure estimates that are not yet updated, as discussed in more detail below.
- **Revenues are relatively flat**. General Fund revenues were $15.3 million at the six-month

midpoint, representing 49% of the total current fiscal year budget. The slight decrease compared to budget is primarily due to lower total sales tax revenue.

- **Expenditures are contained but are not sustainable**. General Fund expenditures were $12.7 million at the mid-year mark, representing 41% of the total current fiscal year budget, excluding transfers. This reflects the City's continued fiscal prudence in containing expenditures. Additionally, current personnel estimates in this mid-year review do not include any projected merit increase as labor agreement negotiations are still on-going, while the budget included merit increase assumptions based on recent trends. After the new labor agreements are finalized, personnel expenditure estimates will be updated with merit increases and compared to the adopted FY 2024-25 budget. Any budget increases that are needed will be presented to Council for approval at that time. While the City continues to be a transparent and fiscally prudent steward of these funds, it should also be noted that the cost of providing the City services and quality of life residents rely on are also rising.

Major Revenue Source Trends

- **Property Tax revenue is higher than budget estimates.** The City's property tax revenue is estimated to be $1.4 million higher than budget, mainly due to the $1.1 million reimbursement received for the VLF shortfall from FY 2022-23. Belmont Fire Protection District's property tax revenues is overall in line with budget.
- **Property Tax in-lieu of VLF (VLF) continues to be underfunded by the State.** Even though the City received a $1.1 million reimbursement for the VLF shortfall from FY 2022-23 that resulted in increased revenues for the current fiscal year, this one-time increase does not make the City whole on VLF funding for FY 2023-24 and FY 2024-25. Thus far, the State has continued to not budget for payment of VLF shortfalls from FY 2023-24 through current FY 2024-25. For FY 2023-24, the shortfall totals approximately $1.7 million for Belmont, which equates to over 40% of Belmont's Local 1% Sales Tax revenue, a major revenue source in the General Fund. The VLF shortfall then grows to an estimated $1.8 million for FY 2024-25. The increasing uncertainty of VLF shortfall reimbursements from the State makes this major revenue source more vulnerable to long-term State takeaways, which has potential impacts to basic services such as public safety, streets and storm facility maintenance.
- **Hotel Room Tax revenue is recovering**. By December 31, 2024, Hotel Room Tax (i.e., Transient Occupancy Tax, or TOT) revenue was on par with pre-pandemic levels. Hotel Room Tax revenue is estimated to be $250K higher than budget. While this revenue source is recovering back, it is important to note the increase is partially based the voter approval of the Transient Occupancy Tax adjustment in 2022, and that there is still lost growth from the pre-pandemic years to the current year.
- **Total Sales Tax revenue is trending down**. The Local 1% Sales Tax revenue is estimated to be approximately $108K lower than budget, primarily due to the auto sector cooling off. Measures A/W and Public Safety sales tax are in line with budget, while Measure I is estimated to be $59K lower than budget. A slowdown in consumer spending is observed across sectors as inflationary pressures persist. Long-term projections indicate reduced economic growth during the next several years.

- **Business License Tax is projected to remain constant.** Belmont voters approved Measure DD to restructure the City's business license tax program in November 2024. The new tax structure moves away from a flat tax structure basing business license rates primarily on employee counts and instead establishes rates based on gross receipts from business activity conducted within the City. It also simplified and reduced the number of rate categories from 43 to 4. Changes took effect on January 1, 2025. All businesses' licensing periods (i.e., the "tax period") have transitioned to January 1 to December 31. An account credit, or a refund by request, gets applied to business licensees' account for any months in 2025 that was paid for under the old rates. As of January 31, 2025, around 35% of business licensees have completed license renewal, and they have until end of March 2025 to renew. For now, budget estimates remain unchanged, but fiscal impact will be reassessed as more data becomes available during the budget development process for FY 2025-26.

Development Update

- As a result of elevated interest rates, escalating construction costs, and high commercial vacancies, there has been a notable slowdown in the development pipeline, both in the commercial and residential sectors.
- On the commercial side, two of the four large-scale biotech projects (601 Harbor and 400 Island Parkway) have paused their entitlement applications. The remaining two large-scale commercial projects, 1301 Shoreway and 425 Harbor (BeamReach) are still moving forward with their approvals but do not anticipate starting construction for at least five years, depending on market conditions.
- On the residential development front, the 608 Harbor project which was entitled in 2023 is not currently moving forward with construction. The only other market rate housing project still working through the entitlement process is 580 Masonic Avenue. The remainder of the projects in the pipeline are 100% affordable housing projects. Two of these projects, the 800 Belmont Avenue project and the Hill Street and El Camino project, are either under construction or will be later this fiscal year. These projects are critical to help the City meet its required housing obligations; however, they are all exempt from property tax and therefore will not generate any revenue for the City to offset the additional cost required to provide essential City services to the properties and their tenants.
- The other major project that is currently under review is the Stanford Campus at Notre Dame de Namur University. This project anticipates a 30-year redevelopment of the existing campus facilities, potentially doubling the on-site square footage. Given the educational use of this property, this development will also be exempt from property tax while incurring additional cost to provide essential City services to the expanded campus and its users.
- Overall, the fiscal impact of these exempt developments that do not generate ongoing property tax revenue but require ongoing provision of City services will place pressure to the City's General Fund as cost to provide essential City services continues to rise.

Financial Reports and Budget Adjustments

The mid-year review analyzes actual results compared to the prior fiscal year while addressing any significant past or anticipated variances this fiscal year. To assist in this analysis, staff generates a detailed Statement of Revenues and Expenditures Budget Variance Report (Attachment B). This report compares budget amounts vs. actual results by major revenue source and expenditure division.

- Routine adjustments to budget *revenues* include variances associated with the timing of the receipt of certain General Fund revenues and variances associated with the timing of the receipt for fees related to development projects.
- Routine adjustments to budget *expenditures* reflect operational and staffing needs for departments and timing of capital improvement project expenditures.

The following are notable FY 2024-25 budget adjustments:

- Increase budget transfer from the General Fund to the Recreation Fund by $250K due to lower-than-expected summer camp and daycare fee revenues. Daycare fee revenue is about $300K lower than FY 2024-25 adopted budget due to higher-than-expected enrollments in Transition-Kindergarten offered at no cost by Belmont Redwood Shores School District. Summer camp fee revenue is about $100K lower than FY 2024-25 budget due to relocating Camp SOAR to Barrett Community Center because of the Belmont Creek Restoration Project, thus reducing the number of third-party contract summer programs that usually occur at the Barrett Community Center. The lower revenue estimates get partially offset by lower expenditures estimates, but will still require an increase in the General Fund transfer in order to support operations in the Recreation Fund. Moving forward, enrollments in recreation programs and related expenditures will be reviewed and adjusted accordingly in the FY 2025-26 budget development process.
- Adjustments to existing capital improvement program (CIP) project budgets in the Capital Improvement Project Fund to update funding sources as summarized under Capital Improvement Program in Exhibit A. Some notable adjustments include:

CIP Project No.	CIP Project Name	Request
3108	2023 Pavement Reconstruction Project	Request to transfer budget appropriation of $150K from CIP Project No. 7092 that has Measure W funding source to cover remaining construction cost and labor cost. Project anticipated to complete this fiscal year.
3231	Traffic Signal Improvement at Cipriani & Belmont Canyon	Request to increase budget appropriation of $68K from the Measure W Fund to cover construction contingency cost and labor cost. Project

		anticipated to complete this fiscal year.
3230	Ralston Avenue Adaptive Signalization	Request to increase budget appropriation of $7,200 from the Measure A Street Improvement Fund to cover construction contingency cost and labor cost. Project anticipated to complete this fiscal year.
8113	Renamed from "Fuel Reduction Project" to "CAL FIRE Grant Fuel Reduction"	This CIP Project No. 8113 is funded by CAL FIRE Fire Prevention Program Grant and FEMA Pre-Disaster Mitigation Grant. Request to create a new Project No. 8123 and split this Project No. 8113 into two separate projects by grant funding sources for fund transparency and accountability: - Project No. 8113 renamed to "CAL FIRE Grant Fuel Reduction" - Transfer budget appropriation of $190K from Project No. 8113 to new Project No. 8123 "FEMA Grant Fuel Reduction".
8123	FEMA Grant Fuel Reduction (new project)	Create new Project No. 8123 named "FEMA Grant Fuel Reduction" with budget appropriation of $190K transfer from Project No. 8113 "CAL FIRE Grant Fuel Reduction".

Proposed Resolutions

Staff recommends that Council adopt resolutions amending the City of Belmont and Belmont Fire Protection District FY 2024-25 budgets as proposed in Attachment A. These mid-year resolutions are considered annually as part of the budget management process.

Next Steps

Feedback from Council on the results of the mid-year financial reports and presentation will help guide the budget development process for FY 2025-26. The City will also continue to engage residents on their City service needs and priorities and incorporate those into the annual budget development process.

Alternatives

1. Take no action.

Attachments

A. Resolutions
   a. City of Belmont – Mid Year Resolution with Exhibit A Summarizing Proposed Budget Amendments by Fund
   b. Belmont Fire Protection District – Mid Year Resolution with Exhibit A Summarizing Proposed Budget Amendments by Fund
B. Mid-Year Financial Reports
C. Mid-Year Budget Presentation

Fiscal Impact

☐ No Fiscal Impact

☒ Funding Source Confirmed: The resolutions attached to this report itemize the fiscal impacts by fund.

Source:	**Purpose:**	**Public Outreach:**
Staff	Discretionary Action	Posting of Agenda

City of Belmont
FY 2024-25
Mid-Year Budget Augmentations

Ref #	Fund	Account #	Description	Revenue / Expenditure	Increase (Decrease)
Community Development					
Revenue					
	277	5-902-6996	Increase Housing Impact Fee revenue based on development project actuals (1041 Hill Street)	Revenue	$47,003
Expenditure					
	210	5-904-8351	Increase to cover cost of supplemental plan check and inspector services ($200K), and document scanning services to digitize Permit Center Records ($20K)	Expenditure	$220,000
	212	5-906-8351	Increase for safety element update contribution per the MOU agreement with the County of San Mateo	Expenditure	$51,704
City Attorney					
Expenditure					
	101	1-121-8101	Increase for salary adjustment to implement new labor agreement	Expenditure	$22,000
City Manager					
Expenditure					
	101	1-111-8101	Increase for salary adjustment to implement new labor agreement	Expenditure	$120,986
	101	1-111-8351	Increase expense to account for policy advocacy services and annual minimum wage mailer	Expenditure	$19,000
Finance					
Revenue					
	101	0-000-6111	Increase Property Tax In Lieu of VLF revenues to reflect $1.07M reimbursement of the FY 2022-23 shortfall, and a $294K increased projection for FY2024-25 based on County's latest estimates	Revenue	$1,367,310
	101	0-000-6105	Decrease supplemental property tax based on County estimates	Revenue	($35,000)
	101	0-000-6121	Decrease Sales and Use Tax based on current trends and updated projections	Revenue	($108,399)
	101	0-000-6125	Increase Transient Occupancy Tax revenue based on current trends	Revenue	$250,000
	101	0-000-6129	Increase property transfer tax based on current property sales trends	Revenue	$40,000
	101	0-000-6132	Increase Garbage Franchise Taxes based on year to date revenues	Revenue	$90,513
	101	0-000-6133	Decrease Cable TV Franchise Taxes based on year to date revenues	Revenue	($36,985)
	101	0-000-7111	Increase to reflect year to date interest revenues	Revenue	$178,758
Police					
Expenditure					
	101	2-601-8351	Increase other professional/tech expense due to higher purchase cost of drones (12K); increase lab processing fee for homicide case ($10K)	Expenditure	$22,000
	101	2-601-8353	Increase pre-employment services cost due to expected new hires in January to June 2025	Expenditure	$40,000
	101	2-601-8580	Increase training cost for police academy training for new hires	Expenditure	$40,000
Administrative Services					
Expenditure					
	573	0-000-9040	Increase to purchase corporation yard gate	Expenditure	$60,000
	101	1-401-8351	Increase for investigative services	Expenditure	$40,000

City of Belmont
FY 2024-25
Mid-Year Budget Augmentations

Ref #	Fund	Account #	Description	Revenue / Expenditure	Increase (Decrease)
Public Works					
Revenue					
	102	3-730-6122	Decrease in Measure I Sales Tax based on current trends	Revenue	($59,368)
	231	3-750-6321	Increase projection of highway user taxes (HUT) based on latest State Department of Finance revenue projections	Revenue	$4,438
	231	3-750-6322	Increase projection of highway user taxes (HUT) based on latest State Department of Finance revenue projections	Revenue	$3,299
	231	3-750-6323	Increase projection of highway user taxes (HUT) based on latest State Department of Finance revenue projections	Revenue	$5,733
	231	3-750-6325	Increase projection of highway user taxes (HUT) based on latest State Department of Finance revenue projections	Revenue	$6,206
	232	3-730-6326	Increase projection of RMRA revenues based on latest State Department of Finance revenue projections	Revenue	$18,151
	234	3-730-6380	Decrease CIP revenue in Fund 234 for Project 3232 - Hill Street to Caltrain Hawk Signal. Revenue was accounted for in CIP Fund 399	Revenue	($384,680)
	237	0-000-6998	Increase Traffic Impact Fees revenue to reflect actual timing of development project permit issuance	Revenue	$125,000
	501	3-710-6805	Increase Sewer Use Fees based on the latest Levy report for Sewer Service and Facility Charges	Revenue	$184,110
Expenditure					
	503	3-730-8351	Increase to make yield reduction payment for 2019 Sewer Revenue Bonds	Expenditure	$173,351
	507	3-730-8351	Increase of bond administration expenses based on past actuals	Expenditure	$25,000

Parks and Recreation					
Revenue					
	205	4-822-6941	Daycare fee revenue is about $300K lower than FY 2024-25 adopted budget due to higher-than-expected enrollments in Transition-Kindergarten offered at no cost by Belmont Redwood Shores School District	Revenue	($298,000)
	205	4-824-6921	Summer camp fee revenue is about $100K lower than FY 2024-25 budget due to relocating Camp SOAR to Barrett Community Center because of the Belmont Creek Restoration Project, thus reducing the number of third-party contract summer programs that usually occur at the Barrett Community Center	Revenue	($100,000)
	205	1-504-7601	Increase transfer by $250,000 from General Fund 101 due to lower than expected summer camp and daycare fee revenues	Revenue	$250,000
Expenditure					
	101	1-504-9602	Increase transfer by $250,000 to Recreation Fund 205 due to lower than expected summer camp and daycare fee revenues	Expenditure	$250,000
	101	4-811-8358	Higher tree trimming costs due to planned tree removals carried over from the previous year.	Expenditure	$30,000
	101	4-811-8411	Water bills are higher than budgeted due to changes in the rate structure and an increase in rates.	Expenditure	$40,000
	101	4-811-8430	Replacement of Belmont Sport Complex north field restroom ($8,000) and pedestal ($12,000)	Expenditure	$20,000
	574	4-801-8423	Increase $23,851 to extend service agreement with Bamacor, Inc. for custodial services, split 50/50 into division 801 and 803	Expenditure	$11,926
	574	4-803-8423	Increase $23,851 to extend service agreement with Bamacor, Inc. for custodial services, split 50/50 into division 801 and 803	Expenditure	$11,926

City of Belmont
FY 2024-25
Mid-Year Budget Augmentations

Ref #	Fund	Account #	Description	Revenue / Expenditure	Increase (Decrease)
Capital Improvement Program					
CIP# 3108			CIP #3108 - 2023 Pavement Reconstruction Project Request to transfer budget appropriation of $150K from CIP Project No. 7092 that has Measure W funding source to cover remaining construction cost and labor cost. Project anticipated to complete this fiscal year. Transfer appropriation from CIP Project #3108 to CIP Project #7092 has no net impact to CIP Fund 399		
CIP# 8113 and 8123			CIP Project No. 8113 is funded by CAL FIRE Fire Prevention Program Grant and FEMA Pre-Disaster Mitigation Grant. Request to create a new Project No. 8123 and split this Project No. 8113 into two separate projects by grant funding sources for fund transparency and accountability: - CIP #8113 renamed to "CAL FIRE Grant Fuel Reduction" - Transfer budget appropriation of $190K from Project No. 8113 to new Project No. 8123 "FEMA Grant Fuel Reduction". - CIP #8123 (New Project) named "FEMA Grant Fuel Reduction" with budget appropriation of $190K transfer from Project No. 8113 "CAL FIRE Grant Fuel Reduction". Transfer appropriation from CIP Project #8113 to CIP Project #8123 has no net impact to CIP Fund 399		
CIP# 3230	399	1-504-7608	CIP #3230 - Ralston Avenue Adaptive Signalization Request to increase budget appropriation of $7,200 from the Measure A Street Improvement Fund to cover construction contingency cost and labor cost. Project anticipated to complete this fiscal year	Revenue	$7,200
	399	3-730-9030		Expenditure	$7,200
	234	1-504-9623		Expenditure	$7,200
CIP# 3231	399	1-504-7620	CIP #3231 - Traffic Signal Improvement at Cipriani & Belmont Canyon Request to increase budget appropriation of $68K from the Measure W Fund to cover construction contingency cost and labor cost. Project anticipated to complete this fiscal year	Revenue	$68,000
	399	3-730-9030		Expenditure	$68,000
	233	1-504-9623		Expenditure	$68,000
CIP# 3108	399	1-504-7619	Transfer appropriation of $237,234 from Measure I Fund 102 to RMRA Fund 232 to correct funding source for CIP Project No. 3108 based on approved budget	Revenue	($237,234)
	399	1-504-7678		Revenue	$237,234
	102	1-504-9623		Expenditure	$237,234
	232	1-504-9623		Expenditure	($237,234)
CIP# 6025	399	3-760-6359	Transfer appropriation of $4 million from Federal Grant to State Grant for CIP Project No. 6025 to correct funding source	Revenue	$4,000,000
	399	3-760-6319		Revenue	($4,000,000)
CIP# 8096	399	1-504-7618	Transfer appropriation of $52,609 from Open Space Fund 343 to BFPD Fund 223 to correct funding source for CIP Project No. 8096 based on approved budget	Revenue	($52,609)
	399	1-504-7616		Revenue	$52,609
	343	1-504-9623		Expenditure	$52,609
	223	1-504-9623		Expenditure	($52,609)

City of Belmont
FY 2024-25
Mid-Year Budget Augmentations

Ref #	Fund	Account #	Description	Revenue / Expenditure	Increase (Decrease)
Multiples	399	1-504-7672	Transfer net appropriation of $156,033 from CIP Fund 399 to Sewer Collections Fund 503 to correct funding sources for the following CIP projects based on approved budget: - transfer $15,663 from CIP Fund 399 to Sewer Collections Fund 503 for CIP Project No. 3219 - transfer $116,029 from CIP Fund 399 to Sewer Collections Fund 503 for CIP Project No. 6025 - transfer $24,700 from CIP Fund 399 to Sewer Collections Fund 503 for CIP Project No. 8113 - transfer $358 from Sewer Collections Fund 503 to CIP Fund 399 for CIP Project No. 7090	Revenue	($156,033)
	503	1-504-9623		Expenditure	($156,033)
Multiples	399	1-504-7672	Transfer net appropriation of $188,905 from Sewer Collections Fund 503 to Storm Drainage Fund 525 to correct funding sources for the following CIP projects based on approved budget: - transfer $165,699 from Sewer Collections Fund 503 to Storm Drainage Fund 525 for CIP Project No. 7074 - transfer $23,206 from Sewer Collections Fund 503 to Storm Drainage Fund 525 for CIP Project No. 7086	Revenue	($188,905)
	399	1-504-7674		Revenue	$188,905
	503	1-504-9623		Expenditure	$188,905
	525	1-504-9623		Expenditure	($188,905)
Multiples	399	1-504-7674	Transfer net appropriation of $13,211 from Storm Drainage Fund 525 to CIP Fund 399 to correct funding sources for the following CIP projects based on approved budget: - transfer $1,790 from Storm Drainage Fund 525 to CIP Fund 399 for CIP Project No. 6001 - transfer $11,421 from Storm Drainage Fund 525 to CIP Fund 399 for CIP Project No. 6046	Revenue	$13,211
	525	1-504-9623		Expenditure	$13,211

TOTAL REVENUE ADJUSTMENT	**$1,480,467**
TOTAL EXPENDITURE ADJUSTMENT	**$1,205,470**

RESOLUTION NO. 2025 –

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE BELMONT FIRE PROTECTION DISTRICT AMENDING THE FISCAL YEAR 2024-25 BUDGET BY APPROVING REVISIONS TO REVENUE AND AUTHORIZING SUPPLEMENTAL APPROPRIATIONS

WHEREAS, the Belmont Fire Protection District (BFPD) fiscal year (FY) 2024-25 budget includes adopted revenue and appropriations; and,

WHEREAS, based on data collected in the first six months of FY 2024-25, year-end estimates are developed and compared to the adopted budget; and,

WHEREAS, the Board of Directors finds that it is necessary to amend the FY 2024-25 revenue budget, appropriations budget, and the estimated fund balance, as identified in Exhibit A; and,

NOW, THEREFORE, the Board of Directors of the Belmont Fire Protection District resolves as follows:

SECTION 1. The FY 2024-25 budget is hereby amended as reflected in Exhibit A.

SECTION 2. The summary effect on funds is shown in the table below.

Summary Combined Effect on Funds					
Fund	Description	Revenues Increase/ (Decrease)	Expenditures Increase/ (Decrease)	Transfer In/(Out)	Net Change on Fund Balance Increase/ (Decrease)
223	Belmont Fire Protection District	337,000	35,000	52,609	354,609

* * *

ADOPTED February 11, 2025 by the Board of Directors of the Belmont Fire Protection District by the following vote:

Ayes:

Noes:

Absent:

Abstain:

ATTEST:

_____
City Clerk

_____
Mayor

APPROVED AS TO FORM:

_____
City Attorney

Belmont Fire Protection District
FY 2024-25
Mid-Year Budget Augmentations

Ref #	Fund	Account #	Description	Revenue / Expenditure	Amount Increase (Decrease)
Fire					
Revenue					
	223	0-000-6101	Increase property tax based on County estimates	Revenue	$60,000
	223	0-000-6103	Increase unsecured property tax based on County estimates	Revenue	$57,000
	223	0-000-6105	Decrease supplemental property tax based on County estimates	Revenue	($65,000)
	223	0-000-7111	Increase to reflect year to date interest revenues	Revenue	$285,000
Expenditure					
	223	2-119-8519	Increase in OPEB/retiree health contribution due to higher health premium	Expenditure	$35,000

TOTAL REVENUE ADJUSTMENT	**$337,000**
TOTAL EXPENDITURE ADJUSTMENT	**$35,000**

CITY OF BELMONT
Statement of Revenues and Expenditures
Budget Variance Report
December 31, 2024
Expenditures

Fund	Division	Description	As of 12/31/2024 Adjusted Budget	YTD Actual	YTD %	Remaining Budget	12/31/2023 Actual
101	101	CITY COUNCIL	$ 431,498	$ 199,025	46%	$ 232,473	$ 150,096
101	102	CONTINGENCY	250,000		0%	250,000	
101	111	EXECUTIVE MANAGEMENT	1,730,192	967,638	56%	762,554	726,123
101	114	CITY CLERK	548,824	277,118	50%	271,706	275,691
101	121	CITY ATTORNEY	641,998	339,757	53%	302,241	311,223
101	202	CITY CLERK-ELECTIONS	163,500	10,380	6%	153,120	
101	401	HUMAN RESOURCES	1,127,474	558,614	50%	568,860	493,161
101	501	FINANCIAL OPERATIONS	1,746,460	799,317	46%	947,143	710,176
101	502	FINANCIAL PLANNING & REPORTING	1,001,576	432,329	43%	569,247	458,893
101	503	RISK MANAGEMENT	196,788	99,649	51%	97,139	95,365
101	504	OPERATING TRANSFERS	4,700,000		0%	4,700,000	12,246
101	600	LAW ENFORCEMENT ADMINISTRATION	2,463,819	1,208,237	49%	1,255,582	1,234,535
101	601	CRIME CONTROL	10,014,897	4,867,243	49%	5,147,654	4,948,271
101	602	TRAFFIC & COMMUNITY SAFETY	1,498,532	618,047	41%	880,485	738,730
101	604	SUPPORT SERVICES	2,007,161	913,237	45%	1,093,924	819,568
101	811	PARKS AND OPEN SPACES	2,820,602	1,437,697	51%	1,382,905	1,203,532
		GENERAL FUND	**31,343,321**	**12,728,288**	41%	**18,615,033**	**12,177,610**
102	730	IMPROVEMENT PROJECTS			N/A	-	(158,958)
102	504	OPERATING TRANSFERS	8,230,831	2,749,378	33%	5,481,452	1,679,299
		MEASURE I	**8,230,831**	**2,749,378**	33%	**5,481,452**	**1,520,341**
205	820	RECREATION ADMINISTRATION	554,999	264,835	48%	290,164	311,601
205	822	COMMUNITY LEARNING CENTER	1,374,358	683,195	50%	691,163	591,278
205	823	SENIOR SERVICES	642,531	274,595	43%	367,936	268,088
205	824	YOUTH AND TEENS RECREATION	1,372,470	671,882	49%	700,588	539,020
205	825	AQUATICS RECREATION	140,742	82,411	59%	58,331	60,389
		RECREATION	**4,085,100**	**1,976,918**	48%	**2,108,182**	**1,770,376**
206	504	OPERATING TRANSFERS	500,000		0%	500,000	
206	801	FACILITIES MANAGEMENT	472,458	202,162	43%	270,296	188,234
		LIBRARY MAINTENANCE/OPERATION	**972,458**	**202,162**	21%	**770,296**	**188,234**
207	504	OPERATING TRANSFERS	210,000		0%	210,000	
207	812	ATHLETIC FIELD MAINTENANCE	143,800	69,562	48%	74,238	48,975
		ATHLETIC FIELD MAINTENANCE	**353,800**	**69,562**	20%	**284,238**	**48,975**
208	811	PARKS AND OPEN SPACES	76,280	22,464	29%	53,816	48,963
208	504	OPERATING TRANSFERS	60,000		0%	60,000	
		CITY TREES	**136,280**	**22,464**	16%	**113,816**	**48,963**
209	803	RECREATIONAL FACILITIES	500		0%	500	
209	811	PARKS AND OPEN SPACES	500		0%	500	
209	812	ATHLETIC FIELD MAINTENANCE	500		0%	500	
209	820	RECREATION ADMINISTRATION	1,000		0%	1,000	
209	822	COMMUNITY LEARNING CENTER	500		0%	500	
209	823	SENIOR SERVICES	5,000		0%	5,000	
209	824	YOUTH AND TEENS RECREATION	1,000		0%	1,000	
209	825	AQUATICS RECREATION	500		0%	500	
		RECREATION DONATION	**9,500**	**-**	0%	**9,500**	**-**

CITY OF BELMONT
Statement of Revenues and Expenditures
Budget Variance Report
December 31, 2024
Expenditures

Fund	Division		Description	As of 12/31/2024 Adjusted Budget	YTD Actual	YTD %	Remaining Budget	12/31/2023 Actual
210		780	PUBLIC WORKS DEVELOPMENT	1,891,955	800,811	42%	1,091,144	797,723
210		904	PERMIT CENTER	2,336,880	1,179,851	50%	1,157,029	933,998
210		905	DEVELOPMENT REVIEW	2,752,331	1,225,078	45%	1,527,252	962,772
			DEVELOPMENT SERVICES	**6,981,166**	**3,205,740**	46%	**3,775,426**	**2,694,492**
212		905	DEVELOPMENT REVIEW			N/A	-	186
212		906	GENERAL PLAN MAINTENANCE	1,368,945	559,985	41%	808,960	414,722
			GENERAL PLAN MAINTENANCE	**1,368,945**	**559,985**	41%	**808,960**	**414,907**
223		115	FIRE SERVICES	11,189,430	7,953,010	71%	3,236,420	7,645,521
223		118	BSCFD LEGACY COSTS	1,880,403	1,875,176	100%	5,227	1,682,332
223		504	OPERATING TRANSFERS	401,600	(33,805)	-8%	435,405	24,171
223		119	BFD LEGACY COSTS	475,691	432,508	91%	43,183	48,425
			BELMONT FIRE PROTECTION DISTRICT	**13,947,124**	**10,226,889**	73%	**3,720,235**	**9,400,448**
225		600	LAW ENFORCEMENT ADMINISTRATION	4,000		0%	4,000	
225		601	CRIME CONTROL	5,000		0%	5,000	326
			PUBLIC SAFETY GRANTS	**9,000**	**-**	0%	**9,000**	**326**
227		601	CRIME CONTROL	87,110	47,969	55%	39,141	61,933
			SUPPLEMENTAL LAW ENFORCEMENT	**87,110**	**47,969**	55%	**39,141**	**61,933**
231		701	PLANNING & PROJECT MANAGEMENT	541,117	292,598	54%	248,519	278,962
231		750	STREET MAINTENANCE	1,390,751	655,120	47%	735,631	656,690
231		751	TRAFFIC/ELECTRICAL OPERATIONS	666,892	271,208	41%	395,684	282,603
			STREET MAINTENANCE	**2,598,760**	**1,218,925**	47%	**1,379,835**	**1,218,256**
232		504	OPERATING TRANSFERS	1,682,371	247,870	15%	1,434,501	540
232		730	IMPROVEMENT PROJECTS			N/A	-	
			RMRA STREET PROJECTS	**1,682,371**	**247,870**	15%	**1,434,501**	**540**
233		504	OPERATING TRANSFERS	2,950,000	85,614	3%	2,864,386	
233		730	IMPROVEMENT PROJECTS			N/A	-	
			MEASURE W	**2,950,000**	**85,614**	3%	**2,864,386**	**-**
234		504	OPERATING TRANSFERS	3,400,029	247,938	7%	3,152,091	33,719
234		730	IMPROVEMENT PROJECTS	69,563	35,038	50%	34,525	37,456
			STREET IMPROVEMENT	**3,469,592**	**282,975**	8%	**3,186,616**	**71,175**
239		504	OPERATING TRANSFERS	10,000		0%	10,000	
			PUBLIC ART	**10,000**	**-**	0%	**10,000**	**-**
275		902	HOUSING	1,573,916	199,861	13%	1,374,055	129,804
			HOUSING SUCCESSOR	**1,573,916**	**199,861**	13%	**1,374,055**	**129,804**
277		902	HOUSING			N/A	-	
			INCLUSIONARY HOUSING FUND	**-**	**-**	N/A	**-**	**-**
308		504	OPERATING TRANSFERS	586,234	11,161	2%	575,073	
308		802	GENERAL FACILITIES IMPROVEMENT	7,076	4,341	61%	2,735	5,451
			GENERAL FACILITIES	**593,310**	**15,502**	3%	**577,807**	**5,451**

CITY OF BELMONT
Statement of Revenues and Expenditures
Budget Variance Report
December 31, 2024
Expenditures

Fund	Division	Description	As of 12/31/2024 Adjusted Budget	YTD Actual	YTD %	Remaining Budget	12/31/2023 Actual
310	504	OPERATING TRANSFERS	3,263,019	(172,162)	-5%	3,435,181	208,196
310	760	EMERGENCY REPAIR		34	N/A	(34)	
		INFRASTRUCTURE	**3,263,019**	**(172,127)**	-5%	**3,435,146**	**208,196**
312	303	COMCAST PEG PROGRAM			N/A	-	
312	504	OPERATING TRANSFERS	120,000		0%	120,000	
		COMCAST	**120,000**	**-**	0%	**120,000**	**-**
341	504	OPERATING TRANSFERS	27,799	394	1%	27,405	
341	810	PARK IMPROVEMENT PROJECTS	672,063	336,031	50%	336,032	336,172
		PLANNED PARK	**699,862**	**336,425**	48%	**363,437**	**336,172**
342	810	PARK IMPROVEMENT PROJECTS			N/A	-	
342	504	OPERATING TRANSFERS	663,000		0%	663,000	
		PARK IMPACT	**663,000**	**-**	0%	**663,000**	**-**
343	504	OPERATING TRANSFERS	51,299	52,609	103%	(1,310)	
343	810	PARK IMPROVEMENT PROJECTS			N/A	-	-
		OPEN SPACE	**51,299**	**52,609**	103%	**(1,310)**	**-**
406	502	FINANCIAL PLANNING & REPORTING	681,615	558,356	82%	123,259	534,859
		LIBRARY BOND DEBT SERVICE	**681,615**	**558,356**	82%	**123,259**	**534,859**
399	302	IT CAPITAL	479,951		0%	479,951	71,766
399	303	COMCAST PEG PROGRAM	120,000	45,352	38%	74,648	
399	501	FINANCIAL OPERATIONS	50,000		0%	50,000	
399	710	SEWER UTILITY	427,482		0%	427,482	
399	730	IMPROVEMENT PROJECTS	41,587,872	5,493,767	13%	36,094,106	2,966,483
399	760	EMERGENCY REPAIR	12,959,906	328,038	3%	12,631,868	238,583
399	801	FACILITIES MANAGEMENT	500,000		0%	500,000	
399	802	GENERAL FACILITIES IMPROVEMENT	1,212,841	11,161	1%	1,201,680	12,246
399	803	RECREATIONAL FACILITIES	194,422	35,278	18%	159,144	57,315
399	810	PARK IMPROVEMENT PROJECTS	601,799	36,106	6%	565,692	24,171
399	811	PARKS AND OPEN SPACES	423,732		0%	423,732	
399	812	ATHLETIC FIELD MAINTENANCE	210,000		0%	210,000	
		CIP FUND	**58,768,005**	**5,949,702**	10%	**52,818,304**	**3,370,563**
501	701	PLANNING & PROJECT MANAGEMENT	1,043,742	463,289	44%	580,453	418,585
501	710	SEWER UTILITY	6,703,216	3,058,286	46%	3,644,931	3,314,580
		SEWER ENTERPRISE - OPERATIONS	**7,746,958**	**3,521,575**	45%	**4,225,383**	**3,733,165**
503	730	IMPROVEMENT PROJECTS	2,512,541	1,302,569	52%	1,209,972	1,099,822
503	504	OPERATING TRANSFERS	23,356,892	6,594,830	28%	16,762,062	1,176,846
		SEWER ENTERPRISE - CAPITAL	**25,869,433**	**7,897,400**	31%	**17,972,033**	**2,276,668**
505	730	IMPROVEMENT PROJECTS			N/A	-	
505	504	OPERATING TRANSFERS	3,555,029	680,575	19%	2,874,454	
		SEWER ENTERPRISE-TREATMENT PLANT	**3,555,029**	**680,575**	19%	**2,874,454**	**-**
507	730	IMPROVEMENT PROJECTS	5,349,705	2,697,878	50%	2,651,827	2,117,700
		SEWER TREATMENT FACILITY	**5,349,705**	**2,697,878**	50%	**2,651,827**	**2,117,700**

CITY OF BELMONT
Statement of Revenues and Expenditures
Budget Variance Report
December 31, 2024
Expenditures

Fund	Division	Description	As of 12/31/2024 Adjusted Budget	YTD Actual	YTD %	Remaining Budget	12/31/2023 Actual
525	504	OPERATING TRANSFERS	1,065,105	(158,727)	-15%	1,223,832	67,227
525	701	PLANNING & PROJECT MANAGEMENT	481,553	225,408	47%	256,145	198,675
525	720	DRAINAGE/WATER POLLUTION CNTRL	1,578,336	735,283	47%	843,053	736,170
525	730	IMPROVEMENT PROJECTS	104	52	50%	52	8,585
		STORM DRAINAGE	**3,125,098**	**802,015**	26%	**2,323,082**	**1,010,658**
530	770	SOLID WASTE MANAGEMENT	383,265	161,121	42%	222,144	170,897
530	813	LITTER CONTROL	225,101	110,410	49%	114,691	92,927
		SOLID WASTE	**608,366**	**271,531**	45%	**336,835**	**263,824**
570	503	RISK MANAGEMENT	852,007	756,151	89%	95,856	685,783
		WORKERS' COMPENSATION	**852,007**	**756,151**	89%	**95,856**	**685,783**
571	503	RISK MANAGEMENT	1,393,402	786,698	56%	606,704	629,759
		LIABILITY INSURANCE	**1,393,402**	**786,698**	56%	**606,704**	**629,759**
572	503	RISK MANAGEMENT			N/A	-	(4,287)
		SELF-FUNDED VISION	**-**	**-**	N/A	**-**	**(4,287)**
573	0		2,010,587	151,478	8%	1,859,109	
573	301	INFORMATION TECHNOLOGY	3,305,505	1,633,420	49%	1,672,085	1,528,393
573	302	IT CAPITAL	1,014	507	50%	507	165,921
573	504	OPERATING TRANSFERS	475,000		0%	475,000	
573	740	FLEET MANAGEMENT	1,161,129	575,725	50%	585,404	672,456
573	751	TRAFFIC/ELECTRICAL OPERATIONS	500	252	50%	248	
		FLEET & EQUIPMENT MANAGEMENT	**6,953,735**	**2,361,383**	34%	**4,592,352**	**2,366,770**
574	504	OPERATING TRANSFERS	544,422	35,278	6%	509,144	38,485
574	801	FACILITIES MANAGEMENT	1,530,171	837,150	55%	693,021	862,140
574	803	RECREATIONAL FACILITIES	1,074,001	480,808	45%	593,193	404,309
		FACILITIES MANAGEMENT	**3,148,594**	**1,353,237**	43%	**1,795,358**	**1,304,934**
575	503	RISK MANAGEMENT	1,585,849	496,681	31%	1,089,168	801,873
		BENEFIT PREFUNDING	**1,585,849**	**496,681**	31%	**1,089,168**	**801,873**
		TOTAL EXPENDITURES	**$ 204,837,558**	**$ 62,190,192**	**30%**	**$ 142,647,366**	**$ 49,388,470**

CITY OF BELMONT
Statement of Revenues and Expenditures
Budget Variance Report
December 31, 2024
Revenues

			as of 12/31/2024				
Fund	Account	Description	Adjusted Budget	YTD Actual	YTD %	Remaining Budget	12/31/2023 Actual
101	6100	PROPERTY TAXES	$ 12,035,307	$ 7,244,752	60%	$ 4,790,555	$ 6,389,550
101	6200	SALES TAXES	3,998,914	1,224,013	31%	2,774,901	1,318,869
101	6300	OTHER TAXES	6,123,503	2,625,866	43%	3,497,637	2,554,102
101	6200	LICENSES AND PERMITS	1,215,275	515,060	42%	700,215	433,167
101	6300	INTERGOVERNMENTAL	366,398	227,413	62%	138,985	243,393
101	6400-6999	SERVICE CHARGES	4,318,251	2,207,929	51%	2,110,322	2,212,164
101	7100	FINES AND FORFEITURES	144,237	47,232	33%	97,005	62,963
101	7100	USE OF MONEY AND PROPERTY	1,738,208	1,206,035	69%	532,173	1,810,295
101	7200	MISCELLANEOUS	320,897	12,360	4%	308,537	15,351
101	7600	OPERATING TRANSFERS IN	1,204,633	-	0%	1,204,633	-
		GENERAL FUND	**31,465,623**	**15,310,659**	49%	**16,154,964**	**15,039,855**
102	6200	SALES TAXES	2,335,338	725,220	31%	1,610,118	819,206
102	7100	USE OF MONEY AND PROPERTY	138,180	74,510	54%	63,670	66,332
102	7200	MISCELLANEOUS	-	3,900	N/A	(3,900)	-
		MEASURE I	**2,473,518**	**803,630**	32%	**1,669,888**	**885,537**
205	6300	INTERGOVERNMENTAL	61,000	18,504	30%	42,496	21,028
205	6400-6999	SERVICE CHARGES	2,562,300	885,569	35%	1,676,731	833,332
205	7100	USE OF MONEY AND PROPERTY	-	2,819	N/A	(2,819)	728
205	7200	MISCELLANEOUS	12,000	19,081	159%	(7,081)	9,796
205	7600	OPERATING TRANSFERS IN	1,500,000	-	0%	1,500,000	-
		RECREATION	**4,135,300**	**925,973**	22%	**3,209,327**	**864,883**
206	6100	TAXES	312,802	156,412	50%	156,390	156,401
206	7100	USE OF MONEY AND PROPERTY	28,850	15,435	54%	13,415	13,245
		LIBRARY MAINTENANCE/OPERATION	**341,652**	**171,847**	50%	**169,805**	**169,647**
207	6400-6999	SERVICE CHARGES	150,000	79,417	53%	70,584	52,587
207	7100	USE OF MONEY AND PROPERTY	14,530	8,366	58%	6,164	6,529
		ATHLETIC FIELD MAINTENANCE	**164,530**	**87,783**	53%	**76,747**	**59,116**
208	6400-6999	SERVICE CHARGES	10,000	2,591	26%	7,409	6,775
208	7100	USE OF MONEY AND PROPERTY	10,290	4,983	48%	5,307	4,878
208	7200	MISCELLANEOUS	-	-	N/A	-	15,538
		CITY TREES	**20,290**	**7,574**	37%	**12,716**	**27,191**
209	7100	USE OF MONEY AND PROPERTY	3,530	2,013	57%	1,517	1,624
209	7200	MISCELLANEOUS	7,000	7,218	103%	(218)	-
		SENIOR SERVICES DONATION	**10,530**	**9,231**	88%	**1,299**	**1,624**
210	6200	LICENSES AND PERMITS	2,385,000	1,696,610	71%	688,390	1,387,496
210	6400-6999	SERVICE CHARGES	3,403,500	1,933,369	57%	1,470,131	1,686,742
210	7100	USE OF MONEY AND PROPERTY	94,140	50,739	54%	43,401	44,950
210	7200	MISCELLANEOUS	300	5,033	1678%	(4,733)	665,182
210	7600	OPERATING TRANSFERS IN	1,000,000	-	0%	1,000,000	-
		DEVELOPMENT SERVICES	**6,882,940**	**3,685,752**	54%	**3,197,188**	**3,784,369**
212	6300	INTERGOVERNMENTAL	-	-	N/A	-	-
212	6400-6999	SERVICE CHARGES	450,000	193,955	43%	256,045	263,675
212	7100	USE OF MONEY AND PROPERTY	53,430	28,709	54%	24,721	26,215
		GENERAL PLAN MAINTENANCE	**503,430**	**222,664**	44%	**280,766**	**289,890**

CITY OF BELMONT
Statement of Revenues and Expenditures
Budget Variance Report
December 31, 2024
Revenues

Fund	Account	Description	as of 12/31/2024 Adjusted Budget	YTD Actual	YTD %	Remaining Budget	12/31/2023 Actual
223	6100	TAXES	17,855,529	9,080,832	51%	8,774,697	8,642,243
223	6300	INTERGOVERNMENTAL	94,110	6,415	7%	87,695	31,574
223	7100	USE OF MONEY AND PROPERTY	734,750	783,428	107%	(48,678)	1,230,847
223	7200	MISCELLANEOUS	-	3,597	N/A	(3,597)	94
		BELMONT FIRE PROTECTION DISTRICT	**18,684,389**	**9,874,271**	53%	**8,810,118**	**9,904,757**
225	7100	USE OF MONEY AND PROPERTY	1,170	748	64%	422	526
225	7200	MISCELLANEOUS	-	452	N/A	(452)	-
		PUBLIC SAFETY GRANTS	**1,170**	**1,201**	103%	**(31)**	**526**
227	6300	INTERGOVERNMENTAL	172,271	134,085	78%	38,186	125,762
227	7100	USE OF MONEY AND PROPERTY	2,560	2,218	87%	342	1,000
227	7600	OPERATING TRANSFERS IN	-	-	N/A	-	-
		SUPPLEMENTAL LAW ENFORCEMENT	**174,831**	**136,303**	78%	**38,528**	**126,762**
231	6300	INTERGOVERNMENTAL	783,493	366,506	47%	416,987	350,788
231	6400-6999	SERVICE CHARGES	375,563	382,441	102%	(6,878)	282,216
231	7100	USE OF MONEY AND PROPERTY	-	31,565	N/A	(31,565)	(5,911)
231	7200	MISCELLANEOUS	-	200	N/A	(200)	400
231	7600	OPERATING TRANSFERS IN	1,500,000	-	0%	1,500,000	-
		STREET MAINTENANCE	**2,659,056**	**780,712**	29%	**1,878,344**	**627,493**
232	6300	INTERGOVERNMENTAL	719,785	324,336	45%	395,449	287,230
232	7100	USE OF MONEY AND PROPERTY	31,190	9,044	29%	22,146	12,712
		RMRA STREET PROJECTS	**750,975**	**333,381**	44%	**417,594**	**299,942**
233	6100	TAXES	417,933	136,996	33%	280,937	135,474
233	6300	INTERGOVERNMENTAL	-	-	N/A	-	-
233	7100	USE OF MONEY AND PROPERTY	71,840	48,468	67%	23,372	31,862
233	7600	OPERATING TRANSFERS IN	-	-	N/A	-	-
		MEASURE W	**489,773**	**185,463**	38%	**304,310**	**167,336**
234	6100	TAXES	938,257	387,773	41%	550,484	394,196
234	6200	LICENSES AND PERMITS	-	3,180	N/A	(3,180)	-
234	6300	INTERGOVERNMENTAL	492,680	41,398	8%	451,282	170,850
234	7100	USE OF MONEY AND PROPERTY	87,720	62,703	71%	25,017	38,410
234	7200	MISCELLANEOUS	-	13,274	N/A	(13,274)	11,597
234	7600	OPERATING TRANSFERS IN	-	-	N/A	-	-
		STREET IMPROVEMENT	**1,518,657**	**508,329**	33%	**1,010,328**	**615,053**
237	6400-6999	SERVICE CHARGES	28,379	153,520	541%	(125,141)	-
237	7100	USE OF MONEY AND PROPERTY	3,690	2,843	77%	847	1,697
		TRAFFIC IMPACT	**32,069**	**156,362**	488%	**(124,293)**	**1,697**
239	6400-6999	SERVICE CHARGES	6,081	-	0%	6,081	-
239	7100	USE OF MONEY AND PROPERTY	15,440	8,653	56%	6,787	7,103
		PUBLIC ART	**21,521**	**8,653**	40%	**12,868**	**7,103**

CITY OF BELMONT
Statement of Revenues and Expenditures
Budget Variance Report
December 31, 2024
Revenues

			as of 12/31/2024				
Fund	Account	Description	Adjusted Budget	YTD Actual	YTD %	Remaining Budget	12/31/2023 Actual
275	6300	INTERGOVERNMENTAL	-	-	N/A	-	119,368
275	7100	USE OF MONEY AND PROPERTY	226,828	117,082	52%	109,746	105,296
275	7200	MISCELLANEOUS	-	-	N/A	-	-
275	7500	OTHER FINANCING SOURCES	-	-	N/A	-	-
		HOUSING SUCCESSOR	**226,828**	**117,082**	52%	**109,746**	**224,664**
277	6400-6999	SERVICE CHARGES	133,500	180,503	135%	(47,003)	-
277	7100	USE OF MONEY AND PROPERTY	12,640	21,409	169%	(8,769)	3,867
		INCLUSIONARY HOUSING FUND	**146,140**	**201,911**	138%	**(55,771)**	**3,867**
308	7100	USE OF MONEY AND PROPERTY	27,870	12,019	43%	15,851	12,849
308	7200	MISCELLANEOUS	-	-	N/A	-	-
		GENERAL FACILITIES	**27,870**	**12,019**	43%	**15,851**	**12,849**
310	6300	INTERGOVERNMENTAL	-	-	N/A	-	2,771
310	7100	USE OF MONEY AND PROPERTY	87,590	46,420	53%	41,170	41,099
		INFRASTRUCTURE	**87,590**	**46,420**	53%	**41,170**	**43,871**
312	7100	USE OF MONEY AND PROPERTY	15,450	8,662	56%	6,788	7,110
		COMCAST	**15,450**	**8,662**	56%	**6,788**	**7,110**
341	7100	USE OF MONEY AND PROPERTY	58,060	17,246	30%	40,814	28,337
341	7200	MISCELLANEOUS	-	-	N/A	-	-
341	7600	OPERATING TRANSFERS IN	33,299	-	0%	33,299	-
		PLANNED PARK	**91,359**	**17,246**	19%	**74,113**	**28,337**
342	6300	INTERGOVERNMENTAL	-	-	N/A	-	-
342	6400-6999	SERVICE CHARGES	19,484	17,050	88%	2,434	13,117
342	7100	USE OF MONEY AND PROPERTY	24,750	14,156	57%	10,594	11,326
342	7200	MISCELLANEOUS	-	-	N/A	-	-
		PARK IMPACT FEES	**44,234**	**31,206**	71%	**13,028**	**24,443**
343	7100	USE OF MONEY AND PROPERTY	3,710	1,854	50%	1,856	1,697
		OPEN SPACE	**3,710**	**1,854**	50%	**1,856**	**1,697**
399	6300	INTERGOVERNMENTAL	11,256,208	544,462	5%	10,711,746	3,757,101
399	7100	USE OF MONEY AND PROPERTY	95,150	93,770	99%	1,380	31,455
399	7200	MISCELLANEOUS	8,000	-	0%	8,000	-
399	7600	OPERATING TRANSFERS IN	43,784,150	4,510,406	10%	39,273,744	3,240,730
		CIP Fund	**55,143,508**	**5,148,638**	9%	**49,994,870**	**7,029,286**
406	6100	TAXES	696,237	348,143	50%	348,094	348,119
406	7100	USE OF MONEY AND PROPERTY	580	5,446	939%	(4,866)	(460)
		LIBRARY BOND DEBT SERVICE	**696,817**	**353,590**	51%	**343,227**	**347,658**
501	6400-6999	SERVICE CHARGES	15,812,965	7,833,487	50%	7,979,478	7,559,218
501	7100	USE OF MONEY AND PROPERTY	2,121,360	1,377,738	65%	743,622	951,328
		SEWER ENTERPRISE-OPERATIONS	**17,934,325**	**9,211,225**	51%	**8,723,100**	**8,510,545**
503	6400-6999	SERVICE CHARGES	-	21,914	N/A	(21,914)	36,074
503	7100	USE OF MONEY AND PROPERTY	-	(212,323)	N/A	212,323	(21,003)
		SEWER ENTERPRISE-CAPITAL	**-**	**(190,409)**	N/A	**190,409**	**15,072**

CITY OF BELMONT
Statement of Revenues and Expenditures
Budget Variance Report
December 31, 2024
Revenues

Fund	Account	Description	as of 12/31/2024 Adjusted Budget	YTD Actual	YTD %	Remaining Budget	12/31/2023 Actual
505	6800	SERVICE CHARGES-SEWER	48,099	-	0%	48,099	-
505	7100	USE OF MONEY AND PROPERTY	-	-	N/A	-	-
505	7600	OPERATING TRANSFERS IN	5,830,546	5,830,546	100%	-	-
		SEWER ENTERPRISE-TREATMENT PLANT	**5,878,645**	**5,830,546**	99%	**48,099**	**-**
507	6400-6999	SERVICE CHARGES	3,147,630	1,574,490	50%	1,573,140	1,573,814
507	7100	USE OF MONEY AND PROPERTY	161,100	121,281	75%	39,819	72,731
507	7200	MISCELLANEOUS	-	240,000	N/A	(240,000)	-
		SEWER TREATMENT FACILITY	**3,308,730**	**1,935,771**	59%	**1,372,959**	**1,646,545**
525	6300	INTERGOVERNMENTAL	-	17,689	N/A	(17,689)	-
525	6400-6999	SERVICE CHARGES	1,095,242	532,888	49%	562,354	506,511
525	7100	USE OF MONEY AND PROPERTY	-	(3,341)	N/A	3,341	988
525	7200	MISCELLANEOUS	-	67,779	N/A	(67,779)	73,975
525	7600	OPERATING TRANSFERS IN	1,000,000	-	0%	1,000,000	-
		STORM DRAINAGE	**2,095,242**	**615,014**	29%	**1,480,228**	**581,475**
530	6300	INTERGOVERNMENTAL	-	-	N/A	-	-
530	6400-6999	SERVICE CHARGES	603,237	266,596	44%	336,641	236,143
530	7100	USE OF MONEY AND PROPERTY	86,040	51,921	60%	34,119	39,449
		SOLID WASTE	**689,277**	**318,516**	46%	**370,761**	**275,592**
570	6400-6999	SERVICE CHARGES	876,072	429,240	49%	446,832	429,396
570	7100	USE OF MONEY AND PROPERTY	64,240	44,155	69%	20,085	28,440
570	7200	MISCELLANEOUS	-	53,441	N/A	(53,441)	93,421
		WORKERS' COMPENSATION	**940,312**	**526,836**	56%	**413,476**	**551,257**
571	6400-6999	SERVICE CHARGES	800,000	400,002	50%	399,998	400,000
571	7100	USE OF MONEY AND PROPERTY	115,030	69,729	61%	45,301	52,357
571	7200	MISCELLANEOUS	-	145	N/A	(145)	(500,965)
		LIABILITY INSURANCE	**915,030**	**469,876**	51%	**445,154**	**(48,608)**
572	6400-6999	SERVICE CHARGES	-	-	N/A	-	-
572	7100	USE OF MONEY AND PROPERTY	-	-	N/A	-	-
572	7600	OPERATING TRANSFERS IN	-	-	N/A	-	-
		SELF-FUNDED VISION	**-**	**-**	N/A	**-**	**-**
573	6400-6999	SERVICE CHARGES	5,052,384	2,526,195	50%	2,526,189	2,269,889
573	7100	USE OF MONEY AND PROPERTY	271,950	145,390	53%	126,560	125,921
573	7200	MISCELLANEOUS	-	135	N/A	(135)	10,314
573	7500	OTHER FINANCING SOURCES	-	6,485	N/A	(6,485)	-
		FLEET & EQUIPMENT MANAGEMENT	**5,324,334**	**2,678,205**	50%	**2,646,129**	**2,406,124**
574	6400-6999	SERVICE CHARGES	2,705,327	1,352,664	50%	1,352,663	1,289,320
574	7100	USE OF MONEY AND PROPERTY	327,600	174,933	53%	152,667	146,851
574	7200	MISCELLANEOUS	-	-	N/A	-	808
574	7600	OPERATING TRANSFERS IN	-	-	N/A	-	-
		FACILITIES MANAGEMENT	**3,032,927**	**1,527,597**	50%	**1,505,330**	**1,436,979**
575	6400-6999	SERVICE CHARGES	1,464,287	720,281	49%	744,006	713,590
575	7100	USE OF MONEY AND PROPERTY	45,950	28,325	62%	17,625	21,656
		BENEFIT PREFUNDING	**1,510,237**	**748,607**	50%	**761,630**	**735,246**

CITY OF BELMONT
Statement of Revenues and Expenditures
Budget Variance Report
December 31, 2024
Revenues

			as of 12/31/2024				
Fund	Account	Description	Adjusted Budget	YTD Actual	YTD %	Remaining Budget	12/31/2023 Actual
704	7100	USE OF MONEY AND PROPERTY	12,030	6,745	56%	5,285	5,536
		SPECIAL ASSESSMENT DISTRICT	**12,030**	**6,745**	56%	**5,285**	**5,536**
		TOTAL REVENUES	**$ 168,454,849**	**$ 62,826,944**	**37%**	**$ 105,627,905**	**$ 56,712,326**

STAFF REPORT

Meeting Date:	February 11, 2025
Agency:	City of Belmont
Staff Contact:	Jozi Plut, City Clerk, jplut@belmont.gov, 650-595-7414
Agenda Title:	Appointments to City Commissions
Agenda Action:	Motion

Recommendation

(1) Motion to appoint two residents to the Planning Commission;
(2) Motion to appoint three residents as voting members and up to two non-voting youth members to the Parks and Recreation Commission.

Strategic Focus Area

Fiscal and Organizational Sustainability

Background

The City of Belmont has two Commissions. During the Months of November 2024 to January 2024, the City of Belmont held an open recruitment for applicants to fill open positions on the Planning Commission, Parks and Recreation Commission. Each Commission is charged with advising the City Council on policy matters and completing assignments as directed by the City Council. Some bodies like the Planning Commission have a regulatory role.

The Planning Commission is a regulatory body and a quasi-judicial body. The Commission makes land use decisions for the City based on the City's General Plan and other focused regulations, such as the Zoning Ordinance, the Belmont Village Specific Plan (BVSP), and area plans.

Presently up to 7 commission seats are potentially available, with up to two on the Planning Commission if Council wishes to keep a seven-member Commission, and up to 3 voting seats on the Parks and Recreation Commission and two non-noting youth seats on the Parks and Recreation Commission. The Council may choose to fill five or seven seats on the two commissions.

The Planning Commission currently has seven members, two of which have reached the end of their appointment periods. To fully staff the seven-member Planning Commission, the Council would need to make two appointments which may be for the typical three-year appointment period. If the Council chooses not to make an appointment from among the current applicants, the commission could continue to function with five filled seats.

The Parks and Recreation Commission currently has seven voting members, three of which have reached the end of their appointment periods. To fully staff a 7-voting member commission, the Council would need to make three appointments. Appointments are for two years under Belmont City Code Section 2-

166(b)(2) unless the Council sets a different period. During the last appointment cycle, the Council discussed extending Parks and Recreation Commission appointments to three years typically. If the Council so chooses, they make 3-year appointments now. Staff would also return with an ordinance amendment to BCC 2-166(b)(2) to reflect any decision to make appointments typically three years instead of two. Council should note that if it fills all three of the open seats with 2-year appointments, it will have five open seats at once in March 2027.

Council may appoint a minimum of five positions and maximum of seven on each commission, plus two non-voting youth seats for the Parks & Recreation Commission.

Analysis

The City Council held panel interviews of commission applicants for consideration of the available positions. The applicants are as follows for each body:

Planning Commission Applicants

Brian Kulich (I)
Mark Gurevich (I)
Clint Freeman
Margaret Jadallah

Parks and Recreation Applicants

Adar Emken (I)
Avery Lyford (I)
Arianna Cunha
Jerome Natoli

Parks and Recreation Non-Voting (youth) Applicants

Jiya Venkatesh
Gracie Huang
Tristan Lim
Simon Gehrke
Karuna Mungali
Itza Perez
Sophia Grace Lee

*(I) – Incumbent

Alternatives

1. Council may direct staff to reopen recruitment to seek additional candidates

Attachments

A. none

Fiscal Impact

☒ No Fiscal Impact

☐ Funding Source Confirmed:

Source:	**Purpose:**	**Public Outreach:**
Staff	Statutory/Contractual Requirement	Posting of Agenda

COUNCIL AGENDA ITEM 13
MATTER OF COUNCIL INTEREST/CLARIFICATION

MEETING DATE: February 11, 2025

COUNCILMEMBER(S): Julia Mates, Mayor

ITEM TITLE: Discussion and Consideration of Endorsing San Mateo County's March Ballot Measure A

Description of Issue:
On November 13, 2024, the San Mateo County Board of Supervisors released a 400-page independent investigation sustaining allegations against Sheriff Christina Corpus. The findings include:

- Retaliation and intimidation within the Sheriff's Office.
- Abuse of authority.
- The use of racial and homophobic slurs in the workplace.

Following the report's release, San Mateo County Congressional and Legislative leaders called for the Sheriff's resignation on November 18, 2024.

The County Board of Supervisors introduced an ordinance to amend the County Charter, allowing for the removal of elected officials for cause on November 19, 2024.

Concerns over leadership in the Sheriff's Office have grown, with over 106 sworn staff departing since Sheriff Corpus took office in January 2023, and a near-total turnover in executive staff. These issues have raised significant public safety concerns and eroded trust in law enforcement leadership.

Request
The Council is asked to consider endorsing the March 4th, 2025 Special Election Ballot Measure A - San Mateo County Charter Amendment Measure, and adopting the attached resolution. The Council's decision on these matters represents an important opportunity to support the Board of Supervisors' concerns over leadership in the Sheriff's Office and demonstrate our commitment to public safety and ethical governance.

Discuss and determine whether to endorse the County's March Ballot Measure to amend the San Mateo County Charter, granting the Board of Supervisors authority to remove an elected official for cause.

Recommendation
The proposed County Charter amendment would empower the Board of Supervisors to remove elected officials for cause, creating accountability mechanisms that do not currently exist. Endorsing this measure would signal our city's commitment to ensuring ethical leadership within

the County and reflects our expectation and commitment to transparency, accountability, and principled governance. We believe that public safety should be administered with fairness, equity, and respect for the diverse communities served and that no one is above the law. Public officials must uphold the highest standards of integrity and responsibility.

Belmont is fortunate to have our own dedicated police department, but we also value the vital partnership and support provided to us by the San Mateo County Sheriff's Department. Their collaboration enhances safety for our residents, businesses, and visitors. It is essential to support this measure to ensure that the Sheriff's employees have a safe workplace, enabling them to continue serving our community and the entire county effectively.

Approximately how much staff involvement will this item take?
Minimal. A proposed draft resolution is Attachment A,

Financial Implications?
Not applicable/negligible

How time sensitive is this issue? Election Day is March 4th, with ballots available in early February.

General Plan/Vision Statement.
The Council's decision on these matters represents an important opportunity to address concerns over leadership in the Sheriff's Office and demonstrate its commitment to public safety and ethical governance. This recommendation meets at least two of the Vision Statements of the General Plan:

- We value and celebrate a strong commitment to diversity, inclusion, safety, equality and dignity for all individuals in Belmont.

- Our strong sense of community and enjoyment of the town's assets and activities deepen as we become better informed and connected.

Attachments
A. Belmont City Council Resolution
B. San Mateo County Ordinance to Amend the Charter (Draft Language)
C. County's Independent Investigation Report (Executive Summary)

RESOLUTION NO. 2025 –

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF BELMONT STATING THE CITY'S SUPPORT FOR SAN MATEO COUNTY MEASURE A, ON THE BALLOT MARCH 4, 2025

WHEREAS, on November 13, 2024, the San Mateo County Board of Supervisors released a 400-page independent investigation ("Report") of the Sheriff sustaining several allegations including that Sheriff Corpus and her executive team have engaged in retaliation and intimidation, exceeded and/or abused their authority, and that the Sheriff has uttered and texted racial and homophobic slurs in the workplace; and,

WHEREAS, on November 18, 2024, San Mateo County Congressional and Legislative leaders issued a statement calling for Sheriff Corpus to resign as a result of the Report; and,

WHEREAS, on November 19, 2024, the San Mateo County Board of Supervisors introduced an Ordinance to amend the County Charter granting the Board of Supervisors the authority through December 31, 2028 the authority on a 4/5 vote to remove an elected Sheriff for cause; and,

WHEREAS, on December 3, 2024, the San Mateo County Board of Supervisors officially passed the Ordinance and called for a special election to be held on March 4, 2025 throughout the County of San Mateo, with the Ordinance becoming "Measure A"; and,

WHEREAS, the findings that were sustained in the Report do not reflect the standards that our community wants in their law enforcement personnel; and,

WHEREAS, we believe in the principle that no one is above the law, and public officials must uphold the highest standards of integrity and accountability. Accountability is not only a cornerstone of good governance but also a necessary foundation for maintaining public confidence in our institutions; and,

WHEREAS, Measure A represents a commitment to transparency, ethical leadership, and effective oversight within the Sheriff's Office. By enacting this measure, we aim to ensure that public safety is administered with fairness, equity, and respect for the diverse communities we serve; and

NOW, THEREFORE, the City Council of the City of Belmont resolves as follows: that the Belmont City Council stands in support of Measure A, a vital initiative to restore integrity and accountability to the San Mateo County Sheriff's Office. This measure is essential to protecting our community and upholding the shared values that define the City of Belmont.

* * *

ADOPTED February 11, 2025 by the City of Belmont City Council by the following vote:

Ayes:

Noes:

Absent:

Abstain:

ATTEST:

_____
City Clerk

_____
Mayor

APPROVED AS TO FORM:

_____
City Attorney