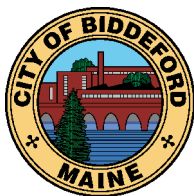


City of Biddeford
City Council - Workshop
December 10, 2019 5:30 PM Council Chambers

1. Workshop Discussion Items

- 1.1. Executive Summary - Senior Tax Credit Program; CIP Funding; CSO Projects
[12-10-2019 Workshop-Executive Summary-CIP Funding-MEMO.docx](#)
- 1.2. Senior Tax Credit Program Proposal
[20191205 Briefing Memo - Possible FY21 Senior Tax Rebate Program.docx](#)
[12-10-2019 Workshop-Ordinance-Senior Tax Rebate Program DRAFT.docx](#)
- 1.3. CSO Project Strategy
[12-10-2019 Workshop CSO Project Strategy-MEMO.docx](#)
[12-10-2019 Workshop-Gooch Street Pump Station-MAP.pdf](#)
[12-10-2019 Workshop-Biddeford Sewersheds-MAP.pdf](#)
[12-10-2019 Workshop-2010 CSO Project Funding-MEMO.pdf](#)
[12-10-2019 Workshop-2012-2013 Flow Monitoring Analysis-Wright-Pierce.pdf](#)
- 1.4. CIP/Project Funding Plan

City of Biddeford, Maine



The Office of
City Manager

James A. Bennett

Email: jbennett@biddefordmaine.org

MEMORANDUM

TO:	Honorable Mayor Casavant Honorable City Council
FROM:	James A. Bennett, City Manager
DATE:	December 6, 2019
RE:	December 10, 2019 Workshop

Executive Summary

The purpose of the Tuesday night workshop is strictly for the Council to understand the challenges facing the community from a capital funding perspective. Staff does not believe it is beneficial at this point to make any decisions or recommendations. This recommendation is primarily made so that more information can be obtained in order to make a better decision. We envision that the Council will hold at least one other workshop meeting within next 30 to 45 days on the subject. At that time, additional information will be available. From a timing perspective, it would be ideal for the Council to make the policy decision regarding the capital funding no later than February 1, 2020.

The Council is requested to bring their copies of the CIP plan to the meeting.

Introduction

The workshop this Tuesday is to deal with essentially two issues. The first is to provide the final specifics for the implementation of the Senior Tax Credit Program. You will find the supporting documents in the package. Should the majority of the Council provide the final direction for the program, we would start the formal approval process at the Council level in order to offer the benefit in the FY21 tax bills.

The second and third issues are connected. The Council will be reviewing the CIP (capital improvement plan) earlier than normal on this evening. In addition, with the recent developments (and development opportunities) in the downtown, staff is recommending a change in the older implementation plans for CSO (combined sewer overflow) work. As a reminder, the CSO work is the result of an agreed-to consent decree between the City and Maine DEP (on behalf of the federal EPA).

We are pleased to report that the suggested revisions will actually save the rate payers/taxpayers money compared to the originally adopted plan. In addition, it does create additional opportunities for economic activity in the downtown. Not only are these details laid out within this documentation, but it is staff's plan to spend some time on Tuesday night explaining the details publicly. While we understand that the Council has traditionally not wanted such presentations, I would suggest that we are missing the single greatest opportunity to provide information for the public during meetings. As we critically analyze how we can provide better and timely information for the citizens, we must consider the opportunity we have during public meetings.

The majority of the Council may recall that the CIP process the last few years was limited to annual appropriations and the uses thereof. With a backlog of borrowed monies that needed to be spent per

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Diana Depaolo, Deputy Human Resource Director, 205 Main Street Biddeford, ME 04005, or call (207) 286-0593.

federal borrowing regulations, a number of road and CSO projects were completed. With the projects slated to be completed this coming year, all of the borrowed funds have been used.

For the first time in the last four years, the Council will face CIP funding without the benefit of taxpayer-approved borrowed funds. There are three known elections that are available in 2020 (March primary, June school budget vote, and November presidential election). Should the Council decide to put forth a borrowing package as part of the strategy to fund CIP, these would seem the likely choices.

Under a separate memo authored by Brian, you will find the details and rationale for the recommendation to adjust the previously approved CSO plan. While this recommended adjustment was generated as staff brainstormed redevelopment opportunities in downtown and more specifically the Pearl and Gooch Street areas, the cost savings alone should be rationale enough to support the change.

FY21 Investment in Capital

Without additional borrowing in the coming year, the entire investment in capital will be otherwise limited to the annual appropriation during the budget. As a reminder, the Council has increased the annual appropriations for capital needs significantly (currently at \$1,595,807¹ vs \$234,114 in FY16). The quick analysis that was done as part of the CIP presentation suggested that with a very conservative replacement schedule, \$4,730,729 is needed annually. Prior to that presentation, I have suggested that a minimum of \$2.5 million should be the minimum appropriated annually. Without the benefit of the borrowed funds to supplement capital investment in the coming year, this issue might merit a deeper conversation prior to the formal budget process.

Waste Water Treatment Plant (WWTP) & System Capital

Compounding the capital challenges for the upcoming year is the growing internal fund unofficial 'loan' between the City's general fund and the WWTP. Last spring, staff was able to clarify the causes of nearly a decade of a growing liability on the City's financial statement. The FY15 audit showed an internal \$4,642,948 loan from the WWTP fund that was owed to the general fund.

Expressed simply, the assumed amount of billable units of wastewater were overstated by the counting of credits as water usage² instead of a deduction. This long-term error was generating approximately \$400,000 of revenue shortfall per year.

The issue was further complicated by the fact that the City was using the traditional municipal budgeting process for approval. The auditors were required to convert the financials from a governmental fund to an enterprise fund (business activity). The major difference between the two is the treatment of capital investment. In governmental accounting for reporting (and budgeting purposes) all capital investment is expensed (total cost is recognized the year it was purchased regardless of useful life) in the current year. Enterprise accounting will not allow capital expenditures to be treated the same. Only the allowable depreciation is expensed annually (based on the useful life). Once the auditor converted the City's WWTP budget/financials to the proper form, depreciation expense was added. Ironically, the 'new' depreciation expense nearly paralleled the net loss shown. This unrelated fact was accepted as the cause of the internal loan and never explored in any detail until two years ago.

Prior to the adoption of the FY20 WWTP budget, approximately \$700,000 was appropriated annually for capital investment. Unused capital funds would carry from one budget year to the next. The FY19 City budget books showed \$3,202,809 in carried-forward capital funds. Unfortunately, these funds did not exist in reality. Once the budget/accounting was converted to the proper format for the FY20

¹ Included is \$1,515,741 in CIP appropriation plus \$79,806 for police vehicles.

² The sewer bill is based on the amount of water that is used by each property. The water usage is generated by the respective water departments.

budget process, these ‘paper’ funds did not exist. Put simply, any expenditure of those funds would be recognized for accounting purposes as an increase in the internal loan from the City’s general fund to the WWTP.

Staff put forth a recommended strategy to deal with these issues as part of the FY20 budget process. It included dealing with the three components, namely:

1. Replenishing the capital funds;
2. Reducing the internal loan over a 7 to 10 year period (\$3,277,616 based on the FY18 audited financials); and
3. Adopting a balanced budget for the sewer budget based on the correct water units (flow).

While the Council never took an official vote to adopt the (recovery) plan for the WWTP fund, it did move forward with adopting a balanced budget in FY20.

The second part of the suggested recovery plan was to occur this spring. Staff had recommended that the Council authorize \$4,000,000 in WWTP revenue bonds to replace the loss of the capital funds that were on paper only. As a reminder, the Council does have the authority to issue revenue bonds without voter approval. The issuance of any general obligation bonds requires citizen support through a public referendum vote.

The final authorization of these revenue bond funds is part of the overall integration of the capital funding for the City.

Other CIP Requests of Significance

There are a number of other requests that have been made by the management team members. In an ideal world, requests made for this year all should have appeared in previous CIP’s. There are some new ones this year and ones of significance.

1. *Replacement of Public Safety Radios*: This \$4,200,000 radio replacement request will completely replace the system that was installed in 2004. The Police Chief is strongly recommending a sole source project with Motorola.
2. *Next Phase of River Dredging*: It appears that the dredge for the mouth of the Saco River, the pool and the ‘gut’ is on track for the upcoming federal budget. If that indeed occurs, debris removal would again have to occur. Those costs would be local. The estimates are based on the work that was done on the upper section of the River.
3. *Recreation Funding Approach*: Over the last couple of years, we have allocated approximately \$150,000 for a number of smaller projects for the Recreation Department. During the review, it is staff’s opinion that such approach is not the best method to achieve the results that the department is seeking for its various major initiatives. One of the options that the Council may want to consider is asking the voters if they want to support a bond issuance for the major work to be done at Rotary Park (parking and field construction). The current estimate is that the cost would be in the \$1,500,000 to \$1,750,000 range.
4. *Pedestrian investments*: It is clear that the community is becoming more pedestrian. Yet, the City does not have a formal (or even informal) plan for investments in pedestrian improvements. It appears that the only sidewalk upgrades have been completed as part of the Community Development Block Grant (CDBG) program or part of an overall downtown improvement plan. Given the changes to the community and society generally, an integrated plan for pedestrian improvements should be developed over the next year.
5. *Vehicle replacement*: We have reduced the amount of capital leases that the City is using to purchase vehicles and used more current tax dollars. At the same time, vehicle replacement as a percentage of current replacement has generally outpaced the other main categories (buildings

and infrastructure). Without proper investment in the other areas, is it appropriate to make a deliberate plan to reduce the number and amount of roller stock that the City maintains.

6. *Annual capital appropriation for paving:* It is recommended that the City should consider a minimum of \$1,000,000 annually (at today's prices) for road paving out of the operating budget, with a desired goal of closer to \$1,250,000.
7. *Building improvements:* There are two large building improvements that need to be tackled in some fashion. The first is the Community Center. The Council did appropriate funds in FY20 to engage the services of an architect to develop reasonable plans for implementing some level of the recommendations that were made by the task force. Staff is behind on this work; the RFQ has not been issued for the selection of the architect. The second building is City Hall. Implementation on any level of investment has been on hold as the fundraising consultant has been working to complete their feasibility study. That work is expected to be completed in the next sixty days. Both of these projects will require some deliberative discussion.

Financial Information

Staff will provide additional financial information in another memo on Tuesday evening as part of the presentation. With the focus of the workshop on the current needs and not on actually taking any action that evening, the sources of funding were not as critical for the meeting. In addition, staff wanted the additional time to make sure we all were in agreement with complete financial package. Finally, with Cheryl being out of the office this week, we were uncomfortable not having her expertise available in person.

Summary

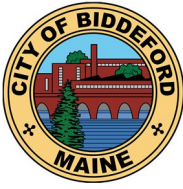
There is strictly one goal for the workshop. It is for the Council to have a deeper understanding of the capital needs and funding challenges facing the community for the next few years. It is not to make any decisions. The integration of the issues and in some cases, the lack of clarity of some of the specifics, suggests that making any decisions immediately is unwise. However, February 1, 2020 seems like the prudent last practical day to make some decisions on issues.

Like most urban centers in the eastern United States, Biddeford has a mandated requirement to continue to find solutions to the intentional discharge of untreated combined sewer and storm water into waterways. Expressed as a court blessed consent decree between the City and Maine Department of Environmental Protection (DEP) on behalf the Federal Environmental Protection Agency (EPA), the City's capital investment obligations are updated in 5 year master plans.

In the upcoming year, the City will have used all available funds for the approved projects. The obligation of the City to make improvements is not complete. Without new capital funds, most likely from a voter-approved borrowing package, the Council will be faced with funding the improvements out of the user fees. This alternative is practically unviable because of the impact on the rates.

In addition to the CSO capital demands, the City will have used all borrowed funds for road and sidewalk improvements available without a new authorization.

Capital funding for FY21 is further complicated by the realization that the \$3.2 million of capital funds that were available in the WWTP fund were only there on paper. There is a new realization that the public safety radio system is ending its useful life and \$4.2 million is being requested for its replacement. The realization that our community is becoming more of a pedestrian downtown is challenging us to think more systematically about our pedestrian investments as well.



City of Biddeford

Chief Operating Officer/Technology Dept/IPP
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Briefing Memo

TO: Honorable Mayor Alan Casavant
Honorable City Council

CC: James Bennett
Mathew Eddy
Carmen Morris
Kristen Barth

FROM: Brian S. Phinney, COO/Technology/IPP

DATE: December 6, 2019

RE: Council Workshop – UPDATE Discussion, Possible FY21 Senior Tax Rebate Program

As a continuation of the June 11th, August 20th, and October 1st discussions this memo provides additional detail on a possible senior tax rebate program. A draft ordinance is also attached for review. The original briefing materials are available at the website meeting archive under the dates listed above.

As proposed, the ordinance covers the following criteria:

- An age criteria of 65 years old or older
- Shall have a homestead in Biddeford for the entire year prior to application
- Shall have been a resident for the 10-years prior to application
- Shall submit an application each year
- Shall show proof of property taxes or rent paid
- Shall meet income requirements (90% of median family income)
- Appropriation for tax rebates limited to \$100,000 in the first year of implementation
- Subsequent annual appropriations at the will of the Council
- Applicants shall be eligible for a rebate up to \$750
- Actual refunds shall provide the greater benefit to those with lower income (as per State statute)
- If the need exceeds available funding all applicants will receive a prorated share of the program appropriation

The draft ordinance includes text in brackets. The bracketed text identifies specific staff recommendations for Council consideration.

The State stipulates that the age criteria shall be 62 years or older. The Ordinance as proposed identifies the minimum eligible threshold age of 65 years. Current projections indicate there may be approximately 2,136 eligible applicants. It should be noted that the financial estimate is based on a “best guess” estimate using existing homestead data correlated with property owner data. State law requires equal access for homeowners and renters. While the City has some data regarding homeowners and homestead recipients, rental data does not exist. Finance used the ratio of homeowners to homestead recipients and applied the ratio to known available rental units to estimate renter participation.

To limit the City’s financial exposure and due to the unknown level of participation, the draft ordinance includes a provision for setting aside a set dollar amount annually through the appropriation process. Staff recommends appropriating \$100,000 in the first year of implementation for direct program funding. The distribution of funds could be based on a first-come-first-served basis until the funding is exhausted. Alternatively, all applicants could be awarded a refund based on a prorated share of available funding. Staff believes the proration format is the appropriate distribution method.

Assuming a funding limit of \$100,000, prorated payments will begin if greater than 9.1% (133) of estimated eligible applicants apply and are eligible for the full \$750 rebate. At \$100,000, if 68.3% of eligible applicants apply and are eligible for the full \$750 rebate the prorated benefit payment would be limited to \$100.

There are program implementation and staffing concerns associated with the program proposal. Staff recommends assigning the application review process to the General Assistance Office. This is primarily due to the confidential nature of income verification and familiarity with the process of income verification as part of the routine GA eligibility review. Applications are due by August 1 of each year. This means that applications will be received over a short period of time and would need to be processed within a reasonable amount of time. As stated above the projected eligible population could be as high as 2,136. As a hypothetical example, if 2,136 applications are received and it takes 30 minutes to review each application it would take approximately 1,000 hrs to process the applications. With a staff of two and existing GA obligations, it is unreasonable to expect staff to have the ability to process the applications. We would anticipate a budget of approximately \$37,000 for processing if the estimated number of eligible residents apply. If minimum expected applications are received (133) the administrative cost would be closer to \$5,000 including administrative costs for training.

The timing of the applications may be a benefit. First, since the applications are due at the same time, staffing could be ramped up utilizing properly trained part-time staff. It is possible that individuals with, say, tax preparation experience who generally work January

through April for tax season may be available for and interested in application processing. Second, the appropriation for the positions would be in place as part of the July1 budget cycle. The City could advertise for and screen support positions before applications are received. Once the number of applications is known –by August 1 – the requisite number of part-time positions could be secured. Third, this type of support position could be offered with flexible hours increasing the appeal of the part-time nature of the roles. Fourth, the City has experience with part-time and seasonal specialized positions through the Parks Department and the office of City Clerk during elections. This program could tap into the best practice experience of these departments when structuring the positions.

Space is a concern as well. There are no available work stations at city hall. It is possible that this part-time workforce could use space at the Rec Center or Adult Ed as available or the workstations in the Council Chambers could be set up for application processing.

Once it is confirmed that the Council has a desire to continue to evaluate this program, these details will need to be evaluated further.

Chapter 2 - Administration

Article V – Finance

Division 6 – Senior Property Tax and Rent Assistance Refund Program

Sec. 2-300. Purpose.

The purpose of this article is to establish a program to provide a property tax and rent assistance refund to persons [65] years of age and over who reside in the City of Biddeford. Under this program, the City of Biddeford will provide refund payments to those individuals who maintain a homestead in the City of Biddeford and meet the criteria established by this Division.

Sec. 2-301. Definitions.

As used in this article, the following terms shall have the meanings indicated:

BENEFIT BASE

Property taxes paid by a qualifying applicant during the tax year on the qualifying applicant's homestead or rent constituting property taxes paid by the resident individual during the tax year on a homestead.

HOMESTEAD

For purposes of this article, "homestead" shall have the same meaning as defined in 36 M.R.S.A. § 5219-KK(1)(C). Generally, a homestead is a dwelling owned or rented by the person seeking tax assistance under this article or held in a revocable living trust for the benefit of that person. The dwelling must be occupied by that person and that person's dependents as a home.

INCOME

Total household income as determined by the total (gross) income reported on the applicant's most recent federal income tax return (line 22 of Form 1040; line 15 of Form 1040A; line four of Form 1040EZ), plus the total (gross) income reported on the most recent federal income tax return of each additional member of the household if filing separately. If the applicant and/or any member of the household do not file a federal income tax return, income shall be the cumulative amount of all income received by the applicant and each additional member of the household from whatever source derived, including, but not limited to, the following items:

- A. Compensation for services, including wages, salaries, tips, fees, commissions, fringe benefits and similar items;
- B. Gross income derived from business;
- C. Gains derived from dealings in property (capital or other);
- D. Interest;
- E. Rents from real estate;
- F. Royalties;
- G. Dividends;
- H. Alimony and separate maintenance payments received;
- I. Annuities;
- J. Pensions;
- K. Income from discharge of indebtedness;
- L. Distributive share of partnership gross income;
- M. Income from an interest in an estate or trust;
- N. IRA distributions;
- O. Unemployment compensation; and
- P. Social security benefits.

QUALIFYING APPLICANT

A person who is determined by the **[General Assistance Administrator]** or his/her designee, after review of a complete application under Sec. 2-303 of this article, to be eligible for a refund payment under the terms of this article.

RENT CONSTITUTING PROPERTY TAX

Fifteen percent of the gross rent actually paid in cash or its equivalent during the tax year solely for the right of occupancy of a homestead. For the purposes of this article, "gross rent" means rent paid at arm's length solely for the right of occupancy of a homestead, exclusive of charges for any utilities, services, furniture, furnishings or personal property appliances furnished by the landlord as part of the rental agreement, whether or not expressly set out in the rental agreement.

Sec. 2-302. Criteria for participation.

In order to participate in the property tax assistance program, an applicant shall demonstrate all of the following:

- A. The applicant shall be **[65]** years of age or more at the time of application
- B. The applicant shall have a homestead in the City of Biddeford at the time of the application and for the entire year prior to the date of application.
- C. The applicant has been a resident of the City of Biddeford for at least 10 years immediately preceding the date of application for participation in the Program.
- D. The applicant shall meet the application and eligibility criteria set forth in Sec 2-303 and 2-304 and of this article.

Sec. 2-303 Application and payment procedures.

- A. Persons seeking to participate in the property tax assistance program shall submit an application to the **[General Assistance Administrator]** no later than August 1 of the year for which the refund is requested. Applications are required for every year the applicant seeks to participate in this program. The application form for the program shall be made available upon request in the **[General Assistance Administrator's]** office and shall include, at a minimum, the applicant's name, homestead address and contact information. Attached to all applications shall be proof of household income.
- B. Applicants shall also submit proof of property taxes paid or rent constituting property taxes paid during the tax year on the individual's homestead in the City of Biddeford.
- C. The **[General Assistance Administrator]** shall review and determine if the application is complete and accurate and if the applicant is otherwise eligible to participate in the program. The **[General Assistance Administrator]** shall notify an applicant if an application is determined to be incomplete. The **[General Assistance Administrator's]** decision on eligibility to participate in the program shall be final.

Sec. 2-304 Determination of eligibility and amount.

- A. Eligibility under this article is designed to provide greater benefits proportionally to applicants with lower income in relation to their benefit base. Applicants with income greater than an amount equal to 90% of the current United States Department of Housing and Urban Development metropolitan area median family income shall not be eligible for benefits under this article. Eligible applicants will receive a benefit totaling the amounts set forth in Subsection A(1) and (2) as follows, provided that the cumulative maximum benefit allowed shall be \$750:
 - (1) The total amount of any increase to the applicant's benefit base from the most recent tax year to the current tax year; and

- (2) Benefits based on a calculation of the applicant's benefit base as a percentage of their income [(Benefit/Income) x 100 = Benefit base as percent of income.]
- (a) If the benefit base as a percent of income is 10% or greater, the applicant will receive \$350;
 - (b) If the benefit base as a percent of income is 8.00% to 9.99% of income, the applicant will receive \$250;
 - (c) If the benefit base as a percent of income is 6.00% to 7.99% of income, the applicant will receive \$150;
 - (d) If the benefit base as a percent of income is 5.99% or less, the applicant will receive \$50.

Sec. 2-305 Limitations on payments.

- A. The City Manager shall report to the Biddeford City Council for its approval at its second meeting in August each year the projected payments and number of eligible applicants requesting assistance from the program fund.
- B. Payments under this article shall be conditioned upon the existence of sufficient monies in the program fund for the year in which participation is sought. If there are not sufficient monies in the program fund to pay all qualifying applicants under this article per the calculations set forth in Sec. 2-304, payments shall be limited to the amounts available in the fund and may be prorated accordingly. In the event that a lack of funding results in no payment or less than the full payment to a qualifying applicant, the request and/or unpaid balance will not carry over to the next year.

Sec. 2-306 Creation of program fund.

The program fund from which payments shall be made under the terms of this article shall be created as follows:

- A. The City Council shall appropriate **[\$100,000]** in FY2021 and thereafter may annually appropriate monies in an amount acceptable to the City Council from the general fund or other sources to support this program as part of the budget approval process.
- B. Any surplus monies available after all payments have been made shall be carried forward to the next fiscal year.

Sec. 2-307 Timing of payments.

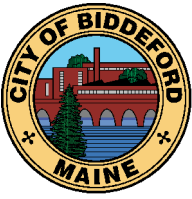
A person who qualifies for payment under this program shall be mailed a check for the benefit amount for which he/she is eligible under Sec. 2-304 no later than 14 days from the date of Council approval of the City Manager's report under Sec. 2-305(A).

Sec. 2-308 One applicant per household.

Only one qualifying applicant per household shall be entitled to payment under this program each year. Eligibility shall be determined based on total household income. The right to file an application under this article is personal to the applicant and does not survive the applicant's death, but the right may be exercised on behalf of an applicant by the applicant's legal guardian or attorney in fact. If an applicant dies after having filed a timely complete application that results in a determination of qualification, the amount determined by the **[General Assistance Administrator]** shall be disbursed to another member of the household upon request and as determined by the **[General Assistance Administrator]**. If the applicant was the only member of a household, then no payment shall be made under this article.

Draft..Not Ready for Publication

City of Biddeford, Maine



The Office of
Chief Operating Officer

Brian S. Phinney

Email: brian.phinney@biddefordmaine.org

MEMORANDUM

TO:	Honorable Mayor Casavant Honorable City Council
FROM:	Brian S. Phinney, COO
CC:	James Bennett, City Manager
DATE:	December 5, 2019
RE:	December 10, 2019 Workshop

This memo is intended to provide detail on the proposed change in the order of the combined sewer overflow (CSO) projects and related Main Street projects.

Previously Proposed CSO Work Potentially Impacted

The following is a list of projects that are currently in the CSO Mater Plan as part of the ongoing CSO work that would be impacted by staff's change recommendations. As a reminder, the CSO work is the results of an agreed to consent decree between the City and Maine DEP (on behalf of the federal EPA). Also, all new construction/ development is required to deliver only separated flows – sewer and stormwater – to the municipal system. The separation work addresses historical infrastructure.

1. *Pumping Station on Elm St.:* A sanitary sewer pumping station has been envisioned for the area of lower Elm St., for about the last decade. The original concept was to use that station to accept the flow from the Elm Street watershed area and pump it away from the Horrigan Court pump station with the knowledge that there will likely continue to be CSO discharges. The original cost estimate was around \$4,000,000. In 2018, the cost was estimated at \$2,300,000. Today's cost estimate would put the project over \$5,000,000.
2. *Horrigan Court CSO Storage Tank:* This project was originally estimated to be in the range of approximately \$2,000,000, if aboveground¹, at the time it was included in the original CSO master plan. This project, when combined with the new pumping station is slated to be the next major phase of CSO work. The City's stormwater separation consultant has been modeling flows to assist in the sizing of the tank based on the latest sewer separation improvements within the watershed. In 2018 the cost estimate was estimated to be approximately \$3,600,000. In 2019 the cost projection was reduced to \$2,600,000.

¹An aboveground installation is less expensive than a belowground tank. A belowground tank would likely approach \$2,500,000.

3. *CSO Sewer Separation Alfred St:* This project would separate the combined sewer lines from the lower end of Alfred Street to lower Main St at the current CSO storage tank. The project is completely designed and ready for bidding within the next couple of months. The current project estimate for the separation work is \$1,760,000. The project was slated for this spring in order to have the work done prior to the state completing the construction of the newly redesigned intersection of Hill, Main, and Water Streets.
4. *Center Street:* This sewer separation project is designed to further reduce loading to the lower Elm Street feed line in an effort to reduce overall CSO discharges at the Horrigan Court CSO and to manage flows at the Mechanics Park CSO tank. The projected cost for this project is estimated to be \$1,430,000.

Suggested Strategy Behind the Proposed Changes to CSO Work

The major change to the original plans is to relocate the proposed pumping station from lower Elm St., to the city-owned property at the lower end of Gooch St., along with relocation of the CSO holding from Horrigan Court to the same area on Gooch St with the prediction that a holding tank may not be needed. In addition, the Alfred/Main and Center St., separation projects would be shifted to early in the FY2021 budget year. A map of the area is included at the end of the memo.

These projects are part of a larger strategy to reduce CSO discharges within the city in compliance with the Clean Water Act, State regulations, and the City's Consent Agreement with the Maine Department of Environmental Protection (MEDEP). Out of an original 16 CSOs the City currently manages seven CSOs. The three CSOs associated with this work are Horrigan Court (at Horrigan Court), and Elm St./Re.1, located near where Elm St./Rt. 1 intersects with the Saco River near Gooch Street and the Mechanics Park CSO.

In order to grasp the complexity of the issue and by way of background information, it is important to understand the scale of the problem being addressed and the options available.

Addressing the latter first, in general the ideal situation is to have two distinct sewer systems – one to serve as a storm sewer and the other to serve as a sanitary sewer. Both can be sized appropriately for the flows expected and with no combined sewers there will be no CSO discharges. In reality, Biddeford was established well before the existence of environmental regulations governing the management of storm water and sanitary waste. Biddeford's sewer infrastructure evolved over a long period. The City still has sewer infrastructure that consists of everything from carved Oak log sewers and vaults to granite and brick sewers and in many instances these aging systems were installed as combined sewers or were modified over time to be combined sewers.

Municipalities can reduce CSO discharges by, among other things, completing sewer separation projects designed to eliminate combined sewers and thus eliminate CSO discharges all together and/or by installing physical structures like CSO holding tanks to collect excess flows for later treatment.

It bears mentioning that installing a holding tank does not solve a CSO issue since it would be very expensive and impractical to size a CSO holding tank properly to eliminate all CSO discharges. This means that sewer separation work will still be required. If a CSO holding tank is installed prior to sewer separation work the holding tank may become oversized when the separation measures are complete. In

other words, sewer separation is a permanent solution to the issue of CSO discharges because the separation eliminates the storm water flow in a combined system. A CSO holding tank only deals with the symptoms, so to speak. That said there are reasons that justify the installation of CSO holding tanks.

The CSO holding tank at Mechanics Park is one example. The main sewer from most of the western portion of the city comes through Water Street and there are several combined sewers that contribute significant flows that could easily overwhelm the treatment capacity of the wastewater treatment plant. The Mechanics Park CSO holding tank has a capacity of 2.0 million gallons and even at that it can fill in less than 40-minutes during major storm events resulting in discharges at CSO #9-Water Street.

As to scale, Figure 1 – Biddeford Sewersheds, depicts the surface area feeding the various CSOs associated with this Order. The map is oriented left to right with the left edge extending out toward Arundel at Morin Street and the right edge showing the in-town area abutting the Saco River. The gold shaded zone reflects the surface area collecting storm water, sanitary, and combined sewer flows associated with the CSO at Horrigan's Court (right edge of map). The purple area reflects the surface area collecting storm water, sanitary, and combined sewer flows for the Elm St./Rt.1 CSO (shown just below the Horrigan Court CSO). In just one day in 2018 during a storm, both CSOs discharged in excess of 1.32 million gallons of untreated combined sewer flows.

The CSO Mater Plan, a required planning document and a live document intended to be updated as conditions change, contemplated the installation of a CSO holding tank near the Horrigan's Court pump station and CSO. The MEDEP was initially advising that the city proceed with the installation of a holding tank as an immediate measure to reduce CSO discharges at Horrigan Court. In preparation for this work, Public Works initiated a flow study within the sewersheds several years ago. The flow study is ongoing and provides valuable data used to accurately report CSO discharges and to shape CSO reduction efforts. This ongoing study and pending redevelopment in the downtown are driving forces behind in the recommendation to place a pump station and possible CSO holding tank at Gooch Street rather than sizing a holding tank for historic excess flows at Horrigan Court. The initial flow data showed that while there are significant combined sewer flows contributing to CSO discharges, there are also key points well within the sewershed where targeted separation work had the potential to reduce combined sewer flows. One such separation project was recently completed on Elm Street in the vicinity of Lamothe and Lessard Avenues. This area contained diversion structures that were installed to address sewer backups caused by legacy issues in the area. The flow study showed that in conjunction with previous sewer separation work a significant volume of combined sewer flows could be removed from the system by eliminating the diversion structures for all but a major storm event. A valve is now in place that only activates during a major storm event to prevent any sewer backups.

The data also shows the significant value that sewer separation projects have on overall CSO discharges. Figure 1 shows the reduction in CSO activity in relation to rainfall for 2014 through 2019 YTD because of sewer separation activity and direct monitoring.

The flow data has had an impact on CIP planning as well. For example, the 2018 CIP contemplated a holding tank at Horrigan Court at a cost of \$3.6 million dollars based on flow estimates and sizing

projections and an Elm Street pump station at a cost of \$2.3 million dollars for a total of \$5.9 million dollars. The Elm Street pump station would serve to eliminate the connection to Horrigan's Court reducing CSO loading at that pump station and directing the Elm St./Rt.1 sewershed flows up to Lincoln Street via Elm Street and then to the WWTP via Main Street. There are force mains in Lincoln Street available for this connection.

In 2019, the Horrigan Court CSO holding tank construction estimate was reduced to \$2.6 million to reflect a size reduction based on reduced flows as a result of sewer separation activity performed by DPW. At the same time, the Elm Street pump station estimate increased to \$5.0 million based on data available at the time and conceptual discussion with MEDEP for a total of \$7.6 million.

The 2020 CIP, based on updated flow data, indicates that there is a possibility that the Horrigan Court CSO holding tank may not be needed and can be moved to the Gooch Street area to better serve that CSO if continued sewer separation work is as successful as the previous initiatives. The current plan is to move the proposed Elm Street pump station to lower Gooch Street. This along with sewer separation work in the sewershed allows for a further reduction in project costs. Current cost estimates carry \$2.3 million for the proposed Gooch Street CSO holding tank and \$2.6 million for the Gooch Street pump station and associated sewer lines (gravity and force main) to service the lower Elm Street CSO area for a total of \$4.9 million; see Figure 2 – Gooch Street Pump Station, for a general location reference. The sewer lines, pump station, and conceptual CSO holding tank are outlined in yellow.

This proposed change eliminates technical issues associated with adding a force main from lower Elm St., to Lincoln St. Work under the railroad bridge requires added cost and approval of the railroad not to mention creating significant traffic impacts during construction. By installing the pump station at lower Gooch Street, everything in the area gravity feeds to the pump station and can be discharged through the force main to Lincoln Street by going through the 3 Lincoln Street site and up Pearl Street. While there is still a necessity to cross under the railroad tracks, Maine Energy installed a 96-in cooling water discharge line below the underpass. The line was filled (with flowable fill) as part of the Maine Energy closure process. Public Works proposes to bore through the center of the filled pipe. This approach significantly reduces concerns for impacts on railroad footings and traffic impacts to Rt. 1. Additionally, new development on the 3 Lincoln Street site and the abutting mill properties would have sewer access at Pearl Street.

The takeaway is that sewer separation work, where possible, has a significant impact on the need for and sizing of CSO holding tanks. The hope is that, like the Horrigan Court separation work, the current proposed Gooch Street CSO holding tank may be further reduced in size and or eliminated. In order to confirm this and to maintain CSO reduction momentum required by the MEDEP, DPW proposes to design the Gooch Street pump station and CSO holding tank and phase in the installation. The pump station is proposed as Phase I, which is needed to send the Elm St./Rt.1 watershed flows to Lincoln Street vs Horrigan Court. Phase II would be installation of a CSO holding tank appropriately sized to reflect actual flows accounting for ongoing sewer separation efforts and only if needed.

The overall funding plan will be addressed in a separate memo; however, the timing of projects plays into the funding strategy. The timing of the Alfred/Main sewer separation work was originally

proposed for the spring of 2020 to stay ahead of the DOT's Main/Hill/Water intersection work. The DOT project has been pushed off until the spring of 2021, which allows the Alfred/Main separation work to move from the spring of 2020 to the fall of 2020. The Center Street separation project can also be moved to the fall of 2020. By shifting these projects it reduces the immediate funding need and makes it possible to apply funds to the Gooch Street project. Funding for the Alfred/Main and Center Street projects could be through a new bond to coincide with available voter approval dates discussed in the finance memo.

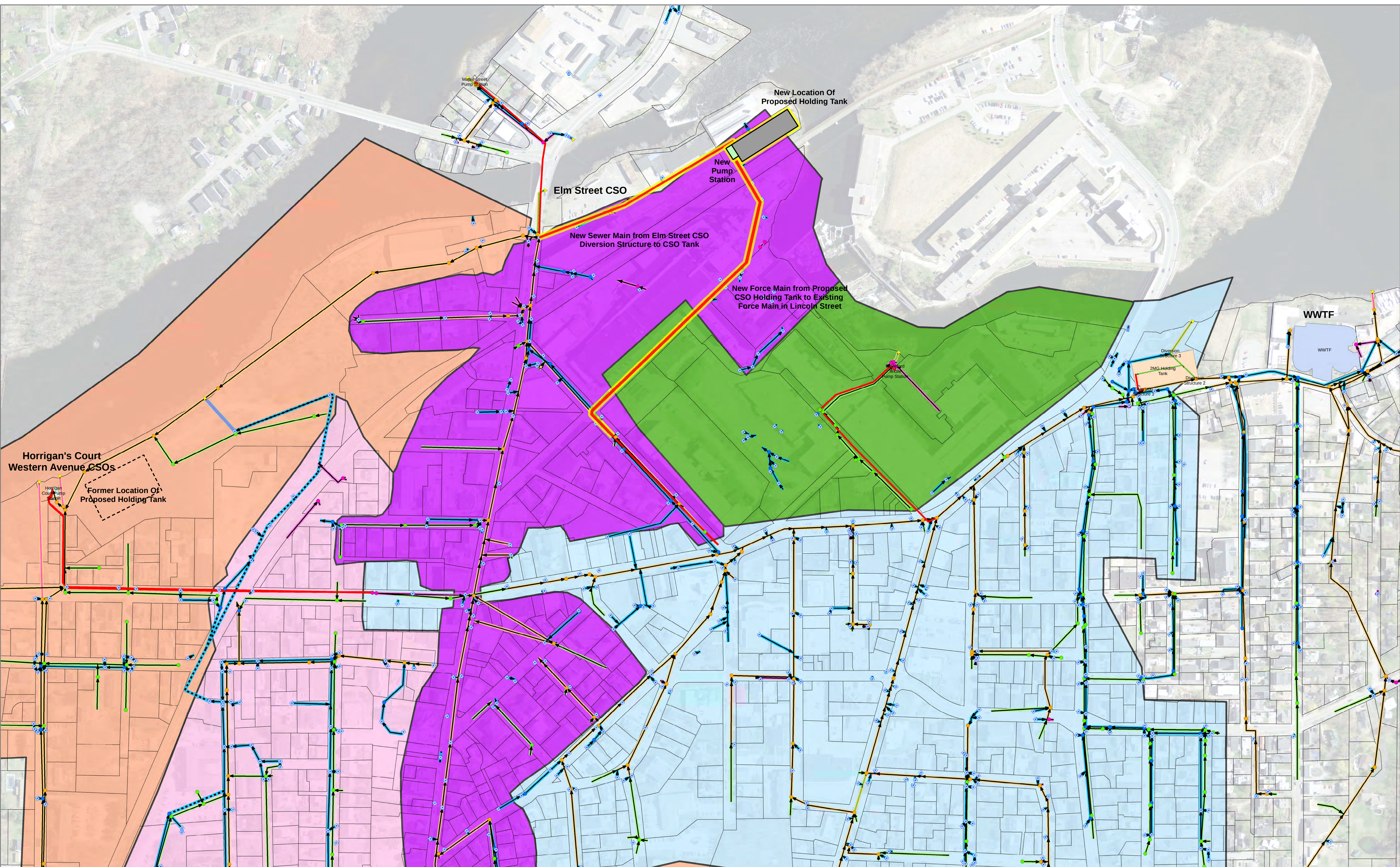


Figure 2
Gooch Street Pump Station

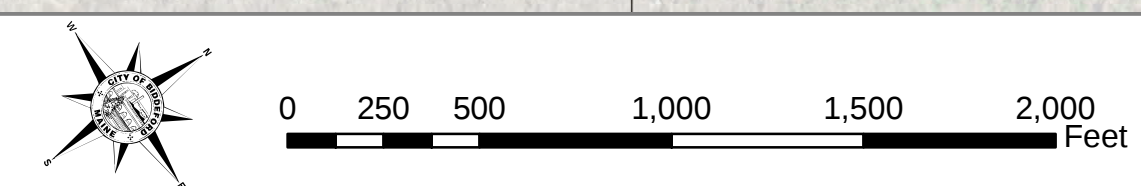
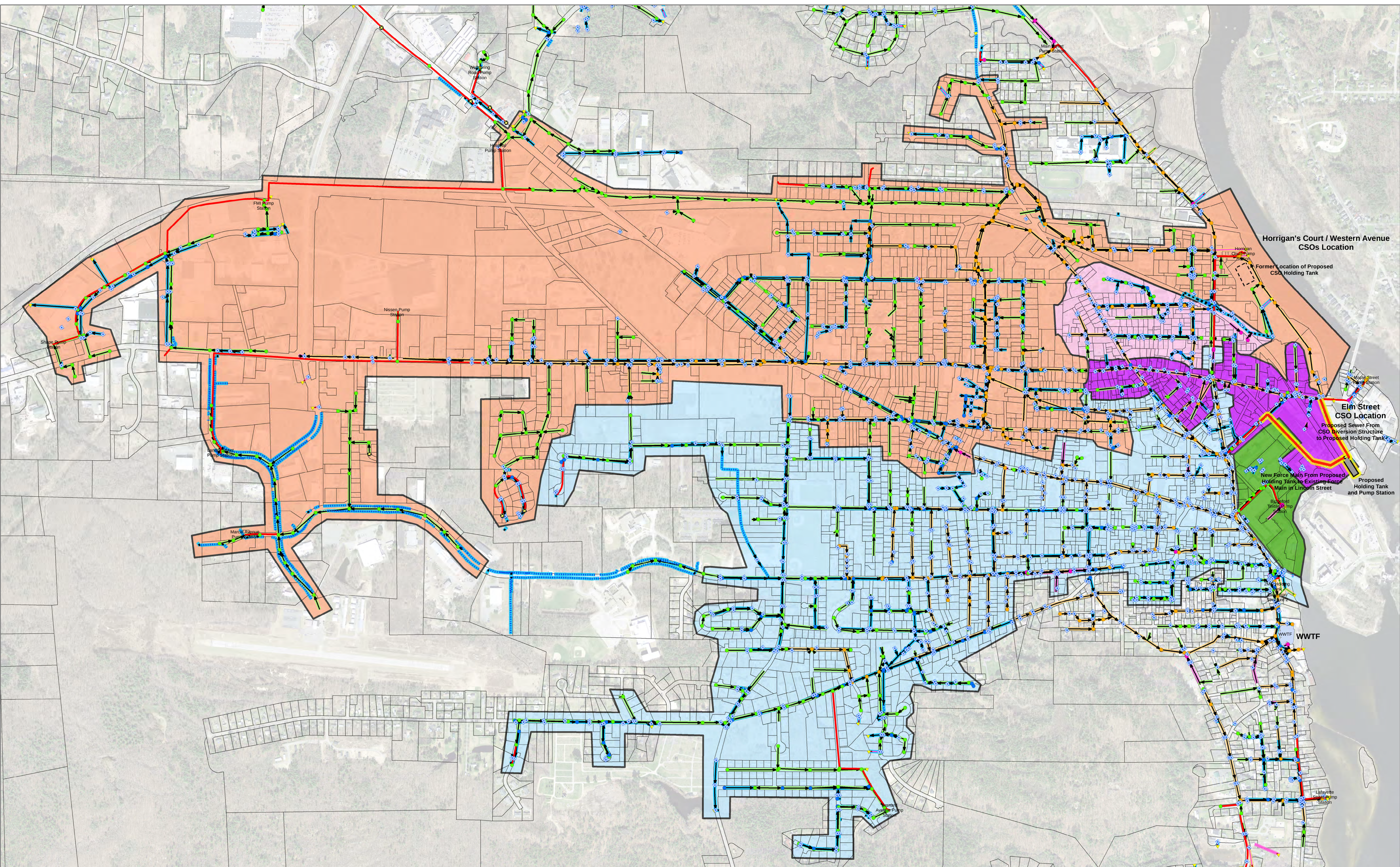
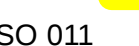


Figure 1
Biddeford Sewersheds

Legend

Name	 CSO 004	 CSO 009	 CSO 011	 CSO 007	Proposed Structures	 Pump Station	 Old Location of Proposed Holding Tank
	 CSO 005/6			 0.5 Million Gallon Holding Tank	 Proposed Sewer Lines		



City of Biddeford, Maine

TO: City Council

FROM: Tom Milligan, P.E.

DATE: September 15, 2010

SUBJECT: 2010 CWSRF Sewer Separation Project Funding

In July of 2010, the Maine Department of Environmental Protection (MeDEP) requested Cities to submit wastewater projects for potential funding through the Clean Water State Revolving Fund Program (CWSRF).

The City of Biddeford submitted a list of six projects for consideration. These projects were either projects listed for completion in the City's Phase II CSO Master Plan or energy related projects.

The projects submitted were: (in no order)

1. Horrigan's Court CSO Storage Facility Project
2. Elm/Lincoln Street Sewer Separation Project
3. Orchard Street Sewer Separation Project
4. Route 1 South Sewer Separation Project Phase II
5. Solar Hot Water Heating Project
6. Wind Turbine at Biddeford WWTP Project

The MeDEP reviewed all the projects submitted and ranked the projects for potential funding. In early August the MeDEP provided a "Draft 2010 CWSRF Proposed Project Funding List" for public review and comment. In late August the MeDEP published the final 2010 CWSRF Project funding list.

Part of the 2010 CWSRF program includes a "Hardship Principal Forgiveness" provision which is intended to provide relief to those communities that have a high sewer user fee to Median Household Income (2000 Census) ratio. As such, Biddeford has qualified to receive a 78.5% principal forgiveness amount on loans from the CWSRF funding program. The CWSRF program is administered by the Maine Bond Bank (MBB). In order to receive this principal forgiveness, the municipality must borrow from the CWSRF program. The hardship forgiveness is capped at \$1,000,000 per community.

An additional requirement of the funding grant is that communities institute and maintain a capital reserve fund to replace treatment plant equipment.

In mid August, the MeDEP requested communities listed on the draft list to express interest in moving forward with the program. Any community not wishing to provide such intent would have their hardship principal forgiveness amount reallocated to other communities on the list. Currently, Biddeford is programmed to receive approximately \$970,000 of such forgiveness on 2 projects (Orchard and Lincoln Street Separation projects). This amount could increase up to the \$1,000,000 level based on how other communities implement their programs.

The CSO projects submitted for consideration were all projects listed in our CSO Master Plan that need to be completed. Therefore, the principal forgiveness Program will allow the City to continue to meet the CSO Program goals and will result in the required work being completed with significantly less financial impact on the City and the Wastewater users.

Staff is respectfully requesting that the City Council endorse and direct that City Staff to continue to pursue the receipt of the hardship grant money by exploring, seeking and receiving the local funding necessary for the loan portion of the program in order for the City to receive the benefit of the hardship grant and forgiveness of principal.

The Finance Committee, at their September 7, 2010 meeting, reviewed the details of the grant program and the local funding aspects required for the City to receive the principle forgiveness under the CWSRF program and voted unanimously to recommend and to forward to City Council that staff move forward to secure the City's matching funds needed to receive the available grant money.

The Wastewater Management Commission reviewed the proposed project funding plan at their September 8, 2010 meeting and voted by unanimous consensus to endorse the seeking of the grant money as outlined in the Staff memo.

**TABLE 6-2
PROPOSED BIDDEFORD CSO ABATEMENT SCHEDULE- STATUS UPDATE**

Task	Status	Dates ⁽³⁾ ⁽⁴⁾		CSO Area	Estimated ⁽¹⁾ ⁽²⁾ Cost
		Start	Completion		
Evaluate CSO Monitoring Locations	O	June 2006	June 2006	All	\$5,000.00
Flow Monitoring	O	June 2005	Dec 2010	004, 005, 006, 007	\$30,000.00
Evaluate Horrigan Court and Bradbury Tanks	C	May 2009	May 2010	005, 006	\$40,000.00
Orchard Street & X-CTY to Lamothe Separation	C	May 2015	Aug 2016	005, 006	\$554,000.00
*Elm Street/North Separation	C	May 2011	Dec 2013	005, 006	\$1,300,000.00
*Elm Street/South Separation	C	July 2010	Nov 2011	005, 006	\$2,040,000.00
Elm Street/South Separation (PACTS)	P	July 2012	Nov 2015	005, 006	\$1,500,000.00
Elm Street and Route 1 Area Separation	O	June 2018	Nov 2019	005, 006	\$5,390,000.00
Graham Street (In town) Separation	F	May 2017	Nov 2018	005, 006	\$2,060,000.00
Green Street Separation	O	May 2013	Nov 2014	005, 006	\$2,180,000.00
Ray Street Area Separation	C	May 2009	Nov 2010	005, 006	\$1,622,000.00
SSES	O	May 2010	Nov 2012	004, 007, 008	\$40,000.00
Evaluate CSO 003 Closure	C	May 2010	Nov 2010	003	\$10,000.00
Flow Monitoring	O	July 2010	July 2014	009, 013, 014	\$30,000.00
SSES	O	May 2010	Nov 2014	009 and 011	\$40,000.00
Evaluation of CSO Reduction Methods (Separation vs. Storage vs. Transport/Treat)	F	Nov 2010	May 2015	004, 005, 006, 007, 008, 009, 011, 013, 014	\$100,000.00
Phase III Master Plan to Reflect Study Results	F	May 2015	Nov 2015	All	\$50,000.00
Phase III Master Plan Update	F	May 2020	Nov 2020	004, 007, 008, 009, 011, 013, 014	TBD
CSO Abatement Projects (TBD)	F	May 2021	TBD	004, 007, 008, 009, 011, 013, 014	TBD

⁽¹⁾ 2008 Costs

⁽²⁾ ENR = 8,126 (April, 2008)

⁽³⁾ Funding may only allow for the completion of select segments of these projects.

⁽⁴⁾ Projects may be adjusted based on Horrigan Court and Bradbury Street holding tank feasibility analysis.

*DEP permit milestones.

Notes: 1. Updated WP table to reflect current status of projects. Did not adjust estimated costs provided by WP.

2. Estimated Costs presented in the last column should be increased by 13% based on the Jan 2012 ENR index of 9176

Status: C complete; O ongoing; P pending; F future

TO:	Tom Milligan, City of Biddeford	DATE:	March 25, 2014
FROM:	Ryan Wingard, Wright-Pierce Christine Rinehart, Wright-Pierce	PROJECT NO.:	12223A
SUBJECT:	DRAFT 2012-2013 Flow Monitoring Analysis		

Purpose

The purpose of this memorandum is to summarize our review of Flow Assessment Services (FAS) meter data that has been collected in support of Combined Sewer Overflow (CSO) planning activities. The meter data was collected in an effort to support the following CSO planning initiatives:

1. Improved CSO monitoring.
2. Determination of potential cross connection elimination upstream of CSO-005.
3. Supporting the design of a CSO storage facility near the Horrigan Court Pump Station.
4. Determination of the hydraulic dynamics of the 24-inch sewer and 48-inch drain lines in the Lamothe Street area.
5. Quantifying the flows through the Diamond Street cross-country sewer.

Background

The City of Biddeford's sewer collection system is a combined system. The City's Phase II CSO Plan was submitted and approved by the Maine DEP in 2009. The CSO Plan presented various sewer separation projects aimed at abating CSO discharges, and also noted other techniques to reduce discharges, such as storage for subsequent treatment. In 2012 and 2013, Flow Assessment Services (FAS) conducted extensive flow metering within the City of Biddeford's combined sewer system to support the CSO Plan activities. FAS completed the initial installation of flow monitoring equipment in March of 2012, which included 17 flow meters, one level meter, three ground water gauges, one rain gauge, and three monitoring blocks. An additional meter was installed in August of 2012. The 2012 monitoring period ended in early December, when all meters, except for two CSO area-velocity meters and the rain gauge, were

removed from service. The 2013 monitoring period began in mid-late April and ran through early December. Two CSO area-velocity meters and the rain gauge remain in service.

Meter Locations

Meter locations were chosen to monitor the flows to the Horrigan Court Pump Station as well as flows within the system and at CSO points. A total of 18 area-velocity meters, one level meter, and a rain gauge were installed during the metering period. Meters at Sites 1, 2US, 3, 4, 5, 6, and 7 were installed in pipes to quantify the flows heading to the Horrigan Court Pump Station, which will help in the design of the CSO storage facility. Three meters (Sites 1A, 3A, and 7A) were installed in CSO pipes, and recorded overflows at CSO-006, CSO-007, and CSO-005, respectively. A total of nine meters were installed within the collection system to help determine the potential for future closure of sanitary and storm drain cross connections and included Sites 8, 9, 10, 11, 12, 13, 14, 15, and 16. Monitoring blocks were installed in three manholes, Site 12, 13, and a drain manhole downstream of Site 10 to observe whether active cross connections were present. The metering locations are summarized in Table 1 and illustrated in Figure 1.

It is understood that some cross connections may exist between the 24-inch sewer and 48-inch drain lines in the Lamothe Street area. The cross connections were most likely installed to provide relief for the 24-inch diameter sewer to prevent backups into residential basements. It is the intent to eventually remove all cross connections between the 24-inch diameter sewer and the 48-inch drain/combined line such that the 48-inch diameter line is solely used for storm flows, resulting in a reduction of overflows at CSO-005 and ultimately reducing the necessary size of the future downstream CSO storage facility. Currently, the 24-inch sewer has a limited capacity as a result of upstream combined connections (either within the public right-of-way or from private inflow/infiltration sources). The limited capacity of the 24-inch sewer and the aforementioned cross connections result in diversions from the 24-inch diameter sewer into the 48-inch drain/combined line.

**TABLE 1
 METER LOCATIONS**

Site	Location
1	24" into Pump Station
1A	12" CSO near Pump Station
2 US	10" cross-country
3	24" on Elm St.
3A	24" CSO on Elm St.
4	24" from Main St. (east)
5	12" from Main St. (west)
6	24" at Western and Main
7	48" at Western and Main
7A	CSO at Western and Main (level meter)
8	48" near 46 May St.
9	24" near 46 May St.
10	18" near 300 Elm St.
11	12" near 12 Union St.
12	18" near 121 Graham St.
13	24" near 144 Graham St.
14	30" near 144 Graham St.
15	12" near 296 Elm St.
16	24" near 21 Lamothe Ave.

Rainfall Observations

Target Rainfall Amount

The target design storm for CSO control in the City of Biddeford is the "S4 storm". The "S4 Storm" is the storm of record that produced the highest flow rate at the wastewater treatment plant as outlined in the 1995 Phase I CSO Master Plan. At the time, it was agreed upon that future CSO mitigation projects should be designed to prevent CSO discharges resulting from this storm. The "S4 Storm" is estimated to be equivalent to a seven-year, 24-hour rainfall event with an approximate 4.2 inch rainfall depth and a peak rainfall intensity of 1.47 inches per hour.

As such, flow data collected during rainfall events similar to the "S4 Storm" would be preferable for determining if the cross connections can be closed and for design consideration of the CSO

storage tank. The "S4 Storm" statistics are shown in Table 2 along with information for other design storms typically considered when planning CSO related projects for comparison.

**TABLE 2
 DESIGN STORM SUMMARY***

Event	24-Hour Duration		48-Hour Duration	
	Inches	Peak Rainfall Intensity (in/hr)	Inches	Peak Rainfall Intensity (in/hr)
1-year	2.61	0.91	2.94	0.46
2-year	3.25	1.14	3.60	0.57
5-year	4.10	1.44	4.59	0.72
"S4 Storm" (7-year)	4.20	1.47	N/A	N/A
10-year	4.89	1.71	5.52	0.86
25-year	6.18	2.16	7.04	1.08
50-year	7.38	2.58	8.47	1.29
100-year	8.82	3.09	10.19	1.55

* Design storm rainfall depths from the Northeast Regional Climate Center, except for the "S4 Storm". The "S4 Storm" is the storm that produced the highest flow rate at the Treatment Plant based on the 1995 Phase I CSO Master Plan. The design storm peak rainfall intensity is derived from the SCS-Type III, 24-hour rainfall distribution.

Rainfall during the Metering Period

During the metering period, there were a total of 23 rain events with rainfall depth greater than one inch (11 in 2012 and 12 in 2013). These rain events ranged in depth from 1.01 inches to 6.52 inches. As seen on Table 3, the majority of rain events were equivalent to design storms comparable to less than or equal to a one-year, 24-hour rain event.

The two storms that produced the greatest depths of rain occurred on June 2, 2012 (6.52 inches) and April 22, 2012 (5.23 inches). While these events were large volume events, they were longer in duration (57 hours and 39 hours) and had intensities (0.68 inches per hour and 0.60 inches per hour) that were less than half of the "S4 Storm" (1.47 inches per hour), which made their equivalent design storms not as significant.

Memo: Tom Milligan – DRAFT 2012-2013 Flow Monitoring Analysis
March 25, 2014
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The two storms that produced the largest intensities occurred on July 1, 2013 (1.52 inches per hour) and May 9, 2013 (1.16 inches per hour). While these two events were high intensity events, they had rainfall depths (2.68 inches and 1.81 inches) that are significantly less than the depth of the “S4 Storm” (4.2 inches).

Based on the rainfall statistics, Biddeford did not experience a storm similar to the target design storm during the metering period. However, the June 2, 2012 and April 22, 2012 rain events provide valuable insight into how the system reacts to large volumes of rain. In addition, the July 1, 2013 and May 9, 2013 rain events provide valuable insight into how the system reacts to high intensity events. All of the rain events included on Table 3 produced overflows at CSO-006 (Horrigan Court), CSO-005 (Western Avenue & Main Street), and CSO-007 (Route 1/Elm Street). For reference, the total daily CSO flow (in gallons) that was metered for the analyzed rain events is also shown on Table 3.

Metering Period Summary

For the 2012 metering period, the meters and blocks were installed between March 6 and March 9, 2012. One area-velocity meter (Site 2) was relocated to Site 2 US on May 16, 2012 due to surcharge conditions. An additional area-velocity meter (Site 16) was installed on August 14, 2012. The meters remained in place from March 2012 to December 2012. All meters, except for Site 1A, 3A, and the rain gauge, were removed from service on December 6 and December 7, 2012. On April 22 and 23, 2013, the meters and monitoring blocks were reinstalled, and remained in operation until they were removed on December 11, 2013. Two CSO meters (Site 1A and Site 3A) and the rain gauge currently remain in service.

CSO Meters

As previously noted, all the rain events that were included in Table 1 produced overflows at CSO-005 (Site 7A), CSO-006 (Site 1A), and CSO-007 (Site 3A). Additionally, overflows were recorded for much smaller rain events.

TABLE 3
RAINFALL ANALYSIS FOR RAIN EVENTS GREATER THAN ONE INCH

Rain Event Data				Equivalent Design Storm	CSO Total Volume (gallons)			Date of Overflow
Date	Inches	Peak Rainfall Intensity (in/hr)	Duration (hrs)		Horrigan Ct. CSO-006 (Site 1A)	Elm Street CSO-007 (Site 3A)	Western/Main CSO-005 (Site 7A)	
4/22/2012	5.23	0.6	39	10-year, 48-hour	1,499,000	2,302,000	3,414,000	4/22/12- 4/23/12
5/8/2012	2.19	0.19	61	< 1-year, 48-hour	494,000	672,000	594,000	5/8/12 - 5/10/12
6/2/2012	6.52	0.68	57	25-year, 48-hour	4,568,000*	7,658,000*	9,789,000	6/2/12 - 6/7/12
6/25/2012	1.33	0.62	31	< 1-year, 24-hour	165,000	314,000	604,000	6/25-12 - 6/26/12
7/26/2012	1.26	0.46	11	< 1-year, 24-hour	95,000	162,000	563,000	7/26/12 - 7/27/12
8/10/2012	1.01	0.37	6	< 1-year, 24-hour	117,000	175,000	359,000	8/10/12
8/16/2012	1.35	0.79	14	1-year, 24-hour	171,000	564,000	815,000	8/16/12 - 8/17/12
9/4/2012	1.21	0.37	25	< 1-year, 24-hour	123,000	231,000	250,000	9/4/12 -9/5/12
9/18/2012	1.13	0.67	15	< 1-year, 24-hour	75,000	125,000	459,000	9/19/12
9/28/2012	1.23	0.2	23	< 1-year, 24-hour	36,000	168,000	43,000	9/28/12
10/29/2012	1.1	0.27	11	< 1-year, 24-hour	93,000	202,000	216,000	10/29/12 - 10/30/12
5/9/2013	1.81	1.16	20	1- to 7-year, 24-hour	177,000	253,000	1,406,000	5/9/13
6/7/2013	2.12	0.47	20	1-year, 24-hour	238,000	519,000	1,043,000	6/7/13 - 6/8/13
6/11/2013	1.65	0.3	26	< 1-year, 24-hour	98,000	393,000	415,000	6/11/13
6/23/2013	1.58	0.95	15	1-year, 24-hour	214,000	388,000	1,151,000	6/23/13
6/27/2013	1.47	0.36	16	< 1-year, 24-hour	146,000	783,000	1,044,000	6/27/13 - 6/28/13
7/1/2013	2.68	1.52	11	1-year, 24-hour	275,000	417,000	2,216,000	7/1/13
7/11/2013	1.05	0.97	9	< 1-year, 24-hour	46,000	460,000	778,000	7/11/13
7/23/2013	1.18	0.33	10	< 1-year, 24-hour	96,000	377,000	554,000	7/23/13
8/9/2013	1.01	0.4	9	< 1-year, 24-hour	61,000	218,000	529,000	8/9/13
9/2/2013	2.47	0.64	17	< 1-year, 24-hour	236,000	739,000	1,671,000	9/2/13 - 9/3/13
9/11/2013	3.88	0.95	45	2-year, 24-hour	413,000	1,438,000	3,050,000	9/11/13 - 9/13/13
11/26/2013	3.23	0.77	23	1- to 2-year, 24-hour	430,000	1,111,000	2,282,000	11/27/13
Total					9,866,000	19,669,000	33,245,000	

* Overflow volume could be larger than what is shown. Overflows continued on 6/8, but there was also additional rain from a separate event.

A full summary of overflow activity for Sites 1A, 3A, and 7A is included in Attachment 1. Figures 2 through 4 in Attachment 1 graphically present the volume of overflow versus depth of rainfall for each CSO. As shown in Attachment 1, the largest volumes of CSOs are observed at CSO-007 (Site 3A) and CSO-005 (Site 7A). It is also observed, that these CSOs are triggered by very small amounts of rain.

In-system Meters and Cross Connections

A total of nine meters were installed within the collection system to help determine the potential for future closure of sanitary and storm drain cross-connections. Five meters (Sites 8, 10, 11, 14, and 15) were located on the 48-inch drain/combined line or in sewer pipes that are diverted to that line. Four meters (Sites 9, 12, 13, and 16) were located in pipes on the 24-inch sewer line or are located in pipes tributary to the 24-inch line. Three monitoring blocks were installed to observe whether cross connections located at Site 12, 13, and a drain manhole downstream of Site 10 were still active. The flows for the nine in-system meters are summarized in Attachment 2. Results from the monitoring block inspections are summarized in Table 4.

Horrigan Court Meters

To monitor the flows to the Horrigan Court Pump Station, meters were installed at Sites 1, 2US, 3, 4, 5, 6, and 7. For the most part, these meters were each located at the downstream end of a sewer catchment tributary to Horrigan Court Pump Station. The flows for these meters, including the CSOs, are summarized in Attachment 3.

Discussion

CSOs

As previously mentioned, the largest volume of combined sewer overflows was recorded at CSO-005 (Site 7A) and CSO-007 (Site 3A). The total volume of overflow associated with rain events greater than 1-inch was 33.2 MG at CSO-005 (Site 7A) and 19.7 at CSO-007 (Site 3A). The total volume of overflow associated with all rain events (regardless of size) was 40.8 million gallons (MG) at CSO-005 (Site 7A) and 31.9 MG at CSO-007 (Site 3A).

TABLE 4
MONITORING BLOCK INSPECTION RESULTS

Date of Visit	DMH d/s Site 10	Site 12	Site 13
3/28/2012	NV	In place	In place
4/25/2012	NV	In place	In place
5/2/2012	NV	In place	In place
5/11/2012	NV	NV	In place
5/31/2012	NV	NV	In place
6/29/2012	In place	Reset	Reset
8/9/2012	In place	NV	In place
9/6/2012	NV	Reset	Reset
10/4/2012	NV	Reset	In place
4/22/2013	In place	In place	In place
5/9/2013	In place	In place	In place
5/14/2013	NV	NV	Reset
5/23/2013	NV	In place	In place
5/29/2013	In place	In place	In place
6/13/2013	In place	In place	In place
6/24/2013	In place	Reset	In place
7/8/2013	In place	Reset	Reset
7/23/2013	Reset	Reset	Reset
7/30/2013	Reset	NV	NV
8/13/2013	In place	In place	In place
8/26/2013	In place	In place	In place
9/16/2013	Reset	Reset	Reset
9/27/2013	In place	In place	In place
10/16/2013	In place	In place	In place
10/31/2013	In place	In place	In place
11/11/2013	In place	In place	In place
11/25/2013	In place	In place	In place

Notes:

1. **In place** - Indicates the block was not tripped and no overflow activity.
2. **Reset** - Indicates the block was reinstalled and there was overflow activity.
3. **NV** - Indicates the site was not visited or the block activity was not recorded.

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The maximum individual overflow was observed at CSO-005 (Site 7A), which was 9.8 MG on June 4, 2012 resulting from 6.52 inches of rainfall. It should be noted that although the largest volume of overflows were observed at CSO-005 (Site 7A), there were instances where CSO-005 did not overflow where CSO-007 (Site 3A) did overflow. These instances occurred during rainfall amounts less than one inch, and resulted in very small volumes of overflows, which might indicate that something other than the rainfall, such as blockage in the line, was causing the overflow.

It is not surprising that the largest overflows are observed at CSO-005 (Site 7A) as this is the overflow on the 48-inch diameter drain/combined line. Presumably, there is a large amount of storm flow in addition to sanitary sewer that is diverted to this line. By comparing the average dry weather flow to the peak flow at Site 7, the 48-inch diameter drain/combined line has a peaking factor of approximately 55 for the June 2, 2012 event and 107 for the July 1, 2013 event.

Based on a review of the 2009 Phase II Combined Sewer Overflow Master Plan, the following areas tributary to CSO-005 were still combined in 2009: Outer Elm Street, Elm Street South, Sunrise Street, Ray Street, Graham Street, Green Street, and Orchard Street areas. Table 5 summarizes the separation that has been completed in areas tributary to CSO-005 since 2009.

As shown in Table 5, extensive sewer separation within the public right-of-way has occurred; however, there is still a significant length of combined sewer upstream of CSO-005. The 2009 CSO Master Plan also estimated that there were approximately 900 linear feet of combined sewers upstream of CSO-005 that is not included in Table 5. Private sources of inflow/infiltration are also a factor in contributing to excess storm flows to the sewer.

**TABLE 5
 COMBINED SEWER UPSTREAM OF CSO-005
 BASED ON THE 2009 PHASE II CSO MASTER PLAN**

Location	Estimated Linear Feet	Date Separated	Estimated Linear Feet Separated	Estimated Linear Feet Still Combined
Orchard Street & X-CTY to Lamothe	770	2011	545	225
Elm Street/North	1,795	2009	1,100	695
Elm Street/South (Lamothe to Dartmouth)	2,450	2009	1,900	550
Elm Street/South (PACTS)	2,000	2112	1,910	90
Graham Street (Intown)	2,785	2010	730	2,055
Green Street Area	2,930	2009	1,030	1,900
Ray Street Area	2,190	2009	590	1,600
Total	14,920		7,805	7,115

It is suspected that CSO-007 (Site 3A) has a significant volume of overflows based on the extent of upstream combined areas. Based on the 2009 CSO Master Plan, it is estimated that approximately 7,000 linear feet of combined sewer were upstream of CSO-007 in 2009. By comparing the average dry weather flow to the peak flow at Site 3, it becomes evident that there are upstream areas that are still combined. The 24-inch sewer at this location had a peaking factor of approximately 40 for the June 2, 2012 event and 49 for the July 1, 2013 event.

The maintenance and condition of the sewer downstream of the overflow point may also play a factor in the frequency of overflows at CSO-007. The manhole at Site 3A has an orifice in the bottom of the manhole that discharges to a 12-inch line on Diamond Street. The orifice is a potential location for clogging and may play a part in overflows that occur during small rain events. In addition, the 12-inch sewer on Diamond Street is known to have siltation issues due to pipe surcharging from the Horrigan Court Pump Station. Excessive debris and surcharging in the pipe could also impact the overflow.

Cross Connections

Three cross connections within the area tributary to CSO-005 were equipped with monitoring blocks. As seen in Table 4, all of the cross connections showed some level of activity. Blocks at Site 12 and 13 showed the most activity. The block at Site 12 was reset seven times and the block at Site 13 was reset six times. The block downstream of Site 10 showed less activity, and was only reset three times. Since the monitoring blocks all showed some level of activity, it suggests that further investigation of these cross connections and the tributary system upstream is warranted before they can be eliminated.

As discussed previously, there are several areas that were identified as combined upstream of the cross connections between the 24-inch sewer and the 48-inch drain line. Table 5 estimates over 7,000 linear feet of combined sewer still exists upstream of CSO-005. The evidence of cross connection activity indicates that, at certain times, the 24-inch sewer is limited in its capacity. Therefore, caution should be exercised in determining if the cross connections can be eliminated.

Additionally, flows at Site 11 on Union Street indicate that, on occasion, flows are overtopping the brick weir that was constructed in this manhole when the sewer line was installed on Union Street during the Elm/Union Street project, and is eventually diverted to the 48-inch diameter drain/combined line. Based on Table 5, a majority of the Green Street area, which is upstream of this diversion, is still combined. The total volume of overflows at Site 11 are small (0.158 MG for the monitoring period), but indicate that this point is still acting as a relief between the sewer and the downstream drain/combined line.

Horrigan Court Storage Facility

One method of determining the required size of the CSO storage facility is to quantify the overflows that occurred during an event similar to the "S4 Storm". The assumption for this sizing method is that flows in excess of the Horrigan Court Pump Station capacity are equal to the overflows. As mentioned previously, however, Biddeford did not experience a storm similar

to the target design storm during the monitoring period. To bracket the storage required, it will be necessary to consider events that were similar in rainfall depth (4.2 inches) and events that were similar in peak intensity (1.47 inches per hour) to the “S4 Storm”. The events that meet this criterion are listed in Table 6 along with the corresponding overflow volumes.

TABLE 6
RAIN EVENTS SIMILAR TO “S4 STORM” DEPTH AND INTENSITY

Event Date	Rainfall Depth (in)	Rainfall Intensity (in/hr)	CSO-006 (gallons)	CSO-007 (gallons)	CSO-005 (gallons)	Total Overflow (gallons)
4/22/12	5.23	0.60	1,499,000	2,302,000	3,414,000	7,215,000
7/1/13	2.68	1.52	275,000	417,000	2,216,000	2,908,000
9/11/13	3.88	0.98	413,000	1,438,000	3,050,000	4,901,000

Based on the above data, the storage facility would need to be between roughly 2.9 MG and 7.2 MG to capture flows from an “S4 Storm”.

An alternative method to determine the required size of the CSO storage facility is to sum the flows upstream of the CSO discharge points and compare them to the Horrigan Court Pump Station capacity. For purposes of this memorandum, the assumed peak capacity of the Horrigan Court Pump Station is estimated to be 6.2 MGD based on pump curves provided by the City. The flows measured upstream of the CSO points to be added and compared to the Horrigan Court Pump Station capacity include Sites 3, 4, 5, 6, and 7. The sum of the flows compared to the capacity of the Horrigan Court Pump Station for the rain events listed in Table 6 are shown in Figures 5, 6, and 7 in Attachment 4. Based on the volumes shown in Figures 8, 9, and 10 in Attachment 4, the storage facility would need to be between 1.8 MG and 6.1 MG. Unfortunately, there is a significant data gap in the Site 6 meter data that encompasses the storm

on April 22, 2012; therefore, the volume in excess for this storm event would be larger than what is shown on the figure.

By way of comparison, conceptual sizing of the proposed CSO storage facility was completed and outlined in a November 25, 2011 technical memorandum completed by Wright-Pierce. Based on meter data available at the time, the calculated storage volume required to handle the April 17, 2011 event (2.14 inches of rain with a peak intensity of 0.59 inches/hour) was between 4MG and 5MG.

Capacity of the 24-inch Sanitary Sewer and the 48-inch Drain/Combined Line

The full-flow capacity of the 24-inch sewer and the 48-inch drain/combined lines were calculated using the Manning's equation and the following assumptions:

- 24-inch PVC, minimum slope = 0.004, Manning's coefficient (η) = 0.012
- 48-inch RCP, minimum slope = 0.005, Manning's coefficient (η) = 0.013

The full-flow capacity of the 24-inch sewer line was estimated to be 10.02 MGD and the full-flow capacity of the 48-inch storm/combined line was estimated to be 65.65 MGD.

For this analysis, the storm with the greatest rainfall depth (June 2, 2012 = 6.52 inches) and the storm with the largest rainfall intensity (July 1, 2013 = 1.52 inches per hour) were considered. Looking at the June 2, 2012 and July 1, 2013 rain events (Figure 11 and 12 in Attachment 4), there was sufficient capacity in the 48-inch storm/combined line; however, the full-flow capacity of the 24-inch sewer was exceeded by approximately 1.73 MGD during the very intense rain event on July 1, 2013. If sewer flows that are currently being diverted to the storm drain (Sites 10 and 15) were added to the sewer (Site 9), the full-flow capacity of the 24-inch sewer still would not have been exceeded for the June 2, 2012 rain event, but would have been exceeded by 6.56 MGD for the July 1, 2013 rain event (Figure 13 and 14 in Attachment 4).

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Although the full-flow capacity of the 24-inch sewer was exceeded during the July 1, 2013 rain event, it does not necessarily mean that the sewer would have backed up into nearby basements. According to the 1999 Bid Drawings for the CSO Separation encompassing Western Ave, May Street, Lamothe Street, Lessard Ave, and Elm Street (1999 Bid Drawings), the lowest sill elevation along Lamothe Street is 109.57 feet (#15 Lamothe Street). Assuming that the average basement is 8-feet deep, the 24-inch sewer hydraulic grade line (HGL) would need to stay below elevation 101.57 feet to avoid backing up into basements. House #15 Lamothe Street is located approximately 200 feet upstream of meter Site 16.

Observation of the HGL at Site 16 (located at #21 Lamothe Street) was estimated by adding the recorded depth to the invert elevation (93.68 feet) listed on the 1999 Bid Drawings. Since there is no meter data at Site 16 for the June 2, 2012 event because the meter was not installed until August 2012, the HGL was also estimated for Site 9, using an invert elevation of 89.25 feet (from the 1999 Bid Drawings). The HGL versus time was plotted and compared to elevation 101.57 feet to determine whether or not the basements were in danger of backing up. This evaluation indicated that no backups were likely to have occurred during the rain events analyzed at Site 9 (see Figures 15 and 16 in Attachment 4). However, for a brief period, the estimated HGL at Site 16 approached the estimated level to avoid backups during the July 1, 2013 rain event (Figure 17 in Attachment 4). Although the HGL did not exceed the 101.57 foot elevation at Site 9, there were final depth readings that were greater than 24-inches, which indicate that surcharging of the 24-inch sewer line was observed during the July 1, 2013 event; also supporting that the capacity of the 24-inch sewer line was exceeded during this event.

During the June 2, 2012 rain event, Site 9 was approximately 4-inches from surcharging at the manhole (based on final depth readings). No comparison could be made for the June 2, 2012 event for Site 16 because the meter was not installed at that time.

The rain-induced response indicates that there are still stormwater sources connected upstream and there is not enough capacity in the 24-inch sewer to handle large/intense rain events. This is evident by a peaking factor of 21 for Site 9 during the June 2, 2012 rain event, and peaking factors of 39 for Site 9 and 114 for Site 16 for the July 1, 2013 rain event. Since previous separation work was focused on removing catch basins, it is likely that roof drains and sump pumps are still connected. In addition, there are upstream areas, such as Taylor Street, Beacon Avenue, and Amherst Street that have not been separated. In comparing recorded flows to theoretical capacity, it does look like there is ample capacity for base flows, even if all the flow from Sites 10 and 15 were diverted back to the 24-inch sewer. If there are stormwater sources connected to the 24-inch sewer, it is likely that the system will be over capacity and surcharge during relatively small, but intense storms.

Diamond Street Flows

It was requested by the City, that the estimated flows contributed by inflow/infiltration be calculated for the Diamond Street cross-country sewer for the June 2, 2012 and July 1, 2013 rain events. Initially this was going to be accomplished by subtracting the upstream flows (Site 3 + Maple Street Pump Station - 3A) from the downstream flows (Site 2); however, Site 2 was relocated for the majority of the metering period (except March-April of 2012) off the Diamond Street line, rendering this method ineffective. Another approach was attempted using meter math, however when the meter data was added and subtracted, it resulted in several negative values that did not yield appropriate results.

Therefore, to estimate the inflow/infiltration in the Diamond Street cross-country line, the data that was collected prior to Site 2 being relocated was used (March 2012 and April 2012). The average daily flows for the Maple Street Pump Station was estimated using pump station run time data that was provided by the City. As shown on Figures 18 and 19 in Attachment 4, the average flow in the cross-country as a result of inflow/infiltration can be approximated to be 0.3 for March 2012 and 0.2 MGD for April 2012. In addition, an increase in flow up to roughly 0.8 MGD was observed during a March 16, 2012 rain event that totaled 0.25 inches. An increase in

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flow up to 4 MGD was also observed during the April 22, 2012 rain event that totaled 5.23 inches.

Recommendation

Based on the meter analysis completed to date, the following action items should be considered as progress is made towards supporting the CSO planning initiative discussed in this memorandum:

1. Investigate areas upstream of the 24-inch sewer and the 48-inch drain/combined line for further inflow and infiltration reduction (public and private). Tributary areas with larger peaking factors should be the initial targets for inflow and infiltration reduction.
2. Consider replacing the CSO-007 diversion structure to eliminate the potentially clog-prone orifice discharge point.
3. Consider increasing the size of the Diamond Street sewer to avoid potential plugging of the line due to debris.
4. Consider improvements to maintenance activities of the CSO-007 orifice and/or the Diamond Street sewer to improve flow conveyance to the Horrigan Court Pump Station.
5. Consider improvements to the Horrigan Court Pump Station to potentially reduce the CSO activity at CSO-006.
6. Develop a hydrologic/hydraulic computer model of the collection system upstream of the Horrigan Court Pump Station to provide guidance in sizing the CSO storage facility and to determine the impacts of removing the cross connections. Meter data collected can be used for calibration and verification of the model.
7. Investigate opportunities to direct flow away from the Horrigan Court Pump Station and towards the Wastewater Treatment Facility (WWTF). An opportunity may exist to direct flow away from CSO-007 at Elm and Center Streets.
8. Consider construction a new pump station at CSO-007 to direct flow away from Horrigan Court Pump Station and towards the WWTF.

**TABLE 6-2
PROPOSED BIDDEFORD CSO ABATEMENT SCHEDULE**

Task	Status	Dates ^{(3) (4)}		CSO Area	Estimated ^{(1) (2)} Cost
		Start	Completion		
Evaluate CSO Monitoring Locations	O	June 2006	June 2006	All	\$5,000.00
Flow Monitoring	O	June 2005	Dec 2010	004, 005, 006, 007	\$30,000.00
Evaluate Horrigan Court and Bradbury Tanks	C	May 2009	May 2010	005, 006	\$40,000.00
Orchard Street & X-CTY to Lamothe Separation	C	May 2015	Aug 2016	005, 006	\$554,000.00
*Elm Street/North Separation	C	May 2011	Dec 2013	005, 006	\$1,300,000.00
*Elm Street/South Separation	C	July 2010	Nov 2011	005, 006	\$2,040,000.00
Elm Street/South Separation (PACTS)	P	July 2012	Nov 2015	005, 006	\$1,500,000.00
Elm Street and Route 1 Area Separation	O	June 2018	Nov 2019	005, 006	\$5,390,000.00
Graham Street (In town) Separation	F	May 2017	Nov 2018	005, 006	\$2,060,000.00
Green Street Separation	O	May 2013	Nov 2014	005, 006	\$2,180,000.00
Ray Street Area Separation	C	May 2009	Nov 2010	005, 006	\$1,622,000.00
SSES	O	May 2010	Nov 2012	004, 007, 008	\$40,000.00
Evaluate CSO 003 Closure	C	May 2010	Nov 2010	003	\$10,000.00
Flow Monitoring	O	July 2010	July 2014	009, 013, 014	\$30,000.00
SSES	O	May 2010	Nov 2014	009 and 011	\$40,000.00
Evaluation of CSO Reduction Methods (Separation vs. Storage vs. Transport/Treat)	F	Nov 2010	May 2015	004, 005, 006, 007, 008, 009, 011, 013, 014	\$100,000.00
Phase III Master Plan to Reflect Study Results	F	May 2015	Nov 2015	All	\$50,000.00
Phase III Master Plan Update	F	May 2020	Nov 2020	004, 007, 008, 009, 011, 013, 014	TBD
CSO Abatement Projects (TBD)	F	May 2021	TBD	004, 007, 008, 009, 011, 013, 014	TBD

⁽¹⁾ 2008 Costs

⁽²⁾ ENR = 8,126 (April, 2008)

⁽³⁾ Funding may only allow for the completion of select segments of these projects.

⁽⁴⁾ Projects may be adjusted based on Horrigan Court and Bradbury Street holding tank feasibility analysis.

*DEF permit milestones.

Notes: 1.Updated WP table to reflect current status of projects. Did not adjust estimated costs provided by WP.

2.Estimated Costs presented in the last column should be increased by 13% based on the Jan 2012 ENR index of 9176

Status: C complete; O ongoing; P pending; F future