STAFF REPORT

DATE: December 15, 2020

TO: City Council

FROM: Stan Gryczko, Public Works Utilities and Operations Director
Brian Mickelson, Assistant City Engineer
Adrienne Heinig, Management Analyst

RE: Stormwater Utility Cost of Service and Rate Study and Approval to Initiate City Stormwater Utility Fee Proposition 218 Process

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Recommendation

1. Receive Stormwater Fee Report (Attachment 1) and presentation from SCI Consulting Group and City staff on the Stormwater Utility cost of service study and development of rate recommendations; and
2. Provide direction on whether or not to include CPI banking; and
3. Approve the Resolution (Attachment 2) declaring the intention of the City Council to initiate a proceeding to obtain approval for the City's stormwater utility fee; and
4. Approve the Resolution (Attachment 3) to adopt ballot procedures for the stormwater fee Proposition 218 process.

Fiscal Impact

The Stormwater Enterprise Funds (Fund 541 & 544) have not had rate adjustments (aside from a 3% annual increase for revenue associated with Fund 544) since the 1990s. As a result, the fund cannot support the current expenditures for the utility. The proposed adjustments to rates will generate adequate revenue to ensure the fund revenues match expenditures, maintains a positive fund balance, develops an appropriate reserve, completes major and necessary capital improvements and continues to provide quality stormwater services to ratepayers.

City Council Goals

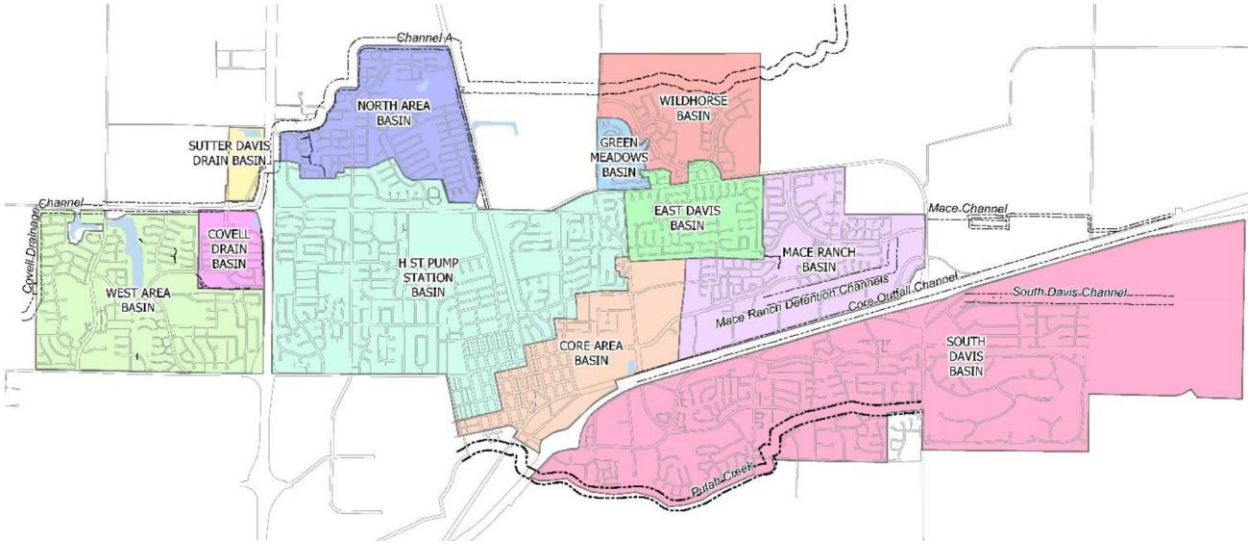
This effort is consistent with the Council Goals to Ensure Fiscal Resilience, Pursue Environmental Sustainability and Fund, Maintain, and Improve Infrastructure.

Background

The City of Davis Stormwater Utility is managed by the Public Works Utilities and Operations Department, within Funds 541 through 544. The system includes integrated storm drainage pipes, inlets, outfalls, culverts, channels, pump stations, force mains, detention ponds, siphons, and access roads to prevent flooding, as well as regulatory compliance and water quality testing required by the State. Stormwater systems collect, manage and convey stormwater and non-stormwater runoff from properties and streets. The stormwater collected by the system flows untreated into local detention ponds, and to area bypasses, where eventually the stormwater will

discharge into the Sacramento River. A schematic of the City's stormwater system is included below as Figure 1.

Figure 1



The first stormwater infrastructure developed in the City included the stormwater pump station constructed in 1924 at the Richards Blvd. undercrossing, which still operates in its original configuration and with most of the original equipment. Additional equipment and infrastructure were installed citywide in the subsequent decades as the City grew and expanded. A number of stations and the City's drainage piping installed in the 1960s is still in operation today. The industry standard for the life expectancy of a stormdrain system is approximately 60 years.

The City first established the stormwater utility as an enterprise fund in the early 1990s, with the introduction of a storm drainage fee to fund the utility's operations and maintenance. A second fee was established not long after to address the increasing costs of compliance with the City's State-issued National Pollutant Discharge Elimination System (NPDES) permit. These fees remain in place today, and are calculated based on a monthly fee per square foot of each parcel (with parcels designated by land use type). Only one line appears on customer bills for both of the rates. Storm sewer rates pay for the operations and maintenance of the detention ponds, the conveyance channel, sampling and testing of stormwater, studies, reporting, and permitting. Vacant parcels are exempt from the storm sewer water quality charge. Drainage rates are used for the acquisition, construction, reconstruction, maintenance and operation of storm drainage water systems and related facilities. Open space and agriculture parcels are exempt from drainage rates. Drainage fee can increase 3% each August, unless waived by City Council resolution.

Proposition 218 Passed by Voters

In 1996, California voters passed Proposition 218, also called the "Right to Vote on Taxes" Act. Proposition 218 requires that jurisdictions obtain voter approval (by a majority vote) for new or increased property related fees, unless those fees are for sewer, water or refuse collection services. Fees associated with sewer, water and refuse collection services can be enacted through

a majority protest process. Stormwater system fees, despite some legal back-and-forth, continue to be treated differently than sewer, water and refuse fees, requiring a majority approval vote from property owners prior to the implementation of fees, and this is unlikely to change within the timeframe that adjustments to the City's rates are needed. Further discussion about the Proposition 218 process, and the impact on Stormwater systems across the State, is included in the Stormwater Fee Report (Attachment 1).

The challenges with enacting stormwater fees have resulted in fees remaining relatively flat (aside from the 3% annual increase in the Drainage rates, revenue which supports the regulatory compliance side of the Stormwater Utility) for almost 15 years, despite the growth of the stormwater system and increased demand in Davis. For perspective, from the 1990s to the 2010s, the population of Davis grew from about 46,000 people to 65,000, and expanded from about 8.5 square miles to 10 square miles.

To operate within the fund supported by current revenues, the Stormwater program has limited capital expenditures, as well as mostly reactive operations and maintenance practices rather than proactive services. In 2016, the City undertook an analysis of the stormwater infrastructure to develop a plan to address the deferred capital maintenance within the utility. The analysis found a number of critical investments needed to ensure that the City's stormwater system has the capacity to handle the current demand, let alone future demand. In 2018, a study was conducted on the current and needed service level of stormwater operations, which also highlighted deficiencies within the program. The current capital improvement plan within the stormwater financial plan totals $34 million dollars over 30 years, one of the most significant drivers of the need for rate increases. The additions related to operations and maintenance, and regulatory compliance, total about $868,000 annually.

Deferred Capital Improvements

Within the 30-year capital improvement project plan utilized for the cost of service study, the majority of the included projects would be scheduled for completion within the first 10 years of the proposed rate adoption. The reason for this is included within the Stormwater and Sewer Stations Assessment that was completed in 2016 (Attachment 4). The study highlighted the significant capital improvements planned at three of the City's nine pump stations, improvements which are necessary as the stations are inadequately sized, present safety concerns for staff and the general public, and require significant staff maintenance efforts. As the Utilities Commission conducted the evaluation of the financial plan of the Utility, questions arose as to whether City staff could rank or prioritize the capital projects, to potentially reduce or further smooth out rate adjustments. Staff has consistently indicated that all of the capital projects included within the financial plan are necessary and high priority, as continuing to defer improvements on the three identified stations could result in serious risks. A staff report to the Commission, containing details associated with these projects, including the immediate and long-term risks, is included as Appendix B in the Stormwater Fee Report.

Should the voters approve the proposed rates, the City would continue to conduct studies to assess the City's stormwater infrastructure and monitor the need for additional improvements. The development of the proposed rate structure includes funding for pay-as-you-go projects.

Regulatory Compliance and Service Level Needs

As with the review of the capital improvement projects included within the financial plan, the Commission and staff looked at the inclusion of requests for additional staffing, contracting and other costs associated with operations and maintenance and regulatory compliance. These requests also contribute to the increases for stormwater rates. Staff was also asked to provide additional background and evaluation for these requests to demonstrate the need.

As has been indicated in this report, the Stormwater Utility has been operating with largely flat revenue despite increasing costs, and increasing service needs. To determine the gaps between standard stormwater operations, as well as necessary regulatory compliance, and current staffing levels, staff worked with two documents. For the cost of service study, the City's consultant, SCI Consulting Group, worked with Larry Walker Associates to prepare a memo on the funding and staffing associated with the City's stormwater regulatory compliance program. This memo is included as Appendix A to Attachment 1. For operations and maintenance staffing and funding, staff and the consultant reviewed the Stormwater Evaluation Report, completed by West Yost in 2017 (Attachment 5).

Regulatory Changes and Increased Staffing Needs/Costs

Recent changes in stormwater permitting with the State Water Resources Control Board (SWRCB) require the City to take on additional monitoring, enforcement, outreach and reporting, which will be phased in over the next 10 years. While the City has made appropriate steps to address some of these requirements, more must be done to ensure full compliance. The memo from Larry Walker Associates includes both the consideration of current additional needs, to meet the current requirements, and future additional needs, to incorporate into the City's financial plan. These needs include implementation costs related to the Trash Amendment, increased staffing required for inspection and reporting requirements, and costs anticipating future monitoring requirements. While minor tweaks were made to the recommendations of the consultant (based on existing City staffing levels and shared tasks), the additional needs included in the report are consistent with the updates the City will need to make to ensure full compliance with the current stormwater permit, and allow for flexibility in addressing future permit costs or changes.

Operations and Maintenance Staffing Needs/Costs

In addition to the needs outlined for regulatory compliance, additional staffing and contract costs were included within operations and maintenance activities. The stormwater operations and maintenance program has been operating with one working supervisor and two FTE maintenance workers (and some temporary part time, or TPT, support) for a number of years. Additional assistance, when needed, is often pulled from other divisions within the Public Works Utilities and Operations Department, including Streets and Wastewater Collections. This model of shared

labor is effective, and aids the City to keep labor consistent throughout the year (some demands are seasonal, and the increased staffing demands can be met by existing staff in other divisions, rather than hiring new employees), however the limited staff trained for stormwater system maintenance can be a significant issue with operations, and utilizing staff from other divisions takes them away from their own work priorities. Challenges arise with scheduling and completing preventative maintenance tasks, among other issues. In the stormwater program evaluation completed in 2018, the following included the following on page 27:

> *Discussions with City O&M staff and review of O&M information indicate that there is a shortage of staffing needed to complete day-to-day operations and complete preventative maintenance tasks. There is also turnover of temporary staff that requires training of new staff. The City currently only has staffing to perform the day-to-day operations, corrective maintenance needs, and some preventative maintenance tasks. City staff noted that not all preventative maintenance tasks are being performed due to shortage of staff.*

Recommendations from the report (and reflected in the additional needs) included the following (on page 36):

- *Convert two temporary staff to one full-time entry-level worker position to improve efficiency and technical ability of this existing staff resource, and lesson the training burden on full-time staff.*
- *Add one new lead Collection System Technician position to maximize the flexibility of crew sizes to meet the maintenance tasks at hand.*

The report included benchmark surveys with other agencies in the area on service levels and maintenance frequencies.

The City currently utilizes contracted work for some stormwater services. The use of contractors for regular maintenance projects, like pipe flushing or stormwater channel cleaning is a common practice, and providing a budget for increased contract assistance would aid City staff in focusing on higher priority projects and tasks, and ensure that regular maintenance is conducted to both identify areas of infrastructure that may need to be repaired or replaced, and prevent the build-up of maintenance needs over time.

It should be noted, the cost of service study includes revenue associated with staffing needs and contracted services identified here, however any inclusion of additional staffing or services is subject to approval by the City Council during normal budget discussions.

Rate Structure

The goal of adjusting the stormwater rates is two-fold. First, to address the capital improvement, service level and regulatory needs, as has been outlined in this report; and second, to ensure that the fee charged continues to reflect how properties within the City interact with the stormwater infrastructure. Although the prior rate structure consisted of a flat fee charged by parcel size and

type, the proposed rate structure uses surveys conducted on property types, sizes and characteristics to develop a basic unit of measure, the single-family equivalent or "SFE" unit. This basic unit of measure is then used to calculate the units of measure for all types of land uses. A full description of the methodology behind the unit of measure, and how it is utilized, is included in the Stormwater Fee Report, starting on page 15.

The annual revenue requirement for the utility, as established by the financial plan and cost of service study, is divided by the total SFEs, to calculate the per-year and per-month cost for each SFE. The per-month, per SFE cost is then multiplied by the SFEs per parcel or per acre, for each land use category, to determine the stormwater rate for that parcel. The proposed rates based on staff and Utilities Commission recommendations are included in Table 9 below, from page 20 of the Stormwater Fee Report. As mentioned on page 2 of this report, current rates are charged based on square footage of each parcel. As a simple comparison the current average monthly stormwater bill for a single-family residential customer ranges from about $5.00 to $10.00.

TABLE 9 – PROPOSED FY 22 STORMWATER FEE SCHEDULE

Land Use Category	Proposed Monthly Rate FY 2022	
Residential [A]		
Small *Under 0.14 ac*	$ 10.23	per parcel
Medium *0.14 to 0.22 ac*	$ 13.10	per parcel
Large *0.23 to 0.27 ac*	$ 17.45	per parcel
Very Large *Over 0.27 ac*	$ 19.47	per parcel
Condo - 1 Level	$ 8.52	per parcel
Condo - 2+ Levels	$ 3.95	per parcel
Non-Residential [B]		
Mobile Home Park	$ 98.20	per acre
Apartment	$ 104.08	per acre
Comm / Industrial / Retail	$ 137.86	per acre
Office	$ 113.63	per acre
Institutional	$ 98.20	per acre
Institutional w/ Field	$ 68.89	per acre
Park	$ 8.22	per acre
Vacant (developed)	$ 8.22	per acre
Open Space / Agricultural	not charged	

A - Residential category also includes duplex, triplex and four-plex.

B - Non-Residential parcel size is calculated to the hundredth of an acre.

Rate Credits: Low Impact Development

The City's NPDES permit requires that certain properties be designed to capture stormwater onsite, aiding in the filtration of the stormwater through landscape to help filter pollutants out of the water prior to runoff into the stormwater system. This type of design, also known as low impact development (LID), will reduce a parcel's stormwater runoff, which in turn reduces the interaction of that parcel with the stormwater infrastructure. If the parcel meets the strict criteria for LID, the parcel would receive a 25% credit of their stormwater fee. Further discussion about this credit is included in the Stormwater Fee Report, on page 24.

Utilities Commission Discussion and Action

The Utilities Commission reviewed the Stormwater cost of service study with the consultant during their meetings on May 20, June 17, July 15, September 16 and October 21 of this year. As

part of the Commission's detailed cost of service study and rate review process, the discussion included a review of the financial plan, outlining the fund requirements of the utility (some of which was discussed in the paragraphs above), rate scenarios and the calculation of the rate structure for the stormwater fees, and the final draft of the full cost of service report.

The current Stormwater cost of service study is the first time that the Utilities Commission has reviewed the utility with this level of detail. Commission discussion highlights are included below:

- The need to update the city's stormwater infrastructure to reflect current conditions, and to allow for adaptation to climate change impacts.
- Consideration of the county areas that surround the City, and how those area activities impact the City's stormwater infrastructure (especially in the South and West of town).
- Calculations on how to determine the single-family equivalent (SFE) unit used to charge the stormwater fee, and what technology is emerging that might be used in the future to aid in the calculation of that fee.
- CPI banking (included in the Rate Recommendation section of this report)
- Consideration of debt that the City's stormwater utility may take on, versus pay-as-you-go financing for large capital projects.
- Greywater, rainwater storage and other possible impacts to the stormwater system due to conservation.
- The importance of establishing enough revenue to fund studies and determine future needs for the system.
- Concern was expressed about the current economic impacts associated with COVID-19, and the challenges on those impacted when enacting rate adjustments at this time.

Ultimately, in October, the Commission made the following motion:

> The commission supports staff recommendation of the rate adjustments that are included in Scenario R – which is the average of Scenarios A-D, with the inflationary factor not to exceed 3% in any single year, or the San Francisco-Oakland-Hayward CPI-U, whichever is less.
>
> Moved by E Roberts-Musser, seconded by G Braun. The motion passed by the following votes:
>
> Ayes: Braun, Kristov, Roberts-Musser, Troost, Williams
> Noes: Bystrom
> Absent: Deos, Franco

One commissioner dissented to the motion. In his dissention, O Bystrom stated that the City should be kept under pressure to keep operations and maintenance costs at a minimum, as the economic uncertainties associated with the COVID-19 pandemic are still a reality. He stated that the City should look for alternative funding to fund capital projects, or undertake fewer projects. He also indicated that utility rate adjustments should be closer to CPI for all utilities, so the

stormwater fund rate revenue (highlighted in the Commission presentation as "out of sync" with the water and wastewater utility revenue) should be considered the desired model, rather than pointed out as an outlier.

Staff Rate Recommendation

With the largest driver associated with the rate adjustments being the need to address capital improvement projects, and the documented need to address those projects sooner rather than later, the consultant and staff approach to the rate recommendation included consideration of the plan to use debt financing to fund the projects, as the fund (should the rate structure be approved by voters) establishes a reserve account and capital improvement funding. The consultant developed four models of annual revenue requirements based on debt costs. Those models included:

A. $20 million debt, 30-year term, remainder as Pay-as-you-Go
B. $10 million debt, 30-year term, remainder as Pay-as-you-Go
C. Two succeeding 10-year debts ($6 and $7 million), remainder as Pay-as-you-Go
D. No debt – all Pay-as-you-Go

The revenue requirements associated with these models range from $4.03 to $4.18 million per year. The debt assumption, especially the larger debt assumption, does increase the necessary rate amounts, but the spread between the models (as outlined in greater detail in the Stormwater Fee Report) is only 3%.

Additional scenarios were developed to show a ramp up of rates over five or ten years, and a scenario was developed reflecting reduced CIP expenditures. The consistent recommendation of staff, however, as discussed with the Utilities Commission, is the necessity of accomplishing the capital improvement projects outlined in the City's financial plan in the short term. Further delay of the completion of these projects continues to place staff at risk, as well as the areas immediately surrounding the stations in need of repair, should stormwater activity exceed current capacity of the stations.

Based on discussions with the consultant, the staff recommendation brought to the Utilities Commission in October represented a blend of the four models that included the assumption of debt costs, A through D included above, with a revenue requirement of $4.1 million, annually. With this recommendation, the chief goal of completing the capital improvement projects without delay is achieved, as well as the development of a reserve (by established City enterprise fund reserve policy) within three years.

It is important to note, with the discussion of debt, that the Stormwater Utility currently cannot support the acquisition of debt, as the current revenue would not cover required debt service. In addition, Public Works Utilities and Operations Department staff continue to work with the City Manager's Office to seek out and review grant programs that could offset the cost of major capital improvements. One challenge, however, is the necessity in developing plans prior to the projects being "shovel ready," which is often a requirement for project grant awards.

If the revenue for this Utility is not such that it can support capital and operational needs, the City will need to potentially fund these needs with General Fund support.

Consumer Price Index-U (CPI-U), or Annual Cost Banking
The current stormwater rate structure includes a partial adjustment of 3% annually. Rate structures can be developed with annual increases when tied to CPI, or other price indexes. Part of the recommendation from SCI Consulting included the concept of CPI "banking." The stormwater fee would be subject to an annual adjustment tied to the CPI-U for the San Francisco Bay Area in December each year (a Sacramento-area equivalent of this index does not currently exist). The maximum adjustment would not exceed 3% in any year. However, if CPI-U banking was utilized, for the years that the CPI-U exceeds 3%, the amount over would be "banked" as unused CPI, and could be used to offset occasions when the annual CPI-U increase was below 3%. As an example, if the CPI-U is 4% one year, the increase for the Utility would only be the maximum allowed of 3%. The 1% over the maximum would be "banked" and in a future year where the CPI-U was only 2% the City could use the "banked" 1% and increase the rate the maximum of 3% if the fund update showed the need for the additional 1% in revenue. The Utilities Commission discussed the concept of CPI-U banking at length, and during a discussion of keeping the City accountable for costs and the importance of keeping operations and maintenance costs low, it was recommended that the CPI-U banking component of the annual adjustment calculation be removed. Council is asked to advise staff on the inclusion of the CPI-U banking component of the rate calculation, with the reminder that determination of annual rates will be before Council each year for consideration.

Independent of the CPI-U banking, staff concurs with the Utilities Commission on the recommended rate structure, as it will address significant and long-term needs within the Stormwater Utility. Should the rate structure be approved by voters, staff will work with appropriate City Commissions and City Council to develop a plan to fund the necessary capital improvement projects, for ultimate approval during the budget process.

Proposition 218 Process
Should the recommended rate structure be approved by the City Council, the Proposition 218 process is initiated by a resolution of intent stating the rates and scheduling a public hearing. Staff would then mail the notice of a public hearing to be held no sooner than 45 days after the mailing to determine if there is a majority protest to stop the process. If there is no majority protest at the public hearing, the ballot packet will be mailed to all property owners. For the purposes of this vote, one parcel equals one vote, and a 50% majority approval is required for the rate adjustments to pass. Based on the current anticipated timeline for this process, the adjustments to stormwater rates would occur in July 2021.

For each year of the approved Proposition 218 term (should the ballot measure pass), staff will provide an annual fund update to the Utilities Commission, and to Council, to review the performance of the fund during the fiscal year immediately preceding, and to develop

recommendations for Council on the next year rate adjustment, based on the performance of the fund.

Outreach Plan

An important piece of the Stormwater Cost of Service Study is the outreach to the community and local stakeholders. City staff, including the Public Works Utilities and Operations Communication team, as well as the City Manager's Office Communications Team, will work with SCI Consulting Group to undertake the outreach and communication plan.

The work is broken out into two phases: 1) actions taken prior to the Council approval to move the rate process forward, and 2) actions taken after the Council approves the rate process. Prior to Council approval, staff worked with the consultant to develop messaging (building off of existing messaging already in use by the City), identify key stakeholders, and draft the Proposition 218 notice for the rate adjustments. Should City Council approve the proposed rate structure and process, the Communications teams will work with SCI Consulting to implement the messaging, conduct community and stakeholder meetings, and develop community education on the measure. As the measure is not an election, the standard process undertaken by the City does not occur. There is no impartial analysis or arguments for or against the measure, only the ballots with Proposition 218-compliant language.

Key messages for the outreach will include: what the stormwater program does, why more funding is needed, and what the funding will be used for, should the rates be approved by voters. Additional information on the City's outreach plan, as well as the draft Proposition 218 notices, will be provided at the next City Council meeting.

Tentative Timeline

Date	**Task**
2020	
October 21, 2020	Utilities Commission meeting – recommendation on rates to City Council
December 15, 2020	Council receives and authorizes Fee Report & Resolutions to initiate Proposition 218 proceeding
2021	
February 2021	Draft & finalize Notices
March 15, 2021	Mail Notices (*at least 45 days before hearing*)
March/April 2021	Community meetings
May 4, 2021	Public hearing regarding proposed fee, (*if no majority protest*) City Council authorizes ballots to be mailed, First Reading of Ordinance
May 17, 2021	Mail ballots
June 25, 2021	Close of ballot period (*no fewer than 45 days after Public Hearing*)
End of June 2021	Ballot tabulation
July 6, 2021	Council certifies ballot results, adopts Ordinance, and orders fees (*if measure passes*)

Attachments

1. Stormwater Fee Report, SCI Consulting Group
2. Resolution Initiating Fee Process for Stormwater Rates
3. Resolution Adopting Ballot Procedures for Stormwater Fees
4. Stormwater and Sewer Stations Assessment (2016)
5. Stormwater Evaluation Report (2017)

CITY OF DAVIS

FEE REPORT

STORMWATER FEE

NOVEMBER 2020

PURSUANT TO THE ARTICLES XIIIC & D OF THE CALIFORNIA CONSTITUTION, AND THE GOVERNMENT CODE SECTIONS 38900 – 38901 ET AL.

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CITY OF DAVIS

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Adrienne Heinig, Management Analyst
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ENGINEER OF WORK

Jerry Bradshaw, SCI Consulting Group

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INTRODUCTION

OVERVIEW

The City of Davis ("City") has engaged SCI Consulting Group to study, make recommendations, and assist in the implementation of a funding approach for its municipal separate storm sewer system[1] ("MS4") including environmental programs, maintenance and operations, capital improvements, and compliance with all state and federal regulations associated with the National Pollutant Discharge Elimination System[2] ("NPDES") permit.

In the early 1990s the City established its first storm drainage fee. Since that time the City has operated its MS4 as a municipal utility akin to its water and sewer systems, where dedicated revenues are spent on the operations associated with the stormwater enterprise. Subsequently, the City established a second fee, the Storm Sewer Fee, to fund the increasing costs of NPDES compliance. Although the City has no comprehensive asset management plan or master plan, the City's Public Works Department has developed two key planning documents pertaining to its Storm Drainage Program ("Program"). These include the Stormwater and Sewer Stations Assessment (2016) and the Stormwater Operations Assessment Report (2018). These assessments made it clear that the Program would need to expand its levels of service to achieve the goals of responsible environmental stewardship and smart investment in the City's aging infrastructure.

In 2019, the City embarked on a project to consolidate its two existing storm drainage fees into a new, single fee structure in conformance with current law and contemporary rate-setting practices. The new rate structure is intended to establish the current minimum rate revenue needed to ensure the ongoing fiscal requirements of the Program including standard operation and maintenance of the collection system and pump stations, basic repair and replacement needs, capital improvement enhancements, and appropriate reserves.

CITY'S FACILITIES

The City operates and maintains a storm drainage system, as it is empowered to do per Government Code Sections 38900 and 38901. This complex system is comprised of integrated storm drainage pipes, inlets, outfalls, culverts, channels, pump stations, force mains, detention ponds, siphons and access roads to prevent flooding. As the community

[1] In this report, the terms "storm sewer," "storm drainage," "storm protection," and "stormwater" are used interchangeably, and are considered to be synonymous.

[2] Created in 1972 by the Clean Water Act, the NPDES permit program is authorized by the EPA to allow state governments to perform many permitting, administrative, and enforcement aspects of the program.

grew and neighborhoods and business districts expanded, the City's storm drainage system was developed. Parts of the system may date back over 100 years.

In 2003 the State Water Resources Control Board ("State Water Board") issued a Phase II Small MS4 General Permit ("Permit") to the City of Davis, which was renewed in 2013. "This Permit regulates stormwater and non-stormwater discharges from the City's MS4 and requires implementation of eleven key elements. Over the years, the range of actions and necessary level of effort to implement the stormwater program has increased in response to the evolving regulatory requirements and community needs."[3]

The operations and maintenance ("O&M") side of the Program has also developed many activities that support clean water goals and maintain the City's aging infrastructure to protect the neighborhoods and businesses from local flooding. On average, the industry-standard life expectancy of a storm drain system is approximately 60 years. The majority of the City's storm drainage pipes were installed more than 50 years ago, leaving the City with a system that is approaching the end of its useful life. At least two of the nine pump stations are more than 60 years old.

The City's complex storm drainage system has evolved to meet the unique needs dictated by the City's flat topography and location near the Yolo Bypass, a large drainage path with a system of weirs that diverts floodwaters from the Sacramento River away from the city of Sacramento and other nearby riverside communities. The system's balance has historically protected the City from flooding from storm runoff. Climate change is bringing about new challenges with a predicted rise in sea level of more than two feet of elevation as well as more frequent and more intense storms. While the City's storm drainage system must adapt to these changes, it alone cannot supply the full scope of remedies to meet these climate change challenges. Therefore, the fee recommendations in this Report will not fully address climate change.

STORMWATER FUNDING BACKGROUND

Since the City established its first storm drainage fee in the early 1990s, the City has used these dedicated revenues to fund the Program. Due to changes in the law the City can no longer increase the fee without the approval of property owners through a ballot measure.[4] For that reason, the storm drain fees have not been increased in nearly 15 years. As a result, the City has needed to limit capital expenditures and keep operations and maintenance activities to a less than desirable level of service, mostly responding to storm-related emergencies and basic regulatory compliance.

[3] From LWA technical memorandum, dated June 10, 2020, found in Appendix A.
[4] This "freeze" on the stormwater fees is due primarily to the stringent requirements of Proposition 218 for a ballot measure to increase fees. See next section for more details.

The scale and projected needs of the storm drainage system point toward the need for asking property owners to approve an increase in storm drainage fees in order to ensure a sufficient and sustainable funding stream. The City of Davis is considering increasing the existing fees along with modifications to the underlying fee structure. This Fee Report is the first step in that process, should the City decide to proceed.

LEGAL REQUIREMENTS OF STORMWATER FEES

This Report calculates the Stormwater Fee as a property-related fee. Property-related fees are subject to the requirements of Articles XIIIC and D of the State Constitution, which were approved by voters in 1996 through Proposition 218, as well as the Proposition 218 Omnibus Implementation Act (Government Code Sections 53750 – 53758).

Any property-related fee must comply with requirements of Article XIIID, Section 6. These include the following:

- Revenues derived from the fee shall not exceed the funds required to provide the property-related service;
- Revenues derived from the fee shall not be used for any purpose other than that for which the fee was imposed;
- The amount of a fee upon any parcel or person as an incident of property ownership shall not exceed the proportional costs of the service attributable to the parcel;
- No fee may be imposed for a service unless that service is actually used by, or immediately available to, the owner of the property in question. Fees based on potential or future use of service are not permitted. Standby charges, whether characterized as charges or assessments, shall be classified as assessments and shall not be imposed without compliance with the assessment section of the code; and
- No fee may be imposed for general governmental services including, but not limited to, police, fire, ambulance or library services where the service is available to the public at large in substantially the same manner as it is to the property owners.

The procedural requirements of Proposition 218 require that new or increased property-related fees submit to the following two-step process: 1) a 45-day public protest period culminating in a public hearing, and 2) a ballot proceeding whereby it must be approved by a 50% simple majority of property owners (or a two-thirds supermajority of registered voters) before new or increased fees could be authorized. However, fees for water, sewer and refuse collection were exempt from the second step. In the years following the passage of Proposition 218, there was uncertainty whether stormwater fees qualified as a type of sewer fee and therefore were not subject to the ballot proceeding requirement. The California Sixth Appellate District Court clarified the question in a 2002 ruling[5] that found stormwater fees

[5] Howard Jarvis Taxpayers Association v. City of Salinas, No. H022665.Sixth Dist. June 3, 2002.

did not qualify as a type of sewer fee, and new or increased fees must be approved through a ballot proceeding. Subsequent to that date, the City Davis did not authorize any further inflation adjustments.

FACILITIES AND SERVICES

The City operates and maintains a municipal separate storm sewer system within the City's boundaries. The system is made up of man-made drainage systems including, but not limited to, curbs and gutters, integrated storm drainage pipes, inlets, outfalls, culverts, channels, pump stations, force mains, detention ponds, siphons and access roads. The system serves the entire City.

The primary storm drainage service provided by the City is the collection, conveyance, and overall management of stormwater and non-stormwater runoff from parcels. By definition, all parcels that shed stormwater into the City's system, either directly or indirectly, utilize, or are served by, the City's storm drainage system. The need and necessity of this service are derived from property improvements, which historically have increased the amount of stormwater runoff from the parcel by constructing impervious surfaces such as rooftops, pavement areas, and certain types of landscaping that restrict or retard the percolation of water into the soil beyond the conditions found in the natural, or unimproved, state. As such, open space land (in a natural condition) and agricultural lands that demonstrate stormwater absorption equal to or greater than natural conditions, are not charged a fee. Other vacant land that was once improved or has been prepared for future improvements do not qualify as open space or natural land and will typically be charged a fee.

A critical service provided by management of the City's storm drainage system is compliance with all water quality requirements through the City's NPDES permit. This service ensures that all parcels within the City are monitored and, in some cases, individually regulated to ensure such compliance. This applies to parcels that may drain directly to non-City receiving waters as well as all other parcels in the City. For this reason, all parcels (other than natural open space and qualifying agricultural) are included in the fee structure.

The storm drainage assessment documents referenced above contain thorough sets of maps and lists of various elements within the stormwater system. Those descriptions are the basis for this Report.

FINANCIAL NEEDS AND REVENUE REQUIREMENTS

SUMMARY OF CLEAN WATER AND STORM PROTECTION SYSTEM NEEDS

As part of the fee implementation task, the SCI team conducted an analysis of the City's Stormwater system needs. This analysis included information from several source planning documents as well as recommendations from City staff members.

FINANCIAL STRUCTURE

The City's financial structure includes the following four separate funds for the storm sewer enterprise: 541, 542, 543, and 544 (as shown below in an excerpt from the two year adopted 2019-21 budget, on Page 3-13). Only Funds 541 and 544 are part of this Report; Funds 542 and 543 are only for use with special projects outside the scope of this analysis.

FUND NO	TITLE	WORKING CAPITAL LESS ENCUMB June 30, 2019	FY 2019/20 ADOPTED BUDGET REVENUES	EXPENDITURES	ADJUSTMENTS AND TRANSFERS	WORKING CAPITAL LESS ENCUMB June 30, 2020
	STORM SEWER FUNDS					
541	STORM SWR/DRN - MAINT & OPER	327,748	1,304,988	991,289	(393,625) [1]	247,822
542	STORM SWR/DRN - CAP REPL RESRV	721,265	22,400	1,500,444	393,625 [1]	(363,154)
543	STORM SWR/DRN - CAP EXP RESRV	2,159,357	68,880	65,794		2,162,443
544	STORM SEWER - QUALITY	763,978	626,080	975,724	0	414,334

Within those funds, there are several accounts that track storm sewer financial activity. They are itemized in the Table below, which also shows the budgeted expense for Fiscal Year 2019-20 ("FY 20") for reference. This report does not recommend any changes to this financial structure as it already is established as an enterprise fund within the City's accounting system.

TABLE 1 – FULL LIST OF ACCOUNTS WITHIN STORM SEWER ENTERPRISE (FY 20)

Division	Name	Category	Acct	Budget
Fund 541 - Storm Drainage				
City Manager Office	General Management	O & M	1110	$ 3,750
City Manager Office	Community Info & Outreach	O & M	1115	5,000
Finance Division	Utility Accounting	O & M	2850	59,404
Planning Division	Natural Resources Comm	O & M	3250	398
Parks Divisioin	Street Tree Planting & Mtce	O & M	4486	10,000
Admin Division (E&T)	Public Information	CIP	6155	2,558
Engr Division (E&T)	Preliminary Engineering	CIP	6602	17,543
Engr Division (E&T)	Planning Entitlement	CIP	6605	114
Engr Division (E&T)	Engineering Development	CIP	6642	48,975
Engr Division (E&T)	Public Works Permits	CIP	6643	8,235
Engr Division (E&T)	Mapping	CIP	6660	881
Admin Division (U&O)	General Administration	O & M	7101	56,574
Admin Division (U&O)	Public Works Info Mgt	O & M	7160	26,074
Transportation Division	Corporation Yard Facility	O & M	7244	2,294
Transportation Division	Street Mtce & Repair	O & M	7252	237
Storm Drainage Division	El Macero Mtce District	O & M	7411	95,244
Storm Drainage Division	Storm Drain Facility Mtce	O & M	7414	594,983
Storm Drainage Division	SD Inter-Dept Charges	O & M	7465	36,324
Enviromental Resources	Integrated Pest Management	O & M	7715	14,062
Fleet Services Division	Fleet Purchase and Disposal	O & M	7811	20,000
Fund 541 Total				$ 1,002,650
Fund 544 - Storm Sewer / Quality				
Stormwater	El Macero Mtce District	O & M	7411	$ 110,714
Stormwater	Storm Drain Facility Mtce	O & M	7414	466,721
Stormwater	SD Inter-Dept Charges	O & M	7465	22,496
Environmental Resources	Stormwater Regulatory Mgt	O & M	7730	380,762
Fund 544 Total				$ 980,693
Storm Sewer Enterprise Total (FY 2019-20)				**$ 1,983,343**

PROGRAM REVENUES

The first step of the analysis was to review the revenues available to the City's Program. Based on information from the City's 2019-20 budget, the existing revenues are projected through Fiscal Year 20-21 as shown in the Table below.

TABLE 2 – SUMMARY OF PROGRAM REVENUES

Shown in thousands

Revenue Source	FY 20	FY 21
Storm Drainage Fees	$ 1,235	$ 1,173
Storm Sewer (Water Quality) Fees	610	580
Interest & Other Misc Revenue	86	76
Total Budgeted Revenues	**$ 1,931**	**$ 1,828**

The adopted budget reflects a decrease in projected revenues for FY 21 due to recent impacts from the ongoing COVID-19 pandemic.

A comparison of the total expenses shown in Table 1 and the total revenues in Table 2 reveal a small deficit. With revenue growth limited, this deficit is expected to grow in future years. This is a primary reason for proposing a new fee structure that can be more flexible and better meet future Program needs.

PROGRAM COSTS

The City's Program is influenced primarily by the requirements to prevent local flooding and to comply with the NPDES Permit. Cost estimates were based on budgetary and supplemental information provided by the City including two recent studies:

- Stormwater and Sewer Stations Assessment (2016)
- Stormwater Operations Assessment Report (2018)

In broadly assessing the Program's costs and following the City's current financial structure, the following two main categories were used: Operations and Maintenance ("O&M") Costs, which include NPDES compliance, and Capital Improvement Program ("CIP") costs. These categories reflect how the City generally allocates funds to implement its day-to-day storm drainage-related programs.

SCI worked closely with City staff from both the Engineering Division and the Utilities and Operations Department to develop priorities for a sustainable Stormwater program.

O&M costs are relatively stable from year to year (approximately $2 million annually) and present a firm baseline. However, the SCI Team worked with City staff to evaluate the

activities and identified several areas where levels of service and compliance activities should be increased. When projected forward to FY 22,[6] the operating costs of the Program grow to nearly $3 million.

The Table below shows the budgeted O&M expenditures for FYs 20 and 21 as well as projected costs for FY 22.

TABLE 3 – SUMMARY OF OPERATIONS & MAINTENANCE COSTS

Shown in thousands

Element	FY 20	FY 21	FY 22
Operations & Maintenance			
El Macero Mtce District	$ 206	$ 211	$ 216
Storm Drain Facility Mtce	1,062	1,103	1,134
Stormwater Regulatory	381	387	398
Support Costs	335	312	319
Baseline Subtotal	$ 1,983	$ 2,013	$ 2,067
Add'l Regulatory Needs [A]			397
Add'l Operational Needs [B]			469
Total Operations & Maintenance Costs	**$ 1,983**	**$ 2,013**	**$ 2,934**

A - Taken from LWA memorandum dated 6/10/20 (Appendix A)
B - Derived from Staff interviews, summarized in Appendix B

The Capital Improvement Program ("CIP") costs shown in the Table below are a compilation of priority capital improvement projects or programs derived from the assessments listed above and staff recommendations. The costs for the first four projects were originally estimated in 2016 and included basic design costs. The first step was to escalate those cost estimates using the Construction Cost Index from the Engineering News Record. The second step was to include additional costs for environmental evaluation, permits, construction administration, and project administration. These "soft costs" were assumed to add another 20% to the project total. The final two projects were added as allowances for various studies and assessments[7], and for annual minor projects aimed at making the physical system work more effectively. These projects were planned to be implemented over a ten-year period. A full description of projects is shown in Appendix C.

[6] Fiscal Year 21-22 is the target year since any new fee structure will not be in place prior to that time.
[7] These include: Needs Assessment, Condition Assessment (hydro-jet and CCTV), and Climate Change and Capacity Study.

TABLE 4 – SUMMARY OF PRIORITY CAPITAL IMPROVEMENT PROJECTS / PROGRAMS

Shown in thousands

Projects / Programs	2015-16 Cost	2019-20 Cost		
	Base Costs	Base Costs	Soft Costs	Total Cost
SDS #6 Replacement	$ 1,400	$ 1,602	$ 320	$ 1,922
SDS #3 Replacement	12,200	13,960	2,792	16,752
SDS #5 Raising & Upgrades	5,200	5,950	1,190	7,140
Covell Channel Widening	1,150	1,316	263	1,579
Plans & Studies (Asset, Capacity, Ponds, Basins)				1,000
Annual Misc Upgrades (inlets, trash racks, siphons, sumps)				900
Total Capital Improvement Program	**$ 19,950**	**$ 22,828**	**$ 4,566**	**$ 29,293**

ANNUAL REVENUE REQUIREMENT

Since stormwater fees are subject to voter approval, it is recommended that a fee be structured in the beginning to be sustainable as well as steady over the long term. Unlike other utilities (e.g., water and sewer) where the fees can be reviewed and re-set at five-year (or less) intervals, stormwater fees are better set at an initial level that can be increased annually in accordance with a predetermined formula or index for many years to come. As a result, the revenue requirements must be expressed in annual terms that will reflect future years' needs (with the formulaic adjustments).

While the O&M costs are shown in Table 3 as annual costs, the CIP costs in Table 4 are shown as lump-sum, one-time costs. Therefore, the CIP costs must be annualized. This presents a significant challenge because City staff prefers to execute the primary projects in the first six years. In order to establish rates high enough to pay directly for this approach would likely be 1) too high to gain voter approval, and 2) higher than necessary after the six-year interval. A more common method of financing a front-loaded CIP is to incur debt that would provide early cash for project implementation and be paid back over time. This approach works best within a utility rate structure as it smooths out the cash flow peaks and provides for a steadier rate.

30-YEAR MODEL

In order to model the various options of debt versus pay-as-you-go ("PayGo"), SCI developed a 30-year rate model. This time frame was chosen as it allowed for either long-term debt or multiple shorter-term debt issuances. The 30-year period begins with FY 22 as the earliest time that a new fee structure could be implemented.

The model elements are as follows: two kinds of revenue (user fees and interest/ miscellaneous) and four types of obligations (operating costs, debt service costs, reserves, and PayGo CIP expenses). These are shown in the graphic at the right.

All elements are managed in the model as predetermined calculations with one exception: the PayGo CIP is computed only after all revenues and other obligations are accounted for. In other words, the PayGo CIP is the cushion used to balance each year's figures.

On a parallel track, the overall $29 million CIP is managed in two ways:

- It is reduced each year by the amount of:
  - Debt proceeds available for projects, and
  - PayGo expenditures.
- The remaining balance each year is escalated by the projected rate of change in the Construction Cost Index ("CCI").[8]

The overall goal of the model is for the $29 million CIP balance to be reduced to zero at the end of the 30-year period. This is managed by inputting sufficient revenue in the first year and balancing the debt amounts (and, thus, the debt service amount) to accomplish that goal.

In addition to the primary inputs, there are several assumptions[9] that must be incorporated into the model. These are detailed in the following Table.

[8] The CCI is published by the Engineering News Record.

[9] FINANCIAL ADVICE DISCLAIMER: Any reference to indebtedness is strictly an exercise in engineering economics for the purpose of forecasting revenue requirements in connection to the rate setting process. Neither SCI nor any of its employees are a registered municipal advisor under the SEC rules. This is not a recommendation with respect to any specific municipal financial products or the issuance of any specific municipal securities. In that regard, we 1) are not recommending an action to the City, 2) are not acting as an advisor to the City, and 3) do not owe a fiduciary duty to the City pursuant to Section 15B of the Exchange Act. The City should discuss any information and material contained in this communication with any and all internal or external advisors and experts that the City deems appropriate before acting on this information or material.

TABLE 5 – FINANCIAL PROJECTION ASSUMPTIONS

Escalation Rates		
Revenues	2.60%	Based on Consumer Price Index ("CPI")average over past 30 years, with an annual cap of 3% and "banking" allowed
O & M Costs	2.78%	Based on the "Leland Model" with personnel at 3.26% and other operating costs at 2.0%
CIP Costs	2.60%	Based on Construction Cost Index average over past 30 years
Interest Earned		
Reserve Interest	2.00%	As recommended by City staff
Debt Assumptions		
Interest	4.00%	
Debt Issuance Cost	2.00%	
Debt Reserve Amount		One year's debt service
Debt Service Structure		Level payments
Debt Service Coverage	110%	Ratio of pledged revenue to debt service

This set of assumptions is derived from the following two important City documents: The reserve policy for enterprise funds, and the Leland Model. As applied to Storm Sewer Funds, the three elements of the reserve policy are as follows:

- Operating – a three-month reserve of operation expenses. A figure of 25% of annual operating costs was used.
- Emergency Capital – Annual amount equal to the five-year average PayGo CIP expenditures. Due to fluctuations in the CIP amounts, a starting figure of $1 million was used. This was increased in certain scenarios when PayGo CIP expenditures increased significantly.
- Rate Stabilization – 5% of annual operating revenue.

For use in the 30-year model, the Operating and Rate Stabilization reserves were combined into a single amount of (25% + 5% =) 30% of operating costs. The full reserve policy can be found in Appendix D.

The Leland Model was developed to provide the City with a financial model for general fund expenditures. Recent utility cost of service studies have used the escalation rates from the general fund model (where applicable) to remain as consistent as possible across the City's funds. These were useful in establishing the escalation rate for operating expenditures in the 30-year model. The recommendations for personnel costs such as salaries and benefits were applied to the 7714 account (as the largest and most representative account in the Storm Sewer Funds) to compute a blended rate, which was computed as 3.26% per year. Other operating costs were assigned a 2% escalation rate based on the discretionary nature of many of those costs. When those two escalation rates were applied to the overall expenditures, the final blended escalation rate for all operating costs was 2.78%.

A question that arises about taking on municipal debt is that of added cost. To evaluate the impact of debt costs, SCI initially ran four debt models:

A. $20 million debt, 30-year term, remainder as PayGo
B. $10 million debt, 30-year term, remainder as PayGo
C. Two succeeding 10-year debts ($6 and $7 million), remainder as PayGo
D. No debt – all PayGo

As expected, the larger the debt, the higher the rate needed to be to pay for it. However, the spread between the $20 million debt and no debt options was only 3%. This is primarily due to how close the debt interest rate (4%) was to the rate of construction cost escalation (2.6%). Further, the debt interest rate is likely more conservative than necessary. As the debt interest approaches the value of the CIP escalation, the smaller the variations in revenue requirements. The conclusion is that the rates are not very sensitive to whether, and how much, debt is taken on in the future. This allows the City the flexibility of deferring the answer to that question until a future time.

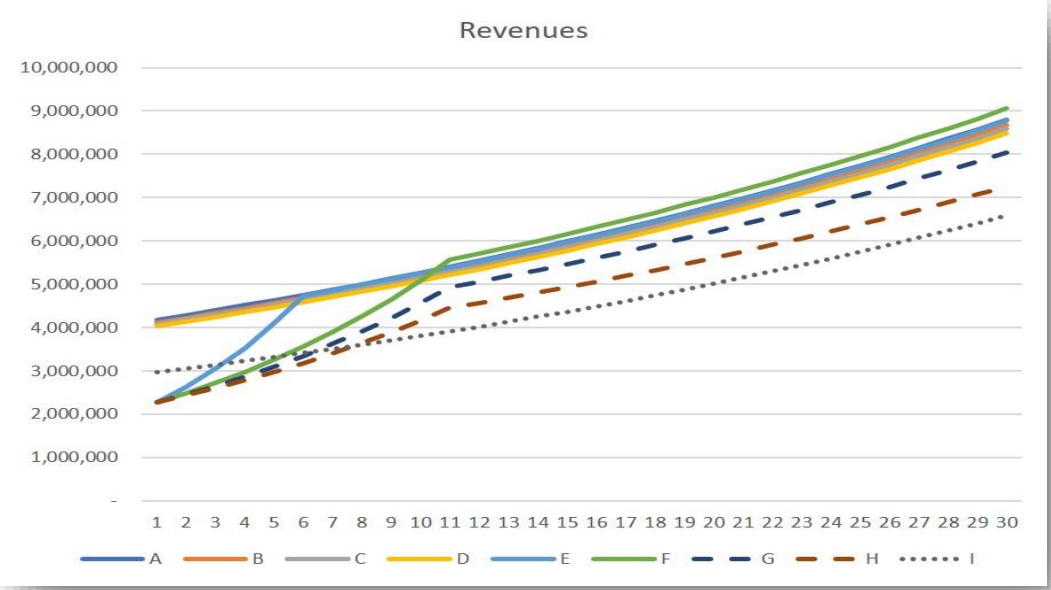
REVENUE REQUIREMENT FINDINGS

For the four scenarios listed above, the FY 22 revenue requirement ranged from $4.03 to $4.18 million. This is approximately double the current revenue levels, which would lead new user fees to increase significantly. This initial finding led to the development of additional scenarios where 1) revenues would be increased gradually, or ramped, over a period of years (scenarios E through H), and 2) CIP expenditures would be reduced (scenarios G, H and I). They are summarized in the Table below.

TABLE 6 – SUMMARY OF REVENUE SCENARIOS

	Scenario	CIP Amt (millions)	Rev Req't (millions)	Yr-31 CIP (millions)	Ramp % Increase
A	LT-20m Debt	$ 29.3	$ 4.178	$ 2.264	
B	LT-10m Debt	$ 29.3	$ 4.115	$ 2.339	
C	Multi-Debt	$ 29.3	$ 4.080	$ 2.264	
D	PayGo	$ 29.3	$ 4.031	$ 2.158	
E	Ramp 5	$ 29.3	$ 2.270	$ 2.450	15.9%
F	Ramp 10	$ 29.3	$ 2.270	$ 2.740	9.4%
G	Ramp 10	$ 20.0	$ 2.270	$ 0.879	8.1%
H	Ramp 10	$ 10.0	$ 2.270	$ 0.453	7.0%
I	No CIP	$ -	$ 2.974	$ 0.231	

The way in which these scenarios fluctuate over time is shown in the graphic below. Scenarios E through H are ramped up over five or ten years, and the starting revenue is approximately 10% higher than current levels. The only significant deviation from the first four scenarios is F (10-year ramp) which ends up with a higher revenue requirement due to the deferral of early revenues. Also, scenarios G, H and I are significantly lower due to the reduced CIP expenditures.



This graphic illustrates the negligible variation among the differing debt levels (A through D). It also illustrates that the revenue requirements are much more sensitive to the CIP expenditure levels (F through I; $29 million, $20 million, $10 million, and zero, respectively). It must be noted that these scenarios were crafted to evaluate these sensitivities. There are many other iterations of these factors that can also be explored.

REVENUE REQUIREMENT RECOMMENDATIONS

After consideration of the alternatives and consultation with the City, it is recommended that a blend of Scenarios A through D be the basis of the revenue requirement for a new fee, or $4.1 million for FY 22. This scenario has the following advantages:

- The entire CIP can be completed within the 30-year planning window.
- Due to the low sensitivity to how (if any) debt is employed, this scenario allows flexibility to the City regarding debt and the pace of delivering the CIP.
- The City's Reserve Policy can be implemented within the first three years.
- The CIP can begin early in the planning window. (All other options require delayed implementation of major CIP projects.)

The primary drawback of the recommended scenario is the immediate jump in rates from approximately $6.00 to $13.10 per month for the average home. A review of the utility bill for the average home in the City (summary at right) shows that this increase will cause the overall utility bill to increase approximately 5%. The two current stormwater fees account for approximately 4% of the bill; the proposed rate would increase that share to 8%.

	Existing	*Proposed*
Water	$ 53.15	*$ 53.15*
Storm	$ 6.00	*$ 13.10*
Other	$ 15.04	*$ 15.04*
Trash	$ 38.95	*$ 38.95*
Sewer	$ 44.11	*$ 44.11*
	$ 157.25	$ 164.35

RATE STRUCTURE ANALYSIS

Proposition 218 states that the amount of a fee upon any parcel shall not exceed the proportional costs of the service attributable to that parcel. It also states that no fee may be imposed for a service unless that service is actually used by, or immediately available to, the owner of the property. In compliance with Proposition 218, the proposed Stormwater Fee will only be imposed on properties that shed water, directly or indirectly, into the City's system or are otherwise served by the system. Additionally, the amount of use attributed to each parcel is proportionate to the amount of stormwater runoff contributed by the parcel, which is, in turn, proportionate to the amount of impervious surface area on a parcel (such as building roofs and pavements).

SINGLE-FAMILY RESIDENTIAL PARCELS AS BENCHMARK

The most widely used method of establishing storm drainage rates[10] is to use the average or median single-family residential parcel[11] ("SFR") as the basic unit of measure, or benchmark, which is called the single-family equivalent, or "SFE." Since the metric for this fee structure is impervious surface area, a benchmark amount of impervious surface area ("ISA") must be established.

Davis has a wide range of sizes of SFR parcels, which have varying percentages of impervious area ("%IA"). Generally, smaller, denser parcels tend to have a higher proportion of impervious area than larger, less dense parcels, which tend to have a lower percentage of impervious area. (This can be best visualized by the fact that larger residential properties tend to have a larger *proportion of pervious* landscaping, and therefore a smaller *proportion of impervious* area.) A random sample of 243 SFR parcels was selected, and the ISA of each sample parcel was measured using aerial photographs. This sample data forms the basis for determining the median ISA, which will then be the basis for determining the SFE.

The range of SFR parcels was grouped into four size categories based on trends that emerged in the %IA data. The median sized SFR parcel is 0.17 acre (approximately 7,405 square feet), which is also the median parcel size for the medium SFR rate category. The average %IA for the medium size group was found to be 46.84%. Therefore, the median parcel in Davis contains 3,468 square feet of impervious surface area ("ISA") as shown in

[10] *Stormwater Utility Survey*, 2017, page 2, Western Kentucky University. Other common names for this benchmark unit are Equivalent Runoff Unit (ERU) and Equivalent Drainage Unit (EDU).

[11] The SFR category also includes multiplex parcels of two, three or four units, since the lot development characteristics do not vary significantly from the SFR parcels of similar size. In all, this includes the approximately 564 multiplex parcels in the City, which were distributed to the same four parcel size categories as the other SFRs. Any residential parcel with five or more units is categorized as apartments, which is calculated separately.

the calculation below. This will be used as the benchmark (1 SFE) for all other size categories and other non-residential land uses.

$$\begin{aligned} 1\ SFE &= \%IA \times Median\ Parcel\ Size \\ &= 46.84\% \times 7{,}405\ sf \\ &= 3{,}468\ sf \end{aligned}$$

This becomes the basis for calculating the SFEs for all other types of land uses. The %IA for each size category was applied to the median size parcel in that category to calculate its median ISA. The SFE per parcel for each size category is a simple ratio of the median ISA for each category to the ISA (3,468 sf) for the benchmark category of medium-sized parcels as shown in the following formula:

$$SFE\ per\ Parcel = \frac{Median\ ISA}{3{,}468}$$

CONDOMINIUMS

Condominium units are particularly difficult to categorize as they are often on very small individual parcels yet share larger common areas that are made up of landscaped (pervious) areas, parking lots and shared roofs, and other recreational uses (either pervious or impervious). The data for these variables is not readily available, so some assumptions are made about their characteristics.

Condominiums can be grouped into two categories: Medium-density where there is only one level of residential units (e.g., townhomes) and high-density where there are multiple levels of residential units (similar to apartment buildings).

There are four sites containing 88 units of high-density condominiums in the City. Each of these sites were measured for ISA and analyzed as a class. The average ISA per unit was 1,045 square feet which equates to 0.30128 SFE per parcel.

Medium-density condominiums are more numerous (2,682 units). They share site characteristics with both the high-density condominium and single-family residences. Therefore, they are assigned an ISA value equal to the average ISA for high-density condominium (1,045 sf) and medium size SFR (3,468 sf), or 2,257 sf. This equates to 0.65064 SFE per parcel.

The Table below shows a summary of the SFEs for residential parcels.

TABLE 7 – SUMMARY OF RESIDENTIAL PARCELS

Lot Type	Parcel Size Range		# of Parcels [A]	Acres [A]	Median ISA (sf) [B]	SFE per Parcel
	Acres	Square Footage				
Small	under 0.14	under 5,881	2,557	269.37	2,710	**0.7812**
Medium	0.14 to 0.22	5,881 to 9,800	7,603	1,306.12	3,468	**1.0000**
Large	0.23 to 0.27	9,801 to 11,978	1,350	329.98	4,622	**1.3325**
Very Large	over 0.27	over 11,978	782	328.40	5,156	**1.4865**
Condo - Med Density [C]		na	2,682	174.15	2,257	**0.6506**
Condo - Hi Density		na	88	2.74	1,045	**0.3013**
		TOTAL	**15,062**	**2,410.76**		

A Numbers of Parcels and Acres do not factor into the basis of the SFE calculation; they are shown for informational purposes only.

B From Table 10, Appendix E.

C Medium-density condominiums are the average of Hi-Density Condo and Medium SFR

NON-RESIDENTIAL PARCELS

Unlike the residential parcels, the non-residential parcels can vary widely in size as well as impervious characteristics. For this reason, the parcels have been grouped into land use categories according to their %IA characteristics (as shown in Appendix E). The SFE for each land use category is based on a per-acre basis, so size can be a variable in the calculation of the fee. The SFE-per-acre can be computed for each category using the following formula:

$$\frac{(43{,}560\ sf / acre) \times \%\ IA}{3{,}468\ sf / SFE} = SFE\ per\ Acre$$

where 3,468 square feet is the amount of ISA in one SFE.

The Table below shows a summary of resulting SFEs for each non-residential land use category.

TABLE 8 – SUMMARY OF NON-RESIDENTIAL PARCELS

Land Use Category	# of Parcels [A]	Acres [A]	% Imperv Area [B]	SFE per Acre
Mobile Home Park	3	43.10	59.7%	7.499
Apartment	221	471.22	63.3%	7.948
Comm / Industrial / Retail	372	396.49	83.8%	10.527
Office	275	136.53	69.1%	8.677
Institutional	58	118.16	59.7%	7.499
Institutional w/ Field	16	202.71	41.9%	5.261
Park	280	580.77	5.0%	0.628
Vacant (developed)	135	187.40	5.0%	0.628
Open Space / Agricultural	421	275.07	not charged	
TOTAL	1781	2,411.45		

A Aggregate numbers of Parcels and Acres do not factor into the basis of the SFE calculation; they are shown for informational purposes only.

B %IA is from Table 10, Appendix E.

Each individual parcel's SFE is then calculated by multiplying the parcel size (in acres) times the SFE per acre for that land use category, as shown in the following formula:

$$Parcel\ Size\ (acres) \quad x \quad SFE\ per\ Acre \quad = \quad SFE$$

NON-RESIDENTIAL CONDOMINIUMS

Non-residential condominium parcels such as commercial or office condominiums cannot be charged on the acreage of the individual unit because that would omit the acreage of the common areas, which are often parking lots with high %IA. In turn, the common area acreage data is sometimes duplicative of the acreages assigned to the individual units. For these reasons, and because there are relatively few such condominiums in the City, the full site acreage for each complex of condominiums has been apportioned to the individual units, prorated on the basis of the individual unit's floor space. From that, their SFEs are calculated in the normal method.

DEVELOPED VACANT[12] PARCELS

Developed vacant parcels are devoid of obvious structures or improvements but are distinguished from natural open space by one of several characteristics. Typically, a developed vacant parcel has been graded to be ready for building construction (possibly as

[12] "Vacant" in this Report refers to land that is devoid of improvements. It does not refer to land with vacant buildings or improvements, which would continue to shed water to the MS4 the same as if they were occupied.

part of the original subdivision or adjacent street grading). In some cases, the parcel previously contained a structure or improvement that has been removed, but its fundamental alteration from a natural state remains. Although developed vacant parcels may have significant vegetative cover, the underlying soil conditions resulting from grading work or previous improvements usually cause some rainfall to runoff into the storm drainage system. The %IA for developed vacant parcels is reasonably assumed to be 5%, which is also used as a minimum value of imperviousness for any land use type (excluding open space and agricultural land – see next section). Vacant parcels that have significant impervious paving remaining from prior improvements may be classified as Commercial or some other classification best representing the %IA of the parcel.

OPEN SPACE AND AGRICULTURAL PARCELS ARE NOT CHARGED

The City's storm drain system was developed in response to land development over many decades. Tracts of land that have not yet been developed, or have been used primarily for agricultural purposes, have not created an impact on the system beyond the natural condition, and are therefore considered to receive no service from the system. In practical terms, these parcels generate no additional storm runoff beyond the natural condition. For these reasons, open space and agricultural parcels are not charged a Fee.

HYBRID PARCELS

Some parcels may have both improvements as well as significant open space areas. For such parcels that contain a residence, the open space acreage does not increase the fee because residential parcels are not charged on a per-acre basis. Rather, they are charged based on the median ISA for that size category.

For such parcels that contain non-residential improvements (which are charged on a per-acre basis), the chargeable acreage should be adjusted downward to reflect the improved area only, leaving the open space area "invisible" to the fee calculation. Where parcels have been found in this category, that acreage adjustment has been made.

OTHER PARCELS

Parcels that do not fall within the land use descriptions listed above may be placed into the category having the closest %IA characteristics.

RATE CREDITS

LOW IMPACT DEVELOPMENT RATE CREDIT

The NPDES Permit requires certain properties to construct stormwater treatment and attenuation facilities, also known as low impact development ("LID"). These facilities are typically designed to capture a portion of the storm flows, retain them, and enable them to filter through a landscape, be used as an alternative water supply, or infiltrate into the ground. While this is intended to help filter pollutants from the water, it also can reduce the parcel's stormwater runoff quantity to some extent, which in turn can reduce a parcel's

impact on the system. In addition to Permit-required LID, other parcel owners may elect to follow LID guidelines voluntarily.

The section of the Permit that requires LID facilities is Provision E.12 (Post Construction Stormwater Management Program). Compliance with E.12 is a well-established and convenient metric on which to base customer activities that further Program goals and affect Program costs. E.12 compliance can have impacts to many of the Program elements. Based on a detailed study done for a similar city in the Bay Area[13] it has been determined that compliance with Provision E.12 equates to a reduction of Program impacts of approximately 25% based on the overall Program costs. Based on that analysis, E.12-compliant parcels shall receive a credit of 25% of their otherwise-calculated fee.

Some non-residential parcels may implement LID for only a portion of the parcel acreage. Since that effort and reduction in impacts to the City's storm drainage system should be recognized, those parcels should receive a partial credit. For any parcel that implements LID for 26% to 50% of the site acreage, the credit shall be 12.5%. For any parcel that implements LID for 25% or less of the site acreage, the credit shall be 6.3%.

STORMWATER FEE CALCULATION

The primary metric in this analysis is the SFE as illustrated above. To arrive at the fee amount for the various land use categories, the total City-wide SFEs must be divided into the total revenue requirement to arrive at the rate per SFE. Using the analysis above, that calculation is represented by the following formula:

$$SFE\ Rate = \frac{Annual\ Revenue\ Req't}{Total\ SFEs}$$

$$= \frac{\$4{,}100{,}000}{26{,}089.90}$$

$$= \textbf{\$157.15 per SFE per year}$$

$$\text{or} = \textbf{\$13.10 per SFE per month}$$

This SFE rate amount is then multiplied by the SFEs per parcel or per acre for the various land use categories to arrive at the Stormwater Fee Rate Schedule shown in the Table below. It should also be noted that the proposed rates shown below are proposed to replace

[13] City of Cupertino, CA, *2019 Clean Water and Storm Protection Fee Report*, February 2019, pages 11 and 12, as reproduced in Appendix F of this Report.

the two existing rates currently in effect, which total approximately $72 per year, or $6 per month, for the average residence.

Appendix G has information about stormwater rate initiatives implemented by other municipalities and rates adopted by other municipalities.

TABLE 9 – PROPOSED FY 22 STORMWATER FEE SCHEDULE

Land Use Category		Proposed Monthly Rate FY 2022	
Residential [A]			
Small	*Under 0.14 ac*	$ 10.23	per parcel
Medium	*0.14 to 0.22 ac*	$ 13.10	per parcel
Large	*0.23 to 0.27 ac*	$ 17.45	per parcel
Very Large	*Over 0.27 ac*	$ 19.47	per parcel
Condo - 1 Level		$ 8.52	per parcel
Condo - 2+ Levels		$ 3.95	per parcel
Non-Residential [B]			
Mobile Home Park		$ 98.20	per acre
Apartment		$ 104.08	per acre
Comm / Industrial / Retail		$ 137.86	per acre
Office		$ 113.63	per acre
Institutional		$ 98.20	per acre
Institutional w/ Field		$ 68.89	per acre
Park		$ 8.22	per acre
Vacant (developed)		$ 8.22	per acre
Open Space / Agricultural		not charged	

A - Residential category also includes duplex, triplex and four-plex.

B - Non-Residential parcel size is calculated to the hundredth of an acre.

These rates are proposed to be maximum rates. If the City chooses to propose, adopt or implement rates that are lower than these, the reductions should be uniform across all rate classes in order to preserve the proportionality and remain in compliance with Proposition 218.

ANNUAL COST INDEXING

The 2019 Stormwater Fee is subject to an annual adjustment tied to the Consumer Price Index-U for the San Francisco Bay Area as of December of each succeeding year (the "CPI"), with a maximum annual adjustment not to exceed 3%. Any change in the CPI in excess of 3% shall be cumulatively reserved as the "Unused CPI" and shall be used to increase the maximum authorized rate in years in which the CPI is less than 3%. The maximum authorized rate is equal to the maximum rate in the first fiscal year the Fee was approved adjusted annually by the lower of either 3% or the change in the CPI plus any Unused CPI as described above.

MANAGEMENT AND USE OF STORMWATER FUNDS

The City shall deposit into a separate account(s) all Stormwater Fee revenues collected and shall appropriate and expend such funds only for the purposes outlined by this Report. The specific assumptions utilized in this Report, the specific programs and projects listed, and the division of revenues and expenses between the two primary categories (O&M and CIP) are used as a reasonable model of future revenue needs and are not intended to be binding on future use of funds.

Dated: October 14, 2020

Engineer of Work

By_____

Jerry Bradshaw, License No. C48845

APPENDICES

APPENDIX A – TECHNICAL MEMORANDUM BY LWA

On the following pages is a technical memorandum, dated June 10, 2020, by SCI Team member LWA. This memorandum contains an analysis of the City of Davis' NPDES Permit compliance including additional needs.

Memorandum

LARRY WALKER ASSOCIATES

Rachel Warren
Airy Krich-Brinton

1480 Drew Ave., Suite 100
Davis, CA 95618
530.753.6400
RachelW@lwa.com
AiryK@lwa.com

DATE: June 10, 2020

TO: Stan Gryczko, City of Davis

SUBJECT: City of Davis – Comprehensive Stormwater/Drainage Rate Study

Cc: Brian Mickelson, City of Davis
Jennifer Cariglio, City of Davis
Adrienne Heinig, City of Davis
Susan Barnes, SCI Consulting Group
Jerry Bradshaw, SCI Consulting Group
Karen Ashby, Larry Walker Associates

1. INTRODUCTION

In response to the federal Clean Water Act (CWA) amendment of 1987 to address urban stormwater runoff pollution from Municipal Separate Storm Sewer Systems (MS4s), and the federal National Pollutant Discharge Elimination System (NPDES) regulations, the State Water Resources Control Board (State Water Board) issued a Phase II Small Municipal Separate Storm Sewer System (MS4) General Permit[1] (Phase II Permit) to the City of Davis (City) in 2003. This permit was subsequently renewed in 2013.[2]

The Phase II Permit regulates stormwater and non-stormwater discharges from the City's MS4 and requires implementation of/compliance with the following key components:

- Program Management (E.6)
- Education and Outreach Program (E.7)
- Public Involvement and Participation Program (E.8)
- Illicit Discharge Detection and Elimination (E.9)
- Construction Site Stormwater Runoff Control Program (E.10)
- Pollution Prevention/Good Housekeeping (E.11)
- Post Construction Stormwater Management Program (E.12)
- Water Quality Monitoring (E.13)

[1] NPDES Permit No. CAS000004, Order No. Order 2003-0005-DWQ
[2] State Water Resources Control Board Water Quality Order No. 2013-0001-DWQ National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000004 Waste Discharge Requirements (WDRS) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) (Phase II MS4 Permit)

- Program Effectiveness Assessment and Improvement (E.14)
- Total Maximum Daily Loads Compliance Requirements (E.15)
- Annual Reporting Program (E.16)

The City implements the stormwater program within its jurisdiction. Over the years, the range of actions and necessary level of effort to implement the stormwater program has increased in response to the evolving regulatory requirements and community needs.

The purpose of this Technical Memorandum (TM) is to present the results of a planning-level cost estimate that has been developed to identify the full costs of implementing the stormwater program by the City over the next ten years. The results of this analysis may be used to support an evaluation of the need for and feasibility of a stormwater utility or other fee-based options. The cost estimate includes a summary of current year (FY 19-20) and future projected (FY 20-21 through FY 29-30) implementation costs of the stormwater program and is accompanied by an Excel spreadsheet-based model.[3]

This memorandum is organized as follows:

1. Introduction
2. Approach
3. Results and Discussion
   - 3.1 Summary of Costs
   - 3.2 Detailed Costs

2. APPROACH

In order to understand the funding needs for the stormwater program, the costs for full implementation of the permit requirements must be understood and compiled. However, tracking and compiling staff time and resources across multiple departments and budget funds and accounts can be a complex and time-consuming process. To identify the implementation costs for the City as comprehensively and efficiently as possible, an interview was conducted with key staff that included structured questions and discussions regarding the agency's staffing, implementation approach(es) for the range of permit requirements, and the estimated costs for program implementation and compliance. *It should be noted that the costs described within this TM are for the regulatory, programmatic staff, and resource needs to manage and comply with the Phase II Permit. These costs do not include ancillary operations and maintenance (O&M) costs or capital improvement costs*[4].

[3] The City does not have a dedicated source of revenue for stormwater programmatic costs (i.e., regulatory, operations and maintenance). The City does have various potential sources of revenue for capital improvement project (CIP) costs, which are not detailed in this technical memorandum.
[4] The O&M and CIP related costs are summarized in a separate TM.

3. RESULTS AND DISCUSSION

A summary of the total City costs for full implementation of the stormwater program during the current year (FY 19-20), and future years (FY 20-21 through FY 29-30), is provided within this section. The information is presented in two ways: a summary of City revenues and costs (**3.1. Summary of Costs**) and a detailed breakdown of costs (**3.2. Detailed Costs**). The approach and assumptions used to develop each of these summaries are described below. All costs are in present-value dollars.

3.1. Summary of Costs

Costs for the current and projected full implementation of the stormwater program were estimated based on budgetary and supplemental information provided by the City, as well as best professional judgement regarding future, anticipated requirements. The costs were compiled and organized by:

- Existing Identified Expenses, including the Phase II permit fees and baseline costs for the management and implementation of the program, which includes all "regulatory" portions of the stormwater program.
    - The baseline costs were identified by the estimated amount of time spent by City personnel conducting the related regulatory activities within each fund [Fund 541 (Programs 7411, 7414, and 7715), Fund 544 (Program 7730)][5].
    - The percent of time spent within each program fund by each position was identified by the City, and the resulting hours (a percentage of 2080 hours was assumed for full time employees, and of 1040 hours for part time employees) were further divided by the City into the percent of time spent on direct costs, O&M, and CIP. The FY 19-20 Step 5 (maximum level) fully burdened hourly rates were assumed for each personnel position. The baseline current cost for FY 19-20 was calculated as the sum of the regulatory costs for each personnel position.
    - Other operating costs were calculated as 21.74% of the baseline costs.
- Additional Needs, including current and future anticipated needs.
    - The current identified implementation needs are related to Phase II Permit components (e.g., illicit discharge detection and elimination, construction, annual reporting) as well as currently adopted and effective additional regulatory requirements (Statewide Trash Amendments).
    - Future anticipated needs include additional requirements pursuant to the renewal of the Phase II Permit as well as the adoption of the Pyrethroid Pesticides Total Maximum Daily Load (TMDL) and Basin Plan Amendment.

[5] Regulatory activities were identified across all four programs (7411, 7414, 7715, and 7730), with additional support from operations and maintenance (O&M) and CIP activities within program 7730 and O&M within program 7715.

In addition, a 2.78% annual escalation factor[6] was included for specific costs starting in FY 20-21. The escalation factor was calculated using information provided by the City and is the weighted average of the specific annual escalators for each aspect of personnel costs (e.g., salary, retirement, leave, health insurance) and other operating costs.

The Existing Identified Expenses for FY 19-20 and the Additional Needs for FY 20-21 through FY 29-30 are summarized in **Table 1** and **Figure 1**. Below are a few key observations regarding the overall estimated costs:

- In FY 20-21, the *Additional Needs* represent a 71% increase above the *Existing Identified Expenses*. In FY 21-22 through FY 29-30, the *Additional Needs* represent a 73% increase (on average) above the *Existing Identified Expenses* (**Table 1**).
- Based on the information available and the assumptions made, between FY 19-20 and FY 29-30, the total cost of the stormwater program may increase significantly (i.e., from $516,000 to $1,167,000) (**Table 1** and **Figure 1**).
    - Between FY 19-20 and FY 20-21, a significant increase in the total cost of the stormwater program is anticipated to occur due to the *Additional Needs*. This increase is based on a thorough evaluation of the City personnel costs required to implement the current Phase II Permit provisions.

[6] Since the permit fee is based on the City's population from the most recently published U.S. Census, it is not subject to the percent increase.

Table 1. Summary of Total Estimated Costs for Stormwater Program, by Cost Category and Fiscal Year

Cost Category	Current	Projected Future									
	FY 19-20	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30
Existing Identified Expenses	$516,470	$530,235	$544,382	$558,923	$573,867	$589,227	$605,015	$621,241	$637,918	$655,058	$672,676
Additional Needs											
Current Additional Needs	$0	$355,895	$299,760	$308,093	$316,658	$325,461	$334,509	$343,808	$353,366	$363,190	$373,287
Future Anticipated Needs	$0	$18,261	$97,224	$99,927	$102,705	$105,560	$108,495	$111,511	$114,611	$117,797	$121,072
Total Additional Needs	$0	$374,156	$396,984	$408,020	$419,363	$431,022	$443,004	$455,320	$467,977	$480,987	$494,359
Total Regulatory Expenses[a]	**$516,000**	**$904,000**	**$941,000**	**$967,000**	**$993,000**	**$1,020,000**	**$1,048,000**	**$1,077,000**	**$1,106,000**	**$1,136,000**	**$1,167,000**

[a] Rounded values.

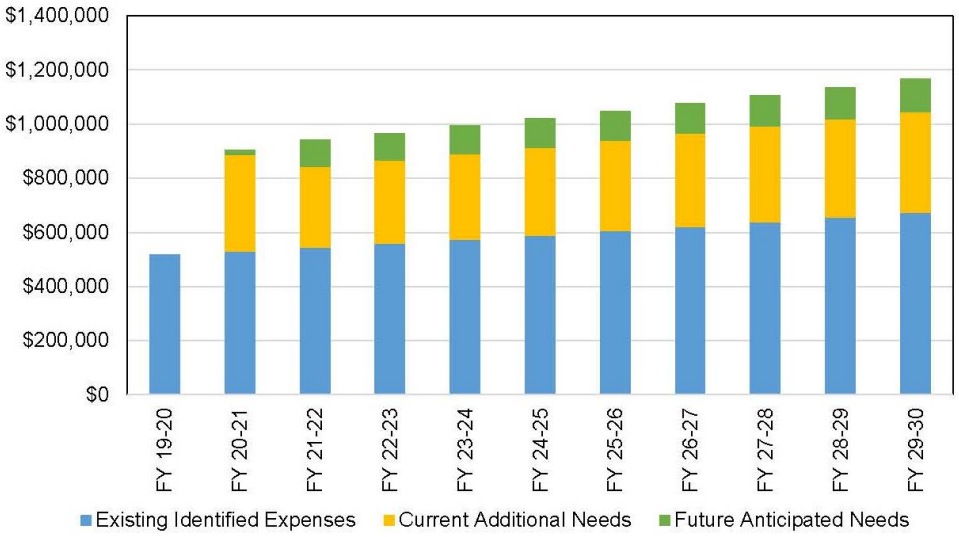


Figure 1. Total Estimated Costs for Stormwater Program, by Cost Category and Fiscal Year

3.2. Detailed Costs

Costs for stormwater program implementation for the Phase II Permit were estimated based on budgetary and supplemental information provided by the City, as well as estimates for the anticipated future costs. The approach and assumptions used were as follows:

- Information used to determine the Existing Identified Expenses shown in **Table 2** was primarily provided by the City during the interview and follow-up communications.
    - The stormwater permit fee is determined by the California Code of Regulations (CCR) Fee Schedule for NPDES Storm Water Fees.[7] The fee is based on the population from the most recently published United States (U.S.) census, which was 2010. The City is in one bracket (population between 50,000 and 74,999) based on the 2010 U.S. Census, and the most recent estimate (2018) places the City in the same bracket. Thus, it can reasonably be assumed that the City's fee will remain at $21,344 after the 2020 U.S. Census is published, and minor adjustments the regulatory authorities may make to that amount are not expected to be significant.
- Additional Needs identified are shown in **Table 2** and are as follows:
    - Current Additional Needs
        - Beginning with FY 20-21, costs for ongoing stormwater program implementation activities not included in existing costs were identified. These include:
            - Implementation costs related to Phase II Permit provisions, including illicit discharge detection and elimination, construction, and annual reporting.
            - Implementation costs associated with the requirements of the Statewide Trash Amendments, in particular, the City's *Track 2 – Implementation Plan for the State Water Resources Control Board's Trash Amendments*.
        - Costs were allocated to FY 20-21 for specific one-time activities associated with implementing the Statewide Trash Amendments that are not included in existing expenses. These costs are higher in FY20-21 then reduced to a lower ongoing value.
    - Future Anticipated Needs included the following:
        - Costs related to the requirements of the Basin Plan Amendment (BPA) for the Control of Pyrethroid Pesticide Discharges[8], including the development and implementation of a Pyrethroid Management Plan.

[7] 23 CCR § 2200. Annual Fee Schedules

[8] Central Valley Regional Water Quality Control Board, Resolution R5-2017-0057. Basin Plan Amendment (BPA) for the Control of Pyrethroid Pesticide Discharges. Approved by OAL on February 19, 2019. Available at: https://www.waterboards.ca.gov/rwqcb5/water_issues/tmdl/central_valley_projects/central_valley_pesticides/pyrethroid_tmdl_bpa/

  - Costs associated with the renewal of the Phase II Permit were estimated using best professional judgment, assuming that the renewal would result in increased and/or new requirements that would require additional funds. These costs were estimated at 15% of the baseline current costs (estimated at $64,445, beginning in FY 21-22).

- Future cost projections were based on the Existing Identified Expenses (from FY 19-20), Additional Needs (from the years they began, primarily FY 20-21), and an annual escalation factor of 2.78%, to account for inflation/cost of living increases and other operating costs. The costs that were affected by the 2.78% annual escalation factor are shaded purple in **Table 2**.
  - No future cost projections were made for the one-time additional costs in FY 20-21 associated with the Statewide Trash Amendments.
- Other operating expenses were calculated as 21.74% of personnel costs for all categories, based on the percentage of the calculated operating expenses for Fund 7730 ($64,178, not including the permit fee) out of total costs ($380,762). Other operating expenses in Fund 7730 included O&M, contracts and professional services, and inter-department transfers.

1

Table 2. Detailed Costs for Stormwater Program, by Cost Category and Fiscal Year

Cost Category	Current	Projected Future[a]									
	FY 19-20	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30
Existing Identified Expenses											
Phase II Permit											
Phase II Permit fees[b]	$21,344	$21,344	$21,344	$21,344	$21,344	$21,344	$21,344	$21,344	$21,344	$21,344	$21,344
Baseline Costs[c]	$406,708	$418,015	$429,635	$441,579	$453,855	$466,472	$479,440	$492,769	$506,468	$520,547	$535,019
Other Operating Costs[d]	$88,418	$90,876	$93,403	$95,999	$98,668	$101,411	$104,230	$107,128	$110,106	$113,167	$116,313
Total Existing Identified Expenses	***$516,470***	***$530,235***	***$544,382***	***$558,923***	***$573,867***	***$589,227***	***$605,015***	***$621,241***	***$637,918***	***$655,058***	***$672,676***
Additional Needs											
Current Additional Needs[e]											
Phase II Permit											
Environmental Resources Specialist for Discharge Prohibitions (10% FTE)[f]	-	$17,680	$18,172	$18,677	$19,196	$19,730	$20,278	$20,842	$21,421	$22,017	$22,629
Construction Inspector (100% FTE)[f]	-	$176,800	$181,715	$186,767	$191,959	$197,295	$202,780	$208,417	$214,211	$220,166	$226,287
Assistance with Annual Reporting (20% FTE)[f]	-	$35,360	$36,343	$37,353	$38,392	$39,459	$40,556	$41,683	$42,842	$44,033	$45,257
Statewide Trash Amendments[g]	-	$62,500	$10,000	$10,278	$10,564	$10,857	$11,159	$11,469	$11,788	$12,116	$12,453
Other Operating Costs[d]	-	$63,555	$53,530	$55,018	$56,548	$58,120	$59,736	$61,396	$63,103	$64,857	$66,661
Total Current Additional Needs	*$0*	*$355,895*	*$299,760*	*$308,093*	*$316,658*	*$325,461*	*$334,509*	*$343,808*	*$353,366*	*$363,190*	*$373,287*
Future Anticipated Needs[h]											
Pyrethroid Pesticides TMDL and Basin Plan Amendment	-	$15,000	$15,417	$15,846	$16,286	$16,739	$17,204	$17,682	$18,174	$18,679	$19,199
Renewed Phase II Permit Requirements (15% of baseline current costs)	-	$0	$64,445	$66,237	$68,078	$69,971	$71,916	$73,915	$75,970	$78,082	$80,253
Other Operating Costs[d]	-	$3,261	$17,362	$17,845	$18,341	$18,851	$19,375	$19,913	$20,467	$21,036	$21,621
Total Future Anticipated Needs	*$0*	*$18,261*	*$97,224*	*$99,927*	*$102,705*	*$105,560*	*$108,495*	*$111,511*	*$114,611*	*$117,797*	*$121,072*
Total Additional Needs	***$0***	***$374,156***	***$396,984***	***$408,020***	***$419,363***	***$431,022***	***$443,004***	***$455,320***	***$467,977***	***$480,987***	***$494,359***
Total Regulatory Expenses (Rounded)	**$516,000**	**$904,000**	**$941,000**	**$967,000**	**$993,000**	**$1,020,000**	**$1,048,000**	**$1,077,000**	**$1,106,000**	**$1,136,000**	**$1,167,000**

[a] Light purple shading indicates that an annual escalator of 2.78% was applied to estimate inflation. This value was determined using information provided by the City and is considered to be the weighted average of the specific annual escalators for each aspect of personnel costs (e.g., salary, retirement, leave, health insurance) and other operating costs.
[b] Permit fees were determined by the California Code of Regulations (CCR) Fee Schedule for NPDES Storm Water Fees (23 CCR § 2200. Annual Fee Schedules) and the population from the most recently published United States (U.S.) census, which was 2010.
[c] Calculated from fully burdened hourly rates at the Step 5 level (per the Excel file provided by the City, "Labor Rates Step 5 April 2020") and the percent of each position's annual hours spent on regulatory activities from each fund.
[d] Other operating costs are calculated as 21.74% of personnel costs for that category.
[e] Additional expenses were identified by the City through the interview process with LWA and via review of the City's Trash Implementation Plan.
[f] FTE: Full Time Employee, assuming $85/hour fully burdened rate.
[g] Compliance with the Trash Implementation Plan requires two additional assessment field personnel and a designated office person as point-of-contact (from the *Track 2 – Implementation Plan for the State Water Resources Control Board's Trash Amendments*, City of Davis' Public Works Department Environmental Resources Division, December 2, 2018, Revised March 21, 2019). The City estimates this cost at between $50,000-$75,000 for the first year and $10,000 for subsequent years, subject to the annual escalator.
[h] Future anticipated needs are based on best professional judgment.

APPENDIX B – ADDITIONAL NEEDS FOR OPERATIONS AND MAINTENANCE

TABLE 10 – ADDITIONAL NEEDS FOR OPERATIONS & MAINTENANCE

Item	Description	FY 20	FY 21
Increase Salaries	Increase 10% to achieve market rate	$ 43,562	$ 44,773
Additional Staff	* MWI * Collection System Tech	$ 263,058	$ 270,371
Contract Services	* Hydro Cleaning Storm Pipes * Channel Cleaning	$ 150,000	$ 154,170
Total Additional Costs for O & M		**$ 456,620**	**$ 469,314**

APPENDIX C – CIP PROJECT DESCRIPTIONS

On the following pages is a staff report to the Utilities Commission on September 16, 2020 that provides background on capital project priorities and details about the projects.

PUBLIC WORKS
UTILITIES AND OPERATIONS
DEPARTMENT
MAIN 530.757.5686

Memorandum

Date: September 16, 2020

To: Utilities Commission

From: Stan Gryczko, Public Works Utilities and Operations Director
Brian Mickelson, Assistant City Engineer
Adrienne Heinig, Management Analyst

Subject: Item 6D – Stormwater Capital Improvement Projects – Priority and Risk

Recommendation
Receive informational report.

Background
For the past few months, the Utilities Commission has been reviewing the financial plan for the Stormwater Utility, one of three cost of service studies that are currently underway. The City's stormwater rates have been in place since the mid-1990's, prior to the adoption of Proposition 218 in November of 1996, and the resulting changes to the rate implementation process associated with the proposition's approval. The current rate revenue does not fully cover the financial needs of the Stormwater program, as the system is aging, and needs upgrades and replacements to reflect the changing stormwater landscape of the City of Davis. It has been recommended that stormwater rates should be raised to capture current and planned future costs. To that end, staff have completed and presented a 30-year capital improvement project plan, although the majority of projects would be scheduled for completion within the first 10 years of the potential rate adoption. This project list, amounting to about $34 Million dollars over 30 years, is one of the largest drivers of the necessary rate increase.

Project Prioritization
Through the evaluation of the financial plan of the Stormwater Utility, questions arose as to whether City staff could rank or prioritize the capital projects, to smooth out necessary rate adjustments or reduce those adjustments. Staff has consistently indicated that all of the capital projects included within the financial plan are necessary and high priority. The projects are based on recommendations from a study conducted in February 2015. This study was used to understand the anticipated timelines, cost and priority for each project.

Within the study, prioritization is focused as follows: *The most problematic and immediate issues should be addressed first. Problematic issues include an inadequately sized pump station, safety concerns for the City's Staff or the general public, or regular and significant staff maintenance efforts.*

The City has 9 pump stations, with three that need extensive work as described below, and the remaining 6 in good working order. While the stations not identified as the highest priority could benefit from some renovation, it would not be appropriate to focus limited resources on those projects at this time, and that work is included as maintenance and smaller-cost efforts budgeted over time (captured in the study as Annual Misc. Upgrades). All of the capital projects listed in the financial plan have either inadequate sizing, safety concerns, and/or significant staff maintenance effort needed, making them high priority projects.

Each of these projects, with immediate hazards and risks, along with longer-term hazards and risks, are included below:

Note: *While the full failure of the stations might be an unlikely occurrence, even with the age of the infrastructure, staff were asked to include information on all risks associated with the CIP projects. Each of these sections will include information on what would occur in a full failure scenario.*

Capital Improvement Projects Listing and Detail

Storm Drainage Station No. 6

Year Constructed: 1924
Pump Type: Electric

SDS (Storm Drainage Station) #6 is the City's oldest station, and is located at Richards Blvd. and Olive Drive. The station was developed just after the construction of the undercrossing. The station is well past its useful life, as typically the useful life of pump station equipment is around 20-30 years, with structures having a useful life of around 50 years. Although the station has been maintained well by stormwater staff, the station needs to be replaced to address a number of safety issues and capacity concerns.

Immediate Hazards/Risks:

- Accessing the station – access is a walkway which is only separated from close large traffic by a chain. The access itself is below accepted requirements for operations and maintenance needs.
- Hazardous materials – The discharge pipe is comprised of asbestos cement.

Long-term Risks

As the station is the oldest in the Stormwater Utility, the surrounding needs of the City have changed considerably since construction. The station does not have the capacity to address the volume of stormwater needed to prevent flooding in the Richards Blvd undercrossing.

Failure of the Station

Failure of the station would result in flooding of the Richards Boulevard tunnel and would cut off this route into and out of the City. This would be an immediate impact to safety, as there is no interconnect to alert staff to the flooding. If flooding occurs and is not reported, this leaves drivers in an unsafe condition, especially at night when the flooding is less visible. In addition, this eliminates this route if needed for an evacuation, reduces in the ability to get goods into and

out of the City, and effects operations on Interstate 80 as northbound traffic would not have access to central Davis from this interchange, shifting traffic to other interchanges.

Storm Drainage Station No. 5 (El Macero Drainage Station)
Year Constructed: 1966
Pump Type: Electric
This station drains South Davis, Willowbank, El Macero, a large portion of unincorporated area comprised of agricultural lands and extends into Solano County. This station protects structures, Interstate 80 and adjacent properties from property and crop damage.

Immediate Hazards/Risks:

- Flooding - During larger storms, the station floods. This can be evidenced by a steel plate which was welded into the doorway which stands approximately 2 and a half feet tall in order to keep flood water from entering the door and flooding the station. If water enters the station, the control equipment will short out and cause the station to fail. During these times of water inundation, the only way staff can access the pump station is to wear waders and wade out to it. This presents a number of hazards to staff attempting to access the station, detailed below.
    - Shock hazard – The steel plate protecting the station can present a shock hazard for staff in flooding events.
    - Hazards to staff – Include drowning risks, as well as back or other injuries.
- Risk to equipment - the pumps themselves are at risk of being flooded causing them to short out and fail. Vegetation growth can cause issues by blocking the pumps, preventing staff from accessing them.
- Aging Equipment - station has seen wear and its components are wearing out.
- Frequent power outages occur, necessitating more maintenance work by staff, and requiring access during periods when the conditions may not be safe.

Long-term Risks
The station needs to be raised in order to proactively prevent the flooding events, and remove safety hazards for staff. In addition, the station location and service area (largely impacted by surrounding agricultural properties) necessitate a close review of the placement of the station, as well as protection for the station against material more likely to occur in a non-urban setting, such as ongoing sediment runoff requiring frequent cleanouts.

Failure of the Station
Failure of the station would result in significant flood damage to adjacent crops, structures and if flooding continued long enough, it could reach Interstate 80, causing safety and operational issues. In addition as failure of this station would flood the station, this would result in the large cost of loss of the mechanical, electrical and computer equipment in the station.

Storm Drainage Station No. 3 (H Street Pump Station)
Year Constructed: 1948
Pump Type: Diesel

This station is the largest of the City's pump stations, and is centrally located in town. With the changes around the station since the initial installation, including the construction of the Covell overpass, and the buildout of the Cannery development, the station is at risk for structural damage in a seismic event, and inadequately sized to meet the required capacity.

Immediate Hazards/Risks:

- Capacity - this station is responsible for draining a large area from approximately State Route 113 to Pole Line and from just north of Covell to Russell Boulevard, there is a large potential for flooding with only one station conveying all the stormwater. At times in the past, during larger storms, flooding has occurred on several streets including H Street, 14th Street, and L flooding has occurred on several streets including H Street, 14th Street, and L Street, as well as other areas. This flooding has been several feet deep and has inundated cars and yards.
- Aging Equipment - The overall pump station is aging. This includes control panels, pumps and overall structure. This is the City's second-oldest station, and is well past the 30 to 50-year operational period for equipment and station infrastructure.
- Difficult to backup - As this station runs diesel powered pumps, they do not lend themselves to backup power like electricity powered pumps. This leaves the largest station without backup power.
- Structural concerns - The structure is also built under the fill of Covell Boulevard which covers the majority of the north side of the structure. Seismic standards have changed over time and the facility should be evaluated based upon current seismic structural standards.
- Air quality concerns - The Yolo-Solano Air Quality district has been emphasizing that the City should convert the diesel-powered pumps to electric for some time.

Long-term Risks

Flooding already occurs with this station, as detailed above. Small equipment failures in the station could greatly increase the flooding that is already occurring.

Failure of the Station

Failure of this station would result in significant and widespread flooding within the area from State Route 113 to Pole Line and from just north of Covell to Russell Boulevard. This would present many safety issues for residents and would also result in extensive property damage. It would also compromise the transportation system making it difficult or impossible for emergency response and other users to traverse the system in a central portion of town.

Covell Channel Widening

Year Constructed: 1966

The Covell Channel, along the edge of Covell Blvd. in West Davis has been overflowing into City streets more and more frequently in recent years, and in some cases shut down the roadway to traffic. Planned improvements include the installation of box culverts across the west and north sides of Covell and Lake intersection, and widening and realigning the channel from Lake to Riesling. This will increase the capacity of the channel, move it farther from the edge of roadway, and align it with the improved section of channel in front of the hospital.

Immediate Hazards/Risks

- Capacity – This channel can no longer handle the flow of stormwater from the unincorporated areas west of the city limits. The original design was to divert stormwater from the west of Davis around developed areas to prevent flooding. With the changes to land use west of town, this amount of water entering this channel has increased significantly over the past 2 decades.
- Flooding – During larger storms the channel overflows and floods onto Covell Blvd. posing a significant hazard to vehicles traveling on Covell. This is most significant at the intersection of Lake and Covell and in front of Sutter Hospital. With the water covering the street, there is no indication of where the street is and the deep stormwater channel next to the street. This flooding is hazardous to drivers traversing next to this deep channel.

Long-term Risks

The largest long-term risk associated with the delay of this CIP project would be the recurrence and magnitude of flooding in the area, which is adjacent to residential areas and the City's only hospital with emergency services (flooding also occurred in the hospital parking lot in recent years, which was not directly related to the Covell Channel issues).

Necessary Assessments & Studies

The age of the infrastructure and equipment associated with the stormwater utility is a challenge, and highlights the need for the City to conduct studies to determine the most efficient and effective updates and upgrades to the system to best reflect the current and future needs of the City. In addition to the equipment and facilities already discussed, more than half of the City's drainage piping is over 40 years old, and 18 percent is over 60 years old. While there have been no piping failures, the continued assessment of the pipeline conditions is critical to planning out replacements and repairs moving forward. Without proper planning, failures within the stormwater system are more likely to occur, and can cause damage via flooding, as well as incur emergency repair costs.

In addition to infrastructure aging, there have been significant changes in hydrologic conditions in Davis, particularly in the West of Davis, which have in turn increased stormwater runoff and introduced unpredictable flow of stormwater. Studies need to be conducted to determine both the capacity of the City's system within each area of town, and what replacements or upgrades are necessary to meet the current and future demand. Also, the region's changing weather patterns will likely have a significant effect on runoff and will need to be evaluated.

Once the utility is able to conduct the necessary studies to determine the baseline needs for the infrastructure and capacity, the City can best prioritize and plan the projects and look for additional funding sources (grants, loans) as needed.

Funding Challenges

One of the most significant challenges associated with grant awards for stormwater has been the availability of implementation grants, and the lack of availability of planning grants. As discussed, stormwater staff need to conduct studies to determine the capacity and needs of each station, rather than replace the station in-kind, which requires planning activity. Without a "shovel ready" project, the City has been unable to apply for recent stormwater grants from the State. In recent years, the City has applied for planning grants now available through the Federal Management Agency (FEMA) Flood Mitigation Assistance program, however these applications have to date been unsuccessful. A planning grant was awarded to the City to look at meeting regulatory requirements for stormwater drainage in the downtown area at the Core Area Pond instead of individual developments. The City continues to apply for planning grants when opportunities arise.

Agencies with limited funding for stormwater infrastructure may look to other enterprise funds or general fund sources to offset expenditures. While one-time loans from other enterprise funds is possible, it is poor practice to rely on loans from other funds for standard operations and maintenance needs, and not a sustainable funding source. General fund dollars are subject to a different set of priorities – as the funds are not focused on a single utility (as with enterprise funds) and are more likely to retract with economic impacts to the region, such as recent recessions and the stay-at-home orders associated with the COVID-19 pandemic.

Future Costs/Challenges

Due to the fact that so much of the needs of the Stormwater utility are unknown, it is likely that there will be additional costs identified and additional projects necessary to bring the system into full and efficient functioning. As discussed in the details of the financial plan, should the rate adjustments be approved, the City would create a reserve for the Stormwater Fund, so funding associated with most of these projects (smaller operations and maintenance activities) would be taken from fund balance, and would not directly impact ratepayers. Larger projects identified would necessitate additional discussions around how the projects should be funded, likely during annual fund updates with the Commission and City Council.

APPENDIX D – CITY OF DAVIS RESERVE POLICY

On the following pages is a copy of the adopted financial reserve policy for City of Davis Enterprise Funds.

CITY OF DAVIS
WATER, WASTEWATER, SOLID WASTE, AND STORMWATER FUND RESERVE POLICY

1. PURPOSE

The purpose of this policy is to establish targeted levels of Water, Wastewater, Solid Waste and Stormwater Utility fund reserves, a crucial component in the financial resilience of public owned utilities. Strong and transparent financial policies, including maintaining adequate reserves for emergencies, rate stability, and working capital, are consistent with best practices in the utility industry, as they help to:

1) Ensure cash for daily financial needs to counter revenue volatility and unanticipated expenses is readily available
2) Fund equipment and infrastructure purchases to mitigate damages related to a catastrophic event such as a natural disaster
3) Protect constituents from rate increases due to unexpected variances from forecasted results that arise from non-recurring events or factors

2. BACKGROUND

The City of Davis Public Works Utilities and Operations Department provides water, wastewater, stormwater and solid waste services for citizens, businesses, and organizations. Public owned utilities are expected to provide uninterrupted service 24 hours a day, 7 days a week while relying largely on service-based revenue. As highlighted by the American Water Works Association, cash reserve balances are a critical component to the utility's financial resiliency and sustainability.

3. DEFINITIONS

***Operating Reserve*:** liquid, unrestricted assets that an organization can utilize to support its operations in the event of an unanticipated loss of revenue, working capital deficiencies, or an increase in expenses.

Emergency Capital Reserve: Funds reserved in this category shall be used to mitigate costs associated with capital purchases due to unforeseen emergencies, including natural disasters. Should unforeseen and unavoidable events occur that require expenditure of City resources beyond those provided in the annual budget, the City Manager shall have authority to approve appropriation of Emergency Reserve funds. The City Manager shall then present to the City Council – as soon as possible– a resolution confirming the nature of the emergency and formally authorizing the appropriation of Emergency Reserve funds.

Rate Stabilization Reserve: Rate stabilization reserves are established to cover wide fluctuations in projected revenue from season to season or year to year. A rate stabilization reserve allows a utility to draw on the fund balance during revenue shortfalls that result from lower than expected revenue. When use of the fund is deemed necessary, the City Manager shall present to the City Council a resolution confirming the nature of the need and authorizing the appropriation of Rate Stabilization Reserve funds.

4. POLICY

The policy illustrated below is the framework established for the Water, Sewer and Stormwater fund. The Public Works Utilities and Operations Director in conjunction with the City Treasurer shall review the Utility reserve balances annually and provide any updates as necessary to the Finance and Budget Commission, Utilities Commission and the City Council.

Reserve Type	Key Considerations	Policy	Methods to Achieve Funding Levels
Operating	• Revenue fluctuations • Working capital • Potential risks • Risk management • Daily financial needs • Operating expenditures	The City will maintain a target 3-month reserve balance for each utility.	As part of the annual utility review, the Public Works Utility and Operations Director will report the target reserves and actual balances in the operating funds.
Emergency Capital	• Cost of critical assets • Critical facilities • Catastrophic events such as natural disasters • Availability of other funds • Address unanticipated, nonrecurring needs.	Target reserve for each utility shall be the average of the planned expenditures in the 5-year Capital Improve Program as provided in each Utility Cost of Service Study (not including any debt-financed projects).	As part of the annual utility review, the Public Works Utility and Operations Director will report the target reserves and actual balances in the capital funds.
Rate Stabilization	• Impacts of revenue shortfalls • Drought restrictions • Revenue volatility • Weather • Regional economic conditions • Rate variability • Sharp demand reduction	Target reserve shall be 5% of annual operating revenue for Stormwater and Wastewater, and 10% of operating revenue for Water.	As part of the annual utility review, the Public Works Utility and Operations Director will report the target reserves and actual balances in the rate stabilization funds.

Solid Waste Reserve Fund Policy: The City of Davis Solid Waste Division is responsible for recycling, garbage, organics collections, street sweeping, and landfill tipping. Eighty-

six percent of the total cost in the fund is a franchise agreement with the waste hauler and the other fourteen percent accounts for state mandated programs, city administrative costs related to operations, and debt service requirements. The solid waste utility does not have assets or large capital expenditures similar to the other City utilities. Due to this difference, and to ensure the fiscal sustainability of the fund, the target reserve is **12** months of ***non-contractual*** operating expenditures. Non-contractual expenditures are defined as expenditures relating to obligations not expressed in a contract. This allows a reserve for changes in contracted service, emergency services, and revenue fluctuations.

Solid Waste Reserve Policy

Reserve Type	Key Considerations	Policy	Methods to Achieve Funding Levels
Operating	• Revenue fluctuations • Working capital • Potential risks • Risk management	Target reserve is 12 months of non-contractual operating expenditures.	As part of the annual utility review, the Public Works Utility and Operations Director will report the target reserves and actual balances in the operating funds.

APPENDIX E – PERCENTAGE OF IMPERVIOUS AREA CALCULATIONS

For most land use categories, a sample of parcels was analyzed using aerial photography and other data to determine the average percentage of impervious area ("%IA").

The Table below shows the results of that analysis.

TABLE 11 – PERCENTAGE OF IMPERVIOUS AREA CALCULATIONS

Land Use Category	# of Parcels	# Parcels Analyzed	Total Acres Sampled	Total Acres Impervious Area	Impervious Area [A]
Single-Family Residential					
Small *under 0.14 ac*	2,557	50	5.34	3.02	2,710 sf
Medium *0.14 to 0.22 ac*	7,603	151	25.95	12.15	3,468 sf
Large *0.23 to 0.27 ac*	1,350	27	6.60	2.92	4,622 sf
Very Large *over 0.27*	782	15	5.45	2.02	5,156 sf
Condo Med-Denisty [B]	2,682	not sampled			
Condo Hi-Density	88	88	2.58	2.11	1,045 sf
Non-Single-Family Residential					
Mobile Home Park [C]	3	not sampled			
Apartment	221	33	66.05	41.80	63.28%
Comm / Industrial / Retail	372	31	21.51	18.03	83.82%
Office	275	19	11.58	8.00	69.09%
Institutional	58	19	28.38	16.95	59.71%
Institutional w/ Field	16	16	202.71	84.91	41.89%
Park [D]	280	not sampled			
Vacant (developed) [D]	135	not sampled			
TOTAL	16,422	449	376.15	191.90	na

A For Residential, impervious area for each category is the average %IA applied to the median parcel size. For Non-Residential, impervious area is expressed as a percentage of parcel area (Total IA/Total Acres sampled).

B Condominium – Not sampled as explained on Page 16 of this Report.

C Mobile home parks were determined to be similar in imperviousness to Institutional parcels.

D Park and Vacant – Park and Vacant parcels were estimated to have a 5% impervious area based on other similar municipalities.

APPENDIX F – LOW IMPACT DEVELOPMENT RATE CREDIT ANALYSIS

On the following pages is an analysis done for the City of Cupertino in February 2019 that estimated the extent to which low impact development ("LID") reduces the impact on the City's storm drain system. Cupertino is similar to the City of Davis in that both are mid-sized cities with similar land use patterns, storm drainage systems, and magnitude of costs and needs.

CITY OF CUPERTINO

FEE REPORT

2019 CLEAN WATER AND STORM PROTECTION FEE

FEBRUARY 2019

PURSUANT TO THE ARTICLES XIIIC & D OF THE CALIFORNIA CONSTITUTION, AND THE GOVERNMENT CODE SECTIONS 38900 – 38901 ET AL.

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Open Space and Agricultural Parcels are Not Charged

The City's storm drain system was developed in response to land development over the many decades. Tracts of land that have not yet been developed, or have been used primarily for agricultural purposes, have not created an impact on the system beyond the natural condition, and are therefore considered to receive no service from the system. In practical terms, these parcels generate no additional storm runoff beyond the natural condition. For these reasons, open space and agricultural parcels are not charged a Fee.

Hybrid Parcels

Some parcels may have both improvements as well as significant open space areas. For such parcels that contain a residence, the open space acreage does not increase the fee because residential parcels are not charged on a per-acre basis. Rather, they are charged based on the median ISA for that size category.

For such parcels that contain non-residential improvements (which are charged on a per-acre basis), the chargeable acreage should be adjusted downward to reflect the improved area only, leaving the open space area "invisible" to the fee calculation. Where parcels have been found in this category, that acreage adjustment has been made.

Low Impact Development Rate Adjustment

The current NPDES Permit requires certain properties to construct stormwater treatment and attenuation facilities, also known as low impact development ("LID"). These facilities are typically designed to capture a portion of the storm flows, retain them, and enable them to infiltrate into the ground. While this is intended to help filter pollutants from the water, it also can reduce the parcel's stormwater runoff quantity to some extent, which in turn can reduce a parcel's impact on the system. In addition to NPDES-required LID, other parcel owners may elect to follow LID guidelines voluntarily.

The section of the MRP that requires LID facilities is Provision C.3 (New Development and Redevelopment). Compliance with C.3 is a well-established and convenient metric on which to base customer activities that further Program goals and affect Program costs. C.3 compliance can have impacts to many of the Program elements. In order to analyze the extent to which C.3 compliance will impact Program costs, each Program element was rated with one of four impact levels: none (0%), minor (25%), medium (50%), and major (80%). By applying those impact levels to the costs of each Program element, it was determined that compliance with Provision C.3 equates to approximately 25% of the overall Program costs. Table 6 below shows the results of that analysis.

Based on that analysis, a commensurate reduction in the fees for certain C.3-compliant parcels is warranted. However, C.3 compliance brings with it some additional administrative burdens to verify ongoing compliance. While this burden is relatively minor, for single-family parcels where the annual fee is also relatively small, the administrative burden negates the LID benefits to the program. Therefore, single-family residential parcels do not qualify for the reduced fee. Conversely, C.3 compliance for condominiums is typically accomplished on a collective basis, so the minor administrative burden is spread across many parcels

making it insignificant. Therefore, a 25% reduction in fees will be applied to all C.3-compliant parcels that are either non-single-family or condominium.

TABLE 6 – LOW IMPACT DEVELOPMENT RATE ADJUSTMENT ANALYSIS

	MRP Provision	Impact Level: None	Minor	Medium	Major	Notes
Operations & Maintenance						
	Program Management					Does not lessen Program Management burden
C.2	Municipal Operations					Reduces storm flows in minor storm, reducing burden on operations
Clean Water Program						
C.1	Permit Compliance					Is a small part of overall Program Compliance
C.2	Municipal Operations					Does not lessen Municipal Operations compliance burden
C.3	New Development and Redevelopment					Is all about C.3
C.4	Industrial and Commercial Site Controls					Provides controls
C.5	Illicit Discharge Detection and Elimination					Does not lessen Illicit Discharge burden
C.6	Construction Site Control					Does not lessen Construction Controls burden
C.7	Public Information and Outreach					Aids in educating property owners
C.8	Water Quality Monitoring					Does not lessen WQ Monitoring burden
C.9	Pesticides Toxicity Control					Capture & infiltration may filter out pesticides
C.10	Trash Load Reduction					Many C.3 devices are considered a partial trash capture device
C.11	Mercury Controls					Capture & infiltration may filter out pollutants
C.12	PCBs Controls					Capture & infiltration may filter out pollutants
C.13	Copper Controls					Capture & infiltration may filter out pollutants
C.17	Annual Reports					Does not lessen reporting requirements

STORMWATER FEE CALCULATION

The primary metric in this analysis is the SFE as illustrated above. To arrive at the fee amount for the various land use categories, the total City-wide SFEs must be divided into the total revenue requirement to arrive at the rate per SFE. Using the analysis above, that calculation is represented by the following formula:

Table 4. City Estimated Expenditures for MRP, by Cost Category (Fund) and Fiscal Year

Fund	MRP Provision	Prior[a] 2017-2018	Current[a] 2018-2019	Future – Projected[b] 2019-2020	2020-2021	2021-2022	2022-2023	2023-2024
Fund 100-85, Operations & Maintenance								
	Program Management			$59,000	$61,000	$63,000	$65,000	$67,000
C.2	Municipal Operations			$493,000	$508,000	$523,000	$539,000	$555,000
	Fund Total	*$449,950*	*$476,503*	*$552,000*	*$569,000*	*$586,000*	*$603,000*	*$622,000*
Fund 230-81, Clean Water Program								
C.1	Permit Compliance			$23,000	$24,000	$25,000	$25,000	$26,000
C.2	Municipal Operations			$148,000	$153,000	$157,000	$162,000	$167,000
C.3	New Development and Redevelopment			$70,000	$72,000	$77,000	$80,000	$82,000
C.4	Industrial and Commercial Site Controls			$83,000	$86,000	$88,000	$91,000	$94,000
C.5	Illicit Discharge Detection and Elimination			$129,000	$133,000	$137,000	$141,000	$145,000
C.6	Construction Site Control			$43,000	$44,000	$46,000	$47,000	$49,000
C.7	Public Information and Outreach			$118,000	$122,000	$126,000	$129,000	$133,000
C.8	Water Quality Monitoring			$11,000	$11,000	$12,000	$12,000	$13,000
C.9	Pesticides Toxicity Control			$21,000	$21,000	$22,000	$23,000	$23,000
C.10	Trash Load Reduction			$130,000	$134,000	$148,000	$152,000	$157,000
C.11	Mercury Controls			$24,000	$25,000	$27,000	$27,000	$28,000
C.12	PCBs Controls			$51,000	$52,000	$57,000	$59,000	$61,000
C.13	Copper Controls			$11,000	$11,000	$12,000	$12,000	$13,000
C.17	Annual Reports			$29,000	$30,000	$33,000	$34,000	$35,000
	Fund Total	*$761,720*	*$720,785*	*$891,000*	*$918,000*	*$964,000*	*$994,000*	*$1,025,000*
	Total	**$1,211,670**	**$1,197,288**	**$1,443,000**	**$1,487,000**	**$1,550,000**	**$1,598,000**	**$1,646,000**

[a] Values are from the City's *Fiscal Year 2018-2019 Adopted Budget*[9] (2018 Adopted Budget and 2019 Adopted Budget for both Non-Point Source (Fund 230-81) (p. 407-409) and Storm Drain Maintenance (Fund 100-85) (p. 434-435)).

[b] Each value for the fiscal years under the "Future – Projected" column is considered to be estimated and has been rounded to the nearest $1,000; thus, summing individual values may result in a slightly different total than those shown in the "Fund Total" and "Total" rows.

[9] https://www.cupertino.org/home/showdocument?id=21776

APPENDIX G – STORMWATER RATES FROM OTHER MUNICIPALITIES

There have been relatively few voter-approved local revenue measures in the past 15 years to support stormwater programs in California. A summary of those efforts plus some others in process or being studied is shown in Table 12 on the following page, in roughly chronological order. Amounts are annualized and are for single family residences or the equivalent.

TABLE 12 – RECENT STORM DRAIN BALLOT MEASURES

Municipality	Status	Annual Rate	Year	Mechanism
San Clemente	Successful	$ 60.15	2002	Balloted Property Related Fee
Carmel	Unsuccessful	$ 38.00	2003	Balloted Property Related Fee
Palo Alto	Unsuccessful	$ 57.00	2003	Balloted Property Related Fee
Los Angeles	Successful	$ 28.00	2004	Special Tax - G. O. Bond
Palo Alto	Successful	$ 120.00	2005	Balloted Property Related Fee
Rancho Palos Verde	Successful , then recalled and reduced	$ 200.00	2005, 2007	Balloted Property Related Fee
Encinitas	Unsuccessful	$ 60.00	2006	Non-Balloted Property Related Fee adopted in 2004, challenged, balloted and failed in 2006
Ross Valley	Successful, Overturned by Court of Appeals, Decertified by Supreme Court	$ 125.00	2006	Balloted Property Related Fee
Santa Monica	Successful	$ 87.00	2006	Special Tax
San Clemente	Successfully renewed	$ 60.15	2007	Balloted Property Related Fee
Solana Beach	Non-Balloted, Threatened by lawsuit, Balloted, Successful	$ 21.84	2007	Non-Balloted & Balloted Property Related Fee
Woodland	Unsuccessful	$ 60.00	2007	Balloted Property Related Fee
Del Mar	Successful	$ 163.38	2008	Balloted Property Related Fee
Hawthorne	Unsuccessful	$ 30.00	2008	Balloted Property Related Fee
Santa Cruz	Successful	$ 28.00	2008	Special Tax
Burlingame	Successful	$ 150.00	2009	Balloted Property Related Fee
Santa Clarita	Successful	$ 21.00	2009	Balloted Property Related Fee
Stockton	Unsuccessful	$ 34.56	2009	Balloted Property Related Fee
County of Contra Costa	Unsuccessful	$ 22.00	2012	Balloted Property Related Fee
Santa Clara Valley Water District	Successful	$ 56.00	2012	Special Tax
City of Berkeley	Successful	varies	2012	Measure M - GO Bond
County of LA	Deferred	$ 54.00	2012	NA
San Clemente	Successful	$ 74.76	2013	Balloted Property Related Fee
Vallejo San & Flood	Successful	$ 23.00	2015	Balloted Property Related Fee
Culver City	Successful	$ 99.00	2016	Special Tax
Palo Alto	Successful	$ 163.80	2017	Balloted Property Related Fee Reauthorization of 2005 Fee
Town of Moraga	Unsuccessful	$ 120.38	2018	Balloted Property Related Fee
City of Berkeley	Successful	$ 42.89	2018	Balloted Property Related Fee
County of Los Angeles	Successful	$ 83.00	2018	Special Tax
Town of Los Altos	Unsuccessful	$ 88.00	2019	Balloted Property Related Fee
City of Cupertino	Successful	$ 44.42	2019	Balloted Property Related Fee
City of Alameda	Successful	$ 78.00	2019	Balloted Property Related Fee
City of Del Mar	Studying	NA	NA	Balloted Property Related Fee
City of Davis	Studying	NA	NA	Balloted Property Related Fee
City of Hillsborough	Studying	NA	NA	TBD
City of Sacramento	Studying	NA	NA	Balloted Property Related Fee
City of Salinas	Studying	NA	NA	TBD
City of San Clemente	Studying	NA	NA	Balloted Property Related Fee
City of San Mateo	Studying	NA	NA	TBD
City of Santa Clara	Studying	NA	NA	TBD
County of El Dorado	Studying	NA	NA	NA
County of Orange	Studying	NA	NA	NA
County of San Joaquin	Studying	NA	NA	Balloted Property Related Fee
County of San Mateo	Studying	NA	NA	NA
County of Ventura	Studying	NA	NA	NA

In addition to the agencies listed above in Table 12 that have gone to the ballot for new or increased Stormwater Fees, there are several other municipalities throughout the State that have existing Stormwater Fees in place. Some of these rates are summarized in Table 13 below. Amounts are annualized and are for single family residences or the equivalent.

The City's proposed $157.15 SFR rate falls within the range of stormwater rates adopted by other municipalities.

TABLE 13 – SAMPLE OF RATES FROM OTHER MUNICIPALITIES

Municipality	Annual Rate	Type of Fee
Alameda	$ 134	Property-Related Fee
Bakersfield	$ 200	Property-Related Fee
Culver City	$ 99	Special Tax
Davis	$ 85	Property-Related Fee
Elk Grove	$ 70	Property-Related Fee
Hayward	$ 29	Property-Related Fee
Los Angeles	$ 27	Special tax
Los Angeles County	$ 83	Special tax
Palo Alto	$ 164	Property-Related Fee
Redding	$ 16	Property-Related Fee
Sacramento (City)	$ 136	Property-Related Fee
Sacramento (County)	$ 70	Property-Related Fee
San Bruno	$ 46	Property-Related Fee
San Clemente	$ 60	Property-Related Fee
San Jose	$ 92	Property-Related Fee
Santa Cruz	$ 109	Special Tax
Stockton *	$ 221	Property-Related Fee
Vallejo Sanitation and Flood Control District	$ 24	Property-Related Fee
West Sacramento	$ 144	Property-Related Fee
Woodland	$ 6	Property-Related Fee

* This is the calculated average rate for the City of Stockton, which has 15 rate zones with rates ranging from $3.54 to $651.68 per year.

APPENDIX H - LIST OF ACRONYMS AND ABBREVIATIONS

%IA	Percent Impervious Area
CIP	Capital Improvement Program
CPI	Consumer Price Index (from the Bureau of Labor & Statistics)
E.12	Provision E.12 of the MRP – New Development and Redevelopment
FY	Fiscal Year, designated by the year in which it concludes (e.g., FY 21 refers to the year from 7/1/20 to 6/30/21)
G.I.	Green Infrastructure
GO Bond	General Obligation Bond
ISA	Impervious surface area
LID	Low impact development
MFR	Multi-family residential
MRP	Municipal Regional Permit (current version is MRP 2.0)
NPDES	National Pollution Discharge Elimination System (EPA)
O&M	Operations and maintenance
Permit	City of Davis NPDES Permit No. CAS000004, Order No. Order 2013-0001-DWQ
Program	General term for the City's Storm Drainage (Storm Sewer, Stormwater) enterprise activities
sf	Square feet
SFE	Single-family equivalent
SFR	Single-family residential

RESOLUTION NO. 20-XXX, SERIES 2020

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF DAVIS DECLARING ITS INTENTION TO INITIATE A PROCEEDING TO OBTAIN APPROVAL OF THE CITY'S STORMWATER FEE, A PROPERTY-RELATED FEE CONFORMING TO ARTICLE XIII, SECTION 6 OF THE STATE CONSTITUTION

WHEREAS, the City of Davis is initiating the Stormwater Fee Initiative; and

WHEREAS, the City maintains and manages a municipal storm drainage system that includes capital improvements, maintenance and operations, and activities to ensure compliance with all state and federal regulations associated with the National Pollutant Discharge Elimination System ("NPDES"); and

WHEREAS, the City's comprehensive storm drainage system includes man-made drainage elements such as curbs and gutters, ditches, culverts, pipelines, manholes, catch basins (inlets), and outfall structures in addition to the City's natural creek system that serves as an integral part of the system; and

WHEREAS, the City, through its storm drainage system, provides stormwater services ("Services") that include, but are not limited to, collecting, conveying, and managing stormwater runoff from properties within the City; and

WHEREAS, the City does not have adequate funding to pay for all of its storm drainage system needs, and in order to finance these needs the City would need to enact the Stormwater Fee in compliance with Article XIII D of the Constitution, which would require a ballot proceeding; and

WHEREAS, the City Council authorized SCI Consulting Group to perform a rate study and draft a Stormwater Fee Report ("Fee Report") to determine the amount of the fees on various parcels of land that would, in compliance with Article XIII D of the Constitution, finance certain capital improvements, operations and maintenance needs and NPDES clean water compliance needs.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF DAVIS HEREBY RESOLVES AS FOLLOWS:

Section 1. **Intention to Seek Approval of a Property Related Fee.** The City intends to seek property owner approval of a proposed property related fee to fund the Services ("Stormwater Fee"), pursuant to Article XIII D, Section 6 of the California Constitution.

Section 2. **Fee Study**. SCI Consulting Group has prepared and submitted to the City a Fee Report concerning the proposed Stormwater Fee. The Fee Study report has been made, filed with the City, and duly considered by the City Council, and is hereby deemed sufficient and approved. The Fee Study shall stand as the Fee Study for all subsequent proceedings under and pursuant to this Resolution. Reference is hereby made to the Fee Study for the following: (a) a description of the Services; (b) the identification of the parcels upon which the stormwater Fee is proposed; (c) the

proportional cost of the Services attributable to each parcel; (d) the amount of the Fee proposed for each parcel; and (e) the basis upon which the amount of the proposed Fee was calculated.

Section 3. **Total Amount of Stormwater Fee**. The amount of the proposed Stormwater Fee, if approved, that would be collected in Fiscal Year 2021-22 would be approximately $4.1 million.

Section 4. **Stormwater Capital Improvements and Services**. The proposed Stormwater Fee will provide funds for capital improvements, operations, and maintenance activities as outlined in the Fee Report, as well as activities to help ensure City compliance with all state and federal clean water requirements under the National Pollutant Discharge Elimination System permits issued by the San Francisco Bay Regional Water Quality Control Board.

Section 5. **Public Hearing.** A noticed public hearing shall be held before this Council at the City Council chambers at 23 Russell Boulevard, Davis CA 95616, and is tentatively planned on May 4, 2021, at 6:30 p.m. for the purpose of conducting a hearing and to consider all protests of property owners regarding the proposed Stormwater Fee and this Council's determination whether the public interest, convenience and necessity require the Facilities and Services. The date set forth above for the public hearing may be delayed without returning for additional approval by the Council, provided that such date is not less that forty-five (45) days after the mailing of the notice required and described in Section 6 below.

Section 6. **Notice of Public Hearing.** The City Clerk is hereby directed to cause a notice of the hearing ordered hereof ("Notice") to be given in accordance with law by mailing, postage prepaid in the United States mail, and such Notice shall be deemed to have been given when so deposited in the mail. The Notice shall be mailed to all record owners, who shall be those persons whose names and addresses appear on the last equalized secured property tax assessment roll for the County of Santa Clara, or in the case of any public entity, the representative of such public entity at the address thereof known to the City Clerk or SCI Consulting Group. The Notice shall be mailed not less than forty-five (45) days before the date of the public hearing.

Section 7. **Majority Protest.** If written protests against the proposed Stormwater Fee are presented to the Council by a majority of owners of the identified parcels before the end of the public hearing, the Fee shall not be imposed. Otherwise, this Council may authorize the City to proceed with a property owner ballot proceeding.

Section 8. **Description of the Proposed Stormwater Fee.** Information regarding the Stormwater Fee, including but not limited to the amount of the Fee proposed to be imposed upon each parcel, the basis upon which the amount of the proposed Fee was calculated, the reason for the Fee, and other elements of the Fee shall be described in the Fee Report, Notice of Public Hearing, Ballot Guide and/or Ballot.

Section 9. **Fiscal Controls.** All revenues received from the proposed Stormwater Fee shall be spent only to fund the Facilities and Services. Stormwater Fee revenues received will be deposited into a separate account or fund.

Section 10. **Cost-of-Living Adjustment Mechanism.** If approved by property owners, the Stormwater Fee shall be imposed annually. The maximum rate of the Stormwater Fee may be adjusted in future years by an amount equal to the annual change in the San Francisco-Oakland-

Hayward Consumer Price Index ("CPI") for All Urban Consumers, not to exceed 3% (three percent) per year without a further vote or balloting process, and any excess CPI may be held in "reserve" to be used in future years when the CPI is less than 3%.

PASSED AND ADOPTED at a regular meeting of the City Council of the City of Davis this 15th day of December 2020 by the following vote:

AYES:

NOES:

ABSENT:

_____
Gloria Partida
Mayor

_____
Zoe S. Mirabile, CMC
City Clerk

RESOLUTION NO. 20-XXX, SERIES 2020

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF DAVIS ADOPTING BALLOT PROCEDURES FOR THE CITY'S PROPOSED STORMWATER FEE

WHEREAS, Proposition 218 was adopted on November 6, 1996, adding Articles XIII C and XIII D to the California Constitution; and

WHEREAS, Article XIII D of the California Constitution imposes certain procedural and substantive requirements relating to property-related fees; and

WHEREAS, barring a protest by a majority of affected property owners, the City of Davis ("City") intends to conduct a ballot proceeding to obtain approval of a proposed property-related fee, called the "Stormwater Fee" consistent with the procedures established in Article XIII D of the California Constitution. If approved, the Stormwater Fee would raise revenue to pay for services provided by the City that are necessary to repair, replace, operate and maintain pipes and other infrastructure to prevent system failure and sinkholes, protect clean drinking water, comply with mandated clean water standards, and protect the City against future flooding; and

WHEREAS, the City is initiating the process necessary to adopt the Stormwater Fee.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Davis as follows:

SECTION 1. **Statement of Legislative Intent.** In adopting this resolution, it is the Council's intent to adopt property-related fee ballot proceedings for adoption of a proposed Stormwater Fee that are consistent and in compliance with Article XIII D of the California Constitution.

SECTION 2. **Definition of Property-Related Fee.** Article XIII D, section 2(e), of the California Constitution defines "fee" as "any levy other than an ad valorem tax, a special tax, or an assessment, imposed by an agency upon a parcel or upon a person as an incident of property ownership, including a user, or charge for a property related service."

SECTION 3. **Property-Related Fee Ballot Proceeding.** Article XIII D, section 6(c), of the California Constitution states "[a]n agency may adopt procedures similar to those for increases in assessments in the conduct of elections" for a property-related fee. The following procedures shall be used to conduct a ballot proceeding to seek property owner approval of the proposed Stormwater Fee:

A. **Providing Notice and Receiving and Tabulating Written Protests:** The City shall follow the procedures for proving notice and receiving and tabulating written protests as they were adopted on January 13, 2013 in Resolution 13-009, Series 2013.

B. **Property-Related Fee Ballots:** The following guidelines shall apply to the property-related fee ballots:

1. The record owner(s) of each parcel to be subject to the Stormwater Fee shall be determined from the last equalized property tax roll.

2. The ballot shall be designed in such a way that, once sealed, its contents are concealed.

3. The ballot and/or ballot guide provided by this section shall contain the following information:

    a. The total amount to be charged to parcels City-wide;

    b. The amount to be charged to the owner's particular parcel(s);

    c. The duration of Fee payments;

    d. The reason for the proposed Fee;

    e. The basis upon which the amount of the proposed Fee was calculated;

    f. A summary of the procedures for the completion, return and tabulation of the ballots;

    g. A statement that the failure to receive a majority of ballots in support of the proposed Fee will result in the Fee not being imposed;

    h. On the face of the envelope in which the notice of election and ballot are mailed, there shall appear in substantially the following form in no smaller than 16-point bold type: "OFFICIAL BALLOT ENCLOSED"; and

    i. The ballot shall include the City's address for return of the ballot, the date and location where the ballots will be tabulated, and a place where the person returning it may indicate his or her name, a reasonable identification of the parcel, and his or her support or opposition to the proposed Fee.

4. Failure of any person to receive a ballot(s) shall not invalidate the proceedings.

5. All ballots must be returned either by mail or by hand delivery not later than the date for return of ballots stated on the ballot described in this section. Mailed ballots must be returned to the City Clerk at the address shown on the ballot and pre-printed on the ballot return envelope. Hand delivered ballots must be returned to the City Clerk, at City Hall, 23 Russell Boulevard, Ste. 1, Davis, CA 95616.

6. Each ballot must be signed under penalty of perjury.

7. Only one vote will be counted per parcel. If more than one vote per parcel is submitted, then only the ballot with the most recent date will be counted and any previous votes submitted for the same parcel will not be accepted or counted. If more than one vote per parcel is submitted and the ballots for that parcel are not dated, the replacement ballot will be counted and any other votes for the same parcel will not be accepted or counted.

8. The City will only accept official ballots issued by the City.

9. If a Stormwater Fee ballot is lost, withdrawn, destroyed or never received, the City will mail or otherwise provide a replacement ballot to the owner upon receipt of a request delivered to the City. The replacement ballot will be marked to identify it as a replacement ballot. Any request for a replacement ballot to be mailed to another location must include evidence, satisfactory to the City, of the identity of the person requesting the ballot. The same procedure applies to replacement ballots which are lost, withdrawn, destroyed, or never received.

10. If a Stormwater Fee ballot is returned by the United States Post Office as undeliverable, the City may mail a redelivered ballot to the current property owner, if updated ownership and/or owner mailing address can be determined. The redelivered ballot will be marked to identify it as a replacement ballot.

11. A property-related fee ballot is a disclosable "public record" as that phrase is defined by Government Code section 6252 during and after tabulation of the ballots.

12. To complete a Stormwater Fee ballot, the owner of the parcel or his or her authorized representative must (1) mark the appropriate box supporting or opposing the proposed Stormwater Fee, and (2) sign, under penalty of perjury, the statement on the ballot that the person completing the ballot is the owner of the parcel or the owner's authorized representative. Only one box may be stamped or marked on each ballot. All substantially incomplete or improperly marked ballots shall be disqualified from the tabulation. The Tabulator will retain all such invalid ballots.

13. After returning a Stormwater Fee ballot to the City Clerk, the person who signed the ballot may withdraw the ballot by submitting a written statement to the City directing the City to withdraw the ballot. Such statement must be received by the City prior to the close of the balloting period. When ballots for the Stormwater Fee are tabulated, the City Clerk will segregate withdrawn ballots from all other returned ballots. The City will retain all withdrawn ballots and will indicate on the face of such withdrawn ballots that they have been withdrawn.

14. In order to change the contents of a ballot that has been submitted, the person who has signed that ballot may (1) request that such ballot be withdrawn, (2) request that a replacement ballot be issued, and (3) return the replacement ballot fully completed. Each of these steps must be completed according to the procedures set forth above.

B. **Tabulating Ballots.** The following guidelines shall apply to tabulating Stormwater Fee ballots:

1. Stormwater Fee ballots shall remain sealed until tabulation commences after the conclusion of the balloting period.

2. The ballots shall be tabulated in a location accessible to the public.

3. The City Clerk shall oversee the tabulation of the Stormwater Fee ballots, and may be assisted by technical staff from a third party. The City Clerk shall follow the rules and procedures of the laws of the State of California, this resolution and any other rules and procedures of the Council or the City. All ballots shall be accepted as valid and shall be counted except those in the following categories:

    a. A photocopy of a ballot, a letter or other form of a ballot that is not an official ballot issued by the City or on behalf of the City;

    b. An unsigned ballot, or ballot signed by an unauthorized individual;

    c. A ballot which lacks an identifiable mark in the box for a "yes" or "no" vote or with more than one box marked;

    d. A ballot which appears tampered with or otherwise invalid based upon its appearance or method of delivery or other circumstances;

    e. A ballot for which the parcel number is damaged or obstructed, unless the parcel number or property ownership information is legible and allows the Tabulator to clearly determine the property(s) identified on the ballot;

    f. A ballot received by the City Clerk after the close of the balloting time period; and

    g. A ballot which has been withdrawn, or a ballot for a parcel for which a later (or replacement) ballot has been counted.

4. The City Clerk's decision shall be final and may not be appealed to the City.

5. In the event of a dispute regarding whether the signer of a ballot is the owner of the parcel to which the ballot applies, the City will make such determination from the official County Assessor records and any evidence of ownership submitted to the City prior to the conclusion of the balloting period. The City will be under no duty to obtain or consider any other evidence as to ownership of property and its determination of ownership will be final and conclusive.

6. In the event of a dispute regarding whether the signer of a ballot is an authorized representative of the owner of the parcel, the City may rely on the statement on the ballot signed under penalty of perjury that the person completing the ballot is the owner's authorized representative, and any evidence submitted to the City prior to the conclusion of the balloting period. The City will be under no duty to obtain or consider any other evidence as to whether the signer of the ballot is an authorized representative of the owner and its determination will be final and conclusive.

7. A property owner who has submitted a Stormwater Fee ballot may withdraw the ballot and submit a new or changed ballot up until the conclusion of the balloting period.

8. A property owner's failure to receive a Stormwater Fee ballot shall not invalidate the proceedings conducted under this section and Article XIII D, Section 6 of the California Constitution.

9. The City shall retain all Stormwater Fee ballots for a period of two (2) years from the date of the close of the balloting period.

10. The period of time in which ballots may be submitted (balloting period) shall end at 5:00 p.m. on the closing date of the balloting. All Stormwater Fee ballots must be received by this date and time to be tabulated.

11. After the conclusion of the balloting period, the Tabulator shall tabulate the ballots at the direction of the City Council.

12. The ballot tabulation may be continued to a different time or different location accessible to the public, provided that the time and location are announced at the location at which the tabulation commenced and posted by the City in a location accessible to the public. The City Clerk may use technological methods to tabulate the ballots, including, but not limited to, punch card or optically readable (bar-coded) ballots.

13. Each ballot shall count for as many votes as there are parcels with a fee greater than zero listed on that ballot. If, according to the final tabulation of the ballots, votes submitted against the Stormwater Fee exceed the votes submitted in favor of the Stormwater Fee, the City Council shall not impose the Stormwater Fee.

PASSED AND ADOPTED at a regular meeting of the City Council of the City of Davis this 15th day of December by the following vote:

AYES:

NOES:

ABSENT:

_____
GLORIA PARTIDA
Mayor

ATTEST:

_____
Zoe Mirabile, CMC
City Clerk

4.0 RECOMMENDED IMPROVEMENTS

HydroScience has developed recommended improvements based on the information gathered at the various site visits, with their specific inventories and assessments as presented in the previous chapters. It is anticipated that these recommendations will be used by others to develop a Capital Improvements Plan (CIP) to detail the specific budgets and timelines for both the City's sewage lift stations and stormwater drainage stations.

These recommendations have been made using a 20-year planning horizon (i.e. projects are anticipated to be completed within the next 20 years) and are arranged in order of priorities with the highest priority projects listed first.

For each project, preliminary construction budgets have been established based on similar projects. In addition, recommended next steps have been included to guide the CIP effort.

4.1 GUIDING PRINCIPLES

While developing and prioritizing specific recommendations, the following guiding principles were applied to each pumping site. Although listed as individual principles, many of these principles are overlapping in nature. They are also meant to inform, and not necessarily to quantify the decision making process.

Principle 1: The most problematic and immediate issues should be addressed first. Problematic issues include an inadequately sized pump station, safety concerns for the City's Staff or the general public, or regular and significant staff maintenance efforts.

> ***Example**: If a lift station is found to be undersized, and therefore incapable of keeping ahead of incoming flows, there is a clear danger of flooding of the incoming gravity sewers. Sewage flooding is a clear and immediate issue that would take precedence over other longer-term needs.*

Principle 2: Closely related to Principle 1 above, is the concept that municipalities should act to mitigate risk where the ratio of risk to project cost is highest. This concept is often spoken about in terms of getting the most benefit for any given expenditure.

***Example 1**: Adding a backup generator to a large pump station serving a densely populated area would be judged as alleviating more risk than the same size construction contract to build a replacement pump station for an aged and somewhat problematic pump station in a sparsely populated area. Note that, in this example, both needs must ultimately be addressed, however, the project that mitigates the greater risk for the same cost is prioritized.*

Principle 3: The oldest equipment within any system should, in general, be replaced before more recently installed equipment is replaced. This can be thought of as an extension of the previous principle in that systems and equipment should be replaced before they can age beyond their useful life and fail or become an ongoing maintenance issue. This principle is complicated because not all equipment within a system ages at the same rate and therefore engineering judgment is often required on a case-by-case basis.

***Example 1**: Control components, such as PLCs, become obsolete more quickly than other components within a pumping system. The replacement rate of control equipment is further complicated as the advantages of remote control are recognized and included in modern designs.*

***Example 2**: The planning horizon also figures into replacements based on age. For example, a pump station that had been in service for 50 years should be slated for replacement within the 20 year planning horizon based simply on service life because by the end of the planning horizon it would have been in service for 70 years.*

Principle 4: Lastly, progress toward standardization should also be considered within the planning process. This principle recognizes the advantages to a municipality resulting from standardization of equipment and operating procedures in terms of Staff training, equipment spares, and redundancy. While progress toward standardization has value, it is not often sufficient cause to justify an entire project on its own.

***Example**: The oldest three sewage lift stations within the City's collection system, built between 1964 and 1975, utilize dry pits to house the sewage pumps whereas the newer three stations, built between 1992 and 1997, utilized submersible pumps housed directly in the wet well. This trend toward submersible sewage pumps, while not universal, can*

be found in many municipalities. Given that the last three stations built use submersible pumps, this style of pump station should be considered the "City Standard" for sewage lift stations. It is therefore reasonable to assume that as lift stations are replaced they will be designed with submersible sewage pumps to continue this standard.

Summary: It is rare to have a single one of these principles cited as the sole driver for a large project. More commonly, multiple drivers such as station age, progress toward standardization, and risk, taken together, will dictate when and how any particular project becomes recommended and prioritized.

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4.2 SEWAGE LIFT STATION (SLS) RECOMMENDATIONS

The following subsections present planning level recommendations for the City's sewage lift stations. Projects are presented in order of priority and are summarized in **Table 4.2** below.

Table 4.2 Sewage Lift Station Recommendation Summary

Project No. or Ranking	Description	Construction Estimate
1	Relocate and replace SLS #4	$1.3 to $2.0M
2	Replace (and possibly relocate) SLS #1	$1.5 to $2.3M
3	Replace SLS #3	$1.2 to $1.9M

Construction cost estimates do not include soft costs such as City internal costs, report preparation, design or contingency.

The remaining three sewage lift stations, SLS #2, SLS #5, and SLS #6, have been well maintained and are in good condition. These three stations are all self-cleaning lift stations with submersible sewage pumps built between 1992 and 1997, and all three lift stations have relatively small pumps (+/- 3 hp pumps) which could undergo electrical and controls upgrade modifications at any time.

With the exception of the tilted control building at SLS #6, which will require some ongoing monitoring, these three stations are unlikely to require significant expenditures beyond those normally associated with lift station maintenance. HydroScience recommends a planning level construction budget between $300,000 to $400,000 for each of these lift stations for ongoing electrical and controls upgrades as well as the minor items identified in the *Chapter 2* inventory tables.

4.2-1 PROJECT 1 - SEWAGE LIFT STATION #4

Sewage Lift Station #4 was constructed in 1971 before Fifth Street was extended to its current location. As Fifth Street was extended, a median was constructed around the lift station to maintain access to the station and to protect the upper portions of the station from vehicular traffic. This location creates station access issues for the City's staff as well as unnecessary conflicts with the general public.

Station in Median

Entrance to the station's dry pit requires a confined space entry. This increases the staff manpower efforts significantly over comparably sized stations.

In 1986, as part of a larger project, the lift station electrical equipment was relocated from the underground dry pit to an above ground site near the Corp Yard entrance. The distance between the control panel and pumping equipment in the dry well is unusually far and not in keeping with good design practices.

This station, built in 1971, is the second oldest station in the City's collection system. By the end of the planning horizon, this station, if not replaced, will have been in service for 63 years. This is beyond typical service life anticipated for this style of sewage lift station.

The configuration of this station does not comply with the City's default self-cleaning submersible sewage pump lift station standard.

Recommendation: For the reasons listed above, HydroScience recommends replacing the entire lift station with a self-cleaning submersible-pump station located within nearby the Corp Yard. By relocating the station within the Corp Yard, the existing station could be used for construction phase wastewater pumping, thus reducing the overall construction costs and risks.

Construction Estimate: $1.3 to $2.0M

Next Step: Pre-design Report

4.2-2 PROJECT 2 - SEWAGE LIFT STATION #1

The El Macero Sewage lift station (SLS #1) was constructed in 1975 at the site of an earlier pump station as part of a larger interceptor sewer project. At that time the electrical/controls building was constructed partially over the top of the earlier lift station. It appears that the then-existing lift station inadvertently supported the building slab on the west side while the site as a whole subsided. This has caused the building to tilt from east to west at approximately ½" per foot for a total tilt of approximately 10-inches. Measures were taken to stabilize the building and the tilting appears to have been halted. The tilt to the building is quite disconcerting and disorienting to anyone working inside the building and is therefore undesirable from a safety standpoint.

Entrance to the station's dry pit requires a confined space entry. This increases the Staff manpower efforts significantly over comparably sized stations.

This station, built in 1975, is the third oldest station in the City's collection system. By the end of the planning horizon the station, if not replaced, will have been in service for 59 years. This is beyond typical service life anticipated for this style of sewage lift station.

The configuration of this station does not comply with the City's default self-cleaning submersible sewage pump lift station standard.

The existing site is very small with little room for onsite staging during construction. Due to site constraints and the need for sewage pumping during construction, replacement of the station at the current location would be both difficult and expensive.

Recommendation: For the reasons listed above, HydroScience recommends replacing the entire lift station with a self-cleaning submersible-pump lift station. We also recommend that a feasibility study be undertaken to find a replacement site nearby due to the site constraints, in hopes that relocating the lift station could improve access for construction, operation, and maintenance, and thus reduce overall costs.

Construction Estimate: $1.7 to $2.5M (does not include cost of land if relocation possible)
Next Step: Feasibility Study and/or Pre-design Report

4.2-3 PROJECT 3 - SEWAGE LIFT STATION #3

This station, built in 1964, is the oldest lift station in the City's collection system. By the end of the planning horizon this station, if not replaced, will have been in service for 70 years. This is beyond typical service life anticipated for this style of sewage lift station.

Access to Station Dry Pit

Entrance to the station's dry pit requires a confined space entry. This increases the Staff manpower efforts significantly over comparably sized stations.

The distance between control panel in the fenced area and pumping equipment in the dry well is unusually far and not in keeping with good design practices.

The wet well is located approximately 60-feet away from the dry pit in the street. This location creates quarterly conflicts between Staff and vehicular traffic as the wet well is maintained. The distance between the wet well and dry pit also results in unusually long pump suction pipes. Both of these situations are not in keeping with good design practices.

The configuration of this station does not comply with the City's default self-cleaning submersible sewage pump lift station standard.

Recommendation: For the reasons listed above, HydroScience recommends replacing the entire lift station with a self-cleaning submersible-pump station. The current site will allow construction of a replacement station while maintaining the existing station for construction phase wastewater pumping.

Construction Estimate: $1.2 to $1.9M

Next Step: Pre-design Report

4.3 STORMWATER DRAINAGE STATION (SDS) RECOMMENDATIONS

The following presents planning level recommendations for the City's stormwater drainage stations. Projects are presented in order of priority.

Table 4.3 Stormwater Drainage Station Recommendation Summary

Project No. or Ranking	Description	Construction Estimate
1	Replace SDS #3	$7 to $12M
2	Upgrade (or replace) SDS #5	$3 to $5M
3	Replace SDS #6	$0.8 to $1.3M

Construction cost estimates do not include soft costs such as City internal costs, report preparation, design or contingency.

The remaining five stormwater drainage stations, SDS #1, SDS #2, SDS #4, SDS #7, and SDS #8 have been well maintained and are in good condition. These drain stations were built between 1980 and 2002 and could undergo electrical and controls upgrade modifications during any dry season.

These stations are unlikely to require significant expenditures beyond those normally associated with drainage station O&M costs. HydroScience recommends a planning level construction budget of $300,000 to $400,000 for each of these drain stations for ongoing electrical and controls upgrades as well as the minor items identified in the *Chapter 3* inventory tables.

4.3-1 PROJECT 1 - STORMWATER DRAINAGE STATION #3

This station is the largest drainage station in the City's stormwater system. At a nominal capacity of 200,000 gpm, this station is almost twice the size of all the other drainage stations combined.

Typical stormwater pump

The report entitled "1991 Sewer and Strom Drainage Facilities Evaluation and Master Planning Study" dated October 1991 stated that, even with all four pumps in operation, the station did not meet the estimated 100-year flow requirements. Anecdotal evidence from Staff confirms that this station is inadequately sized to meet the required capacity.

When the overpass adjacent to the station was constructed, an unusual soil load was placed against the structure. An analysis of this additional load calls into question the structural integrity of the building under a seismic event.

This station is the only stormwater drainage station equipped with diesel powered pumps. Diesel powered pumps do not lend themselves to backup power in the same manner that electrically powered pumps do (with a backup generator replacing the utility power supply in the event of a power failure). This leaves this station, the most important in the City's collection system, without a source of backup power. This represents a clear and significant risk to the City.


Embankment against structure.

As noted above, the capacity of this drain station represents approximately two-thirds of the pumping capacity within the City's stormwater system. A failure at this station in even a relatively minor event could cause significant flood damage.

Built in 1945, this station is the second oldest station in the City's drainage system. By the end of the planning horizon this station, if not replaced, will have been in service for 89 years. This is well beyond typical service life of a stormwater drainage station.

Recommendations: For the reasons listed above, HydroScience recommends replacing and upgrading the H Street Station as soon as possible. Given the limited space available at the current site and the need for stormwater pumping during construction, HydroScience recommends a comprehensive feasibility study effort be undertaken of the collections system to determine if this station could be replaced by multiple smaller stations strategically located throughout the collection system. The feasibility study should also consider upgrading this station to include self-cleaning screens to protect the pumps.

Construction Estimate: $7 to $12M

Next Step: Feasibility Study

4.3-2 PROJECT 2 - STORMWATER DRAINAGE STATION #5

At a nominal capacity of 62,000 gpm, this station is the second largest drain station in the City's stormwater system. It is the City's only stormwater drainage station south of Interstate 80. This station was constructed in 1965 by Assessment District No. 105 as part of the Yolo County El Macero District Drainage and subsequently taken over by the City sometime before 1991. Note that the 1992 report entitled "South Davis Storm Drainage Hydologic and Hydraulic Evaluation" estimated only 55% of the flow at this station originated in urban areas of the City with the remaining 45% of the flow originating in the agricultural areas between the City and the drainage station.

Plate across building door

The electrical/controls building has been subject to flooding for some time. To mitigate this issue, a metal plate was installed across the building door. This is an impediment to safe operation and should be removed and replaced with another means of flood protection as soon as possible.

The open channel to drainage station has sediment issues which require significant effort by the City's Staff each year. Isolation gates could likely be engineered to help mitigate this issue and reduce the yearly cleaning efforts. Note that the sediment appears to originate from the agricultural areas between the City limits and the drain station.

Station screens

This station, built in 1965, is the third oldest station in the City's drainage system. By the end of the planning horizon this station, if not replaced, will have been in service for 69 years. This is near the typical service life of a stormwater drainage station of this configuration.

The previously mentioned 1991 Hydraulic Evaluation noted that, with all pumps in service, the station was only capable of discharging the equivalent of a 10-year

discharge event. This flow limitation is noted as acceptable because flooding from higher flows would be limited to agricultural lands and would not impact upstream urban areas.

Unlike the other stormwater drainage stations within the City's stormwater management system, there is no clear path forward for this station. Issues to consider include:

- This is the only station in the City's system responsible for substantial flows from areas outside the City's urban area.
- The station clearly needs upgrades to the electrical system to remain reliable and modifications to the supply channel to mitigate the ongoing costs due to sediment runoff from agricultural lands.
- The current system reportedly provides better than 200-year flood protection for the urban areas by gravity (i.e. a station is not needed to drain the urban areas).
- The required peak instantaneous flows are significantly reduced due to the acceptability of overflows in the agricultural areas surrounding the drainage station itself.
- The station will have been in service for 69 years at the close of the planning horizon therefore a plan should be in place for replacing the drainage station by the end of that period.

Recommendations:

Alternate 1: We recommend upgrades to the El Macero Drainage Station to raise and relocate the electrical/controls building by 6-feet while relocating the building closer to the levee. These changes will protect the electrical equipment from flooding and allow for access to the building during flood events. We also recommend modifying the supply channel to include gates to facilitate yearly maintenance activities.

Alternate 2: A Feasibility Study could be undertaken to consider construction of drainage station at or near the City limits along the existing drainage channel and allow the City to return operation of the existing station to the local drainage district. This, if possible, would decouple the urban drainage areas from the agricultural drainage areas. It is unclear if a discharge forcemain would be required or if the existing levee system supports this approach.

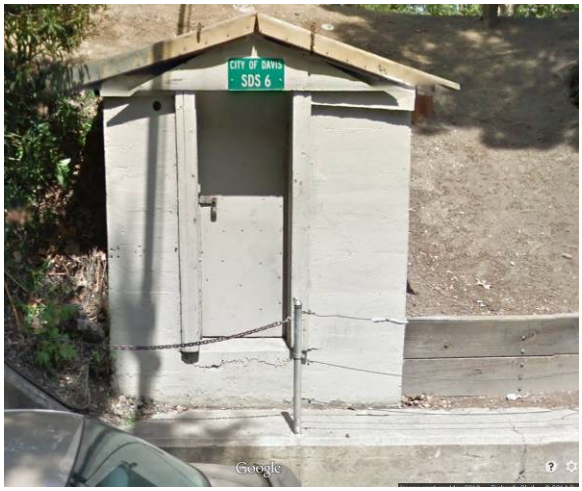
Alternate 3: A Feasibility Study could be undertaken to consider alternate methods for either controlling or managing the sediment entering the open channel. Alternatives for sediment control might include setbacks on both sides of the channel to reduce sediment laden runoff into the channel or a large sediment receiving pond ahead of the station.

Construction Estimate: $3 to $5M (Alternate 1)

Next Step: Pre-design report

4.3-3 PROJECT 3 – STORMWATER DRAINAGE STATION #6

The Richards Undercrossing storm drainage station, SDS #6, located at 1000 Olive Drive, on the southeast side of the Richards Boulevard railway underpass, is the oldest station in the City's stormwater system. At a nominal capacity of 314 gpm this station is also the smallest drainage station.



Pump Station Building

Access to the pump building is difficult and far below what is generally recognized as the minimum acceptable access required for operations and maintenance.

By the end of the planning horizon this station, built between 1920 and 1930 will have been in service for over 100-years. This is far beyond typical service life of a stormwater drainage station.

Recommendation: HydroScience recommends replacing the Richards Undercrossing storm drainage station with a precast pump station located nearby on City property.

Construction Estimate: $0.8 to $1.3M

Next Step: Pre-design report

Stormwater Evaluation Report

Prepared for

City of Davis

September 2017

WEST YOST ASSOCIATES
Consulting Engineers

011-10-17-55

This report printed on 50% post-consumer paper

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consulting engineers

Stormwater Evaluation Report

Prepared for

City of Davis

Project No. 011-10-17-55

9/5/17

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List of Acronyms and Abbreviations

CCTV	Closed Circuit Television
CIP	Capital Improvement Project
City	City of Davis
CMMS	Computerized Maintenance and Management System
CWEA	California Water Environment Association
DI	Drainage Inlets
FTE	Full-Time Equivalent
GIS	Geographic information system
HP	Horsepower
O&M	Operations & Maintenance
PLC	Programmable Logic Controllers
RTU	Remote Telemetry Units
SCADA	Supervisory Control and Data Acquisition
SDS	Storm Drainage Pump Station
SOP	Standards Operating Procedures
KPIs	Key Performance Indicators
WWTP	Wastewater Treatment Plant

1.0 INTRODUCTION

In order to move the City of Davis' (City) Stormwater Division of the Public Works Department from largely reactive operations to a more proactive, preventative program, City management staff requested this evaluation of current Stormwater Division operations. This Report summarizes current staffing and operation and maintenance (O&M) practices, provides a benchmarking summary of similar and best management agencies, and recommends stormwater program improvements.

1.1 Purpose

West Yost reviewed several reference documents related to stormwater department operations and maintenance activities and interviewed O&M staff to gather the information needed to assess current O&M protocols. Several recommendations have been identified based on our O&M review and assessment. West Yost was also tasked with assessing the adequacy of the current O&M staffing levels. The staffing level assessment and recommendations are based on the duties of current staff, a comparison with similar size stormwater utilities, and on the ability of staff to perform additional tasks recommended for the O&M program.

This report includes the following:

- A summary of the O&M reviews and findings.
- A review and assessment of current maintenance procedures for several infrastructure types and recommended modifications and/or additions to those procedures to meet best practices and/or the City's desired level of service.
- An assessment of O&M staffing levels needed to meet the City's desired level of service. Staffing recommendations are compared against staffing levels within existing utilities of a similar size with varying degrees of maintenance needs.

1.2 Available Workhour Assumptions

This evaluation analyzes the City's work order and payroll records and makes recommendations for staffing levels based on the assumed annual work hours available from each full-time equivalent (FTE) employee shown in Table 1. Timesheet data provided by the City from 2011 through 2014 also showed that the average number of hours recorded for each full-time Storm Division employee during that timeframe was 1,504 hours per year, which validates this assumption.

Table 1. Available Workhours per Year per FTE

Description	Work Days per Year	Work Hours per Year
52 Weeks/Year x 5 Workdays per Week	260	2,080
Holidays	-12	-96
Vacations	-20	-160
Sick Days	-15	-120
Compensatory Time	-5	-40
Training	-20	-160
Total Available per FTE	188	1,504

1.3 Information Sources

The following sources of information were used during this evaluation:

- City of Davis Public Works Department Adopted Budget 2015-16
- City of Davis Stormwater Management Plan, September 2006
- Stormwater Asset Inventory
- Drainage Area Map, January 2015
- City of Davis Lift Station Assessment and Inventory Report, February 2015
- City of Davis Wastewater Collections Division O&M Manuals
- City of Davis Current and Potential Stormwater Division Staff Job Descriptions
- City of Davis Public Works Standby Schedule, February 2017
- City of Davis Public Works Organization Chart, August 2016
- City of Davis Stormwater Division Asset Management Data, October 2016
- City of Davis Stormwater Division Work Order Summary, February 2014 to February 2017
- City of Davis Budget Data, 2012-2017
- El Macero Pump Station Run Time Hours, 2012-2016
- City of Davis Work Order Detail Report, 12/29/2016-3/22/2017
- City of Davis Task Summary by Category Report, 3/23/2017
- City of Davis Non-Stormwater Division Hours, 2012-2016

1.4 Stormwater System Description

The City of Davis stormwater system is divided into eleven (11) tributary basins that are located within the Davis City Limits. The drainage basins are delineated in the service area map located in Appendix A.

The City stormwater conveyance system is comprised of approximately 92 miles of storm drain pipe, 0.5 miles of force main, 33 miles of storm drain laterals, 1,850 maintenance holes, 160 drainage inlets, and 8 siphon structures, as summarized in Table 2.

Table 2. City Storm Division Assets	
Asset	Quantity
Storm Drains	92 miles
Drainage Inlets	2,870
Storm Drain Laterals	33 miles
Maintenance Holes	1,850
Drainage Channels	16.7 miles
Detention Ponds	6 (65+ acres)
Drainage Pump Stations	9 (7.5 to 750 HP)
Bike Tunnel Sump Pumps	10 (4 HP each)
Force Mains	0.5 miles
Siphon Structures	8
Access Roads	15 miles

According to the City's asset inventory records, 18 percent of the City's storm drain assets were installed before 1960 and are reaching the end of their expected service lives, as summarized in Table 3.

Table 3. Estimated Storm Drainage Collection System Age	
Year Installed	% of Total Length
2000 to Present	6.6
1980 to 1999	30.2
1960 to 1979	45.8
1940 to 1959	11.5
1920 to 1939	1.9
1900 to 1919	3.9
Total	100

Stormwater flows by gravity into four City detention ponds, one detention basin, and one drainage pond, as summarized in Table 4.

Table 4. City Storm Drainage Ponds

Tributary Pump Station	Name	Pond/Basin Area, Acres
SDS#1	West Area Detention Pond	31.0
SDS#2	North Area Detention Pond	15.0
SDS#4	Core Area Detention Pond	11.8
SDS#7	Sutter Detention Basin	3.9
SDS#8	Evergreen Detention Pond	2.5
SDS#9	Cannery Drainage Pond	unknown
	Stonegate Retention Pond	18

Nine (9) stormwater drainage pump stations (SDS) lift stormwater from the ponds and basin into several main drainage channels. The drainage channels include the following:

- Covell Channel
- John Jones Channel
- F Street Channel
- Channel A
- Lincoln Highway Channel
- Putah Creek Channel
- Mace Ranch Park Channel
- El Macero Channel
- Chiles Swale Chanel

These channels are tributary to the Willow Slough Bypass or the Yolo Basin Wetlands, Davis site, which is located east of the City of Davis. The Willow Slough Bypass also receives runoff from agricultural lands to the north of the City of Davis. The Yolo bypass is the main receiving water body for stormwater collected throughout the City of Davis. The City has approximately 15 miles of access roads that are used to gain access to ponds and drainage channels for on-going maintenance tasks.

The SDSs are numbered 1 through 9, and are summarized in Table 5.

Table 5. City Storm Drainage Pump Stations

Name	Location	Date Constructed	Approximate Age, years	Pump Size
SDS#1	2700 W. Covell Boulevard	1980	37	2 - 25HP
SDS#2	3131 F Street	1980	37	1 - 40HP
SDS#3	1999 H Street	1948	69	2 - 200HP, 2 - 318HP
SDS#4	1919 Second Street	1987	30	2 - 30HP, 1-3 HP
SDS#5	One mile south of I-80	1948	69	2 - 250HP, 1 - 40HP
SDS#6	100 Olive Drive	1924	93	1 - 7.5HP
SDS#7	3003 John Jones Road	2002	15	2 - 14HP
SDS#8	1500 W. Covell	1997	20	1 - 7.5HP, 3 - 30HP
SDS#9	Cannery	2015	2	4 - 25HP, 3 - 60HP

SDS#1 and SDS #2 pump from their associated detention ponds which are used for wild life habitat in addition to stormwater detention. This use effects both the design parameters of the pump stations and overall detention basin storage capacity, which is discussed later in this report. SDS#4 pumps from an associated detention pond which is also used as a dog park. The dog park is closed when a storm event occurs to allow the pond to be used for stormwater storage.

In addition to the drainage pump stations, the City has ten (10) bike tunnel sump pumps that lift stormwater from the tunnels to nearby conveyance systems. Each bike tunnel sump pump station is equipped with a single four horsepower (HP) pump. The bike tunnel pump stations were built between 1989 and 1998 and have been in service for 19 to 28 years.

2.0 STORMWATER DIVISION EVALUATION

This section summarizes the City's current Stormwater Division O&M activities.

2.1 Maintenance

The purpose of the maintenance program is to ensure that stormwater system facilities, assets, and equipment are properly functioning to maximize system reliability, to ensure assets meet or exceed their expected service life, and to ensure that repairs can be performed in a scheduled manner avoiding extra costs and disruptions caused by unexpected failure.

The current maintenance activities are described based on interviews with staff and review of existing maintenance logs from 2014 to 2017. The City O&M staff are currently performing regular maintenance on many types of stormwater infrastructure. The maintenance review includes the assessment of current maintenance tasks for several infrastructure types and aspects, which include the following:

- Drainage pump station maintenance (pumps and generators);
- Conveyance system cleaning and condition assessment;
- Maintenance hole cleaning, repair, and replacement;
- Drainage inlet and siphon cleaning;
- Channel maintenance;
- Basin and pond maintenance;
- Access road and grounds maintenance; and
- Computerized Maintenance and Management System (CMMS).

Recommended modifications and/or additions to the current procedures are made to meet best practices and/or recommended regulatory guidelines. Detailed assessments and recommendations are given below for each infrastructure type or aspect.

2.1.1 Labor Hour Records

The City provided a summary of the labor hours recorded for each labor task category in work orders for the three-year period from February 14, 2014 through February 14, 2017, which is provided as Total Labor Hours in Table 6. Note that for this time period, there are labor hours without work orders, and only a portion of the total labor hours are recorded in work orders.

Note that according to Table 6, the average hours per year recorded in Lucity™ work orders for stormwater maintenance over the last three years is equal to 2,540 hours or a full-time employee equivalent of 1.69 people (per the available workhour assumptions in Table 1). Since Storm Division staffing levels have been between three and four FTE's during this same time period, Table 6 shows that roughly half of the available workhours are recorded in Lucity™ work orders.

Table 6. Maintenance Task Labor Hour and Work Order Summary (2/14/2014 to 2/14/2017)

Task Category	Total Labor Hours	Average Hours per Year	Percent of Total Labor Hours	No. of Work Orders	Percent of Total No. of Work Orders
SDS#1-4, 6-8	2,012	671	26.4	98	40.5
Drainage Channels	2016	672	26.5	38	15.7
Drainage Inlets	1,858	619	24.4	35	14.5
EM SDS05	648	216	8.5	13	5.4
Ponds/Basins	313	104	4.1	8	3.3
Bike Path Pump Stations	249	83	3.3	41	16.9
Drainage Maintenance Holes	160	53	2.1	2	0.8
Drainage Main	160	53	2.1	1	0.4
Street Segment	70	23	0.9	-	-
Customer Services	44	15	0.6	5	2.1
Stormwater Collection	40	13	0.5	-	-
WWTP Assistance	19	6	0.2	-	-
Parks Assistance	11	4	0.1	1	0.4
Water Assistance	8	3	0.1	-	-
Signs	5	2	0.1	-	-
WW Collections Assistance	5	2	0.1	-	-
El Macero Drainage	4	1	0.1	-	-
Total	7,621	2,540	100	242	100
Annual FTE (1,504 hours/year)		1.69			

2.1.2 Drainage Pump Station Maintenance

Current SDS maintenance tasks and frequencies are summarized in Table 7, and are based on O&M and asset inventory data provided by City stormwater staff.

According to the City's 2014-2016 work order records (see Table 3), City drainage pump station maintenance accounted for approximately 26 percent of the total stormwater division O&M staff labor hours and up to 35 percent of the total stormwater division hours when the El Macero SDS#5 is included.

The City conveyance system includes 9 drainage pump stations. Each drainage pump station has operation and maintenance data specific to the pump station that is used as a guide to the facilities O&M activities. Generally, the staff visit the pump stations on a daily to weekly basis to inspect equipment and station operations unless a higher priority task is required elsewhere. Alarms are currently tested quarterly at each SDS.

Most pump stations can be monitored remotely via the telemetry/SCADA system. The City's SCADA/Utility Controls Technician has access to the telemetry/SCADA system. At SDS#3, the on-site standby generator is activated by an automatic transfer switch in the case of a loss of power.

2.1.3 Bike Tunnel Maintenance

Bike tunnel maintenance consists of inspections, pump maintenance and quarterly cleaning of the wet well. Each bike tunnel pump station is inspected for vandalism, control panel lights are inspected, pump readings are recorded, inlet grates are cleaned, wet well is cleaned and the pump is run to ensure operability.

Staff use standard equipment, where possible, to increase the efficiency of repairs and accessibility of spare parts. All but one of the bike tunnel drainage pumps are the same manufacturer and model.

2.1.4 Conveyance System Cleaning and Condition Assessment

Staff reported that consistent cleaning, inspections, closed circuit television (CCTV) of the conveyance system are not being conducted due to a lack of staff resources and outdated CCTV equipment. CCTV provides a video of pipe condition from within the pipe that is used to conduct pipe condition assessments. Storm drain pipes need to be cleaned prior to CCTV. Staff has access to a hydro cleaning truck that is shared with the wastewater collections division. Staff will need proper training to operate the hydro cleaning truck and CCTV equipment.

O&M staff would like perform cleaning, CCTV, and inspection of approximately 1,000 feet of storm drain pipe per week. With approximately 92 miles of storm drainage pipe in the City's system, it would take approximately 9 years to complete a full system inspection. This does not include an additional 33 miles of storm drain laterals and force main which would require another 3 years. Staff estimated that less than 1 percent of the entire stormwater system has been cleaned in the last 3 years. The minimal hydro cleaning that has been completed was done by outside contractors due to a lack of staff time. The hydro-cleaning crew production expectations in the current City O&M manual states an annual mainline cleaning goal of 4,000 to 5,300 feet per day but does not specify if this is for sewers and/or storm drains.

2.1.5 Maintenance Hole Cleaning, Repair, and Replacement

Maintenance hole inspection is typically accomplished during the routine hydro-cleaning operation. According to staff, only a small portion of the stormwater system is being hydro cleaned due to a lack of resources. Therefore, the maintenance holes are not being regularly maintained. The location and maintenance of storm drain maintenance holes and pipe should be tracked using CMMS software utilizing geographic information system (GIS) capabilities for future reference. According to the City's O&M Manual, maintenance holes are inspected for the following conditions:

- Maintenance hole high or low
- Grout missing around joints
- Exposed rebar
- Hydrogen sulfide damage
- Old maintenance hole bricks missing
- Infiltration around barrel joints
- Objects present that might restrict flow
- Check frame and lid for cracks

Table 7. Drainage Pump Station Maintenance Task

Task	Task Frequency	SDS #1	SDS #2	SDS #3	SDS #4	SDS #5	SDS #6	SDS #7	SDS #8
Read and Record Hour Readings	Weekly	X	X	X	X	X	X	X	X
Check station for vandalism	Weekly	X	X		X	X	X		X
Flush line and drainage inlet	Weekly between October- April						X		
Test run pump(s)	Bi-weekly	X	X	X	X	X	X	X	X
Exercise all valves	Bi-weekly				X			X	X
Check bar screen during winter months	Bi-weekly between November-May	X							
Exercise wheel valve	Bi-weekly	X							
Check sump pump operation	Bi-weekly					X			
Clean inside of building	Bi-weekly			X		X			
Exercise hoist	Bi-weekly					X	X		
Check fire extinguishers	Monthly			X					
Test station alarms	Quarterly	X	X	X	X	X		X	X
Inspect and clean wet well	Quarterly			X			X	X	
Record pond level staff gauge and controller reading	Quarterly	X	X		X			X	X
Check control panel light indicators	Quarterly	X	X	X					X
Test area light	Quarterly	X							
Test control panel and pump indicator lights	Quarterly				X				
Check discharge flapper gates	Quarterly					X	X		X
Check anti-siphon valves	Quarterly					X			
Check water in engines	Quarterly			X					
Check fuel tank and order fuel when level reaches 500 gallons	Quarterly			X					
Check battery cables for corrosion	Quarterly			X					
Test power failure alarm	Quarterly			X					
Check engine solenoids	Quarterly			X					
Drain regulators in back of bubbler control panel	Quarterly			X					
Purge bubbler and check rotameter	Quarterly			X					
Check air pressure	Quarterly			X					
Start dehumidifier when exhaust fan no longer keep walls dry	Quarterly			X					
Check engine clutches	Quarterly			X					
Check engine heater	Quarterly			X					
Log completed tasks in log book	Quarterly			X					
Check engine water, add corrosion control chemical	Quarterly			X					
Check fuel lines and engine water lines for leaks	Quarterly			X					
Test emergency shutdown systems on all engines	Quarterly			X					
Check motor oil and add oil	As Needed	X	X	X	X	X			
Check dripper pot and add oil	As Needed	X	X	X	X	X			
Keep area clean. Wash down area	As Needed	X	X		X	X	X		X
Check and clean bar screens	As Needed		X	X		X	X		
Change out pesticide traps	As Needed	X	X		X	X	X	X	X
Inspect inlet and outlet discharge line and clear out lines	As Needed							X	
Clean trash rack	As Needed								X
Clean equipment	As Needed			X					

According to a City work order summary for a three-year timeframe (February 2014 to 2017) only 160 labor hours were dedicated to drainage maintenance holes. Detailed January 2017 work order reports indicate three labor hours for replacing maintenance hole lids that were removed during storm events.

2.1.6 Drainage Inlet Cleaning

The City has 2,870 drainage inlets (DI's) that require annual maintenance to clear trash, remove large obstructions, and conduct visual condition inspections. In 2016, public works staff spent approximately 260 hours inspecting 96 percent of the total drainage inlets, and cleaning 28 percent, which resulted in the removal of 538 pounds of trash and 150 pounds of concrete block and/or rocks. During storm events, DI's can become clogged with debris which can cause stormwater to back-up and create flooding conditions. Therefore, during storm events staff spend considerable resources clearing out debris from DI's to allow for proper drainage to occur. These are not planned tasks and, therefore, are considered corrective versus preventative. Additional staff time and resources should be allocated for potential storm events and their associated corrective maintenance tasks.

2.1.7 Siphon Cleaning

The City has eight siphon locations that require regular maintenance. Each siphon is inspected and cleaned annually.

2.1.8 Channel Maintenance

Open channels are either natural or concrete lined channels that convey stormwater or run-off. These channels must be maintained to prevent localized flooding by draining stormwater. Open channel maintenance consists of mowing slopes and flats and clearing vegetation and debris from channels annually during the summer months. The core area is flushed annually in September. Staff indicated that channel cleaning efforts utilize 50 percent to 70 percent of staff labor resources between April and September. Some channels are not being regularly cleared due to limited staff resources. Staff are required to clear several open channels that are located outside the City limits which also creates a drain on existing staff resources. Staff recommended that several of these channels be concrete lined or piped to eliminate the need for on-going maintenance. Outside contractors are used for spraying channels, maintaining major trees, beaver eradication, and to address environmental concerns.

Staff reported that the El Macero Channel has not been cleared due to several coordination complexities. Staff needs to coordinate with the Fish and Wildlife due to regulatory requirements associated with the garter snake and beavers. Staff needs to coordinate with Kinder Morgan regarding an existing hazardous materials pipeline that crosses the channel. The El Macero Channel also has issues with improper grading and sediment buildup at SDS#5.

Prior to performing channel maintenance staff must ensure that homeless encampments are cleared from the area. Staff gets as-needed support from the police department in clearing these encampments.

Staff is concerned about a potential new city regulation that would ban the use of Round-up, a chemical used in weed abatement. This regulation would make maintaining channels more difficult.

2.1.9 Detention Basin and Pond Maintenance

Detention basins and ponds are designed to hold, infiltrate and/or slowly release stormwater. Quarterly maintenance activities currently include:

- Mowing/weed eating,
- Chemical herbicide treatments,
- Maintenance of slopes/fire breaks,
- Trees and brush trimming,
- Clearing inlets/outfalls,
- Clearing trash/debris,
- Grading access roads,
- Repairing gate/fence, and
- Inspecting/repairing signage.

Staff is currently maintaining most basins and ponds, except the North Area and West Area ponds that are being utilized for wildlife habitat. These ponds cannot be drained to remove accumulated sediment and vegetation.

2.1.10 Access Road and Grounds Maintenance

Access roads are used to bring in equipment to perform maintenance activities in the channels and at various ponds and basins. These roads must also be maintained to ensure access by necessary maintenance vehicles and equipment. Staff indicate that, due to a lack of staffing, access roads along channels are not being consistently maintained. A detailed City work order in January 2017 indicates a significant staff effort (approximately 176 staff hours) was required to repair access road erosion that had occurred on a channel access road. If the access road had failed it may have created a channel blockage.

2.2 Operations

2.2.1 System Capacity

SDS#1 and SDS #2 pump from their associated detention ponds which are used for wildlife habitat in addition to stormwater detention. The drainage pump stations were designed to pump stormwater based on the full capacity of the detention basins. The detention basins must have a specific volume of water at all times to provide wildlife habitat, and therefore has a reduced storage capacity from the original design. In addition, detention basin maintenance (vegetation and sediment removal) cannot be performed because the basins always have water in them, thus further reducing their storage capacity. The existing detention basin storage capacity that is being used for wildlife should be replaced in-kind and the design of SDS#1 and SDS #2 should be reassessed to determine if pumping design parameters have changed due to design criteria changes. If capacity issues are not addressed they may pose flooding risks in the areas adjacent to and directly upstream of the basins.

SDS#3 is the largest drainage station in the City's stormwater system representing two-thirds of the City's entire pumping capacity. According to the condition assessment indicated that even with all four pumps running the station is unable to keep up with 100-year flow requirements. Staff have confirmed this assessment and believe the station requires additional pumping capacity. The condition assessment states "A failure at this station in even a relatively minor event could cause significant flood damage."

SDS#5 is the second largest drainage station, and is also reported to be under capacity. According to the condition assessment, "the station was only capable of discharging the equivalent of a 10-year discharge event. This flow limitation is noted as acceptable because flooding from higher flows would be limited to agricultural lands and would not impact upstream urban areas." The assessment report refers to a 1992 report entitled "South Davis Storm Drainage Hydrologic and Hydraulic Evaluation" which estimated that only 55 percent of the flow at this station originated in urban areas of the City, with the remaining 45 percent of the flow originating in the agricultural areas between the City and the drainage station. Staff indicated that the electrical pumping cost at the SDS#5 ranges between $8,000 and $10,000 each month during the dry season due to continuous recirculation of agricultural run-off.

Due to the scale of the cost of maintaining these facilities serving drainage areas located outside of the city limits, it would likely benefit the City to conduct an ownership and maintenance responsibility assessment to identify potential cost sharing opportunities and/or maintenance responsibility relief. The liability assessment should attempt to quantify the agricultural irrigation impacts to downstream facilities, and attempt to develop a regional plan for tailwater reuse and disposal.

2.2.2 SCADA Monitoring

SCADA is currently being monitored by the SCADA Control System Technician through existing drainage pump station Remote Telemetry Units (RTU's) and/or Programmable Logic Controllers (PLC's). The stormwater drainage pump stations with remote monitoring capabilities are currently monitored for flow, alarms, and high water levels. Only SDS#3 and #9 have full monitoring and remote control capability through the existing SCADA system. The other stormwater drainage pump stations (SDS#1, #2, #4, #5, #7, #8) require staff to physically go to the SDS site to make any control adjustments or trouble shoot issues. In addition, bike tunnel pump stations have no SCADA capabilities and must be monitored manually by staff to ensure they remain operational. Staff resources are utilized to make the necessary site visits.

It should ultimately be a goal for the City to add SCADA system control capabilities to the remaining stormwater drainage pump stations and the bike tunnel pump stations to improve the efficient use of staff resources. Remote monitoring and control capabilities allow for improved documentation of operational changes and provide an on-going record of these types of changes to on-call staff. Additionally, since the bike tunnel pump stations only have one pump at each station, there is no redundancy in the case of a pump failure. Pump failure quickly causes flooding and severely increases the risk to public safety – particularly at Pump Station 6, which is the Richards Boulevard underpass, which is also a major transportation and emergency evacuation route for the City. SCADA monitoring at these sites will notify staff of any equipment failures so that emergency response staff can be deployed.

The SCADA Control System Technician provided an estimated cost for adding remote control capability through system integration at approximately $20,000 per SDS site based on 2015 estimates. This estimate may be low depending on whether installation and programming is included in this cost. SDS#6 will likely have a higher cost because it is not currently equipped with a modern PLC or RTU which is needed for SCADA system integration. Remote communication upgrades to SDS#6 are considered the most critical. Once SCADA integration is completed, existing staff resources can be refocused on other higher priority tasks.

2.3 Regulatory Compliance

Stormwater quality regulatory requirement compliance is overseen by the City's Environmental Resources Division. The Environmental Program Specialists within the division are responsible for compliance with stormwater quality regulatory requirements including compliance with the MS4 permit. Evaluating this program and its staffing is not within the scope of work for this evaluation.

2.4 Condition Assessment

HydroScience conducted a condition assessment of all the City's SDS's in 2015. The Lift Station Assessment and Inventory Report identified several improvements at SDS#3, #5, and #6. The remaining stations were reported as well maintained and in good condition but in need of electrical and control system upgrades. Staff report that none of the recommended improvements for SDS#3, #5, and #6 have been addressed to date. The assessment also indicated the structural integrity of the SDS#6 building may be compromised during a seismic event. The report also indicates "This station is the only stormwater drainage station equipped with diesel powered pumps. Diesel powered pumps do not lend themselves to backup power in the same manner that electrically powered pumps do (with a backup generator replacing the utility power supply in the event of a power failure). This leaves this station, the most important in the City's conveyance system, without a source of backup power. This represents a clear and significant risk to the City." Hydroscience recommended replacing SDS#3 as soon as possible at an estimated construction cost of $7 to $10 million. When the diesel-powered pumps at SDS#3 are replaced with electric powered pump, a back-up generator should be installed to provide power during an electrical outage.

The assessment indicated SDS#5 electrical and control building has been subject to flooding. According to the HydroScience report, "To mitigate this issue, a metal plate was installed across the building door. This is an impediment to safe operation and should be removed and replaced with another means of flood protection as soon as possible." In addition, the assessment report states, "the open channel to drainage station has sediment issues which require significant effort for removal by the City's staff each year. Isolation gates could likely be engineered to help mitigate this issue and reduce the yearly cleaning efforts. Note that the sediment appears to originate from the agricultural areas between the City limits and the drain station." The assessment report recommended three possible alternatives, one of which was a relocation of the electrical control building and modifying the drainage channel to reduce the sediment buildup. The report estimated a construction cost of $3 to $5 million for this alternative.

The City's two largest capacity drainage pump stations, SDS#3 and SDS#5, are over 50 years old. Typically, the useful life of pump station equipment is limited to 20 to 30 years, with

good maintenance. Pump station structures typically have a useful life of 50 years[1]. Thus, both of these drainage pump stations are well beyond their useful life.

SDS#6 is the City's oldest storm drainage station and has been in service for over 100 years. This station is also the smallest in capacity. The condition assessment recommended full replacement with an estimated construction cost of $0.8 to $3 million.

Staff indicate that there has been no condition assessment on the majority of the City's stormwater drainage piping. In 2015-16, City Engineering staff used an outside contractor to CCTV the sanitary sewer and storm sewers in the downtown core area of the City to identify repairs needed before paving projects commence.

Table 2 of the HydroScience report provides a breakdown of the City's drainage piping by year of installation. Approximately 67 percent of the City's drainage piping is over 38 years old and 18 percent is over 58 years old. Staff report that there have been no piping failures. Continued pipeline condition assessment is critical to understanding the scope and budget for pipeline replacements and/or repairs into the future. Without proper planning, failures will likely occur which can cause other consequences and increased costs due to emergency repairs.

2.5 Training

Staff reported that training is provided for all activities for each new staff when they are hired. The Collections System Technician provides training to new staff and staff from other divisions that are being cross-trained. In addition, tailgate training sessions are conducted prior to performing tasks to discuss safety issues. Training for necessary certifications are performed by outside vendors. Staff meetings are held weekly and during these meetings O&M manual procedures are reviewed as a training refresher.

2.6 Record Keeping

2.6.1 Standard Operating Procedures and Operation and Maintenance Manual

Staff provided their current O&M Manuals for review. The manuals document the fundamentals for most activities. Each binder included several standard operating procedures for various maintenance tasks.

Standard Operating procedures in the current O&M Manual include the following:

- Storm Drainage Station
  - Procedures for inspections, records documentation, and general maintenance items (2010)
  - Location on maps from the drainage atlas maps
  - Pump and motor nameplate data
  - Pump manufacturers data, maintenance, and troubleshooting recommendations (SDS#4)

[1] https://www3.epa.gov/npdes/pubs/in-plant_pump_station.pdf

  - — Pump operation level data (high and low water alarms, pump on, pump off)
  - — Pump operating modes (SDS#5)
  - — Pump assembly dimensions (plan and profile)
  - — Level and pressure sensor technical data
  - — Wet well inspection and cleaning procedure (SDS#3)
  - — Power outage emergency procedure (SDS#3, 2003)
  - — Air compressor manufacturers data, maintenance, and troubleshooting recommendations (SDS#3)
  - — Spill prevention control and countermeasure plan (SDS#3, 2005)
  - — PanelView User's Manual for PLC (SDS#3, 2003)
  - — Control strategy (SDS#3)
  - — Access easement information (SDS#6)
  - — Piping diagram (SDS#6)
  - — Float switch manufacturers data (SDS#6)
  - — PG&E information (2010)
  - — Pump controller manufacturers data and troubleshooting recommendations (SDS#8, 2001)
  - — Status sheet for documentation purposes
- Emergency operations procedures for extended power failure (2010)
- Training Record Form
- Standard specifications and drawings, January 1996 Edition
  - — Sewer Systems
  - — Storm Drainage Systems
    - Collections Crew Expectations (2004)
    - Sanitary Sewer Collections Lines (2004)
    - Public Information Handout – Sewer Lateral Maintenance Policy (2007)
- Collections Vehicle Inspection Guide
- Traffic Control Training (2002)
- Gas Detector User Manual (2001)
- North Davis Meadows Low Pressure Sewer System – Procedure for Emergency Repairs and/or Replacement Projects (2002)
- Equipment Maintenance Schedule Form
- Standard Guidelines for the Installation, Handling and Removal of Pneumatic Pipe Plugs (2002)
- General Information - Isolation of 42" and 48" Trunk Lines (2002)
- Equipment Needed for Isolation of 42" and 48" Trunk Lines (2002)
- Guidelines for New Connections on Existing Lines (2004)

- Wastewater Safety (2002)
- Criteria for Maintenance Worker II Wastewater Collection Division (2002)
- Wastewater Collections Department – Fundamental Guide (2002)
- Wastewater Collections Systems – Division of Responsibilities (2002)
- Wastewater Spill Report Form (2002)
- Hydraulic Cleaning Crew Meeting Agenda (2002)
- Utilities Crew Meeting Agenda (2002)
- Collections Crew Meeting Agenda (2002)
- Collections Crew Operations and Maintenance Manual (2004)
  - Sanitary and Storm Sewer System Responsibilities (2002)
  - Sanitary Sewer Responsibility Check – Trouble Shooting Procedures (2002)
  - USA Marking Guidelines (2002)
  - USA Location Request Format Form (2002)
  - USA North Suggested Marking Guidelines & the California One Call Law (2000)
  - Procedures for Utility Connections
  - Collections Connection Permit Form (2005)
  - Rules and Procedures for Entering Maintenance Holes and Confined Spaces (2002)
  - Confined Space Entry Procedures for Sewer Lift Stations 1, 3 and 4 (2002)
  - Sanitary Sewer Overflow Response Procedures (2007)
- Hydraulic Cleaning Crew Operations and Maintenance Manual (2003)
  - Hydro-Cleaning Crew Expectations (2004)
  - Sanitary\Storm Sewer Preventative Maintenance Responsibilities (2002)
  - General Instructions for: (2002)
    - Utility Maps
    - Catch Basin/Siphon Cleaning
    - Maintenance Hole Inspection
    - General Safety
  - Mainline Hydro-Cleaning Procedures
  - Preventative Maintenance Recording and Updating System (2002)
  - Drainage System Maintenance – Three Month Downtown Program Form (2009)
  - Storm Sewer Mapping Instructions (2002)
  - Operation/Maintenance Procedures for High Velocity Cleaners
  - Procedure for Replacing High Pressure Hose on High Velocity Cleaners (2006)
  - Operation and Maintenance of Hydro-Cleaning Truck (1988)
  - Operation and Maintenance of Combination Cleaning Truck
  - Hydro-Cleaning Log Sheet (2002)

- — Sewer Main Maintenance Daily Report (2002)
- — D.I. Cleaning Program Form (2007)
- — Maintenance Hole Inspection Report (2002)
- — Standard Manhole Details (1989)
- — Backyard Easement Hydraulic Cleaning Procedure Survey/Safety (2002)
- — North Davis Meadows Low Pressure Sewer System Maintenance Procedures (2002)
- — North Davis Meadows Low Pressure Sewer System Preventative Maintenance Hydraulic Flushing Procedure (2002)

- Utility Crew Operations and Maintenance Manual (2004)
  - — Utility Crew Expectations (2004)
  - — Service Line Chemical Treatment Procedure (2002)
  - — Integrated Pest Management Weed Abatement (2002)
    - Procedure for Herbicide Application (2002)
    - Record Keeping Procedures (2002)
    - Safety Precautions (2002)
    - Econ Portable Emergency Eye Wash Station (2002)
    - Integrated Pest Management – Weed Abatement Forms (2002)
    - Herbicide manufacturers data and MSDS information
    - Hazardous Materials Emergencies Contacts (2002)
  - — T.V. Inspection
    - T.V. Inspection System Equipment Checklist (2002)
    - T.V. Inspection Daily Report Form (2002)
    - T.V. Inspection Report (2002)
    - User's Manual for CCTV System (1994)
    - User's Manual for Footage Display (1994)
  - — Procedures for Locating Sanitary Sewer Service Clean-Outs
  - — Confined Space (2002)
  - — Confined Space Regulations (1994)
  - — Lockout/Tagout Procedure (2001)
  - — Chemical Distribution Record Form (2002)
  - — Mainline/Lateral Stoppage Record Form (2002)

2.6.2 Computerized Maintenance Management System

The City of Davis is utilizing the CMMS software program Lucity™ to track basic system maintenance activities. Staff mentioned that there is an effort currently underway to get more training on Lucity™ for staff to fully utilize the software capabilities.

There remains an opportunity to gain efficiency and workflow benefits by integrating Lucity™ with the City's storm system GIS and CCTV inspections, linking record drawings and O&M manuals, and to track work order information that provides more sophisticated workflow analytics to inform future business decisions. Access to historical work order data through CMMS allows

the user to assess work order completion goals, identify trends, better understand maintenance costs, and improve inventory control. The CMMS program can also be set to automatically generate preventative maintenance work orders and help optimize maintenance activities to potentially reduce repairs, expensive emergency costs, and equipment downtime.

2.6.3 Work Order Generation and Documentation

West Yost reviewed the 2017 work order detail reports as part of this evaluation. Work orders are currently being generated to address corrective tasks such as repairs identified through inspections, responses to complaints, and weather events. Each work order identifies labor resources, and material and equipment used to respond to and address the work order tasks. Work order detail reports indicate the following items:

- Category (used to track work completed for different types of infrastructure),
- Problem,
- Problem cause (if known),
- Main task needed to address the problem,
- Work request comments,
- Staff who created and assigned the work order,
- Address or location, and
- Start and completion dates and times.

Work orders are completed based on their priority. The highest priority work orders are based on addressing safety concerns.

Table 6 (in Section 2 above) summarizes the number of work orders recorded for each labor activity. It does not appear that preventative maintenance task work orders are being generated and tracked. The City's O&M manual includes the following tasks as Storm Sewer Preventative Maintenance Responsibilities:

- Annual Catch Basin/Siphon Cleaning Program,
- Annual Cleaning of Drainage Pump Station Sumps,
- Quarterly cleaning of Siphon (Core Area) Storm Sewer,
- Routine maintenance hole inspection,
- Routine records updating, and
- Emergency stoppages/wash-downs.

Implementation and tracking of a strong preventative maintenance program will maximize the useful life of all system facilities and minimize emergency conditions by performing system maintenance in a regularly scheduled and timely manner. A key component of a preventative maintenance and an asset management program is the implementation and regular use of a CMMS and asset management program. Most CMMS programs are GIS-based and provide asset

management tools used to perform inspection, monitoring, and condition assessment. These programs track maintenance work and create a database that includes maintenance information on system facilities such as: drainage inlets, storm drains, pump stations, and detention ponds. Implementation of a CMMS program requires the development of an inventory of all system assets. The program uses the inventory of assets and historical maintenance and repair data to generate preventative work orders for field staff to perform.

Full implementation of the program will allow the City to:

- Inventory/track all assets by ID number and physical address;
- Track labor, material, and associated maintenance costs;
- Incorporate Manufacturers maintenance recommendations for mechanical and electrical equipment;
- Record and document the maintenance history for each piece of equipment;
- Plan and schedule work by individual assets or group assets;
- Generate work orders for scheduled preventative maintenance;
- Forecast repairs and replacement part needs; and
- Project budgetary information.

Until the existing CMMS program can be fully utilized, the Collections System Supervisor should prepare a schedule of preventative maintenance tasks with instructions to complete them. Instructions may include specifications for fuels, lubricants, filters, and other items related to specific equipment. The manufacturer's maintenance recommendations for equipment specific O&M manuals should be incorporated into the schedule of preventative maintenance tasks. The Collections System Supervisor will be responsible to ensure that the program tasks are being completed and that timely updates to the schedule are incorporated.

2.7 Key Performance Indicators

Storm Division key performance indicators (KPIs) appear to be tracked as individual specific goals set for each year, which can vary from year to year. The City's Public Works Department's 2015/16 Annual Budget listed the following operation and maintenance-related Stormwater performance measures:

- Complete a video inspection of the City's stormwater mains;
- Complete hydro-jetting of the entire stormwater piping system;
- Three miles of stormwater main lines were inspected and hydro cleaned;
- Performed inspection, cleaning, and repairs of 2,700 storm drain inlets;
- Maintained 15 miles of stormwater channel;
- Maintained and cleaned 5 drainage ponds;

- Cleaned and inspected 6 stormwater detention ponds and 15 miles of drainage channels; and
- Maintained seven roads (1 mile) of maintenance access roads.

The operation and maintenance measures listed above are general and sometimes overlapping, and not specific enough to help staff track progress and show marked changes or improvements from year to year. Additionally, the goals of completing hydro-jetting and video inspection of all stormwater mains appears to be a long-term goal to be accomplished over several years; while in reality, three miles of stormwater mains were hydro cleaned and inspected in fiscal year 2015/16. Note that at the rate of three miles of pipe cleaned and inspected per year, it would take 30 years to clean the entire 92 miles of stormwater mains. The City will need to reassess these measures based on their current staffing resources, and employ additional staff and/or use outside contractors to increase annual cleaning and CCTV production rates in order to accomplish the current measures.

3.0 STAFFING ASSESSMENT

The City has requested a staffing analysis on the estimated work needs and the appropriate levels of staffing. A current organization chart is provided as Appendix B. Our assessment and recommendations are described in the sections below.

3.1 Current O&M Staffing Summary

Current stormwater O&M staff is made up of three permanent occupied positions and two potential/open positions. The occupied positions include a Collections System Supervisor, Collections System Technician, and a Public Works Maintenance Worker II.

Several of the current stormwater O&M staff provide assistance to other public works departments for tasks such as traffic control and sewer system O&M tasks. Other public works department staff assist the stormwater O&M staff during storm events and to complete annual maintenance tasks. According to interviews with current staff, the sharing of staff resources between the public works departments is mutually beneficial, yet not always equal in overall staff time resources. Drainage pump station electrical and instrumentation work is completed by wastewater treatment plant O&M staff. The stormwater staff share administrative support with other divisions in the public works department. When administrative support is not available, O&M staff must complete administrative tasks which can take them away from O&M field tasks.

In addition, and on an annual basis, the City hires temporary laborers to support permanent staff. The current permanent and temporary staff responsibilities are described in detail for each position below, which are based on current job descriptions provided by the City.

3.1.1 Collections System Supervisor

The Collections System Supervisor position has many responsibilities with the main responsibility being planning, coordinating, supervising and overseeing the work completed by the permanent and temporary staff. Additional responsibilities include the following duties:

- Provide technical staff assistance;
- Train, assign, and evaluate personnel;
- Review personnel work;
- Materials selection;
- Estimating materials and labor costs for jobs;
- Ensure needed supplies, materials, and equipment are on-hand;
- Record daily labor, material, and equipment costs;
- Maintain work related records;
- Ensure compliance of maintenance tasks with appropriate laws, rules, and regulations;
- Respond to inquiries and complaints regarding field maintenance operations;
- Inspect new installations and repair work;

- Participate in the development of new systems and equipment;
- Assist in developing, administering, and monitoring project budgets;
- Identification of maintenance repair needs and recommend corrective actions;
- Review plans and specifications;
- Participate in stand-by program;
- Coordinate emergency and special assignments with other City departments and divisions, and with outside agencies and companies; and
- Build and maintain positive working relationships with co-workers, other city employees, and the public using principals of good customer service.

3.1.2 Collections System Technician

Under the direction of the Collections System Supervisor, the Collections System Technician is a lead worker that provides a wide variety of skilled and semi-skilled maintenance, construction, and repair work. Additional responsibilities include the following duties:

- Lead field crew, train and assist supervisor in evaluating personnel;
- Operate and train personnel in the safe and proper operation of a wide variety of maintenance and construction equipment;
- Receive assignments and assist in the planning and layout of the work crew and scheduling and assigning specific duties to crew personnel;
- Review the work of assigned personnel;
- Participate in work of crews engaged in maintenance, construction, and repair work;
- Assist supervisor in selecting materials and estimating material and labor costs for jobs assigned;
- Ensure needed supplies, materials, and equipment are on hand;
- Record daily labor, material, and equipment costs;
- Maintain work related records;
- Perform more difficult work in the general O&M of the City sewer system and storm drains;
- Operate and check the operation of sanitary/storm sewer facilities, pumps, motors, valves, filters, programmable controllers, auxiliary engines and related equipment;
- Perform utility connection inspections, underground service alert markings, sanitary and storm drain responsibility checks;
- Respond to sanitary and storm sewer overflows and flooding problems;
- Setup sampling and flow monitoring equipment and collect samples;
- Install and repair underground pipes and remove blockages from sewer and storm drain lines;

- Perform sewer maintenance duties;
- Operate maintenance equipment and tools;
- Utilize proper safety precautions related to all work performed;
- Read and interpret maps of underground sewer and drainage systems;
- Participate in maintenance hole repairs, sewer line rodding, installation, and repairs on collection pipelines;
- Participate in standby program as required; and
- Build and maintain positive working relationships with co-workers, other city employees, and the public using principals of good customer service.

3.1.3 Public Works Maintenance Worker II

Under the direction of the Collections System Supervisor and Technician, the Public Works Maintenance Worker II provides a variety of semi-skilled and skilled tasks in the construction, maintenance, and repair of streets, signs, sewers, storm drains, and related public works facilities. Additional responsibilities include the following duties:

- Operate light and moderately heavy power driven equipment;
- Install and repair underground pipes and remove blockages from sewer and storm drain lines;
- Exercise valves and replace mainline valves;
- Test and install pipes; assist in maintaining and testing valves;
- Set up traffic safety devices and barricades;
- Perform sewer maintenance duties;
- Operate construction and maintenance equipment and tools;
- Perform street maintenance duties;
- Utilize proper safety precautions related to all work performed;
- Read and interpret maps of underground sewer and drainage systems;
- Maintain storm drains and ditches including removal of brush, trees, and weeds;
- Assist in maintaining drainage pump stations and sewer lift stations;
- Perform emergency street, sewer, storm drain or other Public Works maintenance work as required;
- Participate in standby program as required; and
- Build and maintain positive working relationships with co-workers, other city employees, and the public using principals of good customer service.

3.1.4 Collections System Worker (Potential Position)

Under the direction of the Collections System Supervisor, the Collections System Worker provides a variety of semi-skilled and skilled tasks in the construction, maintenance and repair of streets, signs, sewers, storm drains, and related public works facilities. Additional responsibilities include the following duties:

- Operate light and moderately heavy power driven equipment;
- Install and repair underground pipes and remove blockages from sewer and storm drain lines;
- Set up traffic safety devices and barricades;
- Perform sewer maintenance duties;
- Perform routine preventative maintenance on equipment;
- Perform street maintenance duties;
- Operate construction and maintenance equipment and tools;
- Utilize proper safety precautions related to all work performed;
- Read and interpret maps of underground sewer and drainage systems;
- Maintain storm drains and ditches including removal of brush, trees, and weeds;
- Assist in maintaining drainage pump stations and sewer lift stations;
- Maintain inventory of supplies;
- Perform emergency street, sewer, storm drain or other public works maintenance work as required;
- Assist in maintaining drainage pump stations and sewer lift stations;
- Operate and check the operation of sanitary/storm sewer facilities, pumps, motors, valves, filters, programmable controllers, auxiliary engines and related equipment;
- Perform utility connection inspections, underground service alert markings, sanitary and storm drain responsibility checks;
- Respond to sanitary and storm sewer overflows and flooding problems;
- Setup sampling and flow monitoring equipment and collect samples;
- Perform street maintenance duties;
- Participate in standby program as required; and
- Build and maintain positive working relationships with co-workers, other city employees, and the public using principals of good customer service.

3.1.5 Public Works Maintenance Worker I (Potential Position)

Under the direction of the Public Works Crew Supervisor, the Public Works Maintenance Worker provides a variety of semi-skilled and skilled tasks in the construction, maintenance and repair of streets, signs, sewers, storm drains, and related public works facilities. Additional responsibilities include the following duties:

- Operate light and moderately heavy power driven equipment;
- Install and repair underground pipes and remove blockages from sewer and storm drain lines;
- Exercise valves and replace mainline valves;
- Test and install pipes; assist in maintaining and testing valves;
- Set up traffic safety devices and barricades;
- Perform sewer maintenance duties;
- Perform routine preventative maintenance on equipment;
- Maintain wells;
- Maintain and repair fire hydrants;
- Operate construction and maintenance equipment and tools;
- Perform street maintenance duties;
- Utilize proper safety precautions related to all work performed;
- Read and interpret maps of underground sewer and drainage systems;
- Maintain storm drains and ditches including removal of brush, trees, and weeds;
- Assist in maintaining drainage pump stations and sewer lift stations;
- Paint traffic markings on streets, crosswalks, parking lots, and curbs;
- Manufacture and install traffic signs and remove old signs;
- Design and manufacture special signs for municipal facilities;
- Maintain inventory of traffic related supplies;
- Spread asphalt in patching and repairing streets;
- Respond to hazardous material incidents;
- Perform emergency street, sewer, storm drain or other public works maintenance work as required;
- Participate in standby program as required; and
- Build and maintain positive working relationships with co-workers, other city employees, and the public using principals of good customer service.

3.1.6 Temporary Staff

The temporary staff are responsible assisting the permanent staff in addressing work orders and completing preventative maintenance duties including controlling vegetation.

Temporary staff are hired through CalOpps, a public employment job board owned and operated by public agencies. Temporary employees are allowed to work a maximum of 1,000 hours in a fiscal year before CalPERS benefits must be provided. This time restriction limits the responsibilities these workers can take on due to the fact that they will not be long-term employees. In addition, each new temporary employee requires training, which is time taken from permanent staff duties. The current temporary staff lack certification which limits the types of work tasks they can perform. For example, temporary staff cannot operate large equipment, enter confined spaces, or conduct traffic control due to specialized training, certification, and insurance requirements.

3.1.7 After-Hours

The City has on-call staffing requirements for staff reporting to emergency calls during non-working hours. Currently the sewer, transportation, stormwater, and potable water staff share these responsibilities. The on-call requirement shift extends over one week. During this week, the on-call staff member must be available to respond to emergency calls and/or system alarms within an hour of the call. Once the staff member assesses the emergency condition they will call additional staff needed to address the condition. A public works on-call staffing schedule is prepared each month with current contact information for each division.

3.2 Labor Hour Analysis

The City provided timesheet data for the Public Works Department for 2011 through 2016, which indicated the number of hours worked by each employee in each division of public works. Figure 1 shows the seasonal pattern of the number of hours worked on Storm Division work over the six-year period. As shown on Figure 1, the 2015 and 2016 timesheet data had inconsistent information, which was found to be due to the use of a new City payroll software that was not tracking data consistently with past years. Therefore, 2015 and 2016 timesheet data is not included in this analysis, but provided only for reference.

Figure 1 also shows the average of years 2011 through 2014, which were relatively consistent with each other. It was expected that the Storm Division would require more labor hours in the wet weather months (October through April) than in the dry weather months. But rather than a weather season trend, Figure 1 shows a trend of less stormwater division staff hours in the wet months due to increased staff hours by both Transportation Division and temporary stormwater staff in the dry months to prepare for the wet months. The dry season maintenance work also depletes the budget for temporary staff, therefore, during the winter months stormwater staff have less overall manpower available. Note that Figure 1 only summarizes Storm Division staff hours, and that outside division staff hours that may have been dedicated to stormwater work are not shown (see Figure 2 for a summary of the total hours worked by all departments).

The timesheet data was also analyzed on an annual basis to find the interdepartmental patterns of work performed by non-Storm Division staff on stormwater work and the amount of work performed by Storm Division staff outside of stormwater work. Figure 2 shows that from 2011 to 2014 (2015 and 2016 data was inconsistent and is provided only for reference), the total number of hours required by the Storm Division was approximately four FTE's, or 6,020 hours per year. Figure 2 also shows that interdepartmental assistance from the Water, Wastewater, and Transportation divisions doubles the time spent on stormwater work by Storm Division staff, and significantly outweighs the time spent by Storm Division staff on non-stormwater work - indicating a clear staffing shortage in the Storm Division.

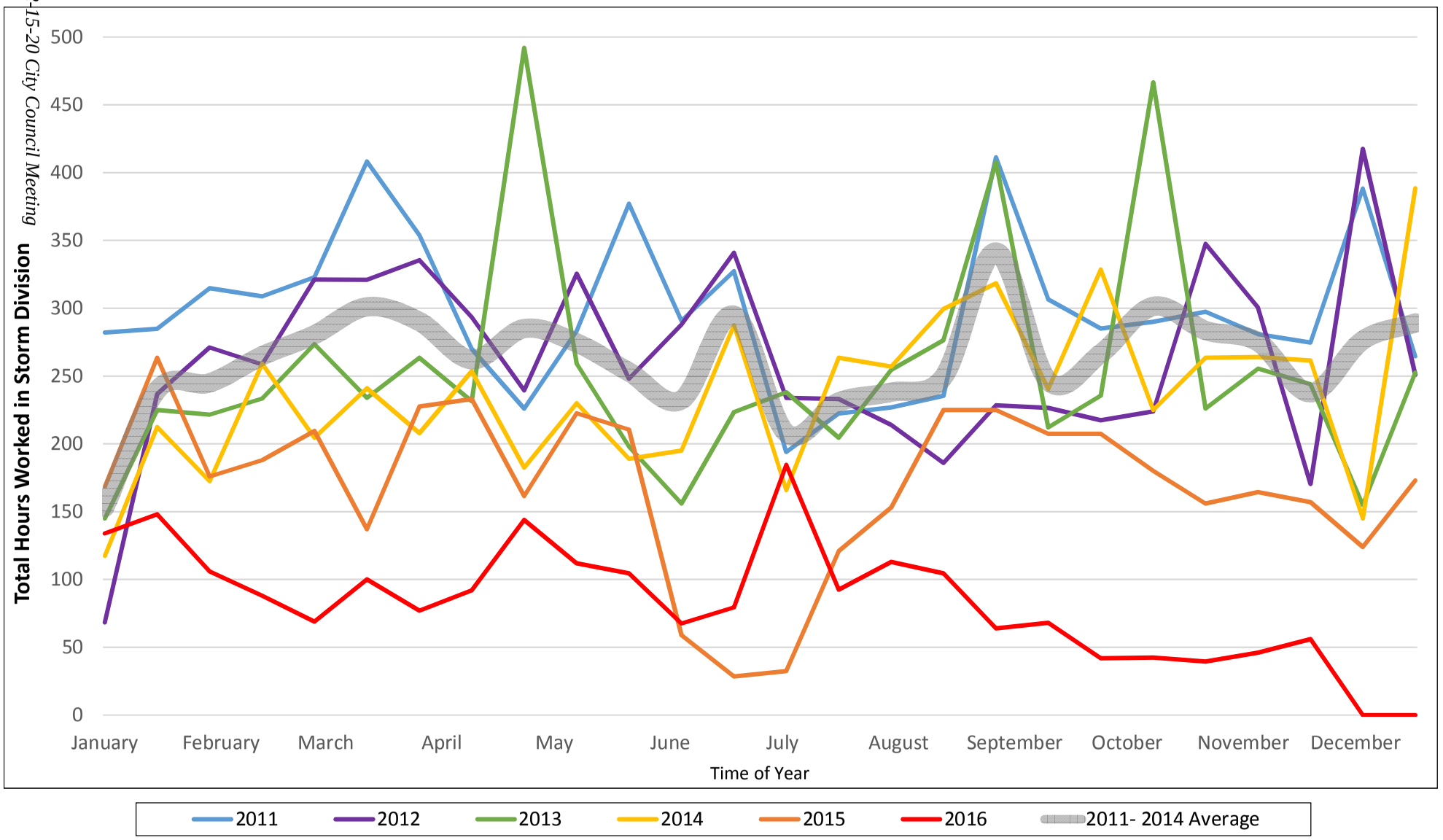
Figure 2 also shows annual rainfall totals, which do not appear to influence the number of hours worked on stormwater work in a given year.

3.3 Staffing Evaluation

In some instances, the task responsibilities described in the current job descriptions are repetitive and lack a clear delineation of task responsibility. For example, if two staff members have the same tasks in their job description, then it is unclear which staff member is ultimately responsible for task performance. A better approach would be to have a lead staff person whom is responsible and a back-up person identified in the absence of the lead staff person. The Collections System Technician has many duplicate task responsibilities to the direct supervisor, the Conveyance System Supervisor. Consequently, it can be difficult to determine who is truly accountable for these duties and to determine if the proposed workload is appropriate for the position. West Yost recommends indicating which tasks are performed as a back-up to the lead staff member assigned to the task. Based on staff interviews, it appears that the Collections System Technician regularly performs the tasks that also fall under the Conveyance System Supervisor job description. The Conveyance System Supervisor job description also lacks a focus on identifying, advancing and implementing larger repair and preventative maintenance projects.

According to the current job descriptions, each of the currently occupied positions have California Water Environment Association (CWEA) certification requirements. West Yost confirmed the current CWEA certifications with a publicly available certification database. Current staff meet the minimum certification requirements except for the Conveyance System Supervisor, which is required to have a Grade III Conveyance System Maintenance Certificate and currently holds a Grade II Conveyance System Maintenance Certificate.

Discussions with City O&M staff and review of O&M information indicate that there is a shortage of staffing needed to complete day-to-day operations and complete preventative maintenance tasks. There is also turnover of temporary staff that requires training of new staff. The City currently only has staffing to perform the day-to-day operations, corrective maintenance needs, and some preventative maintenance tasks. City staff noted that not all preventative maintenance tasks are being performed due to shortage of staff.

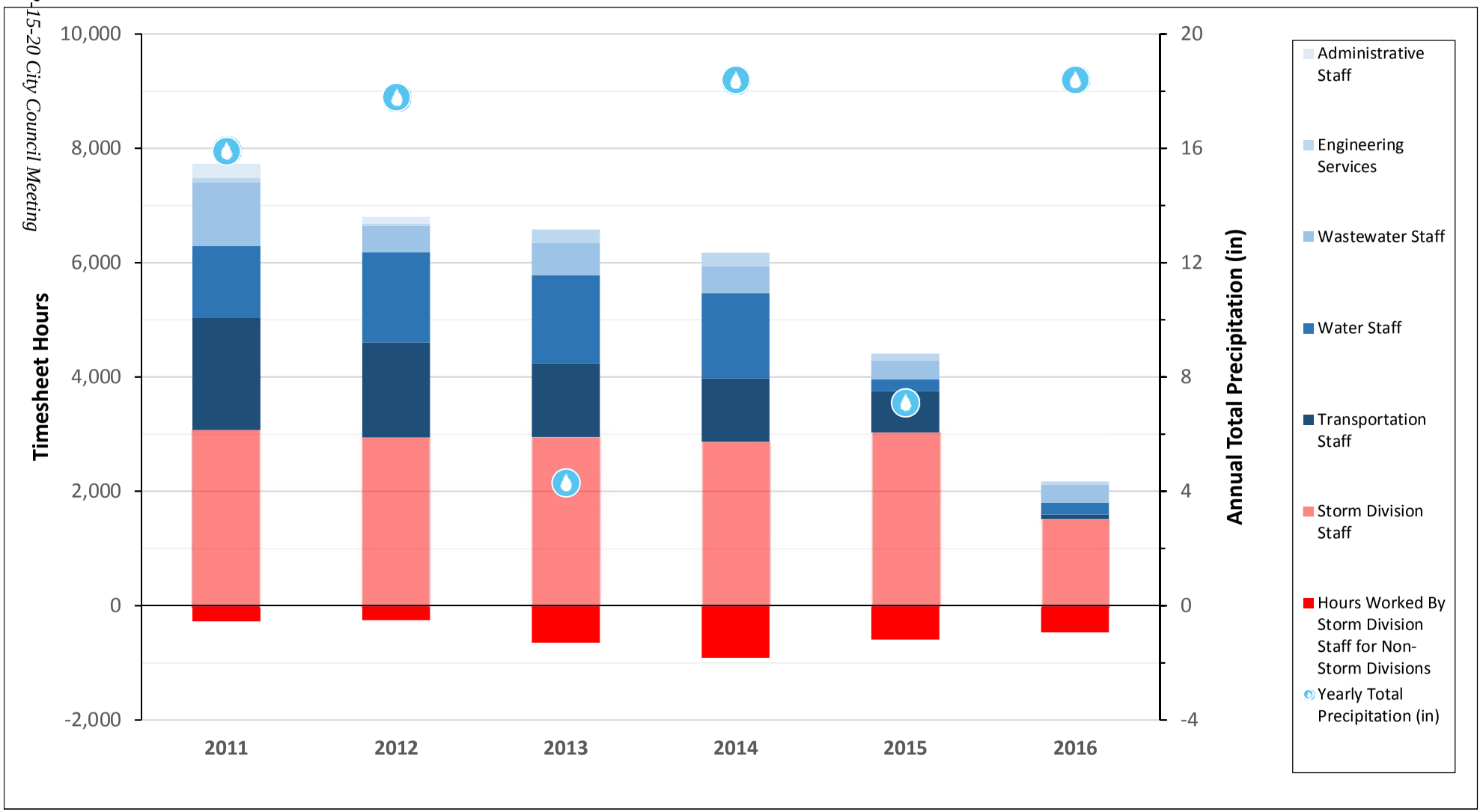


Note:
The 2015 and 2016 timesheet data has incomplete/inconsistant infomation due to the use of new City payroll software.

Figure 1

Seasonal Pattern of Storm Division Work

City of Davis
Stormwater Evaluation



Note:
The 2015 and 2016 timesheet data has incomplete/inconsistant infomation due to the use of new City payroll software.

Figure 2

Annual Hours Worked in Storm Division

City of Davis
Stormwater Evaluation

4.0 BENCHMARKING DATA SUMMARY

West Yost contacted other stormwater agencies to discuss how they implement their stormwater programs. The sections below describe the programs of six agencies of a similar service population to the City, plus two large, proactive stormwater agencies. The results of the benchmark data gathering are included in detailed call logs in Appendix C, and are summarized in Table 8. The six organizations are of comparable size are valuable for their small staff management strategies. The larger agencies lend experience with best management practices for stormwater facility maintenance frequencies and ideal supervisor to worker organizational arrangements. The experiences of each agency are unique, given that each have different hydrologic conditions, land use characteristics, geographic constraints, and infrastructure conditions. However, each had implemented different practices that could be applied to the City's system for improvement of the current staffing. Some management strategies include:

- Use of contractors for specific maintenance tasks, such as pipe flushing;
- Staffing more full time workers and fewer seasonal and management staff (suggested ratio of 5 maintenance staff per 1 field supervisor);
- Regular review and reprioritization of maintenance activities;
- Sharing of staff from other Divisions/Departments during wet-weather events; and
- Regular inspection and maintenance of stormwater facilities to reduce unplanned maintenance demands.

4.1 City of Hanford

West Yost spoke with Mike Consenza, Utilities Superintendent for the City of Hanford. The Utilities Department Stormwater Division maintains the City's stormwater facilities including 57 miles of pipe, 1 mile of channels, and 30 pump stations.

The Stormwater Division was created last year and was split from a joint division with sewer staff. Previously there were 7 maintenance workers and 1 foreman in this joint stormwater/sewer division. The Stormwater Division currently has 1 foreman and 3 maintenance workers, although they hope to add an additional 4 or 5 maintenance workers to the team. The Stormwater Division can request sewer/water division maintenance staff support as needed. Staff from other Divisions was frequently used in the past wet-weather season (3 to 4 times per month).

Maintenance activities are primarily focused on the 250 acres of ponding basins: spraying weeds, mowing, disking, scarify basins for percolation, removing trees, repairing the 21 miles of fence line, removing graffiti, and weekly inspection of the basins. Pump stations are visually inspected weekly, during which the pump is operated. The Stormwater Division does not have a proactive flushing program for the pipelines - the City has the equipment to flush the pipelines but do not have the staff to complete the work. Overall, the City estimates that 80 percent of staff time is spent on scheduled maintenance and 20 percent on reactive maintenance, such as repairing fences or clearing drains.

Table 8. Summary of Benchmarking Results

Agency	System Description and Annual Budget	Staffing	Key Performance Indicators (KPIs) and Goals for O&M Activities	O&M Frequencies	References for Preventative versus Reactive Maintenance
City of Davis	• Stormwater pipe – 93 miles • Channels – 16.7 miles • Drainage area – 10 square miles • Pump stations – 9 • Service population 65,000 • Annual O&M budget: $1.6M	• 1 Supervisor • 1 Lead worker • 1 Worker • 2 Seasonal Workers	• Performed inspection, cleaning, and repairs of 2,700 storm drain inlets; • Maintained 15 miles of stormwater channel; • Maintained and cleaned 5 drainage ponds; • Cleaned and inspected 6 stormwater detention ponds and 15 miles of drainage channels; and • Maintained 7 roads (1 mile) of maintenance access roads.	• Inspect drainage inlets twice per year • Clean siphons annually • Channel and basin clearing annually • Hydro-flush/CCTV storm drains as needed • Pump stations checked weekly, maintained quarterly	• Proactive pump station maintenance • 96% of drainage inlets inspected (28% cleaned) in 2016. • 8 siphons cleaned annually • Less than 1% of the storm drain system cleaned in the last 3 years • Some channels and access roads are not being regularly maintained due to limited staff resources.
City of Hanford	• Stormwater pipe – 57 miles • Channels – 1 mile (one channel) • Pump stations – 30 • Drainage area – 17 square miles • Service population – 59,338 • Annual O&M budget: $790,000	• Stormwater Division was created last year • 1 foreman and 3 maintenance workers • Would like to double number of staff members this year.	• Maintenance activities are primarily focused on the 250 acres of ponding basins: spraying weeds, mowing, disking, whipping basins for percolation, removing trees, repairing the 21 miles of fence line, removing graffiti • Weekly inspection of the basins • Pump stations are visually inspected weekly • Currently no proactive flushing program for the pipelines - City has the equipment but do not have enough staff to complete the work.	• Don't have planned flushing of system – will start to do this because of requirements of new permits • Pump stations – visual inspection at least once a week (inspect telemetry, control panels, oil) • Start and stop every pump station once a week	• 80% scheduled maintenance • 20% reactive to issues (fence repair, clogged drain) • May shift depending on amount of rain
City of Madera	• Pump stations - (unknown) • Drainage area – 26 square miles • Service population – 64,000 • Annual O&M budget - $720,000	• Streets Division manages the City's stormwater facilities including pipelines, basins, and pump stations. • No dedicated stormwater staff, stormwater is a sub-function of the Streets Division. • Streets Division is 27 people, 5-6 are typically utilized during a storm event • Usually use 5-6 people to perform maintenance on basins, but up to 10 if they are doing multiple basins in a day	• Maintenance activities include annual basin maintenance (clearing vegetation and reprofiling) and seasonal inlet/culvert maintenance (clearing leaves and vacuuming debris). • Pipelines not flushed regularly – vacuum out drain inlets and cross culverts seasonally, but not every inlet or culvert is done	• No set schedule for maintenance of pump stations – City is working on asset management for sewer and water, stormwater is next • Two lift stations are used regularly; the others are hardly ever used and not regularly inspected or maintained	• Estimated 95% preventative work • Estimated 5% reactive to an issue
City of Manteca	• Stormwater Pipe – 170 miles • Pump stations - 36 • Service Population – 75,000-80,000 • Annual O&M budget: $487,000	• Stormwater maintenance staff includes 10 maintenance staff led by the Collections Supervisor and WWTP Superintendent.	• Maintenance staff are conducting a visual inspection of all outfalls and pump stations to identify and fix maintenance issues and determine where illicit discharges may occur.	• Pipelines are not on a regular flushing or maintenance program • Drainage channel maintenance is completed by the South San Joaquin Irrigation District.	• Reactive maintenance program, but becoming more proactive because of inspections performed as part of the MS4 permit
City of Napa	• Stormwater pipe – 152 miles • Channels – 4-6 miles • Pump stations – 1 • Drainage area – 14,500 acres • Service population – 78,000 • Annual O&M budget: $1.4M	• 2 to 4 O&M staff members • 2 engineers for design and construction of storm drain/sewer/water projects • 12 maintenance workers that do stormwater work	• 4-6 miles of channels maintained annually	• Planned maintenance includes annual inspection and clearing of 114 drainage inlets and biennial channel maintenance	Not provided
City of Rocklin	• 467 Outlet structures • Service population – 60,000 • Annual O&M budget: (unknown)	• No designated stormwater crew • Streets Division – 5 full time, 5 to 6 part-time seasonal staff • City is currently working on an annual budget that would increase funds for stormwater maintenance.	• Flush pipes as needed (by private contractor) • Annual creek/channel maintenance including clearing outlets, trash removal, tree removal, and spraying for weeds. • Annual open space vegetation removal using goats.	• Annual maintenance of creeks coordinated by Fish and Wildlife. • No maintenance on detention basins.	• Most of the maintenance activities are reactive, due to budgetary constraints. • The City's stormwater infrastructure is nearing the end of its useful life. Pipes are lined on an emergency basis to extend their useful life. • Much of the system's corrugated metal pipe is failing.

Table 8. Summary of Benchmarking Results

Agency	System Description and Annual Budget	Staffing	Key Performance Indicators (KPIs) and Goals for O&M Activities	O&M Frequencies	References for Preventative versus Reactive Maintenance
City of Turlock	• Stormwater pipe – 133 miles • Channels – Approx. 110 miles • Lift/Pump stations – 40 • Service population – 72,000 • Annual O&M budget: $1.3M	• Maintenance Division staff dedicated to stormwater maintenance range from 6 to 16, depending on needs. • During storm events, the full 16-person staff is needed to respond to issues.	Not provided	• Preventative maintenance activities include weekly mowing of basins and weekly inspection of the pump stations.	Not provided
County of Orange	• Stormwater pipe – 740 miles • Channels – 350 miles • Pump stations – 7 • Drainage area – 789 square miles • Service Population – 3.1 million	Not provided	• Visual inspection of channels • Inspection of reinforced concrete boxes and pipes 36-inches and larger, conducted by confined space personnel entry • Visual inspection and cleaning of catch basins • Trash/debris removal • Inspection of channel subdrain vaults • Trash debris boom maintenance • Urban runoff diversion inspection • Ocean outlet cleaning • Flap gate/sluicegate inspection • Pump station trash rack cleaning • Herbicide treatment and rodent control • Channel sediment removal • Basin sediment removal	• Weekly Pump exercise • Monthly Pump station maintenance and debris cleaning • Annual Dam inspection • Maintenance activities that occur twice per year are typically conducted just before and just after the storm season. • Completed as needed – CCTV inspection of storm drain laterals, fence maintenance, access road maintenance, channel weep hole cleaning, graffiti cleanup, homeless encampment cleanup, corrugated metal pipe maintenance, and insect control.	Not provided
County of San Bernardino	• Drainage area - 20,000 square miles • The Flood Control District only maintains regional facilities – channels, basins, etc. • Each member City is responsible for maintaining their own system to the point at which it connects to the County's channels.	• 263 staff, which are assigned to one of three regions. • Each region has a Regional Superintendent. • Remote transportation yards (13) and 4 flood yards throughout the County staffed at various levels – each has supervisor (large yards also have lower level supervisor) and different numbers of field staff. • Staff is shared between flood control and transportation, as needed.	• Main KPI for department is the Roadside Pavement Condition Index (PCI) – they have at a set PCI and assign resources as needed to complete activities to maintain the goal PCI. • Goals for stormwater are to have the facilities ready to accept winter flows before they begin. Primary basins are empty and able to accept full design capacity. Channels are cleared if needed. • Since much of the work is based on severity of the seasons, it is difficult to establish many KPIs.	• Channel Maintenance – Trash and shopping carts are cleared as needed. • Channel vegetation removal is performed by District staff and weed spraying is performed by the County Agriculture Department. Weeds sprayed annually. • Each member City is responsible for the maintenance of their systems, including the pipelines up to the point of connection to the County's channels. • Currently considering getting a maintenance management system. Current system allows charges by activity code, but doesn't facilitate planned maintenance scheduling.	• Most of the stormwater activities are reactionary, due to the unpredictability and changes in needs in any given year. • The Division creates a CIP list annually. Large projects/reconstructions are sent out to contractors, but minor projects are done in house. • The activities (planned and unplanned) are regularly reviewed and reprioritized. Priorities may change depending on the season. There is always more to be done than can be done.

4.2 City of Madera

West Yost spoke with Dave Randall, Public Works Director for the City of Madera. The Public Works Department Streets Division manages the City's stormwater facilities including pipelines, basins, and pump stations. The Streets Division includes 27 staff, of which 5 to 6 are typically dedicated to stormwater maintenance, although up to 10 staff may be used for basin maintenance.

Maintenance activities include annual basin maintenance (clearing vegetation and reprofiling) and seasonal inlet/culvert maintenance (clearing leaves and vacuuming debris). The major pump stations facilities are maintained, but minor facilities with low use are not regularly maintained. Pipelines are not on a routine flushing program. The City is currently developing an asset management program for the sewer and water facilities, and will develop a program, including regular maintenance schedules, for the storm facilities next.

4.3 City of Manteca

West Yost spoke with Harfateh Grewal, Assistant Engineer for the City of Manteca Stormwater Department. The Stormwater maintenance staff include 10 maintenance staff led by the Collections Supervisor and Wastewater Treatment Plant (WWTP) Superintendent. Maintenance is largely preventative, due to inspection required by their MS4 NPDES permit. The maintenance staff are conducting a visual inspection of all outfall and pump stations to identify and fix maintenance issues and determine where illicit discharges may occur. Pipelines are not on a regular flushing or maintenance program. Drainage channel maintenance is completed by the South San Joaquin Irrigation District.

4.4 City of Turlock

West Yost spoke with Fallon Martin, Municipal Services Analyst for the City of Turlock. The Public Facilities Maintenance Division is responsible for maintaining the City's stormwater facilities including: 133 miles of pipelines, 110 miles of channels, and 40 pump stations. Maintenance Division staff dedicated to stormwater maintenance range from 6 to 16, depending on needs. During storm events, the full 16-person staff is needed to respond to issues. Preventative maintenance activities include weekly mowing of basins and weekly inspection of the pump stations.

4.5 City of Napa

West Yost spoke with Gerardo Mendez, Stormwater Coordinator for the City of Napa. The Stormwater Department maintains the City's stormwater facilities including: 152 miles of pipes, 5 miles of channels, and 1 lift station. The maintenance staff is comprised of 12 workers that may also do paving or concrete work. Planned maintenance includes annual inspection and clearing of 114 drainage inlets and biennial channel maintenance.

4.6 City of Rocklin

West Yost spoke with Rick Lawrence, Streets Supervisor for the City of Rocklin. The Streets Division is responsible for the stormwater facilities maintenance, although there is not a designated stormwater crew. The Division has five full time staff, and typically 5 to 6 part-time seasonal staff. The following maintenance activities are conducted on the stormwater facilities:

- Flush pipes as needed (by private contractor);
- Annual creek/channel maintenance including clearing outlets, trash removal, tree removal, and spraying for weeds; and
- Annual open space vegetation removal using goats.

Most of the maintenance activities are reactive, due to budgetary constraints. The City's stormwater infrastructure is nearing the end of its useful life. Pipes are lined on an emergency basis to extend their useful life. Much of the system's corrugated metal pipe is failing. The City is currently working on an annual budget that would increase funds for stormwater maintenance.

4.7 County of Orange

West Yost spoke with Richard Boon, Stormwater Program Chief for the Orange County Department of Public Works. The Stormwater Program manages the major stormwater facilities for the unincorporated areas of Orange County, as well as the 34 member-cities. These stormwater facilities include 740 miles of storm drain pipes, 7 pump stations, and 350 miles of channels.

The Operations and Maintenance Division created and follow maintenance activities, as documented in the comprehensive *Flood Control Channel Routine Maintenance Plan* report. This report documents the following maintenance activities and frequencies:

- Visual inspection of channels (twice per year);
- Inspection of reinforced concrete boxes and pipes 36-inches and larger, conducted by confined space personnel entry (once every two years);
- Visual inspection and cleaning of catch basins (three times per year);
- Trash/debris removal (twice per year);
- Vegetation clearing (twice per year);
- Inspection of channel subdrain vaults (once every three years);
- Trash debris boom maintenance (twice per year – before storm season and after);
- Urban runoff diversion inspection (once per week);
- Ocean outlet cleaning (twice per year – before storm season and after);
- Flap gate/sluicegate inspection (once per year);
- Pump exercise (once per week);
- Pump station maintenance and debris cleaning (once per month);
- Dam inspection (one per year);
- Pump station trash rack cleaning (twice per year);
- Herbicide treatment (pre-emergent annually, post-emergent three times per year);

- Rodent control (four times per year);
- Channel sediment removal (when height reaches 1-ft above design grade); and
- Basin sediment removal (when over 25 percent of design capacity).

Maintenance activities that occur twice per year are typically conducted just before and just after the storm season.

The following activities are completed on an as-needed basis as issues occur:

- CCTV inspection of storm drain laterals,
- Fence maintenance,
- Access road maintenance,
- Channel weep hole cleaning,
- Graffiti cleanup,
- Homeless encampment cleanup,
- Corrugated metal pipe maintenance, and
- Insect control.

4.8 County of San Bernardino

West Yost spoke with Brendon Biggs, Deputy Director of Public Works Operations for San Bernardino County. The Public Works Operations Department staff are responsible for the maintenance of the County's flood control and transportation facilities. Regional flood control facilities include channels and basins, and member cities maintain their own system up to the point of connection to the County channel.

Staff are assigned to one of 3 regions, and further assigned to remote yards throughout the County. Each Region has a Superintendent and each yard has one or two Supervisors, depending on size. Staffing of each yard is typically between 3 to 20 people. Typically, the ratio to field workers/operators to supervisors is approximately 5 to 1 (see the organizational chart included as Appendix D). Staff are shared between flood control and transportation, as needed.

Most of the stormwater activities are reactionary, due to the unpredictability and changes in needs in any given year. In a wet year, there may be significant storm damage done to roads, bridges, and other infrastructure that the staff will need to focus on. There may be fires, flash floods, or drought that affect maintenance needs. The Division creates a capital improvement project (CIP) list annually. Large CIP projects/reconstructions are sent out to contractors, but minor projects are completed in-house. There is always more work to be done than the staff have time to complete, so maintenance activities (planned and unplanned) are continuously reviewed and reprioritized. Priorities may change depending on the season.

5.0 RECOMMENDATIONS FOR PROGRAM MODIFICATIONS AND IMPROVEMENTS

This section describes suggestions for improvements to the City's existing stormwater operation and maintenance division.

5.1 Maintenance Frequencies

Existing and recommended modifications to the City's current maintenance schedules are listed in Table 9. Recommended frequencies are increased or remain the same as the existing goals for many maintenance tasks. For example, where the current frequency goal is adequate to maintain the system the recommended frequency remained unchanged. In general, frequencies were increased for tasks that may have a greater impact on the system if not completed and for tasks that can identify maintenance issues such as inspections. Recommended frequencies were decreased from existing goals for certain tasks to allow staff more time resources to address tasks that have not been consistently completed. Staff will need to evaluate performance and make any necessary adjustments to recommended frequencies after implementation of recommended goals and additional staffing.

5.2 Staffing Level Recommendations

In order to meet the recommended maintenance schedules in Table 9, the recommended staffing modifications are:

- Convert two temporary staff to one full-time entry-level worker position to improve efficiency and technical ability of this existing staff resource, and lesson the training burden on full-time staff.
- Add one new lead Collection System Technician position to maximize the flexibility of crew sizes to meet the maintenance tasks at hand. Adding a second Collection System Technician will allow the Storm Division to operate in the following crew formations:
  - Two (2) two-worker crews (each with one Collection System Technician, and one worker)
  - One (1) three-worker crew (for high-traffic, confined-space, or labor-intensive tasks), and one (1) one-worker crew (one technician for USA markings, service call response, etc.)
  - For days when one crew member is unavailable because of illness, vacation, training, or inter-departmental help: one (1) three-worker crew (maximizing crew cross-training efforts and/or completing intensive tasks)
- Consider one supervisor position per five field crew members.
- Adjust the tracking parameters in the new payroll software to allow continued tracking of historic labor hours.

Table 9. Recommended Preventative Maintenance Schedules

Activity	Existing Frequency Goal	Recommended Frequency
Channels		
Clear Debris and Trash	Annually	Biennially (every two years)
Visual Inspection	Annually	Biannually (twice a year)
Herbicide Treatment (Pre-emergent)	*None*	Annually
Herbicide Treatment (Post-emergent)	Annually	Biannually
Rodent Control	*None*	Quarterly
Clear Outlets and Inlets	Annually	*No change*
Regrade Slopes	Annually	Biennially
Pipes, Maintenance Holes and Inlets		
CCTV Inspection of Pipes (including laterals)	None	Every 5 years
Hydro-jet Pipes and Maintenance Holes	Annually	Every 5 years
Flush Siphons	Quarterly	Biannually
Basins and Ponds		
Visual Inspection and Vegetation Clearing	Quarterly	Annually
Trash/Debris Removal	Quarterly	Annually
Herbicide Treatment (Pre-emergent)	*None*	Annually
Herbicide Treatment (Post-emergent)	Quarterly	*No change*
Inspect Inlets	Annually	*No change*
Clear Inlets/Outfalls	Annually	*No change*
Stormwater Pump Stations		
Pump Exercise	Monthly	Monthly
Station Maintenance -Record Readings -Check Motor Oil -Check Dripper Pot -Exercise Pump -Check for Vandalism -Check Bar Screens -Check Panel Lights -Test Area Lighting -Exercise Discharge Valve -Check Pest Traps -Test Station Alarms	Quarterly	Monthly
Bike Tunnel Pumps		
Station Maintenance -Record Readings -Exercise Pump -Check for Vandalism -Clear Area / Wash Down -Inspect Wet Well -Inspect Inlet Grates -Check Panel Lights	Monthly	*No change*
General		
Grade access roads	Quarterly	Annually
Inspect Fencing	Quarterly	*No change*
Inspect Signage	Quarterly	*No change*
Trim Trees	Quarterly	Annually

5.3 Maintenance Recommendations

The following provides the top priority maintenance recommendations for the stormwater system based on limited staff resources.

5.3.1 Drainage Pump Station Maintenance

West Yost recommends the generator at SDS#9 be tested and serviced monthly to ensure automatic operational functionality. Testing frequency should also comply with air quality permit requirements. In addition, generator fuel level is currently being observed and maintained based on use. All pump station equipment should be maintained according to manufacturer's recommendations. West Yost recommends all equipment maintenance should be documented for historical reference and warranty conditions. Documentation should include records of the following:

- Oil levels, lubrication;
- Suction and discharge pressures;
- Pump motor run hours;
- Number of pump stops and starts;
- Station flow Power usage and cost;
- Testing results; and
- Motor current draw

West Yost recommends daily drive-by visual inspections of these facilities continue during wet weather months, and that O&M Manual and manufacturers recommendations be followed for maintenance activities. Mechanical and electrical equipment repairs are currently performed by wastewater treatment plant staff and transportation staff, respectively, who have the appropriate skill sets to perform this specialized type of work. Large drainage pump station repairs, such as a pump replacement or rebuild, should be completed through an engineering CIP.

In the long-term, West Yost recommends pump capacity and efficiency be measured with pump tests. The pump tests should be compared to the original factory settings to determine if losses in pump capacity and efficiency will cause pumps to be targeted for repair and/or replacement due to wear. West Yost recommends pumps with horsepower's greater than 25 HP, be monitored for heat, vibration, and noise every 3-5 years to identify any changes that could be occurring and reducing overall pump service life. Large pumps and motors should be tested for heat and vibration through thermography and vibration analysis. These tests are used to identify pump issues that may reduce the overall life of a pump. Thermal imaging can identify issues with grease and oil or worn pump bearings. Vibration testing can identify issues with bearings and/or shaft and motor alignment. Motor resistance testing can also identify motor winding insulation health. These types of tests are considered preventative maintenance items to extend the life and efficiency of pumping equipment.

5.3.2 Conveyance System Cleaning and Condition Assessment

Periodic storm drain system cleaning removes accumulated sediment, trash, and other possible obstructions and pollutants. Routine cleaning reduces the amount of trash and debris that will eventually reach receiving waters. Without routine cleaning, clogging and/or a reduction in overall pipe capacity may occur, which can increase the risk of flooding. Priority should be given to older pipes, recurring problem spots, and pipes with flat slopes that do not flush sediment and debris well.

Since approximately 20 percent of the storm drain system has passed its expected useful life, and another 40 percent of the system is not far behind, it will be proactive for the City to inspect the condition of the piping system before failures start systematically occurring. CCTV inspection will establish a baseline condition for storm drain system, and allow the City to schedule and prioritize future cleaning and rehabilitation work. Best management practices are to inspect aging underground piping systems using a condition rating system on a five-year cycle to monitor the progress of structural defects over time. However, CCTV inspection can require expensive equipment, require skilled training, and be labor-intensive. It also requires that each pipe be hydro-cleaned ahead of the CCTV inspection crew to remove debris and cobwebs that hide structural and maintenance defects and/or prohibit the CCTV camera from traveling through the pipe. Given the current Storm Division staffing limitations, adding a large internal CCTV program does not appear feasible now, but would remain a good, long-term goal for the Division. In the meantime, it is recommended that within the next two years, the City hire outside CCTV contractors (who will hydro-clean each pipe first, then conduct a condition assessment) to inspect the storm drain assets that were installed on or before 1960 (approximately 18 percent of the system), along with any large-diameter and/or critical pipes. This will give the City short-term maintenance and repair/replacement programs that can jump-start the development of a long-term proactive program.

5.3.3 Maintenance Hole Cleaning, Repair, and Replacement

Since the City is currently not cleaning the entire system on a fixed-frequency, maintenance holes are also not being accessed regularly. It's important to access maintenance holes on a regular basis to maintain their accessibility and monitor any problems. Maintenance hole access can be lost when covers get mistakenly paved or built over, so it's important to locate and access manholes on a five to ten-year cycle – and after every street paving project. The cleaning and CCTV work recommended above will facilitate the access of approximately 20 percent of the maintenance holes, so it is recommended that the City develop a tracking system to ensure that over the next seven to ten years, all the maintenance holes get accessed. The condition of each manhole is equally as important as the condition of the pipelines to prevent flooding. Visual inspection (NASCCO MACP Level 1 inspections) of the manhole structure from the ground surface does not require confined-space entry, and is recommended at the time each manhole is accessed. Photographs should be taken of any observations for the facilitation of repairs and for historic condition records.

5.3.4 Detention Basin and Pond Maintenance

West Yost recommends annual inspection of these facilities at a minimum. Inspections and maintenance tasks should include:

- Removal and disposal of litter and dead vegetation;
- Accumulated sediment, oil and any other pollutants;
- Evidence of settlement or sinkholes;
- Evidence of rodent holes in dams or berms and removal of rodents;
- Identify any slope erosion and repair eroded slopes when rills form;
- Inspect sediment trap;
- Inspection after storm events for infiltration;
- Removal of trees and weeds that are growing within the pond, on side slopes/berms, or within the emergency overflow area. It is recommended that the City use outside contractors for drainage pond dredging as needed to increase pond capacity;
- Remove sediment to 10 percent of the designed ponds depth during summer months;
- Maintain vegetation (mow and weed trim to match surrounding area); and
- Identify and remove any pollutant sources.

5.3.5 Access Road and Grounds Maintenance

West Yost recommends inspecting access roads and grounds on an annual basis when the facilities they service are inspected and/or maintained. Maintenance activities include the removal of litter, vegetation management, and erosion control. In addition, fences and gates should be periodically inspected to ensure access is being restricted.

5.3.6 Standard Operating Procedures and Operation and Maintenance Manual

Many of the existing O&M manuals, forms, and Standards Operating Procedures (SOP's) apply to the wastewater collection system and/or are outdated (over 10 years old) and need to be updated to reflect current requirements, methods, and equipment. O&M Manuals and SOP's should be reviewed at least once every two years, and updated as necessary. Staff indicate that the current manuals are not detailed enough for a new staff member to pick up and use without additional training required.

Because of the current staffing limitations, it is recommended that the Storm Division seek consultant support to work with staff to update the SOP's. For budgetary purposes, the City can plan for an average consultant cost of $3,200 to $3,500 to update maintenance SOPs.

Existing O&M guidance should be supplemented with procedures or information that address the following topics:

- Customer complaint response protocol and record keeping;
- Start-up, shut-down, sequencing and adjustment procedures for mechanical equipment;
- Detailed preventative maintenance procedures for mechanical equipment;
- Description of valve positions related to various operational scenarios;
- Types and amounts of lubricants for mechanical equipment;
- List of replacement parts to be kept on hand for each piece of mechanical equipment;
- Any environmental factors which may affect operation;
- Manufacturer recommended O&M procedures;
- Common operating problems and solutions;
- How changes to normal operation should be addressed;
- Alternative operating procedures such as operations when equipment is out of service; and
- Current manufacturer contact information.

5.3.7 Computerized Maintenance Management System

It is recommended that the Storm Division fully utilize the Lucity™ software capabilities to improve data collection of labor hours and increase work order task designations. Work order instructions may include specifications for fuels, lubricants, filters, and other items related to specific equipment. The manufacturer's maintenance recommendations for equipment-specific O&M manuals should be incorporated into the schedule of preventative maintenance tasks. The Collections System Supervisor will be responsible to ensure that work orders are being issued and completed, and that timely work order action codes, notes, and labor hours are incorporated.

It's also recommended that the Storm Division implement a work order prioritization system. Below are several example categories which could be used to prioritize work orders:

- **Emergency** – Catastrophic failure has or is about to occur which may be a hazard to the public, eminent flood risk, or may be dangerous to personnel. Work must be performed immediately. Around the clock work and outside contractors may need to be authorized.
- **Urgent** – Failure that could affect the flooding, personnel health, or a repair that can greatly improve the system. Generally, applies to equipment with no back up. Overtime and outside contractors may need to be authorized.
- **Important** – May adversely affect or damage equipment or infrastructure. Work should be planned within two weeks, if possible.
- **Routine** – Desirable to repair, but not threatening equipment or flooding potential. Complete the work preferably within 4 weeks.

- **Contingency** – Will extend the life of equipment, will reduce cost of operation, and will improve the system. Routine work should be scheduled according to workload, as fill-in for the end of the day or on days when no work has a higher priority. Complete the work preferably within 8 weeks.

5.3.8 Key Performance Indicators

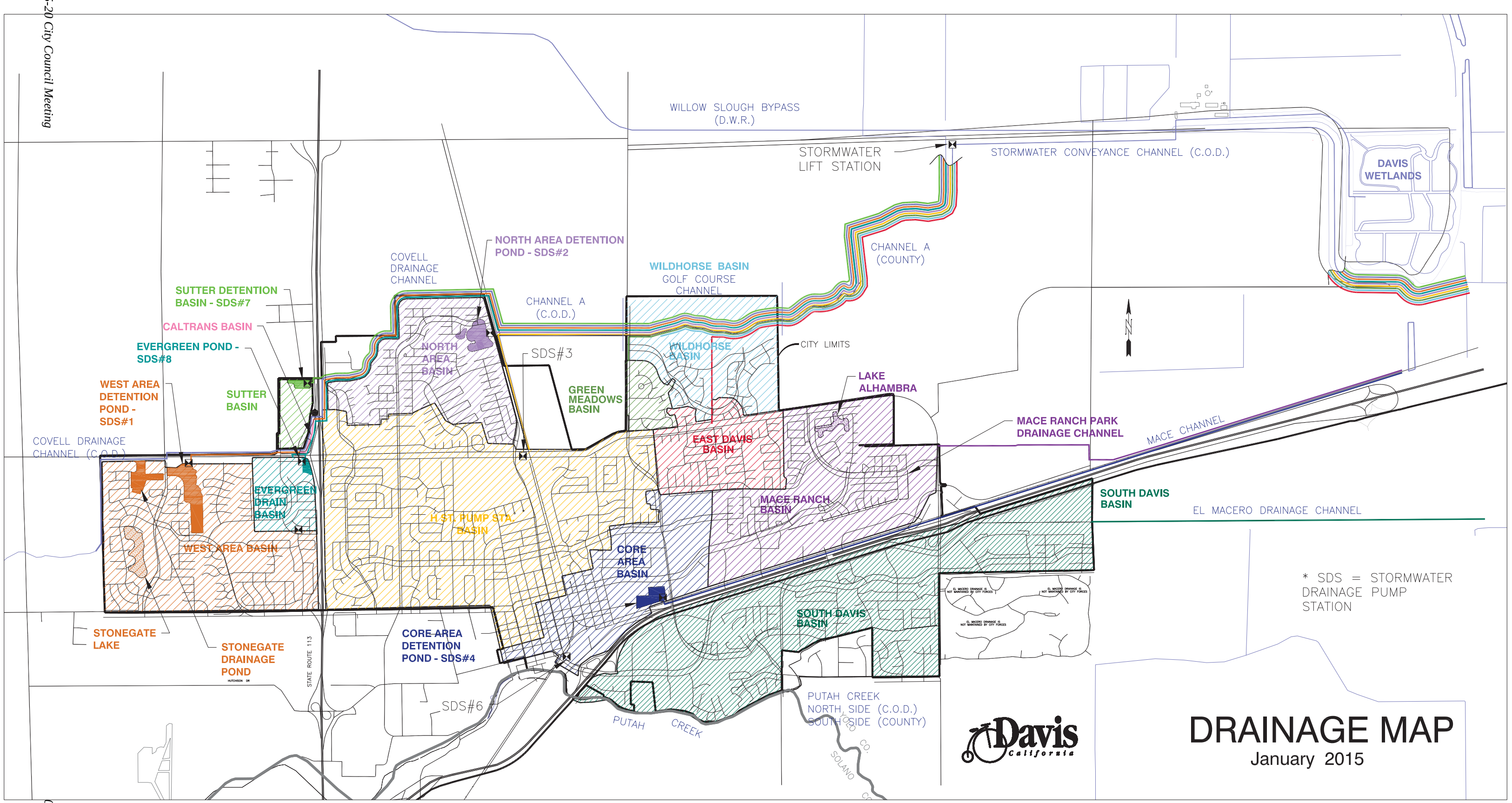
It is recommended that performance of maintenance be measured and evaluated using KPIs that are consistent from year to year, showing improvements and progress over time. Typically, KPIs are expressed numerically. The following are common KPIs for stormwater programs:

- Quantity of detention pond and channel inspections and cleanings per month/year,
- Pipe cleaning/video inspection rates per year (recommended as contract labor),
- Percentage of preventative work orders completed on schedule, and
- Number of staff hours on preventative vs. corrective work orders.

Target values will need to be established for each KPI to evaluate performance indicators on a regular basis. It is recommended that these KPIs be reported to management monthly, and summarized in an annual Storm Division report to City Council. Reporting provides accountability on the Division's goals, and helps communicate challenges with management and elected officials.

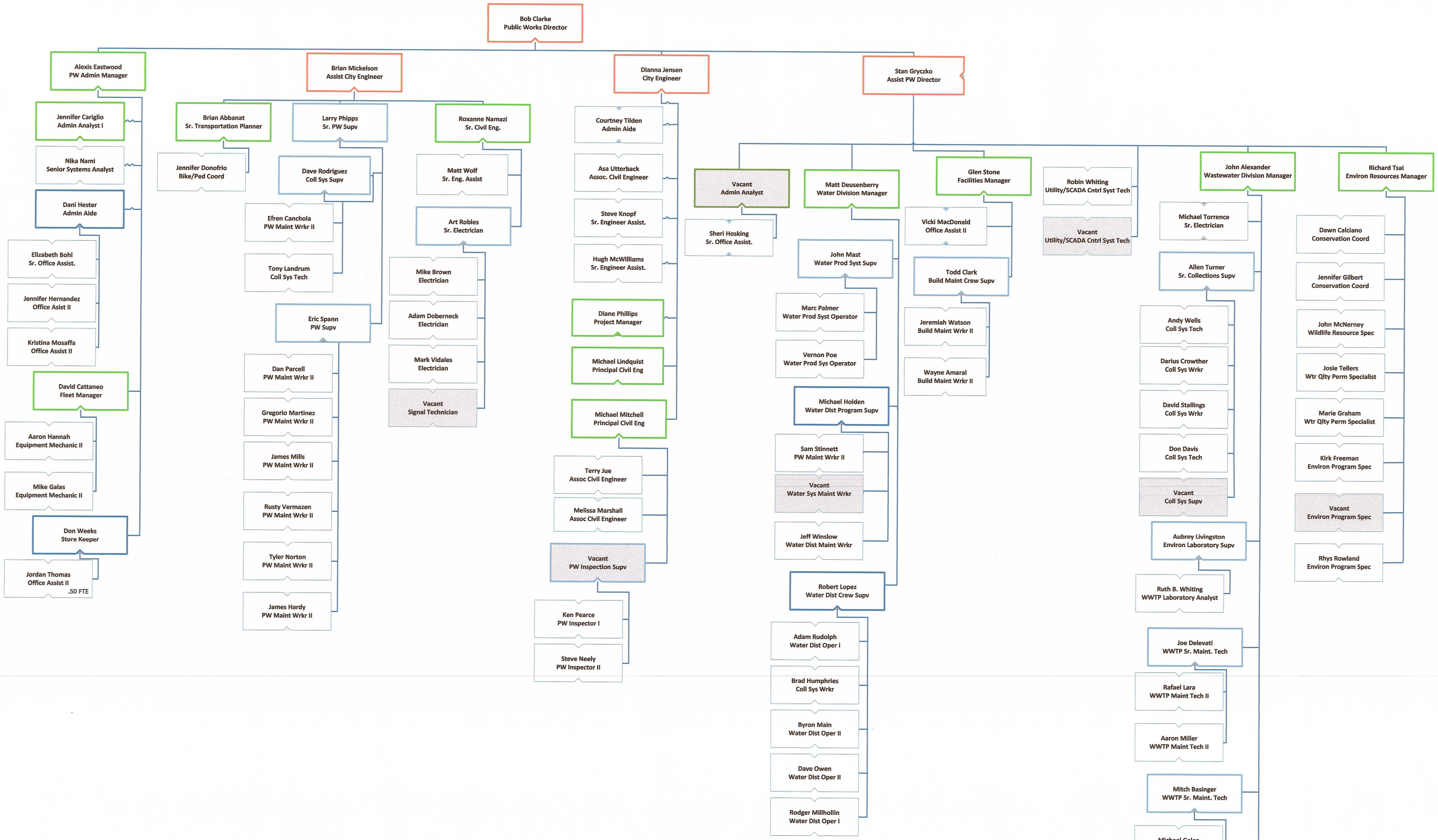
APPENDIX A

Drainage Areas


WILLOW SLOUGH BYPASS
(D.W.R.)
STORMWATER
LIFT STATION
STORMWATER CONVEYANCE CHANNEL (C.O.D.)
DAVIS
WETLANDS
CHANNEL A
(COUNTY)
NORTH AREA DETENTION
POND - SDS#2
COVELL
DRAINAGE
CHANNEL
WILDHORSE BASIN
GOLF COURSE
CHANNEL
CHANNEL A
(C.O.D.)
SUTTER DETENTION
BASIN - SDS#7
CALTRANS BASIN
EVERGREEN POND -
SDS#8
NORTH
AREA
BASIN
SDS#3
WILDHORSE
BASIN
CITY LIMITS
LAKE
ALHAMBRA
WEST AREA
DETENTION
POND -
SDS#1
SUTTER
BASIN
GREEN
MEADOWS
BASIN
MACE RANCH PARK
DRAINAGE CHANNEL
MACE CHANNEL
COVELL DRAINAGE
CHANNEL (C.O.D.)
EAST DAVIS
BASIN
EVERGREEN
DRAIN
BASIN
H ST. PUMP STA.
BASIN
MACE RANCH
BASIN
SOUTH DAVIS
BASIN
EL MACERO DRAINAGE CHANNEL
WEST AREA BASIN
CORE
AREA
BASIN
EL MACERO DRAINAGE IS NOT MAINTAINED BY CITY FORCES
EL MACERO DRAINAGE IS NOT MAINTAINED BY CITY FORCES
EL MACERO DRAINAGE IS NOT MAINTAINED BY CITY FORCES
SOUTH DAVIS
BASIN
STONEGATE
LAKE
STONEGATE
DRAINAGE
POND
HUTCHISON DR
STATE ROUTE 113
CORE AREA
DETENTION
POND - SDS#4
SDS#6
PUTAH CREEK
NORTH SIDE (C.O.D.)
SOUTH SIDE (COUNTY)
PUTAH CREEK
YOLO CO.
SOLANO CO.
* SDS = STORMWATER
DRAINAGE PUMP
STATION
Davis
california
DRAINAGE MAP
January 2015

APPENDIX B

Public Works Org Chart



Regular Full Time	93.5
Vacant Positions	6.0
Total Staff (FTE's)	99.5

City of Davis
Public Works Department

Printed: 08/30/2016

APPENDIX C

Benchmarking

City of Handford
Mike Consenza, Utilities Superintendent, 559-585-2550
Description of Facilities & System Map *(i.e., miles of stormwater pipes, miles of channels, acres of tributary area, numbers of lift/pump stations, service population)*
Miles of stormwater pipe – 57 miles Miles of channels – 1 mile (one channel) Acres of tributary area – 17 square miles (basically the city limits) Number of lift stations – 30 total; 15 – off street pumping; 15 – pumps in ponding basins (turned on during off peak rain events to make room in the system depending on needs) Service Population – 59,338
Organizational Chart *(Identify stormwater operations and maintenance staff – differentiate between field staff and management staff. Ask if cross-departmental or seasonal help is provided for wet-weather events.)*
Division split last year into separate sewer and storm drain division (were 8 employees, 7 maintenance and 1 foreman). New standalone stormwater division includes 1 foreman, 3 maintenance workers. Not enough people. Will be asking for 4 or 5 more maintenance workers in the future. Stormwater has the option to have sewer/water division maintenance staff come to help out – this year they have utilized staff from other divisions frequently (3 or 4 times a month during the rainy season) Department has a utilities supervisor that oversees daily field operations of water and storm drain operations in the field
Key Performance Indicators (KPI) and Goals for O&M Activities *(e.g., miles of pipe flushed per year, miles of channels maintained, number of service calls)*
Miles flushed per year – no proactive flushing at all. City has the equipment, but does not have enough people to do the work. Number of service calls – 1 a week in the rainy season, maybe 2 if there are bad rainstorms 250 acres of ponding basins – Maintenance includes spraying weeds, mowing, discing, whipping the basins for percolation, removing trees, inspecting/repairing 21 miles of fence line, spraying fence line, removing graffiti. Inspect fence lines and ponding basins weekly – 1 staff person does this on Wednesdays
O&M Activity Frequencies *(e.g., flush system every 5 years, annual visual inspection and maintenance of pump stations, annual vegetation clearing from basins)*
Don't have planned flushing of system – will start to do this because of requirements of new permits Pump stations – visual inspection at least once a week (inspect telemetry, control panels, oil) Start and stop every pump station once a week
Resources for Preventative Maintenance versus Reactive Maintenance *(Try to get a sense of how much time is spent doing scheduled activities versus time spent responding to issues)*
80% scheduled maintenance 20% reactive to issues (fence repair, clogged drain) May shift depending on amount of rain
Additional Information *(Ask if there is anything else that we should know about the Agency's O&M Staff and Activities)*
Will probably try to double staff this year

City of Madera
Dave Randall, Public Works Director, 559-661-5461
Description of Facilities & System Map *(i.e., miles of stormwater pipes, miles of channels, acres of tributary area, numbers of lift/pump stations, service population)*
Mile of pipes – Miles of channels – no channels Acres of tributary area – 26 square miles Number of life stations - Service population – 64,000
Organizational Chart *(Identify stormwater operations and maintenance staff – differentiate between field staff and management staff. Ask if cross-departmental or seasonal help is provided for wet-weather events.)*
No dedicated stormwater staff, instead stormwater is a subfunction of the Streets Division. Streets Division is 27 people, 5-6 are typically utilized during a storm event Dry and wet season staff are the same Usually use 5-6 people to perform maintenance on basins, but up to 10 if they are doing multiple basins in a day
Key Performance Indicators (KPI) and Goals for O&M Activities *(e.g., miles of pipe flushed per year, miles of channels maintained, number of service calls)*
No hard metrics tracked by the department Maintain every basin annually – to clean up vegetation and reprofile if there has been erosion Pipelines not flushed regularly – vacuum out drain inlets and cross culverts seasonally, but not every inlet or culvert is done Leaf pickup throughout the city (paid for by solid waste funds) Only get service calls when there is very heavy rain and streets become flooded
O&M Activity Frequencies *(e.g., flush system every 5 years, annual visual inspection and maintenance of pump stations, annual vegetation clearing from basins)*
Facilities division has electricians and they help with maintenance of motors, controllers at pump stations No set schedule for maintenance of pump stations – City is working on asset management for sewer and water, stormwater is next Two lift stations are used regularly; the others are hardly ever used and not regularly inspected or maintained
Resources for Preventative Maintenance versus Reactive Maintenance *(Try to get a sense of how much time is spent doing scheduled activities versus time spent responding to issues)*
Most of work is preventative (leaf pickup, clearing culverts and inlets, basin maintenance) maybe 5% of time is reactive to issues Work orders are not used, so time use is difficult to track with precision
Additional Information *(Ask if there is anything else that we should know about the Agency's O&M Staff and Activities)*
Issue of stormwater quality is becoming more of an issue and they are starting to look into ways to address that Looking into installation of pervious surfaces to replace impervious surfaces

City of Manteca
Harfateh Grewal, Assistant Engineer – Stormwater, 209-456-8429
Description of Facilities & System Map *(i.e., miles of stormwater pipes, miles of channels, acres of tributary area, numbers of lift/pump stations, service population)*
Miles of pipe – Miles of channel – Acres of tributary area – Basins - Lift stations – Service population – 75,000-80,000
Organizational Chart *(Identify stormwater operations and maintenance staff – differentiate between field staff and management staff. Ask if cross-departmental or seasonal help is provided for wet-weather events.)*
1 crew for sewer and storm collections systems. Crew is based at WWTP and includes about 10 maintenance staff members led by the WWTP superintendent and Collections Supervisor Haven't had to ask other departments for help
Key Performance Indicators (KPI) and Goals for O&M Activities *(e.g., miles of pipe flushed per year, miles of channels maintained, number of service calls)*
Does not think there is a flushing schedule for pipelines As part of NPDES permit, they are surveying outfalls and pump stations to identify areas where illicit discharges may take place and also areas that need maintenance attention Service calls – 3-5 per month, only received 2 in the month of February (clogged storm drain inlet, pump issues, illicit discharges are typical issues)
O&M Activity Frequencies *(e.g., flush system every 5 years, annual visual inspection and maintenance of pump stations, annual vegetation clearing from basins)*
Have an agreement with South San Joaquin Irrigation District to assist with drainage channel maintenance
Resources for Preventative Maintenance versus Reactive Maintenance *(Try to get a sense of how much time is spent doing scheduled activities versus time spent responding to issues)*
Have more of a reactive maintenance program, but have lately been becoming more proactive because of the inspections they are performing as part of their MS4 permit Didn't see a big uptick in stormwater issues this winter with big storms
Additional Information *(Ask if there is anything else that we should know about the Agency's O&M Staff and Activities)*

City of Napa
Gerardo Mendez, Stormwater Coordinator, 707-257-9520 Karl Ono, Operations Engineer, 707-257-9407
Description of Facilities & System Map *(i.e., miles of stormwater pipes, miles of channels, acres of tributary area, numbers of lift/pump stations, service population)*
Miles of pipe – 152 miles Miles of channel – unknown, lots of surface drainage is comingled with the County (Napa County Flood Control District), shared responsibility for maintenance, typically alternate years for maintenance. Approximately 4-6 miles. Acres of tributary area – 14,500 acres Lift stations – 1 Service population – 78,000
Organizational Chart *(Identify stormwater operations and maintenance staff – differentiate between field staff and management staff. Ask if cross-departmental or seasonal help is provided for wet-weather events.)*
MS4 permit compliance, phase 2 – 2 to 4 staff members. $30,000 dollars O&M – 2 engineers for design and construction of storm drain/sewer/water projects, crew of 12 maintenance (could be paving, concrete crew, no dedicated crew) that do stormwater work 114 DI that are inspected and maintained annually as part of permits
Key Performance Indicators (KPI) and Goals for O&M Activities *(e.g., miles of pipe flushed per year, miles of channels maintained, number of service calls)*
4-6 miles maintained annually
O&M Activity Frequencies *(e.g., flush system every 5 years, annual visual inspection and maintenance of pump stations, annual vegetation clearing from basins)*
Resources for Preventative Maintenance versus Reactive Maintenance *(Try to get a sense of how much time is spent doing scheduled activities versus time spent responding to issues)*
Additional Information *(Ask if there is anything else that we should know about the Agency's O&M Staff and Activities)*

City of Rocklin
Rick Lawrence, Streets Supervisor, 916-625-5500
Description of Facilities & System Map *(i.e., miles of stormwater pipes, miles of channels, acres of tributary area, numbers of lift/pump stations, service population)*
Miles of pipe – Miles of channel – Acres of tributary area – Lift stations – none Service population – 467 outlet structures
Organizational Chart *(Identify stormwater operations and maintenance staff – differentiate between field staff and management staff. Ask if cross-departmental or seasonal help is provided for wet-weather events.)*
Not a large in house facility – staff of five full time, hire five to six part time seasonal staff members Maintain SOS, storm drain lines, creeks and open space areas, drainage outlets Contract with private vendor – Vactor service – utilized heavily for cleaning services Just purchase their own Vactor truck Broke city into thirds Streets division does all maintenance, doesn't have a team just dedicated to storm.
Key Performance Indicators (KPI) and Goals for O&M Activities *(e.g., miles of pipe flushed per year, miles of channels maintained, number of service calls)*
Clean SOS 1/3 – each one every three years Pipes flushed – done by need, as plugged or dirty systems are found, cleaned by contractor Have a lot of corrugated metal pipe that is reaching the end of its life Doing a lot of pipelining – based on funding, but pretty much on an emergency basis Trying to get more money from City County, getting an annual budget Annual maintenance of creeks – August 15 – October 15 dedicated to creek maintenance, walk the entire system, identify trees that need to be removed, trash removal. Clear all outlets. Spray for weeds at outlets. Coordinated through Fish and Wildlife. Basins are pretty maintenance free – basins are closed as needed Detention basins serve as water quality controllers Grazing program – goats and sheep graze on open space areas, going into 4th or 5th year. Also, helps with fire prevention Few service calls
O&M Activity Frequencies *(e.g., flush system every 5 years, annual visual inspection and maintenance of pump stations, annual vegetation clearing from basins)*
Just use slide gates for detention basins
Resources for Preventative Maintenance versus Reactive Maintenance *(Try to get a sense of how much time is spent doing scheduled activities versus time spent responding to issues)*
Reactive because of budget issues Try to remain proactive
Additional Information *(Ask if there is anything else that we should know about the Agency's O&M Staff and Activities)*
Biggest threat is corrugated metal pipes

City of Turlock
Fallon Martin, Municipal Services Analyst, 209-668-5590, famartin@turlock.ca.us
Description of Facilities & System Map *(i.e., miles of stormwater pipes, miles of channels, acres of tributary area, numbers of lift/pump stations, service population)*
Miles of stormwater pipelines in system: 133 +/- Miles of stormwater channels in system: 110 +/- Total tributary area (acres or square miles): Same as the City +/- Number of lift/pump stations: 40 Service population: 72,000 +/-
Organizational Chart *(Identify stormwater operations and maintenance staff – differentiate between field staff and management staff. Ask if cross-departmental or seasonal help is provided for wet-weather events.)*
Total number of staff dedicated to stormwater operations minimum of 6 and maximum of 16 Is cross-departmental help provided for wet weather events? Yes, Public Facilities Maintenance Is seasonal help provided during wet weather? No
Key Performance Indicators (KPI) and Goals for O&M Activities, (*e.g., miles of pipe flushed per year, miles of channels maintained, number of service calls)*
O&M Activity Frequencies *(e.g., flush system every 5 years, annual visual inspection and maintenance of pump stations, annual vegetation clearing from basins)*
How often is vegetation cleared from basins? Mowed weekly How often are pump stations inspected and maintained? Weekly Approximately how much time is spent working on schedule maintenance activities and how much time is spent responding to issues? Storm events = 16 staff members at 8 hours/day
Resources for Preventative Maintenance versus Reactive Maintenance *(Try to get a sense of how much time is spent doing scheduled activities versus time spent responding to issues)*
Additional Information *(Ask if there is anything else that we should know about the Agency's O&M Staff and Activities)*

Orange County Public Works – Stormwater Program
Richard Boon, Stormwater Program Chief, 714-955-0670, richard.boon@ocpw.ocgov.com
Description of Facilities & System Map *(i.e., miles of stormwater pipes, miles of channels, acres of tributary area, numbers of lift/pump stations, service population)*
Service population 3.1 million Area 789 square miles (incorporated areas and the limits of 34 cities) 740 miles of storm drains 350 miles of channels
Organizational Chart *(Identify stormwater operations and maintenance staff – differentiate between field staff and management staff. Ask about field crew organization, such as number of staff per crew and number of crews per supervisor. Ask if cross-departmental or seasonal help is provided for wet-weather events.)*
(see attached organizational chart)
Key Performance Indicators (KPI) and Goals for O&M Activities *(e.g., miles of pipe flushed per year, miles of channels maintained, number of service calls)*
None
O&M Activity Frequencies *(e.g., flush system every 5 years, annual visual inspection and maintenance of pump stations, annual vegetation clearing from basins)*
Visual inspection of channels (twice per year – before storm season and after); CSE inspection of reinforced concrete boxes and pipes 36" and larger (once every 2 years); visual inspection and cleaning of catch basins (3 times per year); trash/debris removal (twice per year); Clear vegetation (twice per year); Channel subdrain vault inspection (once every 3 years); trash debris boom maintenance (twice per year – before storm season and after); diversion inspection (once per week); ocean outlet cleaning (twice per year – before storm season and after); Flapgate/sluicegate inspection (once per year); pump exercise (once per week); station maintenance (once per month/year); dam inspection (one per year); pump station trash rack cleaning (twice per year); herbicide treatment (pre-emergent annually, post-emergent three times per year); rodent control (four times per year); As-needed: CCTV inspection of storm drain laterals, fence maintenance, access road maintenance, channel weephole cleaning, graffiti cleanup, homeless encampment cleanup; CMP maintenance; insect control; channel sediment removal (when height reaches 1-ft above design grade); basin sediment removal (when over 25% capacity)
Resources for Preventative Maintenance versus Reactive Maintenance *(i.e., how much time is spent doing scheduled activities versus time spent responding to issues)*
No response
Additional Information *(Ask if there is anything else that we should know about the Agency's O&M Staff and Activities)*
None

County of San Bernardino Flood Control
Eloy Ruvalcaba, Environmental Management Division, eruvalcaba@dpw.sbcounty.gov Brendon Biggs, Deputy Director of Public Works - Operations, bbiggs@dpw.sbcounty.gov
Description of Facilities & System Map *(i.e., miles of stormwater pipes, miles of channels, acres of tributary area, numbers of lift/pump stations, service population)*
The District boundary covers approximately 20,000 square miles. The Flood Control District only maintains regional facilities – channels, basins, etc. Each member City is responsible for maintaining their own system to the point at which it connects to the County's channels.
Organizational Chart *(Identify stormwater operations and maintenance staff – differentiate between field staff and management staff. Ask if cross-departmental or seasonal help is provided for wet-weather events.)*
263 staff under Brendon, which are assigned to one of 3 regions. Each region has a Regional Superintendent. Remote transportation yards (13) and 4 flood yards throughout the County staffed at various levels – each has supervisor (large yards also have lower level supervisor) and different numbers of field staff. Staff is shared between flood control and transportation, as needed.
Key Performance Indicators (KPI) and Goals for O&M Activities *(e.g., miles of pipe flushed per year, miles of channels maintained, number of service calls)*
Main KPI for department is the Roadside Pavement Condition Index (PCI) – they have at a set PCI and assign resources as needed to complete activities to maintain the goal PCI. Goals for stormwater are to have the facilities ready to accept winter flows before they begin. Primary basins are empty and able to accept full design capacity. Channels are cleared if needed. Since much of the work depends on the severity of the seasons, it would be difficult to establish many KPIs. For example, the miles of snow plowed per year would be zero if there is no snowfall.
O&M Activity Frequencies *(e.g., flush system every 5 years, annual visual inspection and maintenance of pump stations, annual vegetation clearing from basins)*
Channel Maintenance – Trash and shopping carts are cleared as needed, and need is determined by calls from the public or by flood control staff when they are on patrol checking on the facilities. The channel vegetation removal is performed by District staff and the weed spraying is performed by the County Agriculture Department. Weeds are sprayed annually. Maintenance of channels is often hindered by the ability to get environmental permits issued. The County is currently working on a general system-wide permit to speed up activities (no individual permit needed for each activity. The County will establish separate mitigation areas to offset all activities.) Each member City is responsible for the maintenance of their systems, including the pipelines up to the point of connection to the County's channels.
Resources for Preventative Maintenance versus Reactive Maintenance *(Try to get a sense of how much time is spent doing scheduled activities versus time spent responding to issues)*
Most of the stormwater activities are reactionary, due to the unpredictability and changes in needs in any given year. In a wet year, there may be significant damage done to roads, bridges, and other infrastructure due to storms that the staff will need to focus on. There may be fires, flash floods, or drought that affect maintenance needs. The Division creates a CIP list annually. Large projects/reconstructions are sent out to contractors, but minor projects are done in house. The activities (planned and unplanned) are regularly reviewed and reprioritized. Priorities may change depending on the season. There is always more to be done than can be done.
Additional Information *(Ask if there is anything else that we should know about the Agency's O&M Staff and Activities)*
Currently looking into getting a maintenance management system. Current system allows charges by activity code, but doesn't facilitate planned maintenance scheduling. The County had an equipment consultant last year assess if they had the right amount and type of equipment. They have different needs than a city or most other counties, being the largest county in the US. Their equipment has to be multi-functional (plow snow in winter, grade desert roads in summer).

APPENDIX D

San Bernardino DPW Operations Org Chart

PC 920 (66780)
73315 STAFF ANALYST *VACANT*

09058 EQUIP PARTS SPECIALIST EILEEN LEWIS

DEPUTY DIRECTOR, OPERATIONS
PC 520 (66720)
85125 CH PUB WKS ENGR BRENDON BIGGS
261

RISK MANAGEMENT
XXXXX SAFETY SPECIALIST DAVID NEUMANN

CUSTOMER SERVICE / DISPATCH
PC 520 (66720)
05637 SECRETARY II SANTA STRATTON
02931 RADIO ROOM CLERK OFFICE ASSISTANT III STEPHANIE HERNANDEZ
83268 PSE/RADIO ROOM LORENA REYES
3

EAST VALLEY/MOUNTAIN REGION
PC 521 (66720)
02145 PUB WKS OP SPT ANGEL H. LEMUS
84
1

FLOOD CONTROL SUPPORT CREW
PC 924 (66782)

77586	PUB WKS OP SPV	MATT DURAN
07532	MNT/CONST SPV II	*VACANT*
02520	EQUIP OPR III	ROBERT SILVA
06934	EQUIP OPR III	GREG ROBERG
02541	EQUIP OPR III	*VACANT*
06943	EQUIP OPR III	MICHAEL FAVREAU
03873	EQUIP OPR II	LEONARD CHAVEZ
03864	EQUIP OPR II	DEAN COCHRANE
03881	EQUIP OPR II	GREG GRIFFITH
03880	EQUIP OPR II	JOHN AFFLECK
02575	EQUIP OPR I	JORGE JIMENEZ
03673	EQUIP OPR I	LISANDRO SOLIS
03683	EQUIP OPR I	IGNACIO NAVA
03514	MNT/CONST WKR II	JAIME OCEGUEDA
03656	MNT/CONST WKR II	*VACANT*
03499	MNT/CONST WKR I	*VACANT*
03506	MNT/CONST WKR I	JAMIE VASQUEZ
04867	PESTICIDE APPL	RONNIE CHAVEZ, SR.

TRANSPORTATION SUPPORT CREW
PC 524 (66781)

05425	MNT/CONST SPV II	RICHARD DIXON
03537	MNT/CONST SPV I	JOHN HUTCHISON
02509	EQUIP OPR III	STEVE ANDREWS
02542	EQUIP OPR III	MIKE WILSON
03835	EQUIP OPR II	STUART GRIFFEY
03844	EQUIP OPR II	FIDEL GONZALEZ
03877	EQUIP OPR II	MIKE TURPIN
03850	EQUIP OPR II	JASON COOK
03730	EQUIP OPR I	VINCENT HELMS
03731	EQUIP OPR I	DAVID GUTIERREZ
74011	EQUIP OPR II	DAVID GARCIA

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TRAFFIC OPERATIONS SECTION
PC 525 (66783)

03679	PUB WKS OP SPV	ROBERT VASQUEZ
05424	MNT/CONST SPV II	ROBERTO LUCERO
13945	MNT/CONST SPV II	DAVID MELLOR
13944	EQUIP OPR III	ERIC HOLLEY
03876	EQUIP OPR II	MARCO SHEHAB
00833	MNT/CONST WKR II	RONNIE RODRIGUEZ
00836	MNT/CONST WKR II	STEVEN VALLEZ
00837	MNT/CONST WKR II	DAVID QUIROZ
00839	MNT/CONST WKR II	*VACANT*
00840	MNT/CONST WKR II	KEVIN GALLARETA
00841	MNT/CONST WKR II	MARTYN MORALES
01133	MNT/CONST WKR II	DANNY MORENO
03463	MNT/CONST WKR II	MANUEL MONTIEL
03471	MNT/CONST WKR II	DAVID GIRDENIS
03480	MNT/CONST WKR II	MICHAEL GONZALES
10032	MNT/CONST WKR II	RICK PEDROSA
10033	MNT/CONST WKR II	MARK MORAN
81751	MNT/CONST WKR I	CHRIS CONTRERAS
75578	MNT/CONST WKR I	FRANCISCO CHILSON

19

CRESTLINE – YARD 7
PC 507 (66745)

01728	PUB WKS OP SPV	JESS SALDANA
83568	MNT/CONST SPV I	BRENT JOHNSON
02518	EQUIP OPR III	RYAN ETHRIDGE
03690	EQUIP OPR II	DAN DOWELL
03692	EQUIP OPR II	ADRIAN ASENCIO
03704	EQUIP OPR II	RON CHALFANT
03472	MNT/CONST WKR II	RUSSELL DAVIS
03660	MNT/CONST WKR II	EBARISTO RAMIREZ
71990	EQUIP OPR II	ANTHONY GREEN

BLUE JAY – YARD 8
PC 508 (66746)

01724	PUB WKS OP SPV	LAMAR ALLMAN
00854	MNT/CONST SPV II	CORY NELSON
02514	EQUIP OPR III	ANDY DUCHATEAU
02517	EQUIP OPR III	JOHN DECADENA
71994	EQUIP OPR III	JOSEPH ROBERTSON
71993	EQUIP OPR II	PETE KATTERHAGEN
03693	EQUIP OPR II	*VACANT*
03695	EQUIP OPR II	ERIK HOLMES
03698	EQUIP OPR II	THOMAS LEONE
03852	EQUIP OPR II	MICHAEL SOTELO
XXXXX	EQUIP OPR II	BRIAN GRUBER
03867	MNT/CONST WKR II	LUIS FARAGOZA
00843	MNT/CONST WKR II	DAMIEN CONTRERAS

PC 509 (66747) BIG BEAR – YARD 9

01730	PUB WKS OP SPV	DEAN SAYLOR
83567	MNT/CONST SPV I	DAVID DORADO
02523	EQUIP OPR III	JESUS DIAZ
03699	EQUIP OPR II	DARREN PALMER
03703	EQUIP OPR II	RICHARD RODRIGUEZ
03705	EQUIP OPR II	ROBERT ANDERSON
03470	MNT/CONST WKR II	WAYNE HIGGINS
00838	MNT/CONST WKR II	BRANDON STEWART

ZONE 3 YUCAIPA
ZONE 5 MOUNTAIN
ZONE 6 LOW DESERT
PC 923 (66786)

00865	MNT/CONST SPV II	MICHAEL FISHER
03534	MNT/CONST SPV I	JOE GOMEZ
02549	EQUIP OPR III	PETE HOLOWAY
80972	EQUIP OPR II	DOUGLAS DURBIN
03687	EQUIP OPR I	RODNEY MILTON
02556	MNT/CONST WKR II	JOHN DREW
03489	MNT/CONST WKR I	TAYLOR GOMEZ

*SR C.C. A. LEMUS

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DESERT REGION
PC 522 (66720)
04789 PUB WKS OP SPT ROBERT EVANS
72
1

BIG RIVER – YARD 2
PC 502 (66767)

02595	MNT/CONST SPV II	KEVIN CANEPA
03868	EQUIP OPR II	*ERIC RONK
03721	EQUIP OPR I	MIKE WILLIAMS

JOSHUA TREE – YARD 10
PC 510 (66768)

01731	PUB WKS OP SPV	PHIL CARDOZO
00862	MNT/CONST SUP II	KEVIN J. ADDISON
02527	EQUIP OPR III	RANDY WILSON
03855	EQUIP OPR II	ROBERT JOHNSON
03862	EQUIP OPR II	JEFF BEHRENS
03712	EQUIP OPR I	TED DUMAS JR.
03713	EQUIP OPR I	*VACANT*
03711	EQUIP OPR I	MATTHEW ALVARADO
03836	MNT/CONST WKR II	ARTHUR WATSON
03465	MNT/CONST WKR I	STEVEN DOMSKIE
88965	EQUIP OPR III	DAVID HOPKINS (TEMP)

BALDY MESA – YARD 11
PC 511 (66761)

01732	PUB WKS OP SPV	ROY MONTRY
00855	MNT/CONST SPV II	FRANK OPICE
02538	EQUIP OPR III	KENNETH EMBREY
02546	EQUIP OPR III	JAMES PFIEFFER
83565	EQUIP OPR II	ANTHONY FREEMAN
02529	EQUIP OPR II	FRED REQUA
03700	EQUIP OPR II	THOMAS JARVIS
82761	EQUIP OPR II	GRANT ATTAWAY
01132	EQUIP OPR I	EDWARD JASSO, JR
03674	EQUIP OPR I	ROBERT WILSON
07223	EQUIP OPR I	*VACANT*
07224	EQUIP OPR I	ED REBHAN, JR.
03485	MNT/CONST WKR II	ZANE BOWER
81509	EQUIP OPR II	ULYSSES SHANK
71978	EQUIP OPR II	SAMUEL CANALES JR.

BARSTOW – YARD 12
PC 512 (66762)

01733	PUB WKS OP SPV	WILLIAM LITTLE
00849	MNT/CONST SPV II	ANTHONY MONTANO
02531	EQUIP OPR III	ROBERT BYRKETT
83566	EQUIP OPR III	VINCENT RUSSO
02532	EQUIP OPR III	RICHARD MORGAN
03859	EQUIP OPR II	LEWIS LAWSON
03872	EQUIP OPR II	KEVIN LANG
03670	EQUIP OPR I	*VACANT*
03706	EQUIP OPR I	JUSTIN BROOKS
03715	EQUIP OPR I	JOE BONETPELS, JR.
03717	EQUIP OPR I	*VACANT*
03719	EQUIP OPR I	BAULIO BIRRUETA
03847	MNT/CONST WKR II	ARNOLD CRUZ

ZONE 4 BALDY MESA
ZONE 6 HIGH DESERT
PC 926 (66787)

00867	MNT/CONST SPV II	SHANE COCHRANE
06917	EQUIP OPR III	ED REBHAN, SR.
77587	EQUIP OPR II	GEORGE CAMPBELL
03845	MNT/CONST WKR II	JEREMY SHANK
03493	MNT/CONST WKR I	JOEL HESTER

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TRONA – YARD 13
PC 513 (66763)

00848	MNT/CONST SPV II	DAVID CHRISTOPH
03860	EQUIP OPR II	*VACANT*
03696	MNT/CONST WKR II	PATRICK MARCOTTE

*SR TO W. LITTLE AND A. MONTANO

NEEDLES – YARD 15
PC 515 (66766)

01734	PUB WKS OP SPV	DON TOY
00859	MNT/CONST SPV II	DELVIN HOLMES
02533	EQUIP OPR III	GARY GREGOR
03861	EQUIP OPR II	JACK SMITH
03708	EQUIP OPR I	LARRY MERICAL
03723	EQUIP OPR I	JOSEPH PUHM

APPLE VALLEY – YARD 16
PC 516 (66764)

01735	PUB WKS OP SPV	CRAIG SHERMAN
00856	MNT/CONST SPV II	JOSEPH BONETPELS
02530	EQUIP OPR III	CODY CESSNA
02535	EQUIP OPR III	*HOWARD BOWERS
03863	EQUIP OPR II	SHANE STOGORMAN
01131	EQUIP OPR II	KYLE RILEY
03725	EQUIP OPR I	MARC GEIST
03726	EQUIP OPR I	JAMES SURRITT
03728	EQUIP OPR I	PAUL BARAGONA
03729	EQUIP OPR I	*VACANT*
06671	MNT/CONST WKR II	ANTHONY PEREZ
03468	MNT/CONST WKR I	*VACANT*

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CRACK FILL CREW
PC 527 (66762)

83682	EQUIP OPR I	*VACANT*
73310	MNT/CONST WKR II	KENNETH BIRD
73311	MNT/CONST WKR I	*VACANT*
73312	MNT/CONST WKR I	TROY PETTIBONE
73313	MNT/CONST WKR I	DAN RAWLINSON
83569	MNT/CONST WKR I	DANNY THOMPKINS

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PERMITS/OPERATIONS SUPPORT
PC 920 (66780)
04319 PUB WKS ENGR IV MELISSA WALKER
28
1

PERMITS/ OPERATIONS SUPPORT
PC 920 (66780)

05645	SECRETARY I	LA SHON BROWN
84729	OFFICE ASSISTANT III	NATALIE LOPEZ
88777	OFFICE ASSISTANT II	DANIELLA POWELL
81357	OFFICE ASSISTANT II	ALYSHA SAVALA
93714	PSE	DAKOTA CORTEZ
94760	PSE	VANESSA VAZQUEZ
83261	PSE	*VACANT*

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PROPERTY MANAGEMENT SECTION
PC 920 (66780)

04403	ENGR TECH V	BRENDA HARTMANN
05321	ENGR TECH IV	BRAD MECHAM
10603	ENGR TECH IV	SAM McDONALD

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OPERATIONS SUPPORT SECTION
PC 920 (66780)

XXXXX	PUB WKS ENGR III	*VACANT*
12035	PUB WKS ENGR II	ROBERT AGUIRRE
89842	ENGR TECH III	TRICIA READ

PC 558 (66711)

09860	PUB WKS ENGR II	MINH-THU HO

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FLOOD CONTROL PERMITS SECTION
PC 927 (66712)

00352	PUB WKS ENGR III	MOHAMMAD ALI
05325	ENGR TECH V	MARTY MISH
05319	ENGR TECH IV	LAWRENCE BROCK
10602	ENGR TECH IV	MATTHEW CORTEZ
02104	ENGR TECH IV	RICHARD MENDOZA
07082	ENGR TECH IV	STACY SERRANO

6

TRANSPORTATION PERMIT SECTION
PC 558 (66711)

00355	PUB WKS ENGR III	MICHAEL TRUETT
04353	OFFICE ASSISTANT III	TRISH URIBE
03739	ENGR TECH V	SYLVIA GOMEZ
04388	ENGR TECH IV	DON BOWEN
05304	ENGR TECH IV	DENNIS BRHEL
83677	ENGR TECH IV	GERALD STONE
05305	ENGR TECH IV	KRIS CARIOU

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WEST VALLEY REGION
PC 920 (66780)
02290 PUB WKS OP SPT SCOTT RYAN
10028 OFFICE ASSIST III SHIRLEY KOCH
88664 CON ARBORIST CHRISTOPHER DANYOW
89841 ARBORIST *VACANT*
70
4

FLOOD CONTROL/SUPPORT CREW
PC 921 (66784)
07501 PUB WKS OP SPV TYSON FRISTOM
1

ZONE 2
SAN BERNARDINO YARD
PC 922 (66785)

00863	MNT/CONST SPV II	BRIAN KLOEPFER
06853	MNT/CONST SPV I	TONY TRONCOSO
02548	EQUIP OPR III	ROBERT MACIAS
02543	EQUIP OPR III	CAREY STOCKTON
06944	EQUIP OPR III	CLINT WAUGH
03842	EQUIP OPR II	DAVID LOMAX
03680	EQUIP OPR I	MICHAEL McCLELLEN
06757	MNT/CONST WKR II	ERIC VASQUEZ
03492	MNT/CONST WKR I	RYAN HAIGLER
03508	MNT/CONST WKR I	*VACANT*
03513	MNT/CONST WKR I	MARCUS MILLER

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ZONE 1
RANCHO CUCAMONGA YARD
PC 921 (66784)

00864	MNT/CONST SPV II	ROBBIE CLARK, JR.
00866	MNT/CONST SPV I	BRANDON CALDERON
02539	EQUIP OPR III	JUAN GALLARDO
02544	EQUIP OPR III	GUILLERMO SANDOVAL
03875	EQUIP OPR III	JUAN ARJONA
06933	EQUIP OPR I	MANU 'ATU TAVITA
06935	EQUIP OPR I	MATTHEW SOMMERVILLE
03664	EQUIP OPR I	ANDREW GARCIA
03486	MNT/CONST WKR II	HENRY NORIEGA
03507	MNT/CONST WKR II	CHRIS SCHIERHOLD
03517	MNT/CONST WKR II	MATTHEW ACEVES
03488	MNT/CONST WKR I	MICHAEL WESTER
03500	MNT/CONST WKR I	JULIAN TARULA
03501	MNT/CONST WKR I	RONALD CHAVEZ, JR.

CRACK FILL CREW
PC 506 (66744)

75577	MNT/CONST WKR II	M. GABLE
75579	MNT/CONST WKR I	*VACANT*
83884	MNT/CONST WKR I	TONY SALKELD
75580	MNT/CONST WKR I	*VACANT*
75581	MNT/CONST WKR I	*VACANT*

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*INCLUDE ON SERVICE REQUESTS

WEST VALLEY – YARD 1/3
PC 503 (66742)

01725	PUB WKS OP SPV	DAVID RAMIREZ
00847	MNT/CONST SPV II	RICK WILLIAMS
75582	MNT/CONST SPV I	*NICK PALACIOS
02507	EQUIP OPR III	JOSH SEELY
02512	EQUIP OPR III	KEVIN SCHMIDT
03832	EQUIP OPR II	NATHANIEL GEIGER
02528	EQUIP OPR II	SCOTT JOHNSON
03837	EQUIP OPR II	TYLER FIFE
03657	EQUIP OPR I	MARK STANFIELD
03672	EQUIP OPR I	JEFF KYSAR
03658	EQUIP OPR I	ROBERT LEROY
03661	EQUIP OPR I	ADAM SCHENK
03666	EQUIP OPR I	MARK HERNANDEZ
03671	EQUIP OPR I	JAVIER MAGANA
02525	MNT/CONST WKR II	FRANK MARTIN
03512	MNT/CONST WKR II	NINO GARCIA
03464	MNT/CONST WKR I	JUAN AVILES
03458	MNT/CONST WKR I	*VACANT*

EAST VALLEY – YARD 5
PC 505 (66743)

01729	PUB WKS OP SPV	MIKE HODGE
00851	MNT/CONST SPV II	ANDY WATTS
00852	MNT/CONST SPV II	RODNEY REIMANN
02515	EQUIP OPR III	*DARRELL PERRY
02551	EQUIP OPR III	*RUBEN ALDERETE
03848	EQUIP OPR II	ROBBIE CLARK, SR.
03865	EQUIP OPR II	MICHAEL CRUZ
02540	EQUIP OPR I	JESS SLAYMAN
03676	EQUIP OPR I	ANDREW DE LA ROSA
03675	EQUIP OPR I	MARIO GANTT
03678	EQUIP OPR I	JAIME RIVERA
03684	EQUIP OPR I	PAUL TROY
03685	EQUIP OPR I	ALEX ESTRADA
03734	EQUIP OPR I	JOSHUA SHOFFEITT
03482	MNT/CONST WKR II	CARLOS TENORIO
02537	MNT/CONST WKR II	MIKE LOFTIN
02469	MNT/CONST WKR I	JOHN BASHOR
71982	EQUIP OPR II	DUANE CARNAHAN
74004	EQUIP OPR II	IVAN CONDIT

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