KING CITY
CALIFORNIA

Item No. 11 (A)

REPORT TO THE CITY COUNCIL

DATE: SEPTEMBER 12, 2017

TO: HONORABLE MAYOR AND MEMBERS OF THE CITY COUNCIL

FROM: STEVEN ADAMS, CITY MANAGER

RE: CONSIDERATION OF WASTEWATER COLLECTION SYSTEM MASTER PLAN AND WASTEWATER TREATMENT FACILITIES PLAN

RECOMMENDATION:

It is recommended the City Council: 1) approve the proposed Wastewater Collection System Master Plan and Wastewater Treatment Facilities Plan; 2) adopt a Resolution approving a Water Recycling Study Grant Application; 3) approve and authorize the City Manager to execute a Memorandum of Understanding (MOU) with California Water Service to participate in a joint Recycled Water Feasibility Study; and 4) direct staff to solicit proposals for preparation of a wastewater rate study.

BACKGROUND:

The City owns, maintains and operates its wastewater system, which consists of sewer pipelines, force mains, sewer lift stations, and the King City Wastewater Treatment Plan (WWTP). The City collects wastewater from residential, commercial, institutional, and industrial customers within its service area. The collection system consists of approximately 32 miles of gravity sewer lines up to 27-inches in diameter, two lift stations, and associated force mains. The City also operates a separate 21-inch industrial sewer line that historically conveyed food process wastewater. Currently, this line accepts distilled water discharges from the Calpine Cogeneration Power Plant, which is treated and disposed of separately from the domestic water. All wastewater is conveyed to the City's WWTP, which has a design capacity of 1.2 million gallons per day and consists of the headworks, seven treatment ponds, an effluent disposal pump station and force main, and six spray irrigation fields for disposal of treated effluent.

Both the collection system and WWTP are beyond their anticipated life span and deficient in both condition and capacity. Over the past few years, the City has begun to upgrade sewer pipes, but a number of additional upgrades will be necessary over the next several years. The capacity of the WWTP is not sufficient to serve buildout of currently approved development projects and does not meet current standards established by the Regional Water Quality Control Board (RWQCB). As a result, staff met with RWQCB representatives and confirmed they that they would likely pursue an enforcement action regarding non-compliance of the City's WWTP absent upgrade efforts and would not approve additional capacity without an upgrade in treatment technology. However, they will hold off on any action as long as the City is proceeding with this effort.

Wastewater fees are restricted by State law to amounts necessary to address actual City operational and capital costs. Therefore, up to date infrastructure master plans for the wastewater treatment system are critical in order to: 1) plan for future capital projects; and 2) determine accurate costs for operations, maintenance and capital improvements. As a result, wastewater funds to update the City's master plans for both the collection system and WWTP were included in the FY 2016-17 Annual Budget. Proposals were solicited and the City Council approved a contract with Carollo Engineers at the August 9, 2016 meeting. Carollo Engineers prepared the original Wastewater Master Plan and Facilities Plan for the City and is one of the leading firms in the country with regard to designing wastewater facility related improvements.

The draft plans have been completed and are being presented for City Council consideration. The consultants will provide a full presentation of the findings and recommendations at the City Council meeting. Copies of the Executive Summary of both reports are attached to the staff report. Copies of the full reports are available at City Hall and online at the City's website.

DISCUSSION:

Collection System Master Plan

The purpose of the Collection System Master Plan is to assess the condition and capacity of all sewer pipelines and infrastructure, identify future necessary improvements, identify projected costs, and establish a plan to time the improvements based upon when they will be needed. The recommended plan includes three phases: Phase 1 (10 years); Phase 2 (20 years); and Phase 3 (Beyond 20 years). The top three priority projects recommended include the following:

Project 1 – Smoke Testing: Smoke testing is recommended along Industrial Way, Airport Road and Bitterwater Road to identify the sources of high rates of inflow that are being experienced.

Project 2 – Bitterwater Road Sewer and Reclaimed Water Main: This project consists of replacing approximately 1,470 feet of existing 8-inch diameter sewer on Bitterwater Road from San Antonio Drive to Metz Road with a new 12-inch diameter sewer, but may not be necessary if the source of inflow is identified from the smoke testing.

Project 3 – Small Diameter Pipeline Replacement: This project consists of annually replacing approximately 1,200 linear feet of the City's existing small diameter sewers (6-inch diameter and smaller) with 8-inch diameter sewers. Full replacement is proposed to take place annually over a 30-year period.

<u>WWTP Facilities Plan</u>

The WWTP Facilities Plan is more complex because it involves a large number of issues and potential scenarios. It includes an analysis of capacity demands and scenarios, regulatory requirements, technology options, and projected capital and operational costs. It has concluded the City will need to upgrade the plant to a minimum of disinfected secondary treatment to meet RWQCB requirements. There are a number of benefits of further upgrading the facility to tertiary treatment because it would enable the City to accommodate use of recycled water and will meet not only current, but likely future State treatment standards.

Per direction received from the City Council when the contract was approved, staff and the consultants have coordinated with California Water Service Company (Cal Water) on development of the study and recommends establishing a formal partnership on future steps. They have concurrently funded an independent study that assessed the feasibility of transporting and selling the recycled water that could be generated from a tertiary treatment facility. It is recommended the City establish a goal of independently funding upgrade of the treatment plant to disinfected secondary treatment. Cal Water would be provided the option of paying the costs involved to further upgrade the plant to tertiary treatment in exchange for the rights to own and sell the water. They would also be responsible for costs of installing the distribution system, in addition to potentially a negotiated fee for use of recycled water pipes the City has already installed and for purchase of the water. Furthermore, the system could be constructed in a way that they would be directly responsible for the added operational costs to maintain the tertiary treatment.

The scope of work for the planning effort also included discussions with Little Bear Water Company, who provides wastewater services to customers in Pine Canyon. They have plans to expand, and the RWQCB would prefer they merge with King City rather than expanding their own facilities. The study's findings indicate that there is a potential the City's facilities could provide services that would reduce costs for Pine Canyon while generating revenue for King City. However, feasibility will largely depend on the costs of connecting their system to the King City plant given the separation by the river and Highway 101. As a result, the WWTP Facilities Plan includes recommendations designed to accommodate, but not depend upon, the inclusion of Little Bear Company participation.

Next Steps

A number of steps are involved to address the recommendations of these planning efforts:

The first will be to prepare a Recycled Water Feasibility Study. Attached for City Council consideration is a Resolution approving an application for a State grant, which would pay half of the costs, and a Memorandum of Understanding (MOU) to agree to partner with Cal Water on preparation of the study.

The next step will be to prepare a rate study. The goal will be to set appropriate rates for the next five-year period, which is now possible to do accurately since the City has identified future costs. The consultants believe a portion of the grant can be used to fund the rate study so staff recommends Council direct staff to solicit proposals from qualified firms within the next few months. Staff has received a number of complaints regarding rates from residents who live in small residential units and apartments. Currently, residential rates are a fixed fee rather than based on volume. As a result, staff recommends the rate study also provide options for changes to the rate structure. This is always a difficult adjustment to address since it means there is a potential that some customers rates increase more than others. Given the level of cost impact all these factors could have on rates, staff is recommending a plan be established so adjustments could be made on a gradual basis.

The following step will be to begin the environmental review process for the project. Funding was included in the FY 2017-18/ FY 2018-19 Biennial Budget. The Council also recently approved staff's recommendations to include a request for $100,000 in the Community Development Block Grant (CDBG) application to be used toward the costs for this study.

The remaining steps will be to move forward with design and construction. Staff is working with the Rural Community Assistance Corporation (RCAC), the consultants and other agencies to identify all potential grant funding sources available.

COST ANALYSIS:

Improvements recommended in Phase I of the Collection System Master Plan are projected to be $2,386,467. This will result in an annual projected cost of approximately $240,000. Inflationary factors are not included so actual costs will increase in the future.

Upgrade of the WWTP would be designed so it could be upgraded in phases. The cost of the first phase is projected to be $32,000,000. Staff hopes to pursue $8 million to $10 million in grants. In addition, it is estimated that approximately $5,000,000 should be available from the Sewer Fund reserves when the General Fund loan is repaid. Therefore, the goal will be to reduce the remaining cost to a maximum of $17 million funded over a 30-year time period, which would result in debt service payments of approximately $900,000 annually if funded through a State low-interest program.

Another substantial challenge will be the increase in operational costs. The WWTP Facilities Plan estimates annual costs to operate the WWTP will be roughly $600,000 within the next 5-year timeframe. Approximately, $350,000 represents increased costs over current annual budgeted expenses.

Therefore, total initial increased annual costs are projected to be almost $1.5 million annually. Excess revenues of close to $800,000 are currently projected in the Sewer Fund. Therefore, a net increase in annual revenue of approximately $700,000 will be necessary by the time the new WWTP is constructed. As a result, it is important for the City establish a revenue plan so changes can be made in a series of steps because it will be difficult to accomplish at one time.

ENVIRONMENTAL REVIEW:

Funds are budgeted in FY 2018-19 to prepare the environmental review for the project to proceed.

ALTERNATIVES:

The following alternatives have been identified for City Council consideration:

1. Approve staff's recommendations;
2. Approve the Wastewater Collection System Master Plan, but request additional analysis before proceeding with the WWTP Facilities Plan;
3. Do not approve the Wastewater Collection System Master Plan or WWTP Facilities Plan and request additional options be included;or
4. Provide staff other direction.

Exhibits:

1. Wastewater Collection System Plan Executive Summary
2. WWTP Facilities Plan Executive Summery
3. MOU with Cal Water for Recycled Water Feasibility Study

Prepared and Approved by: ______________________________
Steven Adams, City Manager

RESOLUTION NO. 2017-4602

A RESOLUTION OF CITY COUNCIL OF CITY OF KING, CALIFORNIA FOR A WATER RECYCLING STUDY GRANT APPLICATION

WHEREAS, there has been presented to the City Council of the City of King an application to the State Water Resources Control Board (SWRCB) for the Water Recycling Study for the grant funding of the 50% cost of the study up to $75,000; and

WHEREAS, the City Council desires to submit an application for this funding.

NOW, THEREFORE BE IT RESOLVED

That the City Manager, City of King or his/her designee is hereby authorized and directed to sign and file, for and on behalf of the City of King, a Water Recycling Facilities Planning Grant Application for a grant from the State Water Resources Control Board in the amount not to exceed $75,000.00 for the 50% of the cost of a facilities planning study of feasibility assessment of expanding the reclamation and distribution of treated WWTP effluent.

NOW, THEREFORE BE IT FURTHER RESOLVED by the City Council of the City of King, California that

1. City of King hereby agrees and further does authorize the aforementioned representative or his/her designee to certify that the City has and will comply with all applicable state statutory and regulatory requirements related to any state grant funds received, and

2. That the City Manager, City of King or his/her designee of City of King is hereby authorized to negotiate and execute a grant contract and any amendments or change order thereto on behalf of the City of King.

PASSED AND ADOPTED at a regular meeting of the City Council on the 12th day of September, 2017, by the following vote:

AYES:

NAYS:

ABSENT:

ABSTAIN:

Michael LeBarre, Mayor

ATTEST:

Steven Adams, City Clerk

APPROVED AS TO FORM:

Shannon Chaffin, City Attorney

EXHIBIT 1

KING CITY
CALIFORNIA

Collection System MASTER PLAN

September 2017

FINAL

carollo

EXECUTIVE SUMMARY

This executive summary presents a brief background of King City's (City's) wastewater collection system, the need for this master plan, proposed improvements to mitigate existing system deficiencies, and proposed expansion projects. A summary of capital improvement project costs is included at the end of this chapter.

1.1 INTRODUCTION

The City is located in the southern Salinas Valley of Central California, 45 miles south of Salinas in Monterey County. It was incorporated in 1911 with 699 residents, and has since grown to cover 3.8 square miles with a population of 13,580[1]. The City maintains a special sense of community and small-town living with beautiful mountain views, tree-lined streets, and a charming historical downtown. Agriculture continues to be the heart of the City's economic and cultural life.

The City owns, maintains, and operates gravity sewer pipelines, force mains, sewer lift stations, and the King City Wastewater Treatment Plant (WWTP). The City collects wastewater from residential, commercial, institutional, and industrial customers within its service area.

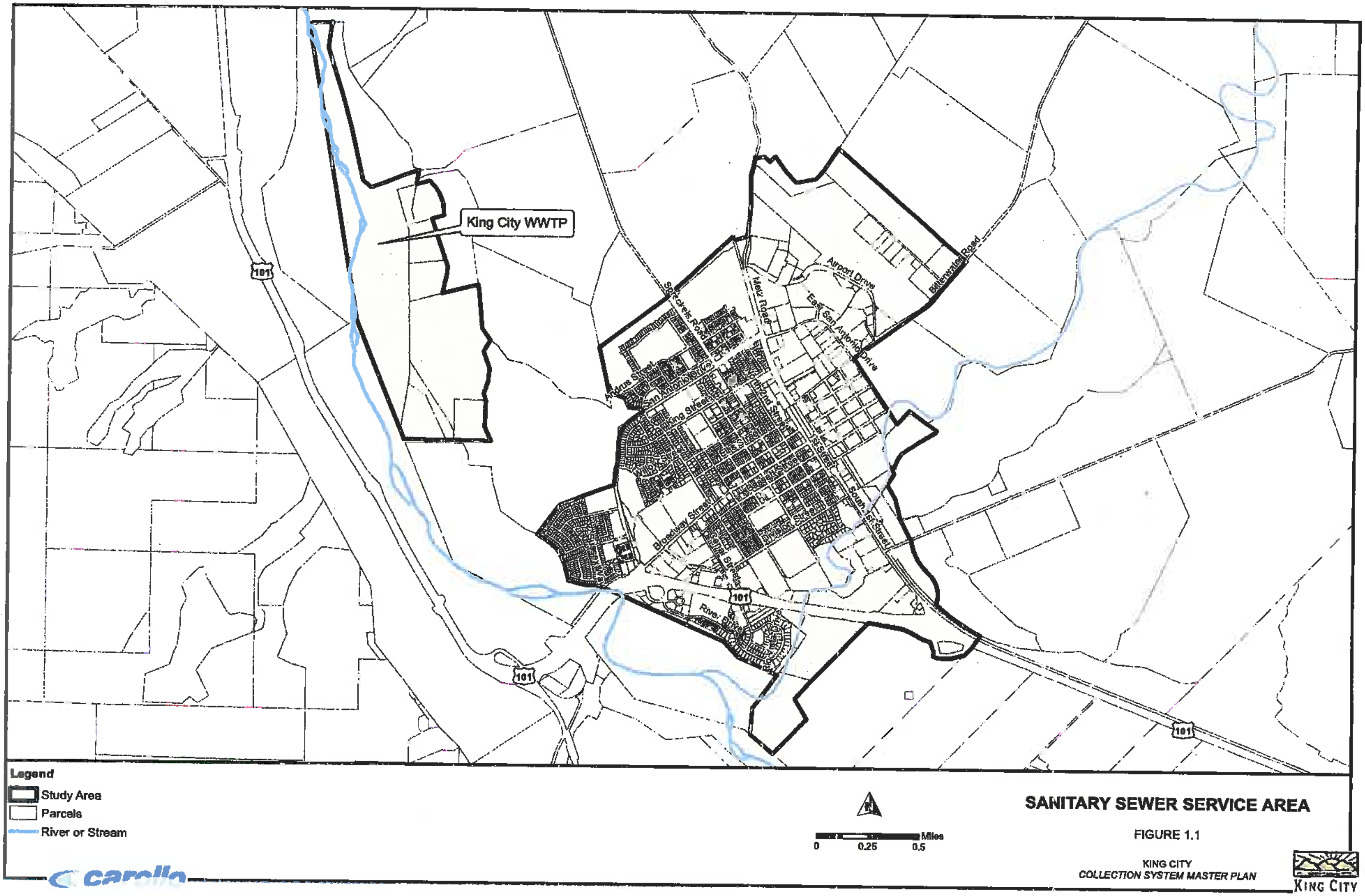
1.2 STUDY AREA

The area serviced by the City is characterized by residential, commercial, and industrial uses within the City limits. The City's economy is based largely on agriculture. What started out as a shipping point for wheat and cattle, the City has grown to become a vegetable center, shipping to all over the nation.

The City is located next to US Highway 101, approximately 45 miles south of Salinas. There are many open space areas within the City, including San Lorenzo Park. The major water bodies located near the City include the Salinas River, which runs along the west side of the City and the San Lorenzo Creek, which runs along the southeast side of the City, discharging to the Salinas River.

The study area boundary for this Master Plan consists generally of the City limits. In addition, the City is considering specific annexations in the future that will extend beyond the current City limits. This Master Plan is intended as the guiding document to plan and implement sewer system improvements to accommodate future growth to build out of the General Plan. Figure 1.1 shows the study area boundary.

[1] http://www.kingcity.com/



SANITARY SEWER SERVICE AREA

FIGURE 1.1

KING CITY
COLLECTION SYSTEM MASTER PLAN

The land use assumptions in this Master Plan were based on the City's General Plan Land Use GIS shapefiles and projected future developments within the City. Should future planning conditions change from the assumptions stated in this Master Plan (i.e., accelerated growth, more intense developments, etc.), revisions and adjustments to the Master Plan recommendations would be necessary.

1.3 SEWER SERVICE AREA OVERVIEW

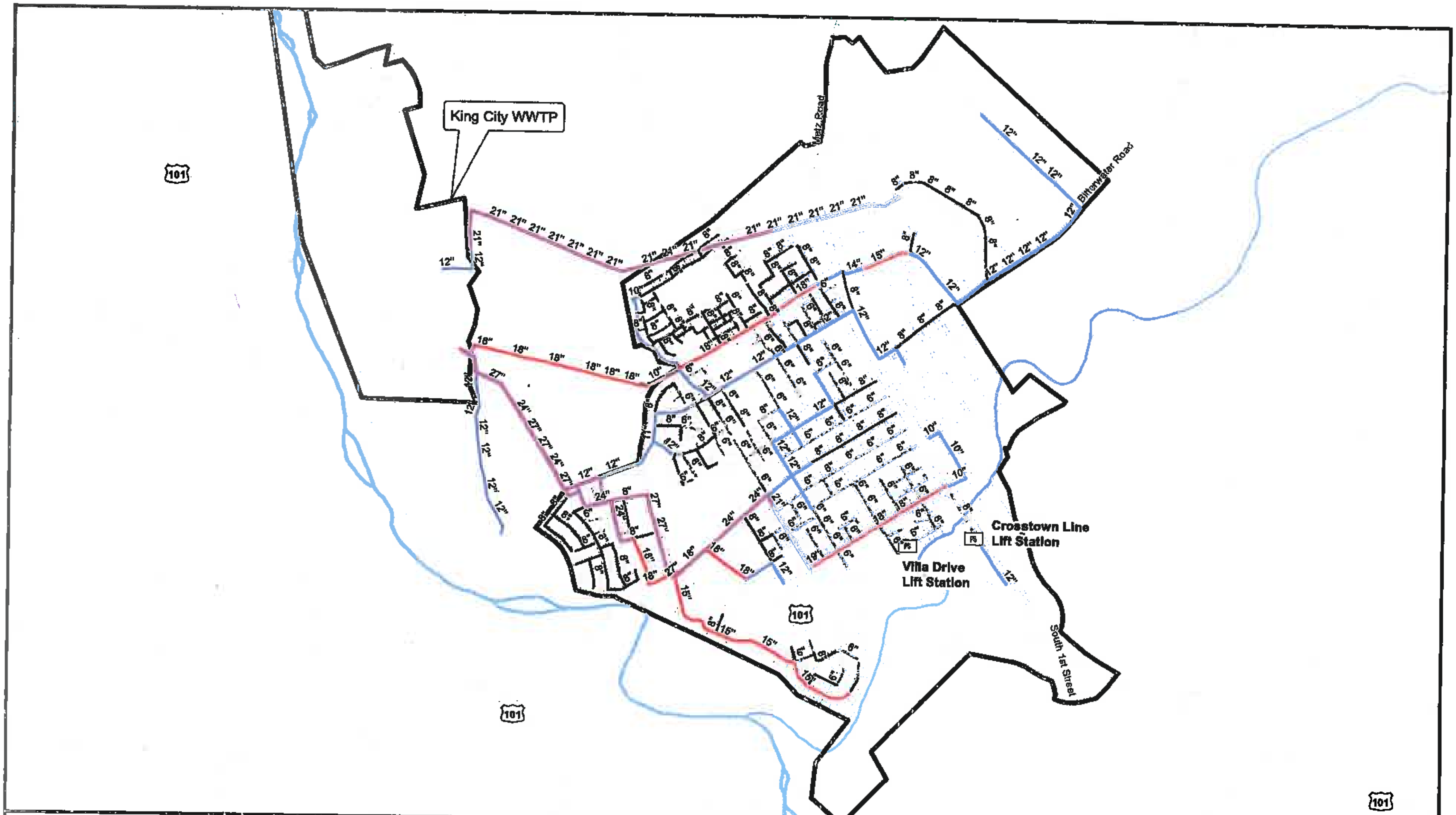
The City manages and maintains approximately 32 miles of gravity sewer lines up to 27-inches in diameter, two lift stations, and associated force mains. All wastewater generated within the sewer service area is conveyed to the City's WWTP for treatment. The City also operates a separate 21-inch industrial sewer line that historically conveyed food process wastewater. Currently, this line accepts distilled water discharges from the Calpine Cogeneration Power Plant. This flow is treated and disposed of separately from the domestic wastewater. Figure 1.2 presents the City's existing collection system, including sewer diameters and lift station locations.

1.4 WASTEWATER FLOWS

The average dry weather flow (ADWF) is the average flow that occurs on a daily basis during the dry weather season. The ADWF includes the base wastewater flow (BWF) generated by the City's users, plus dry weather groundwater infiltration (GWI).

Peak wet weather flow (PWWF) is the highest observed hourly flow that occurs following the design storm event. The City's sewers were evaluated based on their capacity to convey the "design flow ("design flow" is synonymous to PWWF in this study).

A summary of the existing and future ADWF and the design flow is presented in Table 1.1. The City's ADWF is projected to almost double from 0.86 mgd to 1.56 mgd by Phase 2 (2037), whereas the PWWF is projected to increase from 4.36 mgd to about 5.67 mgd by Phase 2 (an increase of approximately 30 percent). Therefore, the City's PWWF to ADWF peaking factor is projected to decrease from roughly 5.1 to 3.6 by Phase 2, which is typical for sanitary sewer collection systems.



EXISTING SANITARY SEWER COLLECTION SYSTEM

FIGURE 1.2

KING CITY
COLLECTION SYSTEM MASTER PLAN

Table 1.1 Current and Projected Wastewater Flow Summary Collection System Master Plan King City			
Year	Average Dry Weather Flow (mgd)	Design Flow (mgd)	Peaking Factor
Existing (2017)	0.86	4.36	5.07
Phase 1 (2027)	1.18	5.36	4.54
Phase 2 (2037)	1.56	5.67	3.63
Phase 3 (Post 2037)	3.01	10.03	3.33

1.5 CAPACITY EVALUATION AND PROPOSED IMPROVEMENTS

The capacity analysis identified areas in the sewer system where flow restrictions occur or where pipe capacity is insufficient to convey design flows. Sewers that lack sufficient capacity to convey design flows create bottlenecks in the collection system that can potentially cause sanitary sewer overflows (SSOs).

For the existing sewer collection system, the PWWF was routed through the hydraulic model. In accordance with the established flow depth criteria for existing sewers, manholes where the maximum hydraulic grade line (HGL) exceeded 90 percent of the pipe diameter (maximum d/D greater than 0.9) were identified.

In general, the City's collection system has sufficient capacity to convey current PWWFs without exceeding the established flow depth criterion. However, there is one area where capacity restrictions lead to flow depths that exceed allowable levels. This is the 8-inch diameter gravity sewer on Bitterwater Road (from San Antonio Drive to Metz Road). Following the completion of the existing system analysis, improvement projects and alternatives were identified in order to mitigate existing system pipeline capacity deficiencies.

The analysis of the future systems (Phase 1, 2, and 3) was performed in a manner similar to the existing system analysis. The purpose of the future system evaluation is to verify that the existing system improvements were appropriately sized to convey future PWWFs, and to identify the locations of sewers that are adequately sized to convey existing PWWFs, but cannot convey future PWWFs.

The recommended improvements to correct existing deficiencies are summarized below.

- **Project 1 – Smoke Testing**: The majority of flow through contributing to the deficient 8-inch diameter gravity pipe on Bitterwater Road is industrial flow. Analysis of the flow monitoring data indicated that the peak flows in this area are due to inflow. It is possible that there may be a drain connected to the collection system causing spikes in flow. Because of this, smoke testing is recommended along Industrial Way, Airport

Road, and Bitterwater Road to identify the inflow source that is leading to high rates of infiltration and inflow (I/I) in the system.

- **Project 2 – Bitterwater Road Sewer and Reclaimed Water Main**: This project consists of replacing approximately 1,470 feet of existing 8-inch diameter sewer on Bitterwater Road from San Antonio Drive to Metz Road with a new 12-inch diameter sewer. This project is required to mitigate surcharged conditions on Bitterwater Road for existing PWWFs. However, this project may not be necessary if the source of inflow is identified during the smoke testing and is resolved. Although this recommended improvement is included in the capital improvement program presented in Chapter 7, it is recommended that this improvement be reevaluated once the smoke testing is completed to determine if it is still required.

  Because the City wants to take advantage of future pipeline projects, this project also includes the installation of approximately 1,470 feet of 10-inch diameter reclaimed water main.

- **Project 3 – Small Diameter Pipeline Replacement:** This project consists of replacing the City's existing small diameter sewers (6-inch diameter and smaller) with 8-inch diameter sewers. There is a total of 36,010 linear feet (LF) of 6-inch diameter gravity sewers in the collection system (approximately 21 percent of the collection system). A replacement program of 30 years would equate to replacing approximately 1,200 LF per year.

Two future system improvements were identified:

- **Project 4 – Little Bear/San Bernabe Sewer**: The hydraulic evaluation indicated that the existing 15-inch diameter sewer on Broadway Street from River Drive to San Antonio Drive has sufficient capacity to convey Phase 2 flows from Little Bear. However, as flows increase beyond the 20-year planning period (Phase 3), the existing 15-inch diameter sewer experienced surcharging. It was assumed for Phase 2, that Little Bear would be connected directly to the existing 15-inch diameter gravity sewer. However, for Phase 3, it is recommended that the Little Bear and San Bernabe developments connect to the 27-inch Crosstown sewer at Broadway Street and San Antonio Drive with approximately 1,250 LF of new 21-inch diameter gravity sewer.

- **Project 5 – Smith Monterey/Silva Sewer (Phase 3):** Under Phase 3 PWWF conditions, much of the existing 12-inch, 15-inch, and 18-inch diameter sewers on Bitterwater Road, Metz Road, King Street, Mildred Avenue, and San Antonio Drive to the treatment plant experienced surcharging and several overflows. This additional flow also causes surcharging and overflows upstream on Airport Road and Industrial Way. It is recommended that a parallel 15 to 21-inch diameter gravity sewer (approximately 13,380 LF) be installed to serve the new developments. The proposed pipeline extends from the intersection of Bitterwater Road and Industrial Way, along Bitterwater Road, Metz Road, then along San Antonio Drive to the treatment plant.

Figure 1.3 illustrates the improvements recommended to mitigate capacity deficiencies in the existing sewer collection system and improvements to accommodate future growth as identified by the hydraulic analysis.

1.5.1 Existing Versus Future Improvement

An existing deficiency is one where the existing facility's capacity is insufficient to meet the planning criteria (e.g., pipeline upgrades required to prevent severe surcharging during the design wet weather event) for existing users. If a project was proposed to correct an existing deficiency exclusively, then existing users were assigned 100 percent of the project's benefit, and therefore, 100 percent of the costs.

A significant portion of the recommended Master Plan improvements will serve future users, even when an improvement calls for the upgrade of an existing facility. In these cases, an existing sewer may have sufficient capacity to convey current PWWFs, but as growth continues and more users are added to the system, the increased flow results in capacity deficiencies. These projects, as well as new trunk sewers to extend wastewater collection system service to future growth areas, are future improvements. Future users were assigned 100 percent of the future project's benefit and 100 percent of the costs.

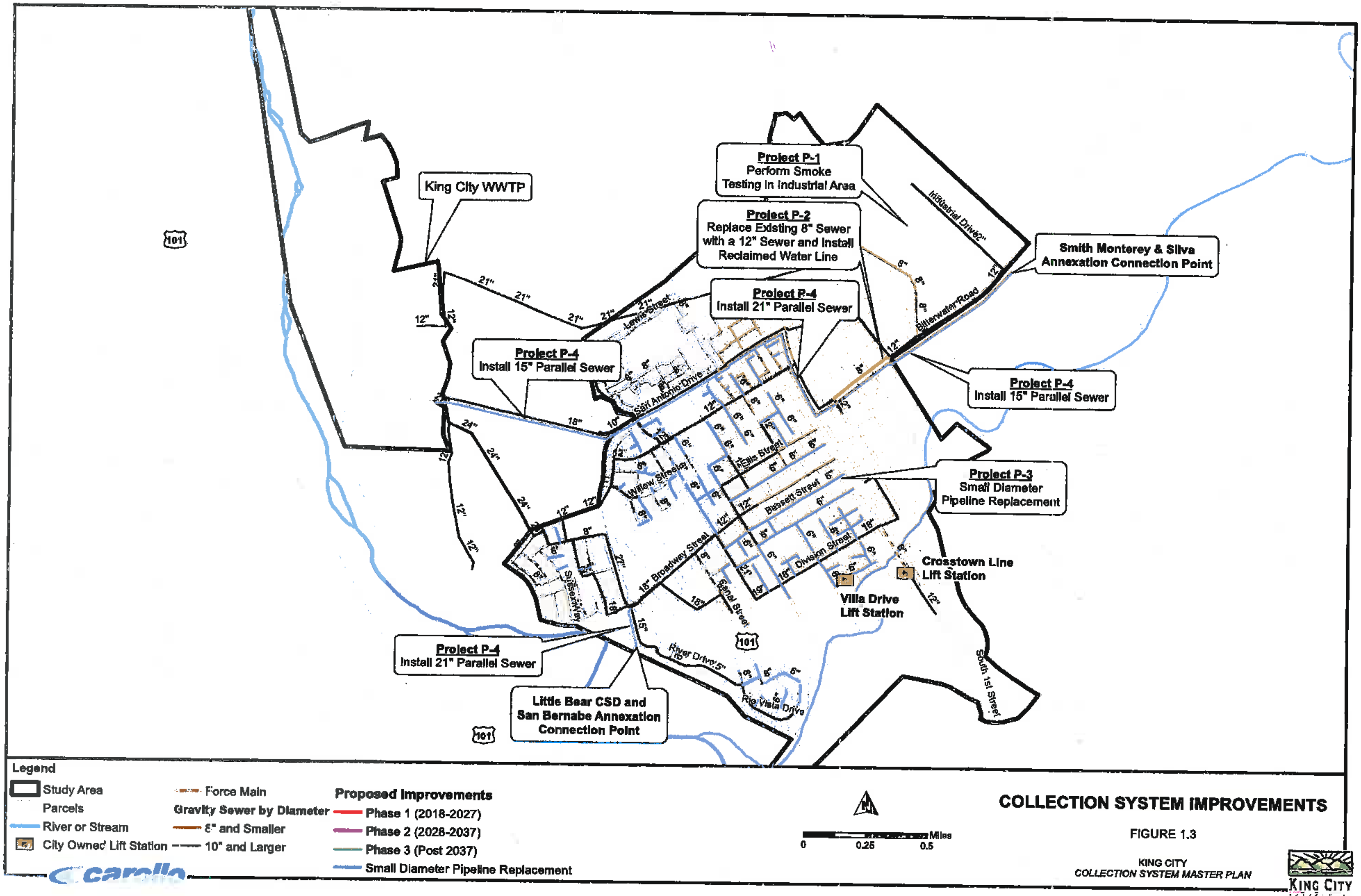
In some cases, a project is needed to correct an existing capacity deficiency, but is sized to accommodate additional flows from future development. In these cases, the hydraulic modeling results were used to determine the cost breakdown between existing and future users based on the ratio of existing and build out average dry weather flows.

1.5.2 Project Prioritization

A small portion of the improvements identified as part of this Master Plan are driven by future development, which consist of new sewers that serve future growth or improvements to existing facilities that are needed to serve future growth. When fully implemented, the capital projects will allow the conveyance of PWWFs to the treatment plant under Phase 3 (build out) conditions.

Prioritizing the required capital improvements for the City's sewer system is an important aspect of this study. The improvement projects were prioritized based on the following factors:

- Upgrading existing facilities to mitigate current capacity deficiencies and to serve future users
- Building the new trunks necessary to serve future users



COLLECTION SYSTEM IMPROVEMENTS

FIGURE 1.3

KING CITY
COLLECTION SYSTEM MASTER PLAN

Improvements to existing facilities will provide sufficient capacity to mitigate existing issues and to convey increased flows resulting from future growth. Future development will require the construction of sewers to serve new users. The projects were grouped into the following phases:

- Phase 1: Years 2018 through 2027
- Phase 2: Years 2028 through 2037
- Phase 3: Beyond 2037

The projects were phased based on the best available information for how the City will develop moving forward. The actual implementation of the improvements serving future users ultimately depends on growth. The priorities presented below are estimates, and changes in the City's planning assumptions or growth projections could increase or decrease the priority of each improvement.

- **Phase 1 Projects (2018-2027)**: The highest priority project for the existing system is the smoke testing of the industrial area (Project 1). This is important to identify the source of high inflow rates, which may allow the City to avoid upsizing the 8-inch diameter gravity sewer on Bitterwater Road (Project 2). Another project targeted to begin in Phase 1 is the small diameter sewer replacement program (Project 3).
- **Phase 2 (2028-2037)**: No new projects were identified for Phase 2. The small diameter sewer replacement program (Project 3) is a long-term project which extends through Phase 2.
- **Phase 3 (Beyond 2037)**: The third phases target new sewers to serve future planned developments, including Little Bear and San Bernabe (Project 4) and Smith-Monterey and Silva (Project 5). As previously noted, the actual rate of growth within the City will dictate when these new pipelines will need be constructed.

1.6 CAPITAL IMPROVEMENT PLAN

The cost estimates presented in the capital improvement plan (CIP) have been prepared for general master planning purposes and for guidance in project evaluation and implementation. Final costs of a project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors such as preliminary alignment generation, investigation of alternative routings, and detailed utility and topography surveys.

The Association for the Advancement of Cost Engineering (AACE) defines an Order of Magnitude Estimate, deemed appropriate for master plan studies, as an approximate estimate made without detailed engineering data. It is normally expected that an estimate of this type would be accurate within plus 50 percent to minus 30 percent.

The CIPs are prioritized based on their urgency to mitigate existing deficiencies and for servicing anticipated growth. It is recommended that improvements to mitigate existing deficiencies be constructed as soon as possible. The improvements proposed in this study either benefit existing users and/or are required to serve new development and future users. A summary of the existing and future user cost share for the proposed projects by phase is summarized in Table 1.2. Recommended improvements for Phase 3 were not included in Table 1.2 or the CIP because it is beyond the planning period of this Master Plan.

Table 1.2 Summary of Capital Improvement Costs
Collection System Master Plan
King City

Reimbursement Category	Implementation Phase		
	Phase 1 (2018-27) ($,M)	Phase 2 (2028-37) ($,M)	Total ($,M)
Existing User	$1.91	$2.23	$4.14
Future User	$0.48	$-	$0.48
Total	**$2.39**	**$2.23**	**$4.62**

Notes:
(1) Costs are based on ENR CCI 20-City Average of 10,530 (December 2016).

EXHIBIT 2

KING CITY
CALIFORNIA

FINAL

Wastewater Treatment
FACILITIES PLAN

September 2017

carollo

EXECUTIVE SUMMARY

1.1 INTRODUCTION

The King City (City) Wastewater Treatment Plant (WWTP) is located in the Salinas Valley of Monterey County, California along the Salinas River and serves a population of approximately 12,900. The WWTP was constructed in 1970 and underwent capacity expansions in 1982, 1991, and 2010. The last facility plan update was completed in 2007. Since then, the City has identified several drivers leading to this current facility plan. These drivers include the following:

- The City's desire to produce tertiary-treated effluent meeting Title 22 unrestricted reuse requirements.
- The City's desire to sell land adjacent to the treatment facility.
- Additional plant capacity required to accommodate anticipated growth in the City.
- Potential for change in current permit requirements (i.e., updates to the City's Waste Discharge Requirements [WDR] by the Central Coast Regional Water Quality Control Board [Central Coast Regional Board]).
- Increasing difficulty meeting existing treatment objectives and anticipated permit requirements with existing pond-based system.
- Need to repair/rehabilitate aging infrastructure.
- Ongoing maintenance needs of the existing pond system including removing accumulated biosolids and inert solids that could cause an internal load.
- Potential for future regulations on nutrients, including ammonia and nitrate.
- Future climate change and flooding concerns.

This facility plan summarizes the facility's current and future regulatory requirements, evaluates the facility's current and future flows and loads, provides alternatives for future effluent reuse and disposal, and recommends alternatives for a future tertiary treatment facility that will produce Title 22 unrestricted reuse-quality water. The basis of evaluation for future needs is over a 20-year planning horizon.

The facility consists of domestic treatment and disposal as well as an industrial disposal-only system. The domestic treatment facility has a design capacity of 1.2 million gallons per day (mgd) and consists of a headworks, seven (7) treatment ponds, an effluent disposal pump station and force main, and six (6) spray irrigation fields for disposal of treated effluent. The WWTP operates under a domestic WDR regulated by the Central Coast Regional Board and disposes of treated domestic wastewater on domestic sprayfields. The City monitors industrial wastewater discharge from one facility, ConAgra 45 (CAG 45), under a separate WDR. Currently, CAG 45 is a cogeneration facility with very little to no influent loading in the waste stream and with no plans to return to agricultural processing. The City has directed Carollo to exclude the CAG 45 facility from this facility plan analysis. Should CAG 45 return to agricultural or industrial processes in the future, pretreatment of the effluent would be required before accepting it into the domestic wastewater treatment plant.

This executive summary chapter provides a brief overview of key findings and recommendations of the facility plan. For more detailed information, the reader is directed to Chapters 2 through 5 of the facility plan.

1.2 CURRENT AND FUTURE REGULATORY REQUIREMENTS

The WWTP discharges are regulated by the Central Coast Regional Board under two WDRs last updated in 1991:

- WDR Order No. 91-05 for the City of King Domestic Wastewater Facility (Domestic), which was adopted on January 11, 1991.
- WDR Order No. 91-84 for the City of King Industrial Wastewater Facility (Industrial from CAG 45), which was adopted on September 13, 1991.

The receiving water limitations for effluent discharges to the domestic and industrial sprayfields are listed in Table 1.1. Any future updates to the WDRs would likely incorporate the recommendations and/or requirements from the latest versions of the Water Quality Control Plan for the Central Coastal Basin (Basin Plan), State Resolution 68-16 (Antidegradation Policy), and the California Water Code Division 7. The Basin Plan describes beneficial uses and water quality objectives for waters of the State and within the Central Coast Region. King City is part of the Salinas River hydrologic unit which may require additional nitrogen reduction requirements. The Antidegradation Policy protects the receiving waters of the treated wastewater, including both surface waters and groundwater, by ensuring minimal degradation of the waters occurs. In addition, the City may also need to include a mandatory pretreatment ordinance for any flows and loads accepted from future industrial and agricultural discharges. The City will need to evaluate the anticipated impact of any future industrial or agricultural effluent discharge and may require pretreatment of the effluent before allowing it to enter the wastewater treatment plant.

Table 1.1 Domestic and Industrial WWTP Effluent Discharge Requirements
Wastewater Treatment Facilities Plan
King City

Parameter	Domestic		Industrial	
	Monthly Average	Weekly Average	Monthly Average	Daily Maximum
Flow, mgd	1.2(1)	--	2.4(2) 1.0(3)	--
Settleable Solids, mL/L	0.8	1.2	1.0	5.0
Suspended Solids, mg/L	100	150	--	--
Total Suspended Solids Loading, ppd/ac	--	--	150(4)	200(4)
BOD_5, mg/L	100	150	1,200	1,300
BOD_5 Loading, ppd/ac	--	--	300(4)	400(4)
pH(5)	6.5 to 8.3	--	6.5 to 8.4	--
Total Dissolved Solids, mg/L	--	--	1,500	2,000
Boron, mg/L	--	--	--	1.0
Chromium (Total), mg/L	--	--	--	0.1
Copper, mg/L	--	--	--	0.2
Diethylethanolamine, mg/L	--	--	--	0.1
Zinc, mg/L	--	--	--	2.0
Nitrate, mg/L as N(6)	8	--	8	8
Sulfate, mg/L(6)	--	--	250	250
Chloride, mg/L(6)	--	--	250	250

Notes:
(1) WDR was last updated in 1991. The facility upgrade has since been completed, increasing the domestic effluent discharge capacity to a monthly mean of 1.2 mgd.
(2) On-season (May 1 through November 30).
(3) Off-season (December 1 through April 30).
(4) Maximum sprayfield loading rates.
(5) pH shall be within this range at all times.
(6) Discharge shall not cause concentrations in the downgradient groundwater to exceed these values.

In addition to the wastewater effluent discharge requirements, biosolids generated from the WWTP are subject to wastewater biosolids regulations. Currently, the solids collected from the wastewater settle and accumulate within the ponds, which must be dredged periodically to maintain the plant's capacity. Future upgrades and/or expansions to the plant will likely increase the amount of biosolids generated.

Biosolids are classified by the EPA's 40 CFR Part 503 Standards for the Use and Disposal of Sewage Sludge ("40 CFR 503") regulations as Class B or Class A, according to the level of pathogen reduction. Biosolids must also meet vector attraction and metal concentration limits.

The State of California does not directly regulate beneficial use of biosolids. The Regional Water Boards have the option of adopting the State's General Order for biosolids, while providing additional management requirements with no additional biosolids quality requirements. Also, California Department of Resources Recycling and Recovery (CalRecycle) and the California Department of Food and Agriculture (CDFA) have jurisdiction over certain aspects of organics management that could affect the future management of biosolids in the State.

Many counties in California have developed, or are developing, ordinances for biosolids land application. The stringency of these county regulations ranges from requirements for relatively high minimum insurance to the complete or partial banning of sludge land application. Currently, Monterey County allows land application of Class B biosolids on a case-by-case basis as approved by the County Director of Health. Should the City need to haul biosolids to another county for land application, potential nearby options include:

- Santa Clara, Alameda, and Santa Barbara Counties - no regulations or ordinances currently enacted.
- Kern County - Class B land application allowed with conditions met.
- Fresno, Kings, and San Luis Obispo Counties - current ban on Class B land application but land application of Class A EQ biosolids allowed.

Updates to these biosolids regulations may arise in the future. The use and disposal of biosolids is becoming progressively more difficult in California. Land application of biosolids is restricted by many California counties, and fewer landfills are accepting biosolids.

1.3 FLOW AND LOAD EVALUATION

1.3.1 Historical and Projected Flow Analysis

The flow and load evaluation for the WWTP included an evaluation of historical wastewater flows and loads as well as future flows and loads projected for the 20-year planning horizon.

Historical wastewater flows and loads were evaluated to understand daily and seasonal trends as well as variations due to drought and non-drought conditions. Current flows and loads were compared with design criteria of the existing facility to understand regulatory compliance history and to develop capacity needs. The flow and load projections were developed based on an analysis of available historical data provided by the City, current flow monitoring conducted as part of the Collection System Master Plan, and available information related with future land use. Projections for flows and loads were ultimately used to size the treatment process elements.

The following flow definitions are used throughout this chapter:

- **Average Daily Flow (ADF):** ADF is the average flow during a one-day period. The WWTP monthly monitoring reports (MMRs) report ADF.
- **Average Annual Flow (AAF):** AAF flow is the average of the ADF values during a calendar year.
- **Average Day Maximum Month Flow (ADMMF):** ADMMF is the largest volume of flow anticipated to occur during either a continuous 30-day period or a calendar month. The WWTP MMRs report ADMMF.
- **Peak Hour Flow (PHF):** PHF is the largest volume of flow anticipated to occur during a one-hour period, expressed as a daily or hourly average.

Treatment plant facilities are typically sized for specific flow parameters, as shown in Table 1.2.

Table 1.2 Basis of WWTP Sizing
Wastewater Treatment Facilities Plan
King City

Flow Parameter	Element
ADMMF, mgd	• Secondary Treatment Processes • Chemical Storage Facilities • Solids Handling Facilities
PHF, mgd	• Influent Pump Station • Headworks (bar screens and grit removal) • Secondary Clarifiers • Tertiary Filtration • Disinfection • Effluent Pump Station

Historical average daily flows from January 2008 through October 2016 from King City were analyzed and plotted separately for non-drought years (2008 through 2011, Figure 1.1) and drought years (2012 through 2016, Figure 1.2). Non-drought years generally indicated a higher AAF than drought years likely due to water conservation efforts during drought years. Non-drought years generally experienced an increase in flow and loads during the dry weather months (March to October) compared to the wet weather months likely due to the increased farmworker population during the agriculturally-intensive months.

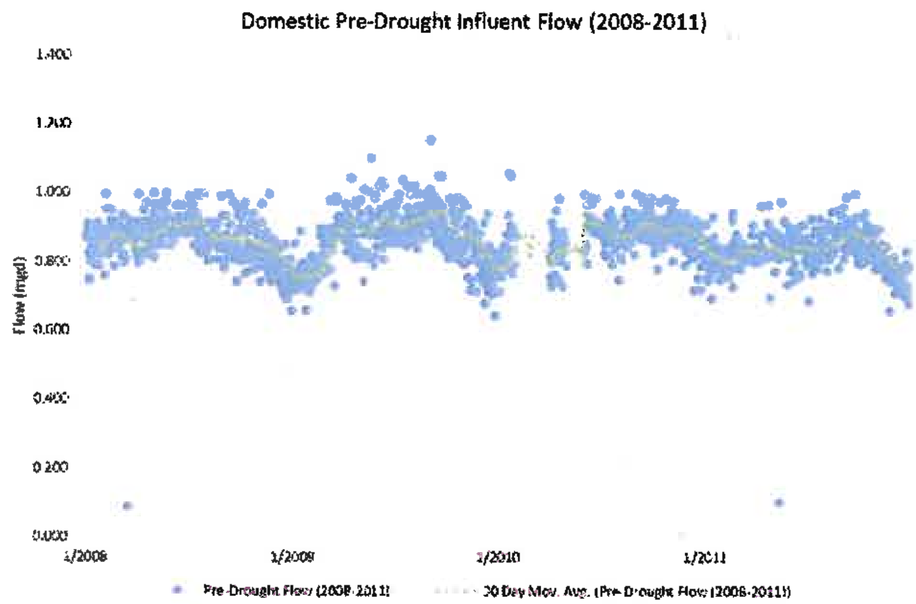


Figure 1.1 Domestic Pre-Drought Influent Flow (2008-2011)

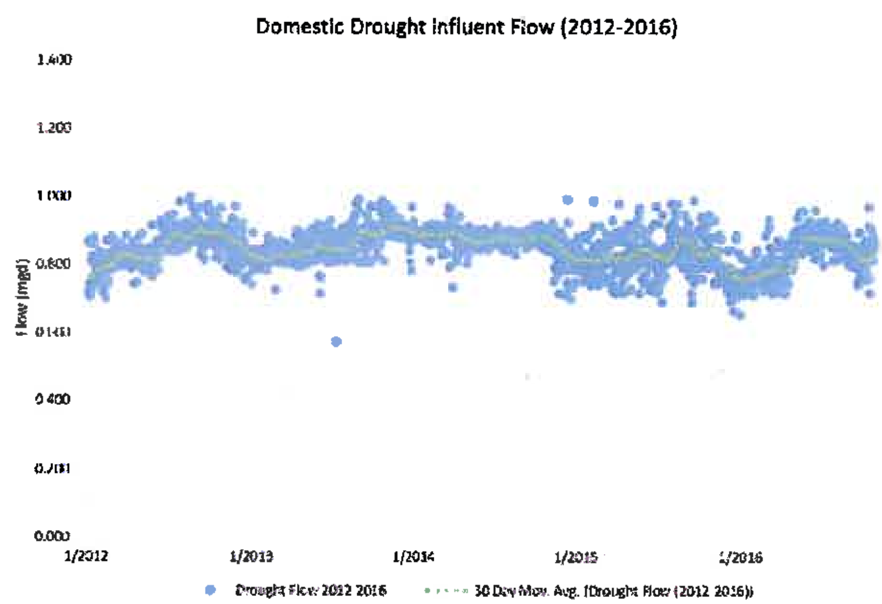


Figure 1.2 Domestic Drought Influent Flow (2012-2016)

Table 1.3 summarizes the historical flows from the monthly monitoring report data from 2008 to 2016.

Table 1.3 Historical Flow Analysis
Wastewater Treatment Facilities Plan
King City

Year	AAF, mgd	ADMMF, mgd	ADMMF/AAF Peaking Factor
2008	0.86	0.94	1.10
2009	0.87	0.98	1.13
2010	0.88	0.95	1.08
2011	0.83	0.91	1.09
2012	0.86	0.92	1.08
2013	0.86	0.93	1.07
2014	0.87	0.91	1.04
2015	0.83	0.91	1.10
2016	0.83	0.90	1.09
Non-Drought(2008-2011) Average	0:86	0.95	1.10
Drought(2012-2016) Average	0.85	0.91	1.08

As a comparison to historical flows, an analysis of potable water consumption data and GIS analysis of land use acreage was conducted. The ADMMF was calculated from flow projections and land use data and compared with water consumption data obtained from the 2015 Cal Water Urban Water Management Plan. Table 1.4 presents the data from that analysis.

Table 1.4 Water Consumption Data and Land Use Analysis
Wastewater Treatment Facilities Plan
King City

Land Use Type	Acreage	Wastewater Flow Factor, gpd/ac	Wastewater Flow, mgd
Single Family	327	1,200	0.39
Multi Family	59	2,000	0.12
Commercial	103	750	0.08
Industrial	342	550	0.19
Institutional/Governmental	144	600	0.08
Total	**975**	-	**0.86**

Flow projections were developed starting from current ADMMF and anticipated community growth information based on current and future land use information from a variety of historical and recent sources. Table 1.5 summarizes the analysis of flow projection by growth area. A 10-percent contingency has been included after the subtotal.

Table 1.5 Flow Projection by Growth Area
Wastewater Treatment Facilities Plan
King City

Growth Area	Number of Dwelling Units, con	Flow Factor, gal/con-d	Aerial Analysis, acre	Generation Factor, gpd/acre	Anticipated Flow, mgd
Current AAF, mgd	-	-	-	-	[illegible]
In-Fill Development	396	190	120	1,170	0.21
Creek Bridge[1]	[illegible]	[illegible]	-	-	[illegible]
Mills Ranch	368	185	-	-	0.07
Downtown Addition	[illegible]	[illegible]	-	-	[illegible]
New Commercial	-	-	35.3	750	0.03
Undeveloped Industrial	-	-	[illegible]	[illegible]	[illegible]
Lone Oak	-	-	-	-	-
Little Bear CSD, existing[2]	[illegible]	[illegible]	-	-	[illegible]
Proposed Annexations	Beyond 20-yr Planning Horizon				
Little Bear CSD, future/planned[3]	Beyond 20-yr Planning Horizon				
				Subtotal	1.56 mgd
				Contingency	10 percent
				PROJECTED AAF	**1.72 mgd**

Notes:
(1) Includes Arboleda.
(2) Only existing flows from Pine Canyon and Royal Estates (including septic and will-serve) are included in this estimate.
(3) Future/planned flows from Pine Canyon, Royal Estates, Morisoli, and Lot 71 are beyond the 20-year planning horizon of this Facility Plan.

A PHF was estimated based on routing two design storms through the collection system model developed for the 2017 Collection System Master Plan. Estimated peak flows were determined based on routing a design storm based on both a January 18, 2010 wet weather event rainfall distribution curve and a Soil Conservation Service (SCS) Type 1 rainfall distribution curve. The total rainfall for both storms was 3 inches, which corresponds to a 10-year, 24-hour storm for the City. For the January 2010 event, an estimated PHF of 2.9 mgd was produced. For the SCS Type 1 event, an estimated PHF of 3.9 mgd was produced. Hence, the more conservative PHF of 3.9 mgd will be used for development of the peaking factor. The projected design flows are summarized in Table 1.6.

Table 1.6	Projected Design Flows Wastewater Treatment Facilities Plan King City		
Flow Parameter	**Current Flows, mgd**	**Design Peaking Factor (From AAF)**	**Anticipated 20-year Design Flows, mgd**
AAF, mgd	0.86(1)	-	1.72(2)
ADMMF, mgd	0.98(3)	1.13(4)	2.00(5)
PHF, mgd	3.90(6)	4.53(7)	7.80(8)

Notes:
(1) From GIS land use analysis.
(2) From Table 1.5. Includes 10% contingency.
(3) Maximum historical ADMMF from 2008 to 2016, occurring in 2009.
(4) Maximum peaking factor from 2008 to 2016, occurring in 2009.
(5) Rounded up from 1.94.
(6) Equivalent to a 10-year, 24-hour storm for King City routed through a SCS Type 1 curve.
(7) Current PHF divided by current AAF.
(8) Rounded up from 7.79.

1.3.2 Loads Analysis

Analysis of influent 5-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), and ammonia as nitrogen (NH_3) concentrations are typically used to evaluate the capacity of existing facilities and for sizing new secondary treatment processes. The City's WWTP, however, is not required to monitor influent domestic wastewater constituents and, therefore, has no data on record for most wastewater constituents. Only effluent constituents, including effluent BOD_5 and TSS, are reported. The most recent WWTP design criteria from the 2010 Domestic WWTP and Disposal Facility Improvements Project will be used as the preliminary design criteria for this analysis. The 2010 project anticipated influent BOD_5 loading to be 3,133 pounds per day (ppd) and TSS to be 2,662 ppd (Carollo, 2010). The 2010 design loads and the future 20-year ADMMF were used to develop the future load projections for sizing the new secondary treatment process alternatives. Table 1.7 summarizes the 2010 and future 20-year design criteria.

Table 1.7	Treatment Plant Design Loads Wastewater Treatment Facilities Plan King City		
Parameter	**2010 Design Criteria[(1)]**	**Equivalent Concentration at ADMMF, mg/L**	**20-yr Design Criteria**
ADMMF, mgd	1.2	-	2.0[(2)]
Influent BOD_5, ppd	3,133	313	5,221[(3)]
Influent TSS, ppd	2,662	266	4,437[(3)]

Notes:

(1) From 2010 Domestic Wastewater Treatment and Disposal Facilities Improvements Project (Carollo Engineers).

(2) Rounded up from 1.94 mgd.

(3) Calculated from equivalent concentration derived from 2010 Design Criteria.

1.3.3 Influent Wastewater Sampling

In addition to the preliminary design criteria developed from 2010 design loads, influent wastewater sampling is recommended to establish a baseline for influent wastewater characteristics and to refine the 20-year design criteria. An initial 2-week sampling plan was developed and sampling was conducted between April 22, 2017 through April 28, 2017 and May 11, 2017 through May 17, 2017 to coincide with anticipated peak annual dry weather flows and peak loads generated during the agricultural season. The samples were collected and analyzed by Monterey Bay Analytical Services, who currently analyze City data for regulatory reporting.

Summary tables of the recommended sampling plan and the sampling results from this initial 2-week sampling period are included in Chapter 3. The results suggest a higher average BOD, TSS, and Total Kjeldahl Nitrogen loading than was initially assumed using 2010 design criteria. To further refine the design criteria for preliminary design, additional monitoring of BOD, TSS, and nitrogen species is recommended during the 2017 dry weather agricultural season (e.g., two weeks in July and two weeks in September) and to continue on a quarterly basis until preliminary design.

1.4 EFFLUENT REUSE AND DISPOSAL

The City would like to consider effluent reuse and disposal using urban irrigation and/or agricultural irrigation when recycled water demand exists and seasonal land disposal (i.e., sprayfields or percolation ponds) when recycled water demand does not exist. Alternatives considered would need to incorporate the current and future (anticipated) regulatory landscape, including recent State policies regarding the drought, the State Groundwater Management Act (SGMA), and salt and nutrient management planning.

In California, both the State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCB) have regulatory authority over projects using recycled water. The SWRCB administers statewide water rights, water pollution control, and water quality functions, while RWQCBs conduct planning, permitting, and enforcement activities. This project lies within the jurisdiction of the Central Coast Regional Board (Region 3). The Central Coast Regional Board has authority to issue WDRs and/or water reclamation requirements to the recycled water supplier, the recycled water user, or both. In lieu of the WDR and water reclamation requirements, the Central Coast Regional Board has authority to issue Master Reclamation Permits to a supplier and/or distributor of recycled water, and this option appears to be more common.

The primary regulation governing recycled water use is published in Title 22, Division 4, Chapter 3 of the California Administrative Code (Title 22). Title 22 regulations define four categories of recycled water determined by the treatment level and effluent turbidity and disinfection levels. In order to be used for agricultural spray irrigation of food crops or landscape irrigation, the City's recycled water treatment facilities would be required to meet the requirements for tertiary disinfected recycled water, which is the highest level of treatment defined by the State and allows for unrestricted reuse in virtually all recycled water applications. Domestic wastewater requires biological (secondary) treatment, filtration, and disinfection to Title 22 effluent limits before it can be considered tertiary recycled water. All of the treatment processes evaluated in this report have been accepted by the State as being capable of meeting the Title 22 regulatory requirements. Title 22 and typically the Master Reclamation Permit describe recycled water producer, distributor, and user responsibilities including permitting, inspection, training, and reporting requirements.

1.4.1 WWTP Permit Compliance History

The existing domestic effluent discharge requirements have not changed since 1991. However, since the original plant design, the regulatory climate and enforcement world has significantly changed. The regulatory climate today is increasingly stringent. Occasional permit non-compliance is no longer acceptable to the SWRCB, environmental conservation groups, or the general public. The existing WWTP relies on a pond-based treatment system for primary and secondary treatment. The system has served the City well over several decades but has a number of drawbacks: there is not sufficient room to further expand the ponds for additional treatment capacity and facultative pond performance is inherently affected by the weather (temperature, wind, and precipitation). Despite the City's efforts to improve secondary treatment performance, ongoing permit exceedances of plant effluent limits for BOD and TSS support the need for increased secondary treatment capacity beyond the capacity of the existing ponds.

Nutrients such as nitrogen in the form of ammonia, nitrates, or total nitrogen have been identified as concerns in the Basin Plan. Other permittees in the Central Coast Region (e.g., City of Soledad) have received more restrictive limits for nitrogen in their recent permit. Nutrient management in the form of nitrogen reduction is also a priority of the Basin Plan with the recommendation that future facility expansions include a means for nitrogen reduction.

During the March 29, 2017 meeting with Carollo, the City, and the Central Coast Regional Board to discuss the Facility Plan, the Central Coast Regional Board indicated that while the domestic and industrial WDRs are not currently being updated, significantly more stringent secondary effluent limits for BOD, TSS, ammonia, and nitrate can be expected in the future. It was discussed that future secondary effluent BOD and TSS limits of 30 mg/L each and a future total nitrogen secondary effluent limit at or lower than 10 mg/L can be reasonably expected. The Central Coast Regional Board also indicated that sprayfield effluent disposal is a nitrogen reduction strategy that will continue to be encouraged for the Salinas River Basin. Other effluent disposal methods such as percolation ponds will need to be further evaluated (such as considering groundwater levels), but may be allowed by the Central Coast Regional Board. The Central Coast Regional Board also confirmed that sprayfield or percolation pond effluent disposal would most likely not require disinfection as currently operated.

In the future, the City would like the new facility to produce tertiary effluent for reuse. The anticipated water reuse demands will be evaluated by Carollo as a separate project in conjunction with Cal Water, who provides potable water service in the City. Any recycled water produced by the City would require coordination and partnership with Cal Water because of the existing "anti-paralleling statute" (California Public Utilities Code, Chapter 8.5 Section 1501) that prohibits duplication of service within the service area of any public or private water utility without approval or payment for loss of revenue and use of facilities.

Approximately 1.7 mgd of effluent will need to be reused or disposed of on an average annual basis. Effluent disposal alternatives need to be considered for periods with little to no recycled water demands. In addition to recycled water demand, the two recommended alternatives for additional effluent disposal are sprayfields and percolation ponds. Further discussion with the Central Coast Regional Board is needed to determine the effluent quality (e.g., undisinfected or disinfected secondary or tertiary effluent) required for the effluent disposal alternatives.

Because the current sprayfields lack sufficient capacity to dispose of the entire 1.7 mgd effluent flow during periods without recycled water demands, alternatives of sprayfields, percolation ponds, and lined storage ponds must be added or combined to make a complete reuse/disposal project.

The summary of the effluent reuse and disposal alternatives evaluated using the results of individual water balances is shown in Table 1.8. The construction cost of each effluent reuse and disposal alternative is shown in Table 1.9.

Table 1.8	Initial Screening of Effluent Reuse and Disposal Options Wastewater Treatment Facilities Plan King City				
Alternative	Existing Sprayfield Area, (ac)	New Sprayfield Area, (ac)	New Percolation Pond Area(1), (ac)	New Storage Pond Area(1), (ac)	Agricultural Irrigation, (ac)
1	54(2)	0	23(3)	0	0
2	Not Used	0	74(4)(5)	0	0
3	54(6)	0	23(7)	10	575
4(8)	54(2)	20	0	0	0
5	Not Used	0	0	[illegible]	[illegible]

Notes:

(1) Bottom pond area (effective percolation area) required is shown. Approximately 20 percent additional top pond area is required to account for sloped pond walls and berms.
(2) Domestic sprayfields in use year-round.
(3) 23 acres is available by converting Ponds 1A, 1B, 3, and 5. Pond 4 can be taken out of service.
(4) 33 acres is available by converting Ponds 1A, 1B, 3, 4, and 5.
(5) An additional 41 acres of percolation pond bottom area is required (approximately 50 acres of top pond area).
(6) Domestic sprayfields only in use during non-irrigation season.
(7) 23 acres is available by converting Ponds 1A, 1B, 3, and 5. Pond 4 will be converted to recycled water storage.
(8) Pond 3, pond bottom area of 4.5 acres, will be kept in service with the existing clay liner intact and used for storage of treated secondary effluent.
(9) An additional 27 acres of lined storage pond bottom area is required (approximately 33 acres of top pond area).

Table 1.9	Cost of Effluent Reuse and Disposal Options Wastewater Treatment Facilities Plan King City	
Alternative	Capital Construction Cost(1)	Recycled Water Production, AFY
1	$2,510,000	0
2	$7,000,000	0
3	$8,450,000	694
4	$2,050,000	0
5	$9,720,000	1,778

Notes:

(1) Cost estimate is based on 2017 Dollars and includes 30% estimating contingency. See Appendix C for capital cost for water balance alternatives.

1.5 TREATMENT ALTERNATIVES ANALYSIS

Identification of treatment alternatives is needed to address the BOD_5 and TSS capacity shortfall and to treat the water to Title 22 unrestricted reuse-quality. Alternatives for each treatment process were developed and evaluated based on economic and non-economic factors. With this analysis in conjunction with input from the City, a recommended preliminary tertiary treatment facility was developed along with preliminary construction costs and a preliminary site plan.

1.5.1 Summary of Common Improvements Needed

Based on the age of the existing facilities and the drivers and objectives for the future WWTP, the majority of the existing treatment facilities must be replaced. There are several required common processes to all alternatives.

Septage Receiving Station: The City desires a new septage receiving station, which can be a source of revenue for the City and would provide a service to the surrounding communities.

Headworks: The headworks capacity must be increased to handle the design PHF of 7.8 mgd. Due to the age and condition of the existing headworks, all structural and mechanical components need to be replaced. A new headworks would include new Parshall flumes, 1/4-inch spacing mechanical bar screens, a vortex grit chamber with grit pumping and grit classifier, and new influent pump station with submersible pumps.

Flow Splitter Structure: A new flow splitter structure is proposed to follow the influent pump station to evenly distribute the flow to the new secondary treatment process.

Effluent Disposal (Irrigation) Pump Station: The existing irrigation pump station is assumed to be reused in this Facility Plan. During preliminary design, the pump station will be further evaluated for recommended improvements.

1.5.2 Identification of Secondary Treatment Options

Identification of secondary treatment options is needed to address the current and future treatment objectives and permit compliance requirements. A preliminary screening of new secondary treatment options was conducted, and those deemed feasible were further discussed with the City.

There are several treatment processes that can be used to provide additional secondary treatment capacity, either alone or in combination with other processes, in order to achieve desired effluent water quality. Table 1.10 provides a list of secondary treatment processes that are commonly considered, along with the constituents they most commonly remove.

Table 1.10 Secondary Processes Meeting Permit Discharge Requirements Wastewater Treatment Facilities Plan King City			
	Ability To Remove		
Process	Organics (BOD)[1]	Ammonia[2]	Total Nitrogen[2]
Suspended Growth			
Activated Sludge	✓	✓	✓
Attached Growth			
Trickling Filters (1-Stage)	✓		
Nitrifying Trickling Filters		✓	
Denitrification Filters			✓
Land Based Systems			
Ponds (Aerated)	✓	Summer only	

Notes:
(1) Current permit discharge requirement.
(2) Anticipated future permit discharge requirement.

Of the options considered, Carollo recommends a suspended growth, activated sludge process for the various reasons indicated in Table 1.11 and the following sections.

Table 1.11 Initial Screening of Secondary Treatment Options
Wastewater Treatment Facilities Plan
King City

Treatment Option	Adds BOD Capacity	Removes Ammonia	Improves Final UVT[1]	Reliable	Move Forward
Additional Ponds	Yes	Summer only	No	Maybe	No - Does not meet WQ objectives
Trickling Filter	Yes	Only if 2-stage	No	Yes	No
Activated Sludge	Yes	Yes	Yes	Yes	Yes

Notes:
(1) Ultraviolet Transmittance (UVT) is an important design criteria for the UV disinfection alternative as discussed in the Tertiary Treatment section of this chapter and Chapter 5.

Additional ponds could provide increased BOD and TSS removal, however, a pond system would have difficulty providing year-round ammonia and total nitrogen removal and meeting secondary effluent quality needed to support downstream processes producing Title 22 unrestricted reuse-quality tertiary effluent. The ponds would also require more land that the City desires to sell, making ponds an inviable option.

Trickling filters would also have difficulty removing ammonia and total nitrogen unless more than one stage is installed. They have unique operation and maintenance (O&M) requirements. Trickling filters are prone to intermittent high effluent TSS due to sloughing, which makes them poor processes to include upstream of ultraviolet (UV) disinfection. They are also prone to attracting snails that strip the attached biological growth from the media, which require additional operational expenses to control. For these reasons, Carollo does not recommend trickling filters or any other attached growth process for the City.

Activated sludge processes provide reliable, year-round BOD, ammonia, and total nitrogen removal and provide the most flexibility for meeting increasingly stringent discharge requirements. The main disadvantage of these processes is they typically have a high O&M cost due to process aeration air demand. Carollo recommends moving forward with the activated sludge options and further defining these process alternatives. During a meeting with the City, the City agreed to move forward with an activated sludge option, which was further narrowed down to conventional activated sludge (CAS) using a Modified Ludzack-Ettinger (MLE) process, oxidation ditches, and membrane bioreactors (MBR).

The CAS with MLE option is a common, proven technology that is widely used to reliably remove organics, ammonia, and total nitrogen, and is easily expanded or modified to increase the overall capacity or improve the process. However, compared to oxidation ditches, this process is more operationally complex and requires additional maintenance associated with equipment used. It would also require periodic shutdowns to clean, replace, and repair equipment.

The oxidation ditch option, compared to the CAS with MLE and the MBR options, is simpler to operate, requires less maintenance, and provides a higher degree of reliability in handling shock loads and avoiding upsets. However, oxidation ditches require a larger footprint and slightly increased aeration costs due to the decreased efficiency of mechanical aeration compared to the diffused aeration used with the CAS with MLE and MBR options.

The MBR option requires the smallest footprint and can produce high quality effluent for reuse applications without the need for additional filtration processes downstream. However, MBRs require finer screening pretreatment and the membranes must be cleaned periodically with chemicals to mitigate fouling. There is also an increased energy cost associated with the additional aeration and pumping requirements.

1.5.3 Identification of Tertiary Treatment Options

Identification of tertiary treatment options is needed to address the future facility objectives and permit compliance requirements. All of the tertiary filtration and disinfection processes evaluated for this project have been accepted by the State as being capable of meeting the Title 22 requirements. Two filtration options (cloth media disk filters and continuous backwash filters) and two disinfection options (UV and chlorination) were considered. The tertiary treatment options were sized using the maximum daily diurnal flow (MDDF) instead of PHF to reduce the overall size of the facilities. On the rare occasion flow exceeds the MDDF, the flow will bypass the tertiary treatment processes and discharge directly to the sprayfields or percolation ponds.

Cloth media disk filters have a small footprint and require minimal energy and operator attention. However, they have the potential for media clogging and scaling, affecting operational run time as well as O&M time and labor.

Continuous backwash filters continuously clean the media through use of an airlift pipe and sand washer and therefore do not require backwash holding basins, waste backwash holding basins, or backwash pumps, which significantly reduces filter construction cost and increases ease of operation. However, these filters require an air compressor which increases the power cost.

UV disinfection is a physical process rather than a chemical process, therefore, no chemicals are used to disinfect the water and no disinfection residual is created that could negatively impact the receiving water. UV disinfection also typically requires a smaller footprint than sodium hypochlorite disinfection. However, UV uses more power than chlorination and has increased O&M related with equipment replacement and cleaning. There are also additional safety considerations associated with exposure to UV light and mercury release from lamp bulbs if damaged.

Sodium hypochlorite disinfection (chlorination) is a proven, reliable process, would require minimal operator attention, and can maintain a disinfectant residual within the distribution system to prevent biological growth within the pipes. However, the chlorine contact basins would require cleaning, reliance on chemical deliveries, and chemical feed and chemical mixer/injector equipment maintenance. Sodium hypochlorite could also generate disinfection byproducts (DBPs), degrade and become less effective in sunlight, and generate sodium which could impact recycled water quality. Chlorine is highly corrosive and toxic in all forms, and thus storage, shipping, and handling requires additional safety and O&M considerations.

1.5.4 Identification of Solids Treatment Options

Identification of solids treatment options is needed to address the regulatory objectives for biosolids. Any of these treatment options deemed feasible were further discussed and evaluated with the City.

Solids collected in the existing treatment system currently accumulate in the pond system and are periodically dredged and removed. With the proposed new facility, the majority of the solids generated will be waste activated sludge (WAS) generated from the secondary treatment process. An additional but smaller source of solids will be generated by the filter backwash. Several solids treatment and handling processes can be used to thicken, stabilize, and dewater wastewater sludge. The need for thickening, stabilization, and/or dewatering is dependent on which secondary treatment option is chosen. As shown in Table 1.12, for WAS produced by CAS with MLE, oxidation ditch, or MBR, there are several treatment processes that can be used for thickening, stabilization, and dewatering.

Table 1.12	Solids Treatment Options Wastewater Treatment Facilities Plan King City		
Secondary Treatment Alternative	**Solids Treatment Step Required**		
	Thickening	**Stabilization**	**Dewatering**
CAS with MLE	✓	✓	✓
Oxidation Ditch(1)			✓
MBR	✓	✓	✓

Notes:

(1) WAS generated by the 25-day solids retention time in the oxidation ditch is anticipated to comply with the pathogen reduction and vector attraction reduction requirements of the 40 CFR 503 biosolids regulations.

Thickening options include gravity belt thickeners (GBT) and rotary drum thickeners (RDT). Stabilization options include aerobic digestion and solids lagoons. Dewatering options include sludge drying beds and screw presses.

GBTs are a reliable and relatively low-maintenance process with low energy consumption. However, they produce emissions of solids, liquids, corrosive gases, and odor that may be an O&M concern for plant staff.

RDTs are self-contained processes, unlike the GBTs, therefore emissions are not an issue. They typically also have a smaller footprint and require less operator attention.

Aerobic digesters, compared to solids lagoons, have an increased process control capability, reduced facility footprint, and reduced potential for odors. However, they have increased power costs and maintenance.

Solids lagoons are reliable, easy to operate, and require little energy. However, they require a significant amount of land area, have increased potential for odors, and require periodic dredging of accumulated solids.

Sludge drying beds require minimal operator attention and are easily maintained. However, they require a significant amount of land area for drying the sludge as well as for the stockpiling of dried sludge. Operational impacts due to wet weather, including runoff, need to be considered. Drying beds also have an increased potential for odors.

Screw presses require minimal operator attention, little power, can be operated on a 24-hour schedule, and are self-contained resulting in little to no potential for odors. The dewatered sludge can also be loaded into a hopper and directly onto a hauling truck.

1.6 OPTIONS FOR OVERALL TERTIARY FACILITY AND RECOMMENDED ALTERNATIVE

A workshop was held with the City on March 30, 2017 to discuss potential treatment options, non-economic considerations associated with each treatment process, and planning-level comparative life-cycle cost estimates for each treatment option. Based on the range of options evaluated, Carollo presented two overall tertiary facility configurations for the City to consider. These two potential configurations for the overall tertiary facility (based on the secondary treatment option) are shown in Table 1.13.

Table 1.13 Recommended Configurations for Overall Tertiary Facility
Wastewater Treatment Facilities Plan
King City

	Liquid Treatment			Biosolids Treatment		
Alternative	**Secondary Treatment**	**Filtration**	**Disinfection**	**Thickening**	**Stabilization**	**Dewatering**
1	Oxidation Ditch with Secondary Clarifiers	Continuous Backwash Filter	UV	N/A	N/A	Screw Press
2	MBR	N/A	UV	Rotary Drum Thickener	Aerobic Digester	Screw Press

Based on feedback obtained from the March 30, 2017 workshop, the City prefers Alternative No. 1: headworks, oxidation ditch, secondary clarifier, continuous backwash filter, UV, and screw press. A preliminary facility site plan is shown in Figure 1.3 and a preliminary hydraulic profile for the proposed facility is shown in Figure 1.4. Given that the construction costs for Alternatives Nos. 1 and 2 are similar, the decision to move forward with Alternative No. 1 was made on a qualitative basis and from input from the City. Alternative No. 1 is further parsed into Buildout and Phasing options for both Secondary Treatment only and full Tertiary Treatment to represent four options for Capital Improvements Program implementation. The recommended number of unit processes for the Buildout and Phasing options are detailed in Table 1.14, with capital construction costs and O&M costs outlined in Table 1.15, Table 1.16, Table 1.17, and Table 1.18.

LEGEND

1) Headworks
2) Oxidation Ditches
3) RAS/WAS Pump Station
4) Secondary Clarifiers
5) Continuous Backwash Filters
6) UV Disinfection
7) Irrigation Pump Station (Existing)
8) Screw Press

N

0 150

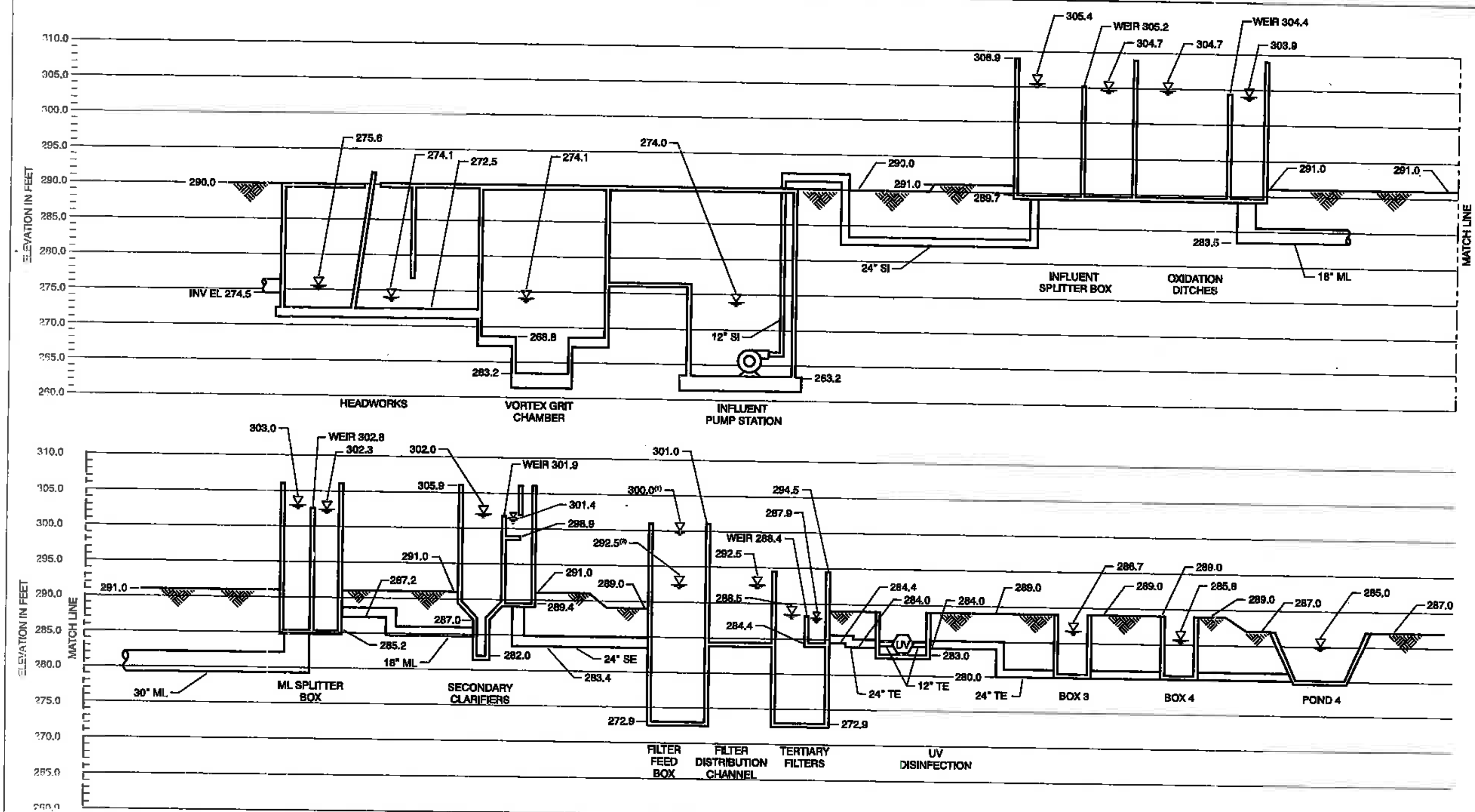
Scale in Feet

PRELIMINARY
TERTIARY FACILITY SITE PLAN

FIGURE 1.3

KING CITY
WASTEWATER TREATMENT FACILITIES PLAN

carollo



NOTES:
1. WATER SURFACE ELEVATION AT PHF 7.8 MGD.
2. WATER SURFACE ELEVATION AT MDDF 3.2 MGD.

PRELIMINARY HYDRAULIC PROFILE

FIGURE 1.4

KING CITY
WASTEWATER TREATMENT FACILITIES PLAN

Table 1.14	Number of Process Units for the Recommended Alternative Wastewater Treatment Facilities Plan King City					
	Tertiary Treatment			Secondary Treatment		
Process	Buildout	Phase 1	Phase 2	Buildout	Phase 1	Phase 2
Headworks	1	1	-	1	1	-
Oxidation Ditch	3	2	1	3	2	1
Secondary Clarifier	3+1	2+1	1	3+1	2+1	1
Continuous Backwash Filter	10+2	6+2	4	-	-	-
UV	3+1	2+1	1	-	-	-
Screw Press	1+1	1+1	-	1+1	1+1	-

Table 1.15	Cost of Tertiary Treatment Facility at Buildout Wastewater Treatment Facilities Plan King City			
Process	Capital Construction Cost(1)(2)	Total Annual O&M Cost(3)	Present Worth of 20-yr O&M Cost(4)	Present Worth of 20-yr Life Cycle Cost(5)
Headworks	$7,570,000	[illegible]	$537,000	[illegible]
Oxidation Ditch/Secondary Clarifier	$24,120,000	$207,400	$2,854,000	$26,974,000
Continuous Backwash Filter	$13,600,000	$46,200	$636,000	[illegible]
UV	$4,700,000	$103,300	$1,422,000	$6,122,000
Screw Press	$3,720,000	$225,300	$3,160,000	$6,880,000
Labor	-	$500,000	$6,881,000	$6,881,000
Total(6)	$53,210,000	$1,125,500	$15,490,000	$68,700,000

Notes:

(1) Cost estimate is based on 2017 Dollars and includes 30 percent estimating contingency. See Appendix H for capital cost item details for each element.
(2) Buildout escalation to midpoint of construction occurs April 1, 2020.
(3) See Appendix F for a summary of O&M cost details.
(4) Present worth is based on a 20-year life, a discount rate of 6 percent, and an inflation rate of 3 percent (P/A=13.76).
(5) Present worth of 20-year life cycle cost = capital construction cost + present worth of 20-yr O&M cost.
(6) Costs do not include reuse or disposal alternatives.

Table 1.16	**Cost of Tertiary Treatment Facility Phased Wastewater Treatment Facilities Plan King City**				
Process	**Capital Construction Cost, Phase 1(1)(2)**	**Capital Construction Cost, Phase 2(1)(2)**	**Total Annual O&M Cost(3)**	**Present Worth of 20-yr O&M Cost(4)**	**Present Worth of 20-yr Life Cycle Cost(5)**
Headworks	$7,670,000	-	$50,000	$687,000	$8,357,000
Oxidation Ditch/Secondary Clarifier	$17,160,000	$7,570,000	$207,400	$2,854,000	$27,584,000
Continuous Backwash Filter	$8,690,000	$4,680,000	$46,200	$636,000	$14,006,000
UV	$3,530,000	$1,270,000	$103,300	$1,422,000	$6,222,000
Screw Press	$3,720,000	-	$220,300	$1,160,000	$5,880,000
Labor	-	-	$500,000	$6,881,000	$6,881,000
Total(6)	$40,770,000	$13,520,000	$1,125,600	$15,490,000	$69,780,000

Notes:

(1) Cost estimate is based on 2017 Dollars and includes 30 percent estimating contingency. See Appendix I for phased capital cost item details for each element.
(2) Phase 1 escalation to midpoint of construction occurs April 1, 2020. Phase 2 escalation to midpoint of construction occurs January 1, 2023.
(3) See Appendix F for a summary of O&M cost details.
(4) Present worth is based on a 20-year life, a discount rate of 6 percent, and an inflation rate of 3 percent (P/A=13.76).
(5) Present worth of 20-yr life cycle cost = capital construction cost, phase 1 + capital construction cost, phase 2 + present worth of 20-yr O&M cost.
(6) Costs do not include reuse or disposal alternatives.

Table 1.17	Cost of Secondary Treatment Facility at Buildout Wastewater Treatment Facilities Plan King City

Process	Capital Construction Cost(1)(2)	Total Annual O&M Cost(3)	Present Worth of 20-yr O&M Cost(4)	Present Worth of 20-yr Life Cycle Cost(5)
Headworks	$7,670,000	$39,000	$537,000	$8,207,000
Oxidation Ditch/Secondary Clarifier	$24,120,000	$207,400	$2,854,000	$26,974,000
Screw Press	$3,720,000	$229,600	$3,160,000	$6,880,000
Labor	-	$300,000	$4,129,000	$4,129,000
Total(6)	$35,510,000	$776,000	$10,680,000	$46,190,000

Notes:

(1) Cost estimate is based on 2017 Dollars and includes 30 percent estimating contingency. See Appendix H for capital cost item details for each element.
(2) Buildout escalation to midpoint of construction occurs April 1, 2020.
(3) See Appendix F for a summary of O&M cost details.
(4) Present worth is based on a 20-year life, a discount rate of 6 percent, and an inflation rate of 3 percent (P/A=13.76).
(5) Present worth of 20-year life cycle cost = capital construction cost + present worth of 20-yr O&M cost.
(6) Costs do not include reuse or disposal alternatives.

Table 1.18	Cost of Secondary Treatment Facility Phased Wastewater Treatment Facilities Plan King City				
Process	Capital Construction Cost, Phase 1(1)(2)	Capital Construction Cost, Phase 2(1)(2)	Total Annual O&M Cost(3)	Present Worth of 20-yr O&M Cost(4)	Present Worth of 20-yr Life Cycle Cost(5)
Headworks	$7,670,000	-	$39,000	$537,000	$8,207,000
Oxidation Ditch/Secondary Clarifier	$17,160,000	$7,570,000	$207,400	$2,854,000	$27,584,000
Screw Press	$3,720,000	-	$228,600	$3,140,000	$6,860,000
Labor	-	-	$300,000	$4,129,000	$4,129,000
Total(6)	$28,550,000	$7,570,000	$774,000	$10,650,000	$46,800,000

Notes:

(1) Cost estimate is based on 2017 Dollars and includes 30 percent estimating contingency. See Appendix I for phased capital cost item details for each element.
(2) Phase 1 escalation to midpoint of construction occurs April 1, 2020. Phase 2 escalation to midpoint of construction occurs January 1, 2023.
(3) See Appendix F for a summary of O&M cost details.
(4) Present worth is based on a 20-year life, a discount rate of 6 percent, and an inflation rate of 3 percent (P/A=13.76).
(5) Present worth of 20-yr life cycle cost = capital construction cost, phase 1 + capital construction cost, phase 2 + present worth of 20-yr O&M cost.
(6) Costs do not include reuse or disposal alternatives.

1.6.1 Cost Saving Alternative for Overall Tertiary Facility

Although the tertiary filtration alternative originally preferred by the City is continuous backwash filtration, an option to reduce overall facility costs was considered with cloth media disk filtration.

The success of the cloth media disk filter is contingent upon the compatibility of the filter with the secondary effluent quality to readily meet Title 22 standards. The final decision to move forward with continuous backwash filters or cloth media disk filters will be further explored during preliminary design after additional influent sampling and modeling is conducted.

The cost saving alternative includes headworks, oxidation ditch, secondary clarifier, cloth media disk filters, UV, and screw press. This tertiary treatment alternative is further parsed into Buildout and Phasing options for full Tertiary Treatment. The recommended number of unit processes for the Buildout and Phasing options are detailed in Table 1.19, with capital construction costs and O&M costs outlined in Table 1.20 and Table 1.21.

Table 1.19	Number of Process Units for the Recommended Alternative with Cloth Media Disk Filter Wastewater Treatment Facilities Plan King City					
Process	Tertiary Treatment			Secondary Treatment		
	Buildout	Phase 1	Phase 2	Buildout	Phase 1	Phase 2
Headworks	1	1	-	1	1	-
Oxidation Ditch	3	2	1	3	2	1
Secondary Clarifier	3+1	2+1	1	3+1	2+1	1
Cloth Media Disk Filter	8+8	6+6	2+2	-	-	-
UV	3+1	2+1	1	-	-	-
Screw Press	1+1	1+1	-	1+1	1+1	-

Table 1.20	Cost of Tertiary Treatment Facility at Buildout with Cloth Media Disk Filter Wastewater Treatment Facilities Plan King City			
Process	Capital Construction Cost(1)(2)	Total Annual O&M Cost(3)	Present Worth of 20-yr O&M Cost(4)	Present Worth of 20-yr Life Cycle Cost(5)
Headworks	$7,670,000	$39,000	$537,000	$8,207,000
Oxidation Ditch/Secondary Clarifier	$24,120,000	$207,400	$2,854,000	$26,974,000
Cloth Media Disk Filter	$4,090,000	$68,300	$940,000	$5,030,000
UV	$4,700,000	$103,300	$1,422,000	$6,122,000
Screw Press	$3,720,000	$229,500	$3,158,000	$6,880,000
Labor	-	$500,000	$6,881,000	$6,881,000
Total(6)	$44,300,000	$1,147,500	$15,764,000	$59,894,000

Notes:
(1) Cost estimate is based on 2017 Dollars and includes 30 percent estimating contingency. See Appendix H for capital cost item details for each element.
(2) Buildout escalation to midpoint of construction occurs April 1, 2020.
(3) See Appendix F for a summary of O&M cost details.
(4) Present worth is based on a 20-year life, a discount rate of 6 percent, and an inflation rate of 3 percent (P/A=13.76).
(5) Present worth of 20-year life cycle cost = capital construction cost + present worth of 20-yr O&M cost.
(6) Costs do not include reuse or disposal alternatives.

Table 1.21	**Cost of Tertiary Treatment Facility Phased with Cloth Media Disk Filter Wastewater Treatment Facilities Plan King City**				
Process	**Capital Construction Cost, Phase 1(1)(2)**	**Capital Construction Cost, Phase 2(1)(2)**	**Total Annual O&M Cost(3)**	**Present Worth of 20-yr O&M Cost(4)**	**Present Worth of 20-yr Life Cycle Cost(5)**
Headworks	$7,670,000	-	[illegible]	[illegible]	[illegible]
Oxidation Ditch/Secondary Clarifier	$17,160,000	$7,570,000	$207,400	$2,854,000	$27,584,000
Cloth Media Disk Filter	$3,060,000	$1,110,000	$68,300	[illegible]	$5,110,000
UV	$3,530,000	$1,270,000	$103,300	$1,422,000	$6,222,000
Screw Press	$3,720,000	-	[illegible]	[illegible]	[illegible]
Labor	-	-	$500,000	$6,881,000	$6,881,000
Total(6)	[illegible]	[illegible]	[illegible]	$15,794,000	[illegible]

<u>Notes:</u>

(1) Cost estimate is based on 2017 Dollars and includes 30 percent estimating contingency. See Appendix I for phased capital cost item details for each element.
(2) Phase 1 escalation to midpoint of construction occurs April 1, 2020. Phase 2 escalation to midpoint of construction occurs January 1, 2023.
(3) See Appendix F for a summary of O&M cost details.
(4) Present worth is based on a 20-year life, a discount rate of 6 percent, and an inflation rate of 3 percent (P/A=13.76).
(5) Present worth of 20-yr life cycle cost = capital construction cost, phase 1 + capital construction cost, phase 2 + present worth of 20-yr O&M cost.
(6) Costs do not include reuse or disposal alternatives.

1.6.2 Recommended Alternative based on Preliminary Recycled Water Feasibility Analysis

The City's facility plan goals are to include enough secondary capacity in the short term to comply with anticipated new discharge requirements, produce unrestricted reuse-quality recycled water, and have enough treatment and disposal capacity to support these goals. The Preliminary Recycled Water Feasibility Analysis conducted by Carollo for Cal Water in spring 2017 concluded a maximum month recycled water demand of 94.8 acre-feet per month (AFM). A tertiary treatment capacity of 1.2 mgd is required to meet this recycled water demand for the City. Based on these facility plan goals and the City's desire to minimize initial capital costs, two additional alternatives are recommended, one with continuous backwash filters and the other with cloth media disk filters. Both include provisions for reuse/disposal facilities. These alternatives are sized for 1.3 mgd secondary treatment capacity and 1.2 mgd tertiary treatment capacity in a phased approach. The capital costs for these alternatives are detailed in Table 1.22.

Table 1.22 Capital Costs Based on Preliminary Recycled Water Feasibility Analysis
Wastewater Treatment Facilities Plan
King City

Process	Capital Construction Cost, Phase 1[1][2]	Capital Construction Cost, Phase 1[1][2]
Headworks	$7,670,000	$7,670,000
Oxidation Ditch/Secondary Clarifier	$17,160,000	$17,160,000
Continuous Backwash Filter	$6,510,000	-
Cloth Media Disk Filter	-	$2,050,000[4]
UV	$2,360,000	$2,360,000[4]
Screw Press	$3,720,000	$3,720,000
Reuse/Disposal	$3,450,000	$3,450,000
Total	**$40,870,000**	**$36,410,000[4][5]**

Notes:
(1) Cost estimate is based on 2017 Dollars and includes 30 percent estimating contingency. See Appendix I for phased capital cost item details for each element.
(2) Phase 1 escalation to midpoint of construction occurs April 1, 2020.
(3) See Appendix F for a summary of O&M cost details.
(4) Based on initial discussions, the tertiary treatment facilities could be paid for by Cal Water. In this case, the total construction cost for the City's 1.3 mgd secondary treatment facility with reuse/disposal would be $32,000,000.
(5) If the City were to build a 2.0 mgd secondary treatment facility with reuse/disposal facilities, the cost would be $38,960,000 ($35,510,000 + $3,450,000) with Cal Water paying for the tertiary filtration and disinfection facilities.

The reuse/disposal alternative would be sized to meet a Buildout ADMMF of 2.0 mgd, which is enough recycled water storage to support Alternative 4 in the Preliminary Recycled Water Feasibility Analysis as well as enough percolation and sprayfield capacity to handle the 20-year planning horizon flows. This first phase of 1.3 mgd secondary capacity would be sufficient for approximately 7 years, at which time Phase 2 would be implemented to expand the secondary capacity to meet the ADMMF of 2.0 mgd required at Buildout.

1.7 NEXT STEPS AND IMPLEMENTATION

The next step for the City is to review the options for Capital Improvements Program implementation. The recycled water study that Carollo is currently evaluating for Cal Water is a preliminary feasibility analysis, which will be used by Cal Water to decide whether or not further recycled water feasibility analysis is warranted. The preliminary feasibility analysis and go/no-go decision by Cal Water is anticipated to be completed by July or August 2017. Should Cal Water and/or the City decide to pursue additional recycled water analysis, the next step would likely be a recycled water feasibility study that would provide planning-level documentation of uses, demands, analysis of alternatives, conceptual design of infrastructure needs, planning-level costs, and identification of funding mechanisms. At that point, additional partnership and cost-sharing opportunities could be discussed with Cal Water. For example, Cal Water may be interested in operating and maintaining the recycled water distribution system with a partnership agreement between Cal Water and the City for financing the treatment, distribution, and/or storage infrastructure.

In addition to the decision by Cal Water affecting the City's decision on effluent disposal and reuse options, the next step for the City is to choose one of the implementation alternatives. A preliminary program schedule is shown below. During the rate study process, funding sources including grant opportunities could also be developed.

Preliminary Implementation Schedule

Task Description	2017	2018	2019	2020
Facility Plan				
Recycled Water Study				
Rate Study				
RWQCB Meetings				
Preliminary Design				
EIR/Permitting(1)				
Final design/Bidding(1)				
Construction(1)				
Start up(1)				

Notes:
(1) Timelines for these tasks could differ based on the implementation alternative selected during preliminary design.

Memorandum of Understanding
Between
City of King and California Water Service Company
For a
Recycled Water Feasibility Study

This Memorandum of Understanding (MOU) is made and entered into by and between the City of King (City) and the California Water Service Company (Cal Water), collectively the Parties, for the purpose of cooperatively undertaking and jointly sharing the costs of a Recycled Water Feasibility Study (Feasibility Study) and to determine the feasibility of providing recycled water from Cal Water to properties within and adjacent to City's service area.

For good and valuable consideration the Parties agree as follows:

SECTION 1. RECITALS.

A. Cal Water provides water to consumers located in the King City incorporated area.

B. The City operates the only wastewater treatment facility in King City, treating and disposing of the wastewater and biosolids collected from households and businesses in central King City. Approximately 303 million gallons of wastewater are treated and released each year.

C. The City and Cal Water desire to participate in an agreement to explore the feasibility of producing and conveying recycled water from the King City treatment plant for off-site use within and adjacent to City's service area.

D. City and Cal Water have a mutual interest in providing recycled water to the community to offset the potable demand within City's service area, reduce groundwater pumping, and reduce the volume of water discharged into the Salinas River by spray fields.

E. The Parties agree to each share half the cost for the feasibility study.

F. City and Cal Water understand that the State Water Resources Control Board (SWRCB) Water Recycling Funding Program (WRFP) has grant funds available for recycled water feasibility studies which potentially could fund up to 50% of the study cost not to exceed $75,000 per study.

SECTION 2: TERM.

The term of this MOU commences on October 1, 2017 and ends on December 31, 2018 ("Term").

SECTION 3: FEASIBILITY STUDY FUNDING.

A. The Parties agree to jointly share the costs associated with the Feasibility Study.

B. City shall act as the lead agency in applying for the WRFP grant and contracting with the feasibility study consultant.

C. City shall provide up-front budgeted funds to complete the Feasibility Study, which study costs are estimated to be approximately $100,000, but shall not exceed $150,000.

D. The Parties anticipate obtaining $75,000 in grant money from the SWRCB WRFP. Therefore, each Party's financial commitment on the Feasibility Study is estimated to be approximately $25,000 and shall not exceed $37,500. City shall submit an invoice to Cal Water at the completion of the Feasibility Study and present copies of the consultant's invoices. At the conclusion of the project, City shall receive and retain the grant money, up to $75,000, provided by the SWRCB.

E. City intends to use additional available grant moneys to fund the costs of preparing a wastewater rate study. The City will be responsible for paying the full cost of matching funds for any grant funds allocated to preparation of the rate study.

SECTION 4: PARTY COLLABORATION.

The Parties agree to:

A. Jointly define the scope of work for the feasibility study;

B. Jointly select an experienced consultant to provide all of the services detailed in the scope of work for the Feasibility Study;

C. Jointly fund the Feasibility Study as described above and on the condition that grant funds will cover up to 50% of total Feasibility Study cost. City and Cal Water shall both own the final Feasibility Study document and other consultant deliverables related to the Feasibility Study scope of work; and

D. Provide timely information to the consultant as needed to complete the Feasibility Study.

SECTION 5: NOTICES & REPRESENTATIVES.

A. City's representative with respect to implementation of this MOU is Octavio Hurtado. Cal Water's representative with respect to implementation of this MOU is Gary Valladao. These representative(s) act as the point of contact for communicating and administering all matters related to this MOU.

B. Notices shall be sent to:

City of King:
Octavio Hurtado
212 S. Vanderhurst Avenue
King City, CA 93930

California Water Service Company:
Gary Valladao, Manager of Wastewater Systems
2000 S. Tubeway Avenue
Commerce, CA 90040

SECTION 6: TERMINATION OF MOU.

Neither party may terminate this MOU once City has contracted with a third party to undertake the Feasibility Study.

SECTION 7: MISCELLANEOUS TERMS.

A. Agreement Binding: The terms and provisions of this MOU shall extend to and be binding upon and inure to the benefit of the heirs, executors, and administrators or to any approved successor, as well as to any assignee or legal successor to any party to this MOU.

B. Merger: This writing is intended both as the final expression of the agreement between Parties hereto with respect to the included terms and as a complete and exclusive statement of the terms of the agreement, pursuant to Code of Civil Procedure Section 1856. No modification of this agreement shall be effective unless and until such modification is evidenced by a writing signed by both parties.

C. Cooperation: Parties pledge cooperation in order that a mutually satisfactory grant application is achieved.

D. No Third Party Beneficiaries: Nothing contained in this agreement shall be construed to create and the parties do not intend to create any rights in third parties.

E. Invalidity of Particular Provisions: If any term, covenant, or condition of this MOU or the application thereof to any person or circumstance shall to any extent be invalid or unenforceable, the remainder of this MOU or the application of such term, covenant or condition to persons or circumstances other than those as to which it is held invalid or unenforceable, shall not be affected thereby, and each term, covenant and condition of this MOU shall be valid and be enforced to the fullest extent permitted by law.

F. No Waiver: The waiver by any Party of any default under this MOU shall not operate as a waiver of any subsequent breach of the same or any other provision of this MOU.

G. Entire Agreement: This MOU contains the entire agreement between the Parties hereto and no term or provision thereof may be changed, waived, discharged or terminated unless made in writing and executed by both Parties hereto.

H. Time is of the Essence: Time is of the essence with respect to the performance of every provision of this MOU which time or performance is a factor.

I. Mediation: Any dispute or claim in law or equity between the Parties arising out of this MOU, if not resolved by informal negotiation between the Parties, shall be mediated by the Parties. Mediation shall consist of an informal, non-binding conference or conferences between the Parties and the mediator jointly, then in separate caucuses wherein the judge will seek to guide the Parties to a resolution of the case. The Parties shall agree to a mutually acceptable mediator. If mediation is unsuccessful, the Parties may avail themselves of any other remedies.

J. Applicable Law: This MOU shall be construed and enforced in accordance with the laws of the State of California. Jurisdiction of litigation arising from this MOU shall be in the Superior Court of California, County of Monterey.

K. No Presumption Regarding Drafter: The Parties acknowledge and agree that the terms and provisions of this MOU have been negotiated and discussed between the Parties and their attorneys, and this MOU reflects their mutual agreement regarding the same. Because of the nature of the negotiations, and discussions it would be inappropriate to deem any Party to be the drafter of this MOU. Therefore, no presumption for or against validity, or as to any interpretation hereof, based upon the identity of the drafter, shall be applicable in interpreting or enforcing this MOU.

L. Assistance of Counsel: Each Party to this MOU warrants that each Party had the assistance of counsel in the negotiation for, and the execution of, this MOU and all related documents; and that each Party has lawfully authorized the execution of this MOU.

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

N. Section Headings: The section headings contained in this MOU are for convenience and identification only and shall not be deemed to limit or define the contents of the sections to which they relate.

O. Counterparts: This MOU may be executed in multiple counterparts each of which shall be deemed an original MOU and all of which shall constitute one and the same MOU.

IN WITNESS WHEREOF, the parties hereto have executed this MOU.

City of King:

By: ______________________________ ____________________
Steven Adams Dated
City Manager

California Water Service Company:

By: ______________________________ ____________________
Name: Dated
Its:

KING CITY
CALIFORNIA

Item No. 11 (B)

REPORT TO THE CITY COUNCIL

DATE: SEPTEMBER 12, 2017

TO: HONORABLE MAYOR AND MEMBERS OF THE CITY COUNCIL

FROM: STEVEN ADAMS, CITY MANAGER

RE: CONSIDERATION OF STREET IMPROVEMENT 5-YEAR CAPITAL IMPROVEMENT PROJECT

RECOMMENDATION:

It is recommended the City Council approve the proposed Street Improvement 5-Year Capital Improvement Project (CIP).

BACKGROUND:

With the passage of Measure X and SB 1, funding for street improvements has increased, which has enabled the City to develop a more comprehensive street improvement program. In the FY 2017-18/ FY 2018-19 Biennial Budget, the City Council approved an overall City CIP, which included funding and expenditure projections for street improvements. Staff is now developing more detailed recommendations on priorities and the specific street improvement projects the funding will be dedicated to for Council consideration. The Transportation Agency of Monterey County (TAMC) and California Transportation Commission both require jurisdictions to submit proposed uses for these funds.

Street improvements are an important investment for the community and one of the budget priorities established by the City Council. Not only is it important to maintain roadways in a condition that are safe, attractive and easy to travel, but proper ongoing maintenance is critical to prevent future substantial costs to rebuild street systems.

DISCUSSION:

TAMC also requires each City to develop and maintain a pavement management program. A pavement management program surveys, records and tracks pavement condition for each street based upon a pavement condition index (PCI) and then establishes an annual maintenance schedule based upon the most efficient allocation of available revenues. The City's current pavement management program has not been updated for approximately 12 years and thus is currently not usable. In order to assist jurisdictions in developing and updating pavement management programs, TAMC will be coordinating a countywide contract to prepare plans for participating agencies. Staff has submitted a request to participate in that program, which will enable the City to prepare a new pavement management program at relatively minimal cost. Therefore, these recommendations are preliminary. Changes may be recommended once the results of the pavement management program are completed. The pavement management program is recommended to be funded from Measure X revenues.

Exhibit 1 includes a table with projections for both revenues and expenditures for street improvements for the last, current and future four fiscal years. The proposed improvements can be considered in two categories: 1) slurry seal program; and 2) resurfacing or overlay projects.

An ongoing slurry seal program is important to maintain streets properly. Ultimately, the City's goal should be to improve all streets to a condition satisfactory to be maintained by the slurry seal program and then to apply a slurry seal to each street on a five to seven year cycle. The overall objective is to gradually upgrade streets in poor condition while at the same time maintaining streets in good or fair condition. If the City was to focus only on the worst streets, the better streets would deteriorate to poor condition and no progress would be made in the condition of the overall street system.

Therefore, in efforts to upgrade the City's street system, it is important to balance slurry seal and overlay projects and to educate the public on the importance of slurry seal work. The public education component is necessary because complaints are often received by the public when they see work being done on streets that are in relatively good condition when other streets are in poor condition. Many people intuitively believe streets in the poorest condition should be the highest priority, but they are actually often less urgent because the project cost does not increase much once a full grind and overlay is required. One analogy that is helpful in explaining the process to the public is to compare a slurry seal to an oil change when maintaining your car. It is important to maintain regular oil changes on a new car in order to avoid needing to rebuild the transmission in the future.

Staff is recommending $150,000 be dedicated for the slurry seal program on annual basis. As more streets are improved, the goal will be to gradually increase funding for the slurry seal program and reduce funding for overlay projects. Initially, slurry seal projects will be recommended for streets in good condition before they deteriorate, as well as some streets that may be in need of an overlay, but are not a high enough priority to dedicate funding for several years. Therefore, the purpose of slurry sealing these streets will be to establish an acceptable condition until an overlay can be funded and potentially avoid the need to fully grind the street in the future before resurfacing it.

In some cases, what is referred to as a microsurfacing may also be recommended, which is thicker than a slurry seal, but not a full overlay. It is a cost efficient way in which to address streets in poor condition when a full grind and overlay is too costly to fund. These projects often don't smooth out all the irregularities in the street, but can significantly extend the life of the roadway.

Staff recommends the slurry seal funding this year be budgeted for slurry seal of the streets in the Rio Vista neighborhoods. Other future streets will be determined based upon the results of the pavement management program.

The remainder of the funding is proposed to be dedicated for design and construction of grind and overlay projects. The first project was the resurfacing of Vivien, Carlson and Haven. This project is complete and will utilize Measure X funds from both FY 2016-17 and FY 2017-18. The following are other initial projects recommended for the 5-year CIP:

FY 2017-18	Bishop/Queen/Vanderhurst
FY 2018-19	N. Third Street
FY 2019-20	First Street (Pearl to Division)
	7th Street/Monte Vista neighborhood streets
FY 2020-21	Broadway Street
FY 2021-22	Broadway Circle
	N. Vanderhurst

COST ANALYSIS:

Funds are proposed from Measure X, SB1, RSTP and the General Fund. Approximately, $3.6 million is proposed to be programmed over the next five years. The City's Long-Range Financial Plan proposes to increase General Fund revenues for street improvements until the City can dedicate at least $900,000 to street improvements on an annual basis.

ALTERNATIVES:

The following alternatives have been identified for City Council consideration:

1. Approve the proposed Preliminary Street Improvement 5-Year CIP;
2. Direct staff to modify the priority projects and approve the Preliminary Street Improvement 5-Year CIP;
3. Do not approve the Preliminary Street Improvement 5-Year CIP; or
4. Provide staff other direction.

Exhibits:

1. Preliminary Street Improvement 5-Year CIP

Prepared and Approved by: ______________________
Steven Adams, City Manager

Exhibit 1

KING CITY
STREET IMPROVEMENTS - PRELIMINARY CIP

Revenue	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	Total
Measure X	$75,000	$316,000	$319,000	$322,000	$325,000	$328,000	$1,685,000
SB 1	$0	$160,000	$325,000	$325,000	$325,000	$325,000	$1,460,000
RSTP	$83,000	$0	$0	$0	$100,000	$0	$183,000
General Fund	$0	$0	$0	$100,000	$100,000	$250,000	$450,000
Total	$158,000	$476,000	$644,000	$747,000	$850,000	$903,000	$3,778,000

Expenditures	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	Total
Slurry Seal Program*	$0	$150,000	$150,000	$150,000	$150,000	$200,000	$800,000
Pavement Management Program	$0	$15,000	$0	$0	$0	$0	$15,000
Haven/Carlson/Vivien Resurface	$158,000	$69,000	$0	$0	$0	$0	$227,000
Bishop/Queen/Vanderhurst Resurface	$0	$242,000	$0	$0	$0	$0	$242,000
Third Street Resurface	$0	$0	$494,000	$0	$0	$0	$494,000
First Street (Pearl to Division) Resurface	$0	$0	$0	$100,000	$0	$0	$100,000
7th Street/Monte Vista Area Resurface	$0	$0	$0	$497,000	$0	$0	$497,000
Broadway Resurface	$0	$0	$0	$0	$700,000	$0	$700,000
Broadway Circle Resurface	$0	$0	$0	$0	$0	$403,000	$403,000
Vanderhurst Resurface	$0	$0	$0	$0	$0	$300,000	$300,000
Total	$158,000	$476,000	$644,000	$747,000	$850,000	$903,000	$3,778,000

* FY 2017-18 Slurry Seal Project: Rio Vista area and Mildred Street east of Broadway Street
FY 2018-19 Slurry Seal Project: Patterson and other streets to be determined by pavement management program
Future Years Slurry Seal Projects: Streets to be determined by pavement management program