November 3, 2022

City of Fair Oaks Ranch Wastewater Treatment Plant (WWTP) Study

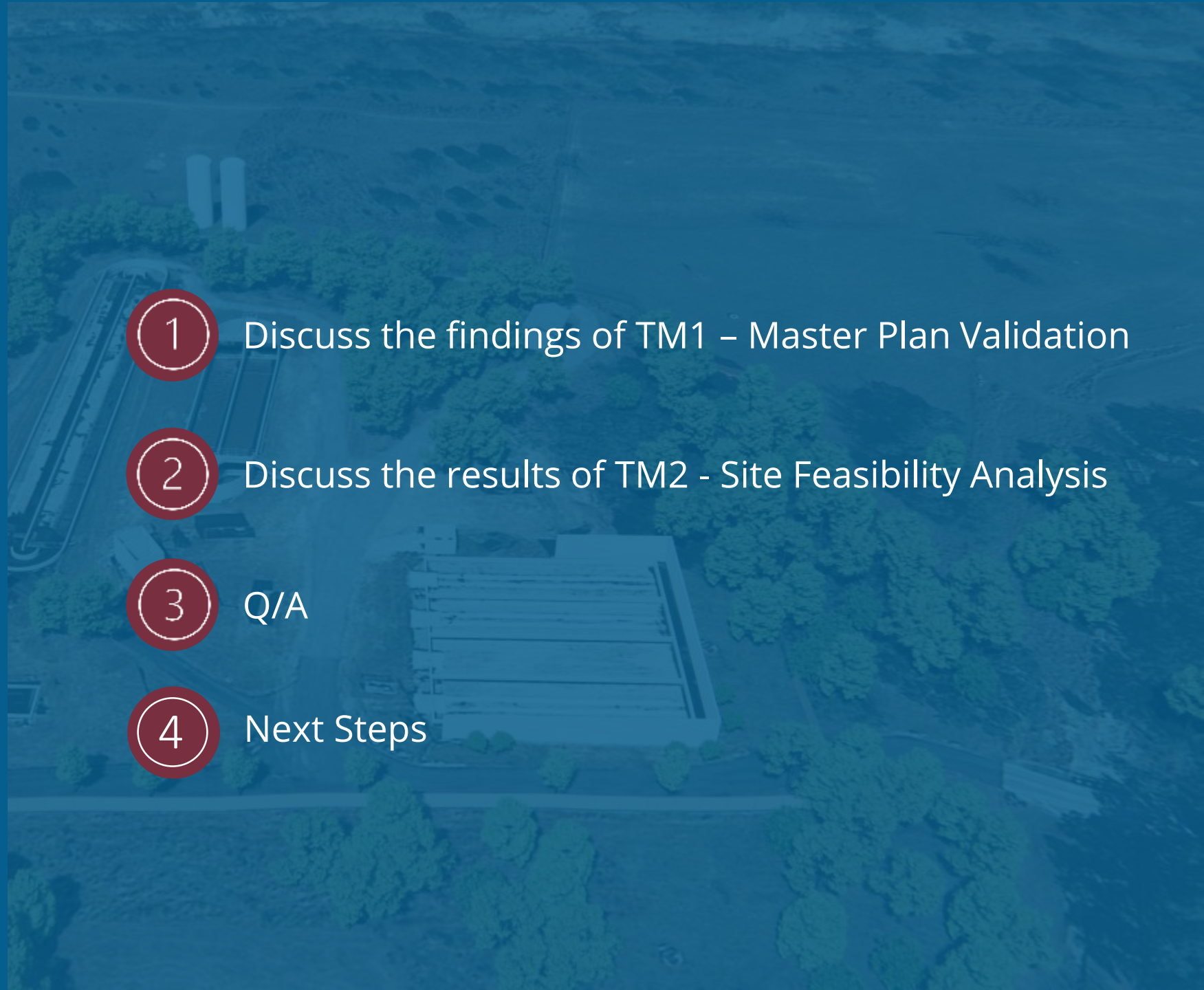
CITY COUNCIL WORKSHOP

GARVER

CITY OF FAIR OAKS RANCH • TEXAS

The goal of today's meeting is to present the TM1 and TM 2 findings of the City of Fair Oaks Ranch WWTP Study.

No action or decision will be requested tonight.



1. Discuss the findings of TM1 – Master Plan Validation
2. Discuss the results of TM2 - Site Feasibility Analysis
3. Q/A
4. Next Steps

First, we will review the key findings from the Master Plan Validation TM.

Existing Fair Oaks Ranch WWTP

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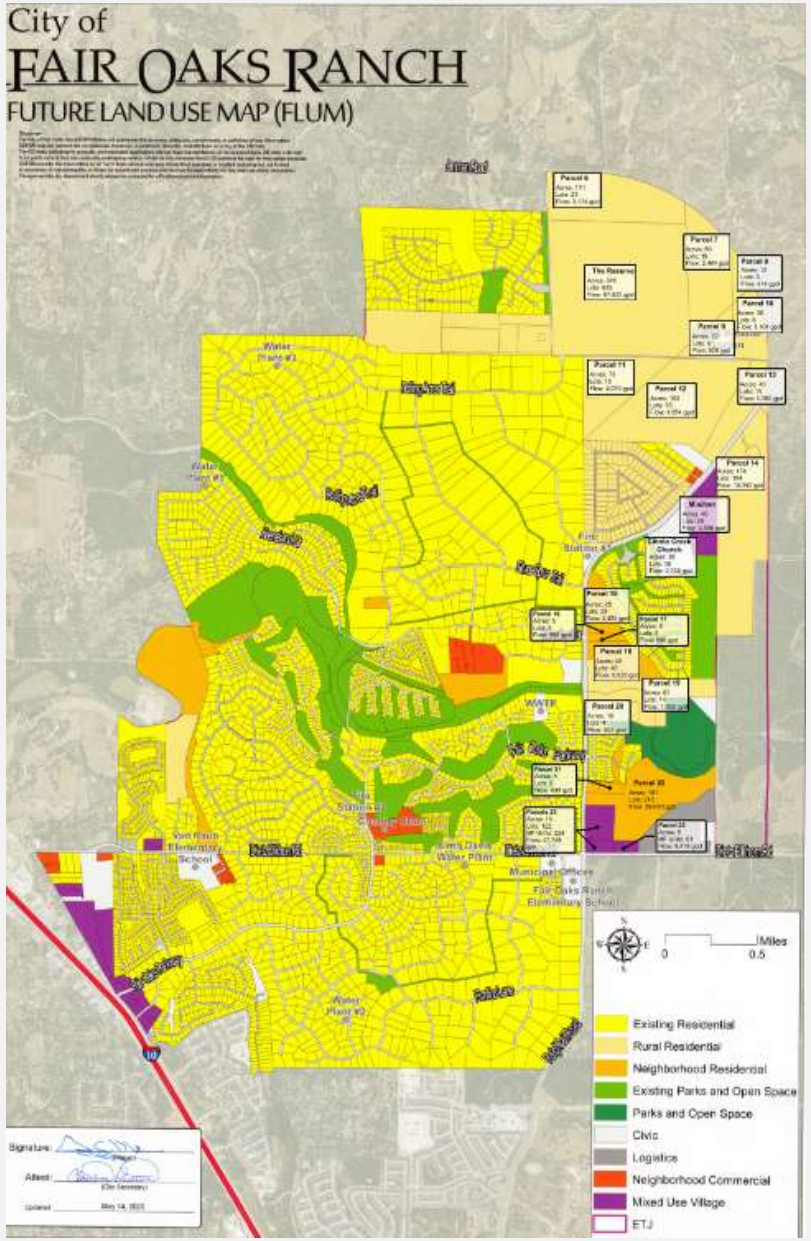
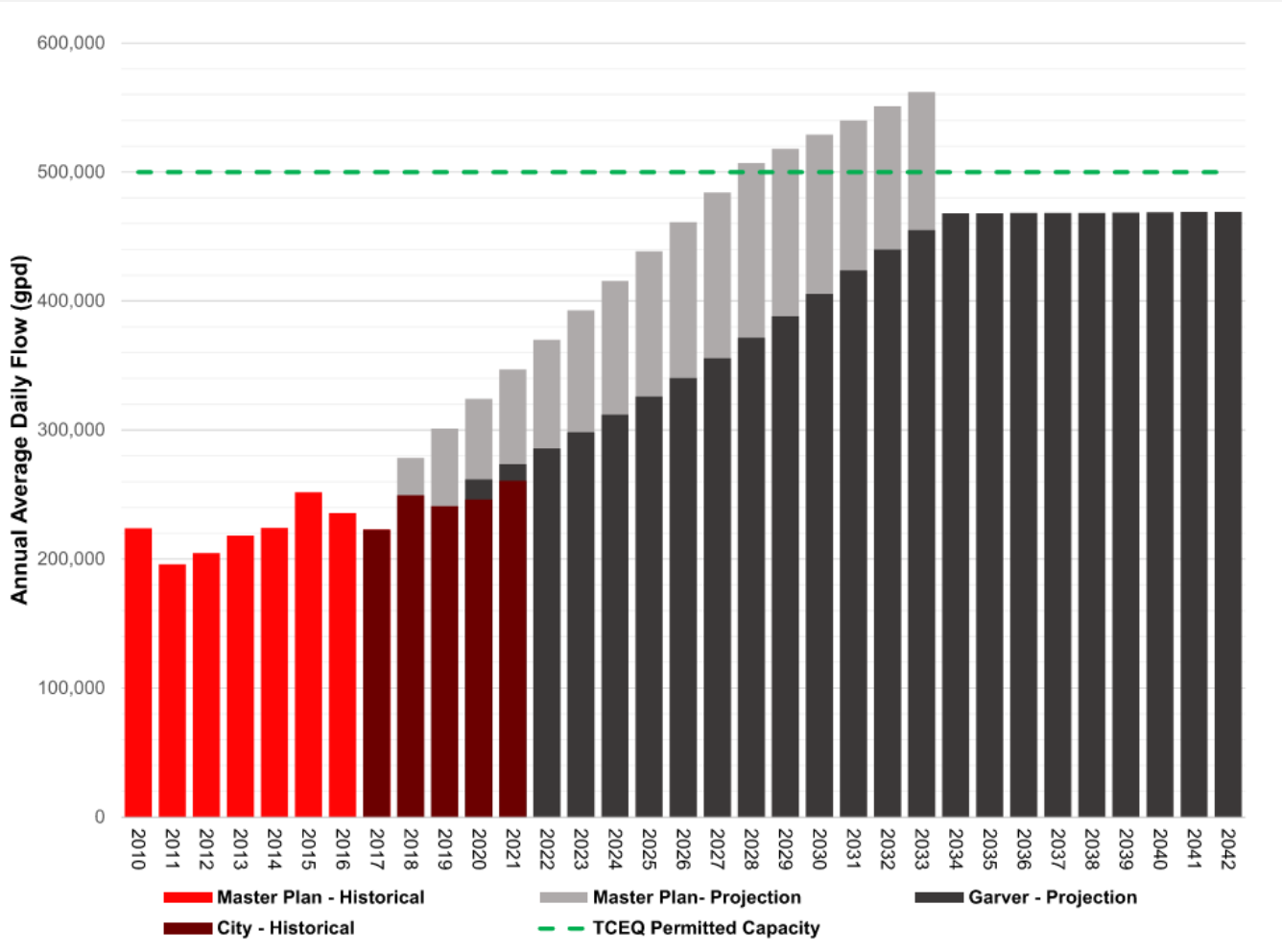


Garver and the City reviewed future land development plans to project future population and WW flow

- The WWTP processed an annual average flow of 0.244 MGD between 2017-2022
- We found that the land use projections for the City show that an additional 0.224 MGD of treatment capacity is needed
- City's ultimate buildout – 0.468 MGD (excluding current septic)

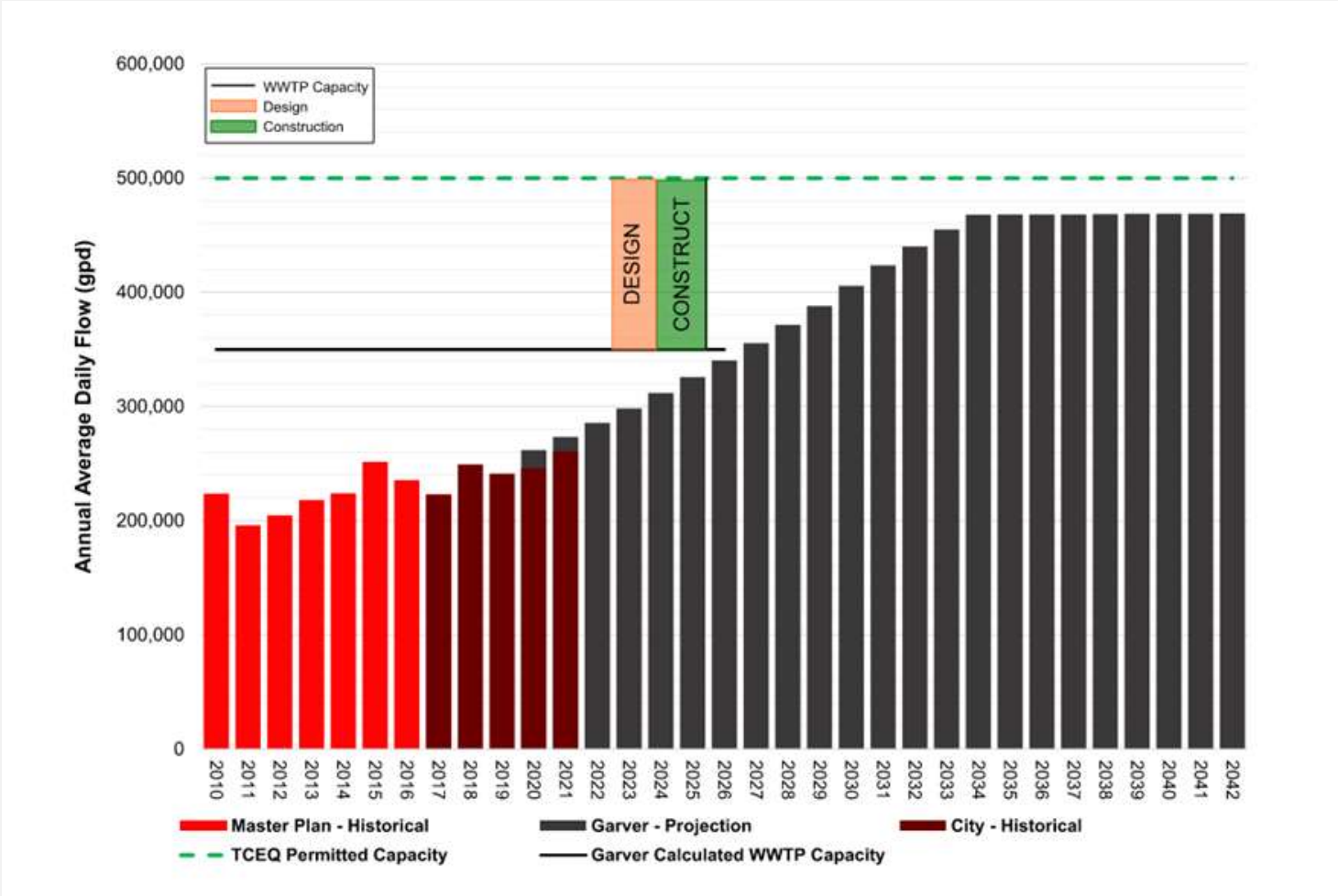
The previous Master Plan findings and recommendations were reviewed



Key findings:

- The prior Master Plan recommended designing for an ultimate WWTP capacity of 0.56 MGD.
- Garver utilized more historical data and updated development plans and found that the ultimate capacity of the WWTP is less than 0.5 MGD.
- The use of septic systems in past/future developments (i.e. Enclave, Oak Bend Estates) and adjustments to match zoning have reduced the projected WWTP flows.

Process capacity improvements will allow the City to take full advantage of the existing discharge permit

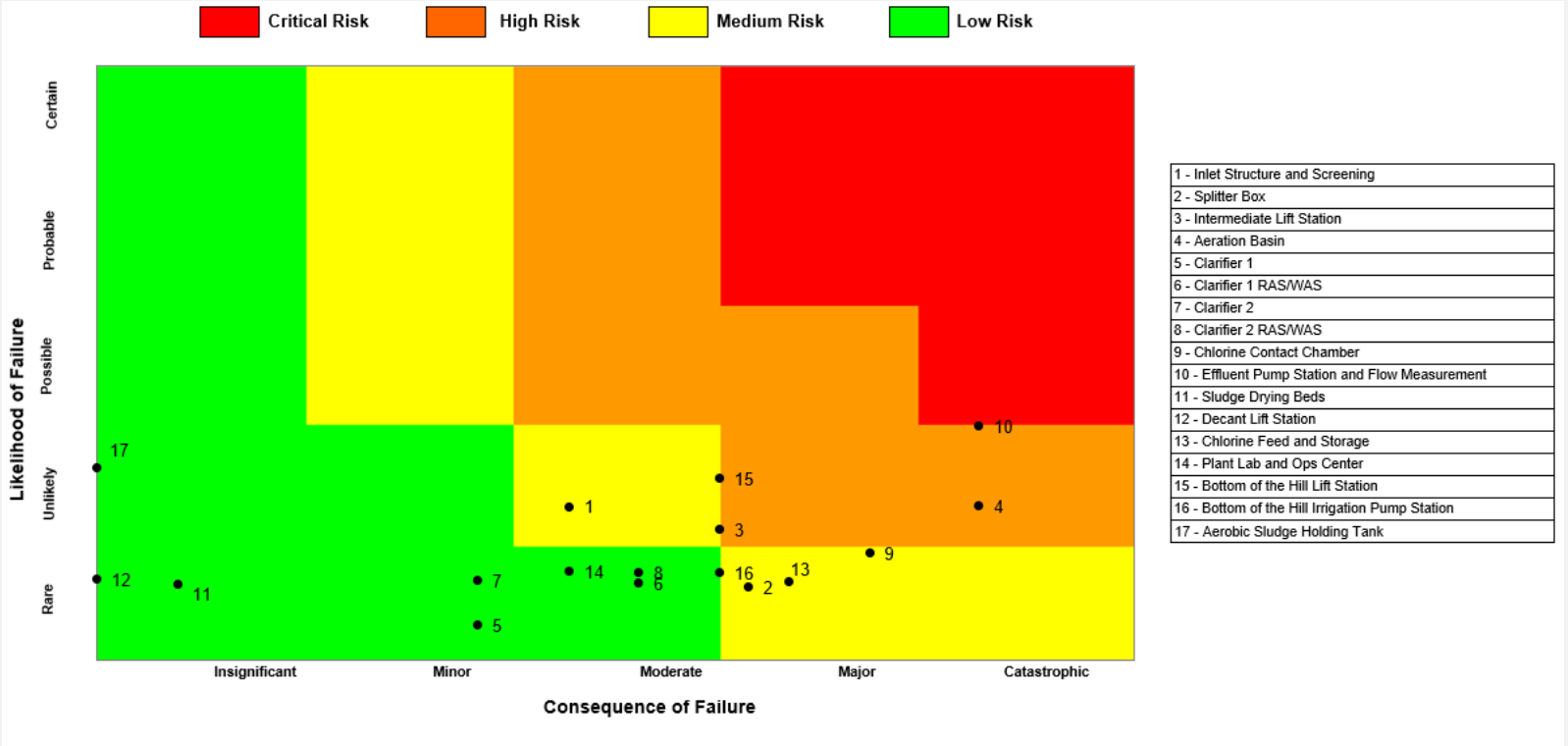


- The current process capacity of the existing WWTP is limited to 0.35 MGD (Oxidation Ditch).
- Garver proposes that the existing WWTP discharge permit remain at 0.5 MGD because it will cover the projected future flow.
- The driver that will initiate expansion at the WWTP includes the 75/90 rule per 30 TAC §305.126(a). (Waiver at 75%)

A condition assessment was performed with the assistance of the City's WWTP operators and staff to identify any critical plant improvements.

Two critical optimization projects were identified.

- #10 - Effluent Pump Station Improvements (Hydraulic limitations for Blackjack and Live Oak ponds)
- #4 - Oxidation Ditch Improvements (Capacity and Resiliency)



Next, we will discuss the five treatment capacity expansion options evaluated in the Site Feasibility TM.

Five options were evaluated in the Site Feasibility TM

1. Expansion at the City's existing WWTP site to meet 100% of the projected required capacity.
2. Construction of a new greenfield facility on the proposed 5-acre City owned property.
3. The existing WWTP would remain at the calculated capacity, and new capacity would be constructed at a new greenfield facility.
4. Construction of a scalping facility that would serve potential new growth areas. The scalping facility would focus on treating and reusing water, while sending solids through the collection system to be treated by the existing WWTP.
5. Evaluate the feasibility of connecting the FOR collection system to the San Antonio Water System (SAWS) collection system to manage the flows beyond the existing WWTP permitted capacity.

Cost estimates for this study utilized Class 4 estimates

Class 4 estimates are typically prepared for strategic business planning purposes such as strategic planning, technical feasibility, preliminary budget approval, etc.

Unknown Site Conditions Percentage Ranges

Unknown	Standard (%)	Potential Range (%)
Miscellaneous Piping and Utilities	15	0 to 15
Other Sitework	15	0 to 15
Electrical and Instrumentation	30	0 to 50

Project Contingencies

Category	% Contingency	Applied to:
Market Pricing Contingency	10%	Raw OPCC
Construction Contingency	30%	Raw OPCC + Marketing Pricing Contingency
Mobilization	5%	Raw OPCC + Marketing Pricing Contingency + Construction Contingency
Contractor Overhead and Profit	20%	Raw OPCC + Marketing Pricing Contingency + Construction Contingency +Mobilization
Total Contingency (Project Cost)	(1.10 * 1.30 * 1.05 * 1.2) =1.80%	180% of Raw OPCC

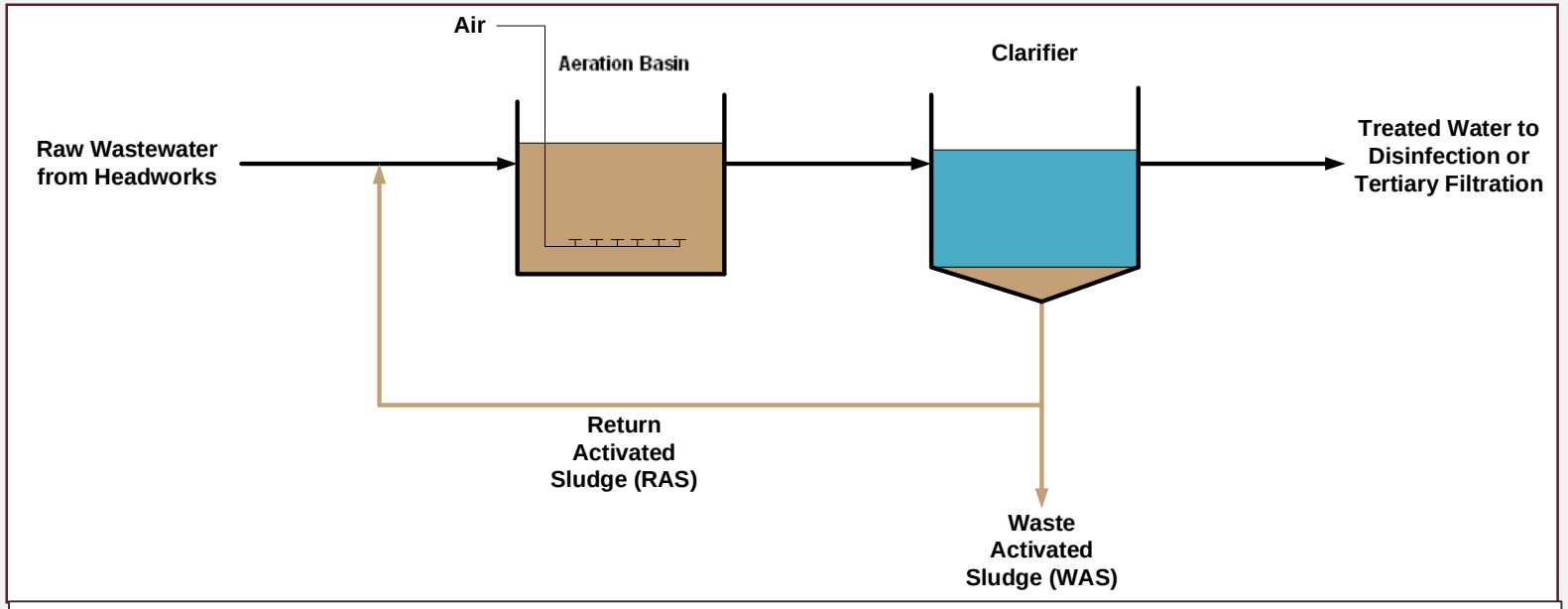
Professional Engineering Services	20%	Total Project Cost

Sample Cost Estimate

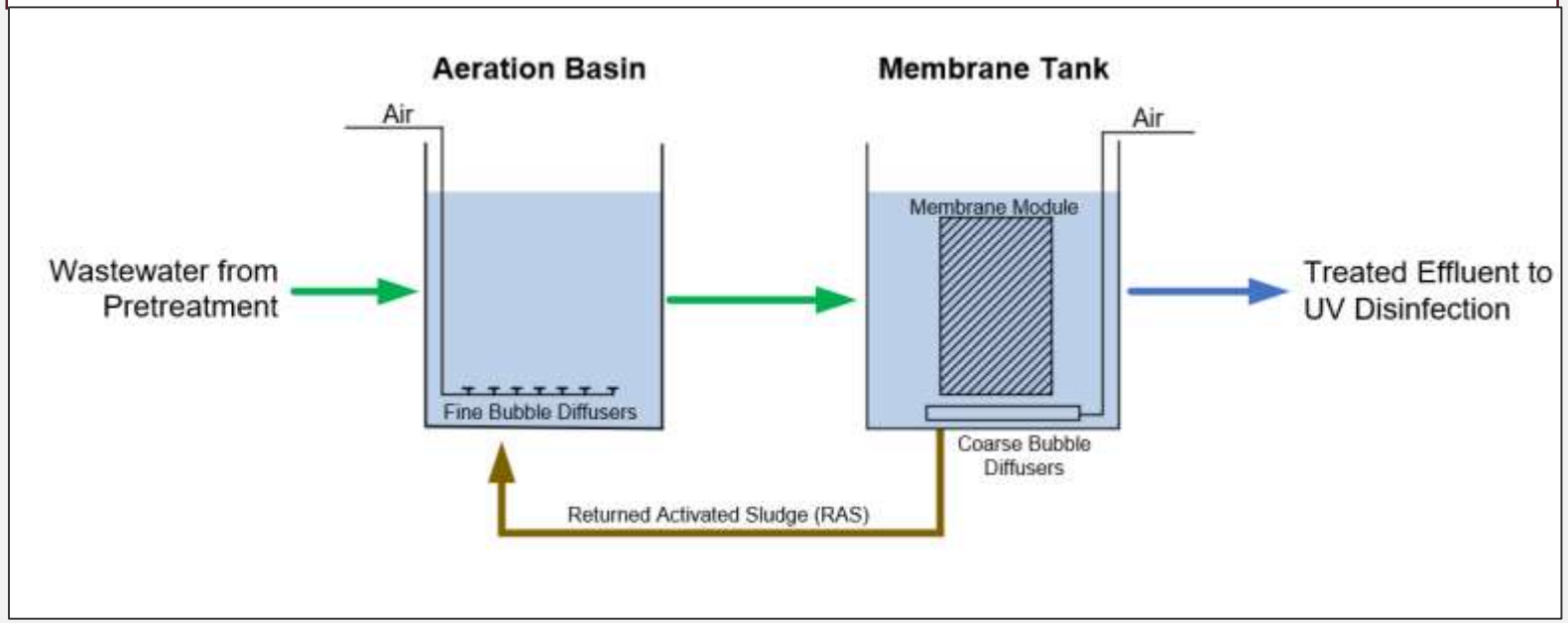
Description	QTY	Unit	Unit Cost	Total Cost ($)
Element 1	1	LS	$1,000,000	$1,000,000
			Raw Subtotal	**$1,000,000**
			Other Miscellaneous Piping and Utilities (15%)	$150,000
			Other Sitework (15%)	$150,000
			Electrical and Instrumentation (30%)	$300,000
			Raw OPCC	**$1,600,000**
			Construction Contingency (80%)	**$1,280,000**
			Total Project Cost	**$2,880,000**
			Engineering Services (20%)	**$576,000**
			Total Programmed Cost(1)	**$3,456,000**
(1) **Total programmed cost estimates do not include overhead costs.**				

Two treatment options were considered for Options 2, 3, and 4

1. Conventional Activated Sludge (CAS)

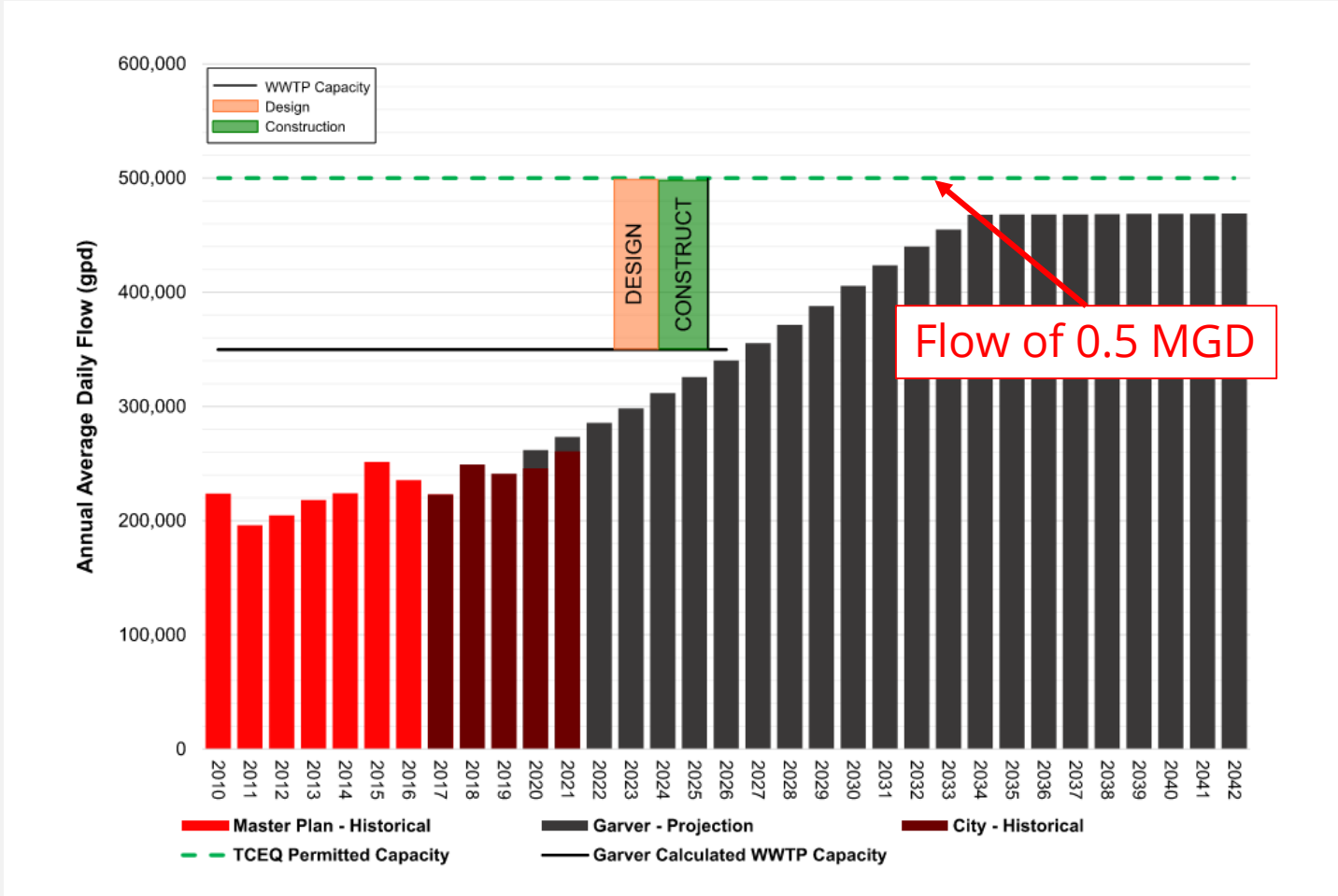


2. Membrane Bioreactor (MBR)



Option 1 - Expansion at the City's existing WWTP site to meet 100% of the projected required capacity.

- The existing WWTP has the space for expansion
  - This was confirmed by TCEQ and accounted for in the neighboring plat documents
- This option considers the restoration of the current permitted capacity of **0.5 MGD**



Option 1 evaluated the feasibility of expanding the current WWTP to 0.5 MGD

- New Process equipment
  - Drop in diffusers into the oxidation ditch
    - Positive displacement blowers
  - Aerated sludge holding tank (3+ days of storage)
  - Vortex grit chamber
- Modified process equipment
  - Upgrade the effluent pump station and piping
- Buffer zone requirements are included in the neighboring property plats

The tables below represent the cost of expanding the existing WWTP to the process capacity of 0.5 MGD

Description	Units	Quantity	Total
Site Civil	LS	1	$144,000
Bottom of the Hill Lift Station Modifications	LS	1	$65,000
In Yard Lift Station Modifications	LS	1	$104,000
Grit Removal System	LS	1	$314,000
Aeration Basins Improvements	LS	1	$1,155,000
Process Blowers	LS	1	$826,000
Aerated Sludge Holding Tank	LS	1	$273,000
Effluent Pump Station and Pipeline Modifications	LS	1	$1,297,000
Raw Subtotal			**$3,864,000**

Description	Total
WWTP Expansion to 0.5 MGD Infrastructure Cost	**$3,864,000**
Raw Subtotal	**$3,864,000**
Miscellaneous Piping and Utilities (15%)	$579,600
Sitework (15%)	$579,600
Electrical and Instrumentation (30%)	$1,159,200
Raw OPCC	**$6,182,400**
Construction Contingency (80%)	$4,945,920
Total Project Cost	**$11,128,320**
Engineering Services (20%)	$2,225,664
Total Programmed Cost	**$13,353,984**

Next, we will discuss Options 2, 3, and 4 as evaluated in the Site Feasibility TM.

Option 2 - Construction of a new 0.5 MGD greenfield facility on the proposed 5-acre City owned property

- New facility sized for 0.5 MGD
- The existing WWTP would be decommissioned under this option and utilized as an intermediate pump station to the new WWTP
- Proposed facility will include a conventional activated sludge process with onsite dewatering and aerated sludge holding tanks
- Effluent will be pumped from the new WWTP to the golf course

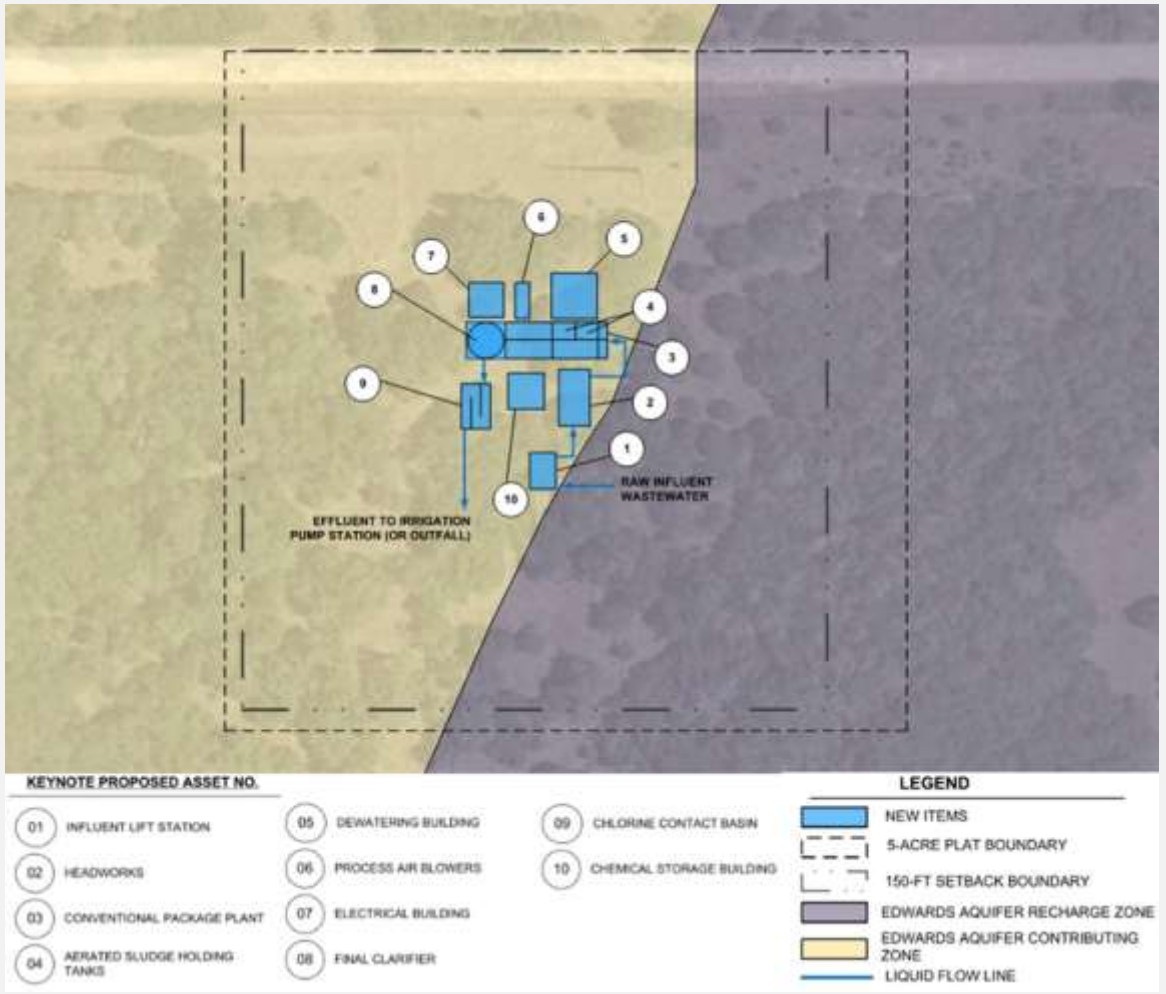
The tables below represent the cost of constructing a new 0.5 MGD WWTP on the City owned 5-acre property (Option 2)

Description	Units	Quantity	Total
Site Civil	LS	1	$212,000
Influent Lift Station	LS	1	$286,000
Headworks	LS	1	$1,248,000
Aeration Basins	LS	1	$1,575,000
Spiral Rake Secondary Clarifiers	LS	1	$748,000
RAS/WAS Pump Station	LS	1	$90,000
Process Blowers	LS	1	$669,000
Disinfection and Chemical Building/Storage	LS	1	$518,000
Aerated Sludge Holding Tank	LS	1	$383,000
Dewatering Equipment and Dewatering Building	LS	1	$1,775,000
		Raw Subtotal	**$7,504,000**

Description	Total
0.5 Greenfield WWTP Infrastructure Cost	**$7,504,000**
Fair Oaks Ranch Conveyance – (To New WWTP)	**$4,133,200**
Fair Oaks Ranch Conveyance – (To the Golf Course)	**$2,956,500**
Raw Subtotal	**$14,593,700**
Miscellaneous Piping and Utilities (15%)	$2,189,055
Sitework (15%)	$2,189,055
Electrical and Instrumentation (30%)	$4,378,110
Raw OPCC	**$23,349,920**
Construction Contingency (80%)	$18,679,936
Total Project Cost	$42,029,856
Engineering Services (20%)	$8,405,971
Total Programmed Cost	**$50,435,827**

Option 3 - The existing site would remain at current capacity and new capacity would be constructed at the City owned 5-acre property

- Increase the total treatment capacity to 0.5 MGD between both plants by:
  - Keeping the capacity of the existing WWTP at 0.3 MGD (no debottlenecking improvements)
  - Add 0.15 MGD capacity
    - Option 3A – Conventional Activated Sludge (CAS)
    - Option 3B – Membrane Bioreactor (MBR)
- Proposed facility will include onsite dewatering and aerated sludge holding tanks



The tables below summarize the most cost-effective alternatives to add 0.15 MGD treatment capacity on the City owned 5-acre parcel

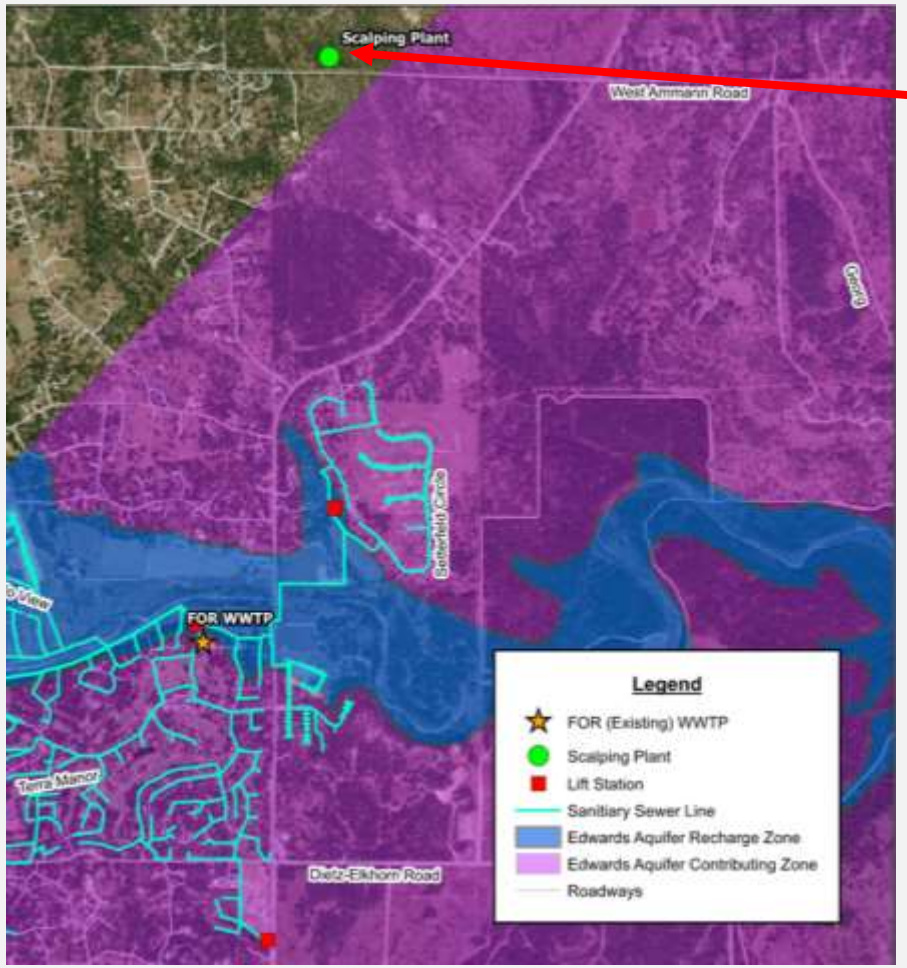
Option 3A (0.15 MGD CAS)

Description	Total
0.15 Greenfield CAS WWTP Infrastructure Cost	**$3,572,000**
Fair Oaks Ranch Conveyance – (To New WWTP)	**$2,776,900**
Fair Oaks Ranch Conveyance Reuse System - (To Golf Course)	**$2,607,500**
Raw Subtotal	**$8,956,440**
Miscellaneous Piping and Utilities (15%)	$1,343,466
Sitework (15%)	$1,343,466
Electrical and Instrumentation (30%)	$2,686,932
Raw OPCC	**$14,330,304**
Construction Contingency (80%)	$11,464,243
Total Project Cost	**$25,794,547**
Engineering Services (20%)	$5,158,909
Total Programmed Cost	**$30,953,457**

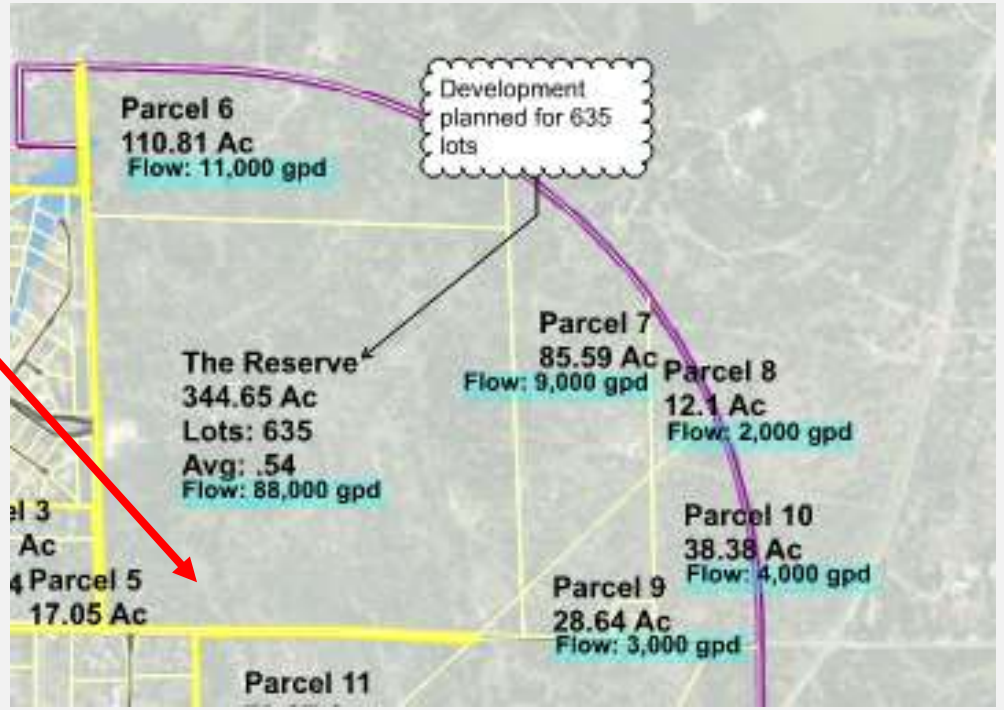
Option 3B (0.15 MGD MBR)

Description	Total
0.15 Greenfield MBR WWTP Infrastructure Cost	**$4,778,700**
Fair Oaks Ranch Conveyance – (To New WWTP)	**$2,776,900**
Fair Oaks Ranch Conveyance Reuse System – (To Golf Course)	**$2,607,500**
Raw Subtotal	**$10,163,100**
Miscellaneous Piping and Utilities (15%)	$1,524,465
Sitework (15%)	$1,524,465
Electrical and Instrumentation (30%)	$3,048,930
Raw OPCC	**$16,260,960**
Construction Contingency (80%)	$13,008,768
Total Project Cost	**$29,269,728**
Engineering Services (20%)	$5,853,946
Total Programmed Cost	**$35,123,674**

Option 4 - Construction of a scalping facility that would serve potential new growth areas.



Scalping Plant Location



- Sizing the scalping plant to process the flows from the Reserve development and Parcels 6,7,8,9, and 10 as well. CAS and MBR considered.
- Approximately 0.12 MGD ADF and 0.18 MGD during MM (1.5 MM PF).
- Parcel located outside the EARZ

The CAS scalping plant alternative was less costly than the MBR alternative

Option 4A 0.12 MGD CAS Scalping Plant

0.12 Greenfield CAS Scalping WWTP Infrastructure Cost	$3,216,000
Fair Oaks Ranch Conveyance Scalping Reuse System	$7,072,000
Scalping Plant Conveyance Sludge Line	$5,925,300
Raw Subtotal	**$16,213,300**
Miscellaneous Piping and Utilities (15%)	$2,431,995
Sitework (15%)	$2,431,995
Electrical and Instrumentation (30%)	$4,863,990
Raw OPCC	**$25,941,280**
Construction Contingency (80%)	$20,753,024
Total Project Cost	**$46,694,304**
Engineering Services (20%)	$9,338,860
Total Programmed Cost	**$56,033,164**

Option 4B 0.12 MBR Scalping Plant

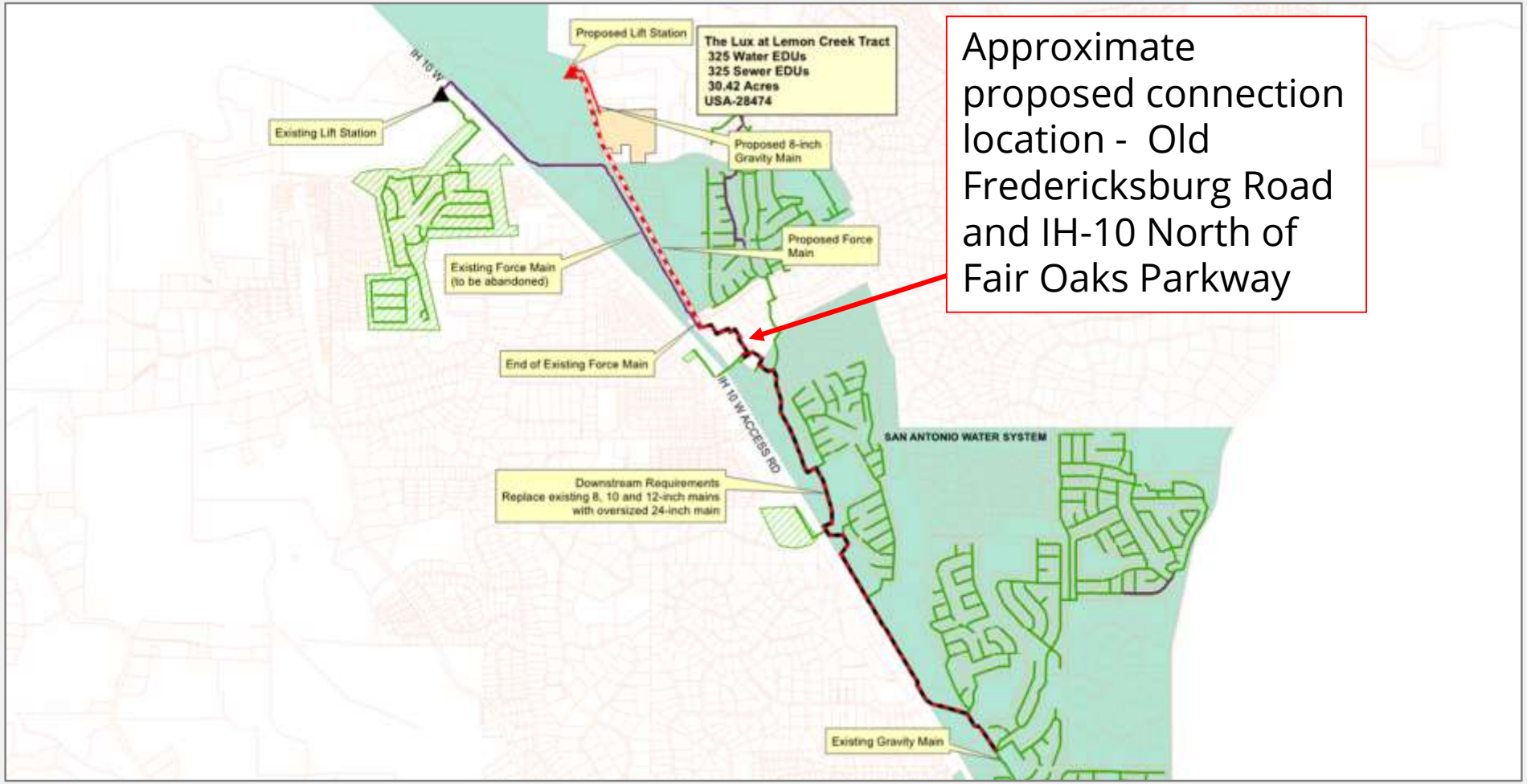
0.12 Greenfield MBR Scalping WWTP Infrastructure Cost	$3,748,000
Fair Oaks Ranch Conveyance Scalping Reuse System	$ 7,072,000
Scalping Plant Conveyance Sludge Line	$5,925,300
Raw Subtotal	**$16,745,300**
Miscellaneous Piping and Utilities (15%)	$2,511,795
Sitework (15%)	$2,511,795
Electrical and Instrumentation (30%)	$5,023,590
Raw OPCC	**$26,792,480**
Construction Contingency (80%)	$21,433,984
Total Project Cost	**$48,226,464**
Engineering Services (20%)	$9,645,293
Total Programmed Cost	**$57,871,757**

The table below summarizes the total programmed cost ranges for Option 2, 3, and 4 alternatives

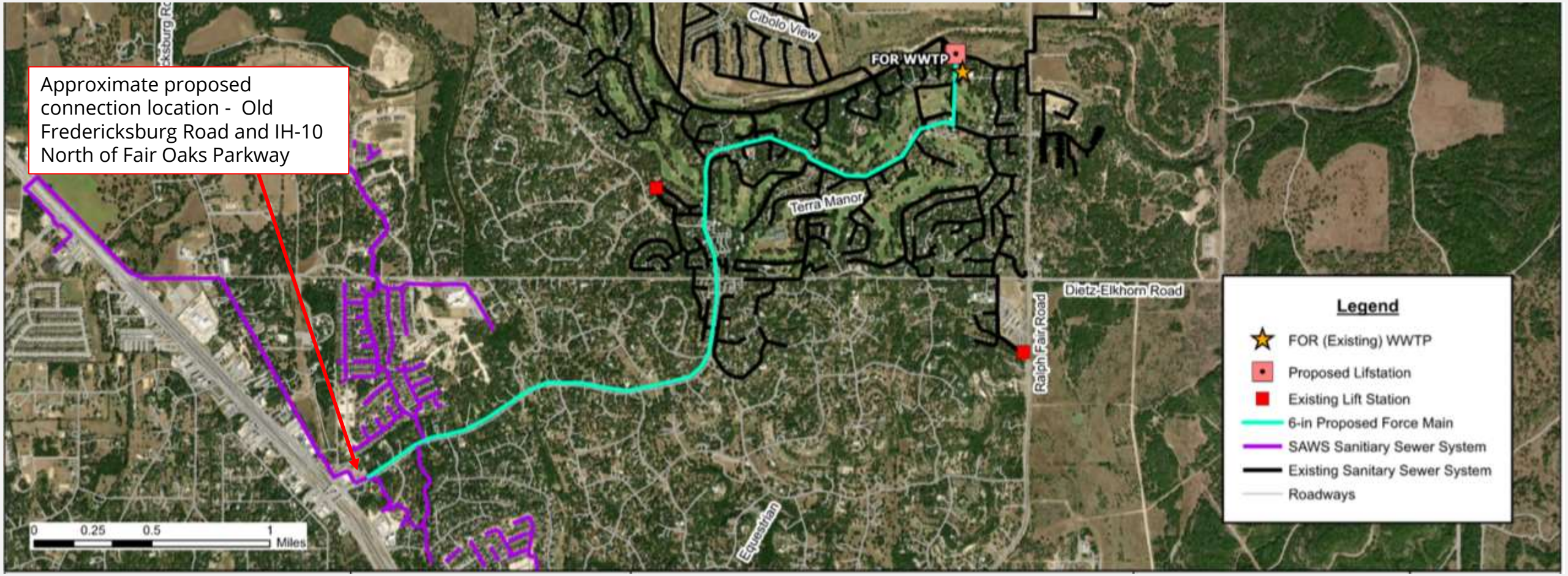
	Option 2 New WWTP (0.5 MGD)	Option 3 New WWTP (0.15 MGD)	Option 4 New Scalping Plant (0.12 MGD)
Total Programmed Cost	**$50.5-52.5M**	**$30.9-36.9M**	**$56 - $57.8M**

Next, we will discuss Option 5 as evaluated in the Site Feasibility TM.

Option 5 - 0.2 MGD connection of the FOR collection system to the San Antonio Water System (SAWS) collection system



Connection of the City of Fair Oaks Ranch Collection System to the SAWS Collection System requires the installation of a 6” force main and new lift station



The planned improvements to the SAWS sanitary sewer trunk line from Fair Oaks Parkway at IH-10 to Sable Run on Old Fredericksburg Road is currently underway with development

Main Size (in)	Linear Feet	Unit Cost	Total Cost
24	14,500	$15.00	$5,220,000
30	14,500	$15.00	$6,525,000
		Difference	$1,305,000

- SAWS has a few developers in place for a cost share on the trunk line upsize to 24-inch
- SAWS indicated that Fair Oaks Ranch will be responsible for cost sharing approximately 16% on the upsize to the 30-inch trunk line (for 0.5 MGD), which would mean that the City will cost share $210,000 (Maximum is $1,305,000)

Fair Oaks Ranch will need to enter a USA with SAWS that requires SAWS board approval

SAWS 2020 Sewer Availability Charge	SAWS 2020 Monthly Volume All Usage (per 100 gallons)	Fair Oaks Ranch anticipated volume (gallons)	Total Monthly (30 days) Cost	Estimated Total Annual Cost
$340.07	$0.4438	200,000	$27,000	$324,000

- Fair Oaks Ranch will be a wholesale customer to SAWS
- Since the City is only entering into a sewer contract, an alternate monthly fee arrangement will need to be coordinated with SAWS
- Fair Oaks Ranch will have to add a wastewater volume flow meter prior to connection with the SAWS system

- The City will have to build a lift station and force main to connect with the SAWS System
- A new lift station could be constructed near:
  - Cibolo Trails neighborhood
  - Existing WWTP
- It is possible that the City may have to abide by SAWS design standards as well

- Impact fee costs could change
  - SAWS current Impact Fee rates are $3,451 per Equivalent Dwelling Unit
  - SAWS assumes that 1,450 EDUs will be associated with the connection

Description	Units	Quantity	Unit Cost	Total
0.5 MGD Lift Station	LS	1	$725,000	$725,000
6" Force Main	LF	18,800	$115	$2,162,000
60" Diameter Manhole	EA	1	$10,375	$10,400
12" Gravity Main	LF	20	$183	$3,700
Wastewater Flow Meter	EA	1	$12,500	$12,500
Pavement Repair	LF	9,600	$75	$720,000
			Raw Subtotal	**$3,633,600**
			Miscellaneous Piping and Utilities (15%)	$545,040
			Sitework (15%)	$545,040
			Electrical and Instrumentation (30%)	$1,090,080
			Raw OPCC	**$5,813,760**
			Construction Contingency (80%)	$4,651,008
			Total Project Cost	**$10,464,768**
			Engineering Services (20%)	$2,092,954
			Total Programmed Cost	**$12,557,722**

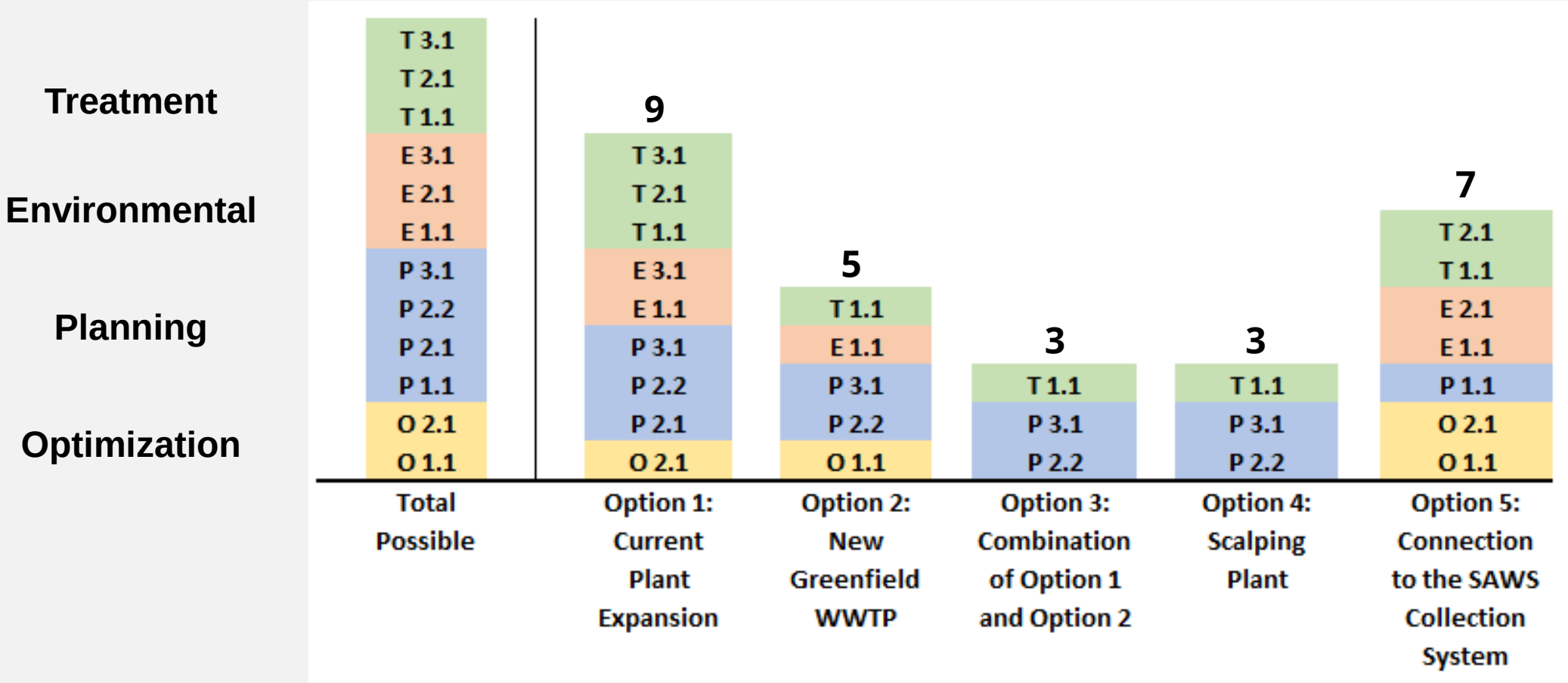
Description	Fair Oaks Ranch Cost to connect
SAWS cost share to upsize 30-inch	**$210,000**
SAWS Impact Fees	**$5,213,950**
Fair Oaks Ranch Lift Station and Force Main	**$12,557,722**
Total	**$17,981,672 + Annualized Cost ($324k/yr)**

Next, we will discuss the non-economic analysis and cost summary presented in the Site Feasibility TM.

A non-economic evaluation of each option was conducted to identify alternatives that provides the City with the most benefit for optimization, planning, environmental, and treatment goals

Evaluation Category	Objective	Criteria
Optimization	O1: Energy reduction	O1.1: is the energy use at the plant site less than the mean of the alternatives?
	O2: Land Use	O2.1 will this alternative reduce the additional land requirement?
Planning	P1: Protect public health and safety	P1.1: is this alternative safer than other alternatives?
	P2: Preserve community reputation, status, and economic vitality	P2.1: will this alternative enhance the perception of the community local to the facility?
		P2.2: will this alternative enhance the perception of the community within the Fair Oaks Ranch service area?
	P3: Contribute to industry leadership	P3.1: does the alternative provide an innovative solution?
Environmental	E1: Minimize local impact	E1.1: is there a positive impact on the efficiency and effectiveness of plant operations?
	E2: Minimize global impact	E2.1: is the chemical use less than the mean of the alternatives?
	E3: Resource Recovery	E3.1: will the alternative help achieve resource recovery?
Treatment	T1: Maximize treatment reliability	T1.1: proven and reliable technology?
	T2: Manageable process complexity	T2.1: is the operation man hours estimate less than the mean of the alternatives?
	T3: Flexibility to meet future regulatory requirements	T3.1: will the alternative meet future regulatory requirements with minimal additional capital investment?

A non-economic evaluation of each option was conducted to identify alternatives that provides the City with the most benefit for optimization, planning, environmental, and treatment goals



Option 1 and Option 5 scored the most “yes” answers

In summary, the lowest cost option for expanding treatment capacity in the City is Option 1 and Option 5

	Option 1: Current Plant Expansion	Option 2: New Greenfield WWTP	Option 3: Combo of Option 1 & Option 2	Option 4: New Scalping Plant	Option 5: Connection to SAWS Collection System**
Total Programmed Cost	**$13.4M**	**$50.4 - $52.5M**	**$30.9 - $37M**	**$56 - $57.8M**	**$17.9M***

*Represents total cost to connect to the SAWS collection system, does not include estimated reoccouring annual cost (~$324K)
**Requires SAWS Board approval

Questions?

Additional Info or Analysis Requested?

GARVER

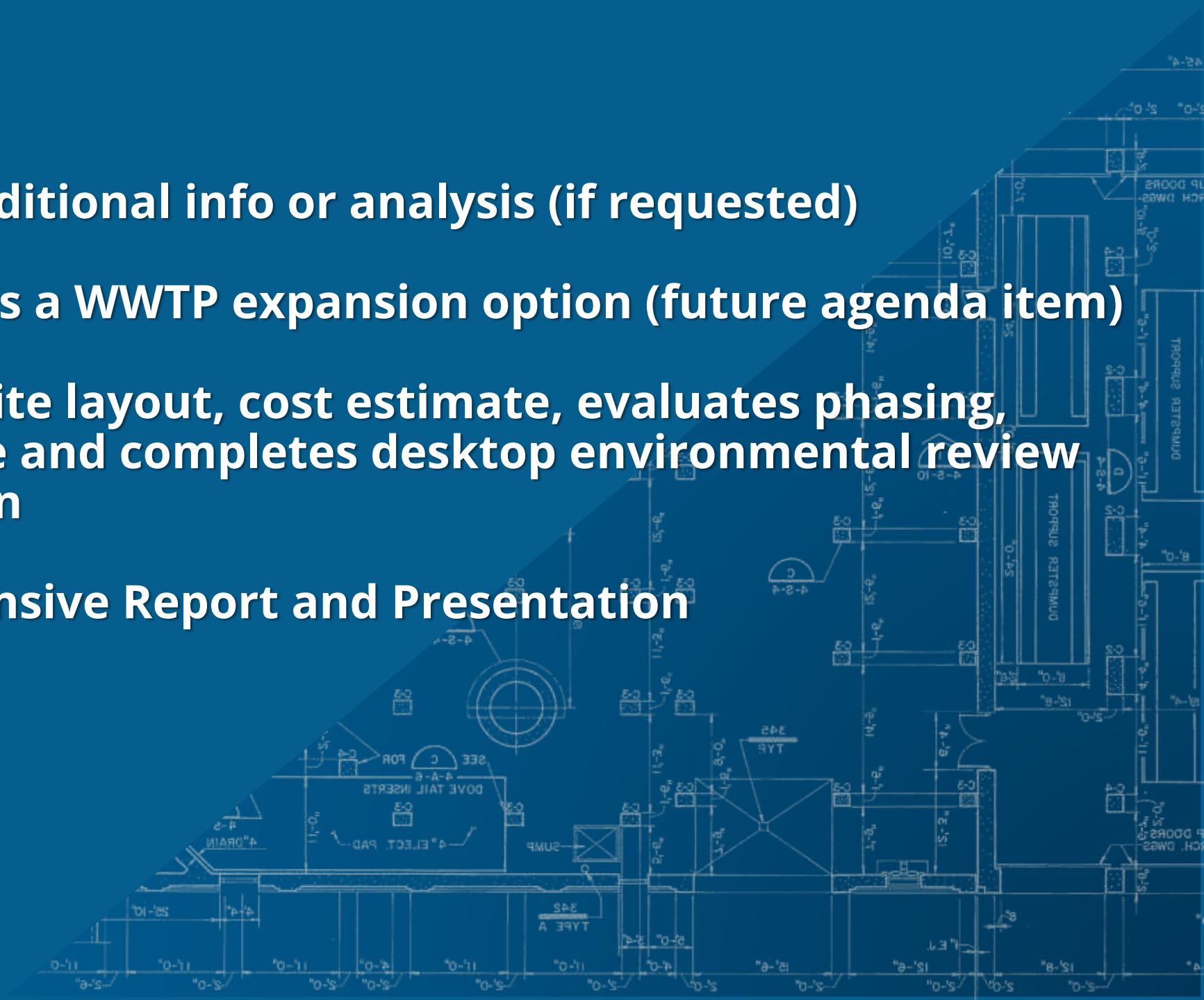
Next Steps

1) Staff provide additional info or analysis (if requested)

2) Council approves a WWTP expansion option (future agenda item)

3) Garver refines site layout, cost estimate, evaluates phasing, transition schedule and completes desktop environmental review for approved option

4) Final Comprehensive Report and Presentation



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