FINAL REPORT

City of Gonzales

EXISTING CITY PLUS SPHERE OF INFLUENCE

WASTEWATER MASTER PLAN

June 2019

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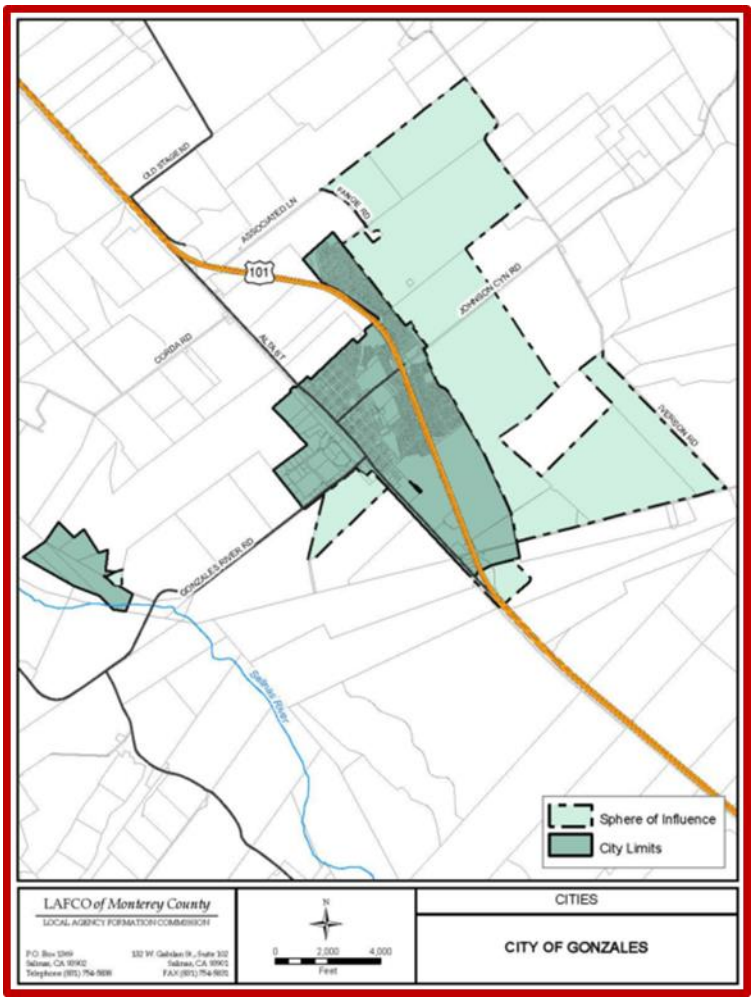
1.0 INTRODUCTION

The City of Gonzales' Existing City Plus Sphere of Influence Wastewater Master Plan has been prepared as part of overall infrastructure studies for the City's Sphere of Influence (SOI) Area that is proposed for development as part of the City's 2010 General Plan. The City of Gonzales is located within Monterey County, just south of the City of Salinas as shown on Figure 1.

The existing City of Gonzales is nearing buildout and expansion of the City has been anticipated with the adoption of the City's SOI area in 2014 by the Local Agency Formation Commission of Monterey County (LAFCO). The existing City Boundary and the SOI Area are shown on Figures 2 and 3, respectively. The area is also shown in the graphic at right, from Monterey County LAFCO.



As identified in the City's 2010 General Plan, the SOI Area includes a comprehensive land use and regulatory framework to guide the development of approximately 2,078-acres located in the SOI Area east of the existing City. The plan area is recognized by the City of Gonzales and LAFCO as a logical direction of growth for the City.

It is anticipated that development could occur in the near future within the SOI Area. Prior to the adoption of comprehensive development plans within the SOI area, the City authorized a study of infrastructure systems and associated facilities at a high level of review for the City in its entirety, including its overall SOI. The infrastructure studies evaluate water, wastewater, storm drain and circulation systems. This report is the wastewater component of that work effort.

1.1 WASTEWATER MASTER PLAN PURPOSE

The purpose of this wastewater master plan is to provide preliminary analysis for the backbone wastewater system that will serve the existing City and the SOI Area. The information presented herein builds upon a number of wastewater and infrastructure related studies that have been completed in draft or final form for the City, including the following:

1. City of Gonzales Design Standards, dated May 1995
2. City of Gonzales 2010 General Plan, prepared by Coast Plans
3. Gonzales 2010 General Plan Environmental Impact Report – Volume 1, dated July 2010, prepared by Coast Plans
4. Gonzales 2010 General Plan Environmental Impact Report – Volume 2, dated July 2010, prepared by Coast Plans
5. Memorandum of Agreement between the City of Gonzales and the County of Monterey Regarding Working Cooperatively on Common Planning, Growth and Development Issues, dated April 02, 2014
6. City of Gonzales Conceptual Drainage Plan, dated February 2010 prepared by Rick Engineering
7. City of Gonzales Wastewater System Conceptual Plan – Draft, dated September 2011, prepared by AECOM
8. City of Gonzales Water System Conceptual Plan – Draft, dated September 2011, prepared by AECOM
9. City of Gonzales Wastewater Treatment Plant Capacity Study – Draft, dated June 2016, prepared by MKN & Associates
10. Wastewater Treatment Plant Master Plan, Draft, dated February 2017, prepared by NCS Engineers and Harris & Associates
11. Gonzales Economic Development Strategy and Action Plan, dated 2013, prepared by ADE
12. City of Gonzales Long Term Wastewater Management Plan, dated August 2018, prepared by Dudek

As part of this Wastewater Master Plan, the following items are presented:

1. The wastewater generation rates for the City and SOI Area
2. The sanitary sewer system infrastructure that conveys the projected flows to the City's existing wastewater treatment plant
3. Alternative options to treat the wastewater generated by the SOI Area

The results and conclusions of the wastewater modeling are based on serving the existing City and new development within the SOI Area. This study looked at the main backbone wastewater collection system that could be required to serve the proposed SOI Area and the developments that are currently in the planning process. It is understood that additional in-tract wastewater collection system piping will be required within each of the development areas to serve the individual users.

1.2 EXISTING CITY AND SOI AREA LOCATION AND DESCRIPTION

1.2.1 Project Vicinity

The City of Gonzales is located in the central part of the Salinas Valley, 16 miles south of the City of Salinas and 33 miles north of King City. San Jose and San Francisco lie to the north, about 70 miles and 120 miles respectively. The combination of climate, soil, terrain, and water have made the Salinas Valley one of the State's most productive agricultural regions for well over a century. The farms adjacent to the City and surrounding area continue to be major contributor to the State's economy and provide thousands of annual and seasonal jobs, as well as secondary jobs in food processing and agricultural businesses.

The most common crops grown within the region are lettuce, broccoli, asparagus, strawberries, grapes, nursery crops, and other field crops and vegetables. The City is surrounded on all sides by agricultural lands.

The entire Salinas Valley is drained by the Salinas River, which originates in the Coast Range south of King City and flows north to Monterey Bay. The river is located about two miles west of Gonzales and is fed by creeks descending from surrounding hills and from sloughs which cross the valley. One of these sloughs bisects Gonzales, creating a natural drainageway through the city and providing some visual relief on the otherwise flat terrain. The hills to the west of the valley are taller, more dramatic, and more densely wooded than those to the east. The eastern hills are drier and more rolling, as is typical of the large ranches that dominate eastern Monterey County.

1.2.2 Pre-Development Conditions

The valley is crisscrossed by a rectangular grid of both improved and unimproved roads. U.S. Highway 101 and Union Pacific Railroad angle across this grid and provide the main transportation arteries through the valley. Gonzales River Road runs from Gonzales to the western shoulder of the valley and provides scenic vistas to citrus and avocado orchards, grazing land, and vineyards on the slopes of the Sierra de Salinas, as well as expansive views across the valley. Johnson Canyon Road runs from Gonzales to the valley's eastern shoulder, with ranches located in the vicinity. East/west roads run between the two sides of the valley at quarter-mile, half mile, or one-mile intervals bisected at right angles by north-south roads running at similar intervals. The roads frame a patchwork quilt of farms ranging in size from about 20 acres to several hundred acres. A complex network of irrigation canals and furrows crosses the area, with water pumped from private and municipal wells.

The existing developed portions of the City include residential, industrial, mixed use/commercial, public, and open space/undeveloped/roadways land uses. Residential land use represents approximately one-third of all the current developed land use area within the City. Of the total residential area, approximately 88 percent is low density (single-family) residential housing. The existing land use pattern within the City is depicted on Figure 4.

1.2.3 Existing City Limits - Land Use Plan at Buildout

The proposed land use plan for the current City limits at ultimate buildout is depicted on Figure 5A. Remaining undeveloped land within the City limits includes approximately 120 acres for residential development, 50 acres for mixed use/commercial, and 210 acres for industrial use.

1.2.4 SOI Area Land Use Plan

The SOI Area of the City comprises an area of approximately 2,078-acres located in the eastern sector of the City. The proposed land use of the City, including the SOI Area, is depicted on Figure 5. In general, the SOI Area consists of three anticipated development areas. To the northwest is the proposed Vista Lucia development. The proposed land use for Vista Lucia is depicted on Figure 5B. To the southeast of the SOI Area is the proposed Puente Del Monte development as shown on Figure 5C. In the middle portion of the SOI Area is the D'Arrigo property. The proposed land use for the D'Arrigo property is depicted on Figure 5D.

Where available, the most current development plans were utilized as part of the analysis presented within this Master Plan. Where current information was not available, the land use included within the City's General Plan governed.

2.0 WASTEWATER STUDY PROCESS

This Plan consists of a high-level analysis of the City's existing wastewater collection system and the proposed wastewater infrastructure necessary to serve the buildout within the existing City and the SOI Area. The process included an evaluation of the existing wastewater generation within the City, the proposed wastewater generation at city buildout, including infill development and the SOI Area. A SewerCAD hydraulic model was developed to analyze the impact of the buildout flows on the existing collection system, and identify improvements required to accommodate the growth of the SOI Area and ultimate buildout of the City. It is noted that a separate Study, "City of Gonzales Long Term Wastewater Management Plan," is simultaneously being prepared to analyze various alternatives to provide additional treatment capacity for the planned growth.

2.1 EXISTING CITY WASTEWATER SYSTEM

The City of Gonzales owns, operates and maintains a wastewater collection and treatment system to provide service to the residents and businesses within the City boundary. Wastewater generated within the City limits is collected via a gravity collection system and conveyed to the west to the City's treatment plant. The permitted discharge capacity of the WWTP is 1.3 MGD. The collection system consists of gravity pipeline segments ranging in diameter from 6-inches to 24-inches and five (5) lift stations which collect flow from the residential communities on the east side of Highway 101. The City's existing backbone wastewater system is shown on Figure 7.

2.2 LAND USE AND WASTEWATER GENERATION

Each land use generates wastewater flow based on unit flow factors or number of dwellings planned. Unit flow factors for areas with the existing city limits were developed specifically for

this analysis based upon existing land use maps and density from the General Plan, population data and existing flow information provided by the City. The existing land use within the City are gross acreages derived from the General Plan land use map, area take offs from AutoCAD line work provided by the City and aerial photography used to create the figures in this Master Plan. The existing City unit flow factors are based on the Draft City of Gonzales Wastewater System Conceptual Plan dated September 2011, land use density, an average number of persons per dwelling unit of 4.37 (derived from Table II-2 of the General Plan), current flow into the wastewater treatment plant, and an average residential flow factor of 70 gallons per capita day (gpcd) as calibrated from the existing flow to the wastewater treatment plant, reported by the City. The existing city flow factors are summarized in Table 1.

As noted above, the SOI Area is proposed to be divided into three major development areas: Vista Lucia, Puente Del Monte and additional General Plan Expansion Area (i.e. D'Arrigo property). The three future development areas are planned to be developed over a number of years with a variety of land uses including residential, commercial/mixed use, public/schools, industrial, open space and parks. The total SOI area is approximately 2,078-acres. The proposed SOI Area residential flow factors are based on the General Plan dwelling unit count of 6,800 and proposed land plans showing the distribution of 6,800 dwelling units in the SOI limits provided by the participating land owners. In addition to the major developments within the SOI, assumptions for future wastewater generation also includes the proposed buildout within the existing City limits of approximately 900 additional dwelling units. Future SOI area and infill development within City limits assumes an estimated 3.74 persons per dwelling unit as derived from Table II-3 of the General Plan, after factoring in a 3% vacancy rate, and a flow factor of 55 gpcd. The resulting Average Daily Dry Weather Flow (ADWF) Unit Flow Factors that are used for the existing City are shown in Table 5. The flow factors for the residential uses in the SOI Area are based on number of planned dwellings and are shown in tables 2 through 4.

It should be noted that future developments will be preceded by Specific Plans. Each project will prepare a Water Supply Assessment (WSA) as required by SB 610 to satisfy the California Environmental Quality Act for developments larger than 500 residential units. The WSA may identify different per capita flow factors as appropriate for the developments, using a methodology required by SB 610.

A summary of the existing land use acreages and residential unit counts that generate wastewater flows for the existing City are shown in Table 1.

Table 1
Wastewater Generation by Land Use – Existing City

Land Use	Unit Flow Factor (GPD/AC)	Total Area (Acres)[1]	Dwelling Unit Count[2]	ADWF (GPD)
Low Density (4.5 du/ac)	1,377.5	328.6	1,474	452,647
Medium Density (7.6 du/ac)	2,345	50.0	380	117,250
Medium-High Density	N/A	-	N/A	-
High Density (22.5 du/ac)	6,883	2.0	45[3]	13,766
Neighborhood Commercial	1,600	30.0	N/A	48,000
Downtown & Highway Commercial				
Institutional	1,000	76.5	N/A	76,500
Light Industrial	1,000	*Included in Heavy Industrial*		
Heavy Industrial	2,200	214.0	N/A	470,800
Hospital	387.5 GPD/BED	-	N/A	N/A
School	1,000	*Included in Institutional*		
Active Open Space	300	12.2	N/A	3,660
Total		**713.3**	**1,899**	**1,182,623**

1. The existing wastewater treatment plant is not included.
2. Per Table II-2 of the 2010 General Plan. For informational purposes only.
3. Table II-2 of the 2010 General Plan indicates there are 213 existing High Density homes on 2 acres. However, there are only 45 apartments on this site.
4. Active Open Space assumes 60 visitors/acre/day and 5 gallons generated per visitor. Passive open space is assumed to have no facilities.

A summary of the proposed land use acreages and residential unit counts that generate wastewater flows for the Vista Lucia planned development in the SOI Area are shown in Table 2.

Table 2

Wastewater Generation by Land Use – SOI Area – Vista Lucia

Land Use	Unit Flow Factor (Unit)[1]	Total Area (Acres)[2]	People per Dwelling[5]	Dwelling Unit Count[3]	ADWF (GPD)
Vista Lucia					
Low Density (gpcd)	55	223.4	3.74	1,054	216,808
Medium Density (gpcd)	55	151.3	3.74	1,272	261,650
Medium-High Density(gpcd)	55	37.4	3.74	605	124,449
High Density (gpcd)	55	19.4	3.74	566	116,426
Neighborhood Commercial (GPA) Downtown & Highway Commercial (GPA)	1,600	5.9	N/A	N/A	9,440
Institutional (GPA)	1,000	-	N/A	N/A	-
Light Industrial (GPA)	1,000	-	N/A	N/A	-
Heavy Industrial (GPA)	2,200	-	N/A	N/A	-
Hospital (Beds)	387.5 GPD/BED	-	N/A	N/A	-
School (GPA)	1,000	43.0	N/A	N/A	43,000
Active Open Space (Park / Recreation)[4] (GPA)	300	61	N/A	N/A	18,300
Passive Open Space (GPA)	0	78.9	N/A	N/A	0
Total		**620.3**		**3,497**	**790,073**

1. Residential flow factors are 55 gallons per capita day (gpcd). Non-residential flow factors are based on gallons per acre (GPA).
2. Excludes backbone roads.
3. Taken from the Master Plans and Traffic Update Project Description provided by Pembrook Development, LLC.
4. Active Open Space assumes 60 visitors/acre/day and 5 gallons generated per visitor. Passive open space is assumed to have no facilities.
5. From Table II-3 of the General Plan, after factoring in a 3% vacancy rate.

A summary of the proposed land use acreages and residential unit counts that generate wastewater flows for the Puente Del Monte planned development in the SOI Area are shown in Table 3.

Table 3
Wastewater Generation by Land Use – SOI Area – Puente Del Monte

Land Use	Unit Flow Factor (Unit)[1]	Total Area (Acres)[2]	People per Dwelling[6]	Dwelling Unit Count[3]	ADWF (GPD)
Puente Del Monte					
Low Density (gpcd)	55	113.4	3.74	341	70,144
Medium Density (gpcd)	55	199.5	3.74	1,195	245,812
Medium-High Density (gpcd)	55	66.2	3.74	596	122,597
High Density (gpcd)	55	22.4	3.74	448	92,154
Residential Mixed Use[4] (gpcd)	55	5.9	3.74	42	8,639
Neighborhood Commercial/Mixed Use[4] (GPA)	1,600	5.9[4]	N/A	N/A	9440
Downtown & Highway Commercial (GPA)					
Institutional (GPA)	1,000	-	N/A	N/A	-
Light Industrial (GPA)	1,000	21.1	N/A	N/A	21,100
Heavy Industrial (GPA)	2,200	-	N/A	N/A	-
Hospital (Beds)	387.5 GPD/BED	-	N/A	N/A	-
School (GPA)	1,000	26.2	N/A	N/A	26,200
Active Open Space (Park / Recreation) (GPA)	300	51.5	N/A	N/A	15,450
Passive Open Space (GPA)	0	-	N/A	N/A	-
Total		**506.2[4]**		**2,622**	**611,536**

1. Residential flow factors are 55 gallons per capita day (gpcd). Non-residential flow factors are based on gallons per acre (GPA).
2. Excludes backbone roads.
3. For informational purposes only. Taken from the Master Plans and Traffic Update Project Description provided by Pembrook Development, LLC with input from the Jackson Family for the Puente Del Monte site. Backbone streets are not included.
4. Residential Mixed Use wastewater generation accounts for the 42 dwellings, the commercial/retail portion is accounted for in the Neighborhood Commercial/Mixed Use line. Acreage is not double counted in the total.
5. Active Open Space assumes 60 visitors/acre/day and 5 gallons generated per visitor. Passive open space is assumed to have no facilities.
6. From Table II-3 of the General Plan, after factoring in a 3% vacancy rate.

A summary of the proposed land use acreages and residential unit counts that generate wastewater flows for the D'Arrigo property and the remaining area in the SOI Area are shown in Table 4.

Table 4
Wastewater Generation by Land Use – SOI Area – General Plan Expansion Area (D'Arrigo & Remainder)

Land Use	Unit Flow Factor (Unit)[1]	Total Area (Acres)[2]	People per Dwelling[5]	Dwelling Unit Count[3]	ADWF (GPD)
D'Arrigo & Remainder					
Low Density (gpcd)	55	40.0	3.74	238.0	48,957
Medium Density (gpcd)	55	26.5	3.74	239.0	49,162
Medium-High Density (gpcd)	55	8.5	3.74	102.0	20,981
High Density (gpcd)	55	5.1	3.74	102.0	20,981
Neighborhood Commercial (GPA)	1,600	90.0	N/A	N/A	144,000
Downtown & Highway Commercial (GPA)					
Institutional (GPA)	1,000	-	N/A	N/A	-
Light Industrial (GPA)	1,000	-	N/A	N/A	-
Heavy Industrial (GPA)	2,200	-	N/A	N/A	-
Hospital (Beds)	387.5 GPD/BED	-	N/A	N/A	-
School (GPA)	1,000	18.0	N/A	N/A	18,000
Active Open Space (Park / Recreation) (GPA)	300	50.0	N/A	N/A	15,000
Passive Open Space (GPA)	0	-	N/A	N/A	0
Total		**238.1**		**681**	**317,081**

1. Residential flow factors are 55 gallons per capita day (gpcd). Non-residential flow factors are based on gallons per acre (GPA).
2. The full property is not represented here. These acreages reflect densities within the range provided by the 2010 General Plan. Backbone roads are excluded. Actual acreages may change when a Specific Plan is submitted.
3. For informational purposes only. Taken from the Master Plans and Traffic Update Project Description provided by Pembrook Development, LLC with input from the Jackson Family for the Puente Del Monte site. Backbone streets are not included.
4. Active Open Space assumes 60 visitors/acre/day and 5 gallons generated per visitor. Passive open space is assumed to have no facilities.
5. From Table II-3 of the General Plan, after factoring in a 3% vacancy rate.

A summary of the existing plus proposed (infill) land use acreages and residential unit counts that generate wastewater flows for the existing City at buildout (excluding the SOI Area) are shown in Table 5.

Table 5

Wastewater Generation by Land Use – Existing City at Buildout

Land Use	Unit Flow Factor (GPD/AC)[1]	Total Area (Acres)[2]	Dwelling Unit Count[3]	ADWF (GPD)
Existing Low Density	1,377.5	328.6	1,447	452,647
New Low Density	925.7	117.4	700	108,677
Existing Medium Density	2,345	50	380	117,250
New Medium Density	1,563.3	2.3	100	3,596
Medium-High Density	N/A	-	N/A	-
Existing High Density	6,883	2.0	45[4]	13,766
New High Density	4,628.3	0.0	0[4]	-
Neighborhood Commercial	1,600	78.4	N/A	125,440
Downtown & Highway Commercial				
Institutional	1,000	87.8	N/A	87,800
Light Industrial	1,000	*Included in Heavy Industrial*		
Heavy Industrial	2,200	437.4	N/A	962,280
Hospital	387.5 GPD/BED	-	N/A	-
School	1,000	*Included in Institutional*		
Active Open Space (Park / Recreation)	300	39.8	N/A	11,940
Passive Open Space	0	-	N/A	-
Total		**1,143.7**	**2,672**	**1,883,396**

1. Existing City at Buildout represents the existing homes plus the new, infill development that is shown in the 2010 General Plan. Existing homes flow factor will remain at 70 gpcd, while new homes use 55 gpcd.
2. Acreages are based on take-offs using the 2010 General Plan Land Use Exhibit, AutoCAD, and aerial imagery.
3. Taken from Table II-3 of the 2010 General Plan.
4. 2010 General Plan lists 213 existing High Density dwellings where only 45 exist in the area shown on the land use map. The General Plan also lists another 10 acres and 100 dwellings in this category per Tables II-2 and II-3, however the land use exhibit do not show any additional land use designated as High Density.
5. Active Open Space assumes 60 visitors/acre/day and 5 gallons generated per visitor. Passive open space is assumed to have no facilities.

A summary of the total additional Average Daily Wastewater Flow (ADWF) at City buildout including the SOI Area is shown in Table 6.

Table 6
Total Wastewater Generation by Land Use – City Buildout

Land Use Area	Area (ac)	ADWF (GPD)
Existing City Buildout	1,143.7	1,883,396
SOI Area – Vista Lucia	620.3	790,073
SOI Area – Puente Del Monte	506.2	611,536
SOI Area – D'Arrigo & Remainder	238.1	317,081
Total	**2,508.3**	**3,602,086**

At full buildout, the SOI Area is projected to generate a total daily average dry weather flow of 1.72 million gallons per day (MGD), while the existing City limits would generate 1.88 MGD. The total average daily flow anticipated by the buildout of the City and SOI Area is estimated to be 3.60 MGD.

3.0 WASTEWATER SYSTEM CONSIDERATIONS

The City's expansion of the wastewater collection system will need to take into consideration several important aspects to allow the logical and systematic development of the system. These considerations include the phasing of future developments and the corresponding infrastructure that will be required and expanded as development phases are brought online.

3.1 WASTEWATER SYSTEM INFRASTRUCTURE

The existing wastewater collection system conveys sewage from east to west to the City's wastewater treatment plant located approximately two miles west of the City. The existing wastewater generated on the east side of Highway 101 is conveyed through lift stations and gravity flow to the west across the highway. The northeast portion of the City is served by the Sunshine Ranch Lift Station (SRLS). The SRLS pumps flow through a force main that crosses U.S. Highway 101 and discharges into a gravity sewer manhole on the west side of the highway. The Arroyo Lift Station and the Mission Meadows Lift Station serve most of the remainder of the existing development east of Highway 101. Both lift stations pump flow to gravity mains located in Johnson Canyon Road. Two gravity mains cross Highway 101 at Fifth Street and continue west to the wastewater treatment plant through a 21-inch trunk line. The City has three (3) existing crossings of Highway 101, a force main, an 8-inch gravity sewer main and 10-inch gravity sewer main.

The existing system was broken into sewershed basins for the purpose of the hydraulic analysis. Figure 7 identifies the existing system sewer basins and backbone piping network. Sewer Basins A11, A12, B8 and B10 represent the sewer basins requiring pumping.

A sanitary sewer system, comprised of gravity trunk pipelines and possibly lift stations will be identified in the specific plan phase to collect and convey wastewater flows within the SOI Area. Likely points of connection (POC) are identified on figures 8 and 9. The gravity pipelines and lift station force mains will be placed within the proposed road system serving the SOI Area wherever possible.

4.0 HYDRAULIC MODELING ANALYSIS

This section of the Master Plan summarizes the procedures, criteria and assumptions used in the hydraulic modeling analyses and presents the conclusions developed from review of the model output data.

4.1 HYDRAULIC MODEL ANALYSIS CRITERIA

The following procedure was used for the hydraulic model analysis of the sanitary sewer system proposed in this SOI Area Sewer Master Plan:

1. The primary wastewater generation areas within the existing City and SOI Area were delineated by sewer basins.
2. Points of connection for the sewer system were defined to collect wastewater flows within the SOI Area.
3. Node points were inserted into the sewer system model to define flow collection points.
4. The land use areas, with their respective generation rates, were assigned a manhole node to tie into the trunk system.
5. Proposed land use acreages and wastewater generation for each manhole point of connection were tabulated and allocated.
6. Wastewater flows, including average dry weather flows and factored peak flows were calculated and allocated at each node point.
7. Average dry weather flows were calculated for the land use types and number of dwellings within each wastewater shed.
8. Peak hour flows were calculated by multiplying the average dry weather flows by a peaking factor of 3.0.
9. Trunk system pipe sizes were initially sized based on peak buildout flows and pipe capacities based on minimum pipe slopes. The hydraulic modeling results can be found in the Appendix to this Plan.
10. Preliminary pipe inverts were calculated and compared to proposed finished grades to verify the ability of the gravity system to serve the tributary areas.

4.2 PIPELINE SIZING CRITERIA

The proposed pipe size diameters were selected using the following pipe criteria:

1. A Manning's "n" value of 0.013 was used for all pipe-sizing calculations.
2. Minimum pipe diameter is 8-inches.
3. Pipes 15-inches and less in diameter are designed to have a maximum depth of flow of 50% of the pipe diameter.
4. Pipes larger than 15-inches in diameter are designed to have a maximum depth of flow of 75% of the pipe diameter.
5. Pipe sizes have been selected assuming pipes will be installed at minimum slopes: 0.0035 ft/ft for 15-inch diameter and less; 0.0010 ft/ft for larger than 15-inch.
6. The minimum slope for a pipe is a slope that yields a minimum 2 feet per second velocity when flowing at design capacity for 15-inch diameter and less, and 1.75 feet per second for pipes larger than 15-inch.

4.3 HYDRAULIC MODEL ASSUMPTIONS

The following are the assumptions that were utilized in the preparation and analysis of the hydraulic models for the proposed wastewater system serving the SOI Area:

1. The minimum pipeline diameter for modeling purposes is 8-inches.
2. For existing system pipelines where as-built records were not available, pipe slopes were assumed to match the straight grade slope of the road surface, or a minimum slope of 0.1%.
3. Existing and proposed sewer lift stations were included as a part of the model.

4.4 MODELING SCENARIOS

A hydraulic model of the skeletonized system representing the existing City collection system and the proposed collection system for the SOI Area was developed utilizing Bentley's SewerCAD hydraulic modeling software by. A static model was developed to analyze two different dry-weather flow conditions: Average Daily Flow and Peak Hour Flow. Both of the flow conditions were modeled under four different scenarios:

1. Existing City
2. Existing City at Buildout
3. SOI Area at Buildout
4. SOI Area – Disconnected (Satellite Treatment Option)

Scenarios 1, 2 and 3 all assume that the wastewater flows generated within the City and SOI Area are routed to the City's Wastewater Treatment Plant. Scenario 4 assumes one or more new Satellite Treatment Plant(s) will be constructed to serve the SOI Area.

Both model input and output data were reviewed for consistency with industry standard criteria and design standards. The results are summarized below.

4.5 MODELING RESULTS

The hydraulic model was analyzed under the average daily and peak hour flow conditions under existing and buildout scenarios. The peak flow condition for Scenario 3 "SOI Area at Buildout" was used to identify the backbone sewer system improvements required to serve the SOI Area, and the existing system upgrades required to accommodate the additional capacity. These improvements are identified as "Alternative 1" and are summarized below.

The peak flow condition for Scenario 4 "SOI Area – Disconnected" was used to identify the shared sewer system improvements required to serve the SOI Area with a satellite treatment plant within the SOI Area. Under this scenario, existing system capacity upgrades are not required. These improvements are identified as "Alternative 2" and are summarized below.

The results of the hydraulic model runs were compared with the standards and criteria established.

4.6 PROPOSED IMPROVEMENTS – ALTERNATIVE 1

4.6.1 Future System (SOI Area)

Wastewater from the Vista Lucia and Puente Del Monte developments will likely be conveyed by a combination of gravity pipes and force mains to the points of connection shown on figure 7.

The wastewater generated by the remainder of the SOI Area (D'Arrigo) is assumed to be conveyed by gravity flow. A portion of the wastewater will be conveyed to Johnson Canyon Road where it will tie into the existing gravity pipelines that cross Highway 101. The existing gravity line crossing Highway 101 will need to be upsized to a minimum 15-inch diameter to accommodate buildout flows. The remainder will be conveyed to the Vista Lucia point of connection as shown on Figure 7.

With the exception of one lift station, 630 LF of the 15-inch, 1,360 LF of 18" sewer main, and 1,320 LF of 21-inch sewer main, the above infrastructure is non-shared, in-tract infrastructure and is therefore developer constructed. For this reason, these items are not included in the preliminary cost estimates or summary.

4.6.2 Existing System

Wastewater generated by the SOI Area must be conveyed through the existing wastewater infrastructure for Alternative 1. To accommodate the increased flows, portions of the existing gravity conveyance system require upsizing. A summary of the improvements required for the existing system include:

1. Approximately 1,500 LF of 15" Force Main under Highway 101
2. Approximately 21,470 LF of 8" – 36" gravity sewer main upsizing in pavement
3. Approximately 2,770 LF of 36" gravity sewer main upsizing in unpaved areas
4. Approximately 8,400 LF of 42" trunk line upsizing in unpaved area (to Gonzales WWTP)

The size and location of the existing system improvements are depicted on Figure 8. This infrastructure is "shared" by existing users and the SOI development. Costs for these upgrades to the existing infrastructure are included in the preliminary cost estimates and summary.

Expansion of the existing treatment plant is discussed in the Long Term Wastewater Management Plan prepared by Dudek and references the following improvements:

1. Headworks screening, grit removal, metering
2. Influent pump station
3. EAAS biological treatment and secondary clarifiers
4. Sludge drying lagoons retrofit
5. Infiltration basins

4.7 PROPOSED IMPROVEMENTS – ALTERNATIVE 2

4.7.1 Future System (SOI Area)

This alternative assumes that one or more new "satellite" wastewater treatment plants(s) will be constructed to treat the wastewater generated within the SOI Area (1.72 MGD). The satellite treatment plant that was modeled is shown to be located near the Johnson Canyon Landfill, east of the SOI Area, adjacent to Johnson Canyon Road, as shown on Figure 9. However, the number and location(s) of the plant(s) may vary from what is shown on the figure. Under this alternative, additional crossings of Highway 101 are not required. Based on the currently available land use plans for the SOI Area, the shared sewer system improvements required to provide service to the SOI Area includes:

1. Approximately 23,500 LF of 10" Force Main
2. Satellite Wastewater Treatment Plant (1.72 MGD)
3. Two (2) new lift stations

4.7.2 Existing System

In Alternative 2, the wastewater generated by the SOI Area will be conveyed and treated with new facilities, therefore capacity upgrades for the existing City collection system will not be required to accommodate SOI Area wastewater flows.

5.0 WASTEWATER TREATMENT OPTIONS

As discussed in this Plan, an additional 2.42 MGD of wastewater is expected to be generated by the full buildout of the City and SOI Area. Several options have been explored to treat the additional wastewater. The City is currently preparing a "Long Term Wastewater Management Plan" that explores several treatment alternatives to expand the capacity of the existing treatment plant. In addition, discussions with City have staff have also included an option to construct one or more new "satellite" treatment plant(s) to treat the SOI Area generated wastewater. The treatment options that have been identified and conceptually discussed include:

1. Expand the existing Gonzales Wastewater Treatment Plant
2. Convey wastewater to the Monterey One Water Regional Treatment Plant
3. Convey wastewater to the City of Soledad Wastewater Treatment Plant
4. Construct a new Industrial Wastewater Treatment Facility in Gonzales
5. Construct a new or multiple "Satellite" Wastewater Treatment Plants to serve the SOI Area

Figure 6 identifies the locations of the three (3) existing wastewater treatment facilities in the region.

Included in the Appendix to this Plan is a Technical Memorandum that discusses the option to convey the SOI Area generated wastewater to the City of Soledad Wastewater Treatment Plant.

Conveyance to the Monterey One Water Regional Treatment Plant is discussed in the City of Gonzales Long Term Wastewater Management Plan, dated August 2018, prepared by Dudek. This option assumes that the City abandon their WWTP and replace it with a pump station and pipeline to deliver flow to Monterey One Water WWTP in North Marina.

6.0 RECYCLED WATER

With regards to provision of recycled water, the City's General Plan policy is as follows "Develop the capacity to recycle wastewater at the Gonzales Wastewater Treatment Plant and/or employ other conservation measures and best practices to meet the demand for water supply in the city."

For the five (5) wastewater treatment options discussed in Section 5 of this report, the best option for providing recycled water to the SOI area is to utilize satellite treatment. This option provides the most cost-effective opportunity to include wastewater recycling at the satellite treatment plant(s) and install recycled water lines to serve the parks and other public landscaping in the SOI developments. Adding recycling facilities and installing recycled water from the existing wastewater treatment plant would be more expensive than the satellite option due to the location of the treatment plant approximately three (3) miles west of the SOI.

Regionalizing wastewater treatment in Soledad or Monterey One would likely make it more difficult to serve the City of Gonzales with recycled water produced from the regional recycled plant. Constructing new wastewater transmission lines to these regional facilities and recycled transmission lines back to the City would likely be more expensive than if the recycled water were produced within the City of Gonzales. In addition, the availability of recycled water from these regional treatment plants to service the City of Gonzales is unsure as there may be more local users near the source of the regional recycling plants that are more feasible that would get top priority.

7.0 PRELIMINARY COST ESTIMATES

A general overview of the backbone improvements required to serve the full buildout of the City and the SOI Area are shown on Figure 7. Based upon these improvements, preliminary construction cost estimates have been developed based on general unit pricing. The cost estimates are rough-order construction costs only. Soft costs have been included for engineering design (10%); CM and inspection (10%); contractor bonding, insurance and overhead (15%); general administration and legal services (15%), and contingency (30%). It is noted that these estimates do not include improvements to the treatment plant, construction of new treatment facilities, or construction of in-tract facilities that would be the responsibility of each major development proposal.

The preliminary estimated construction cost for the shared piping infrastructure and existing City system improvements is $16.8 M. The cost back-up data is included in the Appendix. The preliminary estimated construction costs for improvements to the Gonzales WWTP have been developed as part of a separate study and were estimated at $31 M without contingency in 2011. Adding soft costs, contingency and escalation increases the treatment cost to $72.0 M for a total of $88.8 M for conveyance and treatment.

The preliminary construction cost estimate for the satellite treatment plant is $80.9 M. Only piping and lift stations that are shared infrastructure are included in this cost. Non-shared, in-tract infrastructure are expected to be developer constructed and are therefore, not included. The cost back-up data is included in the Appendix.

The estimated cost to convey the SOI Area generated wastewater to the City of Soledad Wastewater Treatment Plant is $90.6 M. The detailed estimate is included in the Technical Memorandum in the Appendix.

The costs for conveyance to the Monterey One Water Regional Treatment Plant are taken from the City of Gonzales Long Term Wastewater Management Plan, dated August 2018, prepared by Dudek. Costs are estimated at $92.2 - $112.2 million. For this reason, the study does not recommend this option as cost-effective without significant subsidies.

A summary of the preliminary cost estimates is included in Table 8.

Table 8

Preliminary Shared Infrastructure Cost Estimate Comparison Summary[1]

No.	Description	Estimated Treatment Facility Cost [2,3]	Upgrade to Shared/Existing Infrastructure Cost [4]	Conveyance to Soledad[5]	Land Acquisition[6]	Total Projected Cost
1	**ALTERNATIVE 1** – Upgrade existing treatment plant for wastewater from new SOI development	$72.0M	$16.8M	$0	$0	**$88.8M**
2	**ALTERNATIVE 2** – Satellite "Package" Treatment Plant for SOI Area	$71.0M	$9.9M	$0	$0	**$80.9M**
3	Regionalization SOI + City – conveyance of wastewater flows to Monterey One Water	$92.2 - $112.2M[7]	$16.8M	$0	$0	**$109.0M - $129.0M**
4	Regionalization SOI – conveyance of wastewater flows to Soledad	$25.8M[8]	$0	$61.8M	$3M	**$90.6M**

NOTES:

1. Costs are expressed as capital costs plus contingency. Where construction costs were available in previous studies, they were escalated to 2019 dollars and contingencies were applied.
2. Treatment facility construction costs for ALTERNATIVE 1 was extracted from the "Revised Draft – City of Gonzales – Long Term Wastewater Management Plan, dated August 2018, prepared by Dudek." Noted costs accurate to within 30-50%. Escalated to 2019, soft costs, and contingencies applied.
3. Alternative cost for treatment is based on $20/gpd for MBR Treatment and includes all City requested contingencies.
4. Upgrade to existing infrastructure costs are extracted from ALTERNATIVE 1 of this Wastewater Master Plan.
5. Conveyance to Soledad costs based on December 4, 2018 Technical Memo included in the Appendix to the current draft Wastewater Master Plan.
6. Land acquisition cost may not include connection fees and improvements for the Monterey One Water facilities.
7. Projected cost may not include connection fees and improvements for the Monterey One Water facilities. This cost represents scenario 1 reported in the "Revised Draft – City of Gonzales – Long Term Wastewater Management Plan, dated August 2018, prepared by Dudek."
8. Estimate of upgrades to Soledad treatment facility/connection fees at $15/gpd.

RECOMMENDATION:

It is recommended that ALTERNATIVE 2 be the preferred option for providing wastewater treatment for the SOI Area within the City of Gonzales. This recommendation is based on the following: A) This option maintains project control with the City and the Developers and does not require other municipalities involvement; B) Of all of the options, it has the least uncertainty regarding projected costs; C) As currently estimated, this option has the lowest projected capital cost; D) Due to the least number of unknowns, this option is anticipated to be the best from an implementation schedule perspective; E) This option results in the least impact to the existing City residents and customers as far as service disruption and construction inconveniences; and F) This option is readily phased as development proceeds within the SOI Area.