ATKINS

Julian
Sewer Service Area

Sewer Master Plan

January 2013

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Acronyms

ac	acre
CEQA	California Environmental Quality Act
CIP	Capital Improvement Program
d/D	depth to pipe diameter ratio
du	dwelling unit
EDUs	Equivalent Dwelling Units
EIR	Environmental Impact Report
GIS	Graphical Information System
gpcd	gallons per capita per day
gpd	gallons per day
gpd/ac	gallons per day per acre
gpd/du	gallons per day per dwelling unit
JWPCF	Julian Water Pollution Control Facility
LAFCO	Local Area Formation Commission
Master Plan	Julian SSA Sewer Master Plan Update
mgd	million gallons per day
NASSCO	National Association of Sewer Service Companies
PVC	poly vinyl chloride
RDI&I	Rainfall derived inflow and infiltration
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SOI	Sphere of Influence
SSA	Sewer Service Area
SSMP	Sewer System Management Plan
SSO	Sanitary Sewer Overflows
SWRCB	State Water Resources Control Board
VCP	vitrified clay pipe
WDR	Waste Discharge Requirement

CHAPTER 1
INTRODUCTION

The County of San Diego (County) is updating Sewer Master Plans for its sewer service areas. Due to increased growth, system expansions, and aging infrastructure, the County is addressing its capacity needs and updating its 10-year Capital Improvement Program (CIP). This Sewer Master Plan Update addresses the Julian Sewer Service Area (SSA).

This introductory chapter to the Julian SSA Sewer Master Plan Update (Master Plan) provides a summary of the:

- master plan objectives,
- contents and organization of this report,
- background information on the SAA,
- overview of regulatory requirements, and
- environmental compliance and policy considerations.

1.1 Sewer Master Plan Objectives

The objectives of this Master Plan are to document the available treatment capacity and general facility operational assessment, evaluate the system capacity and provide an assessment of the condition of identified portions of the existing sewer collection system in order to develop a comprehensive 10-year CIP. The 10-year CIP includes pipeline and pump station condition and capacity improvement projects, long range maintenance program enhancements and treatment and disposal needs. This recommended CIP forms the basis for capital facility needs, sewer rate evaluations, and long-range financial plans to be completed in separate financial studies.

1.2 Report Organization

This Master Plan provides a comprehensive review and evaluation of the SSA's wastewater collection, conveyance, and capacity requirements under existing and ultimate conditions. Based on findings of the evaluation, the Master Plan recommends facility improvements and capital cost requirements to ensure that aging infrastructure remains serviceable and to allow for the continued buildout of the County General Plan.

The Master Plan is presented in six (6) chapters:

- Chapter 1 provides an introduction to the project.
- Chapter 2 presents an overview of the study area and existing wastewater collection facilities.

- Chapter 3 presents an overview of the sewer basins and provides estimates of future wastewater generation rates and treatment capacity requirements.
- Chapter 4 presents the methodology and findings of the sewer capacity evaluation, including summaries of hydraulic calculations used to analyze flow conditions.
- Chapter 5 presents a condition assessment of identified SSA facilities and identifies specific condition deficiencies, as well as recommends enhancements to the County's ongoing Video Inspection Program.
- Chapter 6 presents a recommended 10-year CIP for the SSA's wastewater facilities.

1.3 Background

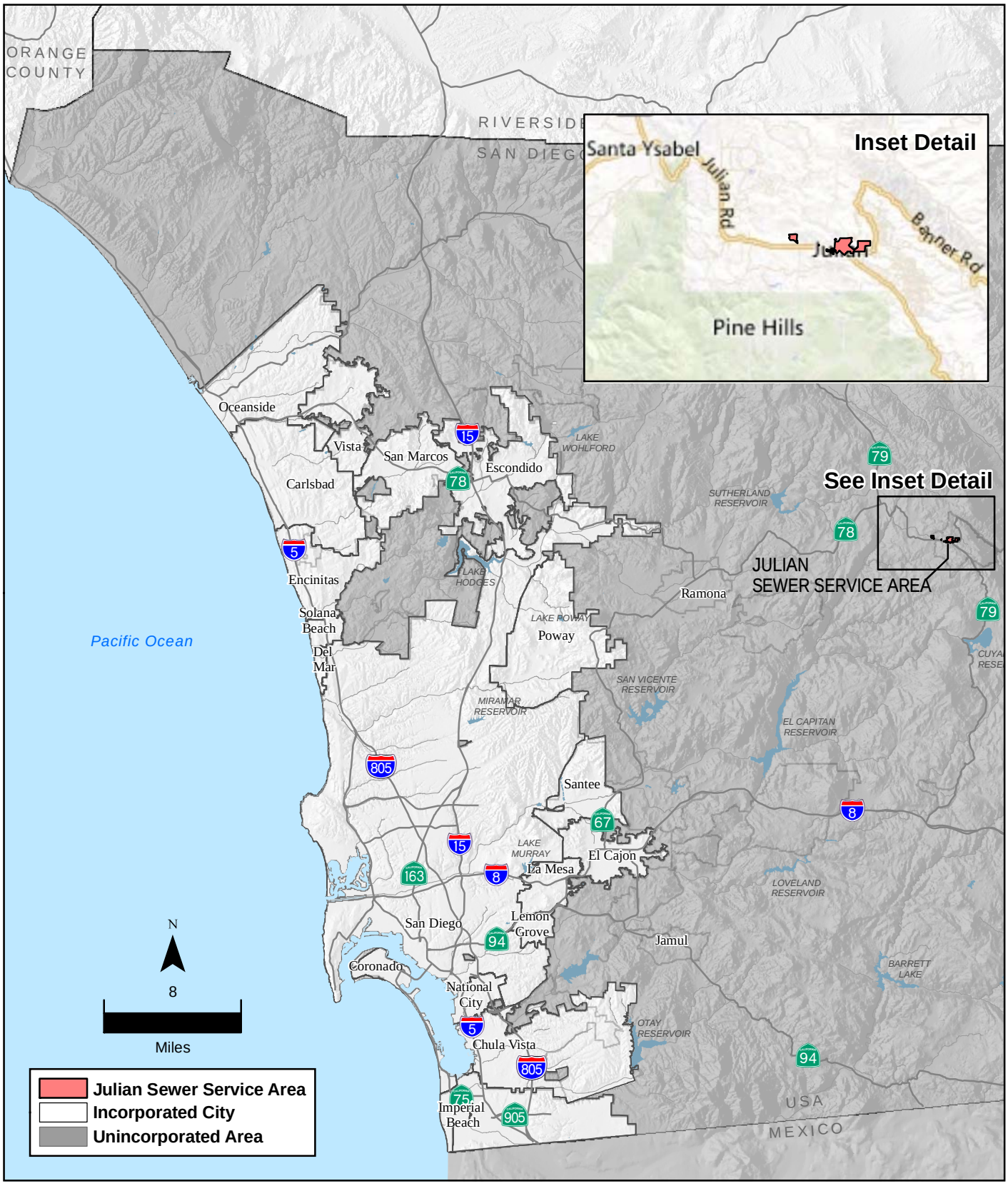
The County Board of Supervisors serves as the Board of Directors (Governing Board) for the San Diego County Sanitation District, which the Julian SSA is a part of. The SSA serves the community of Julian and is maintained by the County of San Diego Wastewater Management Section. Operation and maintenance costs required for the SSA is collected through connection and service fees assessed to each connection to the sewerage system. The location of the Julian SSA is shown on Figure 1-1.

Sewer flows generated within the Julian SSA are conveyed to the Julian Water Pollution Control Facility (JWPCF) for treatment and disposal. The JWPCF operates under Statewide General Waste Discharge Requirements (WDRs) 83-09 with a permitted discharge capacity of 40,000 gallons per day (gpd). The JWPCF has a secondary treatment process which consists of a grease trap/flow equalization basin, two aeration basins, two secondary clarifiers, RAS/WAS pumps, two digesters, sludge drying beds, and two emergency storage ponds which store the plant effluent prior to irrigation of surrounding lands.

The Julian Sanitation District was formed in 1945 by the County Board of Supervisors and serves the community of Julian. Based upon a County Board of Supervisors action, on July 1, 2011 the Julian Sanitation District was officially reorganized and annexed into the Spring Valley Sanitation District and the Spring Valley Sanitation District was renamed the San Diego County Sanitation District.

1.4 Regulatory Requirements

On May 2, 2006, the State Water Resources Control Board (SWRCB) adopted Order 2006-0003, the Statewide General Waste Discharge Requirements (WDRs) for Sanitary Sewer Systems, which requires all federal and state agencies, municipalities, counties, districts, and other public entities that own or operate a sanitary sewer system greater than one mile in length to comply with the elements of the WDRs. The WDRs serve to provide a unified statewide approach for reporting and tracking Sanitary Sewer Overflows (SSO), establishing consistent and uniform requirements for Sewer System Management Plan (SSMP) development and implementation, establishing consistency in reporting, and facilitating consistent enforcement for violations.



PROJECT LOCATION

Figure 1-1

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The County's state mandated SSMP was initially approved July 2009 and encompassed all of the separate sanitation and sewer maintenance districts at the time. The SSMP documents include detailed information demonstrating the County's efforts to comply with each of the mandatory and applicable elements required. Revisions are currently being made to the SSMP documents to reflect the reorganization of previously separated sanitation and sewer maintenance districts into the consolidated San Diego County Sanitation District.

1.5 Environmental Compliance

The Sewer Master Plan is statutorily exempt from the preparation of an Environmental Impact Report (EIR) or a Negative Declaration per Section 15262 of the California Environmental Quality Act (CEQA) guidelines. However, the approval or adoption of this Master Plan represents a discretionary action by the County, which is subject to review under CEQA.

1.6 Policy Considerations

The County of San Diego Board of Supervisors has adopted a number of policies which affect wastewater service in the County. These policies were reviewed for their applicability and impact to the SSAs. Appendix A summarizes the policies reviewed. Policy I-113 "Establishment of Priorities for Limited Sewer Capacity in the Julian Sewer Service Area of the San Diego County Sanitation District," renewed in 2012, is applicable to the Julian SSA. The policy was adopted in response to limited available capacity in the JWPCF. The policy established priorities for allocating capacity and new permits for failing septic systems, single family homes, commercial development in the Town Center, Julian Union High School District and previously committed EDUs. When the JWPCF reaches its permitted discharge capacity, Policy I-113 states that no new sewer capacity commitments shall be issued until additional capacity and a new discharge permit is obtained from the Regional Water Quality Control Board (RWQCB).

CHAPTER 2
STUDY AREA

This chapter provides a description of the Master Plan study area including:

- existing and planned land uses,
- existing and projected populations,
- physical attributes of the collection system, and
- wastewater facilities serving the SSA.

2.1 Study Area Description

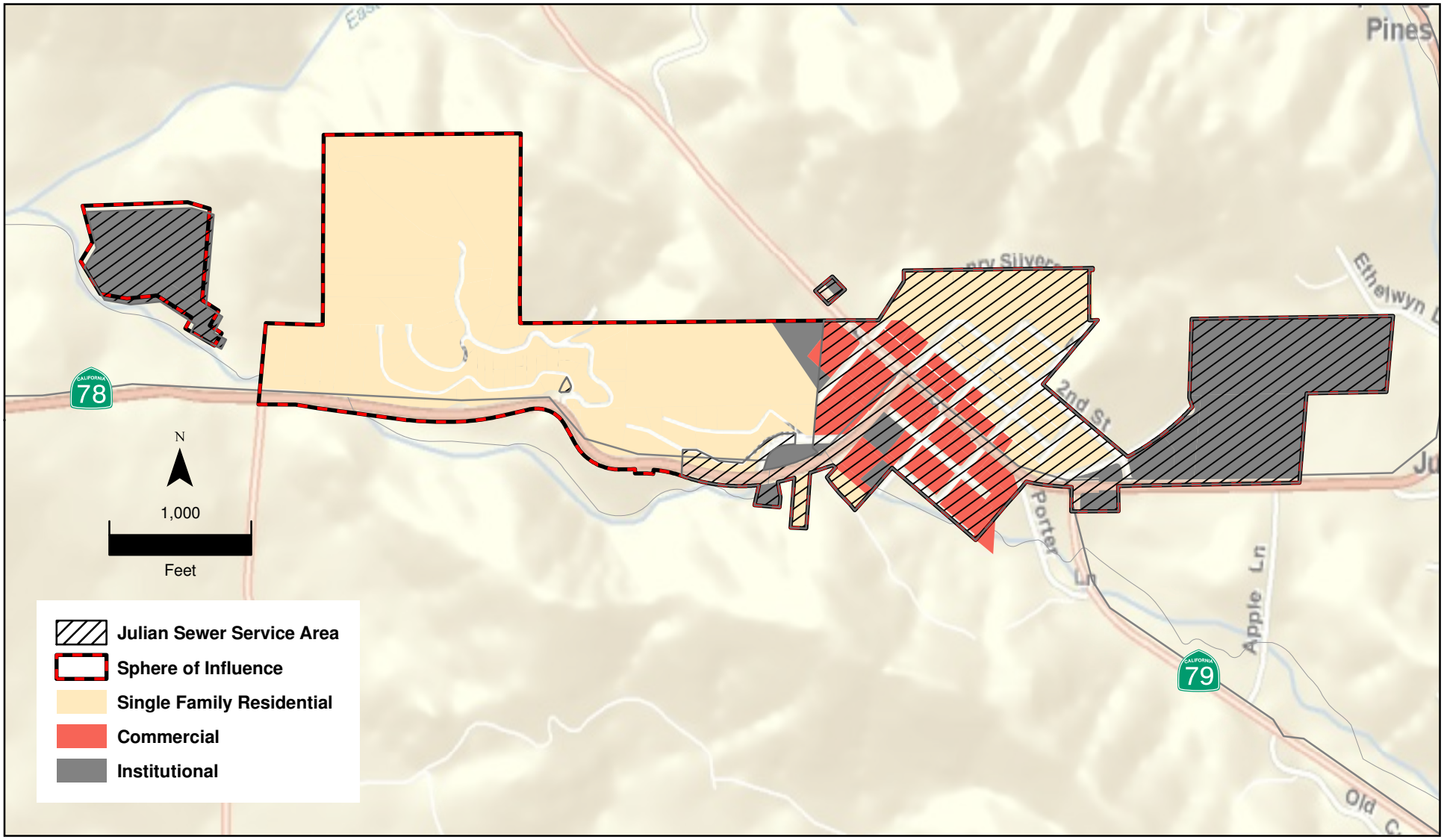
The Julian SSA is located in the eastern portion of San Diego County on Highways 78/79 in the Cuyamaca Mountains. Julian is a historic gold mining town and a tourist destination with numerous bed and breakfast accommodations. Although tourists visit Julian year-round, the fall/winter is peak season when the apples and fall colors are abundant. The rural area consists of residential homes and the commercial business area in the town of Julian.

County Policy I-113 limits the remaining available capacity in the SSA wastewater collection and treatment system and establishes priorities for new permits. The JWPCF has a capacity of 0.040 mgd and it treated an average annual weekend daily flow of approximately 0.037 mgd during 2010.

The community of Julian is predominately built out and, due to the limited treatment plant and disposal capacity, the SSA boundary has been designated as the study area. The Local Agency Formation Commission (LAFCO) Sphere of Influence (SOI) boundary, adopted September 2, 2010, has not been included as part of the study area because it is unlikely that the existing sewer collection and treatment systems would be expanded to service the area due to the high costs of treatment plant expansion and Policy I-113.

2.2 Land Uses

In August of 2011, the County of San Diego Board of Supervisors adopted an updated General Plan. The General Plan establishes future growth and development thresholds for the unincorporated areas of the County and concentrated population growth in the western areas of the County where infrastructure and services are more readily available. The community of Julian is predominately built out and the adopted General Plan doesn't include any increased densities in Julian. Figure 2-1 presents the existing land use within the SSA boundary (study area) as well as the LAFCO SOI. As shown on the figure, the only vacant land in Julian is located outside of the study area and is planned for single-family residential units which will likely utilize onsite septic systems for onsite disposal of wastewater.



EXISTING LAND USE

Figure 2-1

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Table 2-1 summarizes the existing and planned land use within the study area. Appendix B includes the General Plan Map for the Julian area. Appendix C includes the land use files provided by SANDAG. This service area is unique in that there are no planned changes to the land use.

Table 2-1 Existing and Planned Land Use

Land Use	Permitted Area
Single-Family Residential	14 Ac
Single-Family Residential	65 DU
Multi-Family Residential	8 Ac
Multi-Family Residential	24 DU
Commercial	17 Ac
Industrial	0 Ac
Institutional	49 Ac
Parks/Recreation/Open Space	0 Ac
Agricultural	0 Ac
Undeveloped Land/Vacant	2 Ac
Total	**89 Ac**

2.3 Existing and Forecasted Populations

Residential and employment population estimates for the study area were provided by the San Diego Association of Governments (SANDAG) for years 2008, 2015, 2020, 2025, and 2030 at the parcel level and are based on the Series 11 - 2030 San Diego Regional Growth Forecast Update was completed in April 2008. Table 2-2 summarizes the residential and employment population projections through 2030 for the study area. Appendix D includes the population files provided by SANDAG. In summary, very little residential growth is anticipated in the SSA due in part to County Policy I-113.

Table 2-2 Julian SSA Existing and Forecasted Populations

Year	Residential	Employment
2010	233	522
2015	233	626
2020	236	627
2025	236	628
2030	237	629

2.4 Existing Wastewater Collection System

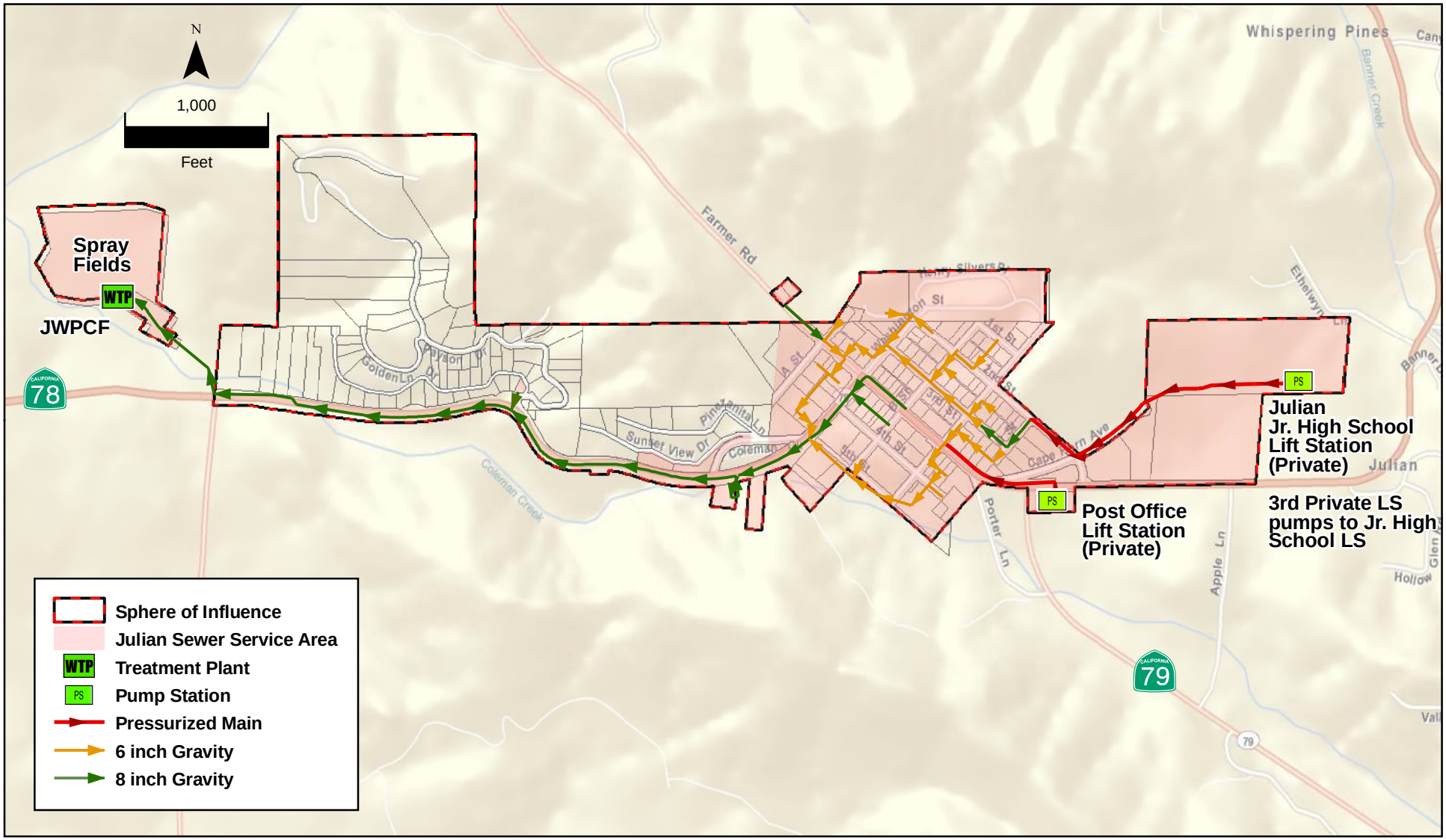
Wastewater flows generated in the Julian SSA are conveyed to the County-owned and maintained JWPCF, where flows are treated to secondary standards and then conveyed westerly through the outfall pipeline to the existing spray fields for disposal. The existing wastewater collection system is shown in Figure 2-2, and consists of three private lift stations

with approximately 3,000 feet of 3-inch diameter polyvinyl chloride pipe (PVC) force main, 14,330 feet of 6-inch and 8-inch diameter gravity collection main, and a secondary wastewater treatment facility.

Table 2-3 summarize the wastewater collection system facilities within the SSA by size, age and material. The system inventory is based on information contained within the County's Graphical Information System (GIS) database. The GIS database was created for the County Wastewater Department by digitizing the as-built record drawings. Figure 2-3 and Figure 2-4 present the age and material of the existing system respectively.

Table 2-3 Existing Wastewater System Summary

	Decade							
Diameter – Material	**1950s**	**1960s**	**1970s**	**1980s**	**1990s**	**2000s**	**Unknown**	**Total**
Collection Main								
6-inch VCP	--	6,120	450	--	--	--	340	6,910
8-inch AC	870	--	--	--	--	--	--	870
8-inch PVC	--	--	--	--	490	140	370	1,000
8-inch VCP	360	810	--	--	--	--	--	1,170
8-inch Truss Pipe Outfall	--	--	--	4,830	--	--	--	4,380
Subtotal	**1,230**	**6,930**	**450**	**0**	**490**	**140**	**710**	**14,330**
3-inch PVC Force Main	--	--	--	960	2,040	--	--	3,000
Total	**1,230**	**6,930**	**450**	**5,790**	**2,530**	**140**	**710**	**17,330**



EXISTING WASTEWATER SYSTEM

Figure 2-2

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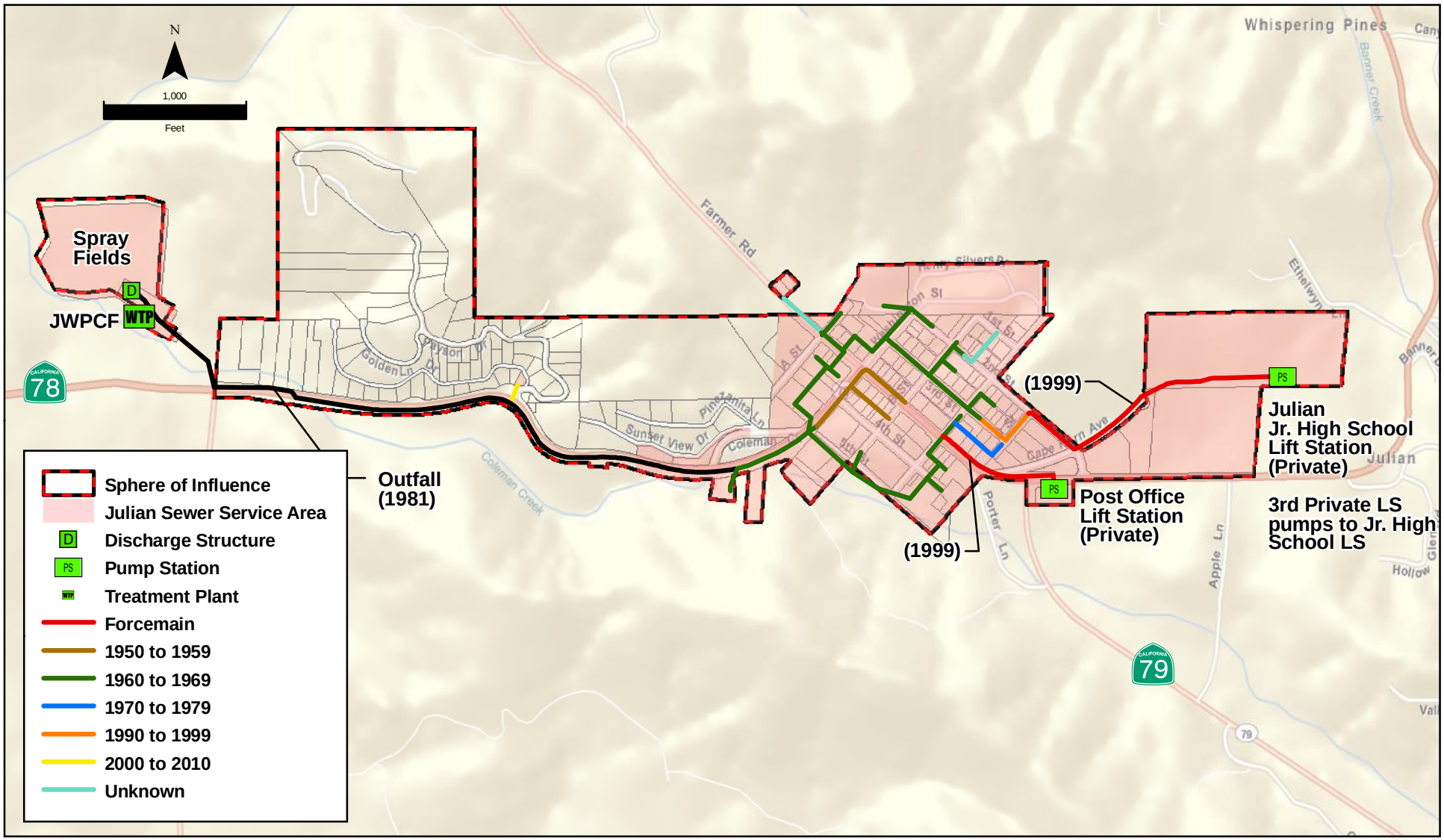

EXISTING WASTEWATER SYSTEM
PIPELINE AGE

Figure 2-3

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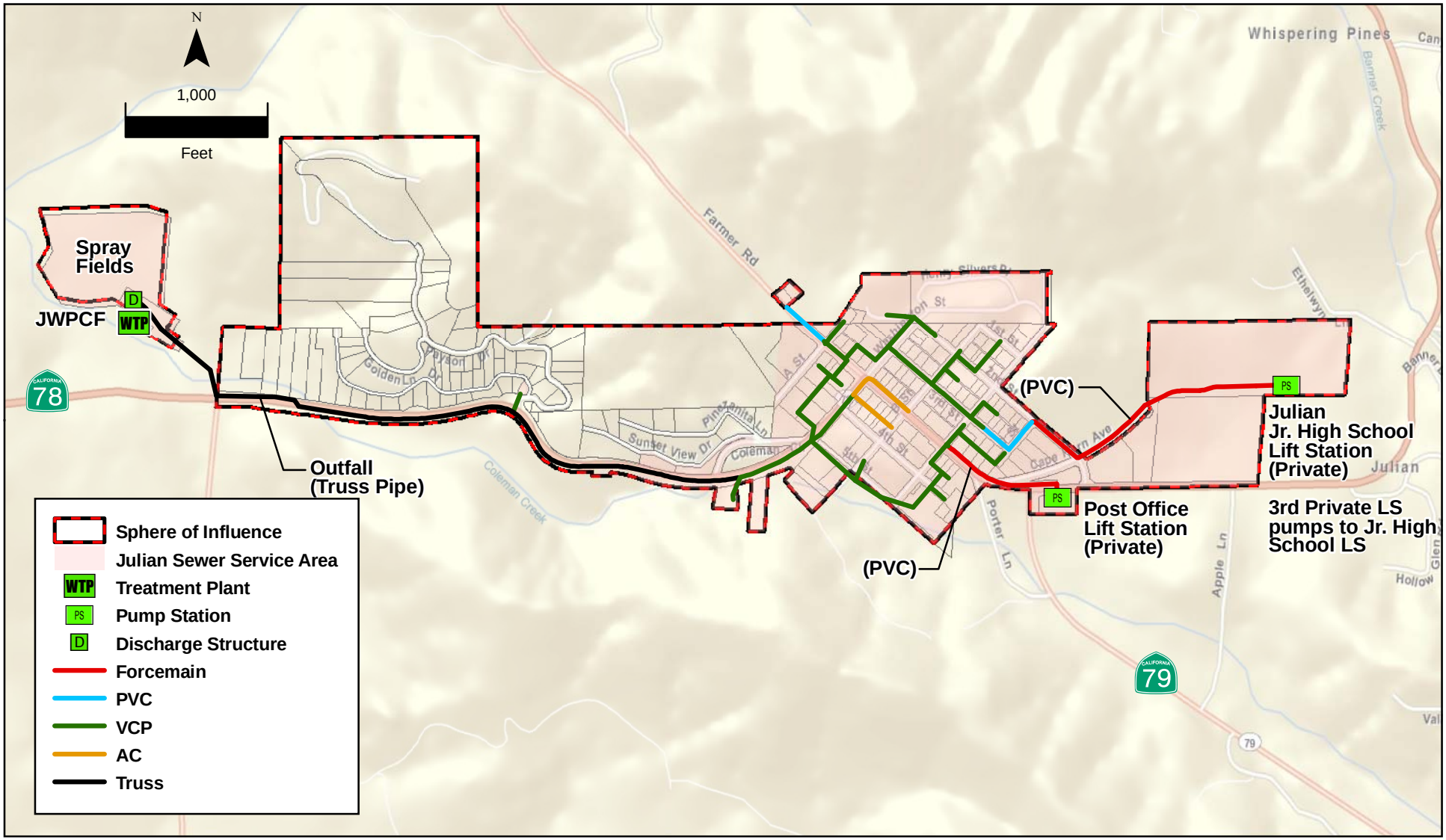

EXISTING WASTEWATER SYSTEM
PIPELINE MATERIAL

Figure 2-4

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CHAPTER 3
WASTEWATER GENERATION ANALYSIS

This chapter provides descriptions of the wastewater generation including:

- methodology for developing unit generation rates,
- recommended unit generation rates,
- estimated future wastewater flows, and
- treatment plant capacity needs.

3.1 Treatment Plant Flows

As described in Chapter 2, wastewater generated within the Julian SSA is collected by County-owned facilities and conveyed to the County-owned and maintained Julian Water Pollution Control Facility (JWPCF), where flows are treated to secondary standards and stored in two emergency storage ponds prior to irrigation of surrounding lands for effluent disposal. The County records daily effluent flow for the JWPCF. The flow readings for 2010 were used for flow calibration. The JWPCF has an average annual flow of 0.029 million gallons per day (mgd) and an average weekend flow of 0.037 mgd. Flow meter data used for calibration is included in Appendix E.

3.2 Wastewater Generation Rates

The purpose of establishing wastewater generation rates is to characterize the existing unit use by either population or land use, and for use in forecasting wastewater flows. The existing metered flows were compared with land use data and population estimates to develop unit wastewater generation rates. This is particularly important in the Julian SSA due to the transient nature of the population. Unit generation rates were estimated using two sources for comparison purposes: 1) population estimates compiled by SANDAG (Series 12 for existing, Series 11 for forecasts), and 2) the County's current land use data (Referral Map, May 2008). Based on the findings of the unit generation rate analysis by land use and population, recommended unit rates will be established for use in forecasting future wastewater flows.

The unit generation rate calibration of the SSA is described in the following sections and summarized in Table 3-1 and Table 3-2.

3.2.1 Generation Rates Using SANDAG Population

The purpose of estimating population based unit generation rates is to establish the amount of wastewater a typical residential person and non-residential employee generate over a given day in order to assist in forecasting the amount of wastewater that the SSA can expect through

2030. Per capita unit generation rates are determined through a comparison of the existing SANDAG population data within a given meter basin against the average wastewater flows observed at that flow meter, and industry standard ranges.

SANDAG provided 2008 residential and employment population projections for the SSA based on Series 12 data. Through an iterative process, per capita generation rates for residential and employment populations were estimated. Table 3-1 summarizes the estimated unit generation rates by population through the flow calibration process. Per capita unit generation rates were calibrated to within five percent of existing flows.

SANDAG population forecasts do not include student populations, such as the Julian High School. The 2010-2011 School Accountability Report Card for Julian High School reported an enrollment of 166 students which will be used to estimate wastewater generation from the high school.

Typically, design and planning standards for agencies in San Diego County assume per capita wastewater generation rates between 60 to 100 gallons per capita per day (gpcd) for residential and 15 to 35 gpcd for employment populations. Table 3-1 summarizes the flows and calibration for the Julian SSA. Julian has an estimated residential per capita unit generation of 60 gpcd and an employment per capita unit generation rate of 25 gpcd. The slightly lower generation rates may be partially attributed to some transient population. The 2010 census projected an average of 2.5 persons per household for the Julian SSA. The calculated household population density for Julian is approximately 2.8 persons per household.

Table 3-1 Wastewater Unit Generation Rate Calibration Based on Population

Land Use	Existing Population	Unit Generation Rate	Estimated Wastewater Generation
Residential	233	60 gpcd	13,965 gpd
Employment	522	25 gpcd	13,048 gpd
Student	166	20 gpcd	3,320 gpd
Total			**30,333 gpd**
		Existing Flows =	28,902 gpd
		Calibration =	5.0 %

gpcd = gallons per capita per day; gpd = gallons per day

3.2.2 Generation Rates Using County Land Use Data

The purpose of estimating land use based unit generation rates is to establish the amount of wastewater generated in a day over an acre of land by general land use types in order to assist in estimating the amount of wastewater that the SSA can expect at the buildout of the study area. While growth within the Julian SSA is currently limited by County Policy I-113, the area has the potential for future development based on proposed land uses in the General Plan should the treatment and disposal capacity at the JWPCF increase.

Land use based unit generation rates are determined through a comparison of the existing area per land use type within a given meter basin against the average wastewater flows observed at that flow meter, and industry standard ranges.

As shown in Figure 2-3 of the previous chapter, existing land uses include single-family residential, multi-family residential, commercial, and institutional. When the GIS land use coverage is overlaid with the County's permitted parcel database, it was possible to estimate the number of single-family and multi-family dwelling units and calculate industrial, commercial, and institutional acreage for the Julian SSA.

Table 3-2 summarizes the calibration of sewer flows for the Julian SSA with estimated unit wastewater generation rates summarized by land use. Unit wastewater generation rates were calibrated to within five percent of existing flows measured at the JWPCF.

Table 3-2 Wastewater Unit Generation Rate Calibration Based on Land Use

Basin	Units	Unit Generation Rate	Estimated Wastewater Generation
Single-Family Residential	65 du	170 gpd/du	11,050 gpd
Multi-Family Residential	24 du	130 gpd/du	3,120 gpd
Commercial	17 ac	250 gpd/ac	4,173 gpd
Institutional	49 ac	250 gpd/ac	11,808 gpd
Total			**30,150 gpd**
		Existing Flows =	28,902 gpd
		Calibration =	4.3 %

ac = acre; du = dwelling unit; gpd = gallons per day

In the Julian SSA the single-family residential land use unit generation rate was first assigned a value equal to the higher of the calculated or census population density multiplied by the calibrated population unit generation rate. The multi-family residential land use unit generation rate was then set equal to 75 percent of the single-family unit generation rate, and the rates were adjusted through an iterative process to reasonably match the estimated residential wastewater generation, as presented in Table 3-1. Non-residential land use unit generation rates were set equal to each other and then were adjusted through an iterative process to reasonably match the estimated employment wastewater generation presented in Table 3-1.

Typically, design standards for agencies in San Diego County assume wastewater flows between 200 to 400 gallons per day per dwelling unit (gpd/du) for single-family residential, with multi-family residential ranging from 60 percent to 75 percent of single-family residential, and 500 to 1,500 gallons per day per acre (gpd/ac) for non-residential land uses. When compared to typical design standards, the calibrated unit generation rates suggest that the Julian SSA transient population results in an overall lower generation rates.

3.2.3 Recommended Unit Generation Rates

For future development, it is typical to develop uniform unit generation rates. The County has relatively uniform wastewater generation for land use and population projections based on our unit generation rate analyses. Therefore, for the existing system analysis, the calibrated unit generation rates shown above will be used. For future wastewater generation, slightly higher and conservative generation rates for commercial and institutional uses will be used to derive an estimated 2050 flow. However, as noted in Section 3.4, future flows will be limited by the JWPCF treatment and disposal capacity and Board Policy I-113. The wastewater generation rates used to estimate future flows are summarized in Table 3-3.

Table 3-3 Recommended Unit Generation Rates

Land Use / Population	Recommended Unit Generation Rate
Land Use	
Single-Family Residential	170 gpd/du
Multi-Family Residential	130 gpd/du
Commercial	500 gpd/ac
Institutional	500 gpd/ac
Population	
Residential	60 gpcd
Employment	25 gpcd

gpcd = gallons per capita per day
gpd/ac = gallons per day per acre
gpd/du = gallons per day per dwelling unit

3.3 Wastewater Flow Projections

Wastewater flow projections were developed through 2030 and for buildout. Flow projections through 2030 were estimated by applying the recommended population unit generation rates to the anticipated forecasted population. Buildout wastewater flow projections were determined by applying the land use based unit generation rates to the land use acreages and allowable densities (Referral Map, May 2008). These projections form the basis for the potential future capacity needs in the wastewater collection system, not withstanding capacity limitation at the JWPCF.

Table 3-4 summarizes the estimated future flows based on population through 2030 and Table 3-5 summarizes the estimated buildout flow based on the land use for ultimate conditions in each SSA.

Table 3-4 Julian Wastewater Flow Projections through 2030 (by Population)

	Population					Estimated Wastewater Generation (mgd)				
Basin	**2010**	**2015**	**2020**	**2025**	**2030**	**2010**	**2015**	**2020**	**2025**	**2030**
Residential	233	233	236	236	237	0.014	0.014	0.014	0.014	0.014
Employment	522	626	627	628	629	0.013	0.016	0.016	0.016	0.016
Student	250	250	250	250	250	0.003	0.003	0.003	0.003	0.003
Total						**0.030**	**0.033**	**0.033**	**0.033**	**0.033**

mgd = million gallons per day

Table 3-5 Julian Buildout Wastewater Flow Projections (by Land Use)

Land Use	Units/Acres	Recommended Unit Generation Rate	Estimated Wastewater Generation (mgd)
Single-Family Residential	65 du	170 gpd/du	0.011
Multi-Family Residential	24 du	130 gpd/du	0.003
Commercial	17 ac	500 gpd/ac	0.008
Institutional	47 ac	500 gpd/ac	0.024
Total			**0.046**

ac = acre; du = dwelling unit; gpd = gallons per day; mgd = million gallons per day

3.4 County Board Policy I-113

The Julian SSA has been subject to County Board Policy I-113, which limits the growth and expansion of the sewer service area. The policy was adopted for several reasons:

- Limited treatment capacity during peak wet weather events
- Inability to adequately dispose of effluent through spray fields during wet weather periods.
- Limited ability to expand disposal system due to permit restrictions and costs.

The County has determined, based on weekend flows, the availability of only 19 additional EDUs in treatment and disposal capacity. Moreover, the County has adopted a priority connection policy which allows properties to connect to the sewer system under the following conditions:

- Previously issued EDU commitments: a total of 14.6 EDUs have been committed for future connections as purchased sewer capacity commitments or other contractual obligations.
- Parcels with failing septic systems located within SAA boundaries.
- Parcels with failing septic systems located outside SAA boundaries, at the discretion of the Director of the Department of Public Works.

Therefore, the ultimate flow considered and evaluated for the Julian SSA is 0.040 mgd based on a maximum weekend flow. County Board Policy I-113 was recently amended on May 9, 2012 to extend the capacity limitation for five more years.

3.5 Conclusions

Existing average wastewater flows generated within the Julian SSA are approximately 0.029 mgd. Based on SANDAG population projections, the total Julian SSA average flow rate at 2030 is estimated to be 0.033 mgd. However, capacity is limited due to County Board Policy I-113 and is based on average weekend flows to the treatment plant.

The JWPCF has a treatment and discharge capacity of 0.040 mgd. Based on County Board Policy I-113 and the allowable EDUs for connection, the treatment capacity at the JWPCF will be sufficient through 2030 due to the limited allowable growth.

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CHAPTER 4
CAPACITY EVALUATION

This chapter provides a description of the capacity analysis performed as part of the Master Plan, and includes:

- evaluation criteria,
- model selection, development and calibration,
- capacity analysis, and
- potential phased recommended improvements.

4.1 Background

A capacity evaluation of the Julian SSA existing wastewater collection system was completed to identify sewer reaches that may be deficient under recommended design criteria and to identify any upgrades needed to accommodate existing and projected dry and wet weather wastewater flows. Based on the evaluation, no capacity improvements are recommended.

4.2 Methodology

The principal tool utilized in the capacity analysis was a hydraulic analysis spreadsheet using the Manning formula to evaluate flow conditions, such as wastewater flow depth, flow rate, and velocity, within pipes and manholes in the SSA wastewater collection system.

The spreadsheet model was developed using the physical collection system data, existing and forecasted populations, and per capita unit generation rates. The model was utilized to evaluate the existing collection system under existing and projected wet weather flow conditions in order to identify potential recommended improvements to the existing collection system.

4.3 Flow Monitoring

The Julian SSA has one flow meter that records daily effluent flows from the JWPCF. Flow data from August 2010 at the JWPCF was used to develop initial average wastewater generation estimates. The month of January 2010 was identified as having a rainfall event typical of a 5-year return storm and was used to evaluate wet weather events.

4.4 Evaluation Criteria

Recommended criteria were developed to evaluate the capacity of the existing collection system under existing and projected dry and wet weather flow conditions. The recommended evaluation criteria were developed by comparing existing County criteria to criteria for similar Southern California sewer agencies. The recommended evaluation criteria are presented in

Table 4-1 and will be utilized to identify deficient facilities and size replacement infrastructure. The evaluation criteria presented in this master plan is not intended to replace the County's existing criteria, which shall continue to be utilized for the design of new infrastructure.

Table 4-1 Recommended Evaluation Criteria

Item	Recommended Evaluation Criteria
Gravity Main Criteria	
Minimum Pipe Diameter	8 inches
Minimum Velocity	2 fps at peak flow rate
Manning's Roughness Coefficient	0.013
Maximum Peak d/D Ratio for Existing Sewers	0.50 Peak Dry Weather Flow for dia. ≤ 15-inch
	0.75 Peak Dry Weather Flow for dia. > 15-inch
	0.92 Peak Wet Weather Flow for a 2-year storm
Maximum Peak d/D Design Criteria for New Sewers	0.50 Peak Wet Weather Flow for dia. ≤ 15-inch
	0.75 Peak Wet Weather Flow for dia. > 15-inch

4.5 Model Development

The spreadsheet model was developed with the physical collection system data, existing and forecasted populations, and per capita unit generation rates. Details regarding the collection system and the application of sewage loading factors and rainfall events are described below.

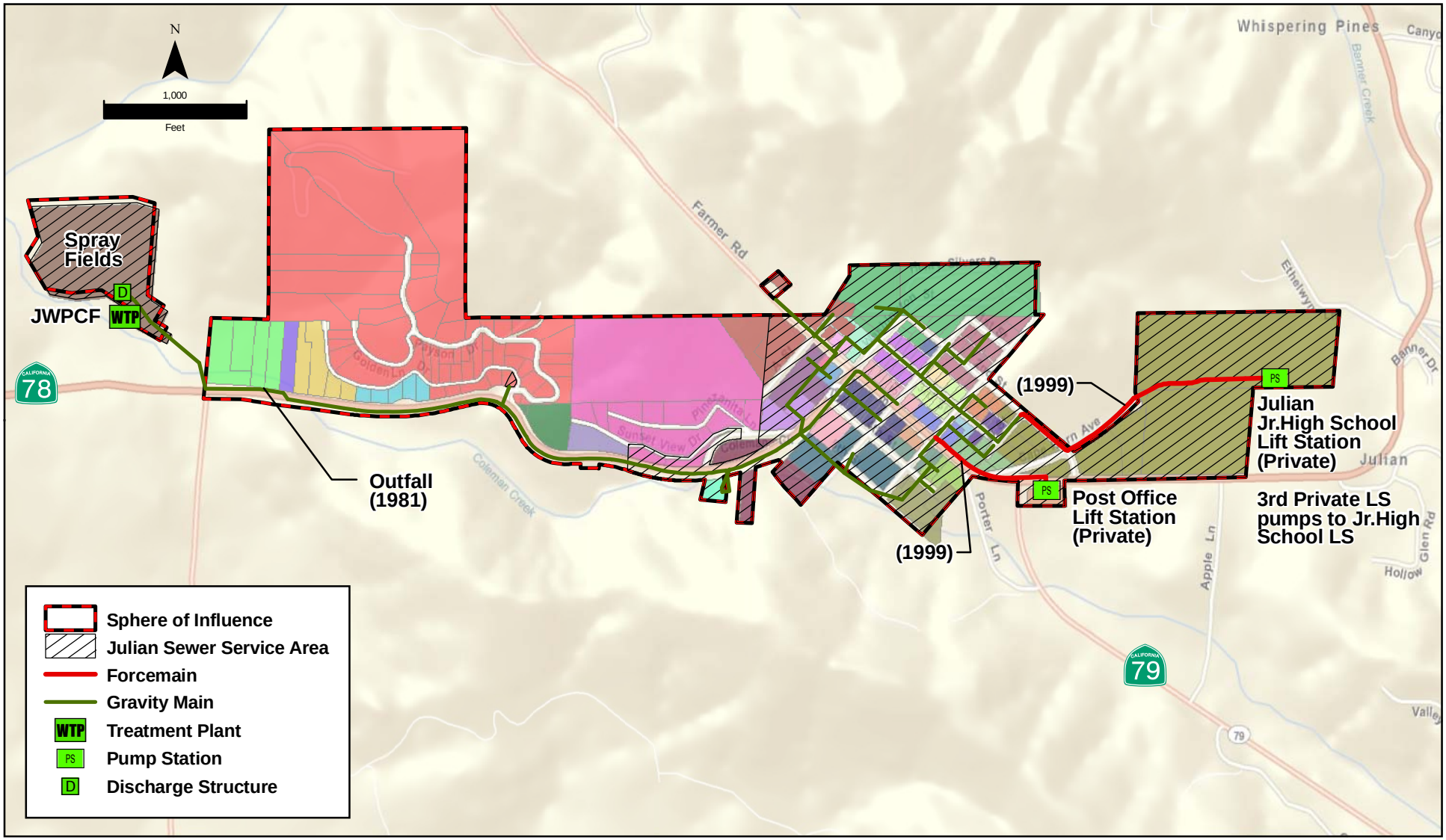
4.5.1 Collection System Attributes

Data required to create the spreadsheet model includes information describing the physical wastewater collection system, such as physical location, pipe diameters and reach lengths, manhole invert elevations, and estimated pipe roughness coefficients. Model connectivity was reviewed and verified against County as-built records. The physical parameters of the system, including pipe diameter, slope, and roughness coefficients were based principally on the County's GIS records. Where the data appeared to be inaccurate or unclear, data was inferred.

4.5.2 Model Loading

Wastewater flows are entered in the spreadsheet model by applying basin populations to per capita unit generation rates at the basin's identified tributary node. Populations were applied for existing and 2030 conditions at the parcel level. Each parcel was assigned a corresponding tributary model node based on available lateral information and topography. Model basins were then formed by merging parcels with identical tributary nodes.

The parcel's existing and 2030 residential and employment populations were summed and input into the model at the basin level. Residential and employment population estimates for the existing and 2030 conditions were provided by SANDAG. Figure 4-1 presents the location of the model basins.



JULIAN MODEL BASINS

Figure 4-1

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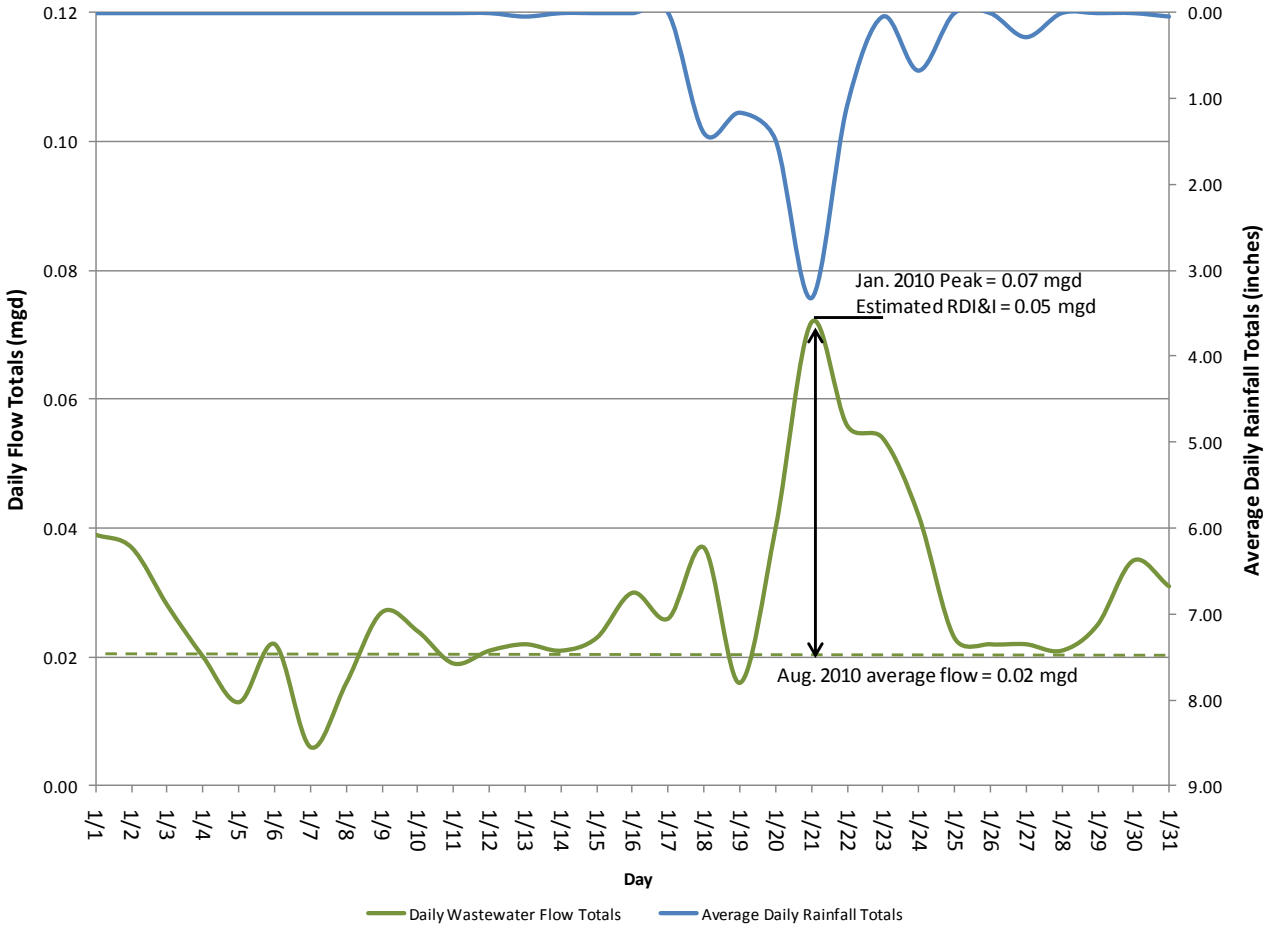
4.5.3 Rainfall Events

Rainfall events were evaluated to identify their potential impacts on the collection system. Rainfall derived inflow and infiltration (RDI&I) flows into the system are modeled by applying infiltration and routing coefficients to rainfall event. A storm event occurring January 18 to 22, 2010 was selected for assessing wet weather flows in the Julian SSA. The precipitation readings for the January storm are typical of 5-year design storms for San Diego County. The Julian rain gauge is closest in proximity to the Julian SSA and was used for this study. Figure 4-2 presents a comparison of the average daily flows recorded at the JWPCF to the average daily rainfall totals at the Julian rain gauge. Rainfall totals for the Julian rain gauge are summarized in Appendix G along with a design storm intensity comparison chart.

Figure 4-2 Julian SSA Wet Weather Flow Assessment



As shown on Figure 4-2, the January storm event produced a peak increase of approximately 0.05 mgd, almost tripling the average flow at the JWPCF from a storm event that averaged over three inches of rain during its 5 day period. The high level of inflow and infiltration observed at the JWPCF suggests there may be inflow and potentially illicit connections into the Julian SSA

collection system. The County may wish to investigate these connections using smoke testing to determine the potential locations.

4.6 Capacity Analysis

A capacity analysis of the existing collection system was performed under peak future flow conditions, as dictated by County Policy I-113. Calculations were performed for the recommended 2030 wastewater generation, discussed in Chapter 3, in order to identify potential improvement projects. Under dry weather flow conditions pipeline capacity projects were identified if the peak flows exceeded a flow depth to pipe diameter (d/D) ratio of 0.50 for pipeline diameters 15 inch and smaller and 0.75 for pipelines greater than 15 inches in diameter. Under wet weather flow conditions pipeline capacity projects were identified if the peak flows exceeded a d/D ratio of 0.92 for all pipeline diameters.

Under peak 2030 flow conditions, no capacity deficiencies were identified for the gravity sewer system. A detailed summary of the gravity pipeline capacity analysis is provided in Appendix H.

Based on Policy I-113 and the JWPCF treatment and disposal capacity of 0.040 mgd, the Julian SSA has the capacity for 14.6 committed EDUs and an additional 4.4 EDUs for potential connections or conversion of failing septic systems.

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CHAPTER 5
CONDITION ASSESSMENT

This chapter provides a description of the condition assessment performed as part of the Master Plan, and includes a summary of the following:

- collection system characteristics,
- current maintenance goals and practices,
- video inspection and assessment process,
- inspection and assessment results, and
- recommended rehabilitation program.

5.1 Background

A wastewater system condition assessment provides agencies and municipalities with valuable information used to determine the funding required to repair and rehabilitate an aging collection system and to prioritize the allocation of funds. An assessment of existing facilities serves to identify the system conditions and defects which may contribute to potential overflows and excessive infiltration. Such conditions include root intrusion at misaligned joints or cracks, breaks in the pipe, inflow and infiltration entering into the system through cracks in pipes or manholes or via illegal storm drain connections, all of which affect pipe capacity and treatment costs. The condition assessment of the existing Julian SSA collection system was based on the physical inspection of over 13,900 linear feet of 6- and 8-inch diameter gravity sewer mains which accounts for approximately 92 percent of the wastewater collection system. The SSA also includes approximately 3,000 linear feet of 3-inch PVC force main which was not inspected. The pipeline segments selected for inspection and assessment included pipelines located in the town of Julian as well as the portion of the system that extends along State Route 78.

5.2 Collection System Characteristics

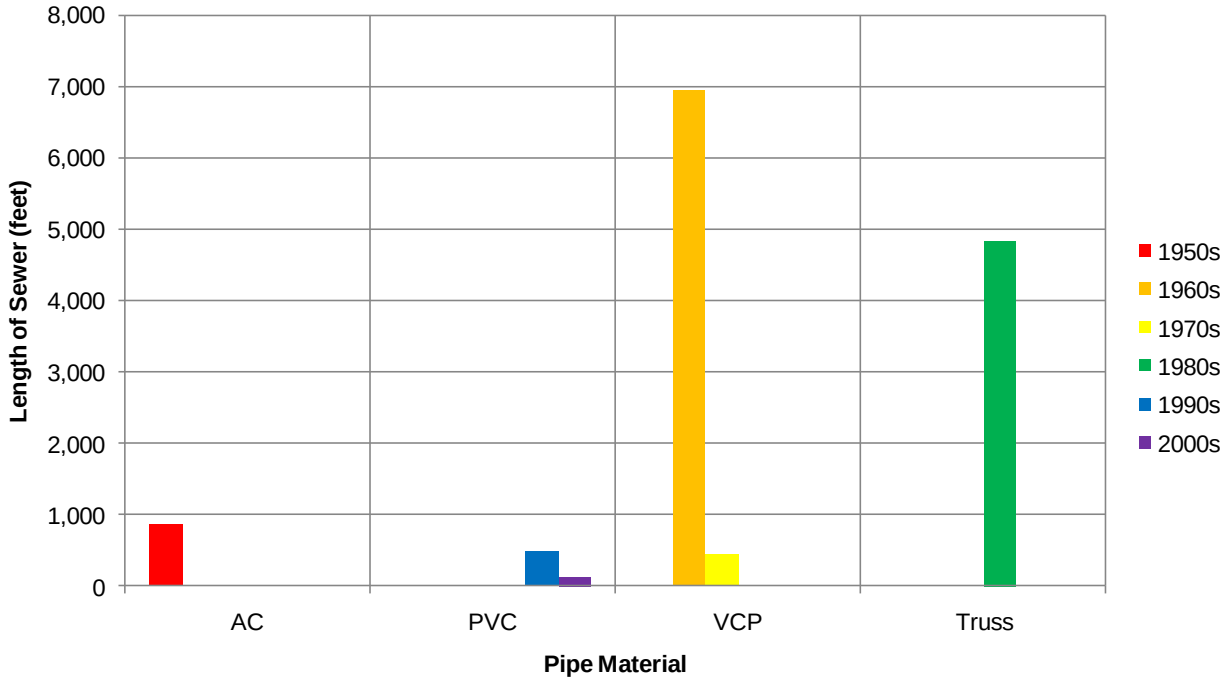
Construction of the Julian SSA collection system commenced in the 1960s when vitrified clay pipe (VCP) was the most common pipe material used for construction. Gravity pipelines constructed of VCP accompanied the growth in Julian with PVC starting to be used in the 1990s. A breakdown of the total pipeline length in the Julian SSA by length of material and age is provided in Table 5-1 and presented graphically in Figure 5-1.

The wastewater collection system data presented, including length, material and pipe sizes, are based on information obtained from the County's database. The database has not been updated to reflect any corrections and/or discrepancies noted through the CCTV inspection findings. Based upon the CCTV data, the County's GIS and mapbooks should be updated to reflect more accurate information obtained through the inspection and assessment process.

Table 5-1 Julian SSA Gravity Pipeline Length of Material by Age

Age	Material				Total
	AC	PVC	VCP	Unknown	
1950s	870	0	0	0	870
1960s	0	0	6,930	0	6,930
1970s	0	0	450	0	450
1980s	0	0	0	4,830	4,830
1990s	0	490	0	0	490
2000s	0	140	0	0	140
Unknown	0	370	340	0	710
Total	**870**	**1,000**	**7,720**	**4,830**	**14,330**

Figure 5-1 Julian SSA Gravity Pipeline Length of Material by Age



As may be determined from Table 5-1 and Figure 5-1, over 50 percent of the gravity system in the Julian SSA was constructed of VCP and over 50 percent of the wastewater collection system was constructed in the 1950s and 1960s. Historically, VCP pipe has a life span ranging from 50-70 years. Based on the information presented above, approximately 50 percent of the VCP pipe has reached the initial years of the pipe material life cycle. Therefore, as the wastewater collection system continues to age, routine inspection is critical for monitoring the condition of the pipe and identifying methods to extend its service life.

5.3 Current Maintenance Practices

The County's Facility Operations staff conducts routine cleaning and inspection of pipelines within the Julian SSA, as well as the additional eight (8) SSAs within the County's jurisdiction. The County's goal is to clean the Julian SSA pipelines on a yearly basis. Additionally, crews clean Special Maintenance locations on a quarterly basis. Currently, there are no Special Maintenance locations identified in the Julian SSA. Approximately 5 percent of the pipelines within the Julian SSA are video inspected annually.

5.4 Inspection and Assessment

Closed circuit television cameras offer valuable insight to the structural and maintenance condition of underground infrastructure. Video inspection of sewer pipelines is used to identify and evaluate the existence and severity of defects including cracks, misaligned joints, accumulation of roots or silt, and potential sources of infiltration. Figure 5-2 shows the pipelines in the Julian SSA that were inspected and assessed.

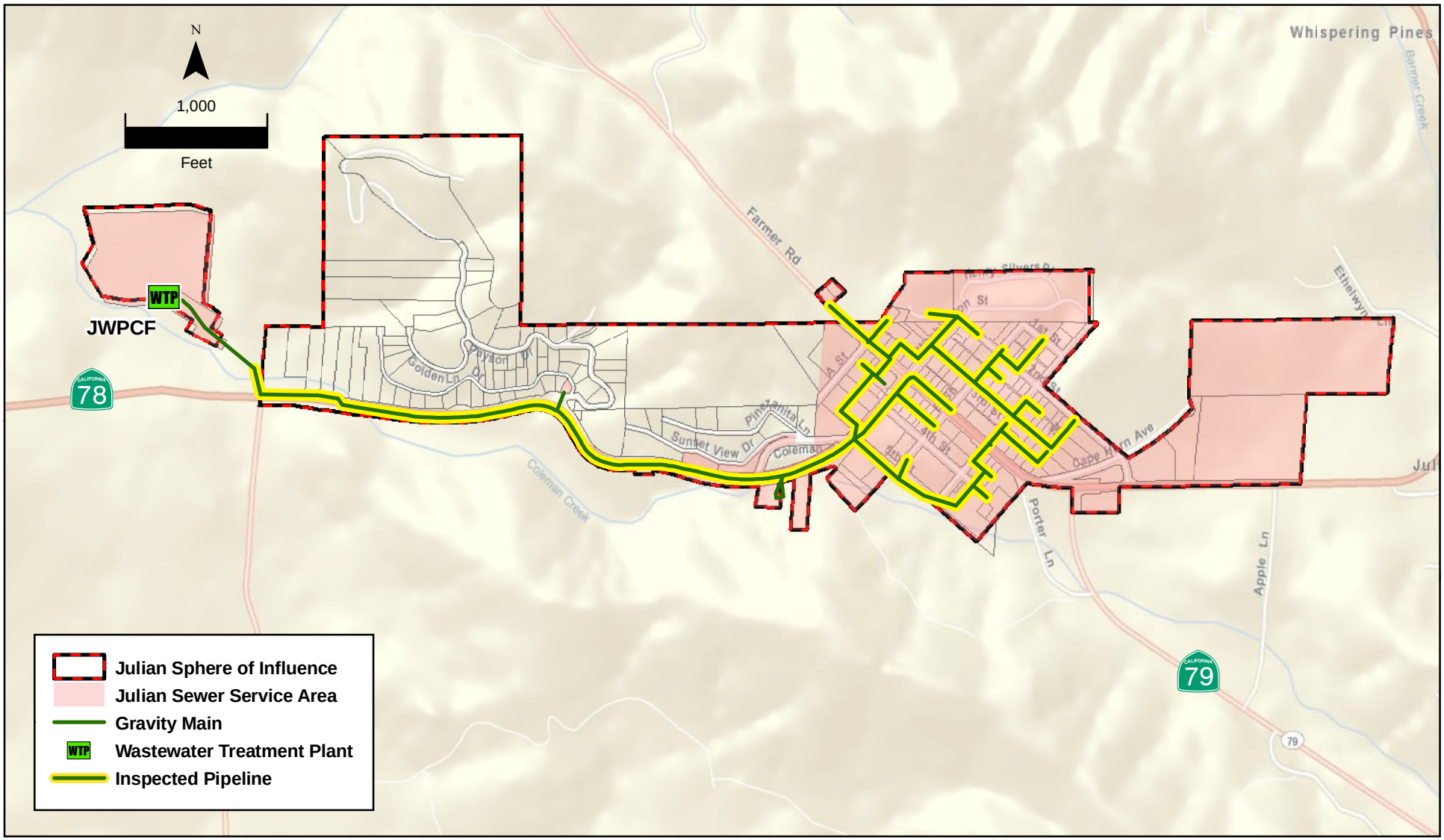
The video inspection for the Julian SSA was performed by Houston and Harris, PCS, Inc. Standard observations and severity ratings were documented on video inspection logs, which included various locations of sewer mains with deficiencies including broken or cracked pipe, misaligned joints, debris, and root intrusion. Inspection log reports are provided in Appendix I. The inspection logs were independently reviewed by Atkins and each observation was assessed for its criticality to assist in determining the final sewer rehabilitation recommendations. The following sections describe the criteria and procedures performed during the inspection and assessment.

5.4.1 Inspection Criteria and Procedures

For the purposes of this project, National Association of Sewer Service Companies (NASSCO) inspection codes and ratings were used. Implementation of the NASSCO codes provides a consistent method in the manner with which the inspection was conducted and the observations noted. A summary of the observation codes used for the CCTV inspection are included in Appendix J. The numeric severity rating (1-5) assigned to the specific structural and/or maintenance observations are also defined. A NASSCO severity rating of one (1) is minor while a severity rating of five (5) is severe. The severity ratings, as noted, are automatically assigned based on the structural and/or maintenance observation noted by the CCTV operator.

5.4.2 Assessment Criteria and Procedures

For each sewer pipeline inspection conducted, the video record and log was independently reviewed as a quality check of the noted observations and respective ratings included in the database results and as confirmation that the data provided for performing the condition assessment was acceptable. The video inspection log for each sewer segment was analyzed and ranked to indicate the criticality of the asset condition using a scale of "A" through "E" to indicate the severity of the pipeline's condition, with "E" being the worst condition. Table 5-2 provides a summary of the general criticality ranking associated with the severity of the overall condition of the asset, as well as a general response time. It should be noted that the actual response time for implementing a recommended action is dependent upon several factors.



INSPECTED
AND ASSESSED PIPES

Figure 5-2

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Task_26_CMP\mxd\19047_Julian-E_WW_InspectedPipes_Fig 5-2.mxd

Therefore, assets with rankings of B or C should be re-inspected and reassessed prior to implementing the recommended action as further deterioration may occur or the condition of the pipe may remain relatively stable and the improvement may be reprioritized.

Table 5-2 Condition Severity Ranking

A	B	C	D	E
Good	Adequate	Moderate	Poor	Failing
Maintenance	5+ years	3 to 5 years	1 to 2 years	Immediate

The severity assigned to each sewer pipeline is based on the criteria listed in Table 5-3 to ensure consistency and uniformity in the process.

Table 5-3 Condition Assessment Criteria – Severity

Observation	Condition Criticality Ranking				
	A	B	C	D	E
Cracks • Circular • Longitudinal • Multiple	None	Very small hair line crack(s)	Hair line crack(s) <50% of ID in length	Cracks ≤1/8" wide or >50% of ID in length	Cracks >1/8" wide
Broken Pipe	None	Connecting cracks, no displacement	Connecting cracks, displacement ≤1/4"	Connecting cracks, displacement >1/4"	Collapsed pipe, impassable
Joints - Offset	Minimal	Up to 1/2 of the pipe thickness	1/2 to thickness of the pipe	Thickness of the pipe to 1½ times	> 1½ times the thickness of the pipe
Joints – Separation	None	Gasket exposed	Bell exposed	Dirt exposed at top	Dirt exposed at invert
Roots	Minimal	10% to 35% Fine roots	35% to 60% Fine/medium roots	60% to 80% Medium roots	80% to 100% Tap root(s) visible
Debris Accumulation	Minimal	Sporadic deposits (no rocks)	≤10% of ID (no rocks)	10% to 25% of ID and/or rocks	>25% of ID or impassable
Erosion (typical concrete pipe)	None	Rough surface	Exposed aggregate	Exposed rebar	Missing concrete
Mineral Deposits	None	Minimal (possible infiltration)	≤10% ID thickness	>10% ID thickness	Impassable, heavy mineral deposits
Infiltration	None	Dripping	Seeping	Constant stream	Gushing water
Sag	None	Minimal (probably not perceptible)	≤25% of ID	25% to 75% of ID	>75% of ID
Flow Capacity	Minimal	2/5 or less full	2/5 to 1/2 full	1/2 to 3/4 full	3/4 to totally full

Using the applicable observation and severity, a preliminary recommendation for each sewer segment was determined. Table 5-4 summarizes the preliminary recommendations for each observed condition and severity ranking.

5.5 Sewer Pipeline Inspection and Assessment Results

The pipelines inspected were initially evaluated using the NASSCO Rating System and were subsequently more thoroughly assessed by conducting a comprehensive review of the videos, still images, and any additional data available. Prior to scheduling maintenance efforts and/or implementing repair and rehabilitation improvements, information included in the appendices should be further reviewed for additional detailed information pertaining to the specific condition of the pipelines inspected and assessed.

Table 5-4 Preliminary Pipeline Recommendation Criteria

Observation	Condition Criticality Ranking				
	A	B	C	D	E
Cracks • Circular • Longitudinal • Multiple	No Action	No Action or Rehabilitate	No Action or Rehabilitate	Rehabilitate	Rehabilitate or Replace
Broken Pipe	No Action	No Action or Rehabilitate	Point Repair or Rehabilitate/ Replace	Point Repair or Replace	Immediate Point Repair
Joints – Offset	No Action	No Action or Rehabilitate	Point Repair and/or Rehabilitate	Point Repair and/or Rehabilitate/ Replace	Point Repair and/or Rehabilitate/ Replace
Joints – Separation	No Action	Rehabilitate	Rehabilitate	Point Repair and/or Rehabilitate/ Replace	Rehabilitate or Replace
Roots	No Action	Clean and Rehabilitate	Clean and Rehabilitate	Clean and Rehabilitate	Clean and Rehabilitate/ Replace
Debris Accumulation	No Action	Clean	Clean	Clean	Clean
Erosion (typical concrete pipe)	No Action	Rehabilitate	Rehabilitate or Replace	Rehabilitate or Replace	Replace
Mineral Deposits	No Action	No Action or Rehabilitate	Point Repair or Rehabilitate	Rehabilitate	Rehabilitate
Infiltration	No Action	No Action or Rehabilitate	Point Repair or Rehabilitate	Rehabilitate	Rehabilitate
Sag	No Action	No Action	Any Option	Replace	Replace
Flow Capacity	No Action	No Action	No Action	Evaluate Capacity	Evaluate Capacity

Overall, the pipe segments inspected are generally in fair condition. However, over 60 percent of the observed pipelines were identified as requiring some form of repair or rehabilitation while over 20 percent were identified as requiring No Action, and approximately 20 percent were identified as requiring maintenance. Table 5-5 includes a summary of the recommended actions based on the number of pipe segments and pipe length inspected and assessed while Table 5-6 includes a summary of the criticality rankings based on the number of pipe segments and pipe length inspected and assessed. Figure 5-3 graphically presents the pipeline inspection and assessment findings by length.

Although Table 5-5 illustrates that over 60 percent of the system requires some form of repair or rehabilitation, Table 5-6 illustrates that the deficiencies documented for 50 percent (7,358 linear feet) of the system should be evaluated for repair or rehabilitation within the next 5 years including approximately 10 percent (1,300 linear feet) within the next year.

Table 5-5 Pipeline Inspection and Assessment Findings by Segment and Length

Description	No Action	Maintenance	Maintenance/ Retelevise	Televise	Repair/ Rehabilitate	Total
Number of Segments	15	3	4	1	38	61
Length (feet)	2,936	1,524	937	17	8,501	13,915
Percentage by Length	21.1%	11.0%	6.7%	0.1%	61.1%	100.0%

Table 5-6 Summary of Criticality Ratings by Segment and Length

Description	Criticality					Total
	A	B	C	D	E	
No of Pipeline Segments	15	17	14	11	4	61
Length (feet)	2,936	3,683	3,675	2,324	1,297	13,915
Percentage by Length	21.1%	26.5%	26.4%	16.7%	9.3%	100.0%

Figure 5-3 Pipeline Inspection and Assessment Findings by Percentage of Length

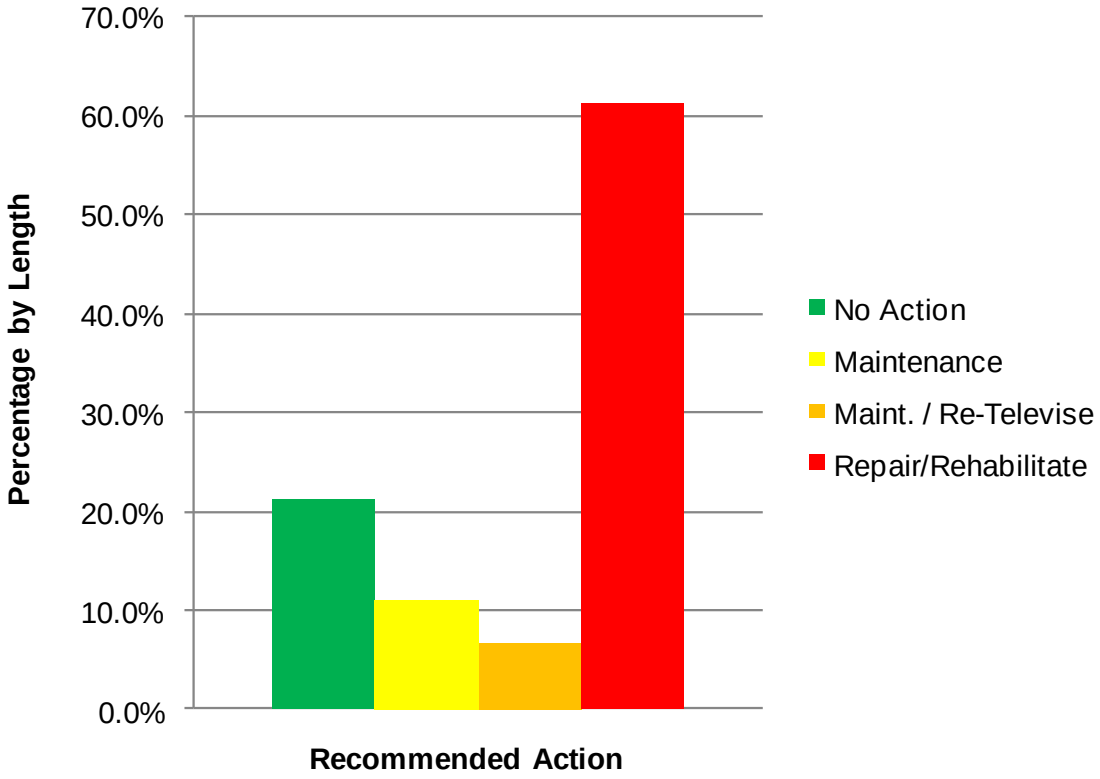
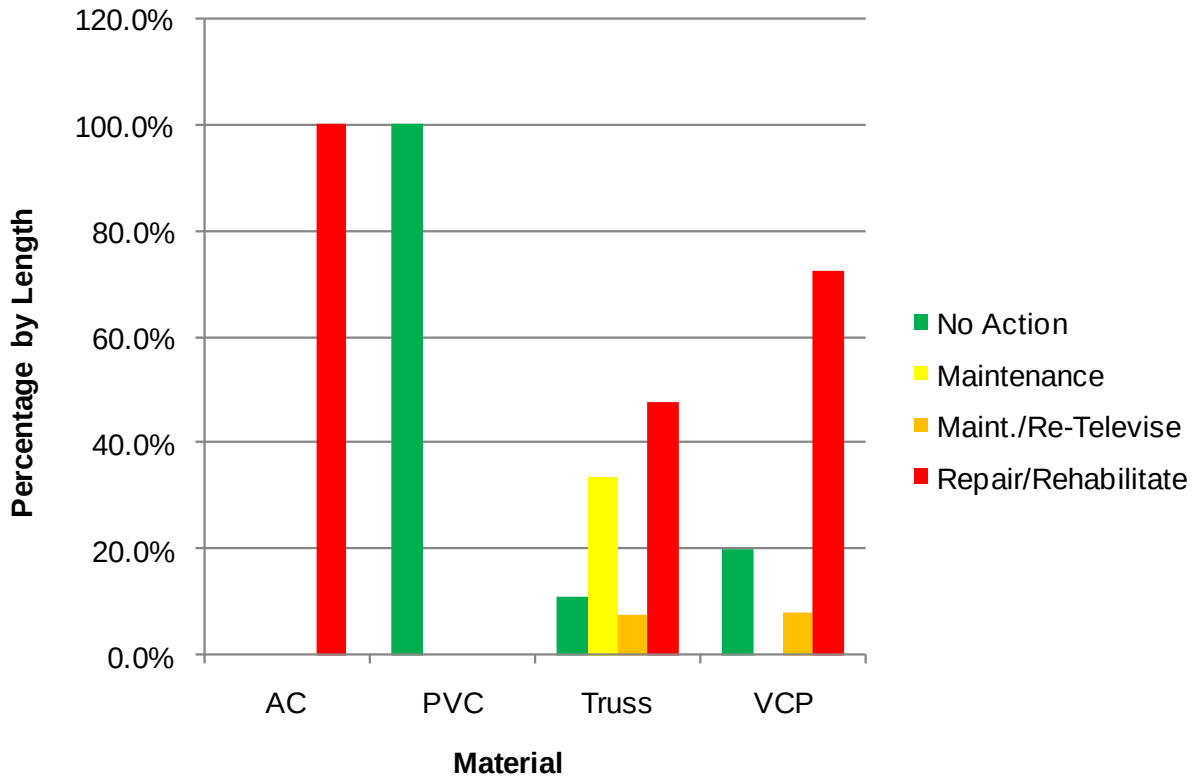


Table 5-7 summarizes the number of pipe segments and length of pipe inspected and assessed by material type while Figure 5-4 illustrates the recommendations for the pipelines within the SSA based on material. It should be noted that based on information obtained from the City's GIS and mapbooks several of the pipelines inspected were classified as having "unknown" material type. However, based on information obtained from the CCTV inspection videos, the material type was updated to reflect the assessment findings. Specifically, the pipelines located along State Route 78, appear to be of truss type pipe material which consists of a semi-rigid walls with concentric inner and outer walls braced by a truss-type structure.

Table 5-7 Pipeline Inspections by Segment and Material

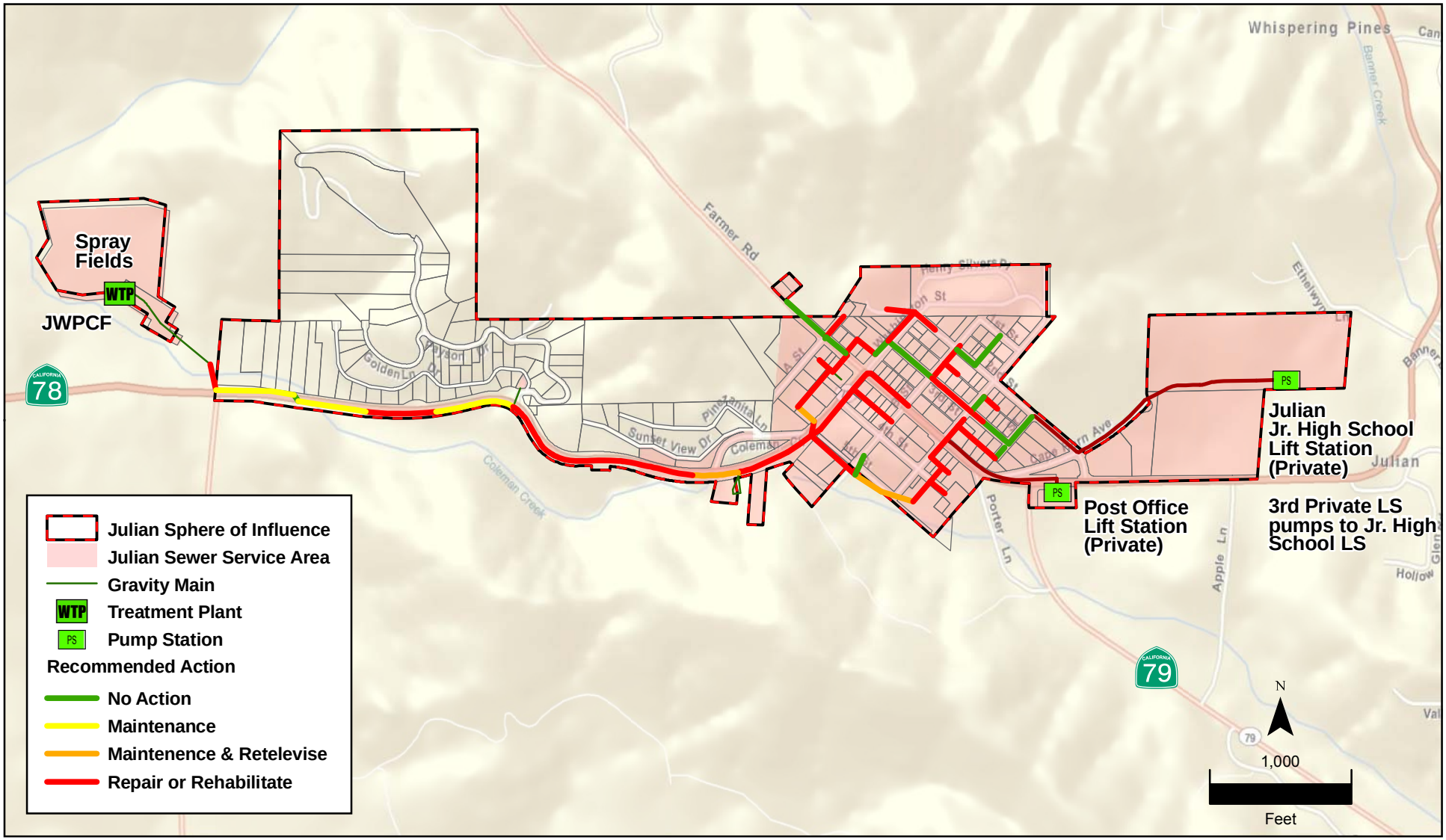
Description	Material				Total
	AC	PVC	Truss	VCP	
Number of Segments	3	3	11	44	61
Length (feet)	691	877	4,555	7,792	13,915
Percentage by Length	5.0%	6.3%	32.7%	56.0%	100.0%

Figure 5-4 Pipeline Inspection and Assessment Findings by Material



Figures 5-6 illustrates the recommendations for the pipelines within the SSA that were inspected and assessed based on age.

Figure 5-5 illustrates the locations of the recommended actions in the Julian SSA. The recommendations include No Action, Maintenance, Maintenance and Re-Televise, and Repair/Rehabilitate. Assessment findings and detailed pipeline recommendations are included in Appendix K.



RECOMMENDED ACTION

Figure 5-5

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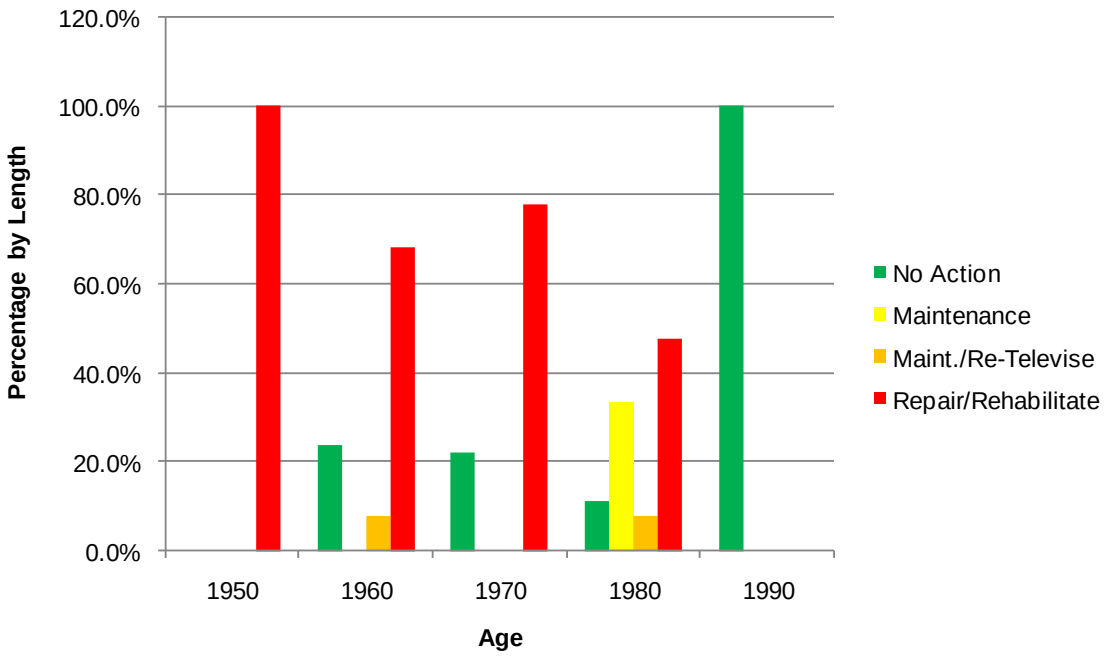
Figure 5-6 Pipeline Inspection and Assessment Findings by Age



Based on the results of the inspection and assessment of nearly the entire wastewater collection system within the Julian SSA, it is estimated that approximately 8,500 linear feet (1.60 miles) requires some form of repair, rehabilitation or replacement over the next 10 to 15 years.

The wastewater collection system in the Julian SSA includes approximately 6,800 feet of 6-inch diameter pipeline. Approximately 4,600 linear feet of the 6-inch pipelines were identified as requiring a form of rehabilitation and/or replacement. Of the 4,600 linear feet, approximately 50% (2,300 feet) is recommended for lining, over 30% (approx. 1,600 feet) is recommended for complete replacement and four (4) pipelines were identified as requiring partial lining to address the types of defects identified.

Generally, lining is not recommended as a form of rehabilitation for 6-inch diameter pipelines as it may significantly reduce the overall capacity of the pipeline and impede maintenance efforts. Therefore, it is recommended that the 6-inch diameter pipe segments identified as being located in accessible locations and requiring rehabilitation for the entire pipeline segments be replaced with larger diameter pipelines. This equates to the replacement of approximately 1,600 linear feet of 6-inch diameter pipe with 8-inch diameter pipelines.

5.6 County Condition Assessment Procedures

As part of the County's assessment process, pipelines identified as requiring repair, rehabilitation, or replacement are prioritized as part of the County's Major Maintenance Project Program. Inspection videos and photos captured during the inspection process, of pipelines which were identified to contain noted defects, are reviewed and assessed by staff in the County's Major Maintenance Project Program. The defects are scored according to defined

criteria and then ranked to indicate the criticality of the asset condition. The scoring procedure is based on the type of defects noted and defined severity criteria. Points assigned range from 0 to 3, with 3 being the most severe for each criterion.

Table 5-8 includes a summary of the scores and severity rankings for the pipelines inspected and assessed in the Julian SSA. Additionally, the score for each of the six (6) criterions used to prioritize projects for the Major Maintenance Project Program are summarized. For the purpose of this study, it was assumed that Sanitary Sewer Overflows (SSOs) have not occurred at these facilities.

The total score for each potential project is then ranked to establish the criticality of the project. Table 5-9 provides a summary of the general criticality associated with the total score for each asset as well as the recommended response time to complete the recommended action for Major Maintenance Program projects.

Based on the summary included in Table 5-8, the scores generally range from 1-9 and rankings consist primarily of 1s and 2s. However, there are four (4) projects that were scored between 7 and 9 points and ranked as priority three (3). Therefore, based on the County Major Maintenance Project Program assessment process, there are currently four (4) projects that require repair or rehabilitation in 6-12 months.

Table 5-8 also includes several pipelines that require televising and/or maintenance. It is recommended that appropriate County staff be notified of the pipelines identified as requiring cleaning to ensure the pipelines are included on the appropriate cleaning cycle. Additionally, it is recommended that cleaning and televising be performed on the pipelines for which the recommended action is noted as *Televise* and *Clean and Re-Televise* to establish the condition of the pipelines and subsequently identify and plan for any additional repair and/or rehabilitation projects necessary to ensure the asset is restored to the proper operating condition.

For the pipelines identified as potential improvement projects, Table 5-10 includes a summary of the severity rating results based on the inspection and condition assessment criteria and process presented in Section 5.3 and the total score and ranking based on the County assessment procedures implemented as part of the Major Maintenance Program described above.

The Condition Severity Rankings included in Table 5-3 and the rankings summarized in Table 5-10 are each associated with a recommended response time. Although there is a correlation between the response times in the tables, the response time associated with the County assessment process serves to identify and schedule potential projects within a 24 month period while the response time associated with the severity rankings extends beyond a 5 year period. Therefore, as a project is confirmed for implementation, it is recommended that each project be reviewed in conjunction with the existing CIP and Major Maintenance Project Program as it may have already been identified and planned for construction or its proximity to scheduled projects may affect the actual response time. Additionally, the scores for each criterion used to determine the total score for each project should be further reviewed to verify the scores are appropriate (i.e., it was assumed that no previous SSOs occurred at the assets) as it may affect the overall score, project ranking, and thus the recommended response time.

Table 5-8 Julian SSA Pipeline Assessment Scores and Rankings

Mainline ID No.	Line Length	Recommended Action	Condition of Facility System	Age of Components, System and/or Facility	Pipe Flow Ratio (peak dry weather)	Previous SSOs	Proximity to Watercourse	Blockage or Damage	Total Score	Ranking
JU0005	504	No Action	0	2	0	0	0	0	2	1
JU0093	252	No Action	1	0	0	0	0	0	1	1
JU0090	240	No Action	0	0	0	0	0	0	0	1
JU0087	137	No Action	1	3	0	0	0	0	4	2
JU0083	270	No Action	1	3	0	0	0	0	4	2
JU0082	70	No Action	0	3	0	0	0	0	3	1
JU0081	100	No Action	0	3	0	0	0	0	3	1
JU0076	391	No Action	0	3	0	0	0	0	3	1
JU0066	134	No Action	0	3	0	0	0	0	3	1
JU0063	385	No Action	0	3	0	0	0	0	3	1
JU0058	12	No Action	0	3	0	0	0	0	3	1
JU0057	179	No Action	1	3	0	0	0	0	4	2
JU0056	17	No Action	0	3	0	0	0	0	3	1
JU0048	100	No Action	0	2	0	0	0	0	2	1
JU0030	145	No Action	0	3	0	0	0	0	3	1
JU0024	569	Line	0	3	0	0	0	1	4	2
JU0020	17	Televise	-	2	0	0	0	-	2	1
JU0013	500	Line	0	2	0	0	0	1	3	1
JU0011M	500	Clean	0	2	0	0	0	0	2	1
JU0009	500	Sectional Line	0	2	0	0	0	1	3	1
JU0089	89	Replace	0	3	0	0	0	2	5	2
JU0079	128	Line	0	3	0	0	0	0	3	1
JU0078	124	Line	0	3	0	0	0	0	3	1
JU0064	128	Line	0	3	0	0	0	0	3	1
JU0055	160	Line	0	3	0	0	0	0	3	1
JU0051	344	Replace	0	3	0	0	0	2	5	2
JU0049	102	Replace	2	3	1	0	0	2	8	3
JU0044	61	Sectional Line & T-Line	0	3	0	0	0	0	3	1
JU0043	123	Line	0	3	0	0	0	0	3	1
JU0041	165	Line	0	3	0	0	0	2	5	2
JU0040	118	Line	0	3	0	0	0	0	3	1
JU0039	55	Line	0	3	0	0	0	0	3	1

Mainline ID No.	Line Length	Recommended Action	Condition of Facility System	Age of Components, System and/or Facility	Pipe Flow Ratio (peak dry weather)	Previous SSOs	Proximity to Watercourse	Blockage or Damage	Total Score	Ranking
JU0015	500	Line	2	2	0	0	0	1	5	2
JU0014	500	Line	2	2	0	0	0	1	5	2
JU0008	520	Clean	0	2	0	0	0	3	5	2
JU0080	35	Line	1	3	0	0	0	2	6	2
JU0073	189	Line & T-Liner	0	3	0	0	0	2	5	2
JU0069	197	Replace	0	3	0	0	0	3	6	2
JU0067	270	Line	1	3	0	0	0	2	6	2
JU0052	100	Line	0	3	0	0	0	1	4	2
JU0053	27	Sectional Line	0	3	0	0	0	2	5	2
JU0028	60	Sectional Line	0	3	0	0	0	2	5	2
JU00247	351	Line	0	3	0	0	0	2	5	2
JU0025	441	Line	2	3	0	0	0	2	7	3
JU0047	350	Sectional Line & Trim Lateral	0	2	0	0	0	2	4	2
JU0038	135	Replace	0	3	0	0	0	2	5	2
JU0016	330	Clean & Retelevise	0	2	0	0	0	3	5	2
JU0003	180	Sectional Line	0	2	0	0	0	3	5	2
JU0088	135	Replace	0	3	0	0	0	3	6	2
JU0086	350	Sectional Line & T-Line	0	3	0	0	0	3	6	2
JU0065	171	Line	0	3	0	0	0	3	6	2
JU0059	196	Line	0	3	0	0	0	1	4	2
JU0050	150	Clean & Retelevise	3	3	0	0	0	0	6	2
JU0028	280	Line	3	3	0	0	0	2	8	3
JU0037	130	Replace	1	3	0	0	0	2	6	2
JU0034	186	Line	0	3	0	0	0	3	6	2
JU0032	216	Clean & Retelevise	0	3	0	0	0	3	6	2
JU0004	504	Clean	0	2	0	0	0	3	5	2
JU0077	137	Line	0	3	0	0	0	3	6	2
JU0033	241	Clean & Retelevise	0	3	0	0	0	3	6	2
JU0029	415	Replace	3	3	0	0	0	3	9	3

Table 5-9 Condition Criticality Ranking-Major Maintenance Projects

Score/ Points	Ranking	Design/Construction Schedule	Project Assessment	Assessment Description
15-13	5	Within 4 Months	Critical	Recent SSO; Exceeded Capacity; Known Failure/Blockage Points; Maintenance Intensive
12-10	4	4-6 Months	High Priority	Severe Deterioration; SSO History: Potential Blockage/SSO; Maintenance Intensive
9-7	3	6-12 Months	Serious	Severe Deterioration; Near Capacity; Maintenance Intensive
6-4	2	12-24 Months	Major	Visible Deterioration and Near Allowable Capacity
3-1	1	24 Months Plus	Discretionary	Functional; Minor Deterioration; Below Capacity

Table 5-10 Summary of Severity Ratings and Major Maintenance Program Rankings

Mainline ID No.	Line Length (Feet)	Severity Rating	Recommended Action	Total Score	Ranking
JU0024	569	B	Line	4	2
JU0089	89	B	Replace	5	2
JU0079	128	B	Line	3	1
JU0078	124	B	Line	3	1
JU0064	128	B	Line	3	1
JU0055	160	B	Line	3	1
JU0051	344	B	Replace	5	2
JU0049	102	B	Replace	8	3
JU0044	61	B	Sectional Line & T-Line	3	1
JU0043	123	B	Line	3	1
JU0041	165	B	Line	5	2
JU0040	118	B	Line	3	1
JU0039	55	B	Line	3	1
JU0015	500	C	Line	5	2
JU0014	500	C	Line	5	2
JU0080	35	C	Line	6	2
JU0073	189	C	Line & T-Liner	5	2
JU0069	197	C	Replace	6	2
JU0067	270	C	Line	6	2
JU0052	100	C	Line	4	2
JU0053	27	C	Sectional Line	5	2
JU0028	60	C	Sectional Line	5	2
JU00247	351	C	Line	5	2
JU0025	441	C	Line	7	3
JU0047	350	C	Sectional Line & Trim Lateral	4	2

Mainline ID No.	Line Length (Feet)	Severity Rating	Recommended Action	Total Score	Ranking
JU0038	135	C	Replace	5	2
JU0003	180	D	Sectional Line	5	2
JU0088	135	D	Replace	6	2
JU0086	350	D	Sectional Line & T-Line	6	2
JU0065	171	D	Line	6	2
JU0059	196	D	Line	4	2
JU0028	280	D	Line	8	3
JU0037	130	D	Replace	6	2
JU0034	186	D	Line	6	2
JU0077	137	E	Line	6	2
JU0029	415	E	Replace	9	3

5.7 Treatment Plant Assessment

A visual inspection was performed of the JWPCF with County operations staff to assess the physical condition of the facility on October 10, 2011. The treatment plant's structure and condition were inspected and assessed. Recommended phased condition improvements were based on the visual inspection and current staff maintenance concerns.

The dried sludge storage building needs to be enclosed so that blowing rain and snow do not re-moisten the already dried sludge. The current building has three walls with 5-foot high masonry walls and openings from the walls to the roof. The majority of the wall openings should be covered with a portion of the openings fitted with shutters to allow cross ventilation when the weather is sunny, and the floor should be sloped toward the fourth wall opening. The opening in the fourth wall could be brought in to minimize the exposure to the elements; however, it must remain large enough to accommodate the skip loader that is used to load and transport the sludge. Skylights should be installed in the roof to provide lighting.

The concrete-lined effluent storage basins located at the west-side of the wastewater treatment plant needs to be relined. Cracks in the concrete allow high groundwater in the winter months to seep into the basins which effectively reduces the amount of effluent storage. There are two effluent storage basins, each with a capacity of approximately 300,000 gallons.

The splitter box from the aeration basins to the clarifiers needs to be improved. The existing splitter box does not evenly distribute flow to both clarifiers. Further study is required to determine if addition of a slide gate or stop logs to the existing splitter box can provide the necessary weir control or if the splitter box needs to be replaced in its entirety.

CHAPTER 6
PROPOSED CAPITAL IMPROVEMENT PROGRAM

This chapter presents the proposed CIP based on the findings of the Master Plan and includes:

- development of unit costs,
- capital improvement project summary of cost and timing, and
- proposed condition upgrades and estimated costs.

6.1 Development of Unit Costs

The unit cost estimates reflect full capitalization inclusive of planning, engineering design, environmental, legal, construction, construction management and contract administration. The values are presented in mid-2010 dollars based on an anticipated ENR Construction Cost Index of 9969 for the Los Angeles/Orange County area. These estimates are based on representative available data at the time of this report; however, since prices of materials and labor fluctuate over time, new estimates should be obtained at or near the time of construction of proposed facilities.

6.2 Recommended CIP Program

The CIP projects identify improvements needed to improve the condition and operation of the JWPCF. Julian SSA CIP projects are proposed for Phase II at an estimated cost of $2,230,000. Proposed CIP projects recommended for the Julian SSA are listed in Table 6-1.

Table 6-1 Julian Master Plan Capital Improvement Program

CIP #	Project	Description	CIP Cost
J-1	Julian WWTP Upgrades	Upgrades to prevent groundwater seepage in the storage/effluent basins. Enclose solids storage building. Miscellaneous upgrades to the splitter box to the clarifiers.	$2,230,000

6.3 Condition Related Projects

The CCTV inspection and condition assessment of the pipelines within the Julian SSA served to identify condition related defects in the wastewater collection system. The condition of the pipelines was used to determine the most effective method of repair or rehabilitation to restore the asset to its most efficient operating condition. Consequently, recommendations for improvements based on the noted defects assists in optimizing the expenditures for the wastewater collection system by targeting available funds to the pipelines that require attention with the most cost effective improvement method.

Specific recommendations were developed based on the results of the condition assessment for the pipelines televised and assessed. Detailed pipeline condition assessment and repair and/or rehabilitation recommendations are included in Appendix K.

6.3.1 Basis of Costs

The wastewater collection system within the Julian SSA consists of 6- and 8-inch diameter pipeline and the recommended rehabilitation methods include a form of lining including full-length lining, sectional lining, T-Liners, and replacements with lateral reconnections. The base unit costs for pipeline materials and installation including repaving and system appurtenances constitute the principal elements of the wastewater collection system facilities and reflect factors that include eighteen (18) percent to account for design and construction management costs and a twenty (20) percent contingency to account for potential unanticipated design and construction conditions, and traffic control issues. Special circumstances (e.g., jacking, trenchless installations, tunnels, etc.) are considered separately on a case-by-case basis. Unit costs ranging from approximately $205/LF to $215/LF were used for estimating lining costs and $245/LF to $260/LF was used for estimating pipeline replacement costs.

Table 6-2 summarizes the probable cost to repair, rehabilitate or replace the recommended pipelines within the Julian SSA. The estimated costs are based on the documented length of the pipeline segments and the recommended actions. Recommended actions that included cleaning and/or televising/re-televising were not included in the estimate as the necessary effort is managed as part of the County's overall preventative maintenance program.

The total cost for these condition related projects is approximately $1,464,000. Generally, the cost for an individual project identified for the Major Maintenance Project Program is approximately $50,000. Based on the summary included in Table 6-3, several projects listed (totaling $842,000) may warrant inclusion in the CIP program while the majority of the projects may be included in the Major Maintenance Project Program (totaling $623,000) or combined to create a larger rehabilitation project.

Based on the findings presented in Chapter 5, consideration of the pipelines with rankings of E should be considered for implementation within the next year and pipelines with ratings of D should be considered for implementation within the next 2 years. Assets with initial rankings of B and C should be re-inspected and re-evaluated for implementation in 5 years and prior to implementing the recommended action to determine whether further deterioration occurred or the pipe remains in stable condition. Reassessment of the pipe condition will help determine whether rehabilitation should be implemented or deferred and reprioritized.

Additionally, as the time period in which improvements are necessary can vary significantly based on the type and frequency of maintenance activities performed on the system, it should be noted that the potential for spills to occur increases as the pipes age and additional deficiencies occur. Therefore, it is recommended that the projects identified be reviewed, prioritized, and subsequently included in the appropriate program. As well, as the County proceeds towards implementation of the projects presented in this Master Plan, it is recommended that the engineering cost estimates be further refined to reflect project costs due to inflation and/or increases in construction costs.

Table 6-2 Estimated Costs for Pipeline Rehabilitation Projects

Mainline ID No.	Line Length	Severity Rating	Recommended Action	Estimated Total
JU0024	569.00	B	Line	$116,751
JU0013	500	B	Line	$102,681
JU0009	500	B	Sectional Line	$2,809
JU0089	89	B	Replace	$21,874
JU0079	128	B	Line	$23,204
JU0078	124	B	Line	$22,502
JU0064	128	B	Line	$23,933
JU0055	160	B	Line	$28,093
JU0051	344	B	Replace	$81,099
JU0049	102	B	Replace	$24,127
JU0044	61	B	Sectional Line & T-Line	$2,821
JU0043	123	B	Line	$23,785
JU0041	165	B	Line	$31,159
JU0040	118	B	Line	$21,448
JU0039	55	B	Line	$11,116
JU0015	500	C	Line	$102,681
JU0014	500	C	Line	$101,952
JU0080	35	C	Line	$6,875
JU0073	189	C	Line & T-Liner	$33,185
JU0069	197	C	Replace	$46,649
JU0067	270	C	Line	$47,408
JU0052	100	C	Line	$19,746
JU0053	27	C	Sectional Line	$1,405
JU0028	60	C	Sectional Line	$1,631
JU00247	351	C	Line	$80,321
JU0025	441	C	Line	$92,839
JU0047	350	C	Sectional Line & Trim Lateral	$3,517
JU0038	135	C	Replace	$30,968
JU0003	180	D	Sectional Line	$1,631
JU0088	135	D	Replace	$33,156
JU0086	350	D	Sectional Line & T-Line	$4,225
JU0065	171	D	Line	$30,754
JU0059	196	D	Line	$35,873
JU0028	280	D	Line	$68,032
JU0037	130	D	Replace	$30,550
JU0034	186	D	Line	$33,388
JU0077	137	E	Line	$24,784
JU0029	415	E	Replace	$95,198
			Total	**$1,464,169**

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