Valley Sanitary District

Collection System Master Plan

FINAL

June 2013

Prepared for Valley Sanitary District
Indio, California

Prepared by MWH
Pasadena, California

Executive Summary

This Executive Summary of the Collection System Master Plan (Master Plan) for Valley Sanitary District (VSD) provides an overview of the Master Plan project. A brief description of the project background, the scope of work, existing sewer system, model creating and calibration, system evaluation, and recommended improvements and their associated costs.

ES.1 OBJECTIVES & SCOPE OF WORK

This Master Plan has been developed under Task Authorization No. 1 between VSD and MWH Americas, Inc. (MWH) dated May 30, 2012.

The key objectives of the Master Plan are to:

- Provide an update to the 2003 Sewer Master Plan
- Create and calibrate a computer-based hydraulic model
- Evaluate the existing sewer collection system
- Address system deficiencies for existing conditions, as well as build-out and 5-year (i.e., year 2018) interim conditions.
- Develop a phased capital improvement program with an emphasis on flow, age, and material deficiencies from the hydraulic model.

The scope of work for this Master Plan consists of the following tasks:

- Task 1: Provide Project Management, Communication and Meetings
- Task 2: Data Collection and Modeling Review
- Task 3: Hydraulic Sewer Model Development
- Task 4: Flow Monitoring and Sewer Model Calibration
- Task 5: Sewer Model Analysis
- Task 6: Sewer System Improvements
- Task 7: Collection System Master Plan Report

ES.2 BACKGROUND

The VSD service area primarily consists of residential areas with moderate commercial, industrial, and public land use encompassing much of the City of Indio, portions of the City of La Quinta and City of Coachella, and unincorporated areas of the County of Riverside. VSD provides collection system services to a population of approximately 76,000. The original Sewer Master Plan was prepared in 2003 by Dudek & Associates, Inc. Since then, growth and infrastructure improvements to support growth within the VSD service area have demonstrated the need to update the previous Sewer Master Plan. The intent of the updated Master Plan is to assist VSD in planning for near-term and build-out development. As part of the Master Plan, a sewer hydraulic model is developed to evaluate the collection system capacity for existing, near-term, as well as future flow conditions. A Capital Improvement Program (CIP) is developed based on hydraulically deficient pipes identified by the model. The purpose of the CIP is to help VSD identify the prioritized collection system infrastructure projects required to support the growth expected to occur within the VSD service area. It is recommended that VSD update this Master Plan every five years to account for changes in the growth pattern that could impact the sewer flows, which in turn could impact the infrastructure requirements.

VSD was formed in 1925 and primarily serves the city of Indio, California. The city of Indio encompasses approximately 96 percent of the VSD service area, while the remaining 4 percent is comprised of portions of the City of La Quinta and City of Coachella, as well as unincorporated land in Riverside County. VSD operates and maintains 246 miles of sanitary sewer line and delivers over 6 million gallons per day (gpd) of wastewater to its 11 million gallons per day (mgd) wastewater treatment plant (WWTP) on Van Buren Street and Enterprise Way.

Table 2-4 shows the breakdown of generalized land use category and the percentage of area each category that occupies the existing VSD service area.

Table 2-4
Existing Land Use

Land Use	Area (acres)	Area (sq. mi.)	Percentage of Total Area of VSD (%)
Commercial	617	0.96	4.8
Industrial	425	0.66	3.3
Mixed Use	119	0.19	0.9
Open	6,763	10.57	52.5
Public	359	0.56	2.8
Residential High	987	1.54	7.7
Residential Low	2,475	3.87	19.2
Residential Medium	1,030	1.61	8.0
Vacant and Septic[1]	107	0.17	0.8
Total	**12,882**	**20.13**	**100.0**

[1] : This category is not present in the Build-out Land Use (Table 2-6) as there is not anticipated to be any septic or vacant land in the projected scenario as a conservative estimate.

Population projection data is provided for each Census tract and evaluated from year 2010 through 2035 in five-year increments, as shown in **Table 2-5**. Population within the VSD service area is expected to increase almost 60 percent from year 2010 to 2035.

Table 2-5
Existing and Projected Population within VSD Service Area

Year	VSD Population
2010	76,036
2015	87,486
2020	100,387
2025	106,923
2030	113,681
2035	120,676

Table 2-6 summarizes land use for the build-out scenario.

Table 2-6
Build-out Land Use

Land Use	Area (acres)	Area (sq. mi.)	Percentage of Total Area of VSD (%)
Commercial	1,063	1.66	8.25
Industrial	542	0.85	4.21
Mixed Use	777	1.21	6.03
Open	3,574	5.58	27.74
Public	457	0.71	3.54
Residential High	4,437	6.93	34.45
Residential Low	1275	1.99	9.9
Residential Medium	758	1.18	5.88
Total	**12,882**	**20.13**	**100**

ES.3 EXISTING SEWER SYSTEM

This section describes VSD's existing sewer infrastructure. The existing wastewater collection system consists of over 246 miles of pipes, 5 active pump stations, 8 siphons, and a wastewater treatment plant (WWTP). The collection system is comprised primarily of polyvinyl chloride (PVC) and vitrified clay pipe (VCP). The oldest known sewer pipes that are still in operation were connected to the system in 1935. Roughly half of VSD's pipes have been built within the last 20 years.

The collection system consists of pipes ranging from 4- to 54-inches in diameter. 8-inch or smaller diameter pipes make up roughly 75 percent of the gravity sewer system. **Table 3-1** presents the distribution of pipe sizes for the VSD collection system.

Table 3-1
Pipes by Diameter Summary

Diameter (in)	Total Length (feet)	Total Length (miles)	Percentage of Total Length (%)
8 or less	970,454	183.8	75%
10	114,208	21.6	9%
12	57,873	11.0	4%
15	74,482	14.1	6%
16	1,271	0.2	0%
18	34,681	6.6	3%
21	3,942	0.7	0%
24	12,491	2.4	1%
27	15,439	2.9	1%
30	2,730	0.5	0%
36	7,113	1.3	1%
42	708	0.1	0%
48	3,253	0.6	0%
54	117	<1	<1%
TOTAL	**1,298,762**	**246.0**	**100%**

The VSD collection system has eight inverted siphons. All siphons in the VSD system are single barrel pipes with the exception of the triple barrel pipes crossing the Coachella Valley Water District (CVWD) stormwater channel located east of Van Buren Street and 45th Avenue. This siphon includes one 16-inch, one 20-inch, and one 24-inch diameter pipe. Based on the record drawings of this siphon, there is a fourth barrel designated for future recycled water (16-inch) which is not included in the sewer model. **Table 3-3** lists the siphons for the VSD system that are input into the sewer model.

Table 3-3
Summary of VSD Siphons

No.	Siphon Start Node	Siphon Stop Node	Siphon Model ID	Diameter (in)	No. of Barrels	Location
1	10B-M035	10B-M040	10B-M035_10B-M040	15	1	Northeast of Jefferson St. and Highway 111
2	9C-M265	9C-M270	9C-M265_9C-M270, CDT-11	12	1	East of Westward Ho Dr. and Spyglass Hills St.
3	6D-M115	6D-M120	6D-M115_6D-M120, CDT-21, CDT-23, CDT-25	15	1	Along Fred Waring Dr. east of Madison St.
4	5D-M072	5E-M005	5D-M072_5E-M005	12	1	South of Indio Blvd., north west of the intersection of Jonquil Ave. and Wild Rose St.
5	6F-M330	6F-M335	6F-M330_6F-M335	15	1	Avenue 44 and Indio Blvd., west of Monroe St., running under Railroad tracks
6	6F-M030	6F-M205	6F-M030_6F-M205, CDT-17, CDT-19	8	1	Intersection of Oleander Ave. and Monroe St.
7	5G-M080	5G-M085	5G-M080_5G-M085, CDT-13, CDT-15	8	1	On Crest Ave. between Grove St. and Arabia St.
8	8J-M125	8J-M130	8J-M125_8J-M130_3, CDT-43, 8J-M125_8J-M130_2, CDT-35, CDT-45, CDT-37, CDT-29, CDT-31, CDT-33	16,20,24	3	CVWD stormwater channel east of Van Buren St. and 45th Ave.

VSD operates all 5 of the 6 pump stations within its collection system. There are two pumping units for each pump station, with varying capacity from 2 to 15 horsepower (hp). VSD’s two largest pump stations are the Calhoun Pump Station at 15 hp and Barrymore Pump Station at 10 hp.

Table 3-5
Pump Stations

Station No.	Station Name	Year Installed	No. of Pumps	Horsepower Per Pump	Pump Capacity	Modeled (Y/N)
1	Calhoun	2005	2	15	630	Y
2	Carver	1967	2	5	320	Y
3	Shields	2001	2	8.7	300	Y
4	Vandenberg	2007	2	2	110	Y
5	Barrymore	1979	2	10	800	N

ES.4 MODEL DEVELOPMENT AND CALIBRATION

Bentley's SewerGEMS V8i, SELECTseries 2 software is used to model the VSD sewer system. SewerGEMS is a fully dynamic model based upon EPA SWMM 5 engine, and utilizes the explicit solutions of the St. Venant equations, which permits accurate analysis of reverse flows and backwater conditions. SewerGEMS can be run in the ESRI ArcGIS, Version 10 environment, which allows for a modeling system that can be fully integrated with (Geographic Information System) GIS software and permits all the advanced ArcGIS functions to be utilized. The VSD model is built using the ArcGIS integrated version of SewerGEMS. SewerGEMS includes several tools used throughout model development including ModelBuilder to construct the model using GIS asset information and LoadBuilder to allocate flow.

The process of creating the sewer model includes: utilizing an existing GIS shapefile to form a preliminary sewer network, review and verification of existing sewer facilities, establishment of bas dry weather flows, allocation of wastewater flows, and model calibration. **Table 4-10** and **Table 4-11** summarize calibration results for the modeled weekend and weekday, respectively.

Table 4-10
Weekend Day Calibration Results

Flow Monitor Number	Monitor ID	Purpose	Calibration Day Average Flows (gpm)	Model Average Flows (gpm)	Difference Between Calibration Day and Flow Monitor Data (%)
1	13C-M085	Low Density	44.7	49.1	9%
2	12E-M360	Medium Density	69.3	75.4	9%
3	11F-M070	High Density	48.9	57.6	16%
4	9G-M020	Public	4.9	4.9	1%
5	9F-M360	Commercial	43.6	43.9	1%
6	11J-M095	Calibration	1290	1466.1	13%
7	10I-M140	Calibration	1700.2	1518.2	-11%
8	10I-M110	Calibration	519.1	638.6	21%
9	7I-M060	Calibration	459.6	425.2	-8%
10	7J-M055	Calibration	952.8	918.1	-4%
N/A	Outfall-1	Calibration	4848.1	5642.8	15%

Table 4-11
Weekday Calibration Results

Flow Monitor Number	Monitor ID	Purpose	Calibration Day Average Flows (gpm)	Model Average Flows (gpm)	Difference Between Calibration Day and Flow Monitor Data (%)
1	13C-M085	Low Density	41.9	44.1	5%
2	12E-M360	Medium Density	53.2	56.7	6%
3	11F-M070	High Density	48.2	55.3	14%
4	9G-M020	Public	7.3	7.7	5%
5	9F-M360	Commercial	39.6	40.1	1%
6	11J-M095	Calibration	1212	1271.8	5%
7	10I-M140	Calibration	1587.5	1453.6	-9%
8	10I-M110	Calibration	514.6	626.1	20%
9	7I-M060	Calibration	367.8	380.3	3%
10	7J-M055	Calibration	875.4	828.1	-6%
N/A	Outfall-1	Calibration	4564.2	5098.7	11%

ES.5 SEWER SYSTEM CAPACITY EVALUATION

The sewer system hydraulic model is used to assess the existing system performance. In addition to evaluating the existing system during dry weather conditions, the model is able to evaluate operation of the system during future projected flow conditions (5-year planning and build-out scenarios). Wet weather conditions were not observed during the flow monitoring period; therefore, the model is primarily based on dry weather assessment criteria.

The model is used to evaluate three different conditions: existing conditions, 5-year planning horizon, and future conditions. Future conditions attempt to model the worst-case scenario (i.e. the system under full build-out conditions). For the VSD model, the existing weekend flow is slightly greater than the existing weekday flow and is therefore considered the worst-case scenario. The criteria used to evaluate dry weather flow for all the flow conditions include:

- All modeled pipes in the existing and 5-year scenario with a d/D ratio (depth of flow in pipe divided by the pipe diameter) greater than the design criteria (d/D ratio of 0.5 or less for pipes smaller than 18 in. in diameter, ratio of 0.75 or less for pipes 18-in. or greater in diameter) are documented and reviewed
- All modeled pipes in the build-out scenario with a d/D ratio equal to or greater than 0.9 are reviewed for potential improvement

The VSD hydraulic model was used to evaluate the system deficiencies for the existing system. In order to evaluate the system, the model was run under the known existing conditions and flows, as calibrated to the flow monitoring data. Once the model was run, the maximum d/D for each pipe in the system that received flow was analyzed, and any pipes that flowed over design capacity were identified.

Pipes 18-inches or more in diameter with a d/D greater than 0.75, and pipes less than 18-inches in diameter that with a d/D over 0.50 were identified in the hydraulic model. Furthermore, any pipes with a d/D greater than 1.0 were identified as a surcharged pipe. **Table 5-1** shows the results of this analysis for each of the three scenarios for both a typical weekend day and weekday under existing conditions.

will be thickened so that it is suitable for stabilization in the anaerobic digesters.   In this manner, the digester gas production level will increase substantially once a means of thickening and digester capacity are available.

At present, well over 50% of all digester gas generated at the WRF is flared as a means of disposal. A small amount of digester gas is used in winter for heating water in the boilers for the digesters to maintain temperature.

Table 5-1
Summary of Surcharged and Impacted Pipes

	Existing Scenario	5-Year Scenario	Build-out Scenario
Number of Surcharged Pipes	81	108	409
Number of Pipes above Design Capacity	235	295	832
Total Number of VSD Modeled Pipes	3422	3422	3422
% of Surcharged Pipes	2.40%	3.20%	12.00%
% of Pipes above Design Capacity	6.90%	8.60%	24.30%

From this process, certain areas of the system were identified as areas of concern (AOCs) for one or more of the scenarios. **Table 5-2** lists these AOCs and gives the pertinent cross streets for the impacted areas.

Table 5-2
Areas of Concern (AOCs)

AOC Number	Location	Cross Street
Existing System Evaluation		
1	Dr. Carreon Blvd/ Highway 111	Dr. Carreon Blvd. from Monroe St. to Calhoun St.
2	Jackson St. and Dr. Carreon Blvd.	Date St. and Arabia St. to Dr. Carreon Blvd and Jackson St.
3	Highway 111 North	Highway 111 and Arabia St. to Oak Ave. and Indio Blvd.
4	Avenue 48 West	Avenue 48 between Jefferson St. and Shields Rd. to Avenue 48 and Madison St.
5	Dillon Ave./ Avenue 45	Palo Verde Ave. and Dillon Ave, ending between Avenue 45 and Interstate 10
6	Palo Verde St. / Avenue 44	Avenue 44 and Jackson St. to Palo Verde Ave. and Sonora Ave.
7	Sola St.	Along Sola street from Kenner Ave to El Paseo Ave.
5-Year Planning Horizon System Evaluation		
8	Desert Grove Dr.	Desert Grove Dr. between Avenue 49 and Avenue 48
9	Avenue 49	Orchard Dr. and Avenue 49 to Desert Grove Dr. and Avenue 49
Build-Out System Evaluation		
10	Lago Vista	Lago Brezza Dr. and Armonia Ct. to Avenue 44 and Lago Vista
11	Avenue 46	Avenue 46 from east of Clinton St. to Monroe St.

ES.6 PIPELINE REPLACEMENT EVALUATION

This section of the Sewer Master Plan describes a pipeline replacement program for Valley Sanitary District (VSD) based on the observed condition data obtained through closed-circuit television (CCTV) and estimated condition based on age of the pipelines. This section presents a systematic, decision-making framework for prioritizing condition assessment activities, VSD's existing closed-circuit television (CCTV) assessment data, and pipeline replacement and rehabilitation prioritizations based on the CCTV data.

Pipelines are ranked according to the combined probability and consequence of failure to the community. Based on the observed condition score from the CCTV data and the consequence of failure, the numerical risk rating was calculated. The risk rating methodology allocates equal weight to the consequence of failure score and the observed or predicted condition score. While the numerical risk rating provided a basis to identify pipes for replacement and rehabilitation, it should be used in conjunction with sound engineering judgment. Therefore, in the case of pipe renewal, a modified alphabetical risk rating, **Table 6-5**, was derived from the numerical risk rating that incorporates the rationale discussed above. The highest risk ratings are at the bottom right of the table while the lowest risk ratings are at the top left of the table.

Table 6-5
Risk Rating for Pipe Renewal Prioritization

Risk Rating = Condition x Consequence (246.7 miles of pipeline)		**Condition Score (Observed or Predicted)**				
		1 Excellent (159.5.0 mi)	**2 Good** (28.5 mi)	**3 Fair** (34.1 mi)	**4 Poor** (17.3 mi)	**5 Very Poor** (7.3 mi)
Consequence of Failure Score	**C = 1 Low Impact** (200 mi)	1 = G (133.8 mi)	2 = F (20.2 mi)	3 = E (26.9 mi)	4 = D (13.2 mi)	5 = C (5.9 mi)
	B = 2 Medium Impact (16.7 mi)	2 = F (7.0 mi)	4 = E (3.8 mi)	6 = D (1.8 mi)	8 = C (2.7 mi)	10 = B (1.4 mi)
	A = 3 High Impact (30.0 mi)	3 = E (18.6 mi)	6 = D (4.4 mi)	9 = C (5.4 mi)	12 = B (1.4 mi)	15 = A (0.1 mi)

Note: The red and white dashed border represents categories which are recommended for replacement/rehabilitation. For "4=D," roughly 7.5 miles of the 13.2 miles are recommended for replacement/rehabilitation as those are the pipes that have CCTV available and where their condition has been confirmed. The remaining 5.7 miles should have CCTV footage taken in order to confirm condition and need for replacement/rehabilitation.

Based on the risk rating presented in **Table 6-5**, it is recommended that all pipelines with the ratings of A, B, or C (high risk category) be replaced or cleaned and televised according to the priorities shown in **Table 6-6**.

Table 6-6
Priority Letter Definitions

Priority	Definition
A	Construct within 0 to 3 years
B	Construct within 3 to 5 years
C	Construct within 5 to 10 years, or re-evaluate priority as required.
4 = D (CCTV)	Construct within 10 to 15 years
4 = D (no CCTV)	Clean and televise within 0–3 years and reevaluate replacement/rehabilitation options
6 = D (Fair)	Keep monitoring the pipe that have CCTV data and televise pipelines that don't have CCTV data within 3 – 5 years
D = 6 (Good)	Keep monitoring the pipe that have CCTV data and televise pipelines that don't have CCTV data within 3 – 5 years
E	Keep monitoring the pipe that have CCTV data and televise pipelines that don't have CCTV data within 5 – 10 years
F	Keep monitoring the pipe that have CCTV data and televise pipelines that don't have CCTV data within 5 – 10 years
G	No action required.

Table 6-7 is a prioritized list and planning level cost of pipes to be replaced or rehabilitated ranked from the highest risk rating to the lowest risk rating. Pipes with the highest alphabetical risk rating should be replaced or rehabilitated first. Of the 246 miles of pipeline, 24.3 miles need to be replaced or rehabilitated, which is equivalent to 9.9 percent of total pipeline length. This total length of pipe that needs to be replaced includes all pipes with a Risk Rating of A, B, and C, and those where D=4 and there is CCTV available. For the D=4 category, roughly 7.5 miles have CCTV available and need replacement/rehabilitation while the remaining 5.7 miles should have CCTV footage taken in order to confirm condition.

The costs in **Table 6-7** reflect a conservative, planning level estimate of costs. This cost assumes full replacement of pipes and does not consider the savings that could be realized through rehabilitation or partial replacement of the pipe sections. Actual cost for replacement will vary depending on individual conditions.

Table 6-7
Pipeline Replacement Costs

Diameter (in)	Cumulative Length (ft.)	Average Cost per foot ($)	Total Cost ($)
Risk Rating = A			
10	349	$160	$55,800
Risk Rating = B			
8	5,679	$130	$738,300
10	1,388	$136	$188,800
12	398	$172	$68,500
15	2,696	$209	$563,500
24	4489	$315	$1,414,000
Risk Rating = C			
8	37,633	$129	$4,854,600
10	2,752	$152	$418,300
12	5,256	$179	$940,800
15	16,256	$190	$3,088,700
18	6,609	$259	$1,711,700
24	4,495	$297	$1,335,000
30	735	$405	$297,700
Risk Rating = D (D=4)			
8	36,194	$121	$4,379,005
10	3,221	$135	$434,800
TOTALS			
Rounded (up to nearest 100)	128,150	-	$20,490,100

Assumptions:

- All pipes 6-inches in diameter were assumed to be replaced with 8-inch pipe
- All pipes 16-inches in diameter were assumed to be replaced with 18-inch pipe
- Any pipe without verified depth information is assumed to be 8 feet deep or less. Please note this is not a conservative estimate, but it is thought to be more accurate than assuming maximum depth
- Average Cost per Foot was calculated based on total cost divided by total length. Total Cost was calculated by finding the cost for the replacement of each individual pipe based on diameter, length, and depth as defined in Table 8-1
- Total costs are rounded to the nearest hundred

ES.7 RECOMMENDED IMPROVEMENTS

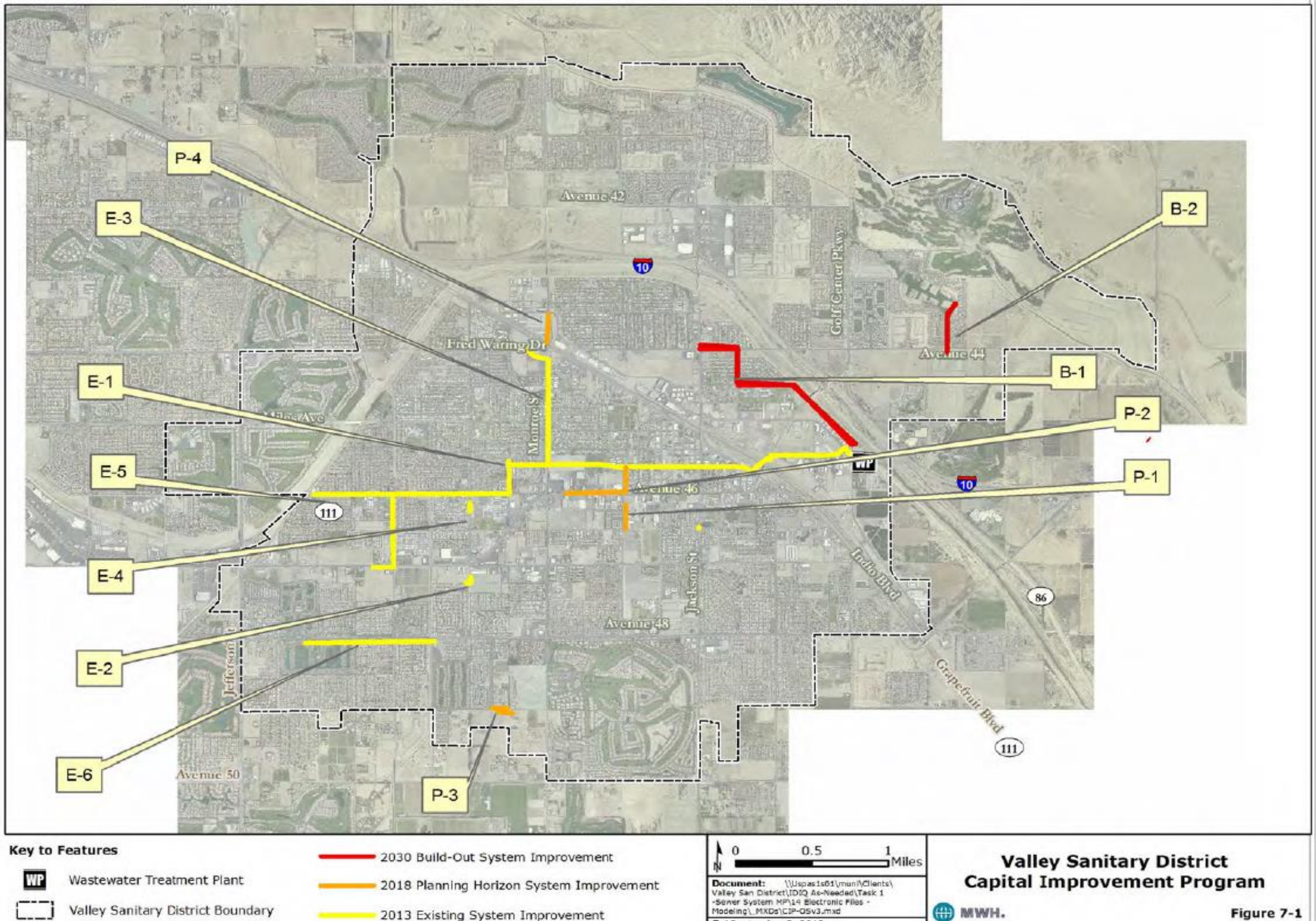
Improvements for the existing system are ordered according to the severity of the deficiency they address. Based on the hydraulic model and discussion with VSD, improvements to address capacity issues along Dr. Carreon Blvd. were identified to be a priority. Other priority improvements involve recommendations that relieve greater areas of concern (AOC). Locations of recommended improvement projects in the VSD collection system are shown on **Figure 7-1** and listed in **Table 7-1**.

Table 7-1
Recommended Improvements Summary

Project Number	Project Name	Description	Purpose	AOC Addressed	Phase	New or Upgrade	Operational Change	Size of Pipe (in)	Length of Pipe (ft.)	Total Length of Pipe (ft.)
E-1	Requa Interceptor	Interceptor from Madison street and Highway 111 to the WWTP	Relieve Dr. Carreon, take Shields PS offline, and service the jail expansion.	1, 2, 3, 12	Existing	New	No	24/ 30	20,906	20,906
E-2	Avenida Esmeralda Interceptor	15-inch line connecting Highway 111 to Avenue 48 via Calle Diamante	Temporary relief of Dr. Carreon Blvd.	1	Existing	New	No	15	368	368
E-3*	Monroe Interceptor Operational Change	Interceptor from Fred Waring Drive and Monroe Street south to the Requa Interceptor.	Take Monroe siphon offline and convey flows to the Requa Interceptor	1,5,6,7	Existing	N/A	Yes	N/A	N/A	N/A
E-4*	Clinton Street Operational Change	Operational change to send flows north on Clinton Street to the Requa Interceptor.	Relieve Dr. Carreon Blvd	1,5,6,7	Existing	N/A	Yes	N/A	N/A	N/A
E-5*	Shields Interceptor	Line from Shields PS east to Avenue 46.	Take Shield PS offline	1	Existing	New	No	10	1,427	1,427
E-6	Avenue 48 West Upgrade	Upsizing of 10-inch line extending west from along Avenue 48 from Madison St.	Relieve current and projected capacity issues for Avenue 48 West	4	Existing	Upgrade	No	15/18	670/ 2,875	3,545
P-1	Arabia Interceptor/ Jackson Street Operational Change	Bulkheading change and pipe improvements to divert flow from Dr. Carreon Blvd north to Highway 111	Relieve Dr. Carreon Blvd	1,2	5 year	New	Yes	8	850	850
P-2	Highway 111 Interceptor	Pipe connecting N. Hwy 111 to the Requa Interceptor	Relieve Dr. Carreon and increase Hwy 111 capacity in order to accommodate jail expansion	3	5 year	Both	No	12	2,979	2,979
P-3*	Avenue 49 Interceptor	Interceptor to convey flows from Avenue 49 to Monroe Street and then north to Avenue 48	Relieve Avenue 49 and Desert Grove Street	8,9	5 year	New	No	12	565	565
P-4	Industrial Pl./Market Interceptor	12-inch interceptor along Fred Waring Dr. from Industrial Pl. to Monroe St., sending flows down Market street	Relieve Sola Street, Palo Verde Street, Avenue 44, and Avenue 45	5, 6, 7	5 year	New	No	12	967	967
B-1	Ave 44/Palo Verde Interceptor and Upgrade	Interceptor to divert flows to 15-inch pipe along Avenue 44 from Palo Verde Street, as well as upsizing of surrounding pipes	Relieve Palo Verde and Avenue 45	6	Buildout	Both	No	12/18	2,639/4,942	7,581
B-2	Lago Vista Upgrade	Upsizing of pipes along Lago Vista to relieve capacity issues	Relieve Lago Vista	11	Buildout	Upgrade	No	15/18	1697	1697

Note: Prefixes to project number stand for Existing (E), Planned (P), and Build-out (B).

*These improvement projects are dependent upon the Requa Interceptor being built and in service.



Valley Sanitary District
Capital Improvement Program

Figure 7-1

ES.8 CAPITAL IMPROVEMENT PROGRAM

The CIP project cost estimates in this section are planning level cost estimates. The estimate was prepared using a combination of parametric estimating factors and local experience in delivering projects similar to those that constitute VSD's CIP. Costs were based on MWH's experience with costs of similar projects in the Coachella Valley. The original costs were developed in March 2010. In order to estimate change in costs from March 2010 to June 2013, price indices from Engineering News Record (ENR) were used to create and adjustment factor that was applied to all costs. The ENR Construction Cost Index for March 2010 was 8671, while the same index has a value of 9542 for June 2013. Therefore, an adjustment factor of 1.1 (9542 divided by 8671) will be used to adjust historical price estimates, and all values are then rounded up to the nearest $5 as a conservative estimate. All improvements are assumed to take place under asphalt road, and operations and maintenance costs are not included in this estimate.

Table 8-12 presents a summary of all recommended projects and the associated total project costs. **Table 8-13** presents these project costs phased out for each planning phase, as well as gives a final cost estimate that includes a 30 percent contingency factor, a 15 percent engineering and administration estimate, and a 10 percent construction management factor. Based on these results, the total cost for all recommended improvements equals roughly $49,390,400, where $31,759,600 is the cost of replacement calculated in Section 6, and $17,630,800 is the cost calculated in this section. It is of note that these costs are a conservative estimate, and in the case of those costs associated with the replacement program outlined in Section 6, it has been assumed that full replacement will be necessary for all pipes, while in fact many of the pipes may be able to be rehabilitated at a lower cost. Costs for pipes that needed replacement based on both capacity concerns and conditions concerns were only counted in the Section 8 costs above, and not counted again in the Section 6 costs.

Table 8-12
Summary of CIP Estimated Costs

Project No.	Project Name	Total Construction (Const.) Cost ($)	30% Contingency ($)	15 % Eng. and Admin. ($)	10% Constr. Mgmt. ($)	Rounded Total Cost ($)
E-1	Requa Interceptor	7,236,300	2,170,900	1,085,400	723,600	11,216,300
E-2	Avenida Esmeralda Interceptor	90,400	27,100	13,600	9,000	140,100
E-3	Monroe Interceptor Operational Change	N/A	-	-	-	-
E-4	Clinton Street Operational Change	N/A	-	-	-	-
E-5	Shields Interceptor	278,300	83,500	41,700	27,800	431,400
E-6	Avenue 48 West Upgrade	823,100	246,900	123,500	82,300	1,275,800
P-1	Arabia Interceptor/ Jackson Street Operational Change	101,200	30,400	15,200	10,100	156,900
P-2	Highway 111 Interceptor	576,900	173,100	86,500	57,700	894,200
P-3	Avenue 49 Interceptor	98,900	29,700	14,800	9,900	153,300
P-4	Industrial Pl./Market Interceptor	169,300	50,800	25,400	16,900	262,400
B-1	Ave 44/Palo Verde Interceptor and Upgrade	1,576,300	472,900	236,400	157,600	2,443,300
B-2	Lago Vista Upgrade	424,000	127,200	63,600	42,400	657,200
Pipe Replacement Costs from Section 6		20,490,100	6,147,000	3,073,500	2,049,000	31,759,600
Total (Rounded)		**31,864,800**	**9,559,400**	**4,779,700**	**3,186,500**	**49,390,400**

Note: June 2013 dollars, costs rounded to nearest hundred.

Table 8-13
Phased CIP Costs

Scenario	Existing	5-Year	Build-Out
Estimated Construction Cost from Section 8 ($)	8,428,100	946,300	2,000,300
Estimated Construction Cost from Section 6 ($)	3,028,900	17,461,200	0
Subtotal	**11,457,000**	**18,407,500**	**2,000,300**
30% Contingency ($)	3,437,100	5,522,300	600,100
15% Engineering and Administration Costs ($)	1,718,600	2,761,100	300,000
10% Construction Management ($)	1,145,700	1,840,800	200,000
Rounded Total Cost ($)	**17,758,400**	**28,531,600**	**3,100,400**

Note: June 2013 dollars, costs rounded to nearest hundred.