

Section 9 - System Evaluation and Capacity Assurance Plan

A. Introduction

The intent of this section of the SSMP is to document the City's planning efforts to assess the current capacity of the wastewater collection system, determine if there are current or expected planned needs, develop a capital improvement plan (CIP) for identified capacity needs, and fund the CIP program so that the wastewater conveyance needs are met before the capacity of the system is exceeded.

B. Regulatory Requirement

The Enrollee shall prepare and implement a capital improvement plan that will provide hydraulic capacity of key sanitary sewer system elements for dry weather peak flow conditions, as well as the appropriate design storm or wet weather event. At a minimum, the plan must include:

- a. **Evaluation:** Actions needed to evaluate those portions of the sanitary sewer system that are experiencing or contributing to an SSO discharge caused by hydraulic deficiency. The evaluation must provide estimates of peak flows (including flows from SSOs that escape the system) associated with conditions similar to those causing overflow events, estimates of the capacity of key system components, hydraulic deficiencies (including components of the system with limiting capacity) and the major sources that contribute to the peak flows associated with overflow events.
- b. **Design Criteria:** Where design criteria do not exist or are deficient, undertake the evaluation identified in (a) above to establish appropriate design criteria; and
- c. **Capacity Enhancement Measures:** The steps needed to establish a short- and long-term CIP to address identified hydraulic deficiencies, including prioritization, alternatives analysis, and schedules. The CIP may include increases in pipe size, I/I reduction, increases and redundancy in pumping capacity, and storage facilities. The CIP shall include an implementation schedule and shall identify sources of funding.
- d. **Schedule:** The Enrollee shall develop a schedule of completion dates for all portions of the capital improvement program developed in (a) – (c) above. This schedule shall be reviewed and updated consistent with the SSMP review and update requirements as described in Section D. 14.

C. City Of Ceres System Evaluation and Capacity Assurance Plan

The City completed an assessment of the capacity needs for the wastewater collection system on June 15, 2009 as part of the General Plan Update. As part of the plan, the City evaluated growth as well as infiltration and inflow into the system, which historically has not been too much of a problem for the City. From the wastewater collection system planning work performed, the City identified specific projects that were needed and included them in the CIP list.

Attached : Wastewater Collection System Capacity Analysis

City of Ceres
Technical Memorandum

Wastewater Collection System Capacity Analysis Update

Prepared For: Glenn Gebhardt, City Engineer, City of Ceres

Prepared By: Melissa Lee, P.E. and Nathan Wilson, EIT

Reviewed By: Neal Colwell, P.E.

Date: June 15, 2009

1.0 BACKGROUND

In October 2008, ECO:LOGIC submitted the *City of Ceres Preliminary Wastewater System Capacity Analysis* to the City of Ceres (City). The report included an analysis of existing capacity in major City wastewater collection system facilities. The report was intended to meet the capacity evaluation requirements of the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems (WDR 2006-003) and general approaches were provided to mitigate areas where significant deficiencies were identified. However, flow monitoring conducted for the analysis in the winter of 2007-2008 yielded storms with a relatively small impact on the system. The results of the analysis were therefore considered somewhat more conservative than they needed to be. One of the recommendations from the report was to perform further monitoring and to update the capacity analysis with the new data.

The current analysis provides a summary of the winter 2008-2009 flow monitoring data and outlines the results from the updated capacity analysis. Also provided are preliminary recommendations for focusing the upcoming master planning effort.

1.1 PURPOSE

The purpose of this study is to provide an update to the 2008 *City of Ceres Preliminary Wastewater System Capacity Analysis* (ECO:LOGIC) based on additional flow monitoring data obtained over the winter of 2008 – 2009. Flow monitoring was conducted in the system from December 18, 2008 to February 18, 2009. The monitors were located such that the data could be used to verify and update the previous capacity analysis, especially in areas of concern. The previous analysis was based on small storm events projected to a design storm level, which appears to have produced an overly conservative analysis in particular areas. This additional

flow monitoring has allowed for the previous results to be refined by the addition of several more storm events.

Existing wastewater collection system capacity is being confirmed in anticipation of the preparation of a wastewater collection system master plan. This capacity assessment is based on the intrinsic capabilities of key system components assuming generally good condition and an average level of preventive maintenance. The master plan will focus on facilities expansion alternatives and phasing to accommodate future planned growth within the City. As the city collects additional system condition information, the capital improvement plan should incorporate replacement and rehabilitation based on this information.

This portion of the report is divided into the following sections:

- Winter 2008-2009 Update Study Area
- Summary of Previous Capacity Results
- Service Road Sewer Improvement Project

1.2 WINTER 2008-2009 UPDATE STUDY AREA

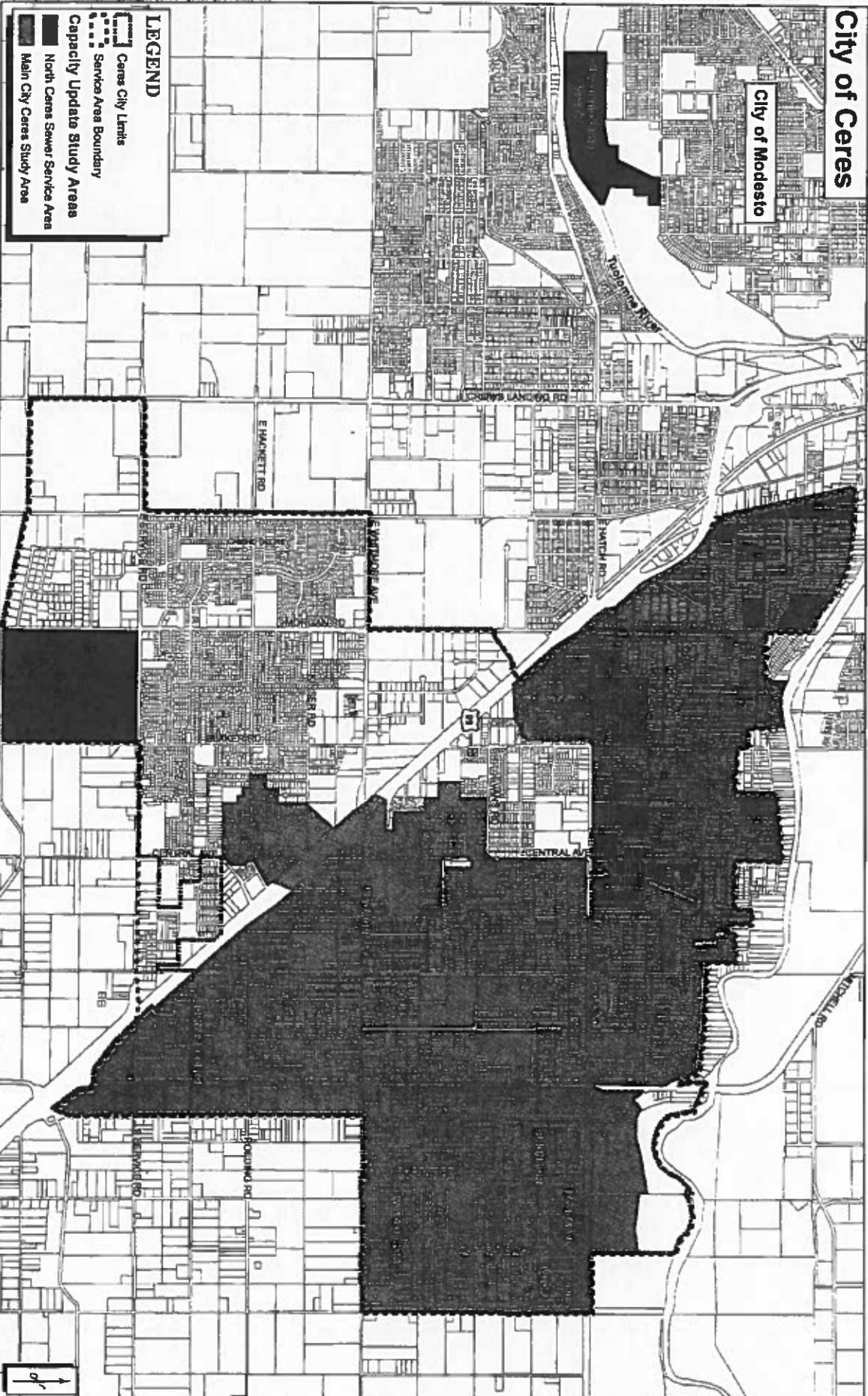
The study area for the update analysis is limited to the current City of Ceres Wastewater Collection System service area as shown in Figure 1. Specifically, this update covers areas of concern that were monitored a second time during the 2008-2009 winter season to update the previous analysis.

As can be seen in Figure 1, the study area includes the North Ceres Sewer Service Area (NCSSA), bounded by Highway 99 on the west, Hatch Road on the south, and Central Road on the east. This service area discharges to the Modesto WWTP. The remaining study area was in the portion of the collection system which discharges to the City WWTP.

This analysis is based solely on current flows from existing development within the City.

of Ceres

City of Modesto



ECOLOGIC Engineering - DRAFT
City of Caras Waterwaler Collection System Capacity Analysis Update

Figure 1
City of Ceres Existing Sanitary Sewer Service Areas

1.3 SUMMARY OF PREVIOUS CAPACITY RESULTS

In the October 2008 capacity analysis, a 10-year, 6-hour design storm was predicted to generate a peak flow of 10.2 Mgal/d at the WWTP with an additional peak flow of 3.5 Mgal/d directed to Modesto. The evaluation indicated that this storm event has the potential to cause 53 incidences of potential overflows. The locations of these potential overflows can be seen in Figure 2 and are described in more detail below. Following construction of the new headworks structure and use of the new 36/42 inch sewer on Service Road, the potential incidences of overflow are predicted to be reduced by 12 to a total of 41. The locations of potential overflow incidences after construction of the new headworks are presented in Figure 2. The following are the capacity deficient areas in the collection system previously known by the City and further confirmed in the previous study:

- **East Service Road 21-Inch Trunk:** The City is aware of the bottleneck in this area and has already completed construction on a new, larger (36- and 42-inch) parallel trunk sewer along East Service Road. However, this line will not be permanently put into service until the new (lower) headworks is completed (anticipated in fall 2010).
- **Barbour's Lift Station, Wix Lane, Mitchell Road, and Don Pedro Road Sewers:** The modeled results confirm the City's recent (January 2008) experience with surcharging and overflows in this area of the collection system.
- **Pine Street Lift Station:** This station pumps at a higher capacity than the downstream pipes can handle, and when combined with the back up caused by the 21 – inch trunk on Service Road, causes potential for surcharging and overflows.

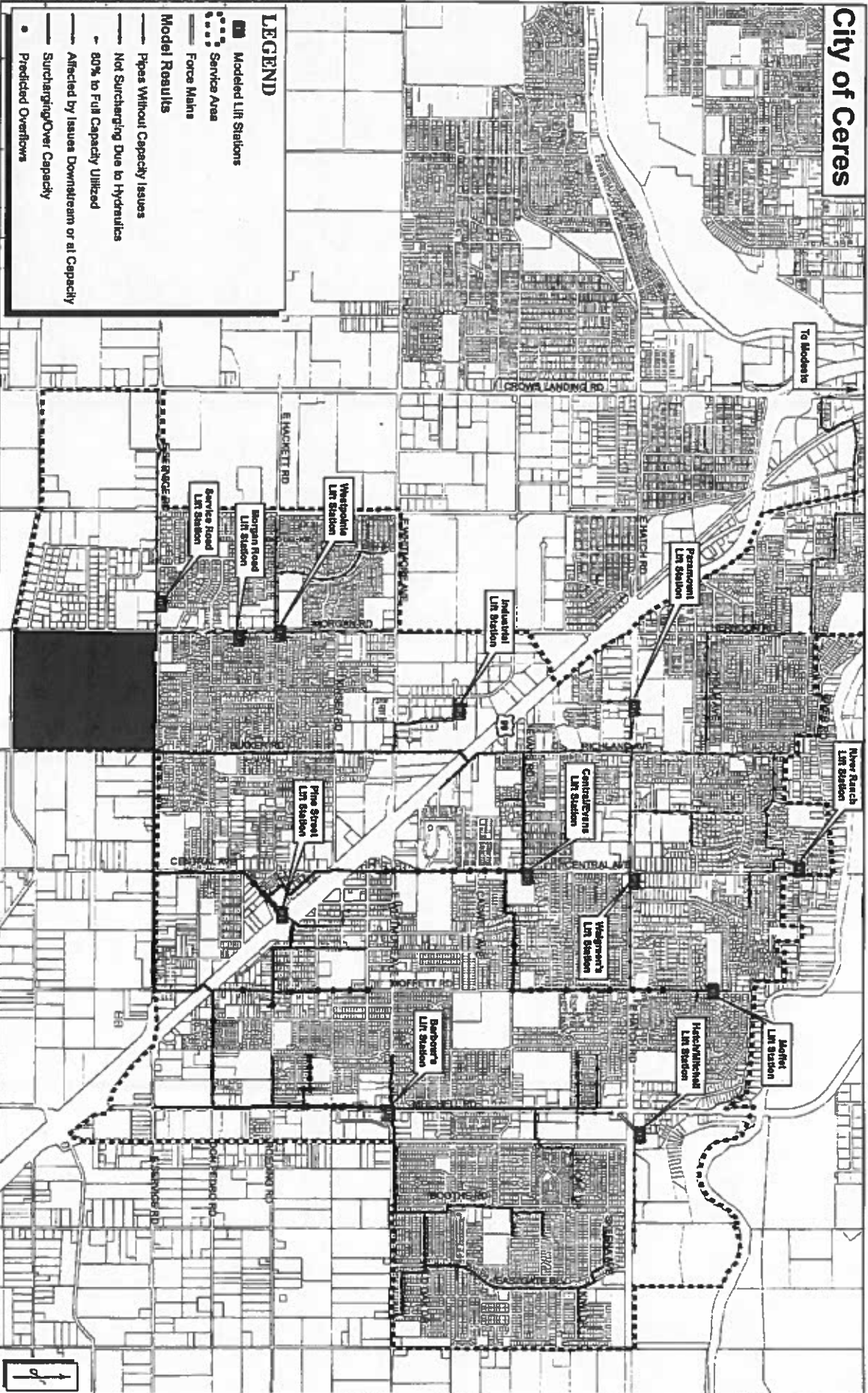
The following were indicated by the previous study as being areas of potential capacity deficiency:

- **Tributary to Pine Street Lift Station:** Modeled potential surcharging and overflows are likely due to high levels of rainfall dependent infiltration and inflow (RDI/I) from the condition of the collection system in this area.
- **Central Avenue:** The central portion of the sewer in Central Avenue (south of Evans Road into the Pine Street Lift Station) was indicated to have a significant potential for surcharging and overflows.
- **Acorn Lane and North Moffett Road:** Because the City has not experienced hydraulic capacity limitations or overflows in this area additional investigation was recommended prior to evaluating capacity enhancement measures.
- **Central/Evans Lift Station:** No overflows were modeled immediately upstream or downstream of the lift station; however capacity appears to be limited and appears to be influencing capacity in Acorn and Forest lanes. Downstream, the pipes were shown in the model to be affected by the capacity of the pumps being greater than the capacity of the downstream sewers; however this result has not been confirmed by City experience.

The City has not experienced the level of surcharging and overflows that were modeled in the four areas described above. It was assumed that because the calibration storm event was of a

relatively small return period, the flows predicted by the model during a 10-year, 6-hour design storm may have been overly conservative. In order to check and refine the model results for these new potential problem areas, flow monitors were strategically placed to gather additional data from these areas.

City of Ceres



ECO-LOGIC Engineering
City of Ceres Preliminary Wastewater System Capacity Analysis

October 2008 Capacity Analysis Existing System Model Results - 10-year, 6-hour Design Storm
Figure 2

1.4 SERVICE ROAD IMPROVEMENT PROJECT

The City has constructed a 36-inch line along Service Road from Central Avenue to Blaker Road, with a 42-inch pipe continuing on to the WWTP. This sewer is intended to replace the current 21 and 24-inch sewer in this location. The new sewer will be put into service in two phases. Both the interim and final phases are described in more detail below. Both scenarios were modeled with the updated flow monitoring data and the results are included in Section 3.

1.4.1 Service Road Sewer Interim Improvement

Originally, the new 36 and 42-inch sewers were to be brought online with the completion of a new, lower headworks at the WWTP. However, because the headworks has not yet been completed (anticipated to be constructed by fall of 2010) and the capacity issues along this stretch of sewer are causing significant impacts in the system, an interim solution has been devised. The new pipe will be brought online before the new headworks is built and will be routed to the old 24-inch sewer upstream of the existing headworks.

1.4.2 Service Road Sewer Final Improvement

Once the headworks for the WWTP has been completed (anticipated 2010), the 36/42 inch sewer will be permanently connected into the collection system, carrying all the flows previously routed through the 21/24 inch line. The 21/24 inch line will then be abandoned in place.

2.0 WINTER 2008-2009 FLOW MONITORING PROGRAM

The purpose of this section is to describe the flow monitoring program that was completed in the winter of 2008-2009 to supplement and refine the October 2008 capacity study results.

2.1 FLOW MONITORING

Temporary flow monitors were installed in five locations throughout the City's wastewater collection system (coordinated with the 10 locations in the first study). Locations were selected to verify flows in areas that were capacity impacted in the October 2008 study.

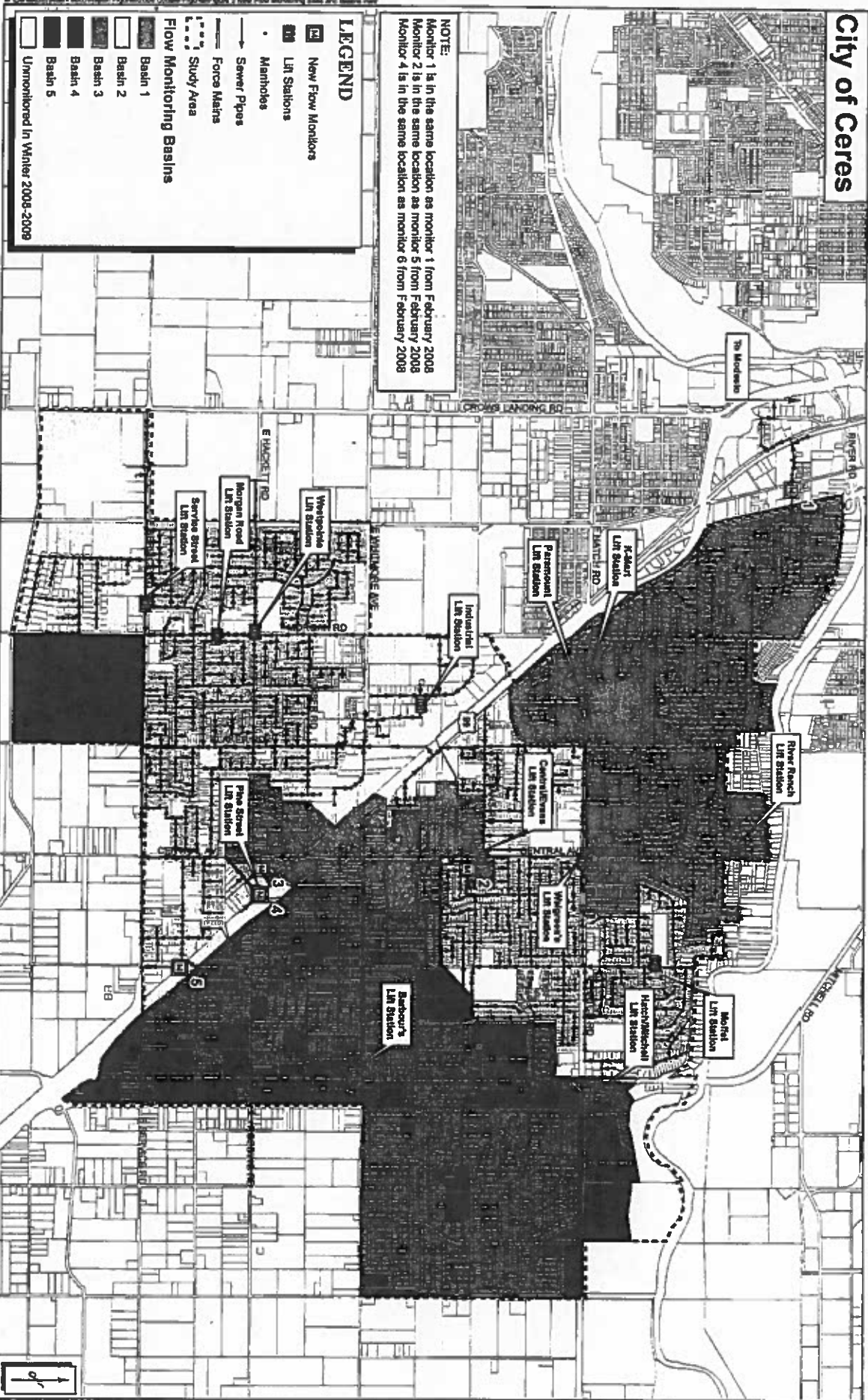
Flow was monitored for an eight-week period from December 18, 2008 to February 18, 2009. Flow monitoring locations and basins are shown in Figure 3, while a flow schematic of the sites and basins is included as Figure 4.

City of Ceres

NOTE:
 Monitor 1 is in the same location as monitor 1 from February 2008
 Monitor 2 is in the same location as monitor 5 from February 2008
 Monitor 4 is in the same location as monitor 6 from February 2008

LEGEND

- New Flow Monitors
 - Lift Stations
 - Manholes
 - Sewer Pipes
 - Force Mains
 - Study Area
- Flow Monitoring Basins**
- Basin 1
 - Basin 2
 - Basin 3
 - Basin 4
 - Basin 5
 - Unmonitored in Winter 2008-2009



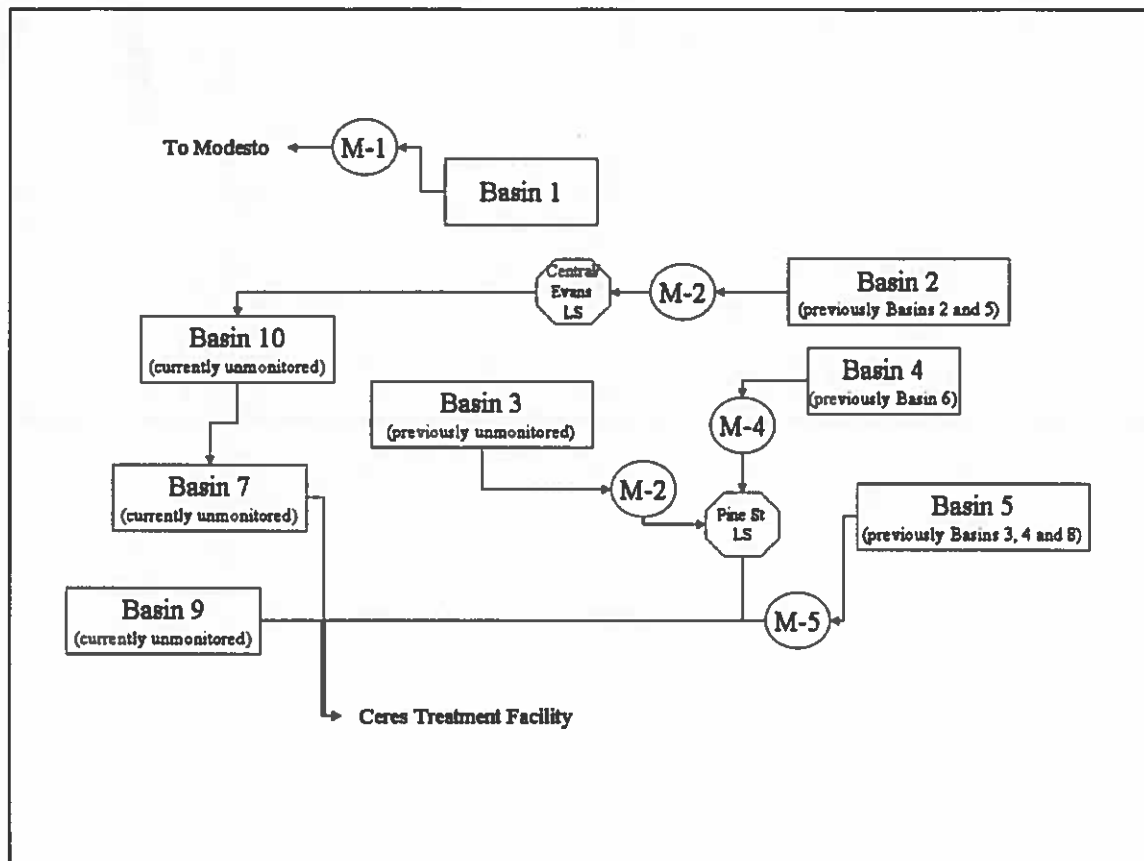


Figure 4
City of Ceres
Wastewater Collection System Flow Schematic

Average and peak flows observed at each new flow monitoring site during the flow monitoring period are shown in Table 1. Flows from the previous flow monitoring study are also included in the table for comparison.

Table 1
City of Ceres
Summary of Monitored Average and Peak Flows

Flow Monitoring Site	2008-2009 Flow Monitoring		2007-2008 Flow Monitoring	
	Average Flow (Mgal/d) ^(a)	Peak Flow (Mgal/d) ^{(a), (b)}	Average Flow (Mgal/d) ^(d)	Peak Flow (Mgal/d) ^(d)
1 ^{(c) (d)}	0.70	1.20	0.69	1.14
2 ^(e)	0.41	0.69	0.40	0.60
3	0.95	0.26	^(g)	^(g)
4 ^(f)	0.41	0.73	0.38	1.18
5	1.02	1.49	^(g)	^(g)

- (a) Mgal/d = million gallons per day.
 (b) Peak flows from monitoring sites taken from wet weather events.
 (c) Total flow to City of Modesto WWTP.
 (d) Also Site 1 from previous flow monitoring study.
 (e) Also Site 5 from previous flow monitoring study.
 (f) Also Site 6 from previous flow monitoring study.
 (g) Locations not monitored in 2008-2009 flow monitoring.

2.2 RAINFALL DATA

Rainfall data was collected from one rain gauge during the same eight-week period as the flow monitoring (December 18, 2008 to February 18, 2009).

Table 2 summarizes the five most significant rainfall events in the City of Ceres during the flow monitoring period.

Table 2
City of Ceres
Summary of Rainfall Events
December 18, 2008 to February 18, 2009

Storm Event No.	Total Rain (in)	Event Period
Event 1	0.39	12/25/2008 4:00 – 12/25/2008 10:00 (6 hours)
Event 2	0.43	1/23/2009 8:00 – 1/23/2009 23:00 (15 hours)
Event 3	0.24	1/25/2009 16:00 – 1/25/2009 19:00 (3 hours)
Event 4	0.35	2/13/2009 4:00 – 2/13/2009 8:00 (4 hours)
Event 5	0.64	2/16/2009 1:00 – 2/17/2009 17:00 (40 hours)

Each rainfall event during the flow monitoring period was classified as a storm event with a less than a one year return period. For comparison, a 10-year, 6-hour storm event in the City of Ceres is predicted to generate 1.25 inches of precipitation.

2.3 INFILTRATION AND INFLOW ANALYSIS SUMMARY

V&A completed the *Sanitary Sewer Flow Monitoring and Inflow / Infiltration Study* in March 2009 for the City of Ceres. The results of the inflow / infiltration (I/I) study are summarized below in Table 3. For comparison purposes, the results from the previous flow monitoring and I/I study are also included in the table.

Table 3
City of Ceres
Flow Monitoring and I/I Results Summary
December 18, 2008 to February 18, 2009

Flow Monitoring Site	Winter 2008 - 2009 Flow Monitoring					2008 Flow Monitoring		
	Average Flow (Mgal/d) ^(a)	Estimated Total I/I (gallons) ^(b)	R-Value (%)	Peak I/I Rate (Mgal/d)	Peak I/I to ADWF Ratio	R-Value (%)	Peak I/I Rate (Mgal/d)	Peak I/I to ADWF Ratio
1	0.70	443,000	0.71	0.46	0.65	1.06	0.45	0.66
2 ^(c)	0.41	128,000	0.43	0.24	0.58	0.39	0.20	0.49
3	0.19	139,000	0.84	0.25	1.29	--	--	--
4 ^(d)	0.41	178,000	0.78	0.25	0.60	0.48	0.79	2.08
5	1.02	399,000	0.50	0.46	0.45	--	--	--

(a) Mgal/d = million gallons per day.

(b) Total I/I is a summation of I/I of all 5 storm events during monitoring period.

(c) Same as Site 5 from previous flow monitoring study.

(d) Same as Site 6 from previous flow monitoring study.

In addition, the following items were highlighted in the 2009 Report from V&A (excerpt from pages 1, 2, and 20):

- **Inflow:** Site 3 had a higher specific inflow rate compared to the other flow monitoring sites.
- **Combined I/I:** Basin 3 had the highest combined infiltration/inflow contributions relative to basin size.
- **Groundwater Infiltration:** There may be slightly higher-than-normal groundwater infiltration occurring in the basins upstream from Site 3 during periods of dry weather flow. Site 3 appears to have the greatest groundwater infiltration rate.
- **Capacity (Peaking Factor):** All sites had peaking factors below the typical design threshold limit of 3.0 for peak flow to average dry weather flow ratio during this study. The peaking factor may have been skewed low because dry weather analysis was determined during wet weather months.
- **d/D Ratio:** Sites 2, 3 and 5 had peak d/D Ratios greater than 1, indicating a surcharged condition.

3.0 COLLECTION SYSTEM CAPACITY EVALUATION RESULTS

The purpose of this section is to provide a summary of the model results with updated flow monitoring data and calibration.

3.1 MODELED SCENARIOS

The model was updated to incorporate the most recent flow monitoring data. That is, observed wet weather flows were integrated into the wet weather calibration and used to fine tune the modeling process.

The following modeled scenarios were conducted at the existing level of development:

- Existing system during winter dry weather flow (includes more groundwater infiltration than summer dry weather flow)
- Existing system during winter dry weather flow with the interim mitigation on Service Road operational
- Existing system during design storm (10-year, 6-hour) event
- Existing system during design storm with the interim mitigation on Service Road operational
- Existing system during design storm with the final improvements on Service Road operational

The modeled results for the simulations described above are listed by pipe in Appendix B.

3.2 CAPACITY EVALUATION CRITERIA

In the October 2008 *City of Ceres Preliminary Wastewater System Capacity Analysis* the following criteria for acceptable levels of maximum surcharging in model simulations of the collection system were developed based on criteria used by other similar communities in California. These criteria are presented in Table 4. These recommended criteria were used to evaluate capacity in flow limited segments of sewer pipelines in all modeled scenarios.

Table 4
City of Ceres
Recommended Acceptable Manhole Surcharging
During Design Storm (10-year/6-hour) Conditions

Manhole Depth ^(a)	Acceptable Level of Manhole Surcharging
4 feet or less	None
Greater than 4 feet	Not to exceed 4 feet below ground surface

(a) Manhole depth as measured from the crown of the pipe to the rim of the manhole.

3.3 MODEL RESULTS

The average and peak flow model results are summarized in Table 5 and described in more detail in the sections below.

3.3.1 Winter Dry Weather Flow

Existing Collection System

At the existing level of development, model simulations indicated that the winter average dry weather flow for the existing system is approximately 3.6 million gallons per day (Mgal/d) at the City WWTP headworks. An additional 0.7 Mgal/d of flow from the northern part of the city is directed to the City of Modesto's WWTP.

At the diurnal peak during winter dry weather flow, the majority of pipes in the system were shown to be less than 80 percent full. However, as can be seen in Figure 5, there are significant capacity limitations in the southeastern corner of the collection system. Flows in that area are being significantly backed up by the hydraulic bottleneck existing at the sewer junction at the corner of Service Road and Central Ave. The bottleneck is caused by the 21 inch line which carries flow from this junction to the WWTP. This line has been identified by the City as being in extremely poor condition, so much so that it restricts flow greater than would be predicted in a 21 inch sewer in good to typical condition.

Another area of concern is with the two 12 inch lines which flow south from the Barbour's Lift Station to Don Pedro Road. The pumps at the lift station pump into the 12 inch lines at a flow nearly 40% higher than the capacity of the lines. This impact is shown in the increased potential for surcharging and overflows in the sewer along Mitchell and Don Pedro Roads downstream of the lift station. station

Model simulation results for the existing system during peak diurnal dry weather flow conditions are shown in Figure 5. Blue pipes show areas with no capacity issues. Pipes shown in green indicate pipes that normally would be experiencing surcharging conditions, but because of downstream hydraulics (i.e. discharging to a lower sewer, resulting in a drawdown curve) are flowing at conditions less than full capacity. Pipes shown in yellow have between 80 percent and 100 percent of capacity being utilized. Pipes shown in orange are at capacity or are being

impacted by problems downstream (i.e. at full capacity because of a bottleneck downstream). Pipes shown in red are experiencing surcharged conditions. It is important to note that the pipeline stretches shown in red and orange are causing surcharging of wastewater in the upstream manholes. In all of the surcharging pipes during dry weather flow, the level of surcharging is below the criteria recommended in Table 4.

Existing Collection System with Service Road Improvements

Once the interim Service Road improvements were added to the model (as described in Section 1.4.1), the results indicated no change in dry weather flow at the City WWTP headworks, or in the flow from the northern part to the City of Modesto's WWTP.

The impact of the improvements on the southeast portion of the collection system can be seen in Figure 6. Splitting the flow between the 21 inch line and the 36 inch line at the Service Road (interim improvement), the 21 inch line no longer causes a serious bottleneck.

Model results for the final improvement (as described in Section 1.4.2) show the same reduction in surcharging as the interim improvement during peak diurnal dry weather flow.

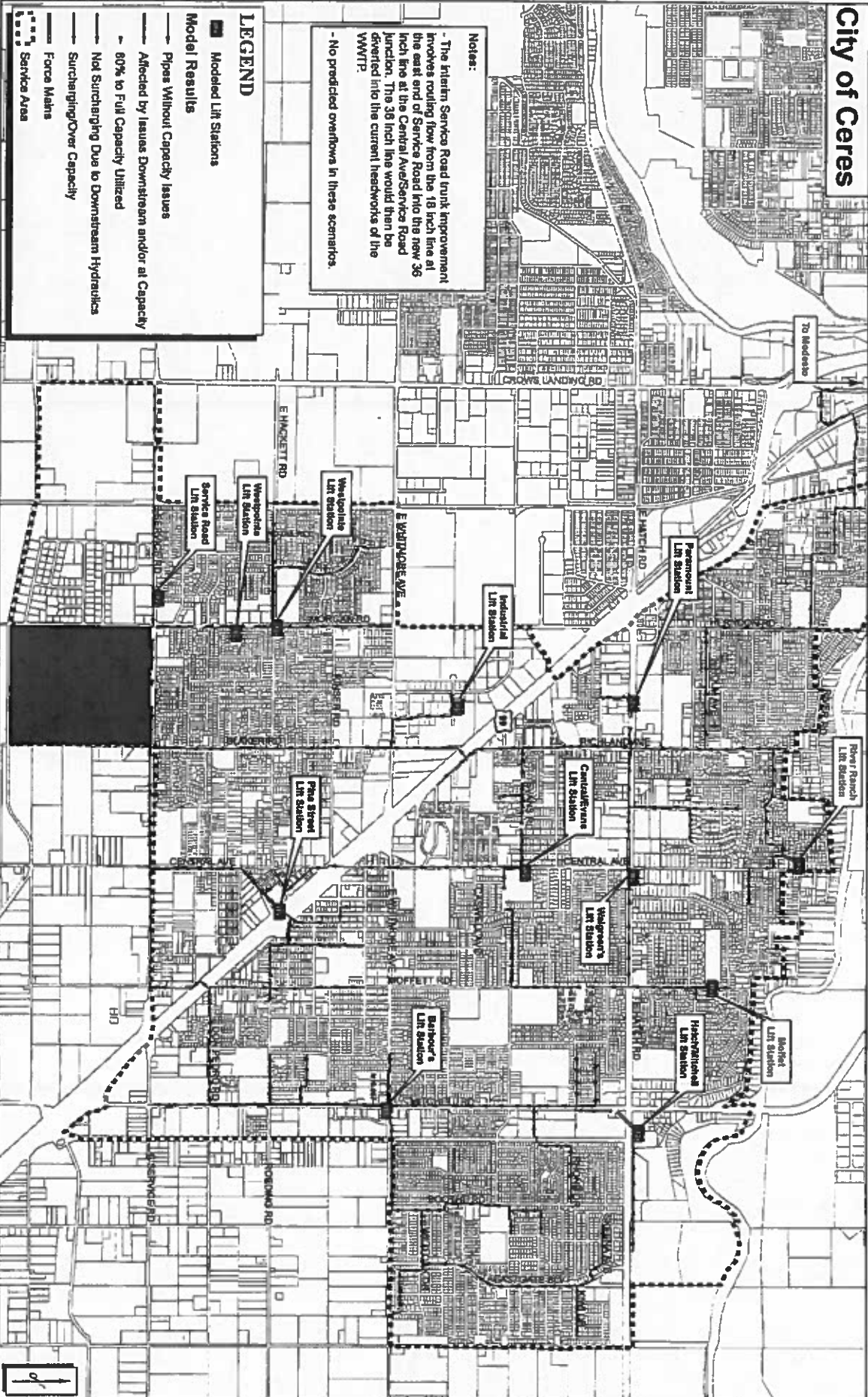
[illegible]

- This scenario does not include the planned mitigation projects for the capacity impacted sewer main on Service Road.
- No predicted overflows in this scenario.

- Model Results
 - Pipes Without Capacity Issues
 - Not Surcharging Due to Downstream Hydraulics
 - 80% to Full Capacity Utilized
 - Affected by Issues Downstream and/or at Capacity
 - Surcharging/Over Capacity
 - Force Mains
 - Service Area

Figure 5
Updated Existing System Model Results - Peak Diurnal Average Dry Weather Flow

City of Ceres



3.3.2 Design Storm (10-year, 6-hour)

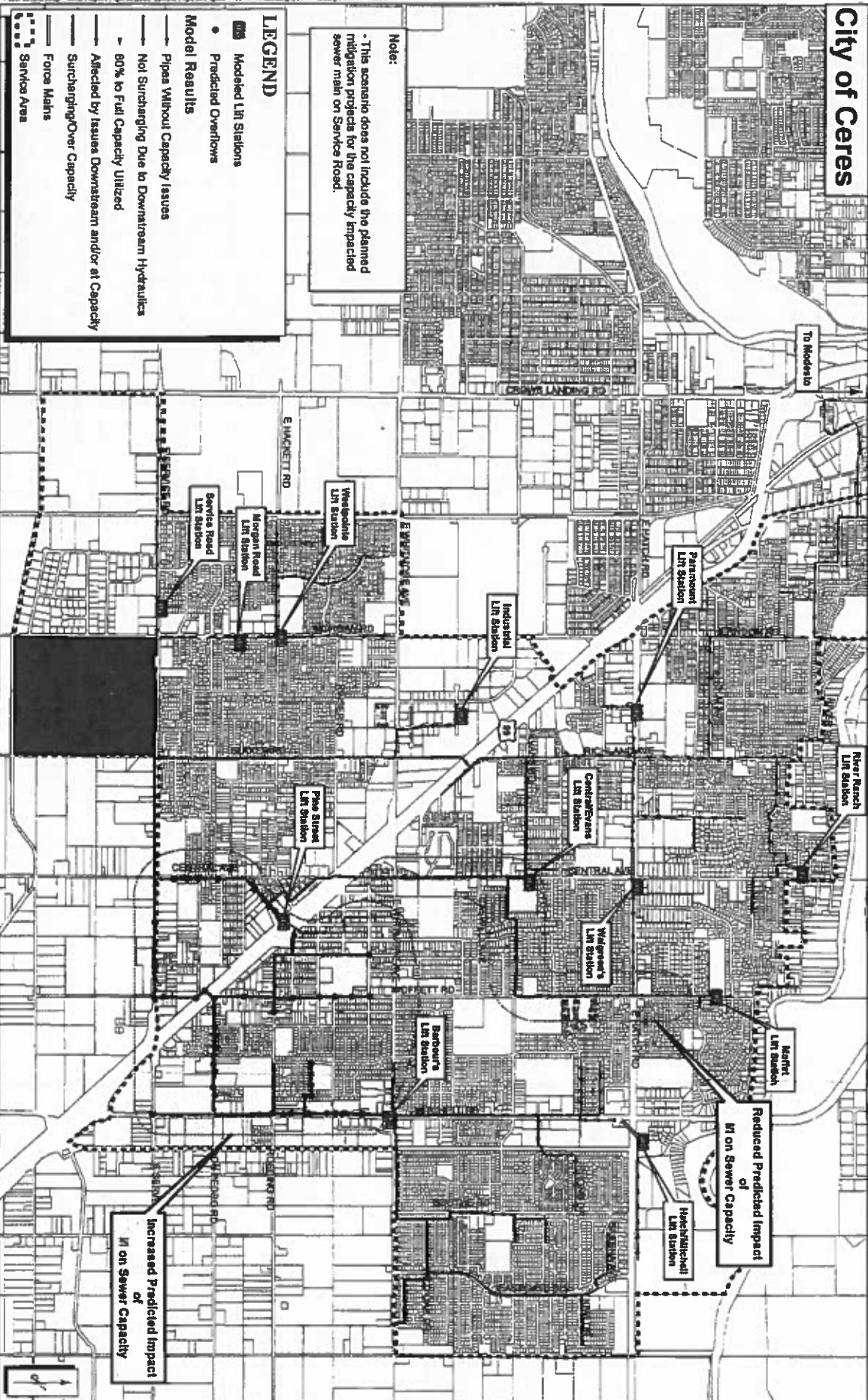
Existing Collection System

Under existing conditions, a 10-year, 6-hour design storm is predicted to generate a peak flow of 7.0 Mgal/d at the WWTP with an additional peak flow of 2.8 Mgal/d directed to Modesto. Evaluation of this storm event in the model shows the potential for as many as 60 manholes to overflow. The locations of these surcharges and potential overflows can be seen in Figure 7.

Changes to the Capacity Impact of the Design Storm on the System

Many of the predicted overflows directly result from the capacity-limited 21-inch line on Service Road. The model was modified to more accurately reflect existing pipe conditions by changing the roughness coefficient for pipes known to be in poor condition. This resulted in a high concentration of potential overflows in the areas upstream of the Service Road, Central Avenue Junction. However, there were other areas in the system, not affected by the 21 inch line, which experienced a change in expected capacity impact due to the new flow monitoring data. These areas are highlighted in Figure 7 and are described in more detail below.

City of Ceres



ECOLOGIC Engineering - DRAFT
City of Ceres Wastewater Collection System Capacity Analysis Update

Updated Existing System Model Results - Peak Flow During 10-year, 6-hour Design Storm
Figure 7

Sewer Lines Tributary to Pine Street Lift Station – Increased RD/I Impact

The sewer network which flows into the Pine Street Lift Station from the east collects flows from the oldest portion of the City. As can be seen in Figure 8, there were only two wet weather flow events which were captured in the winter 2007-2008 flow monitoring. In winter 2008 – 2009, however, several usable wet weather flow events were captured. These flow events indicated a more severe I/I component during wet weather flow in this area than had previously been predicted.

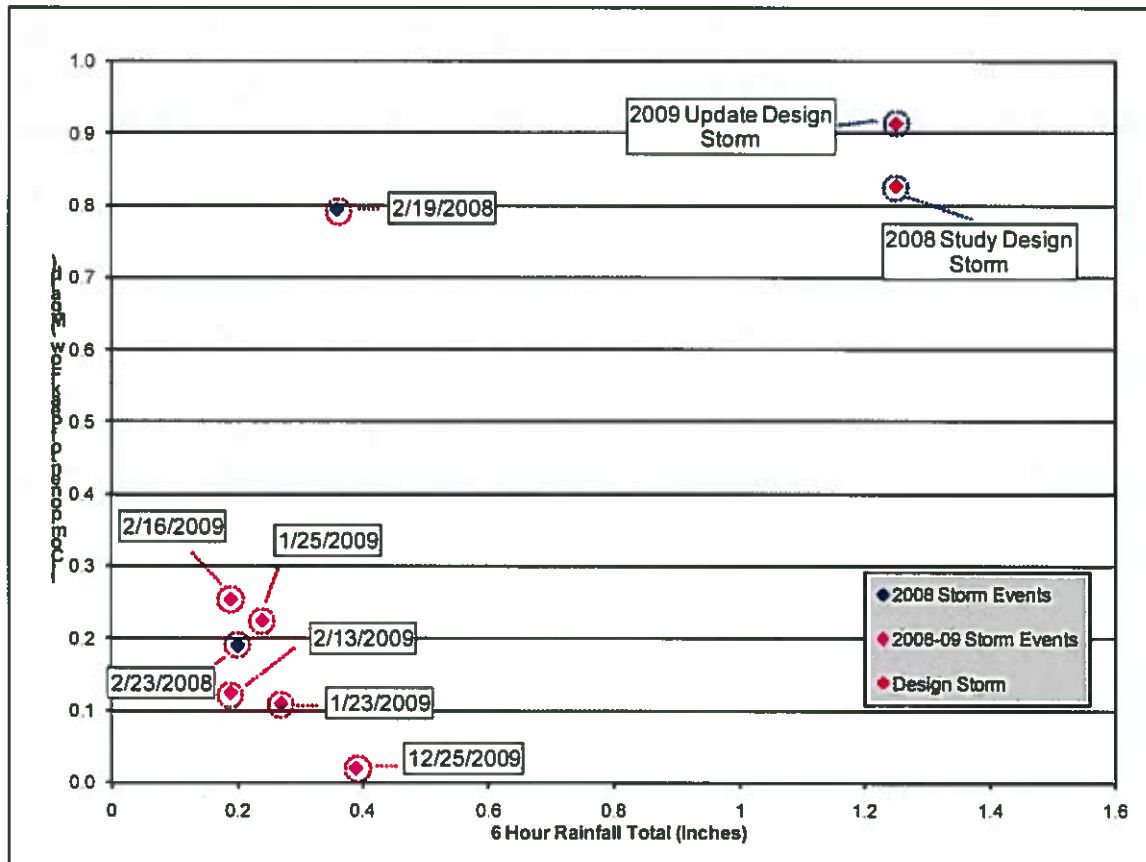


Figure 8
City of Ceres
Basin 4 (2008 Basin 6) I/I Projection Comparison

Sewer Lines Tributary to Pine Street Lift Station – Decreased RD/I Impact

In the October 2008 capacity analysis the sewer network which flows into Pine Street Lift Station from the north was unmonitored. In the model, this portion of the sewer, which collects flow for Central Avenue south of Evans Road, was assigned winter dry weather flow characteristics (e.g. diurnal curve and per capita flow) and I/I flow characteristics (e.g. leakage rate) based on those of the surrounding sewer basins. Model results based on these assumptions showed a significant potential for sewer overflows. However, the 2008 – 2009 flow monitoring indicated that the

actual winter dry weather flow carried by this sewer network was significantly less than previously assumed. The I/I component of wet weather peak flows in this portion of the collection system was actually higher than had been previously predicted; however, the model indicates a lower base flow peak than previously predicted, the sewer lines are capable of handling the resulting peak design storm flows without causing overflows.

Sewer Lines Tributary to Central/Evans Lift Station – Decreased RDI/I Impact

In the October 2008 capacity analysis the Central/Evans Lift Station modeling indicated surcharging both up and downstream of the lift station. However, model results could not be reconciled with the City's experience with this portion of the system. The 2008-2009 flow monitoring at Site 5 (upstream of Central/Evans) captured several wet weather flow events. As can be seen in Figure 9 these storms indicated a less significant I/I component during wet weather peak flows than had been exhibited in the 2008 flow monitoring. When the design storm was modeled with the new I/I conditions, sewers tributary to Central/Evans did exhibit a surcharge condition, but surcharge levels in manholes were well below the criteria in Table 4, indicating that the sewer lines tributary to Central/Evans are capable of handling peak flows from the existing level of development while simultaneously carrying peak I/I flows generated by a 10 year-6 hour design storm.

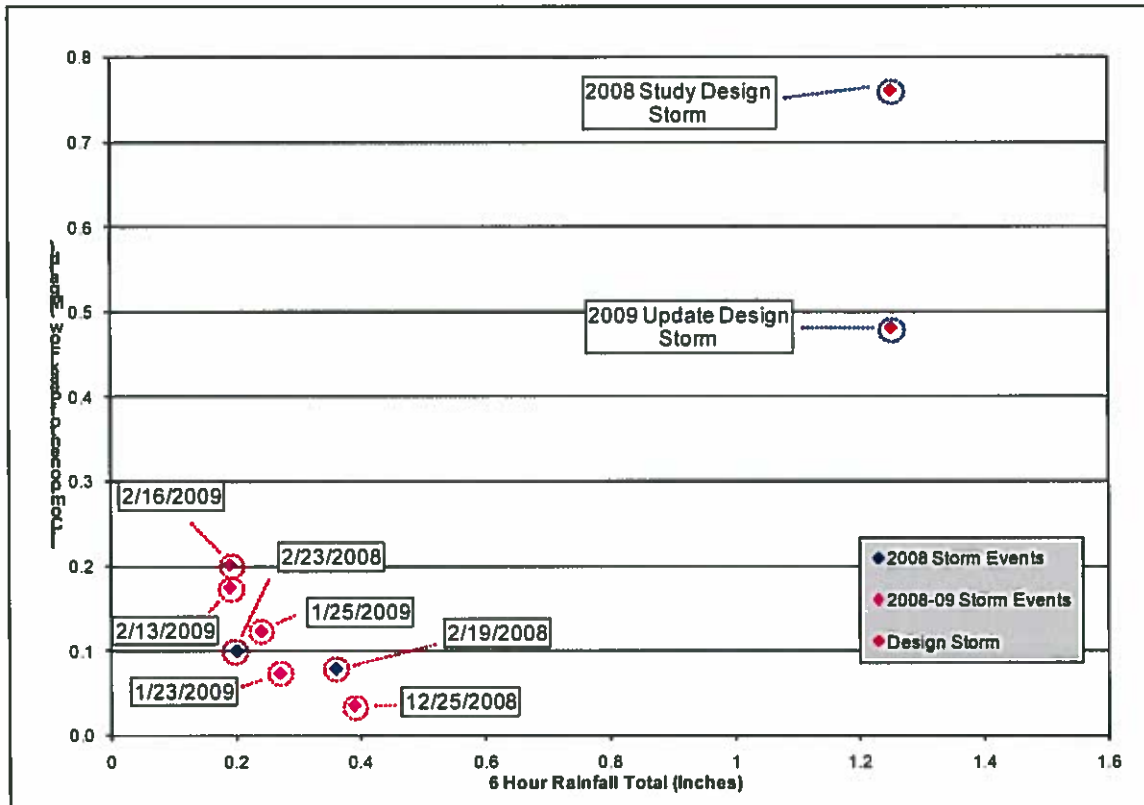


Figure 9
City of Ceres
Basin 2 (2008 Basin 5) I/I Projection Comparison

Existing Collection System with Service Road Improvements

Once the existing 36 inch line is tied into the collection system and a significant portion of the flow at the Service Road, Central Avenue junction is diverted from the impacted 21 inch line (interim improvement), the capacity of the Service Road sewer trunks to carry peak flows during peak the design storm I/I flow is no longer impacted. The upstream benefit of this improvement can be seen in Figure 10 as the majority of potential upstream manhole overflows are eliminated. However, potential overflows do still exist along the two 12 inch sewer lines downstream of Barbour's lift station. A close up view of the model results of this area is show in Figure 11.

In the final stage of the improvement, all sewer lines at the Central Avenue, Service Road junction will be diverted into the 36 inch line and the 21 inch line will be abandoned. As seen in Figure 12 the interim and final improvements produce similar results in regards to a reduction of surcharging and overflows on Service Road and upstream.

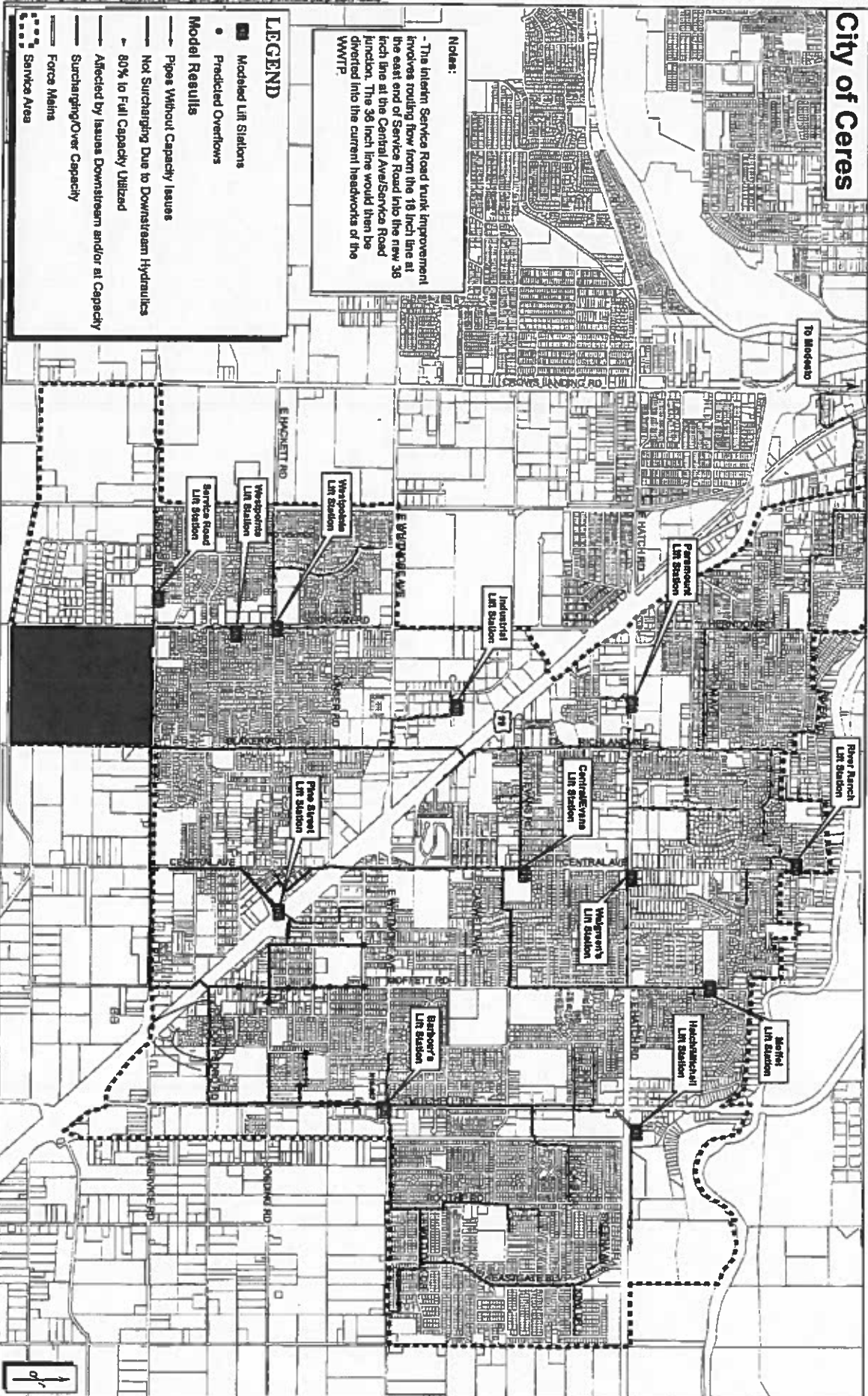
City of Ceres

Notes:

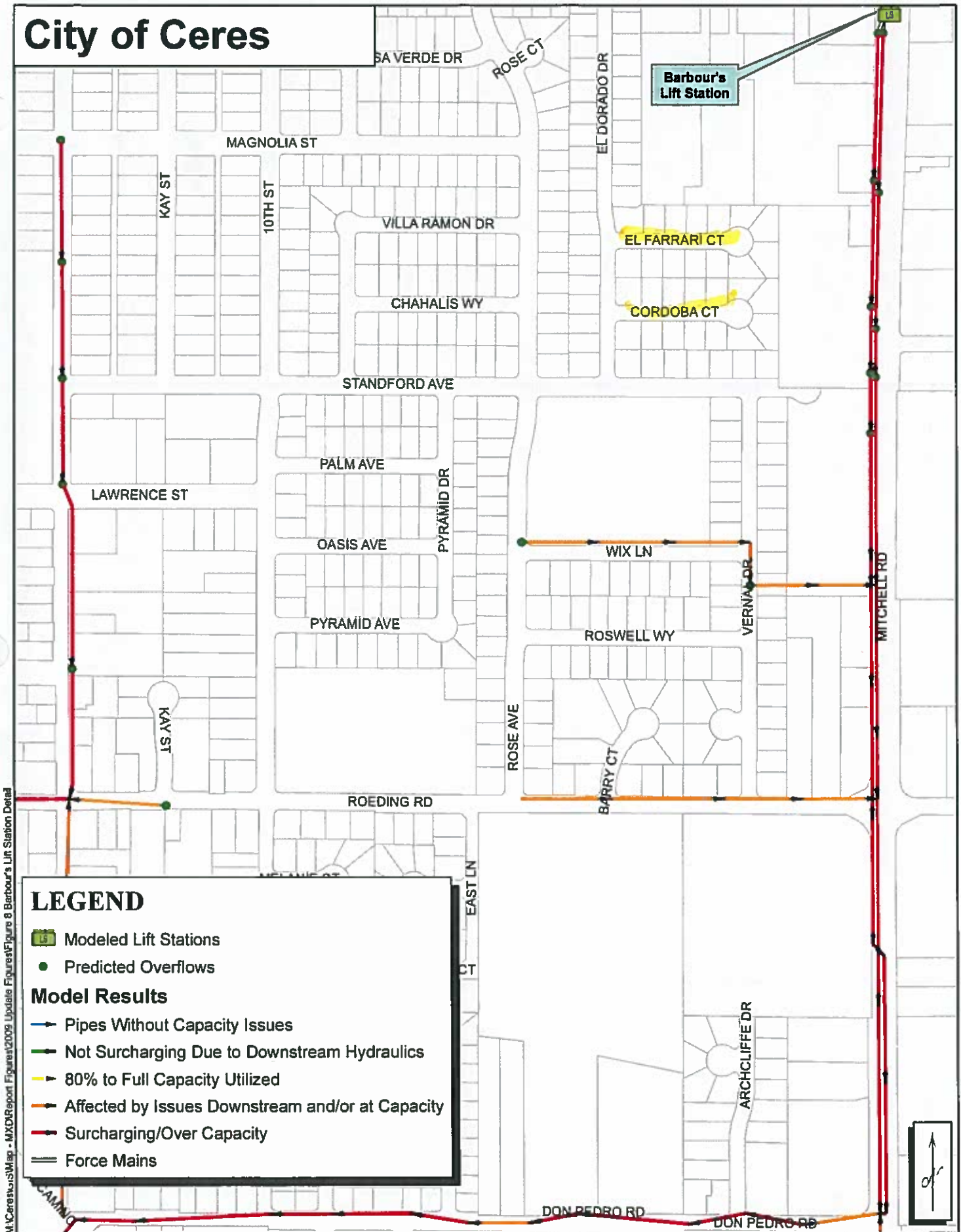
- The Interim Service Road trunk improvement involves routing flow from the 18 inch line at the east end of Service Road into the new 36 inch line at the Central Ave/Service Road junction. The 36 inch line would then be diverted into the current headworks of the WWTP.

LEGEND

- Modelled LIT Stations
- Predicted Overflows
- Model Results
- Pipes Without Capacity Issues
- Not Surcharging Due to Downstream Hydraulics
- ~ 80% to Full Capacity Utilized
- Affected by Issues Downstream and/or at Capacity
- Surcharging/Over Capacity
- Force Mains
- Service Area



City of Ceres



M:\Ceres\GIS\Map - WWD\Report Figures\2009 Update Figures\Figure 8 Barbour's Lift Station Detail

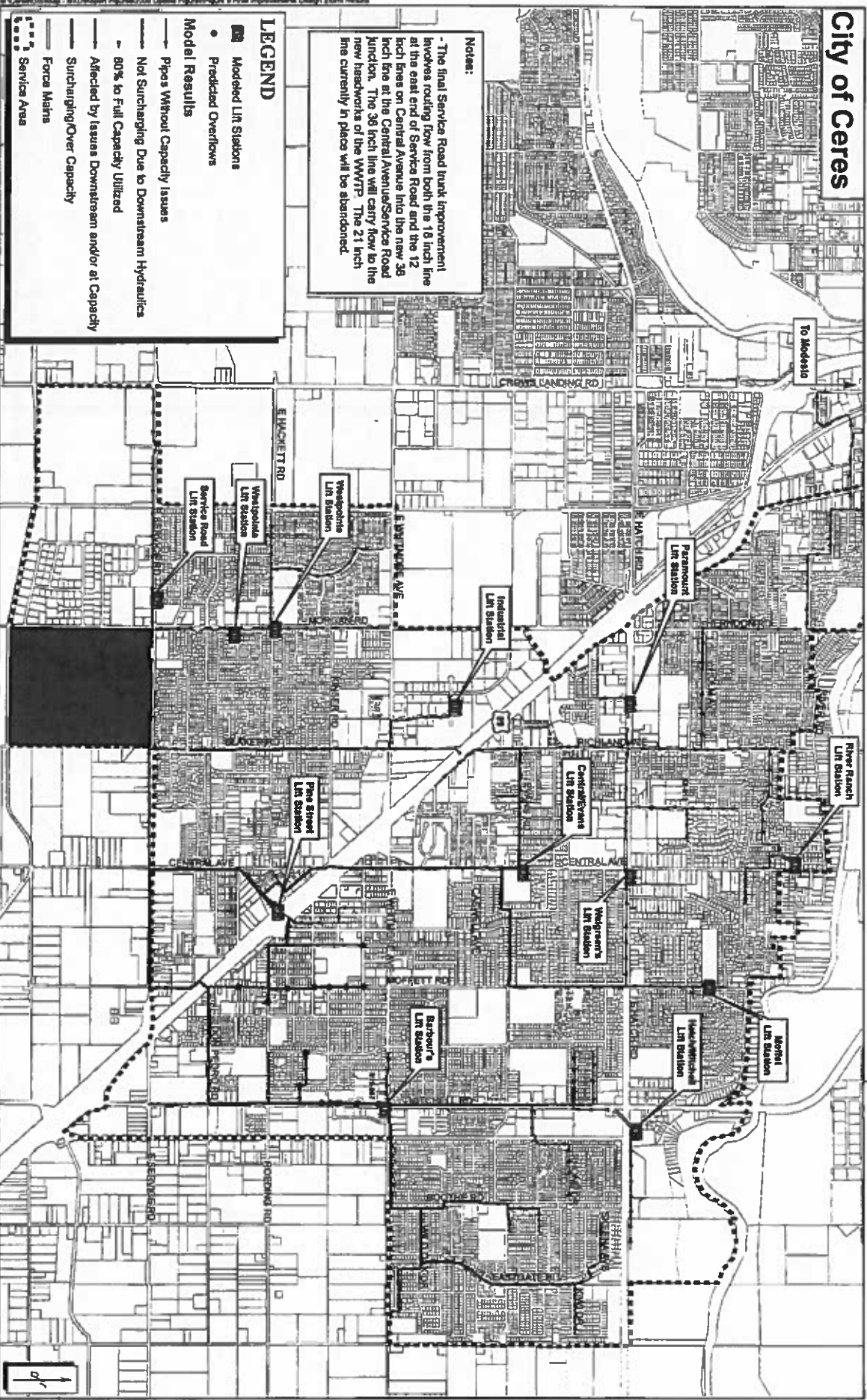
City of Ceres

Notes:

- The final Service Road trunk improvement involves routing flow from both the 18 inch line at the east end of Service Road and the 12 inch lines on Central Avenue into the new 36 inch line at the Central Avenue/Service Road Junction. The 36 inch line will carry flow to the new headworks of the WWTP. The 21 inch line currently in place will be abandoned.

LEGEND

- Modelled LIT Stations
- Predicted Overflows
- Model Results
- Pipes Without Capacity Issues
- Not Surcharging Due to Downstream Hydraulics
- ~ 80% to Full Capacity Utilized
- Affected by Issues Downstream and/or at Capacity
- Surcharging/Over Capacity
- Force Mains
- Service Areas



ECO-LOGIC Engineering - DRAFT
City of Ceres Wastewater Collection System Capacity Analysis Update
Model Results for the Final Service Road Trunk Improvement - Peak Flow During 10-year, 8-hour Design Storm
Figure 12

4.0 NEXT STEPS

Following is a brief summary of areas that need to be reviewed in the upcoming master plan to be included in the capital improvement program. Potential mitigation measures are also included.

- **Sewer tributary to Barbour's Lift Station:** Explore options for upsizing the Barbour's lift station to handle peak wet weather flows and prevent back up into the tributary sewer.
- **Sewer south of Barbour's Lift Station on Mitchell:** Explore options for directing flow from Barbour's to a less capacity limited section of sewer via force main.
- **Sewer tributary to Pine Street Lift Station:** CCTVing for condition assessment and I/I source identification. Rehabilitation of existing sewer may be justified.
- **Sewer tributary to Central/Evans Lift Station:** Divert flow from sewer north of E. Hatch Road into the sewer which serves NCSSA. CCTVing should be used to locate sources of I/I to validate whether this would alleviate the problem. If most sources of I/I are south of E. Hatch Road, then a rehabilitation of the existing sewer would be more appropriate.
- **Sewer south of 99 on Blaker Road:** CCTVing for condition assessment and I/I source identification. Parallel relief sewer may be appropriate in surcharged section of this line.