APPENDIX J

SEWER FLOW ASSESSMENT

ECO:LOGIC
ENGINEERS · CONSULTANTS

3875 Atherton Road
Rocklin, CA 95765

916.773.8100 TEL
916.773.8448 FAX

April 21, 2010

Katherine Waugh
North Fork Associates
110 Maple Street
Auburn, CA 95603

RE: Orchard at Penryn Sewer Capacity Assessment

Dear Ms. Waugh:

As part of the EIR process for the Orchard at Penryn project (Project), flow monitoring was performed in the adjacent sewer for two weeks from June 19, 2008 to June 26, 2008, and from July 24, 2008 through July 31, 2008. Flow monitoring was completed by V&A Consulting Engineers who submitted the *Sanitary Sewer Flow Monitoring and Capacity Analysis* in August 2008.

In a meeting with SPMUD staff on April 12, 2010, it was confirmed that no new development has connected to this portion of the sewer between the time of the flow monitoring and now. Therefore, the flow monitoring from 2008 is still relevant and can be used as the basis of an up-to-date capacity analysis. Attached to this cover are assumptions required for estimating average and peak sewer flows from the Project (Attachment A).

To satisfy the requirements of the EIR for SPMUD, SPMUD staff requested that the attached report from V&A be included in an appendix of the draft EIR along with this cover letter and attachment.

If you have any questions or clarifications, please don't hesitate to contact us.

Sincerely,

ECO:LOGIC Engineering

Charles G. Bunker, P.E.
Principal

cc: Tiffany Knapp, P.E., ECO:LOGIC
Melissa Lee, P.E., ECO:LOGIC

SPLA07-003

ECO:LOGIC
ENGINEERS · CONSULTANTS

ATTACHMENT A

The Orchard at Penryn Project

Average and Peak Sewer Flow Estimates

Prepared By: Melissa Lee, P.E.

Reviewed By: Tiffany Knapp, P.E.
Charles Bunker, P.E.

Date: April 21, 2010

The *South Placer Municipal Utility District Wastewater Collection System Master Plan* (January 2009, Master Plan) established an average unit flow for future residential development of 190 gallons per day per equivalent dwelling unit (gpd/EDU). This value can be applied to the number of EDUs determined for the Orchard at Penryn project (Project) to establish average dry weather flow for analyzing trunk sewers (not for sizing on-site sewer systems). Peak wet weather flow for analyzing the trunk sewer will be established using model-specific peaking factors as determined in the Master Plan.

Conversely, the on-site wastewater collection system must be sized using a 400 gpd/EDU value, with a wet weather peaking factor of 2.3.

SANITARY SEWER FLOW MONITORING AND CAPACITY ANALYSIS

Orchard at Penryn Project

August 2008

V&A

SANITARY SEWER FLOW MONITORING
AND
CAPACITY ANALYSIS

ORCHARD AT PENRYN PROJECT

Prepared for:

ECO:LOGIC CONSULTING ENGINEERS
3875 Atherton Road
Rocklin, CA 95765

Prepared by:

V&A
Lake Merritt Plaza
1999 Harrison Street, Suite 975
Oakland, CA 94612

August 2008

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FIGURES

EXECUTIVE SUMMARY

V&A has completed a sanitary sewer flow monitoring and capacity study within the South Placer Municipal Utility District's (SPMUD) service boundary near the community of Penryn. One site was monitored for two weeks from June 19, 2008, through June 26, 2008 and from July 24, 2008, through July 31, 2008. The purpose of this study was to investigate the existing flow volume through the sanitary sewer pipe at the flow monitoring location, and identify the potential impacts on the capacity at the flow monitoring location.

The results from the sanitary sewer flow monitoring are summarized in Table 1. Snapshots of the pipe cross-section during peak and average measured flows are illustrated in Figure 1. Please refer to Figure 2 for the flow monitoring location.

The 8-inch line monitored had approximately 1.5 inches of sediment present during the flow monitoring period. The sediment constricts the flow and reduces the overall capacity of the pipeline. V&A recommends hydro-jetting the pipeline to clean and restore the full potential capacity of the pipe.

Table 1. Summary of Flow Monitoring Data

Item	Flow Monitoring Site 12-inch Line
Estimated 100% Capacity of Pipeline:	210 gpm
Average Dry Weather Flow:	10.0 gpm
- as % of Capacity (by Volume):	5%
- as % of Capacity (by Level):	31%
Peak Measured Flow:	62.0 gpm
- as % of Capacity (by Volume):	30%
- as % of Capacity (by Level):	46%
Available Capacity over Peak Measured Flow:	148 gpm
- as % of Capacity (by Volume):	70%
- as % of Capacity (by Level):	54%

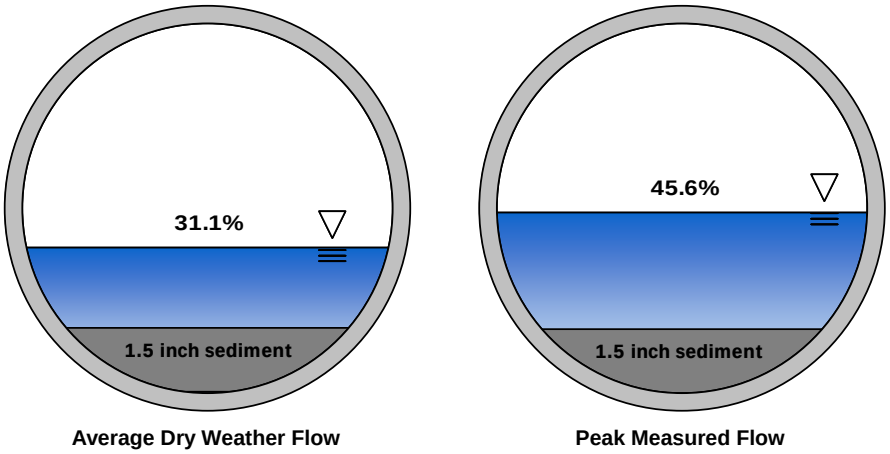


Figure 1. Flow Monitoring Site Cross-Sectional View Snapshots

INTRODUCTION

V&A was retained by Eco:Logic to conduct a sanitary sewer flow monitoring and capacity study at one location within the South Placer Municipal Utility District's (SPMUD) service boundary near the community of Penryn. The purpose of this study was to record and report the existing flow volume through the sanitary sewer pipe, and identify the potential impacts on the capacity at the flow monitoring location. The scope of work included the following tasks:

- Install flow monitoring equipment at one location to determine the existing sanitary sewer flow. Record flow data for a period of two weeks at 15-minute intervals.
- Provide calculations of the existing sewer pipe capacity.

Flow monitoring was conducted over two 7-day periods from June 19, 2008, through June 26, 2008 and from July 24, 2008, through July 31, 2008, at one flow monitoring site as follows:

- **Flow Monitoring Site:** A flow meter was installed in a manhole structure located on a service road northeast of the church on Hope Way.

Figure 2 illustrates the location of the manhole where the flow meter was installed.

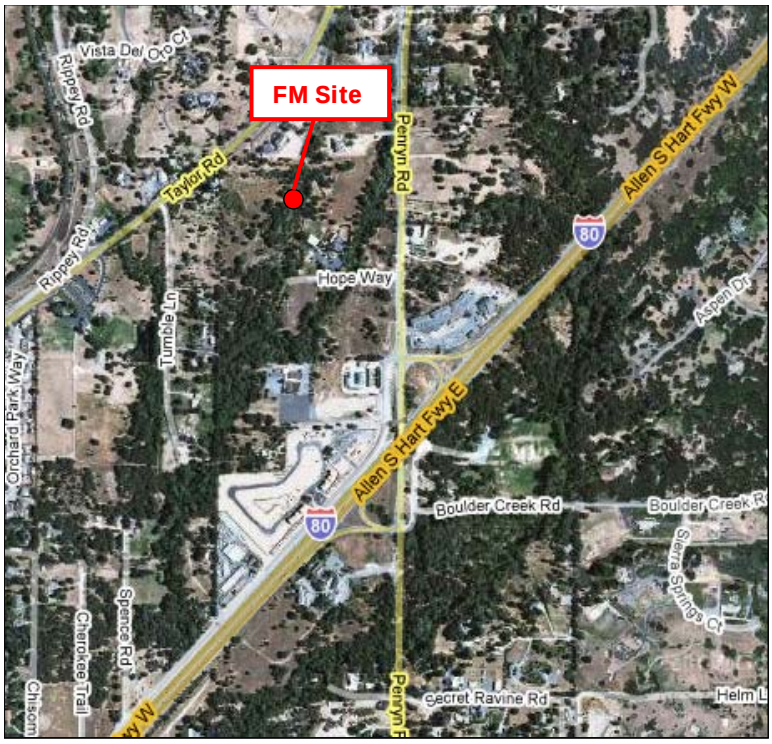


Figure 2. Map of Flow Monitoring Site

FLOW MONITORING METHODS AND PROCEDURES

Meter Installation

One Isco 2150 area-velocity flow meter was installed by V&A in the sewer manhole shown in Figure 2. Isco meters use a pressure transducer to collect depth readings, and ultrasonic Doppler sensors on the probe determine the average fluid velocity. Figure 3 shows a diagram of a typical flow meter installation.

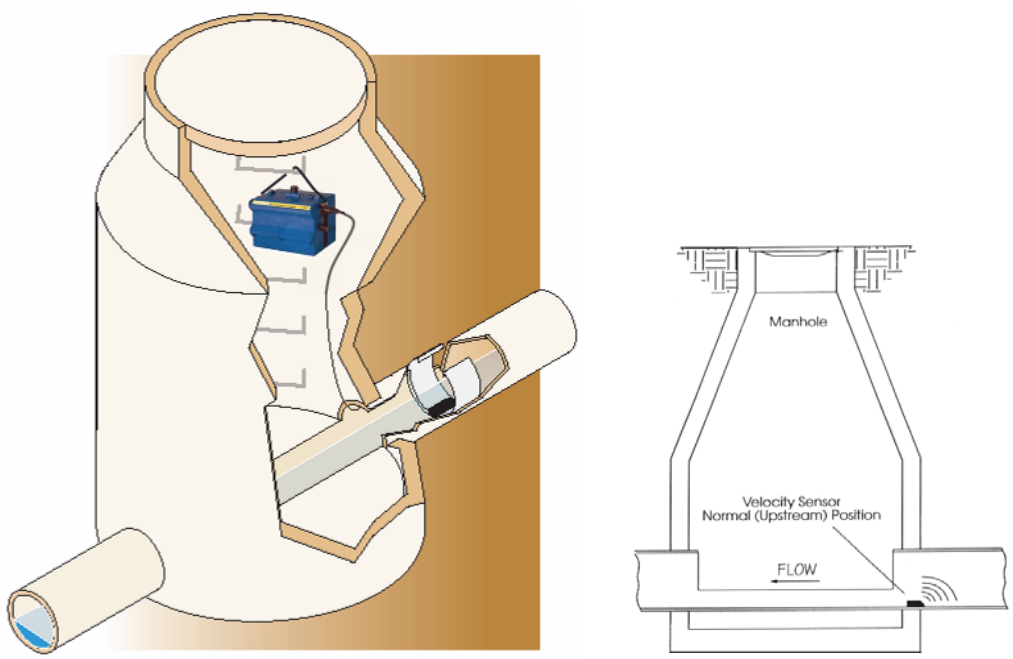


Figure 3. Flow Meter Installation Diagram

Manual level and velocity measurements were taken in the field during the flow meter installation and again when the meter was removed. These manual measurements are compared to the instantaneous level and velocity readings of the flow meter to ensure proper calibration and accuracy. The continuous depth and velocity readings were recorded by the flow meter in 15-minute increments and downloaded into a computer spreadsheet program where the data could be analyzed and made report-ready.

Explanation of Report Graphs and Definition of Terms

Flow versus time graphs are created by plotting the data recorded by the flow meter in 15-minute intervals. The graphs represent the diurnal flow curve recorded over a given monitoring period and represent the data in its rawest form. Figure 4 shows a typical diurnal flow curve and identified on this graph are the hypothetical peak, low, and average flows recorded over an example monitoring period. These graphs are useful in identifying the extreme limits of the flows being monitored, and identifying any trends that might be occurring at a particular site. The graphs for flow, level, and velocity versus time for this project are provided in the Findings Section.

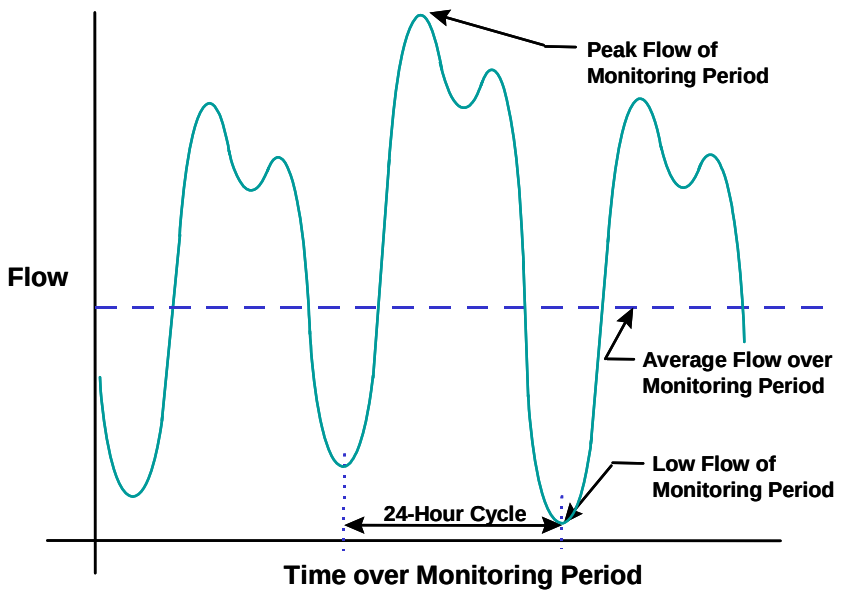


Figure 4. Diagram of Hypothetical Diurnal Flow over Monitoring Period

Dry weather flow is the flow that is caused by actual waste drainage from buildings in the area. Wet weather flow includes rain-dependent infiltration and inflow which may increase the flow through the sewer pipes. The flows recorded during this study were dry weather flows only.

FINDINGS

Flow Monitoring Results

The recorded flow showed peaks in the early morning and the late afternoon on throughout the week. Figures 5 and 6 plot the level, velocity, and flow over the monitoring period.

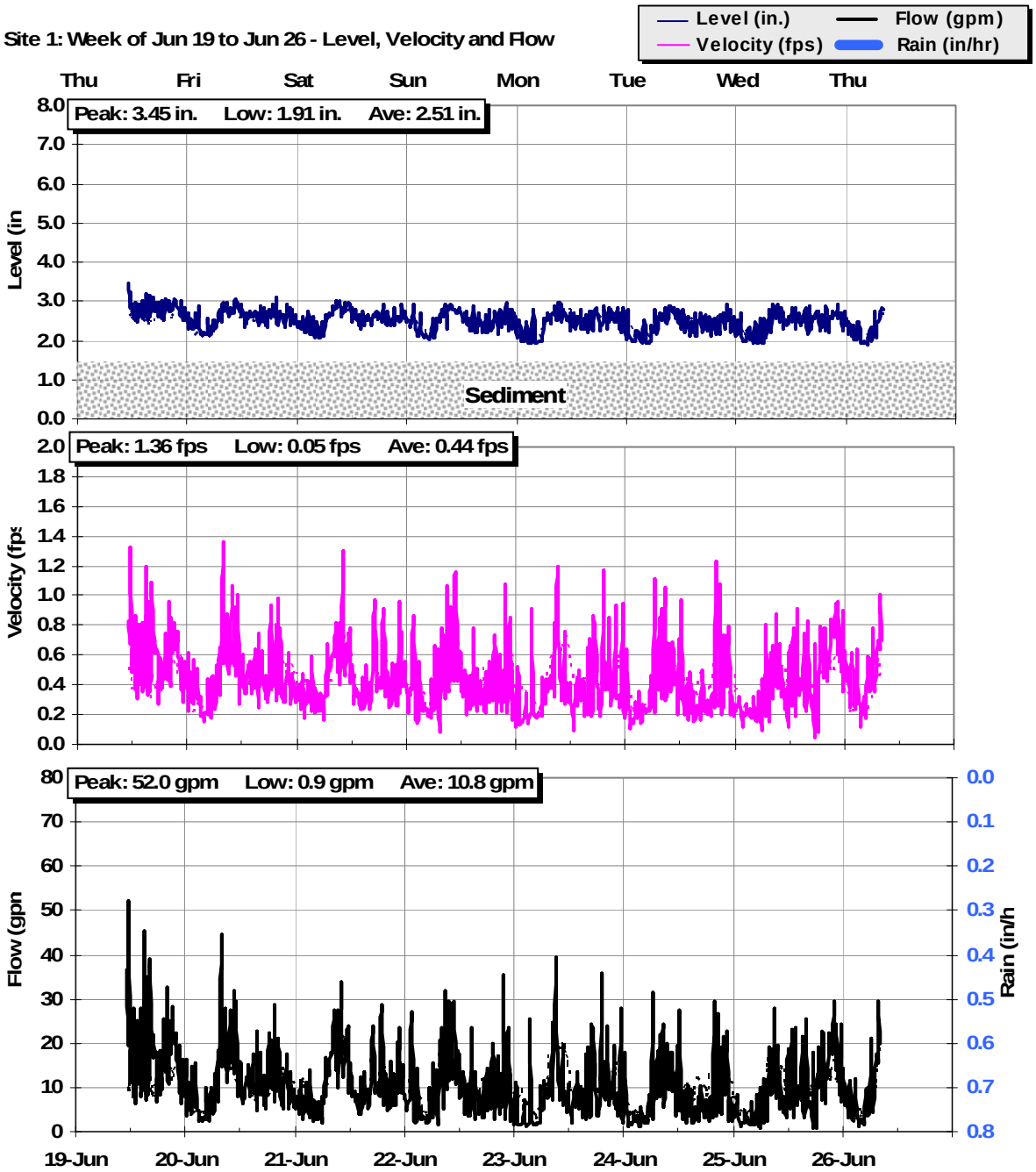


Figure 5. Level, Velocity, and Flow: Week 1

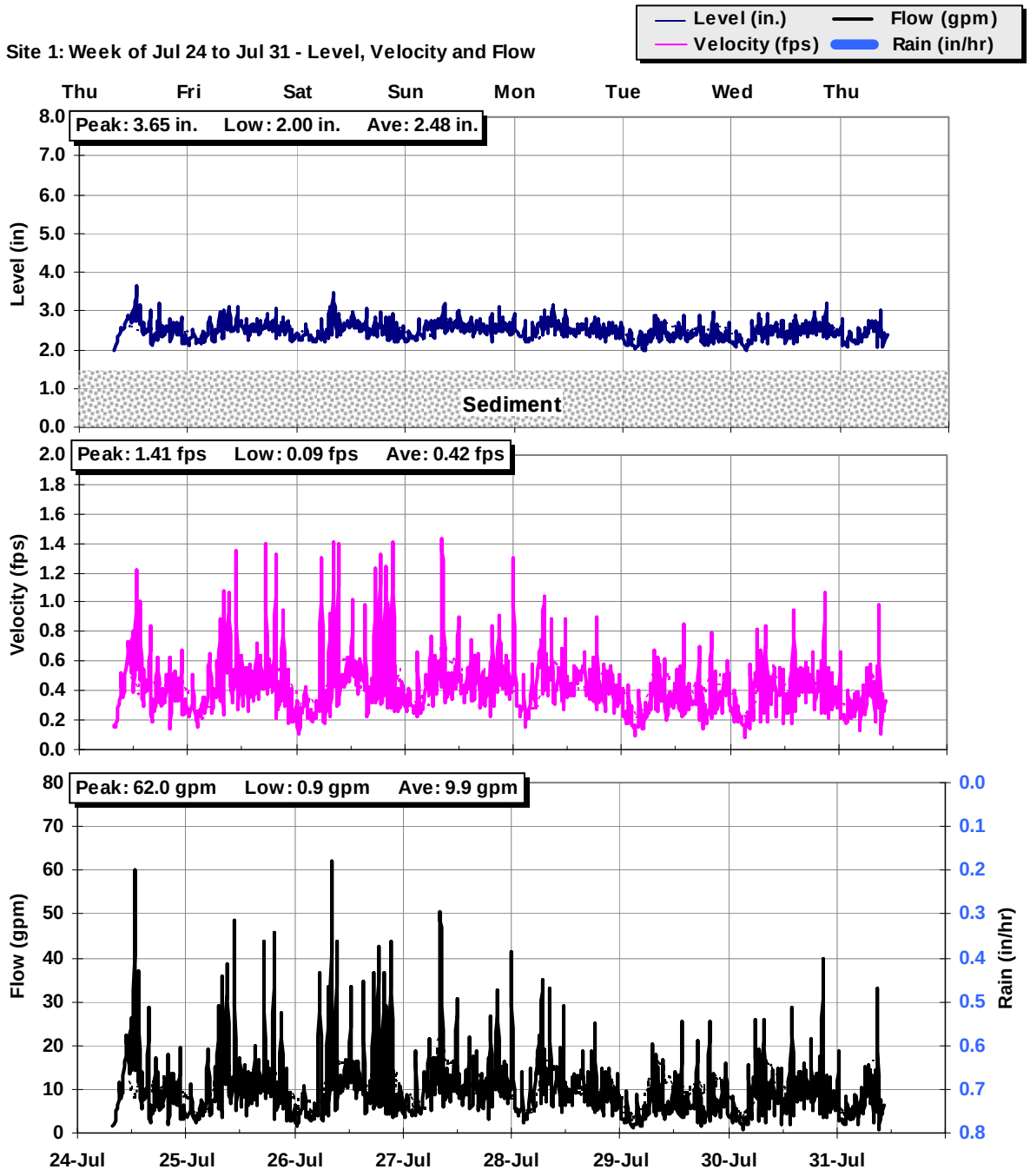


Figure 6. Level, Velocity, and Flow: Week 2

Table 2 summarizes the measured average dry weather flow and the peak measured flow at the monitoring site during the monitoring period. Figure 7 plots the average daily weekday and weekend flow.

Table 2. Flow Monitoring Results

Site	Weekday Average Flow (gpm)	Weekend Average Flow (gpm)	ADWF** (gpm)	Weekend to Weekday Ratio	Peak Measured Flow (gpm)	Peak to ADWF Ratio
8-inch line	9.6	11.0	10.0	1.15	62.0	6.20

**ADWF calculated as (5*weekday+2*weekend)/7

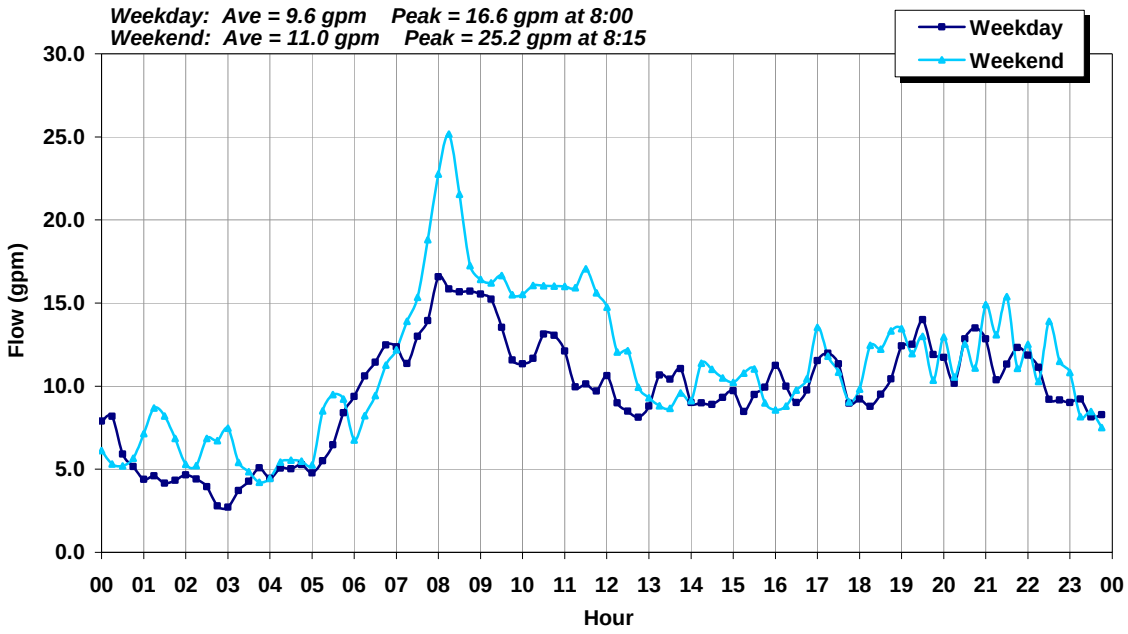


Figure 7. Average Daily Flow Graph

Pipeline Capacity

The pipeline capacity is estimated based on the measured data from the flow metering site. The metered flow data is plotted over the Manning's Equation flow curve and extrapolated to a full-flow scenario, as shown in Figure 8.

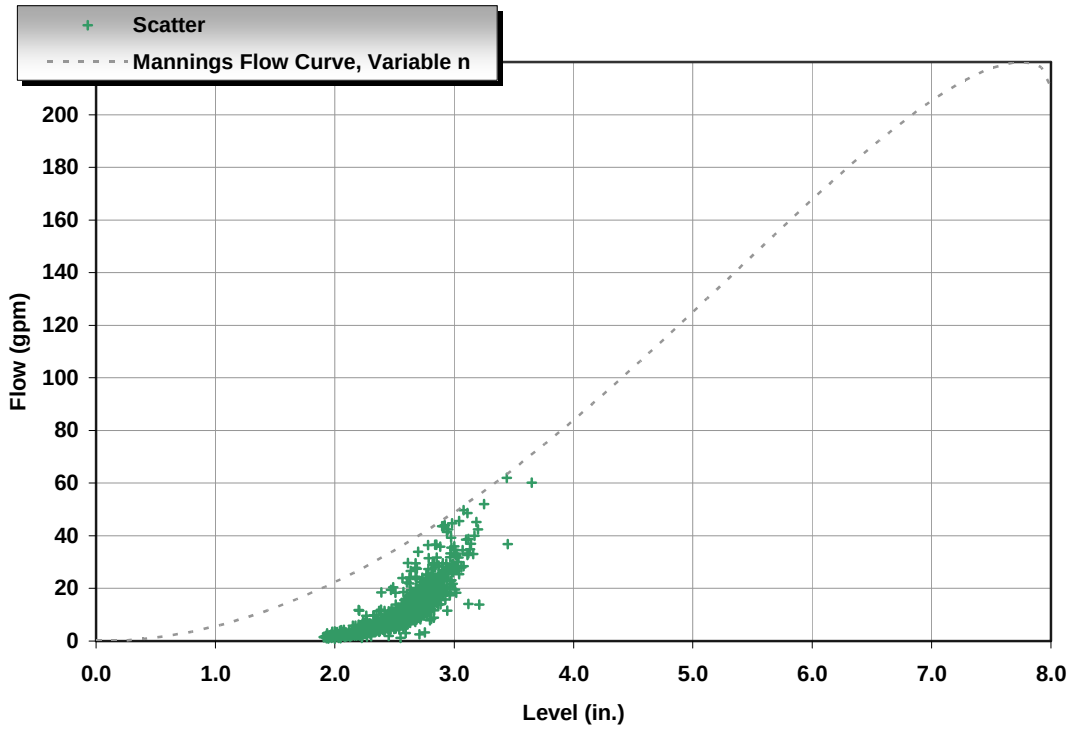


Figure 8. Flow Monitoring Site Stage Curve

Note that the 8-inch line monitored had approximately 1.5 inches of sediment present. The sediment constricts the flow and thus reduces the overall capacity of the pipeline. V&A recommends hydro-jetting the pipeline to clean and restore the full potential capacity of the pipe.

Table 3 summarizes the capacity data including the average dry weather flows and peak measured flows as a percent of the pipe capacity. Figure 9 shows pipe cross-sectional snapshots of these conditions.

Table 3. Average Dry Weather Flow and Peak Measured Flow as Percent of Capacity

Site	100% Capacity of Line (gpm)	ADWF (gpm)	ADWF as % of Capacity (by Volume)	ADWF as % of Capacity (by Level)	Peak Measured Flow (gpm)	Peak Measured Flow as % of Capacity (by Volume)	Peak Measured Flow as % of Capacity (by Level)
FM Site: 8-inch	210	10.0	5%	31%	62.0	30%	46%

ADWF = Average Dry Weather Flow

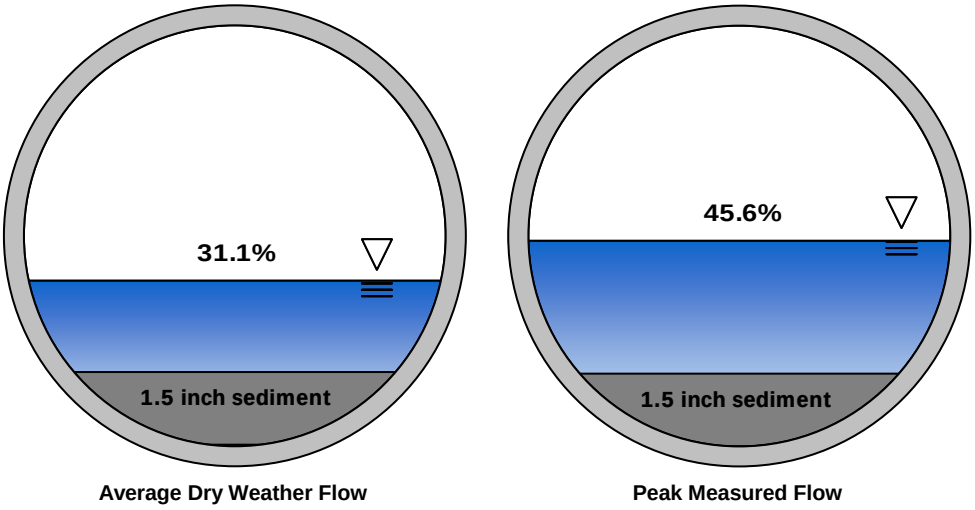
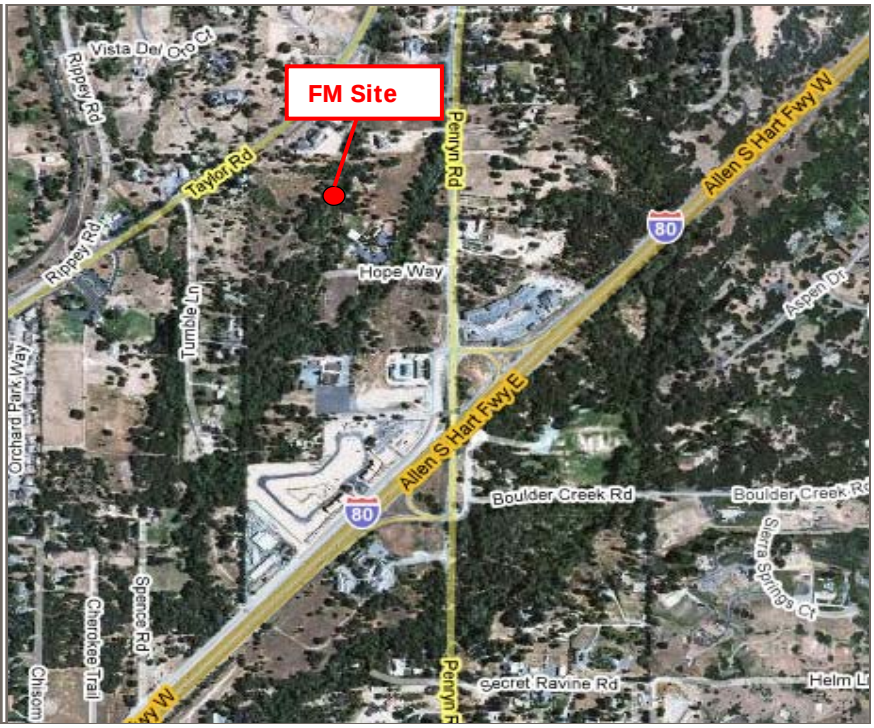


Figure 9. Flow Monitoring Site Cross-Sectional View Snapshot



Western Region
1999 Harrison Street, Suite 975
Oakland, CA 94612
510.903.6600 **Tel**
510.903.6601 **Fax**

Southwest Region
8291 Aero Place, Suite 110
San Diego, CA 92123
858.576.0226 **Tel**
858.576.0004 **Fax**

Northwest Region
14900 Interurban Avenue, Suite 268
Seattle, WA 96818
206.674.4560 **Tel**
206.674.4561 **Fax**

South Central Region
One Riverway, Suite 1700
Houston, TX 77056
713.840.6490 **Tel**
713.840.6491 **Fax**

vaengineering.com