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APPENDIX DR-04

Easterly Modeling Report Full Document
(Reference Document)

State of Ohio
Department of Transportation
Jolene M. Molitoris, Director

Innerbelt Bridge
Construction Contract Group 1 (CCG1)

Revision Date: August 23, 2006

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

In 1994, the Northeast Ohio Regional Sewer District (NEORSD) completed Phase I of the Combined Sewer Overflow (CSO) Facilities Plan Study. This study recommended a more comprehensive and consolidated facilities planning study of CSO Control in the Easterly Service area. Accordingly, the District has undertaken the Easterly District Combined Sewer Overflow Phase II Facilities Plan. This Collection System Model Development and Verification report describes the collection system modeling performed for the Phase II Facilities Plan.

The goal of the Phase II study was to develop a wet weather Long-Term Control Plan (LTCP) for the Easterly District that minimizes the CSO impact on receiving waters, as required by the Environmental Protection Agency's (EPA) CSO Policy. This required that the collection system be modeled in far greater detail than in the Phase I Study.

Scope

This report documents the development and verification of a detailed hydraulic model of the Easterly CSO Study Area collection system, shown in Figure 1-1. The model was developed under Task B-5, as part of the CSO Phase II Facilities Plan. The calibrated model was used in the facilities plan to evaluate existing conditions, conduct a baseline assessment, and evaluate various control alternatives.

This report is divided into five chapters as described below:

<u>Easterly Collection System Existing Facilities</u>: Chapter Two describes the physical extents of the Easterly Collection System. The service area characteristics are given on an outfall by outfall basis. The interceptors and culverts are also described in this chapter.

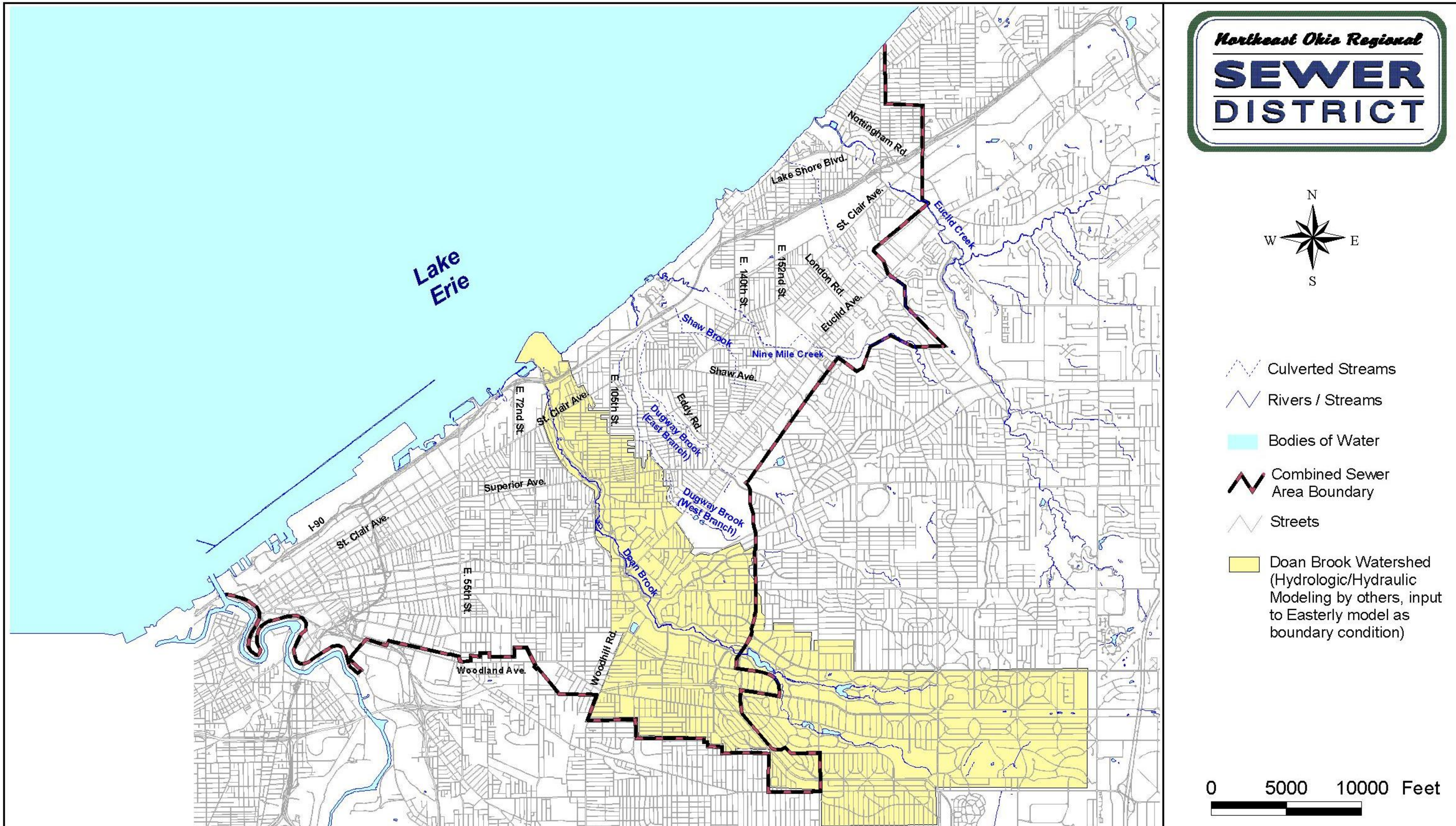

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**Figure 1-1.
Easterly CSO Facilities Plan
Study Area**

Collection System Monitoring Program: Chapter Three details the rainfall monitoring program and presents rainfall statistics. The flow monitoring program and results are also discussed in this chapter.

Collection System Model Development: A description of the software used to create the model is presented in Chapter Four. A description of the model network and the criteria for determining what was modeled is also addressed in this chapter. Modeling parameters for dry and wet weather flows are presented in this chapter.

Collection System Model Calibration: Chapter Five details the calibration process and the issues associated with the model calibration. Calibration results, accuracy and suitability for use are presented in this chapter.

Development of Baseline Conditions: Chapter Six describes the baseline conditions for the Easterly system model. In addition, Chapter Six includes a discussion of the development of the design storms and the typical year of rainfall data used for characterizing CSO activity.

CHAPTER TWO

EASTERLY COLLECTION SYSTEM EXISTING FACILITIES

The existing facilities of the Easterly District are presented in detail in this chapter. The facilities are grouped according to function. Combined sewer overflows are further grouped by receiving water. The collection system facilities described include interceptors, combined and separate sewers, regulators, overflows, pump stations and the Easterly Waste Water Treatment Plant (WWTP). Easterly District facilities described include the portions of the system owned, operated and maintained by the Northeast Ohio Regional Sewer District (NEORSD); the interceptor system, CSO outfalls and the treatment plant.

The Easterly collection system covers approximately 48,700 acres. Approximately 29,700 acres are serviced by separate sewers that will discharge directly to the Easterly WWTP via the Heights-Hilltop Interceptor. The combined sewer area is approximately 20,000 acres, and includes roughly 3,100 acres of isolated pockets of separate sanitary sewer areas that discharge to combined sewers.

The communities serviced by the Easterly district include all of Cleveland Heights, East Cleveland, South Euclid, Lyndhurst, Highland Heights, Mayfield Heights, University Heights, Bratenahl, and the east side of Cleveland. Sections of Shaker Heights, Beachwood, Gates Mills, Mayfield, Richmond Heights, and Pepper Pike are also tributary to the Easterly WWTP.

The facilities identified in this chapter represent the major combined sewer facilities tributary to the District's permitted CSO outfalls within the Easterly District. The descriptions are not intended to indicate ownership or maintenance responsibilities.

The major collection system components conveying wastewater in the Easterly District can be grouped into eight different interceptor systems: Easterly Interceptor, Doan Valley Interceptor, Dugway Interceptors (east and west), East 140th Interceptor, East 152nd Interceptor, Lakeshore Interceptor, Nottingham Interceptor and the Heights-Hilltop Interceptor, as illustrated in Figure 2-1. Table 2-1 identifies the interceptors and branch sewers in the Easterly service area.

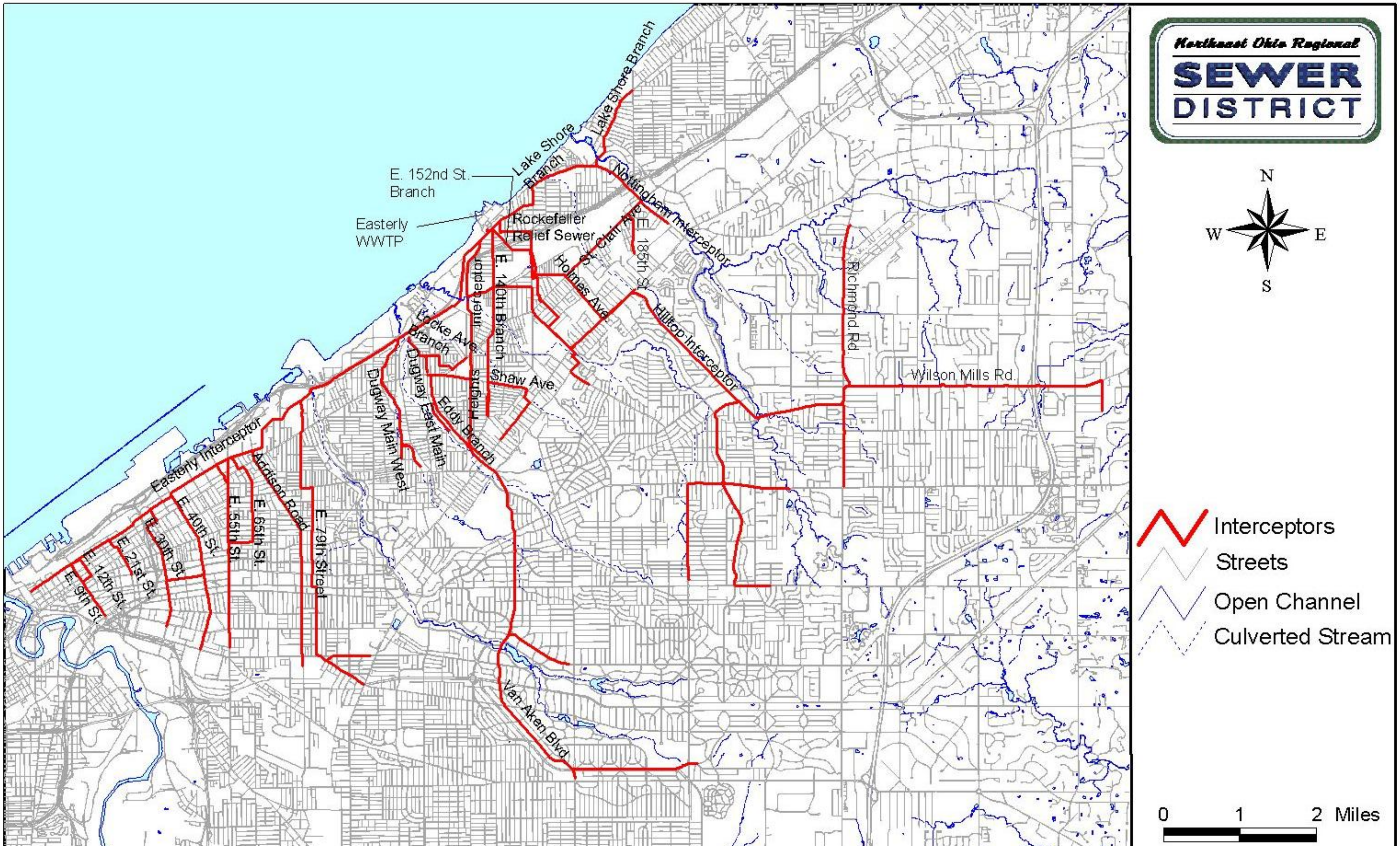

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**Figure 2-1.
Interceptors in
Easterly District**

The receiving waters for the storm and CSO flows from the Easterly service area are Doan Brook, Dugway Brook, Shaw Brook, Nine Mile Creek, Green Creek, Euclid Creek, Lake Erie, and the Cuyahoga River. These receiving waters, with the exception of Doan Brook, are described later in the chapter. The Doan Brook area was studied under a separate District Watershed Study.

Table 2-1. Easterly District Interceptor Sewers*

Area	Main and Tributary Sewers
Downtown Area Branch Sewers to the Easterly Interceptor	Easterly Main Branch • East 12th Street Branch • East 21st Street Branch • East 30th Street Branch • East 40th Street Branch • East 55th Street Branch • East 65th Street Branch • Addison Road Branch • East 79th Street Branch
Doan Valley Interceptor	Doan Valley Interceptor is described in a separate report entitled Doan Brook Watershed Study, Montgomery Watson, 2001
Dugway Brook Area Interceptors	Dugway Main West Interceptor • Branch D • Branch E Dugway Main East Interceptor Locke Avenue Branch Eddy Road Branch
East 140th Street/Hayden Interceptor	East 140th Street/Hayden Main Interceptor Branch Shaw Interceptor Branch
East 152nd/Ivanhoe Interceptor	East 152nd Street/Ivanhoe Main Interceptor Branch Shaw Interceptor Branch
Lake Shore Boulevard Interceptor	Lake Shore Boulevard Main Branch Interceptor
Nottingham Interceptor	Nottingham Main Branch St. Clair Avenue Branch East 185th Street Branch
Heights-Hilltop Interceptor	Heights-Hilltop Interceptor

**Owned by NEORSD.*

DESCRIPTION OF MAJOR COLLECTION AND TREATMENT SYSTEM COMPONENTS

The following sections describe the major components of the collection system consisting of pump stations, interceptors, major combined sewer conduits, CSO outlets and tributary regulators. The figures that accompany this section illustrate the facilities described in the text. Detailed descriptions of regulators tributary to each CSO are provided later in this chapter.

There are eight pump stations that discharge directly to Easterly District facilities, or impact CSO conveyance and/or overflows within the Easterly CSO area. These pump stations are described in Table 2-2. Narrative descriptions of the conveyance routes associated with these pump stations are also provided.

Table 2-2. Easterly CSO Area Pump Stations

Pump Station	Owner	Pump Type(s)	Capacity (gpm)	Total Dynamic Head (feet)	Force Main Diameter
Burke Lakefront Airport	Cleveland	2 – Smith & Loveless 20 horsepower	300	100	6-inch
Front Street	Cleveland	2 – Gorman Rupp 50 horsepower	800	80	12-inch
East 9th Street	Cleveland	2 – Allis-Chalmers 1.5 horsepower	180	9	6-inch
Euclid Creek	NEORSD	2 – Yeomen P4010 75 horsepower	1,000	34	Two 12-inch
Nottingham Road	Cleveland	2 – Smith and Loveless 1.5 horsepower	100	20	6-inch
Stones Levee	Cleveland	2 – Smith and Loveless 10 horsepower	380	44	8-inch
Superior Avenue	Cleveland	5 – Gorman Rupp 35 horsepower	2 at 500 3 at 1,000	91 89	20-inch
West 6th Street	Cleveland	2 – Smith and Loveless 20 horsepower	400	97.5	6-inch

Easterly Interceptor

Figure 2-2 shows the Easterly Main Interceptor alignment. The Easterly Main Interceptor constitutes one of three interceptor systems providing flow to the Easterly WWTP. This section describes the Easterly Main Interceptor system. The other two interceptor systems are discussed later in this chapter.

The main branch of the Easterly Interceptor network runs parallel with the Lake Erie shoreline along Lakeside Avenue from West 9th Street to the Easterly WWTP. In addition to direct local sewer connections along the shore of Lake Erie, the Easterly Interceptor routes flows from the East 9th, 12th, 21st, 30th, 40th, 55th, 65th, Addison Road and 79th Street branches of the Easterly Interceptor. Flows from the Doan Valley and Dugway Interceptors are collected downstream of the East 79th Street branch connection and conveyed to the Easterly WWTP.

This interceptor begins as a 96 inch brick sewer and increases in diameter to 138 inches at East 18th Street and Lakeside Avenue for two blocks up to East 20th Street. From East 20th Street to East 23rd Street, the interceptor is 144 inches in diameter and then decreases in diameter to 141 inches for three blocks up to East 26th Street. The interceptor returns to 144 inches in diameter at East 26th Street to East 67th Street at which point it turns north and increases in diameter to 175 inches for 575 ft. The next section of the interceptor is 147 inches in diameter to East 70th Street, where it increases to 153 inches in diameter to northwest of East 79th Street. At this point the interceptor returns to 147 inches for one pipe section. Then the interceptor has one section of reinforced concrete pipe that is 147 inches in diameter, but increases to 153 inches at Martin Luther King Boulevard, and returns to brick for one section of sewer. The interceptor increases to 162 inches as a brick sewer to Coit Road where it remains the same diameter, but becomes reinforced concrete to beyond Nine Mile Creek. The interceptor material returns to brick and 162 inches in diameter to the treatment plant.

Downtown Area Interceptors. The downtown area branches that are tributary to the Easterly Main Interceptor consist of the East 9th, 12th, 21st, 30th, 40th, 55th, 65th, 79th Streets and Addison Road branches of the Easterly Interceptor. In general, these branches collect combined sewer flows from the urban areas in and adjacent to downtown Cleveland. Interceptor

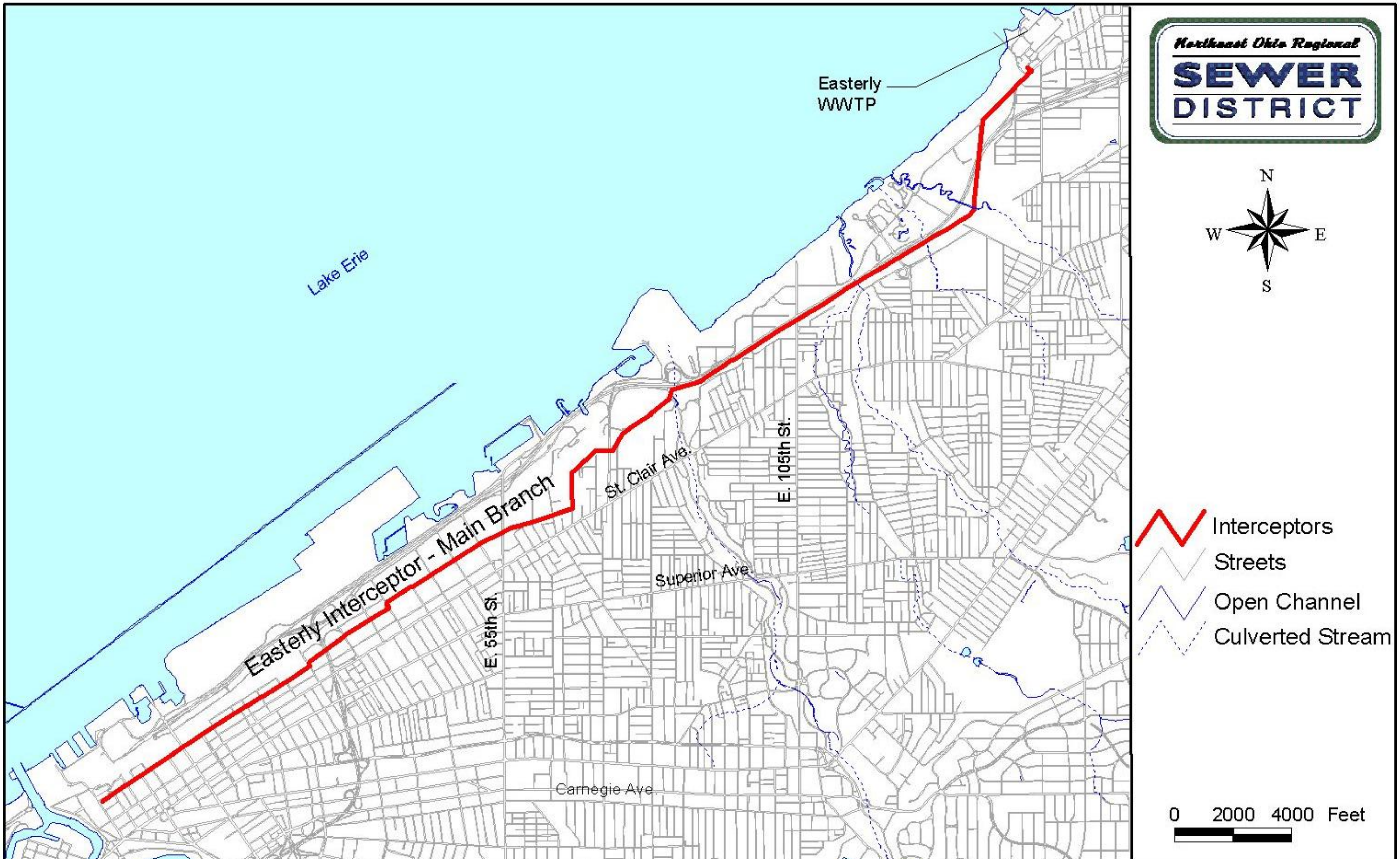

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Figure 2-2.
Easterly Interceptor - Main Branch

flows are conveyed in the northerly direction, through regulator structures, and into the Easterly Main Interceptor. The downtown area pump stations consist of the West 6th Street (Stevedore), East 9th Street (North Coast), and Burke Lakefront Airport pump stations as shown in Figure 2-3. The pump stations are owned by the City of Cleveland and are used to convey flows from the low areas north of I-90 along Lake Erie. The West 6th Street (Stevedore) Pump Station conveys flow from the pump station to the Easterly Interceptor. The East 9th Street (North Coast) Pump Station conveys flow from the pump station to the West 6th Street Pump Station. The Burke Lakefront Airport Pump Station conveys flow from the airport terminal to the Easterly Interceptor. The receiving water for the emergency wet weather overflows from all three pump stations is Lake Erie.

The East 9th Street branch is made of brick and begins as a No. 7 egg shaped sewer. Flow proceeds north from the intersection of East 9th Street and Superior Avenue, to the intersection of Lakeside Avenue and East 9th Street. Flows then proceed east along Lakeside Avenue in a 30 inch sewer, parallel to the Easterly Main Interceptor. The sewer diameter increases to 59 inches before flows pass through Regulator E-18 and into the Easterly Main Interceptor. Wet weather flows from E-18 are tributary to CSO 094.

Flow in this sewer proceeds north on East 9th Street to between Prospect and Euclid Avenue, where it changes diameter to a No. 17 egg shaped sewer. North of Euclid, the interceptor becomes a No. 13 egg shaped sewer. At East 9th Street and Hickory Street, the interceptor increases in diameter to 86 inches. The interceptor decreases diameter to 84 inches at Superior Avenue to East 12th Street, where it increases in diameter to 99 inches, through Regulator E-18, and into the Easterly Main Interceptor.

The various size configurations for egg shaped sewers are provided in Table 2-3 for reference.

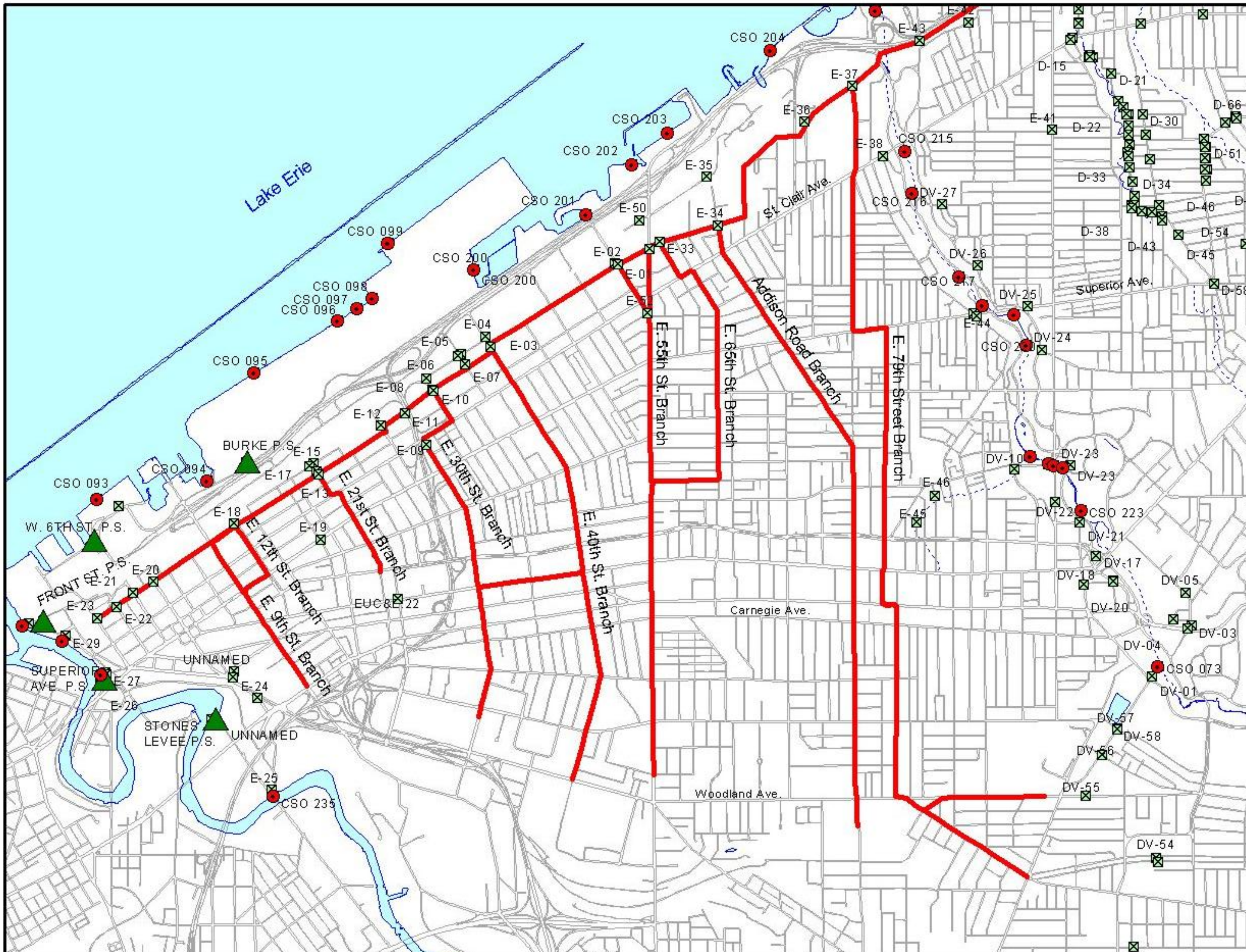

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Figure 2-3. Easterly Interceptor Branches

Table 2-3. Egg Shaped Sewer Sizes

Egg shaped Sewer Number	Size
No. 2	39 in x 23 in
No. 3	33 in x 27 in
No. 4	39 in x 31 in
No. 5	45 in by 35 in
No. 6	4 ft 3 in x 3 ft 4 in
No. 7	4 ft 8 in x 3 ft 8 in
No. 8	5 ft 1 in x 4 ft 1 in
No. 9	5 ft 7 in x 4 ft 4 in
No. 10	5 ft 11 in x 4 ft 8 in
No. 11	6 ft 4 in by 5 ft
No. 13	7 ft 1 in x 5 ft 7 in
No. 14	7 ft 5 in by 5 ft 10 in
No. 15	7 ft 10 in x 6 ft 2 in
No. 16	8 ft 2 in x 6 ft 5 in
No. 17	8 ft 6 in x 6 ft 8 in
No. 18	8 ft 10 in x 6 ft 11 in
No. 19	9 ft 1 in x 7 ft 2 in
No. 20	9 ft 5 in x 7 ft 5 in

The East 21st Street branch begins at Chester Avenue and East 21st Street as a 42 inch reinforced concrete pipe, and follows north along East 21st Street to St. Clair Avenue. Between Payne Avenue and Chester Avenue, the sewer size changes to a No. 7 egg shaped sewer and the material becomes brick. At Superior Avenue the interceptor size increases to a No. 15 egg shaped sewer. At St. Clair Avenue, the interceptor turns west to East 20th Street and then north on East 20th Street to Lakeside Avenue. At this point, Flow Divider E-13 directs dry weather flow into the Easterly Main Interceptor. Wet weather flows are diverted north to Regulator E-16, where flow is routed south to the Easterly Main Interceptor or overflows to CSO 095.

The East 30th branch begins at East 30th Street and Euclid Avenue as a 30 inch reinforced concrete pipe. The interceptor becomes a No. 3 egg shaped brick sewer to north of Chester Avenue, where the size changes to a No. 6 egg shaped sewer, to Payne Avenue. The interceptor size increases to a No. 7 egg shaped sewer from Payne Avenue to Superior Avenue. Just south of St. Clair Avenue the interceptor increases to a No. 8 egg shaped sewer and flow passes through Regulator E-9, where wet weather flows overflow to CSO 097. The interceptor is a 25 inch brick pipe on St. Clair Avenue to East 31st Street, where it increases size to a No. 3 egg shaped sewer to East 32nd Street. The diameter of the interceptor becomes 63 inches and flows to East 33rd Street and then flows north to Lakeside Avenue. At Lakeside Avenue flows pass through Flow Divider E-10 and into the Easterly Main Interceptor via an 18 inch pipe. Excess flows proceed north to King Avenue where Regulator E-8 diverts flow south back into the Easterly Main Interceptor. Excess flow from E-8 overflows to CSO 098.

The East 40th Street branch has a leg that joins the main branch at Euclid Avenue and East 40th Street. The leg begins at the intersection of East 30th and Community College as a No. 4 egg shaped sewer. At Central Avenue, the size changes to No. 11 egg shaped sewer and continues to Cedar Road. The sewer is a No. 12 egg shaped sewer from Cedar Road to its connection to the main section of the East 40th Street Branch at Euclid Avenue and East 40th Street. The Main branch begins at East 40th Street and Woodland Avenue as a No. 4 egg shaped brick sewer. Flows proceed north from this point to Euclid Avenue, where the East 30th Street leg joins the main leg of the interceptor branch. The size becomes a No. 5 egg shaped brick sewer, to south of Central Avenue and is a No. 8 egg shaped sewer to Central Avenue. From Central Avenue to Cedar Road the interceptor is a No. 12 egg shaped sewer. From Cedar Road to Carnegie Avenue the interceptor is a No. 14 egg shaped sewer and becomes a No. 15 egg shaped sewer from Carnegie Avenue to Euclid Avenue. Flows continue north along East 40th Street to Lakeside Avenue. The interceptor increases in size to a No. 19 egg shaped sewer from Euclid Avenue to Perkins Avenue. The size changes to a No. 18 egg shaped sewer from Perkins Avenue to Payne Avenue. From Payne Avenue to St. Clair Avenue, the size changes to 105 inches in diameter. It increases in diameter to 108 inches from St. Clair Avenue to the 144 inch section of pipe at Lakeside Avenue where flow is routed through Regulator E-3 and into the Easterly Main Interceptor. Wet weather flows are conveyed to CSO 200.

The East 55th Street branch begins just north of the intersection of East 55th Street and Quimby Avenue as a No. 9 egg shaped brick sewer. At Harlem Court, the interceptor becomes a No. 10 egg shaped sewer to Superior Avenue and increases to a No. 14 egg shaped sewer onto Marquette Street. Flows proceed north along East 55th Street to Stanard Avenue, and through Flow Divider E-52. Dry weather flows are passed north on East 55th Street through Regulator

E-50A in a brick 56 inch diameter sewer for approximately 33 ft to a No. 14 egg shaped sewer. The last section of pipe before entering the Easterly Main Interceptor is vitrified clay pipe that is 10 inches in diameter. Wet weather excess flow from E-50A is discharged through CSO 202. Wet weather flows from E-52 are routed northwest along Marquette Street to Regulator E-1 through a 15 inch vitrified clay sewer, where flow is diverted to the Easterly Main Interceptor. Excess wet weather flows from E-1 are discharged through CSO 201.

The East 65th Street branch begins at East 55th Street and Woodland Avenue as a 48 inch diameter brick sewer. The size increases to No. 6 egg shaped sewer at Central Avenue. South of Thackeray Avenue, the size of the pipe increases to a No. 8 egg shaped sewer. This diameter remains to Quimby Avenue, where the interceptor changes in diameter to 78 inches. Flow proceeds east on Quimby Avenue. At East 65th Street, the interceptor turns north and the diameter increases to 105 inches. The diameter is 108 inches from Linwood Avenue to White Avenue, where it becomes 122 inches for two pipe sections to Wade Avenue. The interceptor decreases slightly to 120 inches from Wade Avenue to Superior Avenue and then changes size to a No. 20 egg shaped sewer from Superior Avenue to Schade Avenue. The interceptor is 144 inches in diameter to Regulator E-33 and 180 inches into the Easterly Main Interceptor. Excess wet weather flows overflow through CSO 202.

The Addison Road branch begins at East 79th Street and Grand Avenue as a No. 10 egg shaped brick sewer. At Woodland Avenue, it becomes a No. 9 egg shaped sewer for one pipe section. The size increases slightly to a No. 10 egg shaped sewer, and continues north to Platt Avenue. The size then changes to a No. 9 egg shaped sewer to Quincy Avenue. From Quincy Avenue to Central Avenue the size is a No. 11 egg shaped sewer then increases in size to a No. 13 egg shaped sewer for two pipe sections. At this point the interceptor becomes a No. 12 egg shaped sewer to Cedar Avenue. The size goes to a No. 13 egg shaped sewer to south of Chester Avenue and to a No. 14 egg shaped sewer from this point to Lagrange Avenue. The interceptor changes to 64 inches in diameter to Hough Avenue and to a No. 13 egg shaped sewer from Hough Avenue to Linwood Avenue. From Linwood Avenue to Addison Road the size of the interceptor is a No. 12 egg shaped sewer, and is a No. 13 egg shaped sewer on Addison Road to Flow Divider E-34 at Wade Park Avenue. Dry weather flows from E-34 are directed north toward the

Easterly Main Interceptor in a No. 11 egg shaped sewer to between Redell Avenue and Decker Avenue where it becomes a No. 12 egg shaped sewer to Superior Avenue. From Superior Avenue to St. Clair Avenue, the interceptor size is a No. 16 egg shaped sewer through Regulator E-35, and into the Easterly Main Interceptor via a 108 inch pipe, downstream of the entry point from Regulator E-34. Excess wet weather flow is discharged through CSO 203.

The East 79th Street branch interceptor runs along Woodland Avenue and is a brick No. 2 egg shaped sewer. At East 93rd Street, the interceptor increases to a No. 3 egg shaped sewer to East 89th Street. Then the sewer becomes a No. 4 egg shaped sewer to the point where it turns southwest and becomes a No. 5 egg shaped sewer for two pipe sections, where this leg joins the main branch at Lisbon Avenue and Buckeye Avenue. The main branch is also brick and is a No. 2 egg shaped sewer along Buckeye Avenue to Steinway Avenue. It then becomes 60 inches to Lisbon Avenue and Buckeye Avenue. From Buckeye Avenue to East 83rd Street, the interceptor is 72 inches in diameter. From East 83rd Street to north of Quincy Avenue the diameter is 95 inches, and from Quincy Avenue to just north of Cedar Avenue the diameter increases to 104 inches. The diameter then goes to 108 inches from north of Cedar Road, across Carnegie Avenue and north onto East 82nd Street. The size transitions to a No. 13 egg shaped sewer north to Hough Avenue. From Hough Avenue to Melrose Avenue the diameter is 141 inches. The size changes to a No. 20 egg shaped sewer from Melrose Avenue to Wade Park Avenue, and from Wade Park Avenue to Donald Avenue and East 79th Street. The size continues as a No. 20 egg shaped sewer to St. Clair Avenue. North of St. Clair Avenue, flow is routed through Regulator E-37 to the Easterly Main Interceptor via a 141 inch diameter pipe. Wet weather flows from E-37 are discharged through CSO 204.

Dugway Interceptors

Figure 2-4 shows the Dugway Interceptor components. The Dugway Interceptor system consists of five branches, connecting to the Easterly Main Interceptor at two different locations. The western portion of the Dugway system is served by the Dugway Main West Interceptors, consisting of Branch D on the west side of the culverted Dugway Brook and Branch E on the

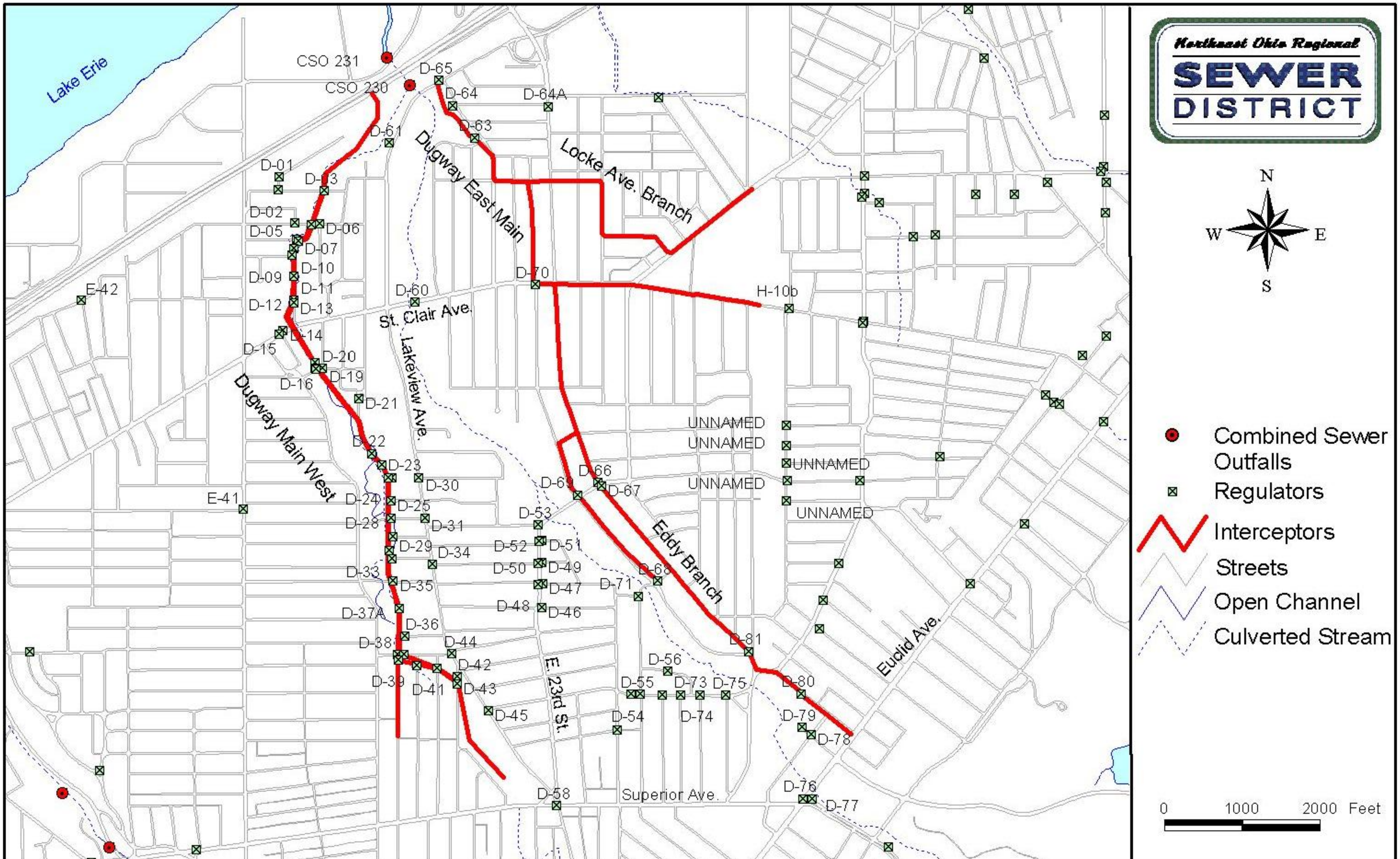

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Figure 2-4.
Dugway Interceptors

east side of the culvert. The eastern portion of the Dugway system is served by the Dugway Main East Interceptor and the Locke Avenue and Eddy Road branches, that are tributary to Dugway Main East.

Dugway West Branch D begins at Tacoma Avenue and East 111th Street and flows north along East 111th Street to Primrose Avenue as a 15 inch circular vitrified clay pipe. Along this pipe on East 111th Street is a 250 foot parallel section north of Grantwood Avenue, which is a 12 inch circular vitrified clay pipe. The West Branch D forks at East 111th Street and Primrose Avenue, and the other side of the fork is an 18 inch circular vitrified clay pipe that follows the West Branch E over to East 114th Street. West Branch E begins as a 12 inch diameter vitrified clay circular pipe running parallel to Carolina Road from Superior Avenue to East 114th Street. West Branch E then follows East 114th Street north to approximately 225 ft south of Lakeview Road, where it turns northwest to Linn Drive. At this point, Branches D and E flank the culvert on the west and east, respectively, and follow the culvert alignment north.

West Branch D is a 15 inch circular vitrified clay pipe on Linn Drive to approximately 275 ft south of where Linn Drive becomes East 109th Street. The pipe then becomes an 18 inch circular vitrified clay pipe to the point where Branch E joins approximately 225 ft north of Dupont Avenue.

Regulator D-39, located at Primrose Avenue and Linn Drive on Branch D, is where excess wet weather flow is diverted to the culverted west branch of Dugway Brook. Dry weather flow continues north to Regulator D-23, located on Linn Drive west of the Lakeview Road/Whitmore Avenue intersection, where excess wet weather flow is diverted to the culvert. Dry weather flow continues north to Regulator D-8, located at East 106th Street and Glenville Avenue, where wet weather flow is diverted to the culvert. The remaining dry weather flow continues north through the junction with Branch E about 200 feet north of Dupont Avenue and into the Easterly Main Interceptor a further 1,300 ft northeast near I-90.

West Branch E runs along the culvert also from Primrose to approximately 350 ft north of Ada Avenue on Linn Drive. Continuing on Linn Drive from that point, Branch E is a 15 inch diameter circular vitrified clay pipe to a point approximately 275 ft south of where Linn Drive becomes East 109th Street. From that point to the downstream junction with West Branch D, the pipe remains an 18 inch diameter circular vitrified clay pipe.

Flows in West Branch E follow the eastside of the culverted west branch of Dugway Brook north through a series of nine regulators. Each regulator discharges excess wet weather flow to the culvert. Flow proceeds north through Regulators D-33 (south of Greenview Avenue on Linn Drive), D-24 (Linn Drive, west of Whitmore Avenue), D-22 (Linn Drive, west of Parklawn Drive), D-20 (south of the St. Clair Avenue/East 106th Street intersection), D-12 (East 106th Street, north of St. Clair Avenue), D-11 (one manhole downstream of D-12), D-10 (one manhole downstream of D-11, north of Clairdoan Avenue), D-4 (at Elk Avenue) and finally through D-3 (at Dupont Avenue).

From the point where Branch E joins Branch D about 200 ft north of Dupont Avenue, Branch D continues as a 24 inch circular vitrified clay pipe for 970 ft where it becomes a 30 inch circular vitrified clay pipe to the Easterly Main Interceptor. The culverted west branch of Dugway Brook discharges to the open portion of Dugway Brook through CSO 230 just south of I-90.

The eastern portion of the Dugway system is served by the Dugway Main East Interceptor and the Locke Avenue and Eddy Road branches. Dugway Main East begins at East 131st Street and Shaw Avenue as a 35 inch diameter circular brick sewer. Flow proceeds west along Shaw Avenue and the diameter increases to 48 inches at East 128th Street and 54 inches at East 127th Street to East 125th Street. From East 125th Street the sewer becomes a 60 inch circular brick pipe along St. Clair Avenue to the section of pipe before the Eddy Road branch joins at Eddy Road. The 20 foot section of pipe before the Eddy branch is a No. 10 brick egg sewer. Flow enters Regulator D-70 at East 120th Street and St. Clair Avenue, heads north along East 120th Street in a No. 10 egg shaped brick sewer to Sellers Avenue. Flow turns then west on Sellers Avenue (size, shape, and material unknown). Flow turns north on East 117th Street and the sewer is a No. 15 egg shaped brick sewer from Oakview and East 117th Street to Regulator D-63, which is just north of Corbus Drive and west of Dundee Drive. East 117th Street becomes Dundee Drive north of Corbus Road. Wet weather flow from both D-70 and D-63 is conveyed to the culverted east branch section of Dugway Brook. Flow continues north from Regulator D-63 as a 36 inch circular brick sewer to Dugway Main East Interceptor connection to the Easterly Main Interceptor.

The Eddy Road branch sewer runs along Eddy Road from Euclid Avenue to St. Clair Avenue, where it connects with Dugway Main East Interceptor. The interceptor begins as a No. 7 brick egg sewer to approximately 400 feet south of Hayden Avenue on Eddy Road at Regulator D-80. From this point the interceptor proceeds as a 24 inch circular vitrified clay pipe to Hart Avenue. Regulator D-81 is in the 24 inch section of sewer at East 131st Street and Eddy Road. At Hart Avenue, the size changes to a No. 3 egg shaped sewer for 350 ft and the material is brick. The sewer then becomes a No. 5 brick egg sewer for approximately 300 ft, where the size changes to a No. 6 egg shaped brick sewer. Regulators D-67 and D-66 are located on Arlington Road in the section of No. 6 egg shaped sewer. The pipe remains this size to Woodside and Eddy where a parallel section of pipe comes in. All wet weather flows from all of the above mentioned regulators are conveyed to the culverted east branch of Dugway Brook, and the remaining flow continues to the Eddy Road branch connection to Dugway Main East Interceptor at St. Clair Avenue. After the parallel pipe joins, the pipe continues on Eddy Road as a No. 7 egg brick sewer to St. Clair Avenue. One section before this branch joins into the main Dugway East interceptor, the size increases to a No. 8 egg brick sewer.

The parallel section of the Eddy Road branch sewer originates at Regulator D-68 (Hart Avenue, east of Thornhill Drive) as a 12 inch circular vitrified clay pipe, and proceeds northwest along Thornhill Drive for 550 ft. The pipe then becomes a 15 inch diameter circular vitrified clay sewer to approximately 280 ft south of Arlington Avenue, where it becomes and 18-inch circular vitrified clay pipe to Arlington Avenue. A section of pipe at Arlington Avenue before Regulator D-69 increases to 24 inches. The sewer remains a 24 inch circular vitrified clay pipe through the regulator along East 120th Street to the point where it joins the main Eddy branch at Woodside Avenue and Eddy Road. Wet weather flow from Regulators D-68 and D-69 is conveyed to the culverted east branch of Dugway Brook.

The culverted east branch of Dugway Brook discharges to the open channel portion of Dugway Brook through CSO 231 located just south of I-90.

The Locke Avenue branch of Dugway Main East begins as a No. 3 egg shaped brick sewer at St. Clair Avenue and East 131st Street. Flows follow St. Clair Avenue southwest to Lancelot Avenue increasing in size to a No. 4 at Cleveland Road and then No. 5 brick egg sewer at East 129th Street to Lancelot Avenue. Flow heads northwest on Lancelot Avenue to East 124th Street in a No. 6 egg shaped brick sewer. Flows head north on East 124th Street remaining a No. 6 egg shaped brick sewer to a point approximately 165 ft south of Locke Avenue. The sewer turns west and runs parallel the south side of Locke Avenue to its connection with Dugway Main East at East 120th Street. From East 124th Street to the connection to the main Dugway East branch at East 120th Street and Sellers Avenue, the pipe is a No. 8 egg shaped brick sewer. The Locke Avenue branch is unregulated throughout its length.

East 140th Street / Hayden Interceptor

Figure 2-5 shows the East 140th Street/Hayden Interceptor components. The East 140th Street/Hayden Interceptor consists of the Main and Shaw Interceptor branches. The Main branch begins as three pipes at the intersection of Fifth Avenue and Hayden Avenue. The west pipe begins as 24 inch vitrified clay, the middle pipe as a No. 6 egg shaped brick sewer and the east pipe as a 51 inch diameter sewer. The flow proceeds north on Hayden Avenue. The middle pipe changes to 45 inches at Graham Avenue and to 48 inch reinforced concrete at Savannah Avenue to Milan Avenue. The west and middle pipe join at Flow Divider H-10, which is located at Milan Avenue and Hayden Avenue, and become a 48 inch diameter reinforced concrete pipe. Dry weather flow continues north on Hayden Avenue.

Wet weather flows are routed from H-10 to the east leg of the Main branch and then into Flow Divider H-10A, joining flows from the upstream end of the east leg. Wet weather flows from H-10A flow west along Shaw Avenue into the Dugway Main East Interceptor.

At Strathmore Avenue, the pipe changes to a No. 6 egg shaped brick sewer to south of Woodworth Avenue and Hayden Avenue. The east pipe increases to 57 inches at Scioto Avenue

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Figure 2-5. E 140th St./Hayden

to Savannah Avenue where it becomes a 60 inch reinforced concrete pipe, until it increases to 63 inches at Alder Avenue. Just south of Woodworth Avenue, the west leg flows through Regulator H-7 and the east leg through Regulator H-8. Dry weather flows from H-7 and H-8 join and continue north on Hayden Avenue as a single sewer. Wet weather flows from H-7 and H-8 are conveyed to the culverted Shaw Brook.

Flows in the main branch continue north on Hayden Avenue as a 24 inch vitrified clay pipe from Woodworth Avenue to St. Clair Avenue. The pipe increases to a No. 4 egg shaped brick sewer northeast on St. Clair Avenue and then north on East 140th Street. The interceptor becomes a No. 5 egg shaped brick sewer at Coit Road.

At Nell Avenue, the size increases to a No. 6 egg shaped sewer to just south of Aspinwall Avenue. The size increases to a No. 7 egg shaped sewer in the intersection of East 140th Street and Aspinwall Avenue, at Regulator H-19. Wet weather flows from H-19 flow west to the culverted Nine Mile Creek. The dry weather outlet of Regulator H-19 is 36 inches in diameter to Deise Avenue. From Deise Avenue to Darley Avenue the size is 40 inches and from Darley Avenue to I-90 the diameter is 60 inches. The diameter is 66 inches from I-90 to Othello Court and 78 inches from Othello Court to Lake Shore Boulevard, where the interceptor ends at the Collinwood junction chamber.

The Shaw branch of the East 140th Street/Hayden Avenue Interceptor begins at Knowles Avenue and Euclid Avenue as a 10 inch vitrified clay pipe and increases to 30 inches in diameter and becomes brick at Beersford Avenue. The size of this interceptor is a No. 3 egg shaped sewer from Beersford Avenue to Marloes Avenue and No. 6 shaped sewer from Marloes Avenue to Doan Avenue. The size is No. 2 egg shaped sewer from Doan Avenue to Rosemont Road. From Rosemont Road to Lee Boulevard the sewer is No. 3 egg shaped sewer and from Lee Boulevard to Page Avenue the size is No. 7 egg shaped sewer. The size is No. 9 egg shaped sewer from Page Avenue to the point where the sewer turns west on Strathmore Avenue where the size is a No. 7 egg shaped sewer on Strathmore Avenue. Flows enter Regulator H-4 at Elderwood Avenue. Wet weather flows from H-4 are conveyed to the culverted Shaw Brook. Dry weather flows are conveyed northeast along Elderwood Avenue in a 15 inch vitrified clay sewer to Shaw Avenue, and continue northwest along Shaw Avenue. At Elmwood Avenue and Shaw Avenue, the pipe material remains the same and the diameter increases to 20 inches. At Allegheny Avenue and Shaw Avenue, the pipe changes back to brick and the size becomes a No. 2 egg shaped sewer, to the point where it joins with the main leg at Hayden Avenue.

East 152nd / Ivanhoe Interceptor

Figure 2-6 shows the East 152nd Street/Ivanhoe components. The East 152nd Street/Ivanhoe Avenue collection system consists of four branches, the Main, Holmes Avenue and St. Clair Avenue branches and the Rockefeller Relief sewer. The Main branch begins on Ivanhoe Road, just northwest of Euclid Avenue, as a 42 inch reinforced concrete pipe on Ivanhoe Road onto Halliday Avenue. It becomes 48 inches in diameter up to Nathaniel Avenue and to St. Clair Avenue. At this point the interceptor splits and becomes two pipes north of St. Clair Avenue on East 154th Street. The pipe to the west is a No. 8 egg shaped brick sewer and the east pipe is a 48 inch in diameter reinforced concrete pipe. These pipes do not change size until School Avenue, where they join and become one brick pipe 78 inches in diameter for one pipe section. Then the pipe becomes 96 inches in diameter over to East 152nd Street and north to Darwin Avenue. The diameter changes to 108 inches on Darwin Avenue, west to East 146th Street, and then northwest to Lake Shore Boulevard where the interceptor ends at the Collinwood junction chamber.

The Rockefeller Relief Sewer begins at Holmes Avenue and East 154th Street as a brick, 108 inch diameter sewer. Flows proceed north from this location, along the east side of East 152nd Street. At Westropp Avenue, the pipe size increases to 120 inch diameter reinforced concrete. Flow proceeds west on Westropp Avenue and then north on East 142nd Street to the Rockefeller Relief Sewer's terminus where is joins the Lake Shore Boulevard interceptor at Regulator L-23, located at East 142nd Street and Lake Shore Boulevard. Excess wet weather flows from Regulator L-23 overflow to the CSO 242 outfall.

The Holmes Avenue branch begins at Euclid Avenue and East 191st Street as a 24 inch vitrified clay pipe. Flow proceeds southwest on Euclid Avenue to London Road and then turns northwest on London Road, where the sewer becomes a brick, No. 4 egg shaped sewer. Flow continues northwest on London Road, across St. Clair Avenue to Holmes Avenue, where the size increases

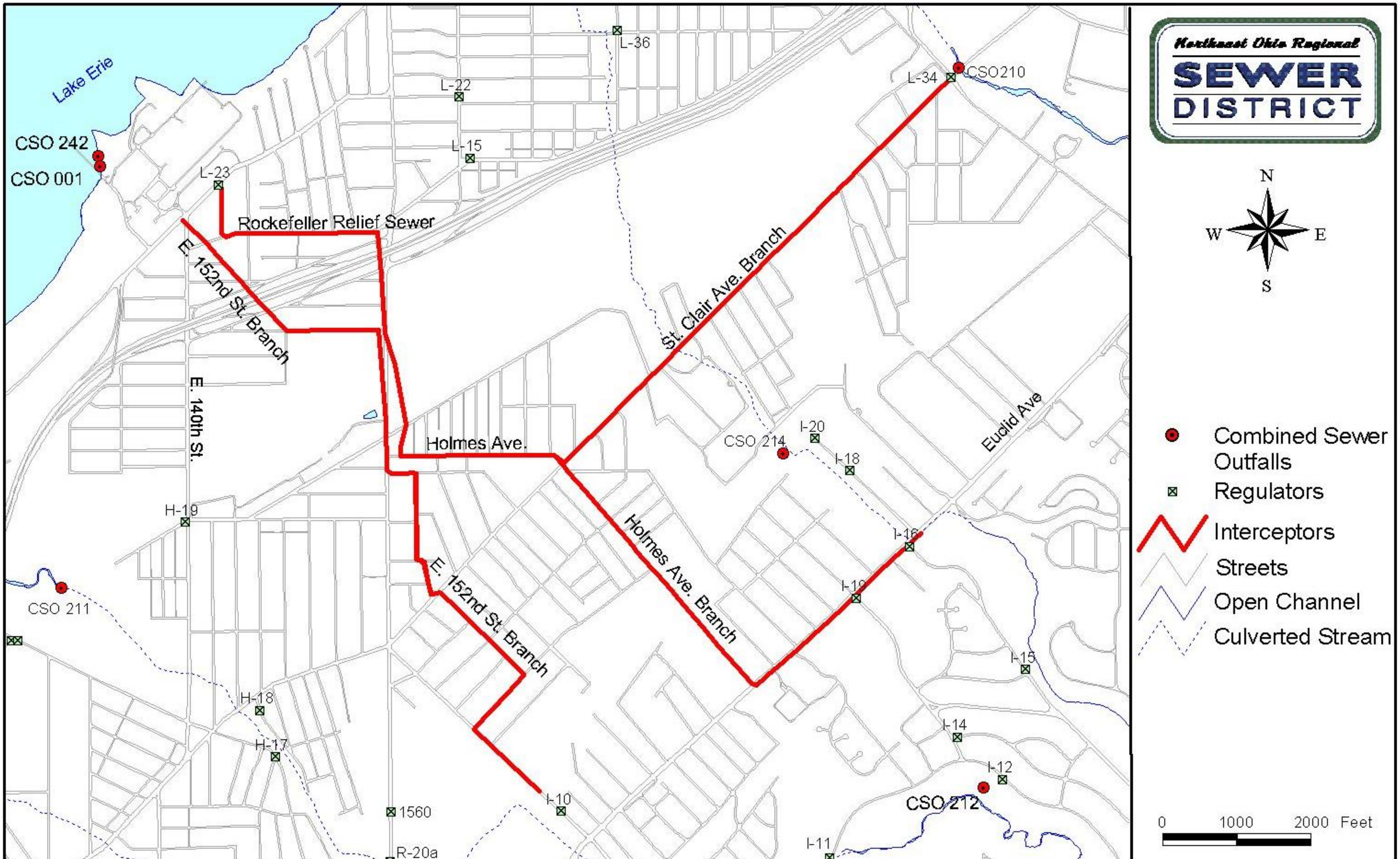

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Figure 2-6.
E. 152nd St./Ivanhoe

to a No. 9 egg shaped sewer. Flow then proceeds west on Holmes Avenue to East 154th Street where the Holmes Avenue branch joins the Rockefeller Relief Sewer.

The St. Clair Avenue branch begins at East 175th Street and St. Clair Avenue as a No. 6 egg shaped sewer. At East 168th Street, it becomes a No. 8 egg shaped sewer. It remains this size to London Avenue, where it joins to the Holmes Avenue branch.

Lake Shore Boulevard and Nottingham Interceptors

Figure 2-7 shows the Lake Shore Boulevard and Nottingham Road components. The Lake Shore Boulevard/Nottingham Interceptor system collects flows from the eastern portions of the Easterly combined sewer service area. This system consists of the Lake Shore Boulevard Interceptor, Nottingham Main Interceptor, St. Clair Avenue branch and the East 185th Street branch of the Nottingham Interceptor.

The Lake Shore Boulevard Interceptor begins at East 185th Street and Lake Shore Boulevard as a 20 inch vitrified clay sewer. Flows are conveyed southwest along Lake Shore Boulevard to Marcella Avenue, where the diameter increases to 24 inches. Flows continue southwest to the Euclid Creek Pump Station, located on East 185th Street on the east bank of Euclid Creek. The pump station lifts flows via two 12 inch cast iron force mains, to a junction manhole at the intersection of East 174th Street and Nottingham Road. Flows exceeding the capacity of the pump station are discharged to Euclid Creek through CSO 239.

After the junction at Nottingham Road, the Lake Shore Interceptor becomes a No. 5 egg shaped brick sewer. Flows continue west on Lake Shore Boulevard through Regulator L-31 located at East 171st Street and Lake Shore Boulevard. Dry weather flows continue to the west. Wet weather flows are diverted into a parallel CSO conduit, which follows the Lake Shore Boulevard Interceptor alignment until it reaches East 156th Street. From Regulator L-31, flows continue west on Lake Shore Boulevard through Regulator L-29, located at East 167th Street where excess wet weather flows are diverted to the parallel CSO conduit described above. From L-29, flow proceeds southwest on Lake Shore Boulevard through Regulator L-28, located at Euclid

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Figure 2-7. Lake Shore and Nottingham Interceptors

Beach Boulevard. Again, excess wet weather flows are diverted to the parallel CSO conduit.

At East 159th Street, the interceptor becomes a No. 7 egg shaped sewer. Flow continues southwest on Lake Shore Boulevard through Regulator L-26, located just east of East 156th Street. Wet weather flows from L-26 join flows from L-28, 29 and 31 and are discharged through CSO 206.

At East 156th Street, the size returns to a No. 5 egg shaped sewer. The interceptor follows Lake Shore Boulevard to Grovewood Avenue. At this point, the size becomes a No. 6 egg shaped sewer. At Macauley Avenue, the size changes to 60 inches in diameter, and remains this size to East 150th Street. From East 150th Street to East 149th Street, the diameter is 72 inches. From East 149th Street to East 146th Street, the sewer is a No. 7 egg shaped sewer. From East 146th Street to East 143rd Street, the size is 75 inches in diameter and from East 143rd Street to East 142nd Street, the size of the interceptor is a No. 7 egg shaped brick sewer. The Rockefeller Relief Sewer joins the Lake Shore Boulevard Interceptor at Regulator L-23, located at East 142nd Street and Lake Shore Boulevard. Wet weather overflows from Regulator L-23 discharge through the WWTP property, to CSO 242 (also termed CSO 001A). The Lake Shore Boulevard Interceptor continues as a 78 inch diameter pipe to its terminus at the Collinwood junction chamber at the intersection of East 140th Street and Lake Shore Boulevard. From this point, the combined flow from the Lake Shore Boulevard, East 140th Street and East 152nd Street Interceptors is delivered to the plant via an 18x18 ft box pipe known as the “Collinwood Interceptor”.

The Nottingham Main Interceptor begins as a 20 inch vitrified clay sewer just southeast of the Nottingham and Redwood Road intersection. Flow proceeds northwest on Nottingham Road. The diameter increases to 25 inches and the material changes to brick. At Redwood Road, the diameter becomes 34 inches and continues to Firwood Road. The interceptor is 50 inches diameter from Firwood Road to north of Melville Road. The size increases to a No. 7 egg shaped sewer and continues to south of St. Clair Avenue and through Regulator L-34, located at the intersection of St. Clair Avenue and Nottingham Road. Excess wet weather flows are discharged through CSO 210 into Euclid Creek. Dry weather flows from L-34 continue northwest on Nottingham Road in a No. 4 egg shaped sewer to the Nottingham Pump Station. From the Nottingham Pump Station, flows are lifted to a manhole located at East 177th Street and Nottingham Road. Flow then resumes gravity flow northwest through Regulator L-32, located at East 174th Street and Nottingham Road. Dry weather flow from L-32 continues west and joins the Lake Shore Boulevard Interceptor in the same intersection. Wet weather overflows from L-32 are diverted north through an overflow conduit to CSO 209.

The St. Clair Avenue branch of the Nottingham Interceptor begins at the intersection of East 175th Street and St. Clair Avenue as a 24 inch diameter vitrified clay sewer. There is one section of 36 inch sewer, and then the size becomes a No. 7 egg shaped sewer. At Larchmont Road, there is one section of 48 inch diameter pipe, which increases to 51 inches on to Melville Road. From Melville Road to Brussels Avenue, the pipe size is a No. 7 egg shaped sewer. The interceptor is 60 inches until East 187th Street, where it becomes 66 inches in diameter. Flow proceeds northeast along St. Clair Avenue to its terminus at Regulator L-34 at the Nottingham Main branch.

The East 185th Street branch begins at East 185th Street and Clermont Road as a 12 inch vitrified clay sewer. Flows proceed north on East 185th Street. At Glen Road, the diameter increases to 24 inch and remains this size up to Cochran Avenue. At Cochran Avenue, the sewer is a No. 2 egg shaped brick sewer. The branch ends at the connection with the St. Clair Avenue branch, at St. Clair Avenue and Melville Road.

Heights / Hilltop Interceptor

Figure 2-8 shows the Heights/Hilltop Interceptor. The Heights/Hilltop Interceptor system serves the southeastern communities within the Easterly service area. All flows to the Heights/Hilltop Interceptor are separate sanitary flows, and are therefore ensured treatment at the Easterly WWTP.

The Heights and Hilltop Interceptors join at a location approximately 1,200 feet north of the intersection of East 131st Street and Coit Road. The 102 inch circular reinforced concrete

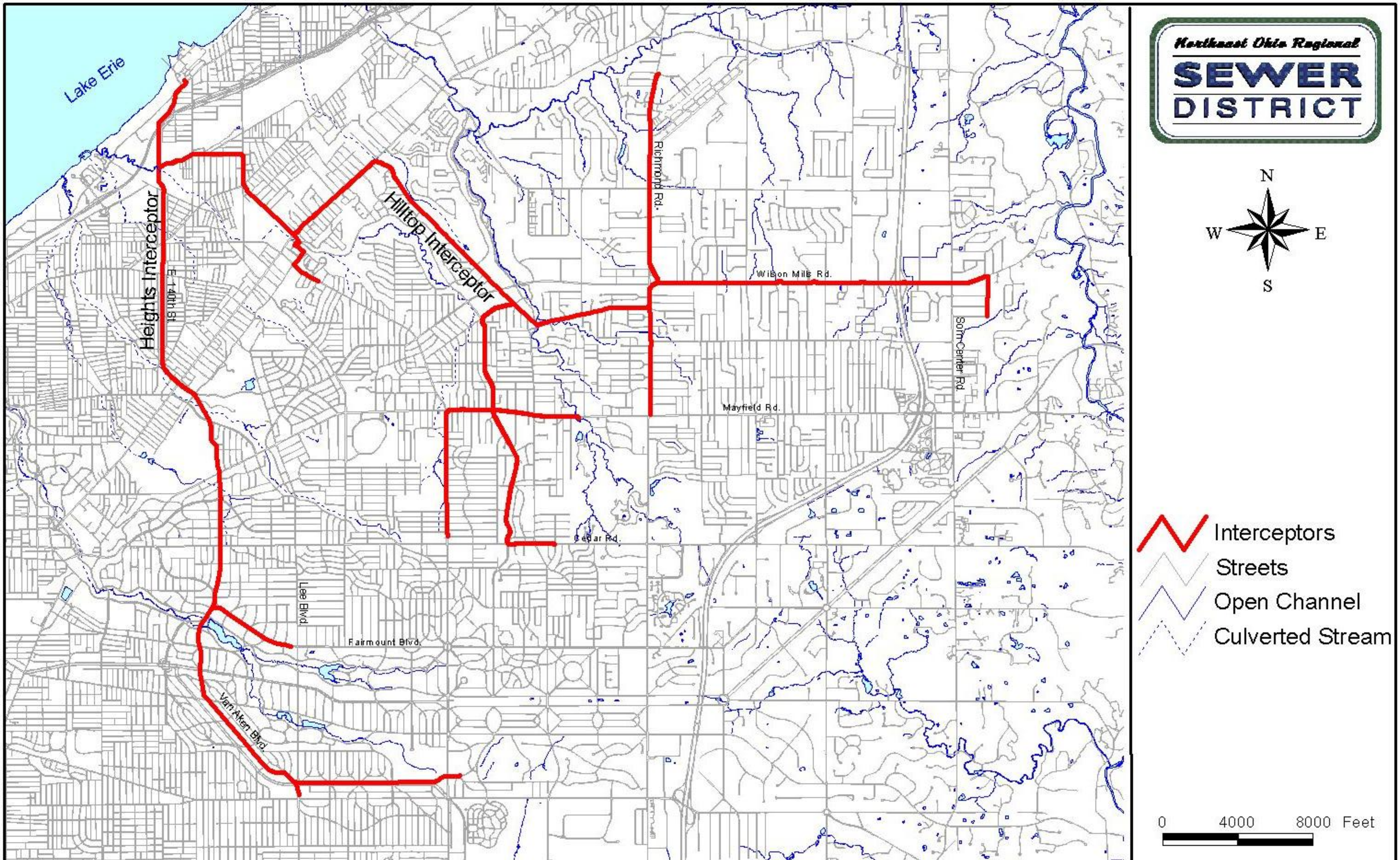

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Figure 2-8. Heights/Hilltop Interceptor

Hilltop Interceptor comes in from the east and the 78 inch circular reinforced concrete Heights Interceptor comes in from the south. The Heights/Hilltop Interceptor becomes a 132 inch circular reinforced concrete pipe after this junction point and proceeds north to a point just north of the Shoreway and west of Darley Avenue. The interceptor then follows the curve of the Shoreway and then north along East 136th Street to Lake Shore Boulevard. The interceptor changes shape to a 108 inch high by 132 inch wide box and follows Lake Shore Boulevard northwest to the Easterly WWTP.

There is a control structure in the Heights Interceptor located at Terrace Road and Forest Hills Boulevard. This structure contains hydraulic sluice gates that can be used to utilize the Heights Interceptor upstream of this structure for storage during wet weather flow conditions. The tunnel is 120 inches in diameter with approximately nine million gallons of available storage capacity.

DESCRIPTION OF COMBINED SEWER OVERFLOWS

Eight receiving water bodies within the Easterly combined sewer service area receive CSO during wet weather events. These receiving waters include Doan Brook, that was studied under a separate facilities plan. This section describes the combined sewer overflows tributary to the seven other receiving waters within the Easterly service area. These receiving waters that receive permitted CSO outfall discharges during wet weather are the Cuyahoga River, Lake Erie, Dugway Brook, Shaw Brook, Nine Mile Creek, Green Creek and Euclid Creek. The following sections describe CSO tributary areas based on the collection system model developed for the Easterly CSO project as further described in Chapter Four. The areas were defined based on the dry weather flow route upstream of each regulator tributary to a given CSO.

Cuyahoga River CSO Outfalls

The Cuyahoga River receives CSO flow from four permitted CSO outfalls within the Easterly combined sewer service area, and emergency overflows from two City of Cleveland-owned pump stations. The Cuyahoga River service area and CSO outfalls are shown in Figure 2-9.

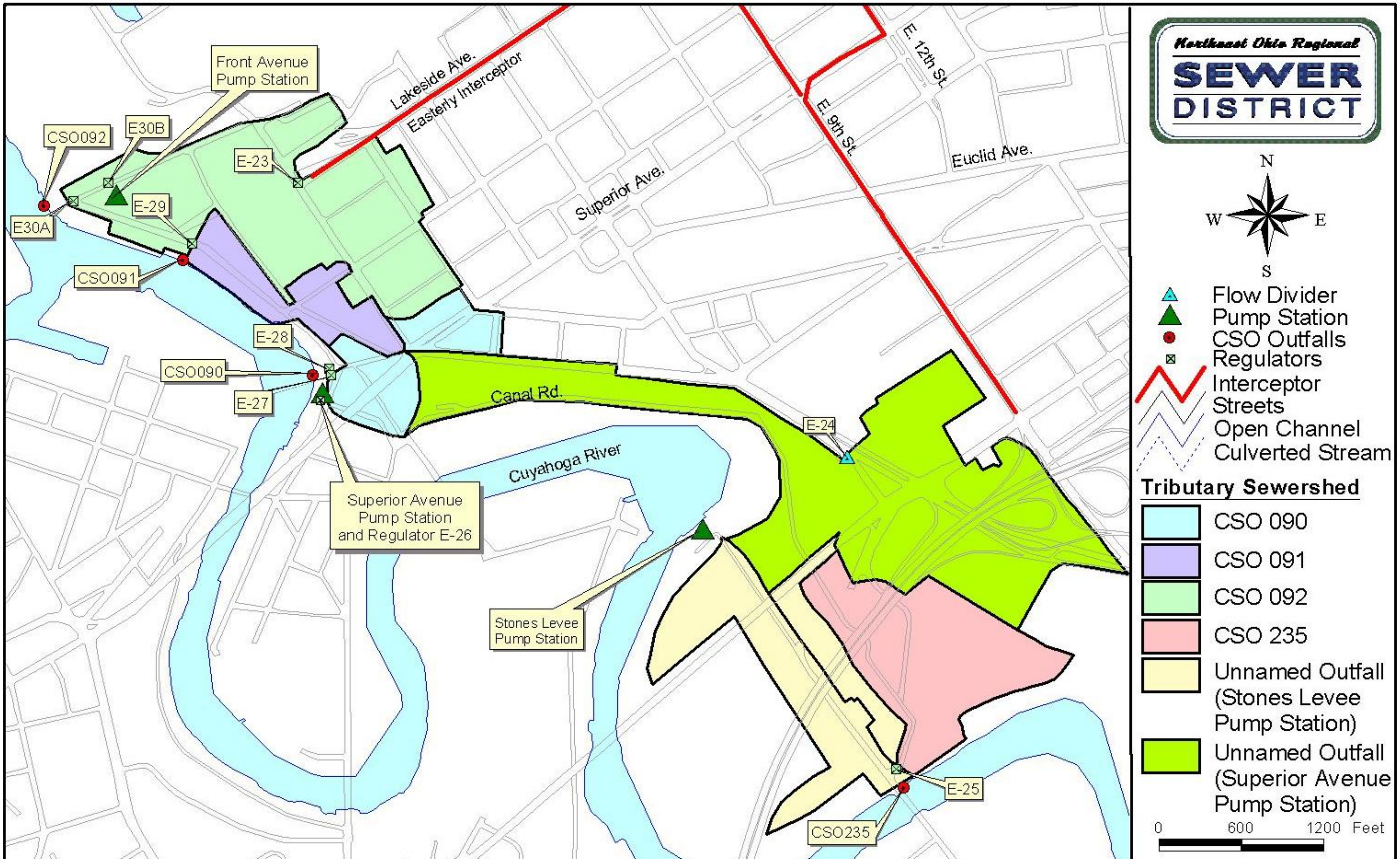

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Figure 2-9. Cuyahoga River CSO Outfalls

The Flats entertainment district is situated at river level along the bank of the Cuyahoga River. This service area is generally characterized as the area west of West 9th Street and Huron Road to the Cuyahoga River. Most of the sewers in this area are combined, with the exception of some of the streets along the river served by separate sanitary sewers. Storm flows in these areas are collected separately and conveyed directly to the river. Sewer flows in the Flats area follow the topography in a northwesterly direction toward the mouth of the Cuyahoga River. Three pump stations direct flows to higher elevations, and ultimately into the Easterly Interceptor. The three pump stations serving the Flats area consist of the Stones Levee Pump Station, the Superior Avenue Pump Station and the Front Avenue Pump Station.

The Stones Levee Pump Station, owned by the City of Cleveland, is the southern most pump station in the Flats area. Combined sewer flows from Regulator E-25, and separate sanitary flows from West 3rd Street, are conveyed to the Stones Levee Pump Station where flow is pumped to a junction manhole located northeast of the pump station on Canal Road. Flows are then conveyed along Canal Road to the Superior Avenue Pump Station, which is described below. Flow exceeding the pump station capacity overflows to the Cuyahoga River via an unnamed emergency bypass.

The Superior Avenue Pump Station, also owned by the City of Cleveland, serves the combined sewer area in the middle area of the Flats. In addition to these combined sewer flows, the Superior Avenue Pump Station receives wet weather flows from Flow Divider E-24 and flows from the Stones' Levee Pump Station that are conveyed along Canal Road, as described previously. Regulator E-26, which is not maintained by the NEORSD, is located at the Superior Avenue Pump Station and serves as a wet-well overflow. The Superior Avenue Pump Station also receives combined sewer flows from Superior Avenue, regulated by Regulator E-27, and St. Clair Avenue, regulated by Regulator E-28. The wet weather overflows from E-27 and E-28 comprise CSO 090. The overflow from the Superior Avenue Pump Station (E-26) is also tributary to the Cuyahoga River, but is not a permitted CSO under the NEORSD's National Pollution Discharge Elimination System (NPDES) permit. Flows from the Superior Avenue Pump Station are pumped northeast up St. Clair Avenue to West 9th Street. Flow is then by gravity north along West 9th Street, through Flow Divider E-23, and into the Easterly Interceptor.

The Front Avenue Pump Station is the northern-most pump station along the east bank of the Flats area and is owned by the City of Cleveland. The Front Avenue Pump Station receives combined flow from Front Avenue, Old River Road, West 10th Street and the adjacent buildings. Dry weather flow is conveyed northwest along Old River Road from Regulator E-29 (wet weather flows to CSO 091) through Regulator E-30A and northeasterly to the Front Avenue Pump Station. Front Avenue flows are conveyed through Regulator E-30B and directly to the pump station. Both E-30A and E-30B are tributary to CSO 092. From the Front Avenue Pump Station, flows are conveyed via force main up Front Avenue and West 9th Street through Flow Divider E-23 into the Easterly Interceptor.

CSO 090. CSO 090 has a combined sewer drainage area of approximately 65 acres and a population of approximately 40 people. Tributary regulators contributing wet weather flows to this outfall are listed in the Table 2-4.

Table 2-4. Regulators Tributary to CSO 090

Regulator Number	Location	Regulator Type	Community
E-27	West 11th Street at Superior Avenue, north of Superior Avenue P.S.	Sidespill	Cleveland
E-28	Superior Avenue, west of West 11th Street at Superior P.S.	Sidespill	Cleveland

CSO 091. CSO 091 has a combined sewer drainage area of approximately 13 acres and a population of approximately 25 people. The tributary regulator that contributes wet weather flow to this outfall is listed in the Table 2-5.

Table 2-5. Regulator Tributary to CSO 091

Regulator Number	Location	Regulator Type	Community
E-29	West 11th Street under Main Avenue bridge	Sidespill	Cleveland

CSO 092. CSO 092 has a combined sewer drainage area of approximately 52 acres and a population of approximately 86 people. Tributary regulators contributing wet weather flows to this outfall are listed in the Table 2-6.

Table 2-6. Regulators Tributary to CSO 092

Regulator Number	Location	Regulator Type	Community
E-30A	Front Street, west of West 11th Street	Perpendicular	Cleveland
E-30B	Front Street, west of West 11th Street	Perpendicular	Cleveland

CSO 235. CSO 235 has a combined sewer drainage area of approximately 39 acres and no resident population. This is due to the industrial use of the entire drainage area. The tributary regulator that contributes wet weather flows to this outfall is listed in Table 2-7.

Table 2-7. Regulator Tributary to CSO 235

Regulator Number	Location	Regulator Type	Community
E-25	Canal Road, 100 ft east of West 3rd Street	Leaping	Cleveland

Superior Avenue Pump Station Overflow. The Superior Avenue Pump Station has a combined sewer drainage area of approximately 54 acres and limited residential population, due to the industrial use of the entire drainage area. The tributary regulator contributing wet weather flows to this outfall is listed in Table 2-8. Figure 2-9 shows the Superior Avenue Pump Station CSO outfall.

Table 2-8. Regulator Tributary to Superior Avenue Pump Station

Regulator Number	Location	Regulator Type	Community
E-26	Superior Avenue/West 11th Street Pump Station	Perpendicular	Cleveland

Lake Erie

Lake Erie receives wet weather flows from 17 CSO outfalls within the Easterly combined sewer service area. The Lake Erie CSO outfalls are shown in Figures 2-10, 2-11 and 2-12.

CSO 001. CSO 001 is the Easterly WWTP headworks overflow. Approximately 17,000 acres of separate and combined sewer service area is tributary to this overflow, without any prior overflow potential. This 17,000 acre area includes the separate sewer area served by the Hilltop leg of the Heights-Hilltop Interceptor, prior to the Heights leg being brought on-line. Heights flows are still part of the Doan Valley sewershed until February 2003. The tributary population is approximately 138,000.

Overflow volumes at CSO 001 are a combination of six potential overflow points. The Collinwood, Easterly and Heights-Hilltop Interceptors can all overflow after screening, which comprise three of the six overflow points. Hydraulic control is maintained to allow them to overflow in this same order, thus preventing the stronger sanitary wastewater from Heights-Hilltop from overflowing until last. Each of the interceptors also have an emergency overflow upstream of the screening facilities.

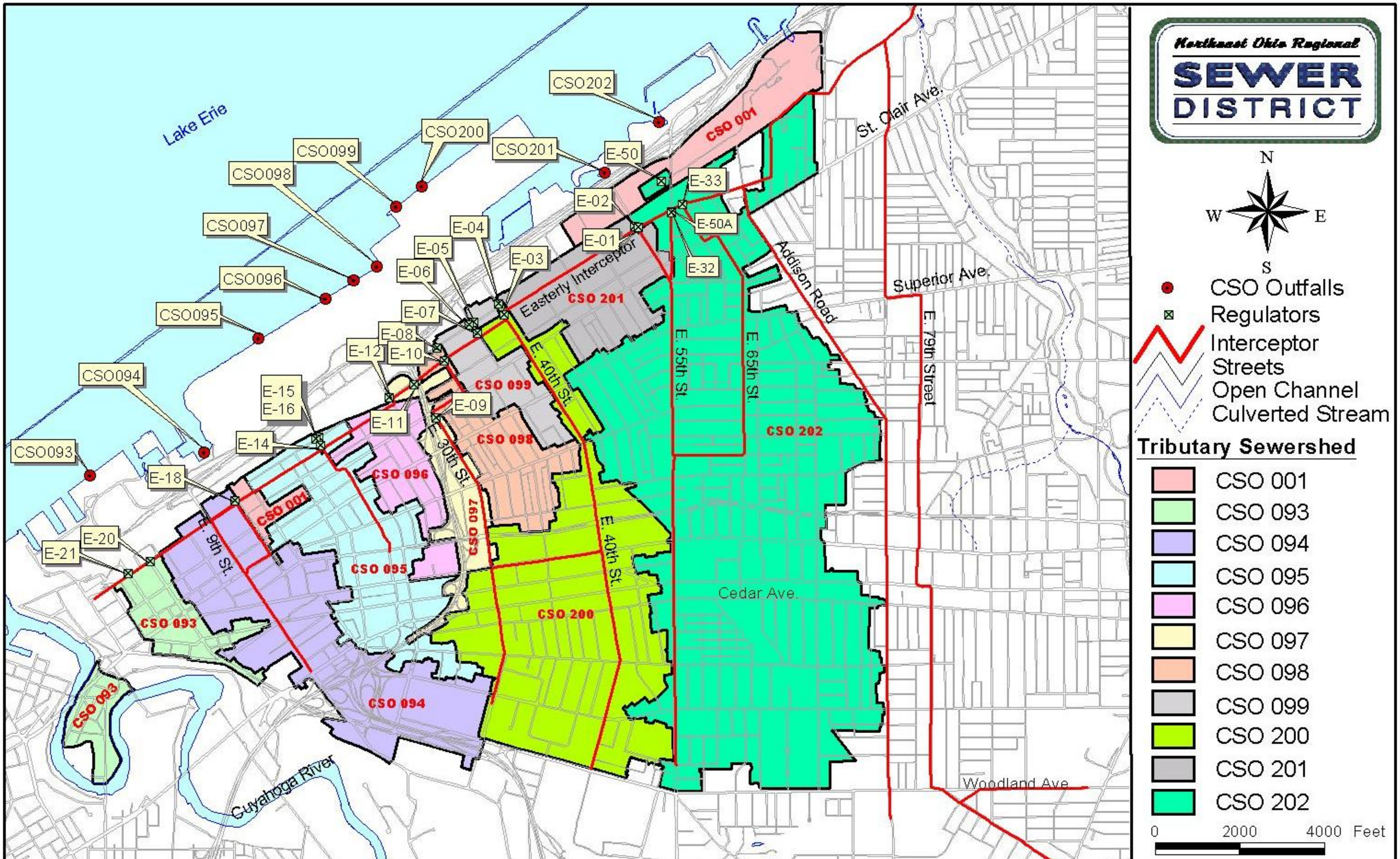

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Figure 2-10.
Lake Erie CSO
Outfalls 093-202

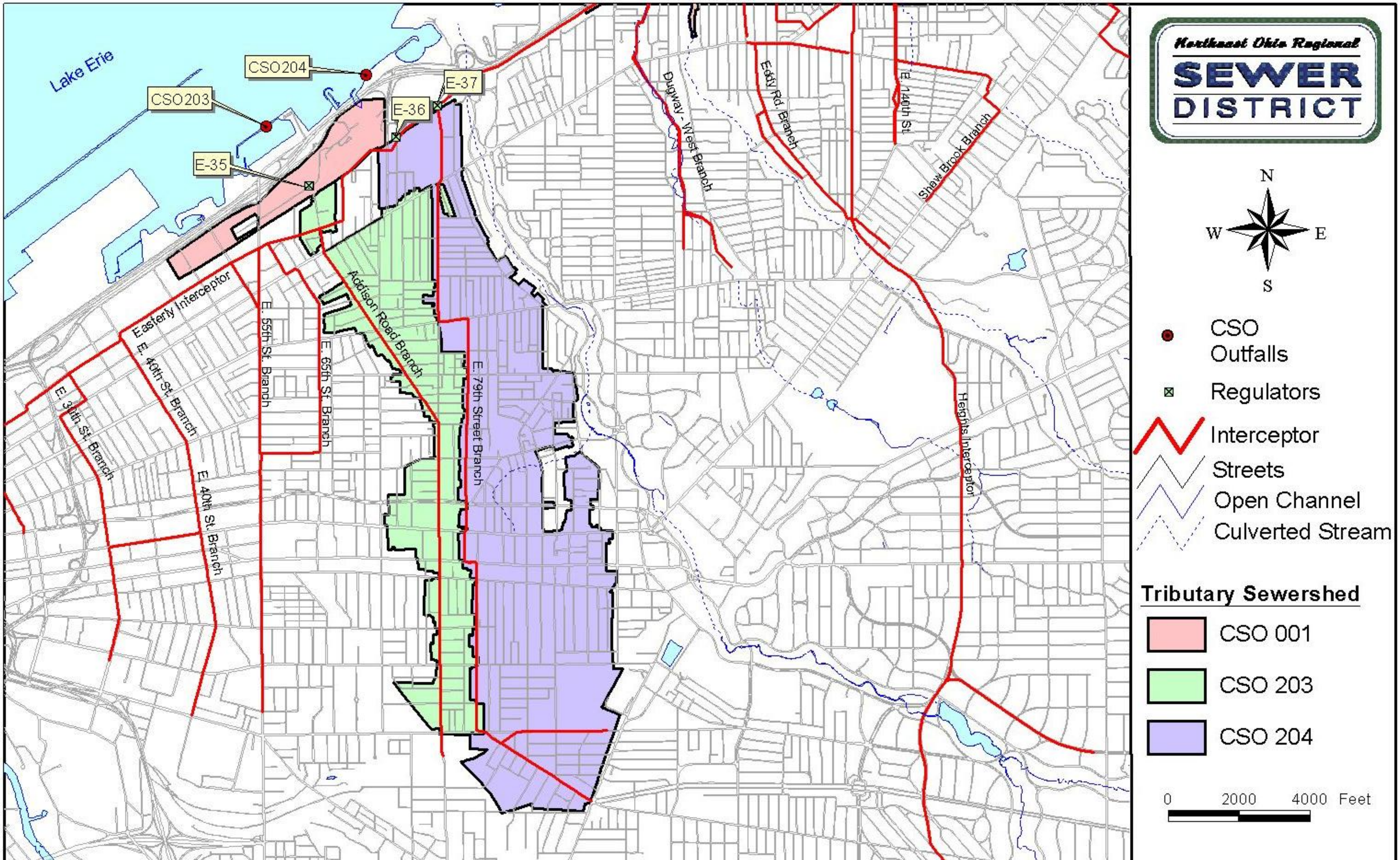

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Figure 2-11.
Lake Erie CSO Outfalls 203-204

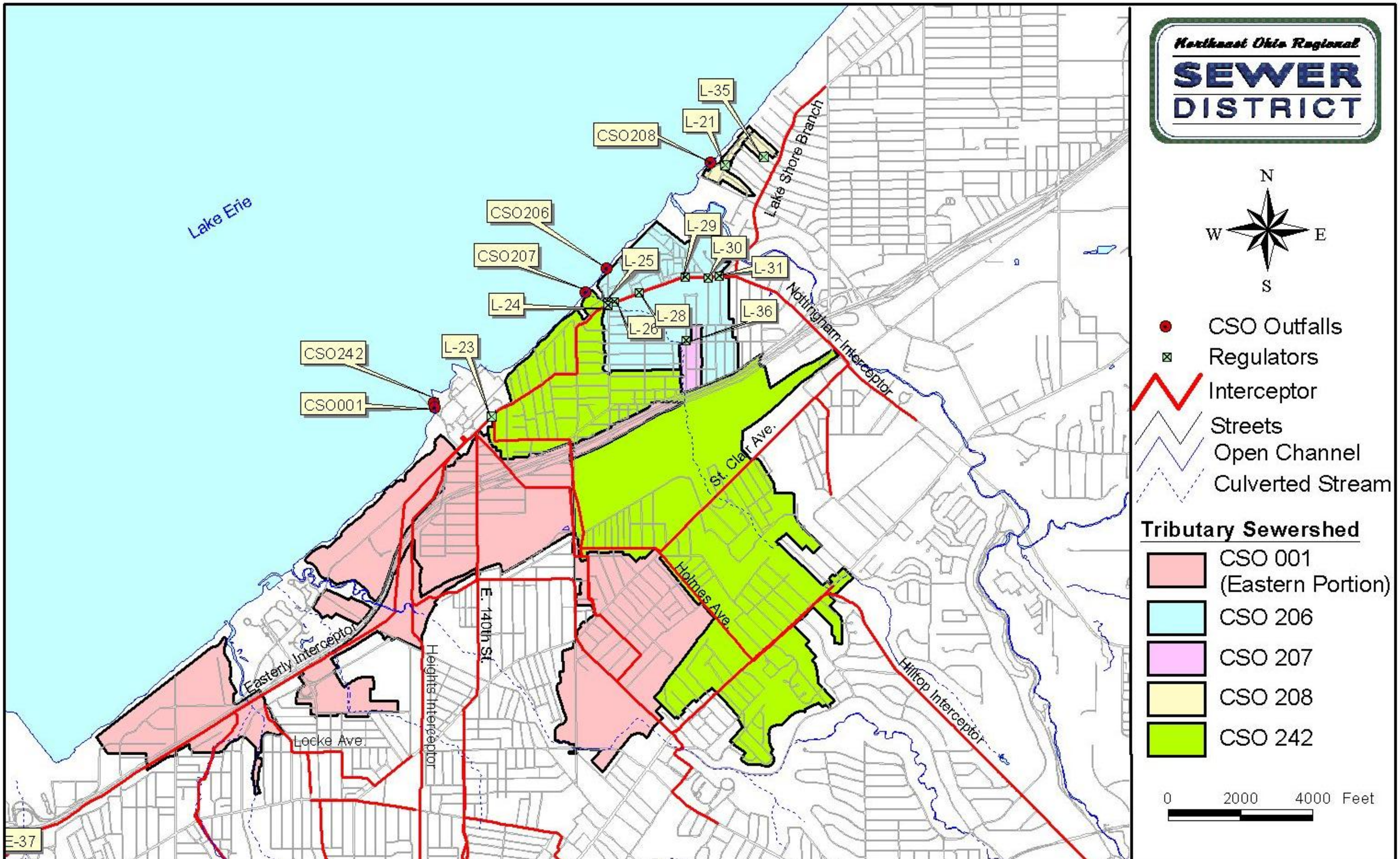

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Figure 2-12.
Lake Erie CSO
Outfalls 206-208,
001, 242

CSO 093. CSO 093 has a combined sewer drainage area of approximately 140 acres and a population of approximately 1,100 people. Tributary regulators contributing wet weather flows to this outfall are listed in Table 2-9.

Table 2-9. Regulators Tributary to CSO 093

Regulator Number	Location	Regulator Type	Community
E-20	Ontario Avenue and Lakeside Avenue	Perpendicular	Cleveland
E-21	West 3rd Street at Lakeside Avenue	Perpendicular	Cleveland

CSO 094. CSO 094 has a combined sewer drainage area of approximately 450 acres and a population of approximately 4,900 people. The tributary regulator contributing wet weather flows to this outfall is listed in Table 2-10.

Table 2-10. Regulator Tributary to CSO 094

Regulator Number	Location	Regulator Type	Community
E-18	East 12th Street, north of Lakeside Avenue	Perpendicular	Cleveland

CSO 095. CSO 095 has a combined sewer drainage area of approximately 300 acres and a population of approximately 1,100 people. Tributary regulators contributing wet weather flows to this outfall are listed in Table 2-11.

Table 2-11. Regulators Tributary to CSO 095

Regulator Number	Location	Regulator Type	Community
E-14	East 20th Street, north of Lakeside Avenue	Leaping	Cleveland
E-15	Davenport Avenue, east of East 20th Street	Perpendicular	Cleveland
E-16	East 20th Street at Davenport Avenue	Perpendicular	Cleveland

CSO 096. CSO 096 has a combined sewer drainage area of approximately 120 acres and a population of approximately 1,700 people. The tributary regulator contributing wet weather flows to this outfall is listed in Table 2-12.

Table 2-12. Regulator Tributary to CSO 096

Regulator Number	Location	Regulator Type	Community
E-12	East 26th Street at Lakeside Avenue west	Perpendicular	Cleveland

CSO 097. CSO 097 has a combined sewer drainage area of approximately 110 acres and a population of approximately 2,400 people. Tributary regulators contributing wet weather flows to this outfall are listed in Table 2-13.

Table 2-13. Regulators Tributary to CSO 097

Regulator Number	Location	Regulator Type	Community
E-09	East 30th Street, south of St. Clair Avenue	Leaping	Cleveland
E-11	Innerbelt southbound, below Lakeside Avenue bridge	Leaping	Cleveland

CSO 098. CSO 098 has a combined sewer drainage area of approximately 150 acres and a population of approximately 1,500 people. The tributary regulator contributing wet weather flows to this outfall is listed in Table 2-14.

Table 2-14. Regulator Tributary to CSO 098

Regulator Number	Location	Regulator Type	Community
E-08	East 33rd Street, 50 ft south of King Avenue	Perpendicular	Cleveland

CSO 099. CSO 099 has a combined sewer drainage area of approximately 100 acres and a population of approximately 200 people. Tributary regulators contributing wet weather flows to this outfall are listed in Table 2-15.

Table 2-15. Regulators Tributary to CSO 099

Regulator Number	Location	Regulator Type	Community
E-05	King Avenue, east of East 38th Street	Leaping	Cleveland
E-06	King Avenue, west of East 38th Street	Leaping	Cleveland
E-07	East 38th Street, north of Lakeside Avenue	Perpendicular	Cleveland

CSO 200. CSO 200 has a combined sewer drainage area of approximately 670 acres and a population of approximately 8,200 people. Tributary regulators contributing wet weather flows to this outfall are listed in Table 2-16.

Table 2-16. Regulators Tributary to CSO 200

Regulator Number	Location	Regulator Type	Community
E-03	East 40th Street and Lakeside Avenue	Sidespill	Cleveland
E-04	1163 East 40th Street, north of King Avenue	Perpendicular	Cleveland

CSO 201. CSO 201 has a combined sewer drainage area of approximately 470 acres and a population of approximately 4,100 people. Tributary regulators contributing wet weather flows to this outfall are listed in Table 2-17.

Table 2-17. Regulators Tributary to CSO 201

Regulator Number	Location	Regulator Type	Community
E-01	1235 Marquette Avenue at Lakeside Avenue	Perpendicular	Cleveland
E-02	West side of Marquette Avenue at Lakeside Avenue	Perpendicular	Cleveland

CSO 202. CSO 202 has a combined sewer drainage area of approximately 1,170 acres and a population of approximately 11,200 people. Tributary regulators contributing wet weather flows to this outfall are listed in Table 2-18.

Table 2-18. Regulators Tributary to CSO 202

Regulator Number	Location	Regulator Type	Community
E-32	East 55th Street at East Ohio Gas	Sidespill	Cleveland
E-33	East 61st Street and Gardena Avenue	Sidespill	Cleveland
E-50	5476 Lake Court, west of East 55th Street	Perpendicular	Cleveland
E-50A	East 55th Street north of St Clair Avenue	Leaping	Cleveland

CSO 203. CSO 203 has a combined sewer drainage area of approximately 690 acres and a population of approximately 11,700 people. The tributary regulator that contributes wet weather flow to this outfall is listed in Table 2-19.

Table 2-19. Regulator Tributary to CSO 203

Regulator Number	Location	Regulator Type	Community
E-35	North of Addison Road and railroad tracks, east of Norwalk Drive	Perpendicular	Cleveland

CSO 204. CSO 204 has a combined sewer drainage area of approximately 1,430 acres and a population of approximately 21,900 people. Tributary regulators contributing wet weather flows to this outfall are listed in Table 2-20.

Table 2-20. Regulators Tributary to CSO 204

Regulator Number	Location	Regulator Type	Community
E-36	Gordon Park near East 72nd Street entrance	Perpendicular	Cleveland
E-37	Gordon Park west entrance	Perpendicular	Cleveland

CSO 206. CSO 206 has a combined sewer drainage area of approximately 425 acres and a population of approximately 9,300 people. Tributary regulators contributing wet weather flows to this outfall are listed in Table 2-21.

Table 2-21. Regulators Tributary to CSO 206

Regulator Number	Location	Regulator Type	Community
L-24	East 156th Street, south of Lake Shore Boulevard	Perpendicular	Cleveland
L-25	Lake Shore Boulevard at East 156th Street	Sidespill	Cleveland
L-26	Lake Shore Boulevard, 250 ft east of East 156th Street	Sidespill	Cleveland
L-28	Lake Shore Boulevard, 800 ft east of East 169th Street	Sidespill	Cleveland
L-29	Lake Shore Boulevard, west of East 169th Street	Sidespill	Cleveland
L-30	Lake Shore Boulevard and East 169th Street	Sidespill	Cleveland
L-31	East 171st Street and Lake Shore Boulevard	Sidespill	Cleveland

CSO 207. CSO 207 has a combined sewer drainage area of approximately 20 acres and a population of approximately 380 people. The tributary regulator that contributes wet weather flow to this outfall is listed in Table 2-22.

Table 2-22. Regulator Tributary to CSO 207

Regulator Number	Location	Regulator Type	Community
L-36	Grovewood at Green Creek culvert, west of East 167th Street	Sidespill	Cleveland

CSO 208. CSO 208 has a tributary sanitary sewer area of approximately 25 acres and a population of approximately 360 people. Two regulators contribute flow to this outfall. Tributary regulators contributing wet weather flows to this outfall are listed in Table 2-23.

Table 2-23. SSOs Tributary to CSO 208

Regulator Number	Location	Regulator Type	Community
L-21 (SSO)	Dorchester Drive at East Park Drive	Sidespill	Cleveland
L-35 (SSO)	17725 Crestland Road, near Lake Shore Boulevard	Sidespill	Cleveland

CSO 242. CSO 242 has a combined sewer drainage area of approximately 936 acres and a population of approximately 10,600 people. The tributary regulator contributing wet weather flows to this outfall is listed in Table 2-24.

Table 2-24. Regulator Tributary to CSO 242

Regulator Number	Location	Regulator Type	Community
L-23	East 142nd Street and Lake Shore Boulevard	Sidespill	Cleveland

Dugway Brook

The drainage area for Dugway Brook includes areas within the communities of Cleveland, East Cleveland, Cleveland Heights, University Heights, and Bratenahl. The brook has two main branches, east and west, with a total length of 7.9 miles and total drainage area of 9.4 square miles. Most of Dugway Brook is culverted, with the following exceptions:

- North of Lake Shore Boulevard;
- On a tributary to the West Branch, between Derbyshire Road and Washington Boulevard in Cleveland Heights;

- On the West Branch, through Lakeview Cemetery, between Mayfield Road and Euclid Avenue; and
- On the East Branch through Cumberland Park, between Euclid Heights Boulevard and Hampshire Road, in Cleveland Heights.

Figure 2-13 shows the Dugway Brook CSO outfalls.

CSO 230. CSO 230 has a tributary combined and sanitary sewer drainage area of approximately 770 acres and a population of approximately 16,800 people. Tributary regulators contributing wet weather flows to this outfall are listed in Table 2-25.

Table 2-25. Regulators Tributary to CSO 230

Regulator Number	Location	Regulator Type	Community
D-01	Leur Avenue, north of Dupont Avenue	Sidespill	Cleveland
D-02	10542 Dupont Avenue	Sidespill	Cleveland
D-03	10658 Dupont Avenue	Sidespill	Cleveland
D-04	Elk Avenue between East 107th Street and East 107th Place	Sidespill	Cleveland
D-05 (SSO)	East 106th Street and Elk Avenue	Sidespill	Cleveland
D-06	Elk Avenue at East 107th Street	Sidespill	Cleveland
D-07	East 106th Street and Glenville (east)	Sidespill	Cleveland
D-08	East 106th Street and Glenville (west)	Sidespill	Cleveland
D-09	Clairdon Avenue at East 106th Street	Sidespill	Cleveland
D-10	543 East 106th Street, between Glenville and Clairdon Avenue	Sidespill	Cleveland
D-11	585 East 106th Street between Clairdon Avenue and St Clair Avenue	Sidespill	Cleveland

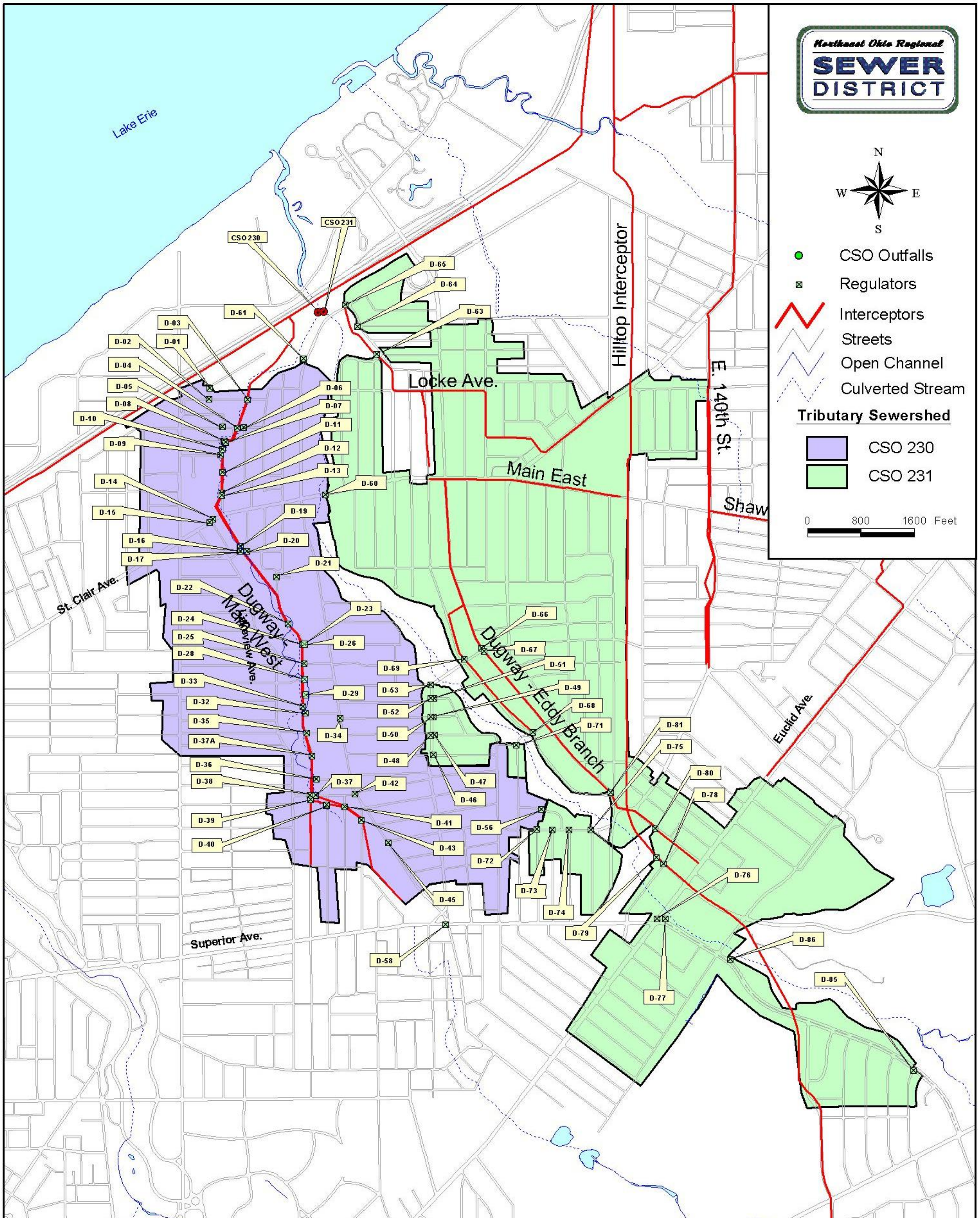
Table 2-25. Regulators Tributary to CSO 230 (cont.)

Regulator Number	Location	Regulator Type	Community
D-12	Across from 605 East 106th Street	Sidespill	Cleveland
D-13	611 East 106th Street	Leaping	Cleveland
D-14	East 106th Street and St Clair Avenue	Perpendicular	Cleveland
D-15	10548 St Clair Avenue on Center Line	Perpendicular	Cleveland
D-16	10662 Helena Avenue in driveway	Perpendicular	Cleveland
D-17	East of East 107th Street and Helena Avenue	Sidespill	Cleveland
D-19	Helena Avenue at East 107 Street	Sidespill	Cleveland
D-20	674 East 107th Street in rear yard	Relief Pipe	Cleveland
D-21	Lima Avenue and Linn Drive	Sidespill	Cleveland
D-22	Near 769 Linn Drive	Sidespill	Cleveland
D-23	Near 821 Linn Drive	Sidespill	Cleveland
D-24	Near 851 Linn Drive, in street	Sidespill	Cleveland
D-25	11102 Willowmere Avenue and Linn Drive	Sidespill	Cleveland
D-26	851 Linn Drive, north of Willowmere Avenue in front yard	Perpendicular	Cleveland
D-28	11102 Earle Road at Linn Drive	Sidespill	Cleveland
D-29	East of Linn Drive on Greenview Avenue	Sidespill	Cleveland
D-32	Berkshire Avenue and Linn Drive	Sidespill	Cleveland
D-33	Near 951 Linn Drive	Sidespill	Cleveland
D-34	Lakeview Avenue and Fairport Avenue	Sidespill	Cleveland

Table 2-25. Regulators Tributary to CSO 230 (cont.)

Regulator Number	Location	Regulator Type	Community
D-35	Tuscora Avenue and Linn Drive	Sidespill	Cleveland
D-36	Ada Avenue at Linn Drive	Sidespill	Cleveland
D-37	Primrose Avenue and Linn Drive	Perpendicular	Cleveland
D-37A	1015 Linn Drive	Sidespill	Cleveland Hts
D-38	East 111th Street and Primrose Avenue, west of Linn Drive	Sidespill	Cleveland
D-39	1087 East 111th Street, south of Primrose Avenue	Leaping	Cleveland
D-40	1096 East 112th Street, south of Primrose Avenue	Leaping	Cleveland
D-41	East 113th Street south of Primrose Avenue	Leaping	Cleveland
D-42	1110 East 114th Street south of Primrose Avenue	Leaping	Cleveland
D-43	East 114th Street south of Primrose Avenue	Leaping	Cleveland
D-45	Lakeview Avenue at Phillips Avenue	Sidespill	Cleveland
D-58	Superior Avenue at East 123rd Street and Lakeview Avenue	Sidespill	Cleveland
D-61	East 110th Street, north of Glenview	Sidespill	Cleveland

CSO 231. CSO 231 has a tributary combined and separate sewer drainage area of approximately 1,050 acres and a population of approximately 19,500 people. Tributary regulators contributing wet weather flows to this outfall are listed in Table 2-26.



Easterly CSO Hydraulic Modeling Report

Figure 2-13.
Dugway Brook
CSO Outfalls

Table 2-26. Regulators Tributary to CSO 231

Regulator Number	Location	Regulator Type	Community
D-46	East 123 Street and Saywell Avenue	Sidespill	Cleveland
D-47	Tuscora Avenue and East 123nd Street	Relief Pipe	Cleveland
D-48	East 123nd Street at Tuscora Avenue	Relief Pipe	Cleveland
D-49	Fairport Avenue at East 123rd Street	Relief Pipe	Cleveland
D-50	East 123 Street at Fairport Avenue	Relief Pipe	Cleveland
D-51	Parkway Drive at East 123rd Street	Relief Pipe	Cleveland
D-52	East 123rd Street at Ohlman Avenue	Relief Pipe	Cleveland
D-53	Arlington Avenue at East 123rd Street	Sidespill	Cleveland
D-56	Speedway Overlook Avenue, 400 ft east of Carlyon Avenue	Sidespill	E Cleveland
D-60	St Clair Avenue between East 110th Street and East 112th Street	Sidespill	Cleveland
D-63	Field by Dundee Drive and Corbus Road	Perpendicular	Cleveland
D-64	Dundee Drive and Ablewhite Avenue	Sidespill	Cleveland
D-65	Hazeldell Drive and Dundee Drive in woods	Sidespill	Cleveland
D-66	Arlington Road at Eddy Road	Sidespill	Cleveland
D-67	Eddy Road, south of Arlington Road	Sidespill	Cleveland
D-68	East of Thornhill Drive on Hart	Sidespill	Cleveland
D-69	East 120th Street and Thornhill Drive at Arlington Avenue	Sidespill	Cleveland

Table 2-26. Regulators Tributary to CSO 231 (cont.)

Regulator Number	Location	Regulator Type	Community
D-71	Carlyon Avenue at Carlyon Place	Sidespill	E Cleveland
D-72	Phillips Avenue at MelbourneAvenue	Sidespill	E Cleveland
D-73	Phillips Avenue at Lockwood Road	Sidespill	E Cleveland
D-74	Phillips Avenue at Bender Avenue	Sidespill	E Cleveland
D-75 (SSO)	Phillips Avenue at Rozelle Avenue	Sidespill	E Cleveland
D-76	13505 Euclid Avenue at Superior Avenue	Leaping	E Cleveland
D-77	Superior Avenue southeast of Euclid Avenue	Sidespill	E Cleveland
D-78 (SSO)	Fay Street at Emily Street	Sidespill	E Cleveland
D-79 (SSO)	Fay Street at railroad tracks, north of Euclid Avenue	Sidespill	E Cleveland
D-80	1641 Eddy Road between Euclid Avenue and Hayden Avenue	Sidespill	E Cleveland
D-81	Eddy Road and East 131st Street	Sidespill	Cleveland
D-85	Hillcrest Avenue at Superior Avenue	Leaping	E Cleveland
D-85A (SSO)	Somerton Avenue at Cumberland Avenue	Leaping	Cleveland Hts
D-86	Superior Avenue southeast of Terrace Road	Sidespill	E Cleveland
HE-09 (SSO)	Superior Avenue, east of Taylor Road	Leaping	Cleveland Hts
HE-12 (SSO)	Cummings Road at Grosvenor Road	Leaping	Cleveland Hts
HE-15 (SSO)	3003 Euclid Heights Boulevard	Sidespill	Cleveland Hts

Shaw Brook

The drainage area of Shaw Brook includes areas within the Village of Bratenahl and the cities of Cleveland and East Cleveland. Dry weather flow from Shaw Brook is diverted directly into the Easterly Interceptor at Regulator E-47X. Most of Shaw Brook is culverted, with the exception of the quarter mile segment from Regulator E-47X to Lake Erie. The total length of Shaw Brook is 2.2 miles and it drains approximately 1.3 square miles. Approximately 0.4 million gallons per day (mgd) flows from this stream into the Easterly Interceptor in dry weather. Figure 2-14 shows the Shaw Brook CSO outfalls.

CSO 232. CSO 232 has a tributary combined and separate sewer drainage area of approximately 540 acres and a population of approximately 12,200 people. Tributary regulators contributing wet weather flows to this outfall are listed in Table 2-27.

Table 2-27. Regulators Tributary to CSO 232

Regulator Number	Location	Regulator Type	Community
D-89	Strathmore Avenue at Elderwood Avenue	Relief Pipe	E Cleveland
DV-60 (SSO)	13817 Baldwin Avenue, east of Hayden Avenue	Relief Pipe	Cleveland
E-39	12711 Taft Avenue at Cleveland Road, south of intersection	Sidespill	Cleveland
H-02 (SSO)	Hayden Avenue and Second Street	Sidespill	E Cleveland
H-05	Alder Avenue at East 141st Street	Relief Pipe	E Cleveland
H-06	Alder Avenue at East 142nd Street	Sidespill	E Cleveland
H-07	1234 Hayden Avenue, south of Woodworth Avenue	Sidespill	E Cleveland
H-08	Hayden Avenue, south of Woodworth Avenue	Sidespill	E Cleveland
H-09	Woodworth Avenue at Hayden Avenue	Perpendicular	E Cleveland
H-10B	East 133rd Street at Shaw Avenue	Sidespill	E Cleveland
H-16	1248 East 144th Street, south of Woodworth Avenue	Sidespill	E Cleveland
HE-08 (SSO)	16389 Glynn road at Northvale Boulevard	Sidespill	Cleveland Hts

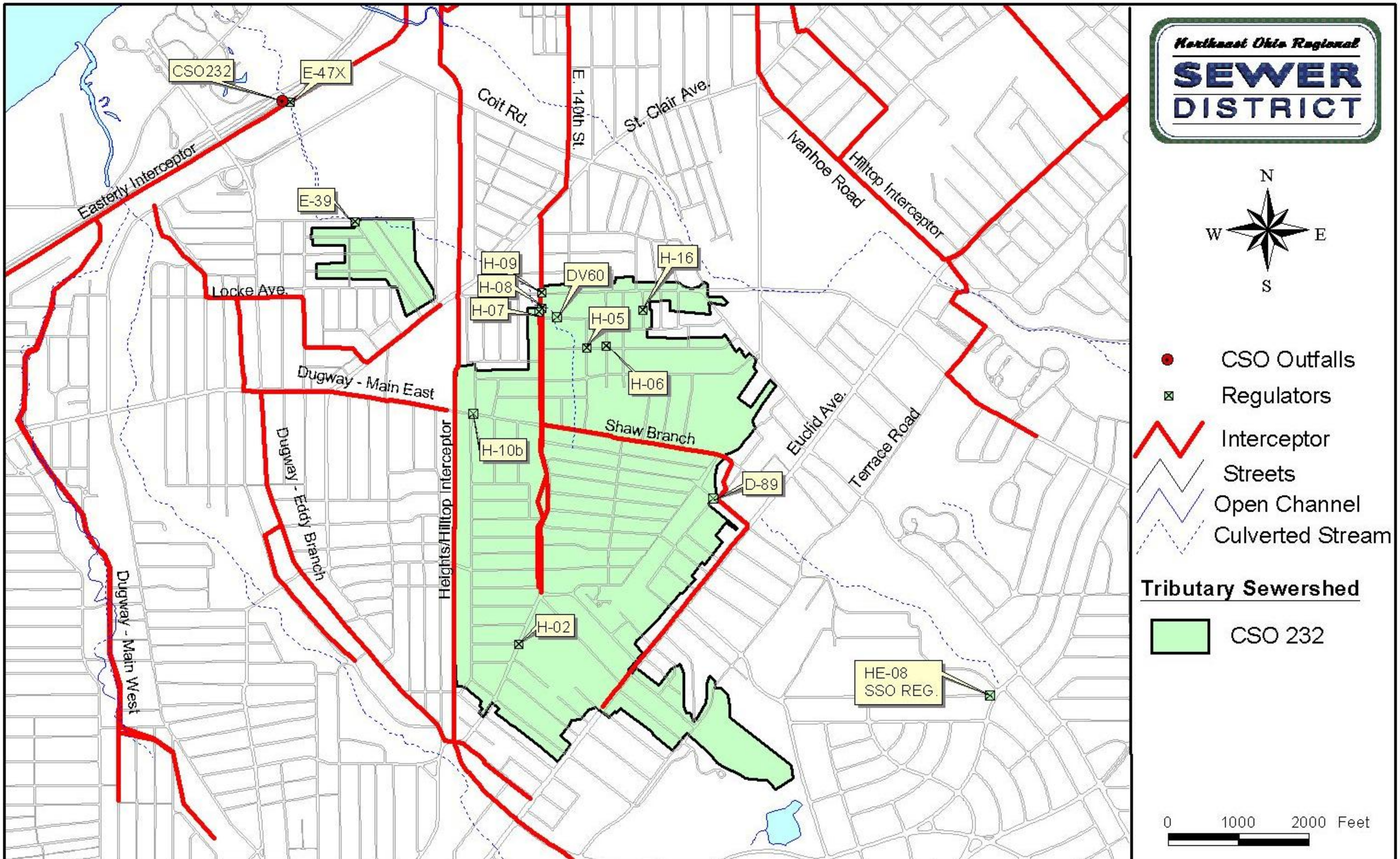


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Figure 2-14. Shaw Brook CSO Outfalls

Nine Mile Creek

The drainage area of Nine Mile Creek includes areas of South Euclid, University Heights, Cleveland Heights, East Cleveland, Cleveland and Bratenahl. The total drainage area is approximately 5,000 acres. Nine Mile Creek is culverted from near its mouth at Lake Shore Boulevard to east of Belvoir Boulevard at the border between the cities of Cleveland and Cleveland Heights. Upstream of this location, the creek is open, and the "Nela Park" Branch, which enters the culverted main stem of Nine Mile Creek south of Belvoir Boulevard east of Hillside Avenue in East Cleveland, is open. Figure 2-15 shows the Nine Mile Creek CSO outfalls.

CSO 211. CSO 211 has a combined sewer drainage area of approximately 2,600 acres and a population of approximately 31,800 people. Tributary regulators contributing wet weather flows to this outfall are listed in Table 2-28.

Table 2-28. Regulators Tributary to CSO 211

Regulator Number	Location	Regulator Type	Community
1565.4 (SSO)	Taylor Road and Brunswick Avenue	Sidespill	E Cleveland
OF-6 (SSO)	Ravine Drive at playground	Relief Pipe	E Cleveland
D-88	15132 Euclid Avenue	Sidespill	E Cleveland
D-90	15344 Plymouth Avenue	Sidespill	E Cleveland
D-91	Plymouth Avenue, northeast of Shaw	Sidespill	E Cleveland
E-47	Coit Road and Kirby Road, southwest of intersection	Perpendicular	Cleveland
E-48	Coit Road and Kirby Road, south of intersection	Sidespill	Cleveland
H-04	Strathmore Avenue, south of Elderwood Avenue	Sidespill	E Cleveland
H-11 (SSO)	Taylor Road at Terrace Road	Sidespill	E Cleveland
H-12 (SSO)	1838 Taylor Road	Sidespill	E Cleveland
H-13	1762 Coit Road	Perpendicular	E Cleveland
H-14	Coit Road, south of Woodworth Avenue	Sidespill	E Cleveland

Table 2-28. Regulators Tributary to CSO 211 (cont.)

Regulator Number	Location	Regulator Type	Community
H-15	East 146th Street, south of Woodworth Avenue	Sidespill	E Cleveland
H-17	East 145th Street and Coit Road	Sidespill	Cleveland
H-18	1020 Galewood Avenue	Sidespill	Cleveland
H-19	Aspinwall Avenue at East 140th Street	Perpendicular	Cleveland
H-20A	Woodworth Avenue, 100 ft west of East 152nd Street	Sidespill	E Cleveland
OF-01 (SSO)	East of 2225 Noble Road	Leaping	Cleveland Hts
I-01	1296 East 152nd Street	Sidespill	E Cleveland
I-02	Collamer Road at East 152nd Street	Sidespill	E Cleveland
I-03	Noble Road at Elderwood Avenue	Sidespill	E Cleveland
I-04	Elderwood Avenue at Rosedale	Relief Pipe	E Cleveland
I-05X (SSO)	Nelaview Drive at Nela Court	Relief Pipe	E Cleveland
I-06	Nelacrest Road at Noble Road	Relief Pipe	E Cleveland
I-06X (SSO)	Helmsdale Road at Nela Court	Relief Pipe	E Cleveland
I-07	Hillsdale Avenue at Hillside Court	Sidespill	E Cleveland
I-08 (SSO)	Hillsdale Avenue at Hillside Court	Sidespill	E Cleveland
I-08A (SSO)	1876 Hillside Court	Sidespill	E Cleveland
I-09	16300 Euclid Avenue near Hillside Road	Leaping	E Cleveland
I-10	1759 Ivanhoe Avenue north of Euclid Avenue	Sidespill	E Cleveland
I-11 (SSO)	Belvoir Avenue, west of Runnymede Road	Perpendicular	Cleveland
I-13 (SSO)	Belvoir Avenue at Lancaster	Perpendicular	South Euclid

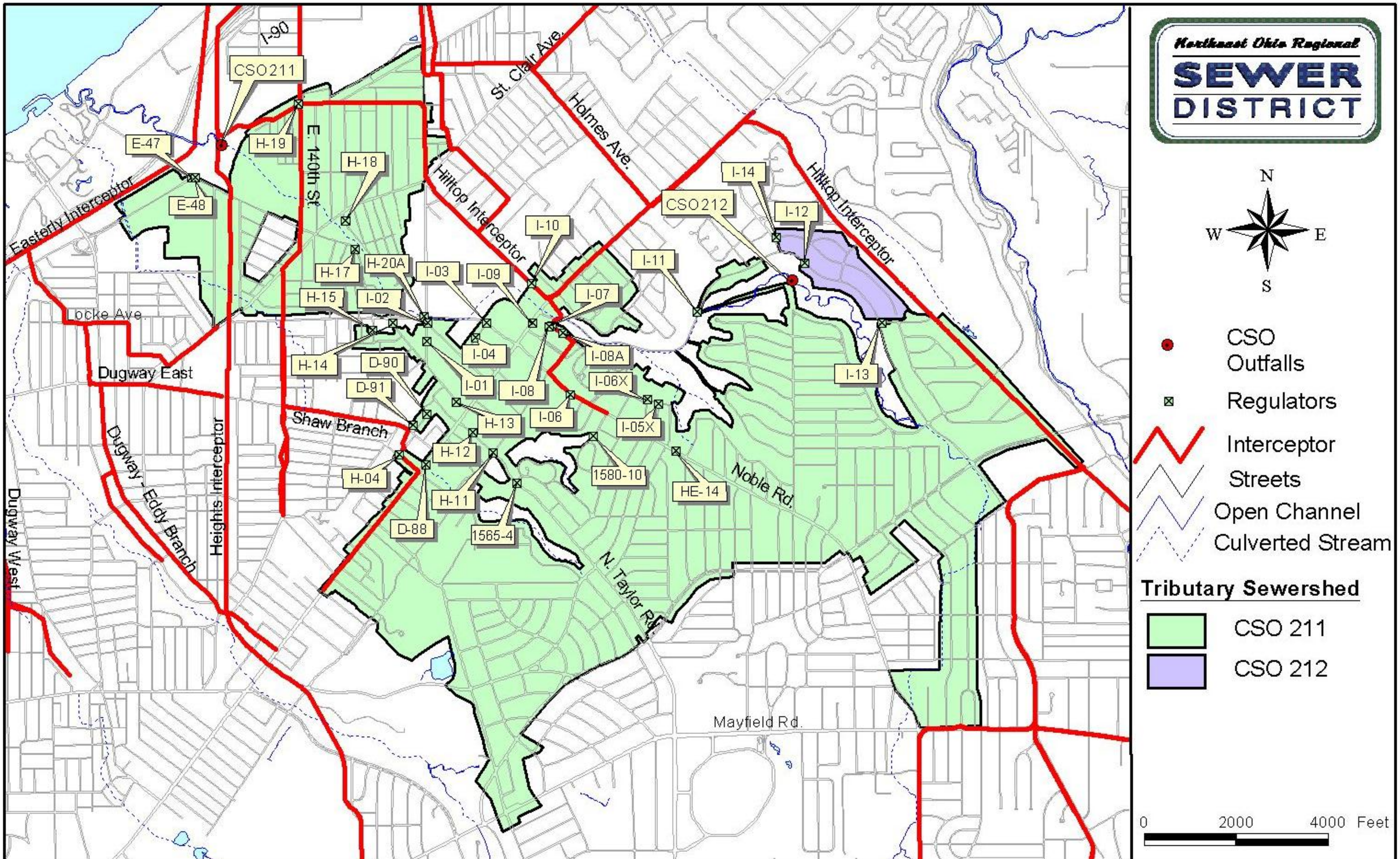

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Figure 2-15. Nine Mile Creek CSO Outfalls

CSO 212. CSO 212 has a tributary combined and separate sewer drainage area of approximately 60 acres and a population of approximately 700 people. Tributary regulators contributing wet weather flows to this outfall are listed in Table 2-29.

Table 2-29. Regulators Tributary to CSO 212

Regulator Number	Location	Regulator Type	Community
I-12 (SSO)	Lot #2368, Belvoir Boulevard, south of Cliffview Road	Sidespill	Cleveland
I-14	Greenvale Road at Cliffview Road	Leaping	Cleveland

Green Creek

Green Creek drains a small portion of Cleveland and South Euclid. The drainage area, mostly residential and industrial, is approximately 660 acres, and the stream is 6.1 miles in length. Green Creek is culverted for 2.3 miles, from Euclid Avenue to Lake Erie. Figure 2-16 shows the Green Creek CSO outfalls.

CSO 214. CSO 214 has a combined sewer drainage area of approximately 220 acres and a population of approximately 1,700 people. Tributary regulators contributing wet weather flows to this outfall are listed in Table 2-30.

Table 2-30. Regulators Tributary to CSO 214

Regulator Number	Location	Regulator Type	Community
I-16	Green Road, south of Euclid Avenue, southeast corner	Leaping	Cleveland
I-18	1670 Catalpa Avenue, north of Olympia	Relief Pipe	Cleveland
I-19	Cliffview Road, south of Euclid Avenue	Leaping	Cleveland
I-20	1617 Catalpa Avenue at NY railroad.	Perpendicular	Cleveland

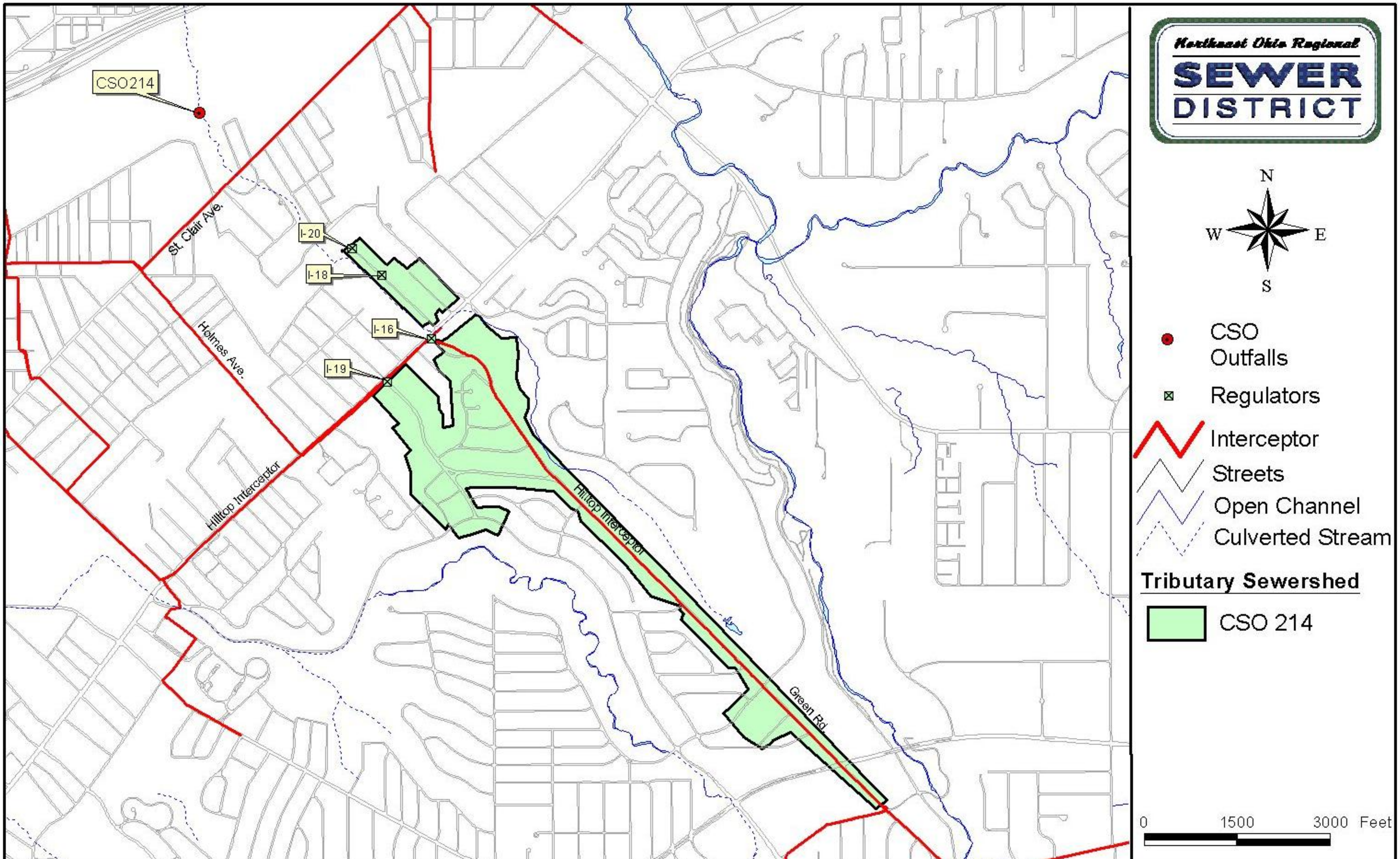

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Figure 2-16. Green Creek CSO Outfalls

Euclid Creek

Euclid Creek drains an area that includes portions of the communities of Cleveland, Euclid, Highland Heights, Richmond Heights, Willoughby Hills, Lyndhurst and South Euclid. The total drainage area is approximately 15,500 acres, and the creek has a length of 9.5 miles. With the exception of a culverted section under I-90, the creek is predominantly open. The section between Lake Shore Boulevard and Nottingham Road has been channelized by the U.S. Army Corps of Engineers with concrete streambeds for flood control. A dam is located downstream of the St. Clair Avenue Bridge. Figure 2-17 shows the Euclid Creek CSO outfalls.

CSO 209. CSO 209 has a combined sewer drainage area of approximately 150 acres and a population of approximately 1,100 people. The tributary regulator that contributes wet weather flow to this outfall is listed in Table 2-31.

Table 2-31. Regulator Tributary to CSO 209

Regulator Number	Location	Regulator Type	Community
L-32	Lakeshore Avenue and Nottingham Road	Sidespill	Cleveland

CSO 210. CSO 210 has a combined sewer drainage area of approximately 440 acres and a population of approximately 3,800 people. The tributary regulator that contributes wet weather flow to this outfall is listed in Table 2-32.

Table 2-32. Regulator Tributary to CSO 210

Regulator Number	Location	Regulator Type	Community
L-34	St Clair Avenue at East 185th Street	Perpendicular	Cleveland

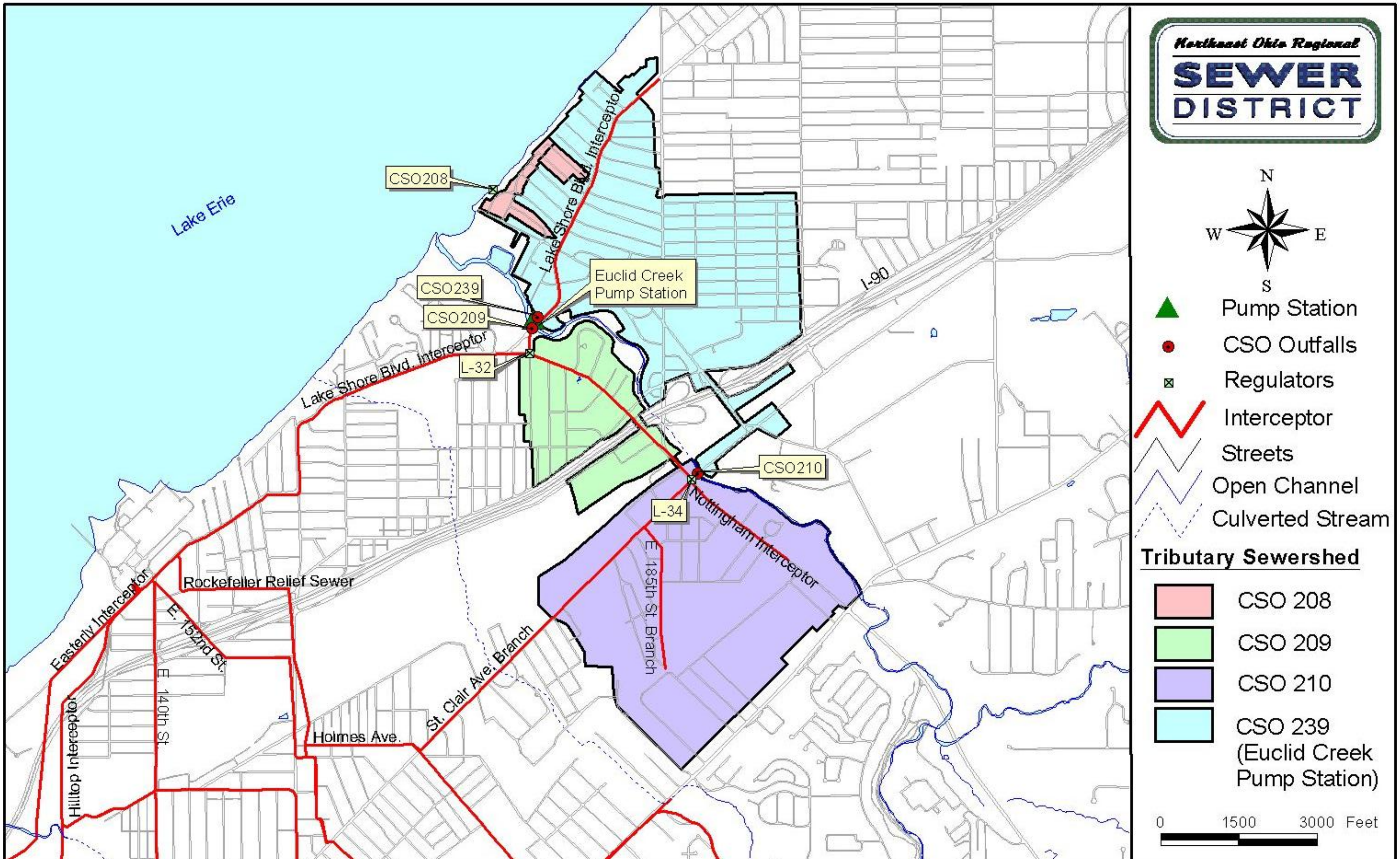

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**Figure 2-17.
Euclid Creek
CSO Outfalls**

CSO 239. CSO 239 is the wet weather overflow for the Euclid Creek pump station. The pump station, which is owned by NEORSD has a tributary area of approximately 470 acres and a population of approximately 5,500 people. The tributary area is primarily served by separate sanitary and storm sewers.

Easterly Wastewater Treatment Plant

The Easterly WWTP currently provides treatment for 155 mgd average daily flow, and 330 mgd maximum flow during wet weather. The 1996 average daily flow was 149 mgd. Three main intercepting sewers (Easterly, Collinwood, and Heights-Hilltop) collect and convey flow from the Easterly service area to the plant. These interceptors enter the plant through a headworks facility that provides coarse screening of the vast majority of dry and wet weather influent through a series of nine 1 1/2-inch bar screens. The hydraulic capacities of the interceptors are listed in Table 2-33.

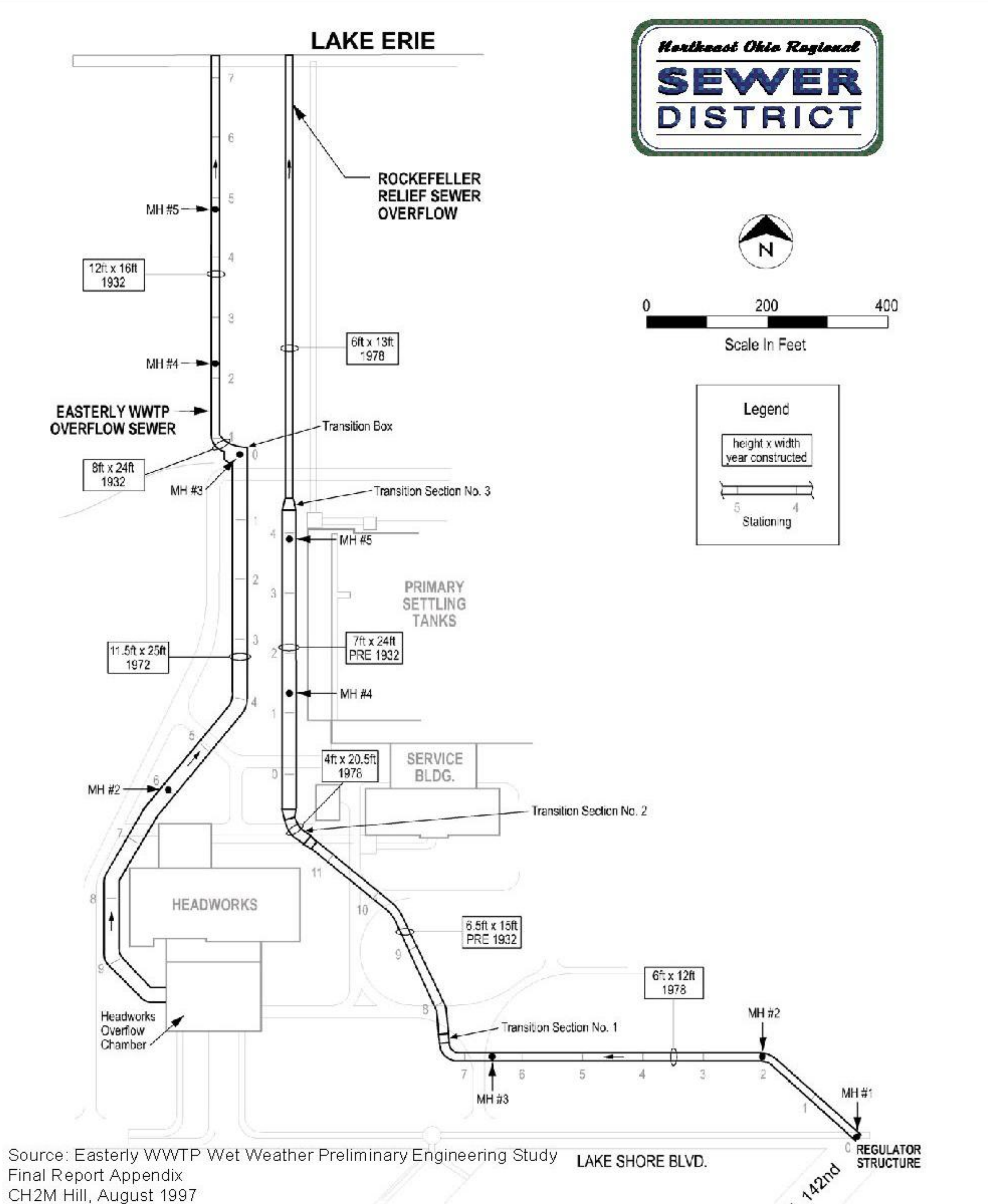
Table 2-33. Easterly Wastewater Treatment Plant Interceptor Hydraulic Capacity

Interceptor	Interceptor Length (mi.)	Service Area	Hydraulic Capacity of Downstream Segment
Easterly	32.9[(1)]	Combined	425 mgd
Collinwood	7.5[(2)]	Combined	650 mgd
Heights-Hilltop	26.1	Separate	400 mgd
Total			**1,475 mgd**

[(1)] *Includes all branch interceptors tributary to Easterly Interceptor.*
[(2)] *Includes Lakeshore, East 152, East 140 and Rockefeller relief branches.*

Flows in excess of the primary treatment capacity of the plant (approximately 330 mgd), overflow downstream of the screens into the CSO 001 overflow channel in the lower level of the headworks facility. This overflow channel leads to the permitted CSO 001 outfall structure in Lake Erie illustrated in Figure 2-18.

Flow from the headworks is fed through detritor and comminutor facilities in the Preliminary Treatment Building to remove grit from the screened influent. From there, the flow is directed



Source: Easterly WWTP Wet Weather Preliminary Engineering Study
Final Report Appendix
CH2M Hill, August 1997

Easterly CSO Hydraulic Modeling Report

Metcalf & Eddy

CH2MHILL

Fig 2-18.
Easterly WWTP
Overflow Conduits

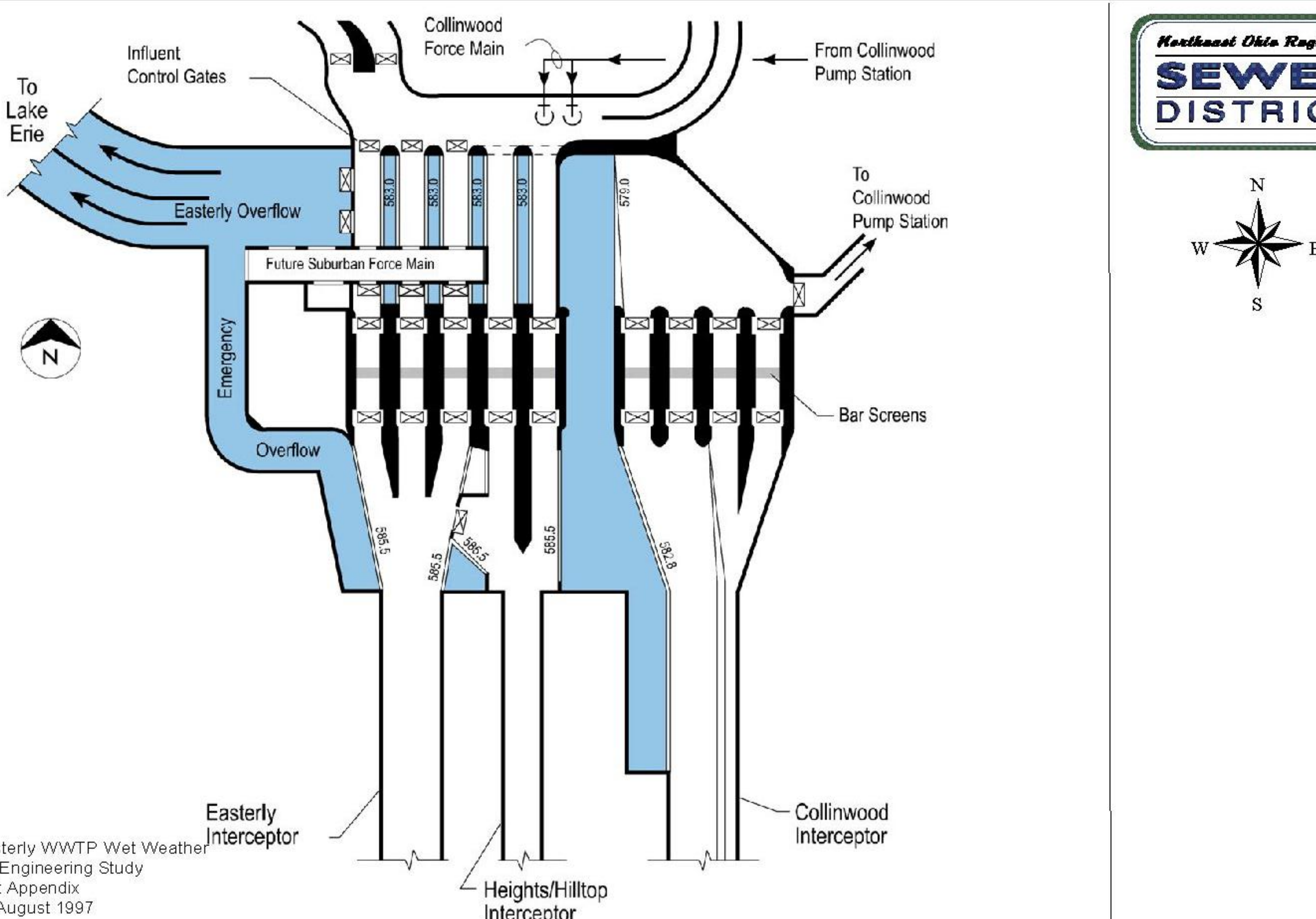
through the primary settling tanks and then to the aeration tanks for secondary treatment. The flow is then passed through the final settling tanks prior to receiving chlorine disinfection in the Disinfection Facility. Dechlorination is applied to the effluent prior to discharge to Lake Erie via the Effluent Pump Station.

The plant sequence of operations during wet weather is achieved by manual operations at the headworks facility. Diversion of flows to the Easterly overflow discharge is accomplished manually at the Collinwood Pump Station (CWPS) and at the Easterly interceptor headworks gates. Historically, operators have observed that the primary settling tank (PST) overflow weirs are submerged when the plant influent flow meters register 330 mgd or higher. This submergence would result in discharge of high solids from the PSTs to the secondary treatment system and could lead to secondary effluent solids concentrations greater than the NPDES 30 mg/L effluent limit. The Easterly WWTP operating rules have called for the CWPS to be shut down as soon as flows reach 330 mgd to avoid primary tank overflows. If flows continue to rise, the Easterly Interceptor headworks gates are restricted to reduce the plant influent flow rate to the target maximum of 330 mgd.

The headworks facility has a screen bypass channel to accommodate extreme events that exceed the screening capacities of the existing bar screens. This channel connects to the CSO 001 channel within the lower level of the headworks facility. Figure 2-19 illustrates the headworks facility and critical elevations of the overflow channels upstream and downstream of the bar screens.

An Easterly WWTP Wet Weather Planning Study was completed in August 1997, and the NEORSD proceeded with the preparation of design documents for a series of recommended improvements. Construction of these improvements to increase the Easterly WWTP wet weather treatment capacities will commence in 2001. These improvements are discussed below and in Chapter Six.

The project purpose was to study and propose modifications to the Easterly WWTP facilities or operations that respond to the CSO policy mandate to maximize flow to the Publicly Owned



Source: Easterly WWTP Wet Weather Preliminary Engineering Study Final Report Appendix CH2M Hill, August 1997

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Northeast Ohio Regional Sewer District

Fig 2-19. Easterly WWTP Headworks Facility

Treatment Works (POTW) for treatment without jeopardizing the ability of the plant to meet its NPDES permit requirements. As part of the study, a review of the plant facilities, operating strategies, and performance history/capabilities of the Easterly WWTP concluded that the plant is well operated and the wet weather operating strategies and process control methods are appropriate and properly executed. The facilities are limited hydraulically but not from the standpoint of process loading. It was determined that several bottlenecks in the hydraulic profile could be removed economically to increase the capacity of the primary clarifiers up to 400 mgd (provided waste activated sludge would not be added to the primary clarifiers) and increase the capacity of the secondary treatment system from 300 mgd to 330 mgd. However, the study concluded that it would not be practical to increase the existing plant facilities treatment capacities beyond these levels.

The study recommended the following short-term options to provide for immediate improvement in reducing pollutant loads to Lake Erie:

- Increased Primary and Secondary Treatment Capacity – Hydraulic improvements that would result in raising the hydraulic capacity from the existing 300 mgd through both primary and secondary processes to a capacity limitation of 400 mgd through the primary and 330 mgd through the secondary systems included:
  - Removal of the existing comminuters and installation of new 3/4 inch bar screens upstream of the headworks, which replace the existing 1-1/2 inch bar screens.
  - Installation of a wet weather bypass around the secondary facilities to maximize primary treatment to 400 mgd.
  - Installation of an electric valve on the waste-activated sludge (WAS) piping to allow the diversion of WAS from the primary clarifiers to the onsite sludge storage tanks during wet weather, which would prevent the lighter WAS solids from “washing-out” and causing an increase in Total Suspended Solids (TSS) during higher flow rates.
  - Removal and replacement of the existing venturi meters with new ultrasonic meters to maximize secondary treatment to 330 mgd.

- Automated Diversion Policies - The recommended short-term improvements included updates to the instrumentation and controls so complete automation was possible for the current process. The study concluded that automating the CWPS operations could reduce overflows an average of 250 mg per year.
- CWPS Recommendations - Joint analysis of plant influent flow records and the CWPS operation records indicated very little opportunity to pump flow at rates greater than 100 mgd. Flows from the Heights/Hilltop and the Easterly Interceptors exceed plant capacity and cause curtailment of CWPS flows during most events that deliver more than 100 mgd to the Collinwood Interceptor. The recommended short-term improvements addressed upgrading the CWPS pumps, drives, and controls.

The design for the Easterly WWTP wet weather improvements included the construction of a second wet well for the CWPS along with replacement pumps, drives, and controls to provide the required 100 mgd firm capacity. This new wet well would provide the plant with the ability to isolate either the new or existing wet well for maintenance, improve pumping hydraulics at higher flowrates, and would result in a sequence of construction that reduces impacts on the existing wet well.

These improvements were included in the baseline conditions utilized to develop and evaluate CSO control alternatives for the Easterly District. The baseline conditions for the Easterly collection system model are discussed in Chapter Six.

CHAPTER THREE
COLLECTION SYSTEM MONITORING PROGRAM

A mathematical model of the Easterly collection system was developed and used to support the facilities planning alternatives analysis. An extensive flow monitoring program was implemented to evaluate the collection system flows and provide calibration data for the collection system model. This chapter summarizes the flow monitoring program. More detailed information and documentation can be found in the following supporting reports:

- Flow Monitoring Data Report (ADS Environmental Services, August, 1998)
- Flow Monitoring QA/QC Report (Metcalf & Eddy, November, 1998)

FLOW MONITORING PROGRAM

A flow monitoring program was conducted in the Easterly system in 1998. Site selections were based upon the following approach:

- Define major interceptors and Easterly District boundary using the City of Cleveland's Dalton-Dalton-Newport Sanitary Collection Sewer System maps.
- Locate static flow regulators, outfalls, and pump stations using the NEORSD CSO Phase I documentation.
- Manually update the maps based on knowledge of the system.
- Manually update the maps based on preliminary information available from the Easterly Interceptor Inspection project.
- Delineate individual sewer basins for each CSO in the combined system and each SSO in the separate system to gain an understanding of flow patterns in the system and to provide an initial definition of significant sewer basins for flow monitoring purposes.
- Using the system knowledge gained through the above steps, select individual flow monitoring sites for each significant system component described above.

After selection of individual sites, ADS Environmental Services, Inc. conducted field reconnaissance inspections of the proposed sites to determine their suitability for flow monitor installation. Minor modifications were made to the original sites such as moving the monitoring location one manhole upstream or downstream. These changes were made to ensure that the location best suited to collecting hydraulic data was selected from available locations at each of the monitoring sites. In total, 145 flow monitors and 20 rain gauges were installed within the Easterly District. Table 3-1 lists a breakdown of the metered sites by sewer system component. Figure 3-1 shows the locations of flow monitors and rain gauges.

Table 3-1. Easterly District Flow Meter Summary

Sewer System Component	Number of Meters	Number of Metering Sites
Separate Sanitary Sewer System		
Separate Sanitary Sewers	16	16
Combined Sewer System		
Regulators	76	41
Interceptors	15	15
Trunk Sewers	8	8
Other Facilities		
Pump Stations	4	4
Easterly WWTP	6	6
Storm Sewer/CSO Outfalls	10	10
Stream Flow Monitors	10	10
Total	**145**	**110**

Primary flow monitoring and rain gauging was conducted from April 4 through June 4, 1998. Forty-five monitors remained in place until August 31, 1998 to further evaluate the performance of the Easterly WWTP headworks, stream flows, and key interceptor flows during larger rain events. These included ten monitors at the Easterly WWTP headworks, ten stream flow meters, and fourteen meters at key locations in large interceptors. In addition, meters at eleven CSO wet weather sampling sites remained in place until June 12, 1998 when sampling had been completed. The longer period of monitoring provided additional data to evaluate the performance of the collection system and WWTP under a wider range of rain events, and to support receiving water sampling and sewer system modeling needs.

Data QA/QC

Each meter inspection form and site report was reviewed to ensure that the information accurately represented the installation location and configuration. During the flow monitoring period, flow data was collected regularly and screened to ensure that depth and velocity information appeared reasonable, and to address apparent problems quickly. Meter calibration data (manual depth and velocity measurements) during dry weather and wet weather periods were also obtained and reviewed throughout the monitoring program.

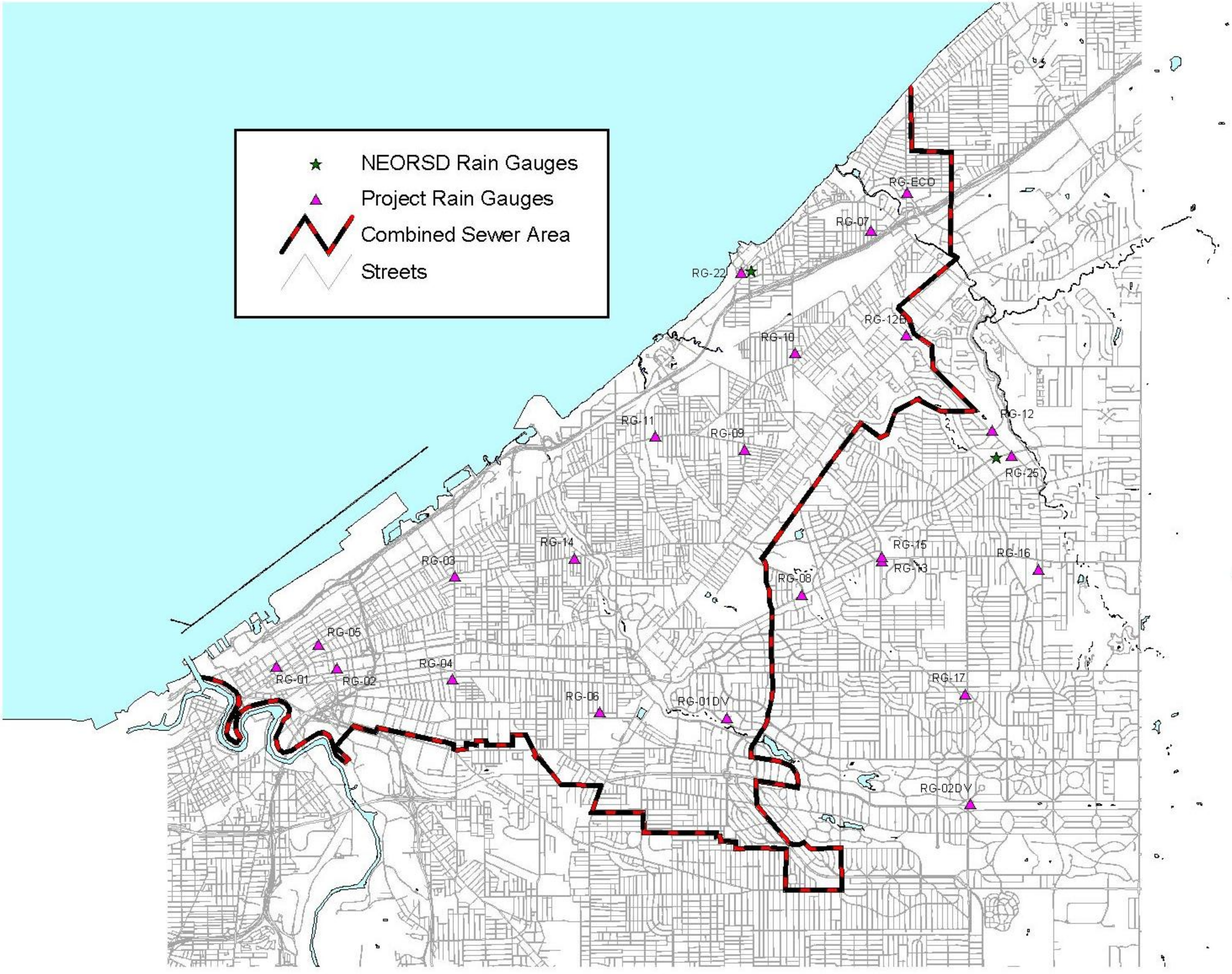
ADS submitted the Flow Monitoring Report in August, 1998 which included all flow and rainfall data obtained during the monitoring program. In addition to checking the field calibration information, other results were reviewed including:

- Scattergraph patterns for each meter
- Total monitoring period "uptime" to ensure a minimum of 90 percent data capture
- Hydrographs for each meter, comparing those generated by the continuity equation and Manning's equation
- Event-based plots of data to evaluate conditions at each meter during rain events
- Production of independent flow and rain plots to check for reasonableness
- Consistent response to wet weather events, considering sub-basin characteristics

Following completion of the flow monitoring program a Flow Monitoring QA/QC Review report (Metcalf & Eddy, November, 1998) was prepared. This report summarized compliance with contract specifications and the overall quality of the data collected.

Flow Balance Analysis

Flow balances were determined by preparing meter equations (simple addition and subtraction of flow quantities between meters) for each flow monitor. Flow balances were used to verify calibration of each monitor, provide insight into actual flow configuration of the collection system, and determine flow quantities within individual basins established for hydraulic modeling. The flow monitoring schematic in Figure 3-1 was used to assist in flow balance checks.


NEORSD Rain Gauges
Project Rain Gauges
Combined Sewer Area
Streets
RG-01
RG-02
RG-03
RG-04
RG-05
RG-06
RG-07
RG-08
RG-09
RG-10
RG-11
RG-12
RG-12B
RG-13
RG-14
RG-15
RG-16
RG-17
RG-22
RG-25
RG-ECO
RG-01DV
RG-02DV

Data gathered during the monitoring period were used for calibration and verification of the collection system model as well as estimation of pollutant loadings to study area receiving waters.

RAINFALL MONITORING PROGRAM

Rain Gauge Locations

Rain gauges were installed at 20 temporary locations within the Easterly CSO planning area. Figure 3-2 shows the location of the rain gauges. The gauges record rainfall at five minute intervals in 0.01 inch increments. Most gauges were functional on April 4, 1998 and operated through August 31, 1998.

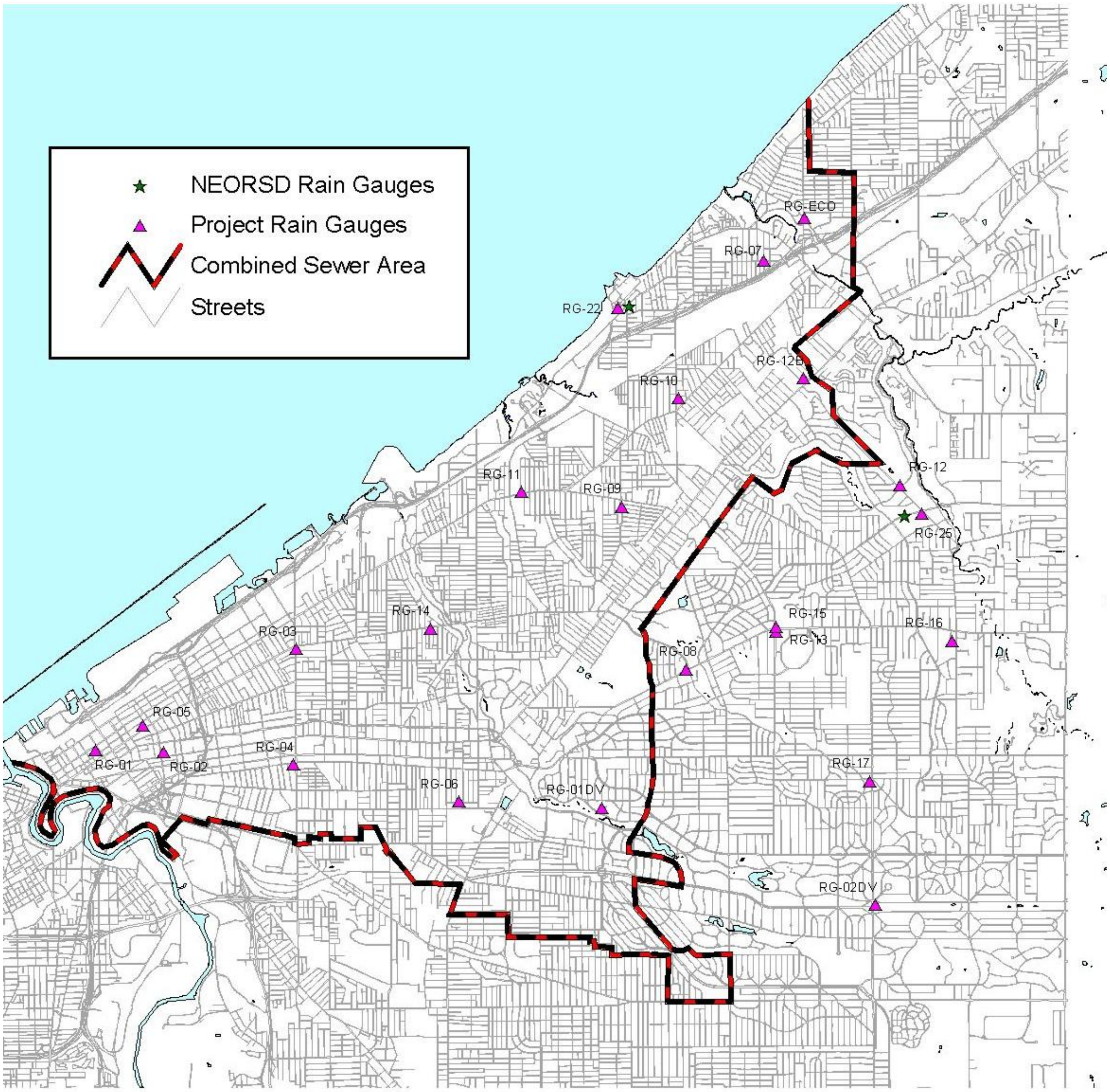
Rainfall Events

Precipitation events that were separated by less than six hours of dry weather were considered a single event. If six hours or more elapsed between periods then they were considered multiple events for the purposes of calibrating the flow volumes during storm events.

Rainfall Monitoring Results

The rainfall records were reviewed for completeness, data quality and general agreement between gauges. Rain Gauge RG-07 did not function during the period from April 14, 1998 to April 25, 1998 and again between May 12th and May 30th. Rain Gauge RG-13 was initially installed directly across street from RG-15 and was relocated after April 27th. The rest of the data for these two gauges were not used in the model calibration. Other rain gauges also occasionally malfunctioned for short periods. In these instances, data from nearby rain gauges were copied to fill the gaps. Anomalies were found in some of the initial rainfall readings due to test tips. The anomalies were removed from the data set. The rainfall data used for model calibration were edited to account for meter malfunctions and anomalies

Figure 3-2. Project and District Rain Gauge Locations



Although most rain gauges were functional by April 4th, there was no precipitation from April 4th to April 6th, before a light rainfall beginning during the evening of April 7th. The majority of the flow monitors were removed by June 5th. The May 31, 1998 storm was the last rainfall event before the removal of the majority of flow monitors. Therefore, the period of April 7th through May 31st was selected by the project team for model calibration and validation. Approximately

7.1 inches of rainfall was measured during this period, based on the average of all rain gauges. An average of 5.6 inches of rainfall occurred in April and an average of 1.5 inches fell in May. The long-term average monthly rainfall for the months of April and May is 3.28 inches and 3.49 inches, respectively. This indicates that April, 1998 was wetter than normal and May, 1998 was much dryer than average. In May, 1998, 0.8 inches of rainfall out of the total 1.5 inches for the entire month of May was produced by the May 31st storm.

Average intensity of the May 31st storm was 0.5 inches per hour while the intensities at individual gauges varied from 0.2 to 0.8 inches per hour. The one-year and six-month design storms have peak intensities of 1.0 and 0.7 inches per hour, respectively.

Individual storm events were developed by reviewing the rainfall gauge records and using a 6-hour inter-event time. A total of 18 rainfall events occurred during the model calibration and verification period of April 7th to May 31, 1998. The distribution of rainfall depths and intensity ranges based on the average of all rainfall gauges is listed in Table 3-2. A summary of these events is listed in Table 3-3.

Table 3-2. Distribution of Rainfall During Flow Monitoring Program (April 7, 1998– May 31, 1998)

Storm Size (inches)	No. Of Storms	Peak Hourly Intensity Range (in/hour)
>1.0	2	0.26-0.29
0.75 – 1.0	1	0.19
0.50 – 0.74	3	0.08-0.54
0.25 – 0.49	1	0.06
0.10 - 0.24	4	0.05-0.23
<0.1	7	0.01-0.07
Total	18	

Table 3-3. Summary of Rainfall Events During the Easterly Flow Monitoring Program (April 7, 1998 – May 31, 1998)

Storm Date 1998	Total Depth (inches)	Peak Intensity (inches/hour)	Duration (hours)
4/7	0.19	0.05	8
4/8	0.23	0.23	1
4/9	1.13	0.29	18
4/14	0.35	0.06	12
4/16 am	0.81	0.19	8
4/16 pm	0.69	0.45	6
4/19	0.64	0.08	21
4/26	1.41	0.26	17
4/30	0.09	0.07	2
5/1 am	0.02	0.02	1
5/1 pm	0.09	0.04	9
5/2 am	0.07	0.04	2
5/2 pm	0.01	0.01	1
5/3	0.24	0.10	15
5/7	0.14	0.07	4
5/11	0.02	0.02	1
5/24	0.01	0.01	1
5/31	0.71	0.54	2

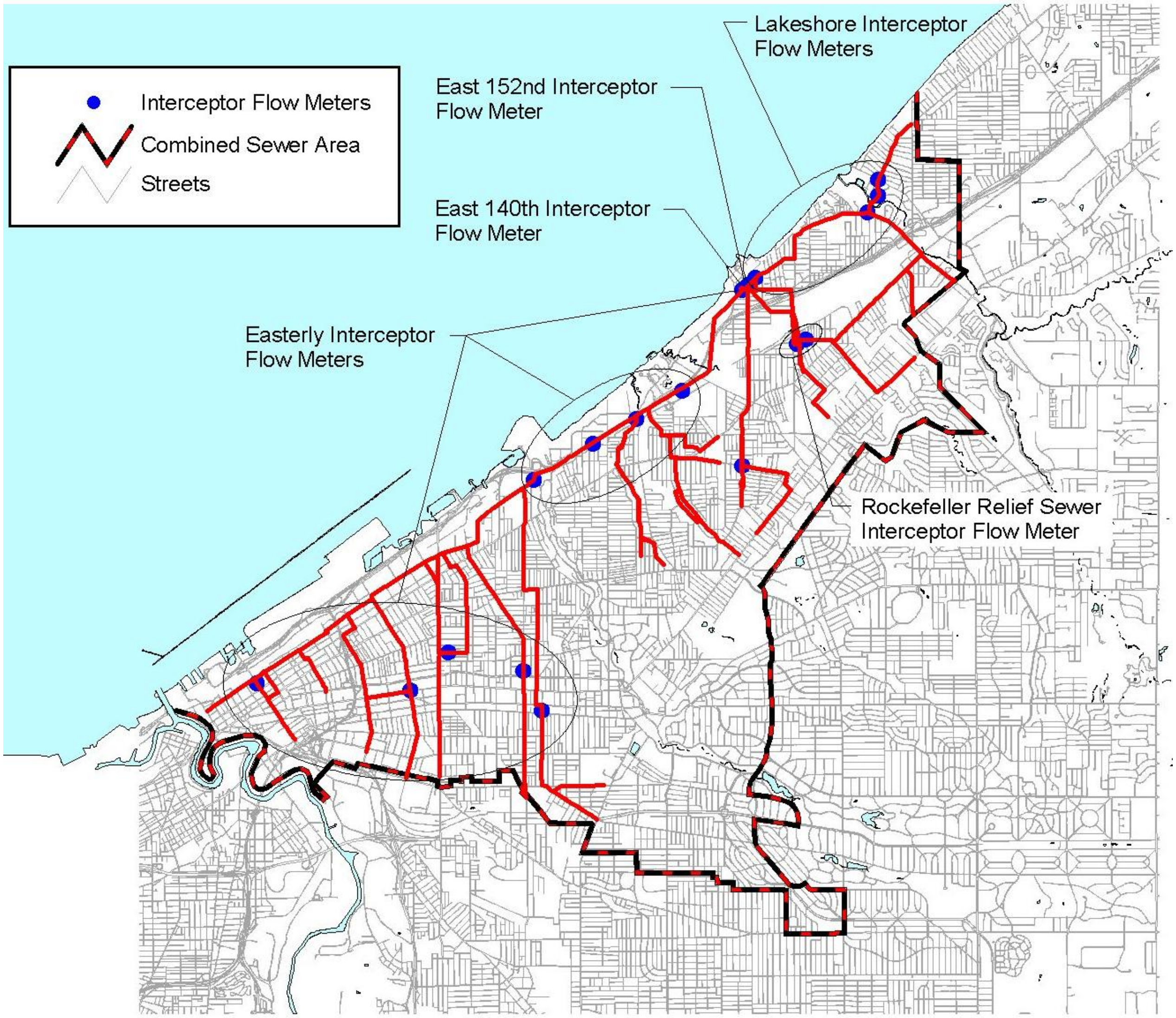
FLOW MONITORING

Flow Monitoring Locations

Flow monitors were installed at 145 locations within the Easterly CSO planning area. The monitors (ADS series 1600) included an ultrasonic depth sensor and a velocity sensor that recorded data at five minute intervals. Depth of flow was measured in 0.01-inch increments and velocity was measured to 0.1 ft/s. Most monitors were functional from April 4, 1998 to June 4, 1998. This period was extended until August 31, 1998 for 45 meters in order to provide a longer continuous period of flow metering data at key locations.

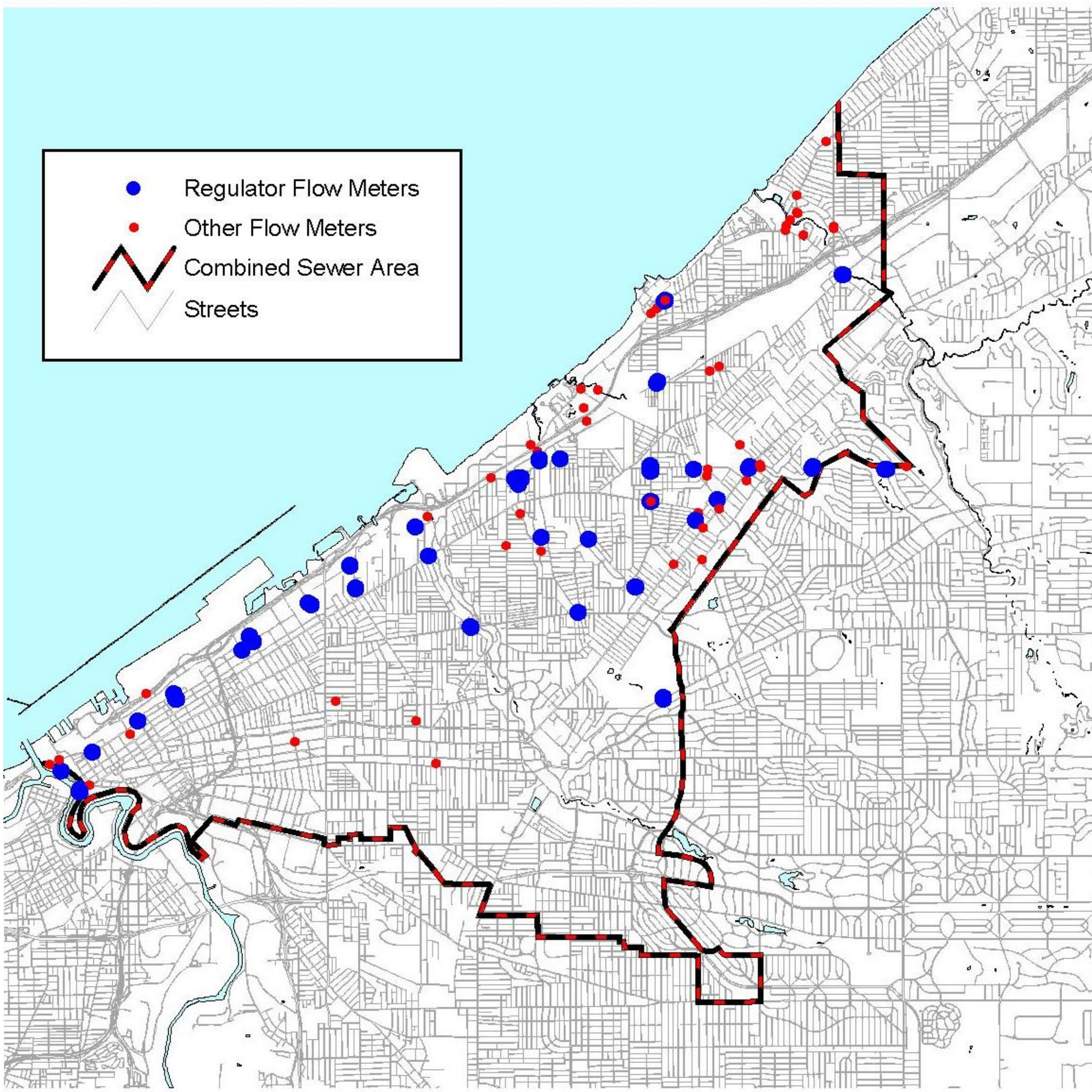
Flow monitors were installed in the interceptor system as illustrated in Figure 3-3.

Figure 3-3. Interceptor System Flow Monitors



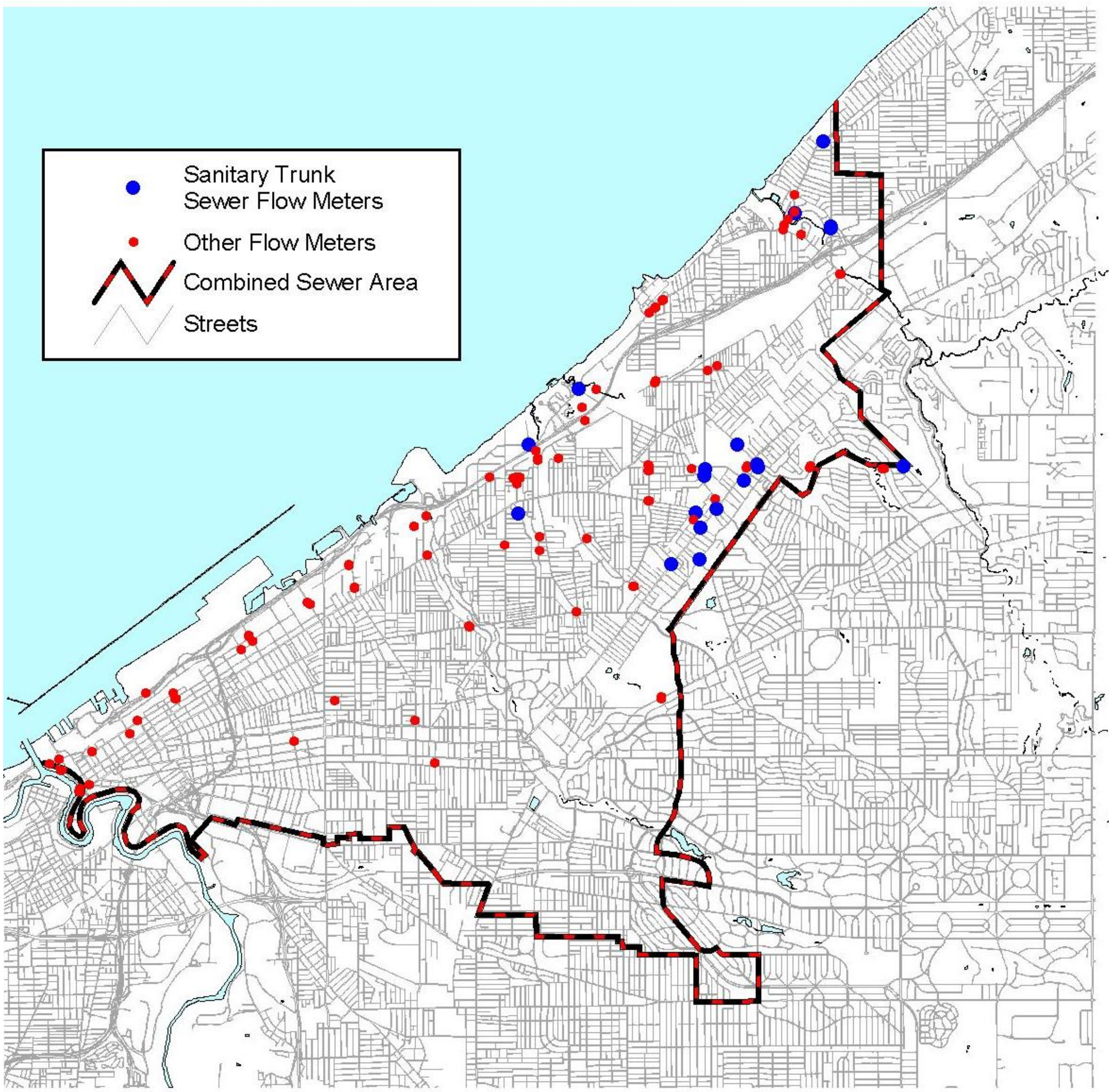
A total of 76 flow monitors were installed at 41 CSO regulator sites. Installation of meters on regulator overflow pipes is not preferred, since the calibration of these meters can only be done during wet weather events. However, due to the lack of suitable installation sites in several critical locations, it was necessary place monitors on overflow pipes. Meters in these locations can provide reliable depth data only. Flow monitoring at regulator sites is presented in Figure 3-4.

Figure 3-4. Flow Monitoring at CSO Regulators



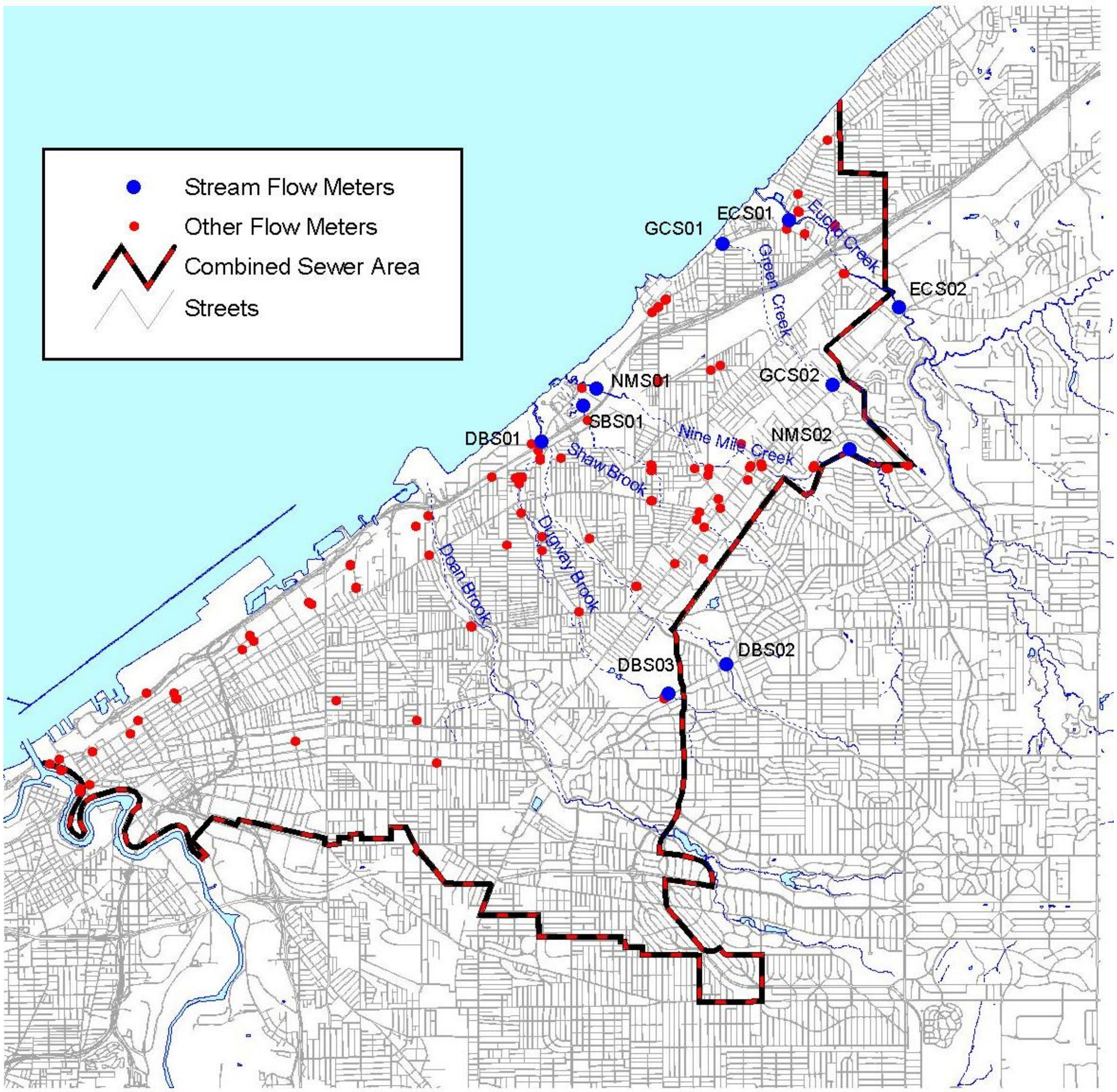
Eight flow monitors were installed on sanitary trunk sewers as shown in Figure 3-5.

Figure 3-5. Flow Monitors Located on Sanitary Trunk Sewers



To support the water quality modeling effort, a total of ten flow monitors were located on the Easterly CSO receiving waters as shown in Figure 3-6.

Figure 3-6. Stream Flow Monitor Locations



Flow Monitor Site Ratings

During flow monitor installation, ADS prepared a site report for each location. Site sheets contain location, installation details, hydraulic, and condition information for the metering installation manhole and pipe segments. Also contained on the site report is a hydraulic rating for each location. ADS uses a subjective grading system to predetermine a site's suitability for monitoring. Letter grades of *A*, *B*, *C*, *D*, and *F* are used to represent a continuum from excellent (*A*) to poor (*F*), where *A* would indicate smooth laminar flow with no pipe disturbances (bends, slope changes) upstream or downstream and *F* would indicate that metering was not possible. Typical for ADS monitoring in sewer systems, most monitoring locations in the Easterly area were rated *C*. Sites with a rating of *C* or higher were the most preferred metering locations. Table 3-4 provides a summary of the site sheet ratings.

Table 3-4. Flow Monitor Site Rating Summary

Rating	Number of Sites
A	0
B	28
C	101
D	15
F	0
No Rating	1
Total	**145**

Flow Monitor Uptime

Uptime is defined as the number of hours the flow monitor was performing optimally. ADS meters exhibited an overall average uptime of 95 percent during the flow-monitoring period. 130 of the 145 meters were "up" in excess of 90 percent of the time. A majority of the sites exhibiting an uptime of less than 90 percent were stream sites. Stream monitors were typically installed in areas where debris carried by the stream under high flow conditions would be less likely to damage the sensors. This often entailed placing the meter sensors on the stream banks away from the main flow channel. As a result, during dry weather the velocity and/or depth measurements can conflict, causing the meter to record an error condition which is reported as "down". Monitors within the collection system exhibiting an uptime of less than 90 percent typically were the victim of damage from debris during high flow events, or had internal errors. An overall comparison of site rating vs. percentage uptime showed no correlation between the two factors. A flow monitoring summary table indicating meter site rating and uptime during the metering period is included in Appendix H.

CHAPTER FOUR

COLLECTION SYSTEM MODEL DEVELOPMENT

A key component in the development of the Easterly District's LTCP is the accurate characterization of the collection system's response to rainfall. This characterization is facilitated by the development of a calibrated and verified sewer system model. The primary objective of the sewer system modeling is to understand the hydraulic response of the system to infiltration, sanitary base flow, and rainfall runoff. This includes predicting the volume and frequency of CSOs, determining the extent of surcharging and identifying the occurrence and cause of restrictions in the system. The sewer system modeling will be used to evaluate sewer system improvement alternatives such as I/I reduction, rehabilitation/repair, and storage.

This chapter provides a description of the overall approach followed to develop the sewer system model, including model selection, modeling approach, and methodology.

MODEL DESCRIPTION

Several components of the Easterly sewershed must be integrated into a comprehensive hydraulic model. These components consist of:

- Combined sewer collection system;
- Interceptor system;
- Easterly WWTP;
- Doan Brook Interceptor subsystem; and
- Heights/Hilltop Interceptor subsystem.

In addition, a hydrologic model must be developed to introduce the following components of Easterly sewer system inflow:

- A runoff model to simulate rainfall-derived inflow and infiltration (RDII) flows into the hydraulic model;

- An inflow model to simulate domestic sanitary inflows and dry weather base flows; and
- Boundary inflows from other existing sewer system models (i.e., Doan Brook Interceptor System Model, Heights/Hilltop Contracts 7A-7C Interceptor Model).

The computer model of the collection system was developed to assist in the assessment of CSO control alternatives. For the Easterly District collection system model, the hydraulic modeling software chosen was MOUSE™, Version 1999, developed by the Danish Hydraulic Institute (DHI). MOUSE™ has the capability of generating sanitary inflow, varied according to a user-specified diurnal variation. This feature was used to generate sanitary flows in the Easterly model. The runoff hydrology was modeled using the EPA Stormwater Management Model (EPA SWMM).

The Easterly model network is shown in Figure 4-1.

MODEL DEVELOPMENT APPROACH

Modeling the collection system involved the development of the hydrologic and hydraulic components. The hydrologic component of the model generates inflow to the collection system during dry and wet weather. The hydraulic component of the model routes these flows through the sewer network and allows the user to determine the flow rate and the elevation of the hydraulic grade line at any location in the sewer network. Community tributary sewers (generally equal to a No. 3 egg or 30 inch or larger in diameter) and the District’s interceptors, regulators, pump stations and all overflow conduits were included in the model.

The model development was initiated with the development of a pilot model. A complete model was developed and calibrated for the pilot study area. The pilot study model was tested and used to refine all of the procedures used to develop the model for the remaining areas. The area tributary to the Euclid Creek Pumping Station was selected for the pilot study. Following the pilot study, the remaining portions of the Easterly system model were developed. Several parameters used to develop the model were obtained from the results of the pilot study. The following summarizes the procedures that were used to develop the Easterly sewer system model, including the inflow model and the collection system model.

Insert Figure 4-1

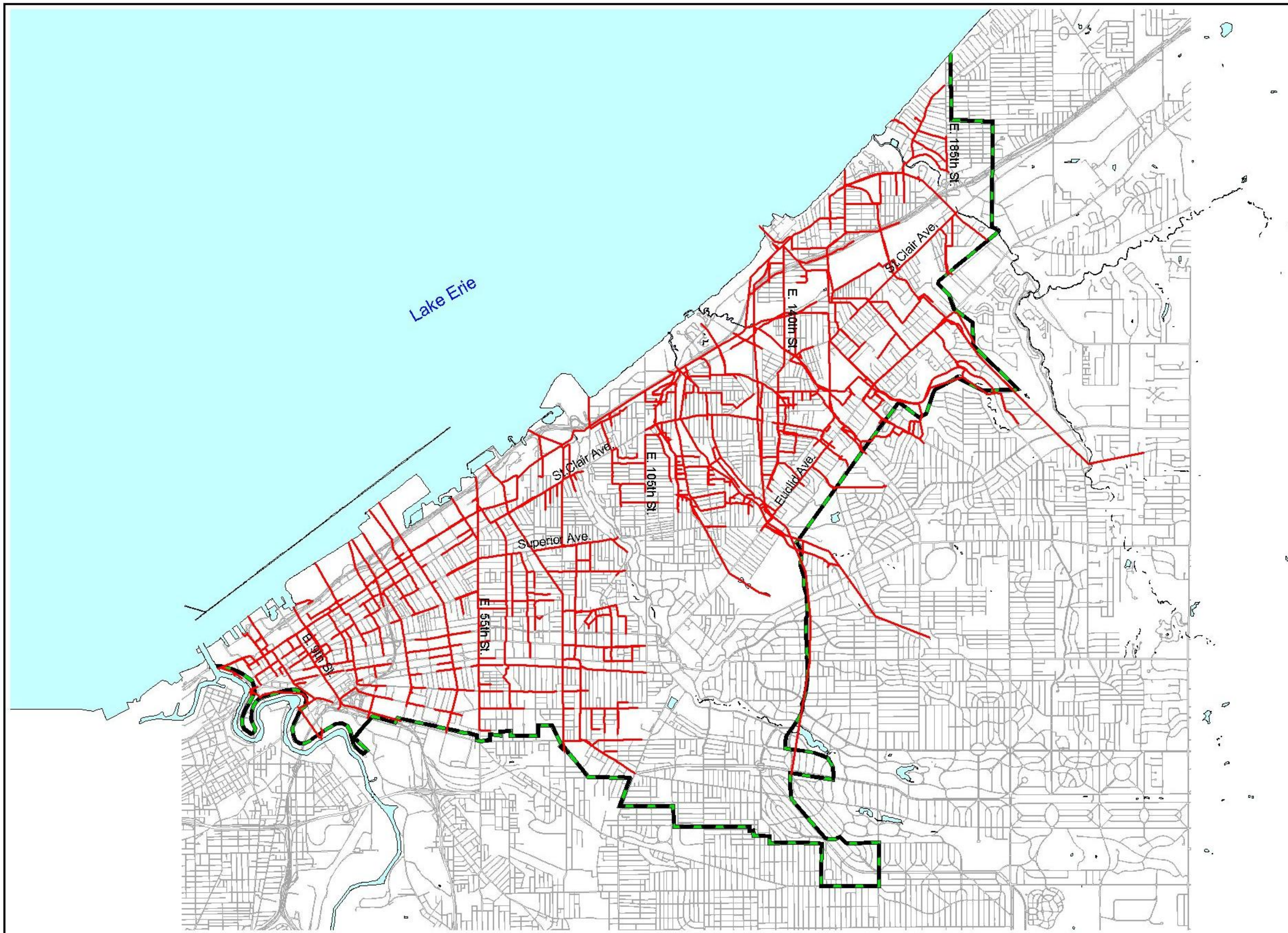


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Figure 4-1.
Hydraulic Model Network

MOUSE™ Hydraulic Model

MOUSE™ was used as the hydraulic model for the Easterly collection system. MOUSE™ is a fully dynamic model that can simulate backwater, looped flow, variable water levels at outlets, pumps and weirs in a collection system network. Water levels, flow rates and velocities calculated by the model were stored at each node and conduit at user-specified time intervals, allowing subsequent examination of hydrographs or hydraulic profiles. DHI MIKEVIEW is the module used for viewing the hydraulic grade line, flow rate, and velocity time series. Model results can also be compared with external time series data, such as meter readings, to facilitate model calibration. MIKEVIEW also allows the examination of dynamic hydraulic profiles, showing the animated hydraulic grade line and flow rates along the pipe profile as a function of time.

Typical hydraulic elements present in sewer systems can be simulated in MOUSE, including conduit cross-sections, circular manholes, detention basins, weirs, pump stations with a variety of operational modes, flow regulators, and constant or time-variable outlet water levels. These hydraulic elements can be simulated in close correspondence to their actual operational characteristics.

The input data required by MOUSE for nodes and conduits included pipe inverts, pipe diameters, pipe material for the conduits and manhole inverts, rim elevations, manhole diameters, and the x-y coordinates for the nodes. Pipe lengths are determined by MOUSE™ based on these coordinates, but could also be user specified through an additional input file. Much of these data were collected and stored in a Microsoft Access database. The data was then imported into MOUSE through MOUSE-GIS.

Naming Convention

The manholes, blind connections, and regulators for this model network were then assigned labels for the model identification. MOUSE allows up to a seven character alphanumeric label for the model nodes. Nodes located along interceptors were assigned a six character alphanumeric designation. The interceptor nodes were assigned names based on the interceptor name. The first two letters were used to represent the name of the interceptor. Table 4-1 lists the interceptors and their corresponding two-letter designation. The third letter denotes the interceptor branch. The three-letter prefix was followed by a three-digit numbering system to sequence the nodes from downstream to upstream. The naming convention used for the nodes located along community sewers followed the same basic protocol. The first three letters correspond to the interceptor branch to which the community sewer is tributary. Next, instead of a three-digit numbering system, a four-digit system was used for community sewers.

Table 4-1. Easterly District Interceptor Codes

Interceptor	Code
Doan Valley	DV
Dugway	DU
Easterly	EA
E. 140th/Hayden	HA
E. 152nd/Ivanhoe	IV
Heights	HE
Hilltop	HI
Lake Shore	LS
Nottingham	NO

A similar methodology was used for the culverted streams. A six character alphanumeric designation was assigned to each culverted stream node. The first three characters are letters corresponding to the name of the culverted stream. Table 4-2 presents the codes used as prefixes for the culverted stream node designations. The next three characters, a three-digit number, was also assigned to each node. Again, the node numbering began at the downstream end and proceeded sequentially upstream. The Cuyahoga River and Euclid Creek are open-channel watercourses throughout the Easterly CSO outfall area, therefore, these receiving waters are not included in the hydraulic model. Doan Brook was included in the Doan Brook Watershed Study.

Table 4-2. Culverted Stream Codes for Easterly Hydraulic Model

Receiving Water	Code
Dugway Brook – East Branch	DCE
Dugway Brook – West Branch	DCW
Green Creek	GRN
Nine Mile Creek	NIN
Shaw Brook	SHW

The CSO regulators were typically assigned names based on the District's structure name, without any dashes or spaces. For example, Regulator E-20 became E20.

For the wet weather overflow pipes from regulators, the nodes were named after the upstream regulator followed by an alpha character (i.e., H02A, H02B, etc…), sequentially until the CSO outfall or culverted stream was reached.

Pipe Information

Pipe shapes are specified in MOUSE as either a standard shape or a unique cross-section. The standard shapes include circular pipes and trapezoidal open-channels. Unique cross-sections were specified through a cross-section database editor. These unique shapes were specified as a series of x-y coordinates that defined the cross-sectional area. MOUSE then used this cross-section to compute the hydraulic characteristics as a function of depth, such as cross-sectional area and wetted perimeter. The special shapes used for this model consisted of:

- Egg-shaped - standard City of Cleveland sizes; smaller at the base and wider at the top;

- Arches - semi-circular top; may have a channelized bottom;
- Box Culverts - rectangular pipe; may have channelized bottom;
- Circular Equivalent (Inverted Egg) - wider at the base and smaller at the top, may have a channelized bottom;
- Elliptical; and
- Open-Channel - these sections were drawn based on Cuyahoga County ground contours or surveyed cross-sections.

With the exception of the open-channel sections, all of the “special shapes” were drawn in AutoCAD. A grid was then overlaid, and the x-y coordinates representing the cross-sectional shape were entered into MOUSE.

Manning’s Pipe Roughness Coefficient

The Manning’s roughness coefficient affects both the velocity and water level in a pipe section. A set of default values consistent with other District projects, shown in Table 4-3, was determined for each of the standard pipe materials. These values could also be set to user-specific values for an individual pipe section as warranted during calibration.

Table 4-3. MOUSE Material Codes

Mousecode	MOUSE Material	Pipe Material	Manning’s n
1	Smooth Concrete	Reinforced Concrete Pipe	0.015
2	Normal Concrete	Corrugated Metal Pipe	0.024
3	Rough Concrete	Segmented Block	0.02
4	Plastic	Poly Vinyl Chloride	0.0125
5	Iron	Cast/Ductile Iron Pipe	0.0143
6	Ceramics	Vitrified Clay Pipe	0.0143
7	Stone	Stone	0.017
8	Other	Brick	0.02

Control Structures

The Easterly collection system model has over 200 control structures. These structures include eight pumping stations, various static weirs and invert plate orifices (leaping weirs). Although the modeling of these structures in MOUSE™ was generally straightforward, a brief description of each is provided in this section.

Pump Stations. MOUSE represents pump stations using a functional relation that connects two nodes and uses the pump characteristic curves and start/stop elevations. The upstream node is the wet well and the downstream node is the connection of the force main to the gravity sewer. The ground elevation at the upstream end of the force main must be artificially raised to an elevation high enough to accommodate the hydraulic grade line.

The pump station characteristics were entered as a discrete flow versus head relationship. The wet well dimensions, start and stop levels and pumping rate were obtained from the District, and entered into MOUSE to represent the pump station operation. There are eight pump stations that discharge directly to Easterly District facilities, or impact CSO conveyance and/or overflows within the Easterly CSO area. These pump stations are included in the Easterly collection system model and described in Table 2-2.

Static Weir CSO Regulators. Static regulators are control structures with fixed configurations, and do not have the ability to be adjusted based on conditions occurring in real-time. A common static regulating structure in the Easterly district has a weir wall, and this weir can be classified as either perpendicular or sidespill. A perpendicular configuration is one in which the face of the weir wall is normal to the incoming flow. A sidespill configuration is one in which the weir wall is oriented parallel to the direction of incoming flow. MOUSE simulates both types of weirs and calculates the overflow based on the weir equation. MOUSE uses the crest elevation, the crest length, and orientation (perpendicular or sidespill) to compute overflow from the weir.

Since MOUSE represents weirs as a link between two nodes, an additional, artificial node is required at the regulating structures. This node was located immediately downstream of the regulator on the wet weather pipe. It was given the same invert and rim elevation as the original regulator node, and was given the regulator name with an addition of a “W” to the end. For example, Regulator E20 has a node E20W on the wet weather outlet pipe, and the weir connects E20 to E20W.

Leaping Weirs. A leaping weir is a regulating device in which the dry weather flow in a combined sewer drops into a lower dry weather outlet pipe through an opening in the invert plate of the combined sewer. During storm events when the velocity and depth of flow increases, the stormwater passes over, or leaps, the opening to the dry weather outlet and continues along to the stormwater outlet. The hydraulic design of leaping weirs has been based on empirical findings and trial and error testing. Adjustable plates have been used so that the opening may be modified. If the opening was constructed of masonry, it was common practice first to undersize it and then enlarge it as necessary based on actual performance (“Fluid Mechanics”, Streeter, Wylie, and Bedford, 4th edition, p. 418, McGraw-Hill Book Company). A rational approach to the design of leaping weirs was developed by McClenahan in 1922 and is based on the trajectory theory (“Handbook of Applied Hydraulics”, Davis, 2nd edition. p. 1068, McGraw-Hill Book Company, 1952). Theoretical velocity between points, neglecting losses, is:

$$V=(2gH)^{1/2}$$

V= Velocity (ft/s)
H= Depth of flow (ft)
g= Acceleration due to gravity (ft/s^2)

The velocity of a free stream of water may be determined if the air resistance is negligible. The x-component of the velocity does not change, therefore:

$$Vt=X_0$$

t= time for fluid particle to drop

The time for a particle to drop distance y_0 under the force of gravity when it has no initial velocity in that direction is equal to:

$$y_0=(gt^2)/2$$

Setting the two equations equal, the time can be eliminated giving:

$$V=(X_0)/(2y_0/g)^{1/2}$$

For the leaping weir, y_0 equals the depth of flow in the pipe H, and X_0 is the distance across the opening of the weir. Solving for length:

$$X_0 = V(2H/g)^{1/2}$$

This equation corresponds to the formula developed by McClenahan.

To determine the point at which the flow leaps across the weir opening, a relationship between the pipe velocity and depth of flow was established using Manning's equation for each of the influent sewers for the leaping weirs. The velocity versus depth relationship for the influent sewer is dependent on the pipe slope, roughness, and cross-section. For circular pipes, Manning's equation was used to calculate the velocity-depth relationship. For non-circular pipes the values generated by MOUSE for depth, area, and hydraulic radius were used in the Manning's equation to determine the velocity versus depth relationship. Given these relationships and the length of the weir opening, X_0, the above equation was solved for the minimum amount of flow necessary to leap the weir. The water depth at which this occurs is termed the "activation depth".

Flow metering data indicated that flow typically begins to enter the storm sewer before this activation depth occurs. Therefore, as a starting point, it was assumed that at a depth of one-third the activation depth, 95 percent of the flow enters the dry weather pipe and the remaining 5 percent of the flow enters the storm sewer. At three-quarters of the activation depth, it was assumed that 10 percent of the flow leaps the opening and enters the storm sewer. When the depth of flow reached the activation depth, 75 percent of the flow was considered to enter the dry weather pipe. This is the maximum flow that is assumed to enter the dry weather pipe. For flows greater than what occurs at the activation depth, any excess flow would enter the storm sewer. These depths and flows were coded into MOUSE using a flow versus depth relationship.

Hydrologic Model Development

Initial Data Preparation and Modeling Sub-Basin Delineation

In order to proceed with model development, the sewers being modeled were mapped prior to completion of the district-wide mapping effort. This model network mapping was later integrated with the district-wide sewer mapping. The following specific mapping-related tasks were carried out to facilitate the model development:

- A 400-scale base map of the model network was compiled using record drawings. In general, the sewers to be modeled consisted of all combined sewers 30 inches in diameter or greater and all sewers, regardless of size, from the regulators downstream to the receiving water and through the interceptors to the WWTP;
- A 400-scale mylar topographic map was overlaid onto the 400-scale sewer base map and the sewers to be modeled were traced onto the topographic drawing. Manholes and regulators to be modeled were labeled, per the naming convention described earlier;
- The sewers to be modeled were digitized from the mylars into the GIS system and ArcView data and shape files of the sewer network to be modeled were created;
- The metering basins and modeling sub-basins were delineated. In many instances, a metering basin consisted of multiple modeling sub-basins. All metering basins and modeling sub-basins, for combined, stormwater and sanitary tributary areas, were digitized as GIS coverages, from which ArcView data and shape files were prepared**.** Generally, the modeling sub-basins were limited to approximately 30 acres. However, if necessary, smaller sub-basins were delineated to keep them as homogeneous as possible as to land use or sewer-type configuration; and
- Using the Geographic Information System (GIS), the area, population, and land use for each sub-basin were computed. The population data, area, and percent imperviousness were prepared. This process will be discussed in further detail later.

Modeling Sub-Basin Summary

The Easterly hydrologic model included a total of 527 sub-basins. There were a total of 416 combined sewer sub-basins, with an average sub-basin area of 27.9 acres. The average area of the 86 separate sewer sub-basins was 216.8 acres. There were a total of 25 stormwater sub-basins, with an average area of 327.3 acres. The separate and stormwater areas were largely located outside the CSO study area, therefore, these areas were aggregated as much as possible for simplification, without sacrificing the CSO characterization accuracy of the model. The combined modeling sub-basins are shown in Figure 4-2, the storm modeling sub-basins are presented in Figure 4-3 and the sanitary modeling sub-basins are shown in Figure 4-4. A modeling schematic was created from the interceptor schematics, providing a representation of the modeling network. The location of sub-basin inputs to the sewer network, modeled trunk sewers, and the location of flow monitors were added to the CSO Phase I schematics to create the model schematics. These schematics can be found in the back pockets of this report.

Dry Weather Flow Generation

The collection system has three potential sources of dry weather flow: wastewater, infiltration, and river/lake inflow. Wastewater is comprised of sanitary flows generated by residential populations and commercial and industrial sources. Infiltration results from water entering the system through cracks in pipes, joints, manholes and other non-specific sources. River/lake inflow may occur if the surface water level is high enough to backflow through the most downstream regulating structure and enter the collection system. Based on river and lake level data, this was not a concern in the Easterly CSO study area during dry weather periods.

Wastewater Flows - The sanitary component of the dry weather flow was determined using population data, per capita wastewater generation rates and billing records for large commercial and industrial sewer customers. Flow monitoring data was then studied to help determine the diurnal pattern of flow.

MOUSE™ calculates sanitary flows based on population density and a per capita wastewater generation rate, varied over a twenty-four hour diurnal pattern. It is also capable of accepting a constant inflow data file that specifies the dry weather base flow (infiltration rate) at any manhole in the collection system.

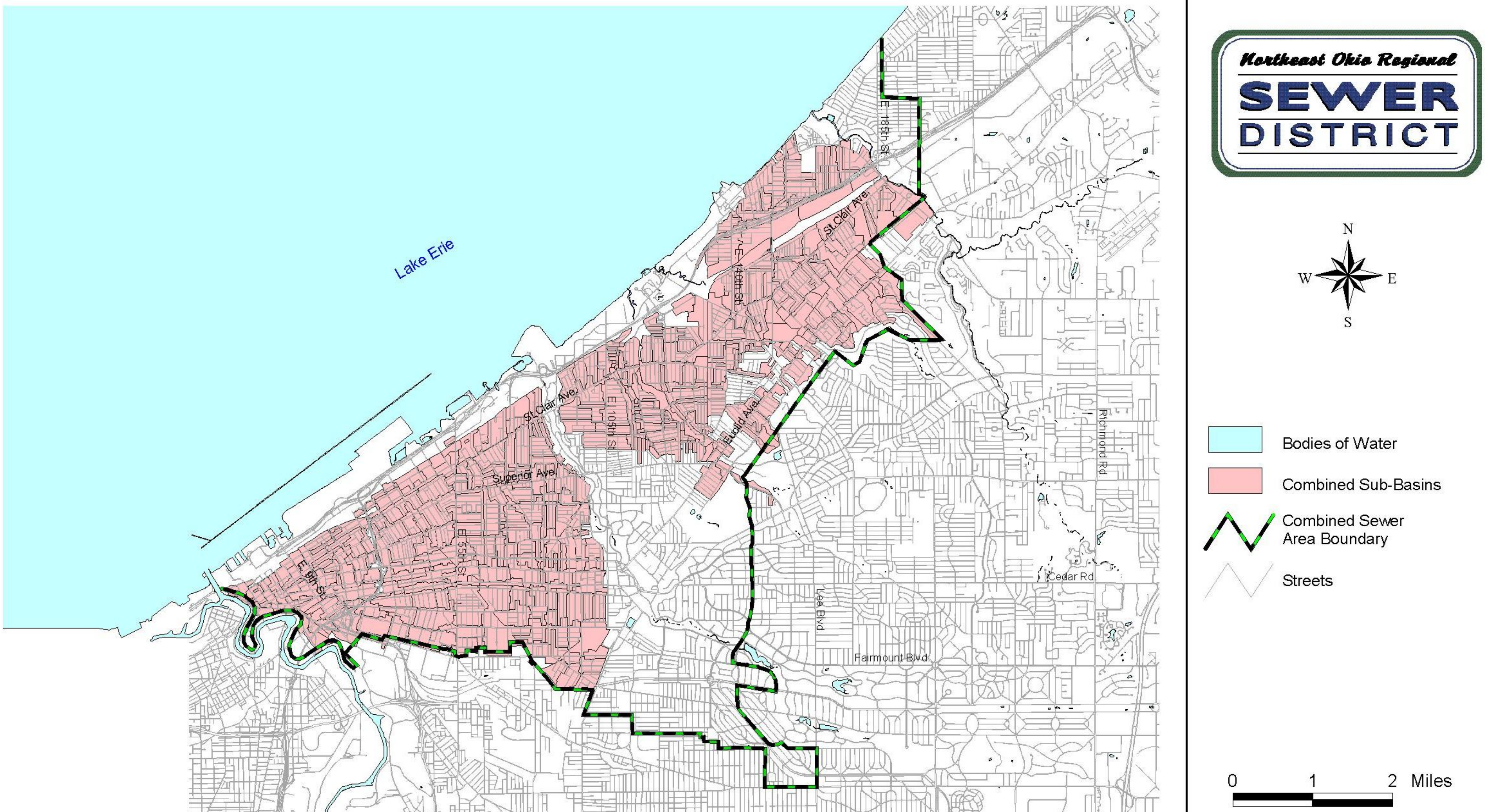

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Figure 4-2.
Combined Sub-basins

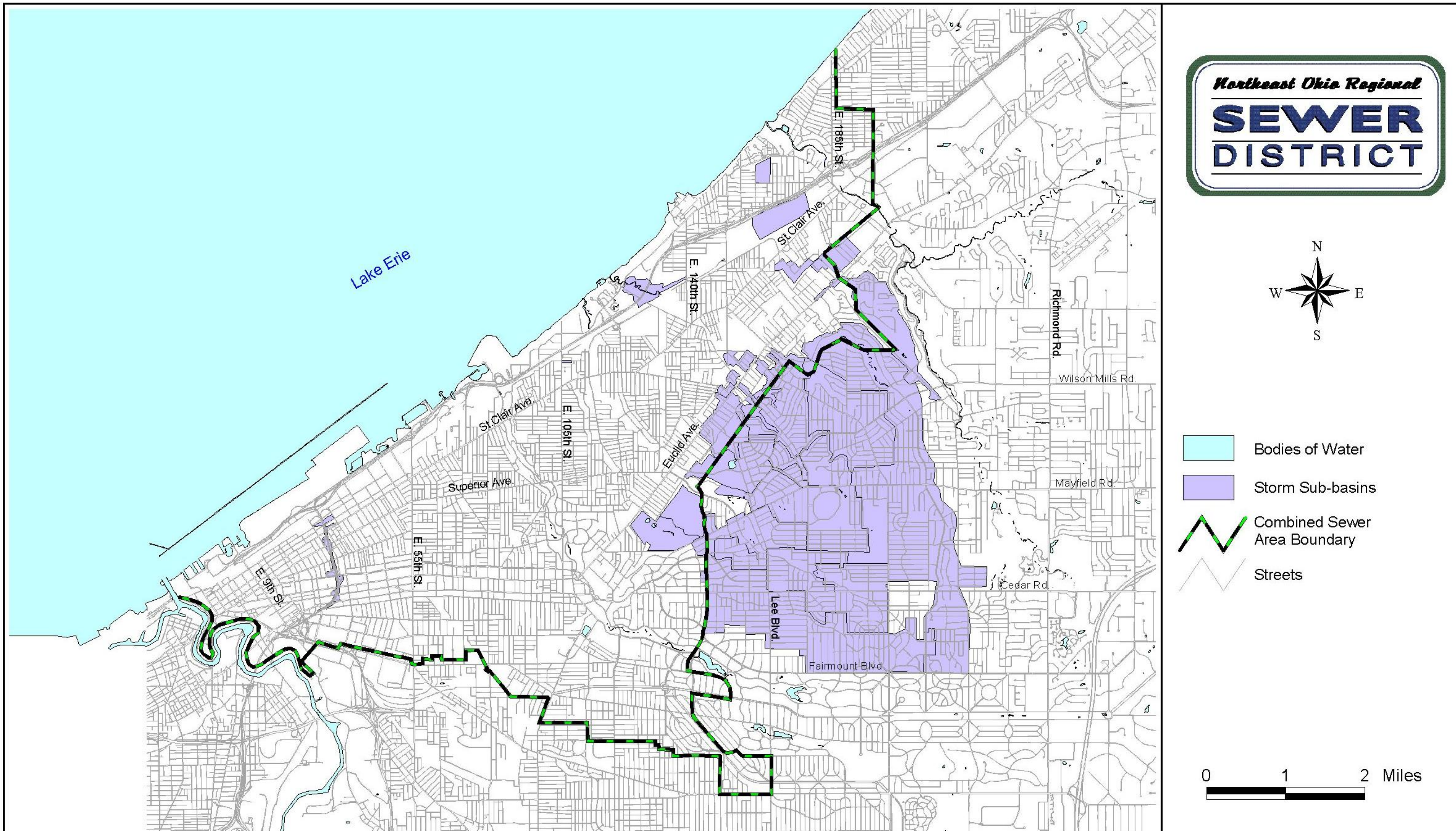

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Figure 4-3.
Storm Sub-basins

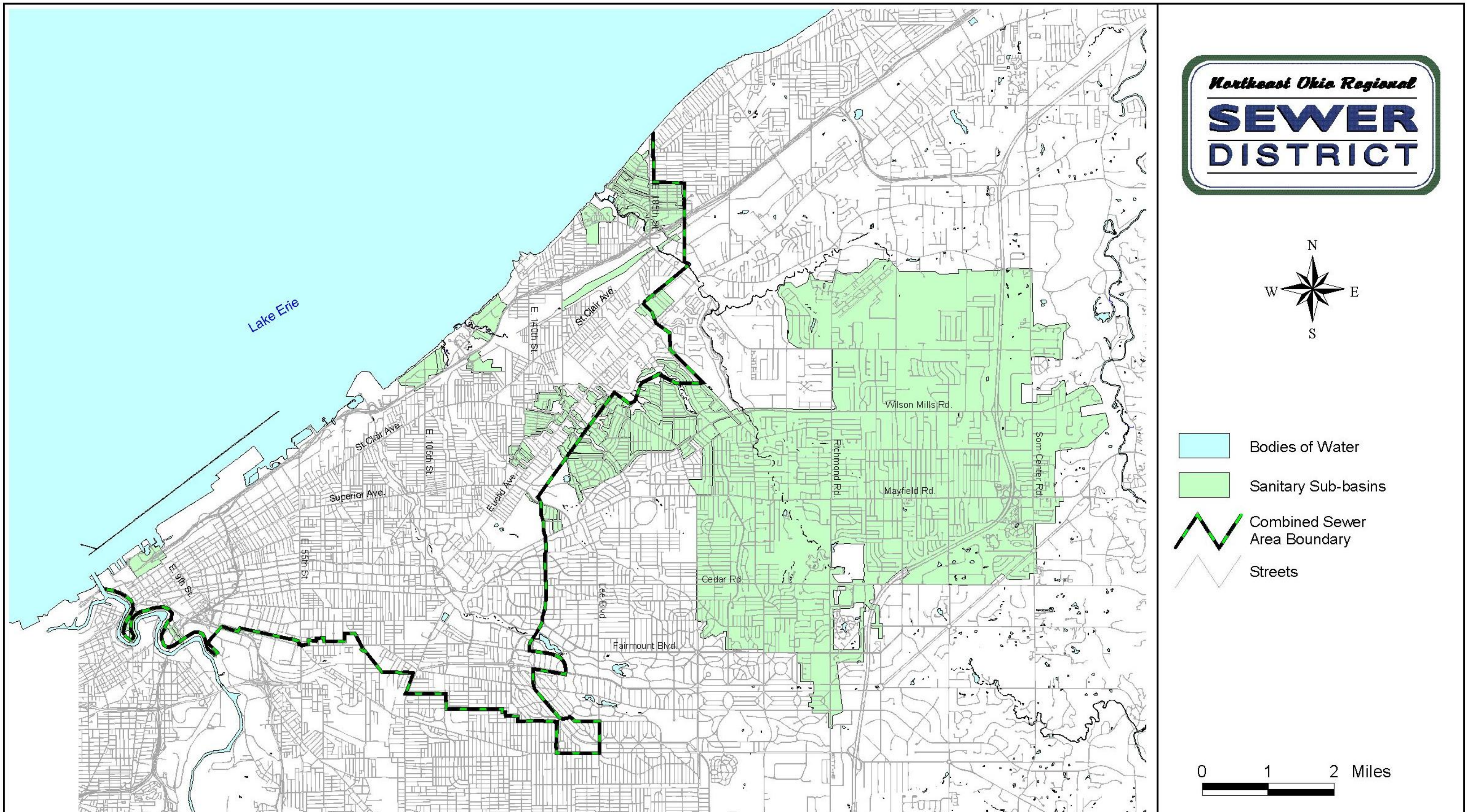

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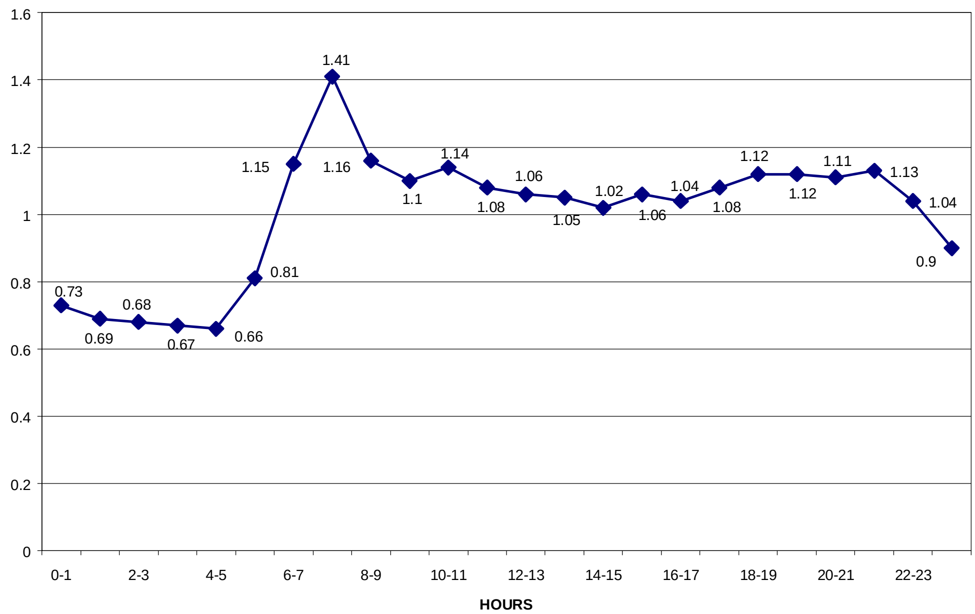
Figure 4-4.
Sanitary Sub-basins

The parameters input to the MOUSE™ model for specification of dry weather flows were:

- Contributing area - All catchments were assigned the proper corresponding area based on the sub-basin delineations;
- Average daily per-capita sewage flow - MOUSE™ 1999 accepts one global value for this parameter. This value was determined during the pilot study for Euclid Creek Pump Station, through analysis of the flow meter data. A daily per-capita wastewater generation rate of 82 gallons per day was used in the Easterly collection system model;
- Population - The population of each sub-basin was determined from a GIS analysis of the TIGER files. This population value was used as an initial value and subsequently adjusted to calibrate the sanitary component of the dry weather flow. The final adjusted population can be found in Appendix A. An equivalent population was determined for the industrial/commercial flow and verified during dry weather flow calibration using monitoring data; and
- Base infiltration - This flow component was estimated as 90 percent of the minimum monitored nighttime flow. To model the infiltration component, a constant inflow was input into the most upstream nodes in the basin. This was done using a .cif file in MOUSE™.

Different diurnal sanitary flow patterns exist for residential areas as compared to the industrial/ commercial areas. A discussion of this discrepancy is provided in Chapter Five-Model Calibration. MOUSE™ 1999 has the capability of modeling one dimensionless diurnal curve. Therefore, all the various sanitary flow patterns were not represented. Since the majority of the area is residential, this pattern was used throughout the study area. Figure 4-5 shows the diurnal pattern used for the model.

Figure 4-5. Hourly Diurnal Peaking Factors for Sanitary Flow



Wet Weather Flow Generation

The RUNOFF block of EPA SWMM was applied to generate the wet weather flows from the combined sewer, separate sewer and stormwater areas. The parameters used for the RUNOFF model were obtained from the initial data preparation and then refined during model calibration. Each modeling sub-basin was identified as either combined or separated, depending on the type of sewer configuration present in the sub-basin. In separated areas, flow can enter either the sanitary sewer or storm sewers. Therefore, overlapping areas were specified to model wastewater inflow into the sanitary sewers and surface runoff into the storm sewers. Care was taken to ensure that the quantity of water entering the storm and sanitary sewers did not exceed the volume of water falling on the basin. In addition, during alternative modeling, modifications to sanitary or storm sewers may require redistribution of the quantity of flow entering the two systems.

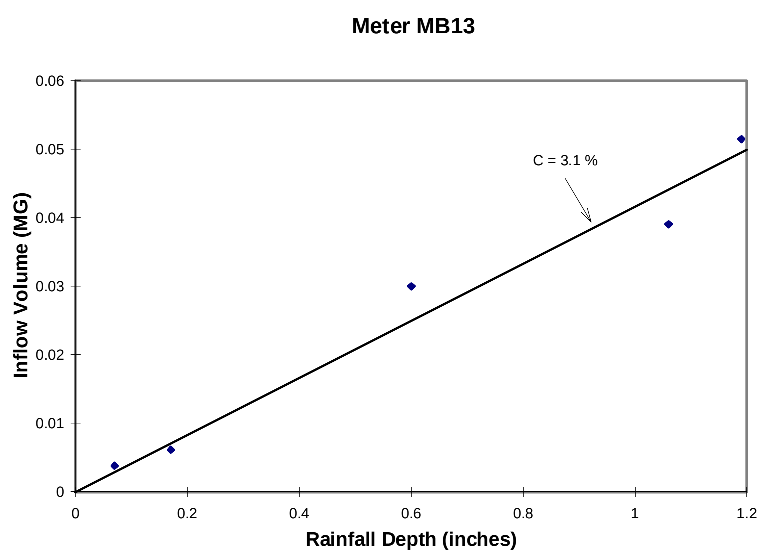
Rainfall Dependent Inflow and Infiltration (RDII) is defined as the amount of flow that enters the sewer system and service connections during wet weather. The primary sources of RDII include, but are not limited to, roof leaders, cellar pump-out, yard and area drains, foundation drains, manhole covers, cross-connections from storm sewers and combined sewers, and rainfall-induced groundwater infiltration. Surface runoff may enter combined and stormwater systems during wet weather. As noted previously, the RUNOFF block of SWMM was used to simulate both types of inflows. With this procedure, RUNOFF input parameters were appropriately selected to yield flows which matched inflows determined from flow monitoring. The following is a summary of the steps undertaken to develop inflow coefficients.

Calculation of Volumetric Inflow Coefficient (C-value): For sewer inflow modeling, the percent impervious parameter, also referred to as the percentage of directly connected impervious area (DCIA), is a required parameter for inflow generation in the RUNOFF block of SWMM. Using the results of the Slicer software, the volumetric inflow coefficient, or C-value, was determined from the flow monitoring data using the following expression:

$$C = \text{Inflow Volume} / (\text{Rain Depth} * \text{Basin Area})$$

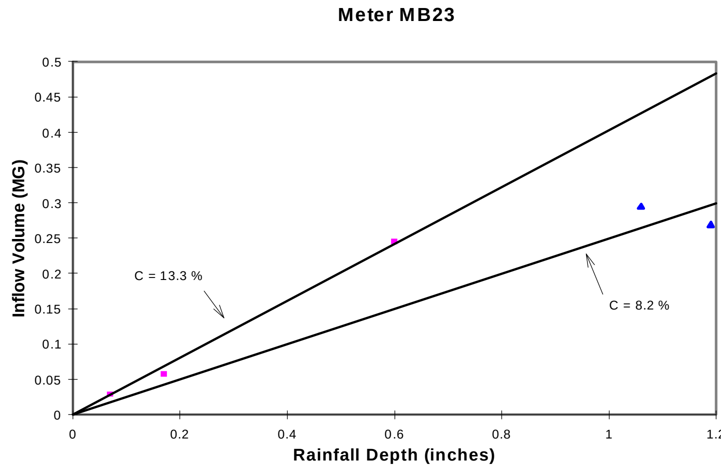
The volumetric inflow coefficient represents the fraction of rainfall that enters the sewer system as inflow. The value of C was estimated using a regression analysis in the ADS Slicer program. Figure 4-6 is an example of a regression analysis carried out by the Slicer program for a metering basin. In this example, a C-value of 3.1 percent was obtained.

Figure 4-6. Example of Regression Analysis to Estimate Volumetric Inflow (C-value)



In some cases, the inflow coefficient may decrease as the storm size increases. This may occur in situations where surcharging or a restriction prevents inflow from entering the sewer system. Figure 4-7 is an example of this situation for another metering basin.

Figure 4-7. Example of Inflow in Sewer Experiencing Surcharge



During the smaller storms (less than about 0.6 inches in rainfall depth), the inflow was not prevented from entering the sewer and the C-value was 13.3 percent. During the larger storms (greater than 1 inch in depth), the inflow was prevented from entering the sewer and the value of C based on the larger storms was 8.2 percent. In other cases, the inflow coefficient may increase as the storm size increases. This may occur, for example, if a certain rainfall depth causes flooding in the street which then enters the sewer through leaky manhole lids. This may also occur if a river rises during wet weather and overtops overflow weirs or floods manhole lids.

The procedure for this study was to develop initial DCIA values by comparing them with the C-values obtained from the Slicer program. Since the flow monitors were only located at certain downstream manholes and regulators, the C values for sub-basins upstream of the meter were proportioned based on their level of separation, type of land use, unpaved area, and soil type. An average DCIA was established for each sub-basin. With these initial values, the model was calibrated and verified at a later time by running the storm events that were monitored from April to June of 1998. During this calibration and verification stage, the final DCIA values that reproduced the measured flows were determined. Other runoff parameters in SWMM RUNOFF such as depression storage, infiltration rates, decay rate of infiltration, and Manning's roughness coefficient for the ground surface, were also adjusted during calibration to produce a good fit. These parameters are discussed in greater detail below. Model calibration will be discussed in Chapter Five.

Basin Slope - An average overland flow path slope is required for each modeling sub-basin included in the RUNOFF input file. Basin slope was manually determined by the model developers, using the various sources of topographic information available.

Basin Width – Basin width values are required for each modeling sub-basin included in the RUNOFF input file. These values were manually determined according to requirements explained in the SWMM RUNOFF manual. The method involves measuring the length of the flow path perpendicular to the channelized flow. During calibration, this parameter was adjusted to more accurately represent the inflow peak to the collection system.

Soil Infiltration - Soil infiltration values were required for each modeling sub-basin included in RUNOFF input file. The Horton infiltration method was used for simulating infiltration from directly connected pervious areas for the Easterly CSO study. Most of the soils within the Easterly CSO planning area are considered disturbed (Hydrologic Soil Type “U”). Typical soil infiltration values are listed in Table 4-4.

Table 4-4. Typical Soil Infiltration Values

Hydrologic Soil Type	Initial Infiltration Rate (in/hr)	Final Infiltration Rate (in/hr)	Decay Rate $(s)^{-1}$
A	10	1	0.00115
B	8	0.5	0.00115
C	5	0.25	0.00115
D	3	0.1	0.00115
U	3	0.1	0.00115

Depression Storage and Evaporation - There is a small amount of depression storage in most watersheds. This is one reason why very small storms do not produce runoff. The depression storage is typically higher for pervious areas than for impervious areas. The SWMM RUNOFF model permits separate depression storage values for pervious and impervious areas for each sub-basin. The amount of depression storage for the impervious area can be determined from examining rainfall records and flow meter data. Based on monitoring data, most flow meters did not respond to rainfall less than 0.06 inches, while the typical range was from 0.02 to 0.06 inches. Depression storage in the pervious areas was harder to determine because of other losses due to infiltration and was set to 0.1 inches. Because depression storage may vary from basin to basin, it was also used as a calibration parameter. Final depression storage for each sub-basin can be found in Appendix B.

The depression storage becomes filled after the initial rainfall of 0.02 to 0.06 inches. For continuous model simulation, the depression storage can be replenished by evaporation. The default evaporation rate for the SWMM model is 0.1 inch per day throughout the year. The events used for model calibration were measured during April-May, 1998. The default evaporation rate of 0.1 inches per day for this period produced close calibration.

Antecedent Conditions

The use of antecedent soil moisture conditions ensured that the state of soil saturation was realistic during continuous simulations. The amount of moisture held within the soil affects the point at which runoff occurs from pervious surfaces. By using the default evaporation rate of 0.1 inches per hour and the pervious infiltration capacity recovery rate, antecedent soil moisture conditions were accounted for during the continuous simulations.

CHAPTER FIVE

COLLECTION SYSTEM MODEL CALIBRATION

The model of the Easterly collection system was calibrated using a three-step process. First, the dry weather flow in the system was calibrated to metered data for a dry weather period during the flow monitoring. Second, a rough wet weather calibration was performed using a two-week period in early April, 1998. This period contained several moderate size storms and a period of dry weather and provided a representative test of flows in the collection system. At this stage, model parameters were adjusted to match wet weather flows as closely as possible, and major discrepancies were resolved. Third, a continuous simulation of the full 55-day monitoring period was modeled to verify and fine-tune the model calibration. The calibration plots showing modeled versus metered flows and water levels during the two week calibration period and the 55-day verification period are included in Appendix D.

Several sub-models were created to accelerate the calibration process. The sub-models were created individually with MOUSE™-GIS and MOUSE™ 1999, before they were linked together to form a global model. The sewer network was divided into five sub-models:

- Euclid Creek/ Lake Shore Interceptor/ Nottingham Interceptor Sub-Model
- East 152nd Street Interceptor Sub-Model
- East 140th Street Interceptor Sub-Model
- Dugway Interceptor and Easterly Interceptor (east of Doan Valley Interceptor) Sub-Model
- Easterly Interceptor (west of Doan Valley Interceptor) and Flats-area Sub-Model

MODEL CALIBRATION PROCESS

Model calibration is the process of comparing model results with measurements and resolving differences until satisfactory agreement is obtained. As part of this process, the initial values of infiltration flow, sanitary flow, and percent imperviousness (DCIA) determined from independent analyses were compared with the ranges of values determined from flow metering data. Table 5-1 summarizes some of the possible discrepancies, their possible causes, and how the anomalies may be resolved.

Table 5-1. Causes and Solutions to Flow Metering Analysis Discrepancies

Discrepancy Between Analysis of Metering Basins and Flow Metering Result	Possible Causes	Action
Infiltration flow recorded by flow meter is higher than range of values determined from desktop study.	• Meter sub-basin incorrectly defined • Flow meter recording incorrect value • Excessive infiltration • Precipitation gage anomalies	• Verify basin delineation • Verify flow meter data • Field inspect river crossings • Televise areas of high groundwater • Verify precipitation data
Sanitary flow recorded by flow meter is higher than range of values determined from desktop study.	• Meter sub-basin incorrectly defined • Flow meter recording incorrect value • Population projection incorrect • Unknown source of sanitary flow	• Verify basin delineation • Verify flow meter data • Verify population data • Check for additional sources of sanitary flow
Percent impervious calculated from flow meters (combined or stormwater basins only) is higher than range of values from desktop study.	• Meter sub-basin incorrectly defined • Flow meter recording incorrect value • Inflow from receiving water • Unknown source of flow	• Verify basin delineation • Verify flow meter data • Field inspect river crossings • Conduct field inspections to find source of water
Percent impervious calculated from flow meters (combined or stormwater only) is lower than range of values from desktop study.	• Meter sub-basin incorrectly defined • Flow meter recording incorrect value • Blocked sewer • Unknown overflow • Large impervious areas disconnected from the sewers	• Verify basin delineation • Verify flow meter data • Televise sewers • Check aerial photos for anomalies

If the model parameters estimated with desktop calculations were within the ranges of values determined from flow metering, the parameters in the model were adjusted to match flow metering values. This accelerated the model calibration procedure. Routing the dry weather and wet weather flows through the model provided an additional flow balance check of the measured flows. When necessary, additional field work was performed to determine the cause of discrepancies, which might be due to unknown connections or overflows in the system. The use of the flow metering and model information in this way helped to focus the data collection efforts as well as provide a further quality check of the flow data. If the flow meter data matched the desktop study and the simulated results from the model, there is a high degree of confidence that the system is correctly characterized. Weekly progress meetings were conducted to discuss flow metering/modeling discrepancies.

Dry Weather Flow Calibration

The model was first calibrated for dry weather. This was accomplished by combining the delineated modeling sub-basins into metering basins. The total sanitary and minimum dry weather base flows for each metering basin were determined and proportioned to the model nodes based on the area tributary to each node.

Two flow components were calibrated under dry weather condition: the minimum dry weather base flow and the domestic sanitary flow.

The dry weather base flow (minimum flow in the sewer) was determined from flow metering data. The measured base flow at the meter was then pro-rated equally to the entire upstream modeling sub-basins tributary to the meter. These flow rates were then entered at the most upstream manhole of the sub-basin as constant inflow rates. The " .cif " file type in MOUSE™ was used. Domestic sanitary flows were entered into MOUSE™ as unit sanitary flow rate (82 gallons per capita per day) with a 24-hour diurnal pattern applied to the rates. Equivalent populations for each model basin were entered to modify the rates to match the flow monitoring data to account for contributions from residential, commercial, industrial, and institutional uses as described earlier.

The model predicted flows were compared with the observed flows to determine modeling anomalies, flow data discrepancies and manhole or pipe data errors. The initial modeling results compared well with the observed flow data. Where the model results did not compare well with the observed dry weather flow monitoring data, the connectivity of the model network was re-evaluated. Once connectivity discrepancies were resolved, the distribution of population was re-examined and redistributed as appropriate based on building locations and other information. After the population distribution was investigated, areas deficient in flow were investigated for large sources of flow (large sewer users). Industrial flows were added to the model as equivalent populations to improve the verification.

Wet Weather Flow Calibration

The rainfall events from April to June, 1998 were used for calibration and verification. Flows measured in the sewer system downstream or upstream of overflow regulators and at overflow regulators during the rainfall events were plotted. The water levels measured in the sewer system and at the overflow regulators during the rainfall events were used for calibrating the hydraulic grade line (HGL) elevations.

In general, the same process was followed for both calibration and verification. Only the length of simulation time, and thus the number of storms, was different. The process was carried out as follows:

1. Wet weather RDII generated by SWMM-RUNOFF versus monitored flows were calibrated by adjusting the RUNOFF parameters starting first with the sub-basin width, then infiltration rates, depression storage and Manning's coefficient for surface roughness. The volume was calibrated by adjusting the percent imperviousness (DCIA).

2. The SWMM-RUNOFF interface files were converted to MOUSE™ interface files by running "swmm_int.exe" provided by DHI-MOUSE™. The wet weather inflow interface files were then read into the MOUSE™ hydraulic model for routing through the collection system to discharge points.

3. The shapes of the wet weather RDII hydrograph in pipes corresponding to the metering locations were further calibrated by adjusting the width of the sub-basin, followed by the Manning's roughness coefficients of overland surfaces, depression storage, etc.

4. HGL elevations calculated with MOUSE™ were compared with the measured water levels; pipe roughness coefficients, pipe configurations, or assumptions used in the model for the CSO configuration and silt depositions were adjusted to calibrate the HGL. It was a difficult task to get an exact match because uncertain inverts, or debris backup during a particular event could likely occur temporarily. Hence, an accuracy of plus or minus one foot was considered satisfactory.

The Doan Brook Watershed Study team supplied input hydrographs for the corresponding design storms and the "typical" year from the Doan Brook collection system model for points in the system where flows from the Doan Brook interceptor system enter the collection system modeled under the Easterly CSO study. These hydrographs were entered into the MOUSE™ model as boundary conditions. Similarly, HGL time series were provided to the Doan Brook team where flows from the collection system modeled by the Easterly CSO team interface with the Doan Brook interceptor system.

Calibration of the model to the two-week period of flow monitoring data involved identifying discrepancies between observed and simulated flows, investigating the discrepancies, and correcting model parameters. Typical problems evaluated during calibration included:

- Under- or over-predicting runoff volumes
- Inaccurate representation of pump station operation
- Over-predicting flooding
- Over-predicting surcharging
- Spatial variations in rainfall
- Delayed response hydrographs
- Underestimating in-system storage

Before investigating discrepancies, the flow monitoring data was evaluated for reasonableness. Some factors that were considered in evaluating the flow monitoring data included:

- Whether depth and velocity sensors were operational (with reference to flow, depth, velocity, and scattergraphs)
- Whether the sensors recorded similar responses for similar storms
- If either sensor was blocked by debris
- If site hydraulic conditions were likely to produce valid data
- If other flow monitors in the vicinity confirmed the data (mass balance)

If the velocity data was questionable, but the depth data seemed reasonable, the model was verified with depth data. In the absence of good or reasonable data, the model was not calibrated with flow monitoring data in that location.

Along with an evaluation of the flow monitoring data, wet weather connectivity (stormwater outlets) and sewer maintenance data were used to evaluate the comparison of simulated and observed flows. For instance, if blockages were suspected, flow monitor inspection logs and condition information from the Easterly Interceptor Inspection Project was consulted to confirm a blockage existed. Suspected and confirmed blockages were modeled where necessary to match flow monitoring data. The blockages were typically simulated using temporary “silt weirs”. A “silt weir” is an artificial weir inserted into the model to simulate a blockage. These artificial weirs were later removed during preparation of the Baseline Conditions Model, as described in Chapter Six.

If evaluation of the flow monitoring data, connectivity, and operational logs did not resolve the calibration, the contributing drainage area percent impervious allocations were inspected for errors. Where reasonable, adjustments were made to percent impervious allocations in areas of poor model calibration. However, unrealistic changes were not considered or implemented. Calibration proceeded from the upstream areas to the downstream areas.

The model was then verified by simulating the full 55-day monitoring period. The results were evaluated by comparing the observed and predicted flows during dry and wet weather flow conditions. For the events during the monitoring period, the goal was to have the difference between predicted flows and observed flows meet the following criteria:

1. Peak flow rate is within +30% and -20%
2. Volume of flow is within +30% and -20%
3. General shape of the hydrographs are similar

The above criteria should be met for the 55-day verification period, unless circumstances at the monitoring locations a), cannot be modeled and are determined to be unimportant, b) are not detrimental to the accuracy of the model, or c) are due to infiltration and can be accounted for in subsequent use of the model. These criteria are similar to those used in the Westerly CSO facilities planning. Currently, USEPA's Combined Sewer Overflows: Guidance for Monitoring and Modeling provides only vague non-numerical criteria for calibration assessment.

Table 5-2 presents a quantitative assessment of the model verification. The average percent difference of peak and volume of flow were generally within the desired ranges. However, large differences were usually attributable to small flow volumes or problems with the monitoring data for that flow monitor during a particular storm. Peak flows, overflow activation (CSO monitors) and water levels are compared graphically in Appendix D.

Table 5-2. Meter Versus Model Volume for 14-Day Calibration Period

Meter Name	Total Volume During 14-Day Calibration Period (April 7,1998 through April 21, 1998)		
	Meter (MG)	Model (MG)	% Difference
Easterly WWTP Influent	1437.42	1272.40	-11.48
EA00	1353.63	1297.94	-4.11
EA03	1073.82	1240.43	15.52
EA04	1027.06	1123.24	9.36
EA06	425.64	505.92	18.86
ESA11	407.02	332.14	-18.40
HH02	371.26	361.19	-2.71

Table 5-2 (continued). Meter Versus Model Volume for 14-Day Calibration Period

Meter Name	Total Volume During 14-Day Calibration Period (April 7,1998 through April 21, 1998)		
	Meter (MG)	Model (MG)	% Difference
ESA08	251.42	361.15	43.65
RF02D	174.63	263.51	50.90
LS00I	156.41	149.73	-4.27
HA00	127.27	115.65	-9.13
EA08I	124.18	121.86	-1.87
IV00	117.82	75.90	-35.58
EA15I	104.39	96.16	-7.88
HA01D	79.06	84.97	7.47
DE02IA	79.00	70.20	-11.15
EA16I	64.30	60.25	-6.30
EA24I	61.11	58.95	-3.54
IV08	51.37	39.90	-22.34
IV20	42.98	41.00	-4.60
EA13	40.95	54.56	33.22
DW00	40.57	46.94	15.70
IV01	38.83	56.36	45.16
LS02	37.00	37.42	1.14
LS04I	36.46	37.89	3.94
LS04D	35.57	33.28	-6.46
IV04D	35.43	31.50	-11.07
HA06I	34.96	39.74	13.68
IV04I	33.27	31.50	-5.31
EA02I	32.84	22.30	-32.10
HA03I	32.09	26.09	-18.69
EA25	31.97	35.68	11.62
EA23	31.39	31.70	1.00
IV02D	29.86	32.34	8.33
IV02I	29.76	32.34	8.68
EA34D	29.63	44.07	48.73
HA06D	29.58	37.20	25.80
EA20I	27.80	23.62	-15.04
DE03D	23.35	25.79	10.43
EA45	22.90	20.32	-11.28
EA32I	22.02	23.84	8.25
EA32D	21.86	20.71	-5.24
EC01	19.90	16.27	-18.27
EC03	19.86	19.63	-1.18
EA02D	19.78	6.02	-69.58

Table 5-2 (continued). Meter Versus Model Volume for 14-Day Calibration Period

Meter Name	Total Volume During 14-Day Calibration Period (April 7,1998 through April 21, 1998)		
	Meter (MG)	Model (MG)	% Difference
EA21	18.96	17.91	-5.57
EC02	18.84	21.52	14.24
EC05	18.61	15.32	-17.64
DE04I	18.32	19.24	5.04
DW02D	18.00	15.80	-12.25
DW02I	17.40	15.69	-9.83
DE04D	17.24	17.02	-1.29
DW19I	16.94	20.18	19.10
IV14	16.73	14.20	-15.10
DW08I	15.99	15.69	-1.89
HA14	14.49	12.36	-14.70
EA43I	14.10	10.49	-25.57
EA36	12.49	9.54	-23.62
HA13I	11.67	11.83	1.34
HA15I	11.51	11.74	2.00
HA02I	11.51	12.06	4.79
DW03I	10.41	11.48	10.37
HA07D	8.55	7.54	-11.75
EA22I	8.04	6.72	-16.46
DW12I	7.23	8.91	23.35
DW15IB	5.90	6.44	9.00
EA28I	5.38	5.70	5.80
DW21I	5.27	6.25	18.51
HA08	4.70	3.62	-22.85
HA16	4.40	3.95	-10.17
IV16	4.10	3.37	-17.81
EA18D	3.73	3.61	-3.40
EA29I	3.63	4.65	28.04
IV18	3.47	3.77	8.50
EA18I	3.43	4.16	21.17
EA40I	3.29	2.82	-14.07
DE02IB	2.77	2.60	-6.02
EA12I	2.61	3.24	23.77
EA12D	2.37	2.77	17.03
HA04	2.13	1.92	-10.12
DW10I	2.01	4.84	140.92
HA10	1.11	1.60	44.79
EA10D	1.07	0.98	-8.27

Table 5-2 (continued). Meter Versus Model Volume for 14-Day Calibration Period

Meter Name	Total Volume During 14-Day Calibration Period (April 7,1998 through April 21, 1998)		
	Meter (MG)	Model (MG)	% Difference
DW15IA	1.06	0.91	-14.26
DW04D	0.99	1.10	10.69
LS06	0.92	0.00	-99.60
NO00	0.90	0.72	-19.96
IV06	0.71	0.87	22.22
EC04	0.55	0.22	-59.29
IV12	0.51	0.48	-5.91
EA17I	0.27	0.39	44.79
EA30I	0.25	0.28	12.89
EA33	0.13	0.30	128.30
DW14I	0.11	0.17	51.22

Some of the flow monitors could not be verified within the above criteria. These meters were often on wet-weather pipes, and could not be calibrated during storms due to safety reasons. Problems with data from some dry weather meters can also be expected in a sewer system as hydraulically complicated as the Easterly District collection system. Structures with such complex hydraulics during storm flows, such as invert plates mingling storm and sanitary flows, present difficult site conditions for the collection of valuable flow data. The collected data has been examined in detail and every effort has been made to use this information when possible.

Some of the reasons why certain sites were not considered verified were:

- Poor flow data (turbulence, flows too low to be recorded by probes, uncalibrated wet-weather meters)
- O&M problems, such as blockages
- Simplified representation of system in peripheral sewersheds
- Over prediction of flooding and spills in peripheral areas
- Unknown connections between sewer branches or storm and sanitary sewers

- Unknown flows contributing to system (highway drainage, additional inflows)
- Complex interaction between sewers in over/under sewer systems
- Complex nature of hydrological processes (non-linear rainfall-runoff relationship)

Overall, the model of the Easterly collection system was considered verified and reasonably predicted the flows throughout the system.

SYSTEM-WIDE CALIBRATION ISSUES

Delayed Inflow/Infiltration Response

It was observed during calibration that for some metering basins, especially in areas serviced by separate sanitary sewers, the wet weather flows predicted by MOUSE™ recede much faster than the measured flows at the end of the storm event. Wet weather I/I from direct connections such as catch basins, roof leaders and foundation drains usually has a much quicker response. The hydrographs produced by these direct connections rise and fall more rapidly. Wet weather I/I which moves through a porous media, such as groundwater that moves through soil, takes more time to appear in the collection system. This increased travel time to the collection system produced the delayed I/I response. To compensate for this delayed inflow, model parameters in the SWMM RUNOFF input file were adjusted. The "width" of the sub-basin in SWMM RUNOFF was reduced to slow down the rate of runoff reaching the sub-basin's inlet manhole, thus extending the receding limb of the runoff hydrograph. In addition, the Manning's coefficient for surface roughness of the impervious and pervious areas were increased to better simulate the delayed inflow response. With these adjustments, it was possible to simulate the delayed response I/I.

Meter Problems

Although development of the Easterly CSO model was based on the characteristics of the water/sewershed and physical properties of the sewers and control structures, a number of model parameters depend on meter records. Model validation is a process of fine tuning the model parameters as well as a means of checking system integrity. When model parameters were adjusted within the reasonable ranges and the model results and meter record still do not agree, the modeler began to check model for possible oversights or errors. After verification of model representation, possible meter errors should also be investigated.

A total of 145 flow monitors were installed in the Easterly CSO service area. These flow meters were calibrated by comparing manual reading of depth and velocity at the site with the values recorded by the meter. Calibrations were performed during both dry and mild wet-weather conditions. According to the summary of meter calibration results presented in Table 4 of the Flow Monitoring QA/QC Report (M&E, November, 1998), 22 meters had calibration errors greater than 50 percent, and 29 meters were located in sites where calibration was not possible. Individual meter calibration errors were presented in Table 5 - Flow Monitor Error Analysis (Flow Monitoring QA/QC Report, M&E, November, 1998). Due to the high degree of uncertainty in the flow data, the model was calibrated to the extent possible at those metering sites with calibration error greater than 50 percent. Calibration plots and descriptions of the site-specific calibration issues are located Appendices D and E, respectively.

Diurnal Curve Calibration

The MOUSE™ model computes dry weather flow by means of sub-basin area, population per acre and a per capita wastewater production rate. Hourly ratios are provided to the model to represent the hourly variation throughout a typical day. This feature, together with the constant inflow option to simulate base flow infiltration, was implemented to model dry weather flow as described in Chapter Four. However, MOUSE™ Version 1999 does not allow weekly dry weather flow variations, nor does it permit more than one diurnal variation. The Easterly service area is comprised of several land use categories. Therefore, the wastewater production pattern varies spatially within the service area. Wastewater production in the downtown Cleveland area peaks during mid-day, whereas the outlying residential areas exhibit a different diurnal variation. Weekday dry weather flow patterns also differed from the weekend patterns.

Seasonal dry weather flow variation can also be observed between the months of April and May, 1998. April, 1998, followed a low snowfall season, but was significantly wetter than May and the average rainfall for the month of April was higher than the long-term average. Reduced base flow in May, 1998 is apparent in some meters. This decrease in base flow can be observed in the calibration plots presented in Appendix D.

A diurnal pattern indicative of residential wastewater production was used in the Easterly CSO model. The dry weather flow pattern for the downtown areas are not quite the same as the residential areas, however, the model was calibrated such that the average daily DWF volumes were equal between the model and the meter. Since dry weather flow is a relatively small component of the wet weather hydrograph, the small differences in dry weather flow in the downtown areas will not impact the prediction of CSOs.

Flow Monitoring of CSO Conduits

There were a total of twenty-nine flow meters installed on CSO conduits that were either normally dry or typically had shallow, standing water. Calibration of these meters was not possible. Therefore, these metering sites provided calibration data for flow depth and frequency of CSO activation only.

Lake and River Levels

During the flow monitoring period, the Lake Erie water levels were higher than average. The high lake level did not affect most of the CSO sites, since the overflow weir elevations were typically much higher than the lake/river levels. At CSO sites where high lake levels did not affect the overflow, a fixed, conservative water level of 574.5 was used as a downstream boundary condition to simplify the model. However, in the Flats-area, the lake/river levels presented a special concern. For the Flats-area CSO outfalls, hourly lake/river levels were downloaded from the NOAA website for the Cleveland gauge. These hourly water levels were the downstream boundary conditions at the overflow outlets at Regulators E-27, E-28, E-29 and E-30. For the design storm simulations and the typical year analyses, a fixed water surface elevation of 574.5 was used. This level is the 95th percentile water level elevation of Lake Erie and the Cuyahoga River based on the Cleveland Regional Geodetic Survey (CRGS) datum.

Conclusion

The purpose of the modeling task was to create an accurate representation of the Easterly collection system network. The model accuracy was sufficient to support the specific system analyses, which included:

- Quantification of CSO frequency and volume for design events and a typical year.
- Collection system capacity analysis.
- CSO reduction alternatives analysis.

The model has certain limitations that were beyond the scope of the Easterly CSO Phase II Facilities Planning project. These limitations include severe event flooding prediction, spatial distribution of rainfall and seasonal variations in groundwater infiltration. In general, the calibration storms were equivalent to a 1-year, 6-hour event in terms of total rainfall volume and to a 6-month, 1-hour event in terms of peak rainfall intensity. Due to the range of intensity in the calibration storms, a moderate degree of confidence is shown in the 5-year, 6-hour design storm flows and volumes. However, larger events should be validated based on rainfall monitoring data and flooding elevations prior to model application for such events. The spatial distribution of rainfall can cause variations in system performance not predicted by the hydraulic model. These variations are not expected to be great during the rainfall patterns in a typical year. Due to the rainfall simulation process discussed previously, many variations would tend to be conservative in the model results. Similarly, the model predicts a static groundwater infiltration rate based on flow monitoring results from April through June, 1998. These infiltration rates would be conservative over the entire year, but are insignificant in the prediction of wet weather flows. Overall the model meets all of the requirements for use in the project.

CHAPTER SIX
DEVELOPMENT OF BASELINE CONDITIONS

The calibrated hydraulic model for the existing condition, presented in Chapter Five, represented the actual performance and capacity of the sewer network measured during the Easterly Phase II CSO Facilities Plan flow monitoring period during April to June of 1998. This chapter describes the modifications to the model to create the baseline condition for the Easterly system. Additionally, the development of the rainfall data, for both the discrete design storm events and for the "typical" year continuous simulation, used to evaluate the baseline condition model will be discussed.

The baseline condition is a near-term future condition that will exist after certain known projects are implemented. It differs from the existing condition, which was based on data collected as part of the facilities planning effort. The baseline condition is the starting point from which the needed level of CSO control is established. The baseline condition represents the implementation of planned capital improvement projects to the sewer systems to be completed from May, 1998 through the year 2001.

A description of each project that was included in the Easterly baseline condition is presented below. Additionally, discussion of the differences between existing and baseline conditions is presented.

PROJECT DESCRIPTIONS

This section summarizes the projects being implemented in the Easterly facilities planning area that were included in the baseline condition. In order to determine baseline projects, several sources were reviewed, including:

- Easterly District Interceptors Inspection and Evaluation Project (Brown & Caldwell, 1999)
- City of Cleveland Capital Improvements Program

- Easterly WWTP Wet Weather Preliminary Engineering Study (CH2M HILL, 1997)
- Easterly WWTP Improvements Project Design (Montgomery Watson, 2000)
- Regional Plan for Sewerage and Drainage (Montgomery Watson, 1999)

In addition, numerous contacts were made and discussions held with the NEORSD, the City of Cleveland and local communities. Projects were identified that had occurred or will occur in the near future after the existing condition.

Table 6-1 organizes the projects by the type of project, the owner of the project, and the corresponding number on the general map. Figure 6-1 is a general location map for the baseline projects.

Table 6-1. Baseline Projects Included in the Easterly Collection System Model

Map Identifier	Project	Owner	Type of Project
1	Regulator E-30 Replacement	NEORSD	Elimination of river inflow, new regulator
2	Easterly WWTP Wet-Weather Improvements	NEORSD	Wet well expansion
3	Heights-Hilltop Interceptor Connections	NEORSD	Sewer tie-ins to new interceptor
4	Regulator I-12 Modifications	NEORSD	Divert stormwater line from regulator structure
5	Regulator I-14 Modifications	NEORSD	Modify leaping weir configuration in regulator

Regulator E-30 Replacement

Regulator E-30 is the CSO regulator in the NEORSD's Easterly District that serves the area generally known as the Warehouse District and the East Bank of the Flats. The regulator overflows to the Cuyahoga River via Outfall 092 and is located at the intersection of Old River

Road and Front Avenue. The project consisted of the construction of a new regulator structure to hydraulically separate the Old River Road sewer outlet from the Front Avenue sewer outlet. The outlet sewers were separated to prevent backwater from Front Avenue that impacted the Old River Road hydraulic grade line. River inflow prevention for Old River Road was also addressed by the installation of a Tideflex™ valve. The Regulator E-30 improvements were incorporated into the baseline hydraulic model.

Easterly WWTP Wet Weather Improvements

This project was implemented after a wet weather study was completed for the Easterly WWTP. The project involved a series of plant improvements designed to increase the wet weather capacity of the plant. The improvements involved the modification of the Collinwood influent pump station, the replacement of existing headworks bar screens, the removal of the comminutors, and the construction of a secondary by-pass system.

The Collinwood Pump Station modifications involved the expansion of the wet well and the replacement of the existing pumps to increase pumping capacity. Because of the new wet well configuration and net positive suction head requirements of the new pumps, the project also required the raising of the Collinwood overflow weir to Outfall 001 by 18 inches.

The existing bar screens in the headworks structure are 1 1/2 inches in size. The new, smaller bar screens will be 3/4 inches in size.

The removal of the comminutors and the construction of a secondary by-pass were improvements to eliminate hydraulic restrictions within the plant and to increase the wet weather treatment capacity. As a result of these improvements, the Easterly WWTP wet weather treatment capacities would be increased to 400 mgd primary treatment and 330 mgd secondary treatment.

These improvements had a significant impact on the plant flows and were incorporated into the baseline hydraulic model. The pump station improvements reduced the frequency and volume of the Collinwood overflow. However, Regulator L-23 activated more frequently because of the raising of the overflow weir. This project had minimal effect on upstream surcharging and flooding conditions.

Heights/Hilltop Interceptor Connections

Since the Heights-Hilltop Interceptor's original construction, several additional connections were made from inter-community sewers in the Easterly separate sewer service areas. The new connections allowed these flows to be expressed directly to the Easterly WWTP. Connecting these sewers into the Heights/Hilltop Interceptor also resulted in a net reduction of combined sewer flows that ultimately led to the Easterly Main Interceptor. This is because these flows previously connected to older combined sewer systems, predominantly in the Doan Brook service area.

These improvements had a significant impact to the Easterly District combined and separate sewer flows and were incorporated into the baseline hydraulic model. This was accomplished by adding a boundary condition hydrograph from the Heights/Hilltop area provided through a separate study.

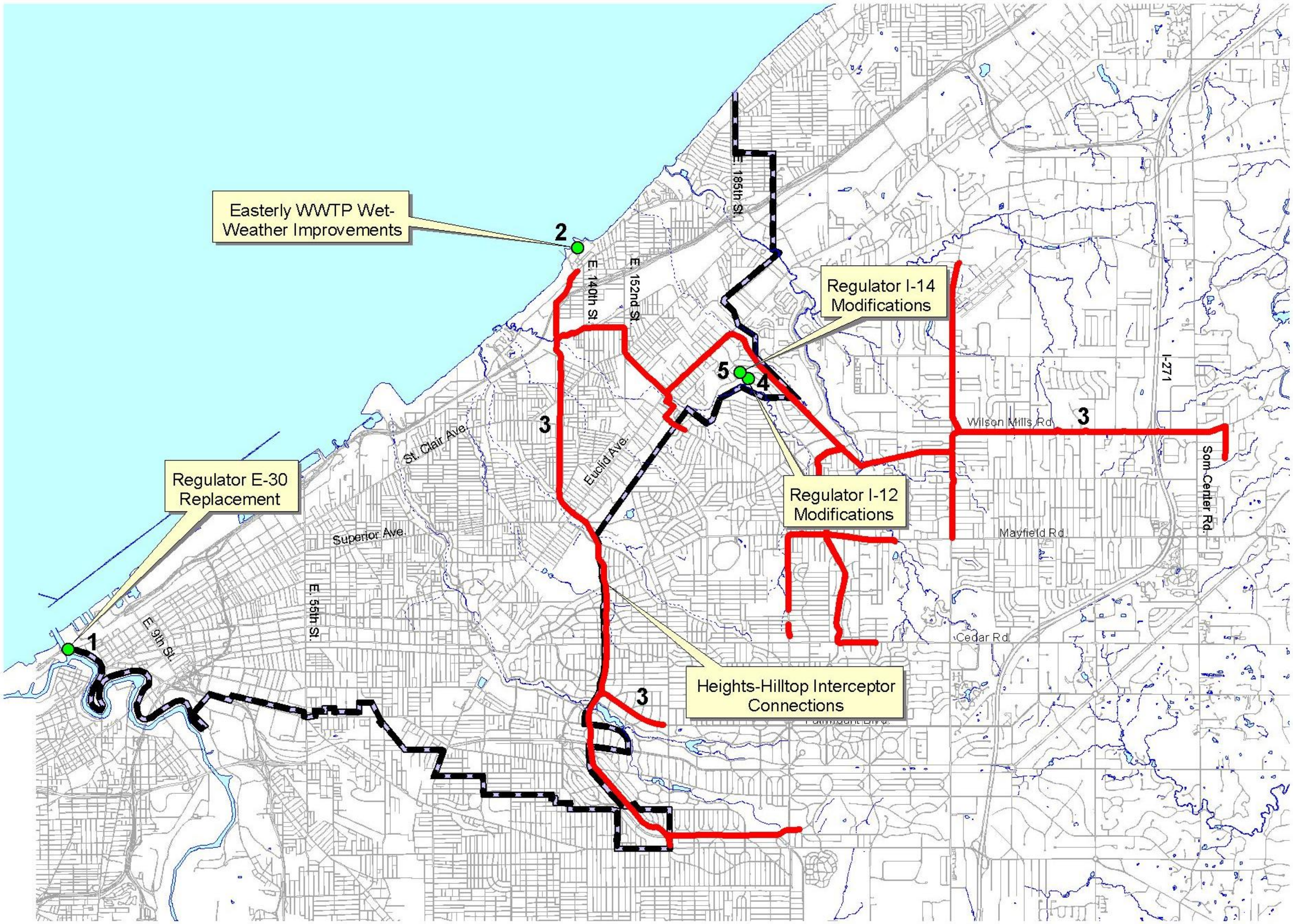
Regulator I-12 Modifications

The Regulator I-12 modification included the diversion of a stormwater pipe from the regulator structure. This improvement reduced the combined sewage flows through the regulator. The project was incorporated into the baseline model.

Regulator I-14 Modifications

The Regulator I-14 modification project included the reconfiguration of the leaping weir inside of the regulator structure. The DWO orifice plate was sealed and replaced with a static weir configuration and a new 12 inch DWO pipe. This project was incorporated into the baseline model.

The locations of these near-term projects included in the baseline condition model are shown in Figure 6-1.



Easterly CSO Hydraulic Modeling Report

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Figure 6-1.
Baseline Condition Projects Included In Hydraulic Model

Maintenance Issues

Sewer Cleaning. The collection system in the Easterly service area is affected in several areas by the build up of silt and debris. These deposits restrict the ability of the existing system to convey flow. In terms of the collection system model, silted pipes were simulated by several methods. The method that produced the best calibration results was implemented on a case by case basis. One method of simulating pipes with sediment involved using different Manning's roughness coefficients for the bottom, sides and top of the pipe via the MOUSE650.IN file. For pipes with large accumulations of sediment throughout the entire length, a user-specified cross-section of the pipe was input (i.e., West Branch of the Dugway Main Interceptor). Another method of modeling sediment in the existing conditions model was the insertion of "silt weirs" to simulate the blockage of channels and pipes. These methods were implemented to properly calibrate the hydraulic grade lines in the existing conditions model. To simulate a clean system for the baseline condition, the Manning's roughness coefficients were restored to default values, special pipe cross-sections were replaced with the respective standard cross-section and the "silt weirs" were removed.

RAINFALL ANALYSIS AND DESIGN CONDITION DEVELOPMENT

The major design conditions used for this study include design storms and a typical year of rainfall. A series of 6-hour duration design storms were developed during the NEORSD Areawide CSO Facilities Plan Phase I Study. These were developed and verified using Cleveland-area rain data. Several 1-hour design storms have also been developed and refined through various NEORSD projects. The 1-hour storms were primarily used to determine community discharge permit limits in separate sewer communities. The 6-hour storms were used to estimate the required CSO control facility sizes for the Easterly District area. A summary of the 6-hour and 1-hour design storms is presented in Table 6-2.

Table 6-2. Easterly CSO Phase II Design Storms

Return Period	Hourly Design Storm Depth (In)						Total Storm Depth (In)
	1	**2**	**3**	**4**	**5**	**6**	
5-Year, 1-Hour	1.43						1.43
5-Year, 6-Hour	0.06	0.10	0.23	1.43	0.20	0.12	2.14
2-Year, 6-Hour	0.12	0.04	0.14	1.17	0.18	0.10	1.75
1-Year, 1-Hour	1.00						1.00
1-Year, 6-Hour	0.05	0.07	0.15	1.00	0.21	0.01	1.49
6-Month, 6-Hour	0.01	0.06	0.02	0.73	0.26	0.02	1.10
4-Month, 6-Hour	0.05	0.15	0.10	0.37	0.16	0.14	0.97
1-Month, 6-Hour	0.06	0.15	0.09	0.09	0.08	0.09	0.56

Metcalf & Eddy developed the typical year of rainfall records in 1995 for the Mill Creek Watershed Project. The typical year is comprised of actual rain events recorded at Cleveland Hopkins Airport. An analysis of 45 years of rainfall recorded at Cleveland Hopkins Airport was performed using EPA's SYNOP program. Rainfall data that best reflected the long-term rainfall statistics (from the years 1991 and 1993) were "typicalized". Individual events were added, removed or replaced such that the typical year developed for the Mill Creek Watershed Study has the same statistical distribution of depths and intensities and the same average number of events as the long-term rainfall records. A summary of the typical year rainfall is presented in Table 6-3.

The design storms were further analyzed during this project to verify them against other available data. First, the Rainfall Frequency Atlas of the Midwest (Huff and Angel, 1992) was used to develop return periods for similar sized design storms. It was found that the return periods developed were close to those determined from local rainfall records.

Second, the 45 year hourly rainfall record from Hopkins Airport was reviewed to determine the highest hourly rainfalls recorded. The results of this review are shown in Table 6-4 along with

Table 6-3. Storm Events for Typical Year Continuous Year Simulation

Storm Number	Date	Hour	Duration (Hrs)	Depth (In)	Average Intensity (In/Hr)	Maximum Intensity (In/Hr))	Storm Number	Date	Hr	Duration (Hrs)	Depth (In)	Average Intensity (In/Hr)	Maximum Intensity (In/Hr)
1	1/3/91	12	1	0.01	0.01	0.01	62	7/3/93	2	1	0.01	0.01	0.01
2	1/5/91	13	10	0.18	0.02	0.03	63	7/4/93	16	1	0.44	0.44	0.44
3	1/9/91	13	2	0.03	0.02	0.02	64	7/6/93	16	1	0.47	0.47	0.47
4	1/11/91	4	19	0.39	0.02	0.09	65	7/11/93	20	3	0.35	0.12	0.24
5	1/12/91	12	21	0.04	0	0.01	66	7/19/93	14	2	0.14	0.07	0.13
6	1/15/91	24	8	0.33	0.04	0.08	67	7/26/93	6	2	0.04	0.02	0.02
7	1/16/91	19	10	0.17	0.02	0.03	68	7/28/93	17	9	1.08	0.12	0.72
8	1/20/91	13	30	0.53	0.02	0.05	69	7/29/93	20	3	0.67	0.22	0.31
9	1/26/91	7	10	0.03	0	0.01	70	8/2/93	5	2	0.42	0.21	0.41
10	1/27/91	19	4	0.08	0.02	0.03	71	8/3/93	21	10	0.42	0.04	0.2
11	1/29/91	20	11	0.37	0.03	0.1	72	8/6/93	19	4	0.1	0.03	0.06
12	1/30/91	18	1	0.01	0.01	0.01	73	8/7/93	13	1	0.13	0.13	0.13
13	1/31/91	14	1	0.01	0.01	0.01	74	8/10/93	16	2	0.02	0.01	0.01
14	2/5/91	7	1	0.01	0.01	0.01	75	8/11/93	4	4	0.24	0.06	0.23
15	2/6/91	15	9	0.1	0.01	0.02	76	8/12/93	17	1	0.02	0.02	0.02
16	2/10/91	15	20	0.73	0.04	0.09	77	8/16/93	4	1	0.07	0.07	0.07
17	2/13/91	14	59	1.53	0.03	0.16	78	8/20/93	9	1	0.01	0.01	0.01
18	2/16/91	24	14	0.18	0.01	0.04	79	8/28/93	2	1	0.06	0.06	0.06
19	2/18/91	15	13	0.08	0.01	0.04	80	8/31/93	13	6	0.03	0.01	0.02
20	2/19/91	17	7	0.29	0.04	0.1	81	9/2/93	8	21	1.02	0.05	0.67
21	2/26/91	4	40	0.08	0	0.01	82	9/6/93	13	1	0.35	0.35	0.35
22	2/28/91	9	4	0.04	0.01	0.02	83	9/7/93	9	1	0.01	0.01	0.01
23	3/2/91	1	14	0.06	0	0.02	84	9/10/93	1	1	0.01	0.01	0.01
24	3/3/91	13	24	0.7	0.03	0.1	85	9/10/93	13	1	0.01	0.01	0.01
25	3/6/91	6	14	0.83	0.06	0.13	86	9/15/93	20	16	2.38	0.15	0.4
26	3/9/91	18	2	0.07	0.04	0.05	87	9/22/93	24	16	0.12	0.01	0.05
27	3/10/91	12	4	0.08	0.02	0.03	88	9/25/93	16	20	1.63	0.08	0.29
28	3/17/91	21	31	0.5	0.02	0.07	89	9/27/93	13	9	0.15	0.02	0.06
29	3/22/91	6	4	0.32	0.08	0.18	90	9/28/93	10	3	0.23	0.08	0.12
30	3/22/91	24	3	0.14	0.05	0.08	91	9/29/93	10	17	0.97	0.06	0.24
31	3/23/91	24	10	0.23	0.02	0.06	92	10/1/93	10	1	0.01	0.01	0.01
32	3/26/91	13	1	0.02	0.02	0.02	93	10/1/93	23	6	0.58	0.1	0.22
33	3/27/91	24	1	0.62	0.62	0.62	94	10/9/93	6	13	0.43	0.03	0.13
34	3/31/91	19	6	0.07	0.01	0.03	95	10/16/93	22	16	0.6	0.04	0.18
35	4/1/93	23	5	0.16	0.03	0.07	96	10/19/93	15	1	0.04	0.04	0.04
36	4/2/93	17	12	0.06	0.01	0.02	97	10/20/93	15	6	0.04	0.01	0.02
37	4/9/93	14	16	0.77	0.05	0.09	98	10/27/93	22	4	0.15	0.04	0.1
38	4/11/93	16	1	0.09	0.09	0.09	99	10/30/93	10	39	1.67	0.04	0.12
39	4/14/93	19	2	0.03	0.02	0.02	100	11/1/91	17	1	0.01	0.01	0.01
40	4/15/93	23	3	0.34	0.11	0.16	101	11/7/91	9	12	0.12	0.01	0.02
41	4/19/93	17	13	0.27	0.02	0.11	102	11/11/91	2	7	0.69	0.1	0.14
42	4/20/93	16	18	0.61	0.03	0.13	103	11/12/91	11	12	0.21	0.02	0.06
43	4/24/93	12	2	0.03	0.02	0.02	104	11/15/91	1	31	0.62	0.02	0.1
44	4/25/93	8	15	0.46	0.03	0.16	105	11/18/91	17	21	0.3	0.01	0.1
45	4/30/93	1	6	0.1	0.02	0.03	106	11/20/91	17	19	0.46	0.02	0.14
46	5/4/93	13	25	0.63	0.03	0.22	107	11/23/91	20	3	0.24	0.08	0.12
47	5/19/93	4	6	0.15	0.03	0.07	108	11/24/91	17	8	0.03	0	0.01
48	5/23/93	16	1	0.01	0.01	0.01	109	11/25/91	14	1	0.01	0.01	0.01
49	5/24/93	6	6	0.08	0.01	0.04	110	11/28/91	6	8	0.19	0.02	0.05
50	5/28/93	24	2	0.03	0.02	0.02	111	11/30/91	6	1	0.04	0.04	0.04
51	5/31/93	23	2	0.16	0.08	0.08	112	12/2/91	16	17	1.19	0.07	0.29
52	6/3/93	23	2	0.07	0.04	0.04	113	12/3/91	21	11	0.06	0.01	0.02
53	6/5/93	5	6	0.37	0.06	0.25	114	12/12/91	15	17	0.16	0.01	0.06
54	6/7/93	16	9	1.56	0.17	0.67	115	12/14/91	7	6	0.15	0.03	0.12
55	6/9/93	10	1	0.21	0.21	0.21	116	12/15/91	16	16	0.07	0	0.01
56	6/9/93	24	1	0.24	0.24	0.24	117	12/18/91	3	2	0.02	0.01	0.01
57	6/19/93	6	2	0.31	0.16	0.22	118	12/18/91	16	16	0.03	0	0.01
58	6/20/93	13	26	0.54	0.02	0.15	119	12/20/91	22	8	0.22	0.03	0.07
59	6/25/93	20	1	0.08	0.08	0.08	120	12/23/91	7	6	0.1	0.02	0.03
60	6/27/93	18	1	0.94	0.94	0.94	121	12/28/91	22	35	0.26	0.01	0.03
61	7/1/93	21	4	0.05	0.01	0.02	Total				37.51		

the design storms. Also shown are the peak hourly rainfalls of the design storms. This table can be used to estimate frequencies of maximum hourly rainfalls, irrespective of what duration storm event they occur within (partial duration series). For example, five storms have hourly rainfalls that equal or exceed the 5-year, 6-hour design storm. Five storms within the 45 year record equate to a once in 9.2 year chance of occurrence. The frequencies of these maximum hourly intensities so determined are shown in Table 6-5.

Table 6-4. Record Rainfall Events with Highest Hourly Depths

Storm Event	Duration (Hrs)	Total Rainfall (In)	Highest Hourly Rainfall Depth (In)	Storm Event	Duration (Hrs)	Total Rainfall (In)	Highest Hourly Rainfall Depth (In)
6-Mo 1-Hr	**1**	**0.73**	**0.73**	5/25/89	6	2.38	1.02
6-Mo 6-Hr	**6**	**1.1**	**0.73**	8/29/60	4	1.12	1.04
9/17/74	2	0.75	0.74	8/7/53	4	1.22	1.06
6/1/59	2	0.81	0.76	6/27/89	5	1.44	1.06
6/22/81	3	0.96	0.77	7/28/70	1	1.1	1.1
7/30/61	1	0.78	0.78	5/28/59	2	1.34	1.12
5/21/75	4	1.27	0.78	8/20/60	5	1.83	1.12
5/24/64	3	1.09	0.79	8/14/72	7	1.34	1.13
8/28/76	3	1.08	0.8	8/24/75	5	2.13	1.13
7/23/91	2	0.84	0.81	9/1/59	4	1.44	1.15
8/31/51	4	1.45	0.82	8/11/48	16	2.43	1.15
7/5/59	5	1.32	0.84	**2-Yr 6-Hr**	**6**	**1.75**	**1.17**
7/8/56	2	1.4	0.85	7/12/92	5	1.62	1.17
7/10/76	4	1.61	0.85	7/4/69	22	2.87	1.21
6/3/89	5	1.73	0.85	6/5/73	5	1.47	1.24
9/7/69	2	0.87	0.86	8/2/87	3	1.53	1.24
7/2/65	2	1.12	0.88	8/21/61	7	2.2	1.24
10/2/64	1	0.9	0.9	9/6/90	15	3.3	1.25
9/27/86	3	1.18	0.92	4/29/70	1	1.26	1.26
6/27/93	1	0.94	0.94	7/28/64	3	1.51	1.3
6/24/70	4	1.24	0.94	8/31/75	25	1.98	1.36
7/29/77	4	1.65	0.96	8/9/78	6	1.53	1.37
1-Yr 1-Hr	**1**	**1.00**	**1**	**5-Yr 1-Hr**	**1**	**1.43**	**1.43**
1-Yr 6-Hr	**6**	**1.49**	**1**	**5-Yr 6-Hr**	**6**	**2.14**	**1.43**
6/22/75	2	1.06	1	7/13/81	4	1.77	1.43
6/18/84	10	1.12	1	5/24/55	5	3.35	1.48
6/23/56	3	1.15	1	7/22/79	2	1.59	1.57
7/31/54	7	1.28	1	7/24/66	3	1.93	1.61
				6/20/79	10	2.25	1.74

Table 6-5. Return Periods of Peak Intensity Rainfalls of Design Storms

Design Storm	Duration (Hrs)	Depth (In)	Peak 1-Hour Rainfall	Return Period Peak 1-Hour Rainfall
5-Year	6-Hour	2.14	1.43	9.2 Year
2-Year	6-Hour	1.75	1.17	3.0 Year
1-Year	6-Hour	1.49	1.00	1.5 Year
6-Month	6-Hour	1.10	0.73	11 Month

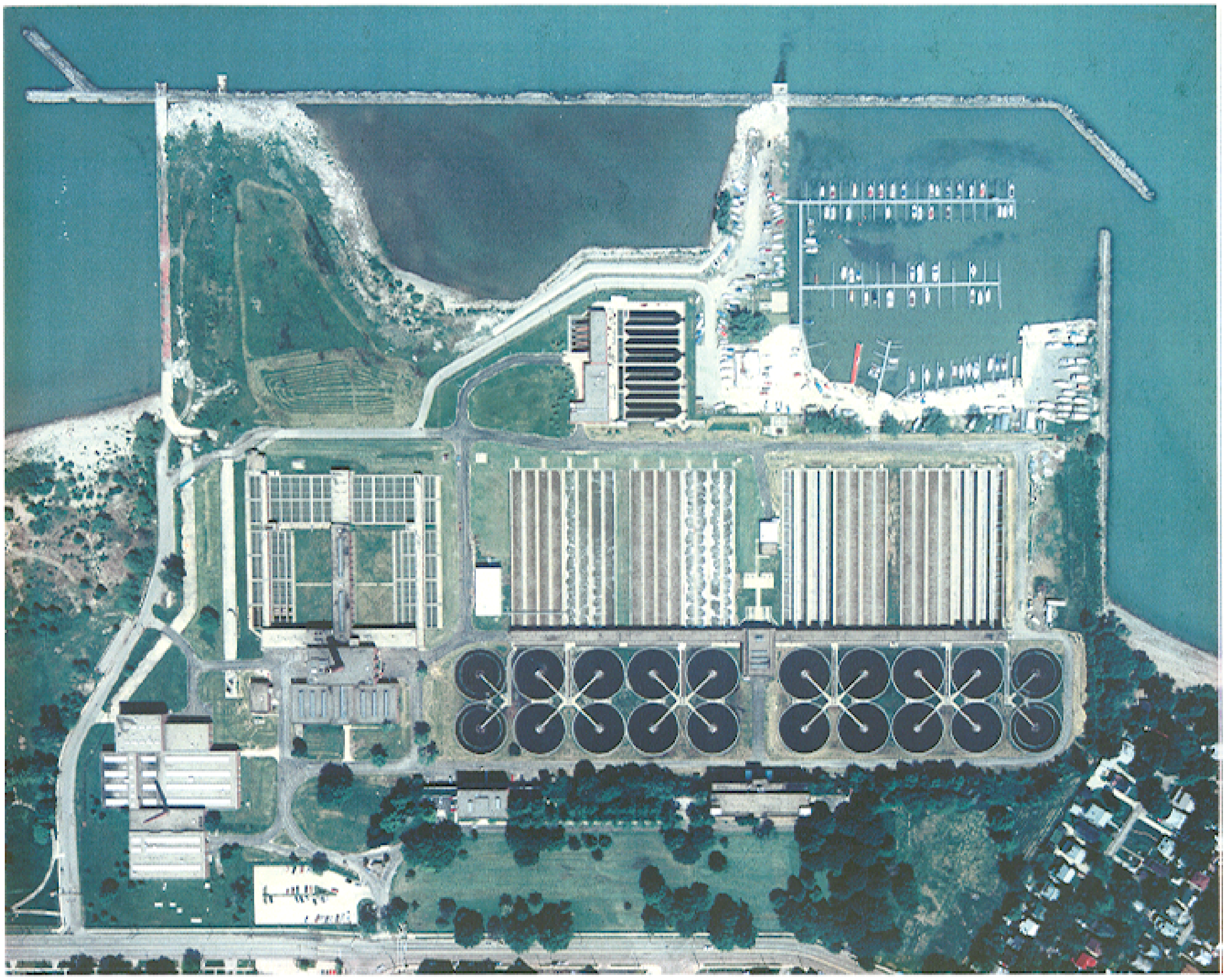
The one-year return period or peak hourly rainfall can be determined by selecting the 46th highest hourly rainfall in the 45 year record. This is 0.78 in/hr. The two-year return period of the peak hourly rainfall is the 23rd highest storm, which is 1.06 in. This shows the maximum hourly intensities of the design storms developed during the CSO Phase I Study are somewhat larger than the rainfall record would indicate, as shown in Table 6-6.

Table 6-6. Peak Hourly Intensity Comparison

Design Storm Frequency	Peak Hourly Intensity (In/Hr)		Percent Difference
	from design storm	**from rainfall record**	
5-year	1.43	1.26	11.9
2-year	1.17	1.06	9.4
1-year	1.00	0.78	22.0

It was decided to continue to use the original design storms derived during Phase I. This indicates that facilities sized in accordance with these design storms would be somewhat conservative if they are sensitive to peak rainfall intensities. Facilities sensitive to peak intensities (and thus peak flows) include treatment facilities and relief sewers. Storage facilities would be sensitive to total storm depth as well as peak flow.

Northeast Ohio Regional Sewer District
Easterly CSO Phase II Facilities Plan



Easterly CSO Phase II
Hydraulic Modeling Report
APPENDICES

June, 2002

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TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

APPENDIX A

Modeled Populations for Sub-basins

Appendix A - Modeled Populations for All Sub-Basins

Model Input Node	Sub-Basin Area (acres)	Modeled Population
HIA100	7685	23055
HIA085	7685	23055
IVA4370	284.05	5397
IVA6202	212.95	2768
EAC180	200	4000
IVA6200	174.48	2966
HAB4045	162.47	487
IVA4180	150.67	4821
EAK2140	129.89	1559
EAA1050	122.35	979
IVA6213	121.39	1214
LSA125	108.17	3245
EAA163	107.72	539
EAB7118	100	4500
EAC9065	100	4500
EAC9115	100	4500
EAC9175	100	4500
EAC5010	100	3300
EAC2115	100	3300
EAB4045	100	2400
E46U	100	2400
EAC3085	100	2400
EAB3515	100	2400
EAB3085	100	2400
W6PSU	99.9	500
IVD045	99.85	399
DUC1018	99.69	1495
LSA9050	97.21	778
EAA035	95.14	190
LSA6075	85.48	6838
HAA075	84.38	928
NOA155	83.19	499
NOC050	82.67	1901
HAA270	82.19	3041
EAH060	77.07	462
LSA2130	74.88	0
LSA025	73.76	1254
IVA045	72.32	217
EAA4785	71.7	1721
EAK2070	69.2	830
EAF1080	69.17	692
IVB130	67.32	1481

Appendix A - Modeled Populations for All Sub-Basins

Model Input Node	Sub-Basin Area (acres)	Modeled Population
DUC1074	65.5	1441
EAK3005	64.3	836
EAK7015	63.86	830
NOA150	63.46	571
LSA2050	63.27	1076
NOA065	61.94	743
IVC075	61.71	2160
DUD025	61.02	122
DUB035	60.4	1027
EAK1345	60	720
232244a	59.87	659
219239a	59.87	659
210234a	59.87	659
NOB025	59.77	538
EAK6525	59	767
EAA2020	58.47	877
IVB3100	58.19	1106
EAE5025	57.8	694
IVA6213	57.63	288
EAK2205	57.53	690
EAD2040	57.38	689
IVA6240	57.19	10980
LSA070	56.99	912
IVA3080	56.49	282
EAH8080	56.41	338
EAA4565	56.23	1125
EAG1115	54.6	764
NOB055	53.94	108
E41M	53.09	1168
EAK1235	52.8	634
IVD040	52.4	52
EAH8040	52.06	312
EAH8135	51.86	311
HAB3030	51.54	464
EAK9030	51.51	670
EAK4015	51.25	666
SAPSU	51.1	1789
IVC031	50.38	50
D70C	50.25	1256
DUD4035	50.25	1156
HAA4210	49.81	2540
DUD4085	49.24	1280

Appendix A - Modeled Populations for All Sub-Basins

Model Input Node	Sub-Basin Area (acres)	Modeled Population
IVA2070	49.19	3197
EAA4590	48.71	1169
IVB1065	48.31	1739
EAK085	47.8	574
IVB1095	47.75	1767
EAF102	47.53	475
EAF2010	47.53	570
HAA2145	47.11	989
HAA180	46.87	797
IVD1035	46.74	2103
LSA2025	46.69	840
EAF1030	45.93	459
EAD035	45.63	548
EAJ1015	45.5	546
IVB4125	45.42	182
EAD4535	45.42	545
DUA060	45.2	1401
EAE9015	44.9	539
DUD6065	44.86	1122
HAA2045	44.56	802
DUA045	44.11	1059
IVA3020	44.06	1630
EAG1235	43.96	791
IVD1050	43.81	570
IVA095	43.21	2809
EAJ3025	43.1	517
EAH080	43.03	258
DUD1050	42.7	726
EAE9525	42.6	511
IVD025	42.49	3484
IVB100	42.48	297
HAA071	42.18	337
IVD1085	41.88	377
HAA7045	40.77	1060
IVB4070	40.65	488
EAE8525	40.4	485
EAA5510	40.08	321
EAE7520	40	480
HAA4183	39.74	397
DUC090	39.62	792
HAA2110	39.56	593
D54D	39.01	1092

Appendix A - Modeled Populations for All Sub-Basins

Model Input Node	Sub-Basin Area (acres)	Modeled Population
HAB145	38.86	855
DUC1140	38.83	1204
EAJ2020	38.8	466
EAA4640	38.39	729
EAA6590	38.36	460
HAB170	37.81	794
EAA5540	37.76	302
EAK9515	37.74	491
IVA180	37.69	188
IVA2050	37.63	2070
EAK015	37.5	450
EAH2045	37.38	224
EAE8020	37.3	448
EAK1115	37.03	444
EAK1075	37	444
EAK055	36.9	443
EAE1010	36.8	294
IVB3140	36.46	1057
EAD4025	36.2	434
EAD040	35.71	429
EAD7015	35.6	427
LSA6090	35.12	2810
EAE2525	35	280
LSA4025	34.79	591
DUC070	34.76	1703
EAA3020	34.55	587
NOB1105	34.32	103
EAE6005	34.3	412
HAA145	33.47	134
EAA1035	33.39	267
EAE3035	33.1	265
EAD6040	32.98	396
IVB4115	32.28	710
EAA6510	31.96	384
EAK2095	31.9	383
EAK1160	31.8	382
EAC3125	31.8	890
DUD5050	31.75	540
EAE1510	31.7	254
DUC135	31.65	633
IVA6135	31.63	474
NOA095	31.53	63

Appendix A - Modeled Populations for All Sub-Basins

Model Input Node	Sub-Basin Area (acres)	Modeled Population
EAA8070	31.5	315
EAA9670	31.2	1092
EAK1365	31	372
EAI1055	30.91	3153
EAE165	30.9	371
HAA6412	30.8	585
HAA4125	30.68	430
IVB2030	30.67	368
EAA4035	30.56	672
EAK1185	30.5	366
EAA4705	30.48	701
EAK1065	30.38	365
IVA6055	30.19	664
200235a	30.05	240
EAA6640	29.98	360
IVA3055	29.96	150
HAB5020	29.85	1075
EAA9570	29.82	1044
E34A	29.62	296
EAA4055	29.51	708
EAA8040	29.47	295
EAH1015	29.06	174
HAA2055	29	435
EAK1225	28.9	347
DUB070	28.89	722
HAA5100	28.74	1092
LSA5015	28.66	287
DUC2025	28.65	630
HAA2180	28.52	656
EAA2057	28.46	740
EAA8565	28.32	878
EAA7045	28.31	793
E34W	27.9	279
NOB1040	27.77	417
HAA1035	27.57	579
IVB105	27.39	959
IVA5970	27.25	2453
EAA2027	27.04	649
EAD1015	26.53	318
EAE187	26.5	318
EAA7535	26.47	979
EAA7005	26.42	264

Appendix A - Modeled Populations for All Sub-Basins

Model Input Node	Sub-Basin Area (acres)	Modeled Population
DUD1070	26.23	472
HAA220	26.2	629
DUC110	26.15	601
IVB3107	26.14	340
EAE060	26	208
HAB4155	25.39	609
EAA6255	25.3	177
DUD1145	25.25	429
EAG2010	25.25	783
EAG1060	25.25	783
HAA2080	25.05	376
EAE7005	25	300
HAB190	24.86	671
EAA6235	24.8	174
IVA6145	24.63	1133
E41C	24.59	590
EAA9615	24.5	858
DUA095	24.35	804
IVA5015	24.15	121
EAG030	24.14	797
EAK2037	24.1	289
HAA1050	24.03	409
HAB4045	24.01	144
EAA2510	23.98	72
IVA1065	23.95	72
IVC040	23.82	71
HAA4060	23.71	664
DUA030	23.52	447
HAB4150	23.15	394
NOB035	23.1	300
HAA2181	22.94	574
EAI015	22.79	2666
DUB015	22.55	812
EAD085	22.02	264
EAD3015	21.99	264
203248a	21.96	1230
IVB2035	21.74	283
EAA9510	21.48	773
DUC3004	21.46	494
IVC010	21.06	590
DUD6025	20.91	523
DUC1072	20.87	104

Appendix A - Modeled Populations for All Sub-Basins

Model Input Node	Sub-Basin Area (acres)	Modeled Population
LSA3035	20.7	228
LSA2500	20.54	226
LSA2196	20.43	347
IVB070	20.1	563
IVA3120	19.85	1072
HAA2015	19.7	296
LSA080	19.6	196
EAA1205	19.24	38
HAA5065	19.11	917
HAA215	19.1	344
EAD6020	18.96	228
EAC1525	18.87	226
EAG070	18.78	789
EAA6210	18.6	130
EAG1035	18.43	792
LSA026	18.41	295
EAD015	18.4	221
IVB1045	18.27	512
DUC1065	18.2	601
IVB105	17.85	428
EAA6715	17.84	214
IVB1115	17.8	231
HAA5034	17.42	662
IVB3025	16.95	271
LSA099	16.5	446
L21	16.36	229
NOB1003	16.35	392
IVA1030	16.19	0
DUD3010	15.95	144
DUC1002	15.9	254
EAK5020	15.78	205
EAD065	15.7	188
DUD1190	15.6	515
EAA5505	15.5	124
HAB055	15.39	569
CATEC04	14.84	59
DUD1182	14.75	605
IVA6070	14.7	529
IVB105	14.69	793
IVA6133	14.39	216
HAA4110	14.07	84
HAA5210	14.02	28

Appendix A - Modeled Populations for All Sub-Basins

Model Input Node	Sub-Basin Area (acres)	Modeled Population
HAB090	13.77	289
LSA2600	13.67	1121
HAB135	13.63	82
D66	13.54	366
IVB160	13.32	506
NOB065	13.13	39
EAH3025	13.05	1527
DUD6110	12.71	229
E29U	12.63	240
IVA6210	12.62	404
EAB4197	12.6	189
EAA6240	12.3	86
HAA5192	12.27	135
HAB2010	12.27	110
HAA5110	12.13	461
IVA4245	12.1	157
EAD075	11.9	143
DUC2505	11.87	237
IVB105	11.81	413
HAA5080	11.46	435
HAA6045	11.33	374
HAA5025	11.18	280
E23D	11.15	335
IVB160	11.1	133
LSA2085	10.91	185
IVA6085	10.38	145
DUD1160	10.12	344
DUD1325	10.12	263
DUC1004	9.99	130
DUA190	9.91	218
HAA5005	9.91	129
IVA019	9.91	159
IVA6095	9.89	465
HAA2131	9.83	98
EAA7060	9.79	793
HAB3030	9.71	39
DUA115	9.69	116
HAA6411	9.52	238
HAA4140	9.27	158
HAB100	9.08	173
HAB1001	9.07	172
DUD1040	8.94	179

Appendix A - Modeled Populations for All Sub-Basins

Model Input Node	Sub-Basin Area (acres)	Modeled Population
HAA4183	8.94	188
HAA4052	8.81	229
IVA6115	8.76	131
DUD1295	8.63	164
EAA6015	8.25	66
192254a	8.23	214
D87	8.11	65
EAA9705	8.02	281
IVB1100	8.01	8
HAA5196	7.95	24
DUE120	7.87	142
E38U	7.72	170
EAA9645	7.69	269
DUD4004	7.4	141
HAA5055	7.35	265
DUE155	7.23	130
DUE180	7.06	92
HAA6045	7	98
238249a	6.9	193
E06U	6.9	55
DUD1082	6.8	122
DUA200	6.75	223
IVA3125	6.64	359
IVA6005	6.55	262
E23F	6.54	582
DUD2025	6.23	50
HAA4140	6.15	320
EAA5345	6.09	73
DUD6105	6.01	108
DUA140	5.88	200
DUA136	5.85	12
EAA9750	5.84	204
IVA3126	5.8	592
DUD1240	5.79	151
D74	5.76	127
EAA9030	5.72	509
D64D	5.61	168
E11U	5.56	67
HAA5210	5.4	162
DUD155	5.35	118
HAA4170	5.33	85
E14	5.1	791

Appendix A - Modeled Populations for All Sub-Basins

Model Input Node	Sub-Basin Area (acres)	Modeled Population
I08A	5.09	46
IVB1105	5.07	56
DUD1330	4.99	140
IVA3085	4.9	123
IVA6186	4.9	152
DUD188	4.74	109
DUC1170	4.41	181
DUD1042	4.31	52
DUD1202	4.29	43
DUD1215	4.29	103
DUD1340	4.28	77
D72	4.1	115
IVA3140	4.05	134
HAB110	3.91	27
E15U	3.89	23
E22U	3.83	119
DUD135	3.79	45
HAA4182	3.66	37
E22C	3.55	107
D73	3.42	86
HAA4160	3.41	55
EAA3025	3.3	73
DUD6120	3.09	133
DUD1320	2.89	87
HAA4025	2.69	81
DUD6108	2.53	23
DUD1345	2.49	42
DUD2500	2.33	61
DUD1310	2.33	56
HAB1015	2.2	57
HAA4037	2.07	79
D03	1.98	18
DUD1203	1.93	50
D12	1.93	12
DUD060	1.88	11
DUD1315	1.79	36
I08	1.73	35
IVA3130	1.73	171
D30A	1.68	35
DUD1205	1.67	45
DUD1305	1.66	30
DUD040	1.59	35

Appendix A - Modeled Populations for All Sub-Basins

Model Input Node	Sub-Basin Area (acres)	Modeled Population
BLPSF	1.5	45
DUD1043	1.48	15
DUD4007	1.37	30
D52	1.23	37
198232a	1.21	64
D50	1.06	39
H02	1.04	3
D53	1.02	20
E32U	1	50
D55	0.93	23
HAB1020	0.88	23
D54	0.86	18
DUD1335	0.8	14
D79	0.69	1
IVA3090	0.53	3

APPENDIX B

SWMM RUNOFF Input
Baseline Condition

Easterly CSO Phase II Modeling Report - SWMM RUNOFF Input for Modeling Sub-Basins (Baseline Conditions)

*	JK	Sub-Basin Name	Input Node	Width	Area (acres)	% Impervious	Basin Slope	Impervious "n"	Pervious "n"	Impervious Depression Storage	Pervious Depression Storage	Max. Infiltration	Min. Infiltration	Infiltration Decay	
**	Flats	submodel	areas												
***	FLATS	REG	E-26	METER	EA48W	CSO	90								
**	move	7.8	acres	from	430b	to	430a	Sep-99							
H1	1	'430B'	'EAA9570'	3000	22.02	50	0.1	0.015	0.2	0.06	0.1	0.5	0.05	0.00115	
H1	1	'442'	'EAA9630'	1400	7.69	10	0.004	0.015	0.3	0.06	0.1	99	99	0.00115	S
H1	1	'443'	'EAA9615'	2200	24.45	10	0.004	0.015	0.3	0.06	0.1	99	99	0.00115	S
H1	1	'434'	'EAA8175'	1300	20.62	70	0.05	0.015	0.3	0.06	0.1	1	0.05	0.00115	
H1	1	'429'	'EAA8160'	1600	27.67	70	0.05	0.015	0.3	0.06	0.1	1	0.05	0.00115	
***	FLATS	REG	E-27	METER	EA46W	CSO	90								
H1	1	'430A'	'EAA9705'	3200	15.82	85	0.1	0.015	0.2	0.06	0.1	0.5	0.05	0.0115	
***	FLATS	REG	E-28	METER	EA46W	CSO	90								
H1	1	'424'	'EAA9750'	1400	5.84	85	0.02	0.015	0.3	0.06	0.1	0.5	0.05	0.0115	
***	FLATS	SAPS	METER	NM	CSO	90									
H1	1	'432'	'SAPSU'	1800	51.11	10	0.013	0.015	0.3	0.06	0.1	99	99	0.00115	S
***	FLATS	REG	E-25	METER	NM	CSO	235								
H1	1	'444'	'EAA9670'	1300	31.23	30	0.066	0.015	0.3	0.06	0.1	1	0.05	0.00115	
***	FLATS	REG	E-29	METER	EA44D	CSO	91								
H1	1	'405A'	'E29U'	4800	12.63	90	0.08	0.015	0.2	0.06	0.05	0.5	0.05	0.0115	
***	W	9TH	REG	E-23	METER	EA40	CSO	92							
H1	1	'411'	'EAA9510'	1200	21.48	70	0.01	0.015	0.3	0.06	0.1	1	0.05	0.00115	
***	W	9TH	REG	E-30	METER	EA42	CSO	92							
H1	1	'396'	'E22D'	1500	3.55	90	0.028	0.015	0.2	0.06	0.05	0.5	0.05	0.0115	
H1	1	'405B'	'E23E'	3500	11.15	90	0.04	0.015	0.2	0.06	0.05	0.5	0.05	0.0115	
***	W	6TH	REG	E-22	METER	NM	CSO	92							
H1	1	'402'	'E22U'	2200	3.83	90	0.01	0.015	0.3	0.04	0.1	1	0.05	0.00115	
***	FLATS	REG	E-30	METER	NM	CSO	92								
H1	1	'401'	'EAA9030'	900	5.72	80	0.017	0.015	0.3	0.06	0.1	1	0.05	0.00115	
H1	1	'409'	'E23J'	700	6.54	80	0.01	0.015	0.3	0.06	0.1	1	0.05	0.00115	
***	W	3RD	REG	E-21	METER	EA38I	CSO	93							
H1	1	'395'	'EAA8515'	2200	28.32	90	0.008	0.015	0.3	0.06	0.1	1	0.05	0.00115	
***	ONTARIO	ST.	REG	E-20	METER	NM	CSO	93							
H1	1	'389'	'EAA8010'	2200	29.47	80	0.01	0.015	0.3	0.06	0.1	1	0.05	0.00115	
H1	1	'420'	'EAA8070'	2200	31.5	80	0.01	0.015	0.3	0.06	0.1	1	0.05	0.00115	
***	NORTH	COAST	S.	DIRECT	TO	EASTERLY	NM								
H1	1	'NCD'	'W6PSU'	1200	99.99	3	0.001	0.015	0.3	0.06	0.1	99	99	0.00115	S
**	beginning	CSO94_95	submodel	areas											
***	East	9th	Branch	REG	E-18	METER	EA36	CSO	94						
**	INCREASE	WIDTH	BY	500'											
**	DECREAS	IDS													
H1	1	'388'	'EAI015'	1500	22.79	85	0.004	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
H1	1	'397A'	'EAH3020'	1900	13.05	85	0.004	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
***	East	9th	Branch	REG	E-18	CSO	94								
H1	1	'376'	'EAI1025'	1879	30.91	85	0.001	0.02	0.3	0.06	0.1	1	0.05	0.00115	D
***	East	12th	Branch	REG	E-18	METER	EA34	CSO	94						
H1	2	'431'	'EAH8065'	2800	56.41	60	0.003	0.02	0.3	0.06	0.1	3	0.3	0.00115	B

Easterly CSO Phase II Modeling Report - SWMM RUNOFF Input for Modeling Sub-Basins (Baseline Conditions)

*	JK	Sub-Basin Name	Input Node	Width	Area (acres)	% Impervious	Basin Slope	Impervious "n"	Pervious "n"	Impervious Depression Storage	Pervious Depression Storage	Max. Infiltration	Min. Infiltration	Infiltration Decay	
H1	2	'441'	'EAH8135'	3600	51.86	50	0.007	0.02	0.3	0.06	0.1	1	0.05	0.00115	D
H1	2	'428'	'EAH8040'	2200	52.06	50	0.025	0.02	0.3	0.06	0.1	1	0.05	0.00115	D
H1	2	'419'	'EAH080'	1704	43.03	85	0.009	0.02	0.3	0.06	0.1	1	0.05	0.00115	D
H1	1	'397B'	'EAH060'	2804	77.07	85	0.003	0.02	0.3	0.06	0.1	1	0.05	0.00115	D
H1	1	'392'	'EAH2045'	2400	37.38	85	0.017	0.02	0.3	0.06	0.1	1	0.05	0.00115	D
H1	5	'369'	'EAH010'	1800	26.47	85	0.011	0.02	0.3	0.06	0.1	1	0.05	0.00115	D
H1	1	'371'	'EAH1005'	1808	29.06	85	0.009	0.02	0.3	0.06	0.1	1	0.05	0.00115	D
***	East	17th	Branch	REG	E-16	CSO	95								
*	sub	353	include	sub352											
H1	5	'353'	'EAA7005'	1800	26.42	85	0.02	0.02	0.3	0.06	0.1	1	0.05	0.00115	D
H1	5	'362'	'EAA7045'	1350	28.31	85	0.02	0.02	0.3	0.06	0.1	1	0.05	0.00115	D
H1	5	'370A'	'EAG1035'	1000	18.43	80	0.02	0.02	0.3	0.06	0.1	1	0.05	0.00115	D
***	East	21th	Branch	REG	E-13	METER	EA32	CSO	95						
**	REDUCE	%	OF	IMP	20%										
**	REDUCE	DEPRESS	STORAGE												
**	REDUCE	WIDTH	BY	300'											
H1	2	'421'	'EAG1225'	1700	43.96	45	0.02	0.02	0.3	0.04	0.1	3	0.3	0.00115	B
H1	2	'400'	'EAG1115'	2700	54.6	60	0.02	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
H1	5	'381'	'EAA7060'	700	9.79	65	0.02	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
H1	2	'370B'	'EAG1060'	1600	49.06	50	0.015	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
H1	2	'374A'	'EAG070'	700	18.78	70	0.04	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
H1	2	'374B'	'EAG2010'	900	25.25	40	0.013	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
H1	2	'355'	'EAG030'	2700	24.14	60	0.02	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
*	sub	357	is	added	to	355									
***	LAKESIDE	SEWRES	REG	E-14	CSO	95									
H1	5	'346'	'E14'	300	5.1	80	0.01	0.02	0.3	0.06	0.1	1	0.05	0.00115	D
***	LAKESIDE	SEWERS	REG	E-15	METER	EA30	CSO	95							
H1	5	'342'	'E15U'	600	3.89	85	0.01	0.02	0.3	0.06	0.1	1	0.05	0.00115	D
***	BURKE	LAKE	FRONT	PUMP	AREA										
H1	5	'BLPS'	'BLPSF'	100	1.5	4.5	0.01	0.02	0.3	0.06	0.1	99	99	0.00115	D
**	E40th	submodel	areas												
***	East	26th	Branch	REG	E-12	CSO	96								
H1	2	'373A'	'EAA6630'	600	18.65	80	0.033	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
H1	2	'373B'	'EAA6615'	550	11.33	80	0.01	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
H1	5	'348'	'EAA6540'	700	17.84	80	0.01	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
H1	5	'345'	'EAA6580'	1100	38.36	80	0.01	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
H1	5	'335'	'EAA6510'	500	31.96	80	0.01	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
***	LAKESIDE	SEWERS	REG	E-11	CSO	97									
H1	5	'331'	'E11U'	500	5.56	60	0.005	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
*	I-77	drainage	CSO	97											
H1	2	'I-77'	'I77A'	3600	54.81	80	0.005	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
***	East	30th	Branch	REG	E-08,	10	METER	EA29	CSO	98					
H1	2	'340'	'EAF075'	1725	47.53	60	0.008	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
H1	2	'354'	'EAF1055'	1883	69.17	50	0.006	0.02	0.3	0.04	0.1	2	0.15	0.00115	B/D
H1	2	'336'	'EAF1015'	1819	45.93	50	0.005	0.02	0.3	0.04	0.1	3	0.3	0.00115	B

Easterly CSO Phase II Modeling Report - SWMM RUNOFF Input for Modeling Sub-Basins (Baseline Conditions)

*	JK	Sub-Basin Name	Input Node	Width	Area (acres)	% Impervious	Basin Slope	Impervious "n"	Pervious "n"	Impervious Depression Storage	Pervious Depression Storage	Max. Infiltration	Min. Infiltration	Infiltration Decay	
H1	5	'328'	'EAF009'	1347	24.74	60	0.004	0.02	0.3	0.04	0.1	3	0.3	0.00115	B
H1	5	'320'	'E10W'	416	5.73	60	0.005	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
***	East	38th	Branch	REG	E-07	METER	EA28	CSO	99						
*	increase	soil	loss												
*	decrease	%	of	imp	by	10%									
H1	3	'332'	'EAA6265'	800	25.28	40	0.005	0.02	0.3	0.04	0.1	3	0.25	0.00115	B/D
H1	3	'321A'	'EAA6225'	700	24.77	40	0.01	0.02	0.3	0.04	0.1	1.5	0.15	0.00115	D
H1	3	'321B'	'EAA6215'	900	12.26	60	0.01	0.02	0.3	0.04	0.1	3.5	0.35	0.00115	B
H1	3	'316'	'EAA6210'	700	18.55	65	0.01	0.02	0.3	0.04	0.1	1.5	0.15	0.00115	D
***	East	38th	Branch	REG	E-05	CSO	99								
H1	3	'305'	'EAA6015'	300	8.25	85	0.007	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
***	East	38th	Branch	REG	E-06	CSO	99								
H1	3	'310'	'E06U'	200	6.9	85	0.005	0.02	0.3	0.04	0.1	1	0.05	0.00115	D
***	East	40th	Branch	METER	EA25	CSO	200								
*	decrease	width	by	300											
H1	4	'440A'	'EAE9515'	1200	42.62	40	0.006	0.02	0.3	0.04	0.1	3.5	0.35	0.00115	B
H1	4	'440B'	'EAE9015'	1200	44.86	40	0.006	0.02	0.3	0.04	0.1	3.5	0.35	0.00115	B
H1	4	'433'	'EAJ3015'	1000	43.11	50	0.006	0.02	0.3	0.04	0.1	3.5	0.35	0.00115	B
H1	4	'427'	'EAJ2005'	1200	38.83	35	0.007	0.02	0.3	0.04	0.1	3.5	0.35	0.00115	B
H1	4	'422A'	'EAE8515'	1050	40.38	10	0.004	0.02	0.3	0.04	0.1	3.5	0.35	0.00115	B
H1	4	'422B'	'EAE8010'	900	37.34	30	0.01	0.02	0.3	0.04	0.1	3.5	0.35	0.00115	B
H1	4	'416'	'EAE195'	2500	45.46	30	0.005	0.02	0.3	0.04	0.1	3.5	0.35	0.00115	B
H1	4	'410A'	'EAE7510'	1200	40	20	0.008	0.02	0.3	0.04	0.1	3.5	0.35	0.00115	B
H1	4	'410B'	'EAE7005'	1050	24.95	20	0.004	0.02	0.3	0.04	0.1	3.5	0.35	0.00115	B
H1	4	'399'	'EAE6010'	2900	34.29	40	0.005	0.02	0.3	0.04	0.1	2	0.15	0.00115	D
H1	4	'398'	'EAE185'	1200	26.47	40	0.007	0.02	0.3	0.04	0.1	2	0.15	0.00115	D
H1	4	'390'	'EAE155'	1900	30.94	40	0.02	0.02	0.3	0.04	0.1	2	0.15	0.00115	D
H1	4	'386'	'EAE080'	2700	57.81	40	0.01	0.02	0.3	0.04	0.1	2	0.15	0.00115	D
***	East	40th	Branch	REG	E-03	METER	EA24	CSO	200						
*	increase	soil	inf												
*	decrease	%	of	imp	by	10									
*	decrease	width													
H1	4	'382'	'EAE3025'	2500	33.09	60	0.033	0.02	0.3	0.04	0.1	2	0.15	0.00115	D
H1	4	'372'	'EAE2510'	1500	34.98	48	0.027	0.02	0.3	0.04	0.1	2	0.15	0.00115	D
H1	4	'359'	'EAE055'	1200	26	80	0.028	0.02	0.3	0.04	0.1	2	0.15	0.00115	D
H1	3	'323'	'EAE030'	1200	31.69	60	0.01	0.02	0.3	0.04	0.1	2	0.15	0.00115	B/D
H1	3	'312'	'EAE010'	1880	36.78	60	0.005	0.02	0.3	0.04	0.1	2	0.15	0.00115	B/D
***	East	40th	Branch	REG	E-04	METER	EA26	CSO	200						
*	change	%	of	imp	to	match	slicer								
H1	3	'309'	'E04U'	400	1.47	13	0.002	0.02	0.3	0.08	0.2	3	0.3	0.00115	D
**	begin	E55/E65	submodel												
***	LAKESIDE	SEWERS	REG	E-02	METER	EA22	CSO	201							
H1	3	'291'	'EAA5505'	2024	15.5	55	0.005	0.015	0.3	0.03	0.1	1	0.3	0.00115	D
H1	3	'294'	'EAA5510'	3480	40.08	55	0.01	0.015	0.3	0.03	0.1	1	0.3	0.00115	D
H1	3	'301'	'EAA5525'	4920	37.76	55	0.005	0.015	0.3	0.03	0.1	1	0.3	0.00115	D

Easterly CSO Phase II Modeling Report - SWMM RUNOFF Input for Modeling Sub-Basins (Baseline Conditions)

*	JK	Sub-Basin Name	Input Node	Width	Area (acres)	% Impervious	Basin Slope	Impervious "n"	Pervious "n"	Impervious Depression Storage	Pervious Depression Storage	Max. Infiltration	Min. Infiltration	Infiltration Decay	
***	St.Clair	to	E55th	REG	E01	METER	EA20	CSO	201						
*	reduce	%	imp	by	5%										
H1	3	'292'	'EAD1015'	2000	26.53	85	0.001	0.015	0.3	0.03	0.1	1	0.15	0.00115	D
H1	3	'302'	'EAD2030'	2200	57.38	40	0.001	0.015	0.3	0.03	0.1	2	0.25	0.00115	B/D
***	East	55th	Branch	REG	E-50	CSO	202								
H1	3	'E50'	'EAA5345'	300	6.09	60	0.02	0.015	0.3	0.03	0.1	1	0.15	0.00115	D
***	East	55th	Branch	REG	E-50A	CSO	202								
H1	3	'275'	'EAD065'	600	14.7	20	0.01	0.015	0.3	0.03	0.1	1	0.15	0.00115	D
H1	3	'290'	'EAD075'	600	11.9	40	0.007	0.015	0.3	0.03	0.1	2	0.25	0.00115	B/D
H1	3	'295'	'EAD085'	800	22.02	35	0.005	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
***	East	55th	Branch	REG	E-32	(finally	added,	subtract	1	acre	from	basin	275)	CSO	202
H1	3	'E32'	'E32U'	200	1	40	0.001	0.015	0.3	0.03	0.1	1	0.15	0.00115	D
***	East	55th	Branch	REG	E-52	CSO	202								
*	reduce	%	of	imp	by	5%									
H1	3	'303'	'EAD015'	1000	18.4	35	0.003	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	3	'308'	'EAD3005'	1650	21.99	45	0.02	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	3	'314A'	'EAD4525'	1300	36.2	80	0.01	0.015	0.3	0.03	0.1	3	0.3	0.00115	D
H1	3	'314B'	'EAD030'	900	45.63	30	0.02	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	3	'322'	'EAD4535'	1100	45.42	30	0.01	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	3	'330'	'EAD040'	900	35.71	25	0.02	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	3	'337A'	'EAD5020'	600	18.96	70	0.02	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	3	'337B'	'EAD7010'	3000	35.6	20	0.03	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	3	'339'	'EAD6015'	1200	32.98	35	0.009	0.015	0.3	0.03	0.1	3	0.3	0.00115	D
***	East	65th	Branch	METER	EA23	CSO	202								
*	increase	Fmin	by	0.05,	change										
H1	4	'447'	'EAK9510'	1200	37.74	45	0.013	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	4	'439'	'EAK9020'	2900	51.51	40	0.013	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	4	'425'	'EAK8010'	1800	63.86	20	0.005	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	4	'404'	'EAK6515'	1600	59.03	20	0.027	0.015	0.3	0.03	0.1	2	0.25	0.00115	B/D
H1	4	'394A'	'EAK5020'	3000	15.78	60	0.025	0.015	0.3	0.03	0.1	1	0.15	0.00115	D
H1	4	'360A'	'EAK4015'	3000	51.25	60	0.025	0.015	0.3	0.03	0.1	1	0.15	0.00115	D
H1	4	'360C'	'EAK155'	3000	64.26	50	0.02	0.015	0.3	0.03	0.1	1	0.15	0.00115	D
***	East	65th	Branch	REG	E-33	METER	EA15	CSO	202						
*	reduce	%	of	imp	by	10%	,	increase	fmin	by	0.05				
H1	3	'198B'	'EAC1005'	800	18.87	35	0.02	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	3	'255A'	'EAK115'	4000	47.82	24	0.02	0.015	0.3	0.03	0.1	1	0.15	0.00115	D
H1	3	'255B'	'EAK1365'	1900	30.97	30	0.02	0.015	0.3	0.03	0.1	2	0.25	0.00115	B/D
H1	3	'255C'	'EAK1305'	2600	60.02	25	0.01	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	3	'255D'	'EAK1205'	2800	28.86	25	0.024	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	3	'255E'	'EAK1100'	2000	14.29	25	0.04	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	3	'255F'	'EAK1025'	2500	37.03	30	0.017	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	3	'255G'	'EAK020'	2000	36.88	45	0.02	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	3	'255H'	'EAC1010'	900	37.5	50	0.02	0.015	0.3	0.03	0.1	2	0.25	0.00115	B/D
H1	4	'347A'	'EAK1170'	1400	30.53	25	0.022	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	4	'347B'	'EAK1150'	1800	31.75	25	0.01	0.015	0.3	0.03	0.1	3	0.3	0.00115	B

Easterly CSO Phase II Modeling Report - SWMM RUNOFF Input for Modeling Sub-Basins (Baseline Conditions)

*	JK	Sub-Basin Name	Input Node	Width	Area (acres)	% Impervious	Basin Slope	Impervious "n"	Pervious "n"	Impervious Depression Storage	Pervious Depression Storage	Max. Infiltration	Min. Infiltration	Infiltration Decay	
H1	3	'318'	'EAK1060'	1200	30.38	25	0.013	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	4	'360B'	'EAK2030'	1100	52.76	40	0.01	0.015	0.3	0.03	0.1	1	0.15	0.00115	D
H1	4	'394B'	'EAK2037'	1600	24.1	50	0.02	0.015	0.3	0.03	0.1	1	0.15	0.00115	D
H1	4	'406A'	'EAK2125'	1500	129.89	10	0.013	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
H1	4	'406B'	'EAK2050'	1800	69.23	25	0.013	0.015	0.3	0.03	0.1	2	0.25	0.00115	B/D
H1	4	'423'	'EAK2175'	1000	57.53	20	0.006	0.015	0.3	0.03	0.1	2	0.25	0.00115	B/D
H1	4	'408'	'EAK2075'	1500	31.89	20	0.013	0.015	0.3	0.03	0.1	3	0.3	0.00115	B
**	begin	E79th/Addi	submodel	subareas											
***	Addison	Branch	METER	EA21	CSO	203									
H1	6	'448'	'EAC9505'	1900	41.75	35	0.015	0.015	0.3	0.06	0.1	2	0.15	0.00115	B/D
H1	6	'436'	'EAC140'	2250	41.33	29	0.008	0.015	0.3	0.06	0.1	3	0.25	0.00115	B
H1	6	'415'	'EAC8010'	3500	33.87	23	0.005	0.015	0.3	0.06	0.1	3	0.25	0.00115	B
H1	6	'403'	'EAC7005'	1200	27.95	35	0.028	0.015	0.3	0.06	0.1	3	0.25	0.00115	B
H1	6	'378'	'EAC100'	2800	60.16	31	0.022	0.015	0.3	0.06	0.1	1	0.1	0.00115	D
H1	6	'365A'	'EAC090'	2000	26.22	41	0.01	0.015	0.3	0.06	0.1	1	0.1	0.00115	D
***	Addison	Branch	REG	E-34	METER	EA16	CSO	203							
H1	3	'365B'	'EAC075'	1000	22.21	30	0.024	0.015	0.3	0.06	0.1	3	0.2	0.00115	B
H1	3	'338'	'EAC070'	3500	32.19	35	0.03	0.015	0.3	0.06	0.1	3	0.2	0.00115	B
H1	3	'319'	'EAC050'	1700	52.11	30	0.01	0.015	0.3	0.06	0.1	3	0.2	0.00115	B
H1	3	'307'	'EAC035'	1600	48.58	25	0.02	0.015	0.3	0.06	0.1	3	0.2	0.00115	B
H1	3	'306'	'EAC3015'	1300	13.71	20	0.013	0.015	0.3	0.06	0.1	3	0.2	0.00115	B
H1	3	'300'	'EAC2065'	2400	29.94	35	0.013	0.015	0.3	0.06	0.1	3	0.2	0.00115	B
H1	3	'253'	'EAC2070'	1000	56.3	40	0.007	0.015	0.3	0.06	0.1	3	0.2	0.00115	B
H1	3	'260'	'EAC2035'	800	40.71	40	0.005	0.015	0.3	0.06	0.1	3	0.2	0.00115	B
H1	3	'249'	'EAC2115'	200	4.87	30	0.04	0.015	0.3	0.06	0.1	3	0.2	0.00115	B
H1	3	'198A'	'EAC020'	2500	37.43	45	0.01	0.015	0.3	0.06	0.1	3	0.2	0.00115	B
H1	3	'198C'	'EAC2015'	1600	35.56	45	0.007	0.015	0.3	0.06	0.1	3	0.2	0.00115	B
H1	3	'198'	'EAC2010'	1600	57.55	45	0.01	0.015	0.3	0.06	0.1	1	0.1	0.00115	D
***	Addison	Branch	REG	E-35	METER	EA18	CSO	203							
H1	3	'246'	'E34A'	2000	29.62	50	0.02	0.015	0.3	0.06	0.1	1.5	0.1	0.00115	D
***	East	79th	Branch	METER	EA13	CSO	204								
H1	6	'454'	'EAB220'	1200	33.97	25	0.051	0.015	0.3	0.06	0.1	2	0.25	0.00115	C
H1	6	'453'	'EAB205'	1900	43.14	45	0.015	0.015	0.3	0.06	0.1	2.5	0.25	0.00115	B/C
H1	6	'452'	'EAB195'	700	31.17	45	0.005	0.015	0.3	0.06	0.1	2.5	0.25	0.00115	B/C
H1	6	'451'	'EAB261'	1100	33.09	25	0.054	0.015	0.3	0.06	0.1	2.5	0.25	0.00115	B/C
H1	6	'450'	'EAB245'	800	19.73	25	0.017	0.015	0.3	0.06	0.1	3	0.35	0.00115	B
H1	6	'449'	'EAB275'	600	22.88	35	0.022	0.015	0.3	0.06	0.1	2.5	0.25	0.00115	B/C
H1	6	'445'	'EAB8000'	1100	30.96	25	0.01	0.015	0.3	0.06	0.1	3	0.35	0.00115	B
H1	6	'438'	'EAC9095'	1400	28.35	30	0.02	0.015	0.3	0.06	0.1	3	0.35	0.00115	B
H1	6	'437'	'EAC9190'	1700	86.29	35	0.012	0.015	0.3	0.06	0.1	3	0.35	0.00115	B
H1	6	'435'	'EAC9040'	3000	44.4	25	0.01	0.015	0.3	0.06	0.1	3	0.35	0.00115	B
H1	6	'418'	'EAB7055'	700	25.36	30	0.01	0.015	0.3	0.06	0.1	3	0.35	0.00115	B
H1	6	'417'	'EAB7070'	800	33.91	30	0.009	0.015	0.3	0.06	0.1	3	0.35	0.00115	B
H1	6	'414'	'EAB7040'	900	50.35	25	0.006	0.015	0.3	0.06	0.1	3	0.35	0.00115	B
H1	6	'413'	'EAB7035'	800	29.47	25	0.01	0.015	0.3	0.06	0.1	3	0.35	0.00115	B

Easterly CSO Phase II Modeling Report - SWMM RUNOFF Input for Modeling Sub-Basins (Baseline Conditions)

*	JK	Sub-Basin Name	Input Node	Width	Area (acres)	% Impervious	Basin Slope	Impervious "n"	Pervious "n"	Impervious Depression Storage	Pervious Depression Storage	Max. Infiltration	Min. Infiltration	Infiltration Decay	
H1	6	'412A'	'EAC8025'	650	17.38	25	0.008	0.015	0.3	0.06	0.1	3	0.35	0.00115	B
H1	6	'412B'	'EAB7030'	600	22.55	25	0.011	0.015	0.3	0.06	0.1	3	0.35	0.00115	B
***	East	79th	Branch	REG	E-45	STONE	BROOK								
H1	6	'375'	'EAB4045'	700	3.8	30	0.02	0.015	0.3	0.06	0.1	2	0.15	0.00115	B/D
***	East	79th	Branch	REG	E-46	STONE	BROOK								
H1	6	'368'	'E46U'	350	14.93	35	0.024	0.015	0.3	0.06	0.1	2	0.15	0.00115	B/D
***	East	79th	Branch	REG	E-37	METER	EA08	CSO	204						
H1	12	'197A'	'EAB025'	2000	32.9	80	0.04	0.015	0.3	0.06	0.1	2	0.15	0.00115	B/D
H1	12	'197B'	'EAB1025'	4000	21.25	75	0.02	0.015	0.3	0.06	0.1	2	0.15	0.00115	B/D
H1	12	'247'	'EAB1060'	3500	24.61	45	0.04	0.015	0.3	0.06	0.1	3	0.3	0.00115	B
H1	12	'265'	'EAB050'	1300	39.59	45	0.01	0.015	0.3	0.06	0.1	3	0.3	0.00115	B
H1	12	'293'	'EAB065'	800	25.45	20	0.022	0.015	0.3	0.06	0.1	3	0.3	0.00115	B
H1	12	'298'	'EAC3065'	2400	49.98	35	0.008	0.015	0.3	0.06	0.1	3	0.3	0.00115	B
H1	12	'299A'	'EAC3030'	1600	39.31	35	0.01	0.015	0.3	0.06	0.1	3	0.3	0.00115	B
H1	12	'299B'	'EAC3050'	1400	25.86	35	0.007	0.015	0.3	0.06	0.1	3	0.3	0.00115	B
H1	12	'311'	'EAB3010'	1000	19.38	35	0.01	0.015	0.3	0.06	0.1	3	0.3	0.00115	B
H1	12	'313'	'EAB3050'	850	22.08	35	0.008	0.015	0.3	0.06	0.1	3	0.3	0.00115	B
H1	12	'324'	'EAB3515'	700	25	35	0.014	0.015	0.3	0.06	0.1	3	0.3	0.00115	B
H1	12	'325'	'EAB3085'	1700	38.17	45	0.02	0.015	0.3	0.06	0.1	3	0.3	0.00115	B
H1	12	'326'	'EAB3045'	2200	48.69	20	0.023	0.015	0.3	0.06	0.1	3	0.3	0.00115	B
H1	12	'329'	'EAB110'	1700	16.14	40	0.02	0.015	0.3	0.06	0.1	3	0.3	0.00115	B
H1	12	'344'	'EAB4055'	800	53.34	35	0.016	0.015	0.3	0.06	0.1	2	0.15	0.00115	B/D
H1	12	'350'	'EAB4005'	1000	25.74	25	0.02	0.015	0.3	0.06	0.1	3	0.3	0.00115	B
H1	12	'358'	'EAB4075'	800	33.19	30	0.013	0.015	0.3	0.06	0.1	2	0.15	0.00115	B/D
H1	12	'361'	'EAB4210'	1900	36.87	30	0.01	0.015	0.3	0.06	0.1	2	0.15	0.00115	B/D
H1	12	'366'	'EAB4020'	2400	33.38	30	0.02	0.015	0.3	0.06	0.1	2	0.15	0.00115	B/D
H1	12	'380'	'EAC6045'	1900	50.48	40	0.02	0.015	0.3	0.06	0.1	1	0.05	0.00115	D
H1	12	'391'	'EAB4150'	2000	70.62	90	0.02	0.015	0.3	0.06	0.1	2	0.15	0.00115	B/D
H1	12	'393'	'EAB130'	2400	22.27	50	0.027	0.015	0.3	0.06	0.1	2	0.15	0.00115	B/D
***	East	79th	Branch	REG	E-44	METER	EA12	CSO	219						
H1	12	'304'	'EAC3125'	4000	31.78	40	0.005	0.015	0.3	0.07	0.1	3.5	0.3	0.00115	B/D
***	East	79th	Branch	REG	E-38	METER	EA10	CSO	215						
H1	12	'235'	'E38U'	2000	7.72	30	0.02	0.015	0.3	0.06	0.1	3	0.3	0.00115	B
***	East	79th	Branch	FD	1355	NM	CSO	to	DV						
**	added	Sep-99													
H1	12	'361A'	'EAB4197'	1600	12.6	60	0.01	0.015	0.3	0.06	0.1	3	0.3	0.00115	B
***	LAKESIDE	SEWERS	REG	E-36	CSO	204									
H1	12	'205'	'EAA5015'	1600	41.79	90	0.001	0.015	0.3	0.06	0.1	1	0.05	0.00115	D
H1	12	'234'	'EAA5035'	1500	20.58	40	0.013	0.015	0.3	0.06	0.1	1	0.05	0.00115	D
**															
***Dugway	Submodel***														
***Flows	to	DE02IA***													
H1	8	'191'	'DUA030'	4400	23.52	60	0.013	0.015	0.3	0.06	0.1	3	0.3	0.00115	
H1	10	'114b'	'DUB015'	1200	22.55	60	0.0038	0.015	0.3	0.06	0.1	3	0.3	0.00115	
H1	10	'259'	'DUA201'	400	12.13	60	0.025	0.015	0.3	0.06	0.1	3	0.3	0.00115	

Easterly CSO Phase II Modeling Report - SWMM RUNOFF Input for Modeling Sub-Basins (Baseline Conditions)

*	JK	Sub-Basin Name	Input Node	Width	Area (acres)	% Impervious	Basin Slope	Impervious "n"	Pervious "n"	Impervious Depression Storage	Pervious Depression Storage	Max. Infiltration	Min. Infiltration	Infiltration Decay
H1	8	'239'	'DUA200'	1400	6.75	60	0.024	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'196'	'DUA040'	873	44.11	60	0.017	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'165'	'DUC3004'	692	21.46	60	0.0048	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'163'	'DUC110'	600	26.15	60	0.0087	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'162'	'DUC085'	1100	39.62	60	0.0057	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'156'	'DUC125'	1400	31.65	55	0.017	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'129'	'DUB010'	2200	60.4	60	0.007	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'116a'	'DUC055'	1165	34.76	60	0.012	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'121'	'DUB070'	1000	28.89	60	0.0084	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'212'	'DUA175'	1500	9.91	60	0.04	0.015	0.3	0.06	0.1	3	0.3	0.00115
***Flows	to	DE02IB***												
H1	10	'116b'	'DUC2010'	800	28.65	43	0.0036	0.015	0.3	0.04	0.1	2.5	0.3	0.00115
***Flows	to	DE03D***												
H1	8	'225'	'DUA095'	141.4	24.35	50	0.012	0.015	0.3	0.06	0.1	3	0.15	0.00115
H1	8	'258a'	'DUA110'	84.4	9.69	45	0.013	0.015	0.3	0.06	0.1	3	0.15	0.00115
H1	8	'213'	'DUA060'	68	45.2	55	0.022	0.015	0.3	0.06	0.1	3	0.15	0.00115
H1	8	'207'	'D66'	380	13.54	55	0.02	0.015	0.3	0.06	0.1	3	0.15	0.00115
***Flows	to	DE04I***												
H1	7	'280'	'DUA136'	50.9	5.85	45	0.01	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	7	'297'	'DUC1074'	210	65.5	55	0.024	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	7	'296'	'DUC1065'	113.2	18.2	55	0.046	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	7	'289'	'DUC1005'	108.7	9.99	65	0.02	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	7	'283e'	'DUC1072'	303	20.87	55	0.024	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	7	'262'	'DUC1018'	190	10.1	55	0.033	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	7	'258b'	'DUA140'	90	5.88	65	0.013	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	7	'287'	'D79A'	20	0.69	55	0.013	0.04	0.5	0.06	0.1	3	0.15	0.00115
***Flows	to	DW00***												
H1	10	'104'	'DUD010'	500	10	30	0.06	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'124'	'DUD2025'	800	6.23	40	0.015	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'132'	'D03'	300	1.98	35	0.04	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	12	'274'	'DUD1340'	1300	4.28	50	0.03	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	12	'269'	'DUD1325'	3400	10.12	55	0.0125	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	12	'270'	'DUD1330'	1600	4.99	55	0.029	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	12	'267'	'DUD185'	170	4.74	60	0.014	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'161'	'DUD060'	240	1.88	50	0.016	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'176'	'DUD3010'	868	15.95	70	0.01	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'155'	'DUD1042'	800	4.31	20	0.015	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'211'	'DUD135'	900	3.79	75	0.04	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'230a'	'DUD155'	116.5	5.35	54	0.04	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'151'	'DUD2500'	1000	2.33	20	0.022	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'148'	'DUD040'	100	1.59	20	0.017	0.015	0.3	0.06	0.1	3	0.3	0.00115
***Flows	to	DW02I***												
***Flows	to	DW03I***												
H1	10	'186'	'DUD4030'	1400	50.25	51	0.0036	0.015	0.3	0.06	0.1	3	0.3	0.00115
***Flows	to	DW04D***												

Easterly CSO Phase II Modeling Report - SWMM RUNOFF Input for Modeling Sub-Basins (Baseline Conditions)

*	JK	Sub-Basin Name	Input Node	Width	Area (acres)	% Impervious	Basin Slope	Impervious "n"	Pervious "n"	Impervious Depression Storage	Pervious Depression Storage	Max. Infiltration	Min. Infiltration	Infiltration Decay
H1	10	'143'	'EAA3025'	1200	3.3	37	0.008	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'138p'	'EAA3021'	800	2.75	37	0.0067	0.015	0.3	0.06	0.1	3	0.3	0.00115
***Flows	to	DW08I***												
H1	8	'273'	'D74'	1200	5.76	59	0.013	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	12	'272'	'D54G'	1132	39.01	45	0.0057	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'268'	'DUD1335'	240	0.8	50	0.06	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	12	'286'	'DUE175'	900	7.06	30	0.004	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'276'	'D54'	300	0.86	50	0.008	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'277'	'D55'	250	0.93	50	0.008	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'278'	'D72'	1300	4.1	50	0.011	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'285'	'DUC1006'	461	12.71	50	0.012	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'256'	'DUD1345'	800	2.49	50	0.04	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'266'	'DUD6108'	600	2.53	50	0.025	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'263'	'DUD6105'	1000	6.01	50	0.0077	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'279'	'D73'	800	3.42	55	0.014	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'166'	'D12'	200	1.93	65	0.04	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'169'	'DUD1043'	300	1.48	75	0.0027	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'200'	'DUE115'	800	7.87	55	0.02	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'250'	'DUD6035'	600	44.86	55	0.02	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'240'	'DUD6015'	760	20.91	50	0.015	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'230b'	'DUE155'	485	7.23	54	0.016	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'229a'	'DUD1320'	800	2.89	55	0.02	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'217'	'DUD1310'	800	2.33	55	0.027	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'215'	'DUD1305'	600	1.66	60	0.027	0.015	0.3	0.06	0.1	3	0.3	0.00115
***Flows	to	DW10I***												
H1	10	'216'	'DUD4085'	1200	49.24	45	0.003	0.015	0.3	0.06	0.1	3	0.3	0.00115
***Flows	to	DW12I***												
H1	10	'208'	'D30A'	40	1.68	50	0.02	0.04	0.5	0.06	0.1	3	0.3	0.00115
***Flows	to	DW14I***												
H1	10	'227'	'DUD1315'	60	1.79	53	0.025	0.015	0.3	0.06	0.1	3	0.3	0.00115
***Flows	to	DW15IA***												
H1	10	'209a'	'DUD1300'	125.3	8.63	54	0.017	0.04	0.5	0.06	0.1	3	0.15	0.00115
***Flows	to	DW15IB***												
H1	10	'229b'	'DUD1182'	40	14.75	50	0.04	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	10	'231'	'DUD1203'	50	1.93	50	0.033	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	10	'251'	'DUD1240'	160	5.79	50	0.017	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	10	'243'	'D48'	60	1.67	65	0.01	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	10	'236'	'D50'	35.5	1.06	65	0.013	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	10	'242'	'DUD1210'	124.5	4.29	50	0.02	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	10	'224'	'DUD1202'	75	4.29	50	0.025	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	10	'223'	'D53'	40	1.02	60	0.01	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	10	'219'	'DUD1170'	50	15.6	50	0.0067	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	10	'209b'	'DUD1160'	50	10.12	50	0.036	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	8	'462'	'DUD6120'	30	3.09	50	0.01	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	10	'228'	'D52'	44.6	1.23	65	0.01	0.04	0.5	0.06	0.1	3	0.15	0.00115

Easterly CSO Phase II Modeling Report - SWMM RUNOFF Input for Modeling Sub-Basins (Baseline Conditions)

*	JK	Sub-Basin Name	Input Node	Width	Area (acres)	% Impervious	Basin Slope	Impervious "n"	Pervious "n"	Impervious Depression Storage	Pervious Depression Storage	Max. Infiltration	Min. Infiltration	Infiltration Decay
***Flows	to	DW19I***												
H1	10	'149'	'DUD1040'	2200	8.94	50	0.012	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'167a'	'DUD1070'	800	23.65	46	0.012	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'178'	'D19'	586	7.4	55	0.013	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'180'	'DUD1082'	600	6.8	65	0.013	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'120'	'DUD1018'	500	42.7	35	0.0125	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'183'	'DUD1135'	500	24.45	51	0.0073	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'183a'	'DUD4007'	200	1.37	50	0.03	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'189'	'DUD5030'	4042	34.33	50	0.0033	0.015	0.3	0.06	0.1	3	0.3	0.00115
***Flows	to	DW21I***												
H1	10	'160'	'D70D'	1200	50.25	40	0.005	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'168'	'DUC2505'	2585	11.87	40	0.0062	0.015	0.3	0.06	0.1	3	0.3	0.00115
***Flows	directly	to	easterly	main***										
H1	10	'100'	'DUC1002'	1100	15.9	50	0.01	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'114a'	'EAA2027'	2500	27.04	51	0.0057	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	10	'113'	'D64E'	2400	5.61	60	0.04	0.015	0.3	0.06	0.1	3	0.3	0.00115
**														
***Flows	to	dugway	west	culvert***										
*H1	7	'283c'	'DUD7005'	2000	174.31	60	0.0222	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	7	'DW2'	'DUD7005'	2050	132.3	1	0.0423	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	7	'DW1'	'DCW173'	3080	152	1	0.0722	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	7	'DW3'	'DCW178'	1604	81	30	0.0243	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	7	'DW4'	'DCW178'	2240	108	30	0.0191	0.015	0.3	0.06	0.1	3	0.3	0.00115
H1	15	'DW5'	'DCW178'	13000	1230	35	0.0127	0.015	0.3	0.06	0.1	3	0.3	0.00115
***Flows	to	dugway	east	culvert***										
H1	7	'283d'	'DUC1170'	550	4.41	60	0.012	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	7	'283f'	'DUC1165'	900	19.3	30	0.025	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	7	'283b'	'DUC1175'	1691	34.63	30	0.0089	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	7	'DE1'	'DCE203'	5028	303	15	0.0257	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	7	'DE2'	'DCE240'	4246	620	30	0.00215	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	7	'DE3'	'DCE247'	3513	256.59	30	0.0215	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	15	'DE4'	'DCE250'	6000	348	35	0.0173	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	15	'DE5'	'DCE260'	8000	380	35	0.00943	0.04	0.5	0.06	0.1	3	0.15	0.00115
H1	8	'167b'	'DCE080'	300	69.11	3	0.0125	0.04	0.5	0.06	0.1	3	0.15	0.00115
**														
***Doan	Brook	part	submodel											
***SUB	AREAS	TO	REG	E-42	N/M	CSO	TO	DOAN	BROOK					
H1	10	'469A'	'EAA4005'	600	29.51	35	0.01	0.015	0.2	0.06	0.1	3	0.3	0.00115
H1	10	'469B'	'EAA4035'	800	30.56	30	0.006	0.015	0.2	0.06	0.1	3	0.3	0.00115
***SUB	AREAS	TO	REG	E-43	N/M	CSO	TO	DOAN	BROOK					
H1	10	'470A'	'E41R'	2000	53.09	35	0.01	0.015	0.2	0.06	0.1	3	0.3	0.00115
H1	10	'470B'	'EAA4510'	1100	56.23	35	0.02	0.015	0.2	0.06	0.1	3	0.3	0.00115
H1	10	'470C'	'E41G'	2000	48.71	35	0.02	0.015	0.2	0.06	0.1	3	0.3	0.00115
H1	10	'470D'	'E41C'	1800	24.59	25	0.008	0.015	0.2	0.06	0.1	3	0.3	0.00115
H1	10	'470E'	'EAA4615'	1000	38.39	30	0.02	0.015	0.2	0.06	0.1	3	0.3	0.00115

Easterly CSO Phase II Modeling Report - SWMM RUNOFF Input for Modeling Sub-Basins (Baseline Conditions)

*	JK	Sub-Basin Name	Input Node	Width	Area (acres)	% Impervious	Basin Slope	Impervious "n"	Pervious "n"	Impervious Depression Storage	Pervious Depression Storage	Max. Infiltration	Min. Infiltration	Infiltration Decay	
H1	10	'470F'	'EAA4685'	1000	30.48	20	0.008	0.015	0.2	0.06	0.1	3	0.3	0.00115	
H1	10	'470G'	'EAA4655'	2000	71.7	25	0.013	0.015	0.2	0.06	0.1	3	0.3	0.00115	
***SUB	AREAS	NORTH/SO	OF	LAKE	SHORE	DIRECT	INTO	EASTERLY							
H1	10	'458'	'EAA163'	1400	107.72	1	0.01	0.015	0.3	0.06	0.1	99	99	0.00115	S
H1	10	'138'	'D01'	500	34.55	30	0.008	0.015	0.2	0.06	0.1	3	0.3	0.00115	
**															
***	Shaw	Brook	submodel												
**	USE	RG-11	JK=10,	RG-9,	JK=8										
**	Easterly	subareas	between	Dugway	and	plants									
***	REG	E-39													
H1	8	'112'	'EAA2057'	1215	28.46	30	0.009	0.015	0.3	0.06	0.1	3	0.3	0.00115	
***	REG	E-47	METER	EA17											
H1	8	'82'	'EAA1030'	1653	33.39	75	0.01	0.015	0.3	0.06	0.1	0.5	0.05	0.00115	
***	REG	E-48	METER	EA17											
H1	8	'81+95'	'EAA1050'	3000	65.77	30	0.007	0.015	0.3	0.06	0.1	3	0.3	0.00115	
H1	8	'88'	'EAA1040'	2282	56.58	50	0.005	0.015	0.3	0.06	0.1	0.5	0.05	0.00115	
***	DIRECT	TO	EASTERLY												
H1	8	'91'	'EAA2020'	1000	58.47	10	0.005	0.015	0.3	0.06	0.1	99	99	0.00115	S
H1	8	'52'	'EAA035'	1000	95.14	2	0.005	0.015	0.3	0.06	0.1	99	99	0.00115	S
***	METER	EA17I													
H1	8	'461'	'EAA1205'	4	19.24	20	0.005	0.015	0.3	0.5	0.1	99	99	0.00115	S
***	METER	EA09I													
H1	8	'85'	'EAA2510'	400	23.98	1.8	0.005	0.015	0.3	0.01	0.1	99	99	0.00115	S
**															
***	Nottingham	Branch	METER	NO02D											
H1	18	'27'	'NOB010'	649.3	59.77	70	0.02	0.04	0.55	0.06	0.1	1	0.05	0.00115	
H1	18	'30'	'NOA130'	502.6	63.46	65	0.0175	0.04	0.55	0.06	0.1	1	0.05	0.00115	
H1	18	'32'	'NOB1015'	345.6	27.77	50	0.012	0.04	0.55	0.06	0.1	1	0.05	0.00115	
H1	11	'33'	'NOA155'	658.9	83.19	15	0.01	0.04	0.55	0.06	0.1	1	0.05	0.00115	
H1	11	'36'	'NOB045'	261.1	53.94	80	0.008	0.04	0.55	0.06	0.1	1	0.05	0.00115	
H1	11	'37'	'NOB035'	287.5	23.1	65	0.012	0.04	0.55	0.06	0.1	1	0.05	0.00115	
H1	11	'39'	'NOB060'	114.4	13.13	60	0.01	0.04	0.55	0.06	0.1	1	0.05	0.00115	
H1	11	'42'	'NOB1070'	186.9	34.32	80	0.012	0.04	0.55	0.06	0.1	1	0.05	0.00115	
*	Sanitary	component	of	basin	#49										
H1	11	'49SAN'	'NOC050'	514.4	82.67	15	0.011	0.04	0.55	0.06	0.1	1	0.05	0.00115	
*	Storm	component	of	basin	#49										
H1	11	'49STM'	'NOB1110'	514.4	82.67	60	0.011	0.04	0.55	0.06	0.1	1	0.05	0.00115	
***	Nottingham	Branch	METER	NO00											
H1	18	'11'	'NOB1003'	152.25	16.35	0.25	0.025	0.04	0.55	0.06	0.25	1	0.05	0.00115	
***	Nottingham	Branch	METER	LS02											
H1	18	'13'	'NOA020'	539.6	61.94	38	0.008	0.04	0.55	0.06	0.1	1	0.05	0.00115	
H1	18	'22'	'NOA080'	392.4	31.53	80	0.02	0.04	0.55	0.06	0.1	1	0.05	0.00115	
***	Euclid	Creek	METER	ECO-01											
H1	18	'ECO-01'	'201235a'	75	21.96	27	0.001	0.035	0.3	0	0.04	100	99	0.0015	
***	Euclid	Creek	METER	ECO-02											

Easterly CSO Phase II Modeling Report - SWMM RUNOFF Input for Modeling Sub-Basins (Baseline Conditions)

*	JK	Sub-Basin Name	Input Node	Width	Area (acres)	% Impervious	Basin Slope	Impervious "n"	Pervious "n"	Impervious Depression Storage	Pervious Depression Storage	Max. Infiltration	Min. Infiltration	Infiltration Decay
H1	18	'ECO-02'	'200235b'	100	30.05	27	0.001	0.035	0.3	0	0.04	100	99	0.0015
***	Euclid	Creek	METER	ECO-03										
H1	18	'ECO-03'	'LSA6075'	1400	85.48	27	0.001	0.035	0.3	0	0.04	100	99	0.0015
H1	18	'ECO-03'	'LSA6090'	600	35.12	27	0.001	0.035	0.3	0	0.04	100	99	0.0015
***	Euclid	Creek	METER	ECO-04										
H1	18	'ECO-04'	'192255a'	40	14.84	27	0.001	0.035	0.3	0	0.04	100	99	0.0015
***	Euclid	Creek	METER	ECO-05										
*H1	18	'ECO-05'	'210234a'	2000	179.61	27	0.01	0.04	0.3	0.04	0.04	100	99	0.0015
H1	18	'ECO-05'	'232244a'	431	59.87	27	0.001	0.035	0.3	0	0.04	100	99	0.0015
H1	18	'ECO-05'	'219239a'	431	59.87	27	0.001	0.035	0.3	0	0.04	100	99	0.0015
H1	18	'ECO-05'	'210234a'	431	59.87	27	0.001	0.035	0.3	0	0.04	100	99	0.0015
***	Euclid	Creek	METER	ECO-03	&	ECO-05	(Harland	Ave.	Relief	Sewer)				
H1	18	'Harland'	'LSA9051'	702	97.21	27	0.001	0.035	0.3	0	0.04	100	99	0.0015
***	Euclid	Creek	METER	LS-06										
H1	18	'LS-06'	'238249a'	275	6.9	27	0.001	0.04	0.3	0	0.04	100	99	0.0015
***	Euclid	Creek	METER	LS-04I										
H1	18	'LS-04I'	'198232a'	50	1.21	27	0.001	0.04	0.3	0	0.04	100	99	0.0015
***	Euclid	Creek	Regulator	I-21										
H1	18	'I-21'	'L21'	2450	16.36	27	0.001	0.04	0.3	0.04	0.04	100	99	0.0015
***	Euclid	Creek	Regulator	L-35										
H1	18	'L-35'	'L35'	1700	8.23	27	0.001	0.04	0.3	0.04	0.04	100	99	0.0015
***	Lake	Shore	Interceptor	METER	LS00									
H1	18	'8'	'LSA110'	986	108.17	30	0.01	0.03	0.4	0.02	0.03	1	0.01	0.0015
H1	18	'10'	'LSA095'	260	16.5	30	0.01	0.03	0.4	0.02	0.03	1	0.01	0.0015
H1	16	'12'	'LSA2600'	110	13.67	30	0.009	0.03	0.4	0.02	0.03	1	0.01	0.0015
H1	18	'15'	'LSA5015'	998.8	28.66	74	0.006	0.03	0.4	0.02	0.03	1	0.01	0.0015
H1	18	'16'	'LSA4020'	1120	34.79	77	0.017	0.03	0.4	0.02	0.03	1	0.01	0.0015
H1	18	'17'	'LSA3010'	525	20.7	78	0.014	0.03	0.4	0.02	0.03	1	0.01	0.0015
H1	18	'18'	'LSA2500'	895	20.54	78	0.02	0.03	0.4	0.02	0.03	1	0.01	0.0015
H1	16	'19'	'LSA080'	470	19.6	85	0.02	0.03	0.4	0.02	0.03	1	0.01	0.0015
H1	16	'21'	'LSA2005'	320	46.69	80	0.012	0.03	0.4	0.02	0.03	1	0.01	0.0015
H1	16	'24'	'LSA020'	660	73.76	80	0.018	0.03	0.4	0.02	0.03	1	0.01	0.0015
H1	18	'25'	'LSA2196'	405	20.43	77	0.015	0.03	0.4	0.02	0.03	1	0.01	0.0015
H1	18	'28'	'LSA2125'	800	14.56	88	0.006	0.03	0.4	0.02	0.03	1	0.01	0.0015
H1	18	'31'	'LSA2105'	460	74.88	70	0.01	0.03	0.4	0.02	0.03	1	0.01	0.0015
H1	16	'20A'	'LSA040'	580	56.99	88	0.013	0.03	0.4	0.02	0.03	1	0.01	0.0015
H1	16	'20B'	'LSA026'	310	18.41	91	0.01	0.03	0.4	0.02	0.03	1	0.01	0.0015
H1	16	'29A'	'LSA2040'	400	63.27	79	0.013	0.03	0.4	0.02	0.03	1	0.01	0.0015
H1	16	'29B'	'LSA2075'	170	10.91	74	0.01	0.03	0.4	0.02	0.03	1	0.01	0.0015
***	Stormwater	flows	to	Green	Creek	METER	GCS02							
H1	11	'GR1'	'GRN200'	2740	341	35	0.022	0.04	0.5	0.06	0.1	3	0.3	0.00115
H1	11	'GR2'	'GRN175'	385	13	30	0.018	0.04	0.5	0.06	0.1	3	0.3	0.00115
***	Stormwater	flows	to	Green	Creek	METER	GCS01							
H1	11	'GR3'	'GRN155'	580	13	20	0.01	0.04	0.5	0.06	0.1	3	0.3	0.00115
H1	11	'GR4'	'GRN115'	700	56	20	0.01	0.04	0.5	0.06	0.1	3	0.3	0.00115

Easterly CSO Phase II Modeling Report - SWMM RUNOFF Input for Modeling Sub-Basins (Baseline Conditions)

*	JK	Sub-Basin Name	Input Node	Width	Area (acres)	% Impervious	Basin Slope	Impervious "n"	Pervious "n"	Impervious Depression Storage	Pervious Depression Storage	Max. Infiltration	Min. Infiltration	Infiltration Decay
H1	11	'GR5'	'GRN070'	1600	125	45	0.008	0.04	0.5	0.06	0.1	3	0.3	0.00115
H1	18	'GR6'	'GRN030'	1000	31	20	0.005	0.04	0.5	0.06	0.1	3	0.3	0.00115
***	East	140th	Interceptor	METER	HA00									
H1	16	'43'	'HAA020'	1314	27.57	65	0.023	0.02	0.3	0.06	0.1	3	0.3	0.00115
H1	16	'50'	'HAA035'	2100	84.38	70	0.012	0.02	0.3	0.06	0.1	1.8	0.15	0.00115
H1	9	'55'	'HAA071'	500	42.18	40	0.008	0.02	0.3	0.06	0.1	1	0.05	0.00115
H1	16	'57'	'HAA1050'	625	24.03	65	0.01	0.02	0.3	0.06	0.1	2.4	0.23	0.00115
H1	9	'54A'	'HAA1510'	1500	22.76	40	0.018	0.02	0.3	0.06	0.1	1.6	0.13	0.00115
***	East	140th	Interceptor	METER	HA01D									
H1	9	'72'	'HAA2050'	112	29	68	0.02	0.02	0.3	0.06	0.1	3	0.3	0.00115
H1	9	'73'	'HAA2035'	262	44.56	60	0.018	0.02	0.3	0.06	0.1	3	0.3	0.00115
H1	9	'87'	'HAA2135'	412	47.11	66	0.022	0.02	0.3	0.06	0.1	2.2	0.2	0.00115
H1	9	'93'	'HAA2120'	375	28.52	65	0.022	0.02	0.3	0.06	0.1	2.2	0.2	0.00115
H1	9	'97'	'HAA2131'	300	9.83	68	0.03	0.02	0.3	0.06	0.1	1.4	0.1	0.00115
H1	8	'102'	'HAA2181'	475	22.94	65	0.023	0.02	0.3	0.06	0.1	2.2	0.2	0.00115
H1	8	'105'	'HAA150'	550	46.87	70	0.02	0.02	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'140'	'HAA5015'	300	11.18	70	0.015	0.02	0.3	0.06	0.1	3	0.3	0.00115
H1	9	'61A'	'HAA2020'	500	39.56	60	0.02	0.02	0.3	0.06	0.1	3	0.3	0.00115
H1	9	'61B'	'HAA2070'	512	25.05	65	0.015	0.02	0.3	0.06	0.1	2.75	0.28	0.00115
H1	9	'68A'	'HAA2015'	150	19.7	65	0.02	0.02	0.3	0.06	0.1	3	0.3	0.00115
H1	9	'68B'	'HAA100'	875	33.47	75	0.013	0.02	0.3	0.06	0.1	1.4	0.1	0.00115
H1	9	'75A'	'HAA5005'	187	27.66	75	0.04	0.02	0.3	0.06	0.1	1	0.05	0.00115
H1	9	'75B'	'HAA5005'	100	9.91	67	0.012	0.02	0.3	0.06	0.1	1	0.05	0.00115
***	East	140th	Interceptor	METER	HA02I									
H1	8	'123'	'HAA4015'	78	23.71	54	0.018	0.02	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'136'	'HAA4052'	22	8.81	45	0.015	0.02	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'142'	'HAA4037'	25	2.07	59	0.013	0.02	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'153'	'HAA4025'	12	2.69	59	0.02	0.02	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'128'	'HAA180'	8	0.08	54	0.01	0.02	0.3	0.06	0.1	3	0.3	0.00115
***	East	140th	Interceptor	METER	HA03I									
H1	8	'222'	'HAB150'	700	37.81	48	0.05	0.02	0.3	0.06	0.1	1	0.05	0.00115
H1	8	'187A'	'HAB2010'	700	12.27	80	0.05	0.02	0.3	0.06	0.1	1	0.05	0.00115
H1	8	'195'	'HAB110'	50	3.91	25	0.03	0.02	0.3	0.06	0.1	100	99	0.00115
H1	8	'201'	'HAB120'	1000	38.86	65	0.03	0.02	0.3	0.06	0.1	1	0.05	0.00115
H1	8	'221'	'HAB125'	50	13.63	25	0.135	0.02	0.3	0.06	0.1	1	0.05	0.00115
***	East	140th	Interceptor	METER	HA04									
H1	8	'182A'	'HAA4165'	20	5.33	12.71	0.04	0.04	0.5	0.06	0.1	100	99	0.00115
H1	8	'182B'	'HAA4160'	20	3.41	12.71	0.032	0.04	0.5	0.06	0.1	100	99	0.00115
*H1	8	'182B'	'H12A'	600	3.41	40	0.032	0.04	0.5	0.06	0.1	2	0.15	0.00115
H1	8	'192A'	'HAA4183'	20	39.74	12.71	0.02	0.04	0.5	0.06	0.1	100	99	0.00115
H1	8	'192B'	'HAA4175'	20	3.66	12.71	0.065	0.04	0.5	0.06	0.1	100	99	0.00115
H1	8	'194A'	'HAA4183'	20	8.94	12.71	0.02	0.04	0.5	0.06	0.1	100	99	0.00115
***	East	140th	Interceptor	METER	HA06									
H1	8	'134'	'HAA205'	825	26.2	50	0.018	0.02	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'146'	'HAA6411'	350	9.52	65	0.03	0.02	0.3	0.06	0.1	3	0.3	0.00115

Easterly CSO Phase II Modeling Report - SWMM RUNOFF Input for Modeling Sub-Basins (Baseline Conditions)														
*	JK	Sub-Basin Name	Input Node	Width	Area (acres)	% Impervious	Basin Slope	Impervious "n"	Pervious "n"	Impervious Depression Storage	Pervious Depression Storage	Max. Infiltration	Min. Infiltration	Infiltration Decay
H1	8	'150'	'HAA6412'	50	30.8	20	0.012	0.02	0.3	0.06	0.1	100	99	0.00115
H1	8	'150'	'HAA6415'	1341	30.8	30	0.012	0.02	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'158'	'HAA4095'	575	14.07	40	0.01	0.02	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'159'	'HAA215'	50	19.1	20	0.015	0.02	0.3	0.06	0.1	100	99	0.00115
H1	8	'159'	'HAA6415'	500	19.1	60	0.015	0.02	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'214'	'HAA270'	400	40.77	85	0.02	0.02	0.3	0.06	0.1	1	0.05	0.00115
H1	8	'226'	'HAA5192'	50	12.27	20	0.03	0.02	0.3	0.06	0.1	100	99	0.00115
H1	8	'238'	'H02'	30	1.04	20	0.03	0.02	0.3	0.06	0.1	100	99	0.00115
H1	8	'248'	'HAB180'	350	24.86	35	0.049	0.02	0.3	0.06	0.1	1.6	0.11	0.00115
H1	8	'173A'	'HAA6045'	500	11.33	70	0.025	0.02	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'173B'	'HAA235'	50	82.19	20	0.025	0.02	0.3	0.06	0.1	100	99	0.00115
H1	8	'241A'	'HAA5210'	50	14.02	20	0.03	0.02	0.3	0.06	0.1	100	99	0.00115
H1	8	'241B'	'HAA5196'	50	7.95	20	0.03	0.02	0.3	0.06	0.1	100	99	0.00115
H1	8	'204'	'HAA6045'	50	7	20	0.035	0.02	0.3	0.06	0.1	100	99	0.00115
H1	8	'NEW'	'HAA6413'	30	5.28	20	0.02	0.02	0.3	0.06	0.1	100	99	0.00115
***	East	140th	Interceptor	METER	HA07D									
H1	8	'241B'	'HAA5635'	625	7.95	55	0.03	0.02	0.3	0.06	0.1	1	0.05	0.00115
H1	8	'185'	'HAA5045'	1350	7.35	60.5	0.01	0.02	0.3	0.06	0.1	1	0.05	0.00115
H1	8	'199'	'HAA5055'	900	19.11	66	0.01	0.02	0.3	0.06	0.1	1	0.05	0.00115
H1	8	'210'	'HAA5075'	1875	28.74	66	0.025	0.02	0.3	0.06	0.1	1	0.05	0.00115
H1	8	'254'	'HAA5645'	1688	5.4	55	0.025	0.02	0.3	0.06	0.1	1	0.05	0.00115
H1	8	'259'	'HAA5110'	900	12.13	22	0.025	0.02	0.3	0.06	0.1	100	99	0.00115
H1	8	'232'	'HAA5080'	1593	11.46	22	0.01	0.02	0.3	0.06	0.1	100	99	0.00115
H1	8	'175'	'HAA5034'	1200	17.42	63.8	0.02	0.02	0.3	0.06	0.1	1	0.05	0.00115
H1	8	'241A'	'HAA5640'	1012	14.02	55	0.03	0.02	0.3	0.06	0.1	1	0.05	0.00115
***	East	140th	Interceptor	METER	HA08									
H1	8	'173C'	'HAB015'	867	15.39	65	0.02	0.04	0.5	0.06	0.1	1	0.05	0.00115
H1	8	'177A'	'HAB1020'	75	0.88	65	0.02	0.04	0.5	0.06	0.1	1	0.05	0.00115
H1	8	'177B'	'HAB1015'	150	2.2	65	0.02	0.04	0.5	0.06	0.1	1	0.05	0.00115
***	East	140th	Interceptor	METER	HA10									
H1	8	'193'	'HAB1001'	700	9.08	80	0.033	0.02	0.3	0.06	0.1	3	0.3	0.00115
H1	8	'181'	'HAB065'	35	13.77	20	0.028	0.02	0.3	0.06	0.1	100	99	0.00115
***	East	140th	Interceptor	METER	HA12									
H1	8	'203A'	'HAB3025'	50	51.54	17	0.02	0.02	0.3	0.06	0.1	100	99	0.00115
H1	8	'203B'	'HAB3010'	50	9.71	17	0.04	0.02	0.3	0.06	0.1	100	99	0.00115
H1	8	'218'	'HAB3035'	2000	8.11	35	0.035	0.02	0.3	0.06	0.1	2	0.15	0.00115
***	East	140th	Interceptor	METER	HA13I									
H1	8	'157A'	'HAA4130'	125	49.81	65	0.035	0.04	0.5	0.06	0.1	1	0.05	0.00115
H1	8	'157B'	'HAA4140'	62	6.15	65	0.032	0.04	0.5	0.06	0.1	1	0.05	0.00115
H1	8	'187B'	'HAA4140'	15	9.27	20	0.035	0.04	0.5	0.06	0.1	100	99	0.00115
***	East	140th	Interceptor	METER	HA14									
H1	13	'245'	'HAB4155'	80	25.39	20	0.028	0.04	0.5	0.06	0.1	100	99	0.00115
H1	13	'257'	'HAB4045'	100	162.47	20	0.03	0.04	0.5	0.06	0.1	100	99	0.00115
H1	13	'233A'	'HAB4110'	100	23.15	20	0.018	0.04	0.5	0.06	0.1	100	99	0.00115
H1	8	'233B'	'1067B'	100	10.72	5	0.135	0.04	0.5	0.06	0.1	1	0.05	0.00115

Easterly CSO Phase II Modeling Report - SWMM RUNOFF Input for Modeling Sub-Basins (Baseline Conditions)

*	JK	Sub-Basin Name	Input Node	Width	Area (acres)	% Impervious	Basin Slope	Impervious "n"	Pervious "n"	Impervious Depression Storage	Pervious Depression Storage	Max. Infiltration	Min. Infiltration	Infiltration Decay
H1	13	'288'	'HAB4045'	100	24.01	20	0.025	0.04	0.5	0.06	0.1	100	99	0.00115
***	East	140th	Interceptor	METER	HA15I									
H1	8	'141'	'HAA4075'	10	30.68	20	0.02	0.05	0.55	0.06	0.1	100	99	0.00115
***	East	140th	Interceptor	METER	HA16									
H1	7	'244'	'HAB5020'	50	29.85	65.71	0.04	0.02	0.3	0.06	0.1	1	0.05	0.00115
***	Stormwater	flows	to	Shaw	Brook	METER	SBS01							
H1	8	'SHAW'	'SHW130'	1700	197.06	40	0.02	0.04	0.5	0.02	0.1	1	0.02	0.00115
****	East	152nd	Interceptor	METER	IV00									
H1	16	'34'	'IVA1050'	3240	35.9	54	0.012	0.035	0.5	0	0.05	1	0.01	0.00115
H1	16	'40'	'IVA010'	2072	14.9	88	0.02	0.035	0.5	0	0.05	1	0.01	0.00115
H1	16	'45'	'IVA1015'	2400	24.3	61	0.02	0.035	0.5	0	0.05	1	0.01	0.00115
H1	16	'47'	'IVA025'	3600	128.5	95	0.015	0.035	0.5	0	0.05	1	0.01	0.00115
***	East	152nd	Interceptor	METER	IV01									
H1	11	'53'	'IVC036'	550	23.82	60	0.01	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'56'	'IVC030'	700	50.38	65	0.013	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'58'	'IVB1100'	300	8.01	10	0.013	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'60'	'IVB1105'	240	5.07	63	0.013	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'63'	'IVB1070'	700	47.75	55	0.015	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'64'	'IVB1115'	400	17.8	55	0.03	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'69'	'IVB145'	400	13.32	60	0.03	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'70'	'IVB1050'	760	48.31	35	0.019	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'71'	'IVB4030'	660	40.65	33	0.05	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'74'	'IVB080'	680	42.48	80	0.025	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'76'	'IVB155'	340	11.1	50	0.04	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'78'	'IVB3005'	450	16.95	60	0.04	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'80'	'IVB116'	860	67.32	33	0.06	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	9	'83'	'IVB2020'	580	30.67	70	0.012	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'86'	'IVB3040'	960	58.19	30	0.03	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'90'	'IVB4085'	600	32.28	30	0.01	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'94'	'IVB105'	440	17.85	20	0.07	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	9	'96'	'IVB2035'	480	21.74	60	0.02	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'98'	'IVB105'	400	14.69	36	0.05	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'99'	'IVB3125'	640	36.46	30	0.01	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'106'	'IVB3107'	530	26.14	15	0.023	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	9	'59A'	'IVB060'	540	20.1	45	0.02	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'59B'	'IVB1010'	440	18.27	50	0.02	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'101A'	'IVB105'	340	11.81	10	0.028	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'101B'	'IVB105'	540	27.39	40	0.05	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'59C'	'IVB025'	480	21.06	45	0.02	0.035	0.5	0.06	0.1	1	0.01	0.00115
***	East	152nd	Interceptor	METER	IV02I									
H1	11	'107'	'IVA4230'	210.8	12.1	20	0.04	0.035	0.5	0.06	0.1	1	0.01	0.00115
***	East	152nd	Interceptor	METER	IV03I									
H1	9	'119'	'IVA6050'	270	30.19	32	0.02	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	9	'133'	'I08'	38	1.73	16	0.02	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	9	'139'	'IVA6435'	45	5.09	12	0.04	0.035	0.5	0.06	0.1	1	0.01	0.00115

Easterly CSO Phase II Modeling Report - SWMM RUNOFF Input for Modeling Sub-Basins (Baseline Conditions)

*	JK	Sub-Basin Name	Input Node	Width	Area (acres)	% Impervious	Basin Slope	Impervious "n"	Pervious "n"	Impervious Depression Storage	Pervious Depression Storage	Max. Infiltration	Min. Infiltration	Infiltration Decay
***	East	152nd	Interceptor	METER	IV04I									
H1	17	'84B'	'IVA4350'	500	284.05	10	0.01	0.035	0.5	0.06	0.1	1	0.01	0.00115
***	East	152nd	Interceptor	METER	IV06									
H1	17	'126'	'IVB4125'	110	45.42	5	0.01	0.035	0.5	0.12	0.2	1	0.015	0.00115
***	East	152nd	Interceptor	METER	IV08									
H1	9	'65'	'IVA2045'	180	37.63	48	0.016	0.035	0.5	0.06	0.1	1	0.05	0.00115
H1	9	'66'	'IVA059'	220	43.21	50	0.02	0.035	0.5	0.06	0.1	1	0.05	0.00115
H1	9	'67'	'IVA2030'	95	49.19	55	0.02	0.035	0.5	0.06	0.1	1	0.05	0.00115
H1	9	'89'	'IVA3030'	320	29.96	70	0.015	0.035	0.5	0.06	0.1	1	0.05	0.00115
H1	9	'92'	'IVA170'	150	37.69	65	0.015	0.035	0.5	0.06	0.1	1	0.05	0.00115
H1	9	'108'	'IVA3060'	195	56.49	65	0.023	0.035	0.5	0.06	0.1	1	0.05	0.00115
H1	8	'122'	'IVA3085'	130	4.9	50	0.03	0.035	0.5	0.06	0.1	1	0.05	0.00115
H1	9	'77A'	'IVA5015'	90	24.15	10	0.015	0.035	0.5	0.06	0.1	1	0.05	0.00115
H1	9	'77B'	'IVA5945'	300	27.25	30	0.012	0.035	0.5	0.06	0.1	1	0.05	0.00115
H1	9	'79A'	'IVA3020'	95	15.74	10	0.015	0.035	0.5	0.06	0.1	1	0.05	0.00115
H1	9	'79B'	'IVA3020'	75	9.48	10	0.03	0.035	0.5	0.06	0.1	1	0.05	0.00115
H1	9	'79C'	'IVA3015'	95	18.84	30	0.015	0.035	0.5	0.06	0.1	1	0.05	0.00115
***	East	152nd	Interceptor	METER	IV10									
H1	9	'125'	'IVA3126'	9	5.8	32	0.035	0.05	0.65	0.1	0.2	1	0.01	0.00115
H1	9	'130'	'IVA3090'	3	0.53	12	0.01	0.05	0.65	0.1	0.2	1	0.01	0.00115
H1	8	'131B'	'IVA3100'	32	19.85	48	0.03	0.05	0.65	0.1	0.2	1	0.01	0.00115
H1	8	'131A'	'IVA3125'	16	6.64	40	0.033	0.05	0.65	0.1	0.2	1	0.01	0.00115
***	East	152nd	Interceptor	METER	IV12									
H1	8	'135'	'IVA3130'	27.5	1.73	10	0.025	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	8	'144'	'IVA3140'	70.6	4.05	10	0.022	0.035	0.5	0.06	0.1	1	0.01	0.00115
***	East	152nd	Interceptor	METER	IV14									
H1	9	'103'	'IVA6225'	210	57.19	45	0.028	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	9	'111'	'IVA180'	40	6.55	85	0.01	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	9	'115'	'IVA6205'	60	12.62	65	0.03	0.035	0.5	0.06	0.1	1	0.01	0.00115
***	East	152nd	Interceptor	METER	IV16									
H1	9	'145'	'IVA6070'	58.2	14.7	16	0.03	0.035	0.5	0.06	0.1	1	0.02	0.00115
H1	9	'154'	'IVA6080'	37.7	10.38	16	0.05	0.035	0.5	0.06	0.1	1	0.02	0.00115
H1	8	'170'	'IVA6092'	57.5	9.89	16	0.015	0.035	0.5	0.06	0.1	1	0.02	0.00115
H1	9	'152A'	'IVA6115'	52.5	31.63	16	0.01	0.035	0.5	0.06	0.1	1	0.02	0.00115
H1	8	'152B'	'IVA6105'	25	8.76	5	0.015	0.035	0.5	0.06	0.1	1	0.02	0.00115
*	Basins	formerly	tributary	to	IV16;	now	tributary	to	HH02					
H1	14	'84A'	'HIA100'	6500	15370	7	0.01	0.02	0.3	0.01	0.1	99	99	0.00115
H1	13	'164'	'IVA6140'	425	174.48	15	0.02	0.035	0.5	0.06	0.1	100	99	0.00115
H1	11	'172'	'IVA6161'	40	0.49	15	0.01	0.035	0.5	0.06	0.1	100	99	0.00115
H1	13	'174'	'IVA6186'	50	4.9	10	0.012	0.035	0.5	0.06	0.1	100	99	0.00115
H1	13	'179'	'IVA6202'	500	212.95	15	0.023	0.035	0.5	0.06	0.1	100	99	0.00115
H1	13	'184'	'IVA6133'	60	14.39	15	0.026	0.035	0.5	0.06	0.1	100	99	0.00115
H1	13	'190'	'IVA6145'	75	24.63	15	0.028	0.035	0.5	0.06	0.1	100	99	0.00115
***	East	152nd	Interceptor	METER	IV18									
H1	17	'117'	'IVA6213'	70	121.39	6.5	0.01	0.075	0.75	0	0.01	1	0.01	0.00115

Easterly CSO Phase II Modeling Report - SWMM RUNOFF Input for Modeling Sub-Basins (Baseline Conditions)

*	JK	Sub-Basin Name	Input Node	Width	Area (acres)	% Impervious	Basin Slope	Impervious "n"	Pervious "n"	Impervious Depression Storage	Pervious Depression Storage	Max. Infiltration	Min. Infiltration	Infiltration Decay
H1	11	'127'	'IVA6213'	82.5	57.63	6.5	0.01	0.075	0.75	0	0.01	1	0.01	0.00115
***	East	152nd	Interceptor	METER	IV20									
H1	17	'110B'	'IVA4180'	300	150.67	5	0.025	0.035	0.5	0.06	0.1	1	0.01	0.00115
***	Rockefeller	Relief	Sewer	METER	RF02I									
H1	11	'26'	'IVD040'	80	99.85	28	0.01	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	16	'35'	'IVD020'	336.1	42.49	40	0.01	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	16	'38'	'IVD035'	130	52.4	30	0.01	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'41'	'IVD1060'	250	41.88	80	0.01	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'46'	'IVC050'	150	61.71	45	0.02	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	11	'48'	'IVD1040'	120	43.81	50	0.01	0.035	0.5	0.06	0.1	1	0.01	0.00115
H1	16	'51'	'IVD1020'	240	46.74	55	0.01	0.035	0.5	0.06	0.1	1	0.01	0.00115
***	Stormwater	flows	to	Nine	Mile	Creek	-	Input	node	NIN255	-	METER	NMS02	
H1	17	'NMS02'	'NIN255'	8000	2115	15	0.02	0.035	0.5	0.06	0.1	1	0.3	0.00115
***	Stormwater	flows	to	Nine	Mile	Creek	-	Input	node	NIN240	-	METER	NMS01	
H1	17	'SEP1'	'NIN240'	6300	637.57	20	0.03	0.035	0.5	0.06	0.1	1	0.3	0.00115
***	Stormwater	flows	to	Nine	Mile	Creek	-	Input	node	NIN145	-	METER	NMS01	
*	Separate	sewer	areas	tributary	to	node	NIN145							
H1	9	'SEP2'	'NIN145'	5600	737.01	20	0.02	0.035	0.5	0.06	0.1	1	0.3	0.00115
*	Open	areas	tributary	to	node	NIN145								
H1	9	'open1'	'NIN145'	3400	87.22	5	0.04	0.035	0.5	0.06	0.1	1	0.3	0.00115
***	Stormwater	flows	to	Nine	Mile	Creek	-	Input	node	NIN010	-	METER	NMS01	
H1	9	'open2'	'NIN010'	6200	79.19	5	0.02	0.035	0.5	0.06	0.1	1	0.3	0.00115

APPENDIX C

Base Flow Input File

Easterly CSO Phase II Model - Base Flow Input File (baseline.cif)

EAA8565	0.08451	EA38I
EAA9510	0.0012	EA40I reduced from 0.0028
E22U	0.00009	
E23F	0.017	EA42(to be verify)
EAA9030	0.0005	to FSPS (EA43)
EAA8175	0.00045	to Reg E-20
EAA8125	0.00045	to Reg E-20
EAA8100	0.00045	to Reg E-20
EAA8040	0.00045	to Reg E-20
EAA8020	0.00045	to Reg E-20
SAPSU	0.0135	to SAPS
EAA9750	0.0054	to SAPS
EAA9705	0.0054	to SAPS
EAA9670	0.0135	to SAPS
E23B	0.0023	EA43
E29U	0.0005	EA44D end of flats.cif
EAG1235	0.0009	EA32I
EAG1115	0.0009	EA32I
EAG070	0.0009	EA32I
EAG2010	0.0009	EA32I
EAG1060	0.0009	EA32I
EAG030	0.0009	EA32I
EAA7060	0.0009	EA32I
EAA7045	0.00009	0
E14	0.00009	0
EAG1035	0.00009	0
EAA7005	0.00009	0
EAH8135	0.00135	EA34D
EAH8080	0.00135	EA34D
EAH8040	0.00135	EA34D
EAH080	0.00135	EA34D
EAH060	0.00135	EA34D
EAH2045	0.00135	EA34D
EAH1015	0.00135	EA34D
EAA7535	0.00135	E12th St san.
EAI015	0.00252	EA36
EAI1055	0.00252	EA36
EAH3025	0.00252	EA36
BLPSF	0.00036	EA33 end of CSO94_95
EAE2005	0.01413	EA24I
EAE1510	0.01413	EA24I
EAE3035	0.01413	EA24I
EAE4015	0.009	EA25
EAE6020	0.009	EA25
EAJ2035	0.009	EA25
EAE230	0.009	EA25
EAE150	0.009	EA25
EAA6260	0.0054	EA28I
EAF1070	0.0054	"EA29I," Consider baseflow out at E10
EAA6590	0.00018	REGE12
EAA6640	0.00117	REGE12
E11U	0.00009	REGE11
EAF102	0.0045	REGE10
E10W	0.00018	E29I end of E40
EAK9515	0.0072	inf EA23
EAK9030	0.0072	inf EA23
EAK8020	0.0072	inf EA23
EAK6525	0.0072	inf EA23

```
EAK5020     0.0072      inf   EA23
EAA5535     0.0045      inf   EA22
EAD060      0.01233     inf   EA20
EAD7012     0.01233     inf   EA20
EAD3015     0.01233     inf   EA20
EAK1365     0.0162      inf   EA15I
EAK1235     0.0162      inf   EA15I
EAK2200     0.0162      inf   EA15I
EAK1160     0.0162      inf   EA15I
EAK1200     0.0162      inf   EA15I
EAK1345     0.0162      inf   EA15I
EAK2095     0.0162      inf   EA15I end   of    E55
E34W        0.00045
E34A        0.00126
EAB230      0.0153
EAB275      0.0153
EAB7070     0.0153
EAC3125     0.00333
E38U        0.0018
EAB1060     0.00378
EAB3075     0.01278
EAB4096     0.0099
EAB4160     0.0099
EAB4225     0.0099
EAC6085     0.0099
EAC9510     0.009
EAC9015     0.009
EAC8015     0.009
EAC2100     0.0225
EAC3020     0.0225
EAC4025     0.0225
EAB2005     0.0054      end   of    E79
;     Dugway      submodel    infiltration      rate    (m3/s)
;Flows      to    DE02IA
DUA035      0.0035861
DUB015      0.0035861
DUA200      0.0035861
DUA045      0.0035861
DUC3004     0.0035861
DUC115      0.0035861
DUC100      0.0035861
DUC135      0.0035861
DUB070      0.0035861
DUC070      0.0035861
DUB070      0.0035861
DUA181      0.0035861
;Flows      to    DE02IB
DUC2025     0.0023619
;Flows      to    DE03
D66         0.0011774
DUA065      0.0011774
DUA100      0.0011774
DUA125      0.0011774
;Flows      to    DE04
DUA136      0.002037
DUC1074     0.002037
DUC1090     0.002037
DUC1004     0.002037
D85         0.002037
DUC1072     0.002037
DUC1170     0.002037
```

DUC1018	0.002037	
DUA145	0.002037	
D79	0.002037	
;Flows	to	DW00
DUD025	0.0003508	
DUD2025	0.0003508	
D03	0.0003508	
DUD1340	0.0003508	
DUD1325	0.0003508	
DUD1330	0.0003508	
DUD188	0.0003508	
DUD060	0.0003508	
DUD3010	0.0003508	
DUD1042	0.0003508	
DUD135	0.0003508	
DUD155	0.0003508	
DUD2500	0.0003508	
D04	0.0003508	
;Flows	to	DW03
DUD4035	0.0205745	
;Flows	to	DW04
EAA3025	0.0028291	
;Flows	to	DW08
D74	0.00099828	
D54D	0.00049914	
DUD1335	0.00099828	
DUE180	0.00049914	
D54	0.00049914	
D55	0.00149742	
DUD6110	0.00049914	
DUD1345	0.00049914	
DUD6108	0.00049914	
DUD6105	0.00149742	
D73	0.00099828	
D12	0.00049914	
DUD1043	0.00049914	
DUE120	0.00099828	
DUD6065	0.00049914	
DUD6025	0.00049914	
DUE155	0.00049914	
DUD1320	0.00049914	
DUD1310	0.00049914	
DUD1305	0.00049914	
;Flows	to	DW10
DUD4085	0.0043528	
;Flows	to	DW12
D30A	0.004534	
;Flows	to	DW14
DUD1315	0.00012744	
;Flows	to	DW15IA
DUD1300	0.00097987	
;Flows	to	DW15IB
DUD1182	0.00036061	
DUD1203	0.00036061	
DUD1240	0.00036061	
DUD1205	0.00036061	
D50	0.00036061	
DUD1215	0.00036061	
DUD1202	0.00036061	
D53	0.00036061	
DUD1190	0.00036061	

```
DUD1160     0.00036061
DUD6120     0.00036061
D50         0.00036061
;Flows      to    DW19
DUD1040     0.002025
DUD1070     0.002025
DUD4007     0.002025
DUD1082     0.002025
DUD1035     0.002025
DUD1155     0.002025
DUD4007     0.002025
DUD5035     0.002025
;Flows      to    DW21
D70B        0.0035697
DUC2505     0.0035697
;Flows      to    dugway      west  culvert
DCW178      0.045312
;FLows      to    dugway      east  culvert
DCE260      0.016992
;Flows      from  Doan  area
EAA4055     0.0008357
EAA4035     0.0008655
E41M        0.001504
EAA4565     0.001592
EAA4590     0.001379
E41C        0.0006964
EAA4640     0.001087
EAA4705     0.0008632
EAA4785     0.002031
EAA163      0.003051
EAA3020     0.0009785
;Flows      from  Shaw  brook area
EAA1205     0.00019     EA17I
EAA2057     0.0015      AREA  112
EAA1050     0.027       EA17, AREA  81+95+88
EAA1035     0.0092      EA17, AREA  82
;Flow artificially added to make up decrease for EA06 meter
EAA035      0.0436
EAA2020     0.03
; E. 140th Sub-model constant inflows (infiltration)
; Flows to HA00
HAA1035         0.008495
HAA075          0.008495
HAA071          0.008495
HAA1050         0.008495
HAA1552         0.008495
; Flows to HA01D
HAA2055         0.0081025       0.0
HAA2045         0.0081025       0.0
HAA2145         0.0081025       0.0
HAA2180         0.0081025       0.0
HAA2131         0.0081025       0.0
HAA2181         0.0081025       0.0
HAA180          0.0081025       0.0
HAA5025         0.0081025       0.0
HAA2110         0.0081025       0.0
HAA2080         0.0081025       0.0
HAA2015         0.0081025       0.0
HAA145          0.0081025       0.0
HAA5005         0.0081025       0.0
HAA5005         0.0081025       0.0
```

```
; FLOWS TO HA03I
HAB170          0.0021997       0.0
HAB2010         0.0021997       0.0
HAB110          0.0021997       0.0
HAB145          0.0021997       0.0
HAB135          0.0021997       0.0
;  FLOWS TO HA04
HAA4170         0.00018877      0.0
HAA4160         0.00018877      0.0
H12A            0.00018877      0.0
HAA4183         0.00018877      0.0
HAA4182         0.00018877      0.0
HAA4183         0.00018877      0.0
;  FLOWS TO HA06
HAA215          0.0013847       0.0
HAA6415         0.0013847       0.0
HAA7045         0.0013847       0.0
HAA5192         0.0013847       0.0
H02             0.0013847       0.0
HAB190          0.0013847       0.0
HAA6045         0.0013847       0.0
HAA270          0.0013847       0.0
HAA5210         0.0013847       0.0
HAA5196         0.0013847       0.0
HAA6045         0.0013847       0.0
HAA220          0.0013847       0.0
HAA6411         0.0013847       0.0
HAA6412         0.0013847       0.0
HAA6415         0.0013847       0.0
HAA4110         0.0013847       0.0
;  FLOWS TO HA07D- WILL ADD INFILTRATION TO 232 STM IN FUTURE
HAA5196         0.0003798       0.0
HAA5055         0.0003798       0.0
HAA5065         0.0003798       0.0
HAA5100         0.0003798       0.0
HAA5210         0.0003798       0.0
HAA5110         0.0003798       0.0
HAA5080         0.0003798       0.0
HAA5034         0.0003798       0.0
;  FLOWS TO HA08
HAB055          0.0007457       0.0
HAB1020         0.0007457       0.0
HAB1015         0.0007457       0.0
;  FLOWS TO HA12
HAB3035         0.00042664      0.0
HAB3030         0.00042664      0.0
HAB3030         0.00042664      0.0
;  FLOWS TO HA13I
HAA4210         0.0028317       0.0
HAA4140         0.0028317       0.0
HAA4140         0.0028317       0.0
;  FLOWS TO HA14
HAB4155         0.0040578       0.0
HAB4045         0.0040578       0.0
HAB4150         0.0040578       0.0
HAB4040         0.0040578       0.0
HAB4045         0.0040578       0.0
;  FLOWS TO HA16
HAB5020         0.0026335       0.0
; INFILTRATION FLOWS FOR E152 SUB-MODEL
; FLOWS TO METER IV00
```

```
IVA1065      0.035 0.0
IVA019       0.035 0.0
IVA1030      0.035 0.0
IVA045       0.035 0.0
; FLOWS TO METER IV01
IVC040       0.000115 0.0
IVC031       0.000115 0.0
IVB1100      0.000115 0.0
IVB1105      0.000115 0.0
IVB1095      0.000115 0.0
IVB1115      0.000115 0.0
IVB160       0.000115 0.0
IVB1065      0.000115 0.0
IVB4070      0.000115 0.0
IVB100       0.000115 0.0
IVB160       0.000115 0.0
IVB3025      0.000115 0.0
IVB130       0.000115 0.0
IVB2030      0.000115 0.0
IVB3100      0.000115 0.0
IVB4115      0.000115 0.0
IVB105       0.000115 0.0
IVB2035      0.000115 0.0
IVB105       0.000115 0.0
IVB3140      0.000115 0.0
IVB3107      0.000115 0.0
IVB070       0.000115 0.0
IVB1045      0.000115 0.0
IVB105       0.000115 0.0
IVB105       0.000115 0.0
IVC010       0.000115 0.0
; FLOWS TO METER IV04
IVA4370      0.06088 0.0
; FLOWS TO METER IV06
IVB4125      0.000408 0.0
; FLOWS TO METER IV08
IVA060  0.01048  0.0
; FLOWS TO METER IV10
IVA3126      0.000910 0.0
IVA3090      0.000910 0.0
IVA3120      0.000910 0.0
IVA3125      0.000910 0.0
; FLOWS TO METER IV12
IVA3130      0.0004063 0.0
IVA3140      0.0004063 0.0
; FLOWS TO METER IV14
IVA6240      0.0062 0.0
IVA6005      0.0062 0.0
IVA6210      0.0062 0.0
; FLOWS TO METER IV16
IVA6070      0.0012 0.0
IVA6085      0.0012 0.0
IVA6095      0.0012 0.0
IVA6135      0.0012 0.0
IVA6115      0.0012 0.0
; FLOWS TO METER IV18
IVA6213      0.000000 0.0
IVA6213      0.000000 0.0
; FLOWS TO METER RF02I
IVD045       0.003798 0.0
IVD025       0.003798 0.0
```

```
IVD040      0.003798 0.0
IVD1085     0.003798 0.0
IVC075      0.003798 0.0
IVD1050     0.003798 0.0
IVD1035     0.003798 0.0
; FLOWS TO METER IV02
IVA4245 0.000142 0.0
; FLOWS TO METER IV03d
IVA6055 0.001048 0.0
IVA6435 0.001048 0.0
I08     0.001048 0.0
; FLOWS TO METER GCS02
GRN180  0.05663  0.0
;Lake Shore-Nottingham-Euclid Creek Sub-model constant inflows
(infiltration)
;Euclid Creek Infiltration input using flow per unit length method in
link menu
; Flows to NO02D
NOB065     0.0000382     0.0
NOB055     0.0000382     0.0
NOC050     0.0000382     0.0
NOB1110    0.0000382     0.0
NOB025     0.0000382     0.0
NOB1040    0.0000382     0.0
NOB1105    0.0000382     0.0
NOA150     0.0000382     0.0
NOA155     0.0000382     0.0
NOB035     0.0000382     0.0
; Flows to NO00
NOB1003    0.000481      0.0
; Flows to LS02
NOA095     0.011         0.0
NOA065     0.011         0.0
; Flows to LS00
LSA125     0.0135        0.0
LSA099     0.0135        0.0
LSA2600    0.0135        0.0
LSA5015    0.0135        0.0
LSA4025    0.0135        0.0
LSA3035    0.0135        0.0
LSA2500    0.0135        0.0
LSA6100    0.0135        0.0
LSA2025    0.0135        0.0
LSA025     0.0135        0.0
LSA2196    0.0135        0.0
LSA2145    0.0135        0.0
LSA070     0.0135        0.0
LSA026     0.0135        0.0
LSA2050    0.0135        0.0
LSA2085    0.0135        0.0
; Infiltration for Heights/Hill Top
HIA100   0.464           reduced due to additional flows from IV20
HIB095   0.0314
CIFEND
```

APPENDIX D

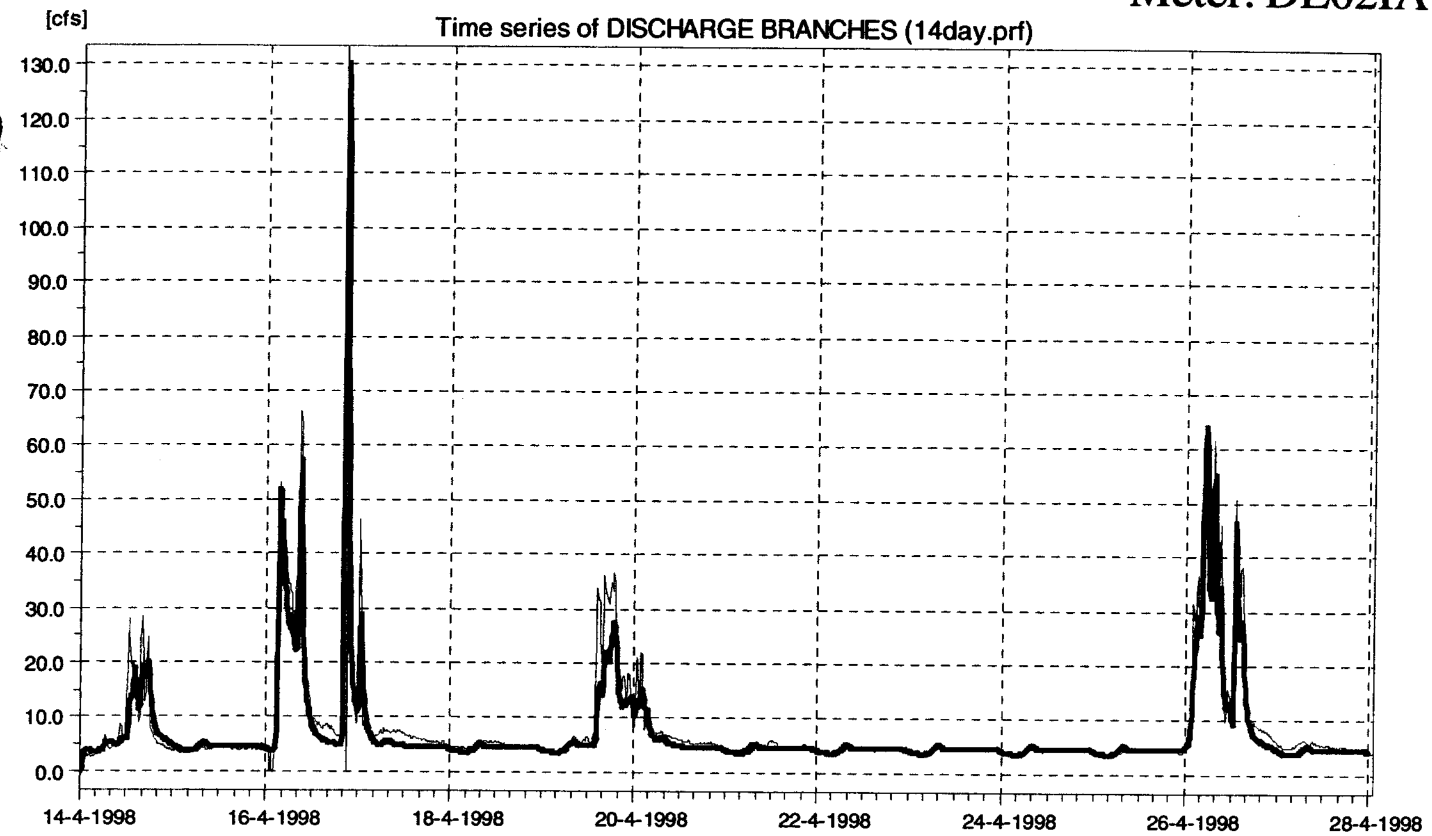
Calibration Plots

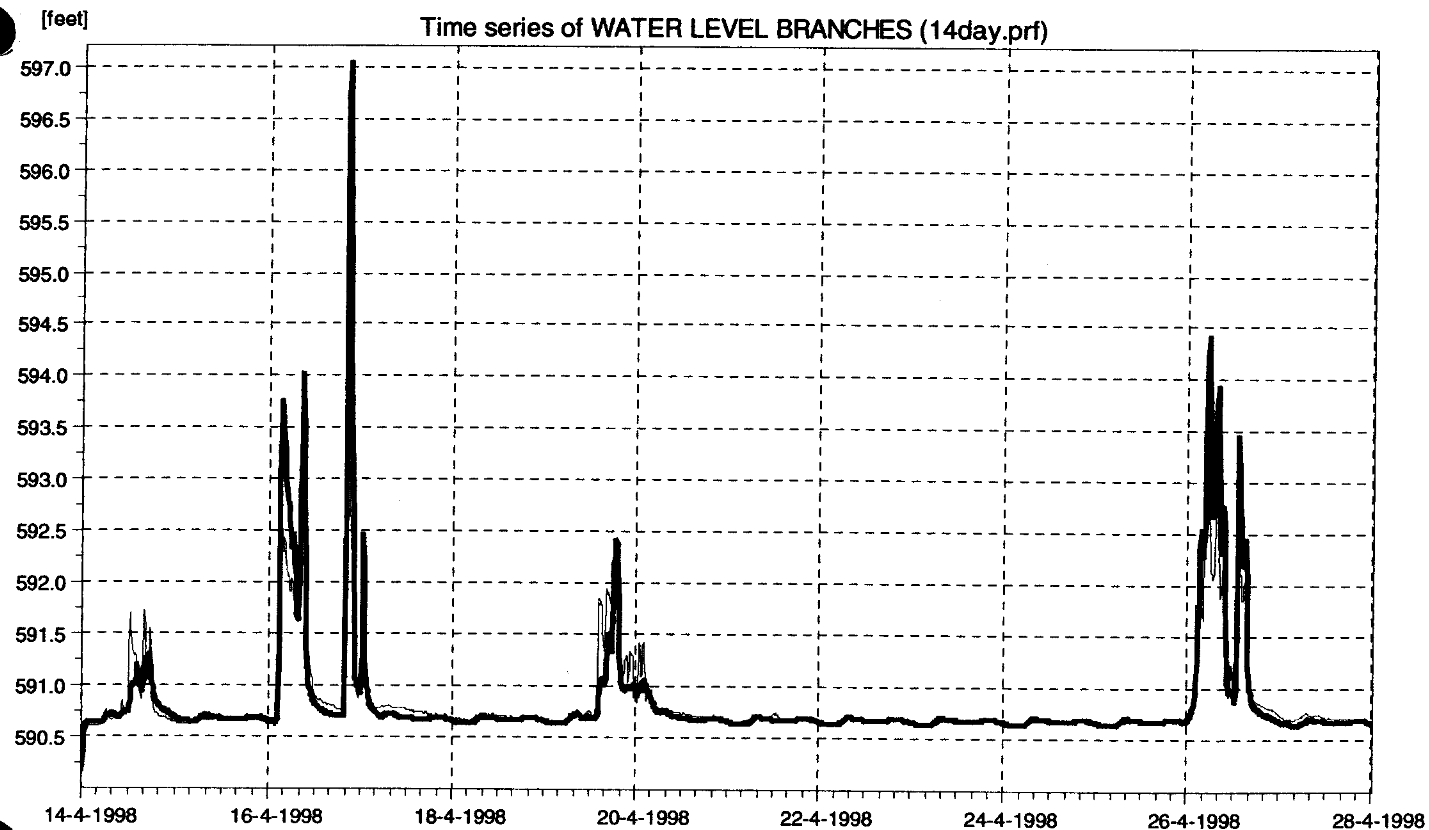
A complete list of meters is included in Appendix H

Calibration Plots are grouped by model sub-area in the following order:

- Dugway Sub-model
- E. 140th Sub-model
- E. 152nd Sub-model
- Easterly Sub-model
- Lakeshore-Nottingham Sub-model

Meter: DE02IA





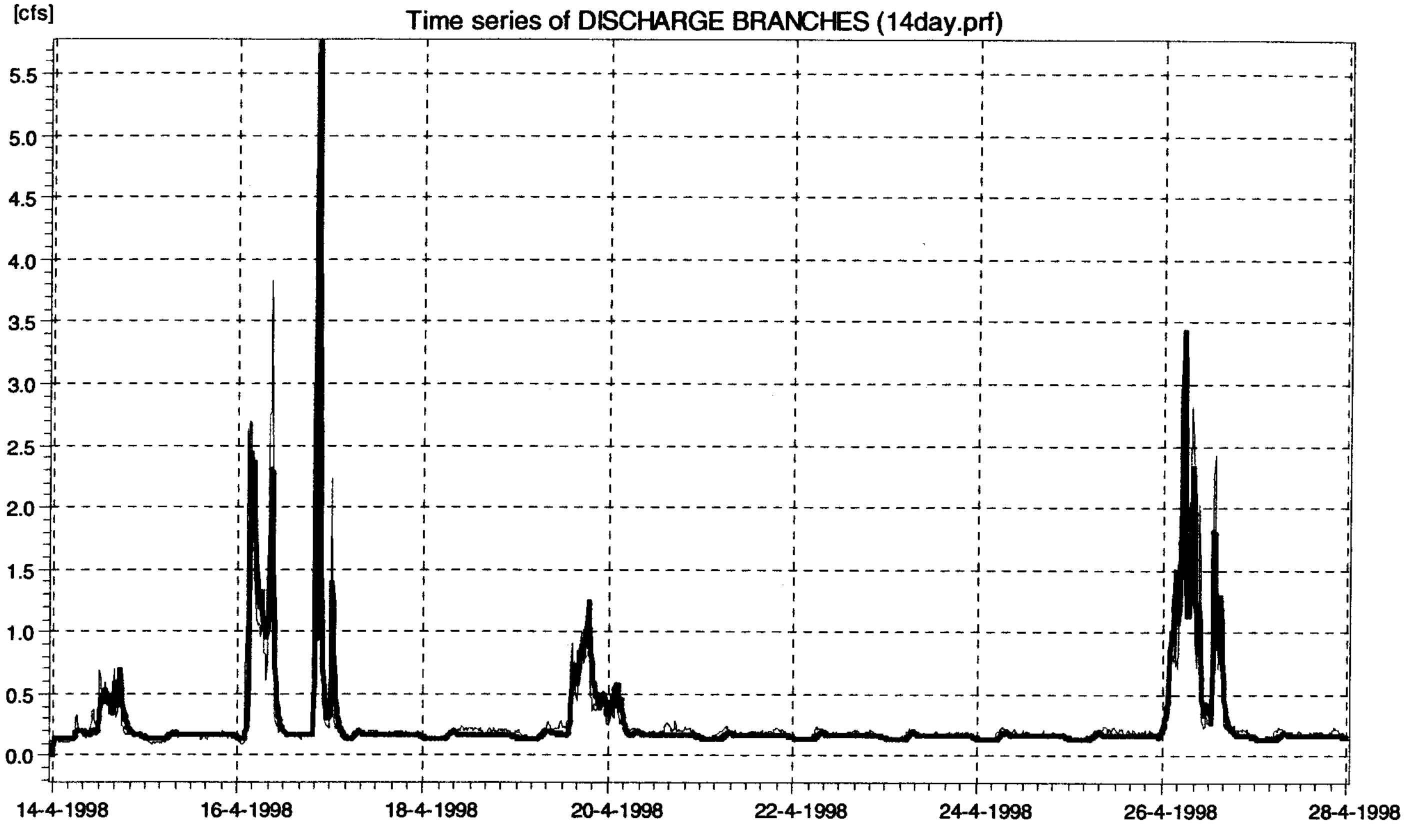
M&E Metcalf & Eddy AQUA ALLIANCE

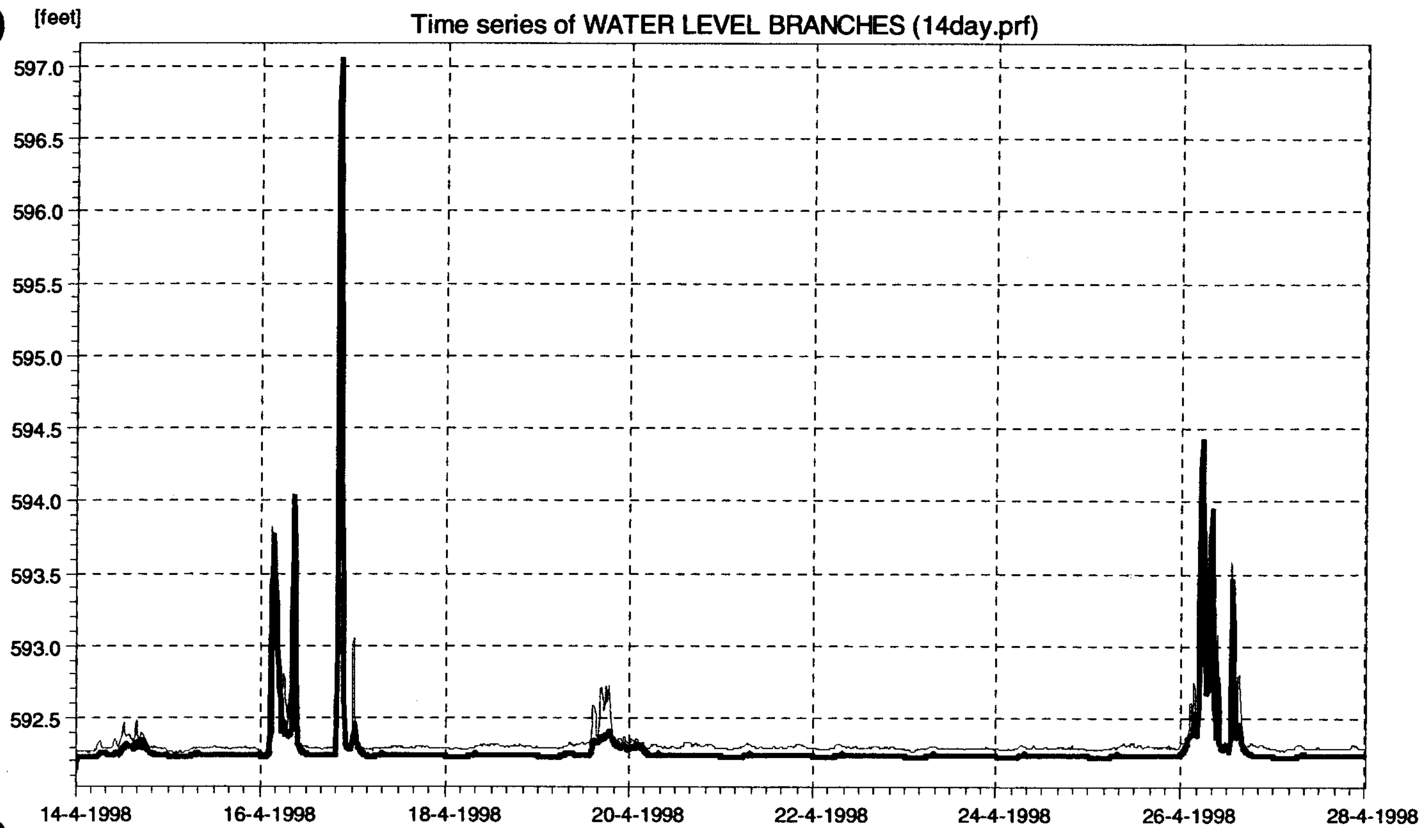
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: DE02IB





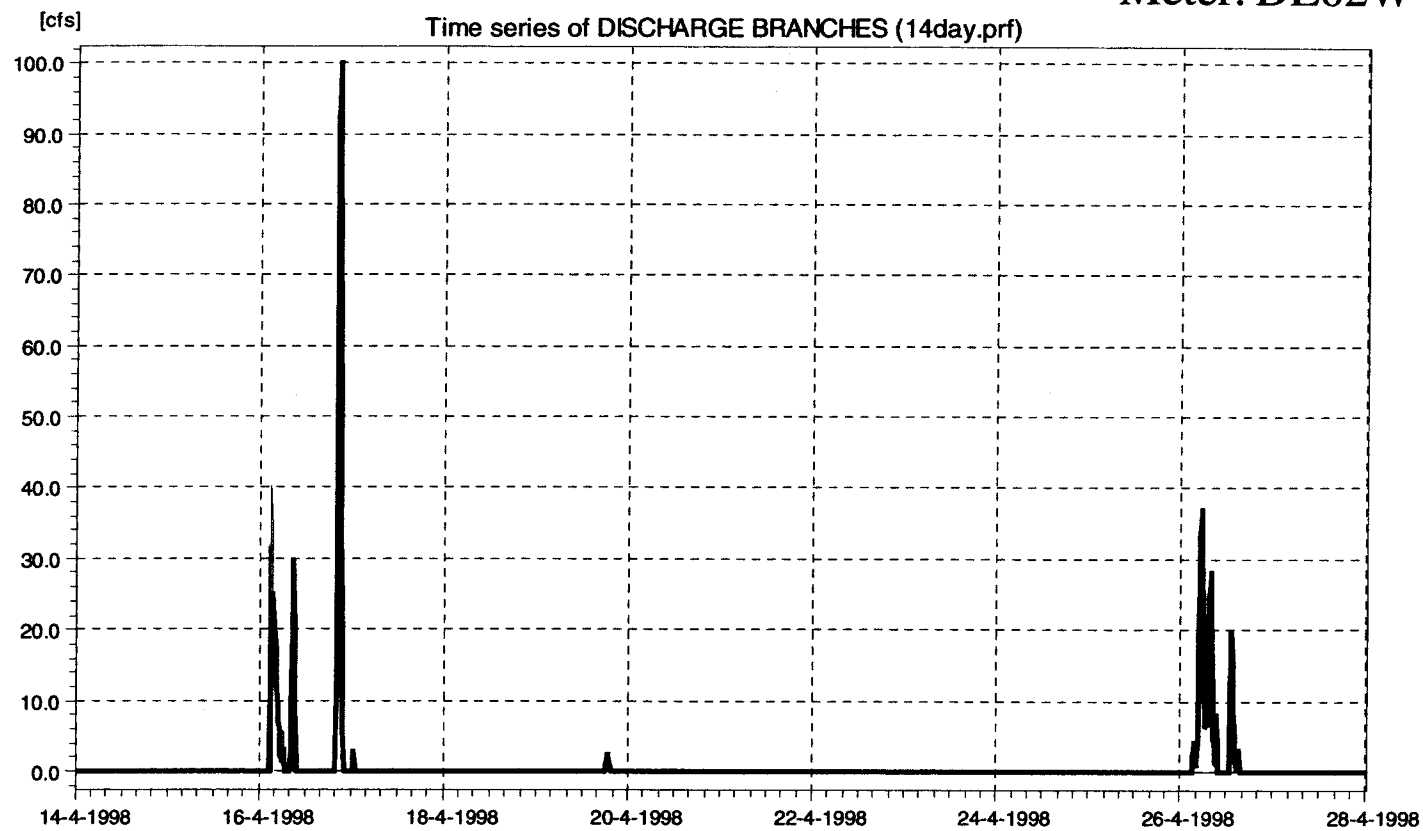
M&E Metcalf & Eddy AQUA ALLIANCE

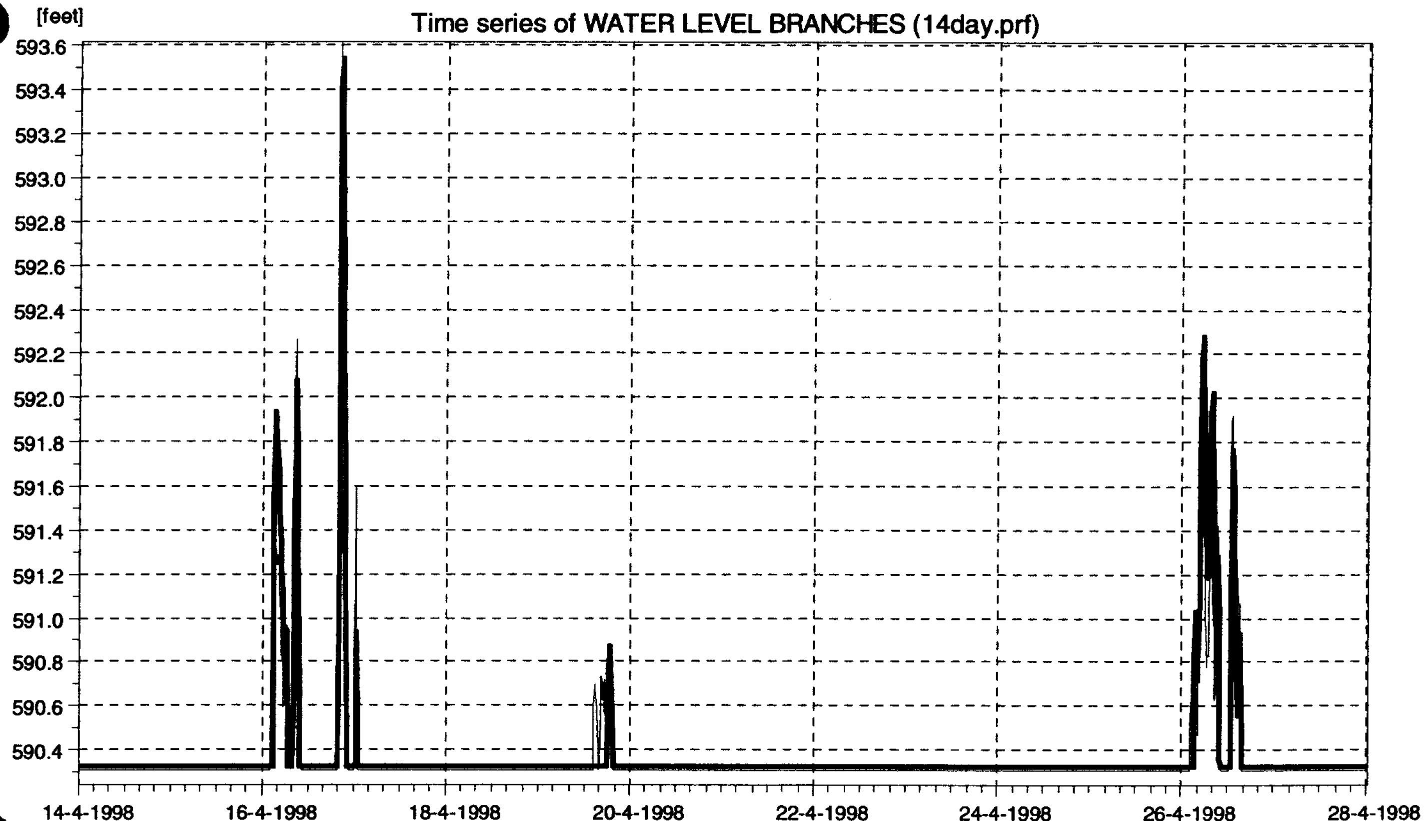
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: DE02W





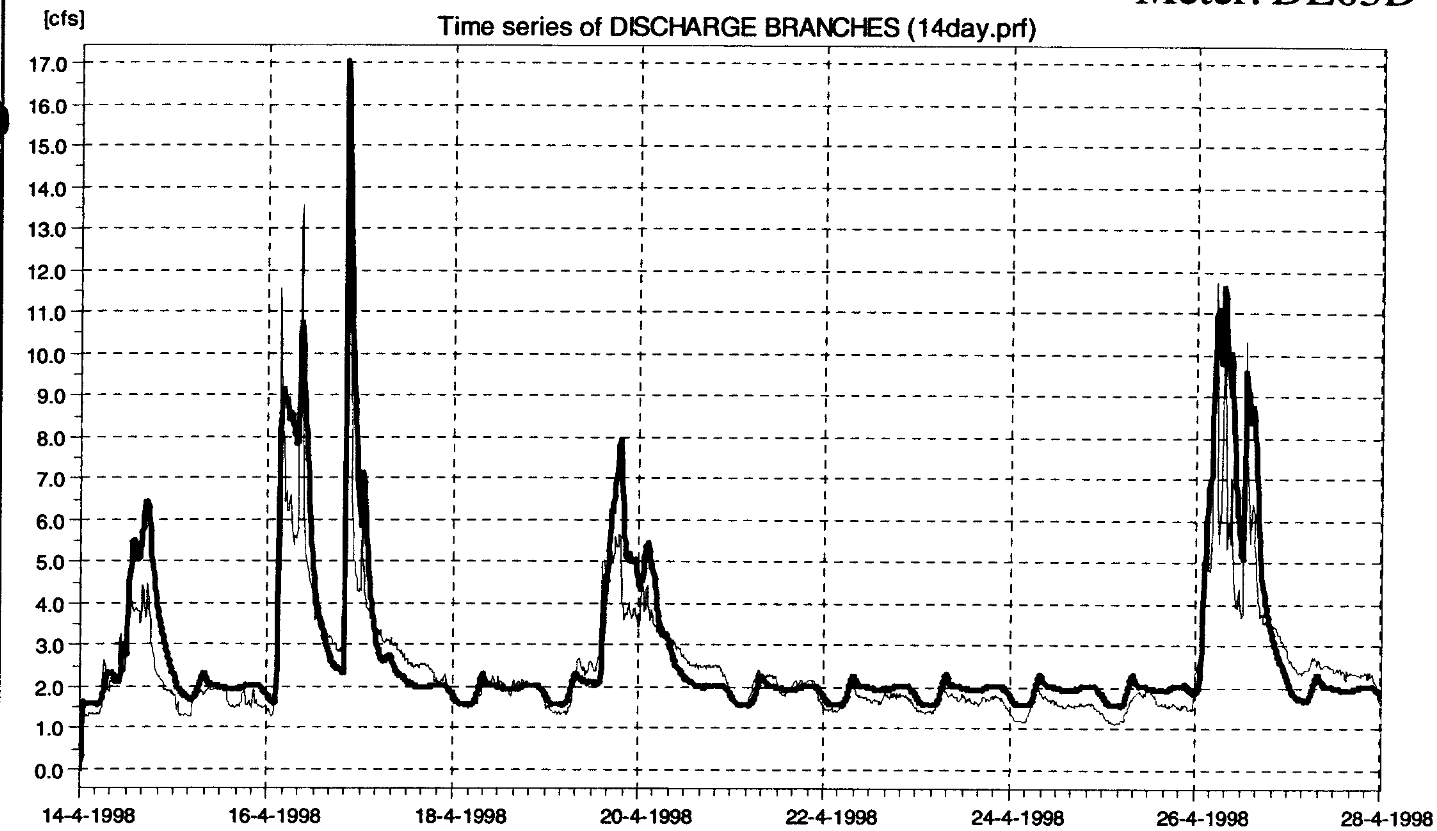
Metcalf & Eddy

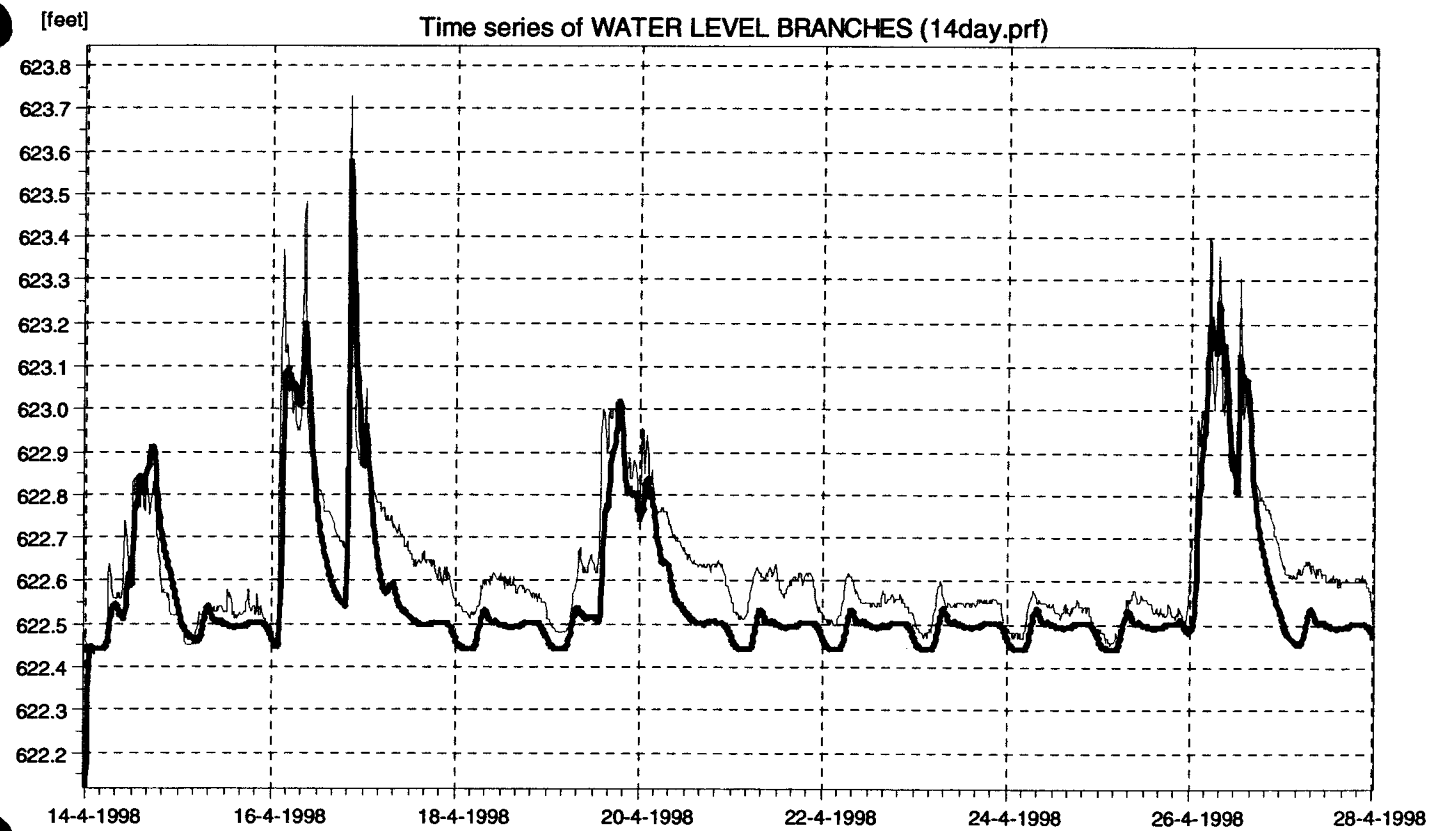
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: DE03D





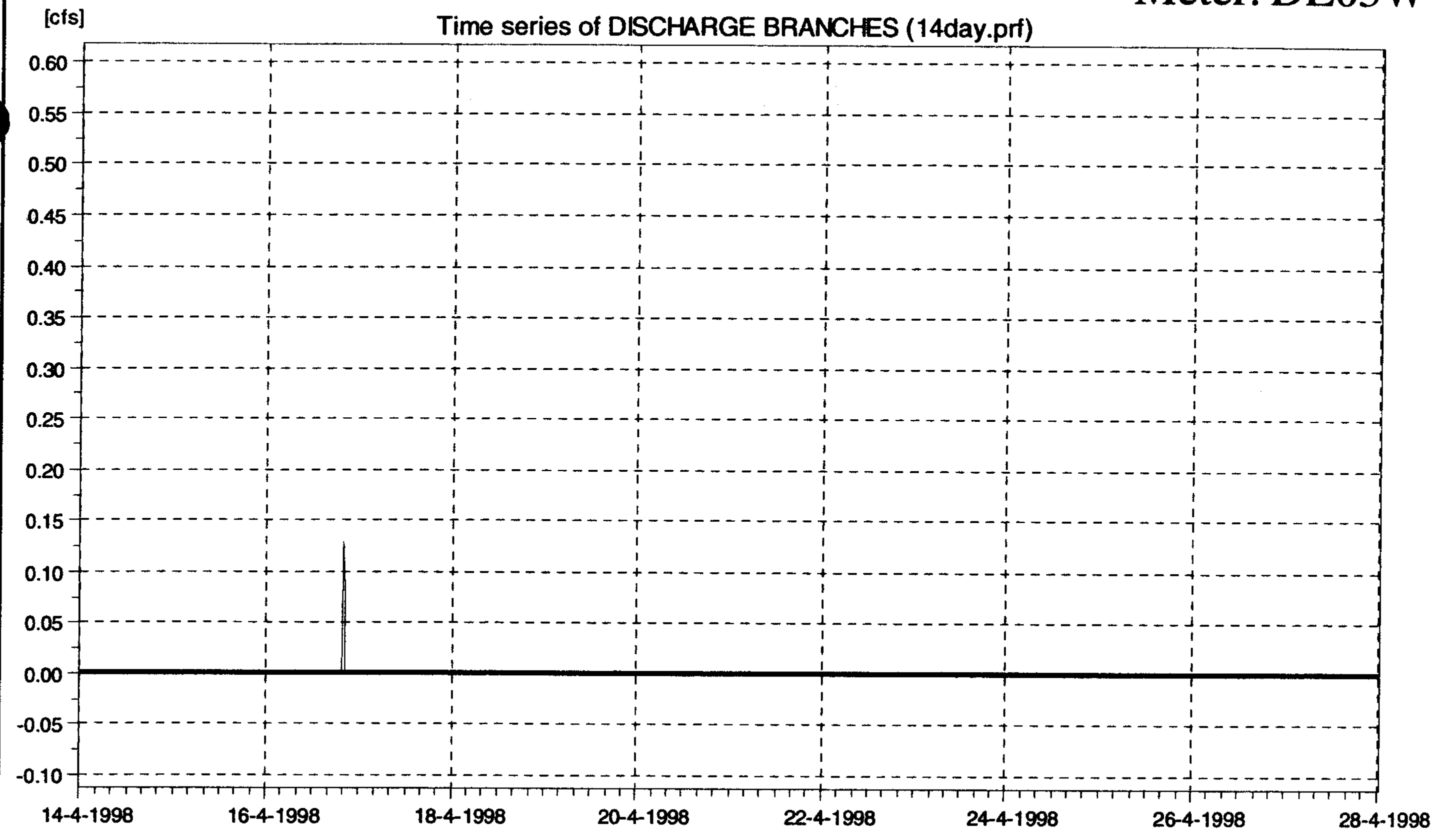
M&E AQUA ALLIANCE Metcalf & Eddy

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: DE03W


[cfs]
Time series of DISCHARGE BRANCHES (14day.prf)
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
-0.05
-0.10
14-4-1998
16-4-1998
18-4-1998
20-4-1998
22-4-1998
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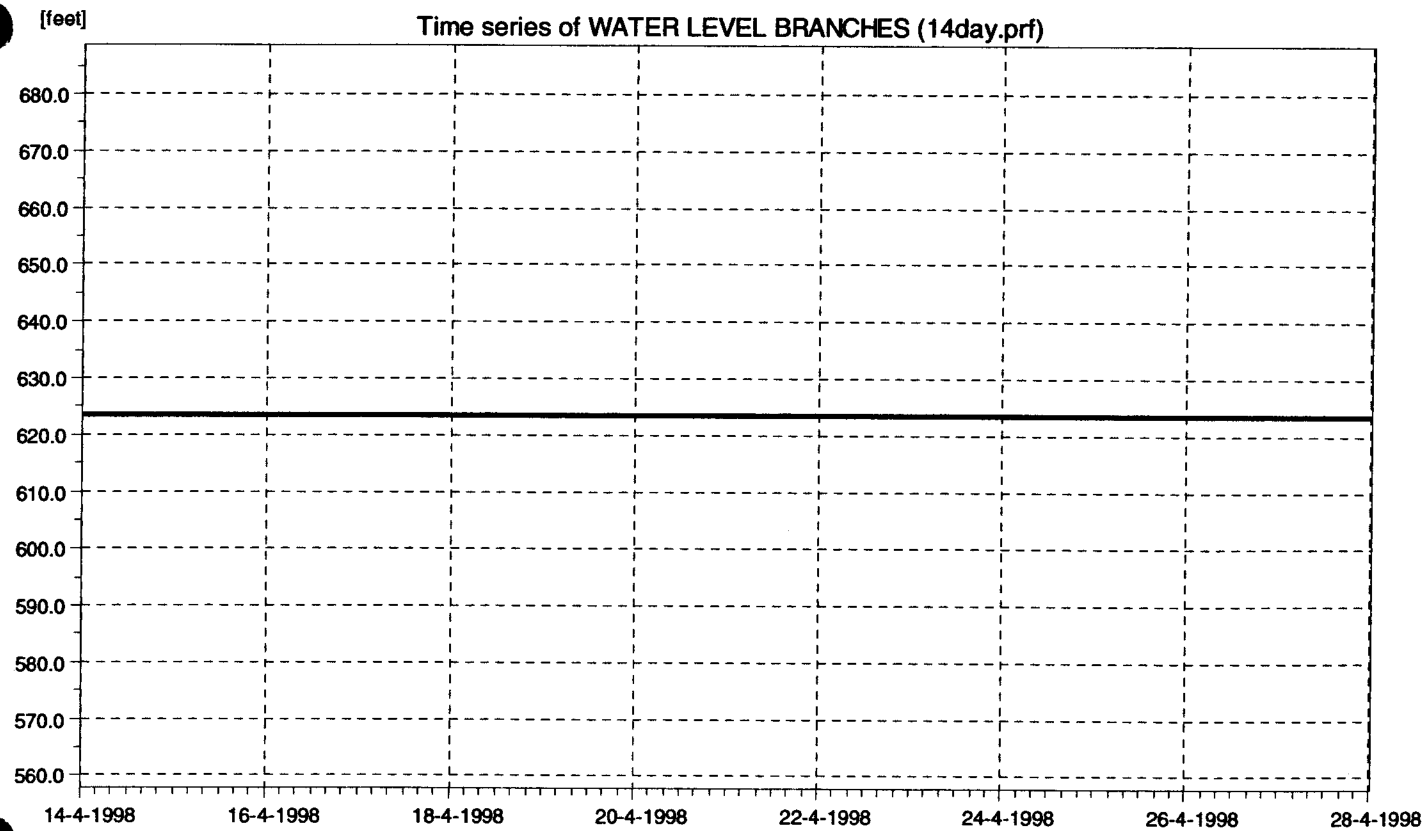
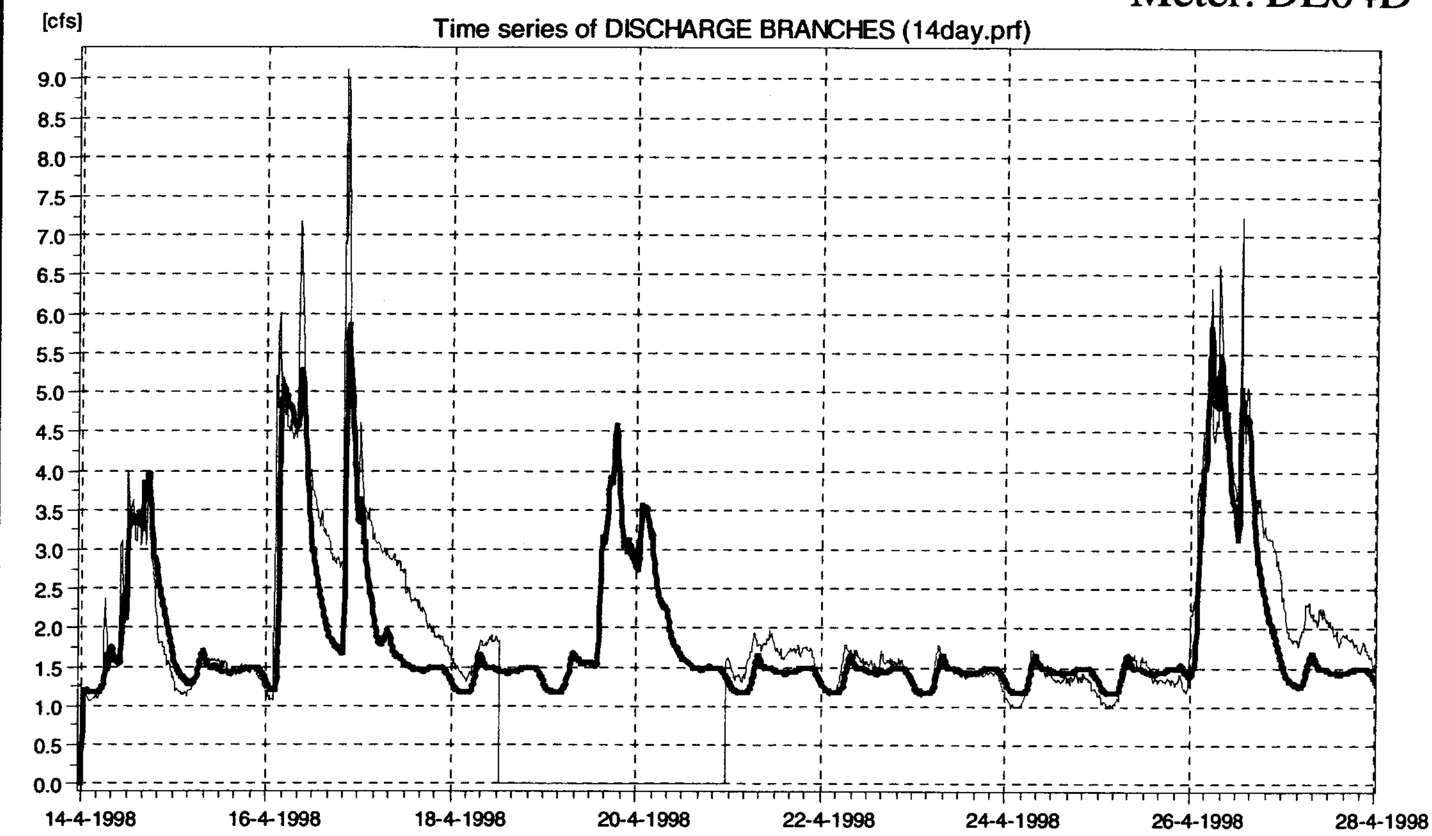
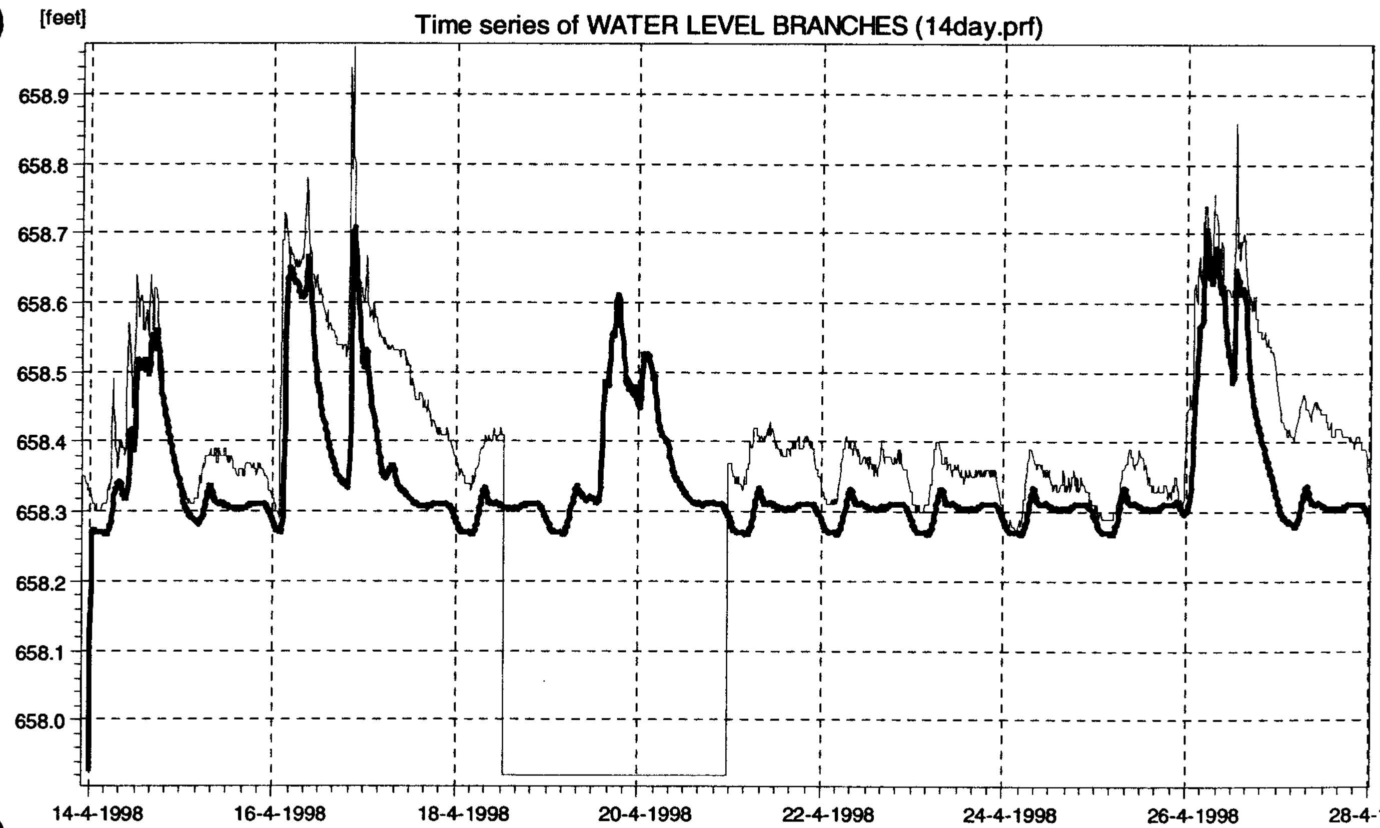
26-4-1998
28-4-1998


[feet]
Time series of WATER LEVEL BRANCHES (14day.prf)
680.0
670.0
660.0
650.0
640.0
630.0
620.0
610.0
600.0
590.0
580.0
570.0
560.0
14-4-1998
16-4-1998
18-4-1998
20-4-1998
22-4-1998
24-4-1998
26-4-1998
28-4-1998

Meter: DE04D





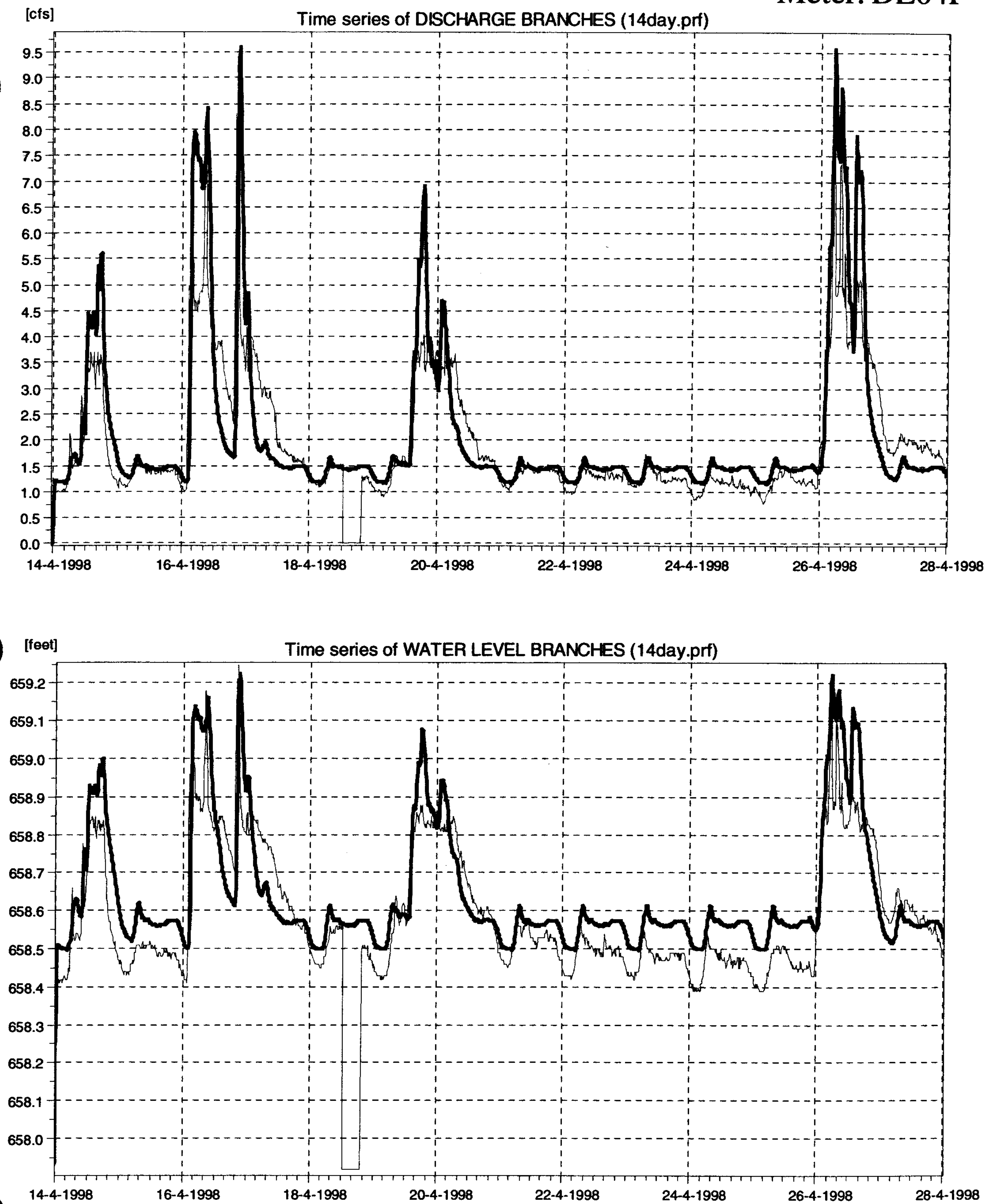
M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: DE04I



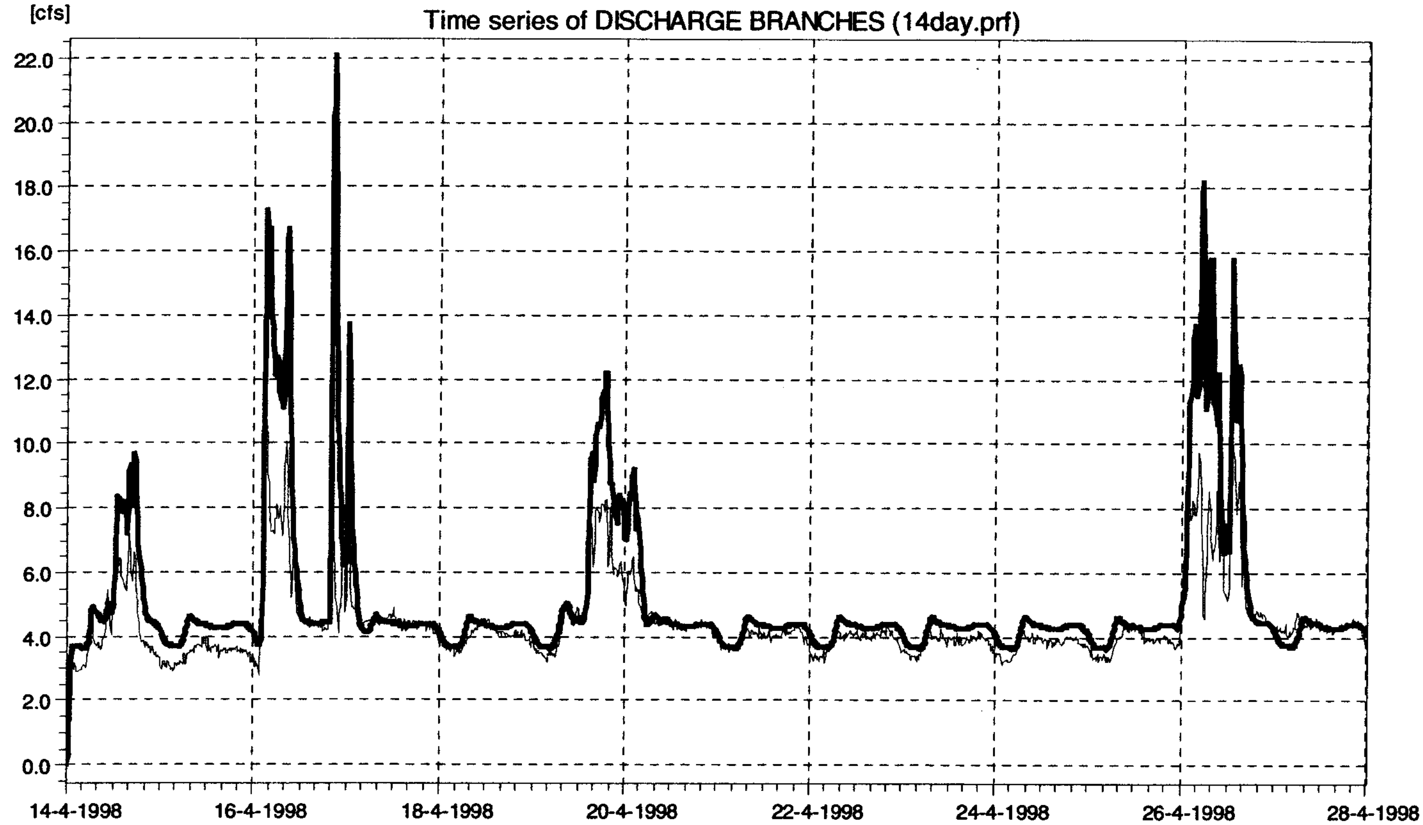
Metcalf & Eddy

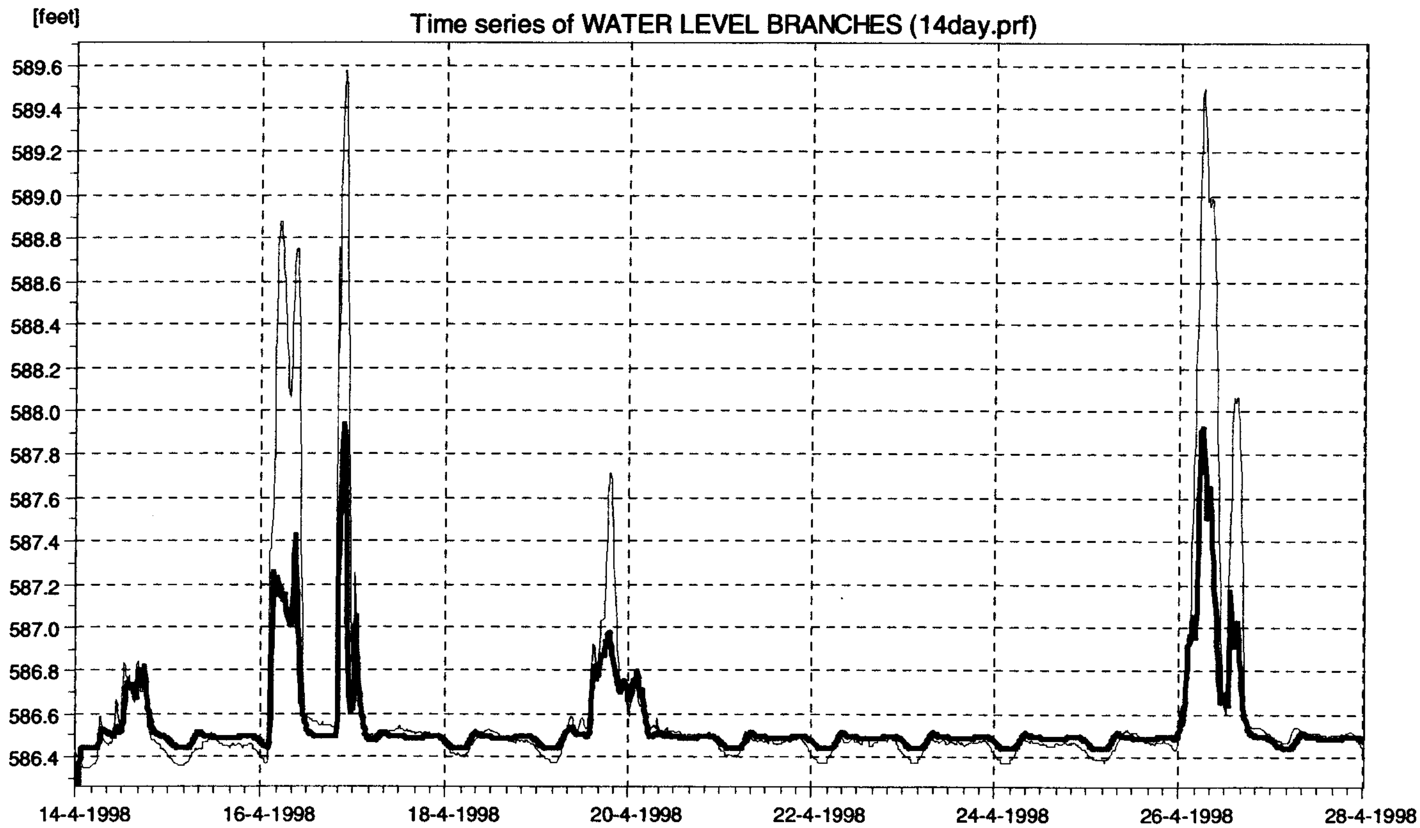
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: DW00





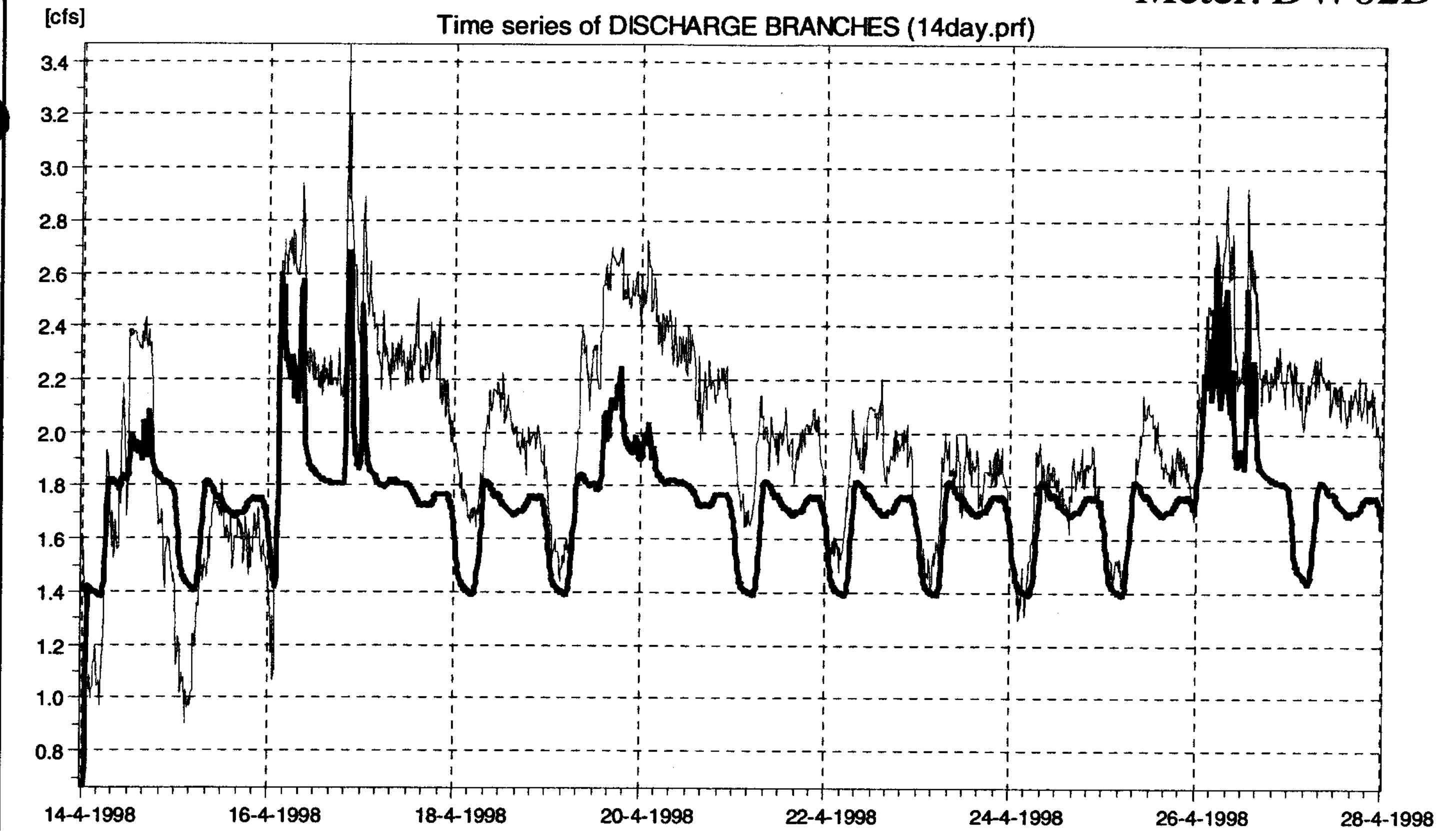
M&E AQUA ALLIANCE Metcalf & Eddy

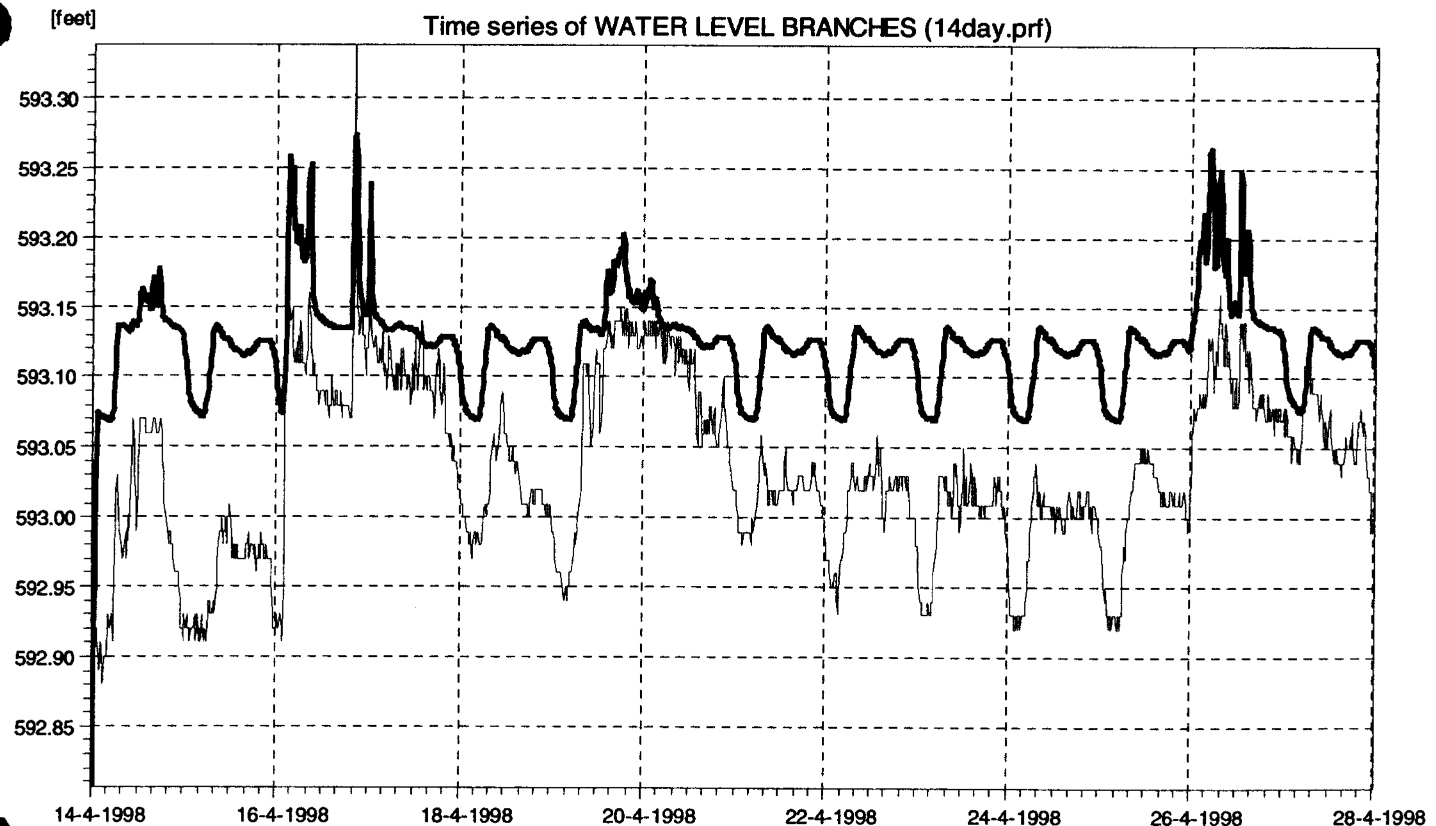
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: DW02D





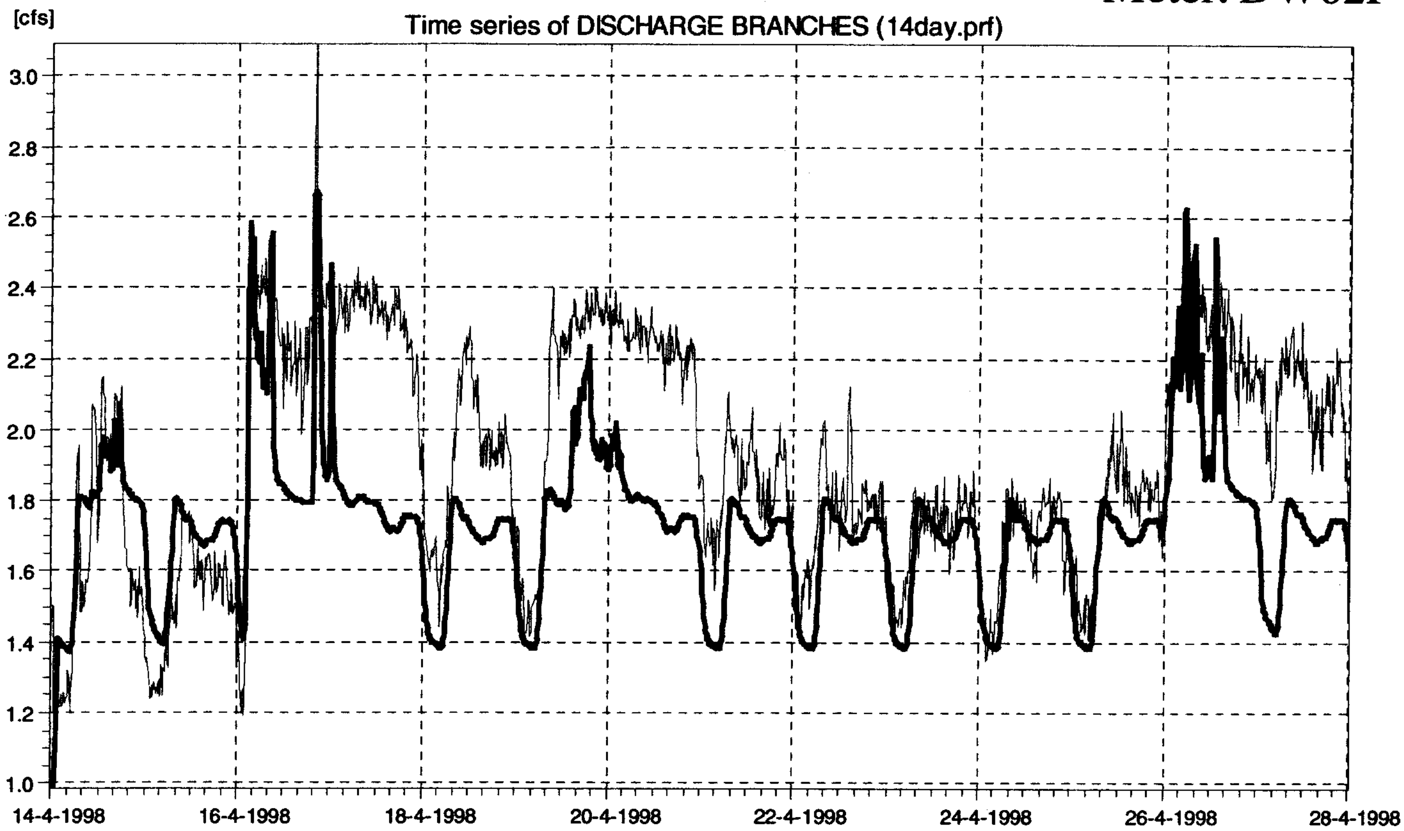
M&E Metcalf & Eddy AQUA ALLIANCE

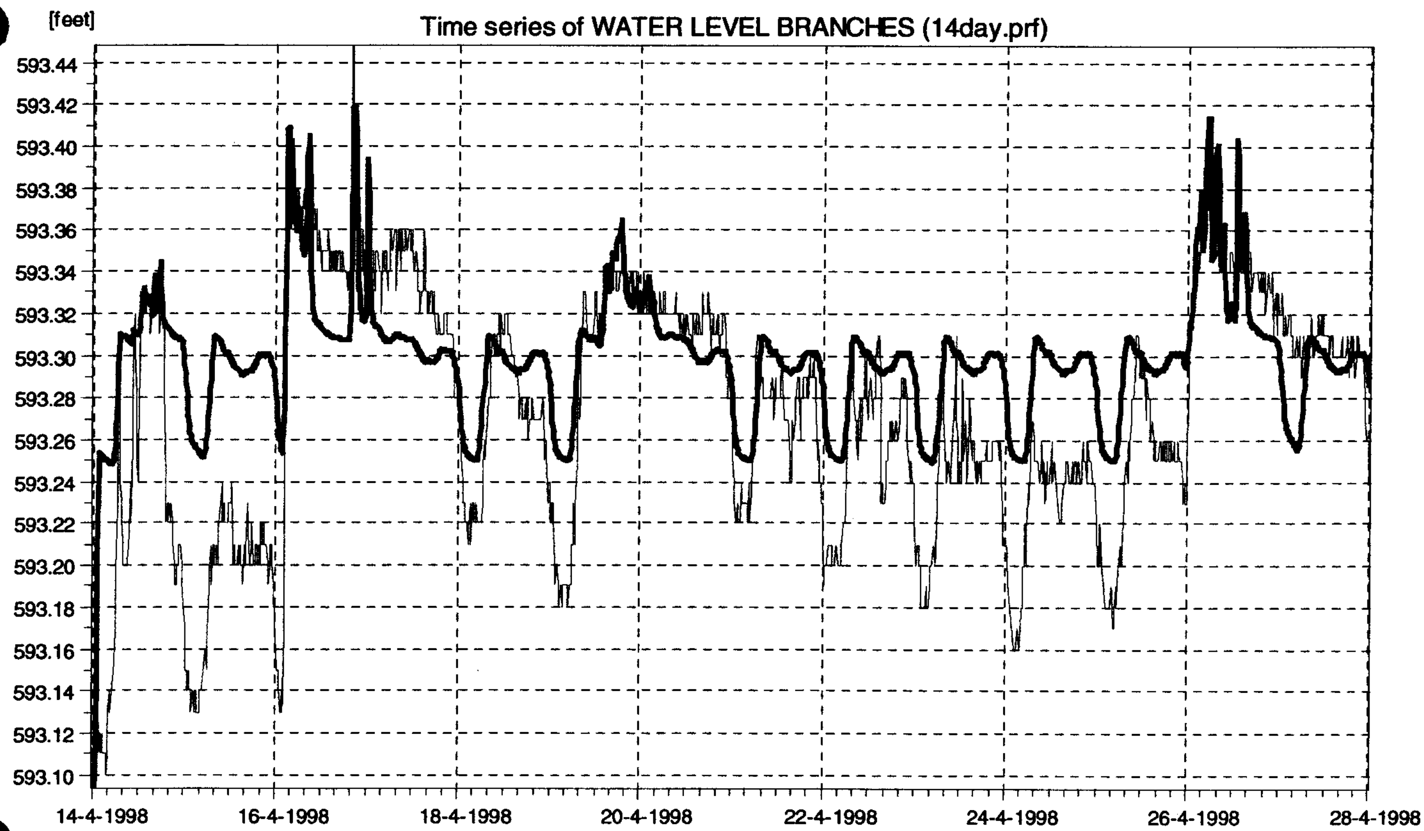
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: DW02I





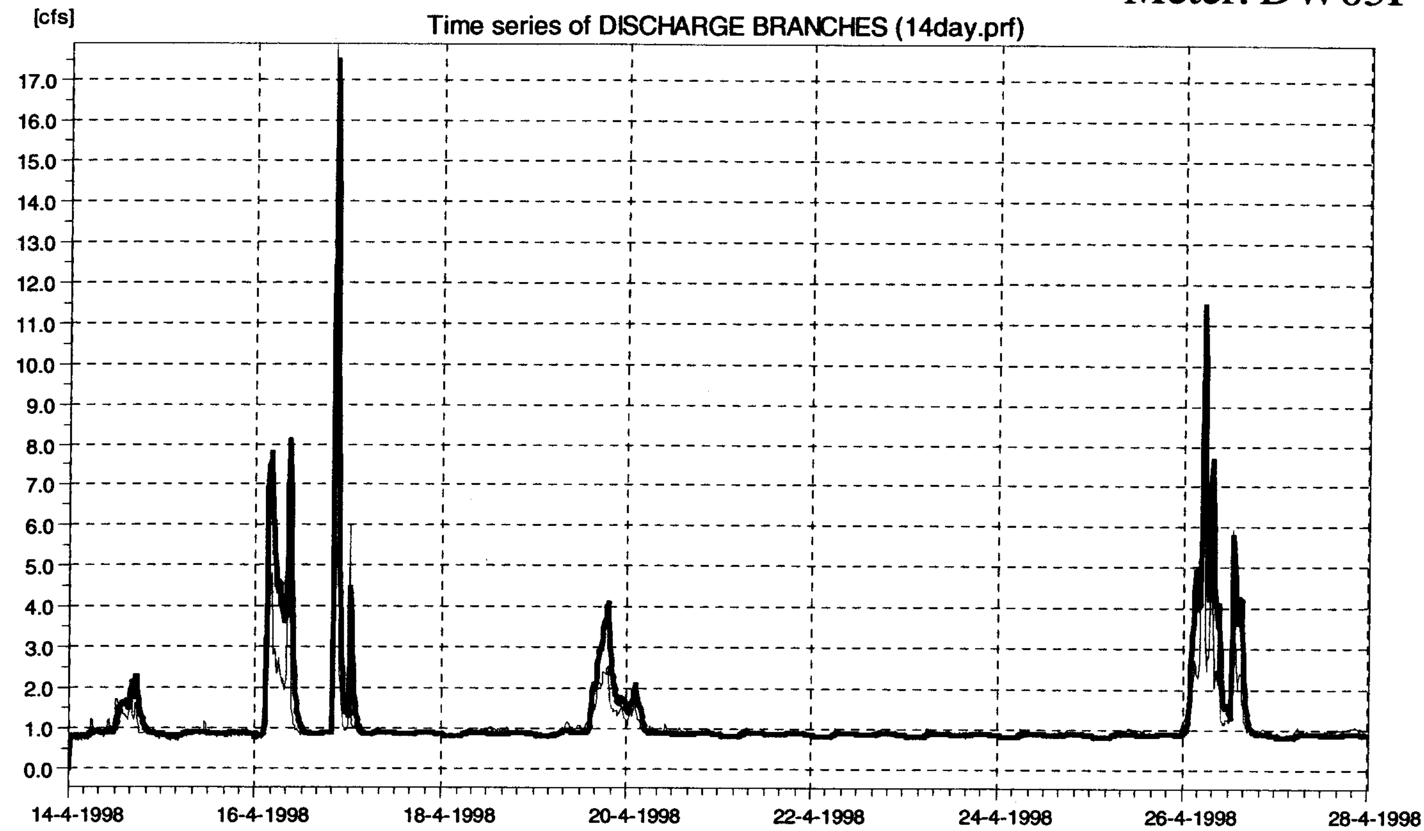
M&E AQUA ALLIANCE Metcalf & Eddy

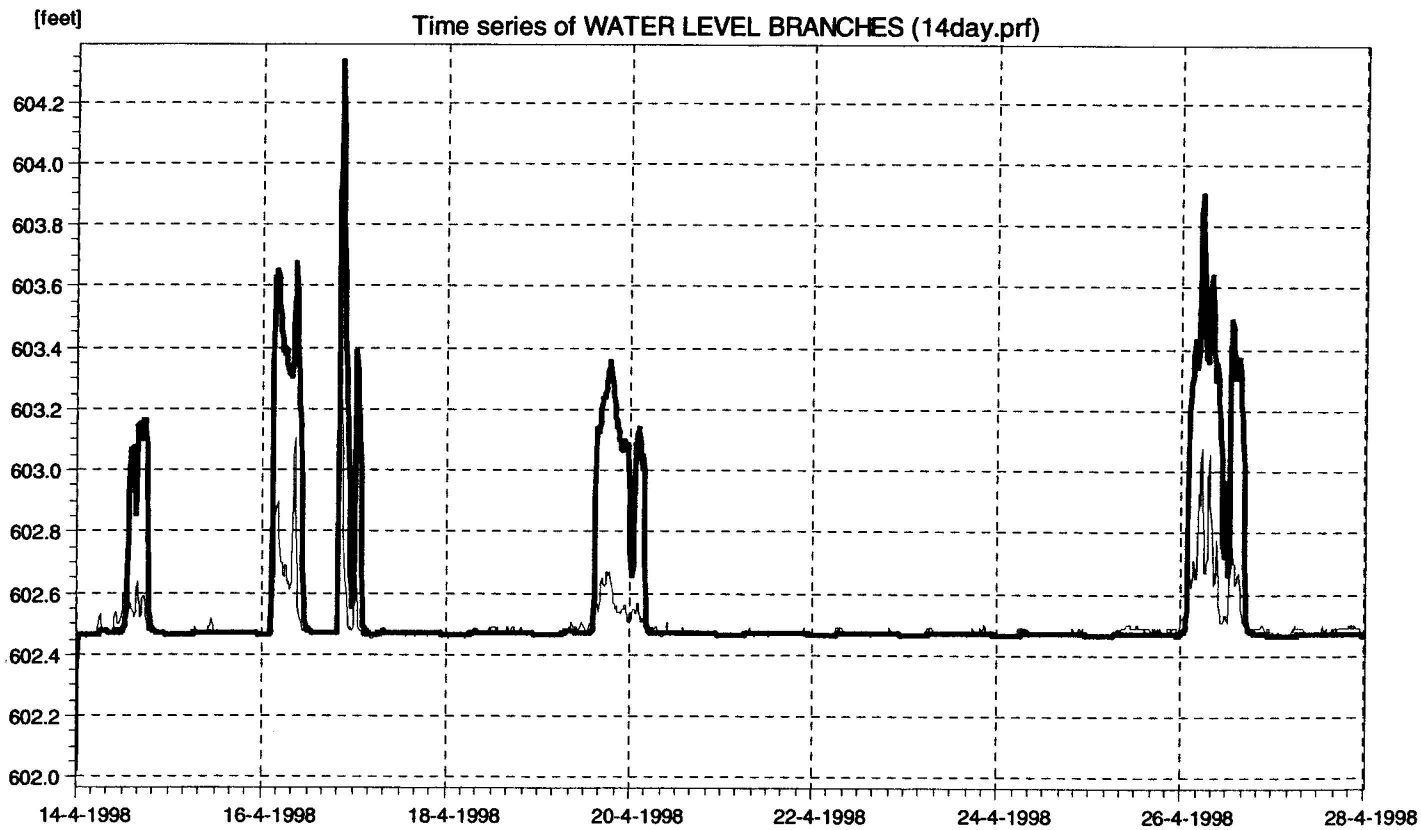
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: DW03I





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Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

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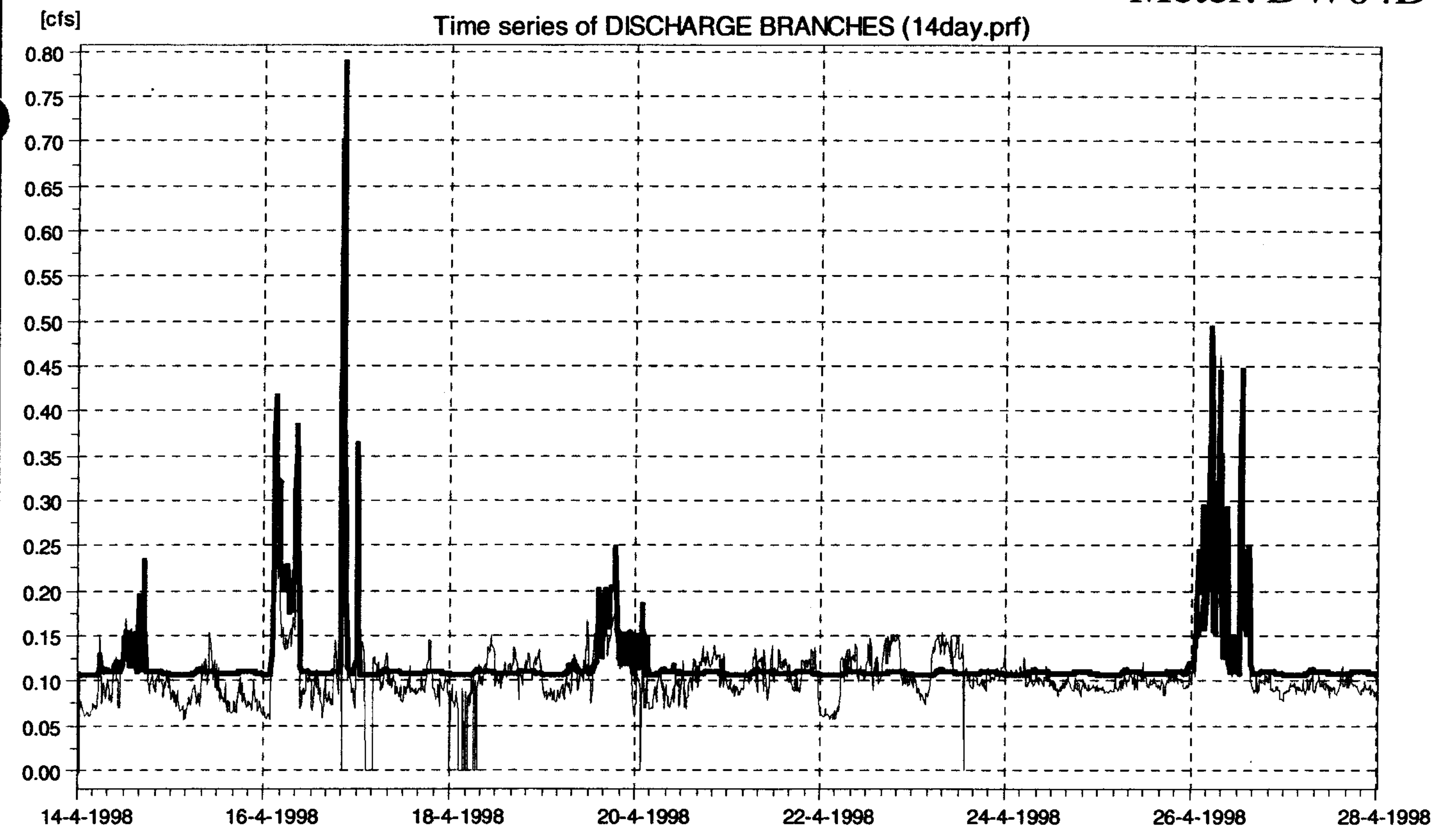

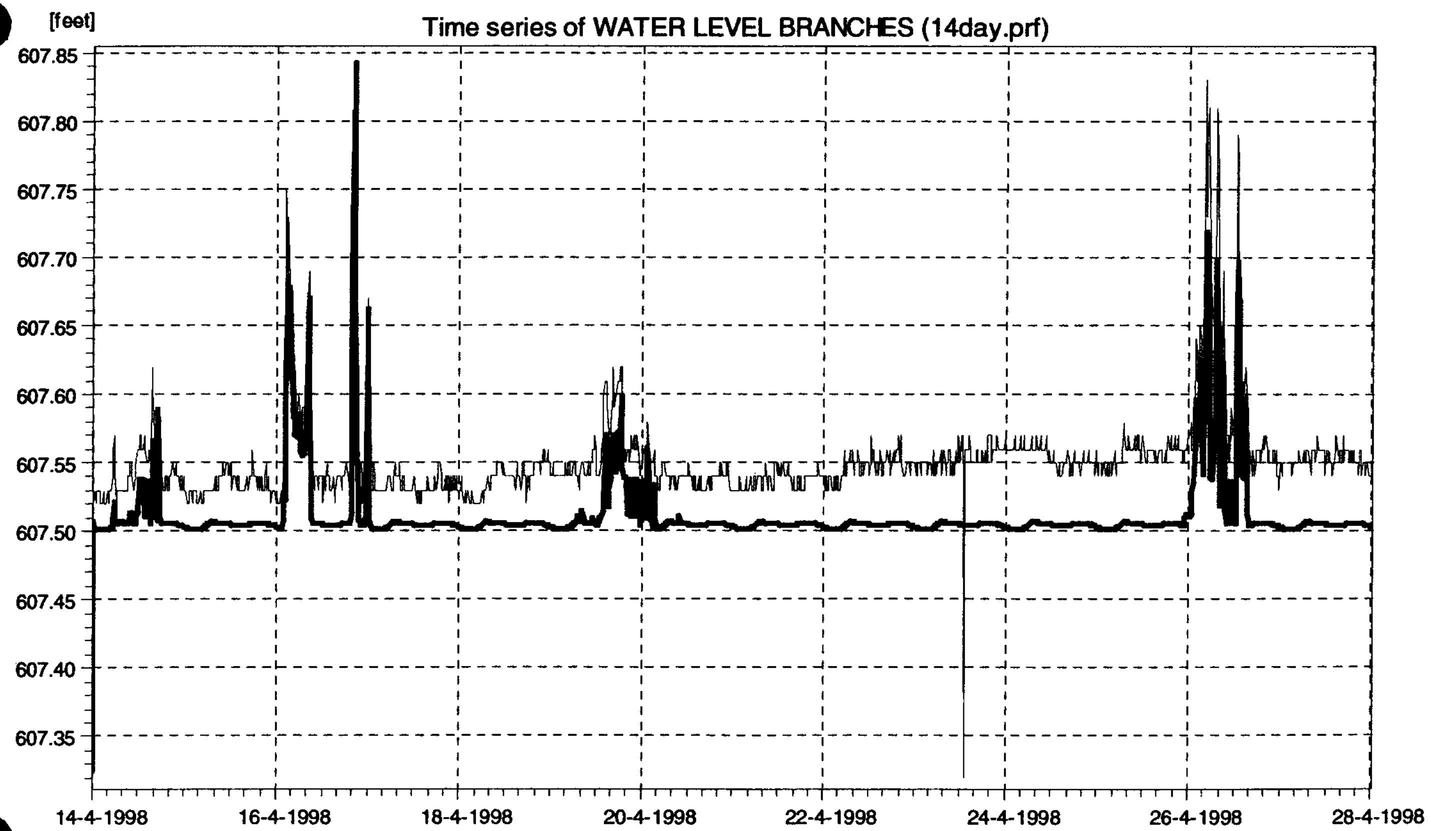

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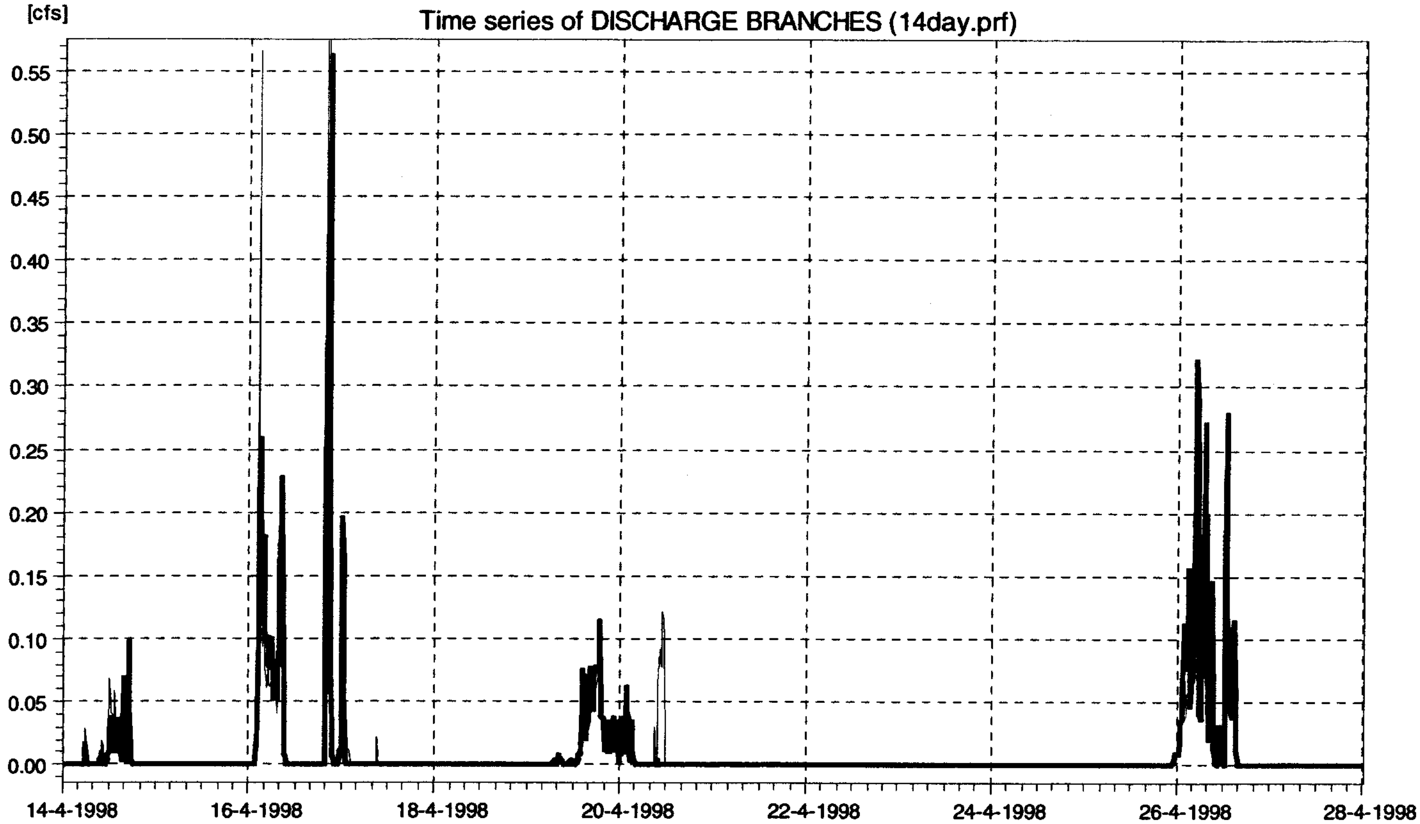
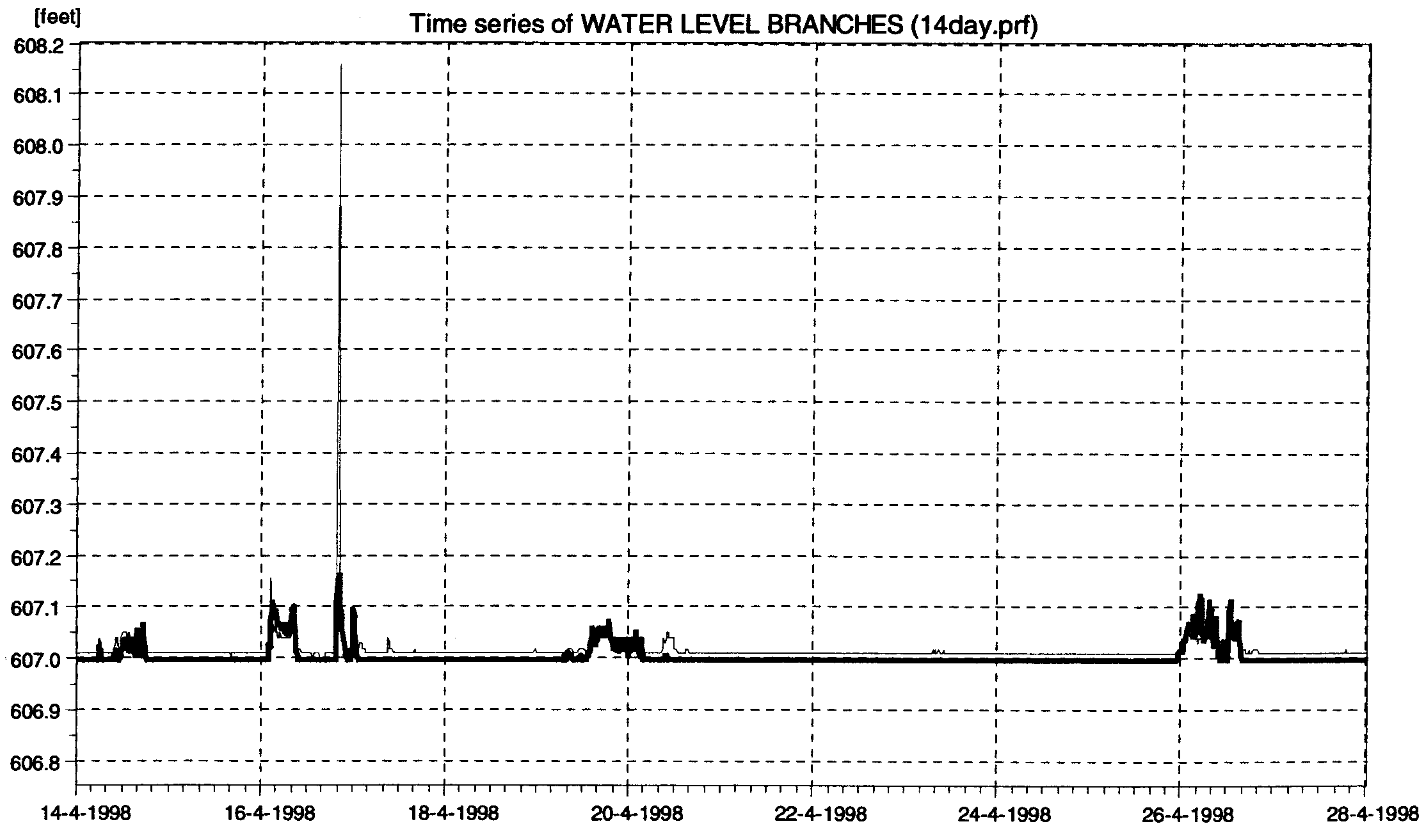
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: DW04W





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Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

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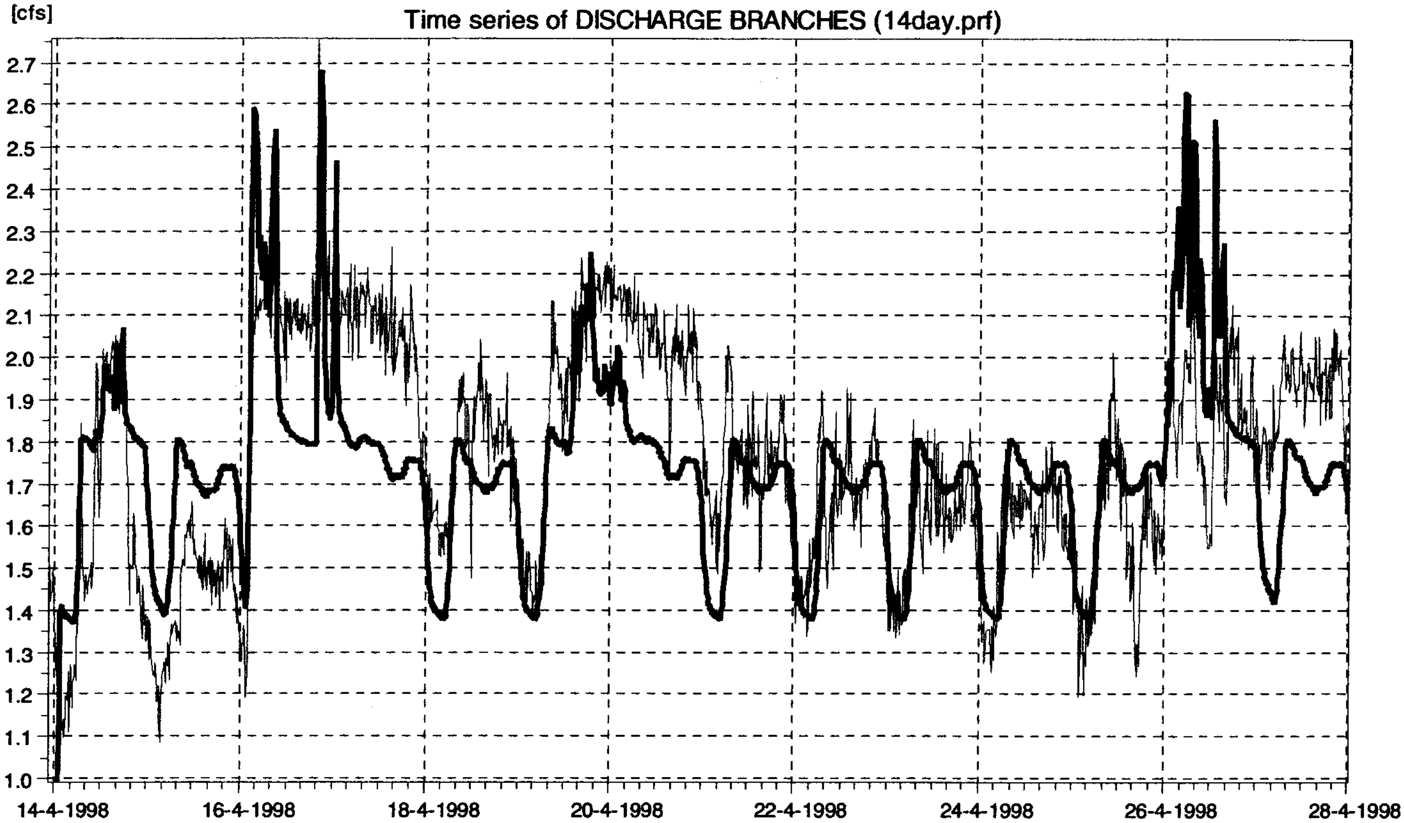

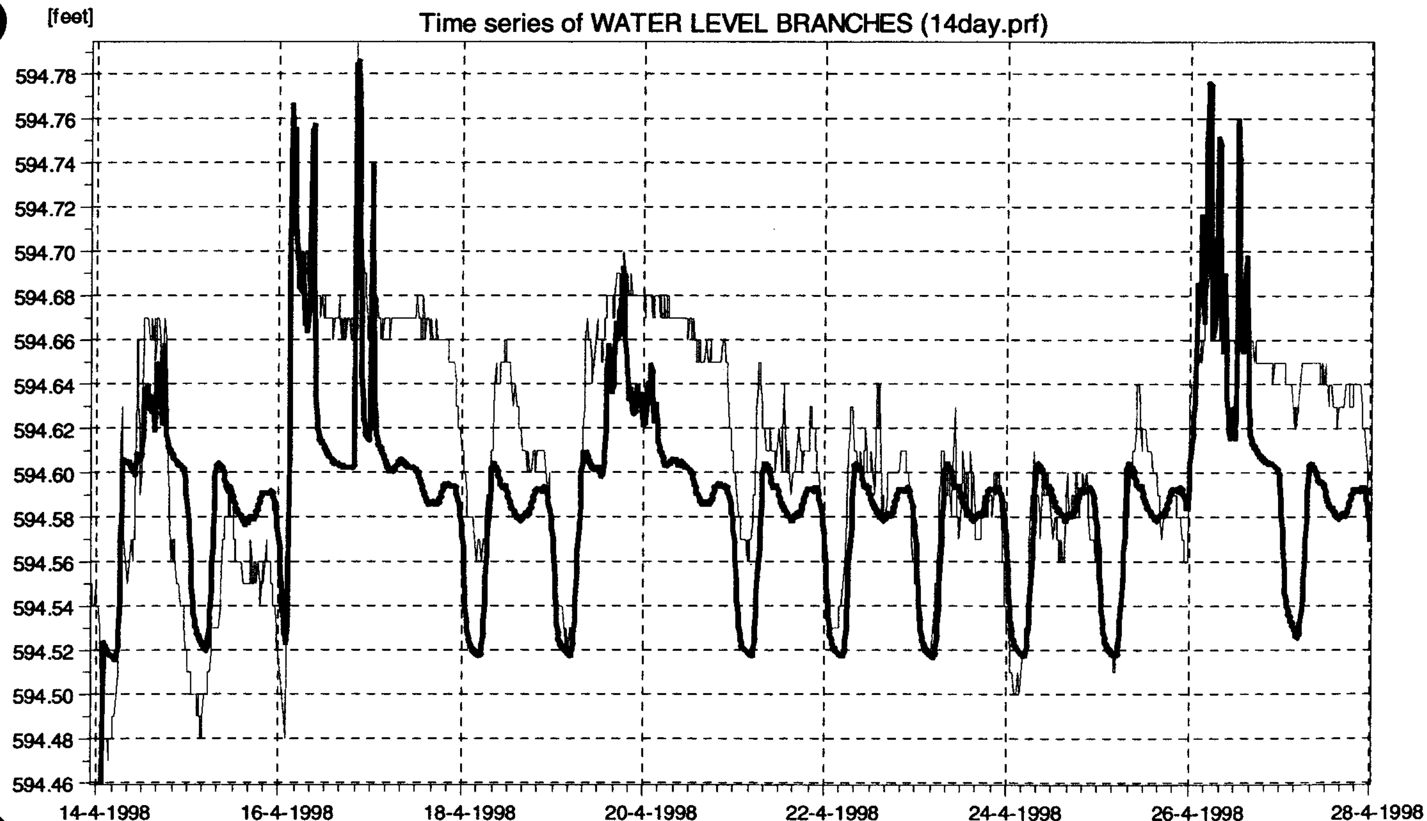

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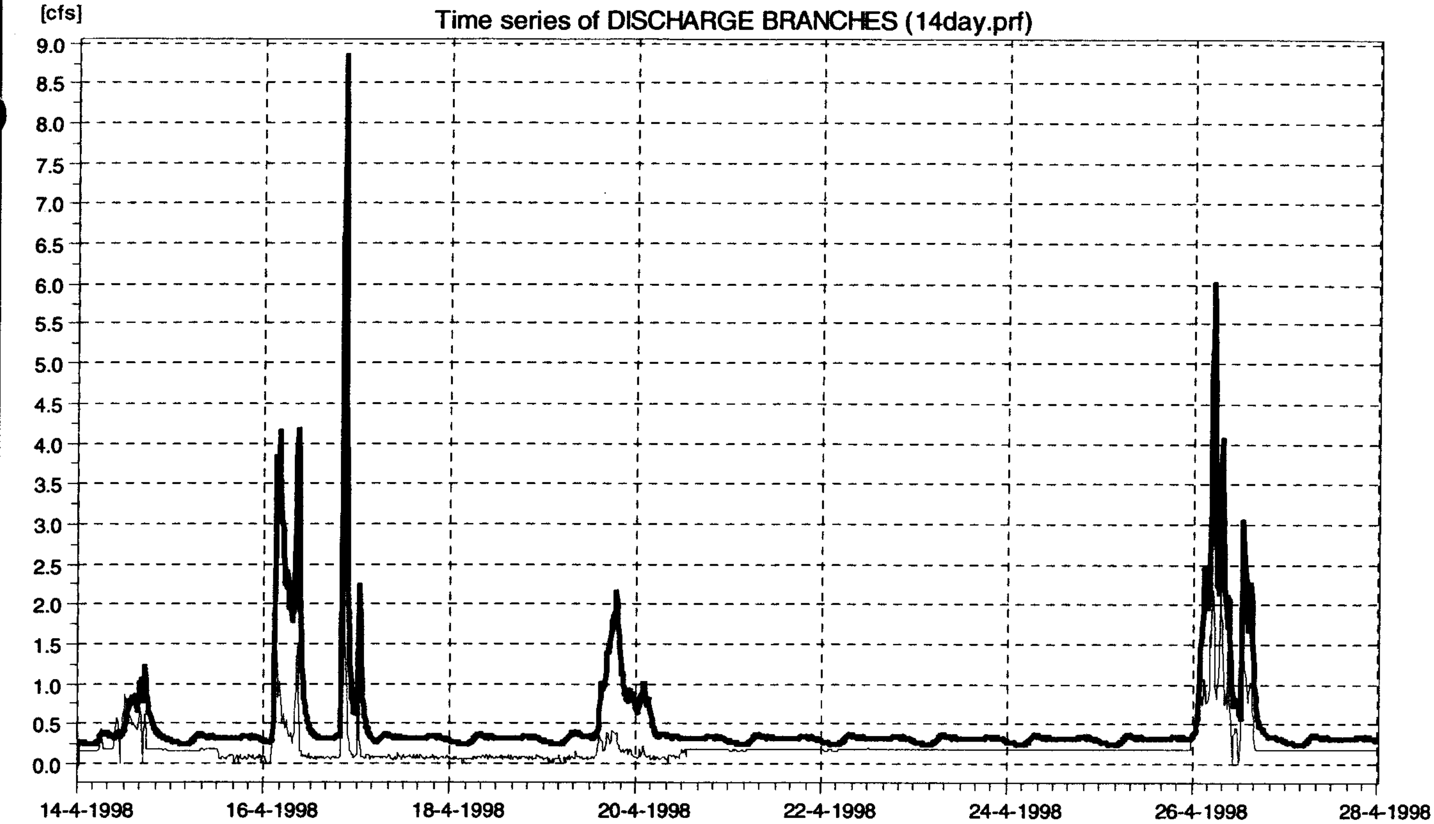
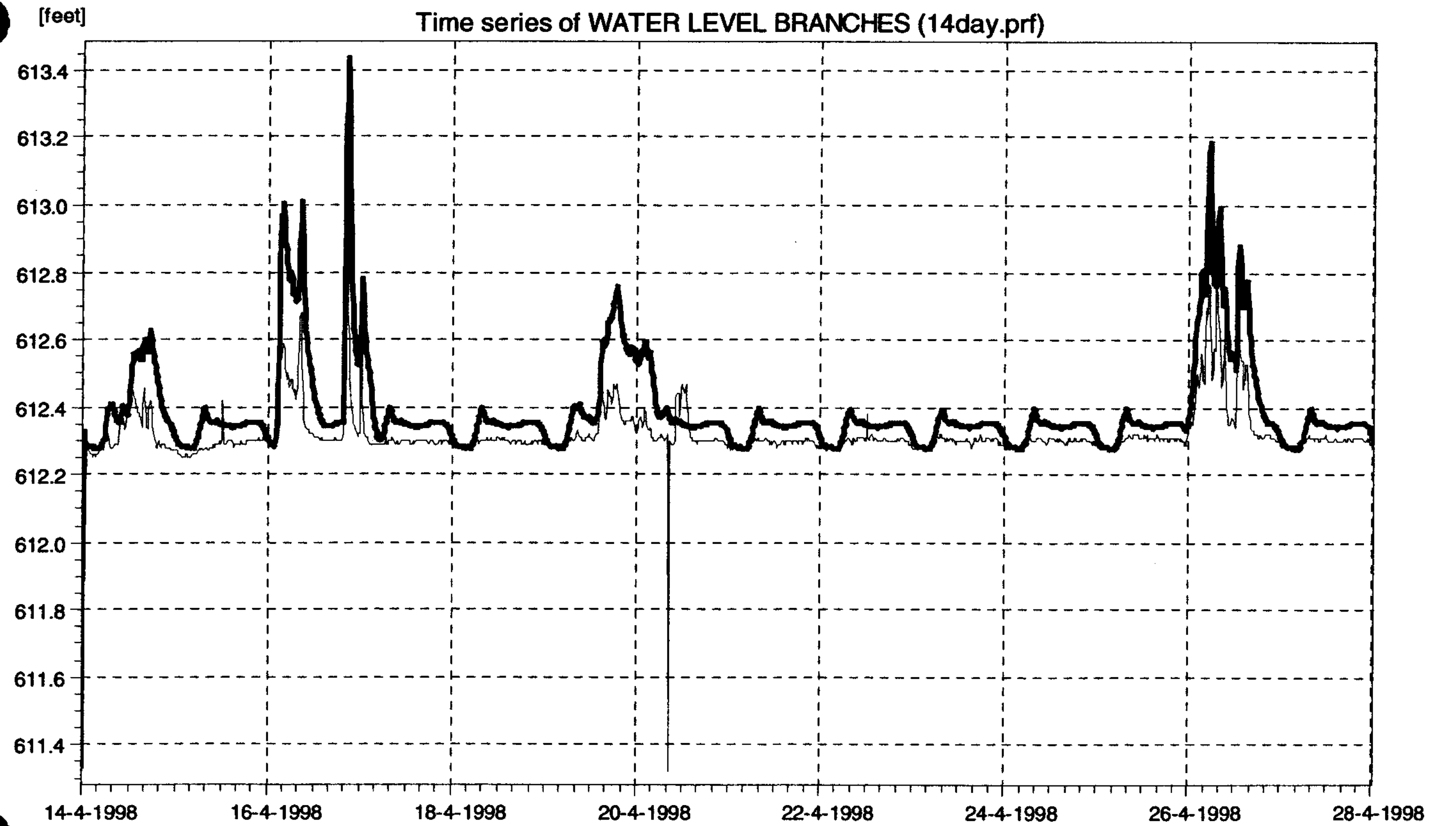
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: DW10I





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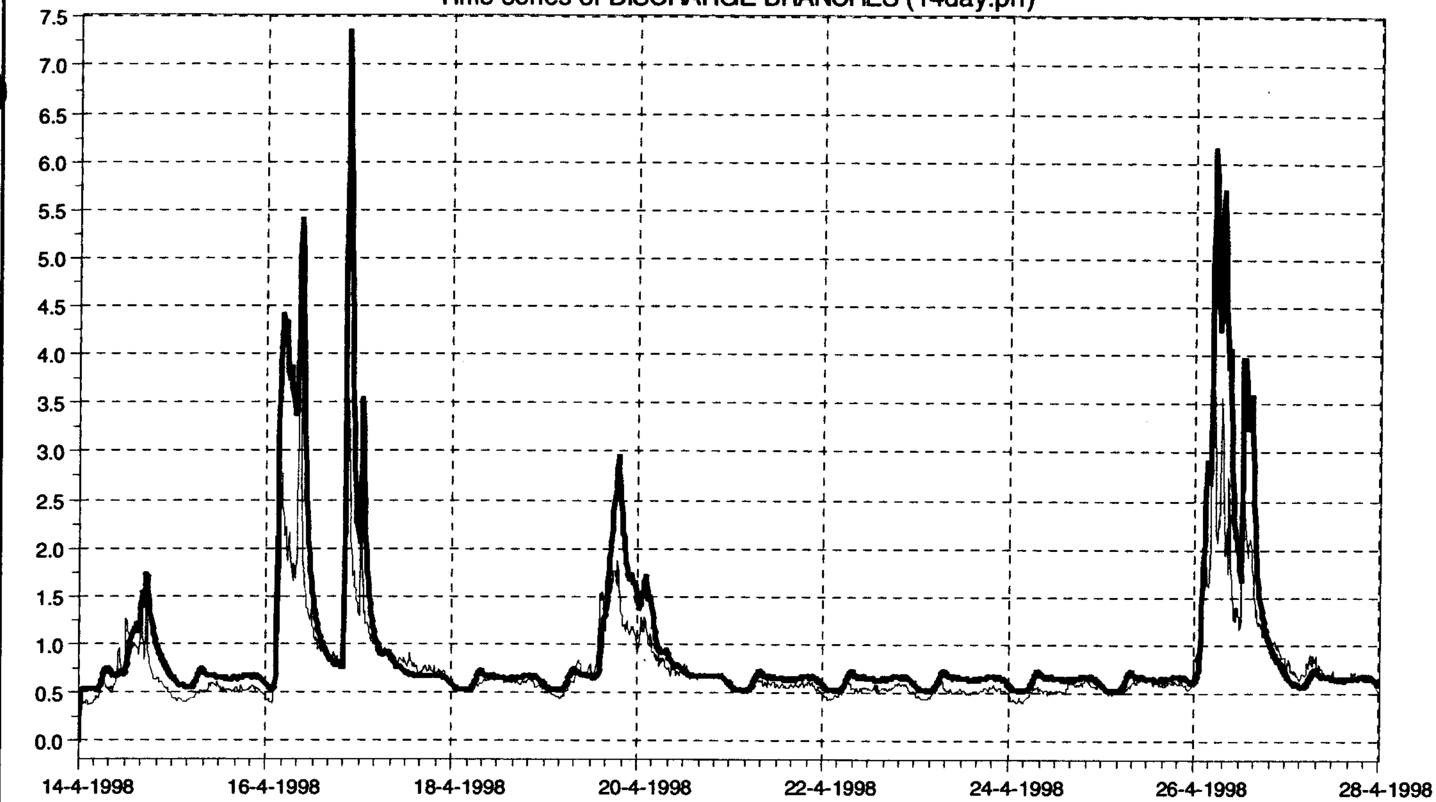
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

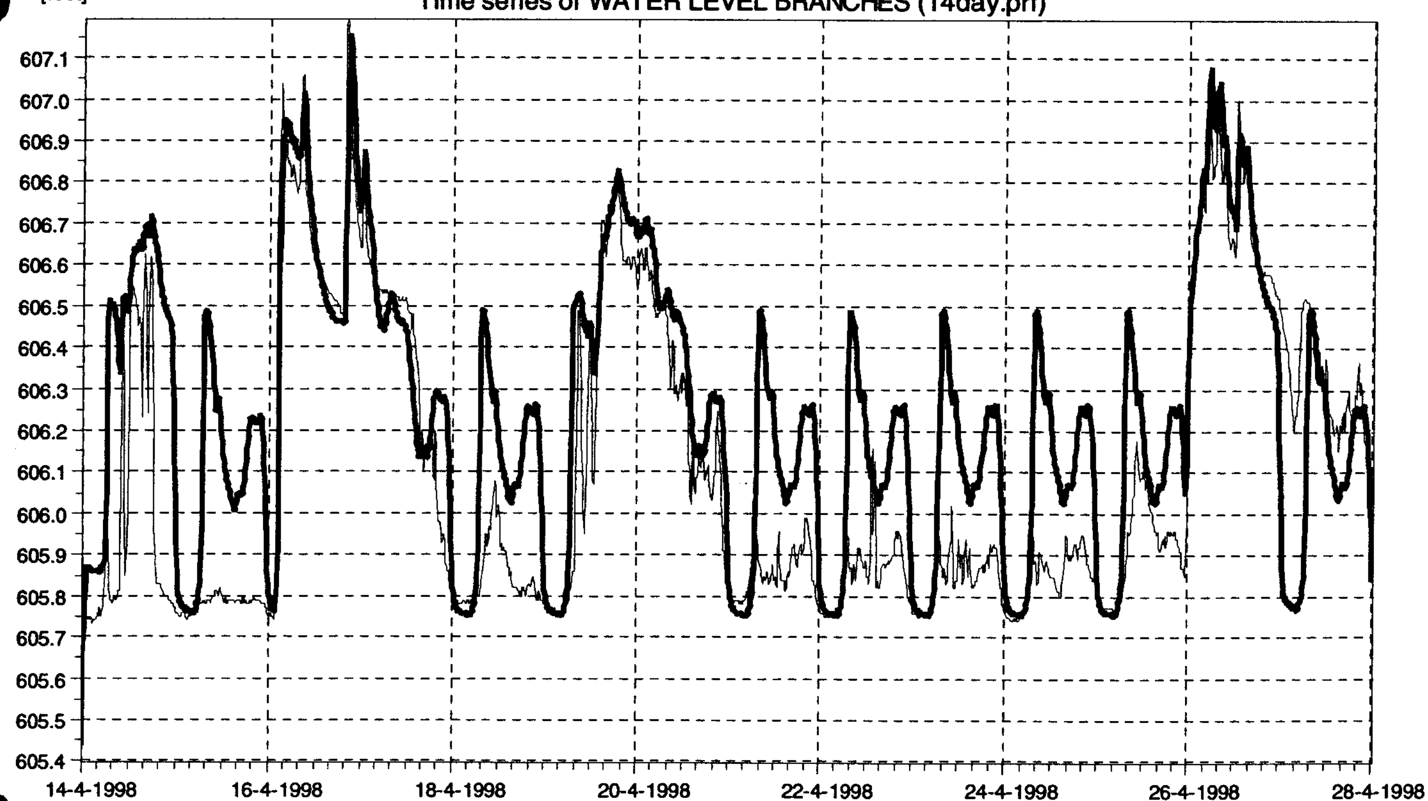
CH2MHILL

Meter: DW12I

Time series of DISCHARGE BRANCHES (14day.prf)



Time series of WATER LEVEL BRANCHES (14day.prf)



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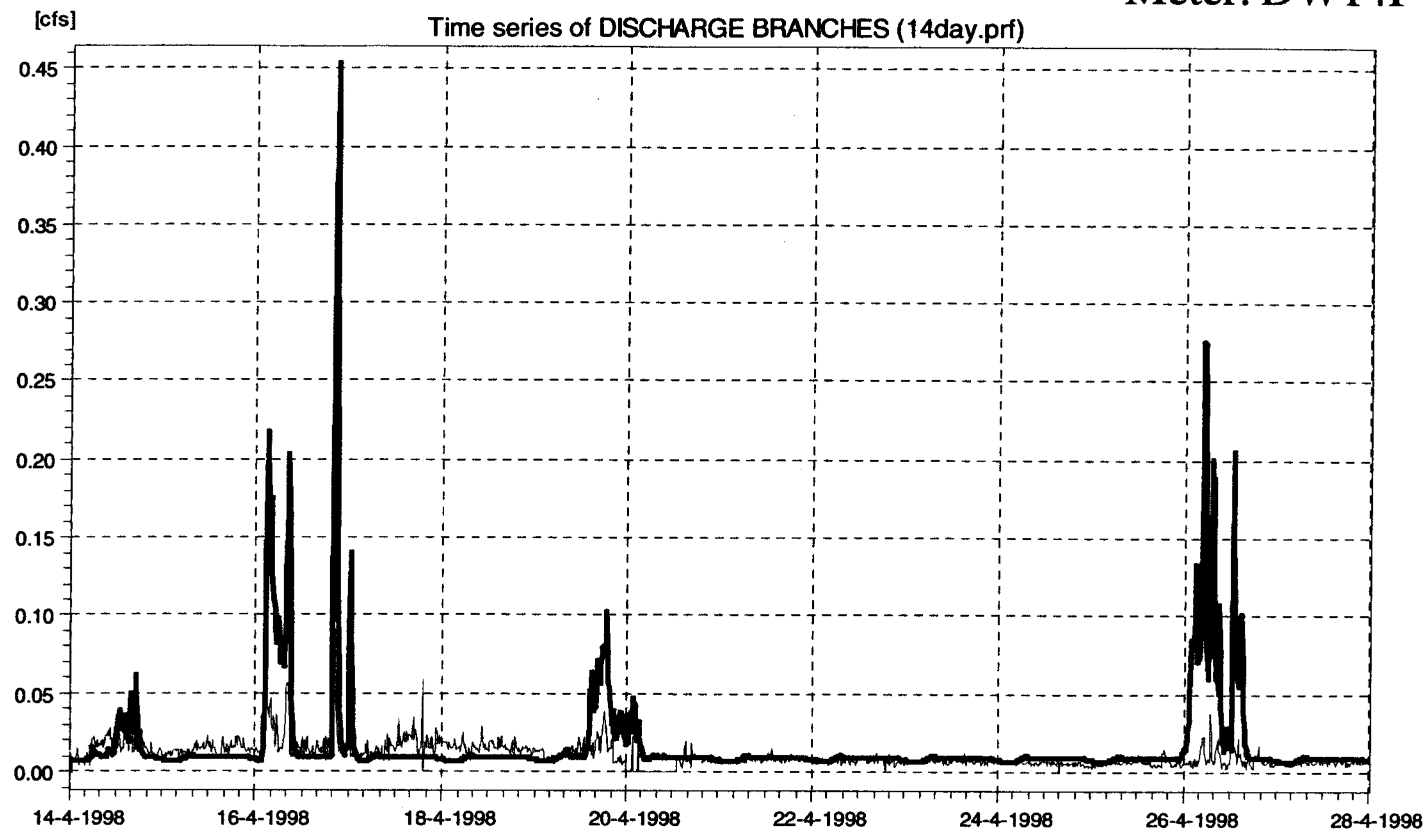

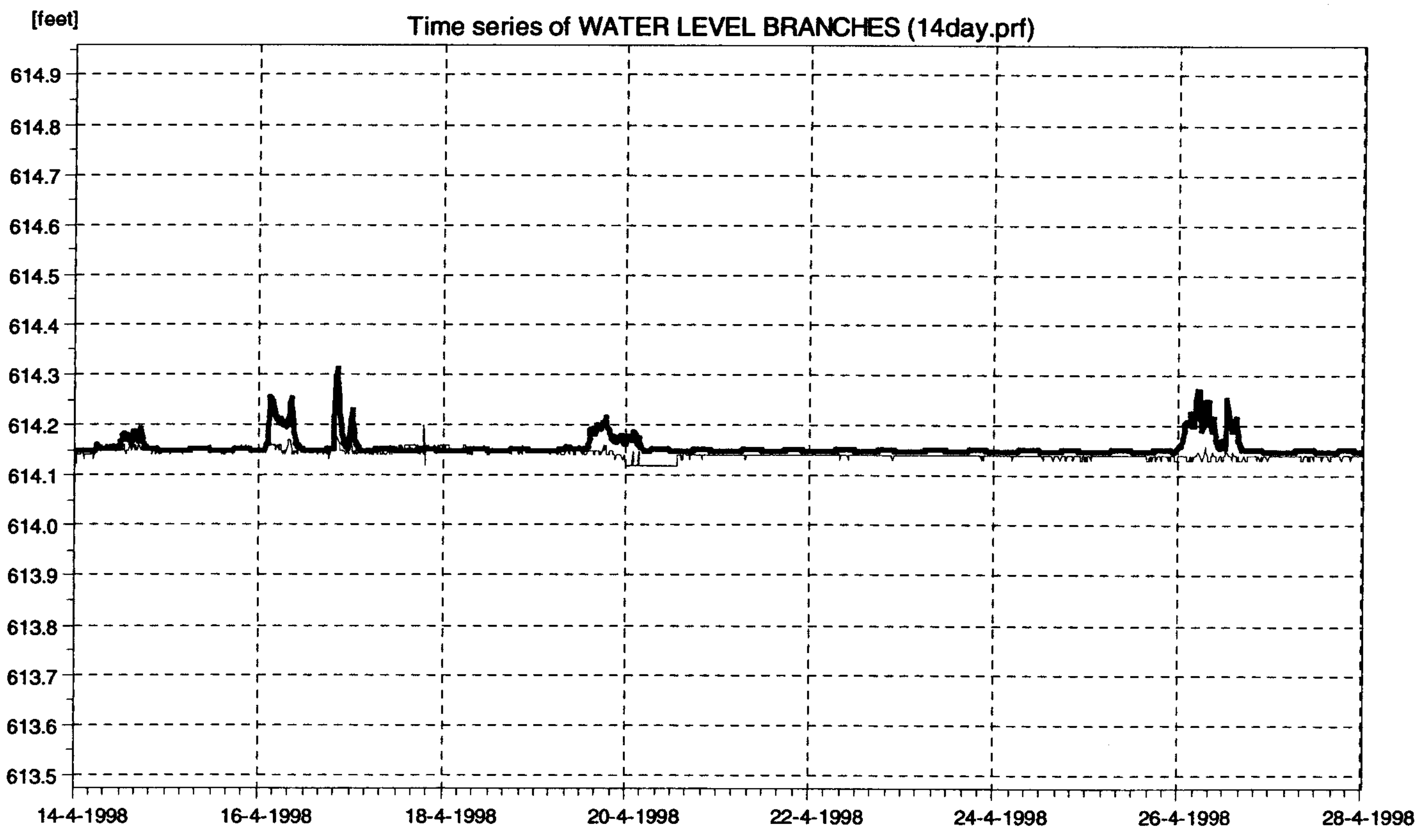

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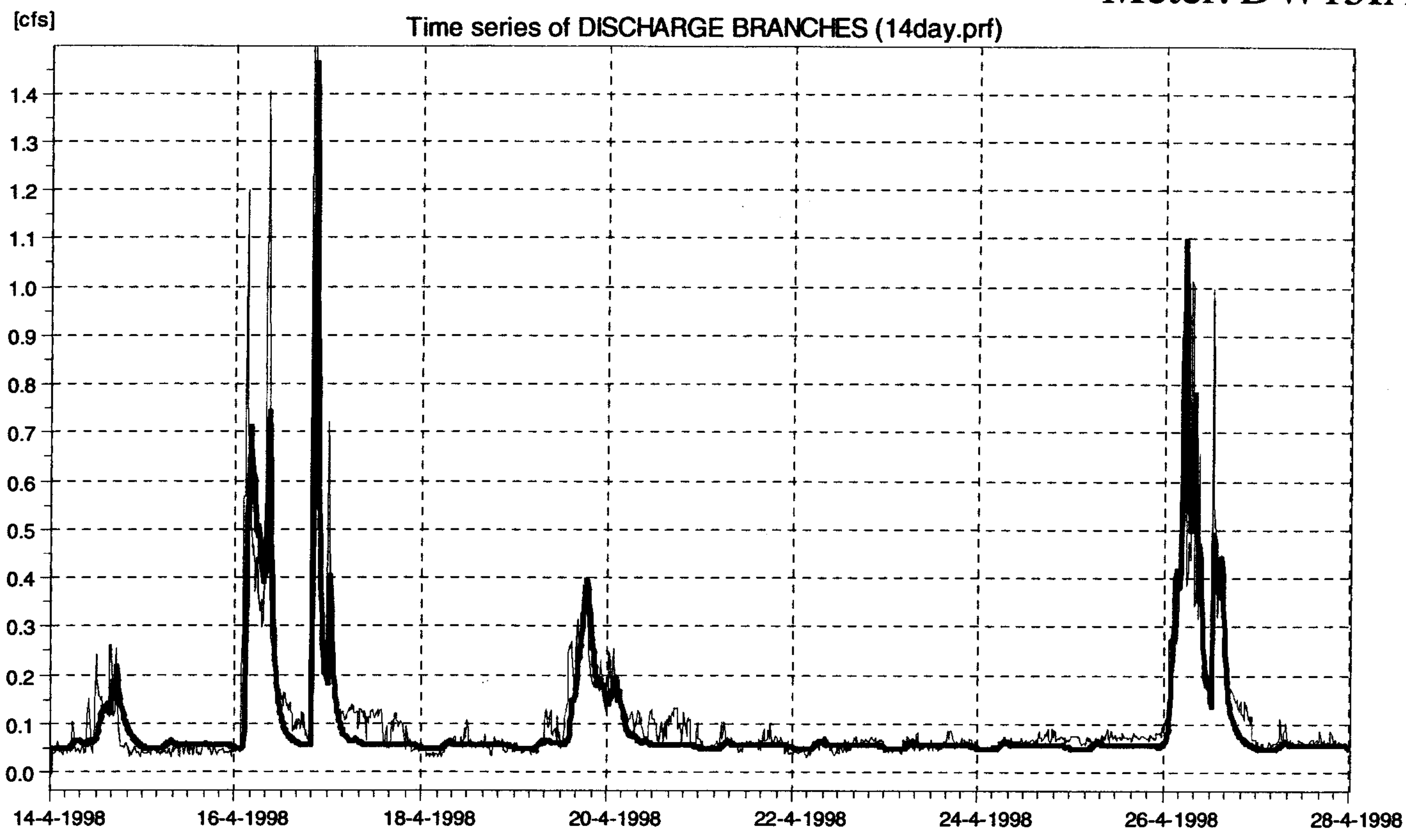
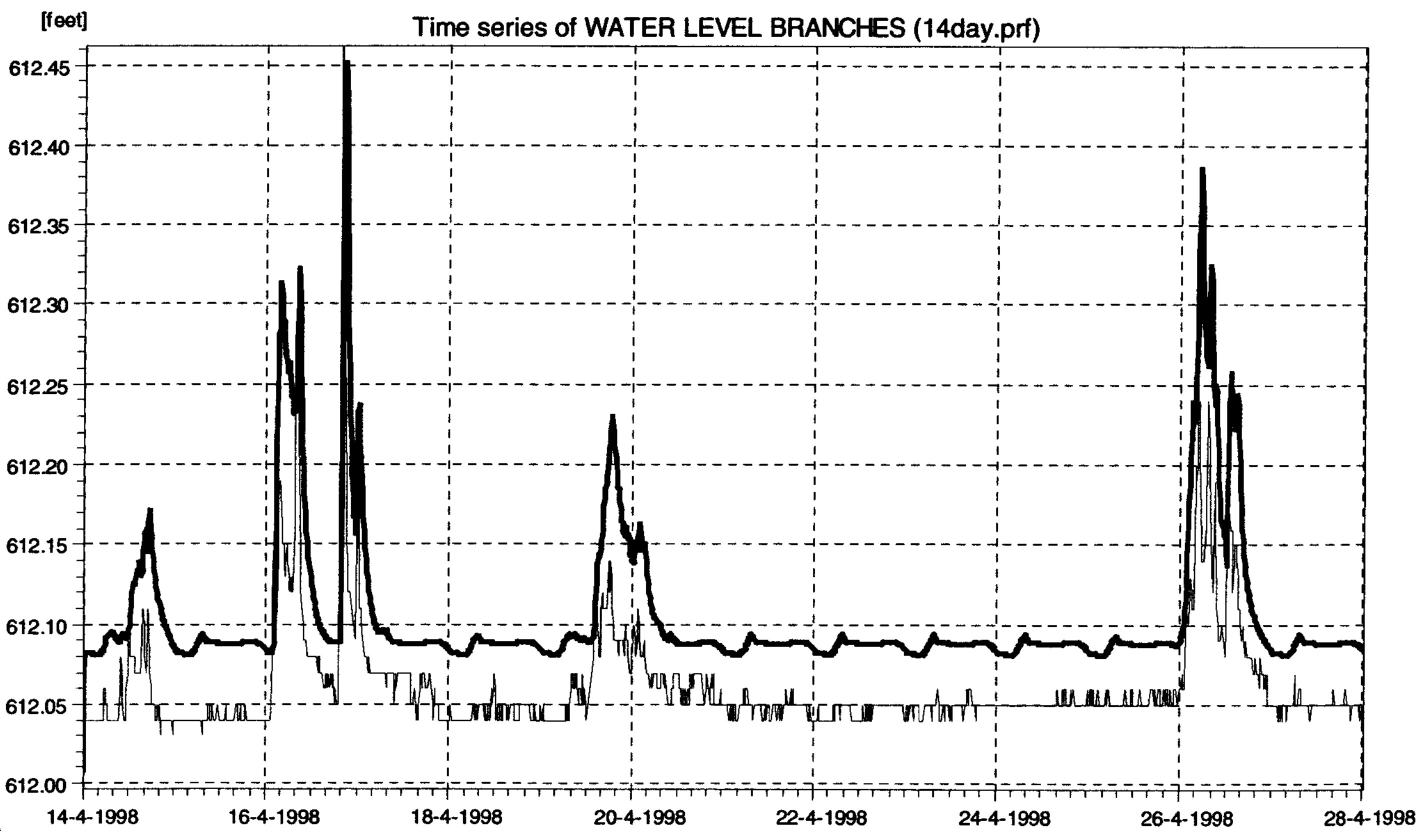
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: DW15IA





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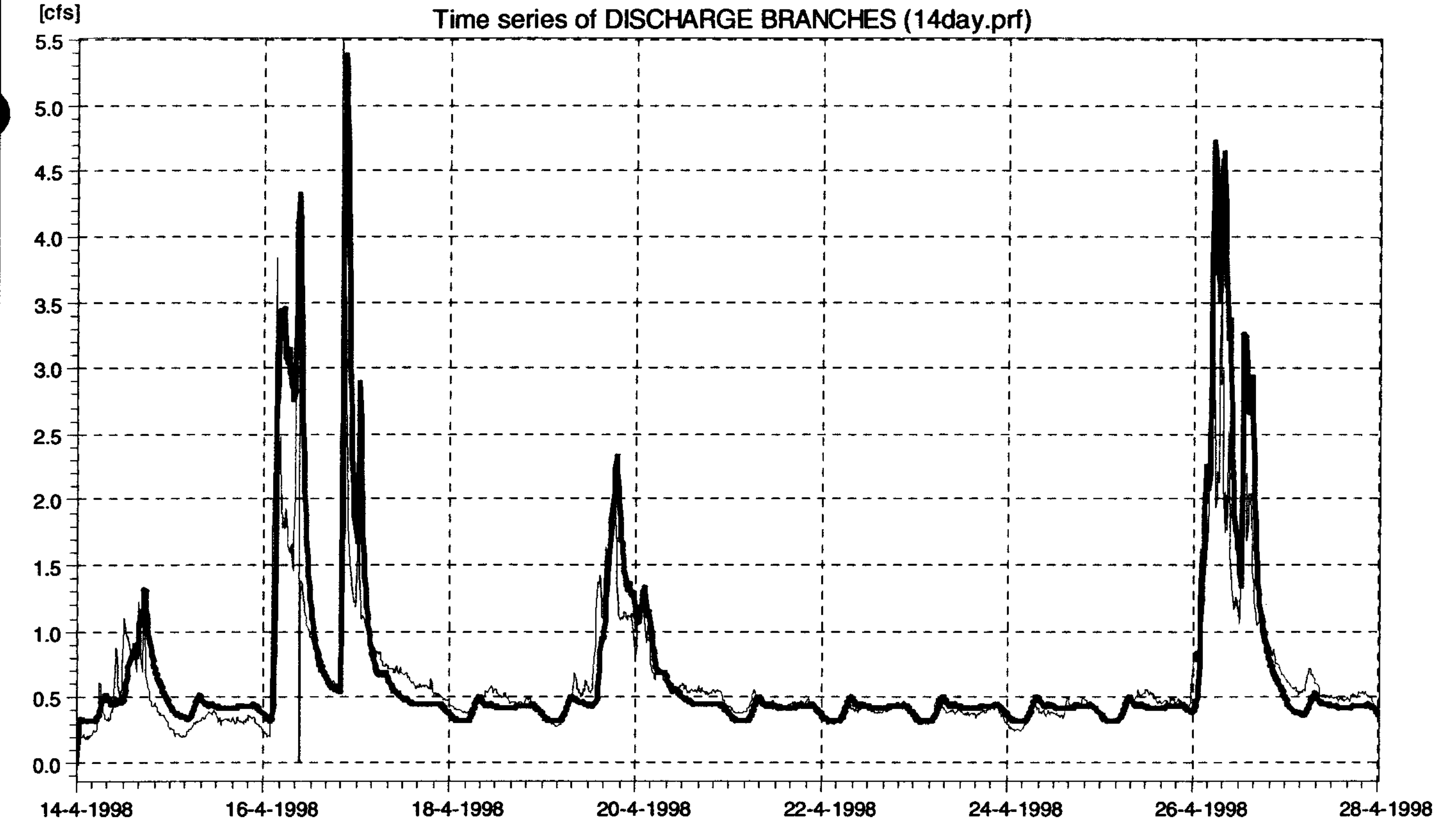
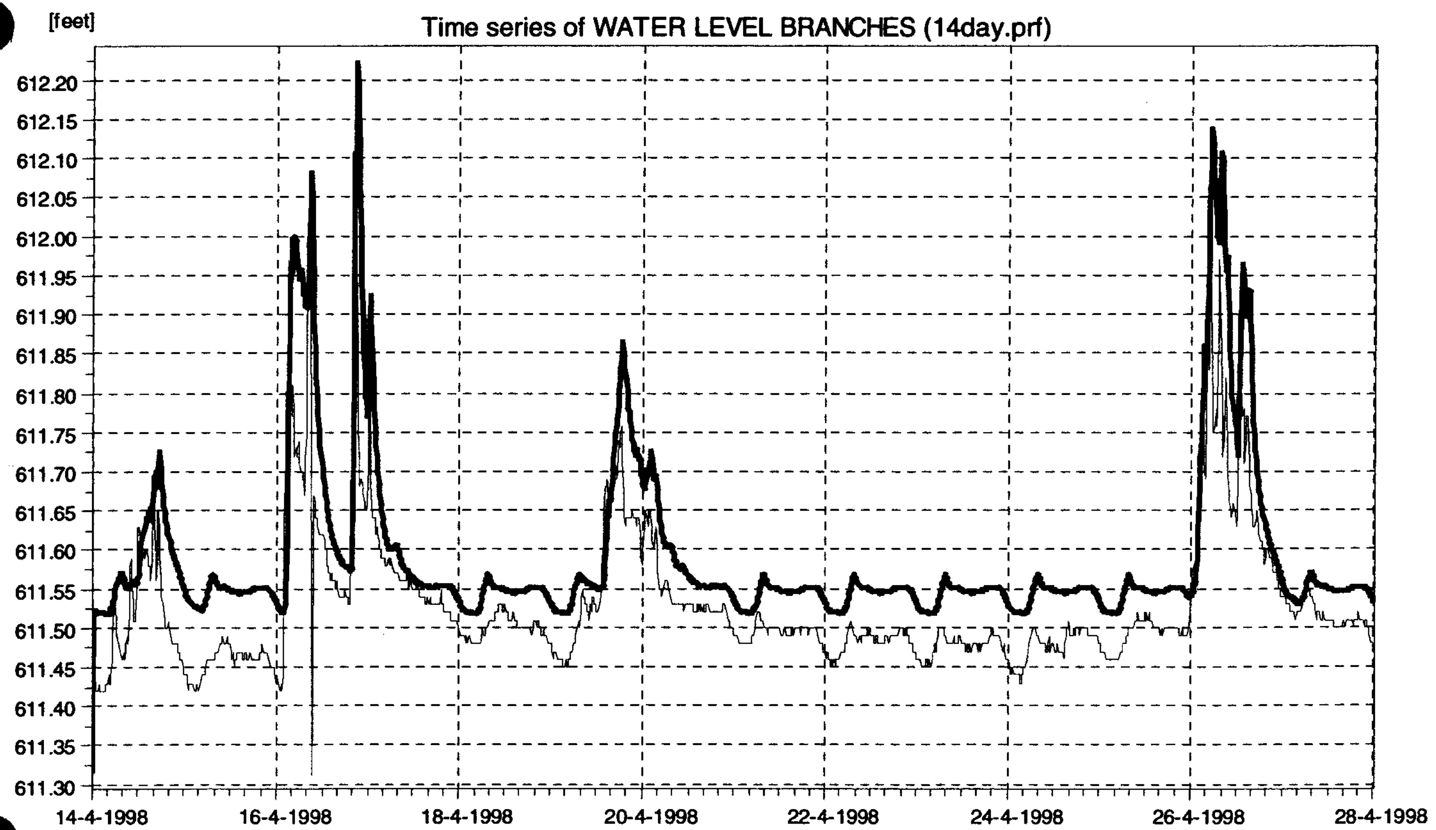
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: DW15IB





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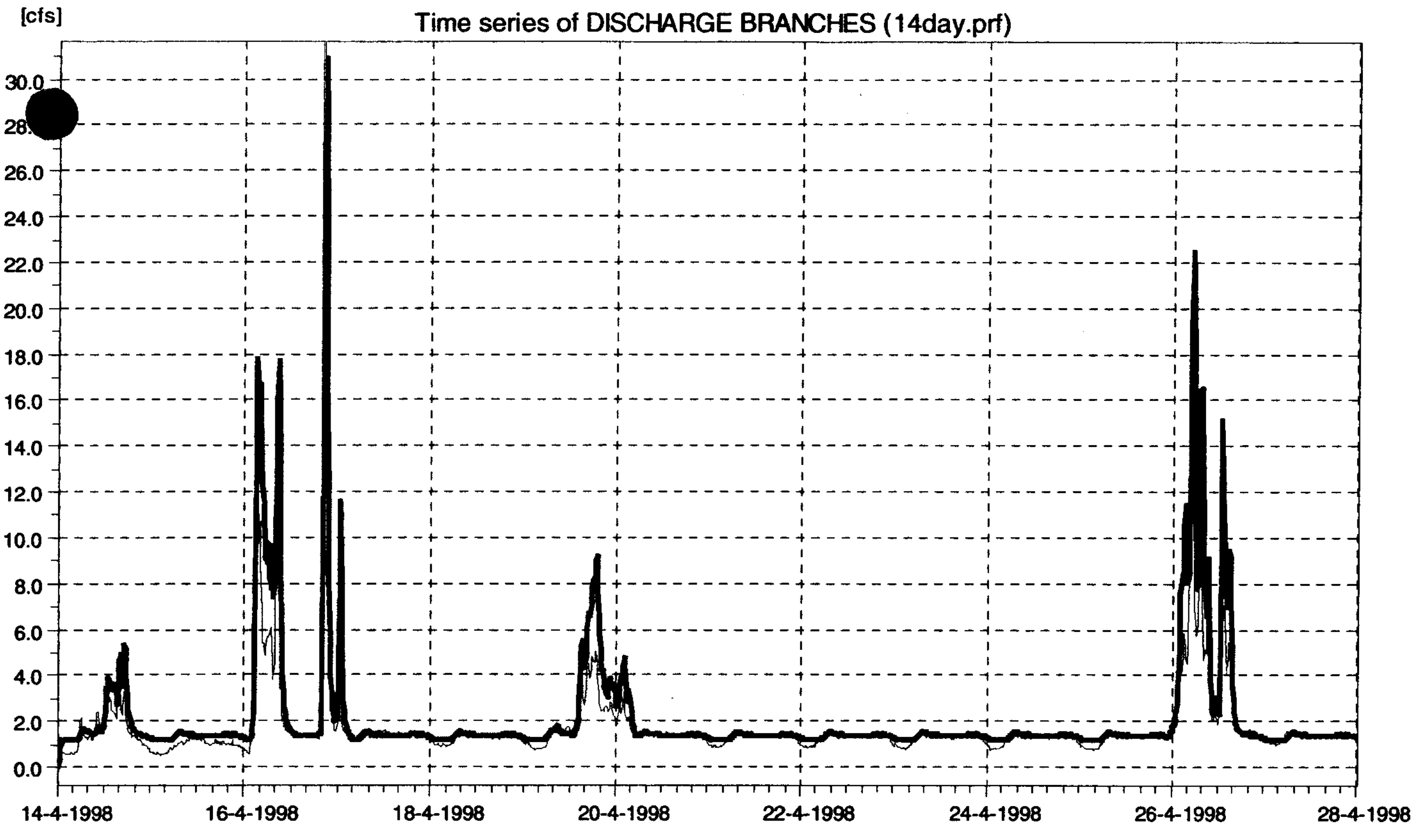
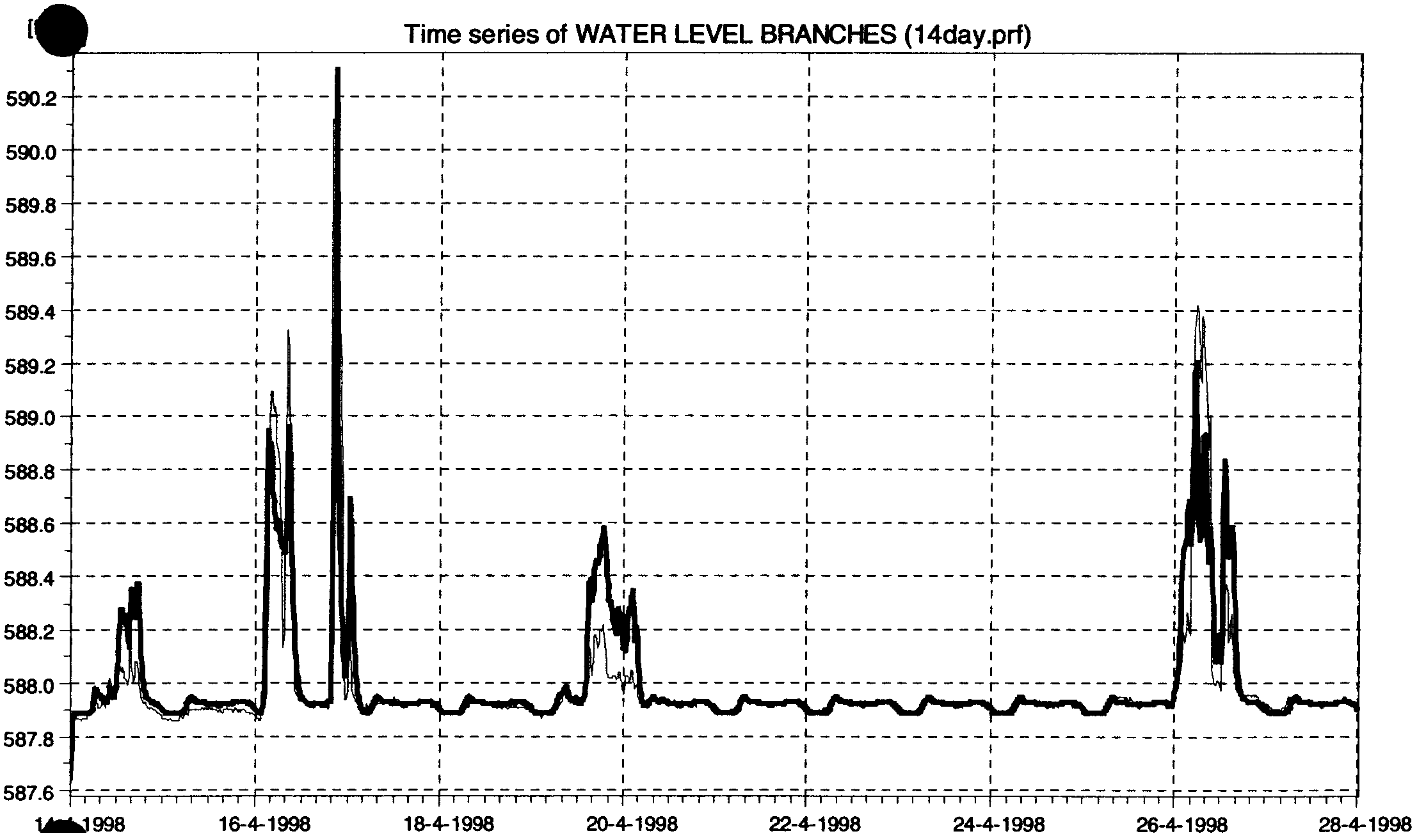
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: DW19I





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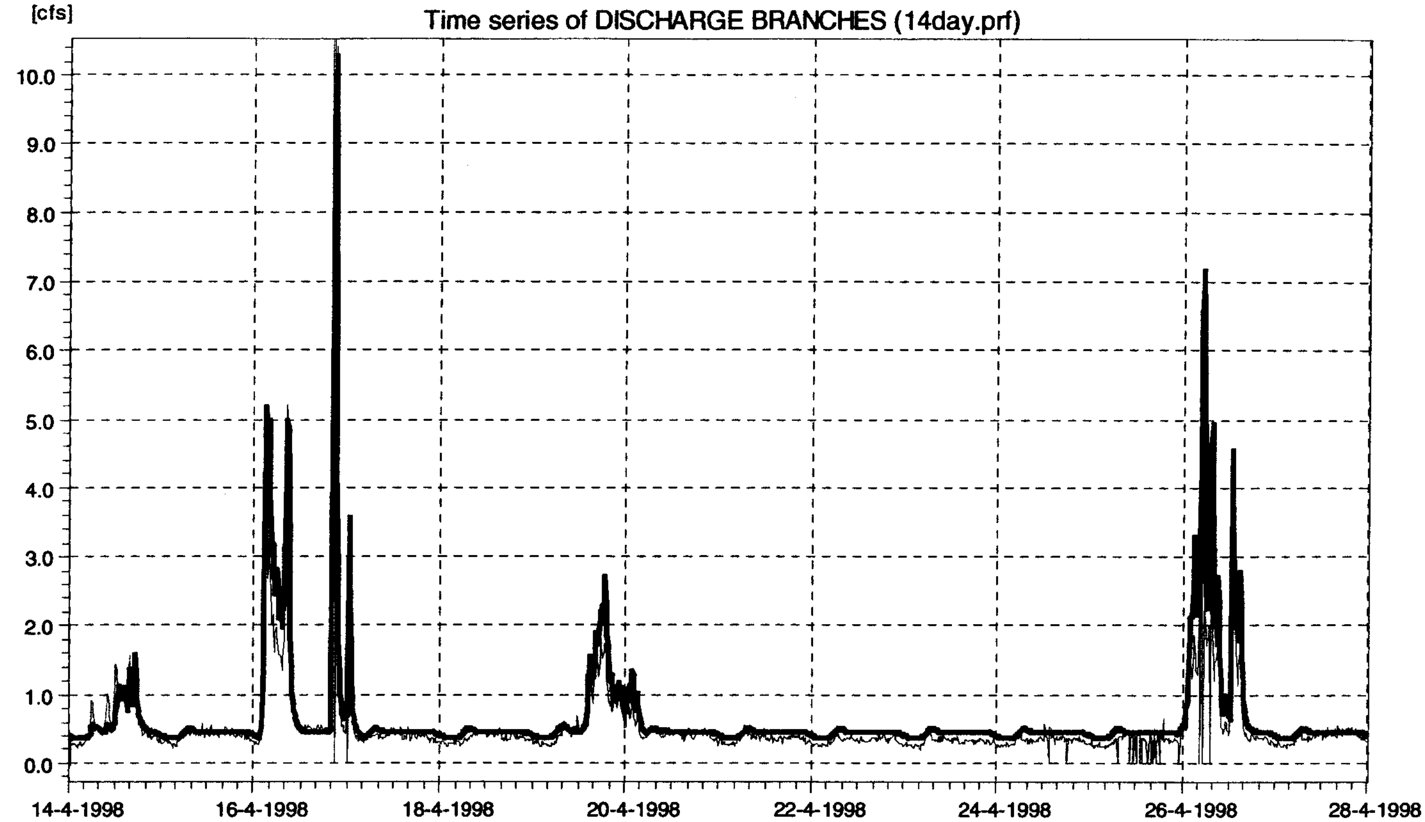
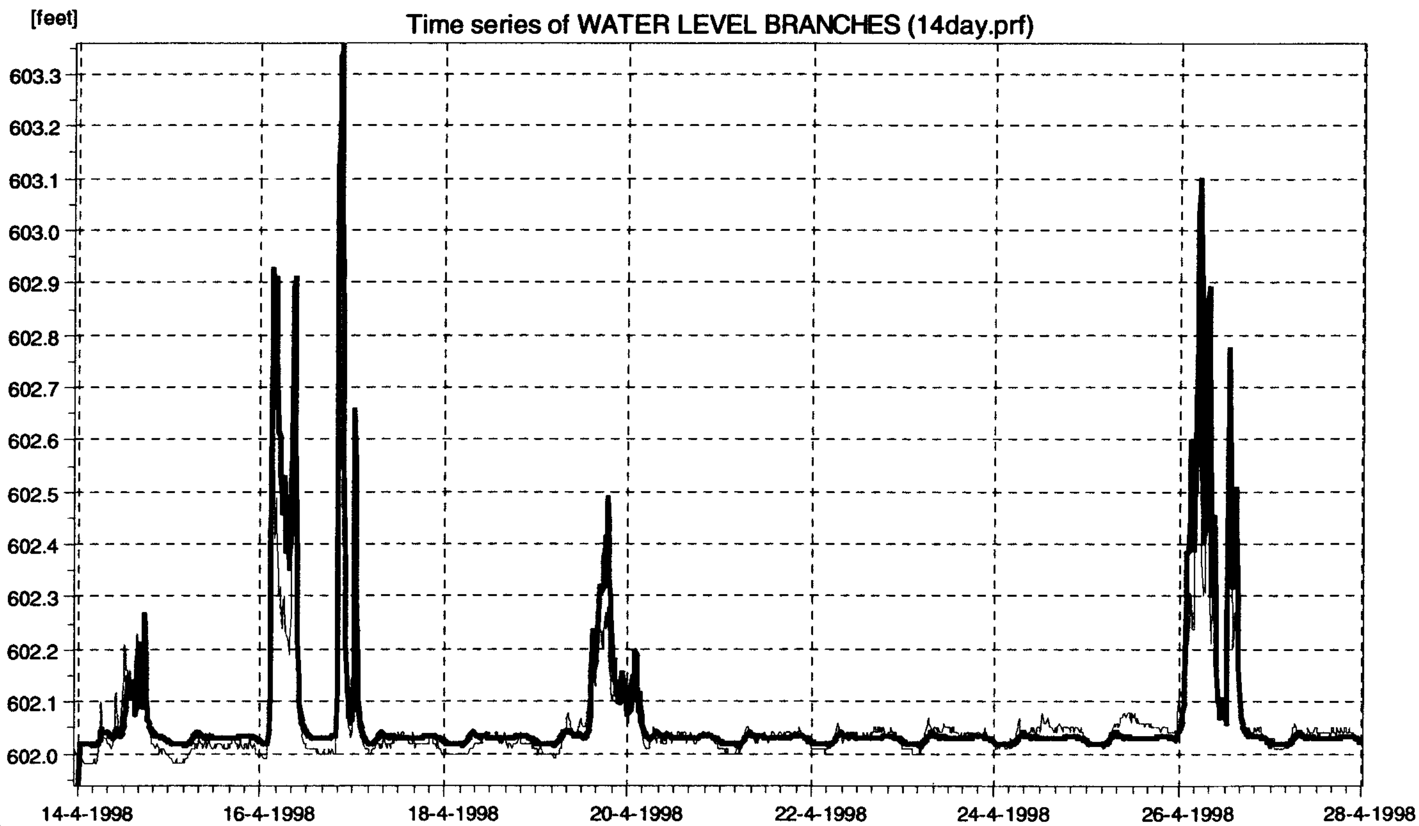
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: DW21I





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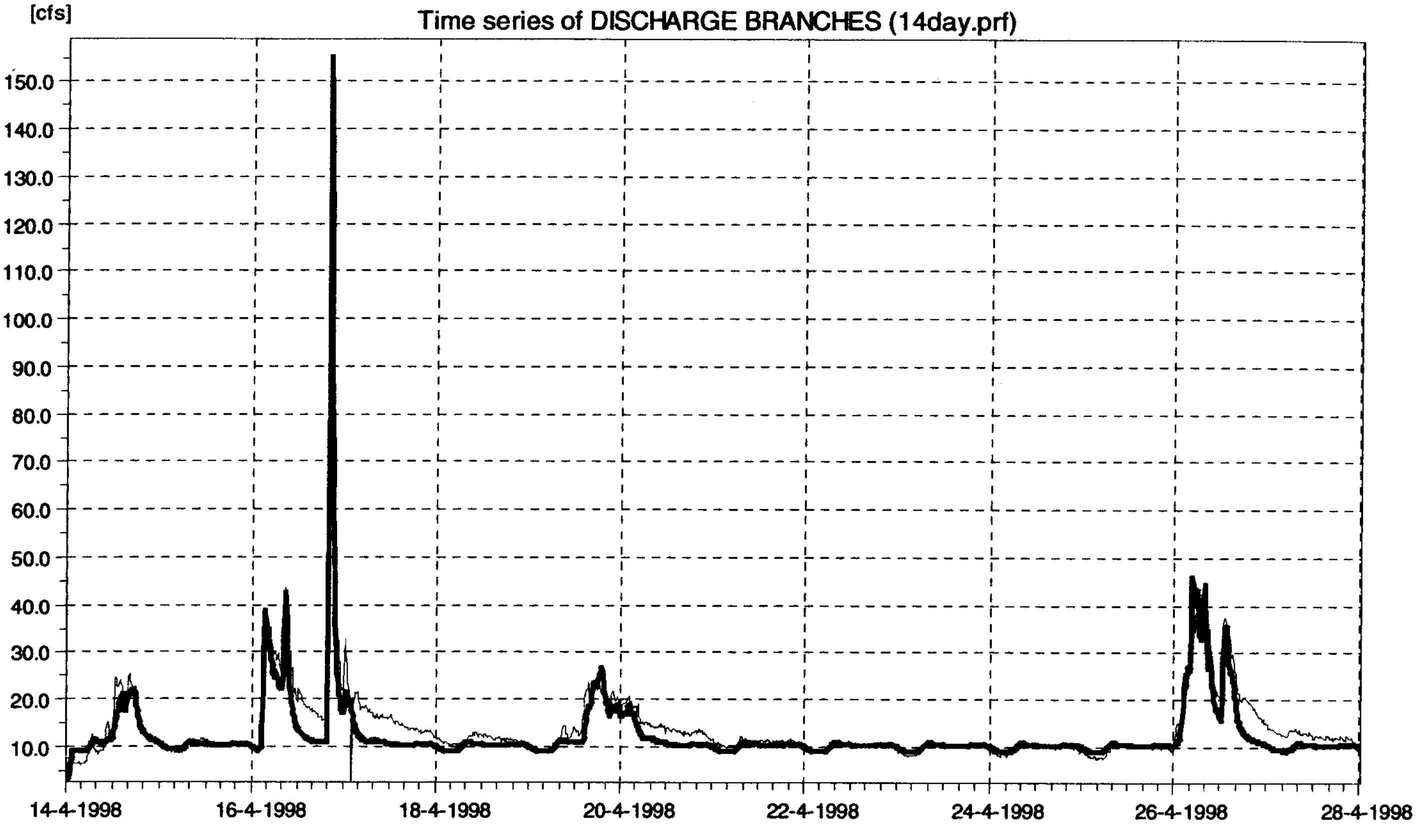
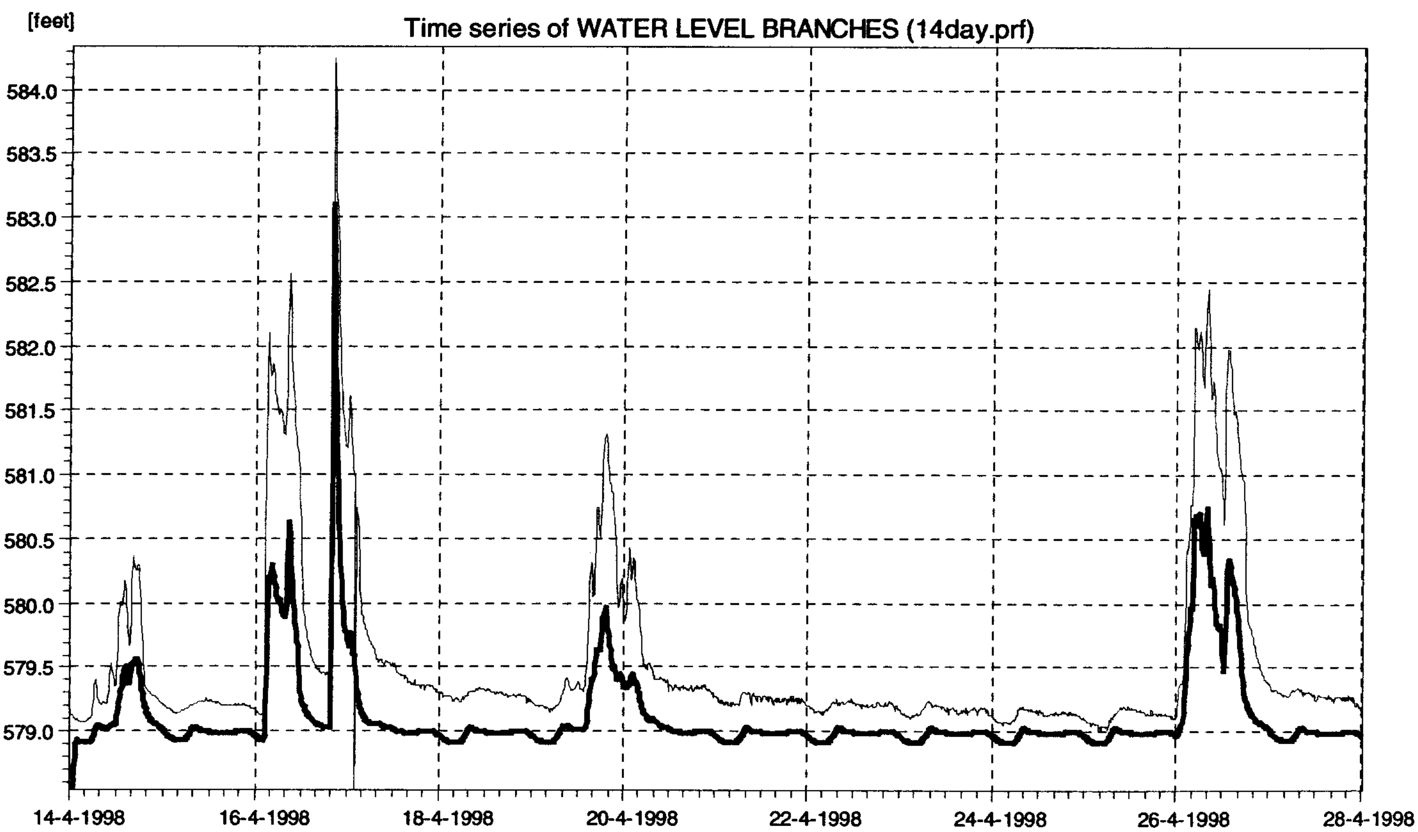
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: HA00





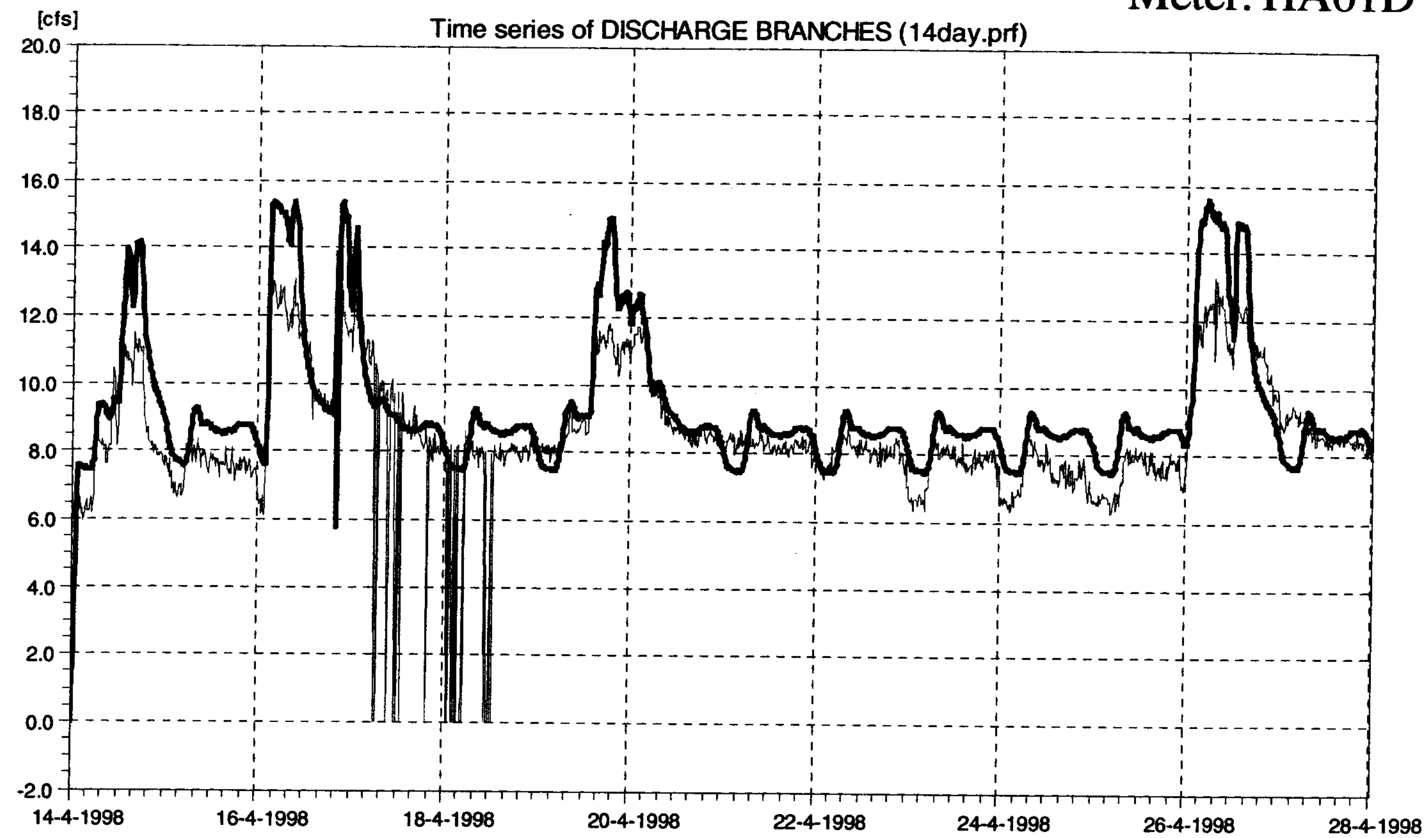
M&E AQUA ALLIANCE Metcalf & Eddy

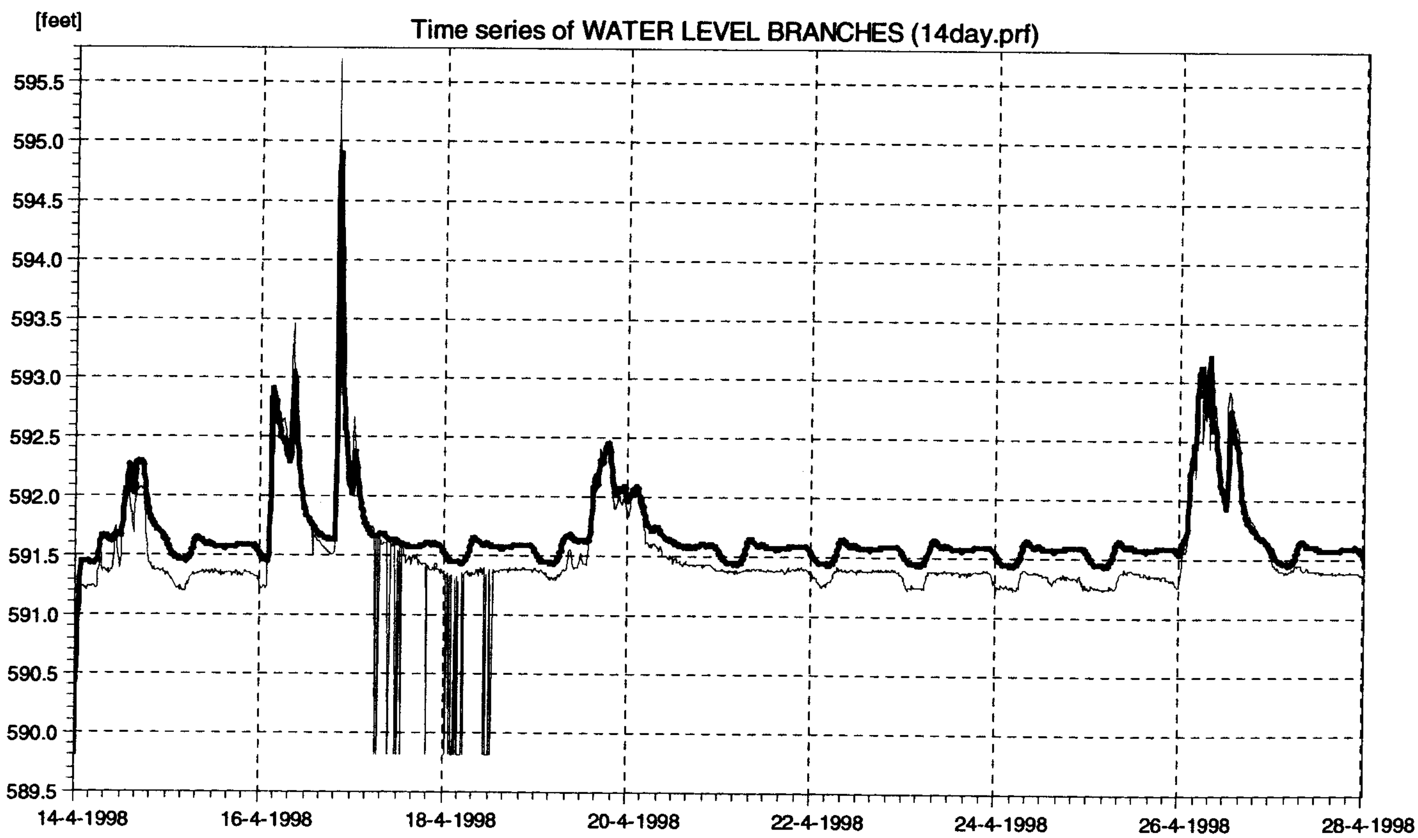
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: HA01D





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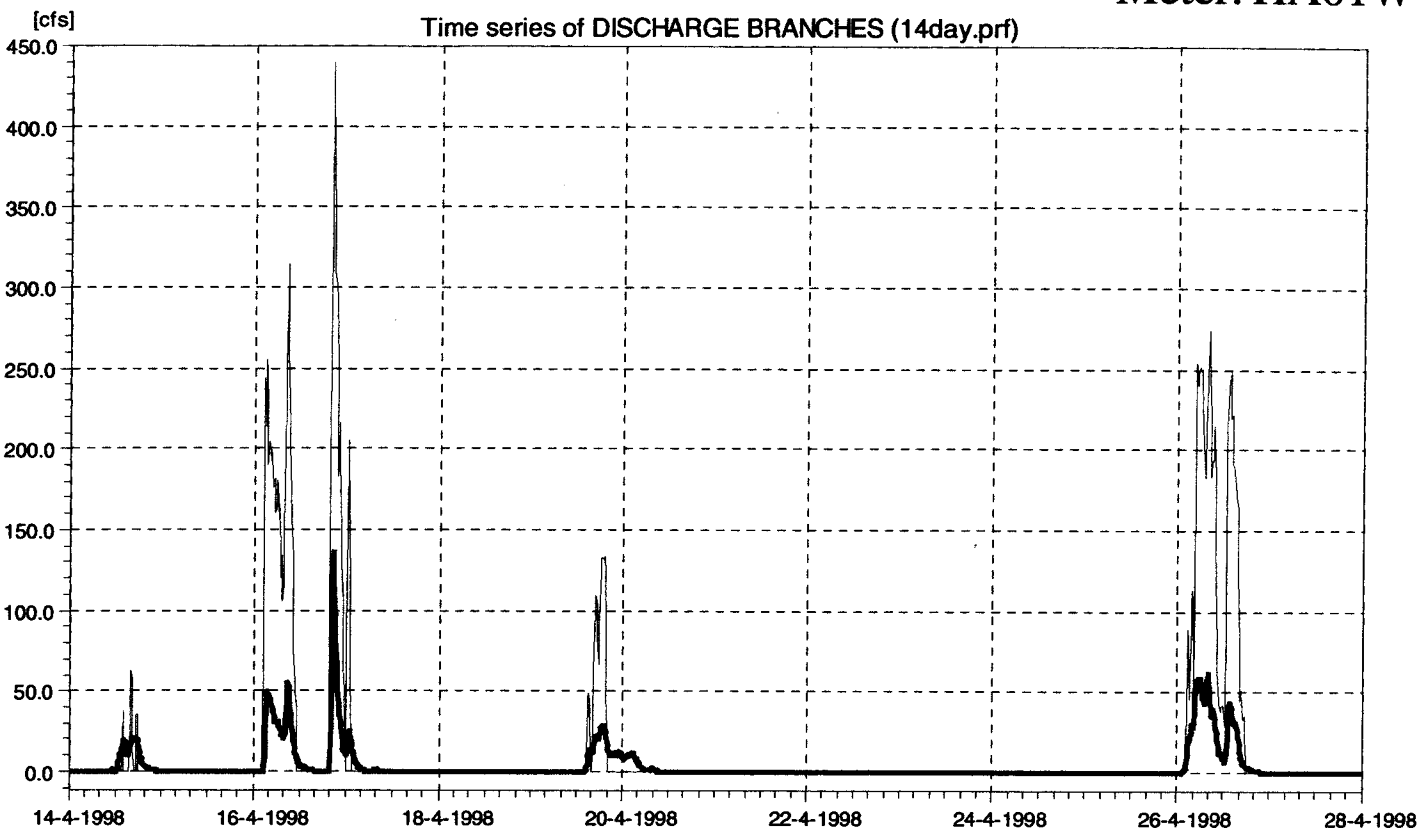
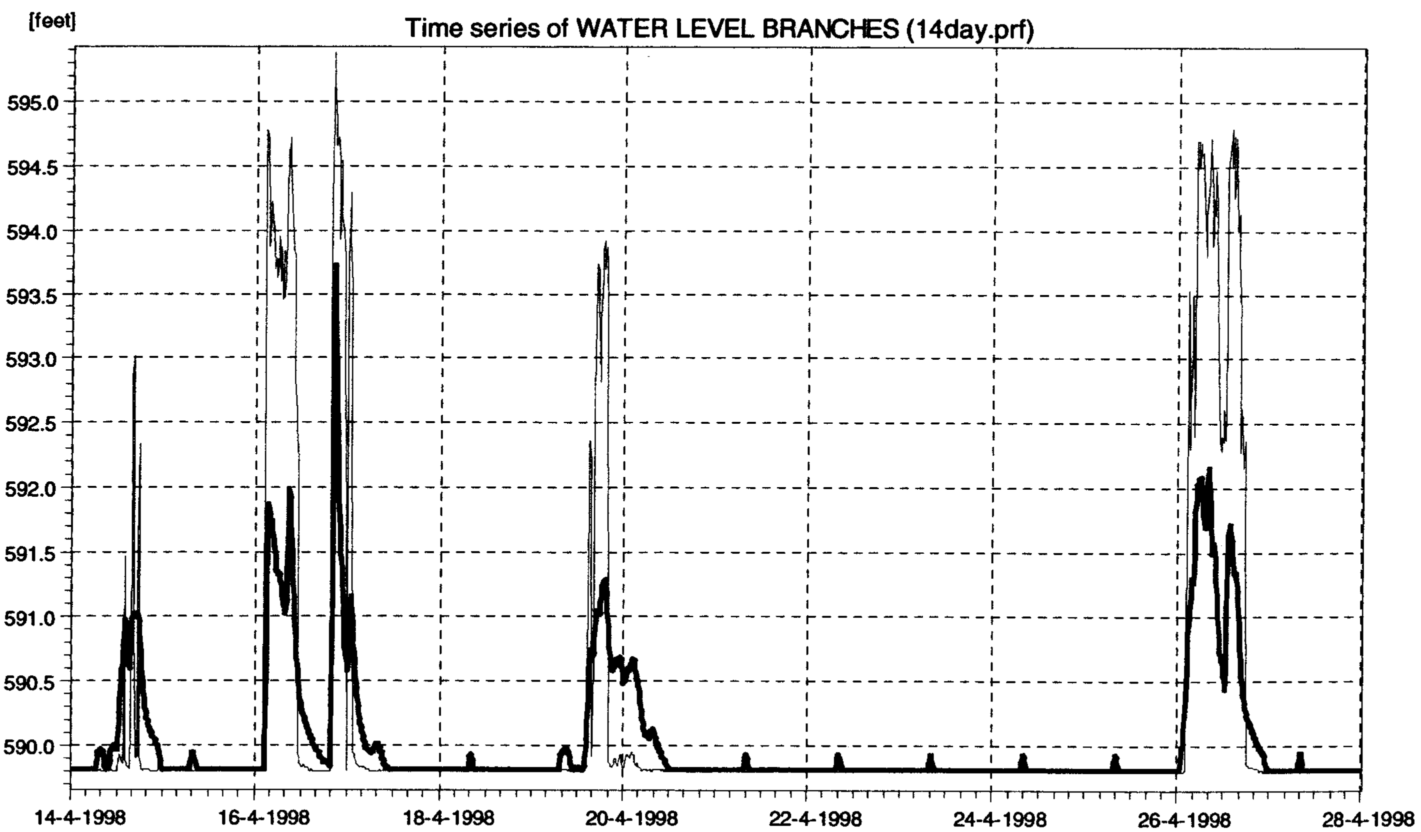
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: HA01W





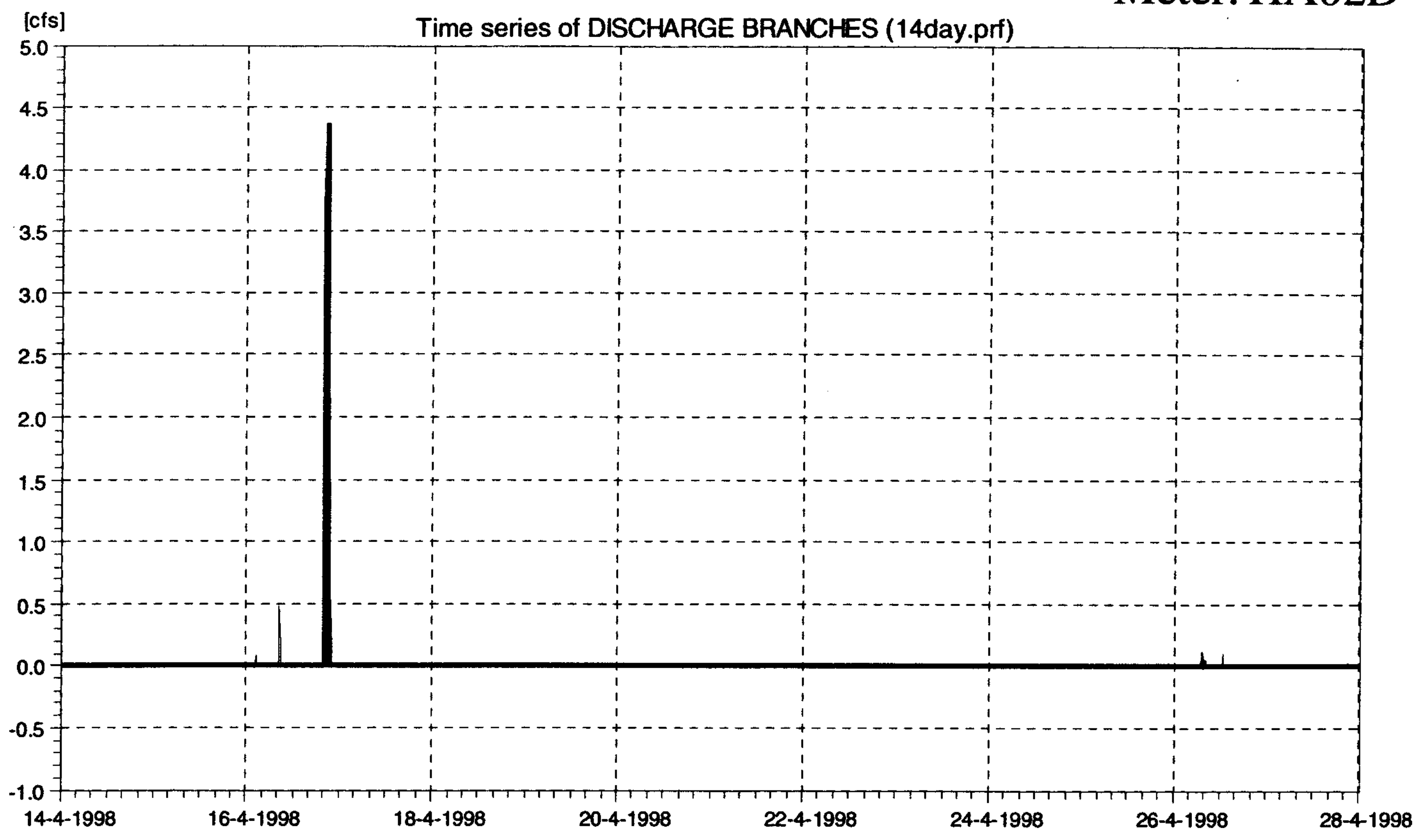
M&E AQUA ALLIANCE Metcalf & Eddy

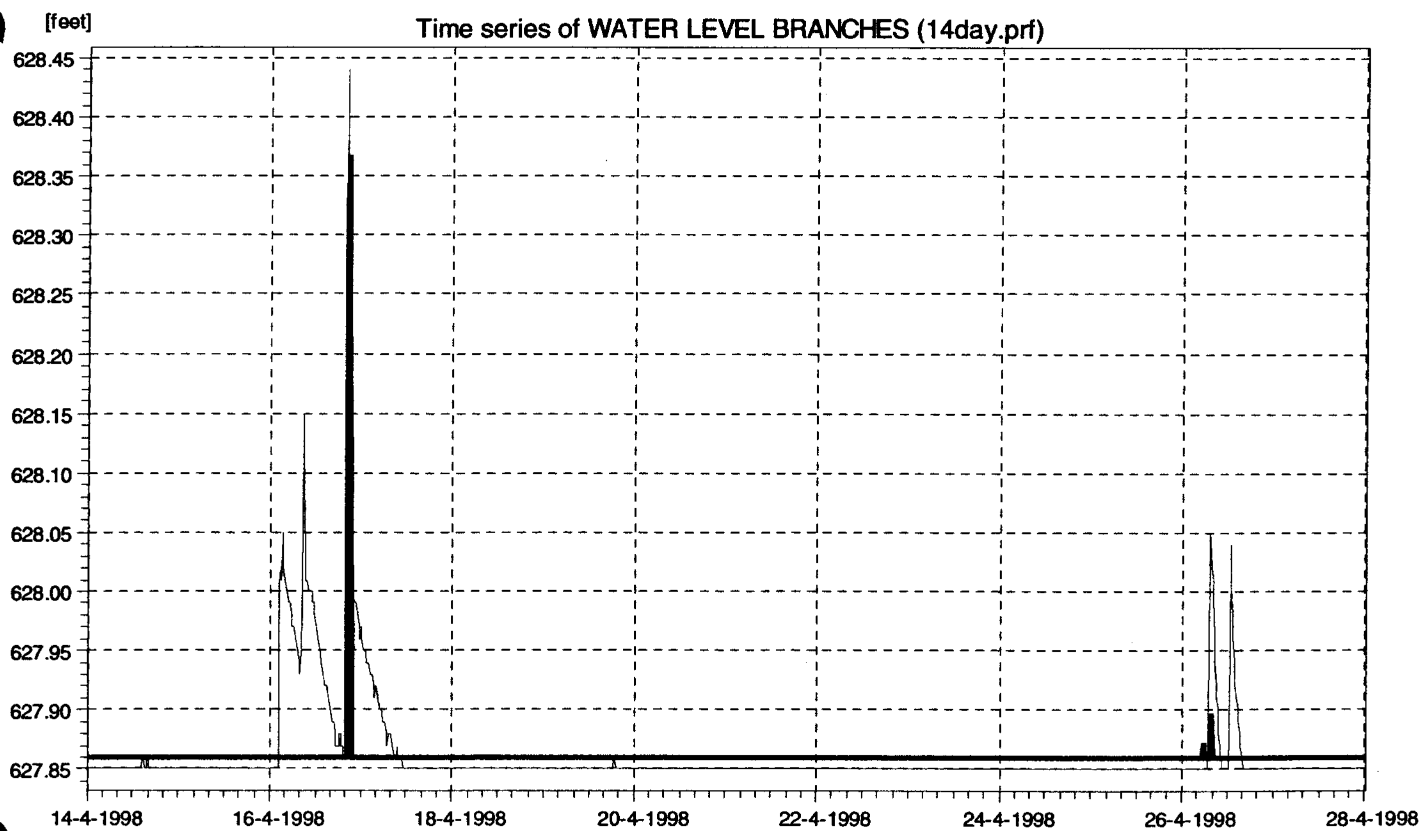
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: HA02D





M&E AQUA ALLIANCE Metcalf & Eddy

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

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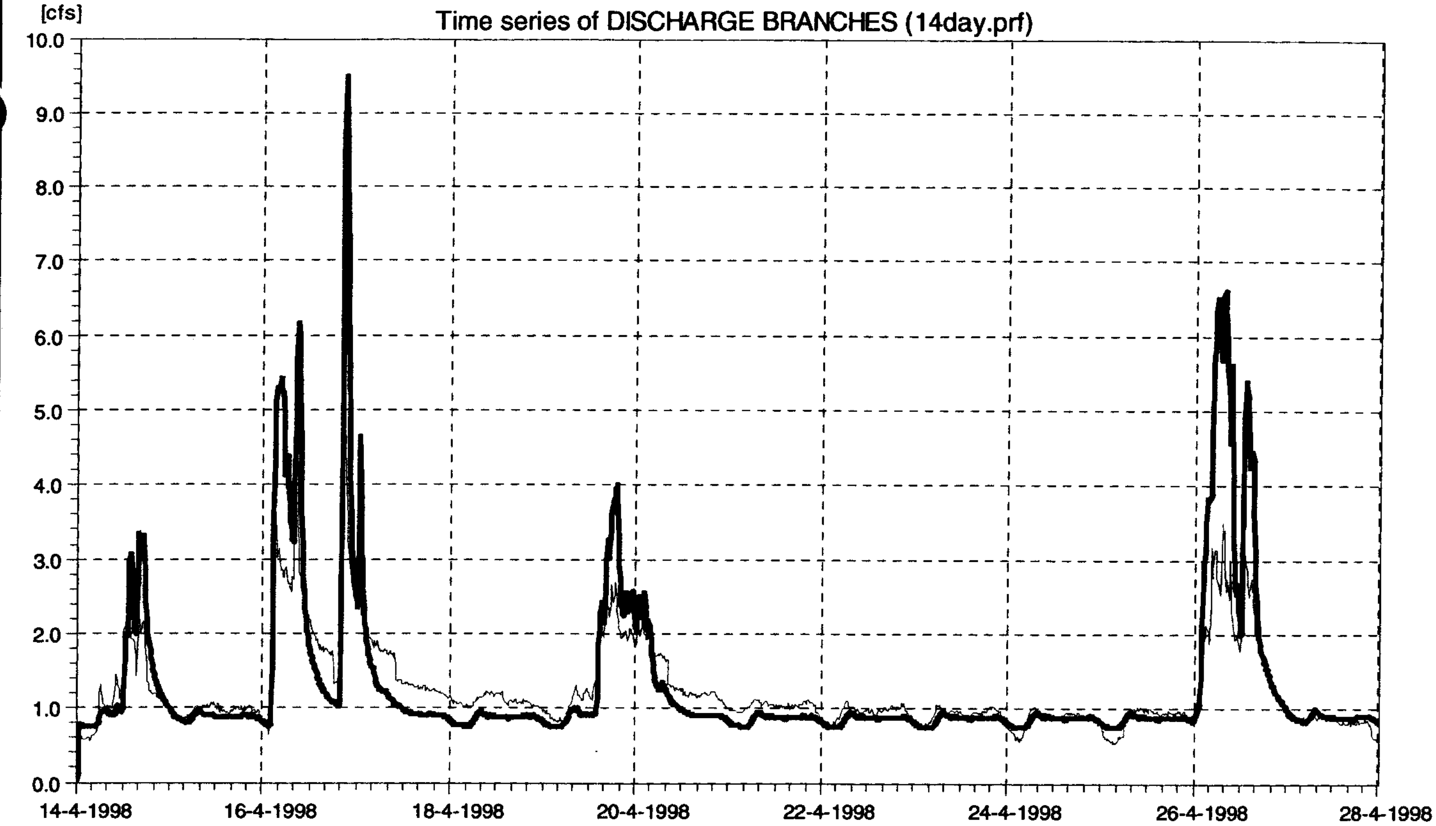

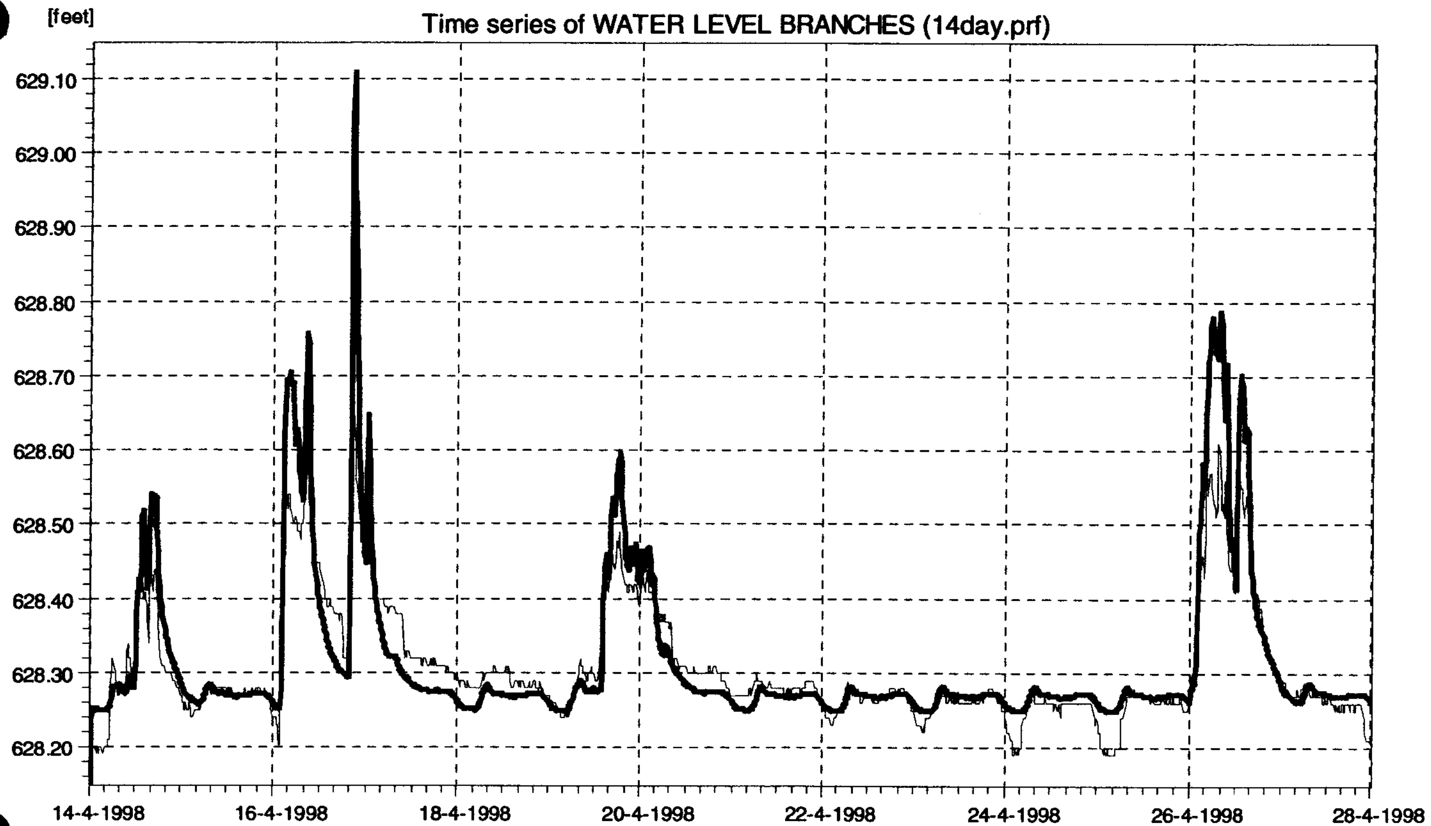

M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

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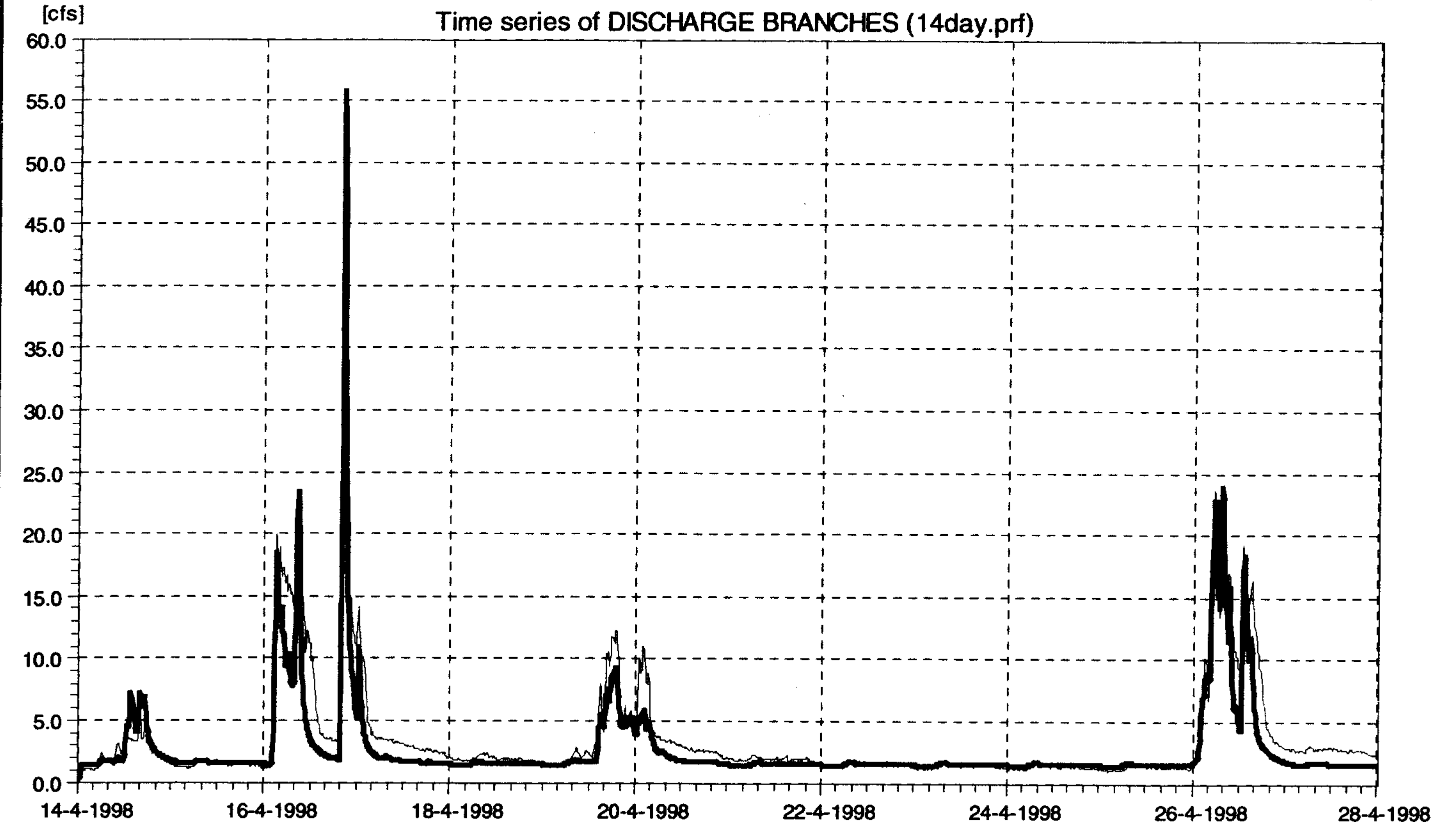
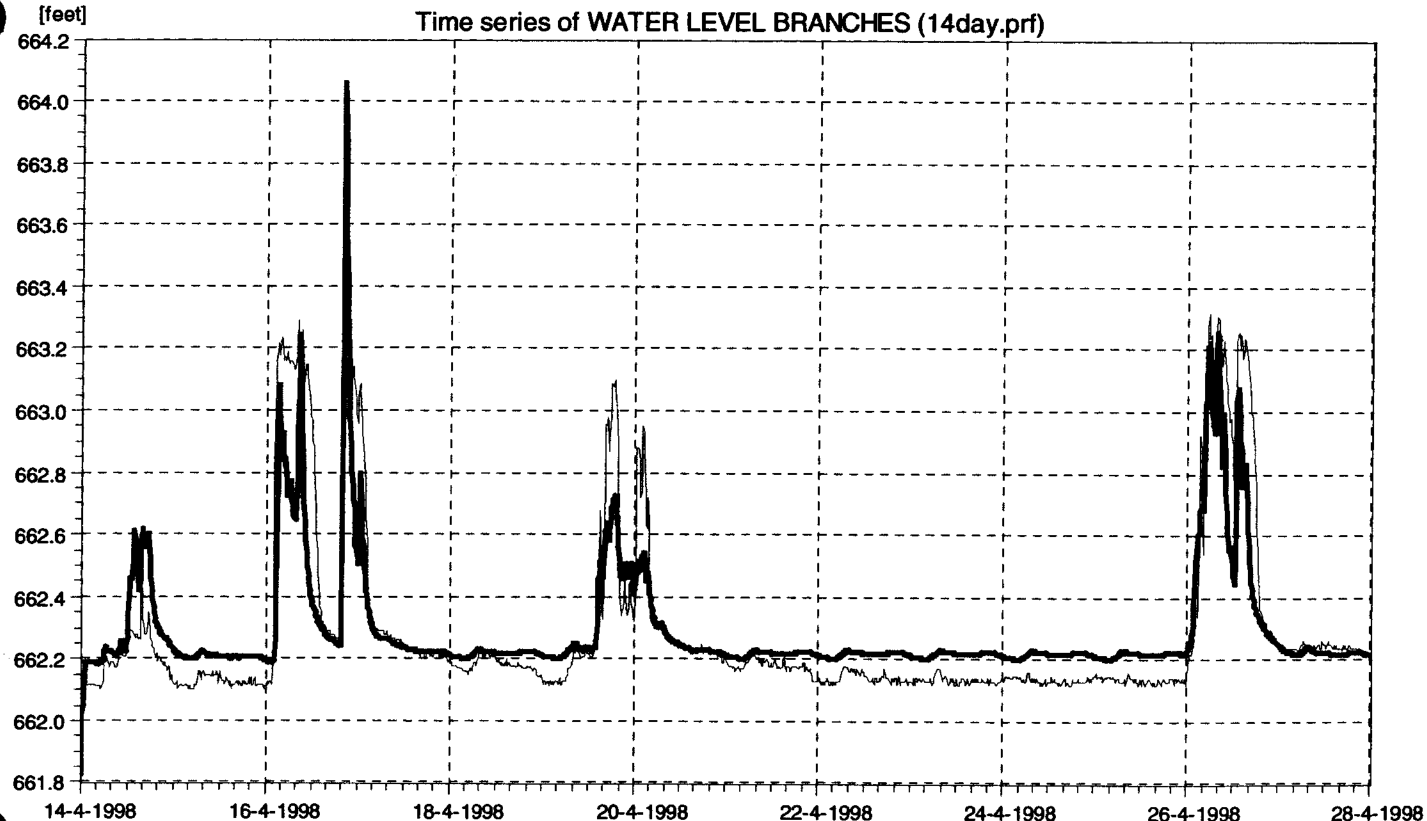




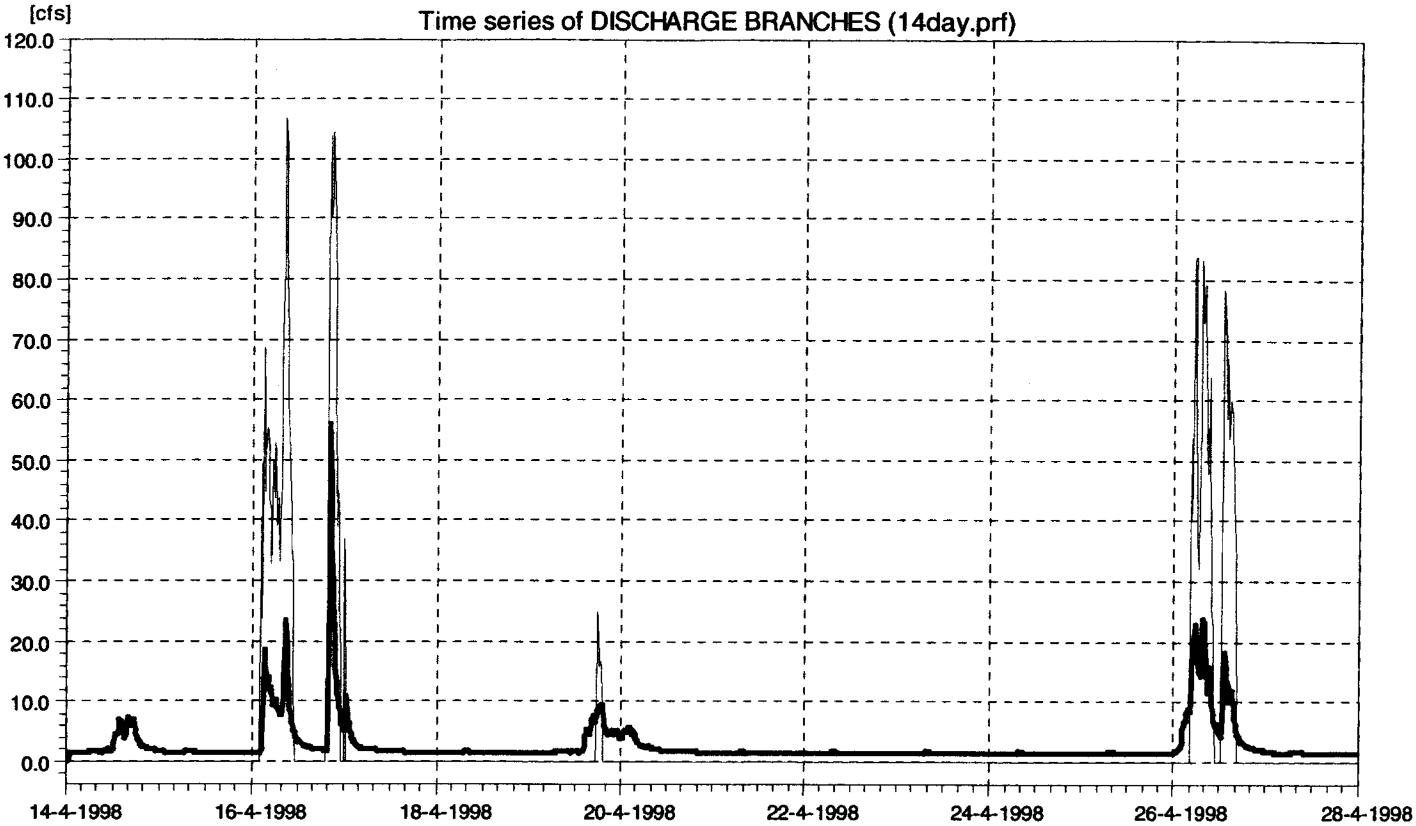
M&E Metcalf & Eddy AQUA ALLIANCE

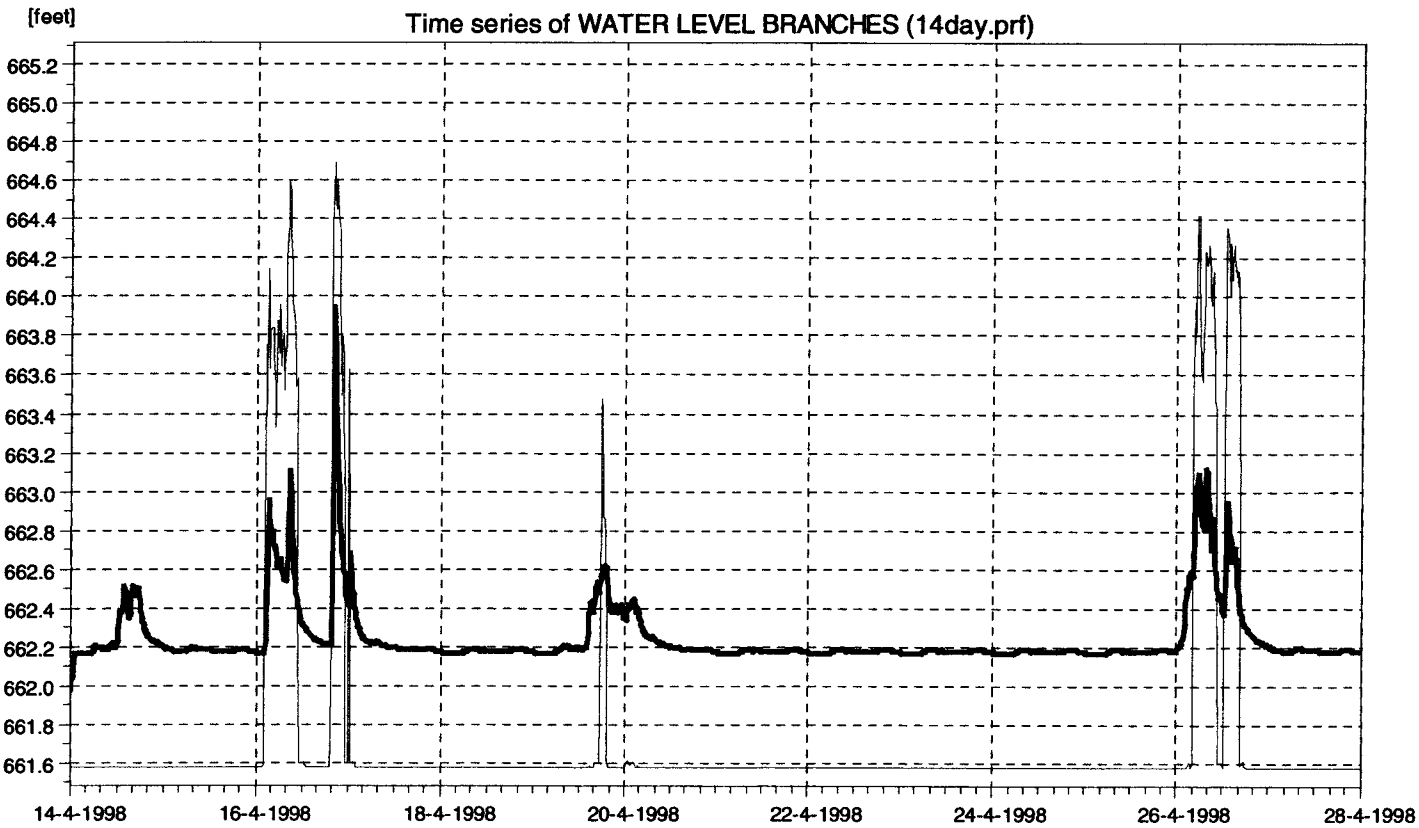
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: HA03W





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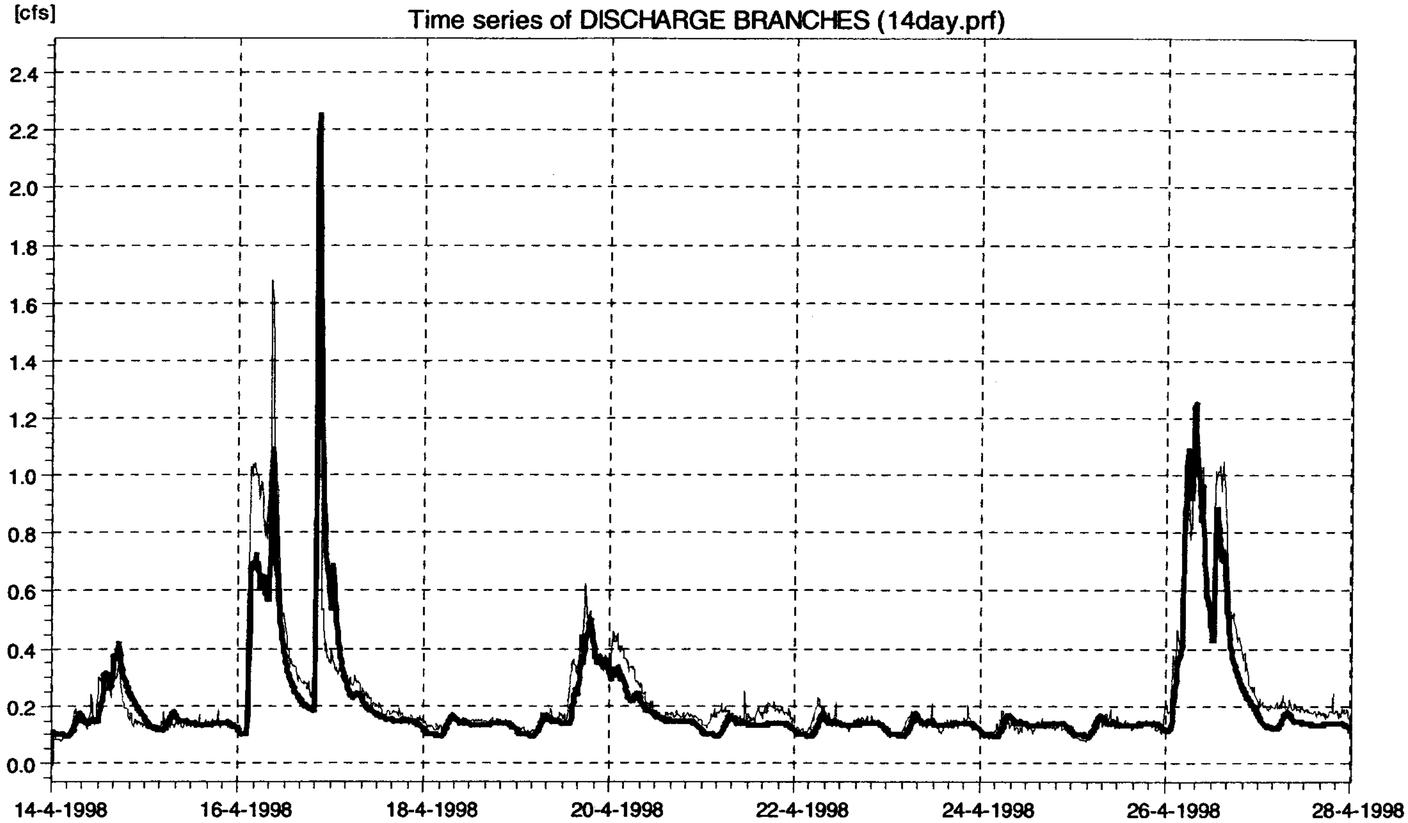
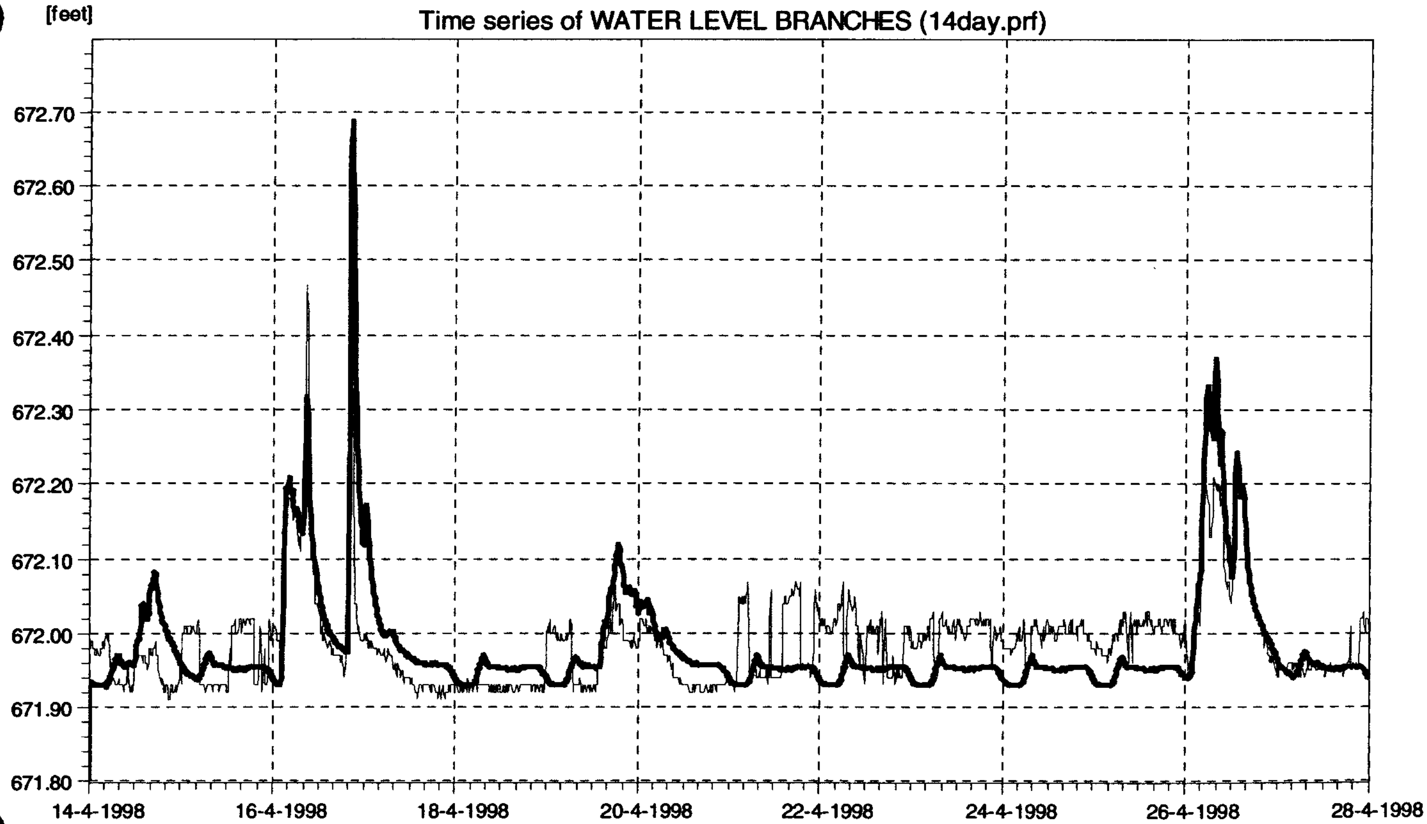
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: HA04





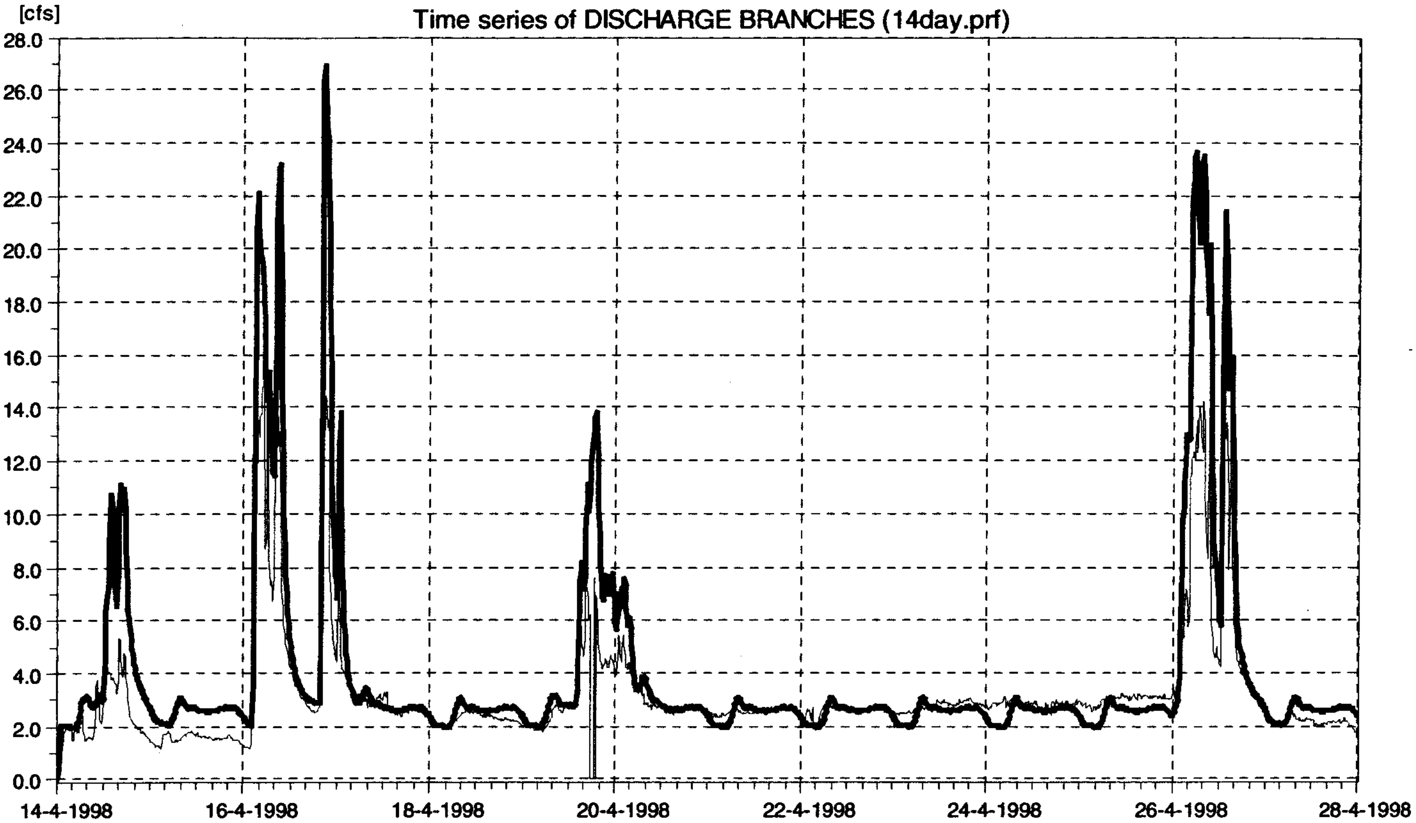
M&E Metcalf & Eddy AQUA ALLIANCE

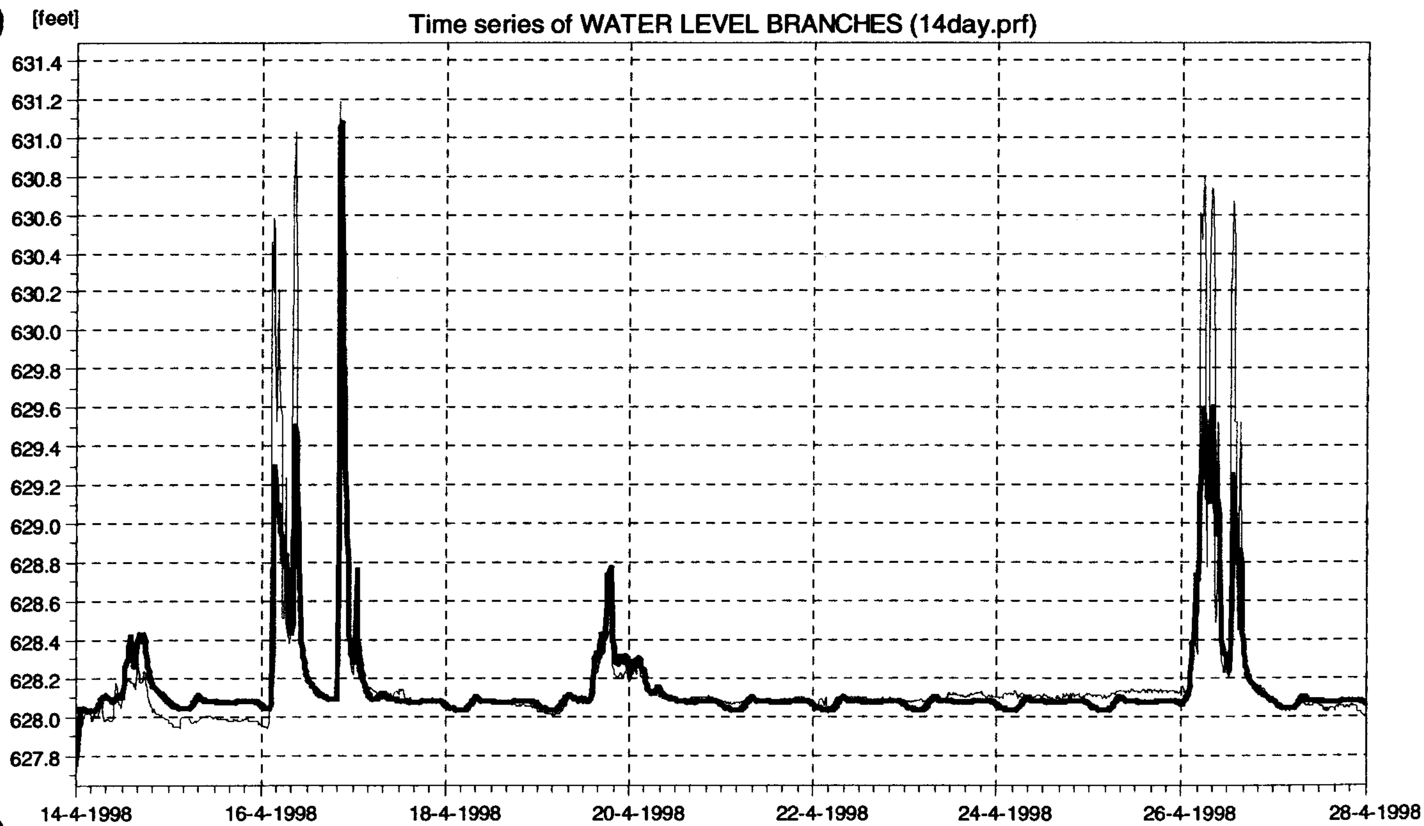
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: HA06D





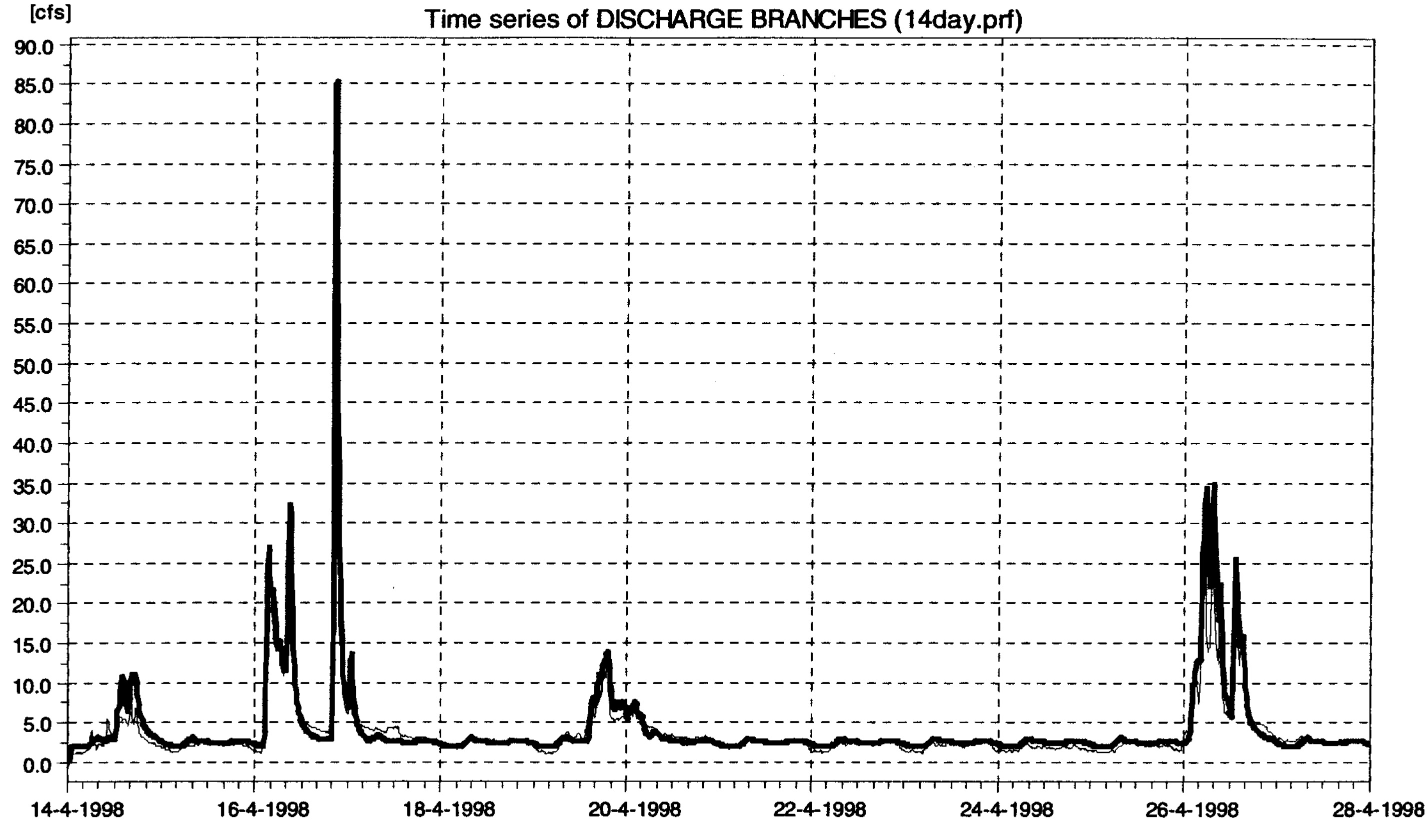
M&E Metcalf & Eddy AQUA ALLIANCE

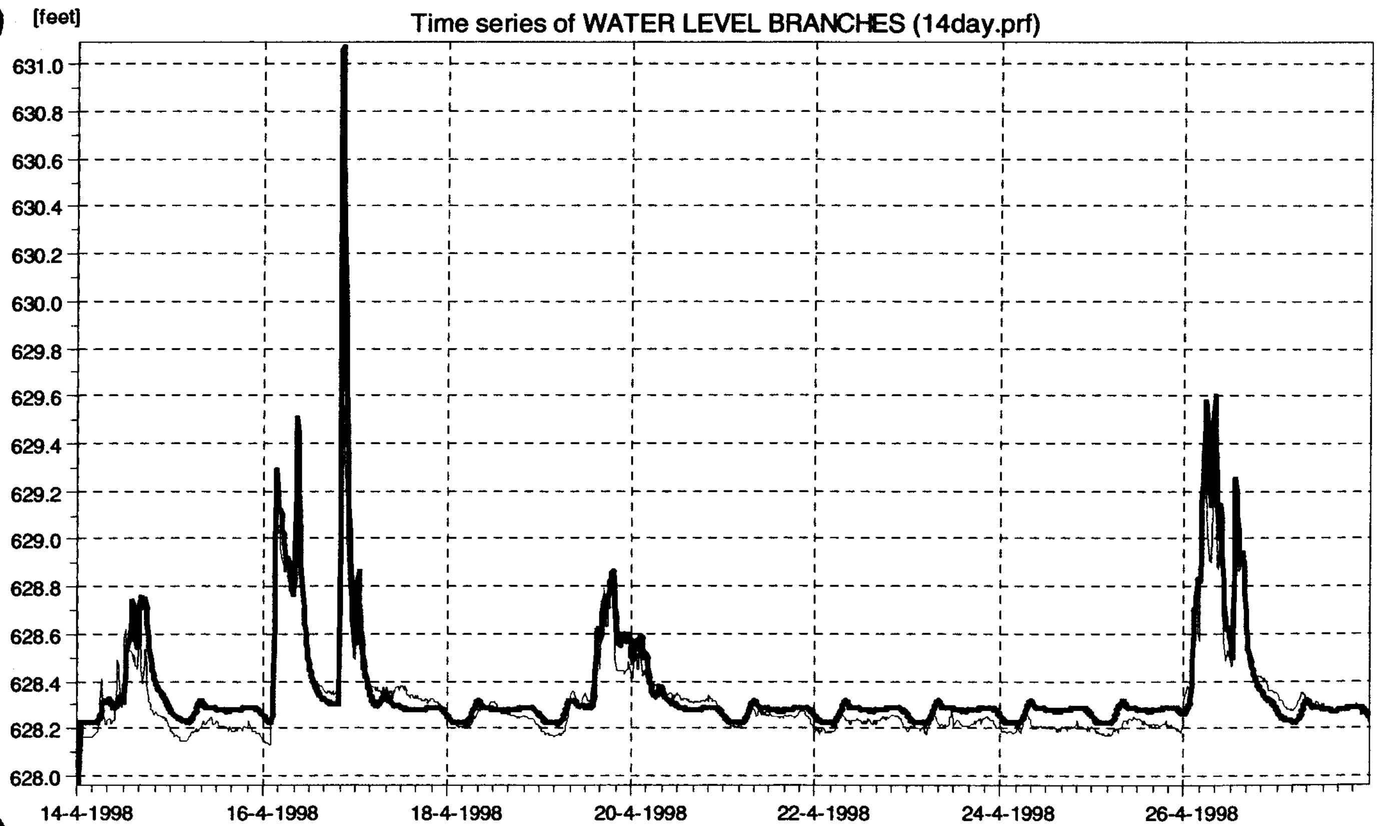
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: HA06I





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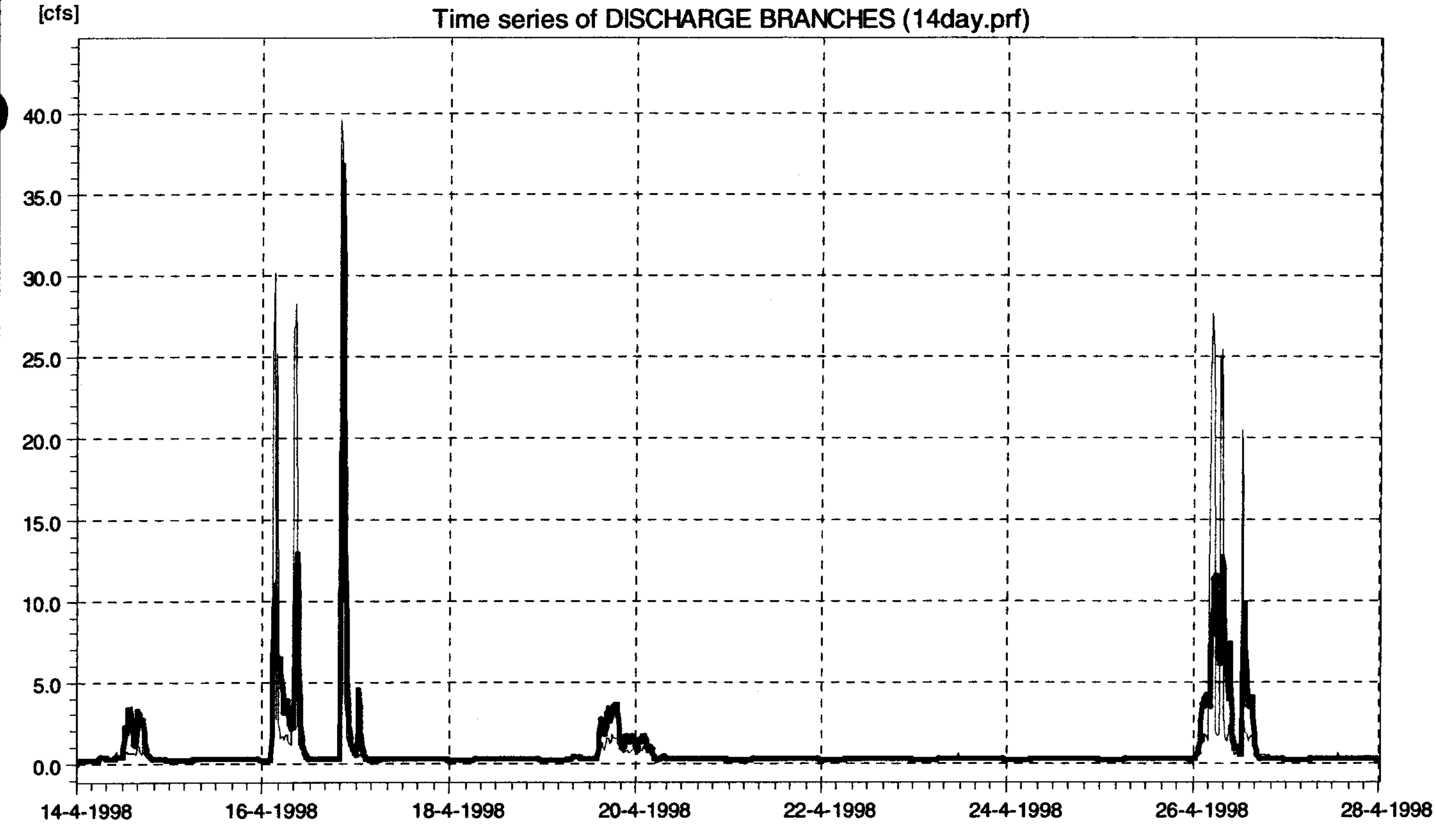
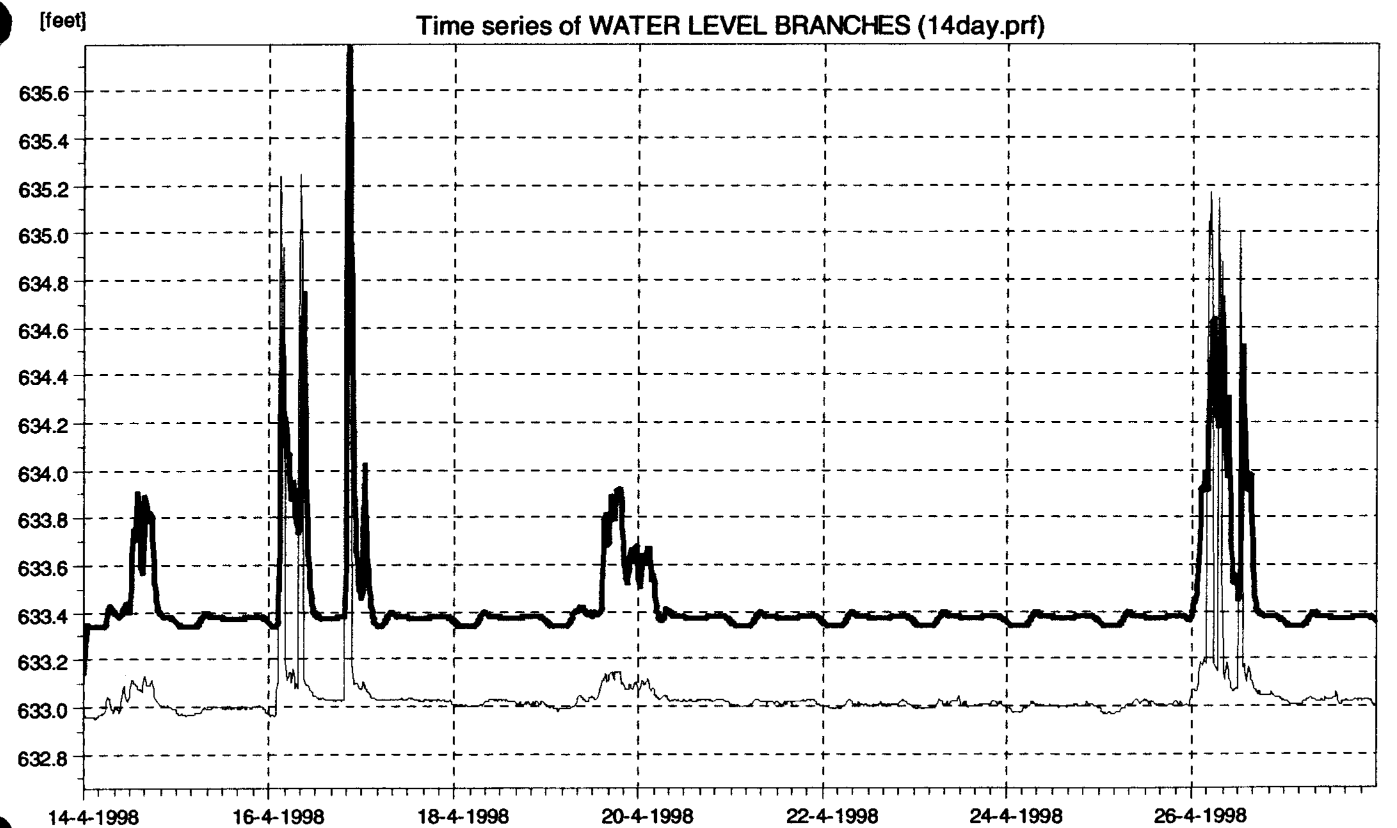
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: HA07D





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Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

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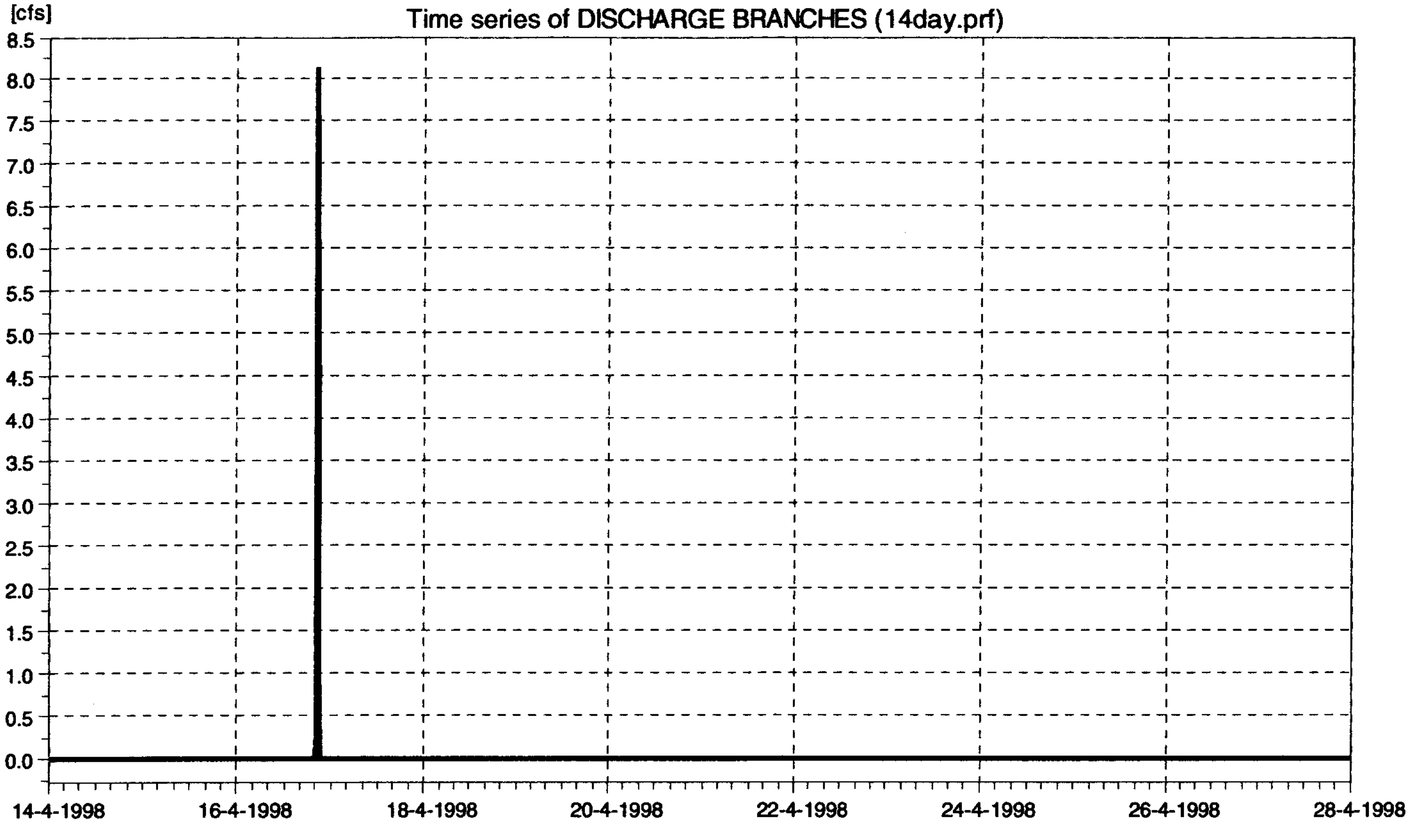

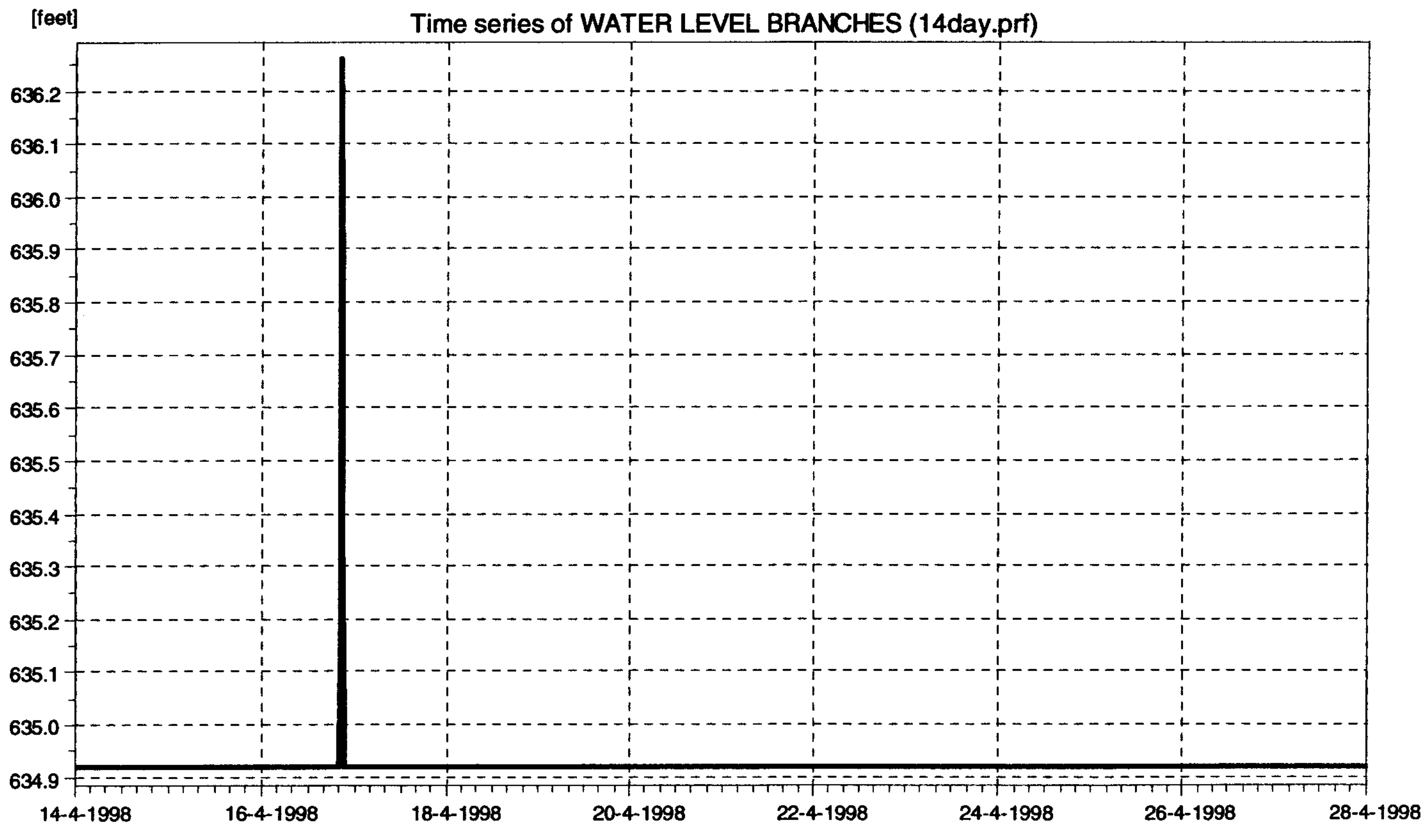

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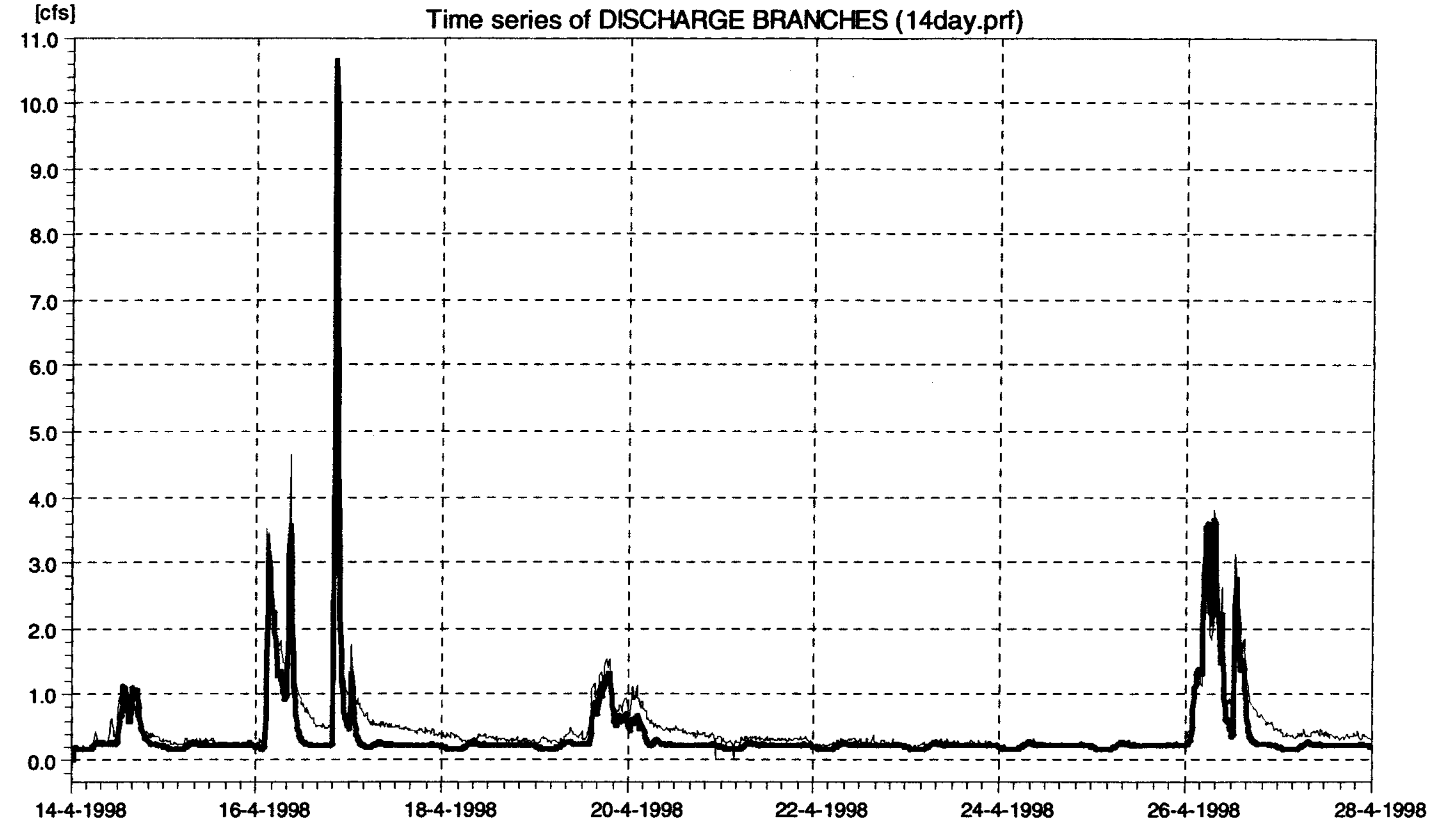
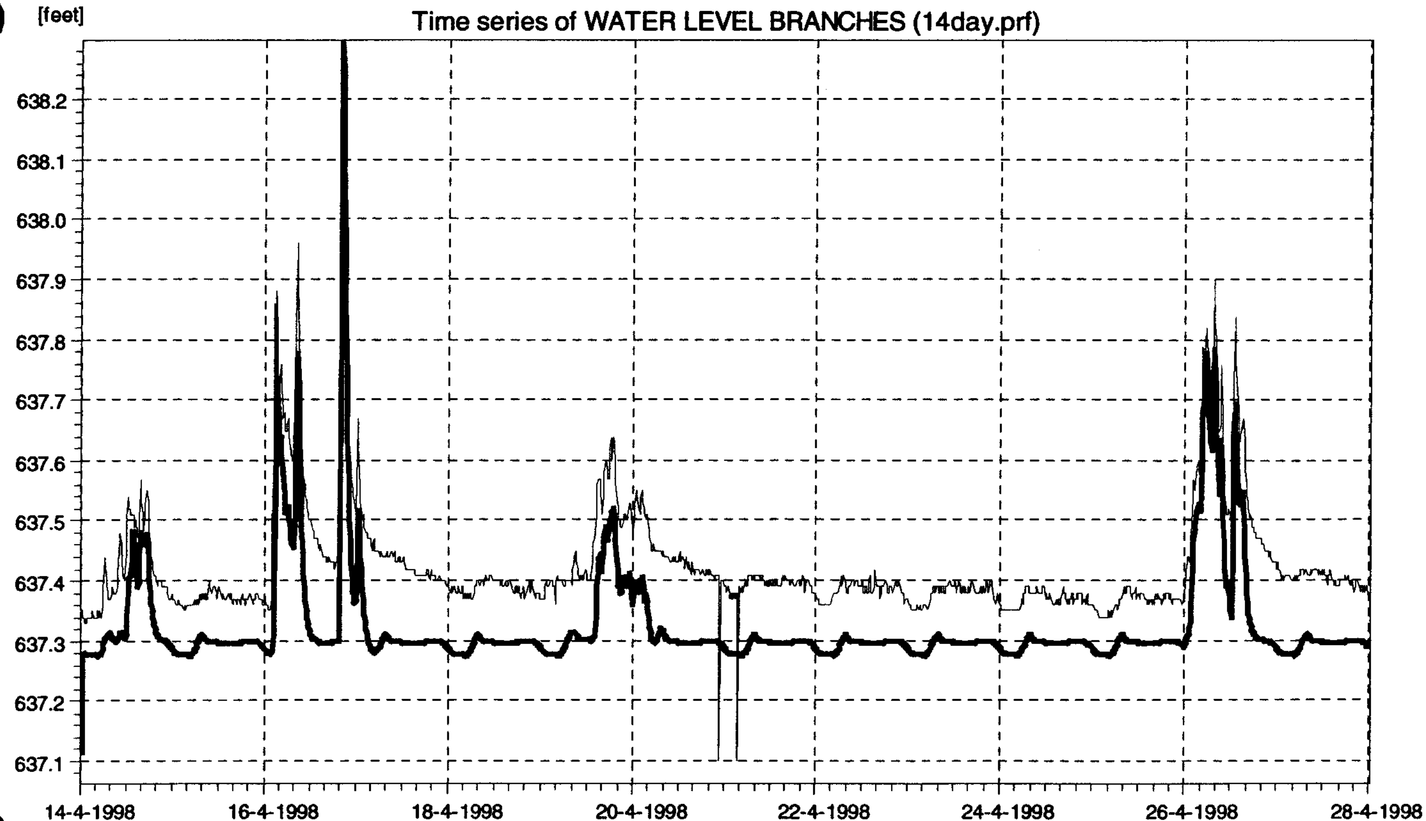
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: HA08





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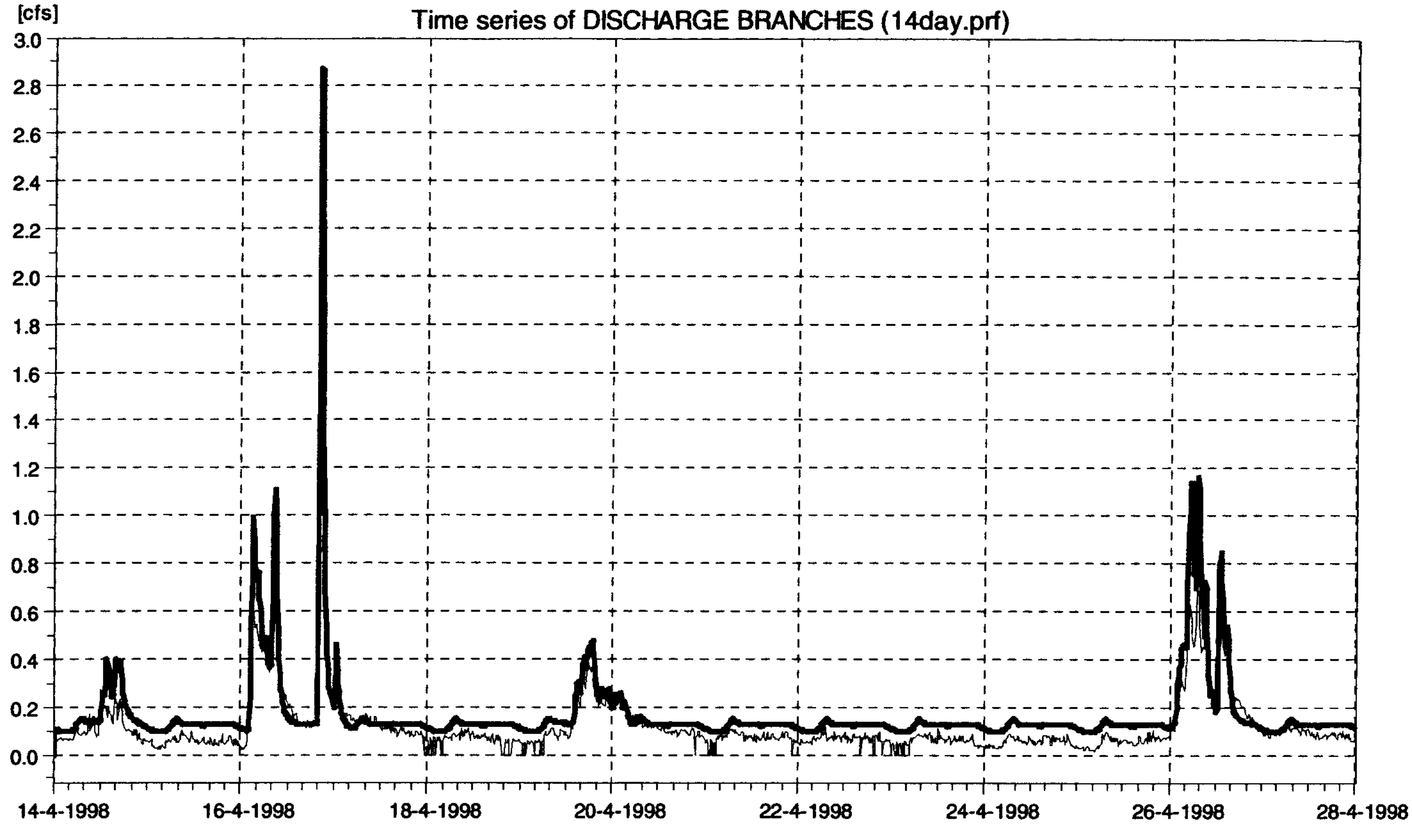
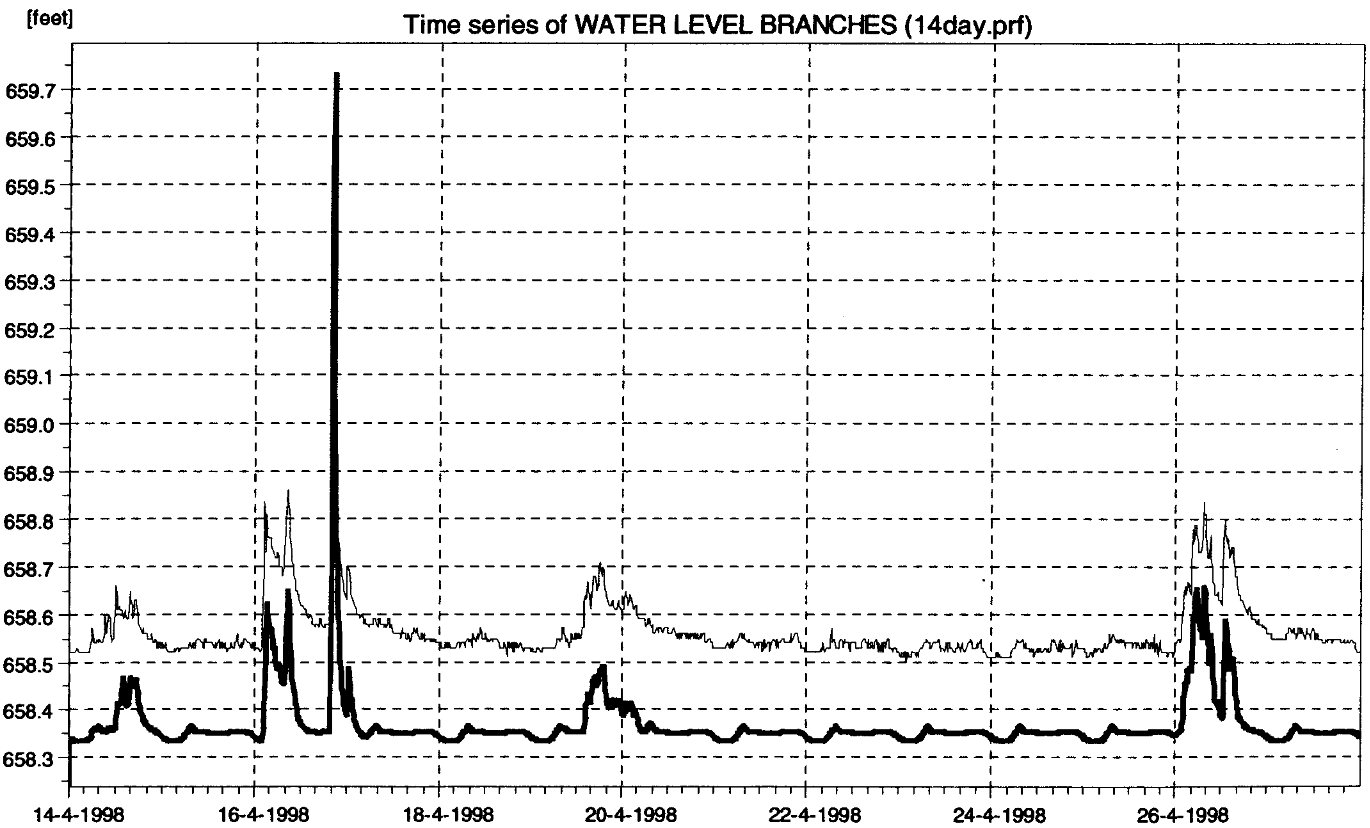
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: HA10





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Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

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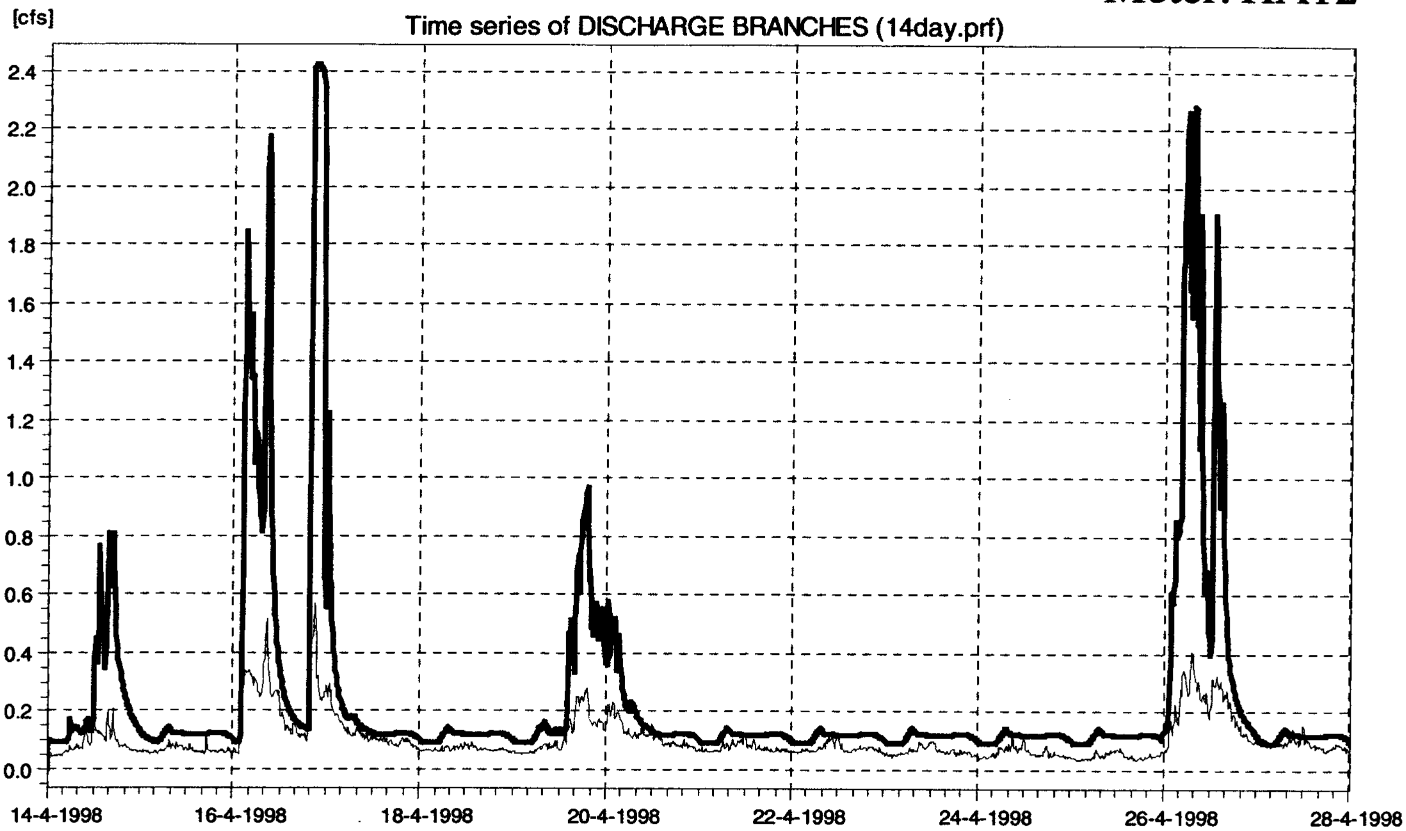

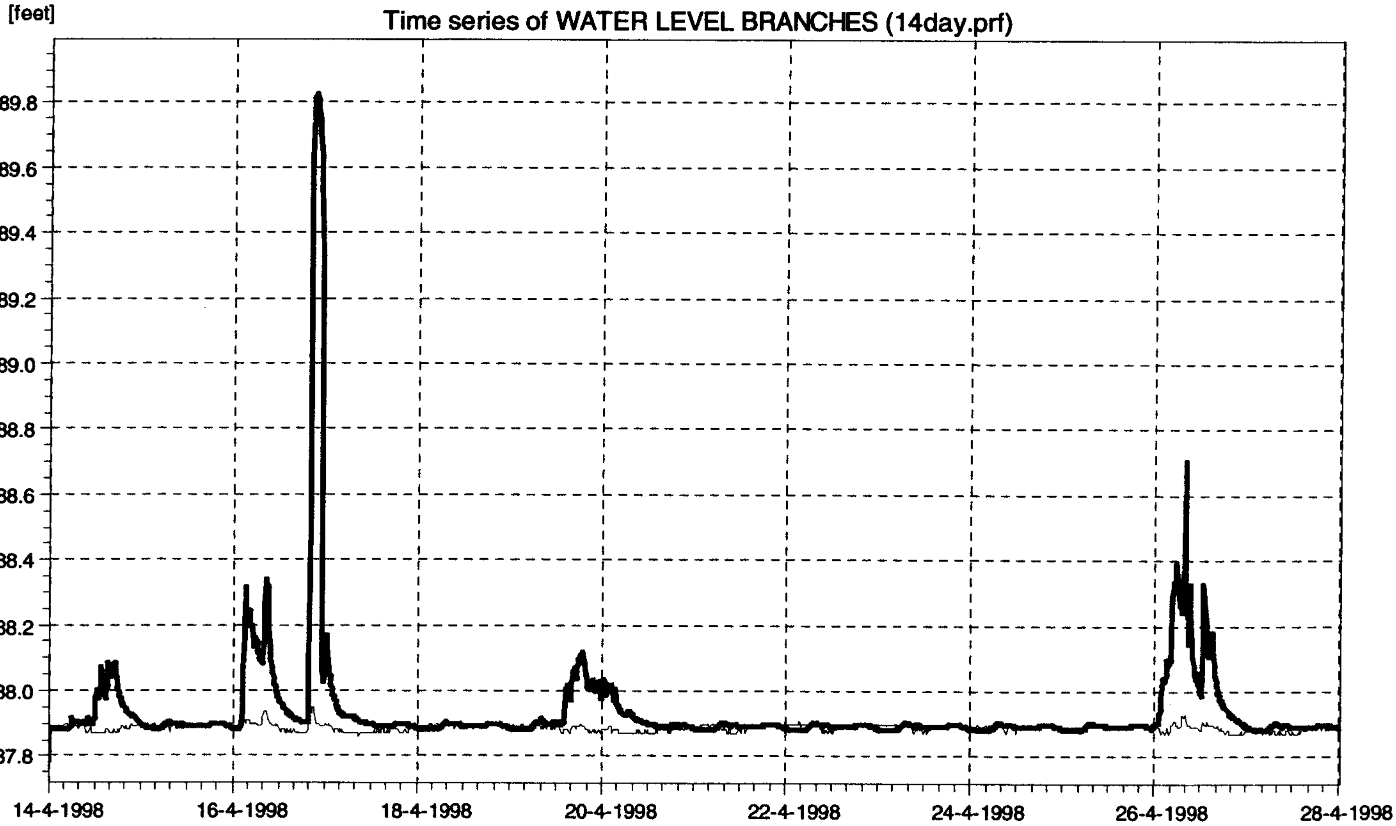

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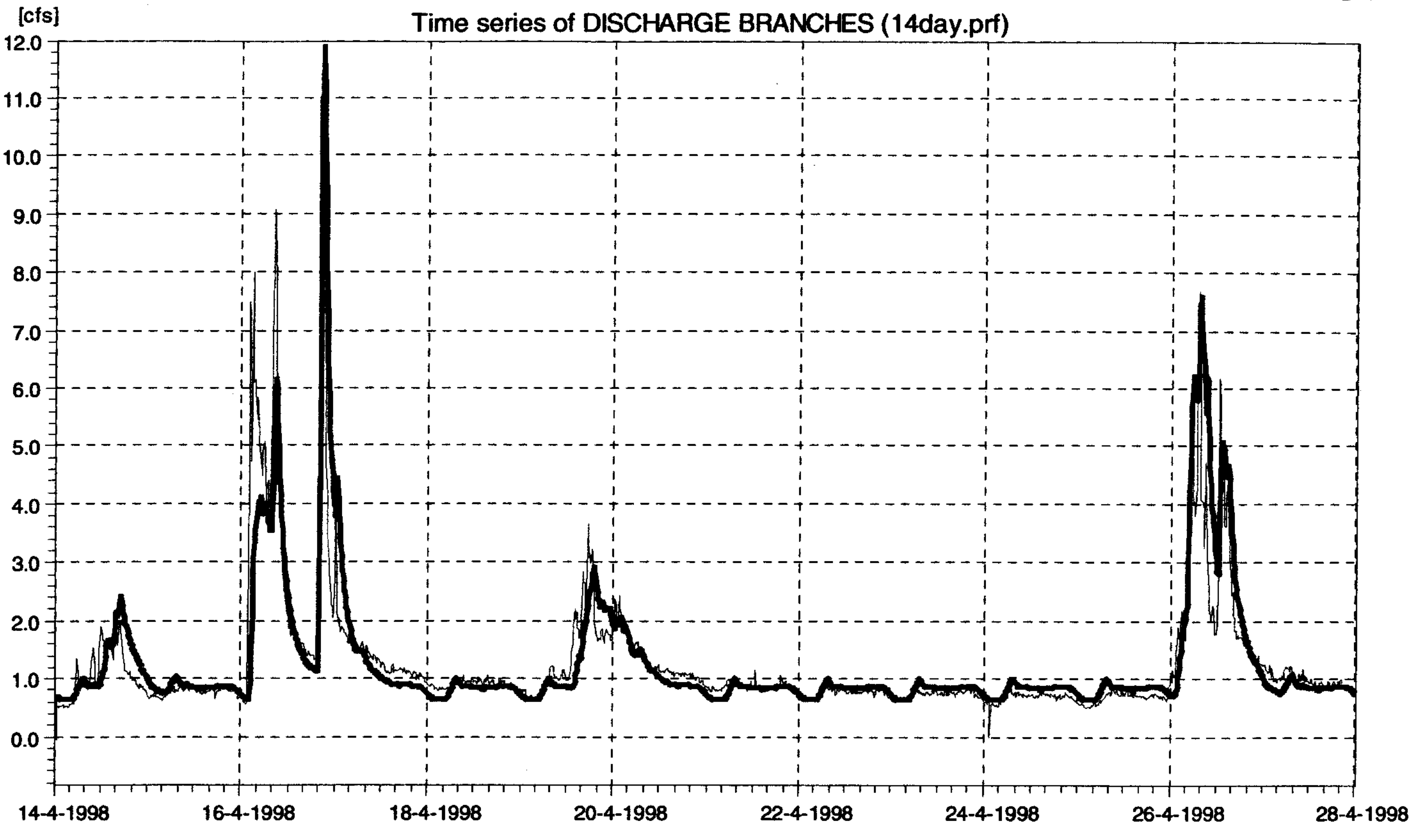
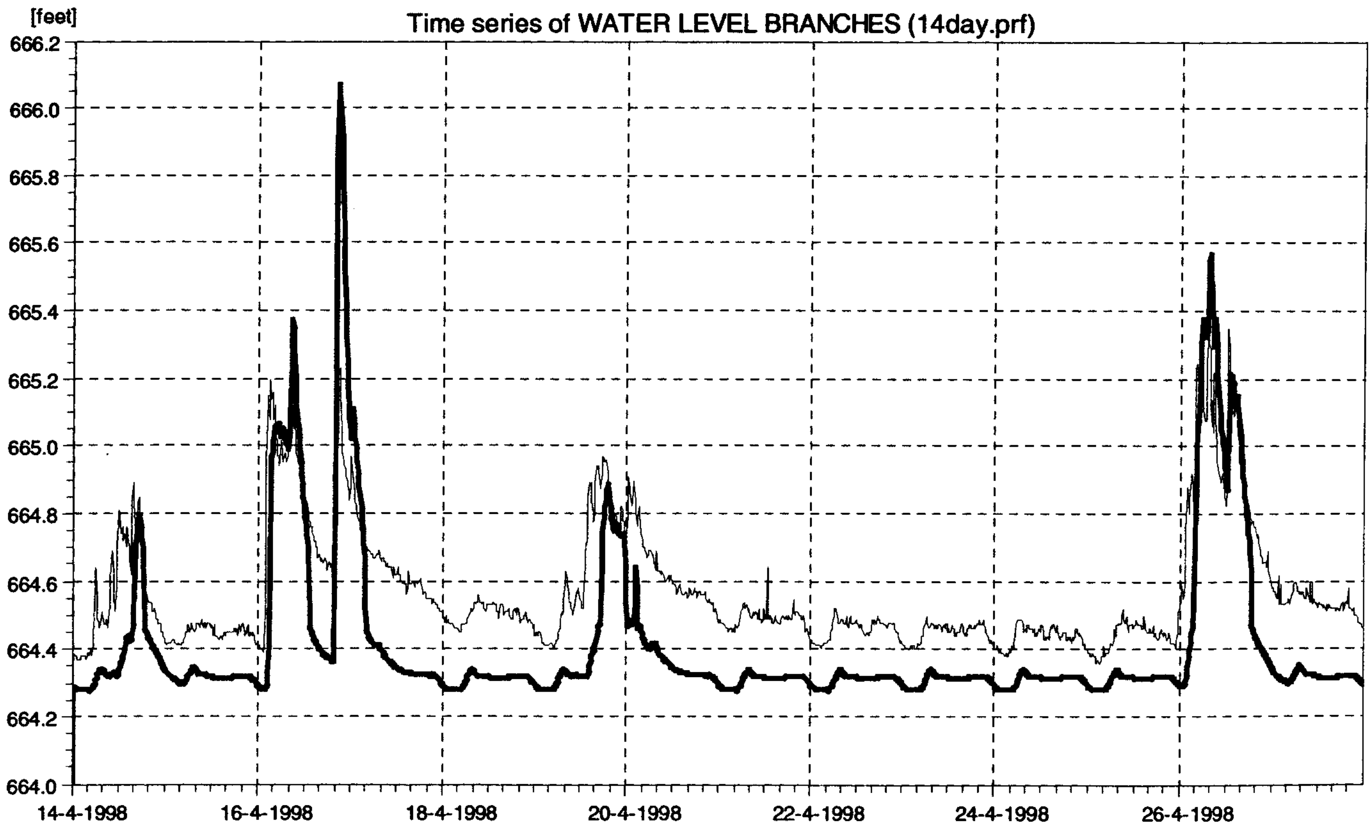
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: HA13I





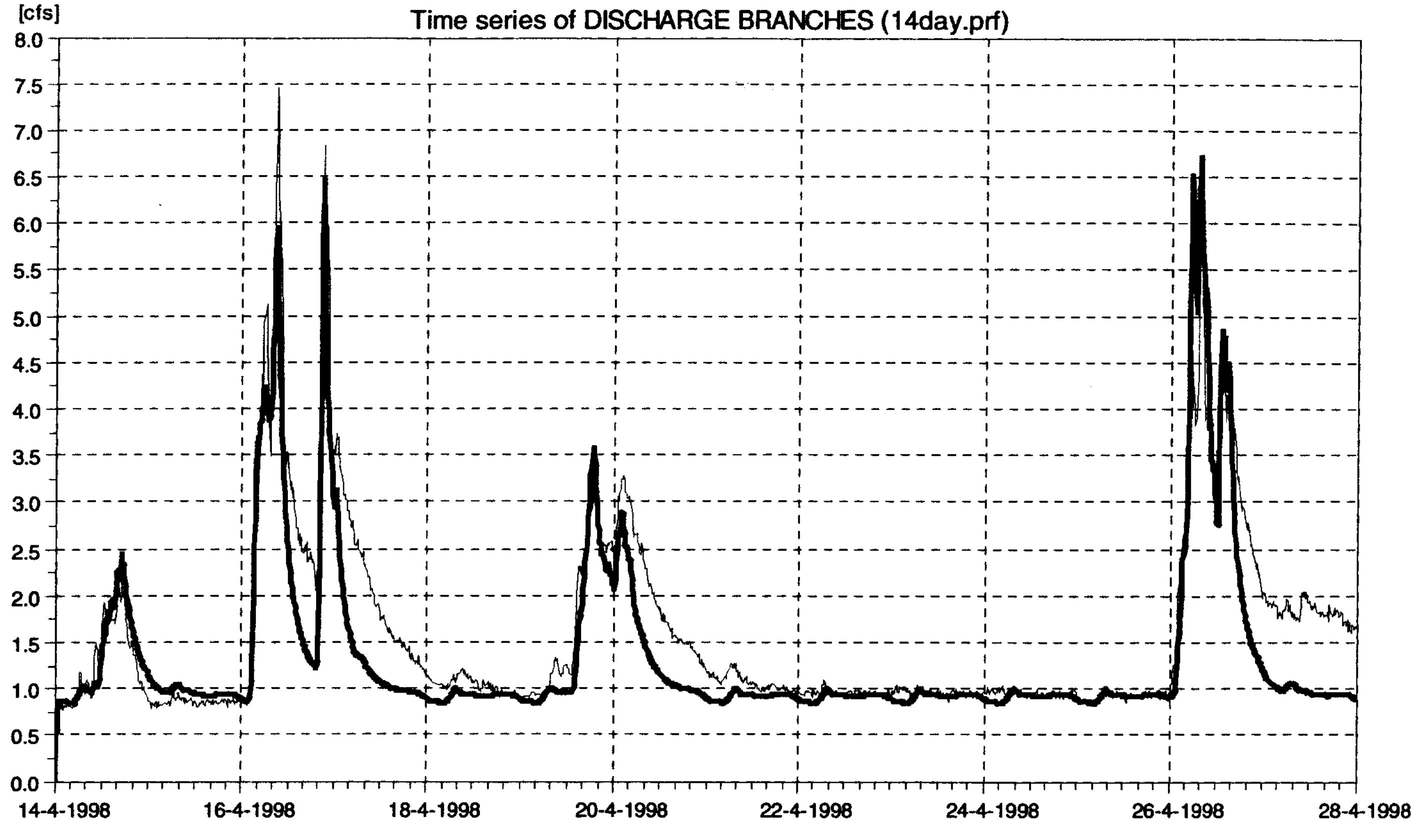
Metcalf & Eddy

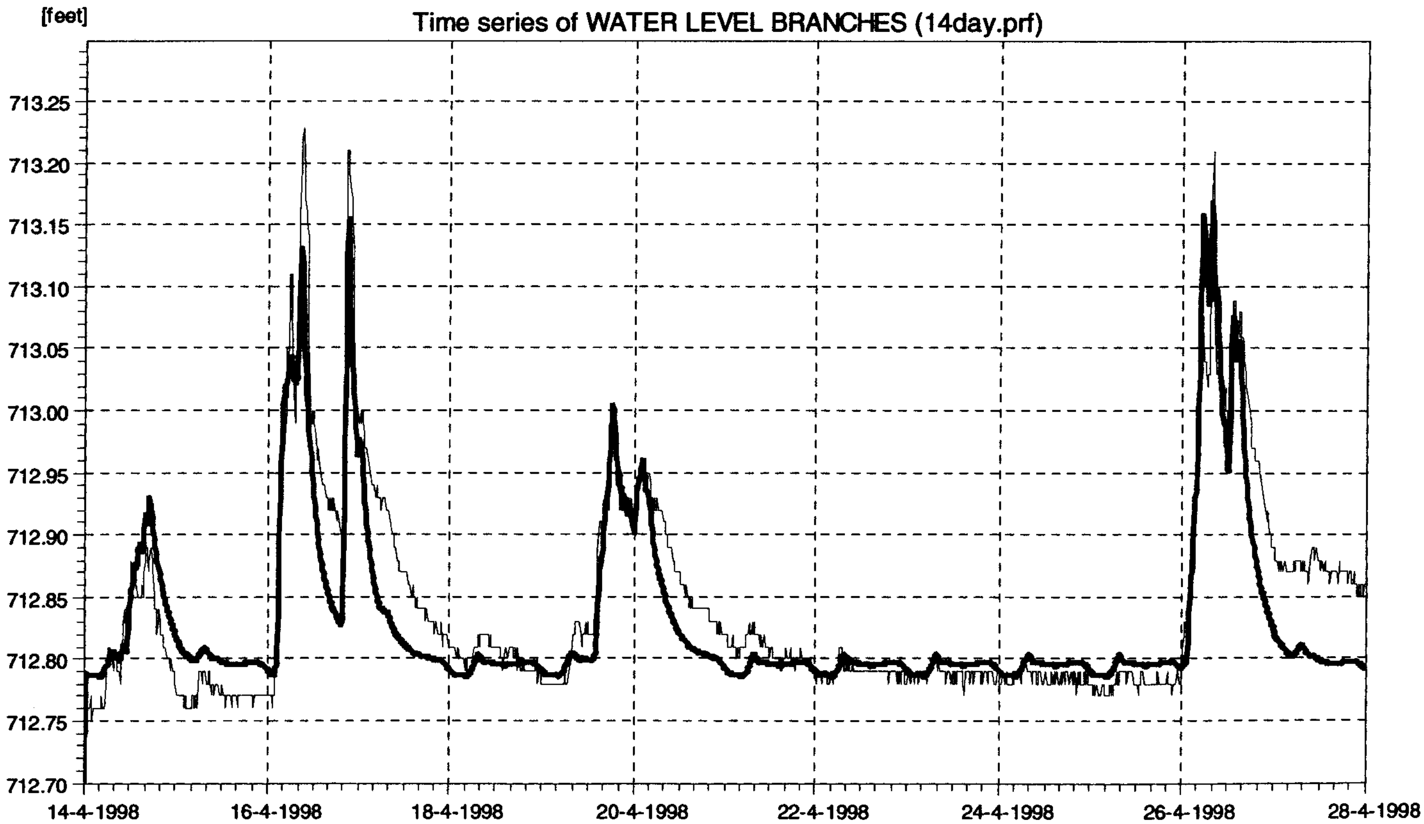
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: HA14





M&E AQUA ALLIANCE Metcalf & Eddy

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

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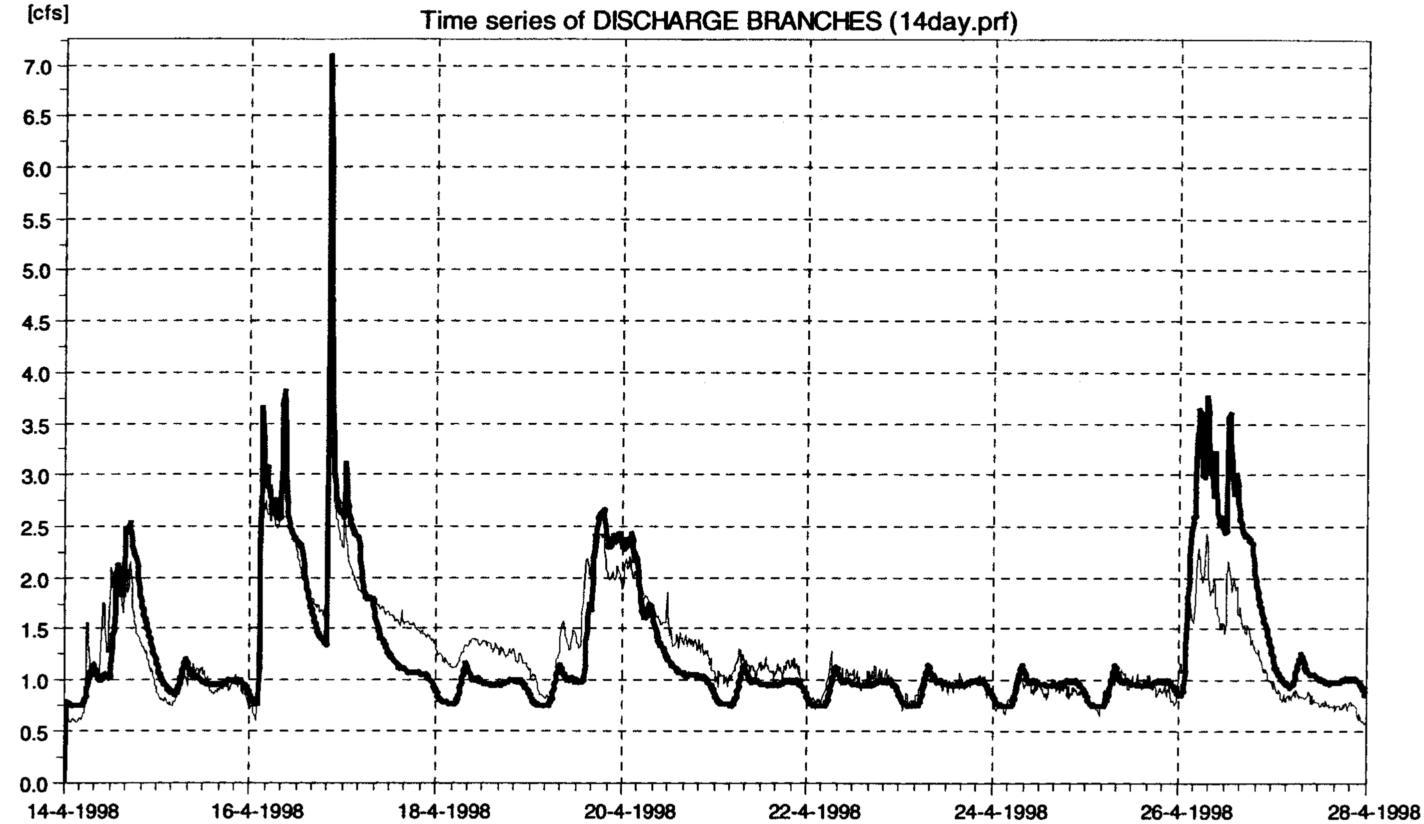

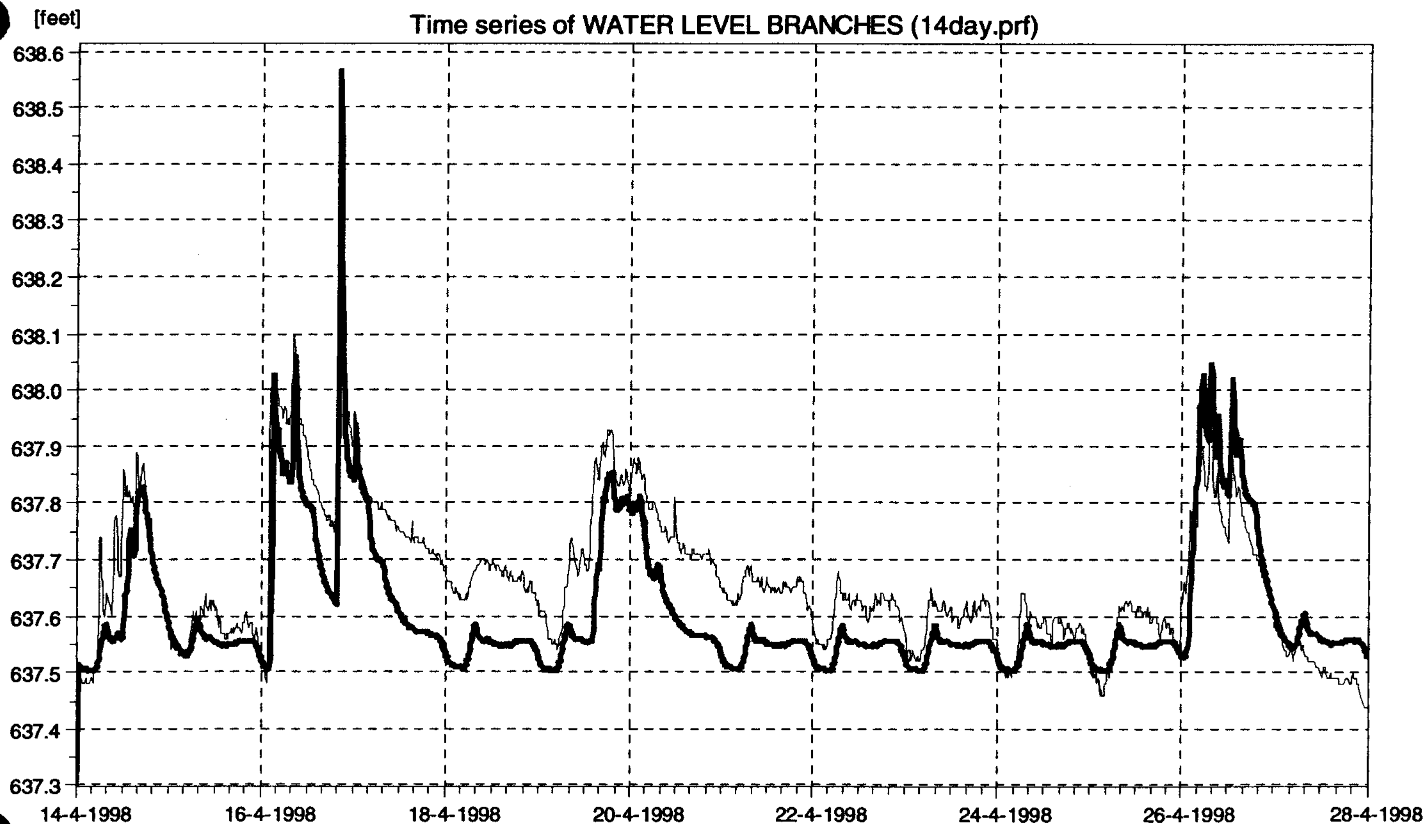

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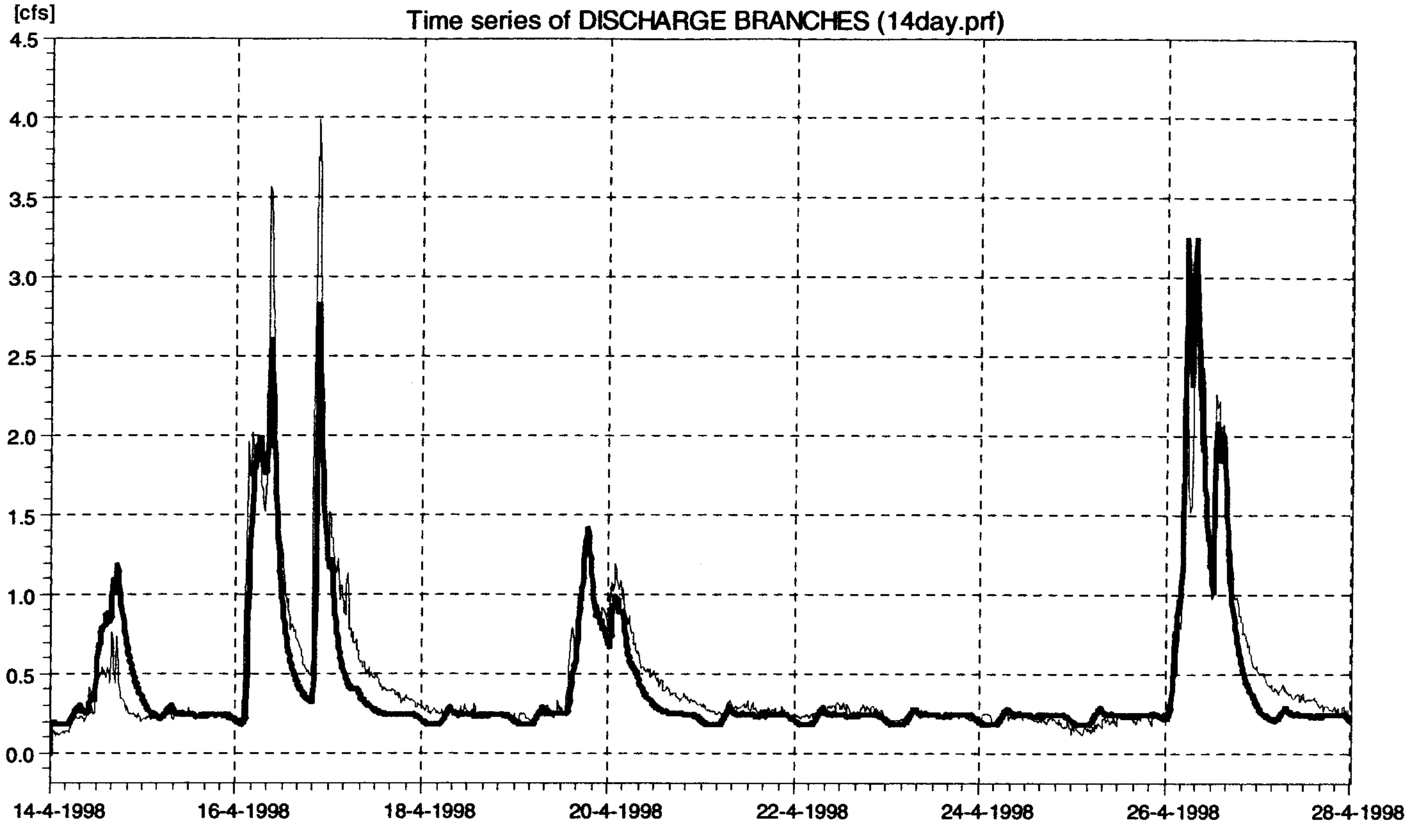
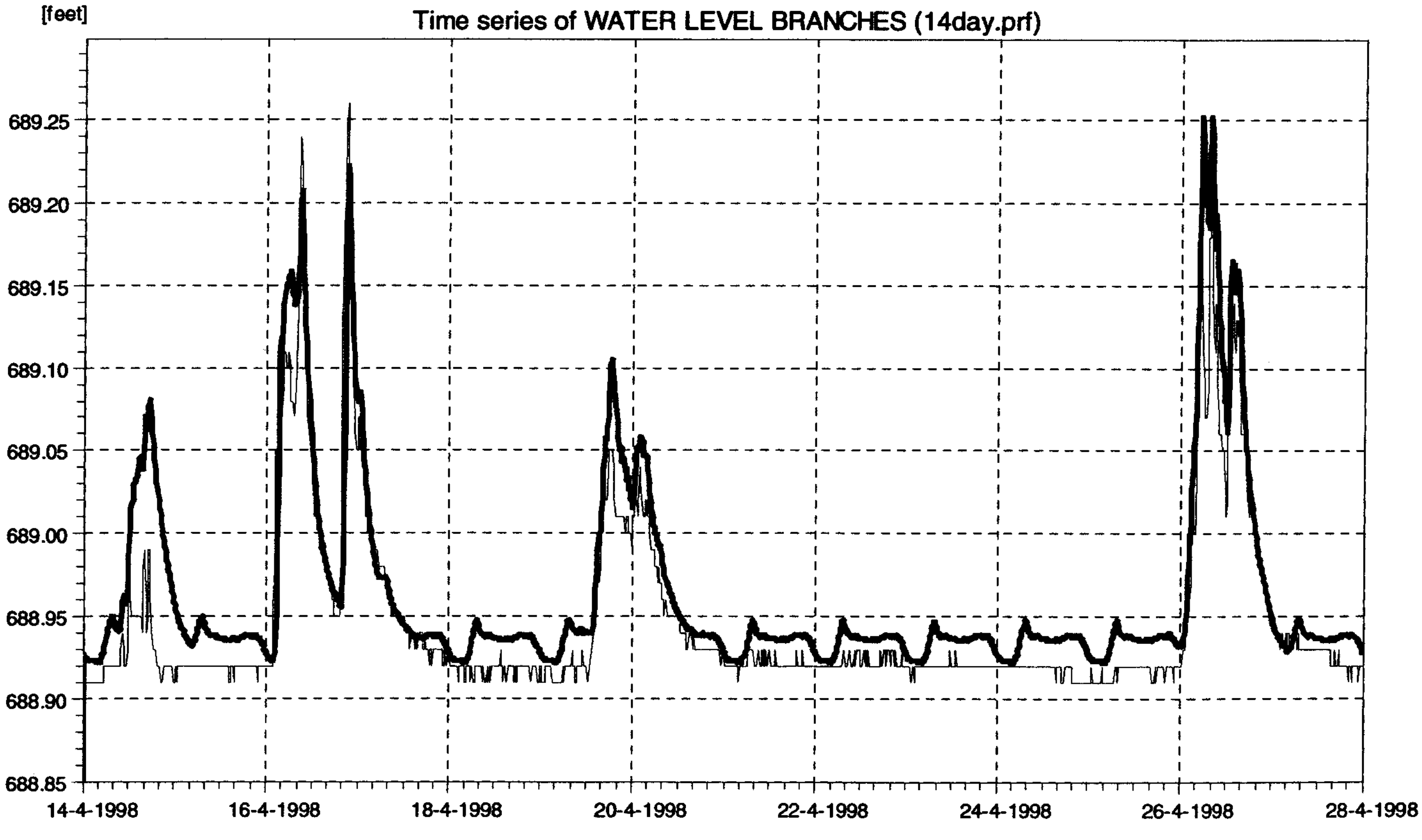
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: HA16





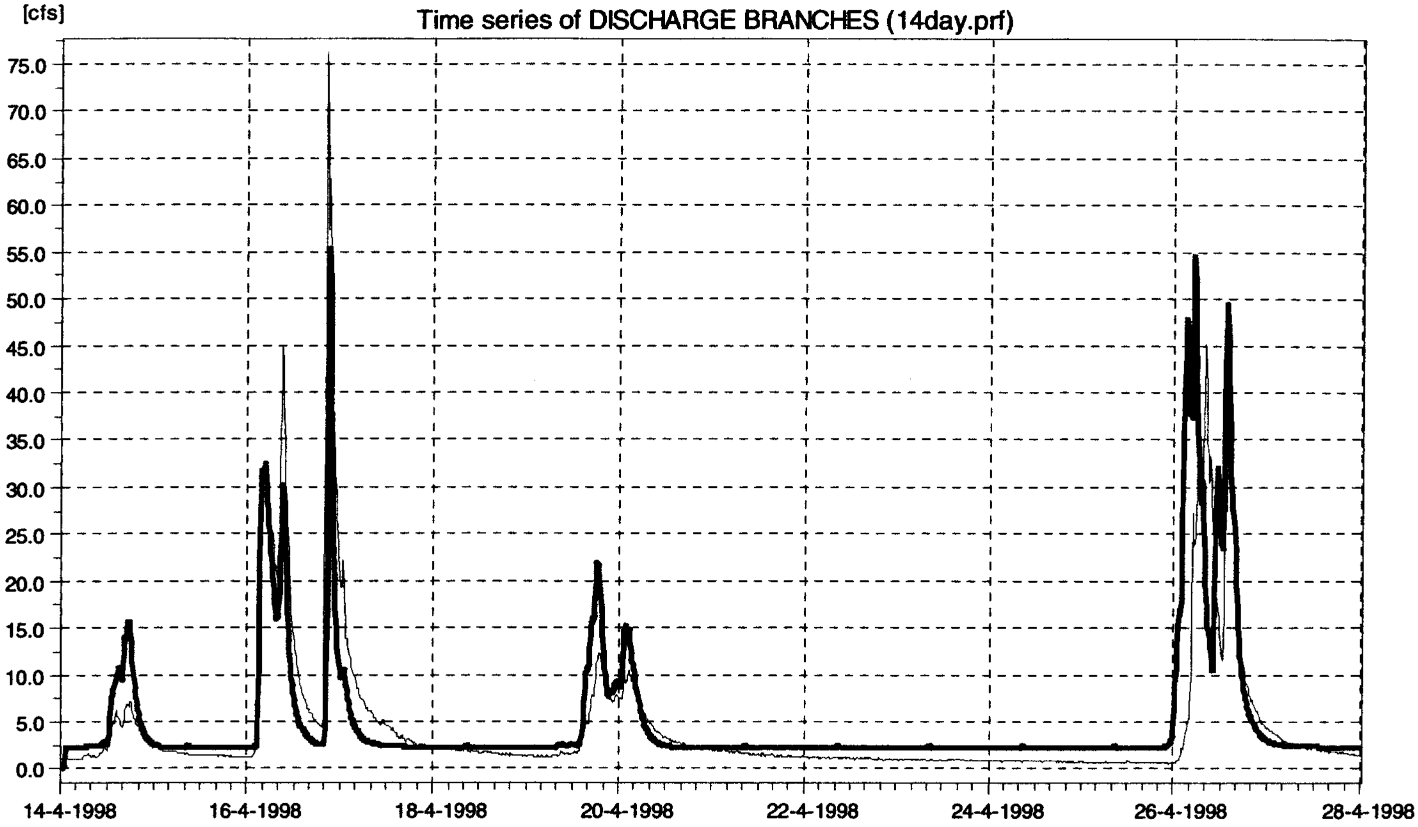
M&E Metcalf & Eddy AQUA ALLIANCE

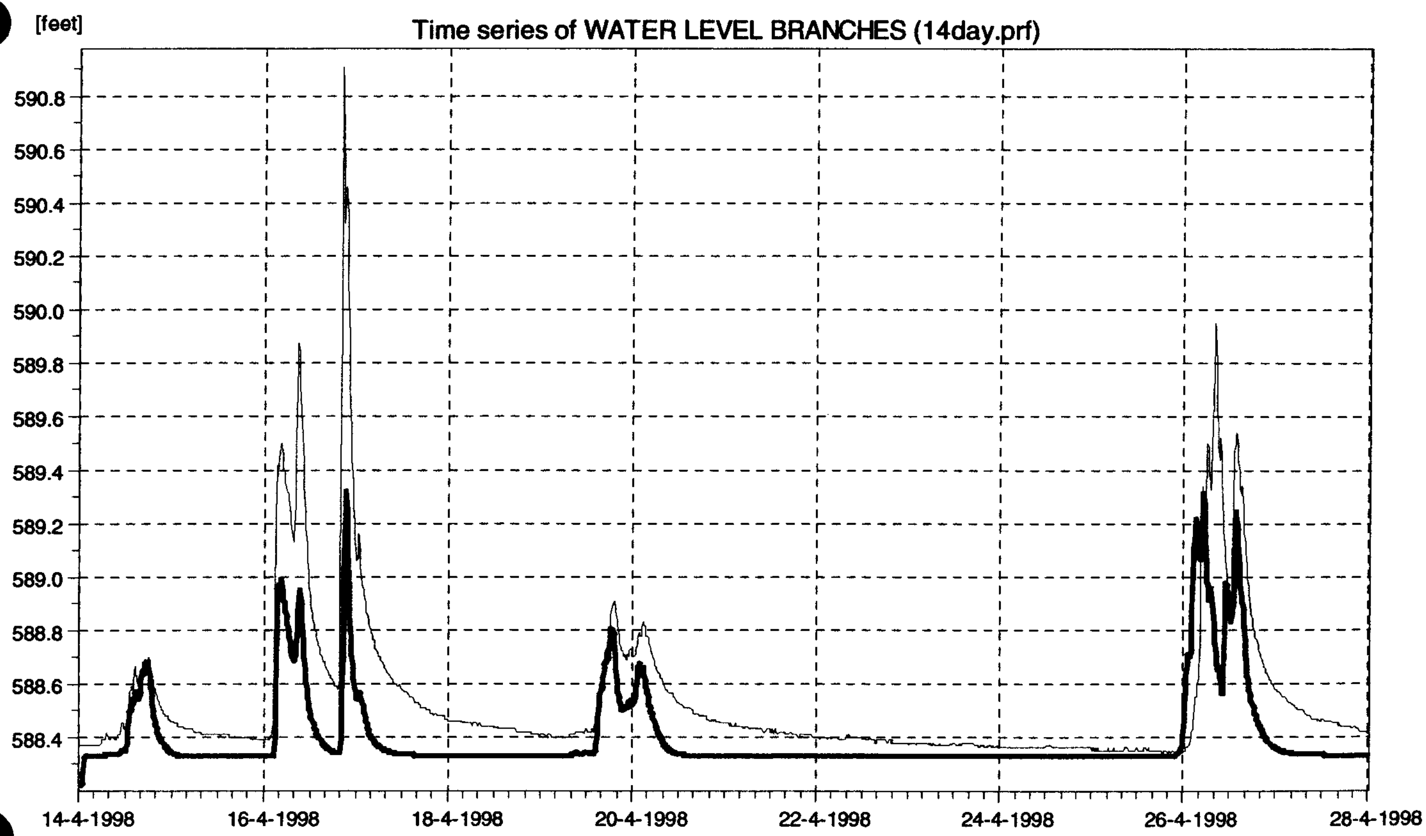
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: GCS01





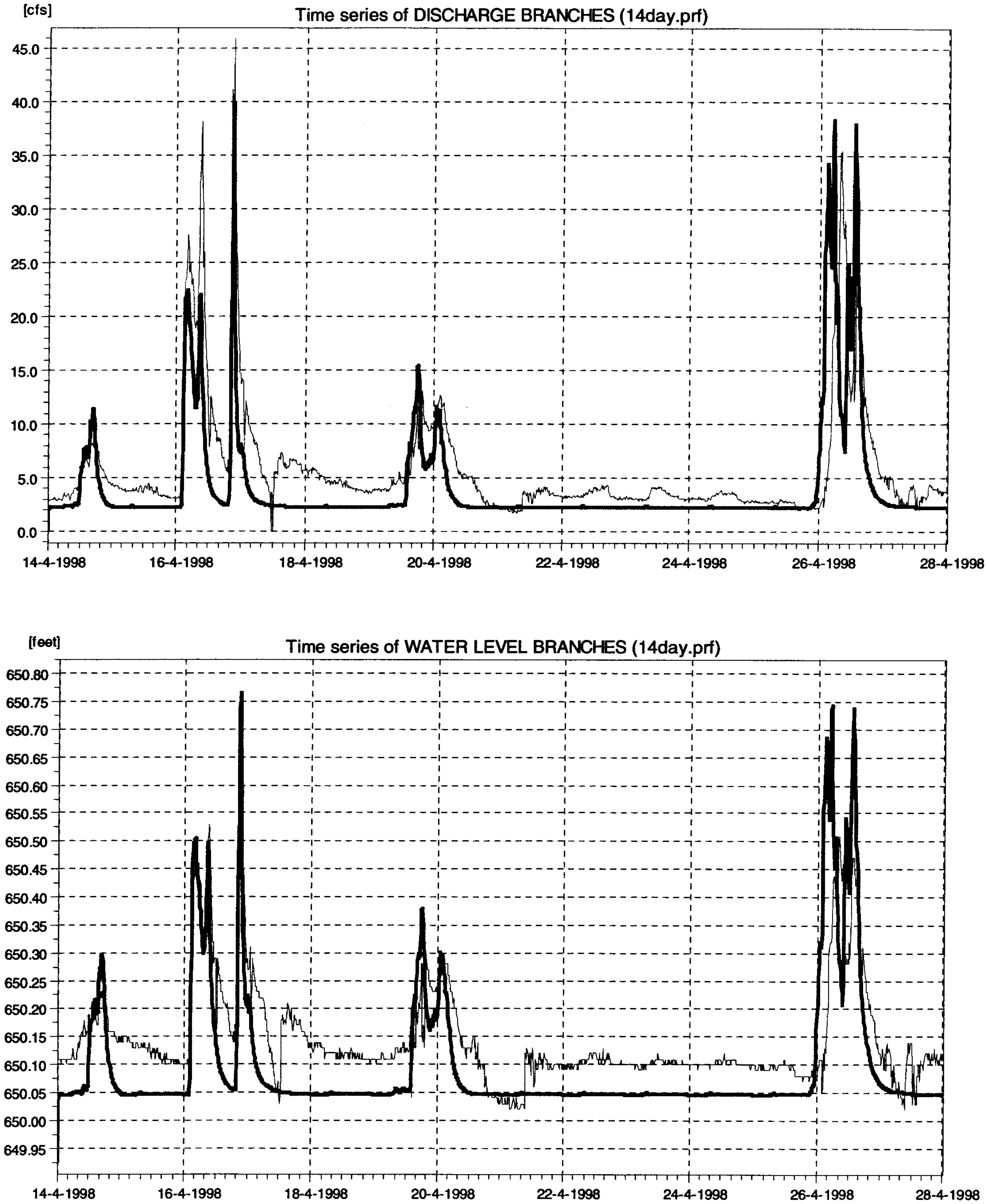
M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: GCS02



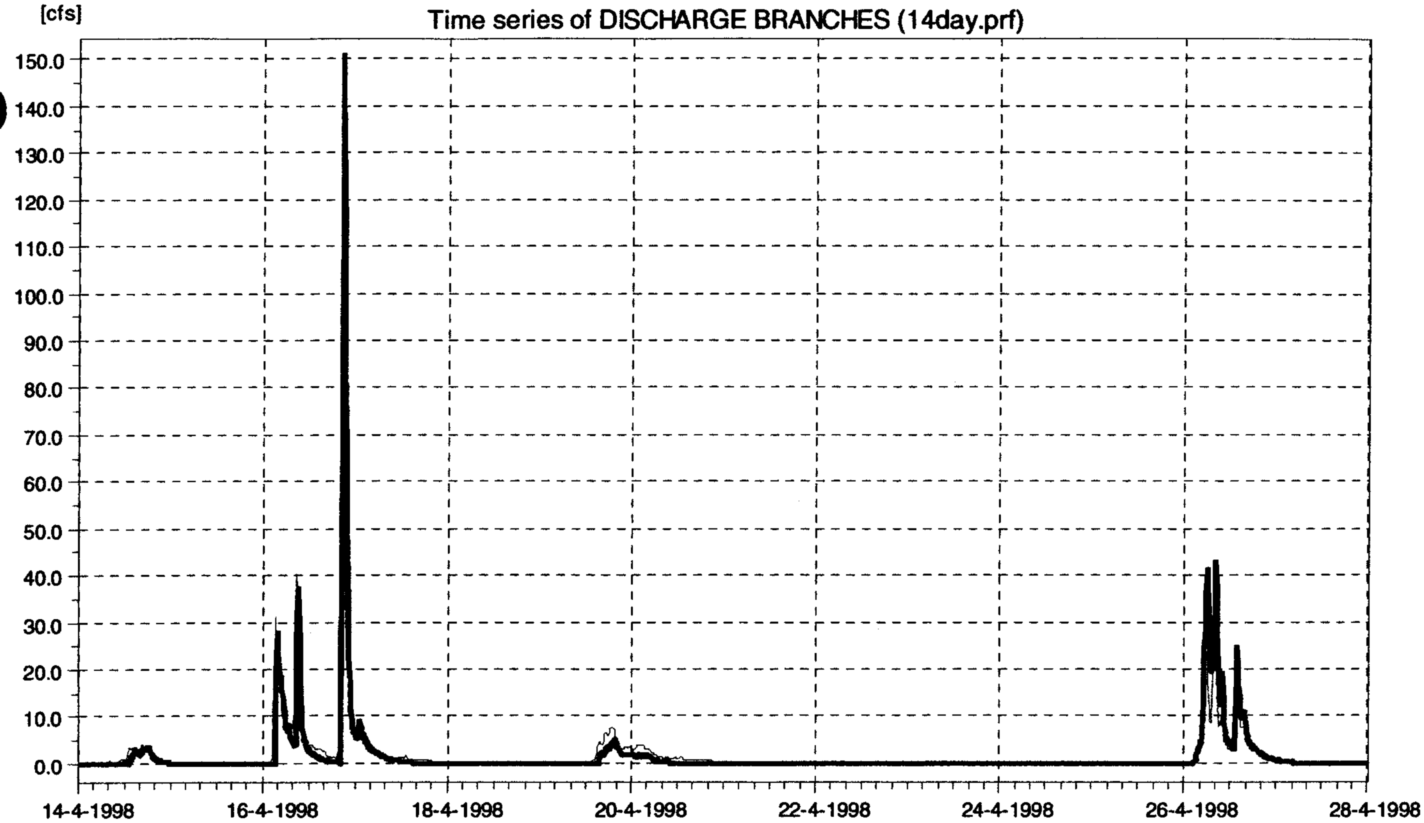
Metcalf & Eddy | AQUA ALLIANCE

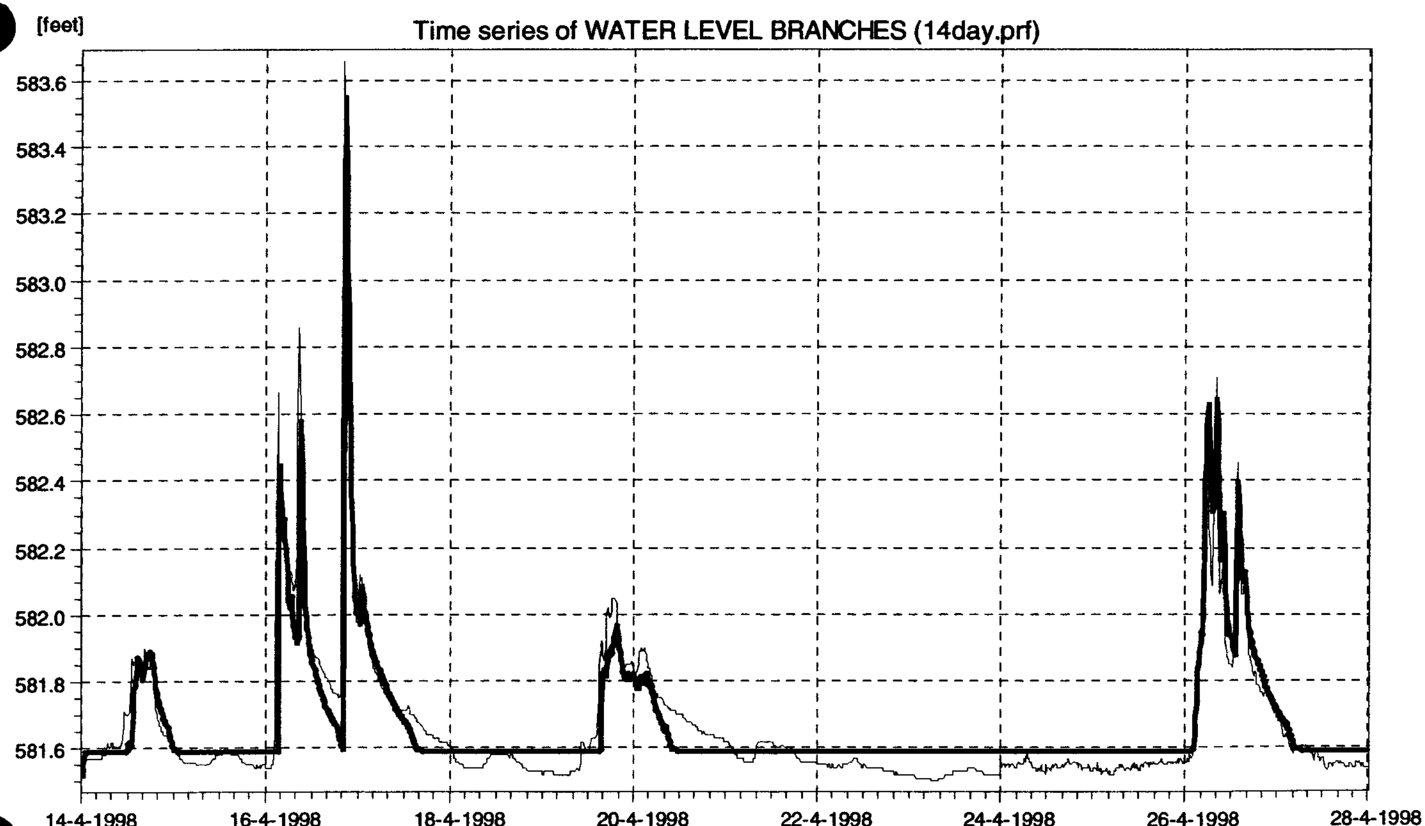
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: SBS01





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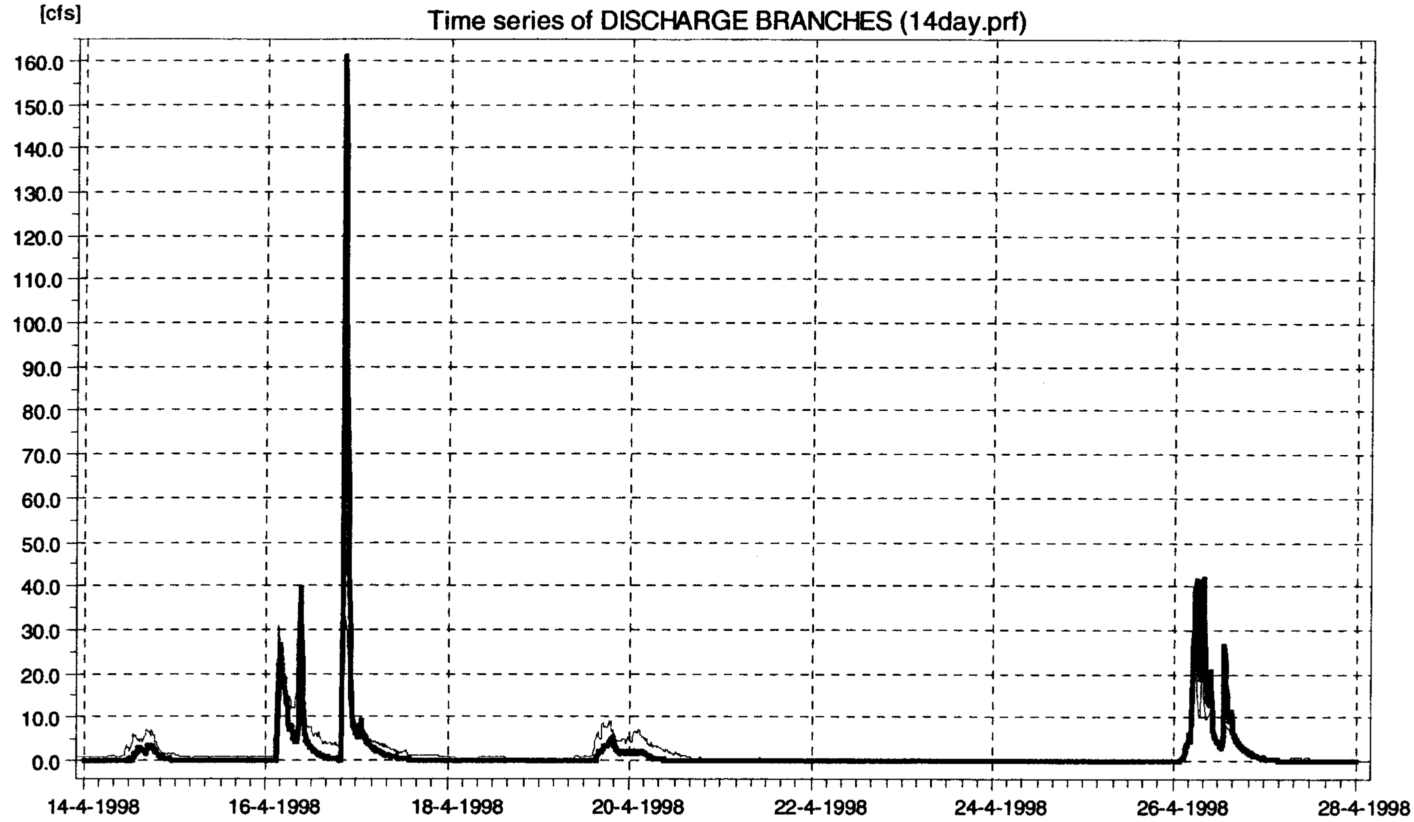
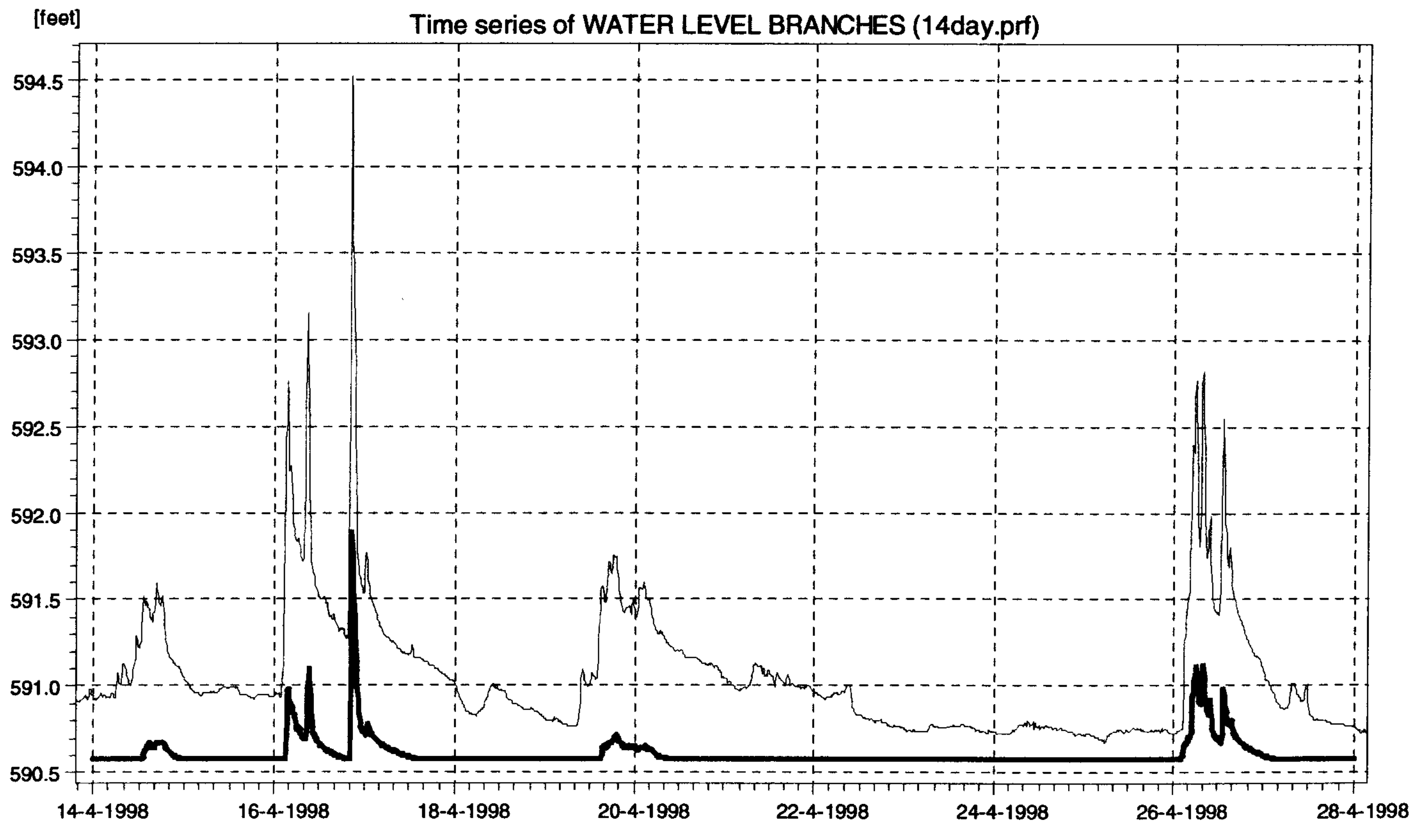
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA02D





M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

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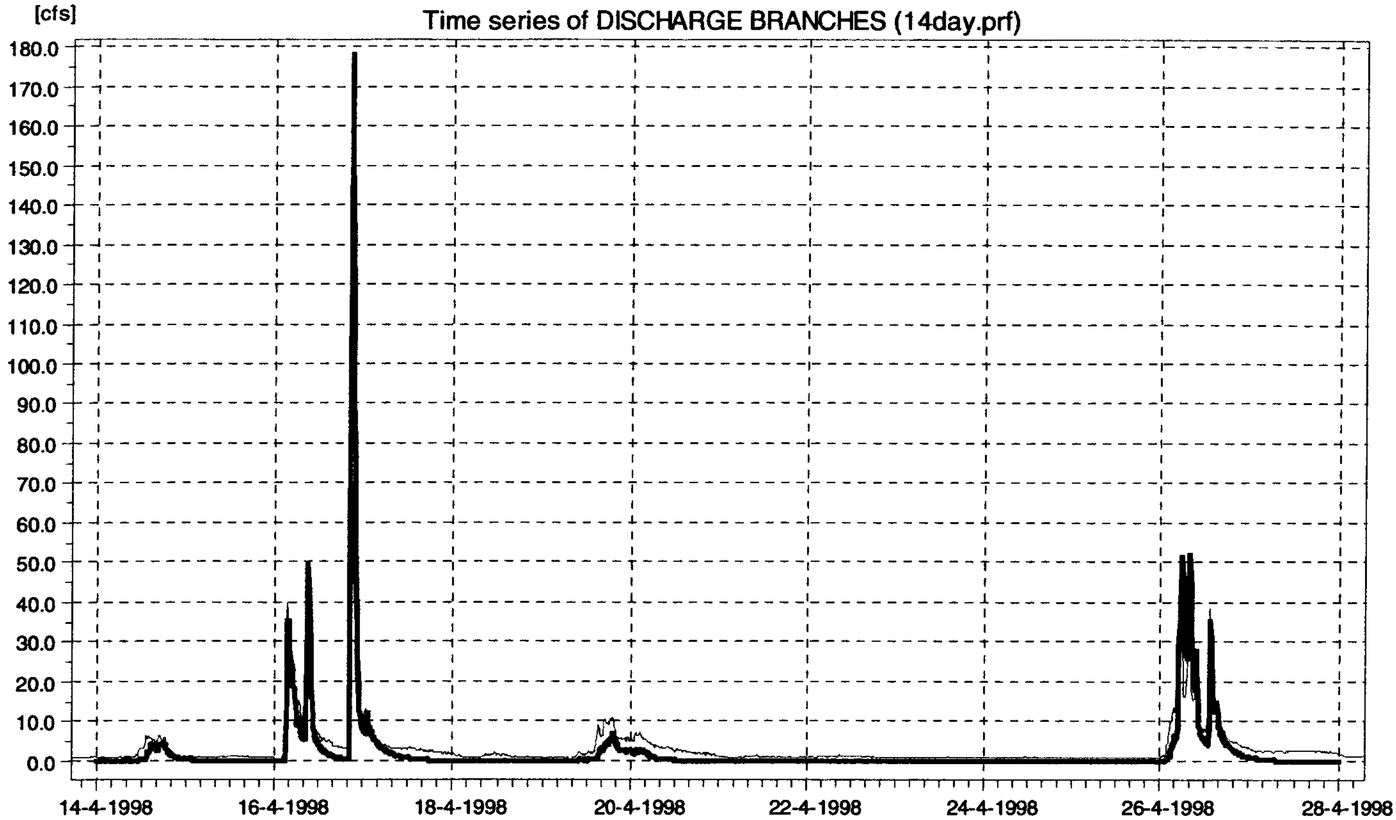

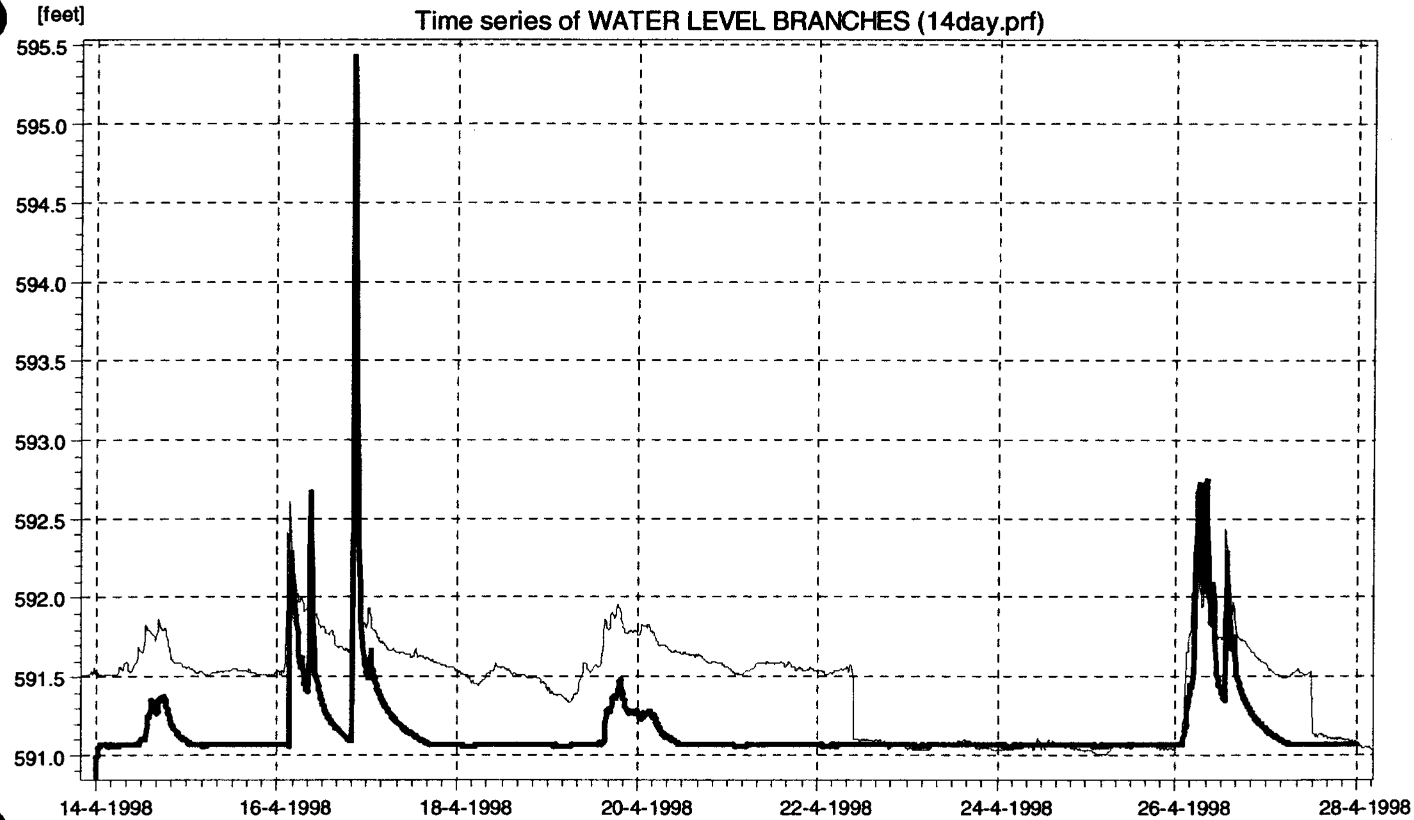

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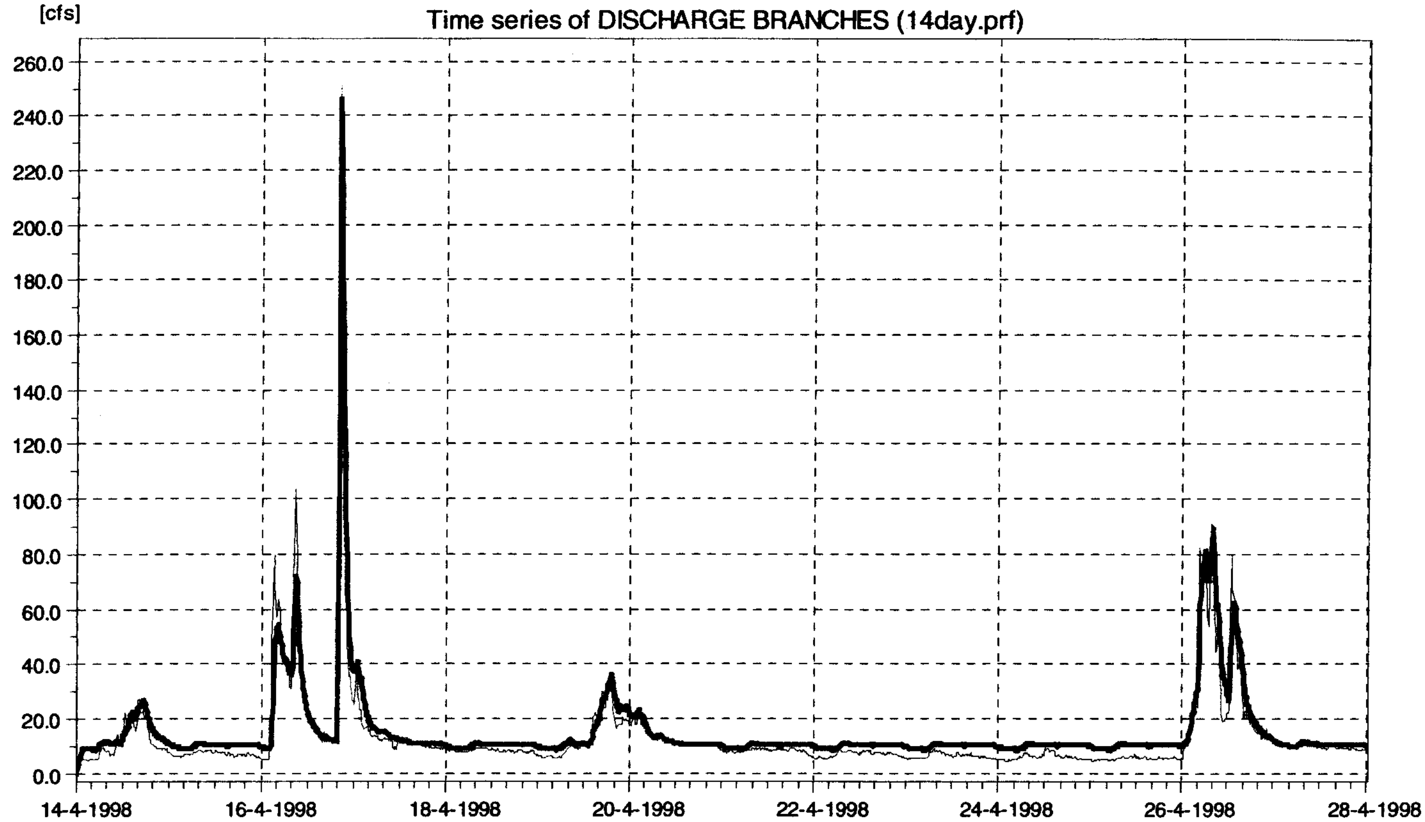
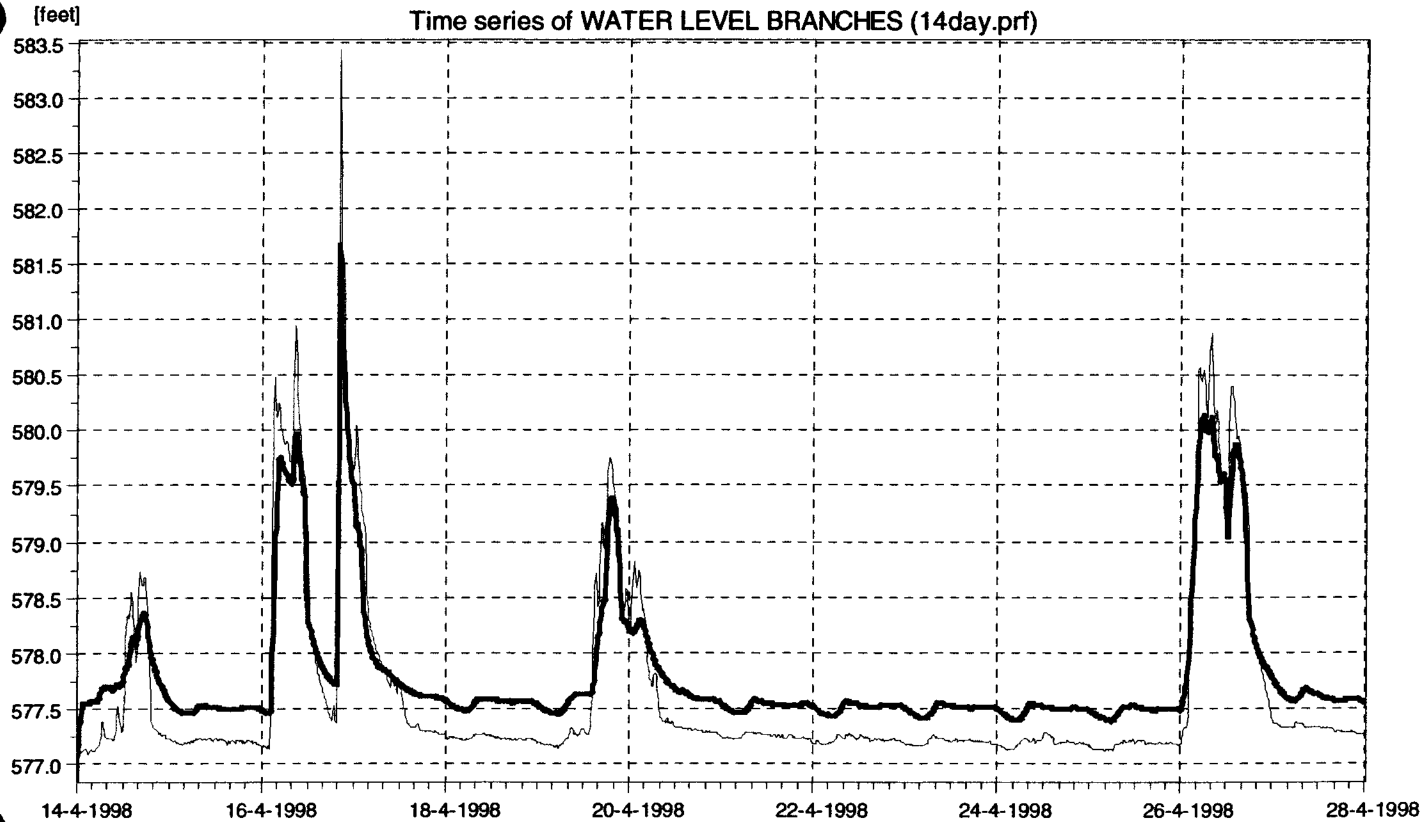
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: IV00





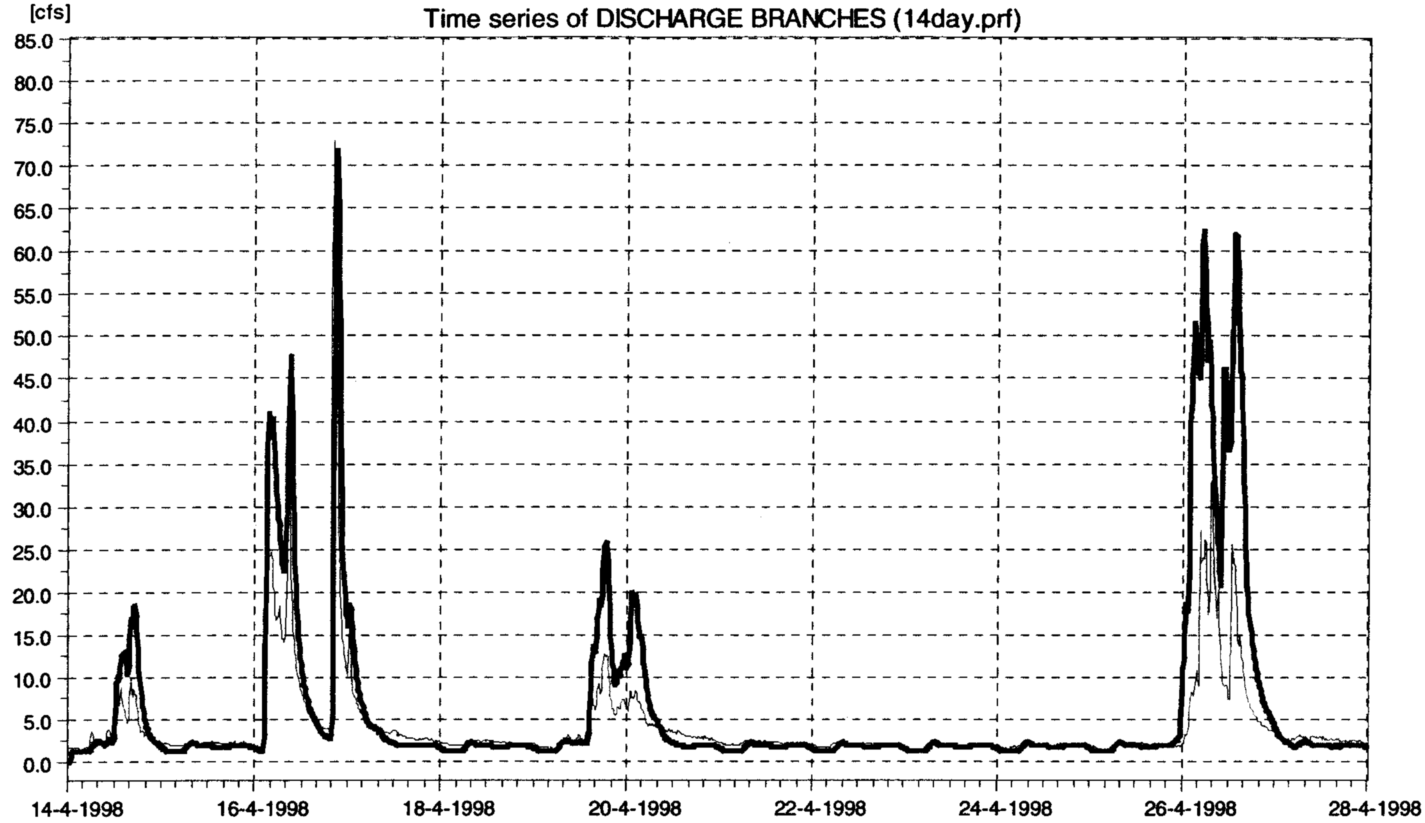
M&E Metcalf & Eddy AQUA ALLIANCE

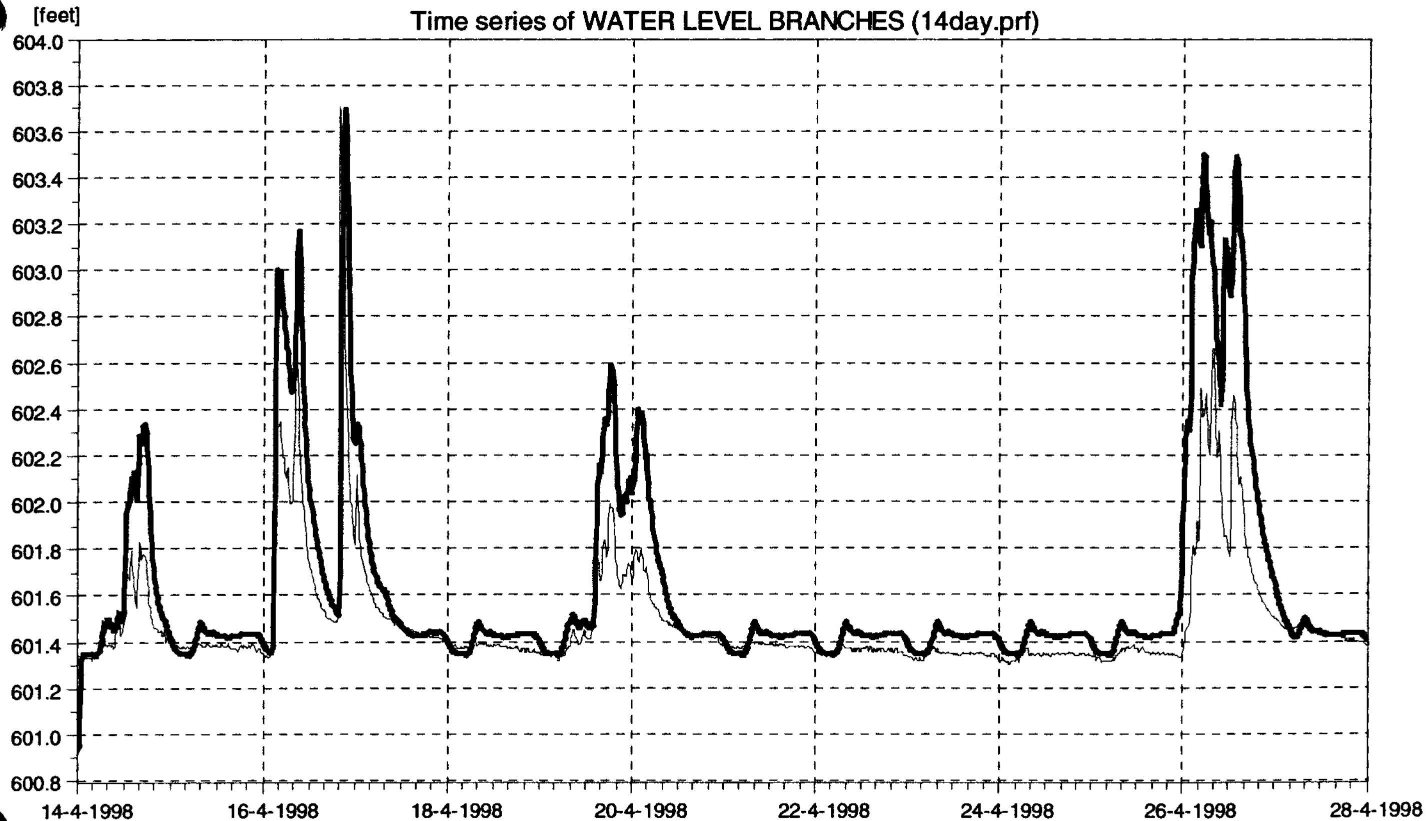
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: IV01





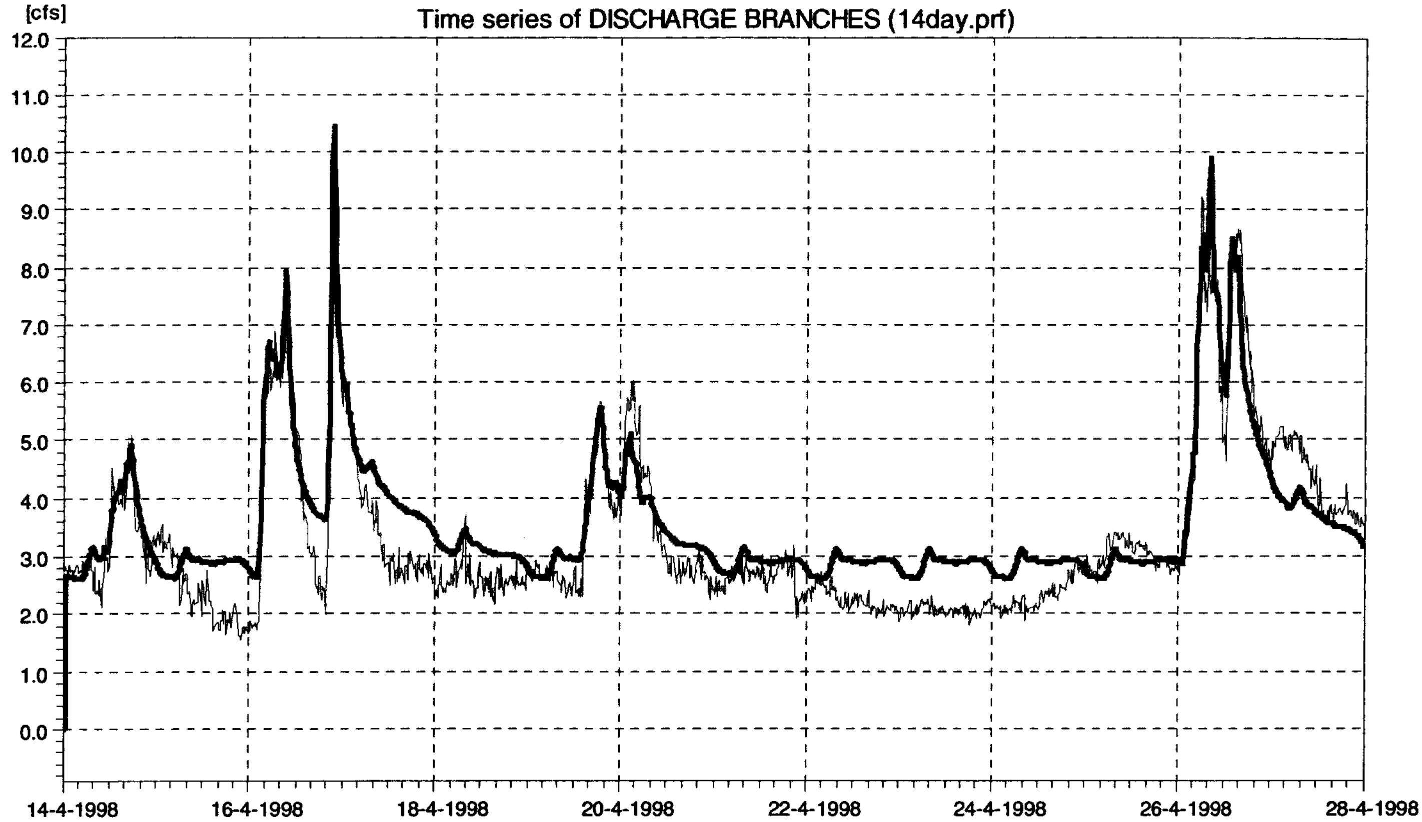
M&E Metcalf & Eddy
AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: IV02I



Metcalf & Eddy

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

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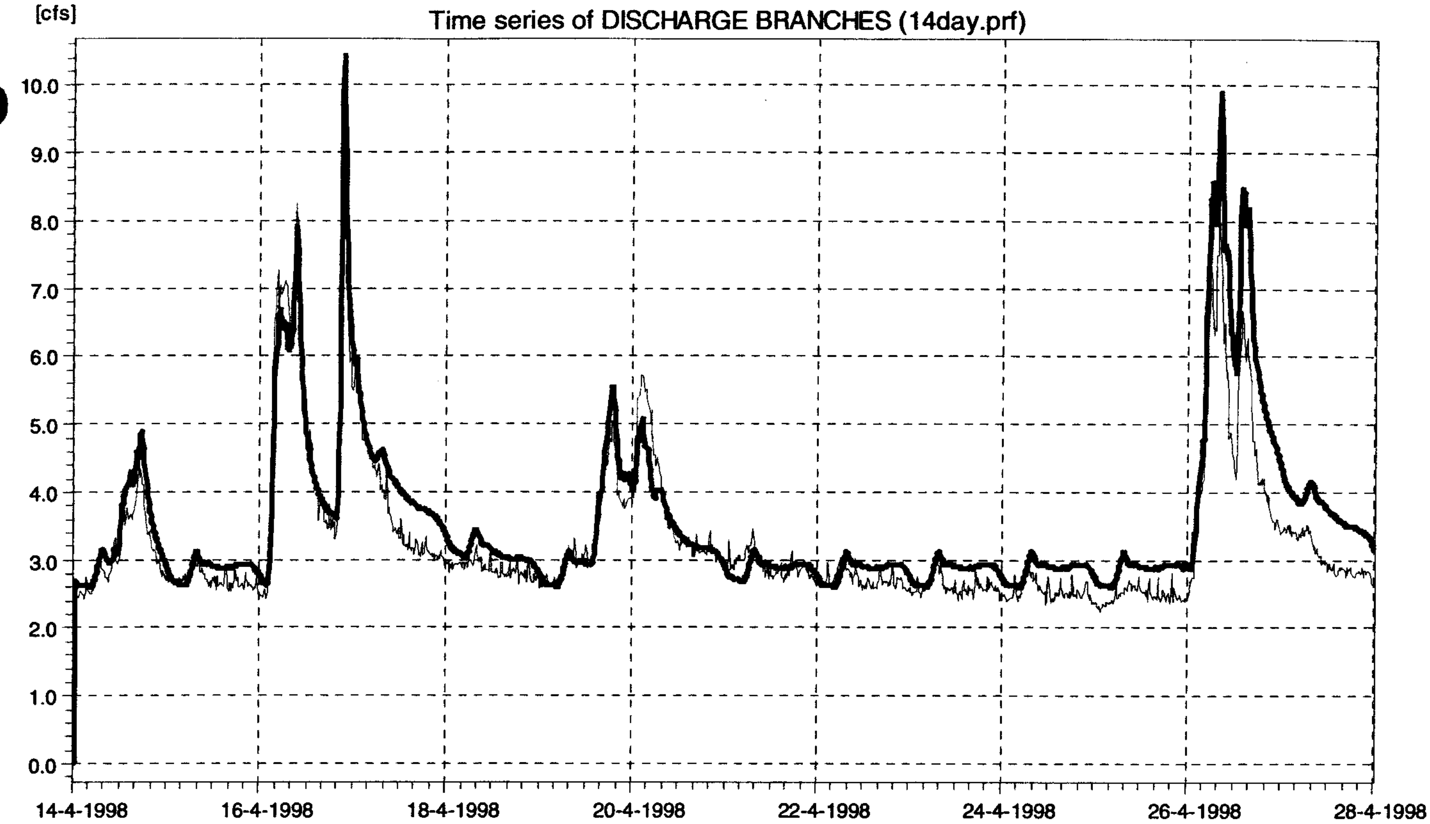

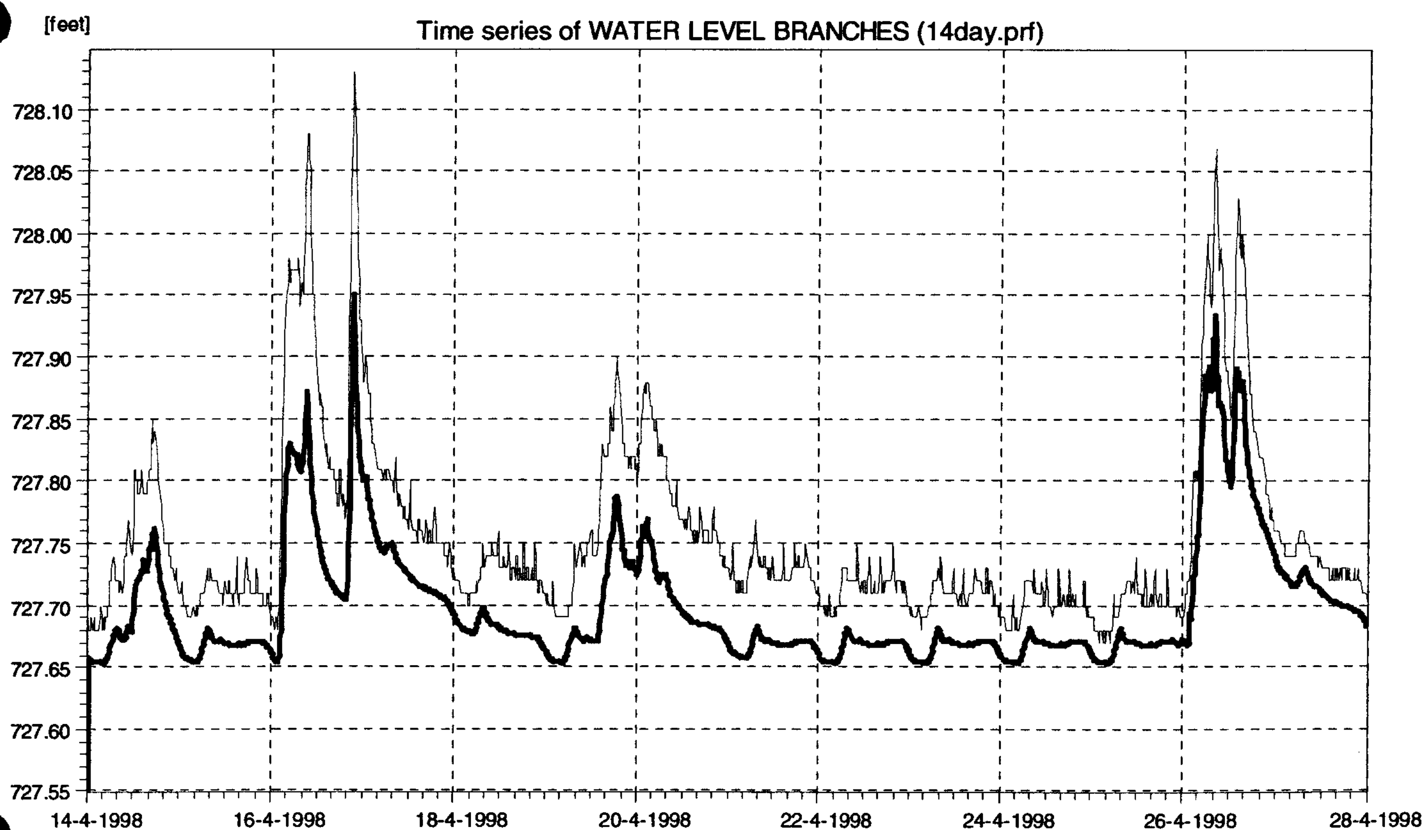

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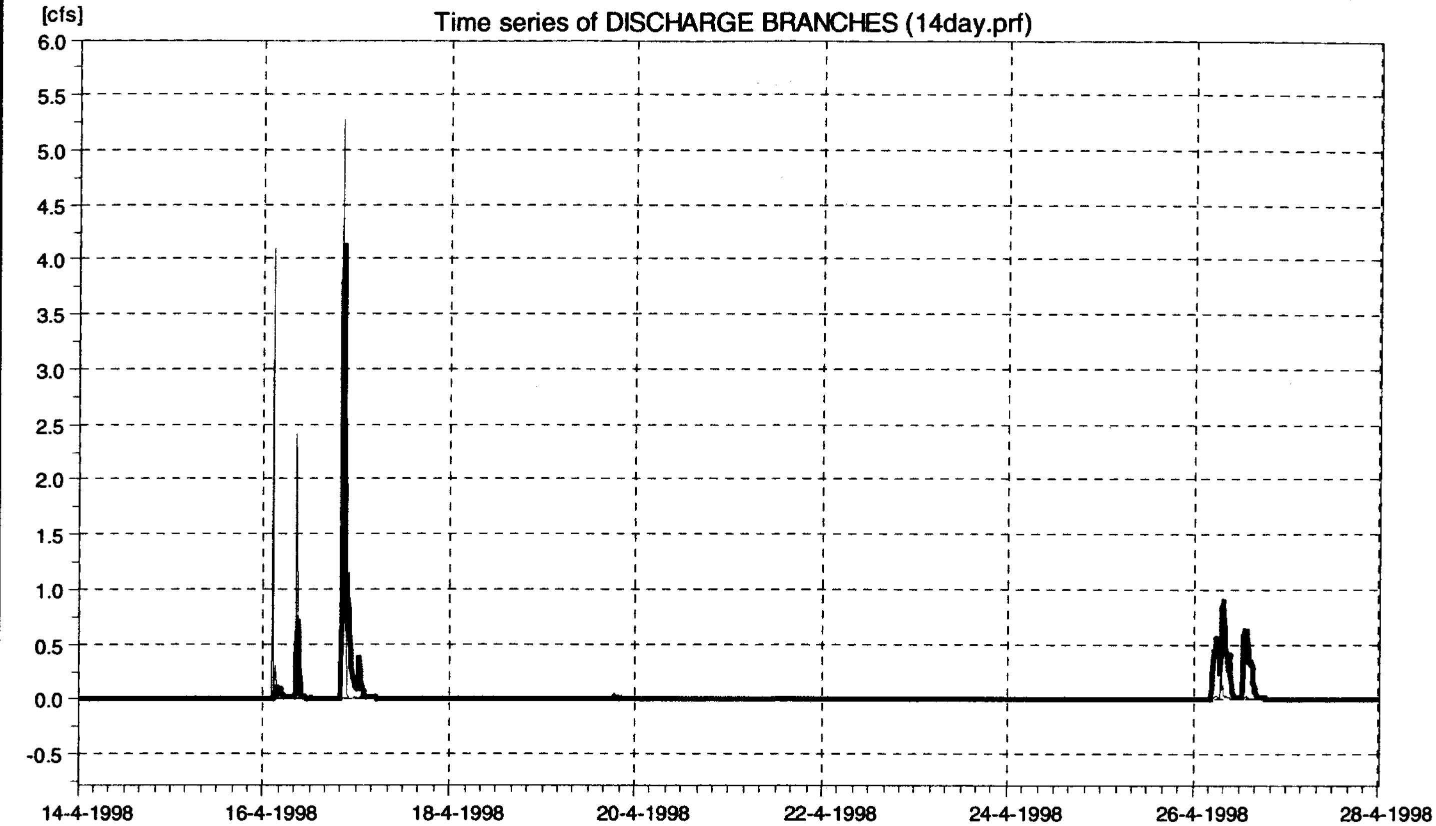
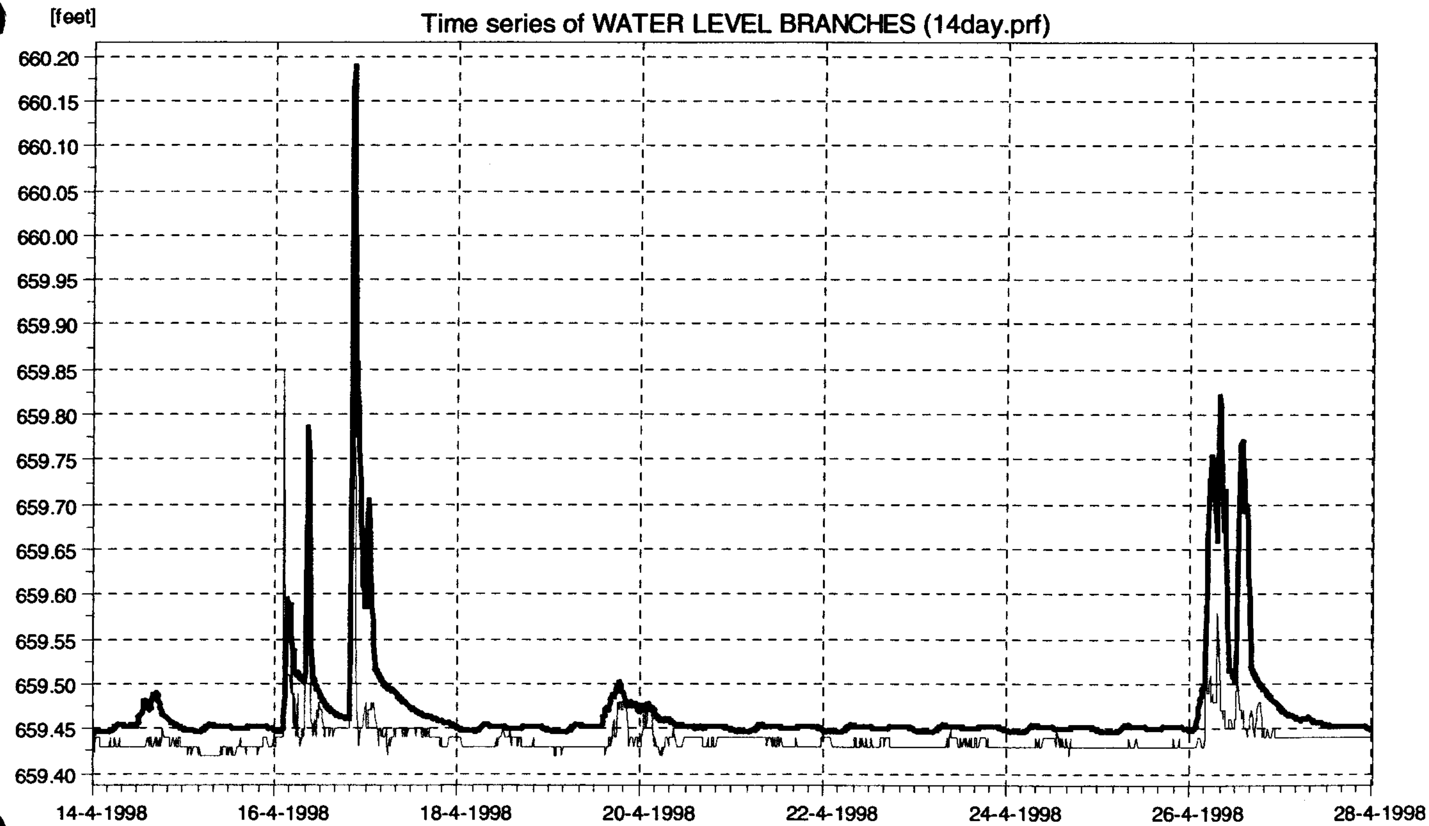
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: IV03W





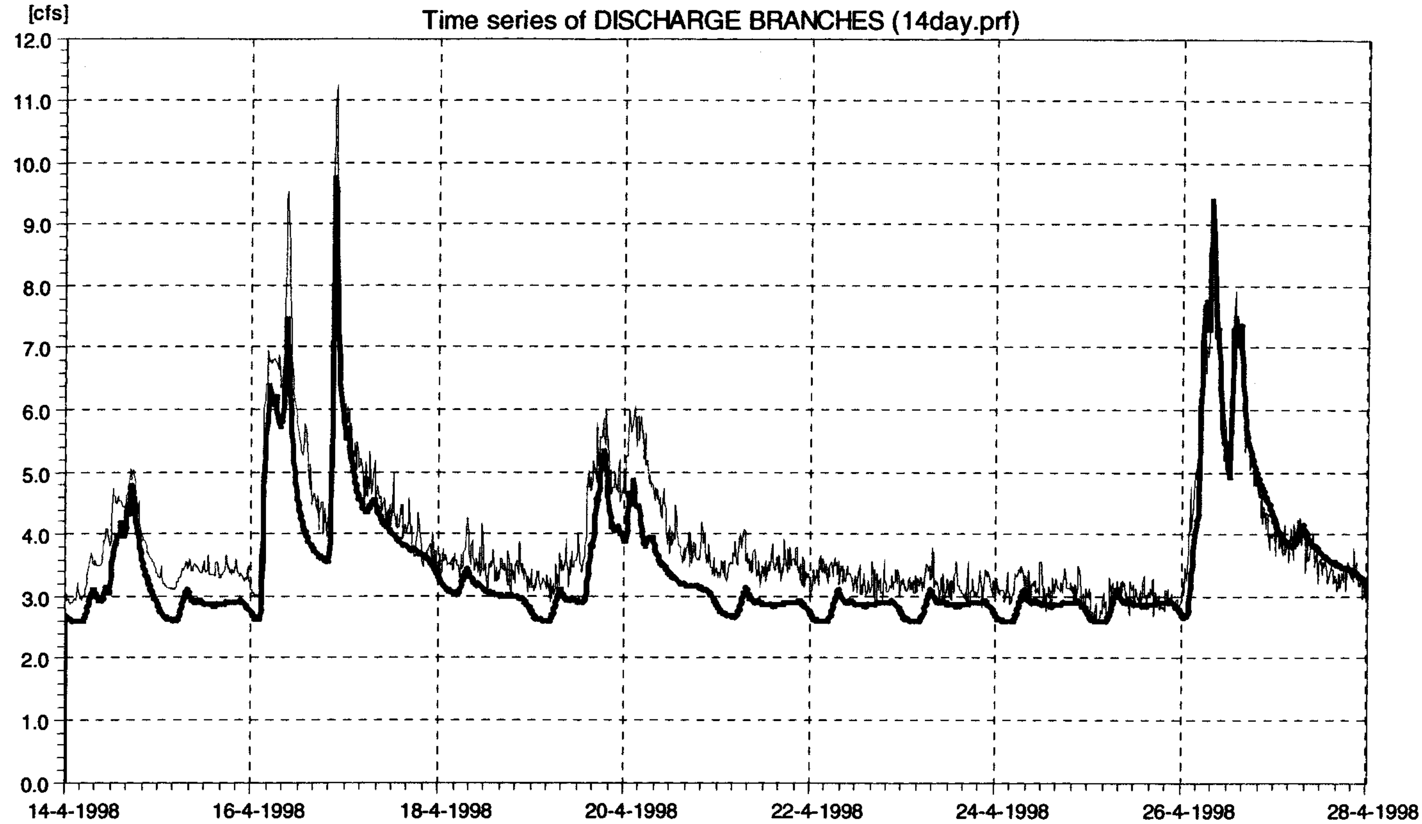
M&E Metcalf & Eddy AQUA ALLIANCE

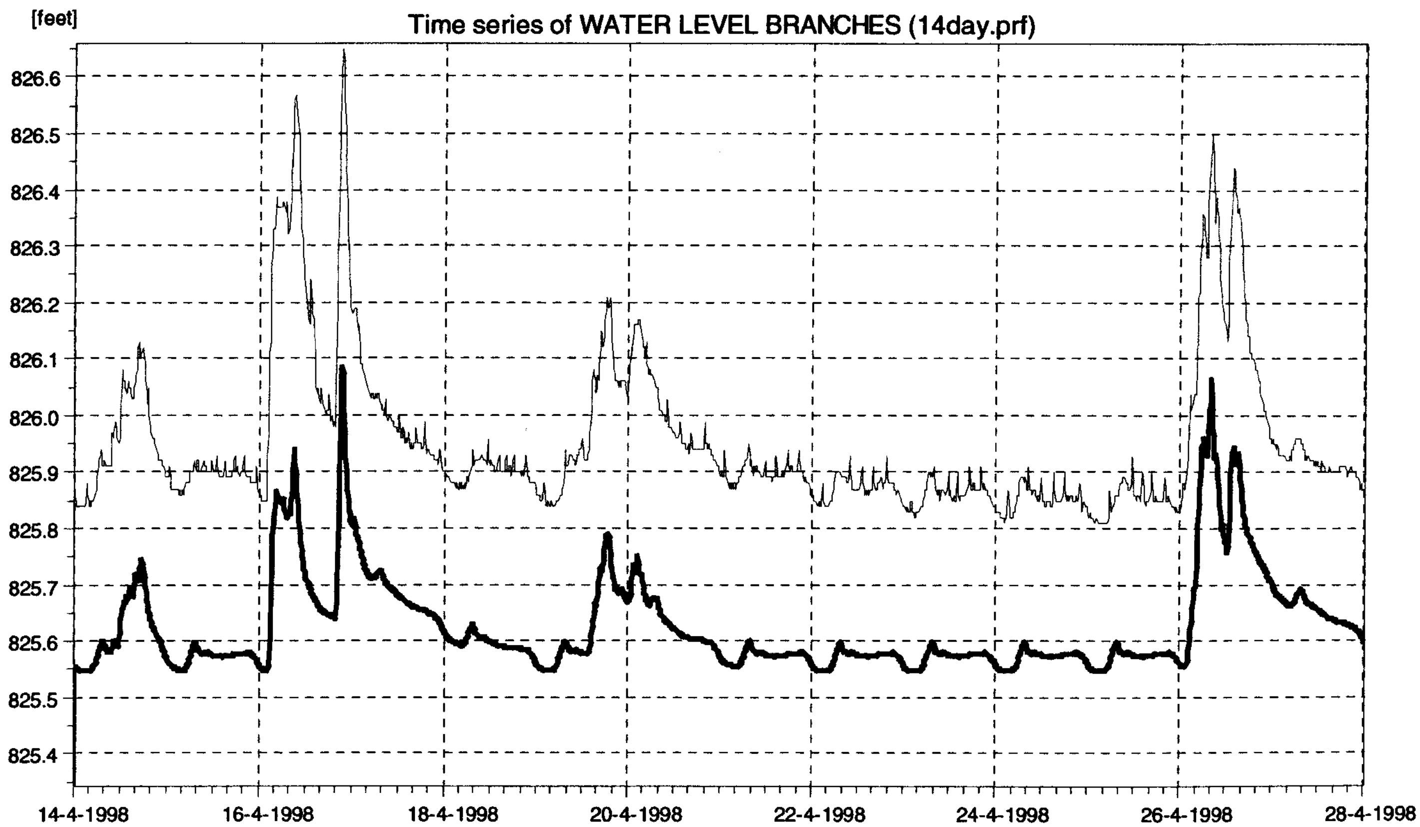
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: IV04D





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Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

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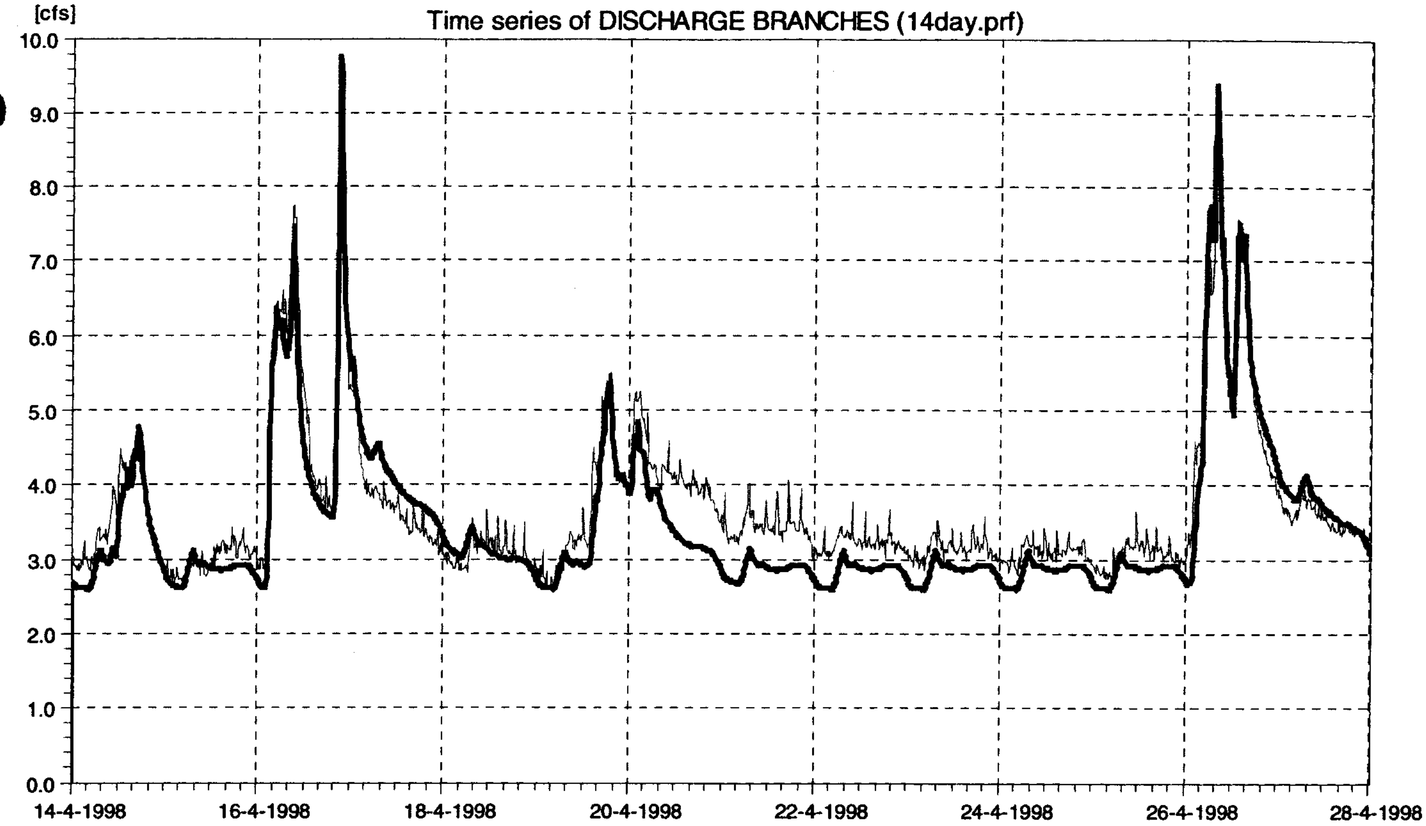

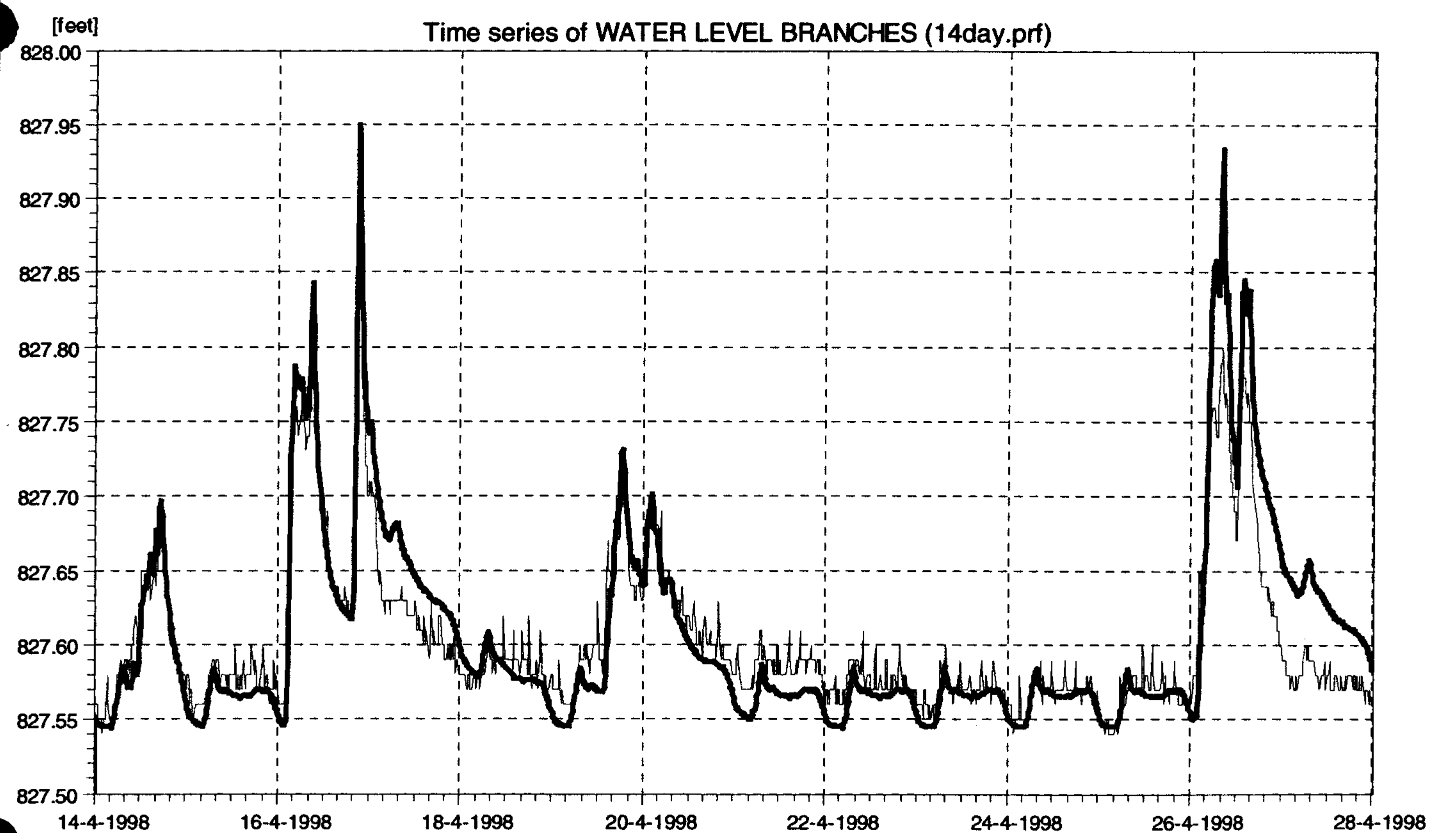

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Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

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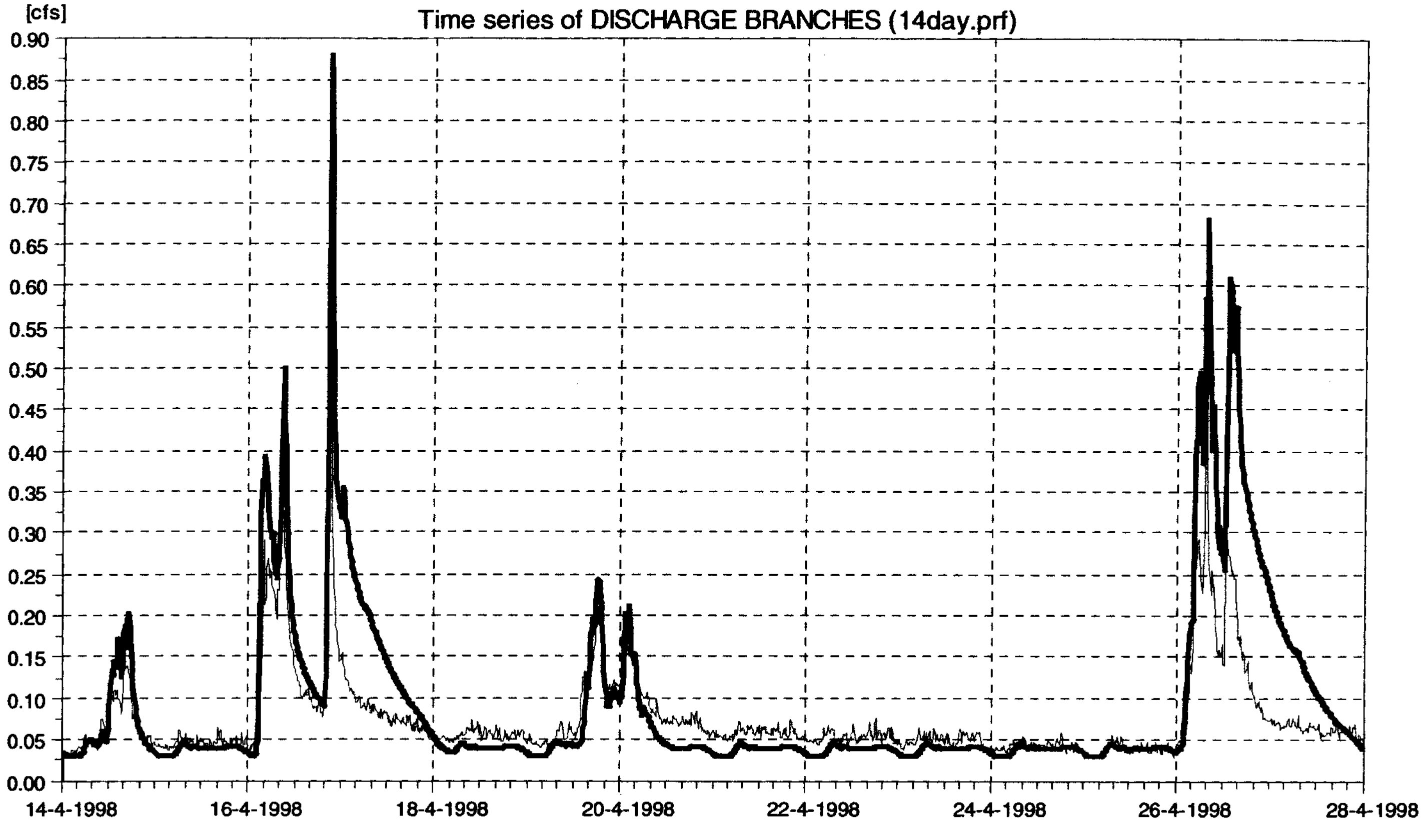

Metcalf & Eddy

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

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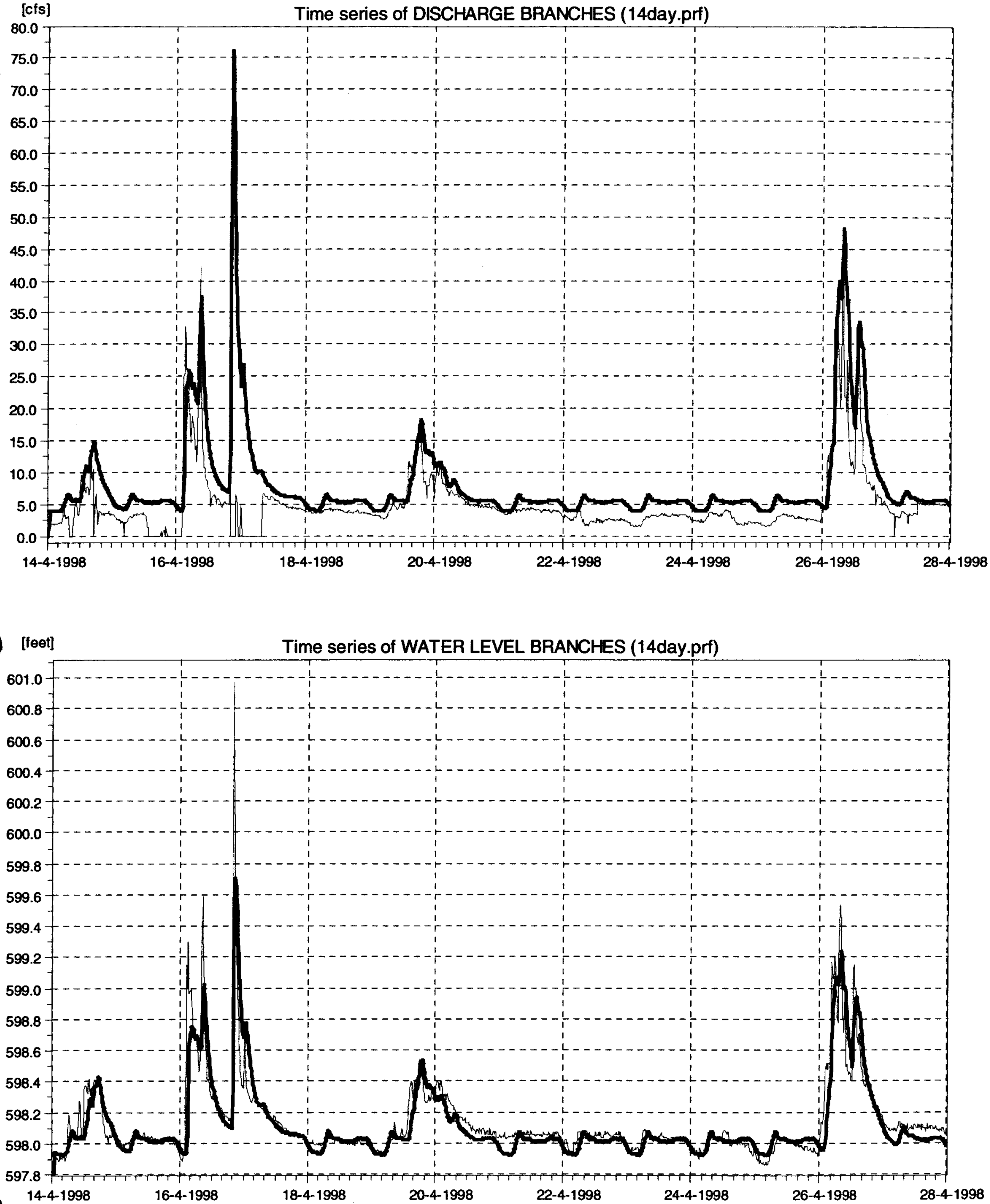

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Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

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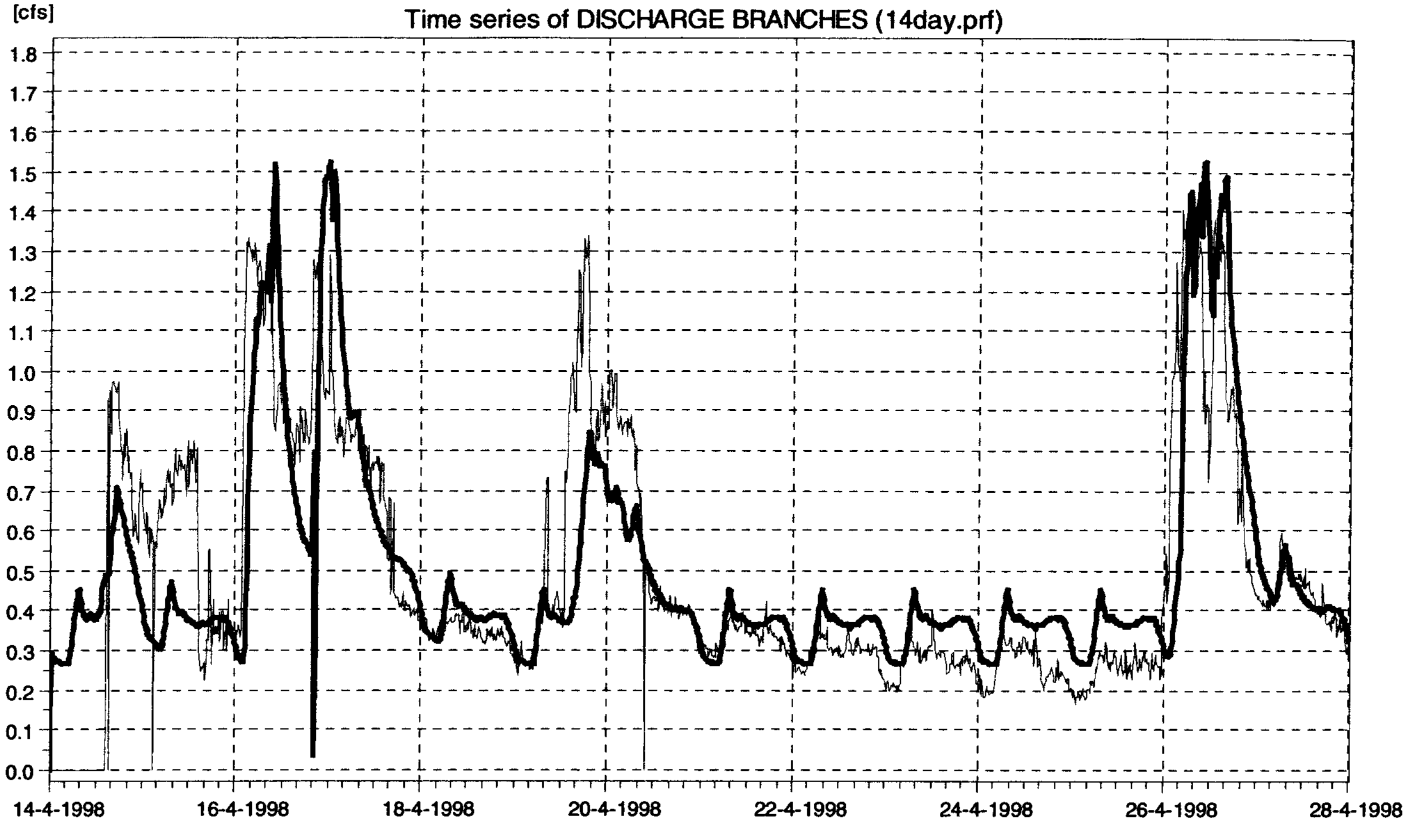

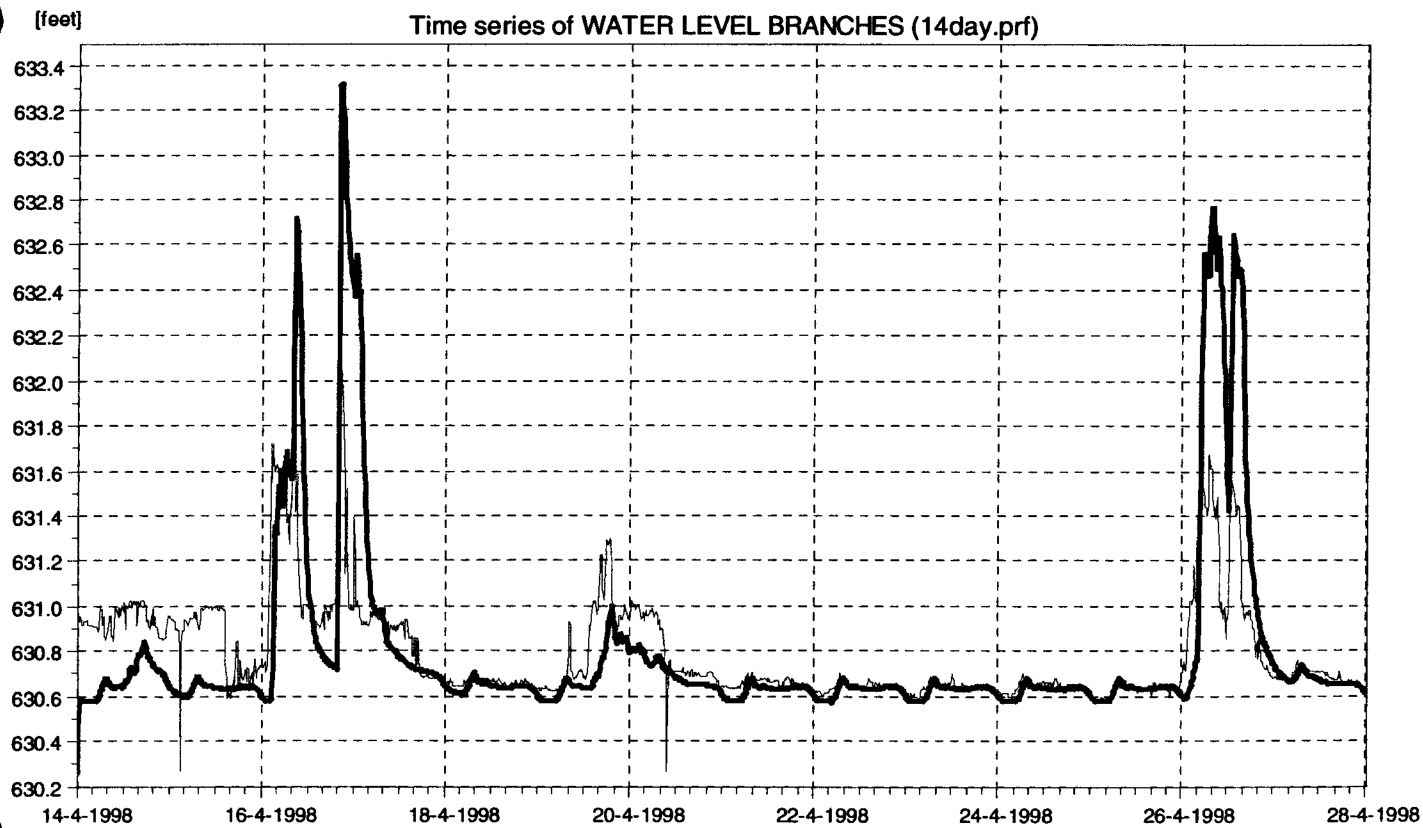

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Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

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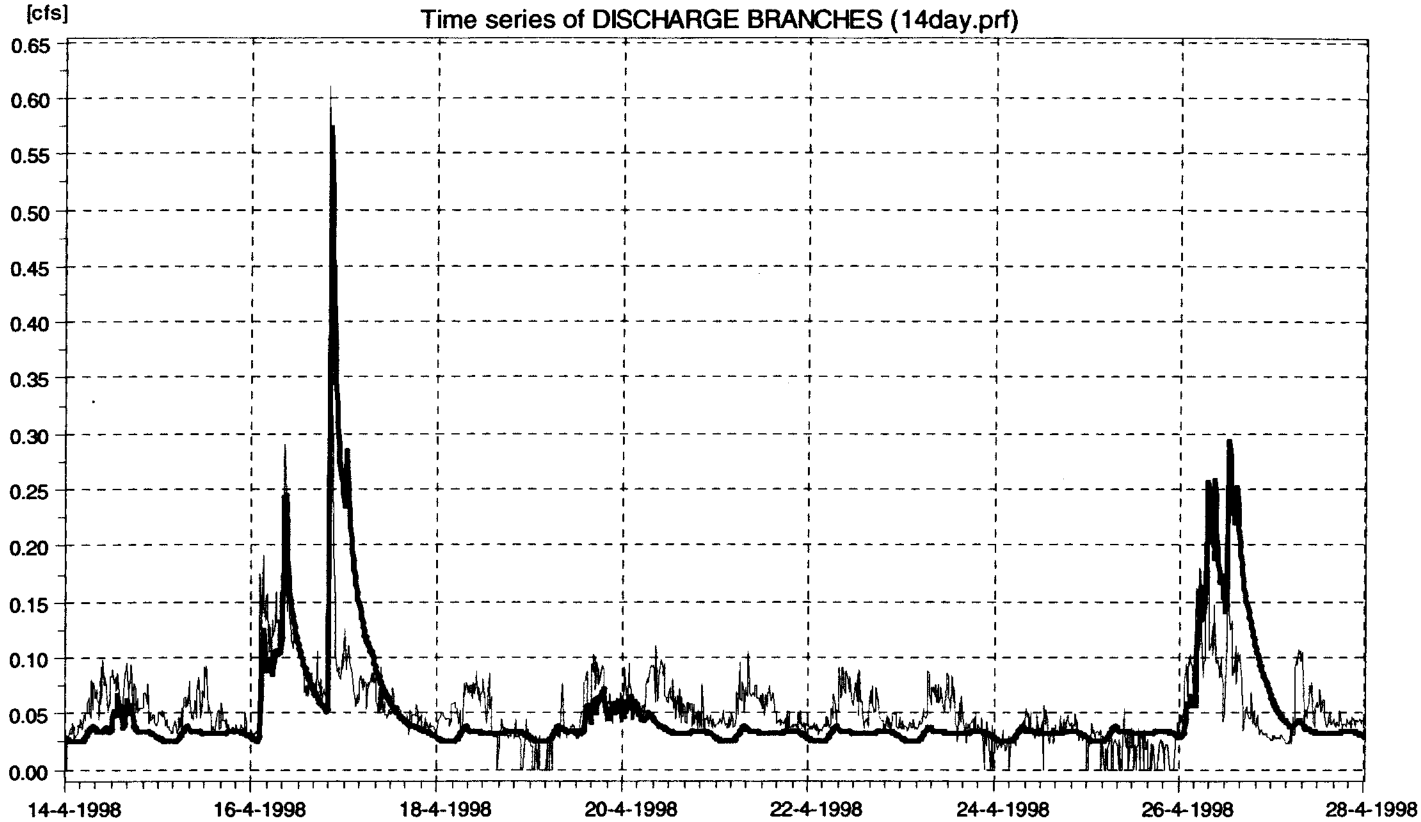

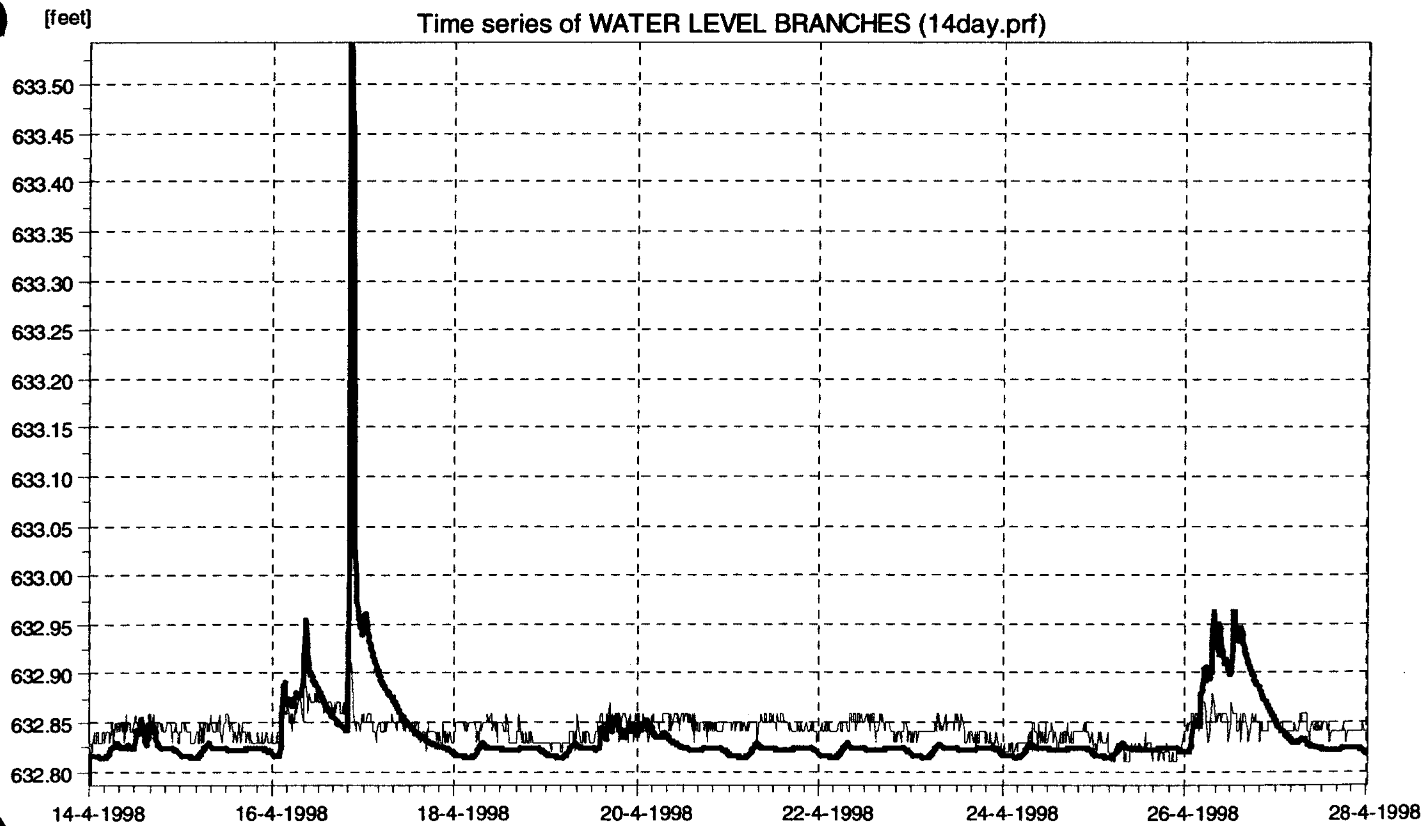

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Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

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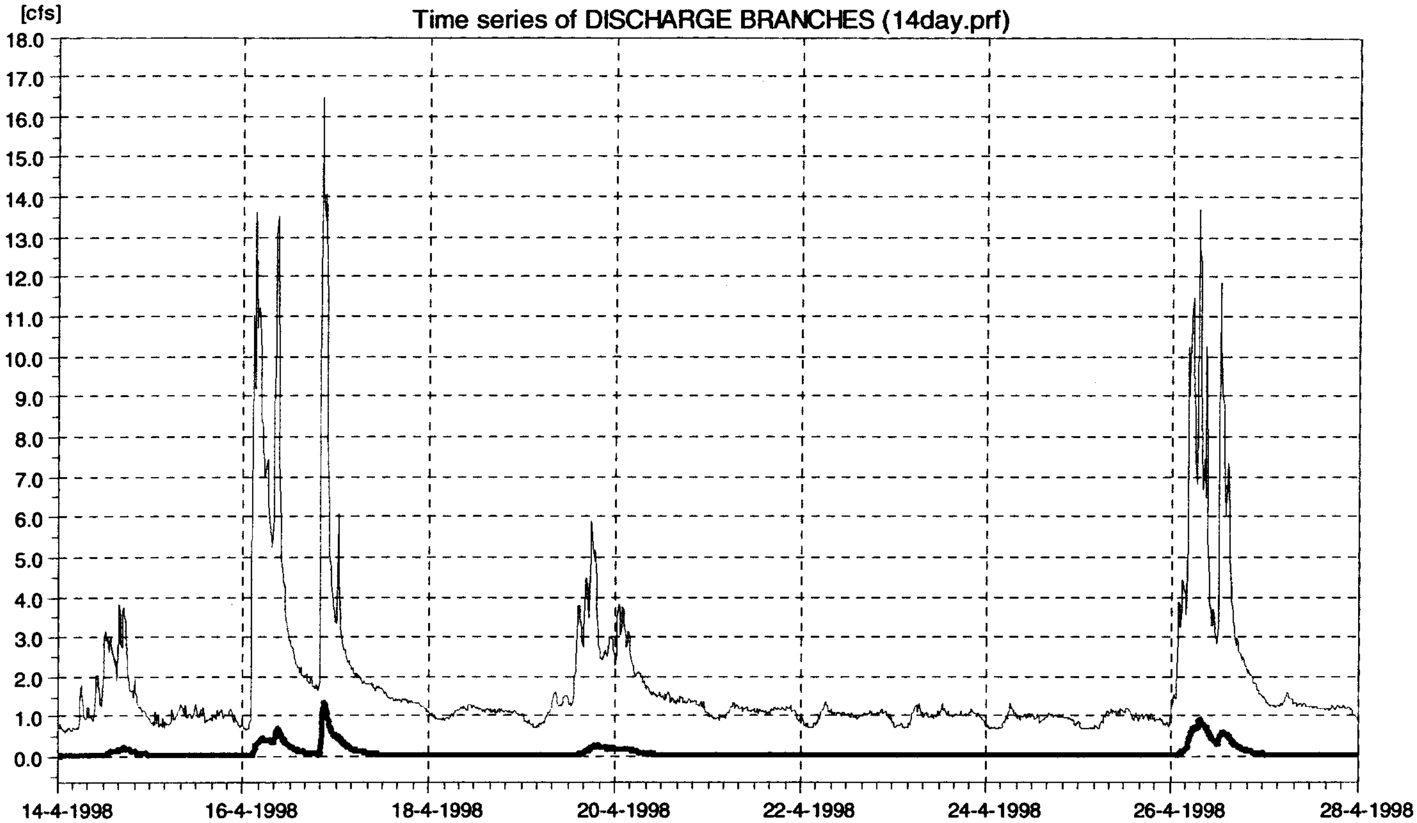

[cfs]
Time series of DISCHARGE BRANCHES (14day.prf)
18.0
17.0
16.0
15.0
14.0
13.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
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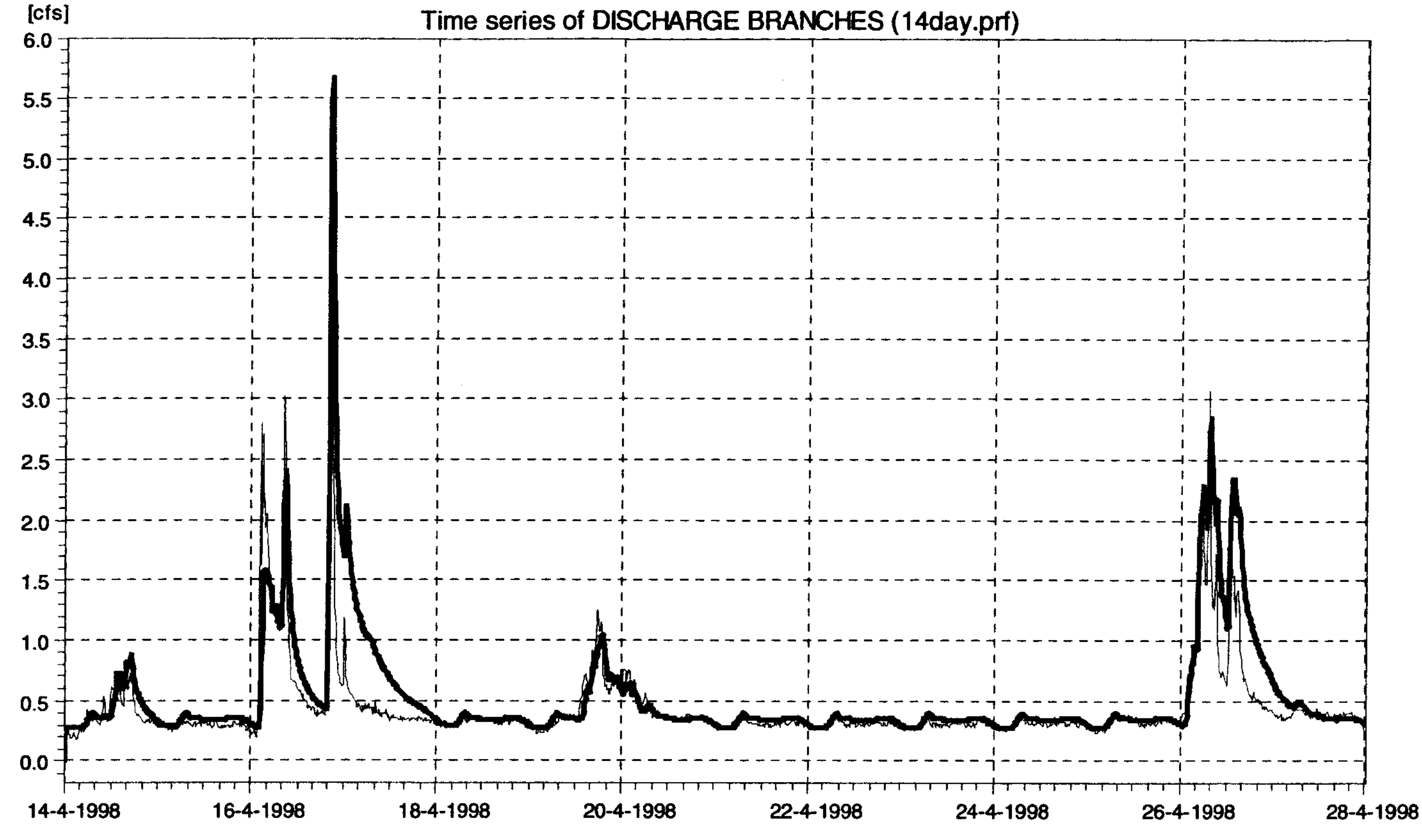

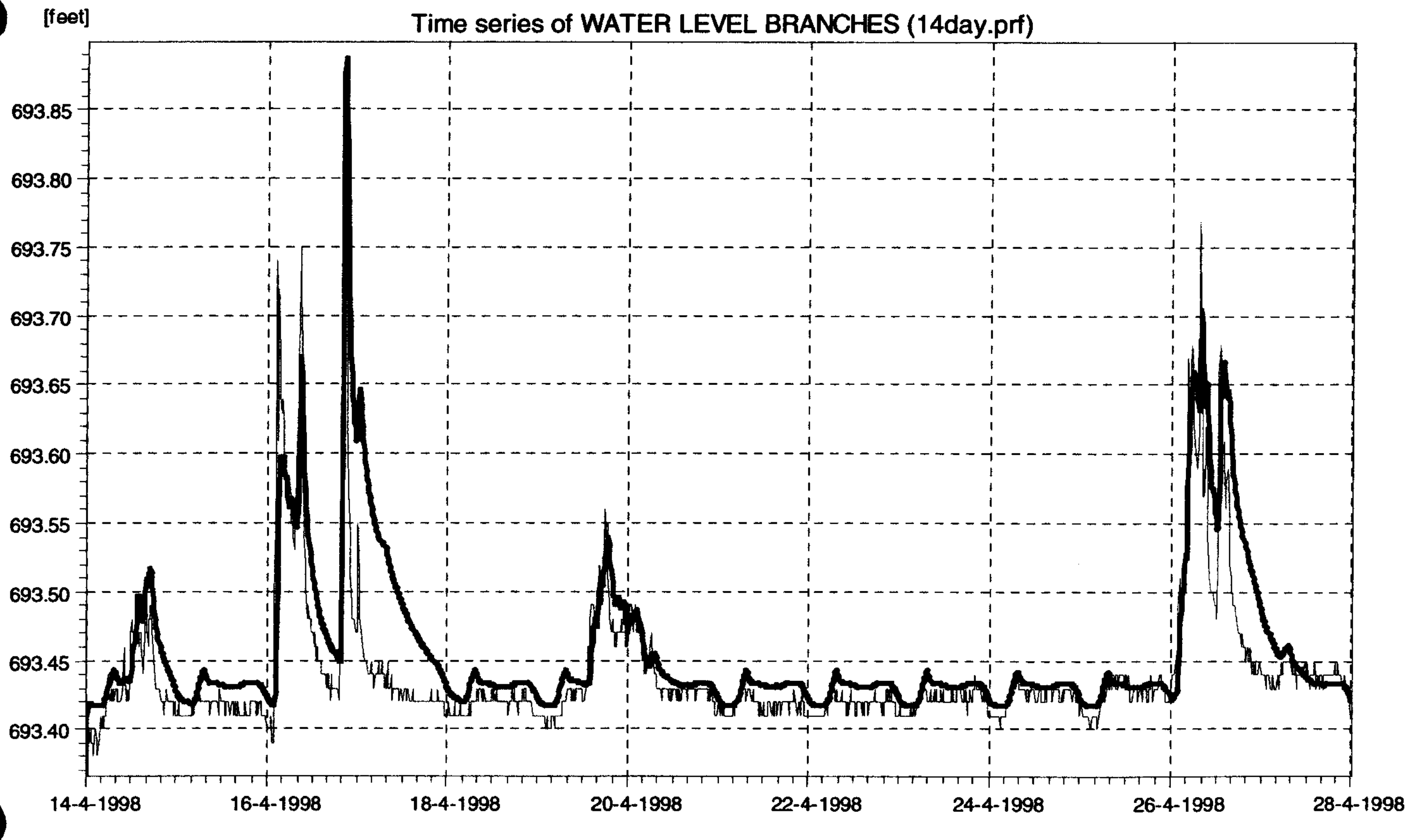

Metcalf & Eddy

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

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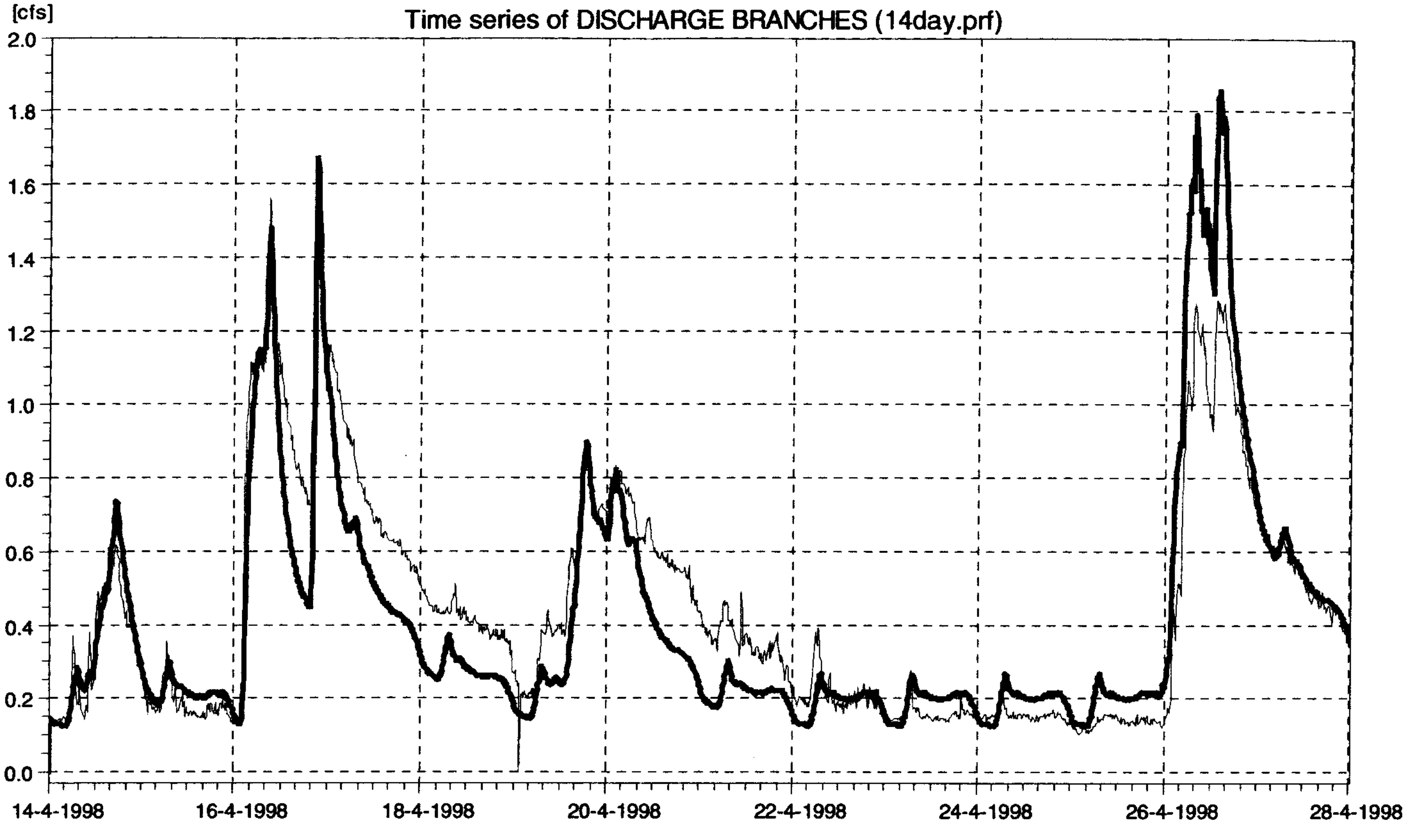

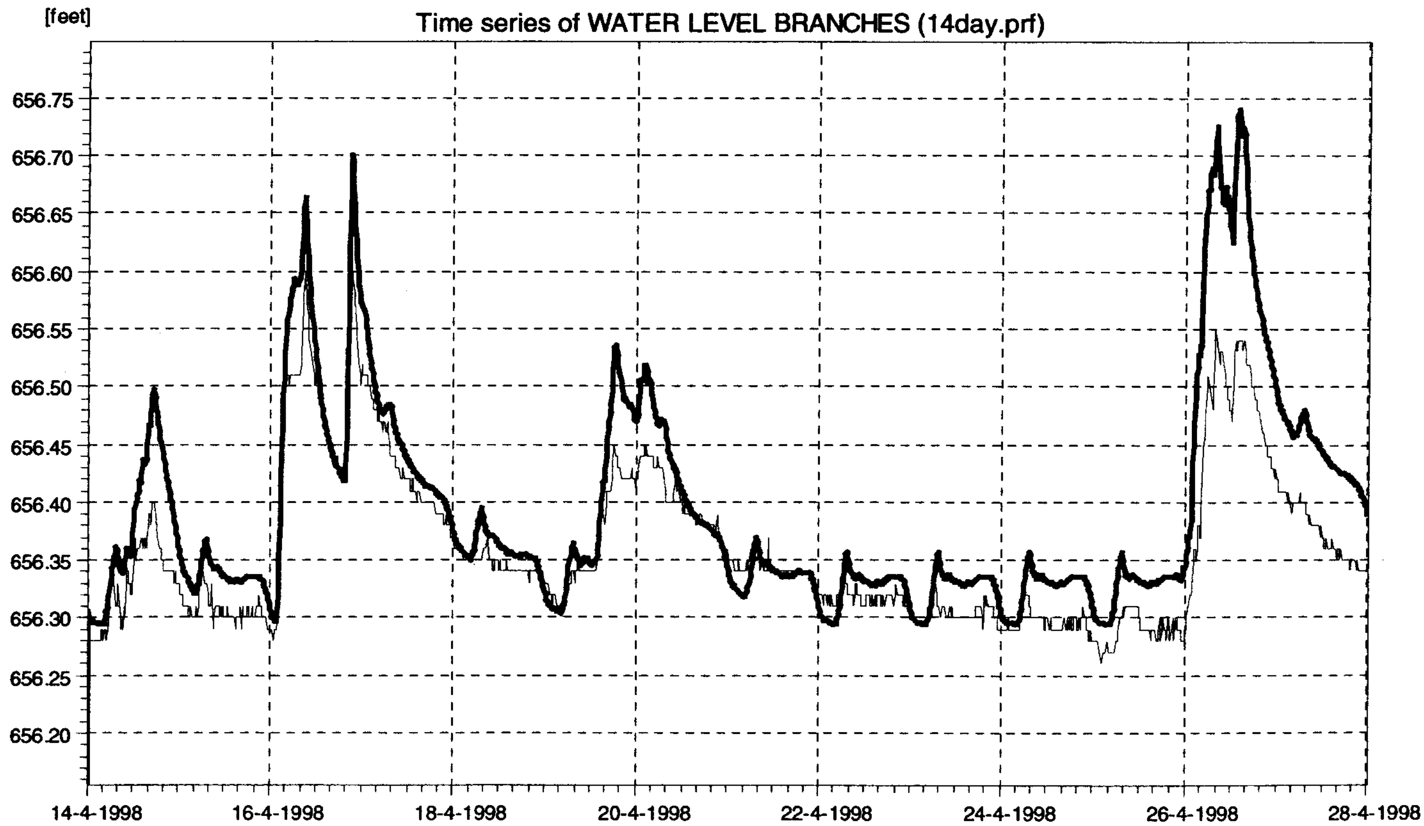

M&E AQUA ALLIANCE Metcalf & Eddy

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

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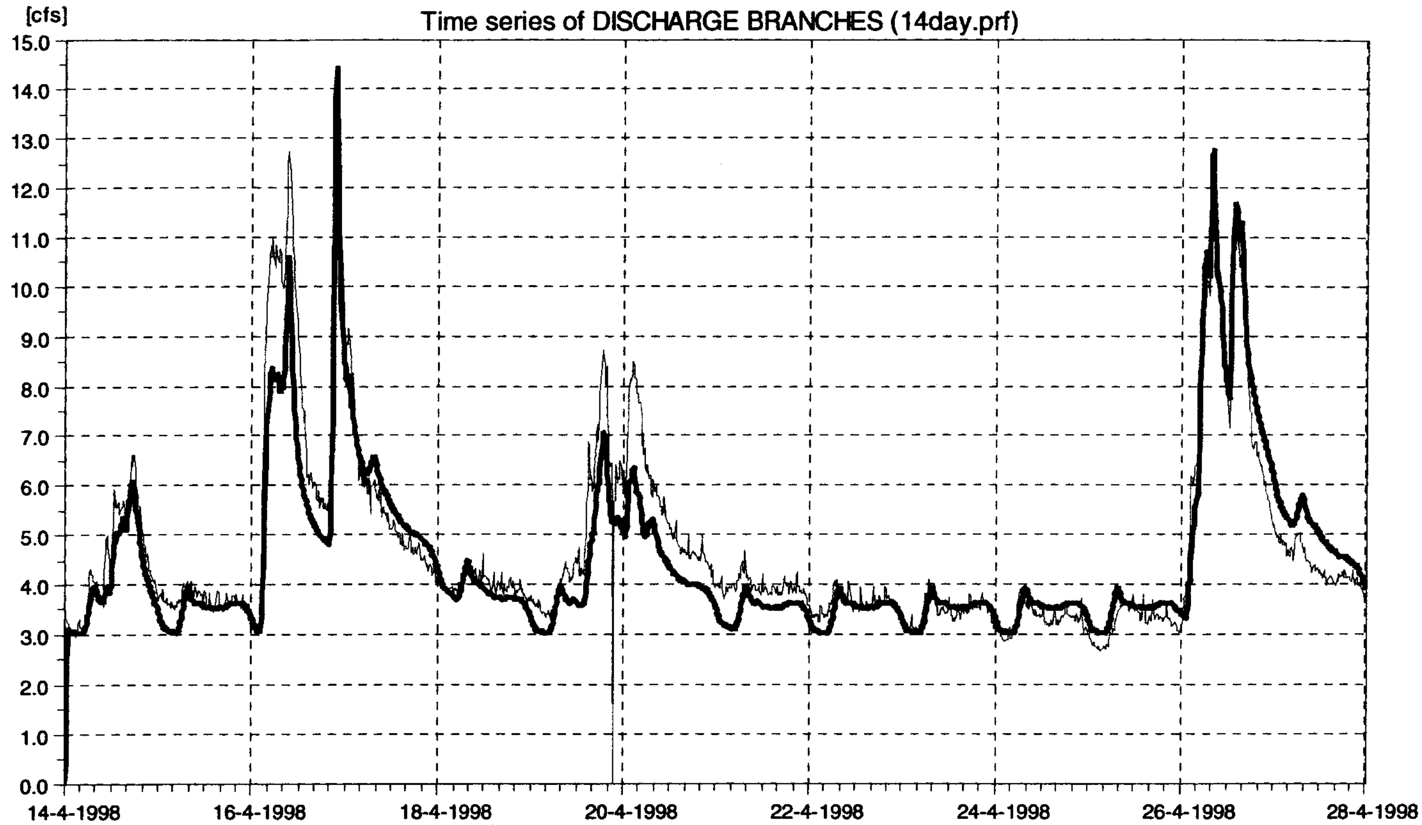
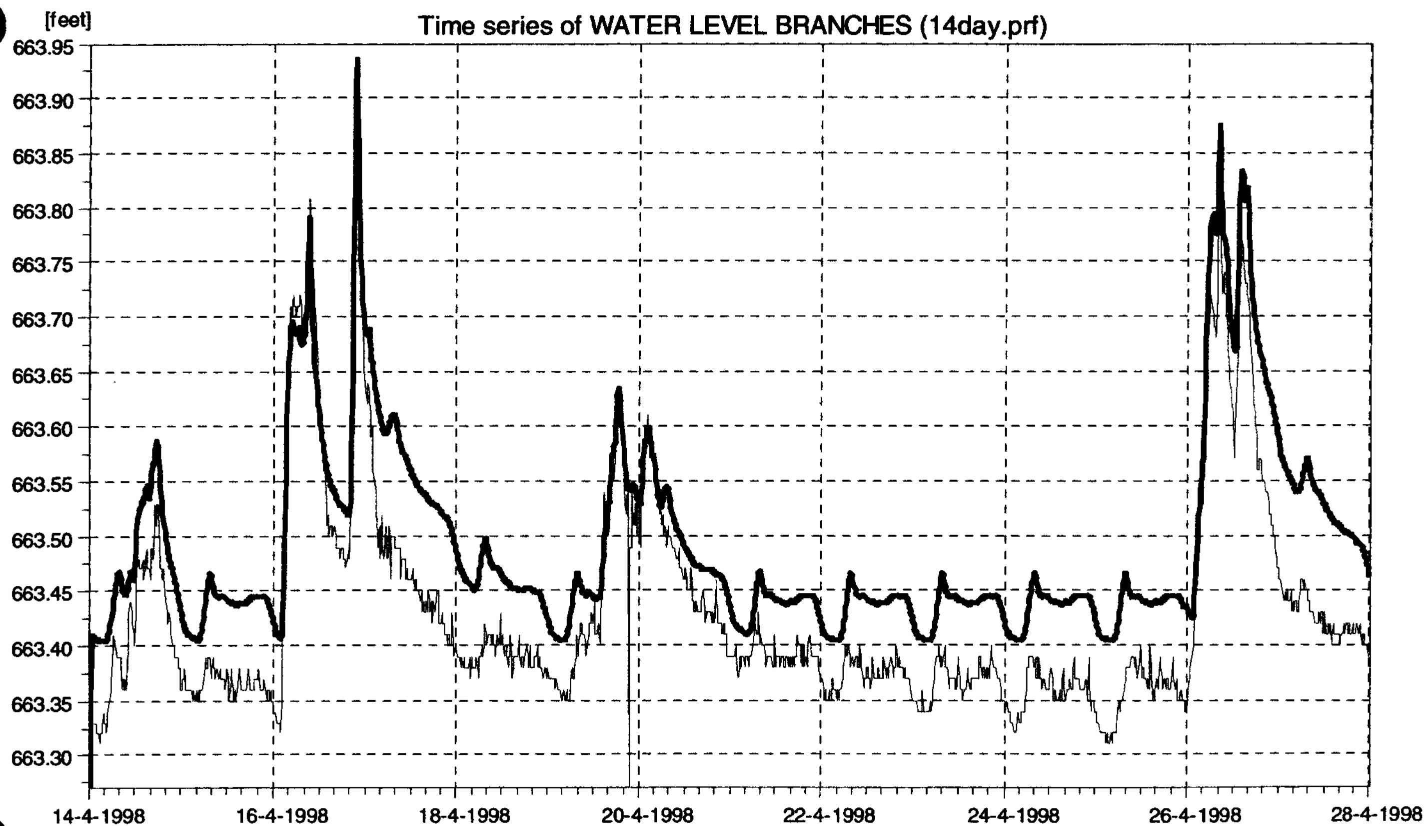




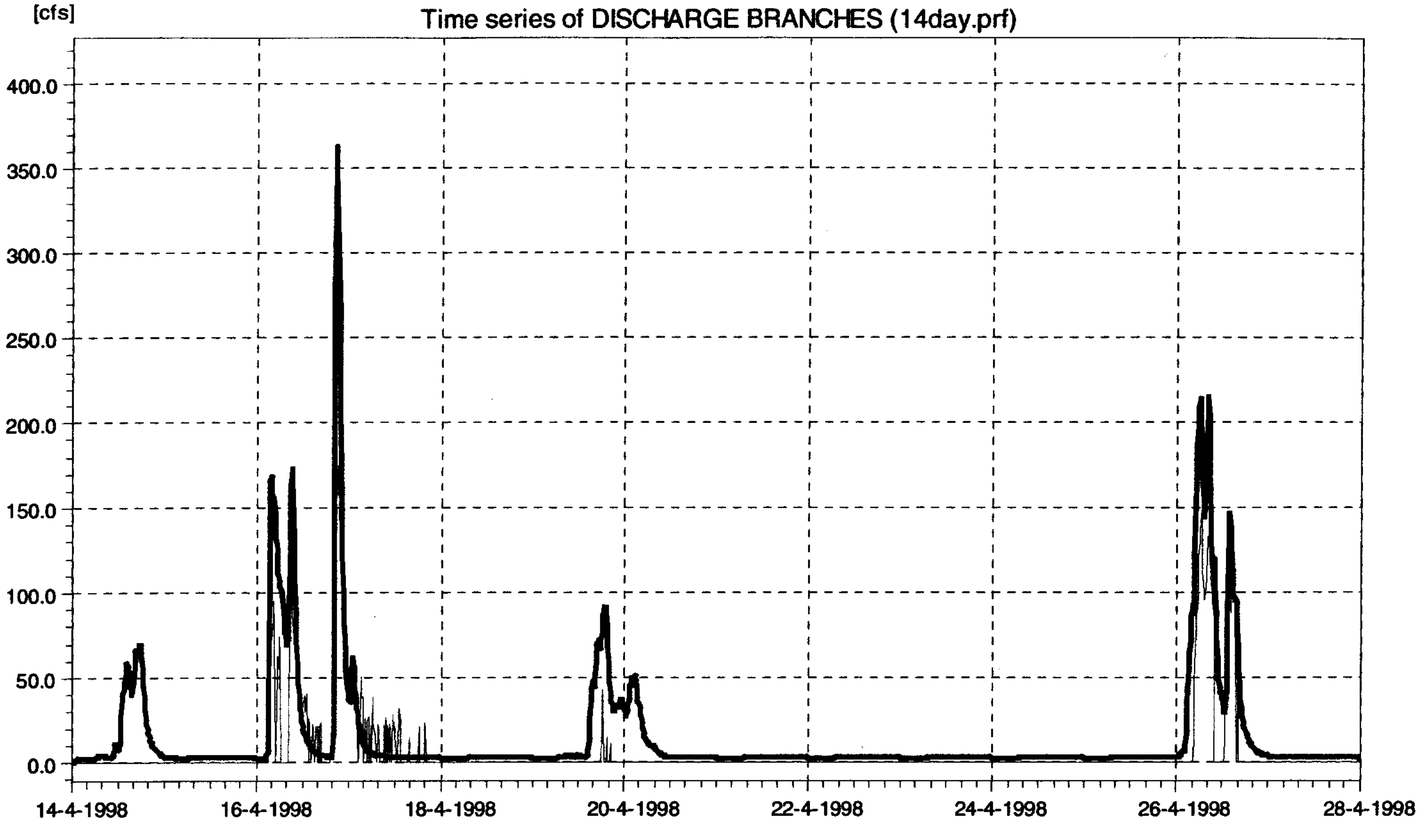
M&E Metcalf & Eddy AQUA ALLIANCE

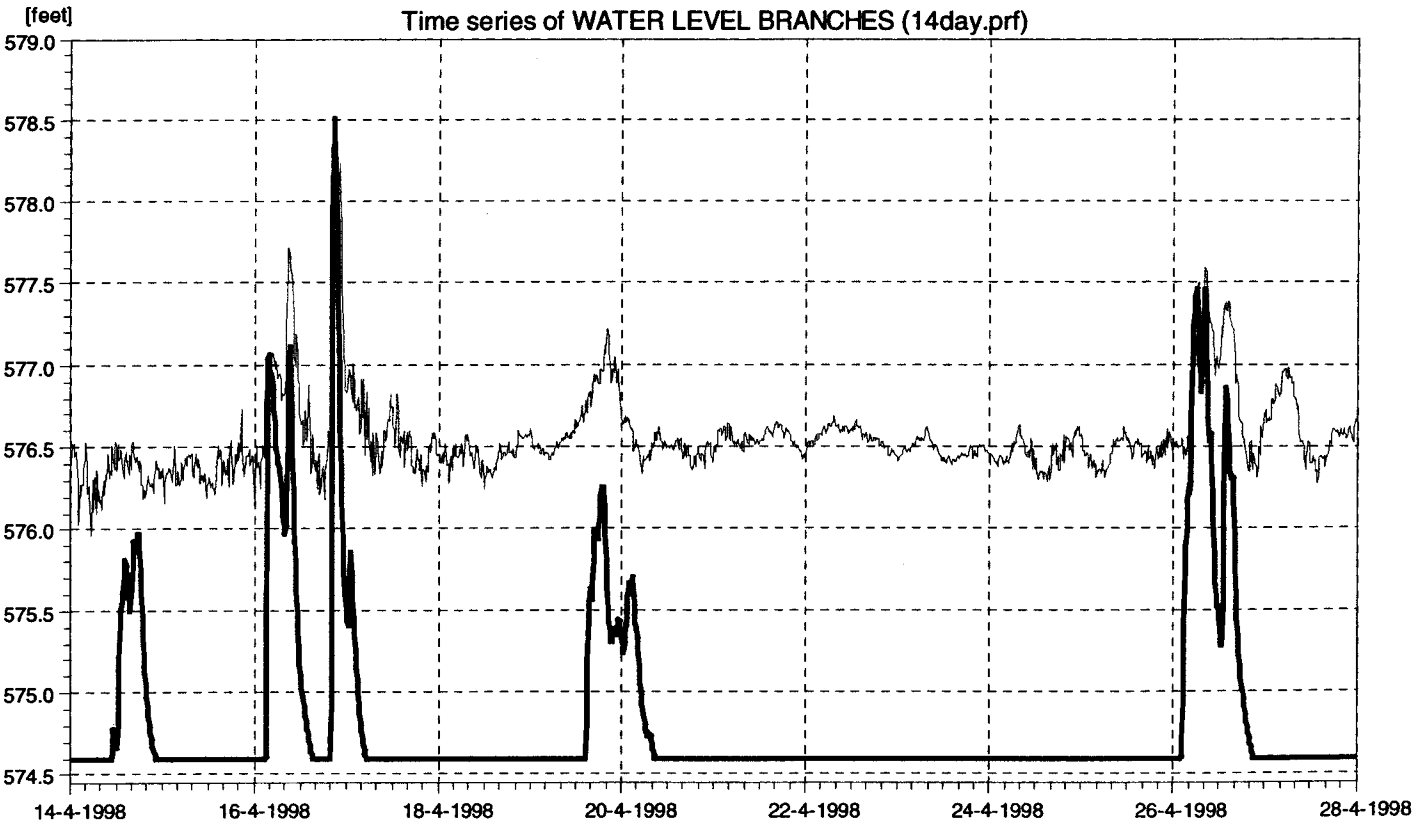
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: NMS01





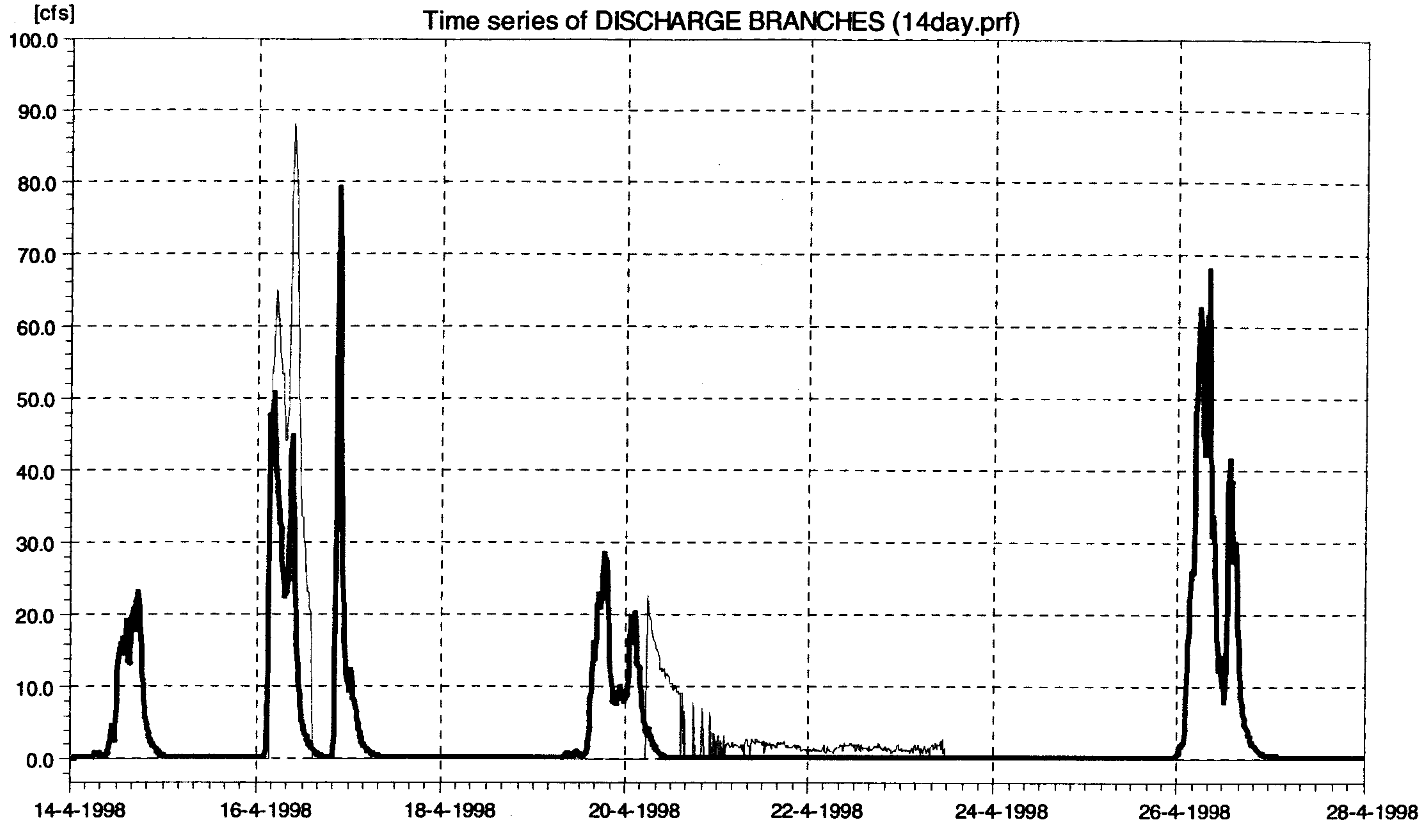
M&E Metcalf & Eddy AQUA ALLIANCE

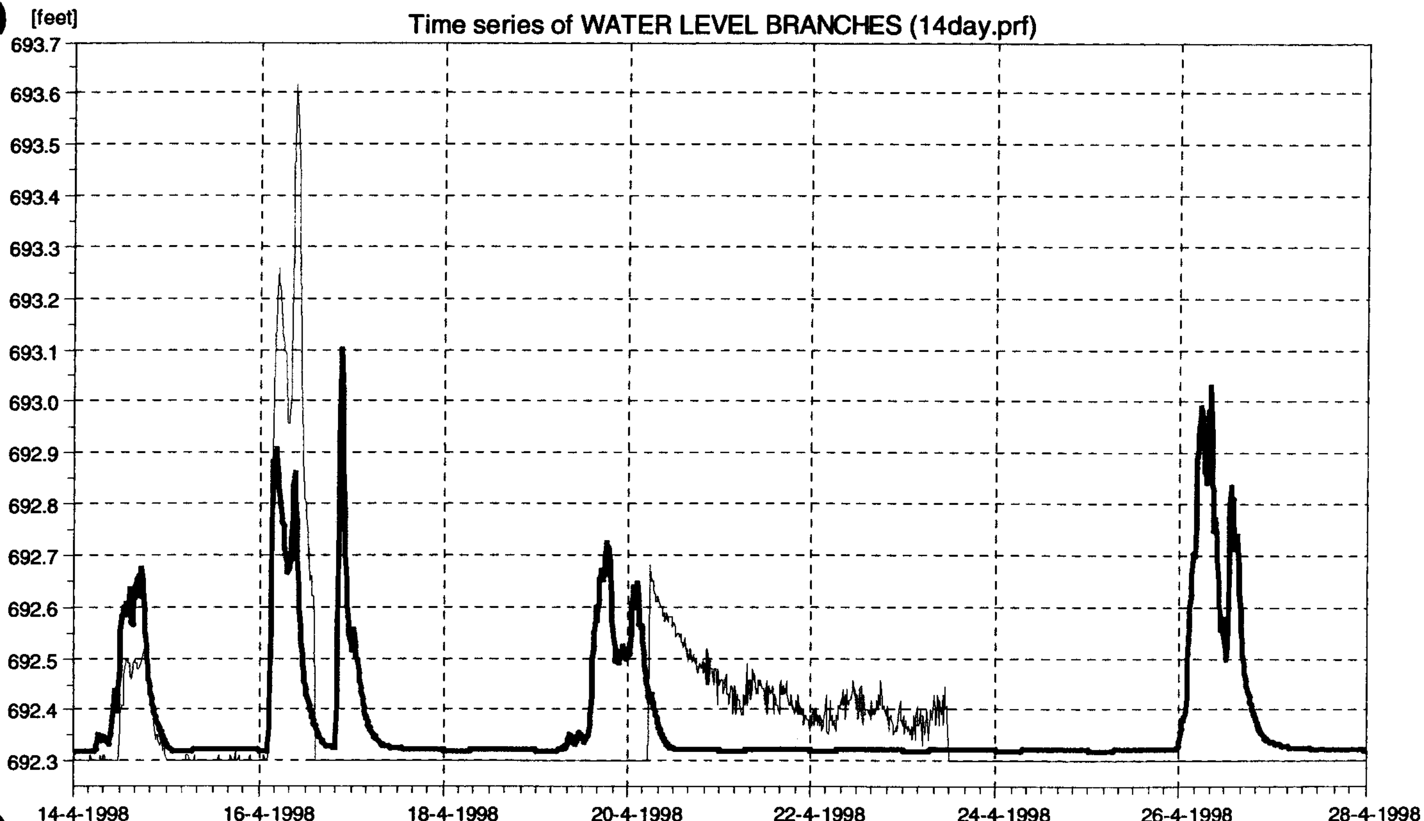
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: NMS02





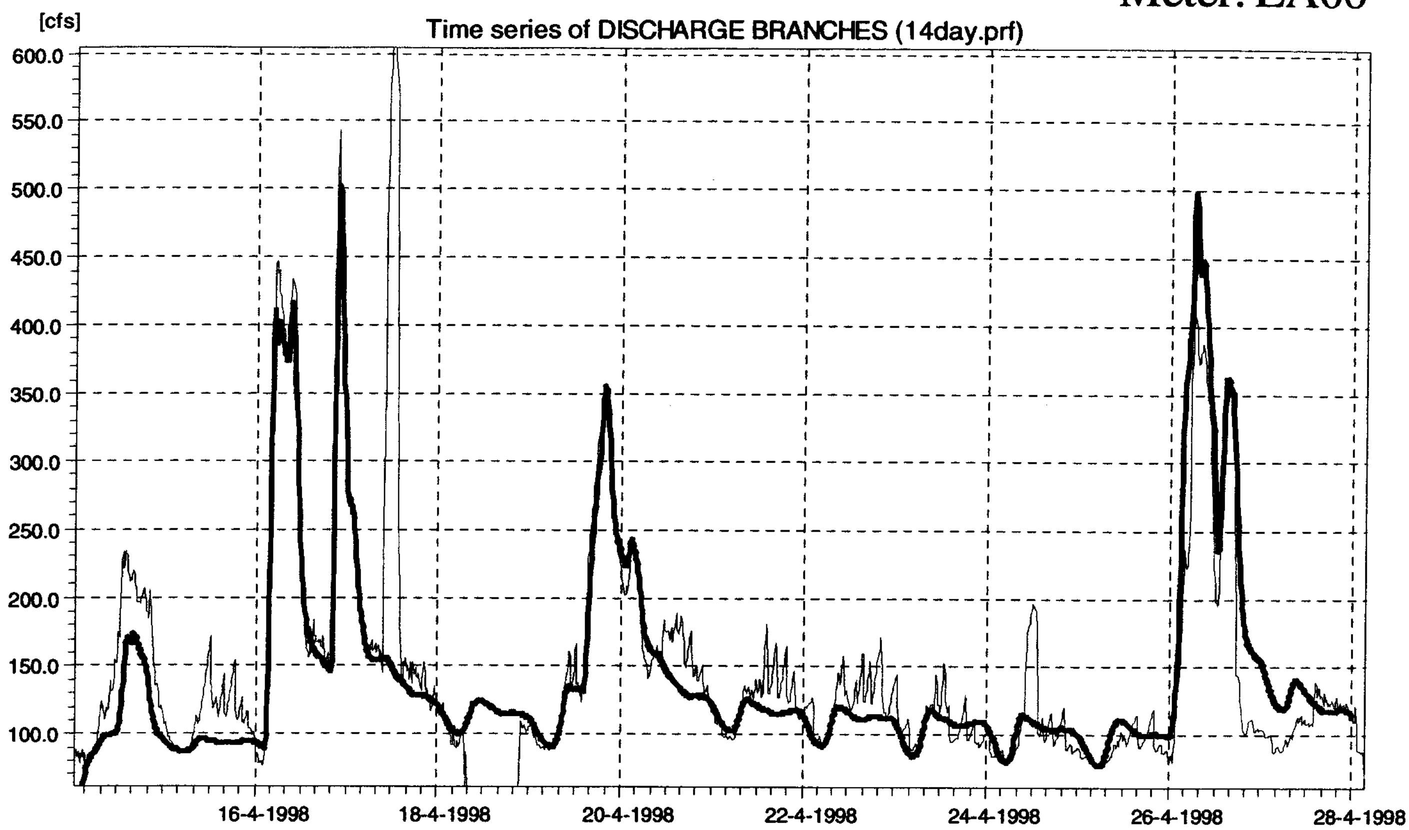
M&E Metcalf & Eddy AQUA ALLIANCE

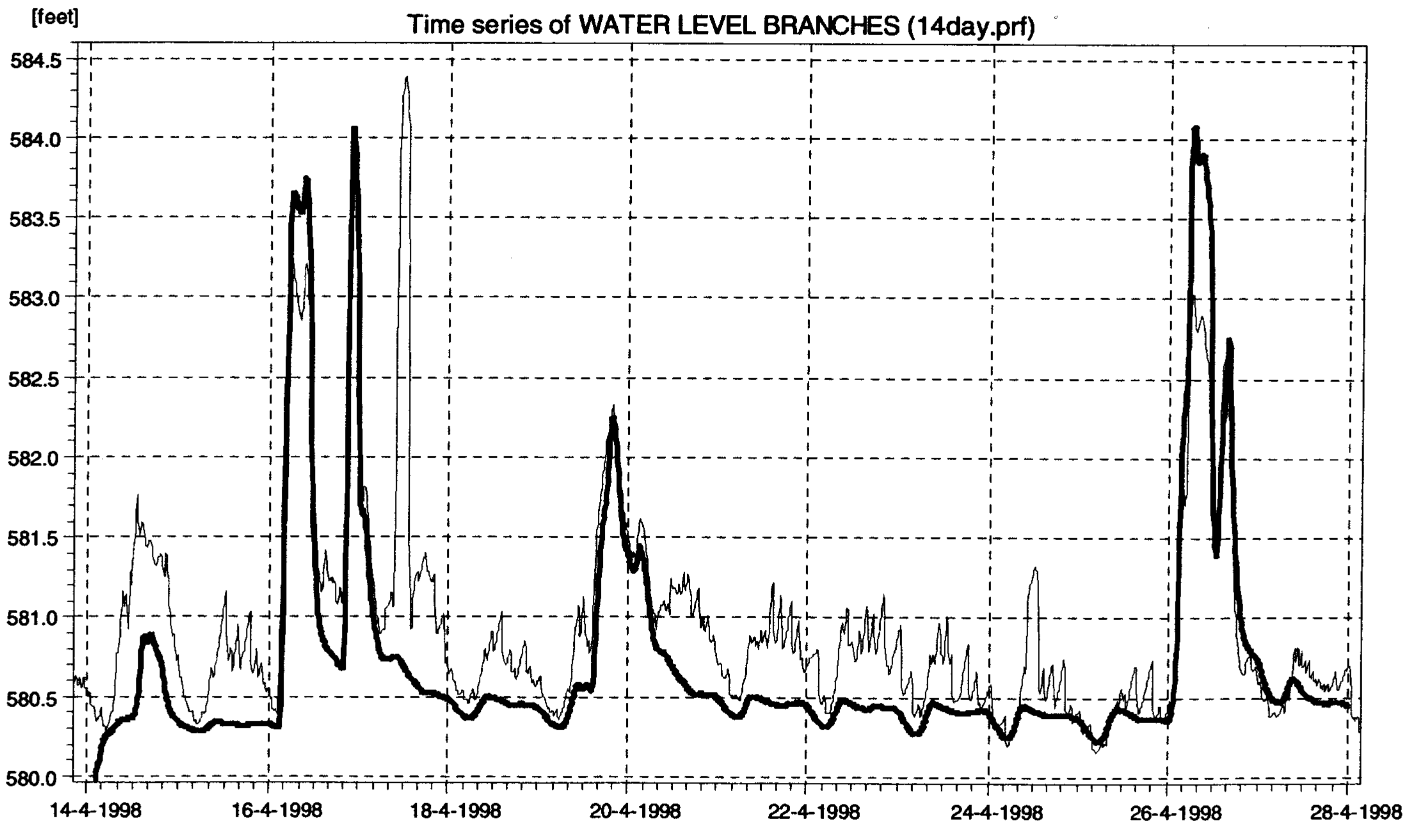
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA00



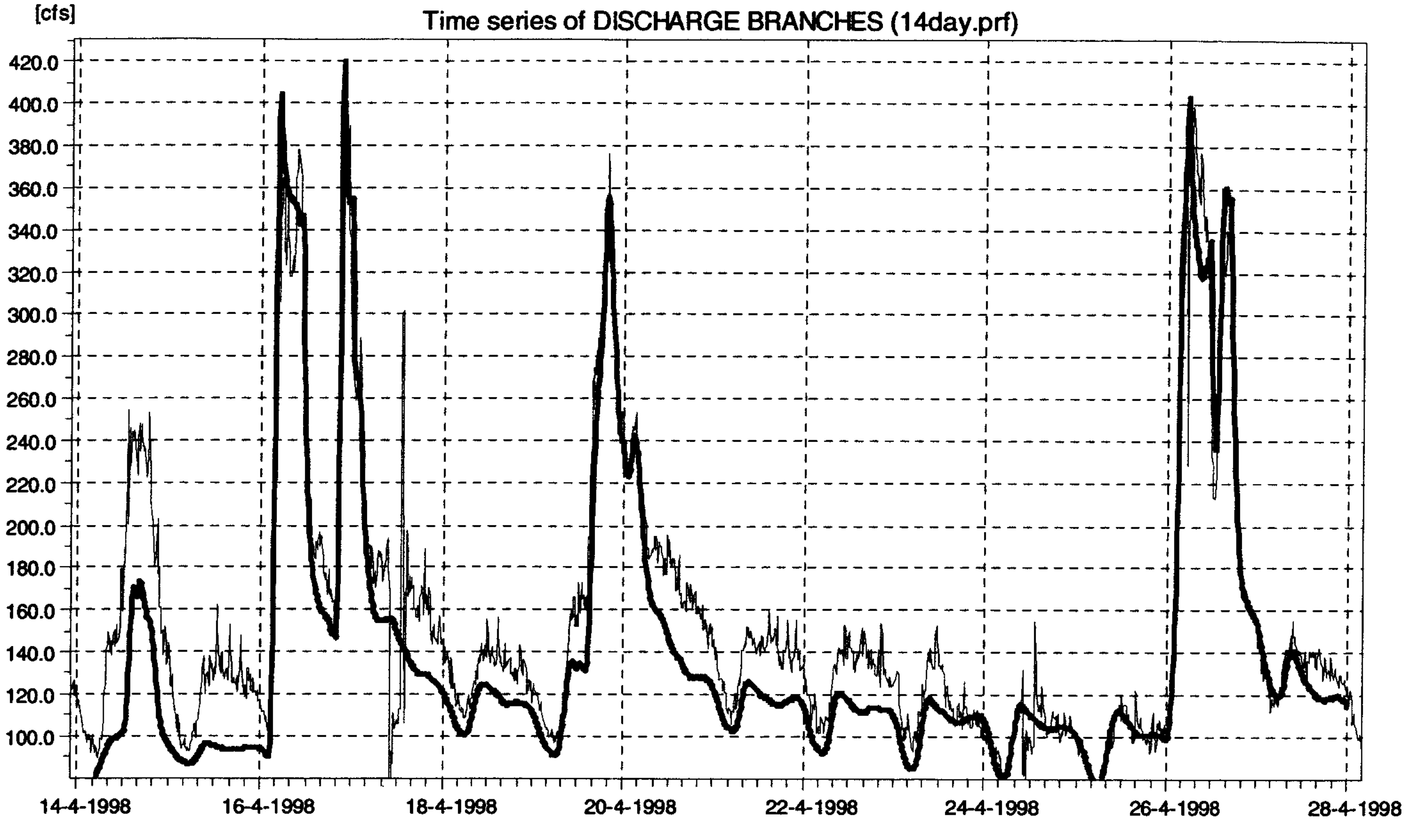


M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

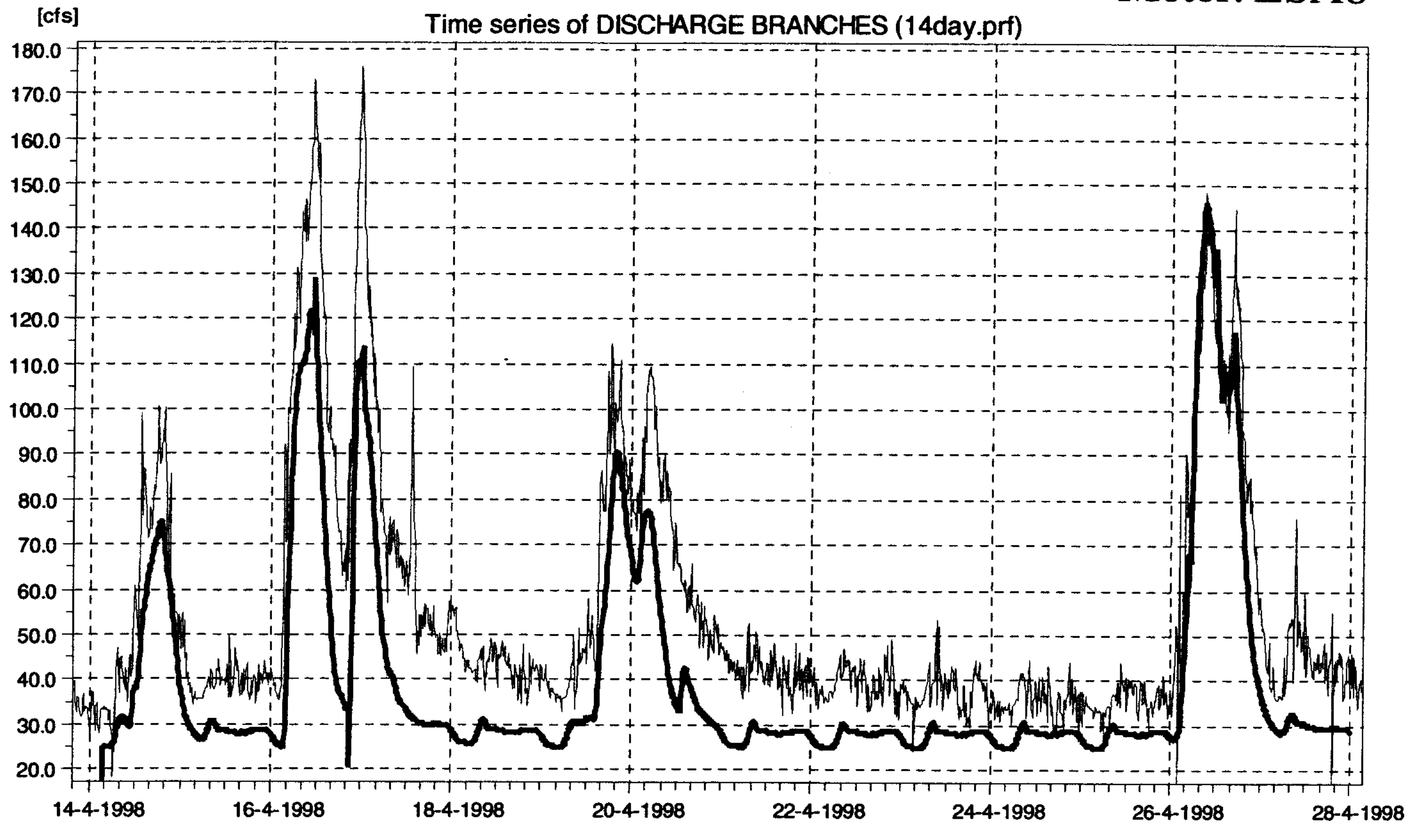
Model Calibration — Model — Meter

CH2MHILL



TOTAL FLOWS, EASTERLY INTERCEPTOR TO PLANT=ESA2+ESA4+ESA 6

Meter: ESA8



M&E Metcalf & Eddy AQUA ALLIANCE

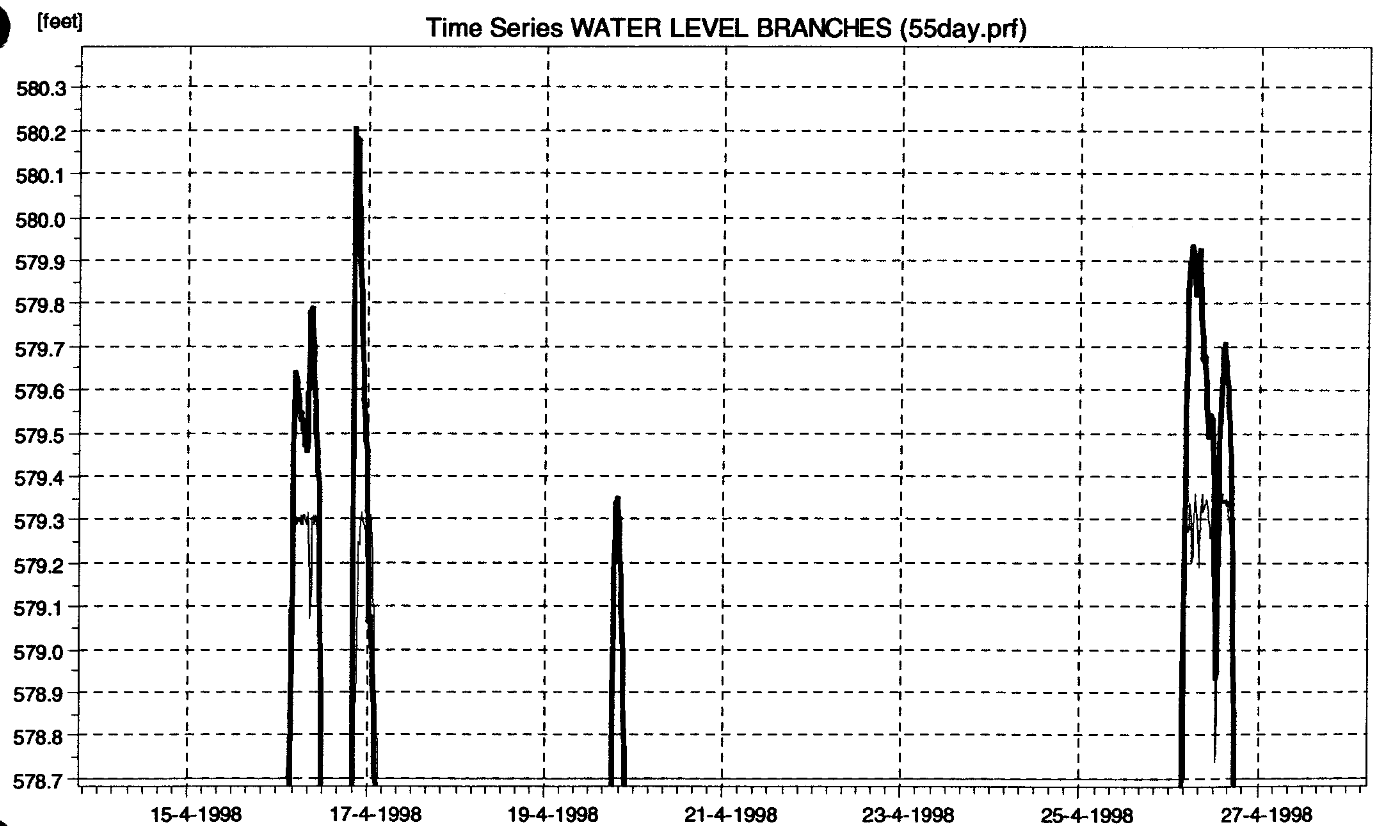
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: ESA10

Meter located on top of overflow weir



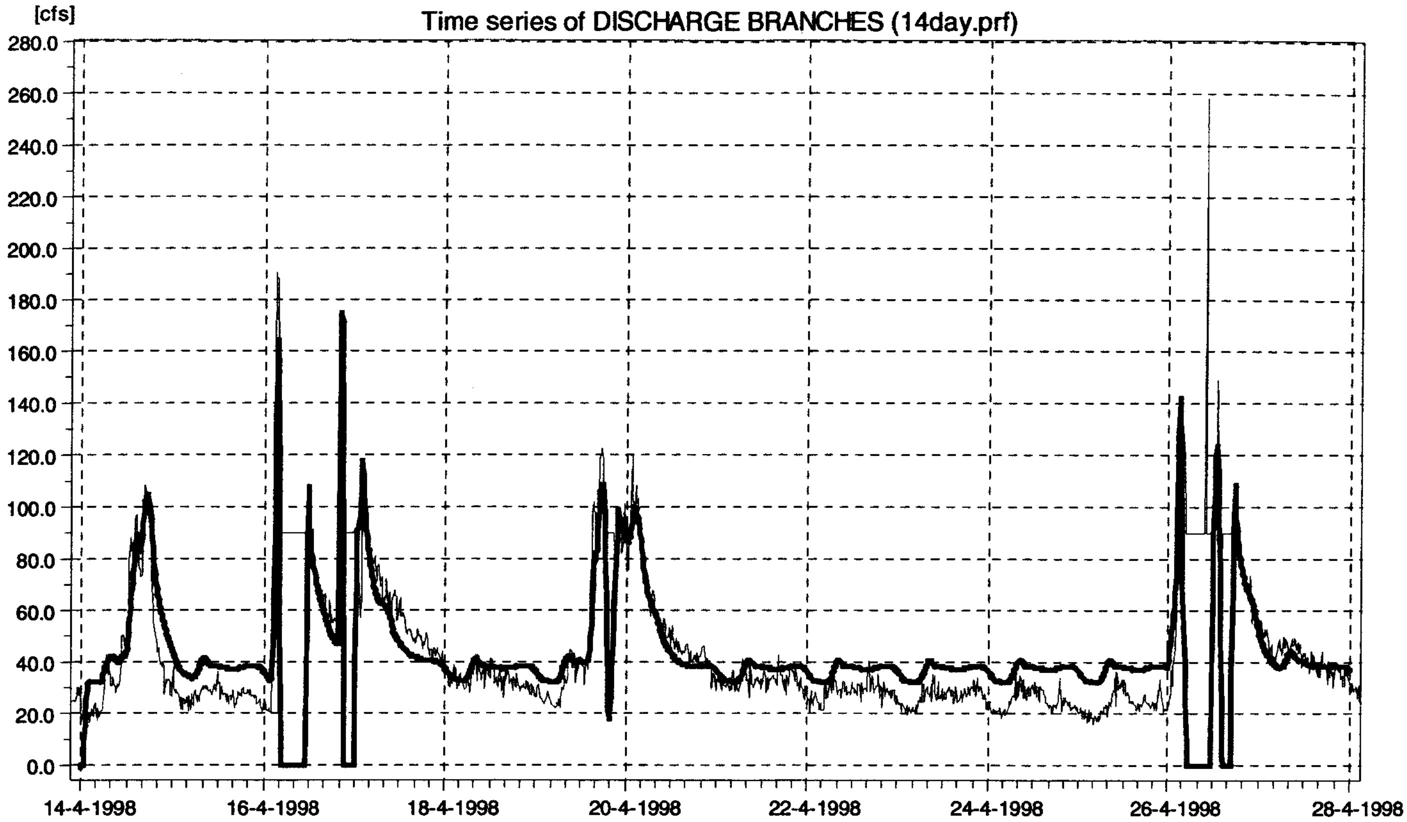
Metcalf & Eddy

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: ESA11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Time series of DISCHARGE BRANCHES (14day.prf)
280.0
260.0
240.0
220.0
200.0
180.0
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
14-4-1998
16-4-1998
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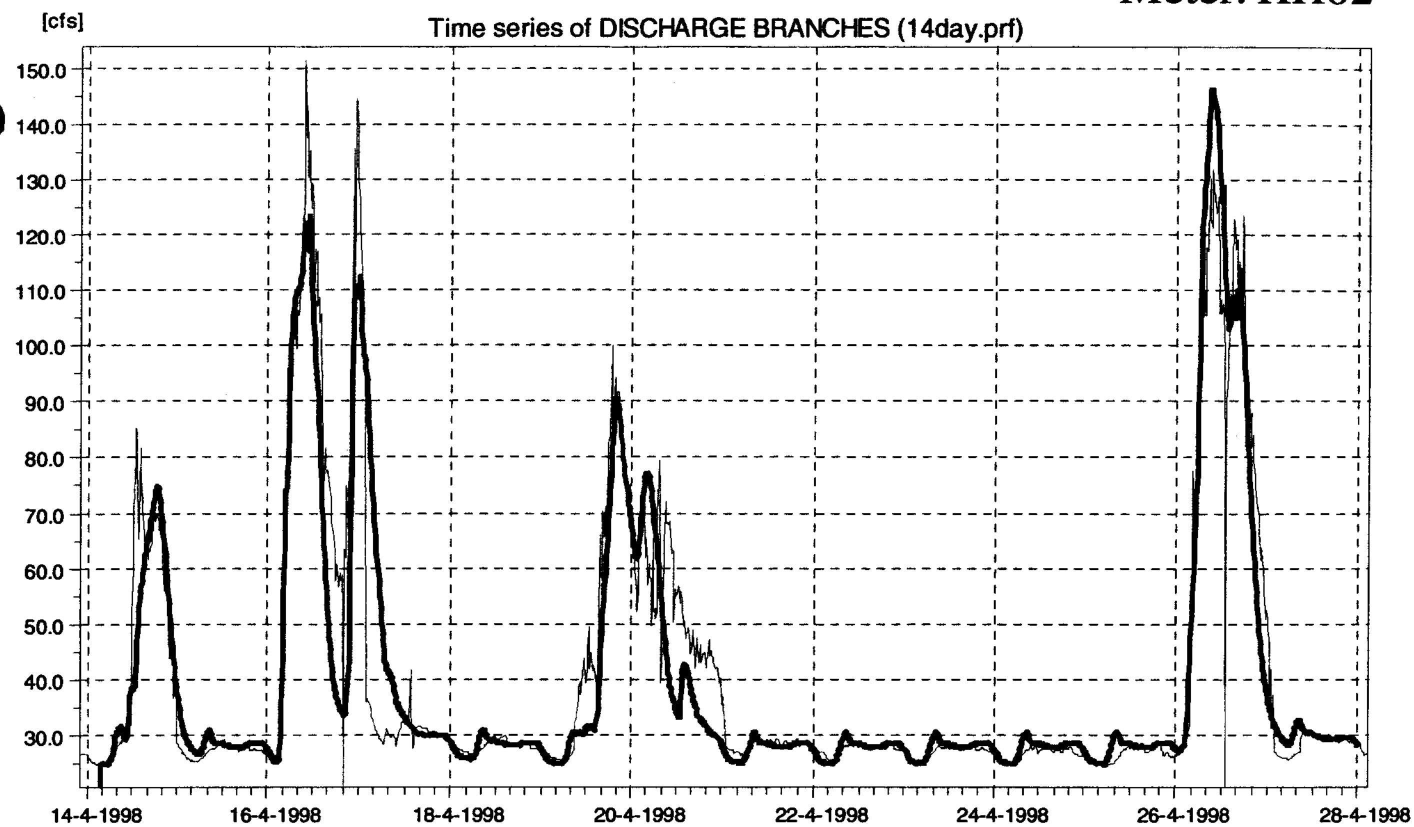
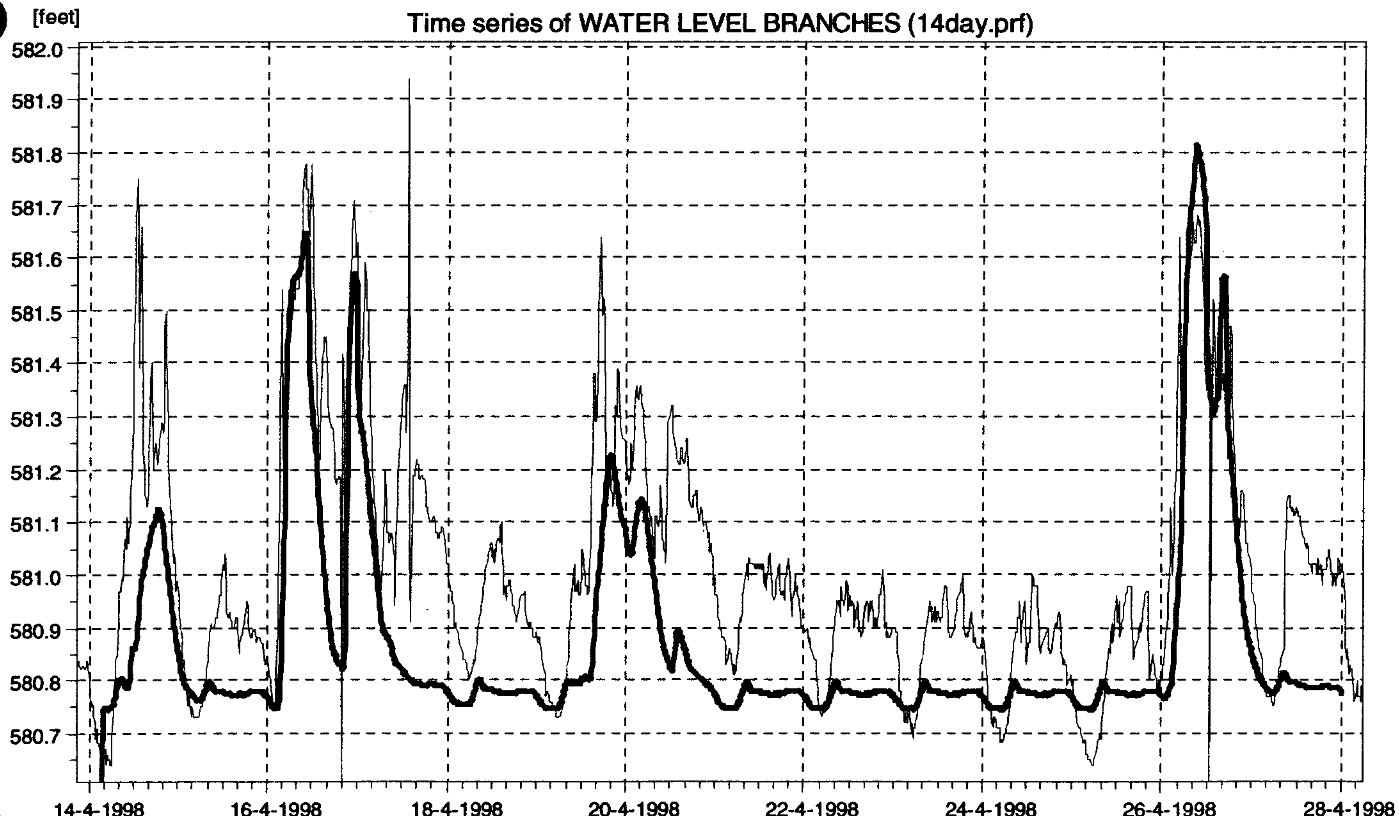
28-4-1998

Meter: HH02





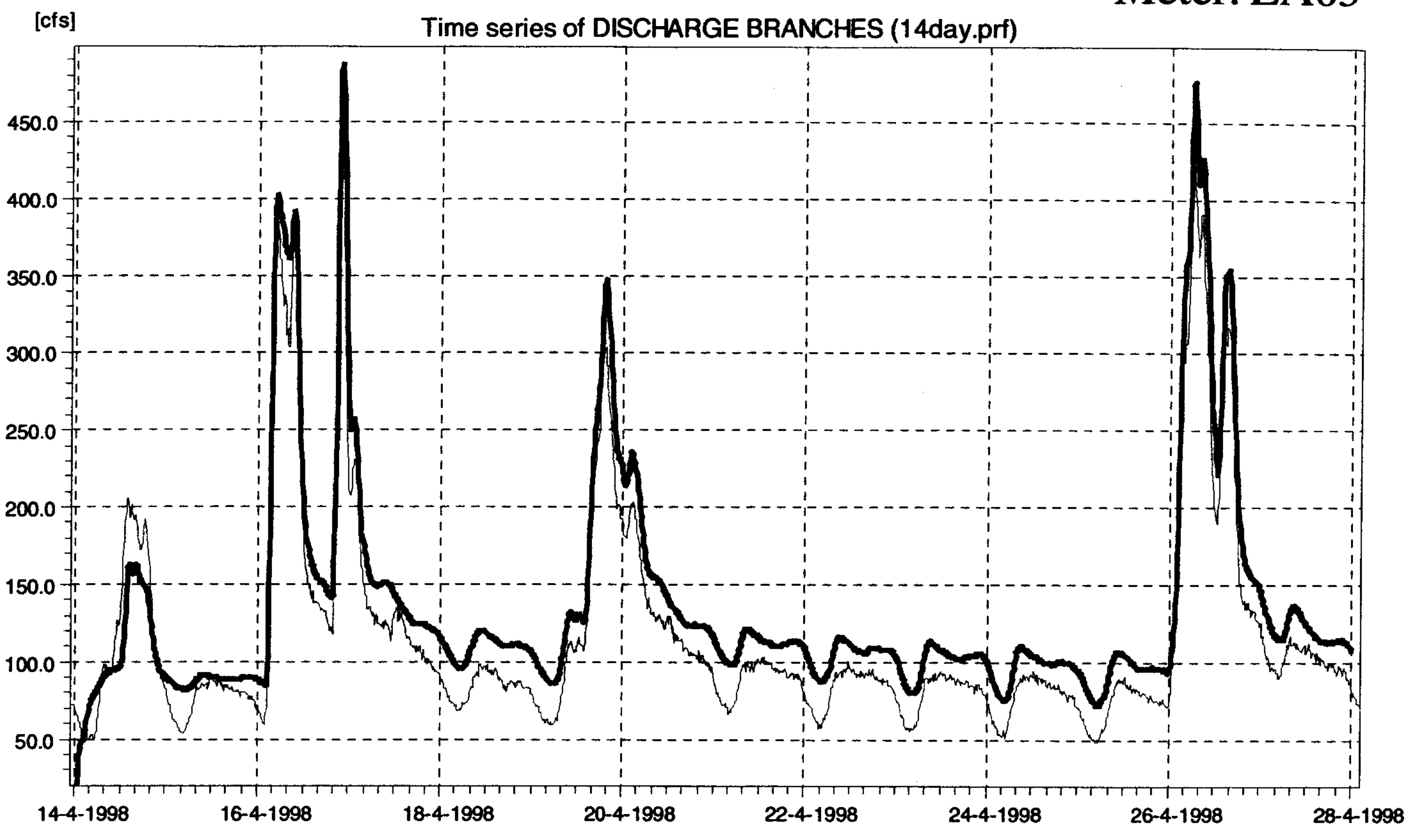
Metcalf & Eddy

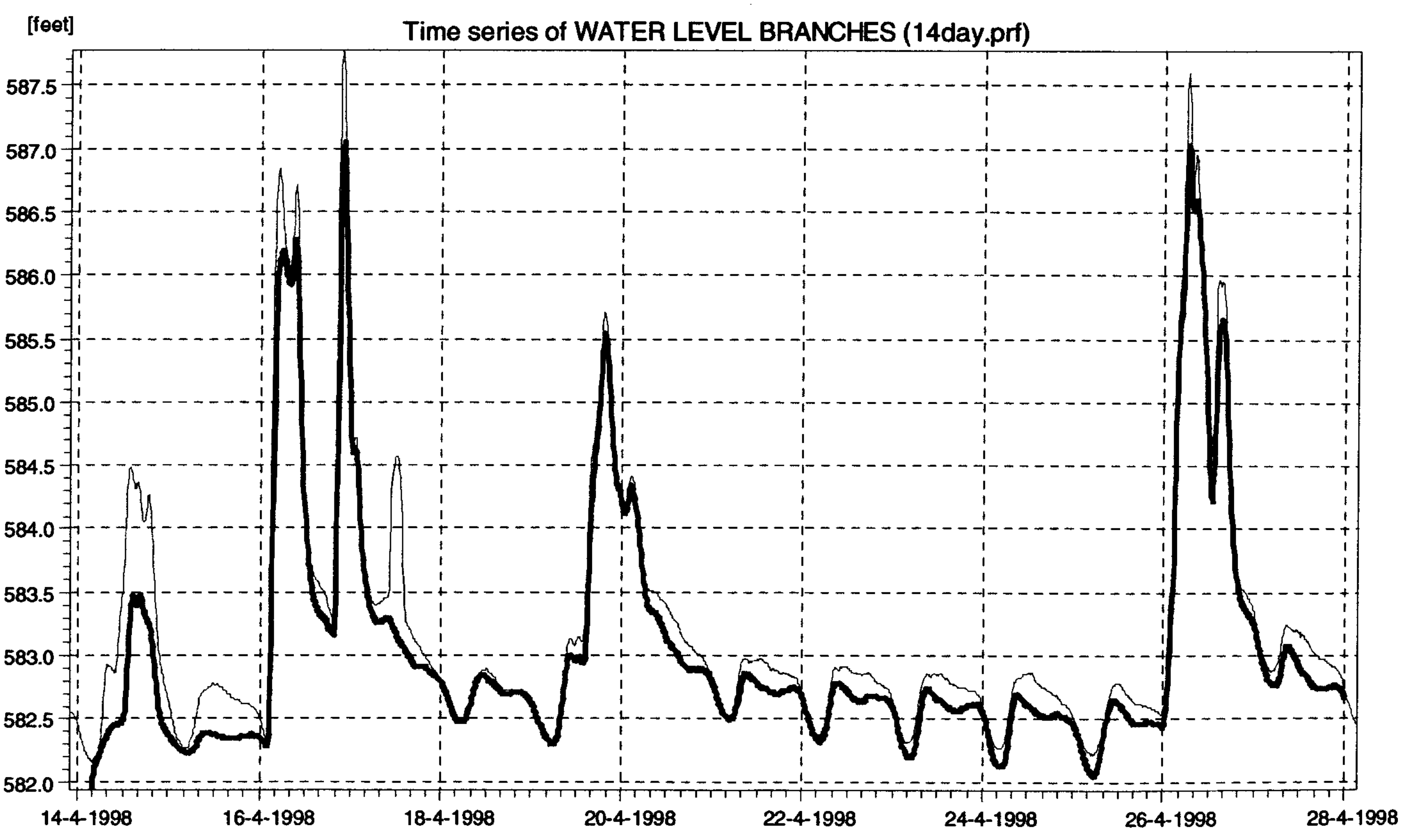
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA03





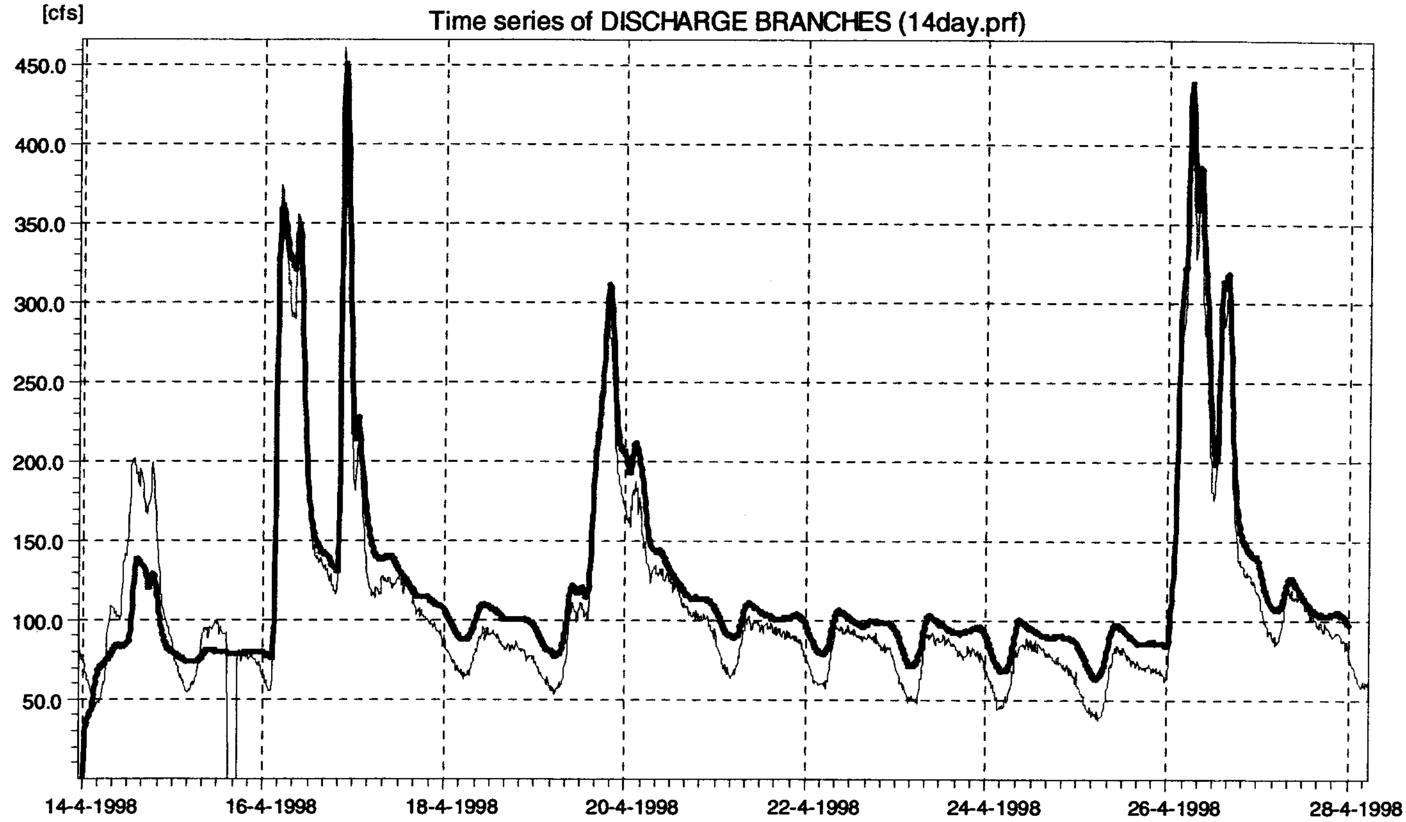
M&E AQUA ALLIANCE Metcalf & Eddy

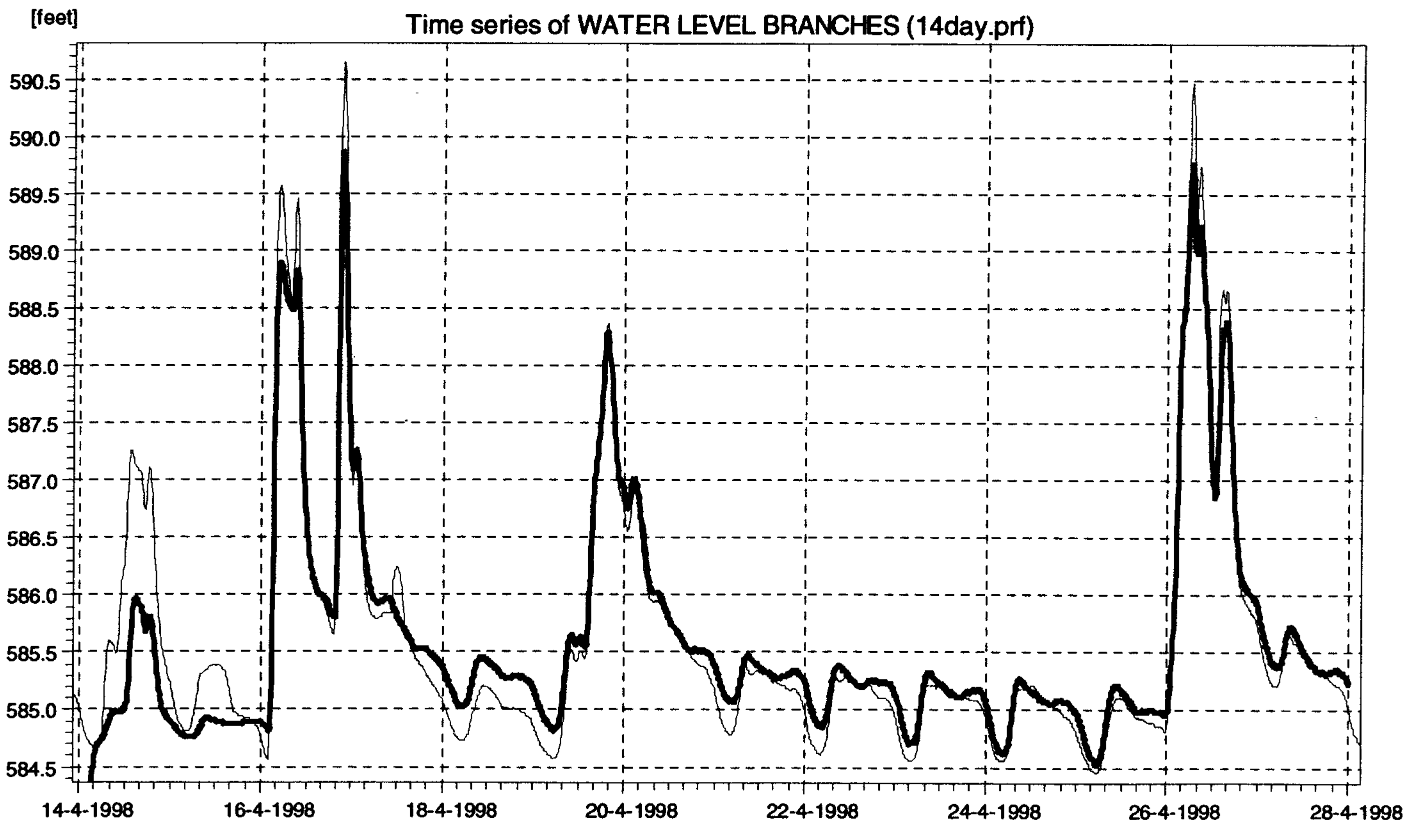
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA04





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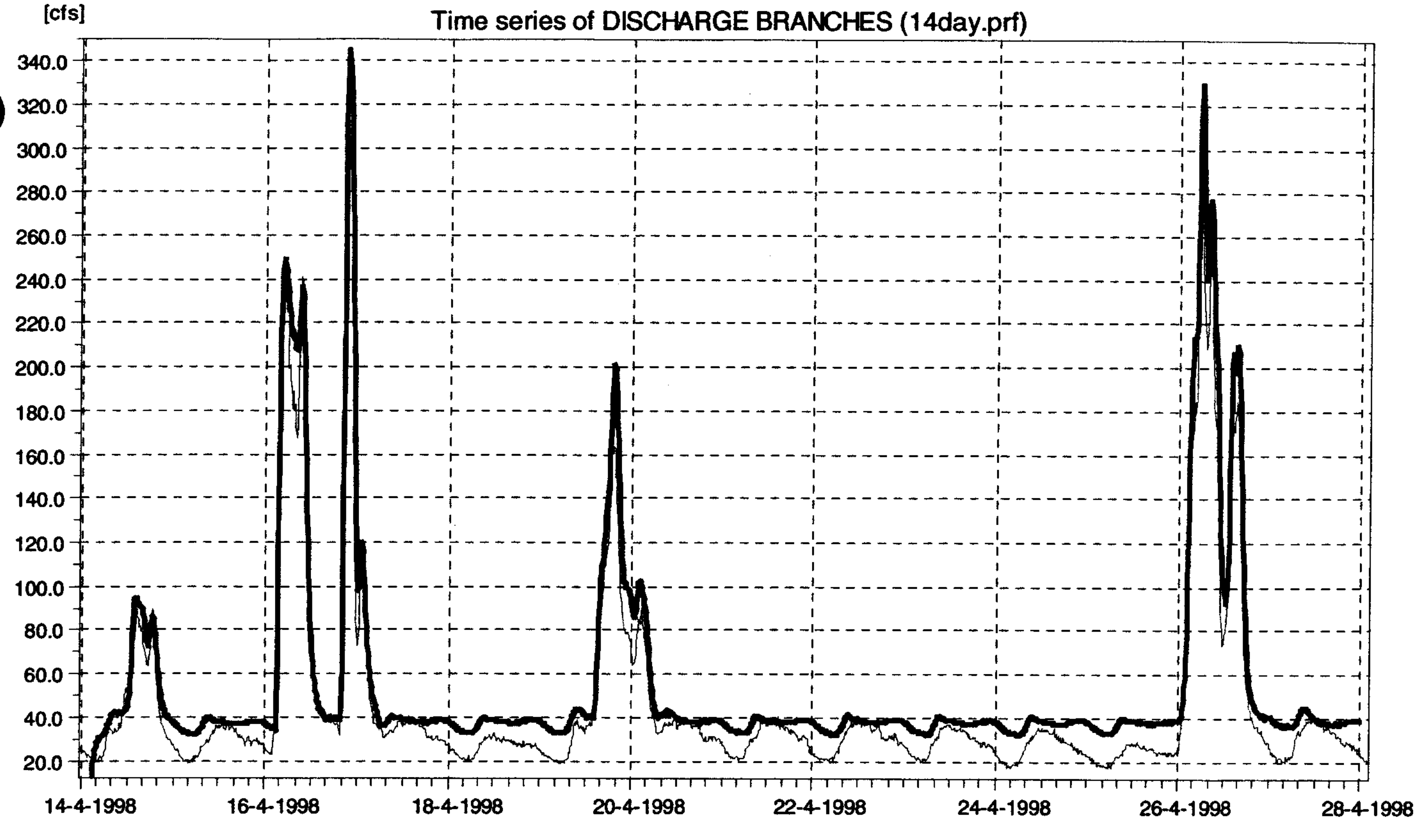
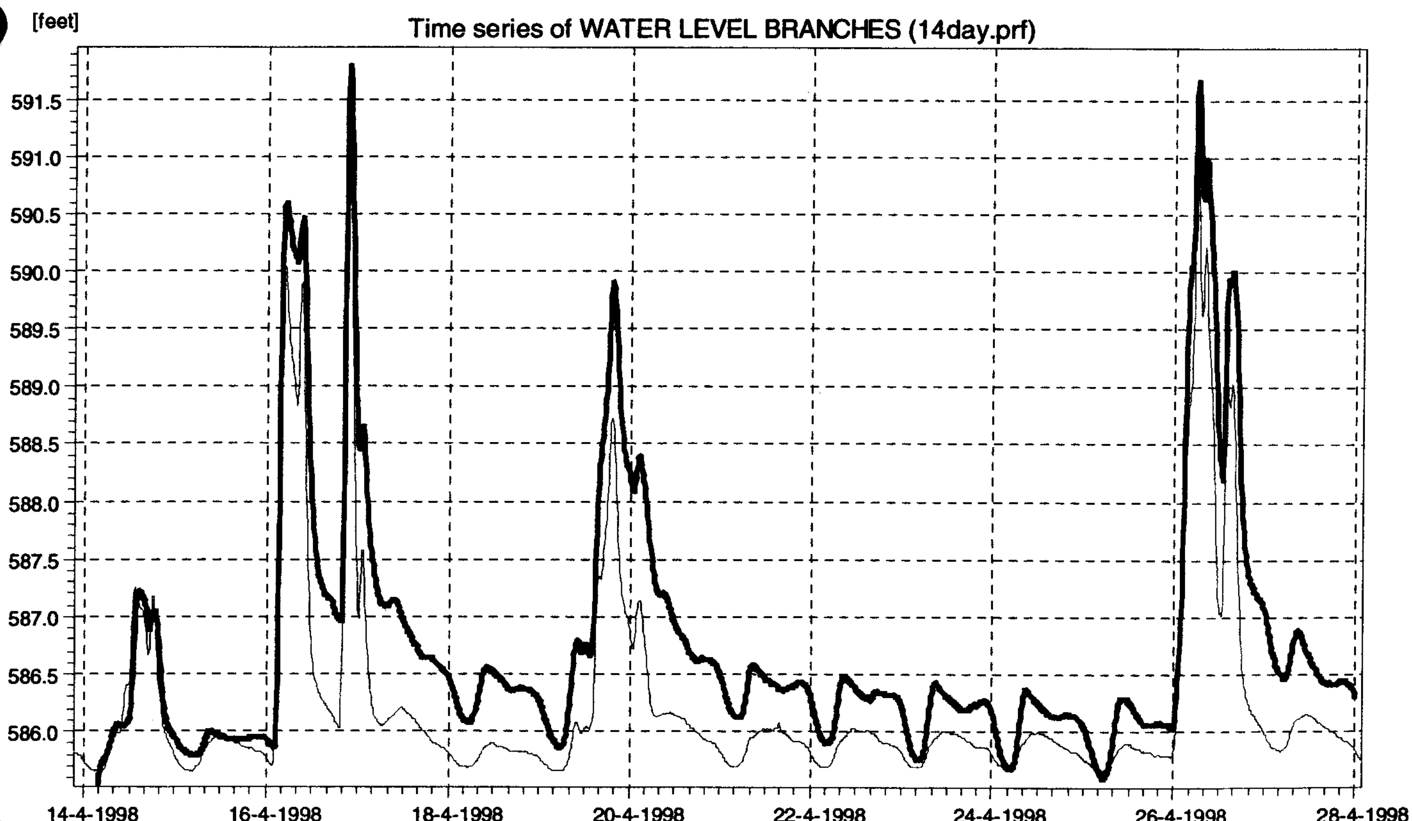
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA06





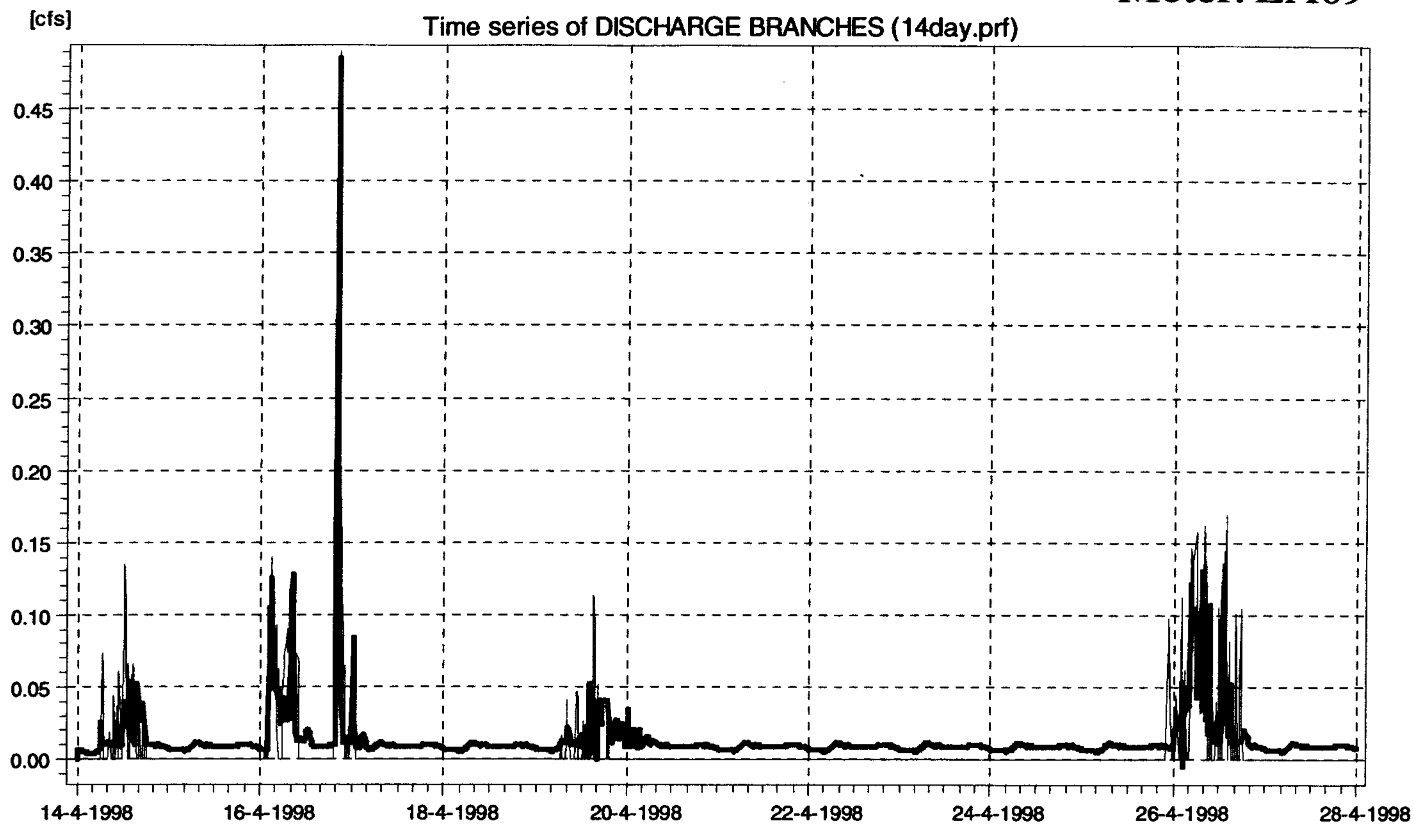
M&E Metcalf & Eddy AQUA ALLIANCE

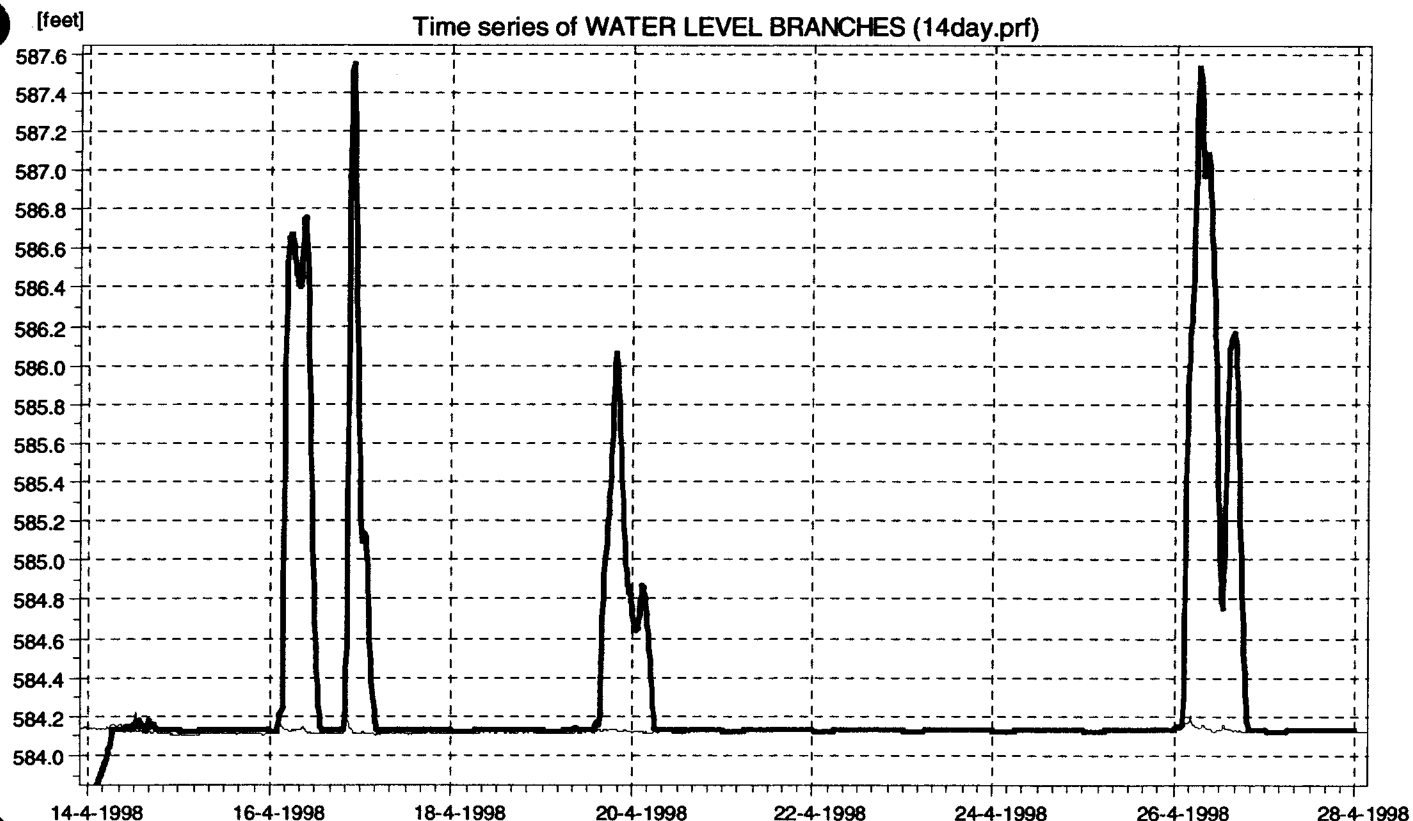
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA09





M&E AQUA ALLIANCE Metcalf & Eddy

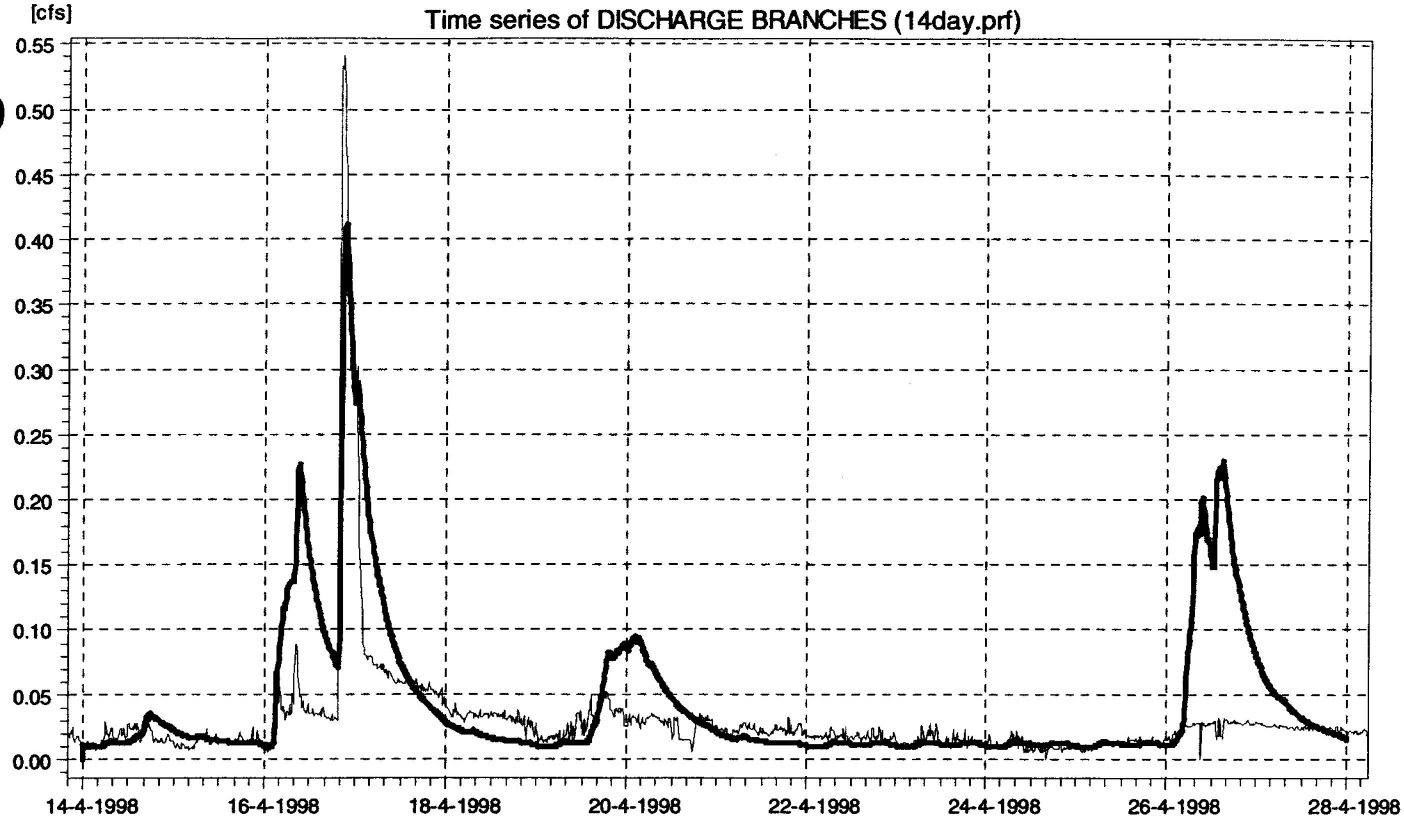
Easterly CSO Phase II Facilities Plan

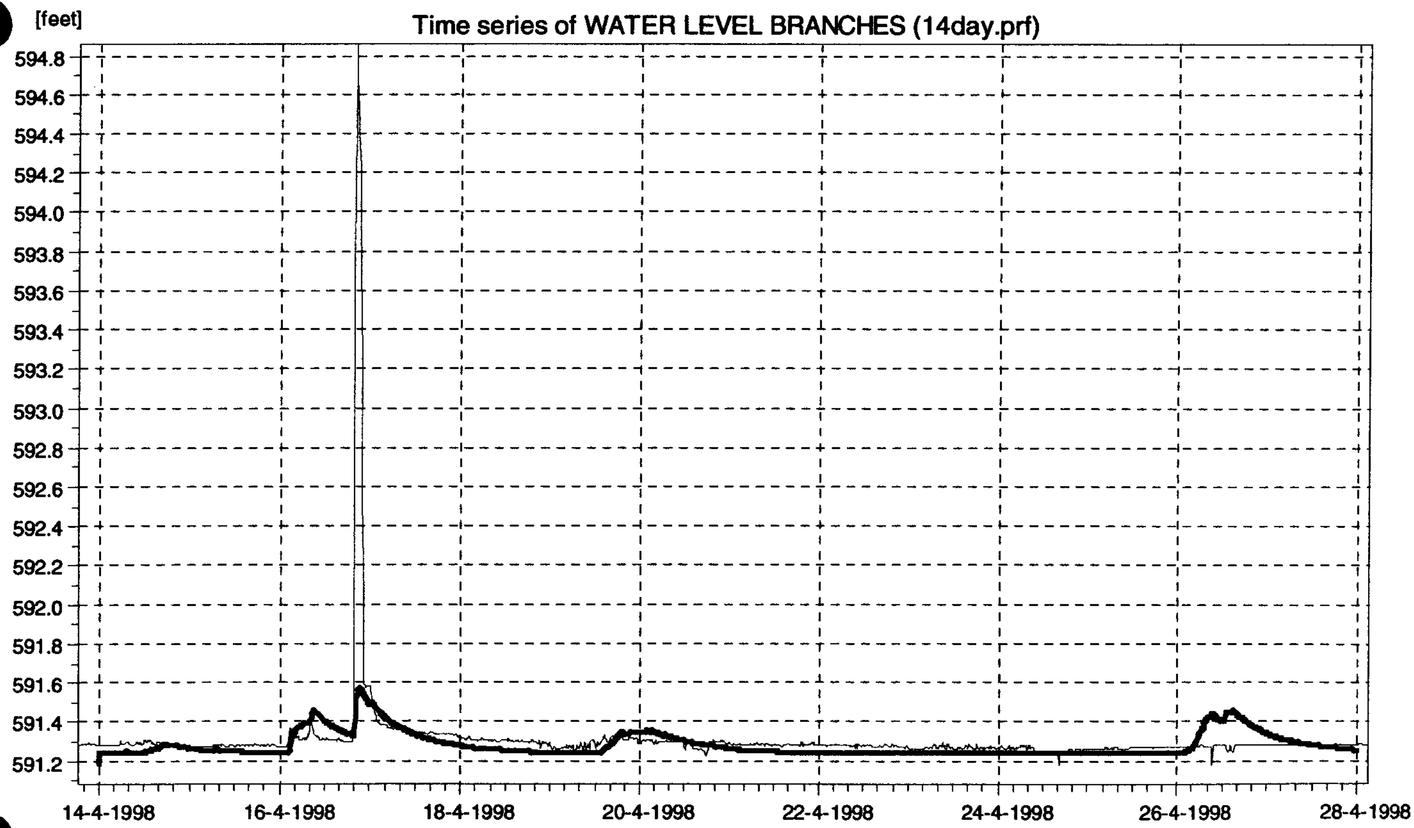
Model Calibration —— Model —— Meter

CH2MHILL

METER EA17 WAS NOT FUNCTIONING DURING 4/14-4/28/99

Meter: EA17I





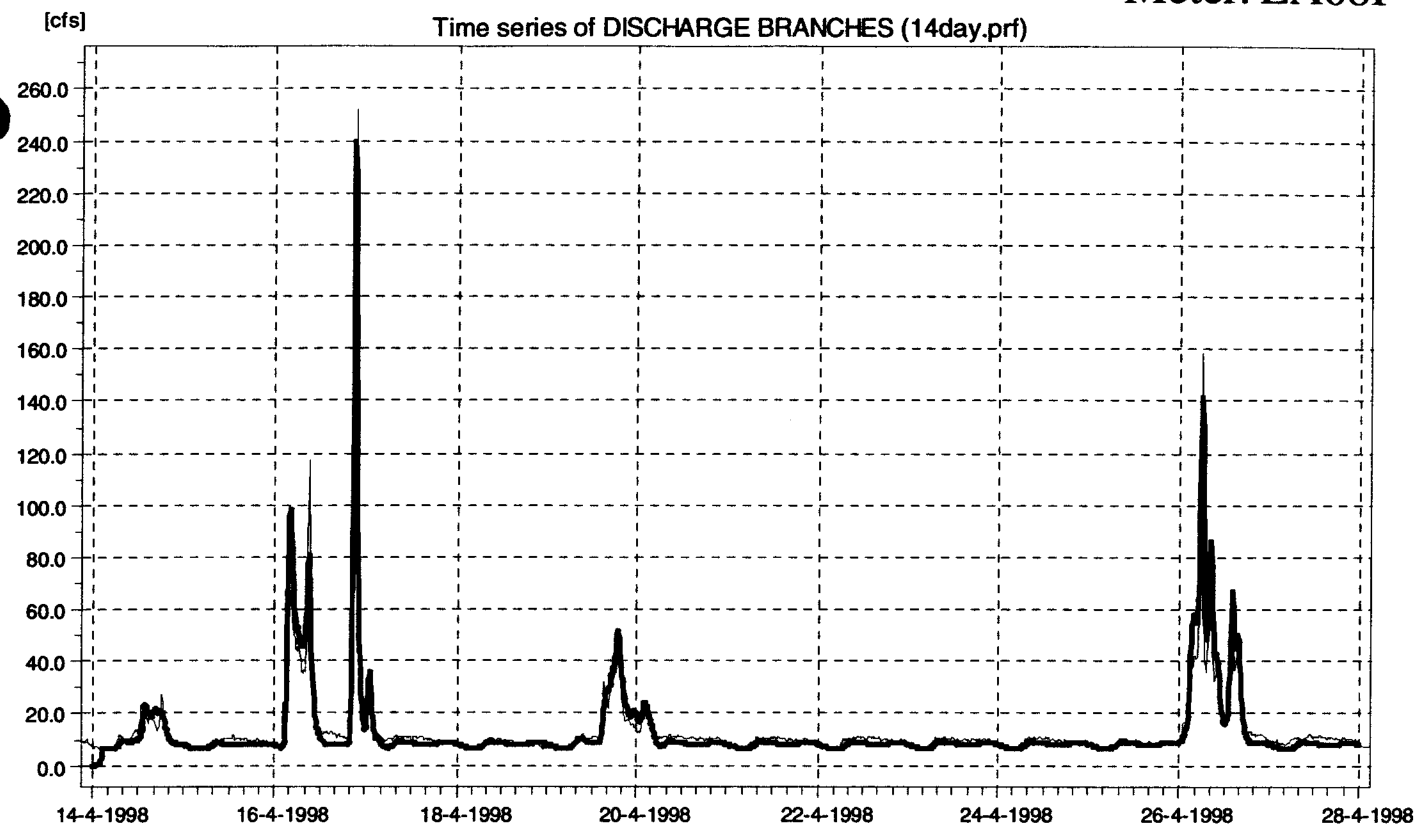
M&E AQUA ALLIANCE Metcalf & Eddy

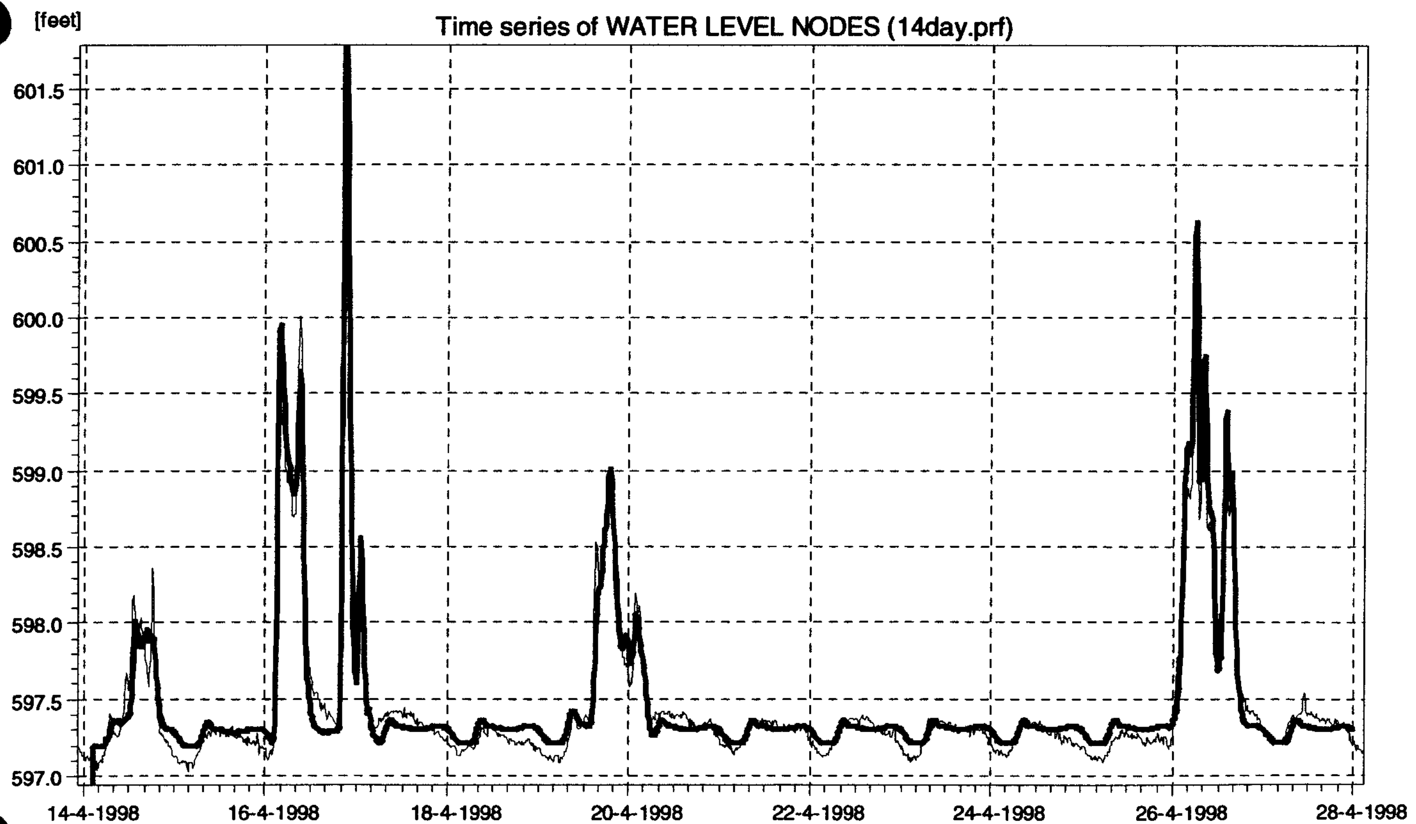
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA08I





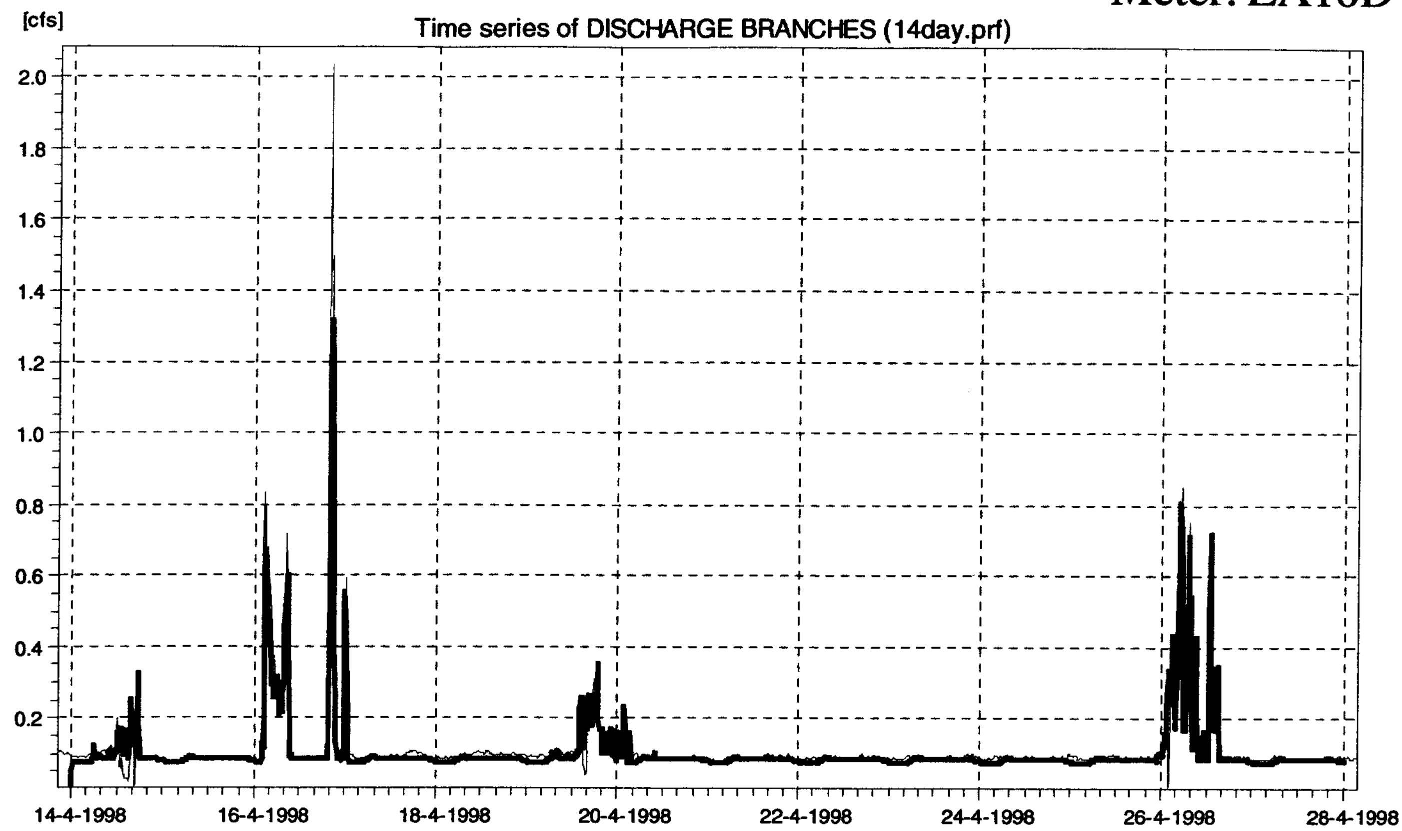
M&E AQUA ALLIANCE Metcalf & Eddy

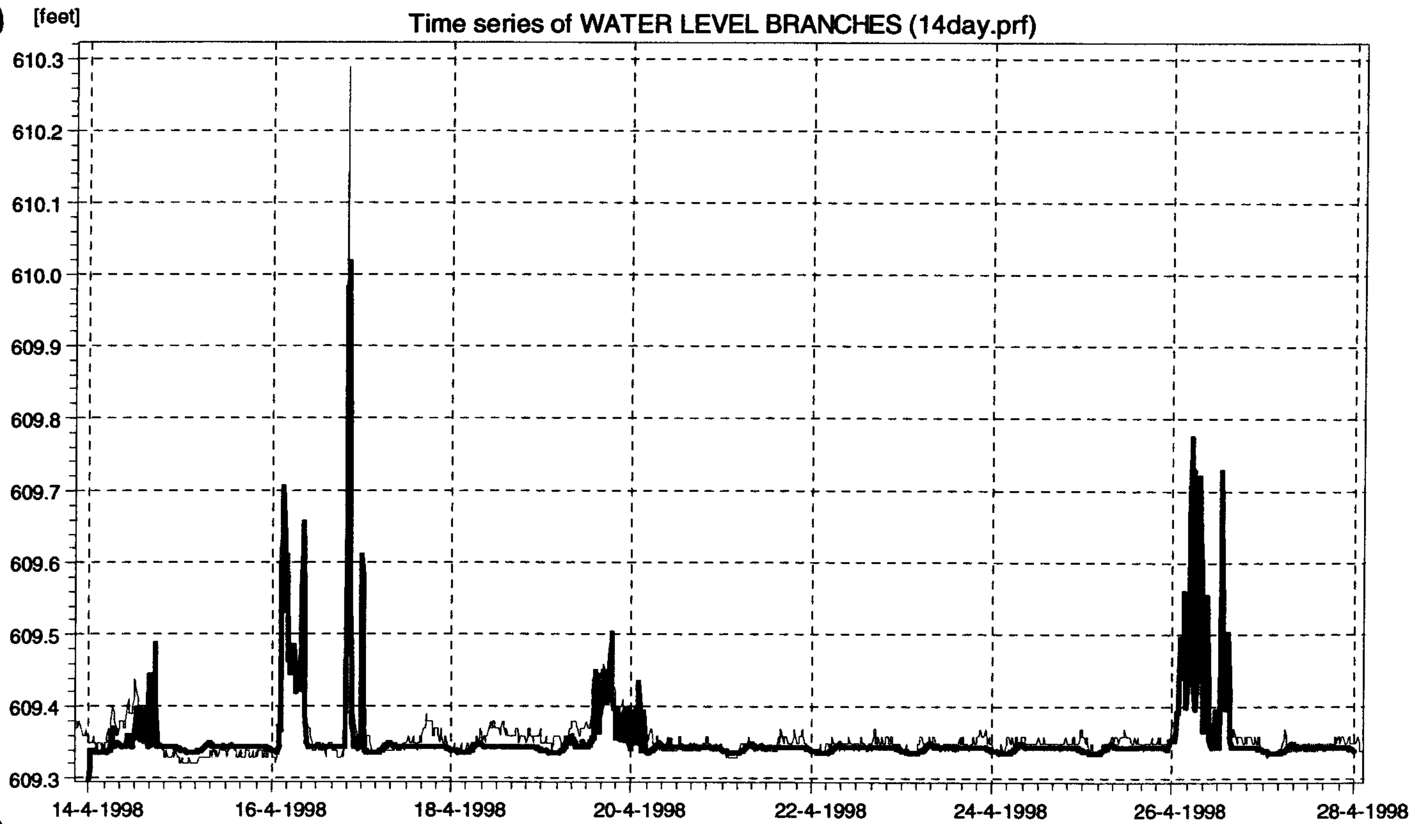
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA10D





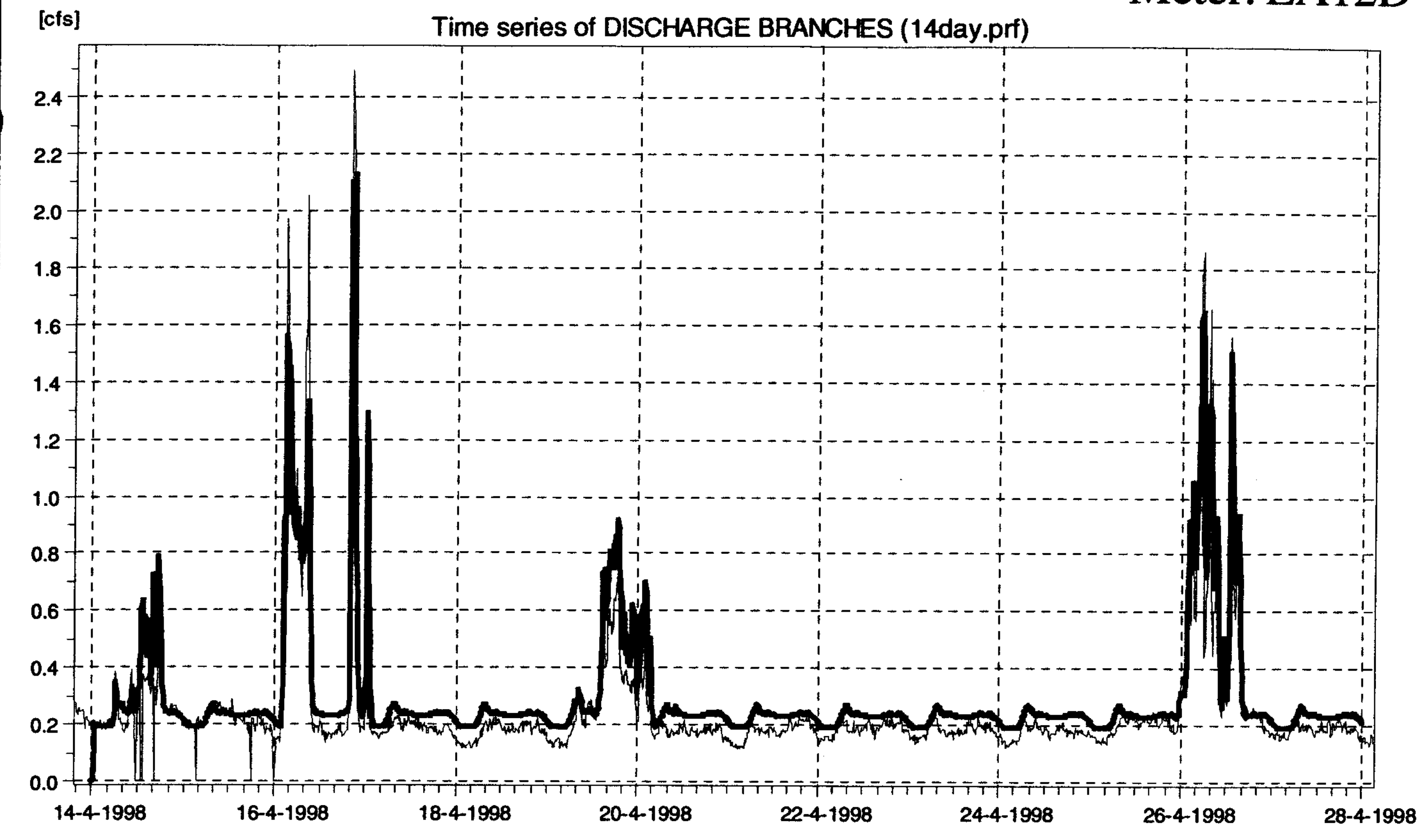
M&E AQUA ALLIANCE Metcalf & Eddy

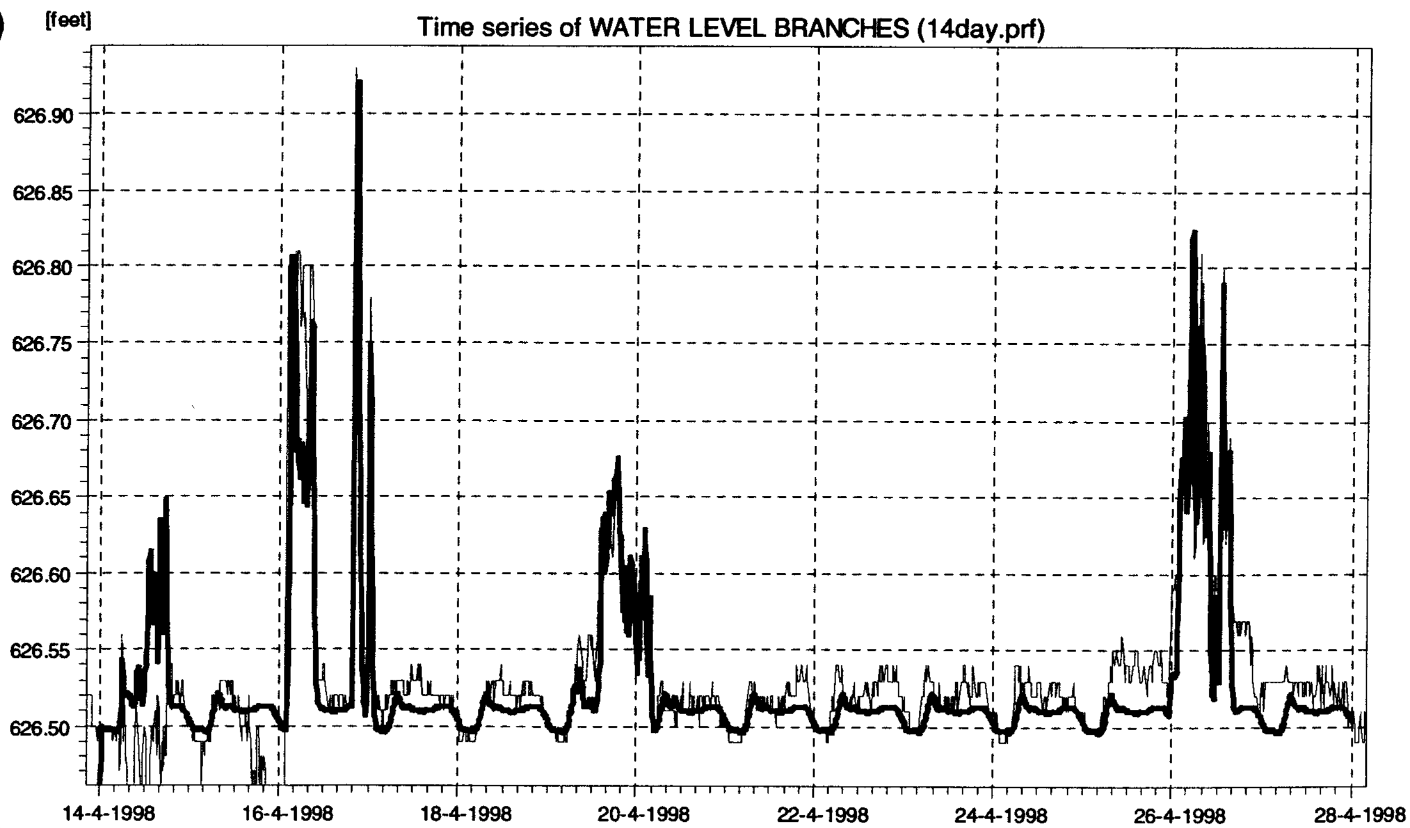
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA12D





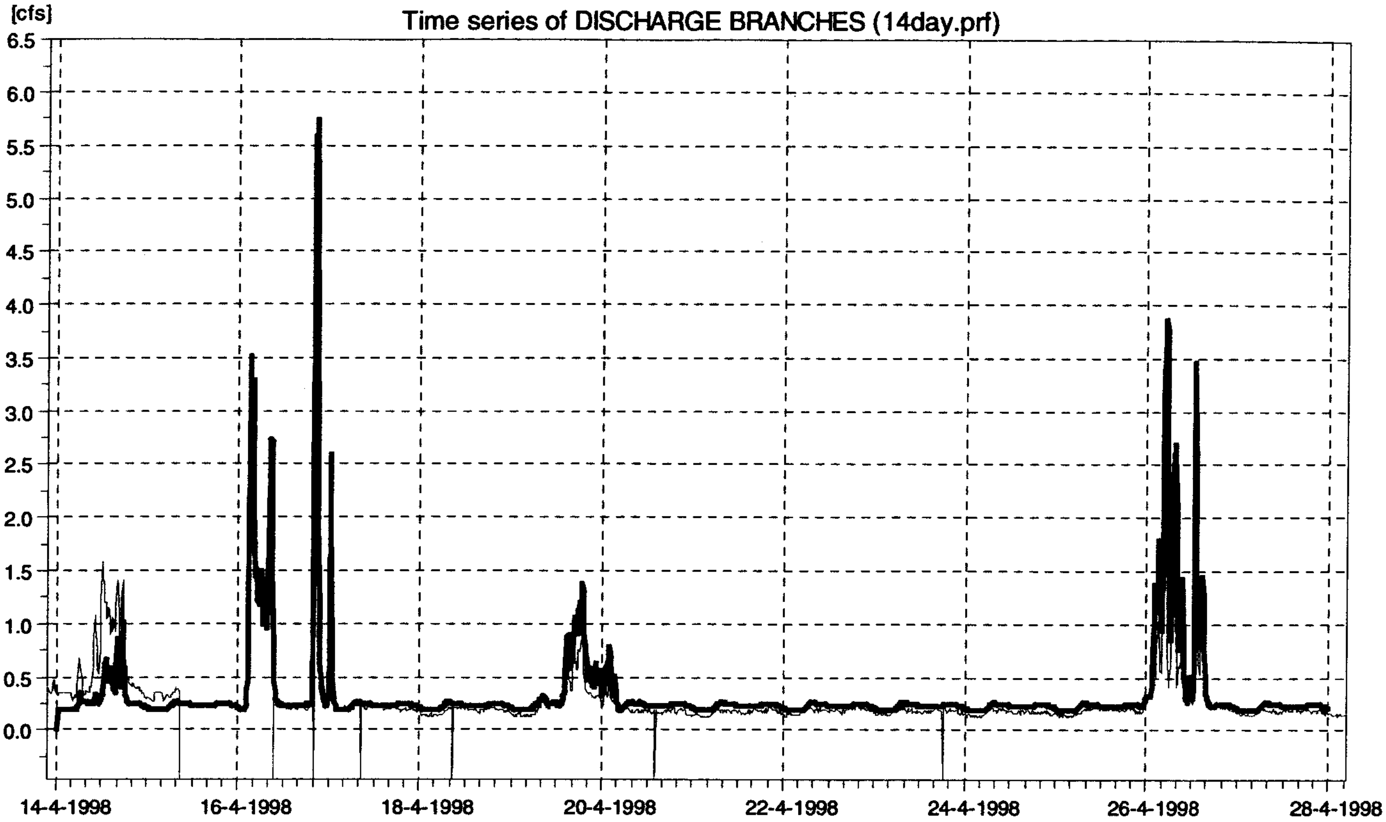
M&E Metcalf & Eddy AQUA ALLIANCE

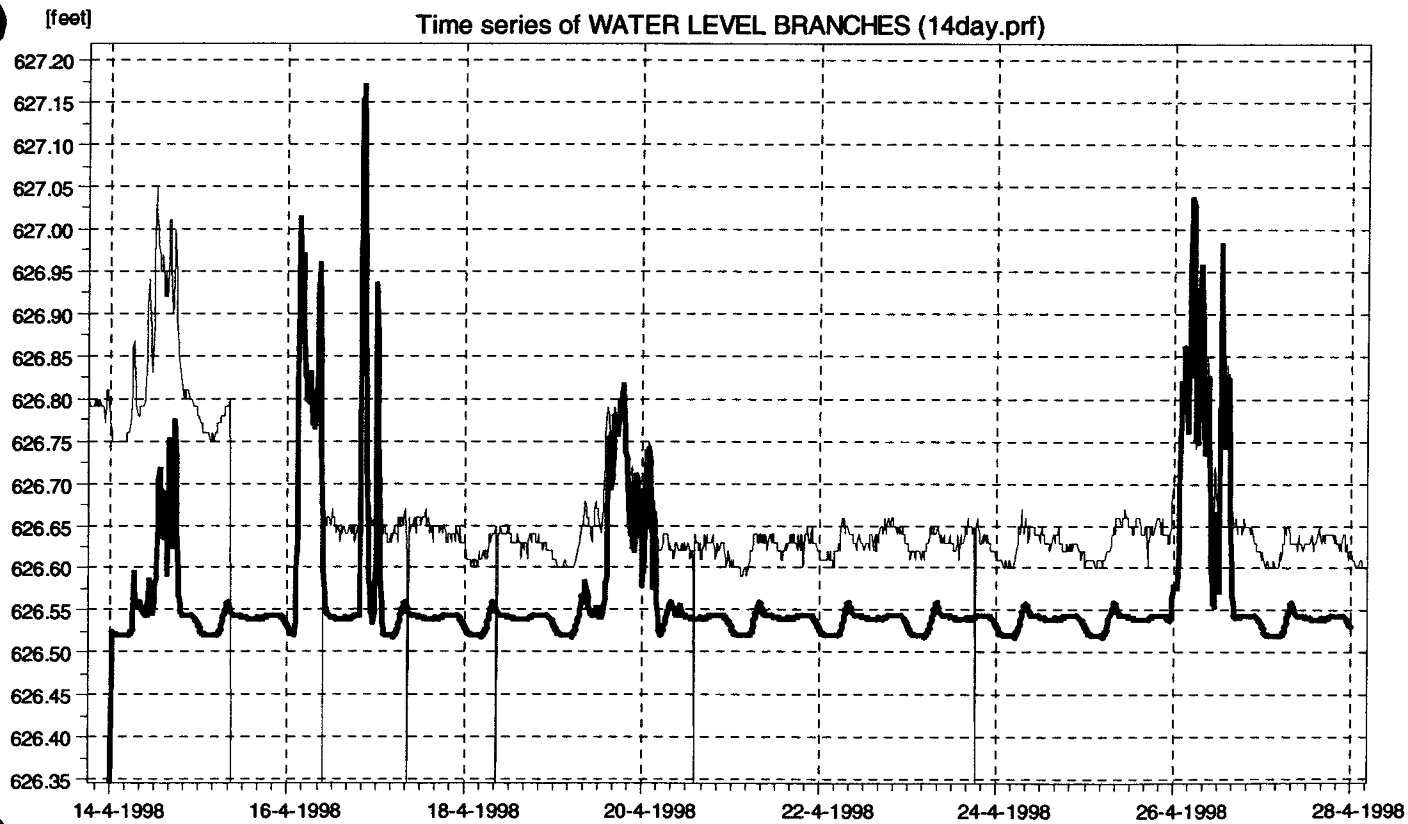
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA12I





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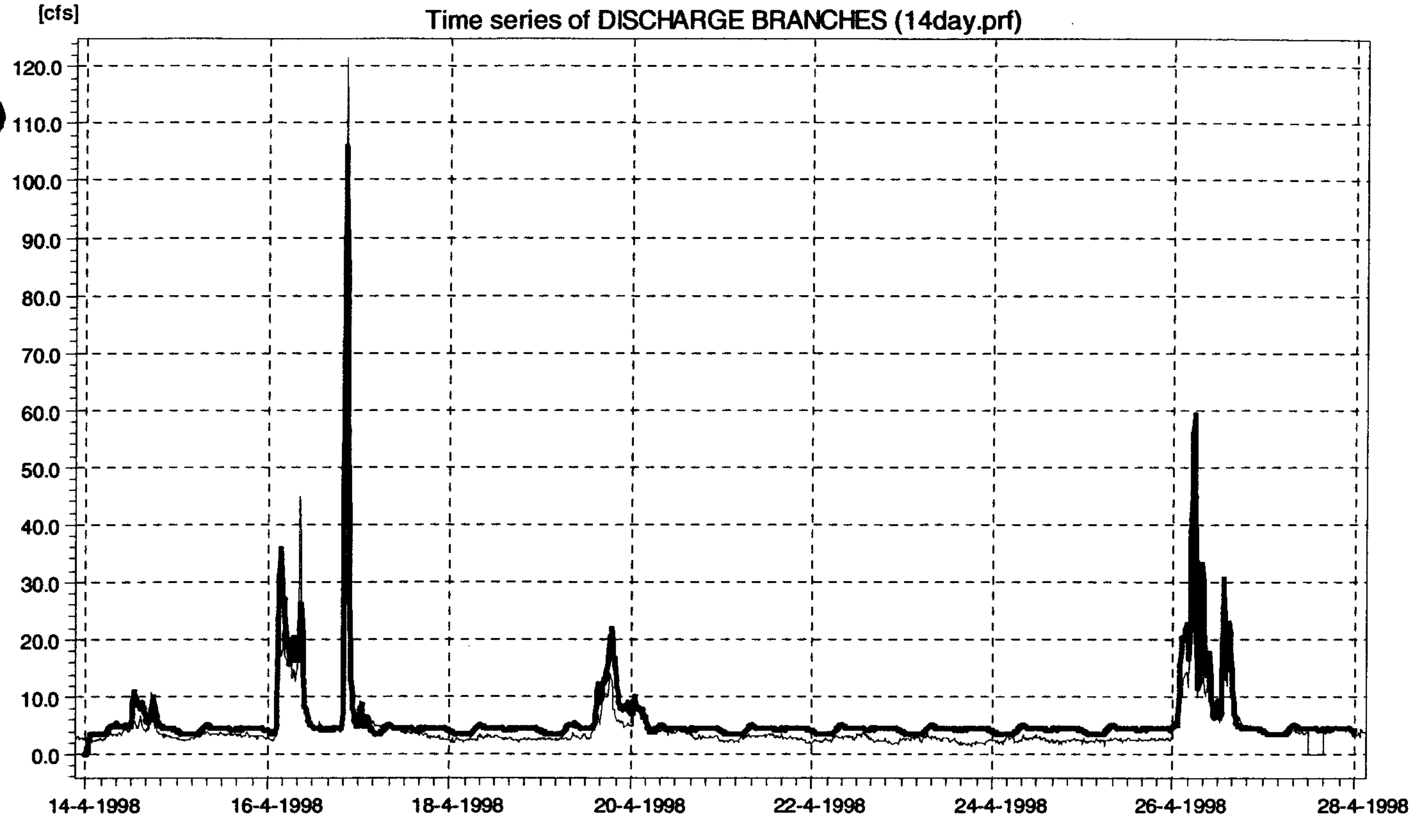
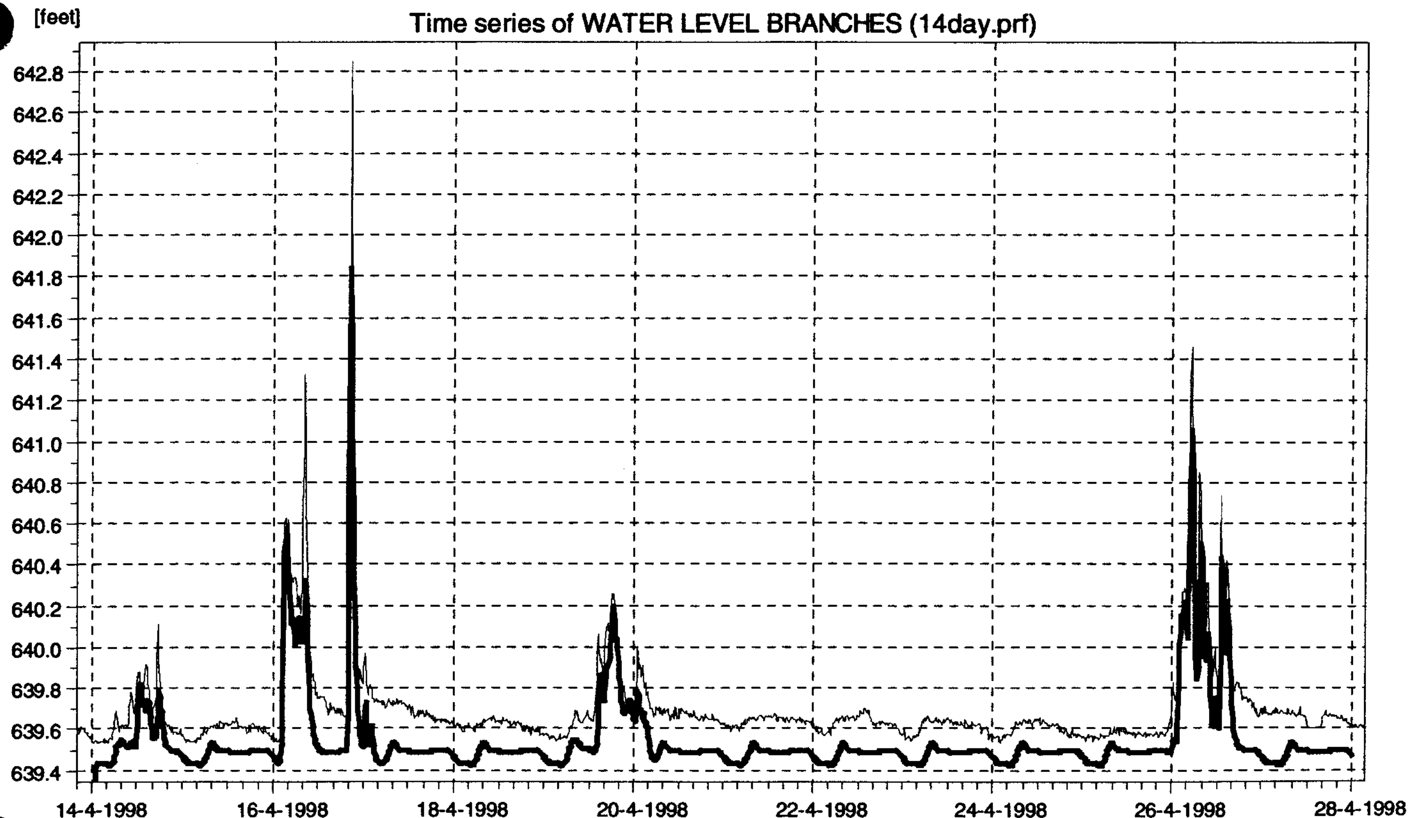
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA13





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Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

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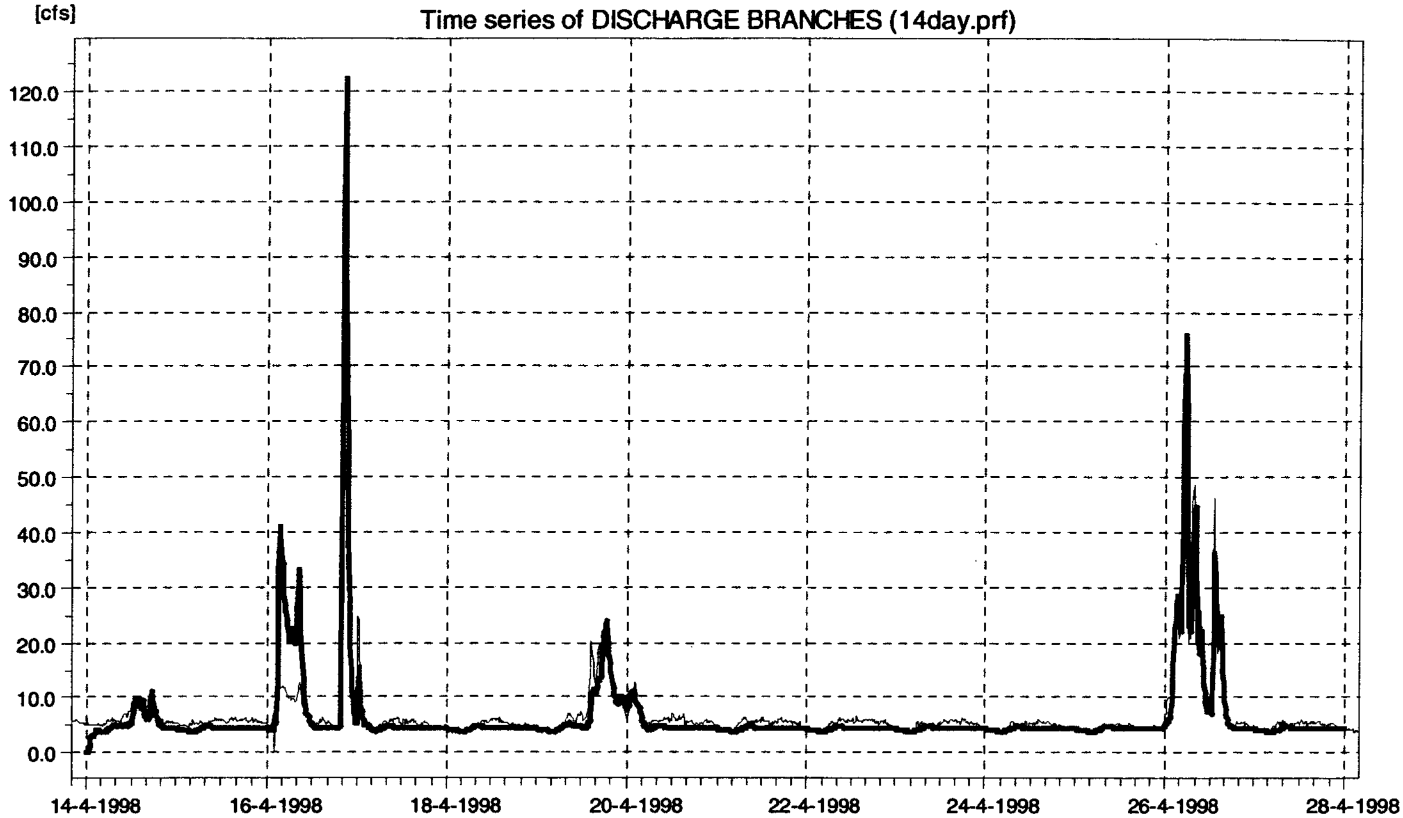
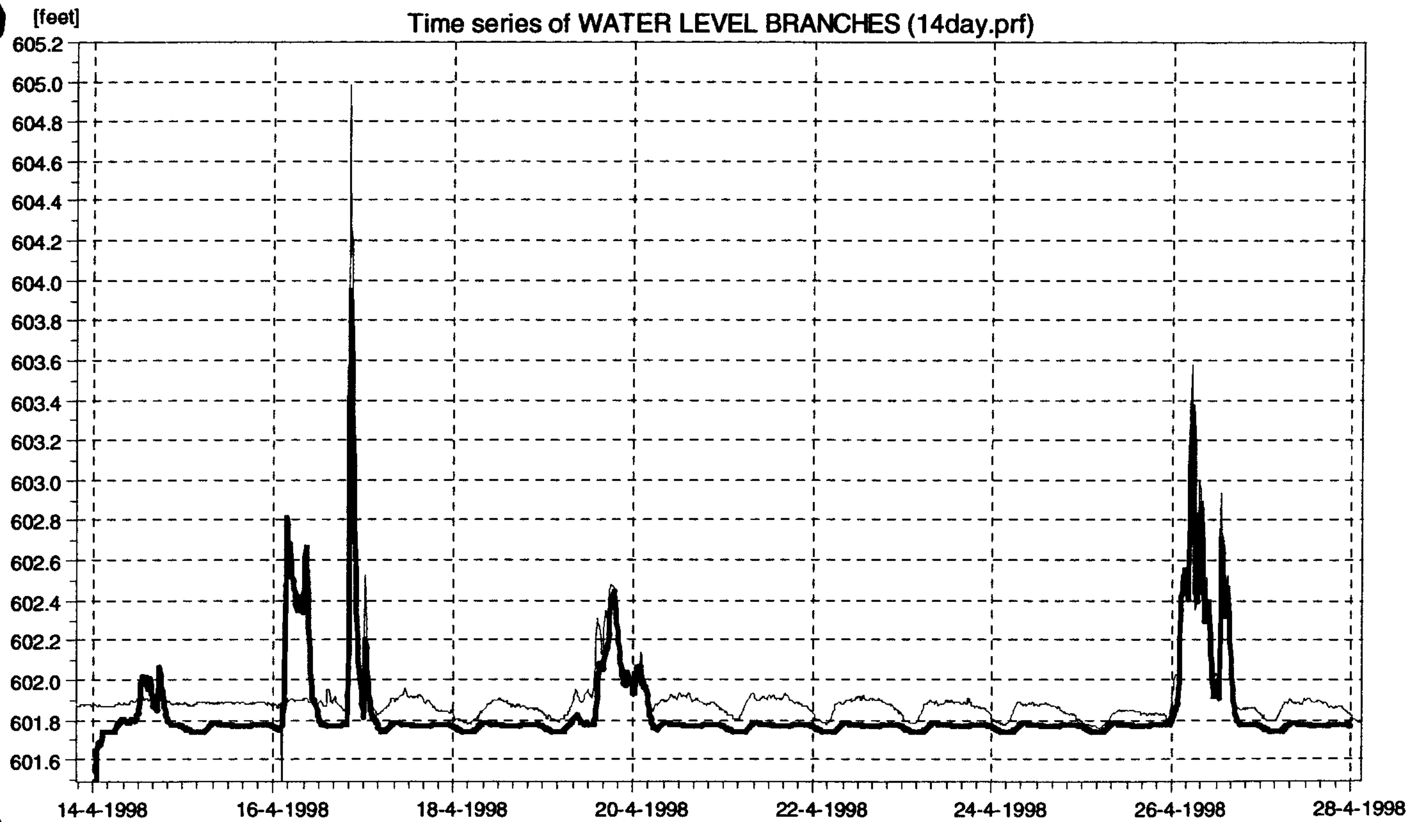




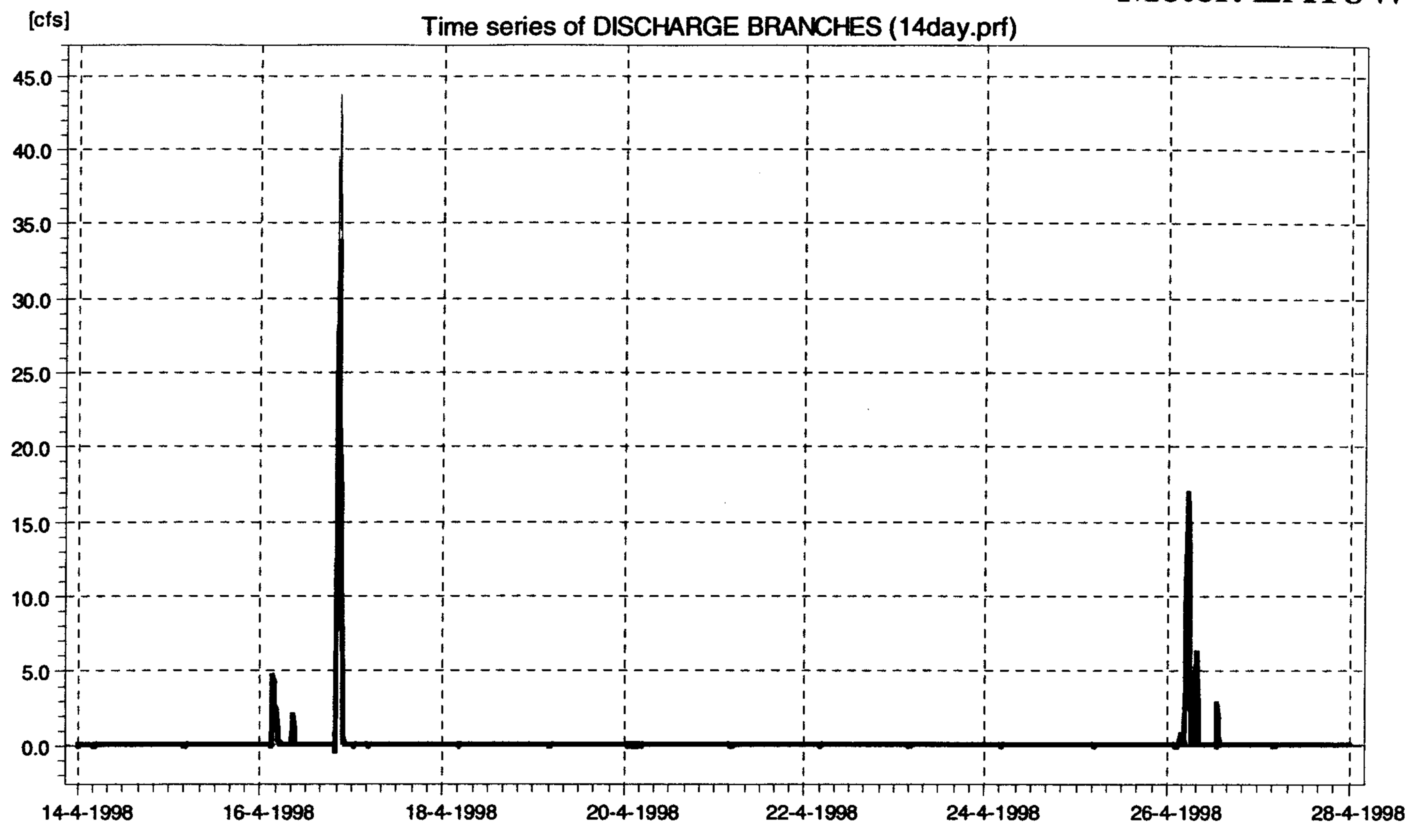
M&E Metcalf & Eddy AQUA ALLIANCE

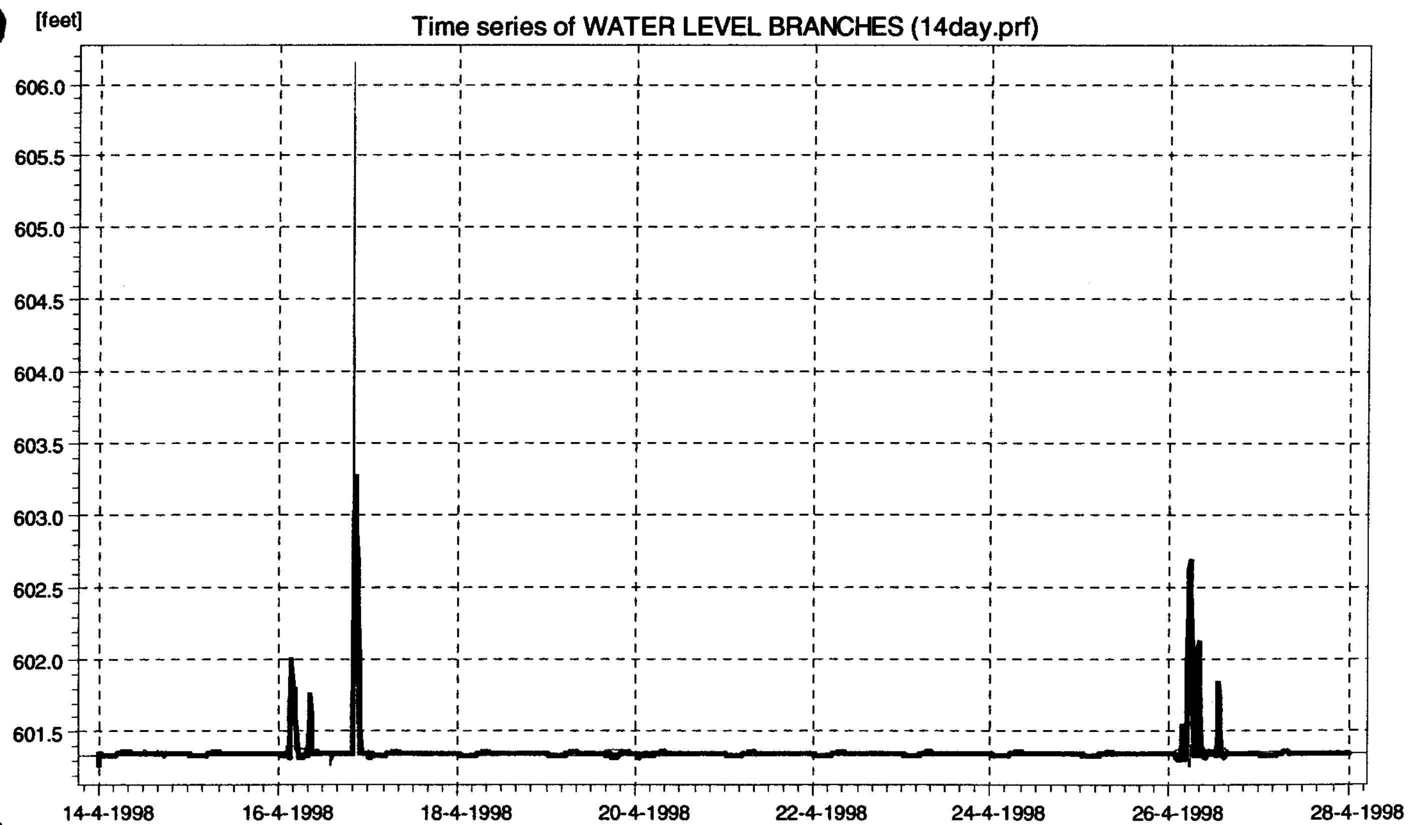
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA16W





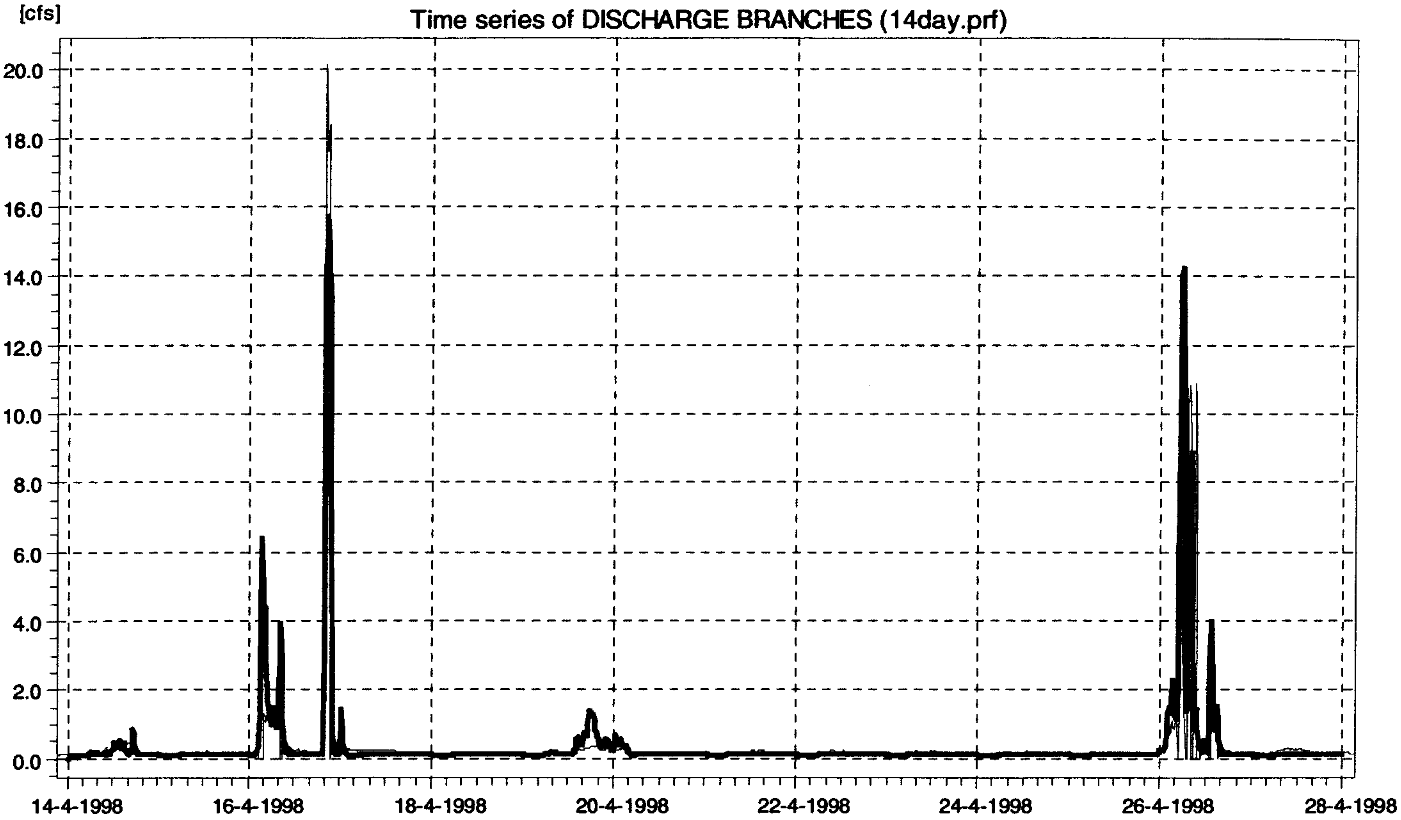
M&E Metcalf & Eddy AQUA ALLIANCE

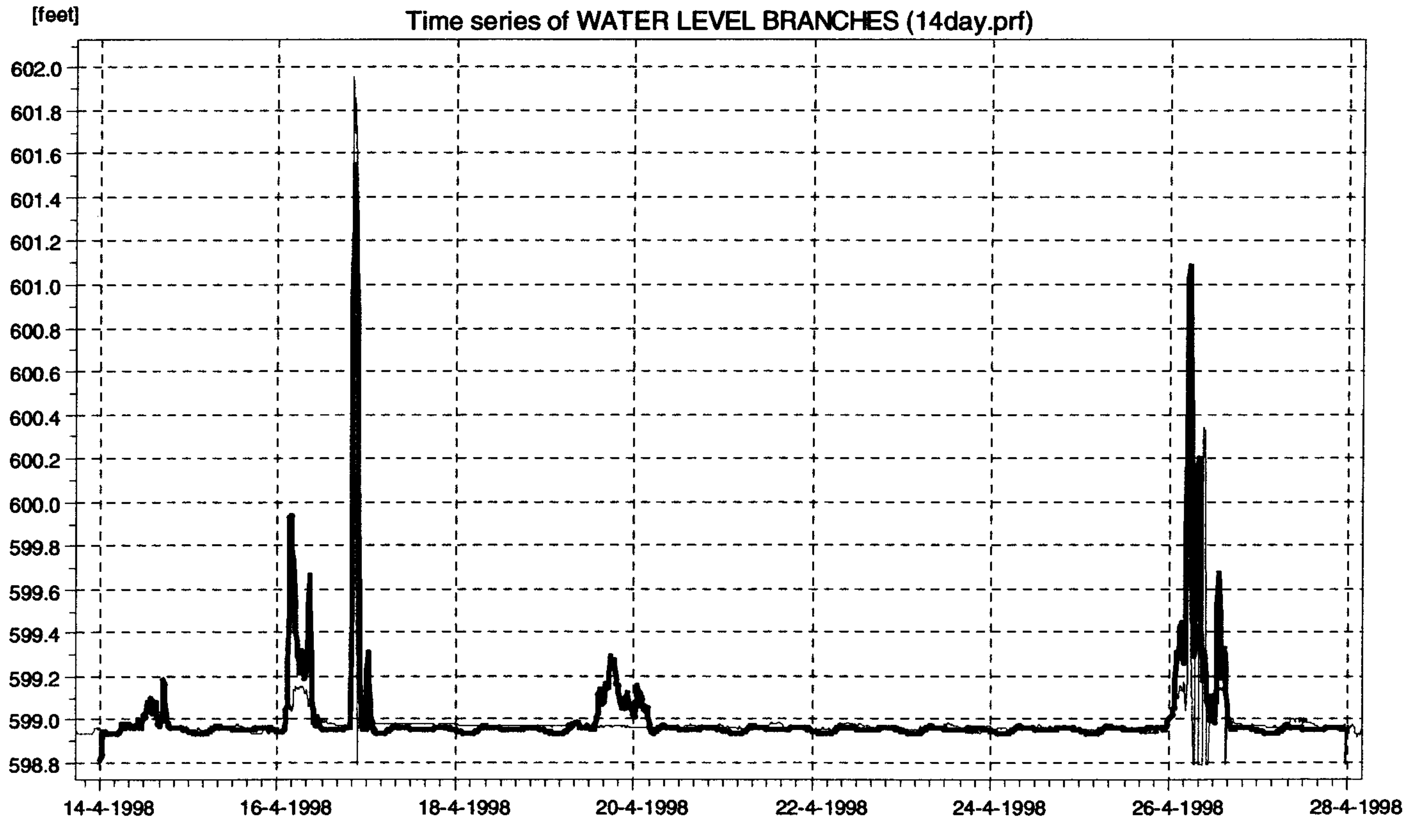
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA18D





Metcalf & Eddy

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

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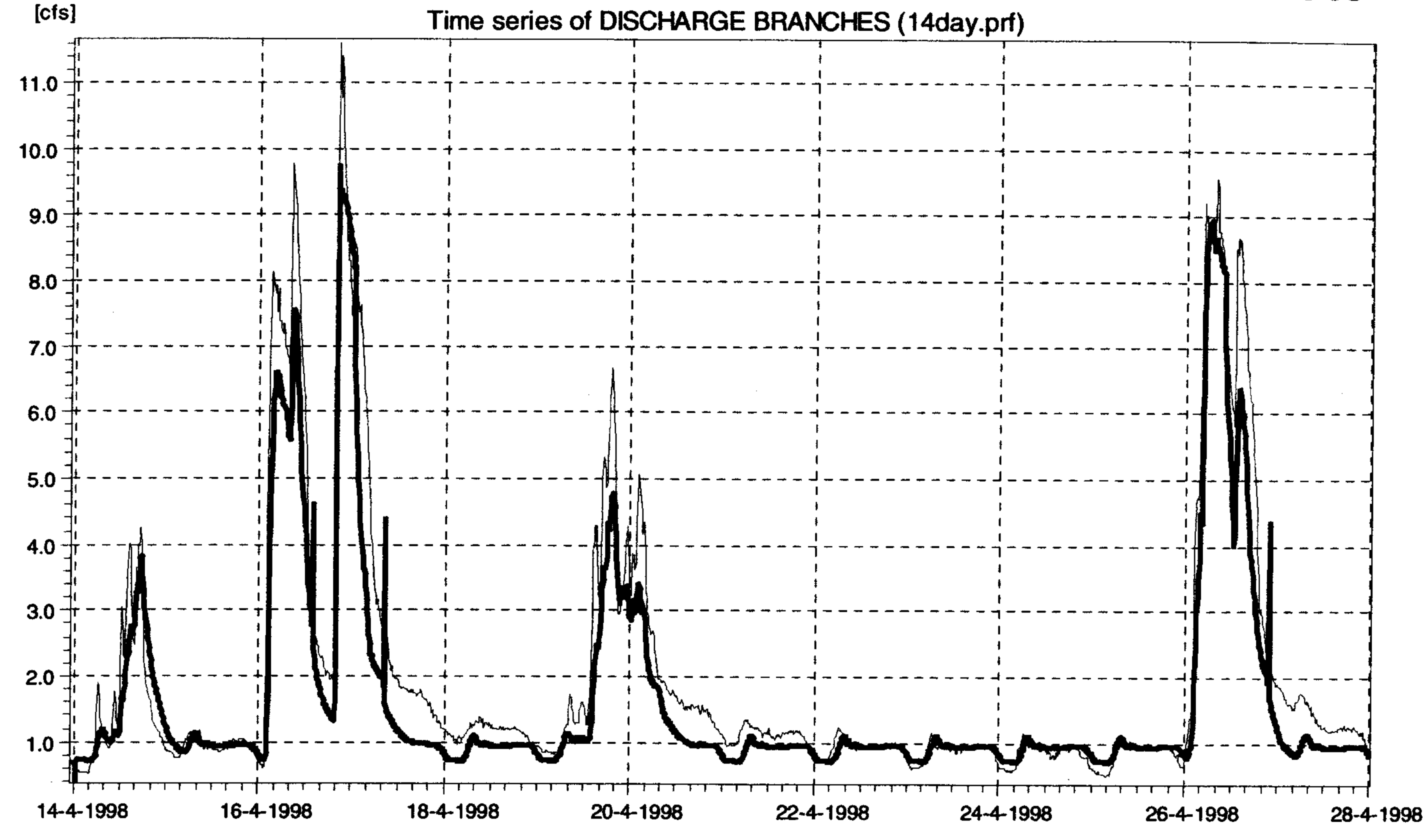
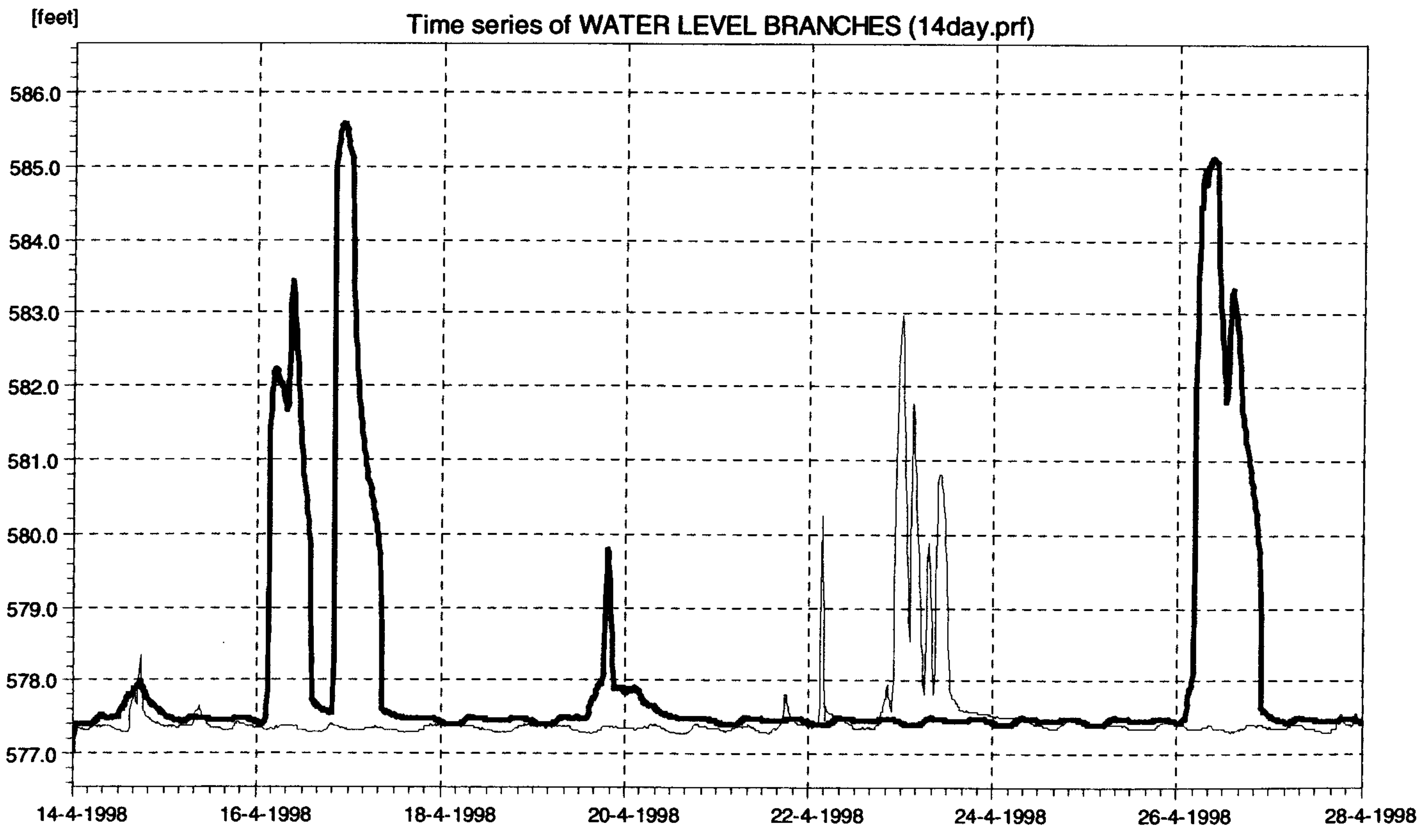




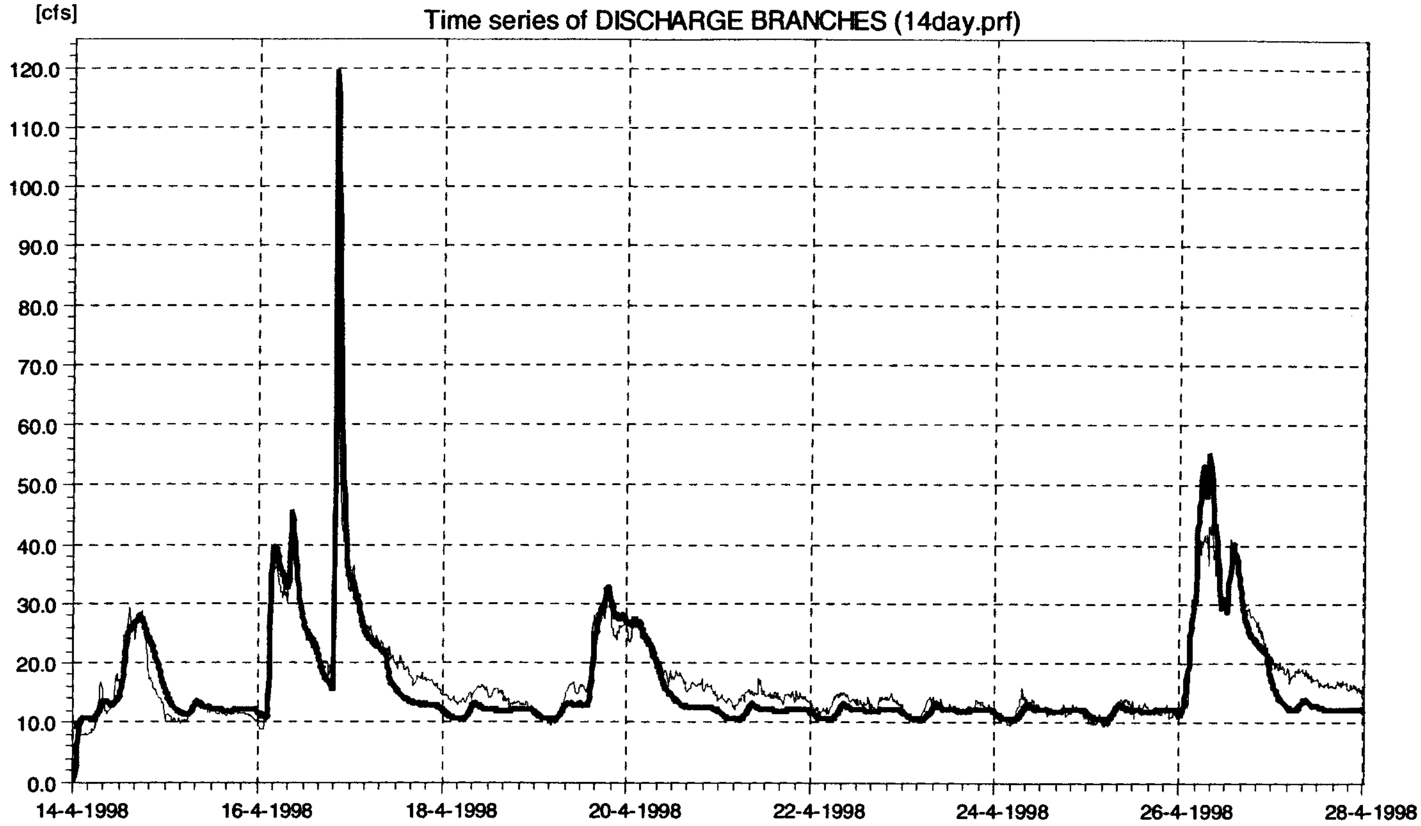
M&E Metcalf & Eddy AQUA ALLIANCE

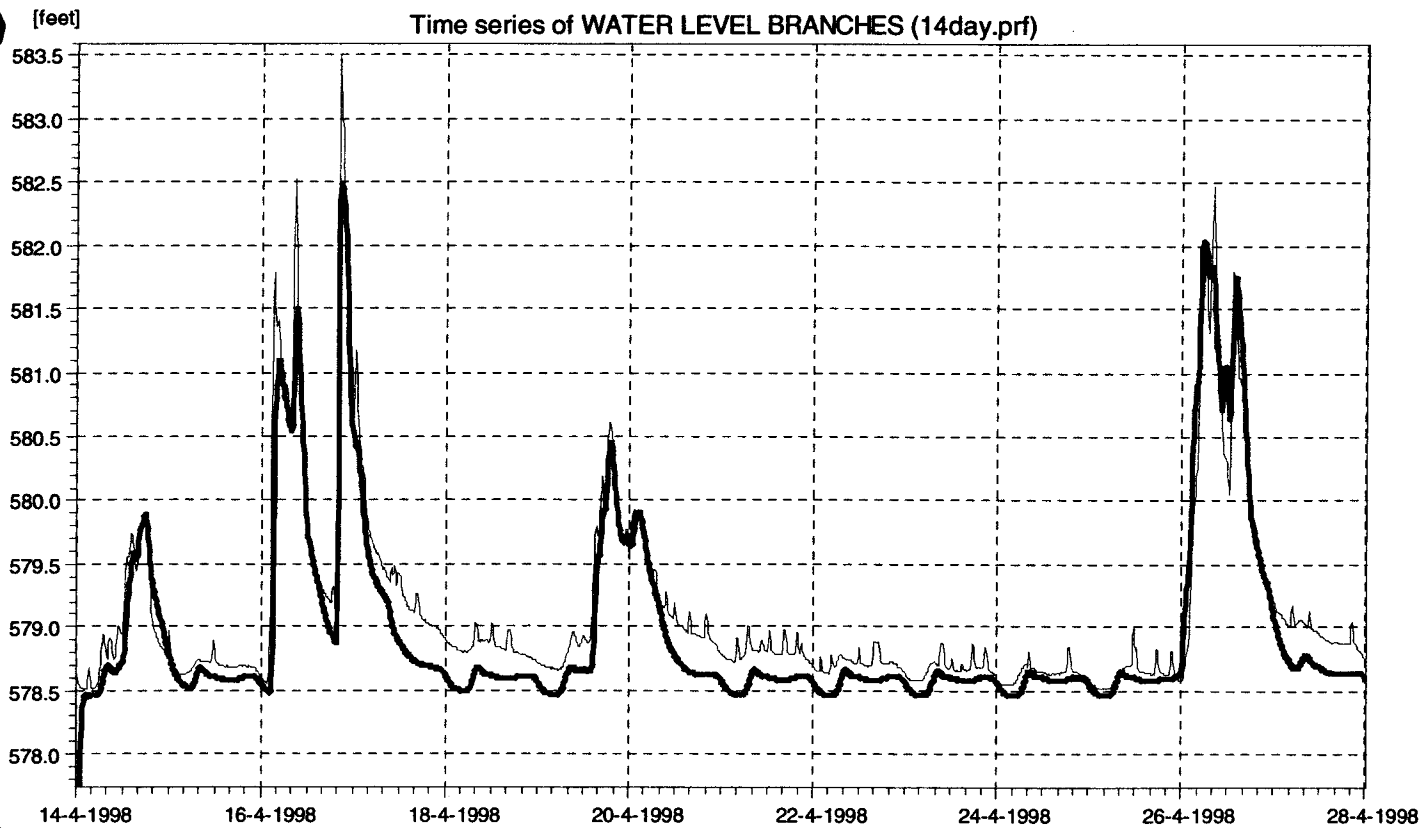
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: LS00





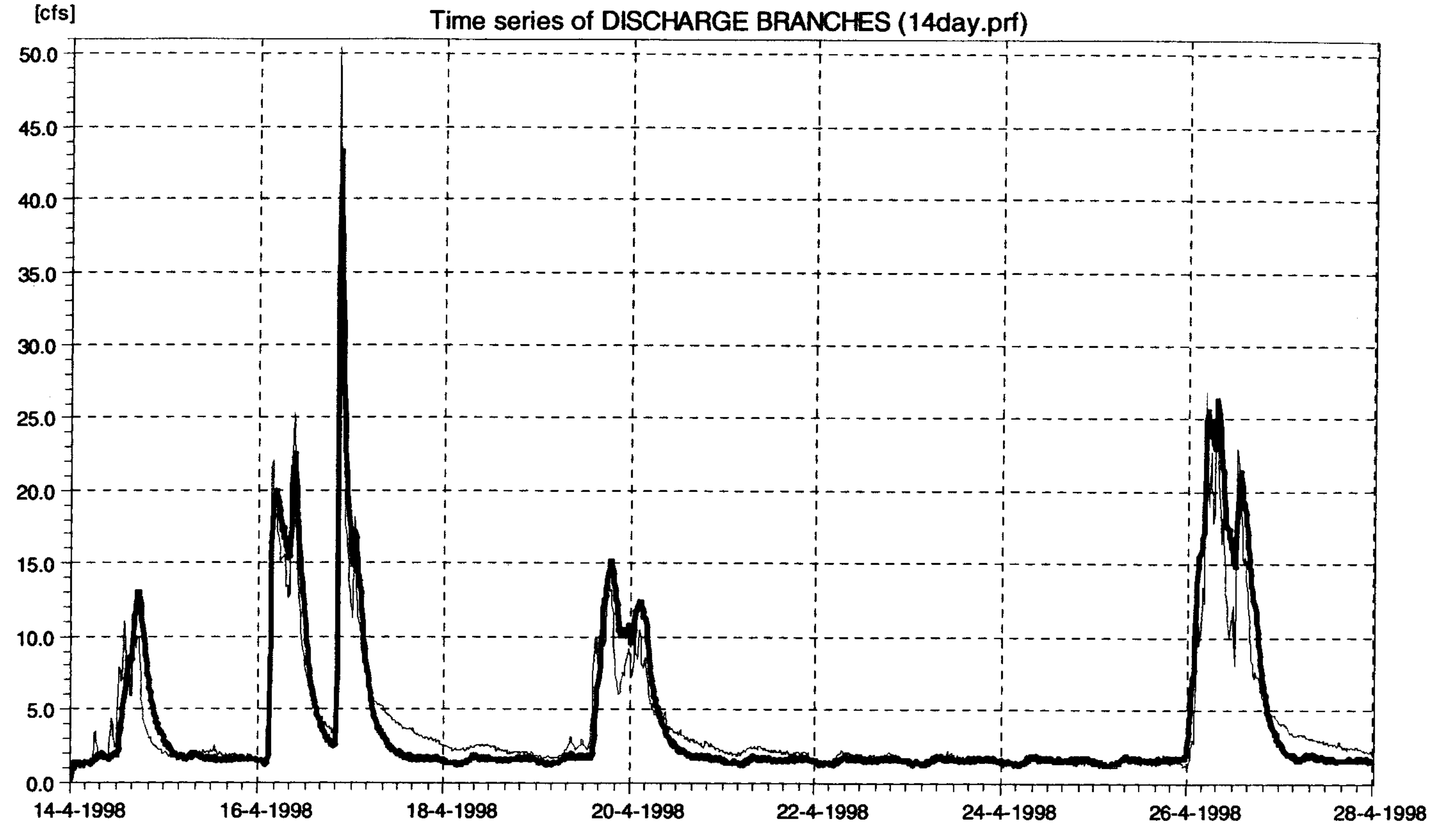
M&E Metcalf & Eddy AQUA ALLIANCE

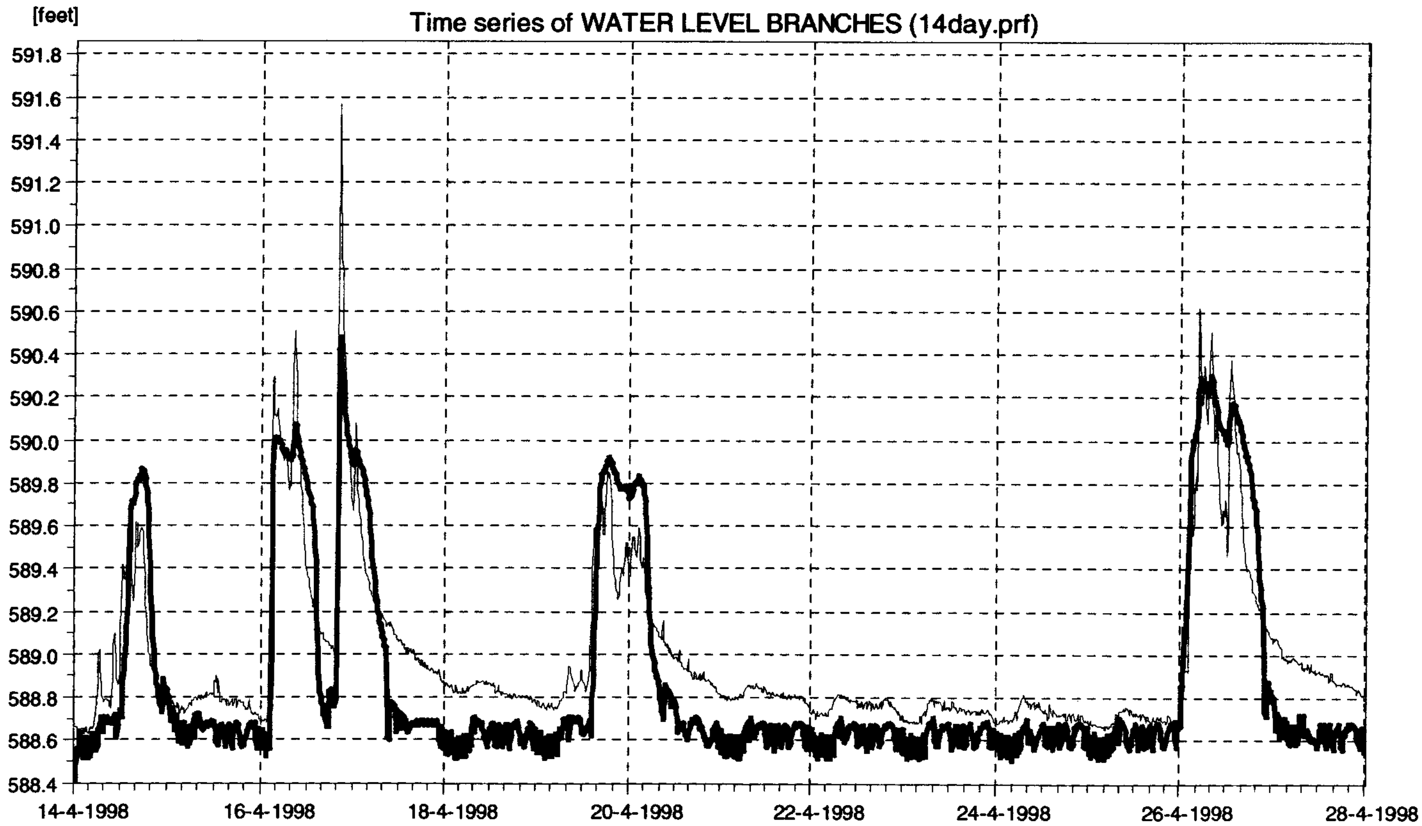
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: LS02





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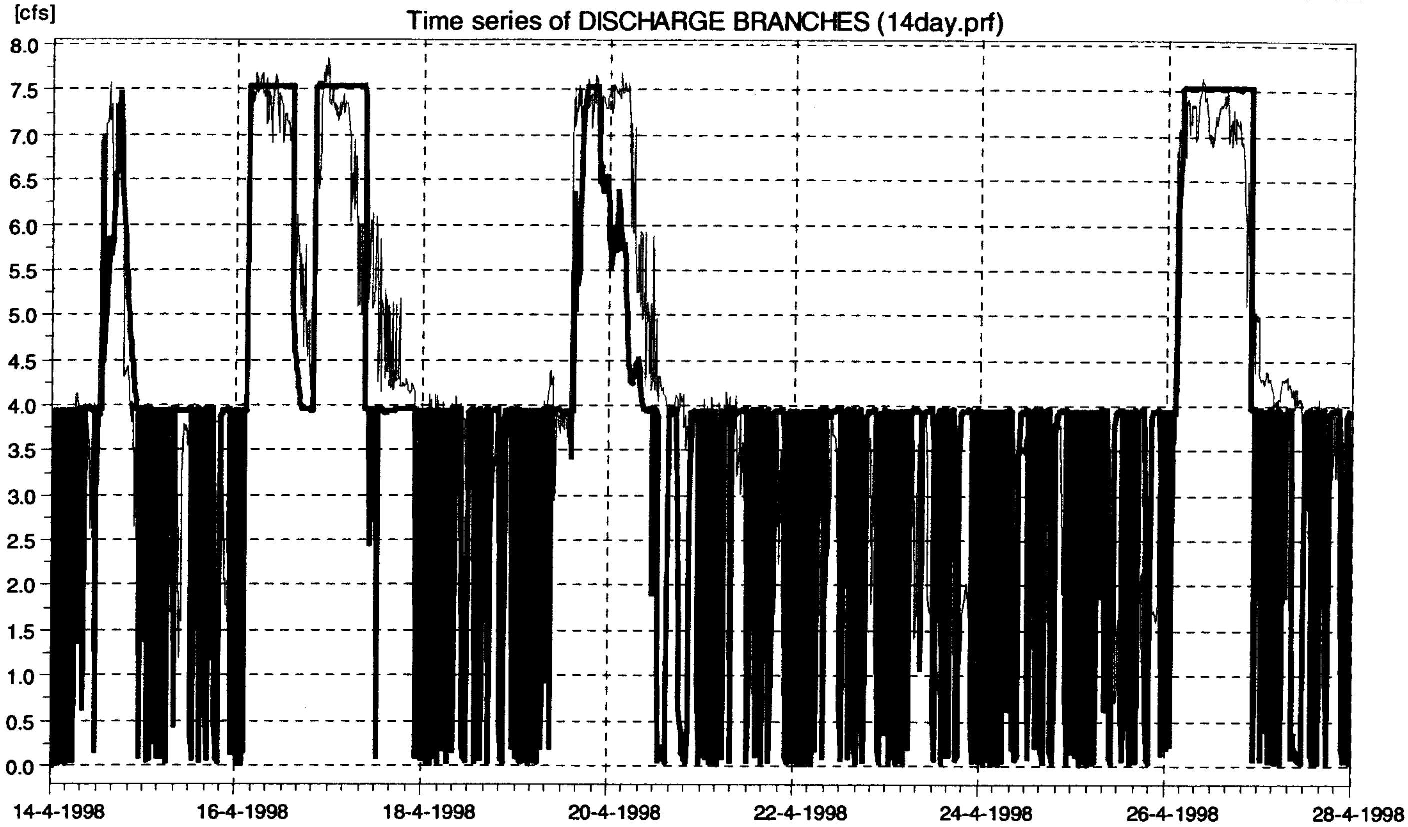
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

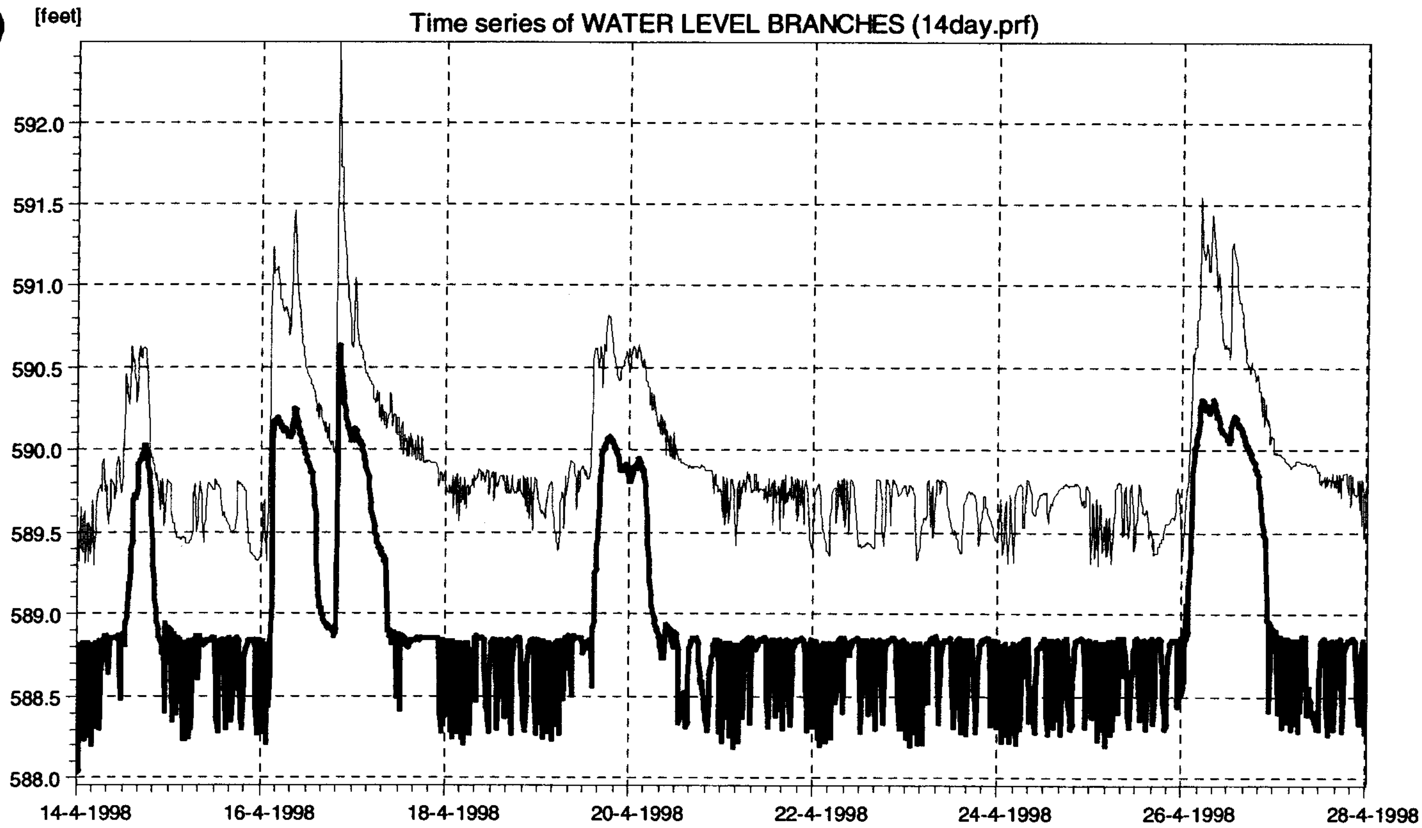
CH2MHILL

Meter: LS04D

Time series of DISCHARGE BRANCHES (14day.prf)



Time series of WATER LEVEL BRANCHES (14day.prf)



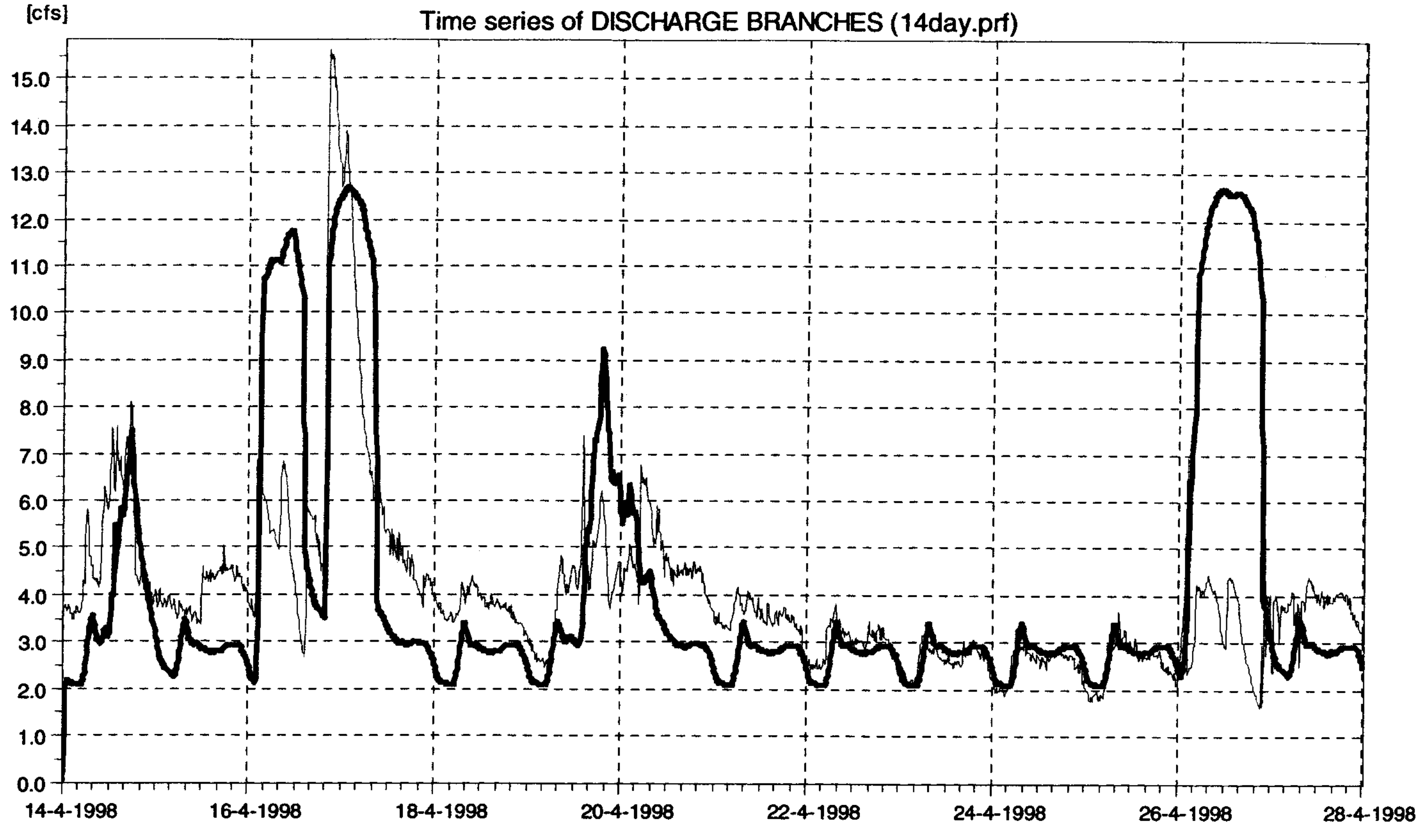
M&E Metcalf & Eddy AQUA ALLIANCE

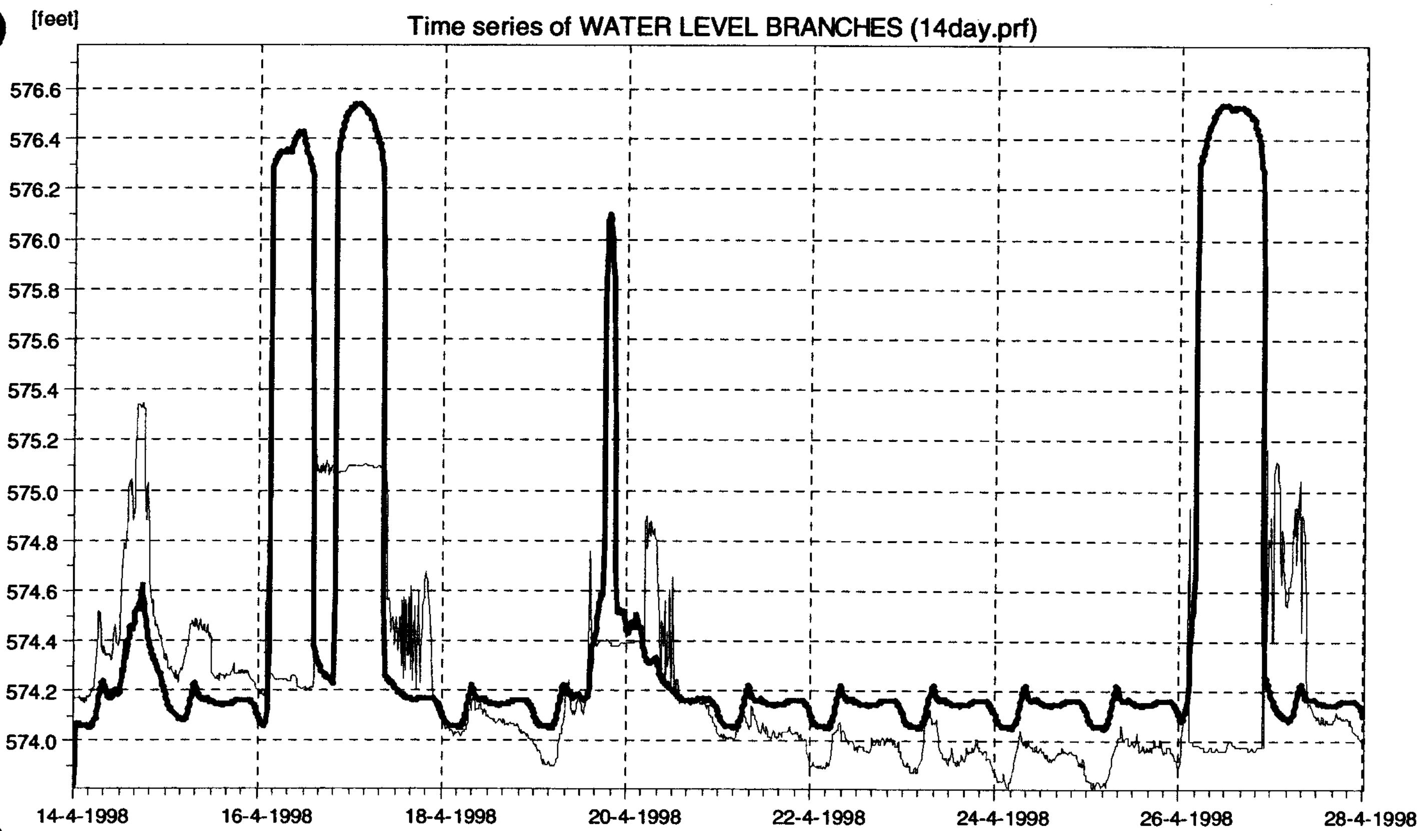
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: LS04I





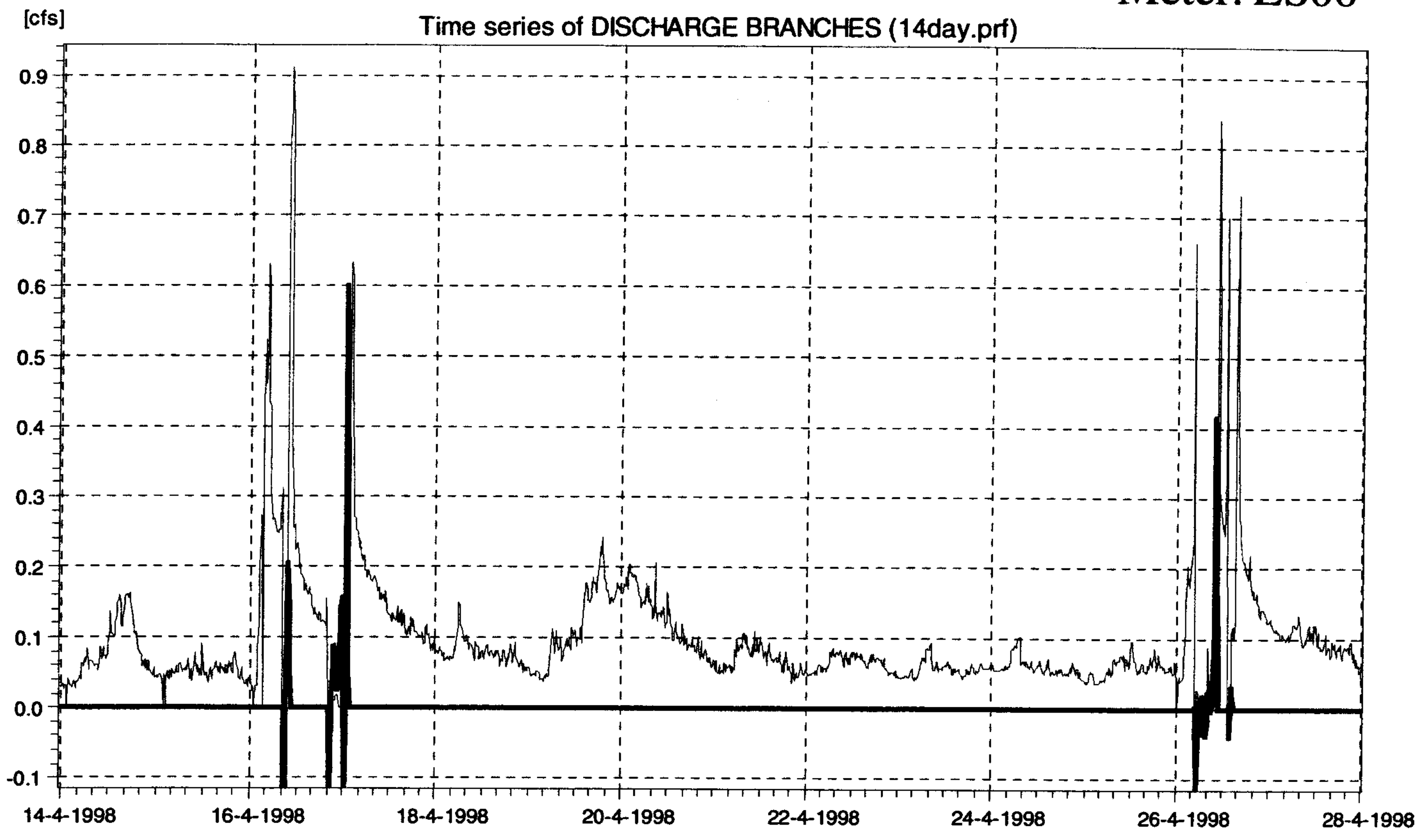
M&E AQUA ALLIANCE Metcalf & Eddy

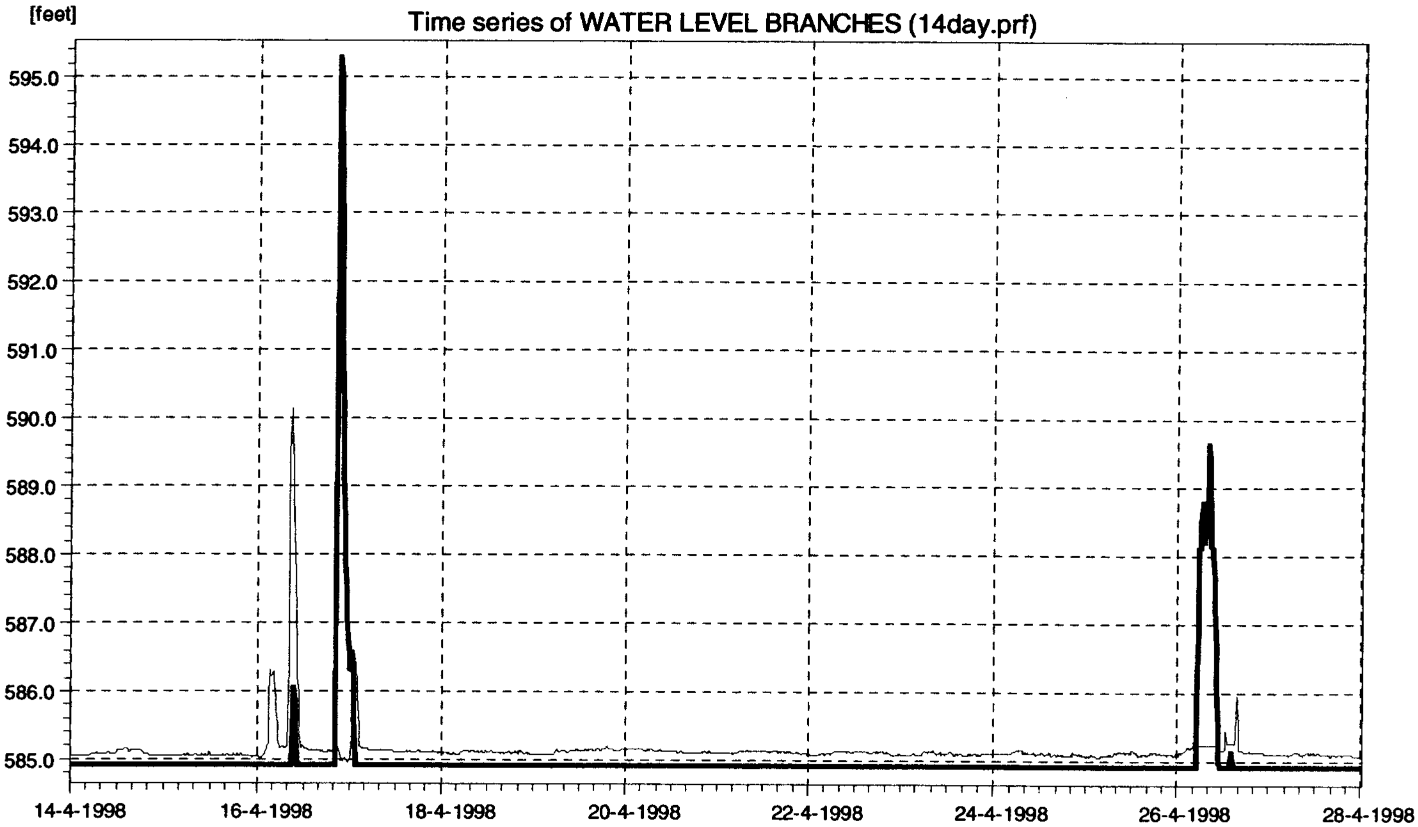
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: LS06





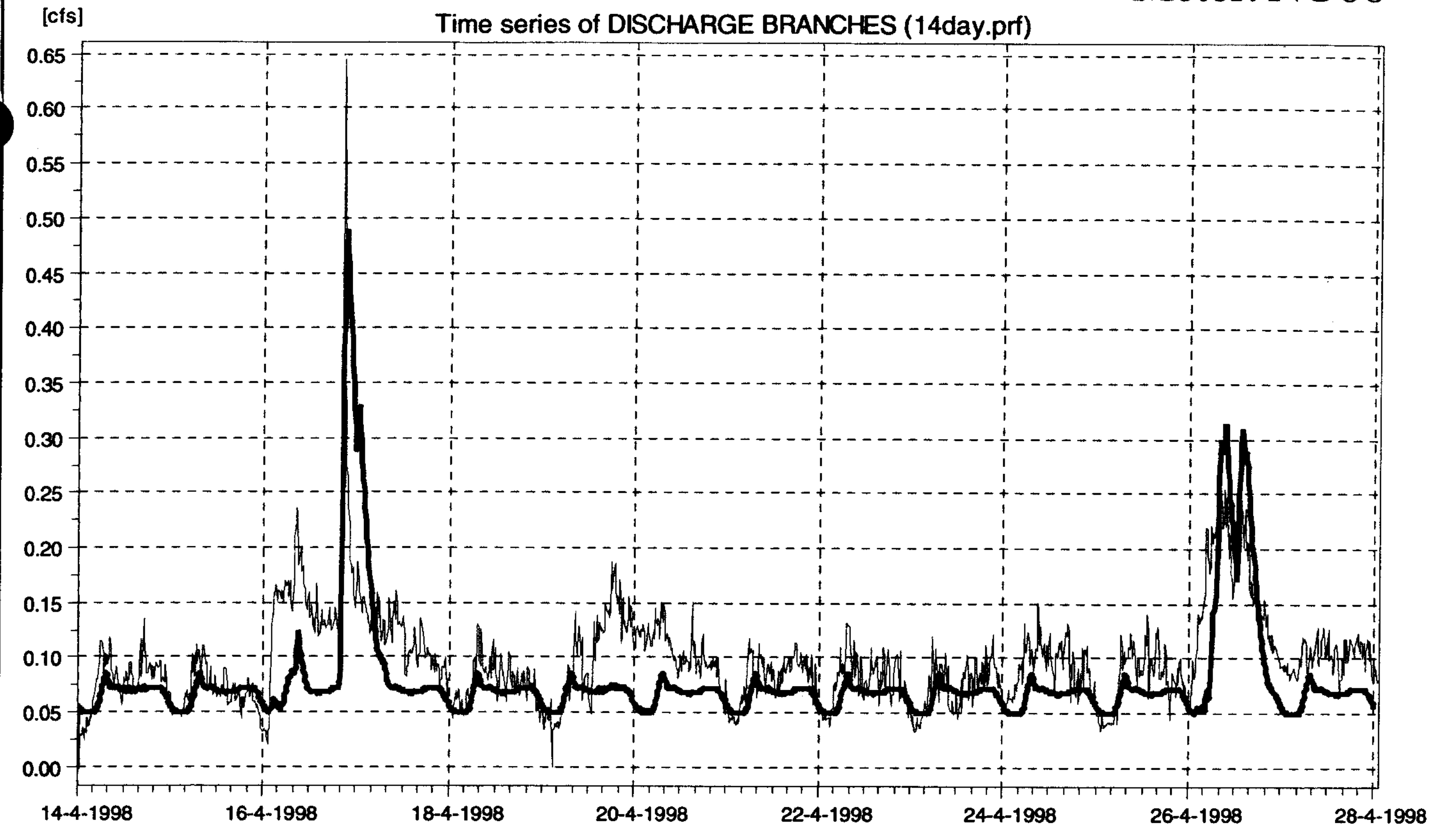
M&E Metcalf & Eddy AQUA ALLIANCE

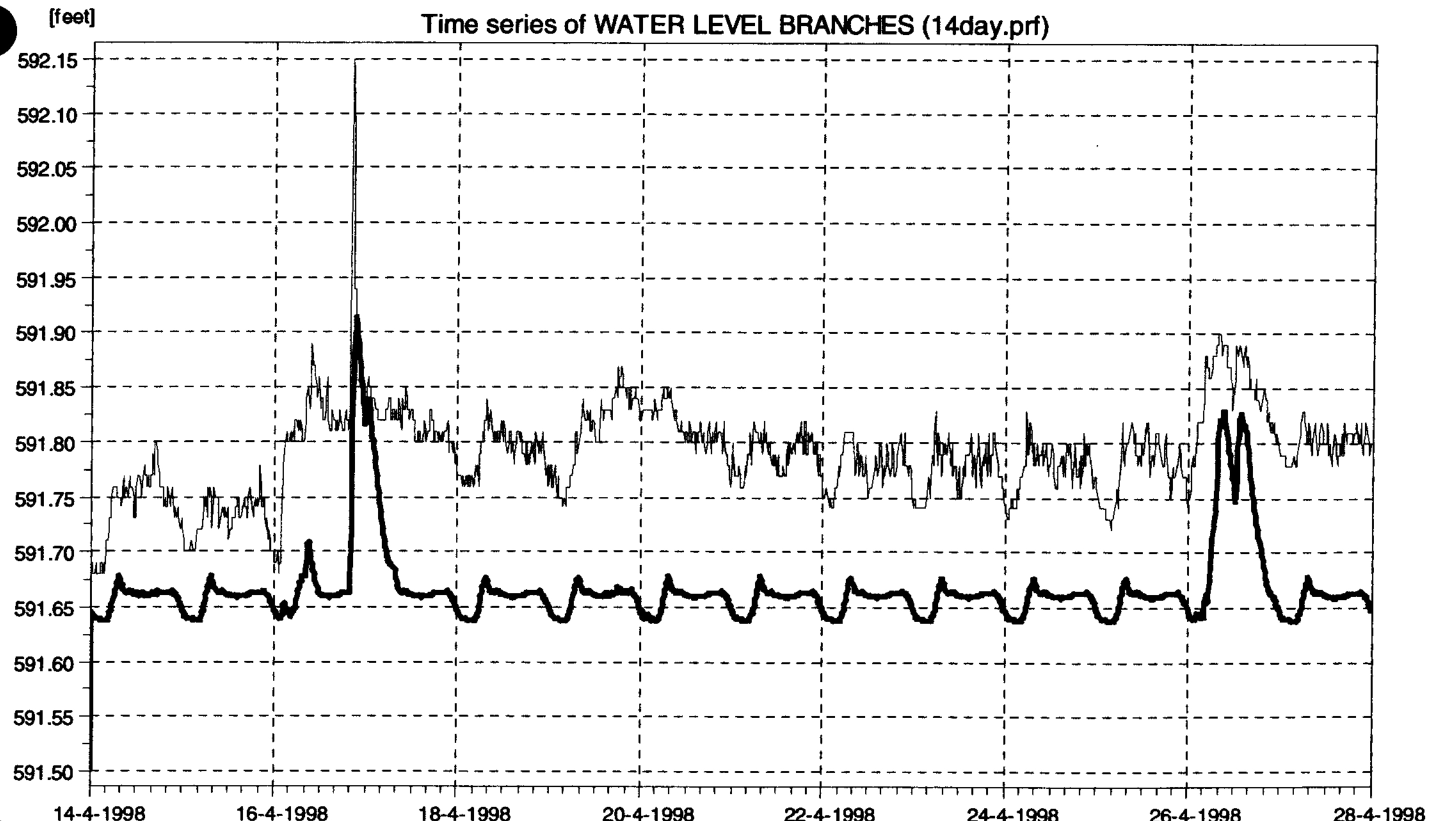
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: NO00





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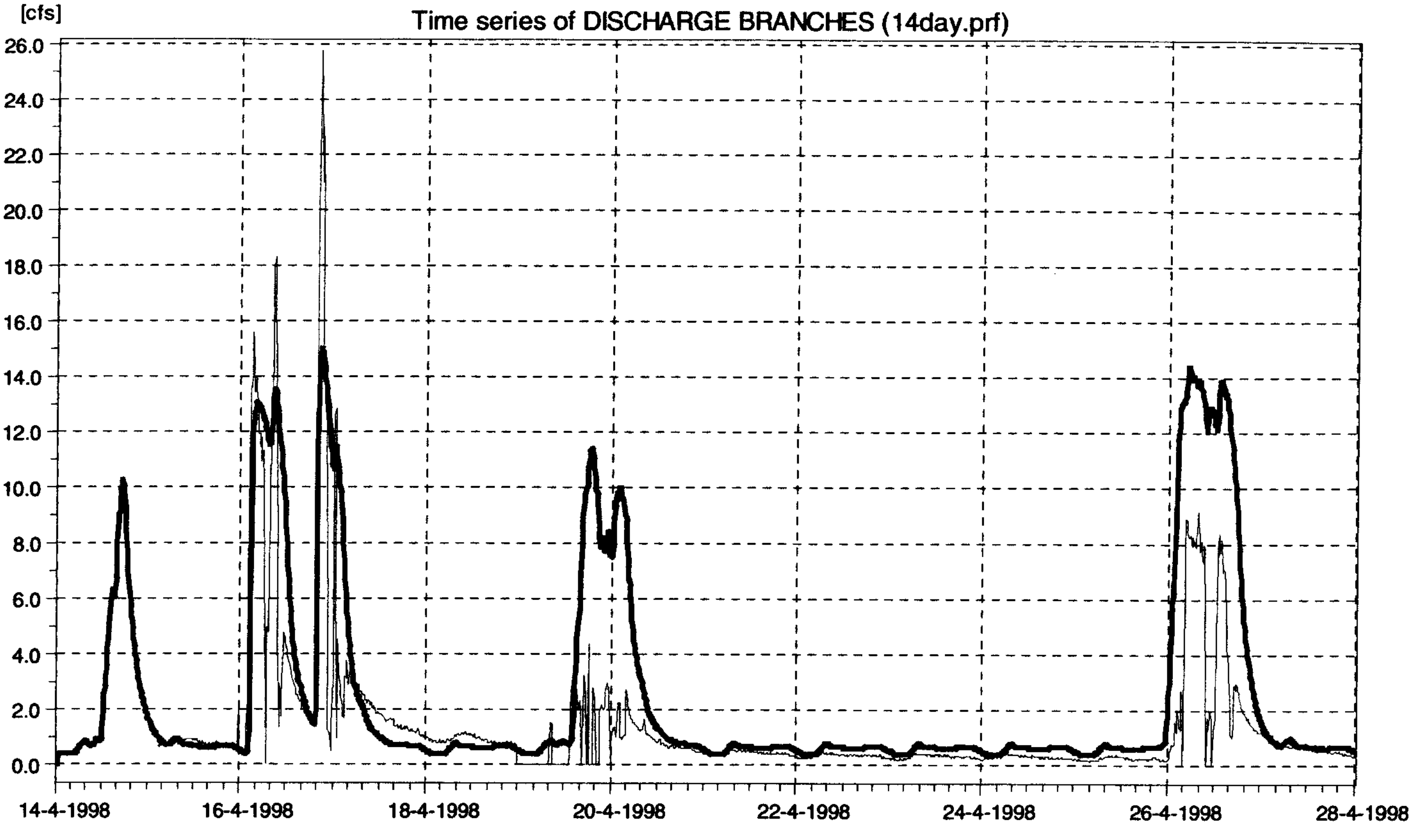
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: NO02D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Time series of DISCHARGE BRANCHES (14day.prf)
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
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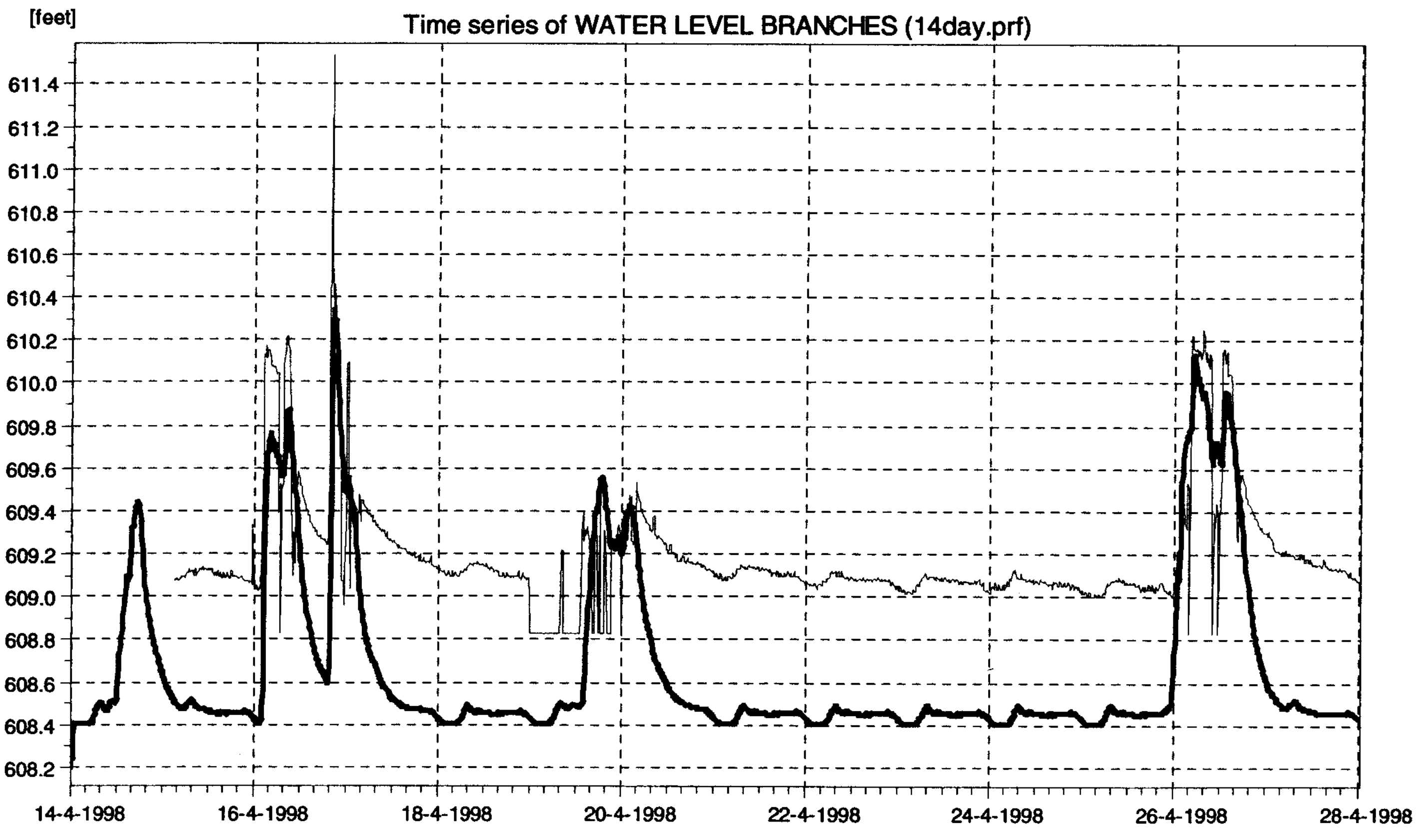
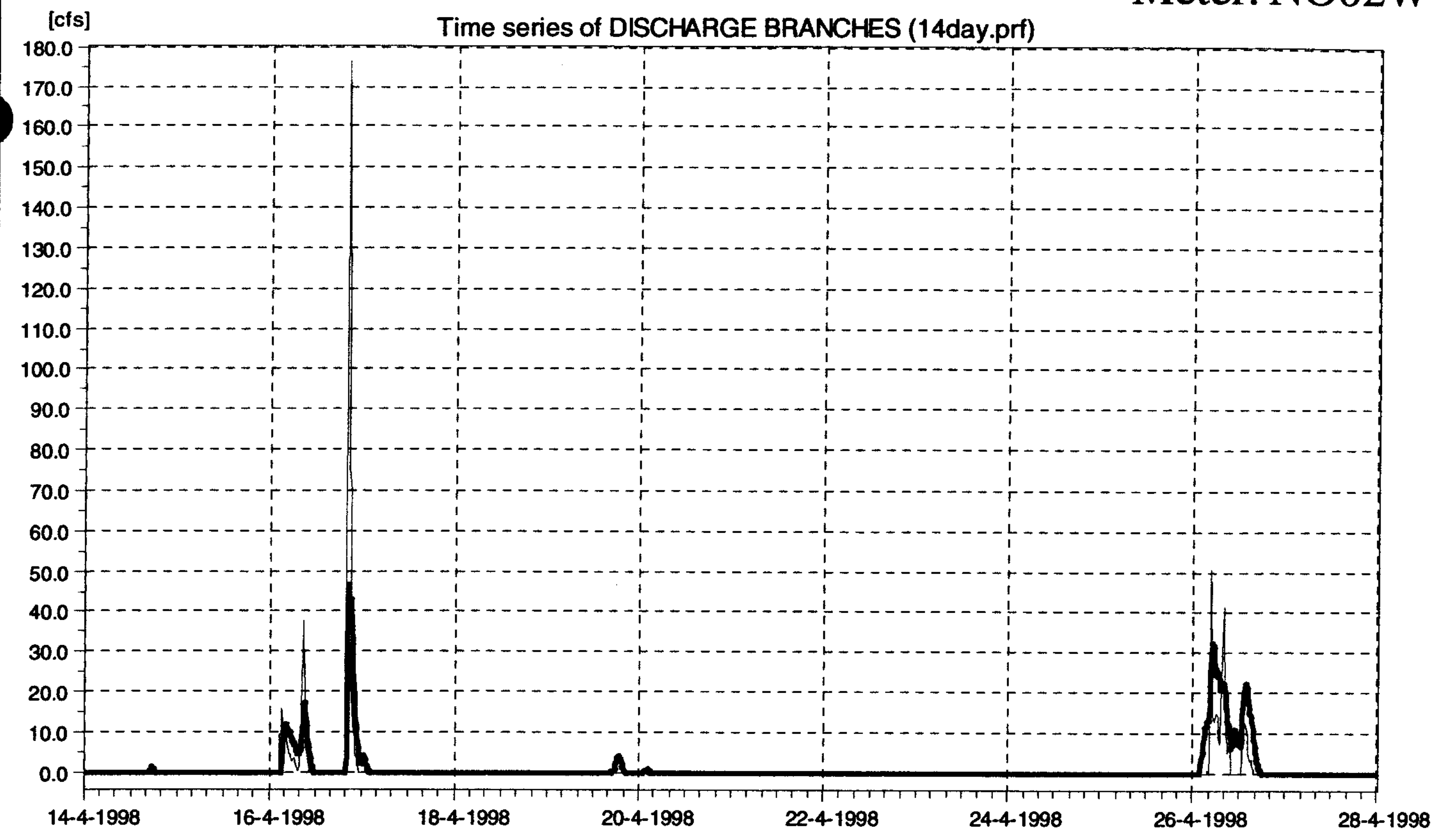
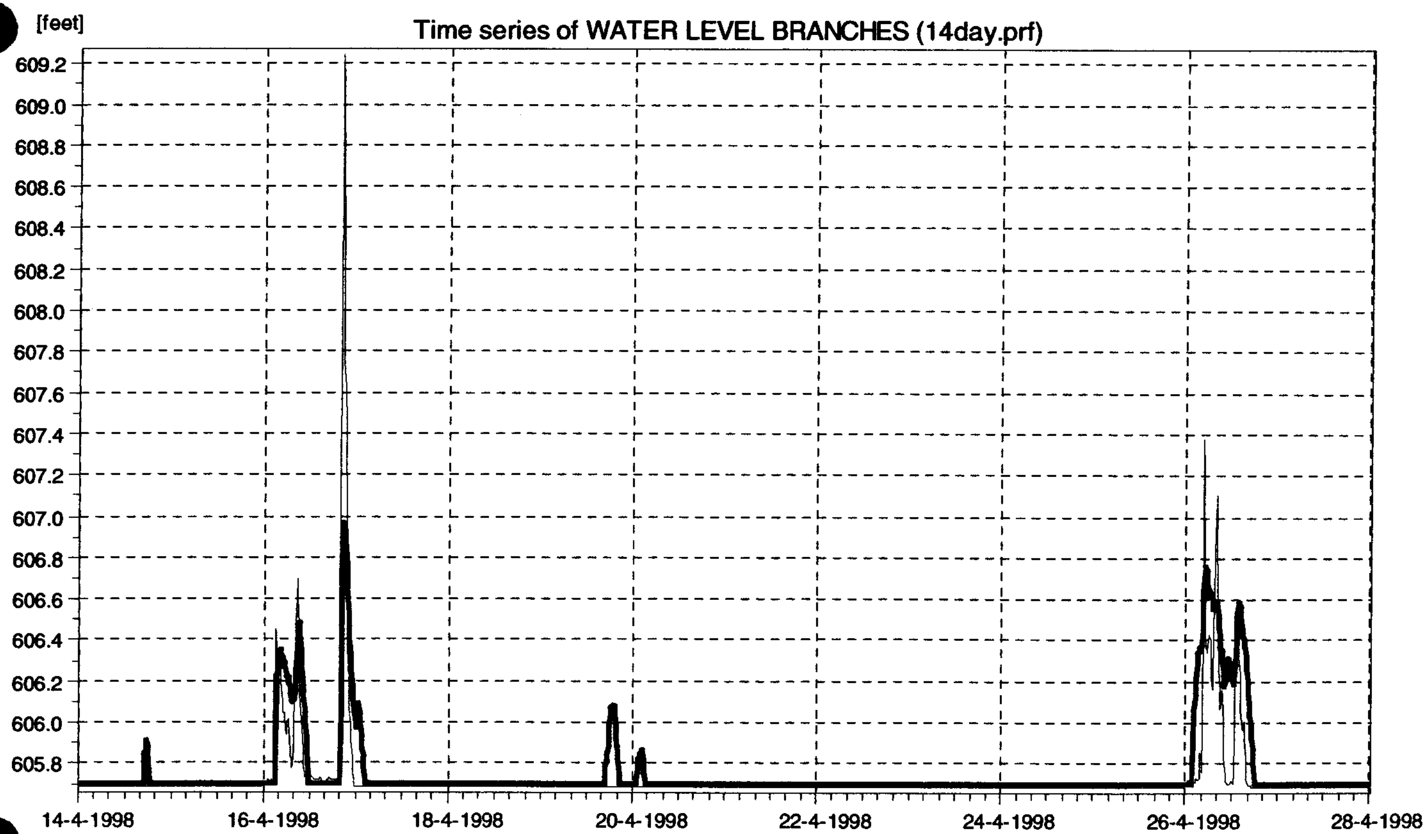
26-4-1998
28-4-1998


[feet]
Time series of WATER LEVEL BRANCHES (14day.prf)
611.4
611.2
611.0
610.8
610.6
610.4
610.2
610.0
609.8
609.6
609.4
609.2
609.0
608.8
608.6
608.4
608.2
14-4-1998
16-4-1998
18-4-1998
20-4-1998
22-4-1998
24-4-1998
26-4-1998
28-4-1998

Meter: NO02W





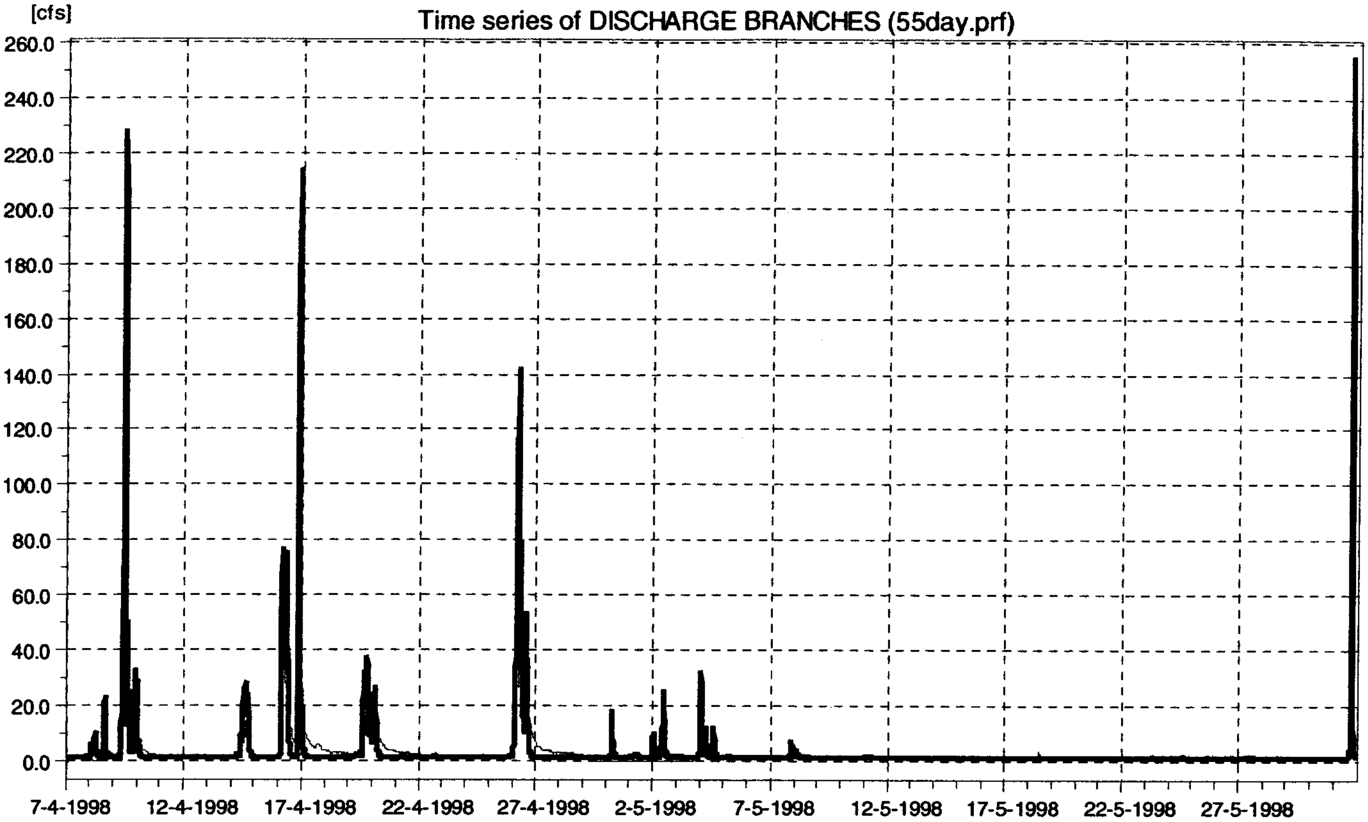
M&E AQUA ALLIANCE Metcalf & Eddy

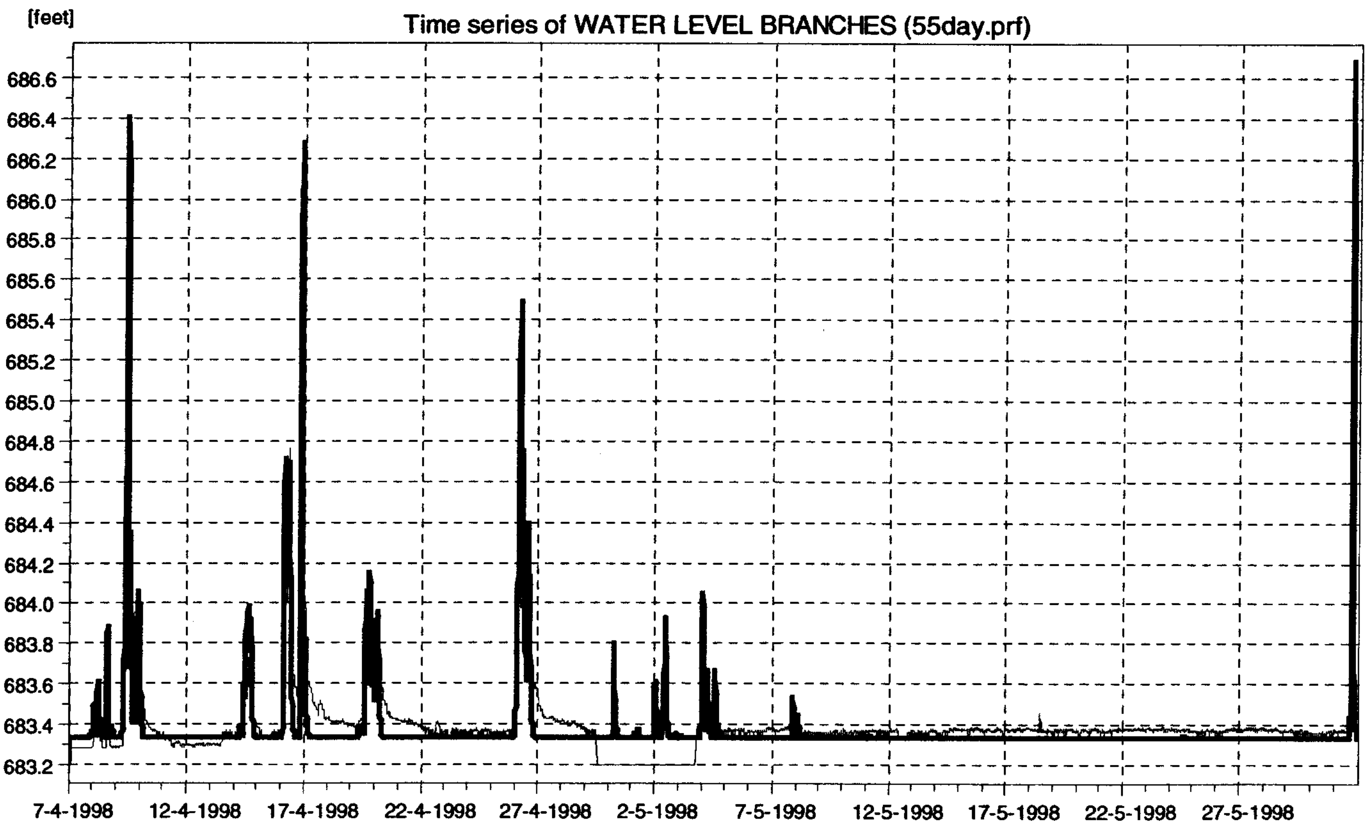
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: DBS03





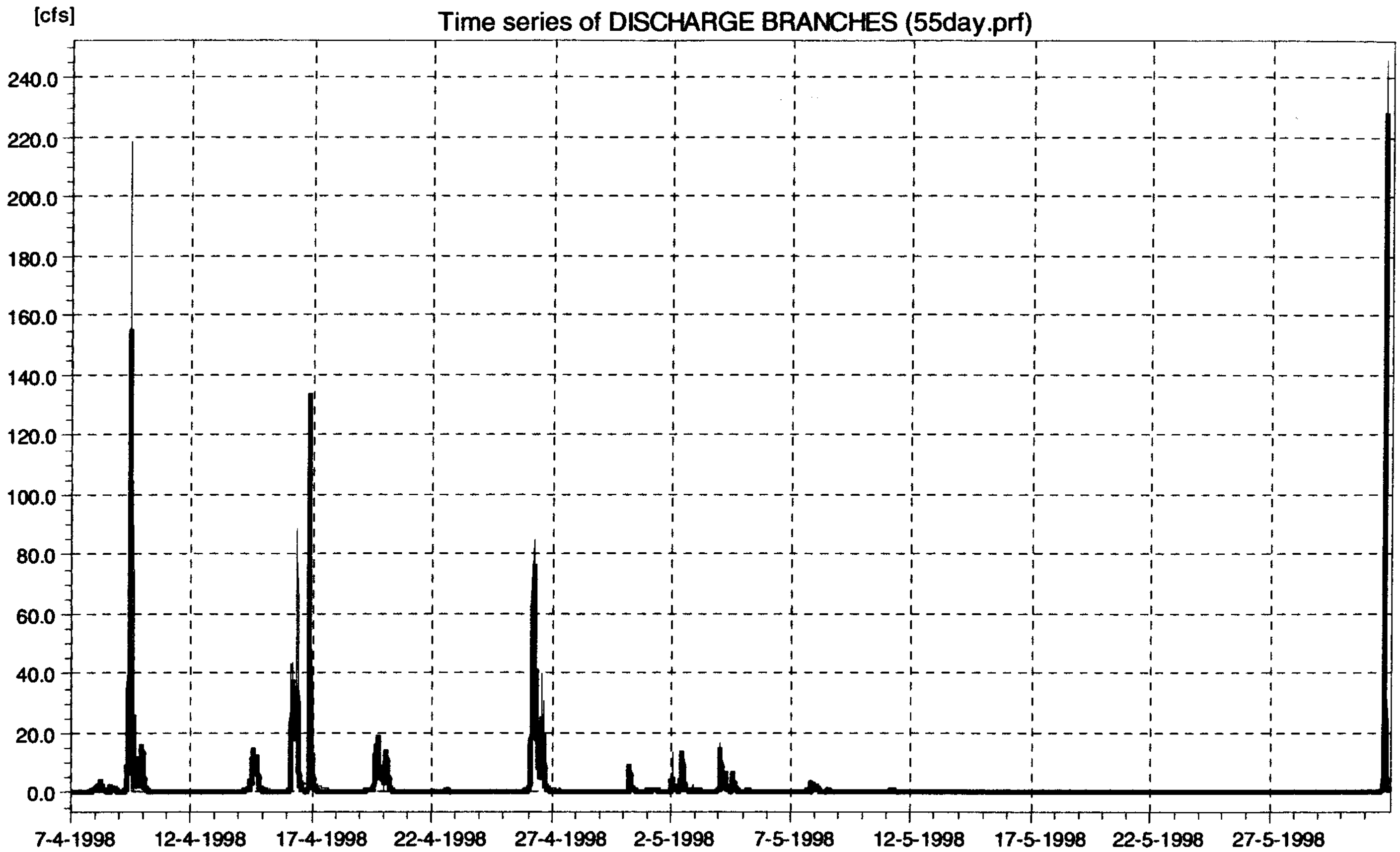
M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

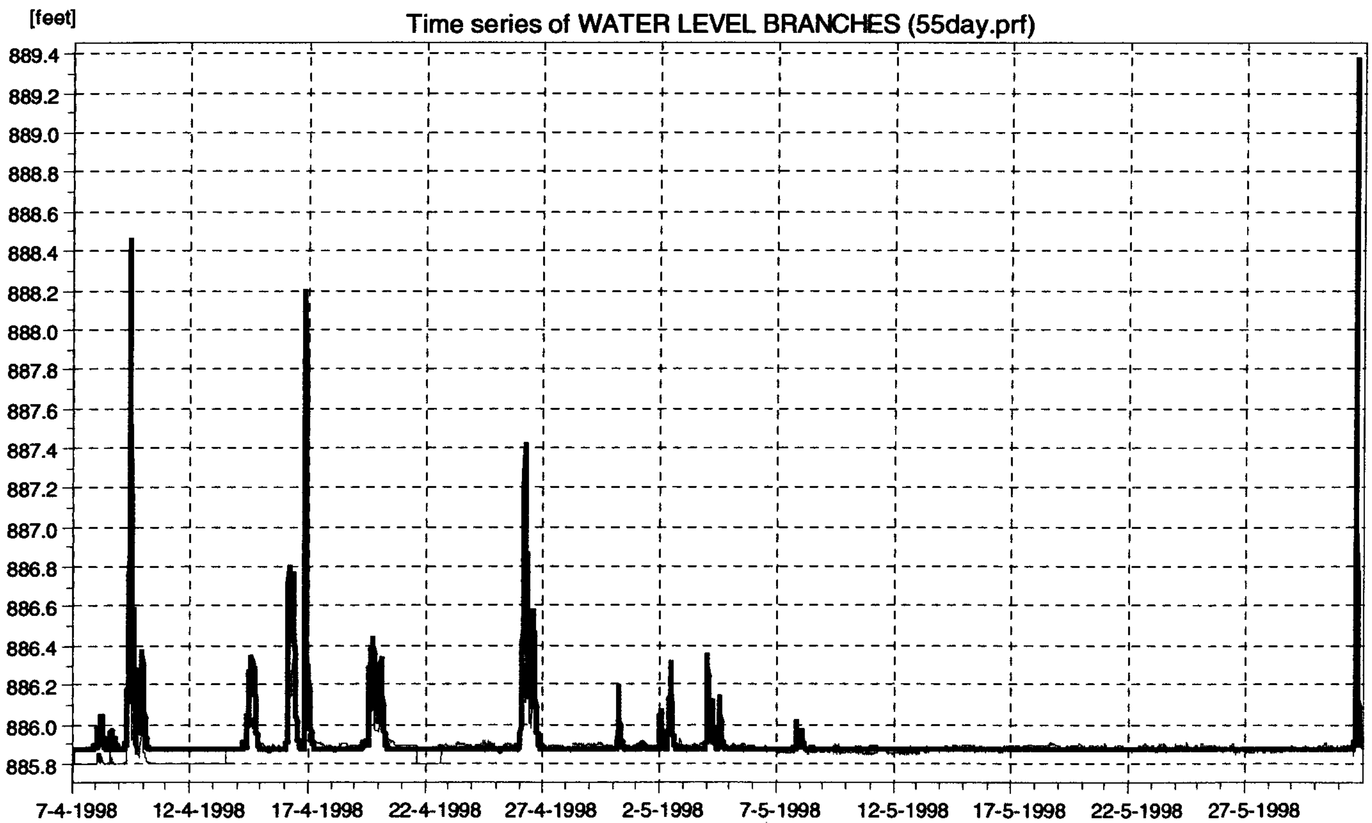
Model Calibration —— Model —— Meter

CH2MHILL

Meter: DBS02

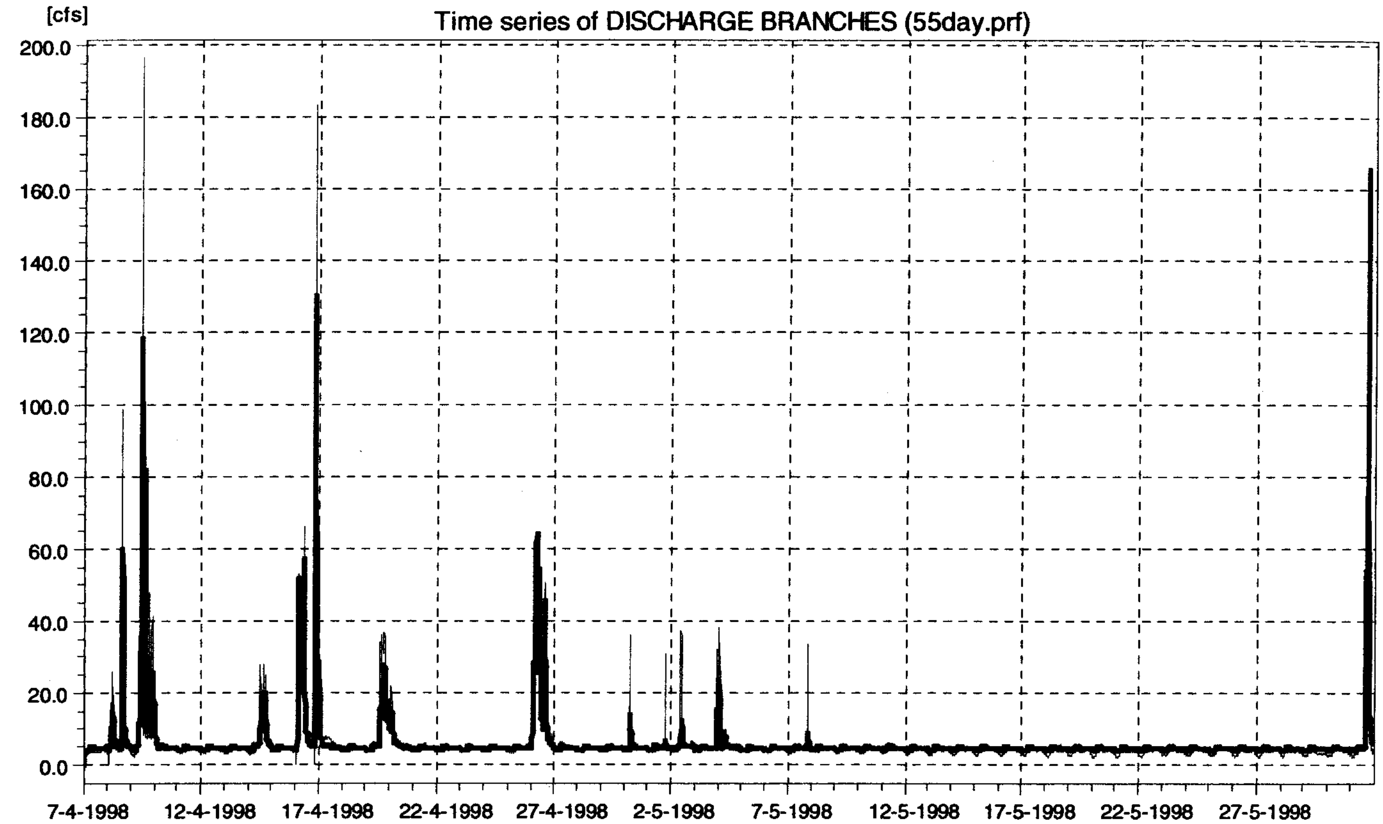


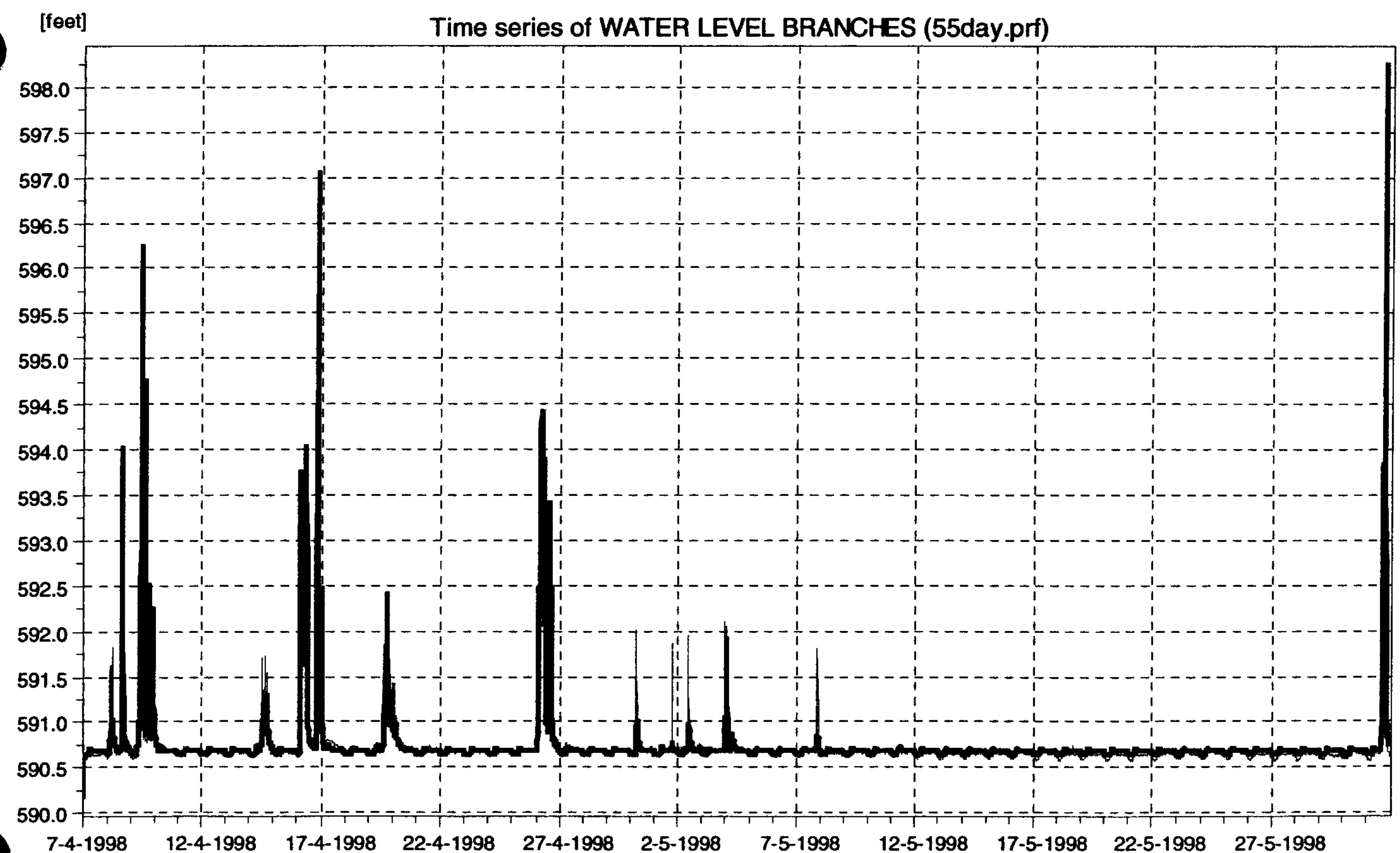
[cfs]
Time series of DISCHARGE BRANCHES (55day.prf)
240.0
220.0
200.0
180.0
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
7-5-1998
12-5-1998
17-5-1998
22-5-1998
27-5-1998



[feet]
Time series of WATER LEVEL BRANCHES (55day.prf)
889.4
889.2
889.0
888.8
888.6
888.4
888.2
888.0
887.8
887.6
887.4
887.2
887.0
886.8
886.6
886.4
886.2
886.0
885.8
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
7-5-1998
12-5-1998
17-5-1998
22-5-1998
27-5-1998

Meter: DE02IA





M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

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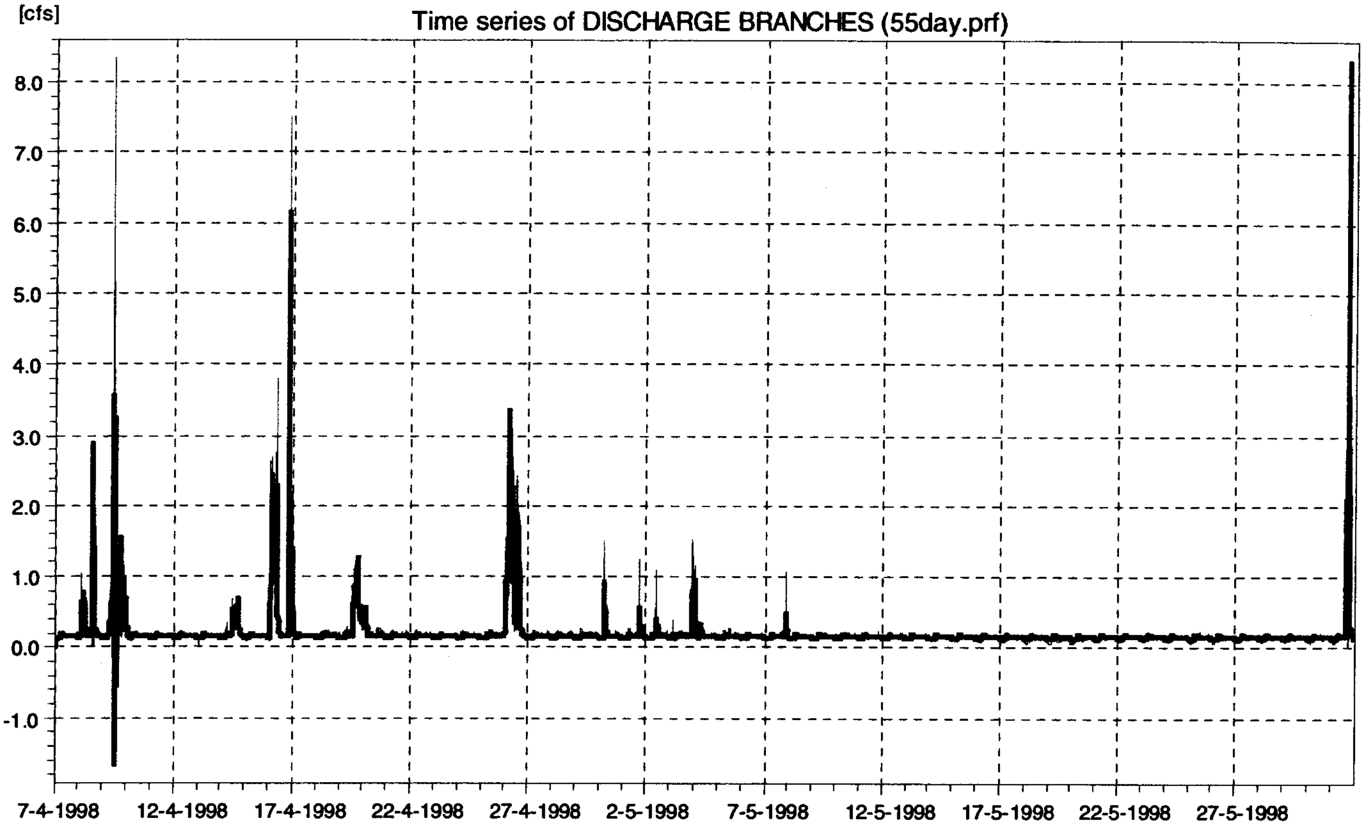
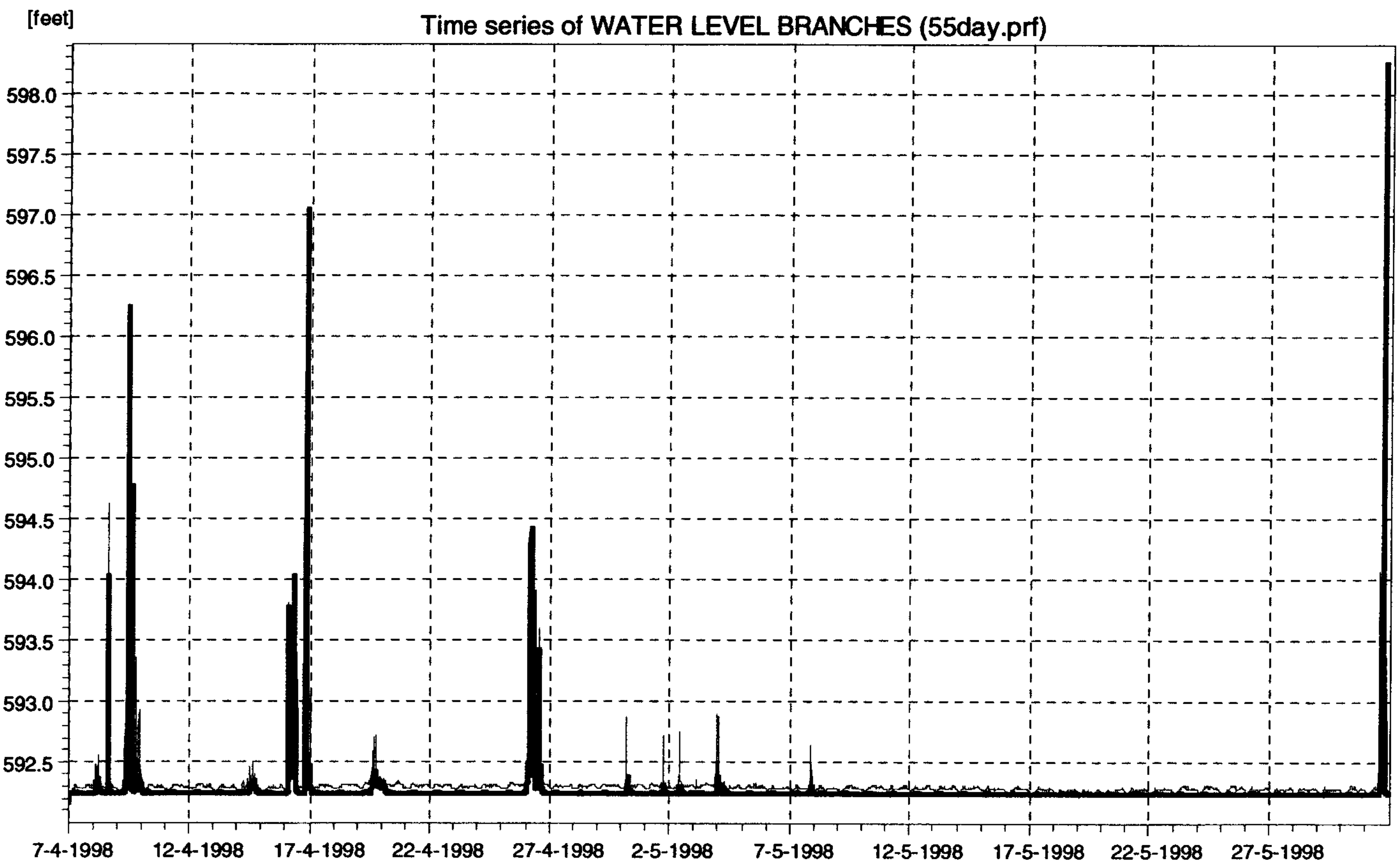




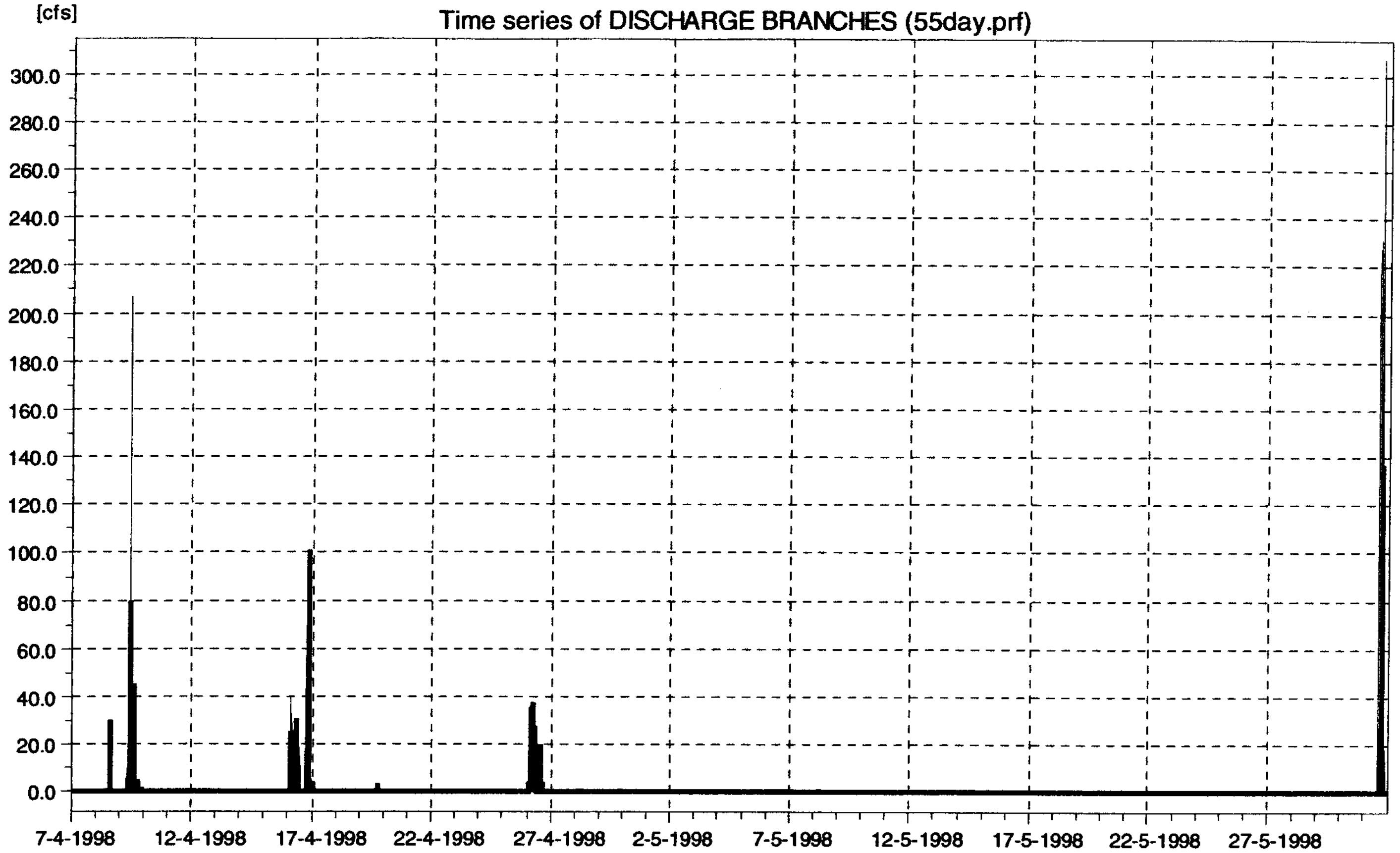
M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: DE02W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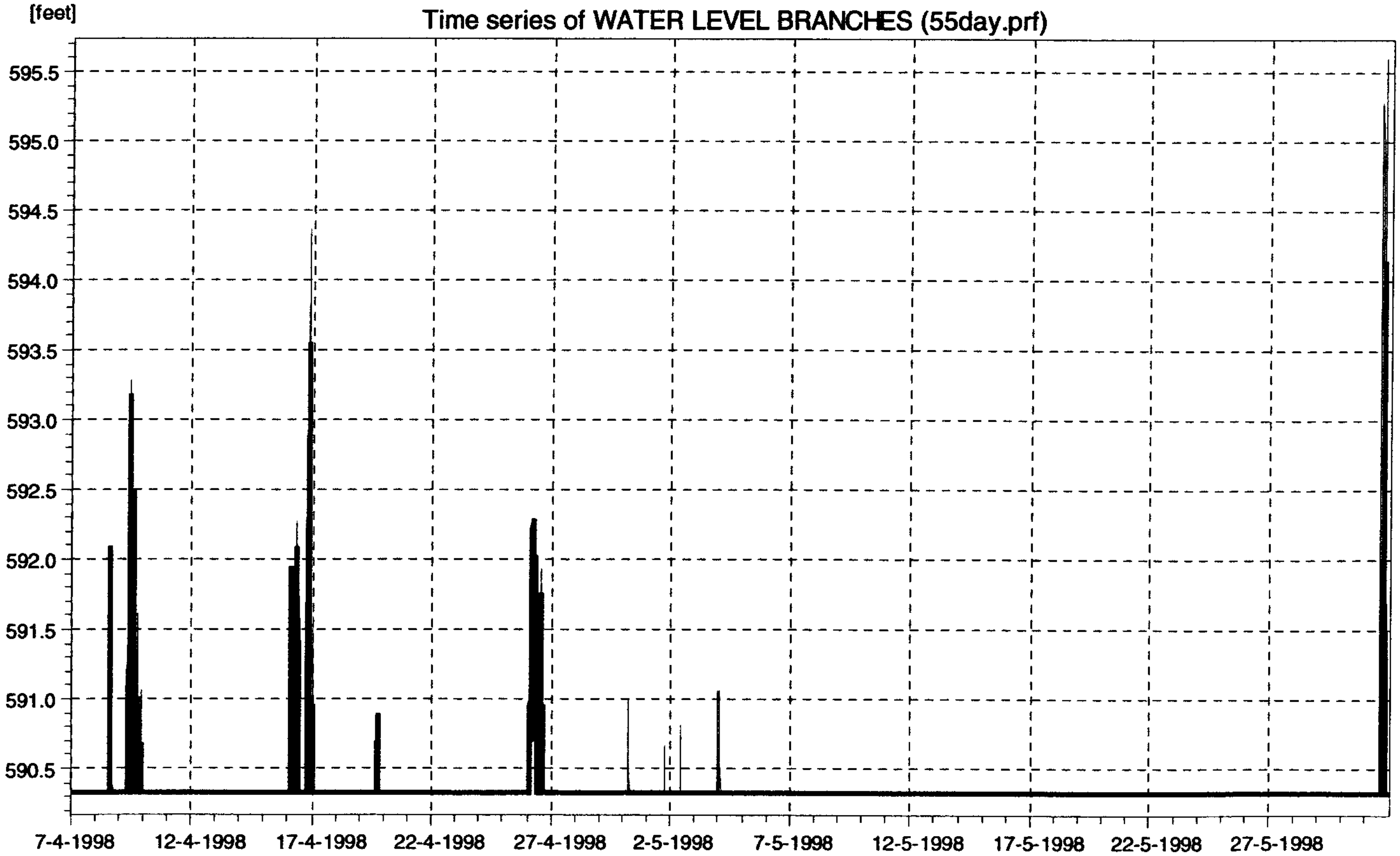
Time series of DISCHARGE BRANCHES (55day.prf)
300.0
280.0
260.0
240.0
220.0
200.0
180.0
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
7-5-1998
12-5-1998
17-5-1998
22-5-1998
27-5-1998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Time series of WATER LEVEL BRANCHES (55day.prf)
595.5
595.0
594.5
594.0
593.5
593.0
592.5
592.0
591.5
591.0
590.5
7-4-1998
12-4-1998
17-4-1998
22-4-1998
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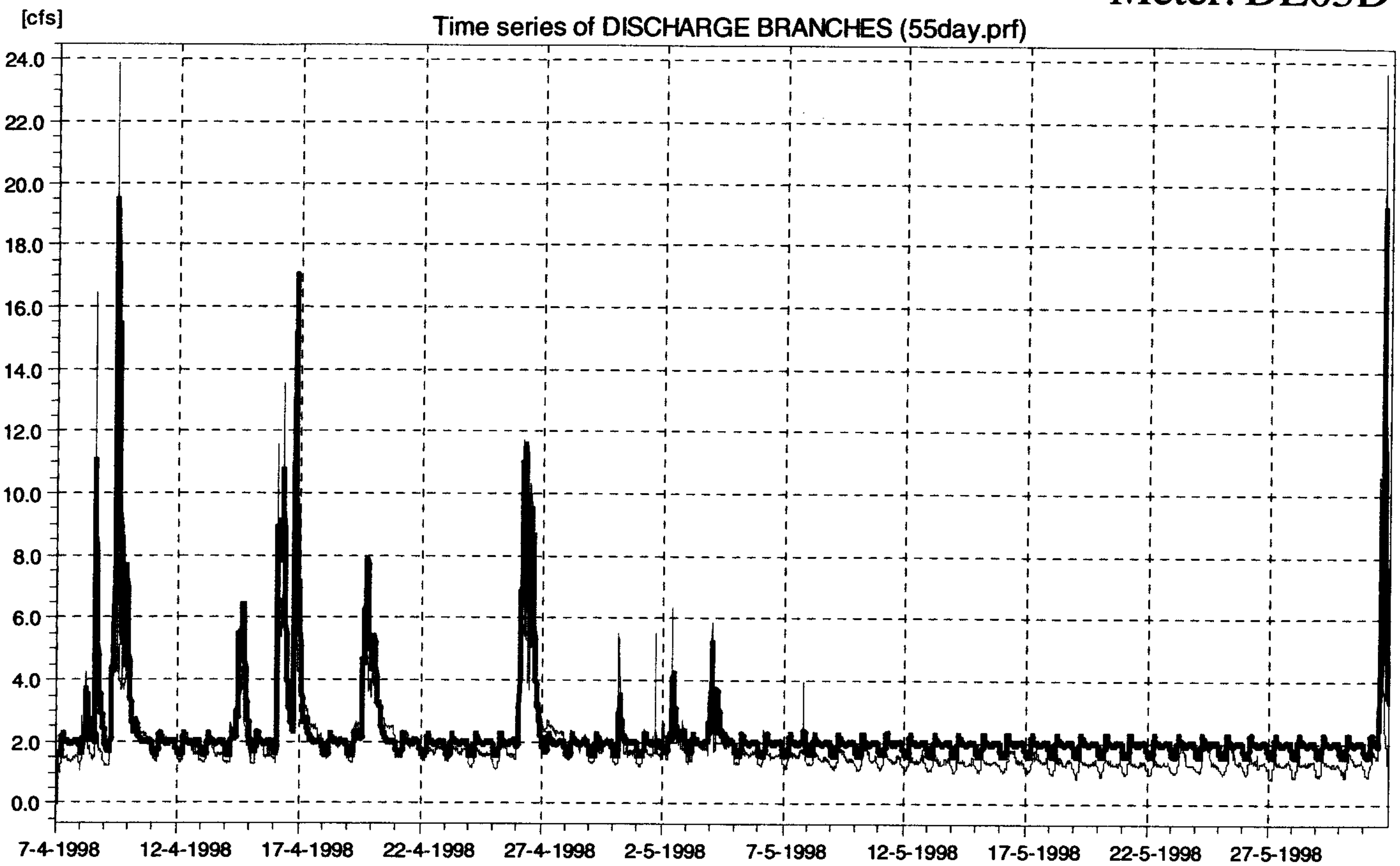
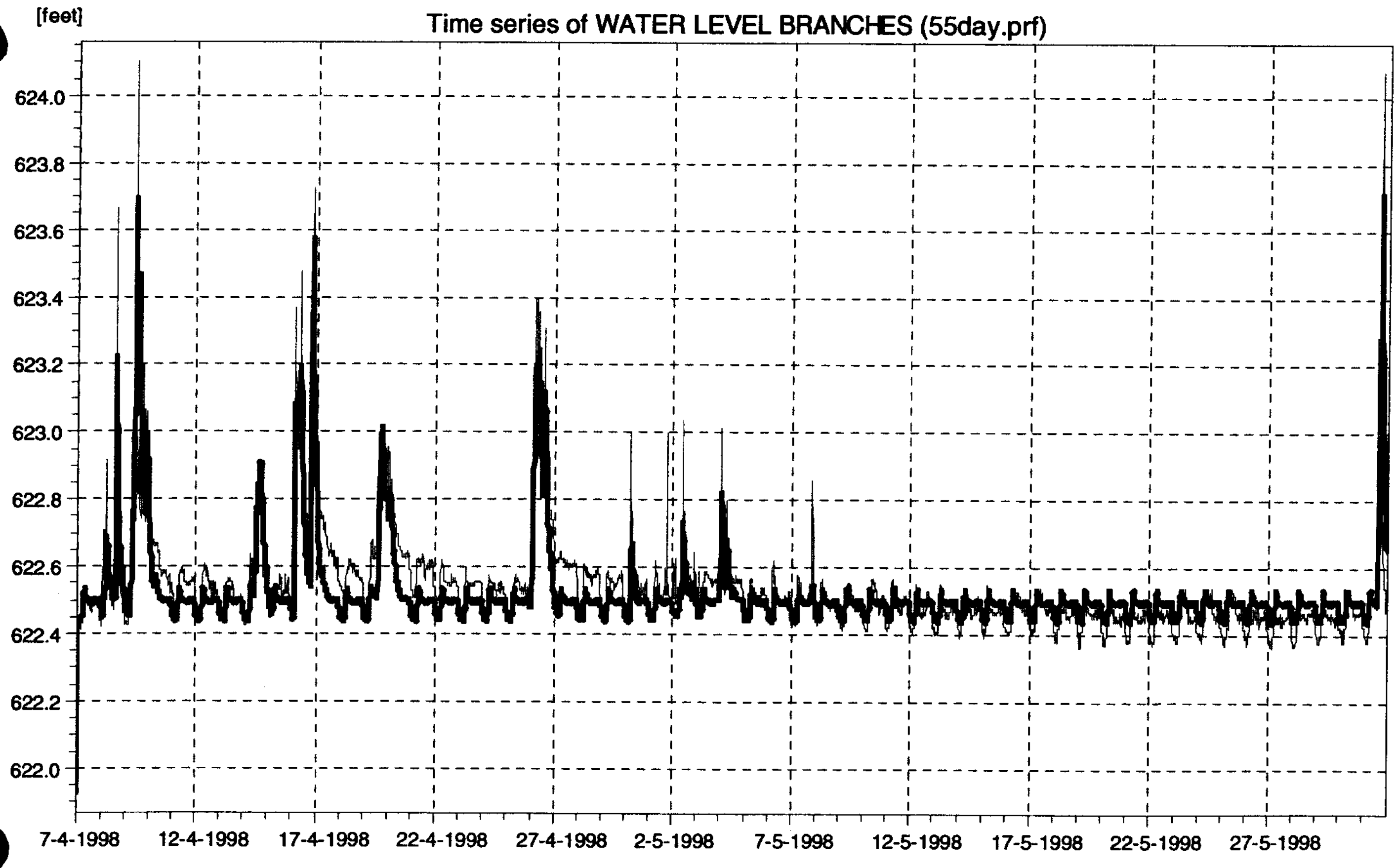
7-5-1998
12-5-1998
17-5-1998
22-5-1998
27-5-1998

Meter: DE03D





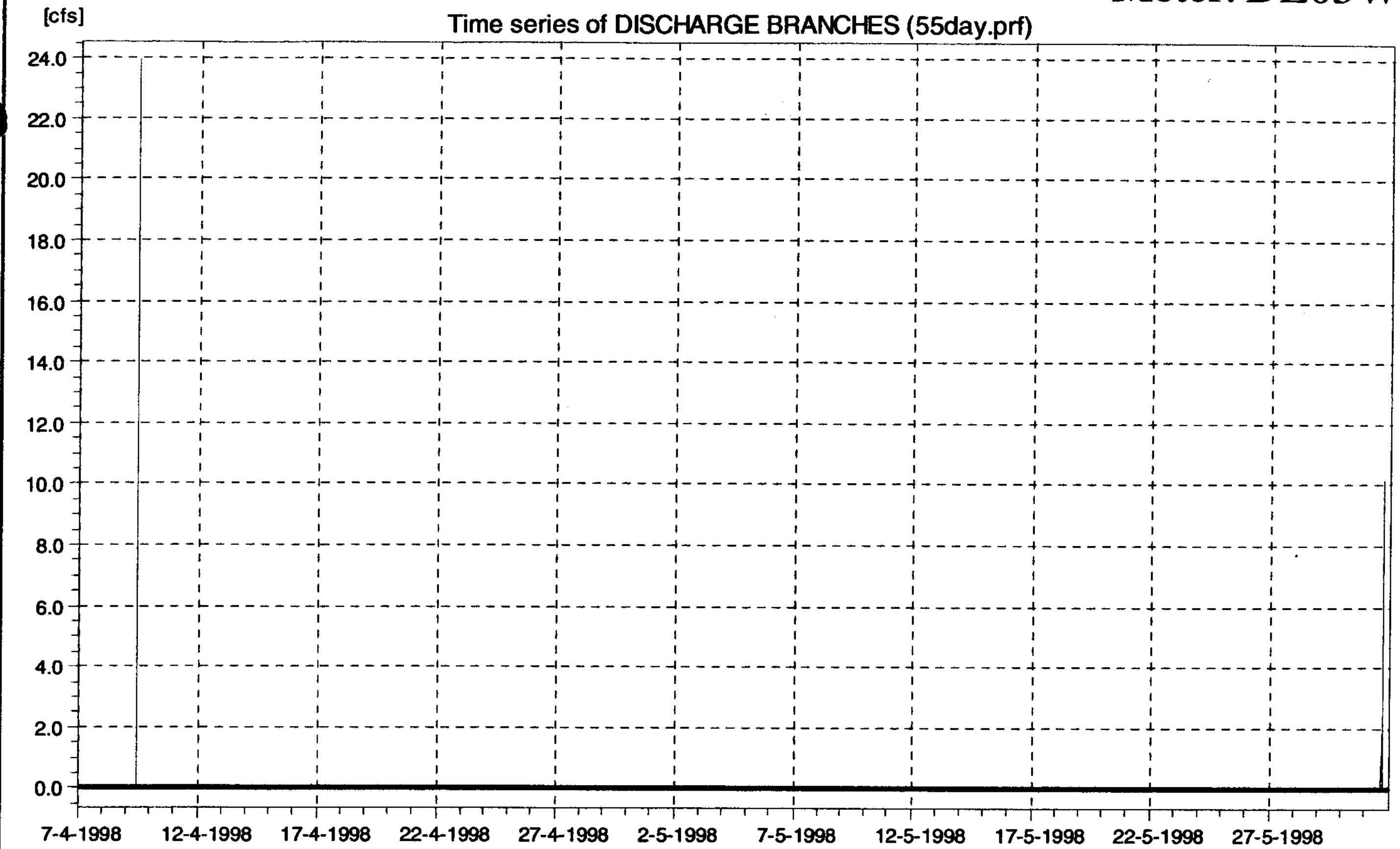
M&E Metcalf & Eddy AQUA ALLIANCE

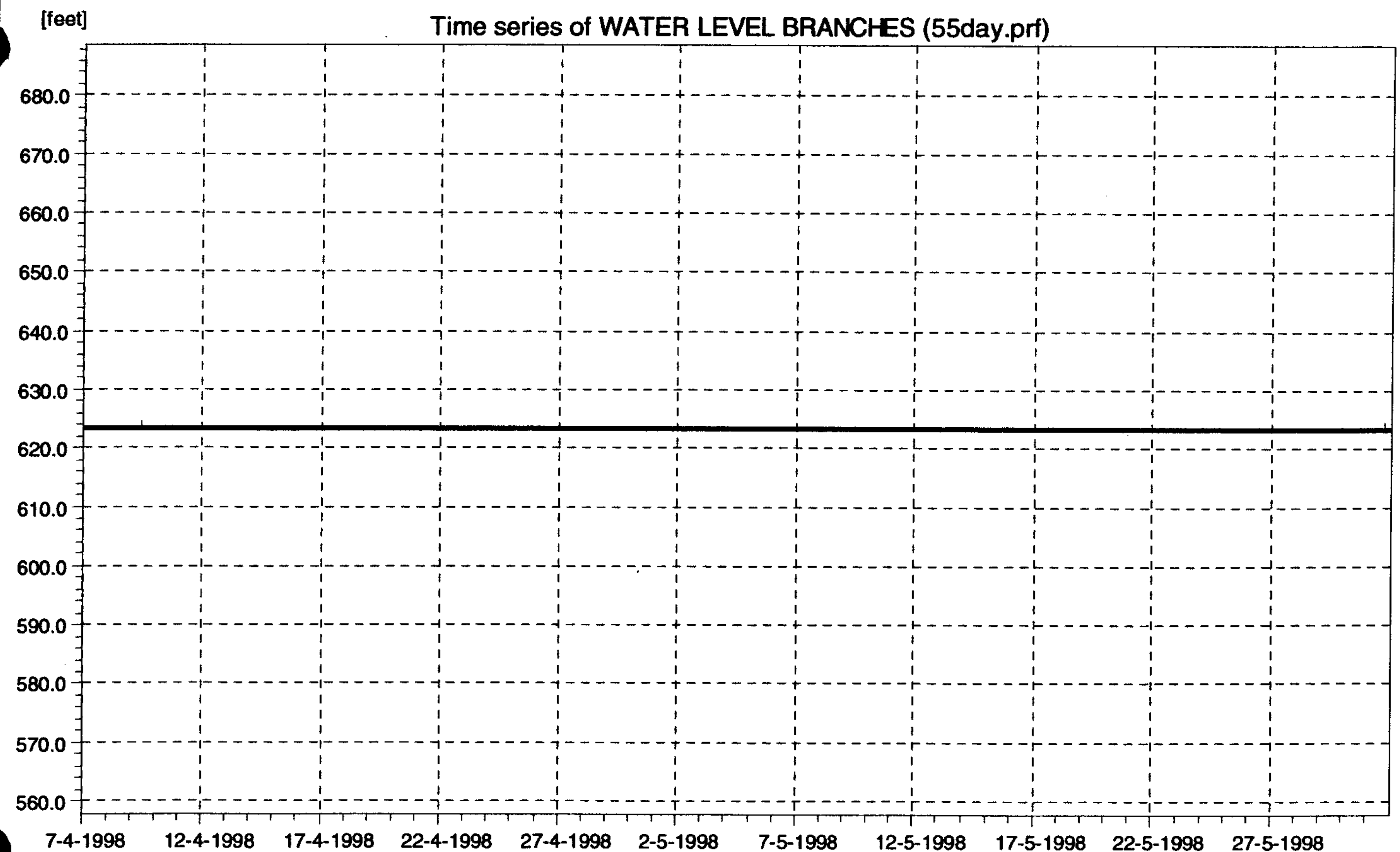
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: DE03W





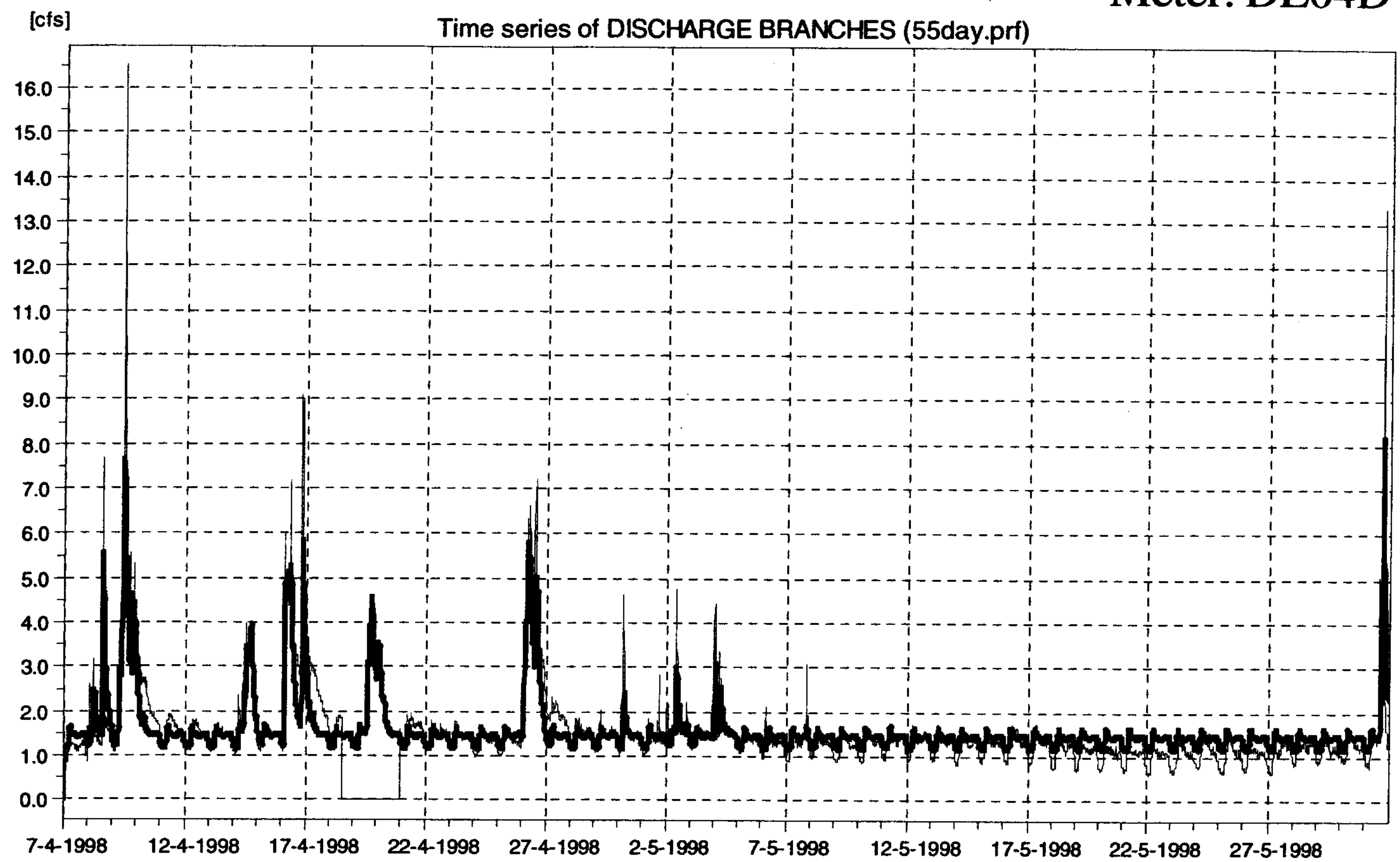
M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: DE04D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Time series of DISCHARGE BRANCHES (55day.prf)
16.0
15.0
14.0
13.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
7-5-1998
12-5-1998
17-5-1998
22-5-1998
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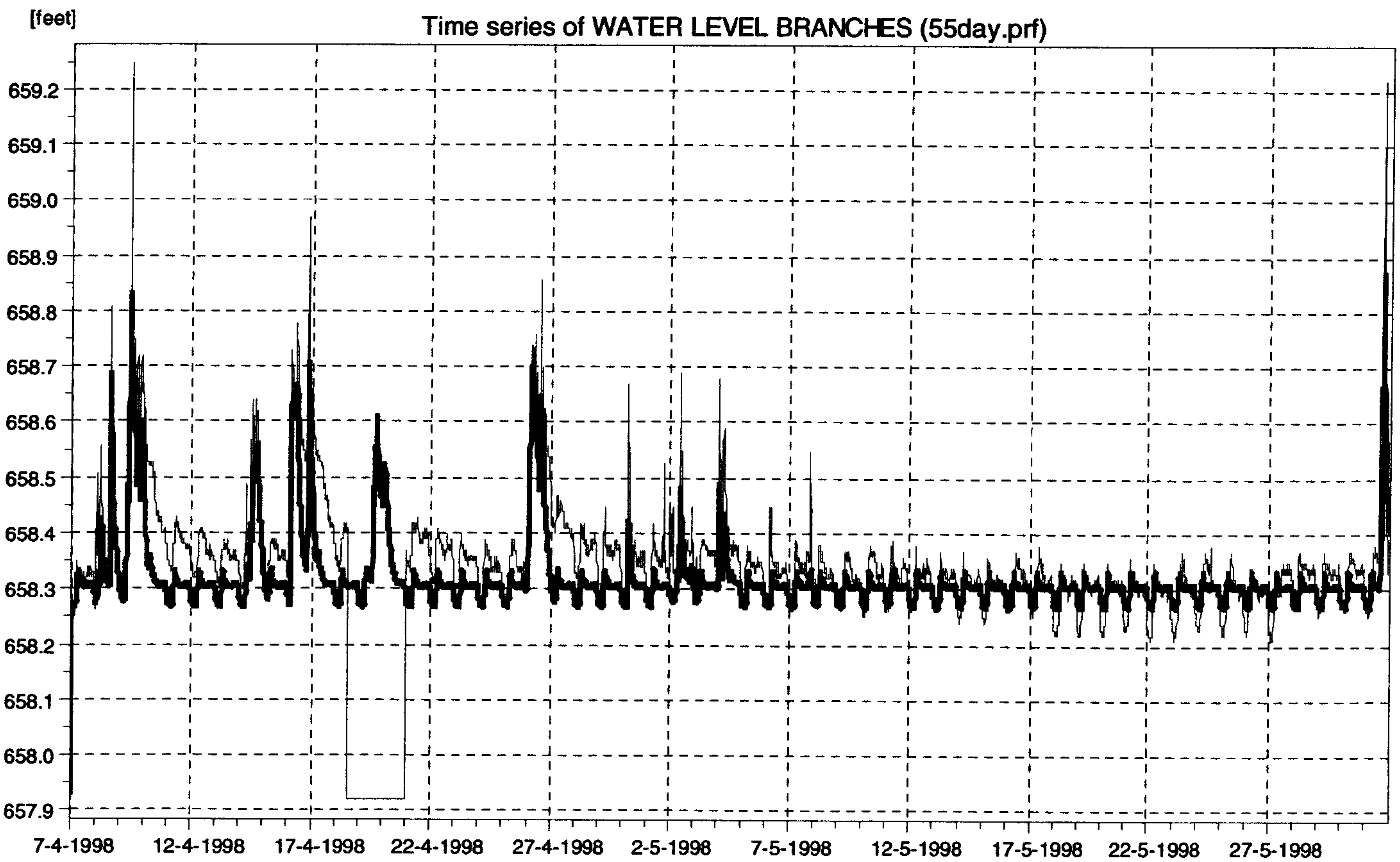
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Time series of WATER LEVEL BRANCHES (55day.prf)
659.2
659.1
659.0
658.9
658.8
658.7
658.6
658.5
658.4
658.3
658.2
658.1
658.0
657.9
7-4-1998
12-4-1998
17-4-1998
22-4-1998
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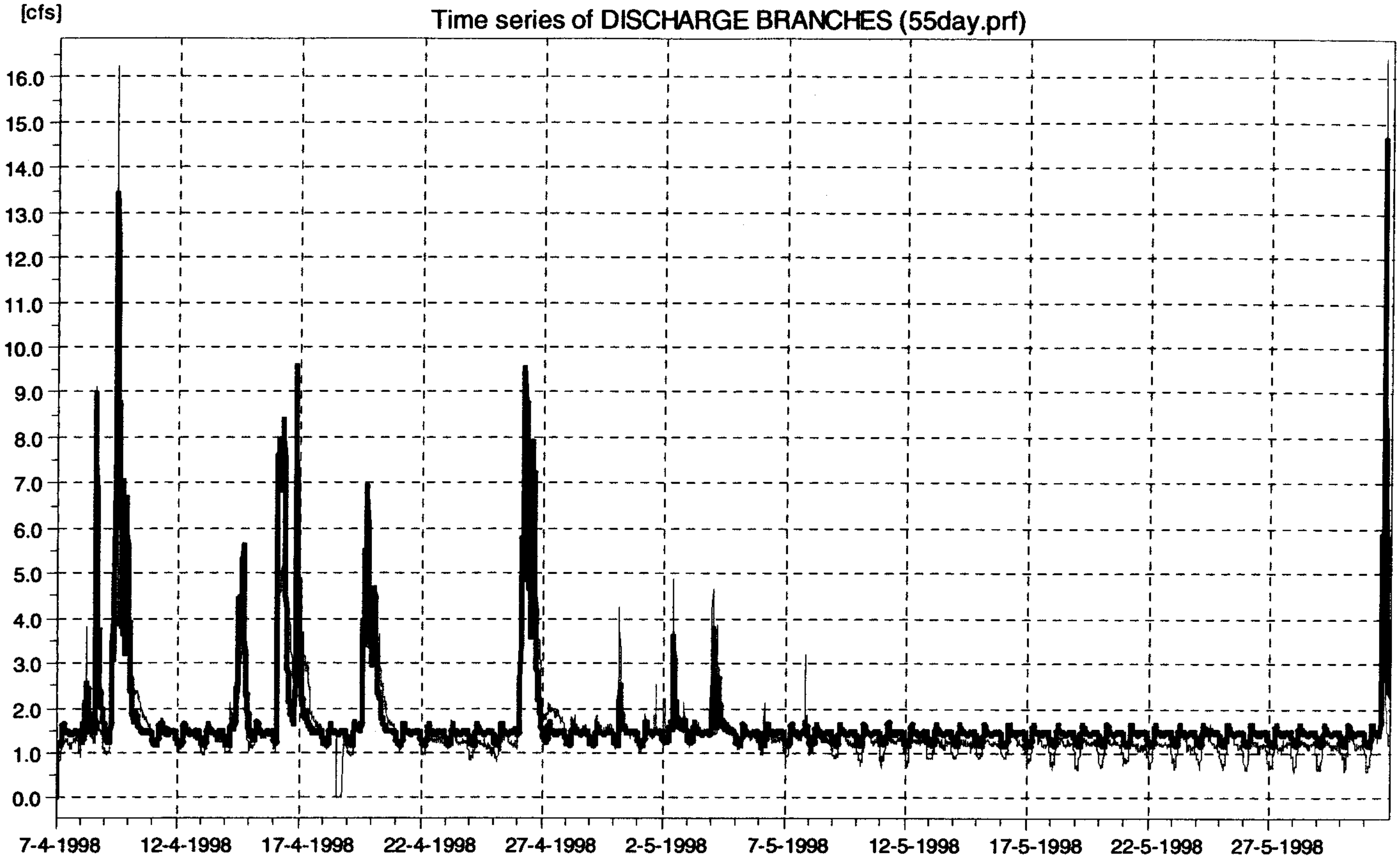
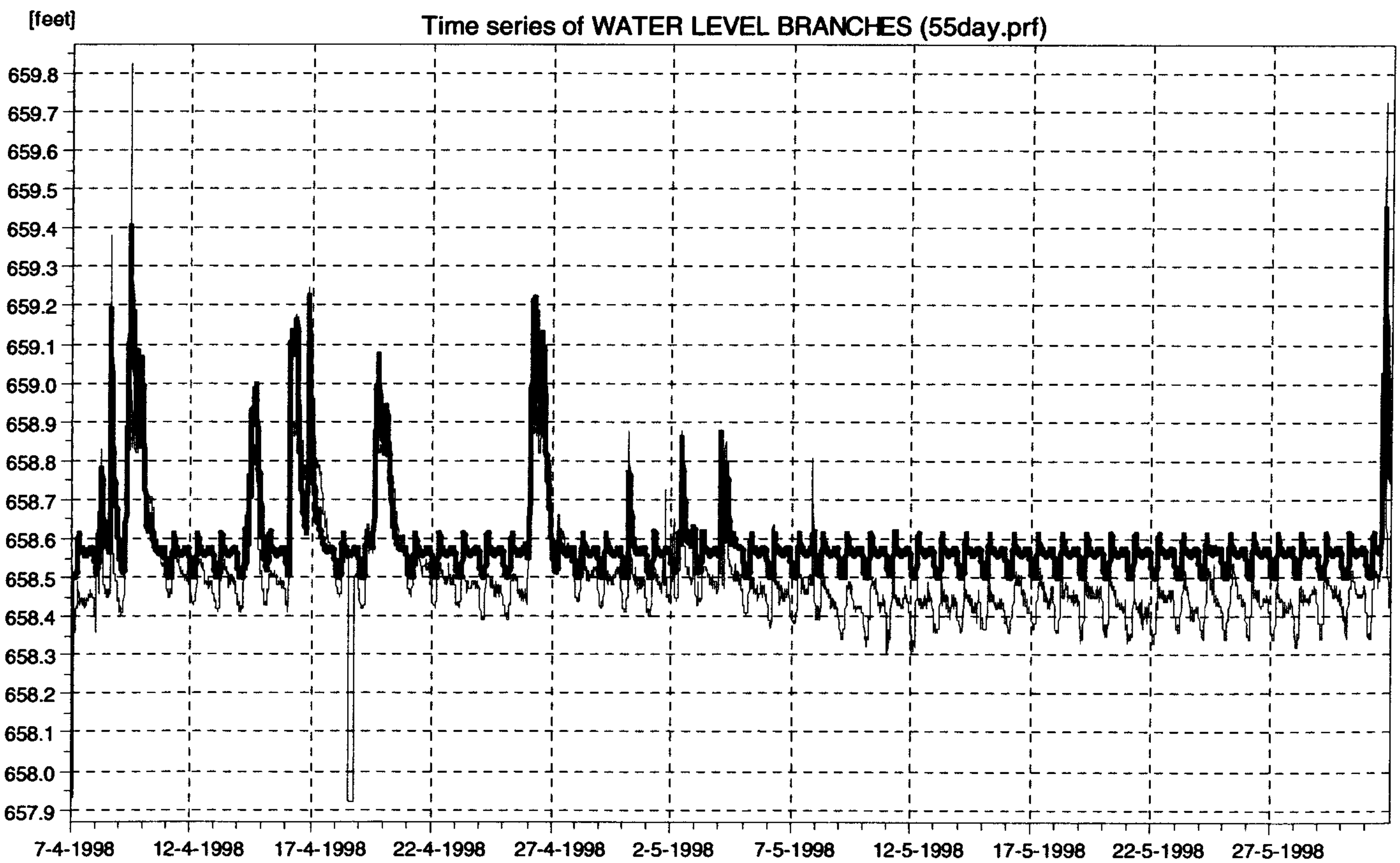
Meter: DE04I





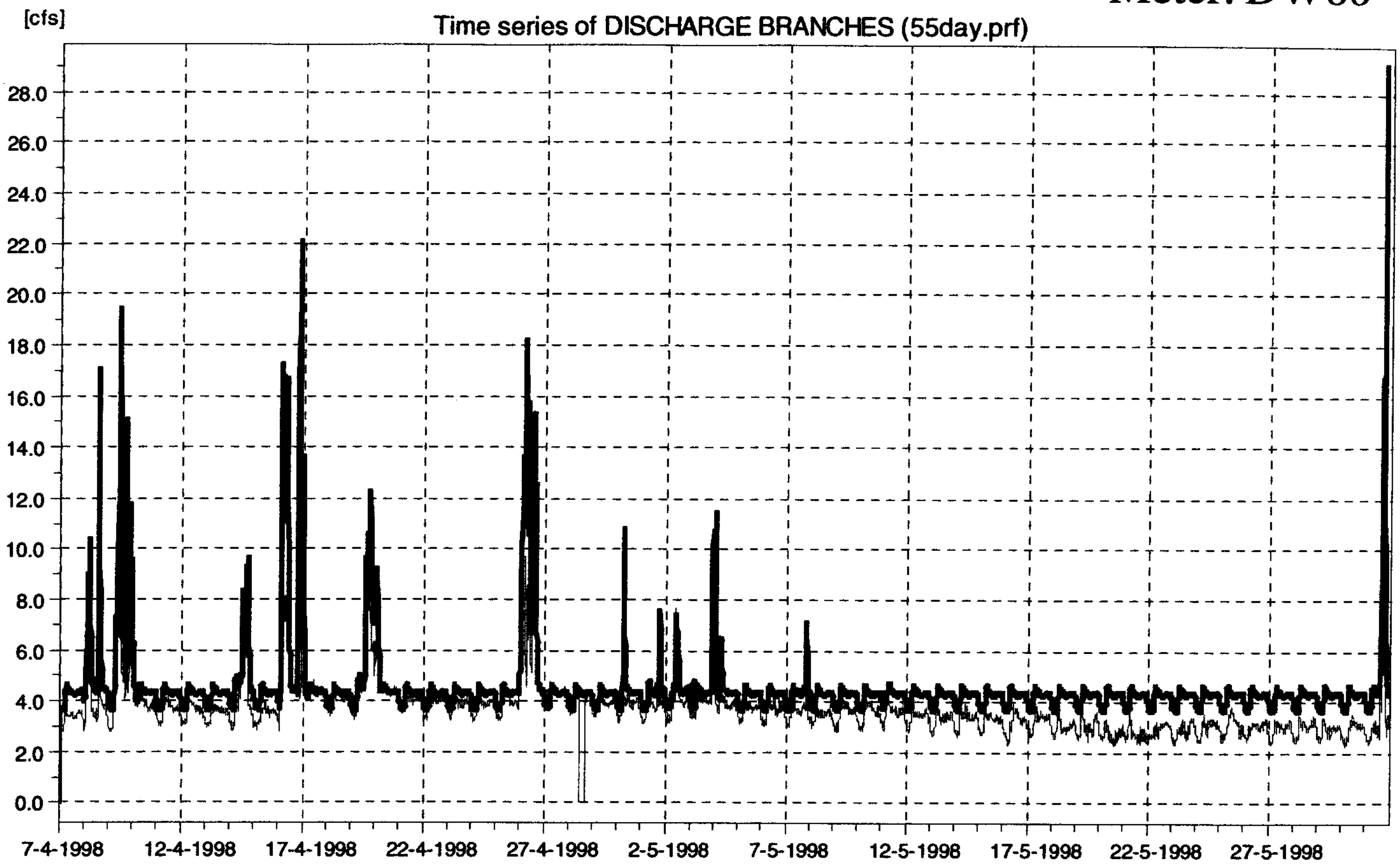
M&E AQUA ALLIANCE Metcalf & Eddy

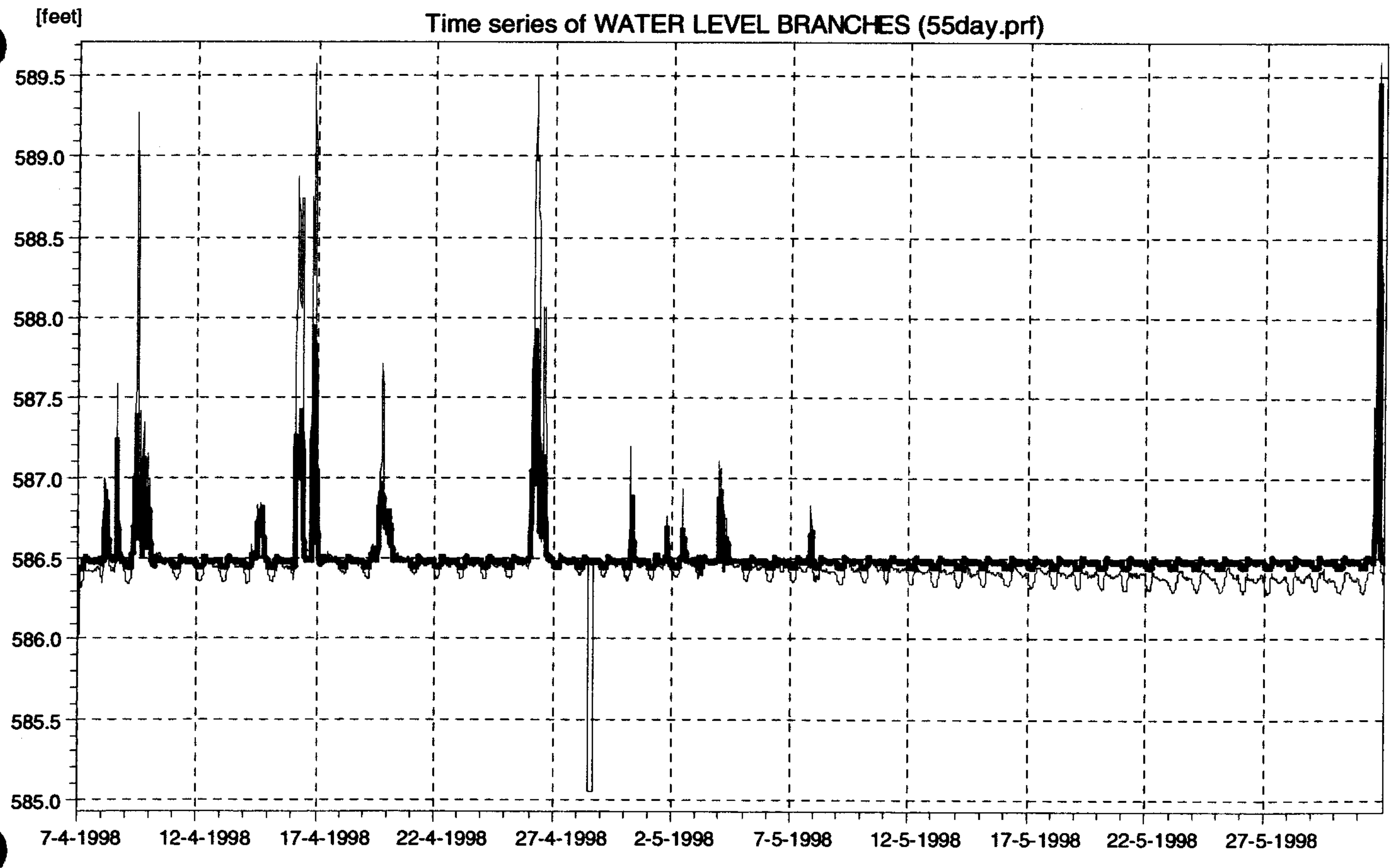
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: DW00





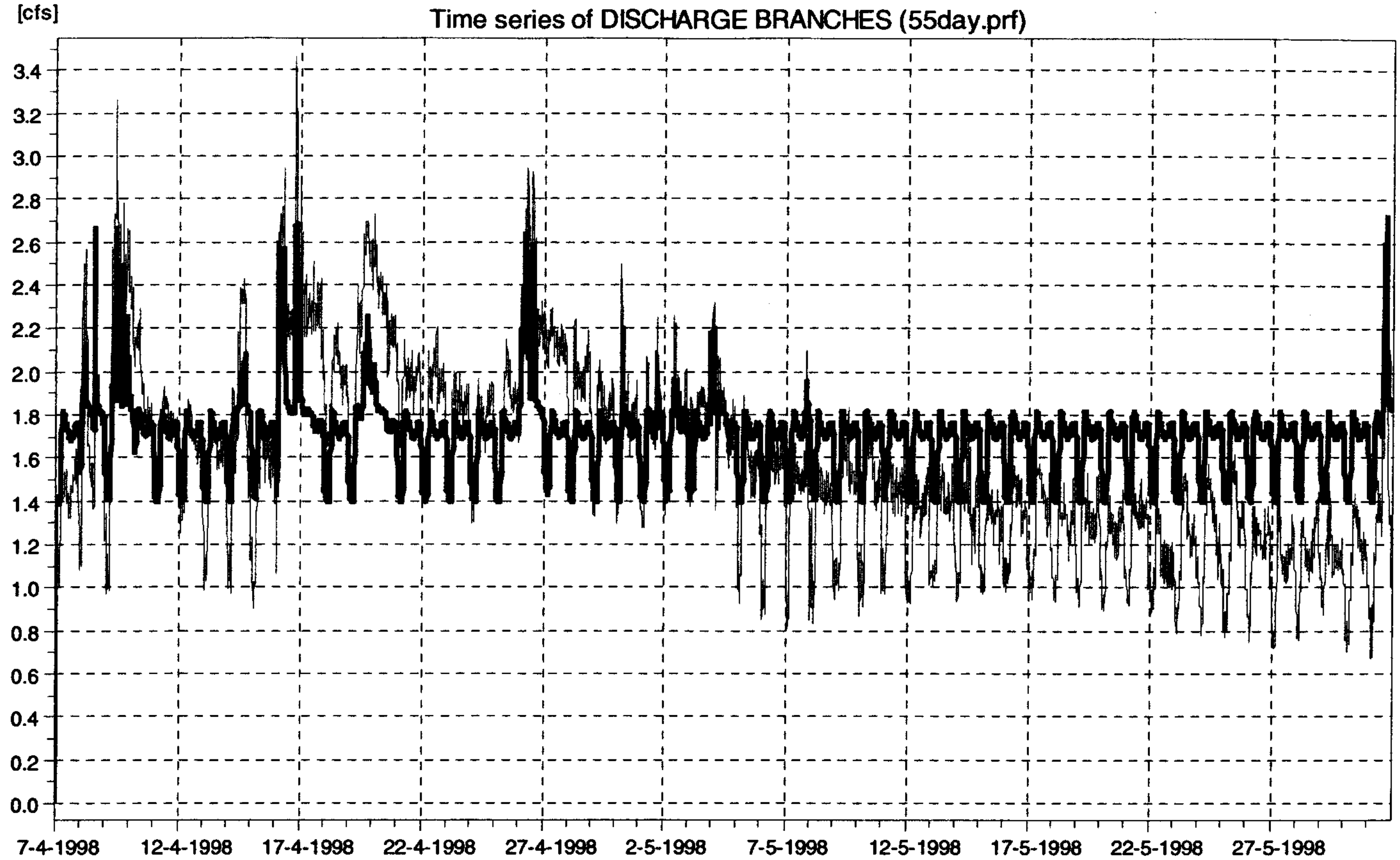
M&E Metcalf & Eddy AQUA ALLIANCE

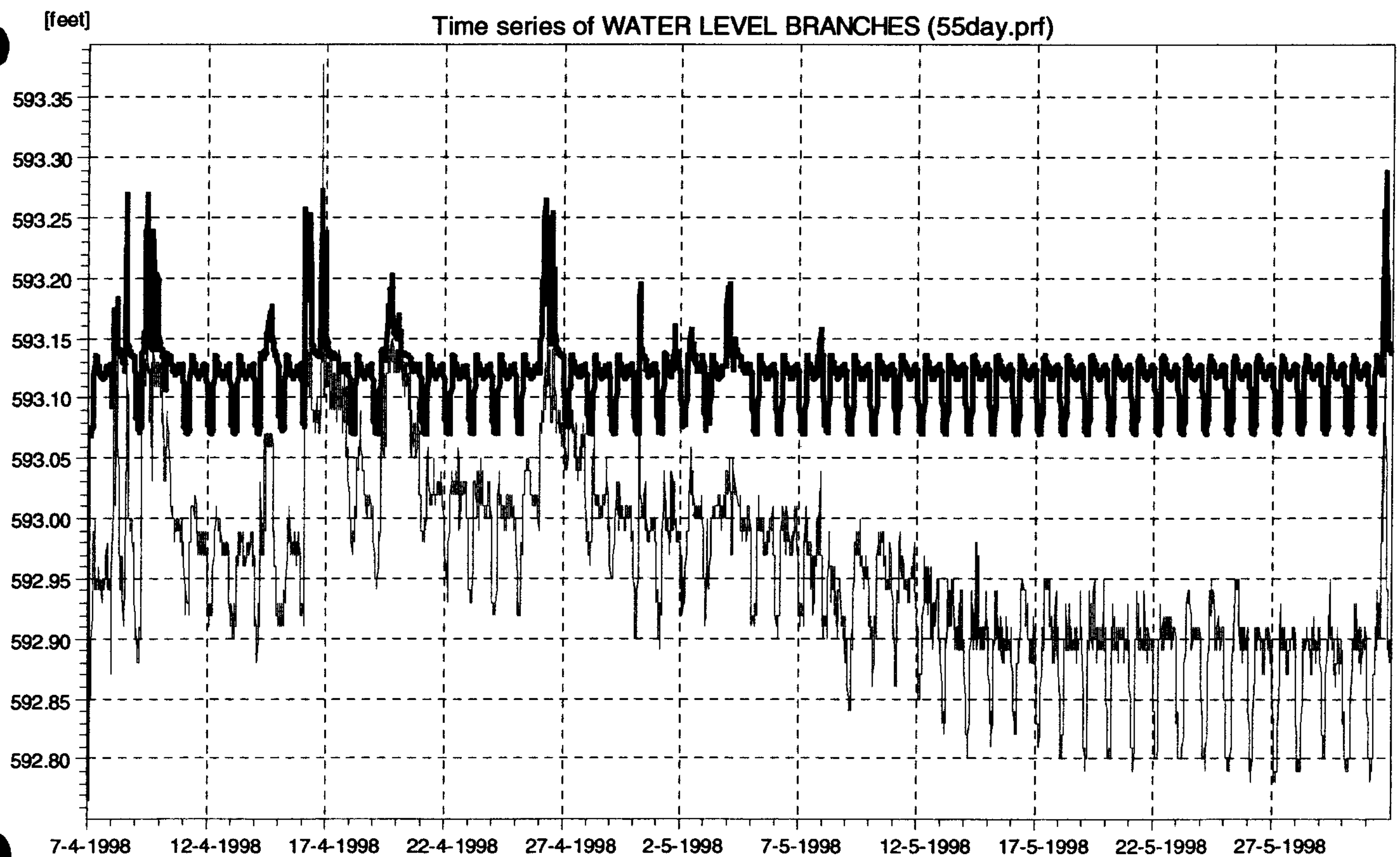
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: DW02D





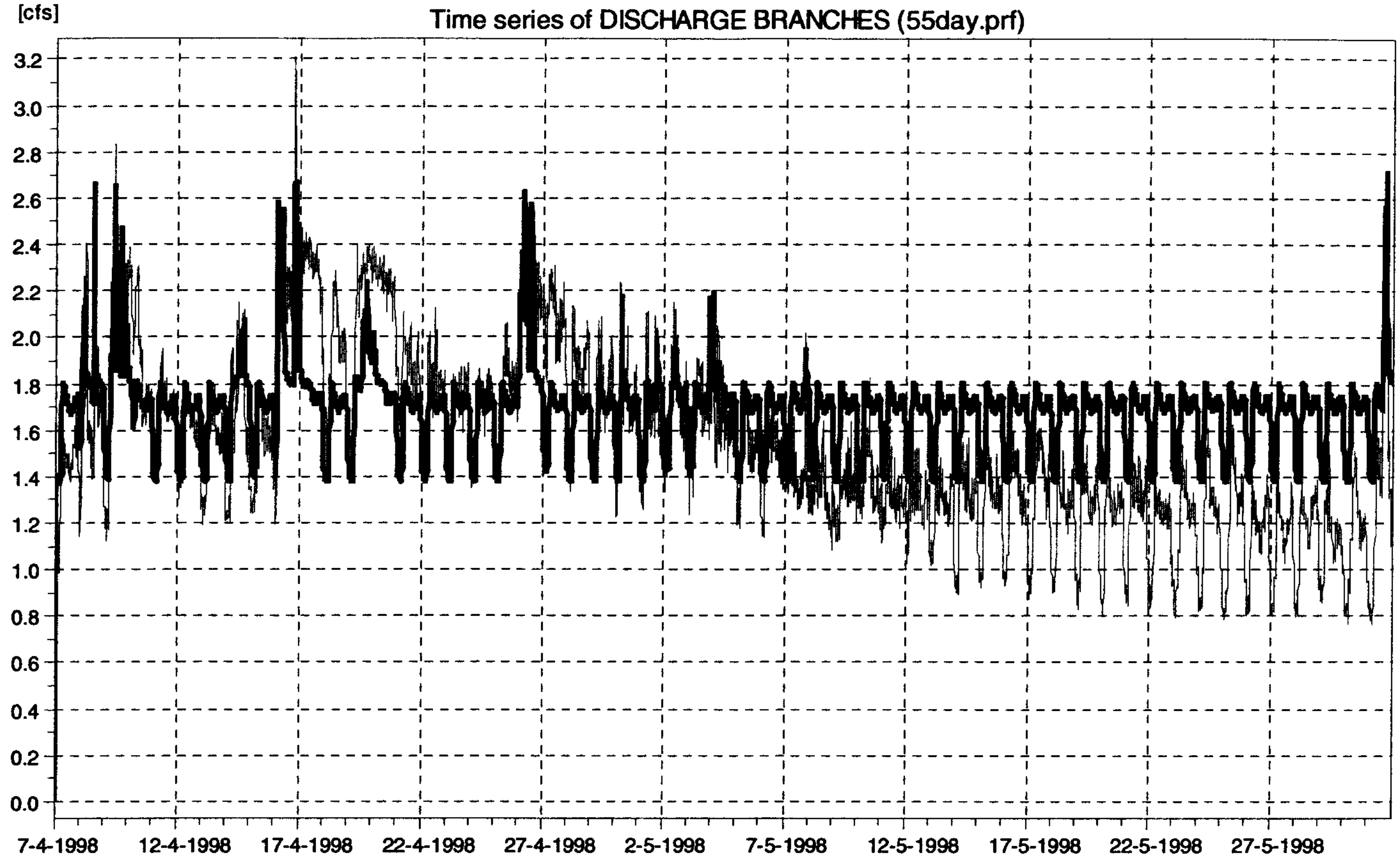
M&E Metcalf & Eddy AQUA ALLIANCE

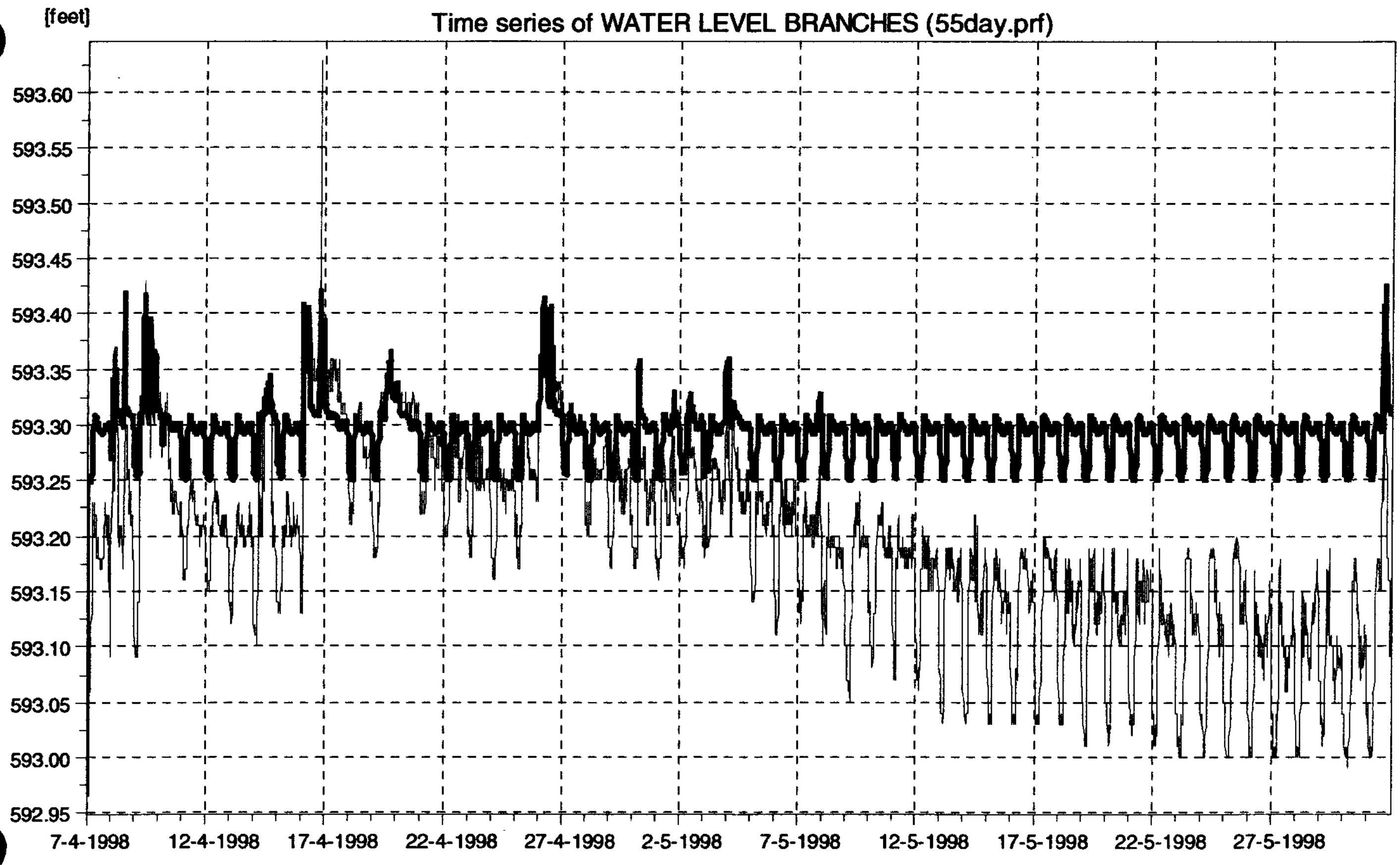
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: DW02I





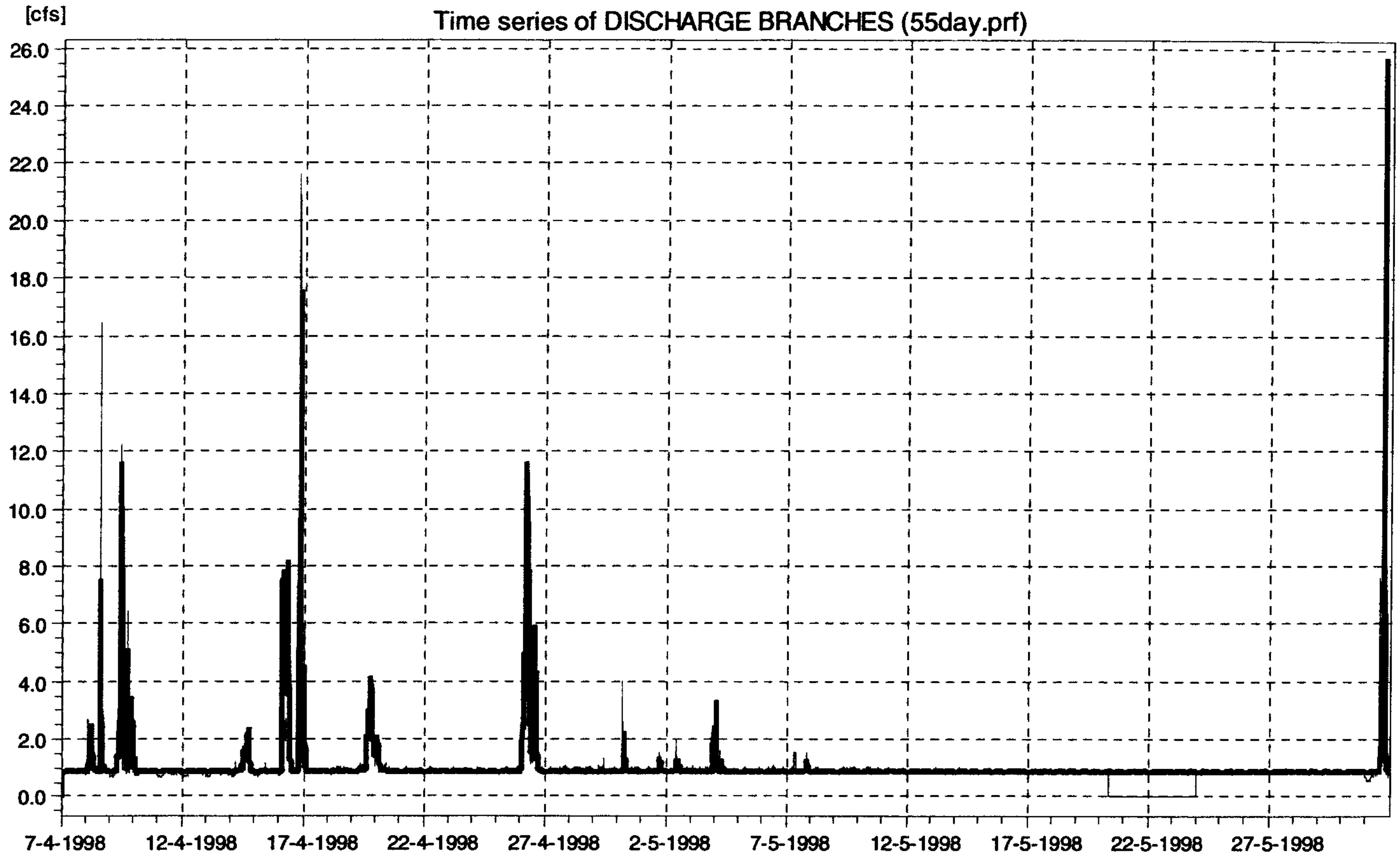
M&E Metcalf & Eddy AQUA ALLIANCE

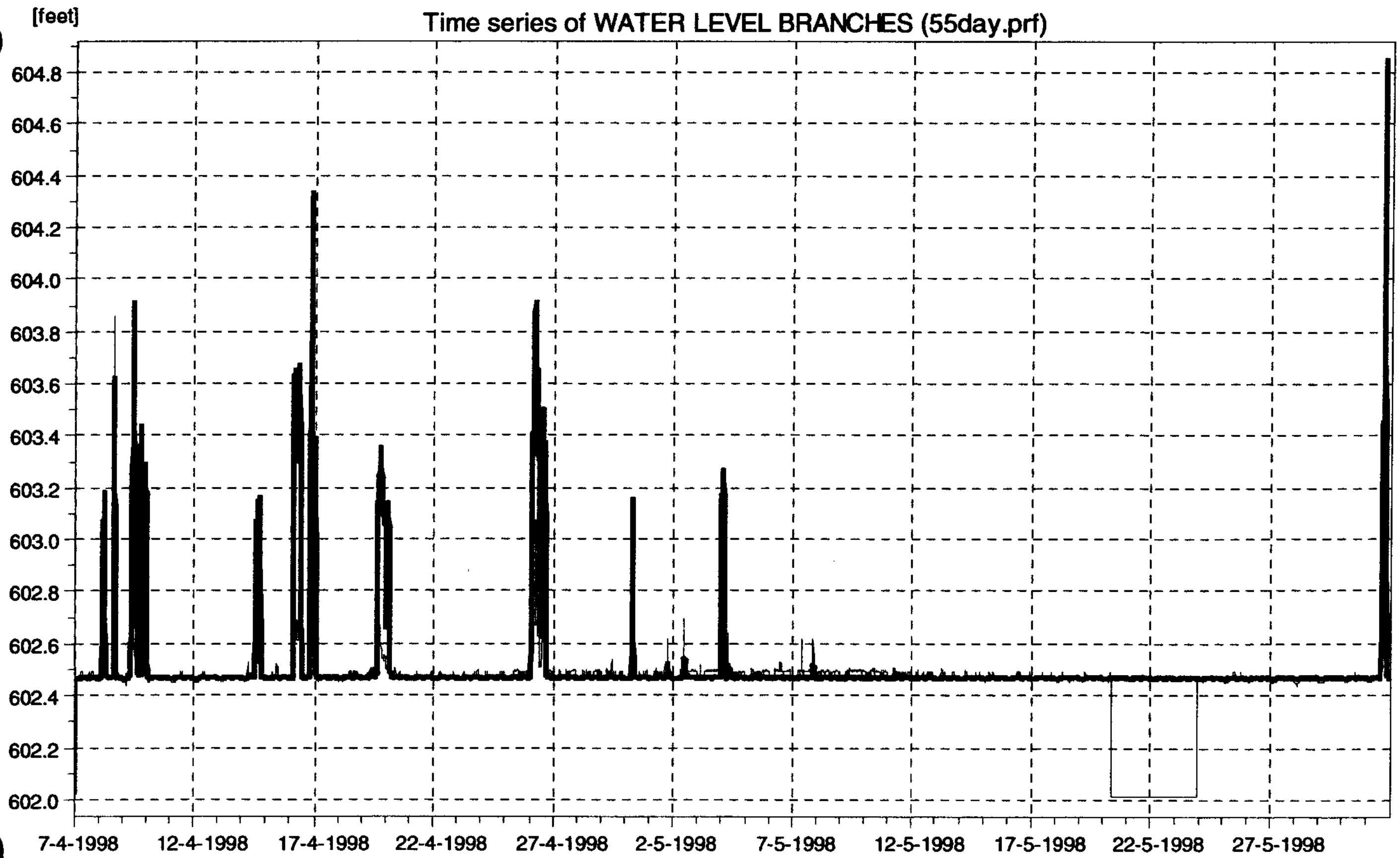
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: DW03I





M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

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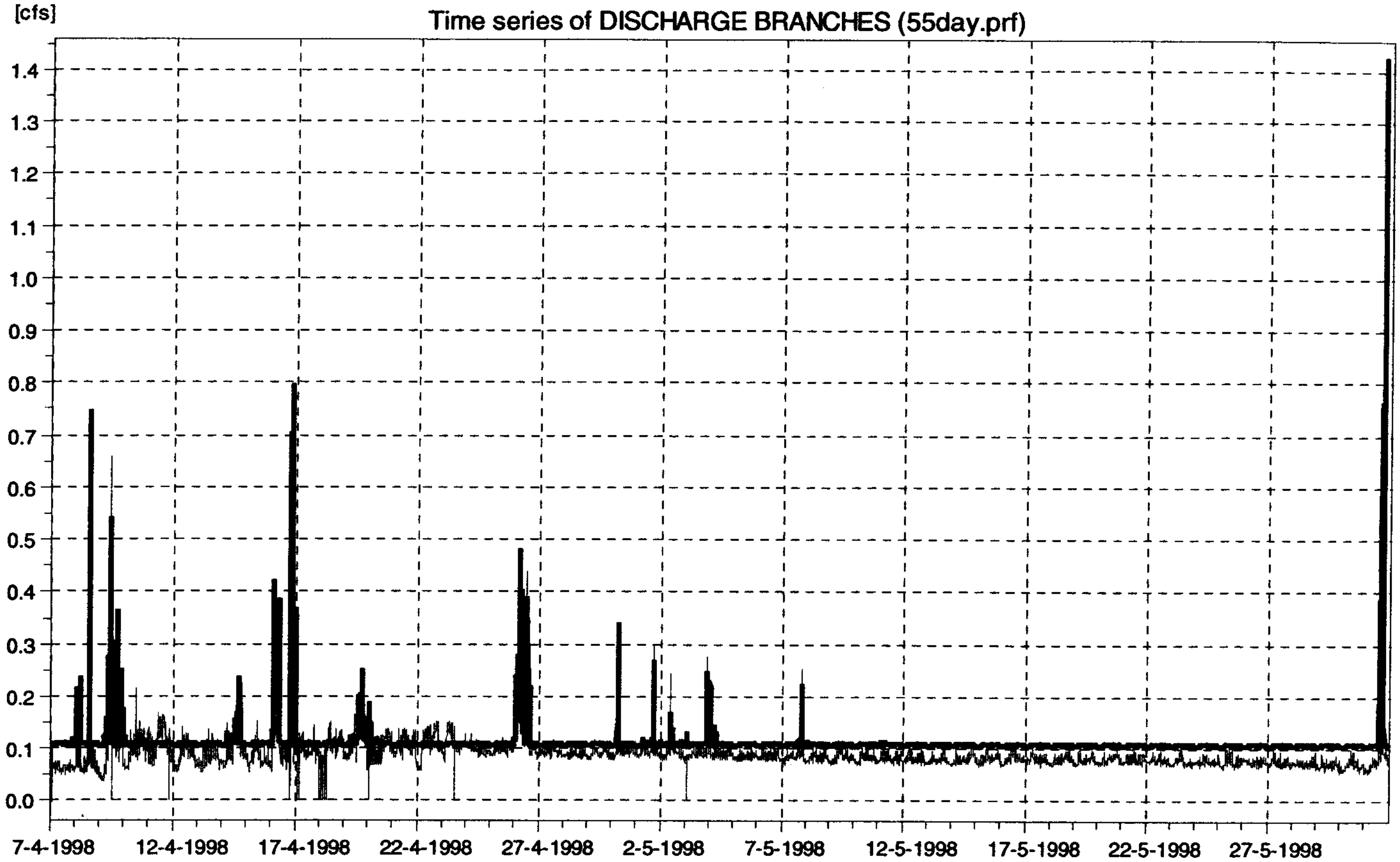

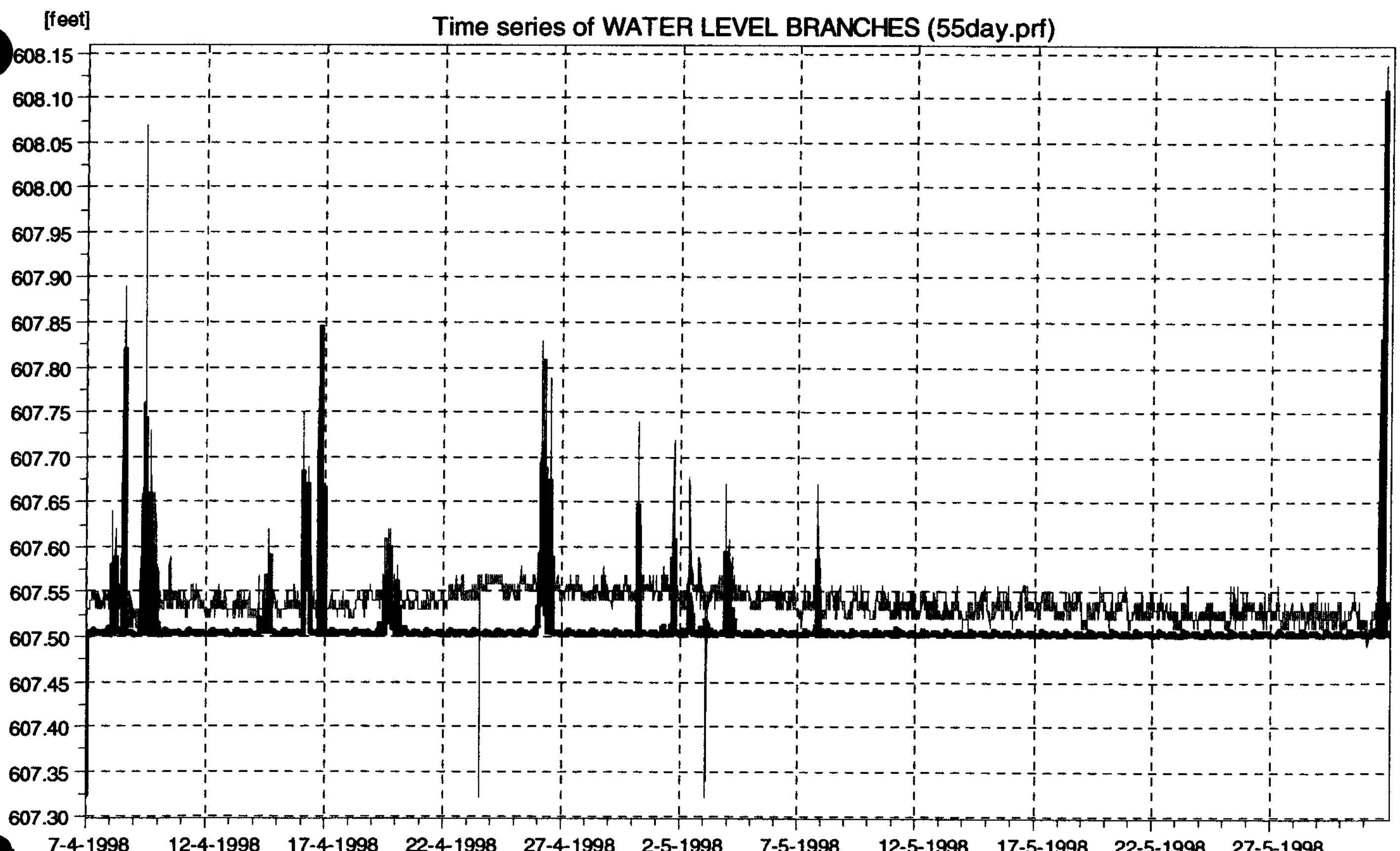

M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

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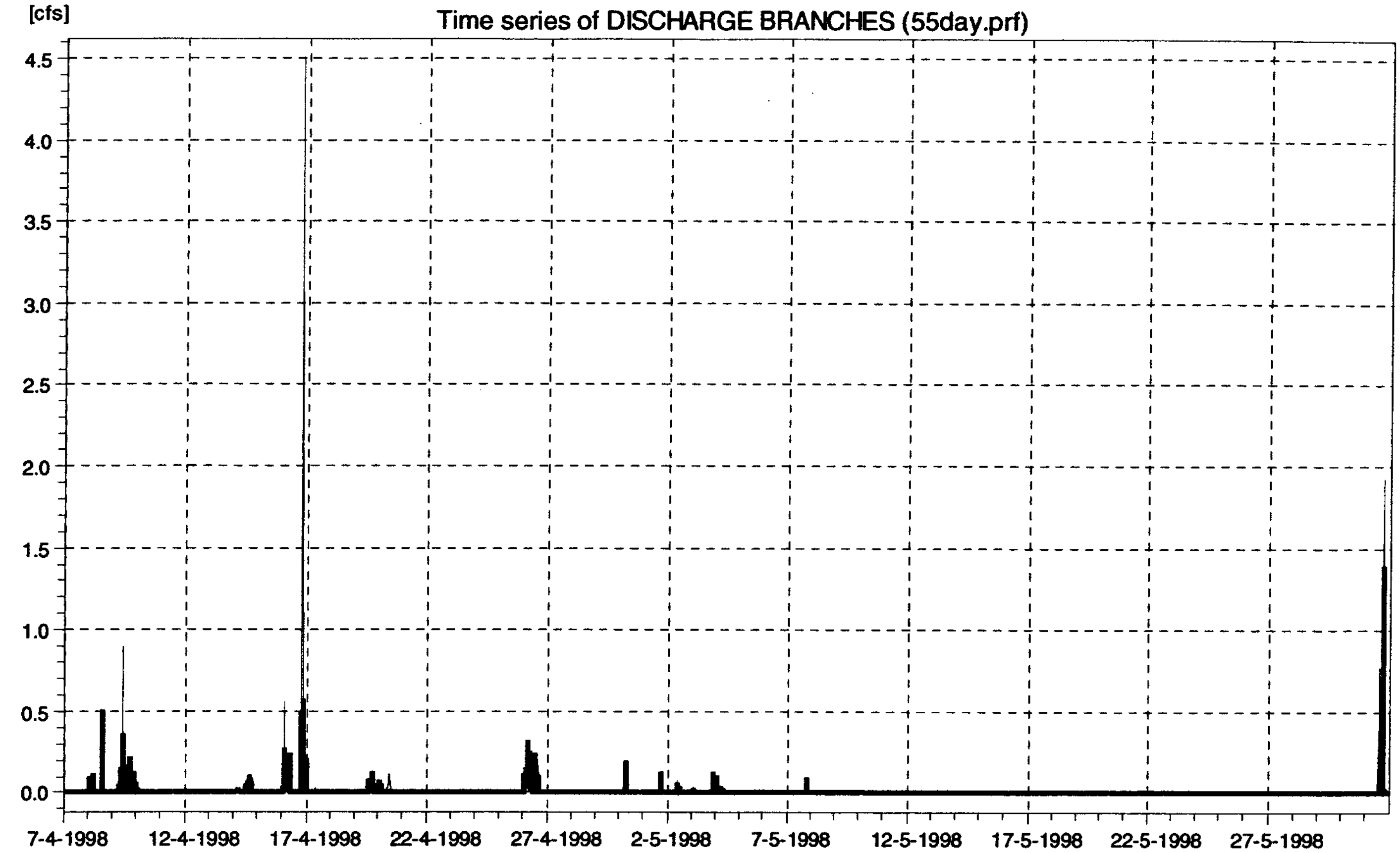
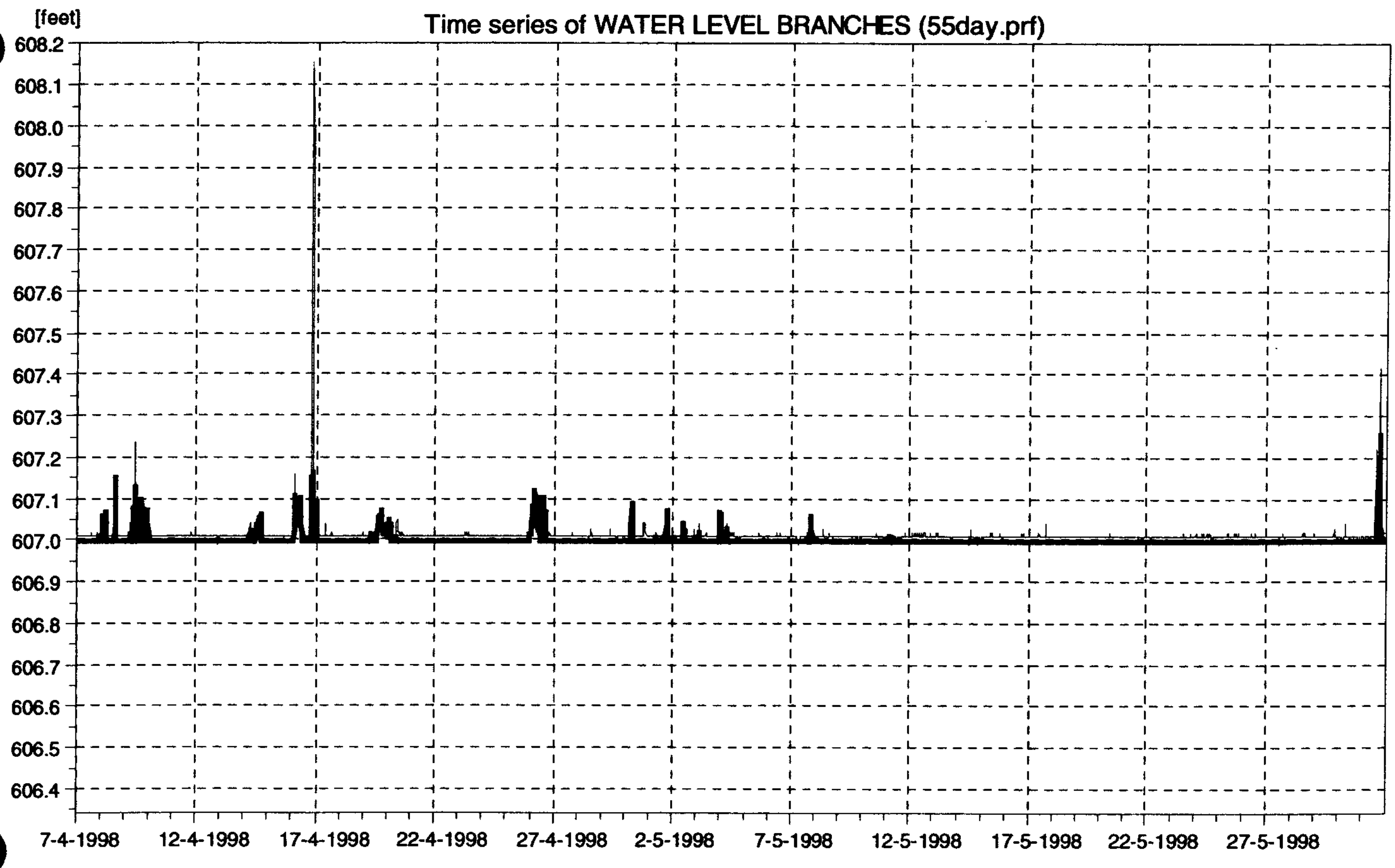




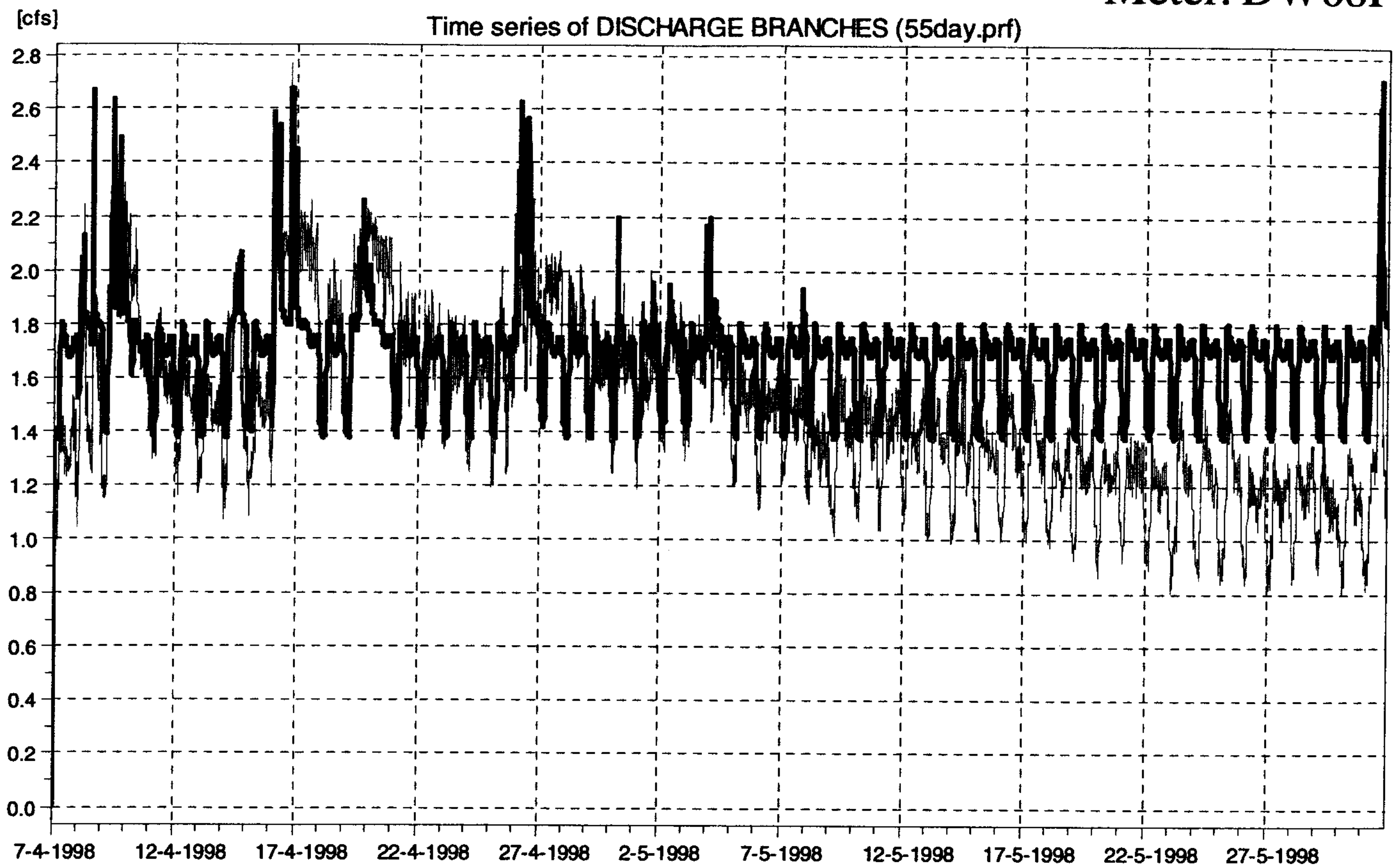
M&E AQUA ALLIANCE Metcalf & Eddy

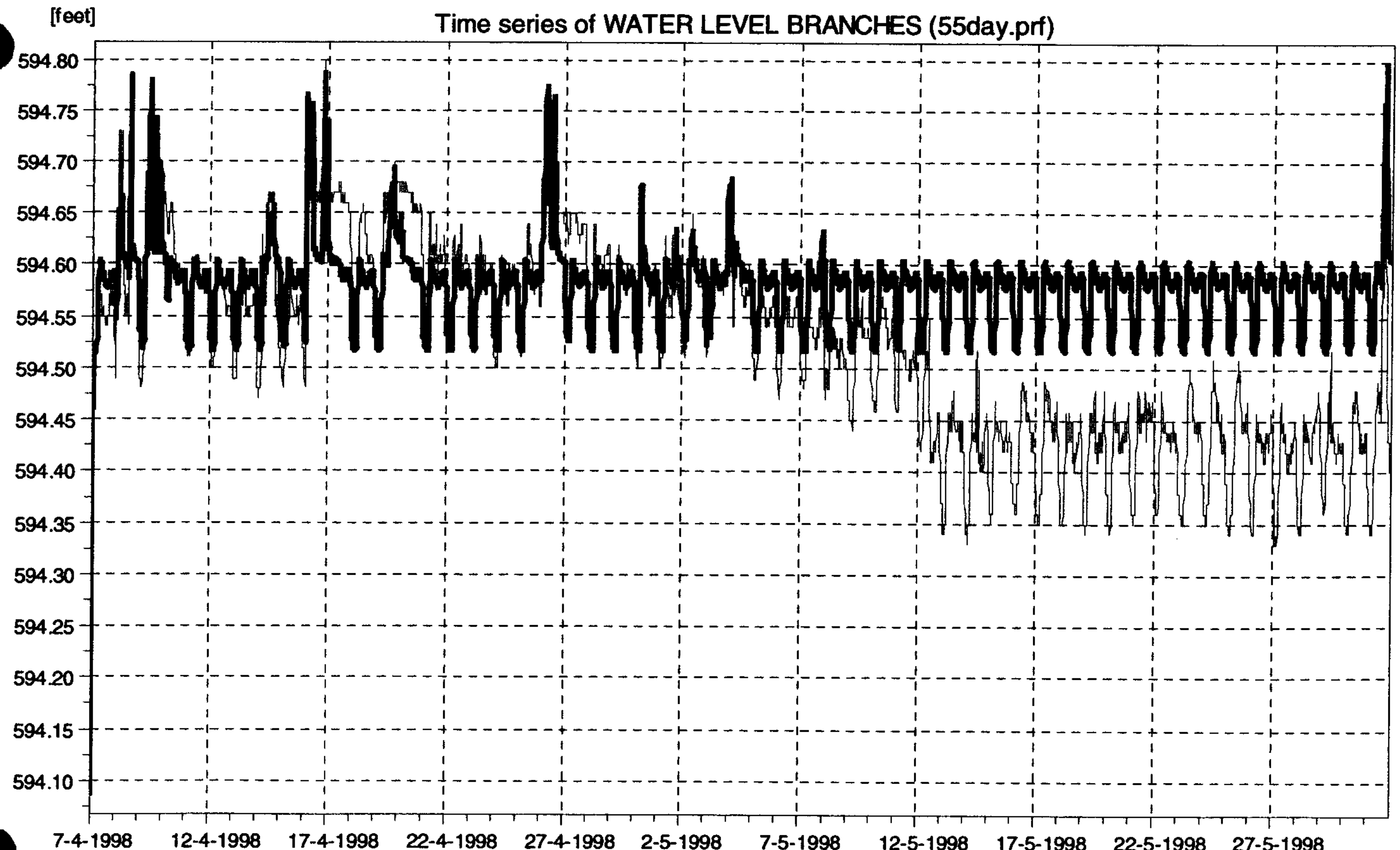
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: DW08I





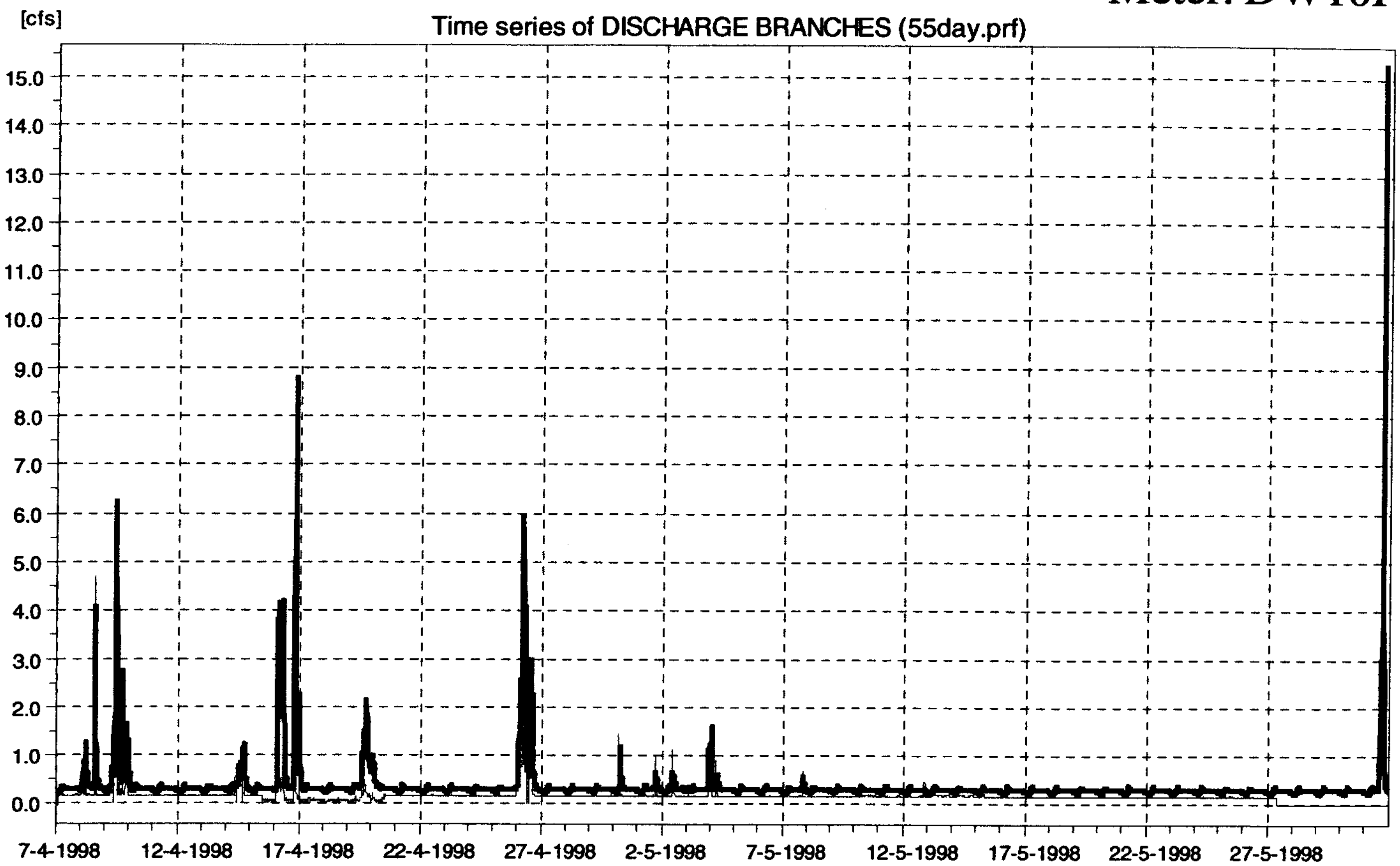
M&E Metcalf & Eddy AQUA ALLIANCE

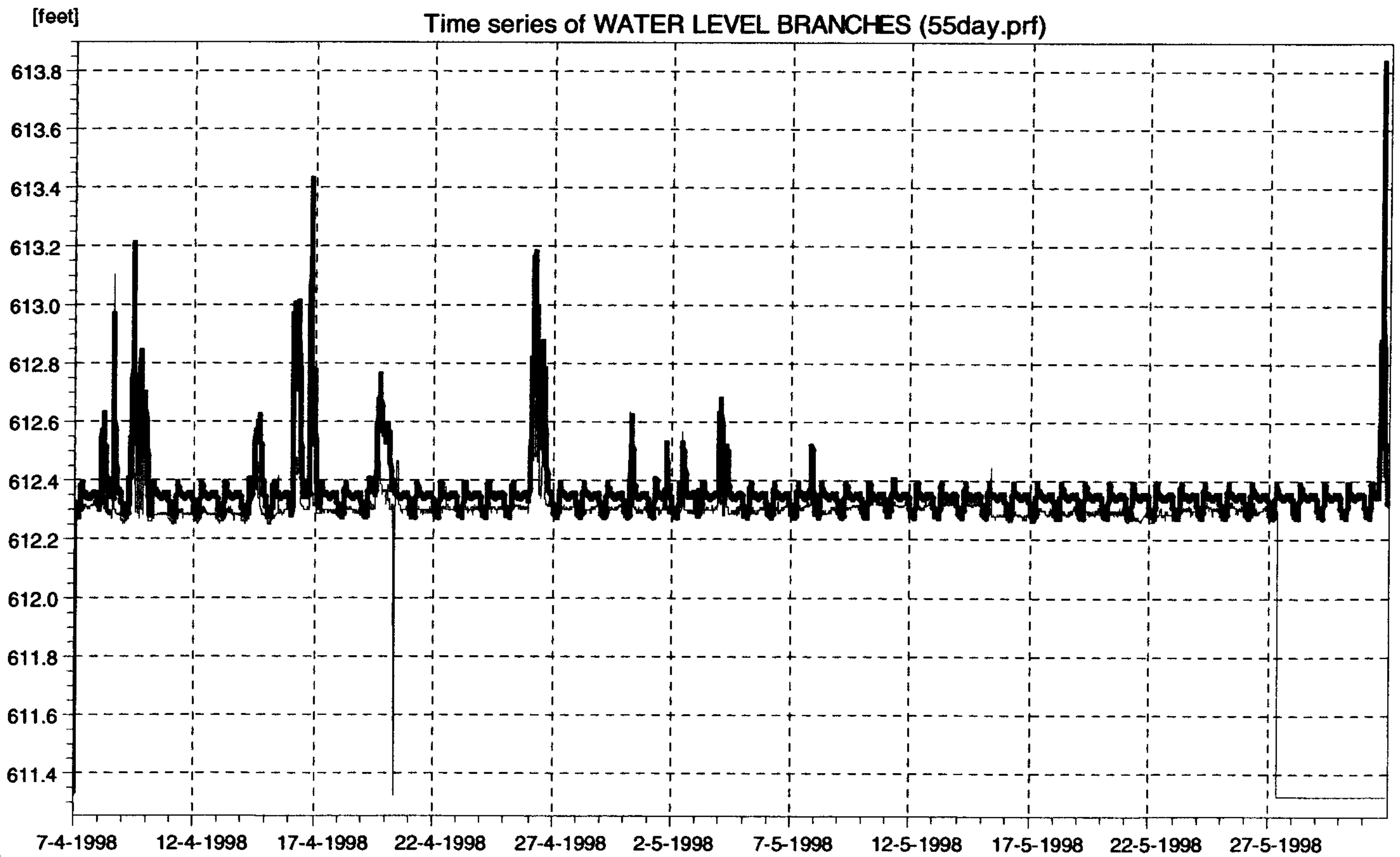
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: DW10I





M&E AQUA ALLIANCE Metcalf & Eddy

Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

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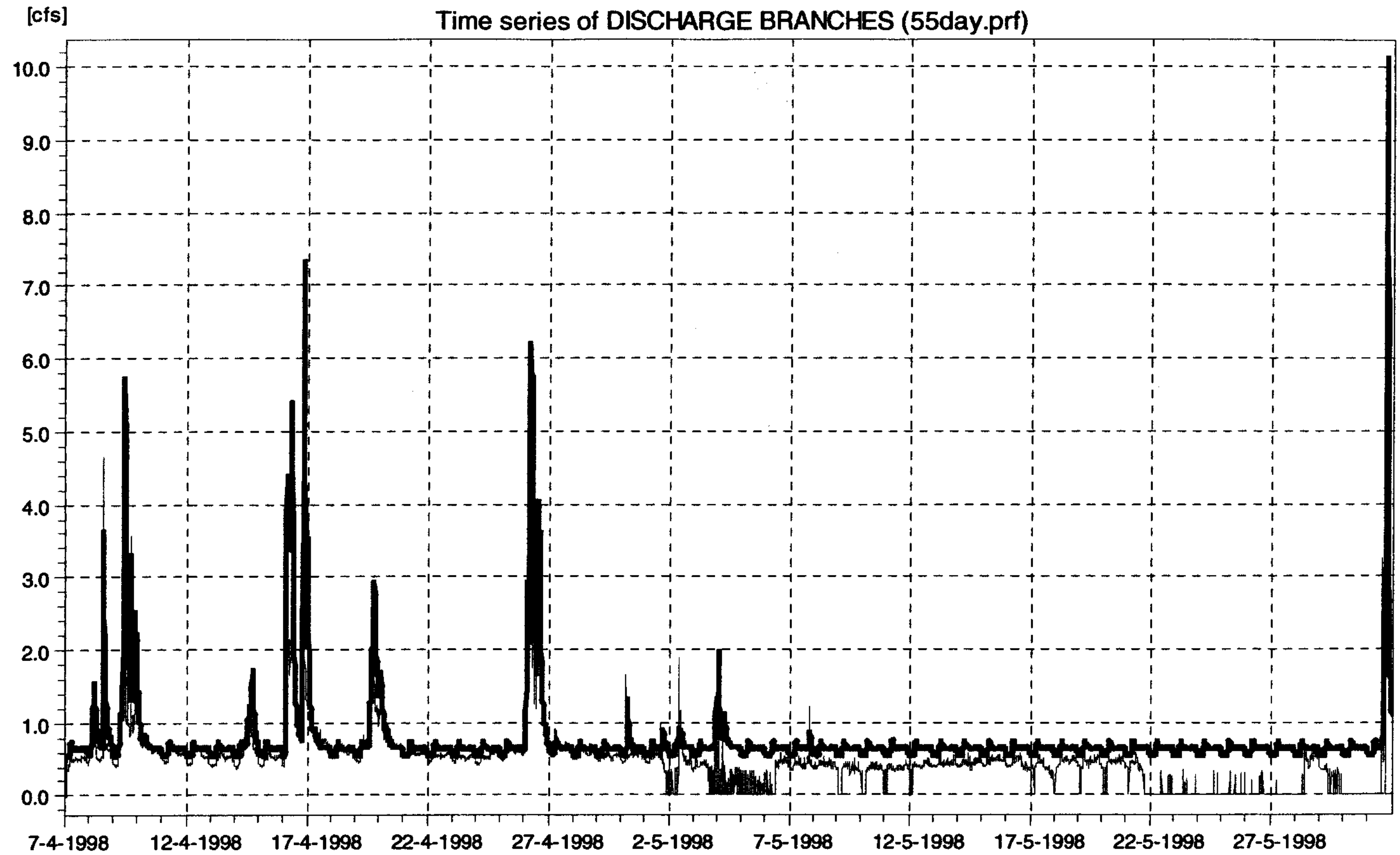
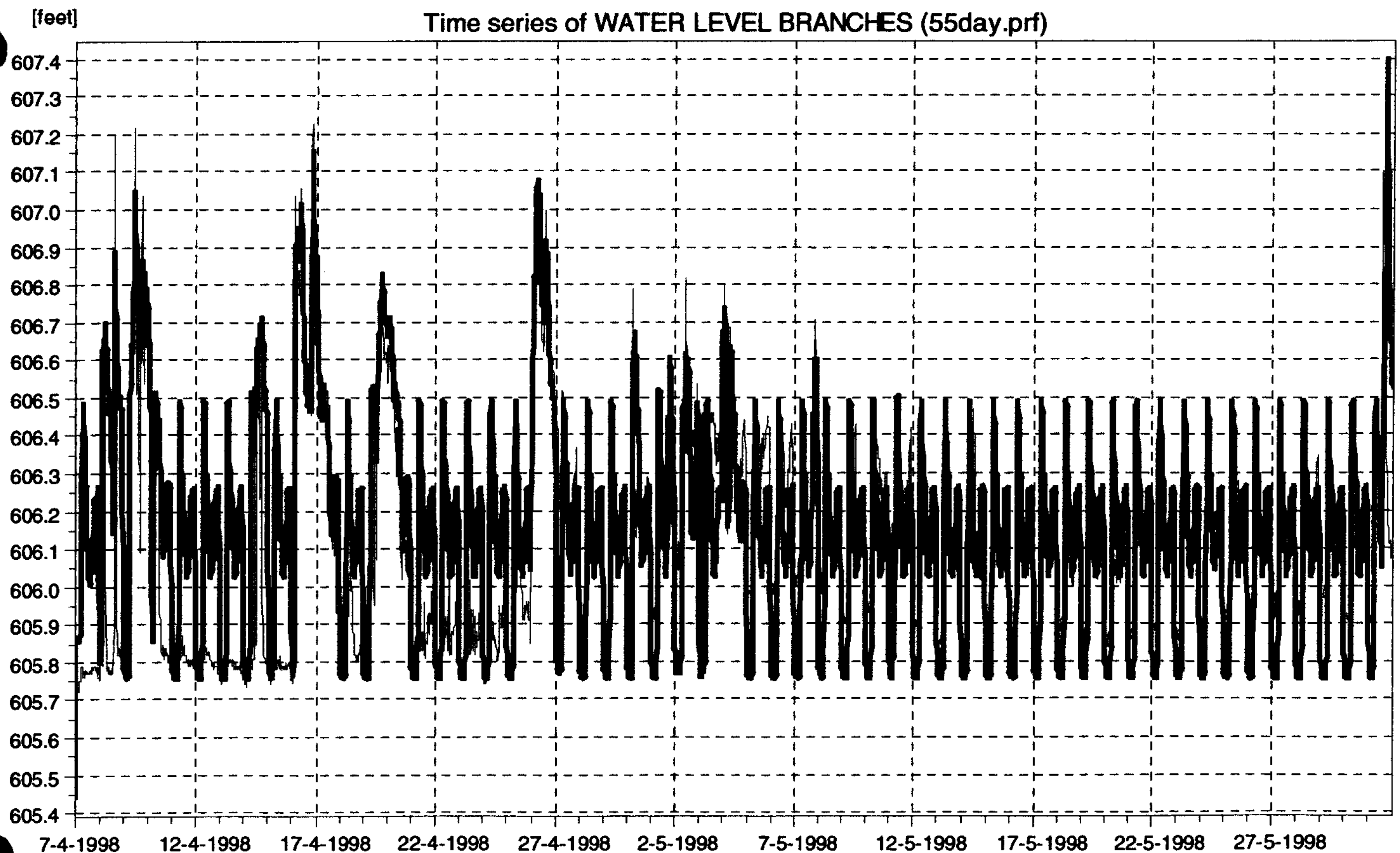




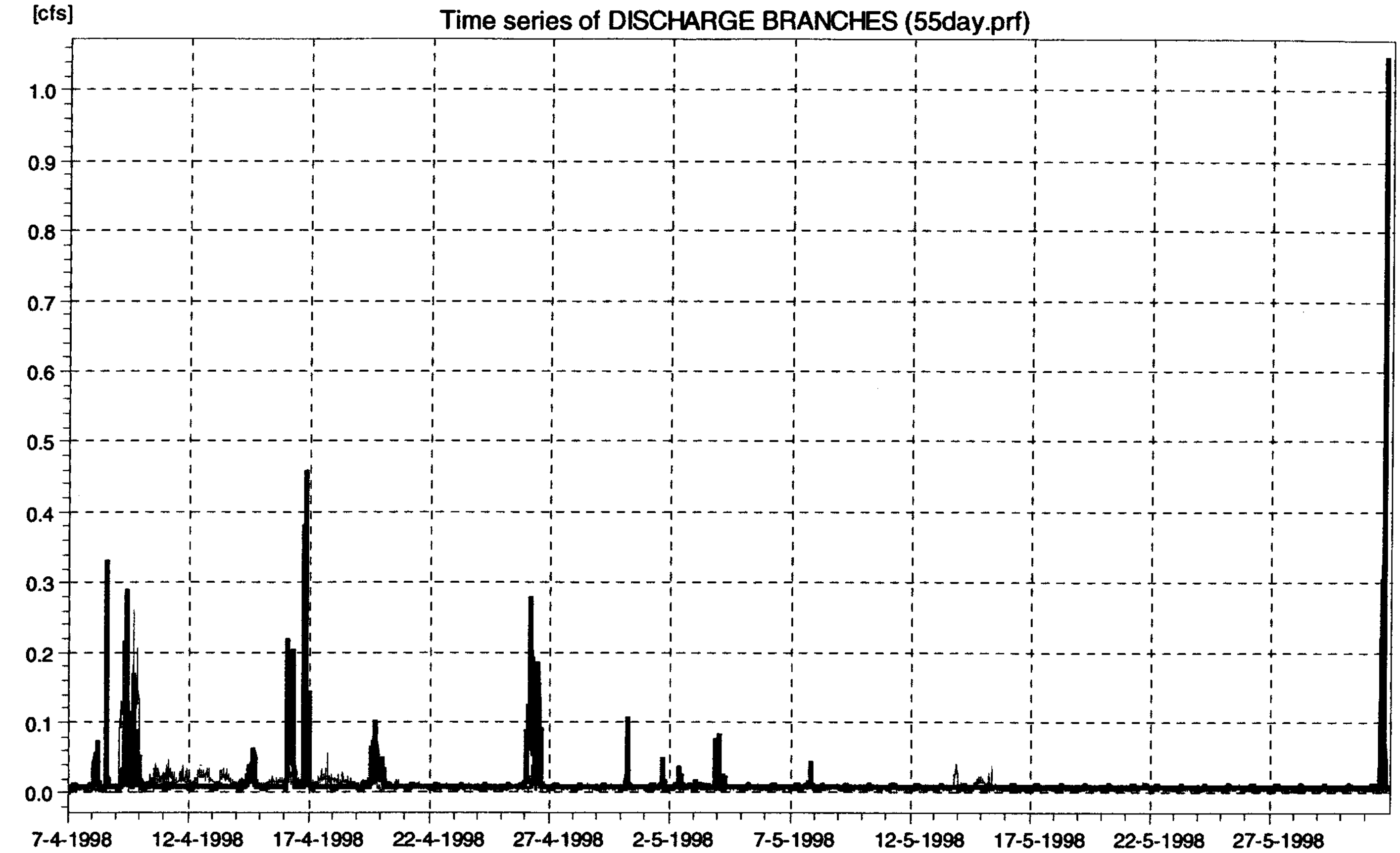
M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: DW14I



[cfs]
Time series of DISCHARGE BRANCHES (55day.prf)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
7-5-1998
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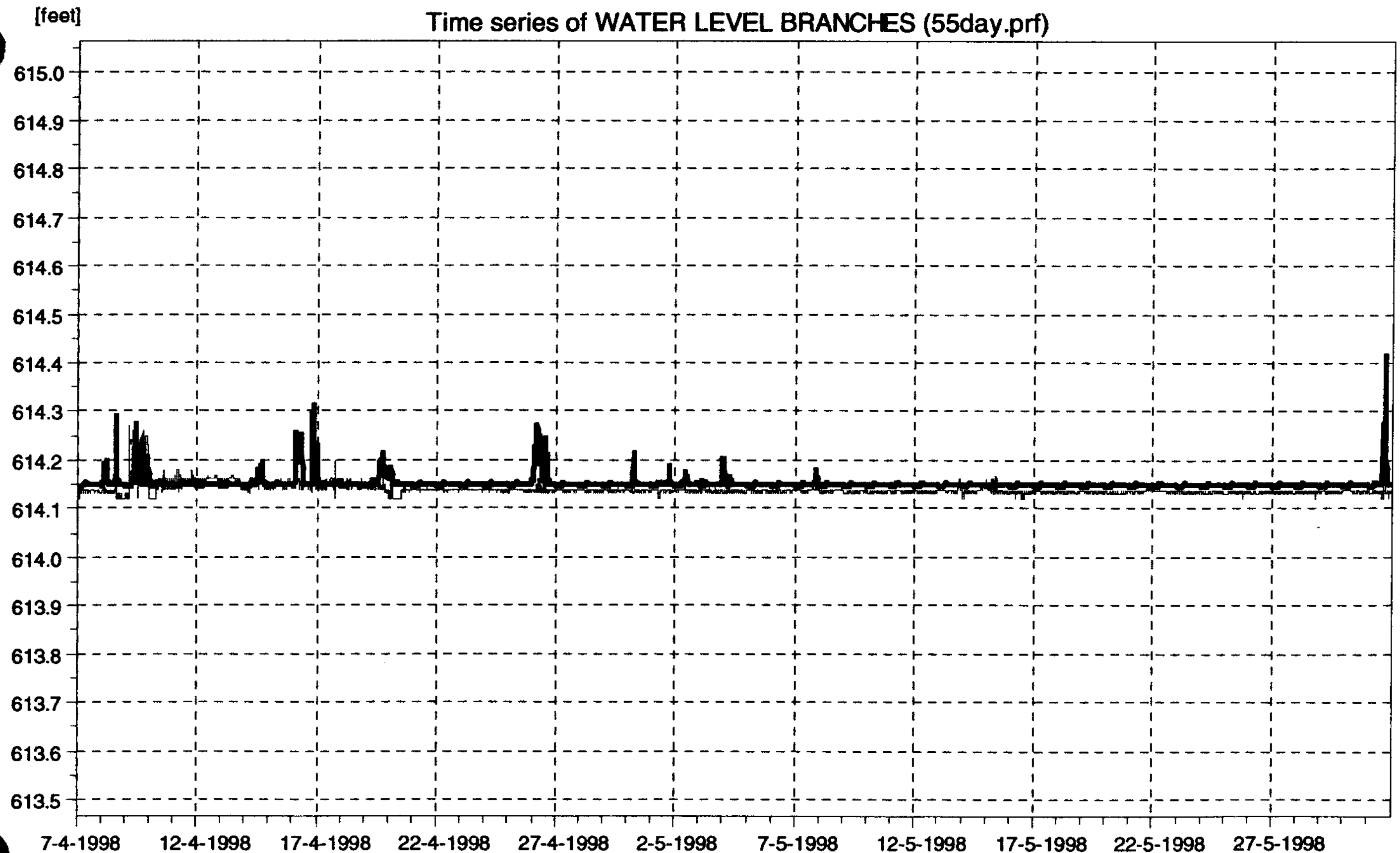
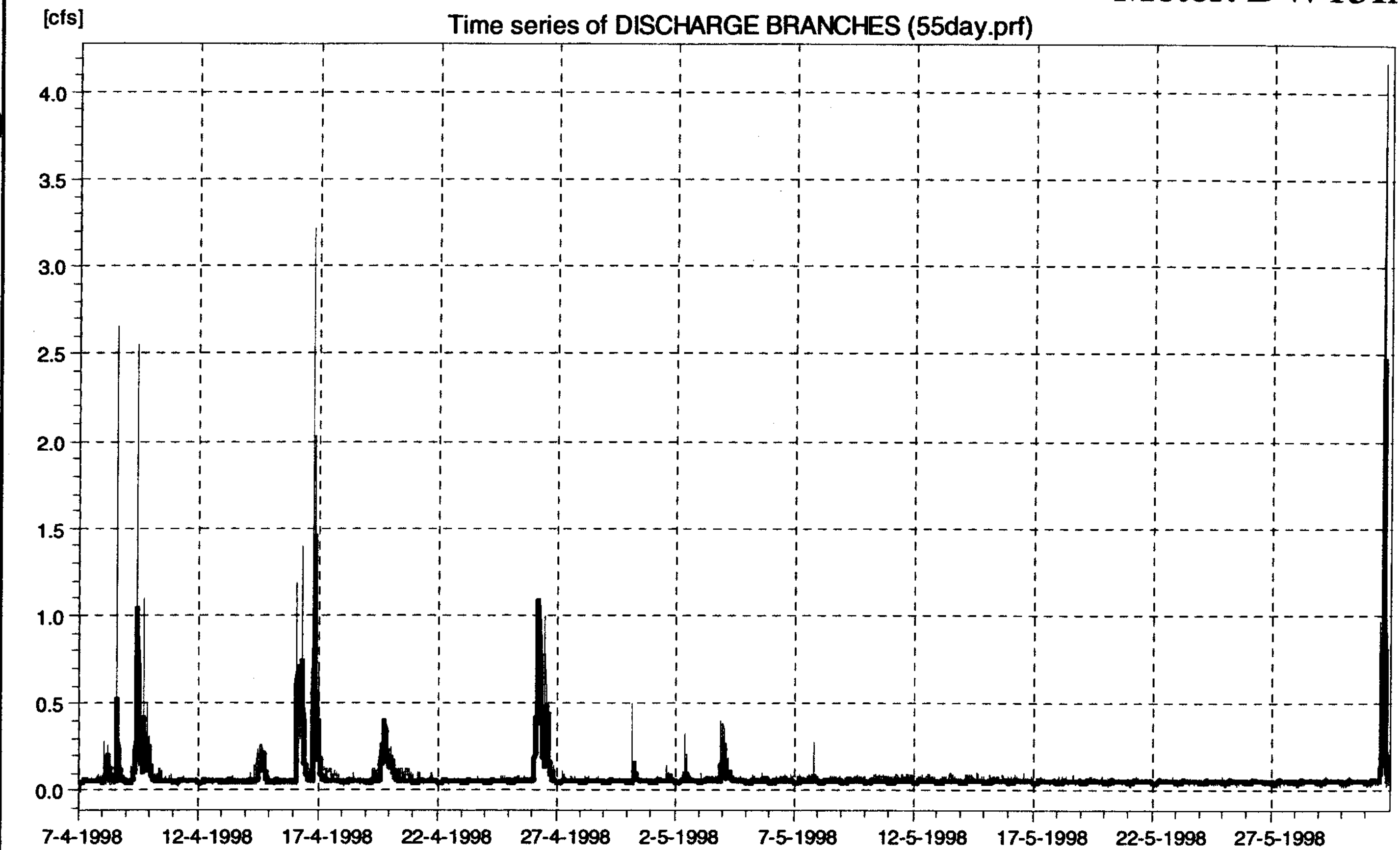
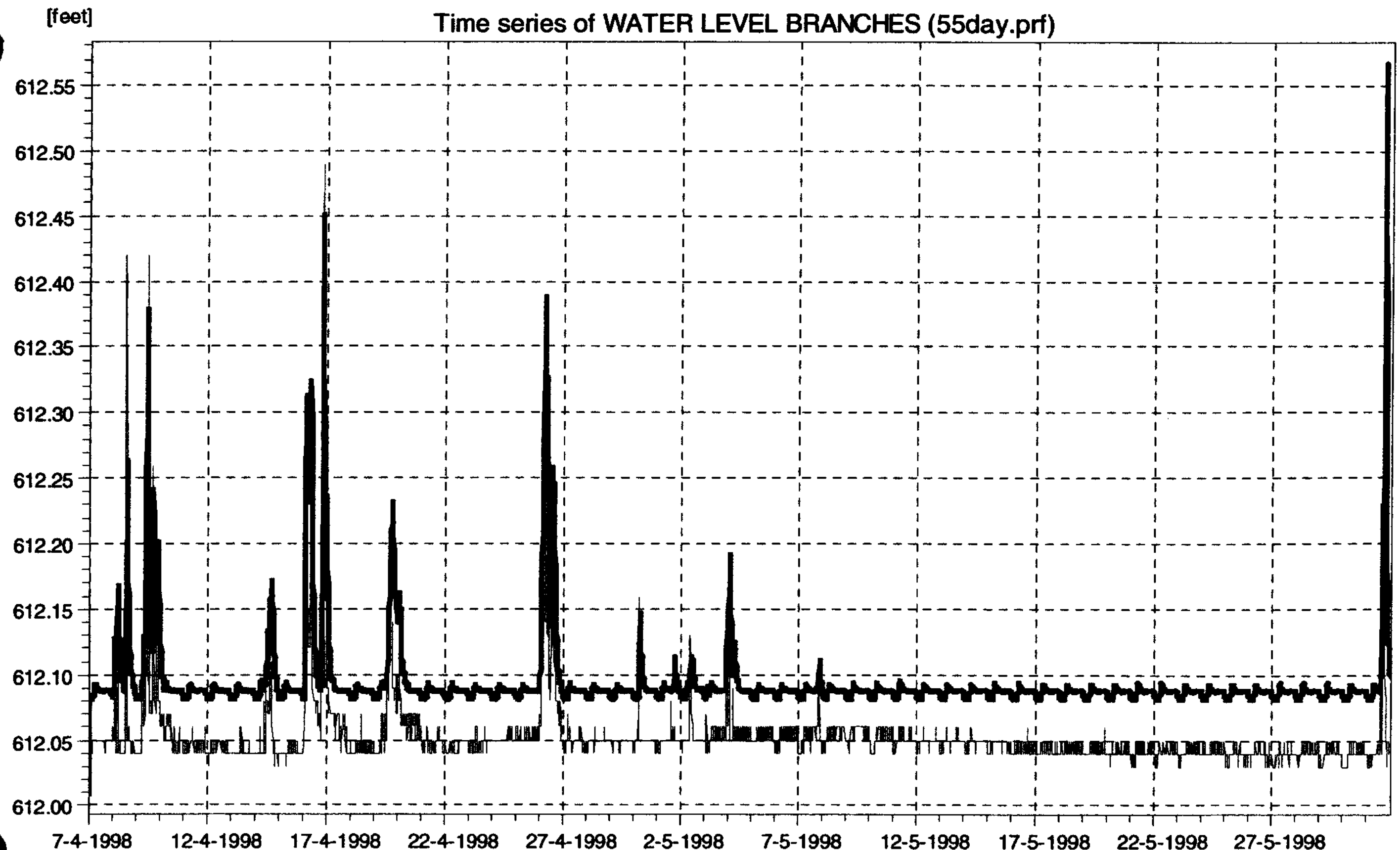
22-5-1998
27-5-1998



[feet]
Time series of WATER LEVEL BRANCHES (55day.prf)
615.0
614.9
614.8
614.7
614.6
614.5
614.4
614.3
614.2
614.1
614.0
613.9
613.8
613.7
613.6
613.5
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
7-5-1998
12-5-1998
17-5-1998
22-5-1998
27-5-1998

Meter: DW15IA





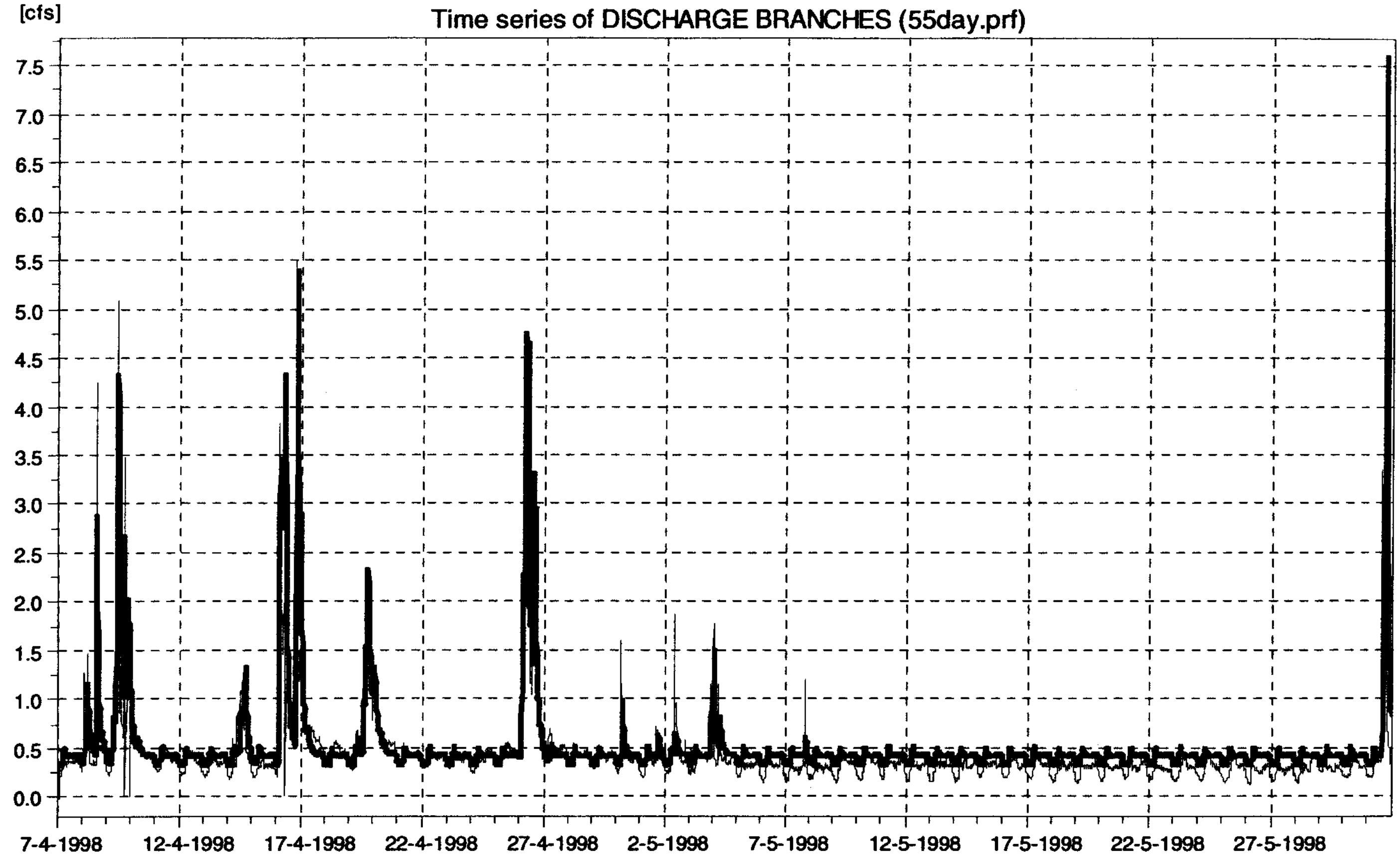
Metcalf & Eddy

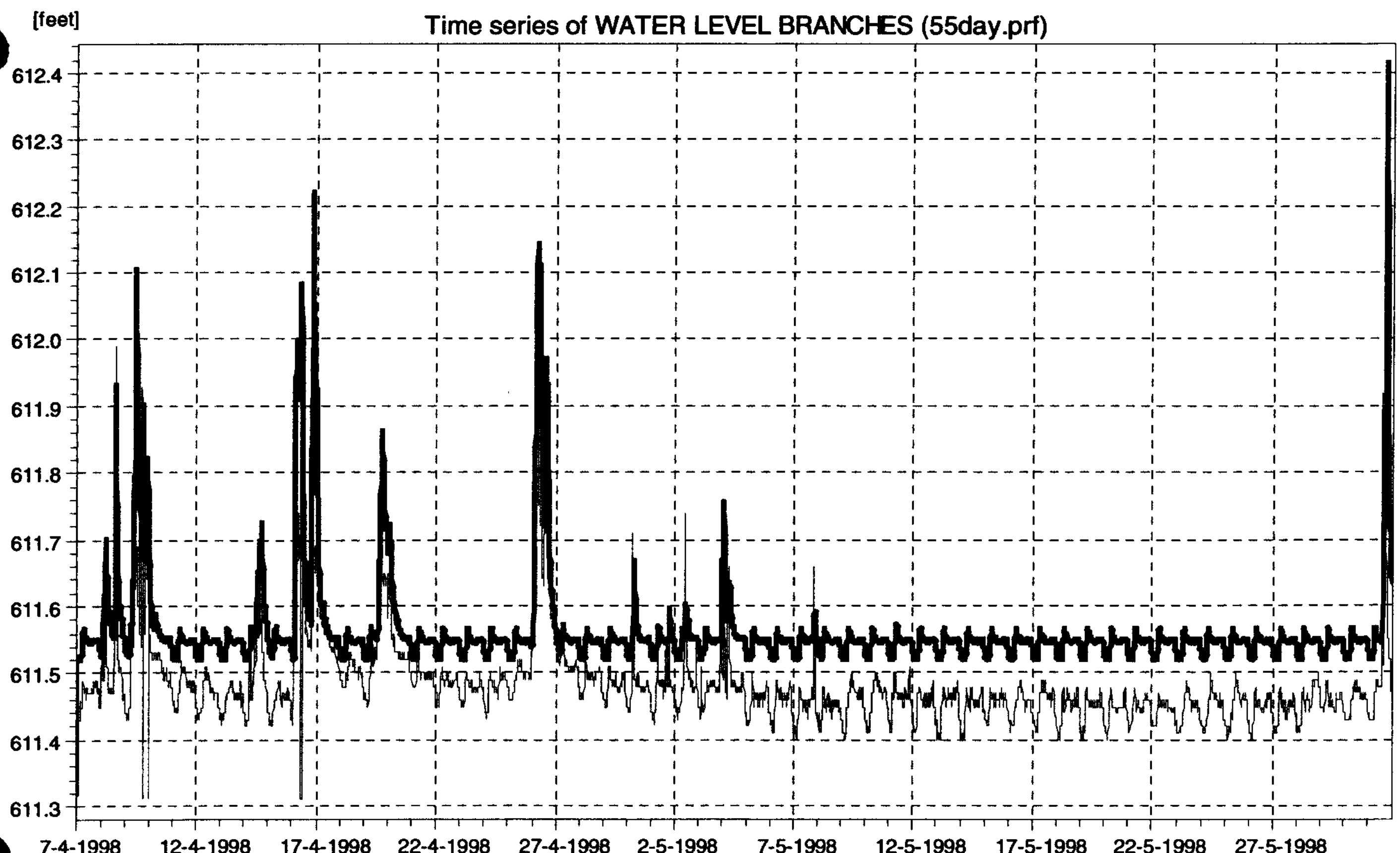
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: DW15IB





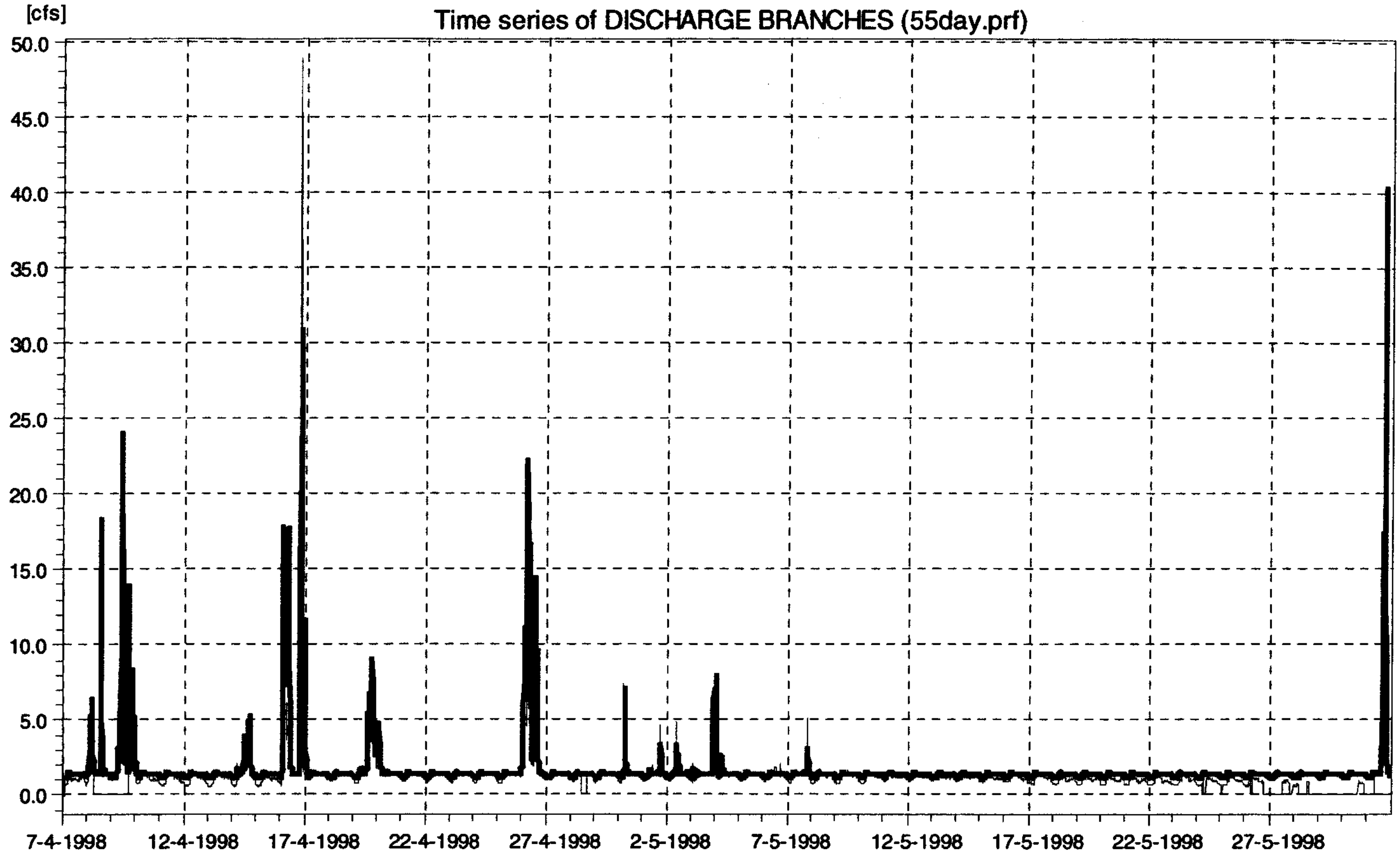
M&E Metcalf & Eddy AQUA ALLIANCE

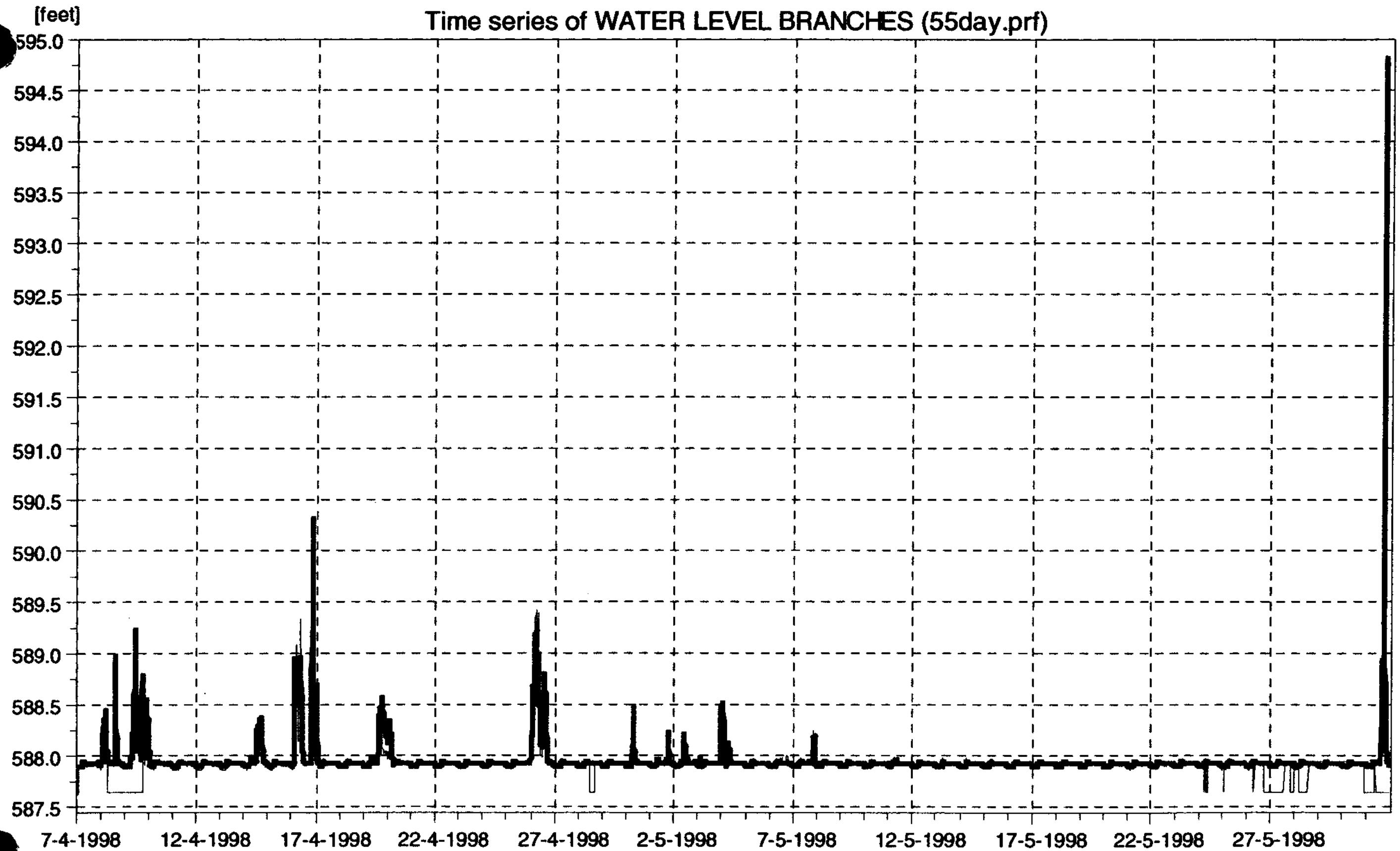
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: DW19I





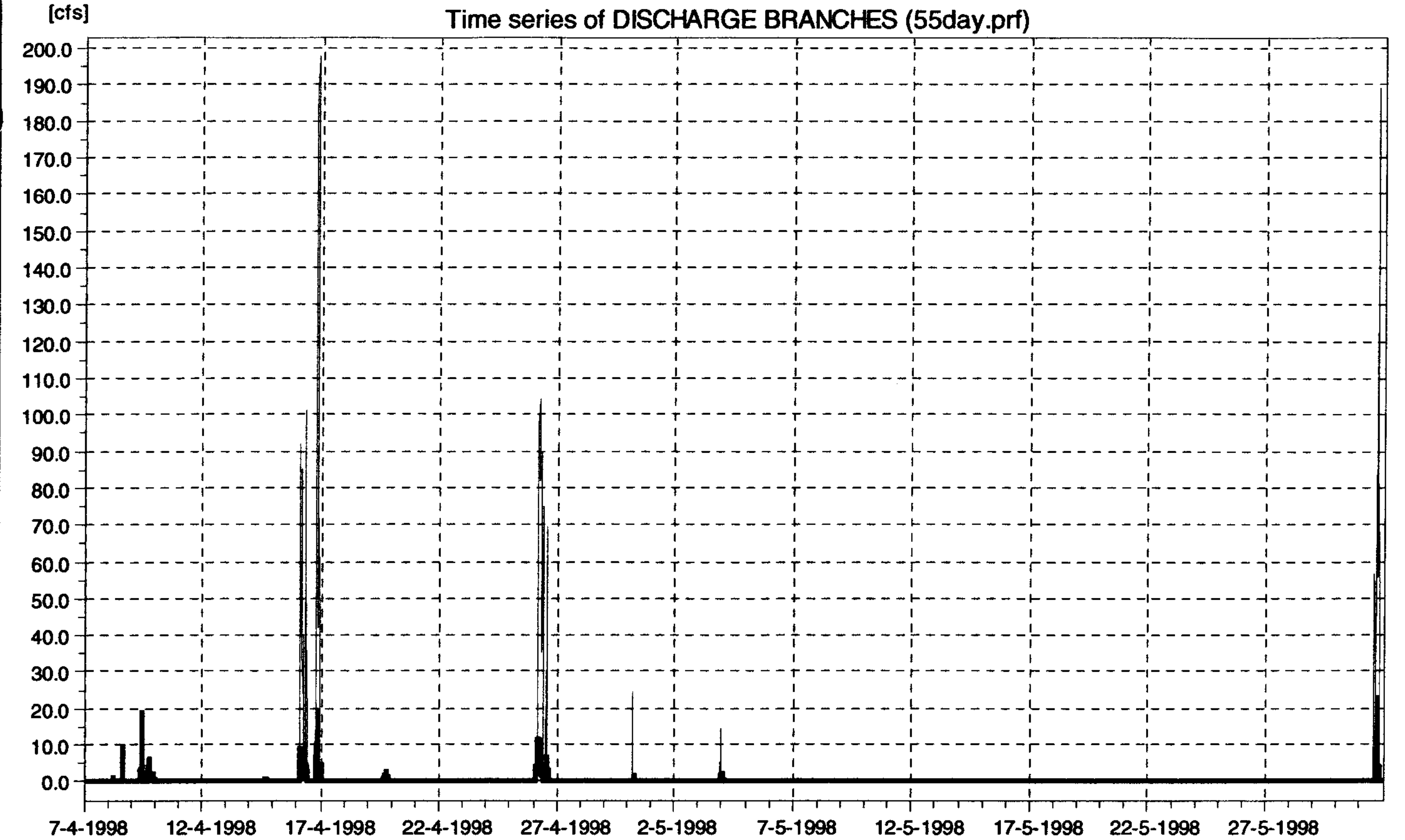
M&E Metcalf & Eddy AQUA ALLIANCE

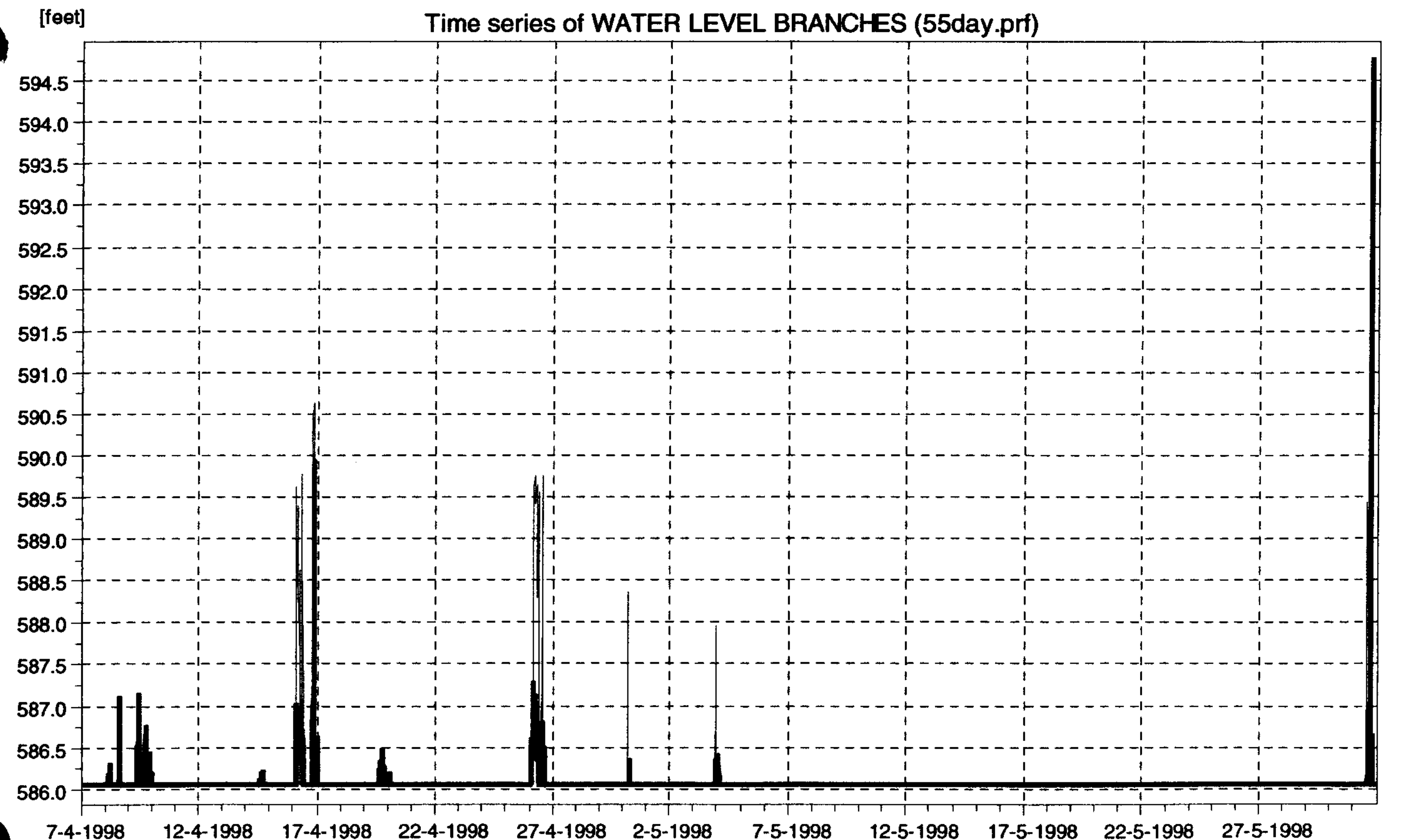
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: DW19W





M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

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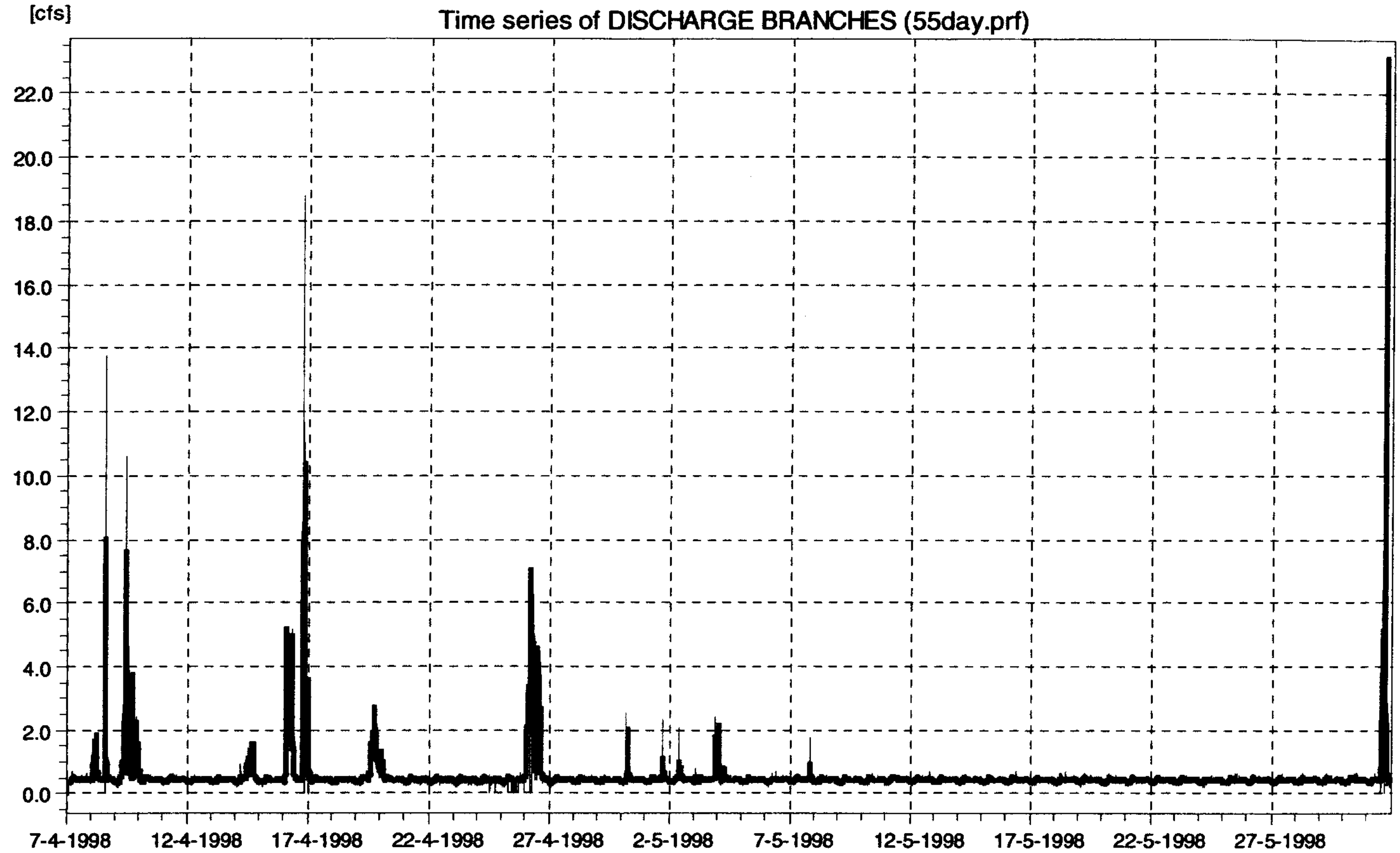
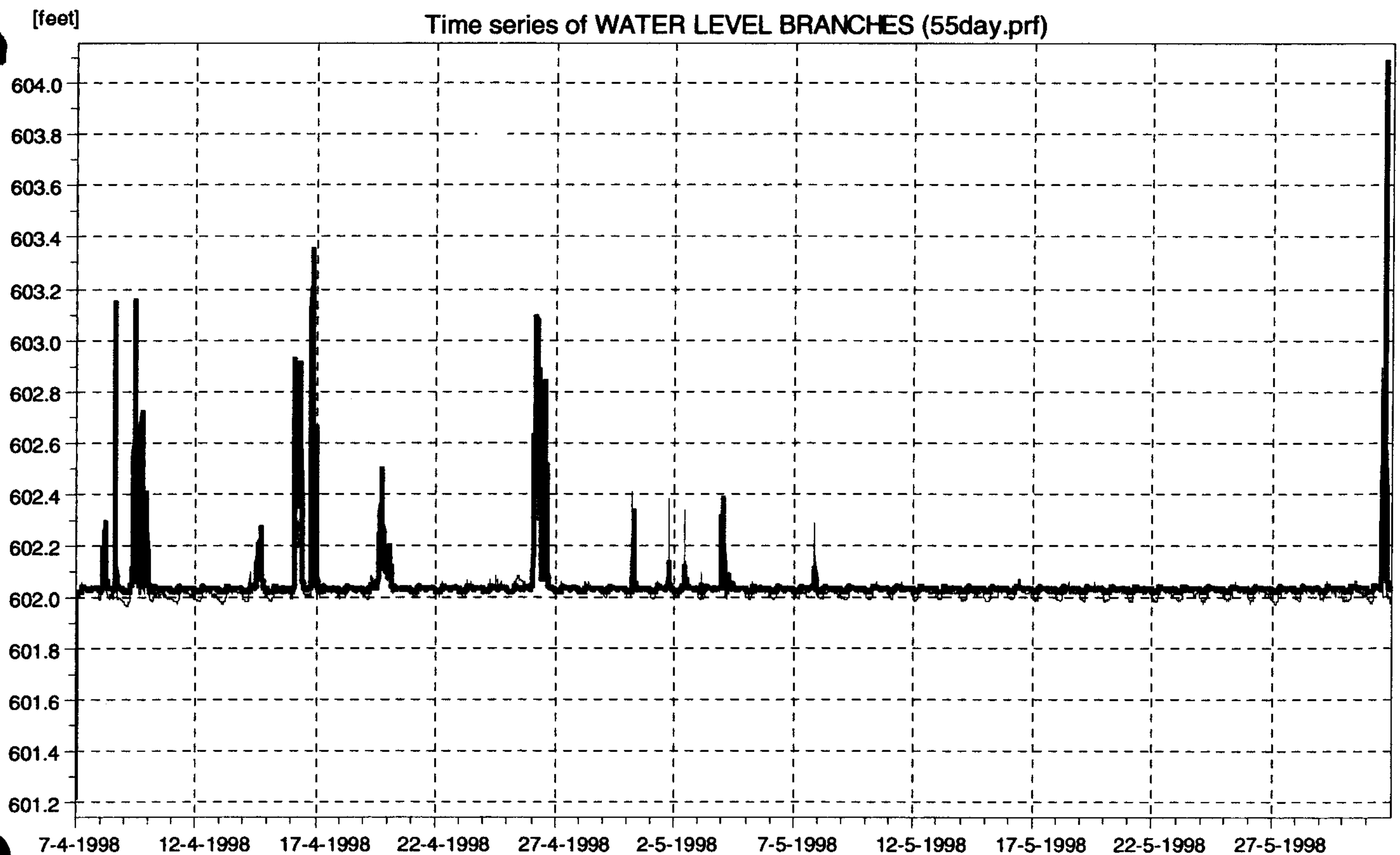




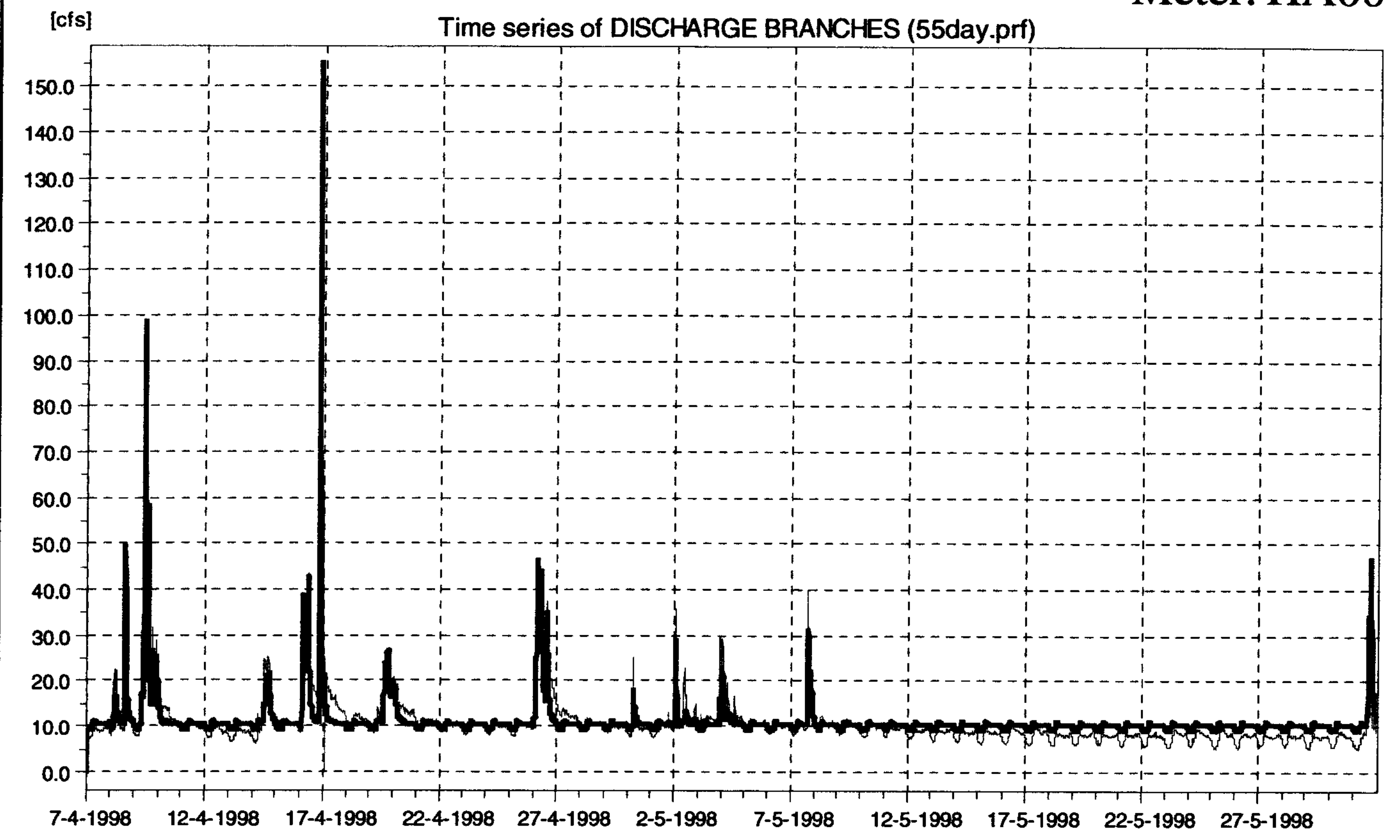
M&E AQUA ALLIANCE Metcalf & Eddy

Easterly CSO Phase II Facilities Plan

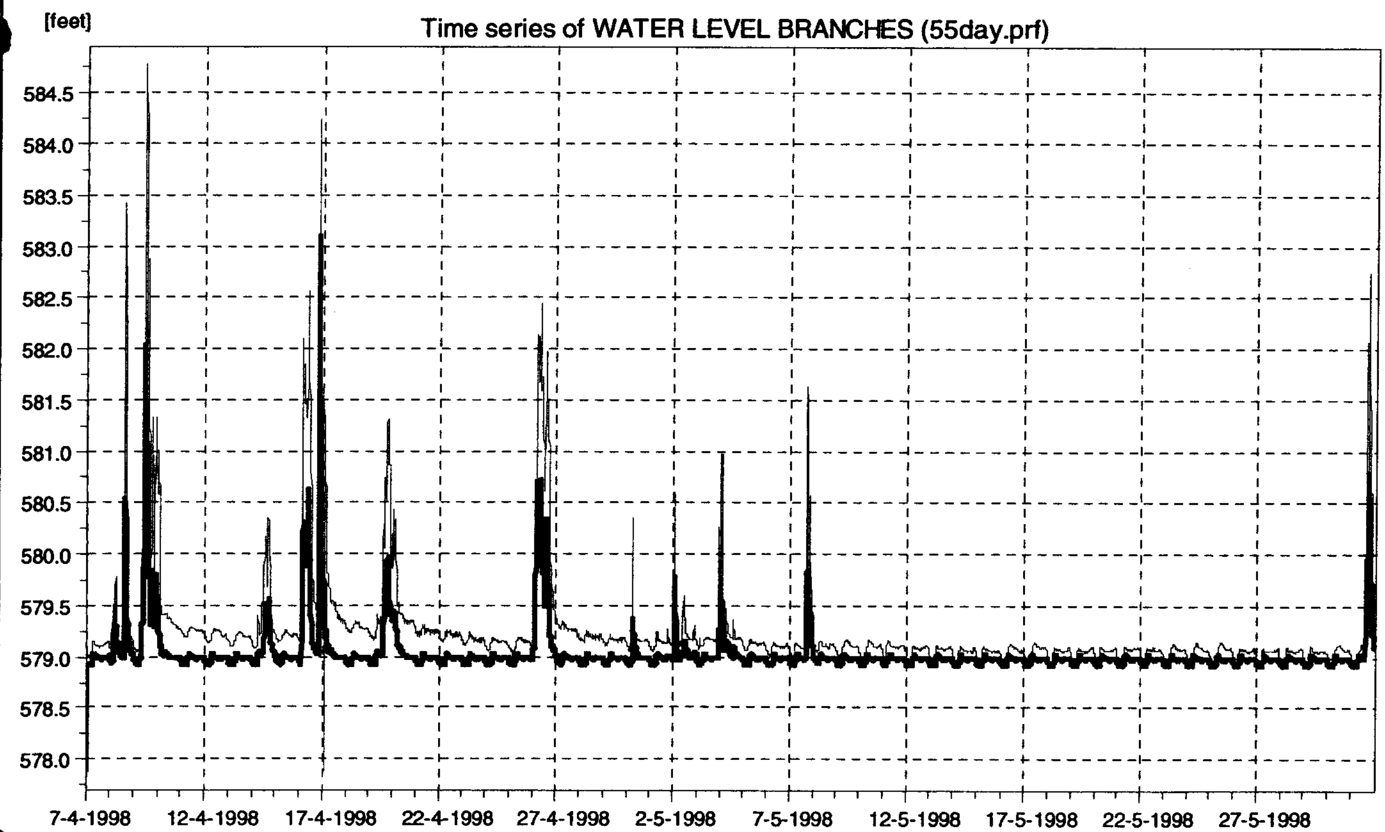
Model Calibration —— Model —— Meter

CH2MHILL

Meter: HA00

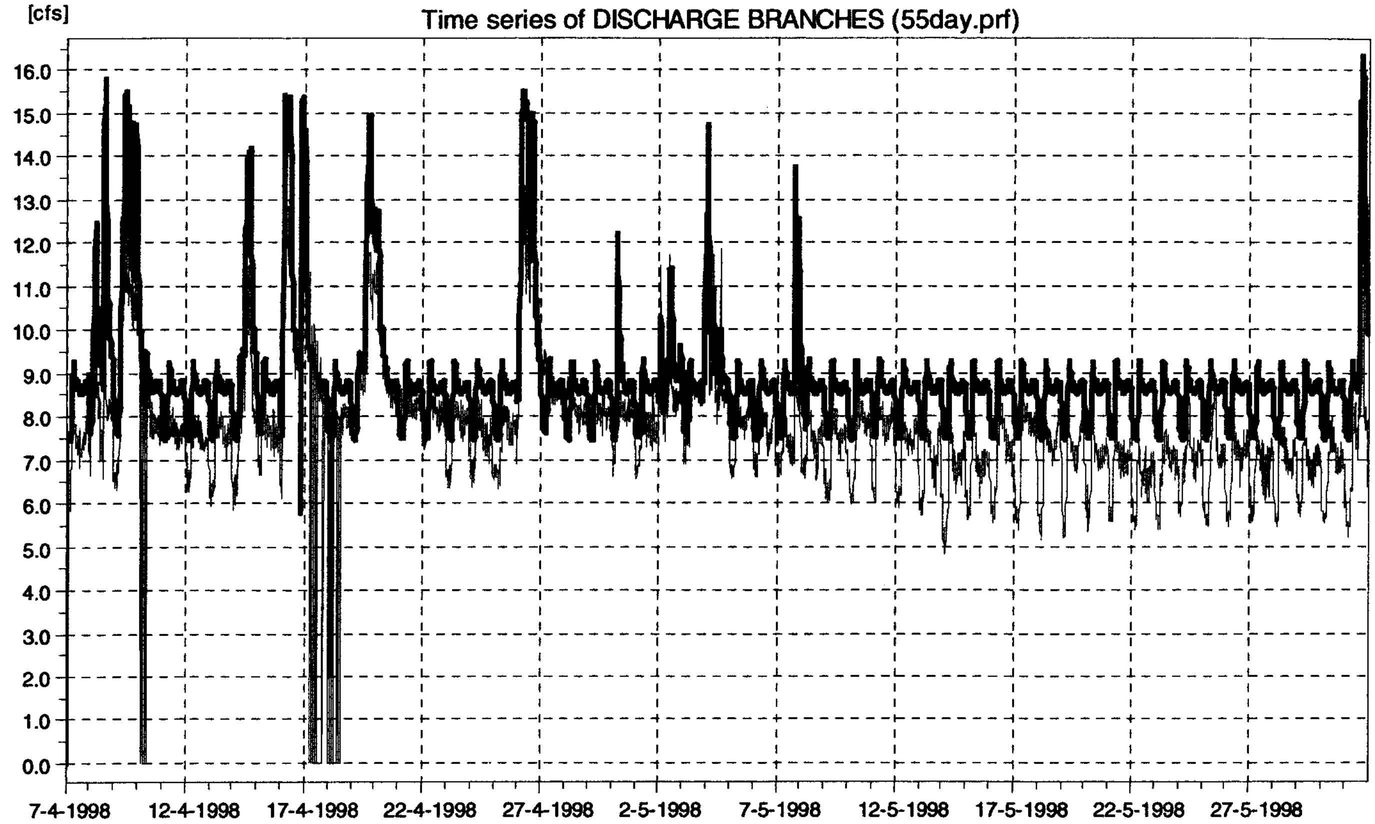


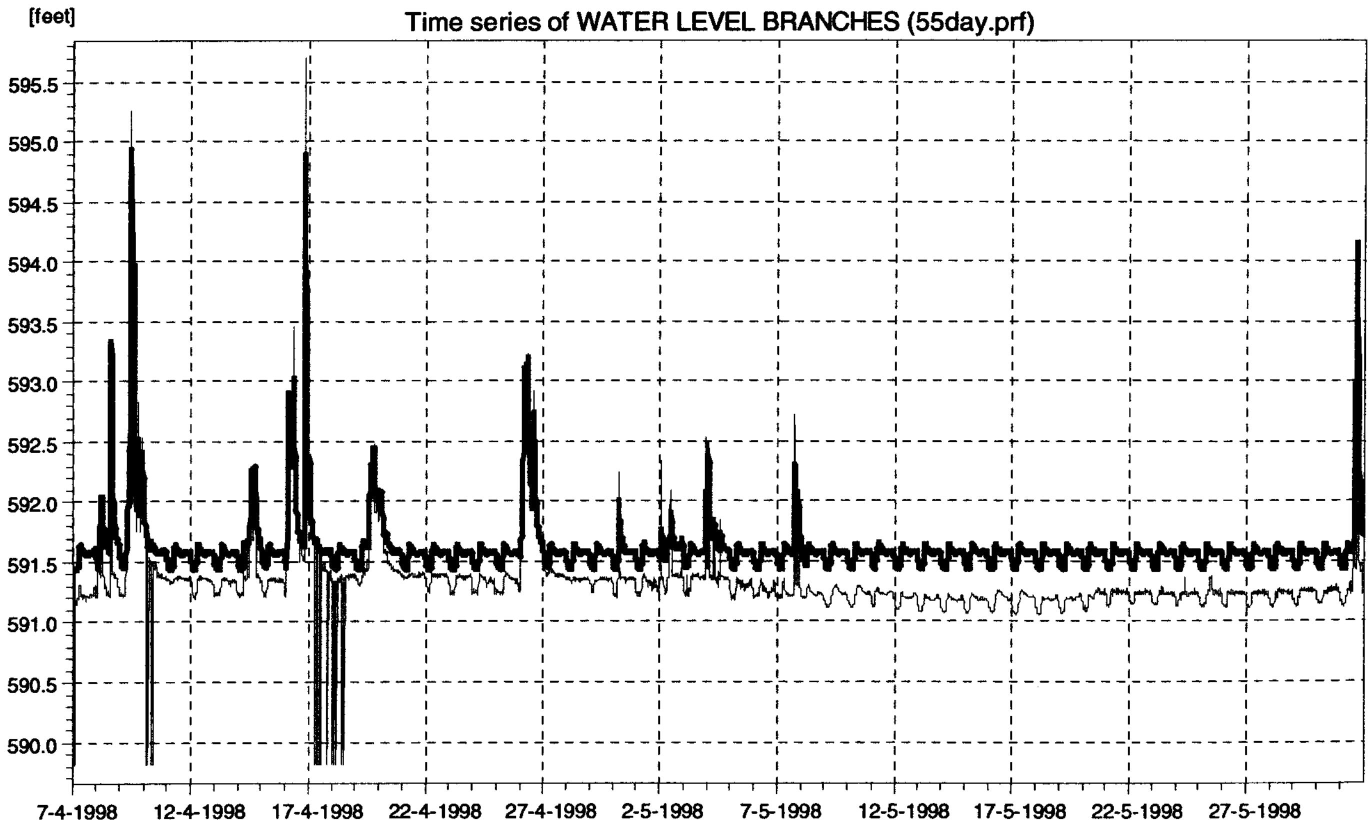
[cfs]
Time series of DISCHARGE BRANCHES (55day.prf)
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
7-5-1998
12-5-1998
17-5-1998
22-5-1998
27-5-1998



[feet]
Time series of WATER LEVEL BRANCHES (55day.prf)
584.5
584.0
583.5
583.0
582.5
582.0
581.5
581.0
580.5
580.0
579.5
579.0
578.5
578.0
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
7-5-1998
12-5-1998
17-5-1998
22-5-1998
27-5-1998

Meter: HA01D





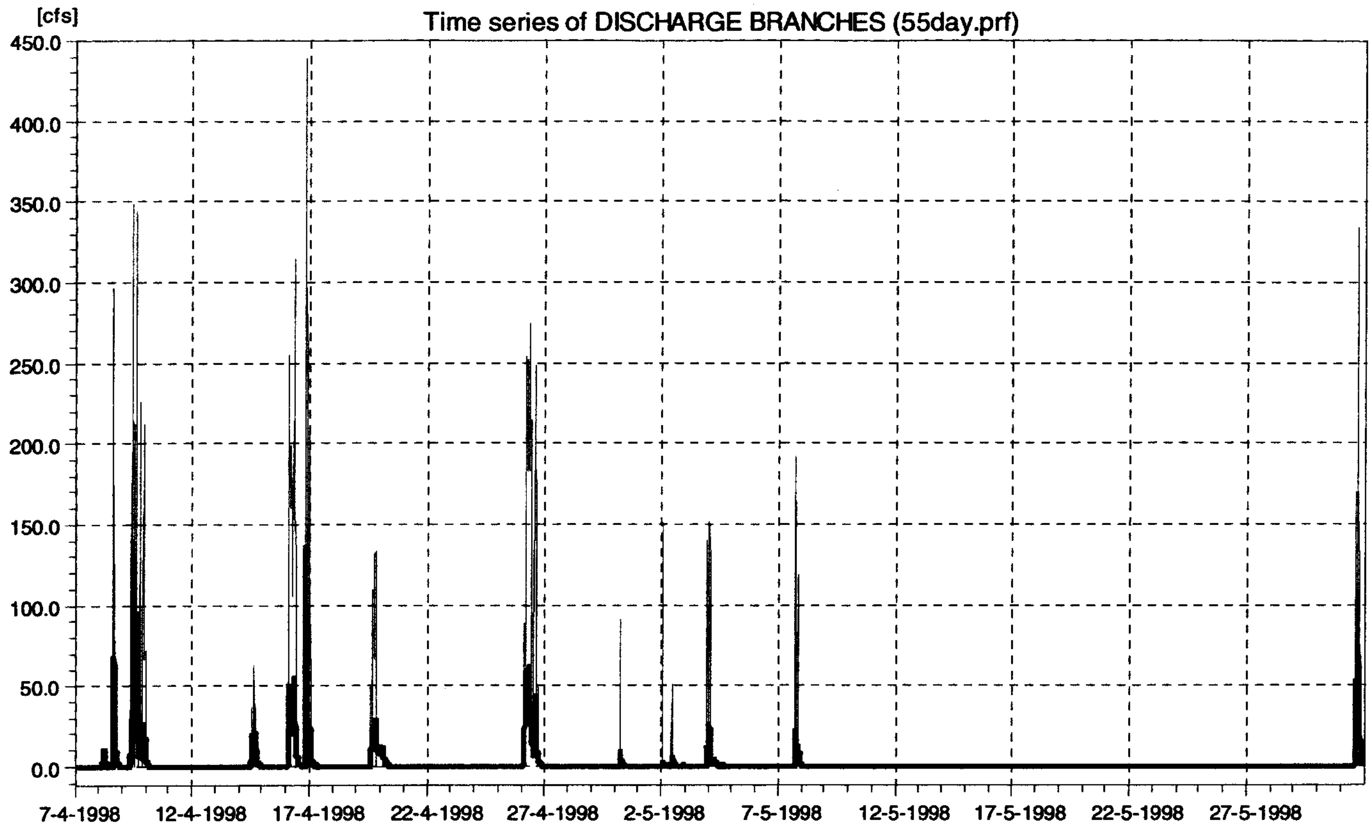
M&E AQUA ALLIANCE Metcalf & Eddy

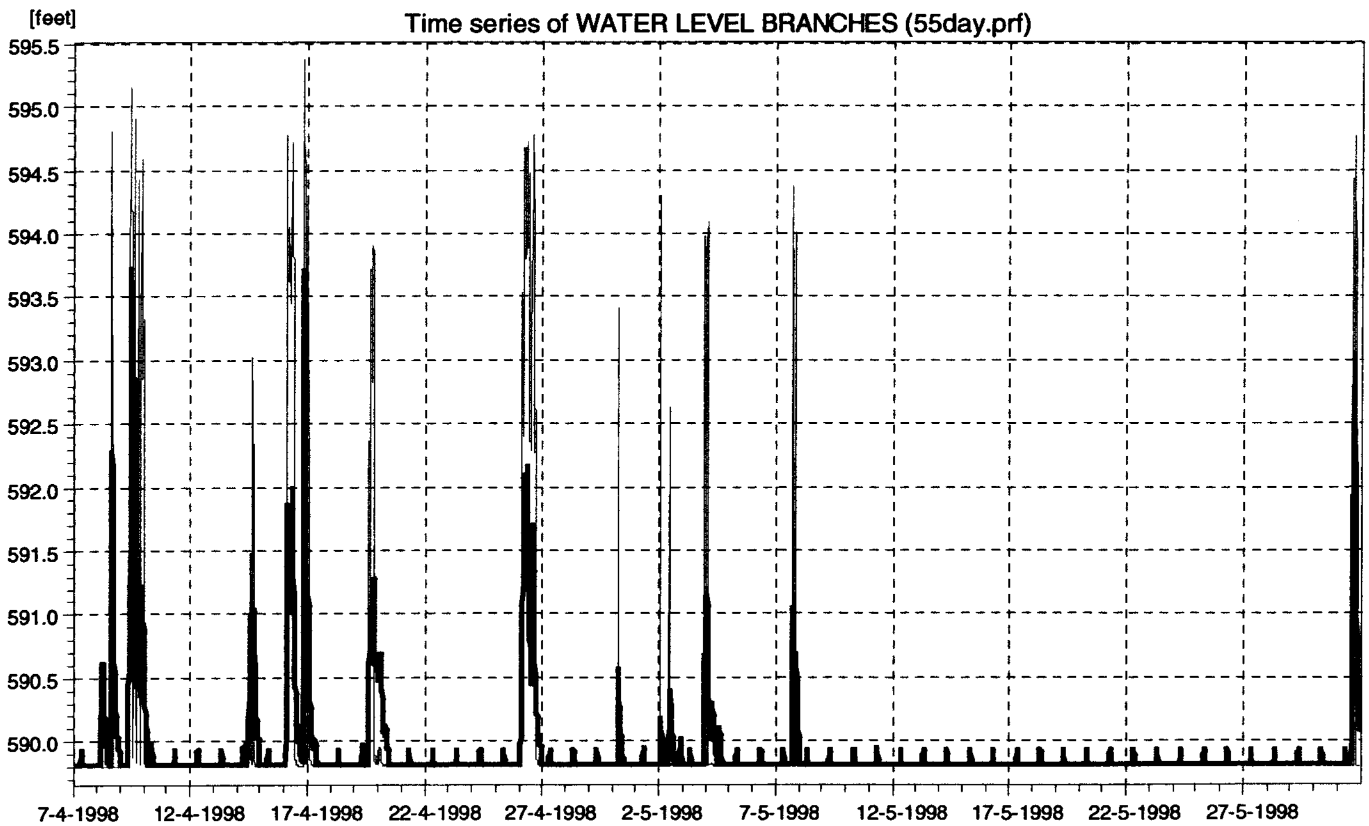
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: HA01W





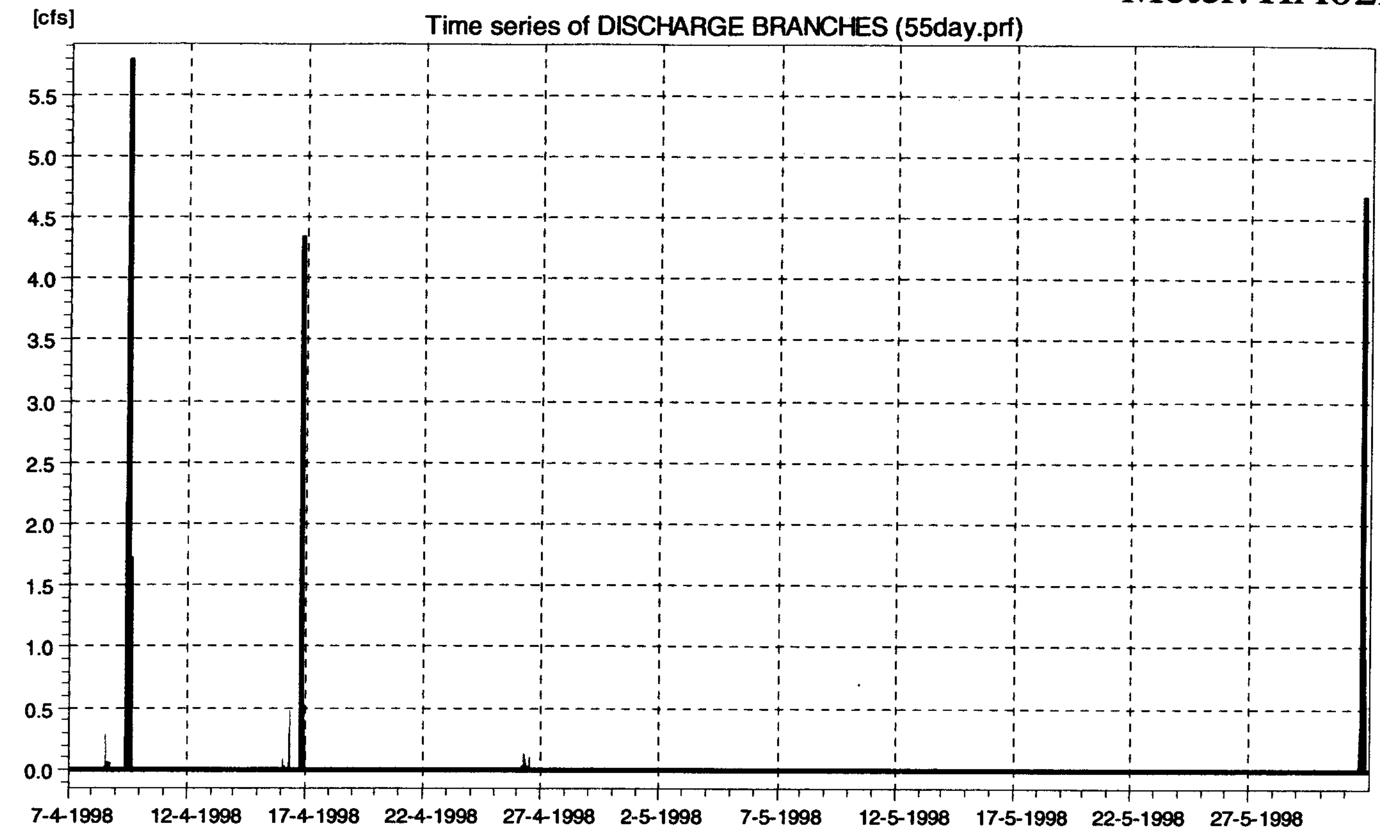
M&E Metcalf & Eddy AQUA ALLIANCE

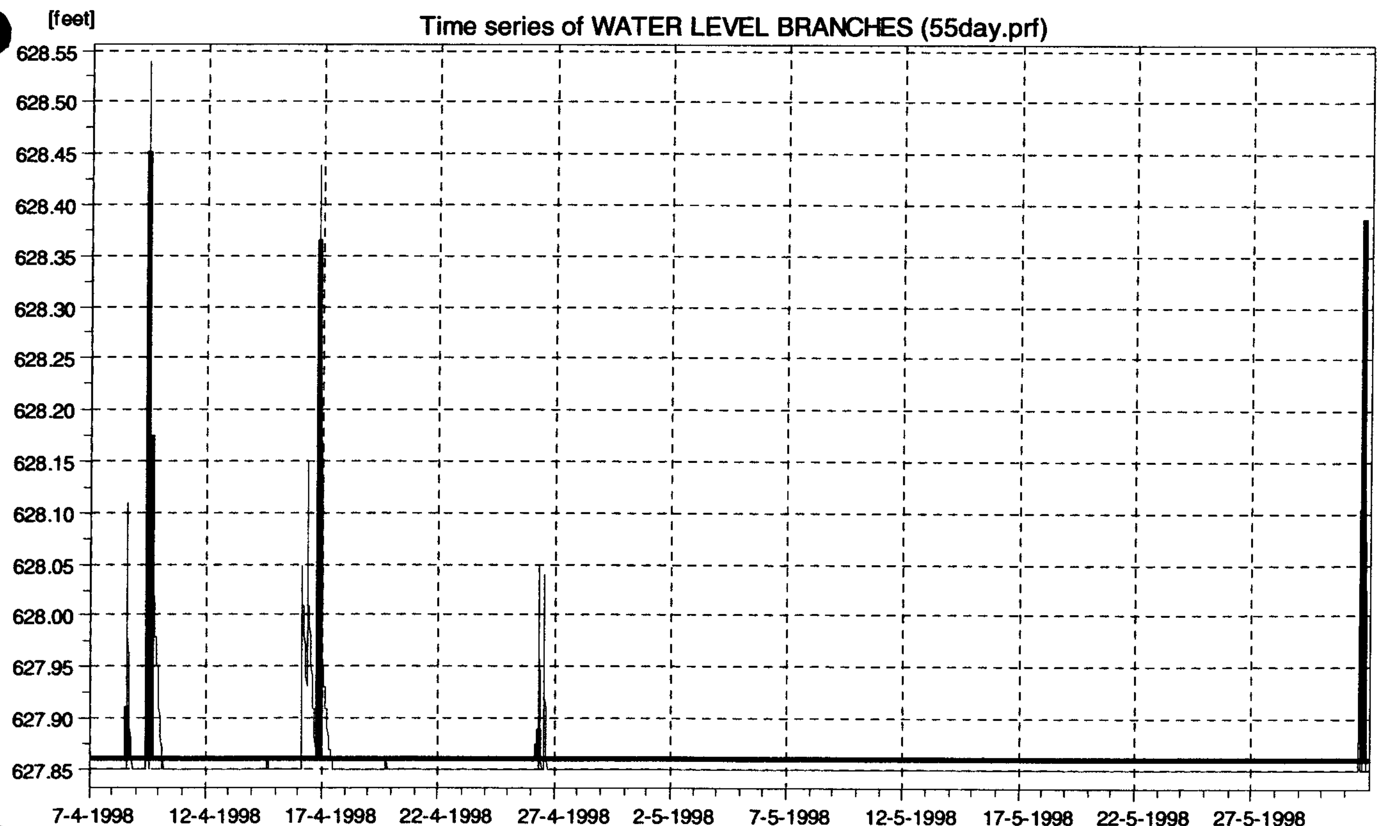
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: HA02D





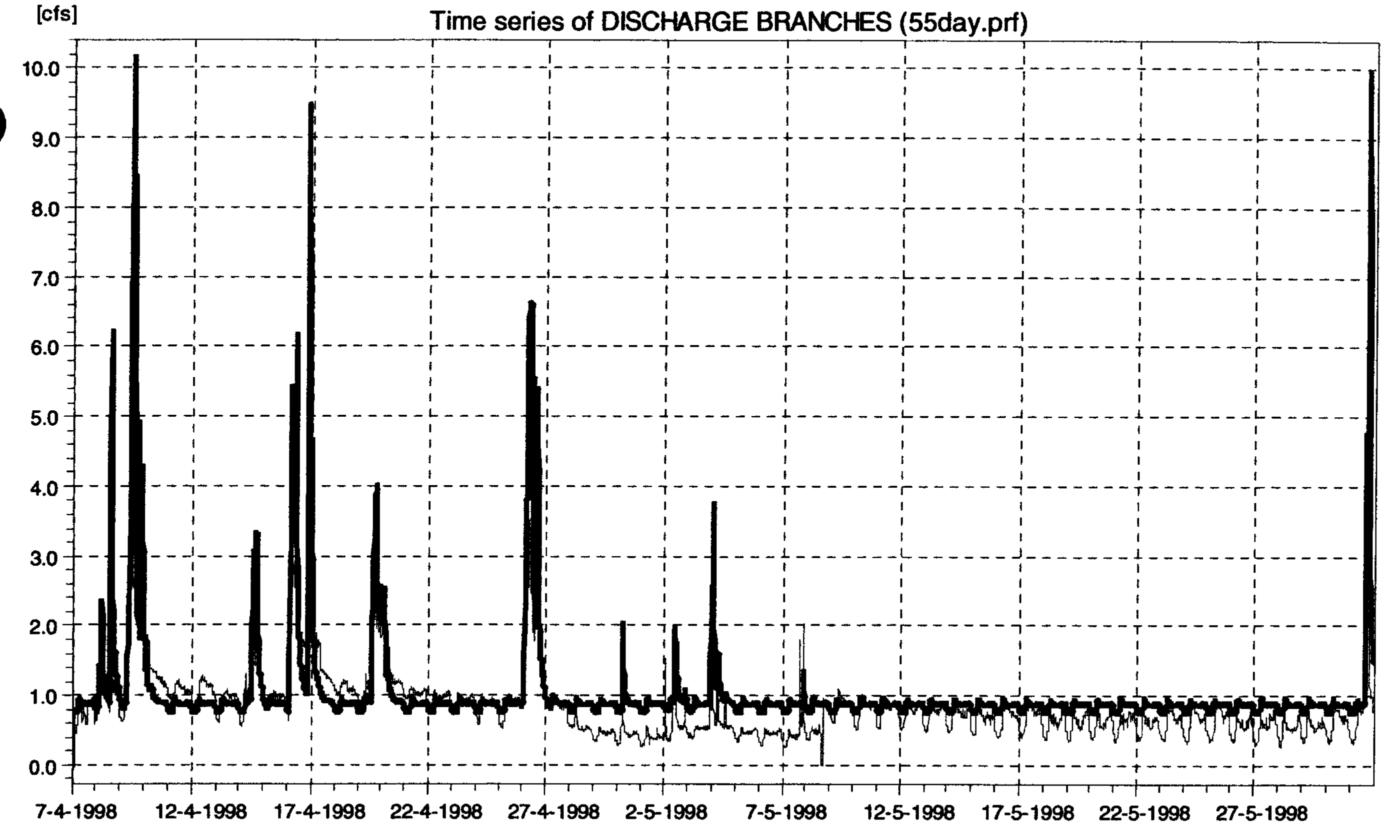
M&E Metcalf & Eddy AQUA ALLIANCE

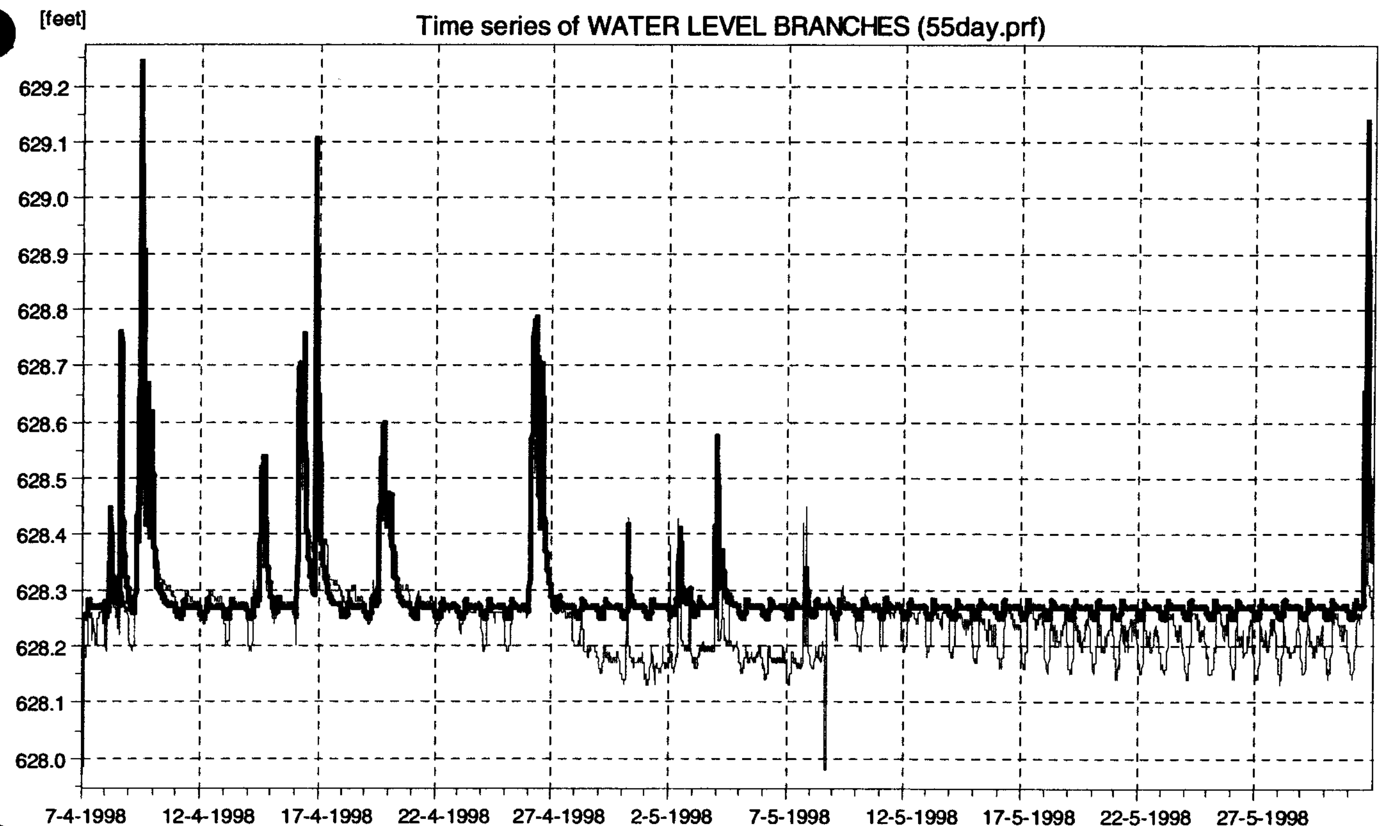
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

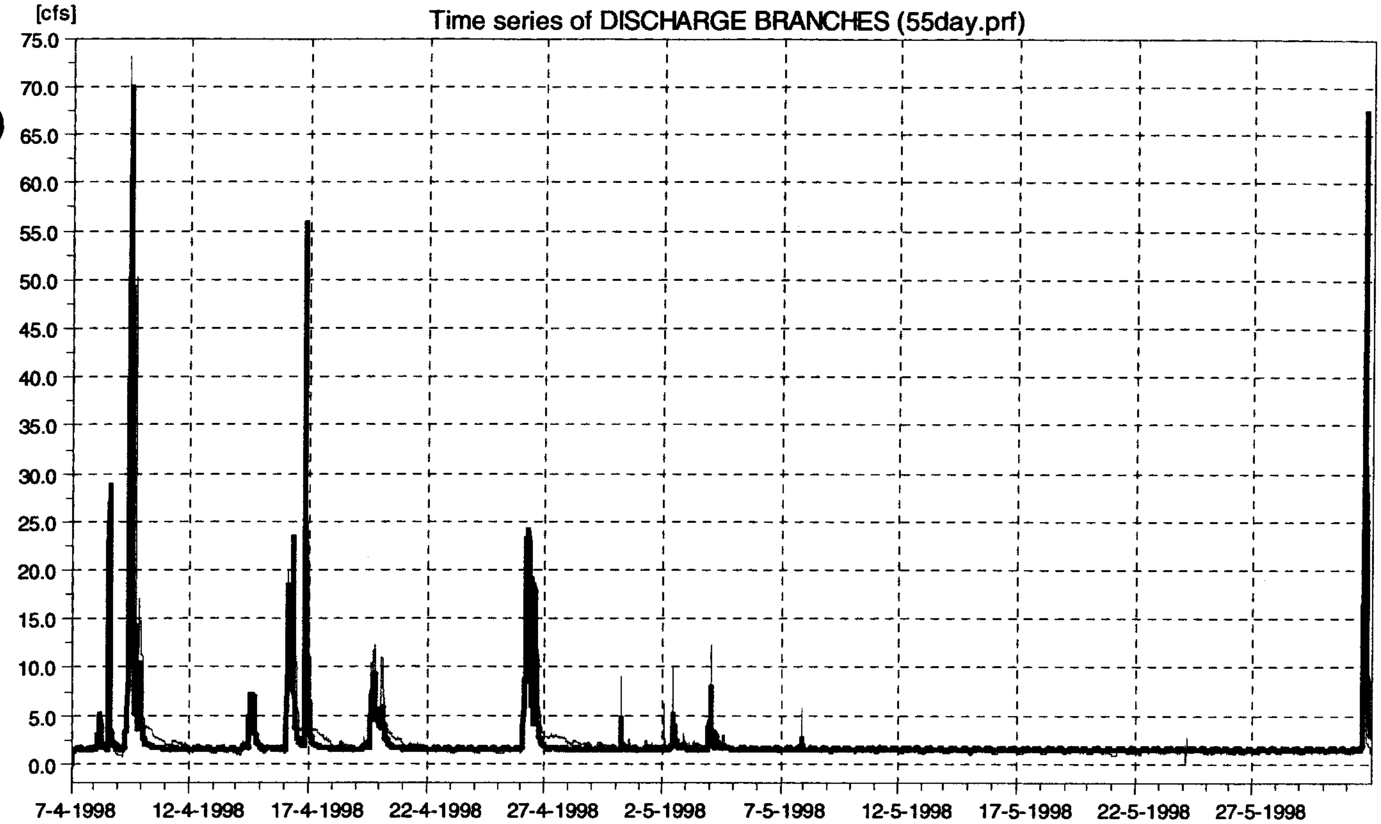
CH2MHILL

Meter: HA02I

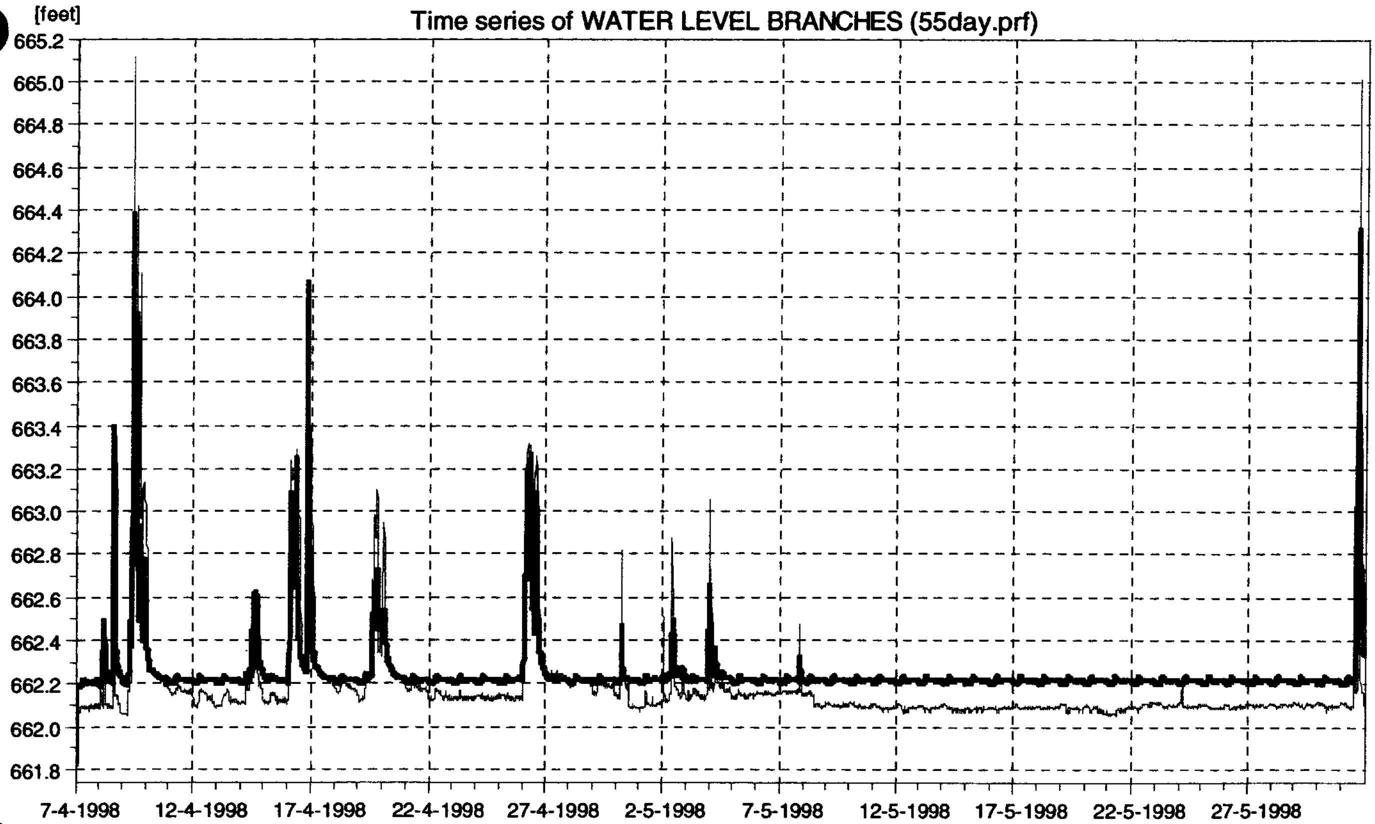

[cfs]
Time series of DISCHARGE BRANCHES (55day.prf)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
7-5-1998
12-5-1998
17-5-1998
22-5-1998
27-5-1998


[feet]
Time series of WATER LEVEL BRANCHES (55day.prf)
629.2
629.1
629.0
628.9
628.8
628.7
628.6
628.5
628.4
628.3
628.2
628.1
628.0
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
7-5-1998
12-5-1998
17-5-1998
22-5-1998
27-5-1998

Meter: HA03I



[cfs]
Time series of DISCHARGE BRANCHES (55day.prf)
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
7-5-1998
12-5-1998
17-5-1998
22-5-1998
27-5-1998



[feet]
Time series of WATER LEVEL BRANCHES (55day.prf)
665.2
665.0
664.8
664.6
664.4
664.2
664.0
663.8
663.6
663.4
663.2
663.0
662.8
662.6
662.4
662.2
662.0
661.8
7-4-1998
12-4-1998
17-4-1998
22-4-1998
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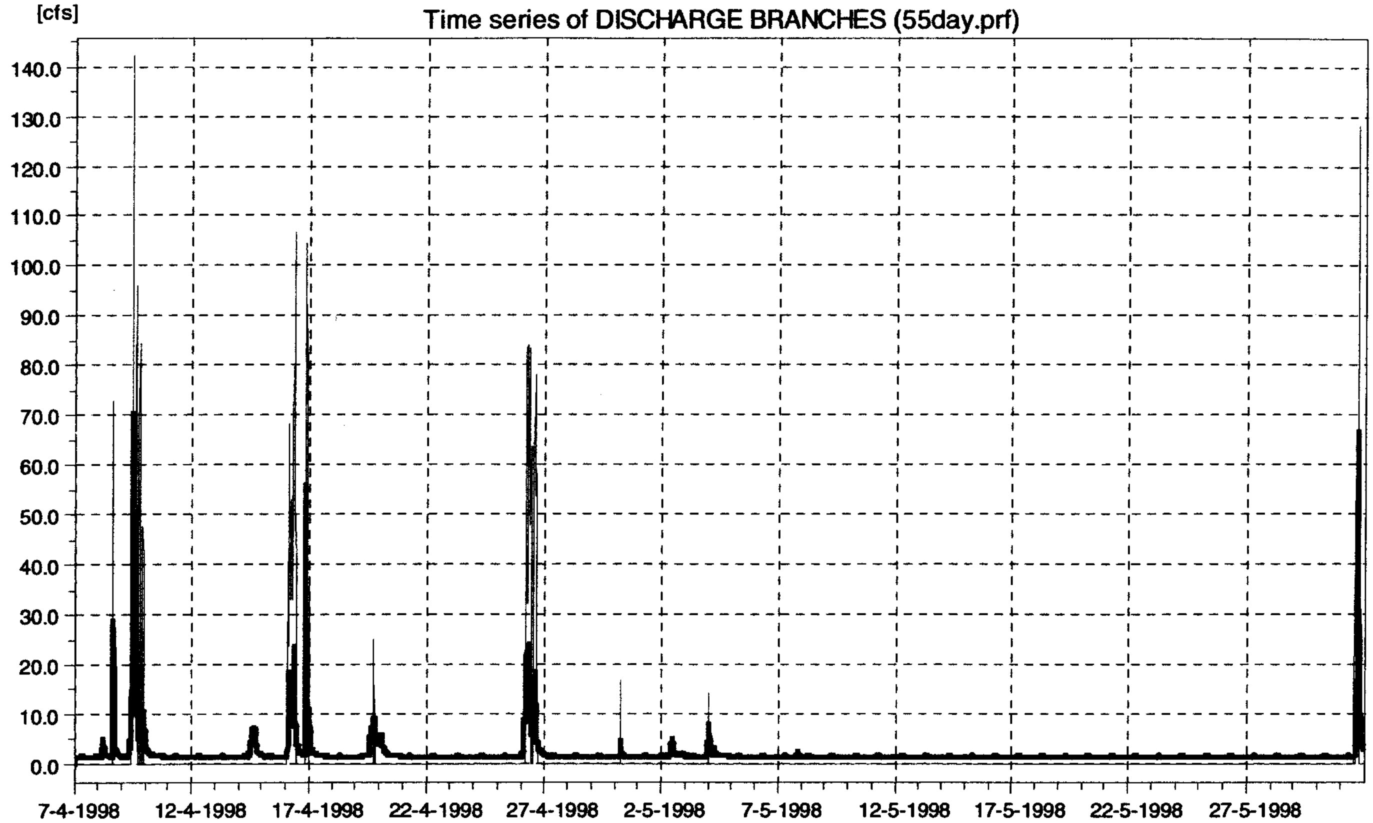
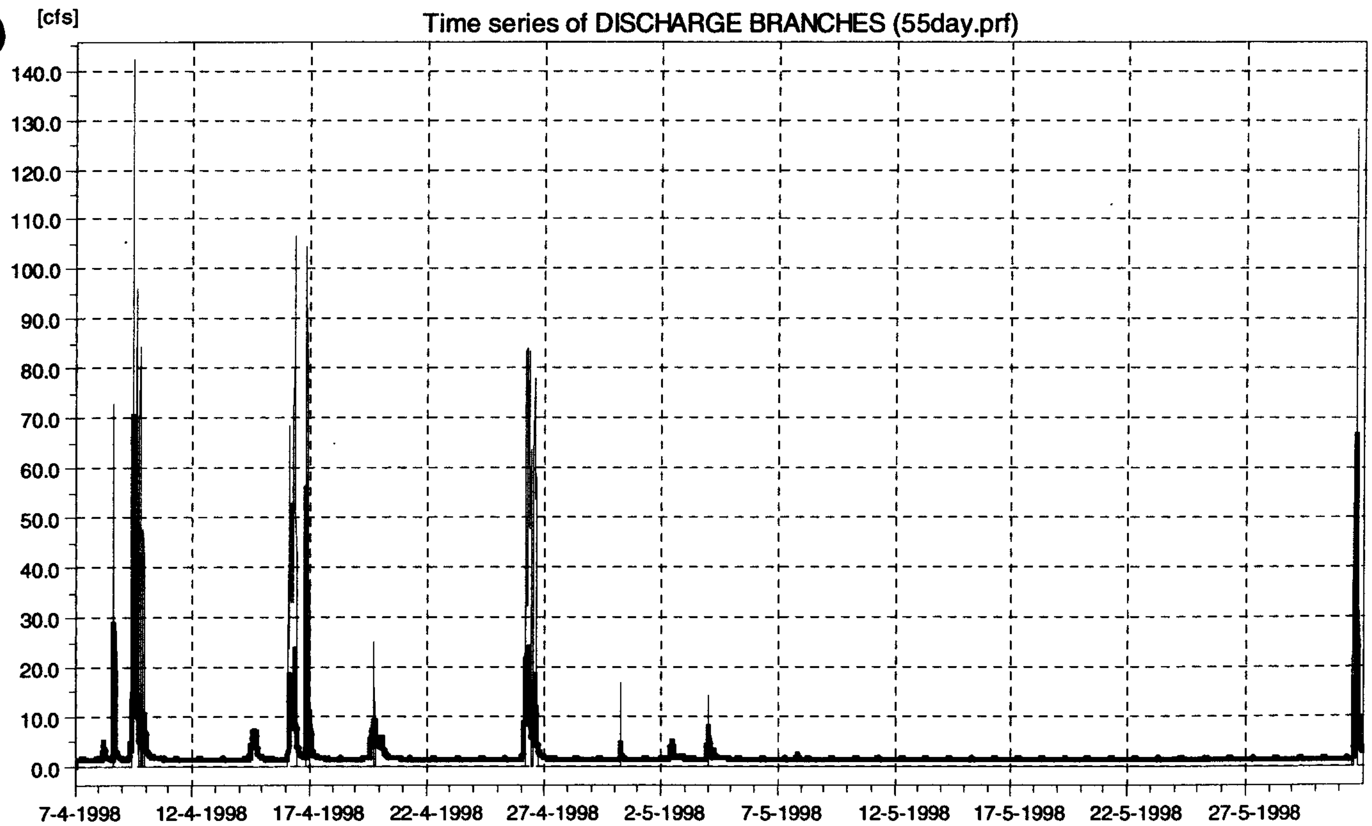
27-5-1998

Meter: HA03W





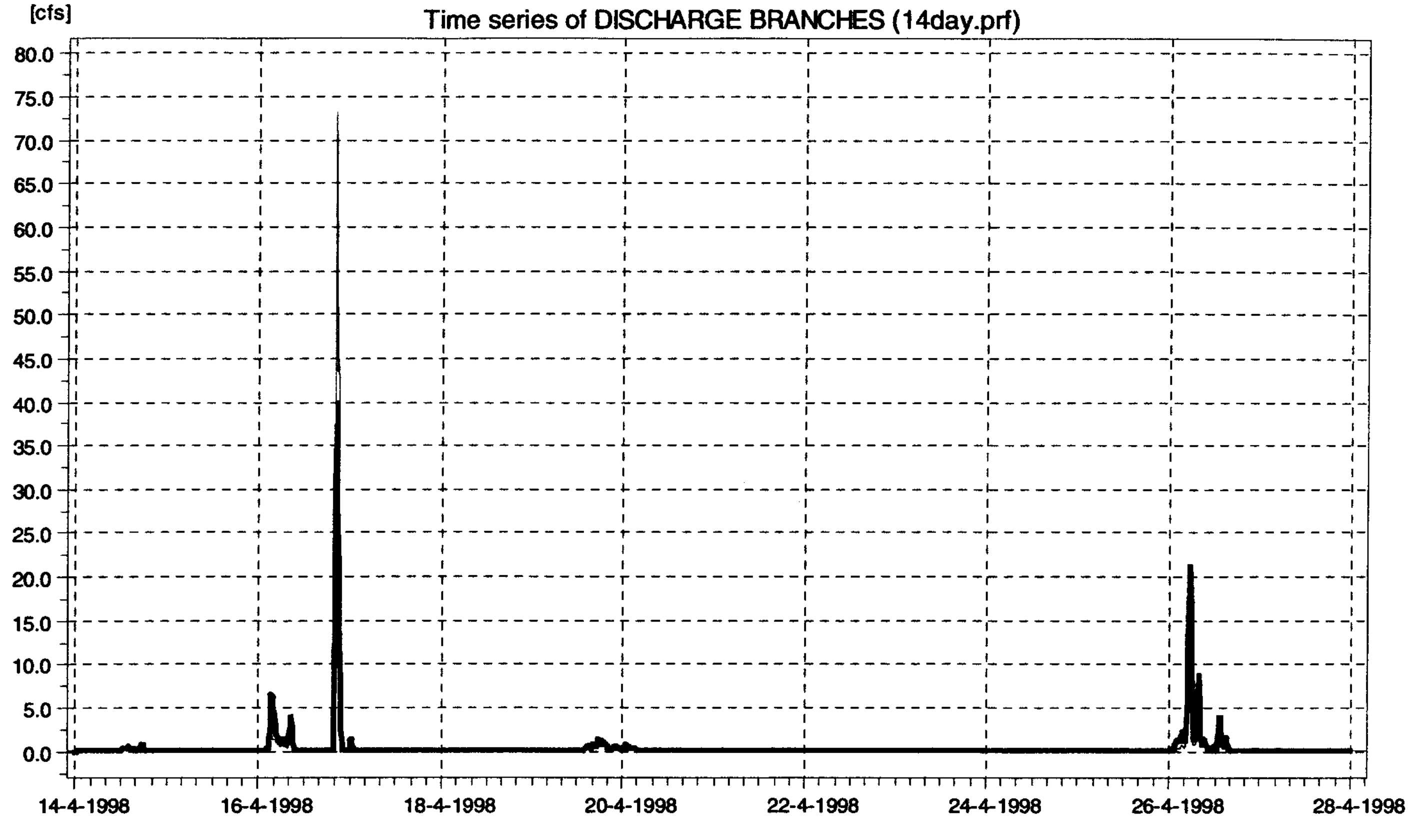
M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

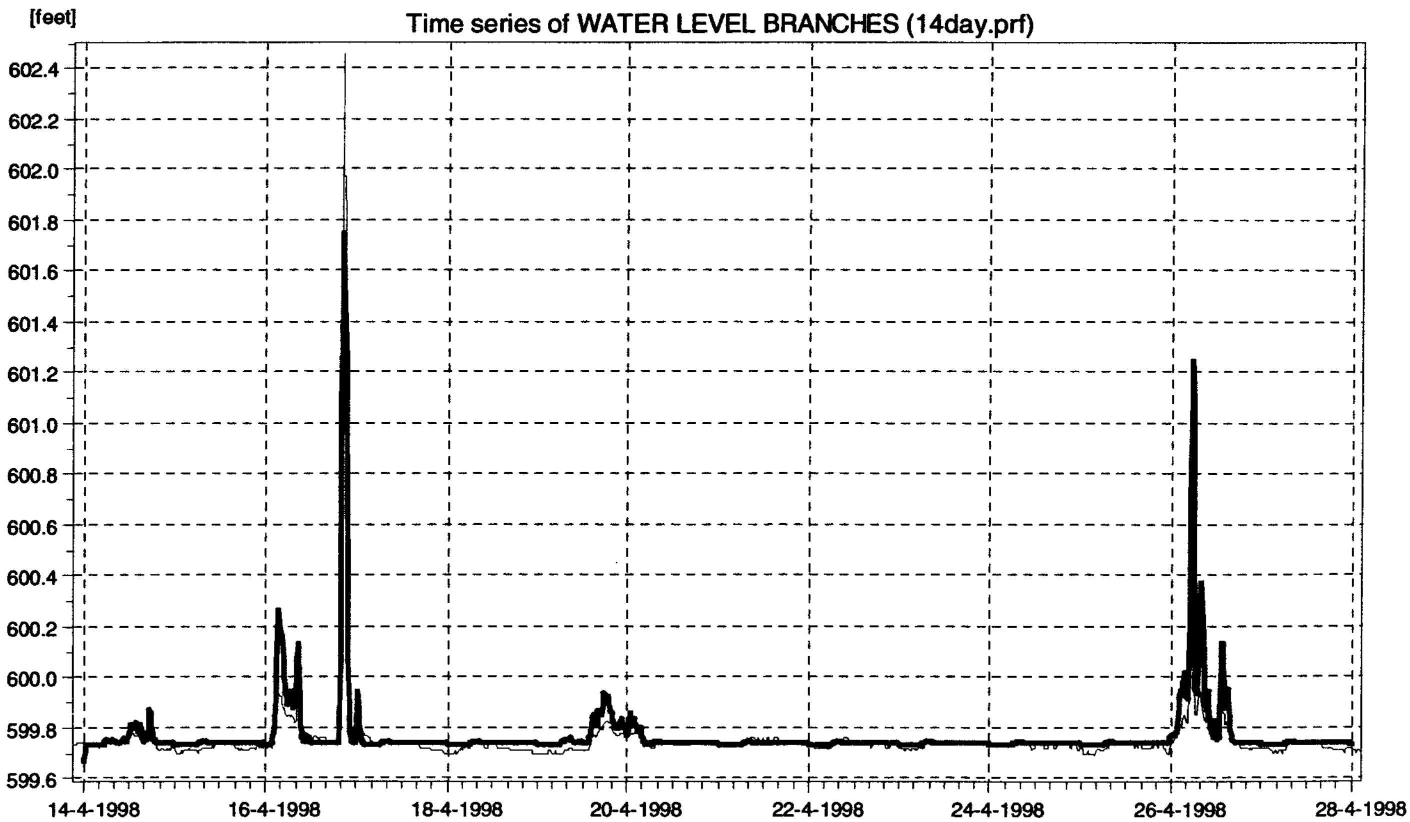
Model Calibration — Model — Meter

CH2MHILL

Meter: EA18I

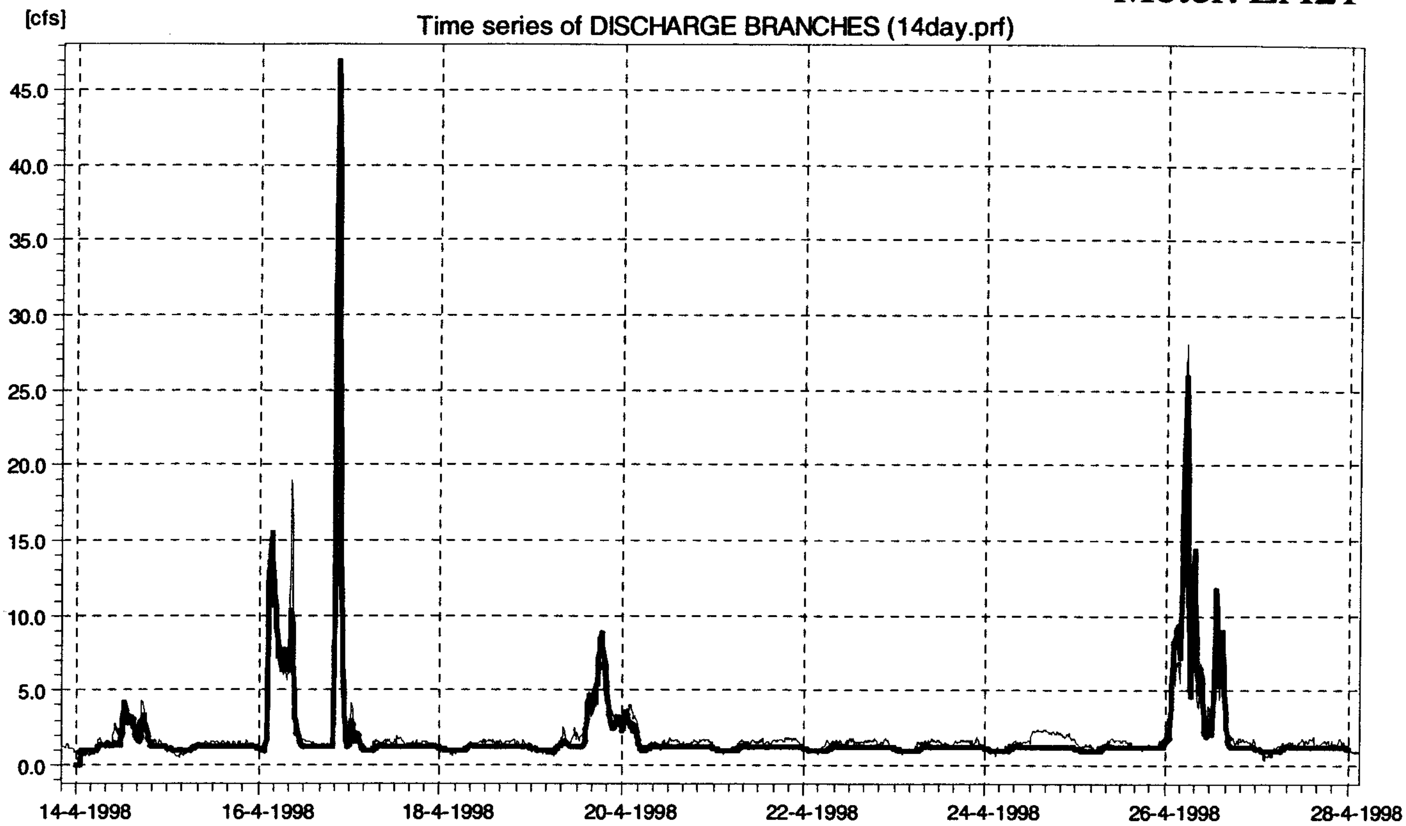


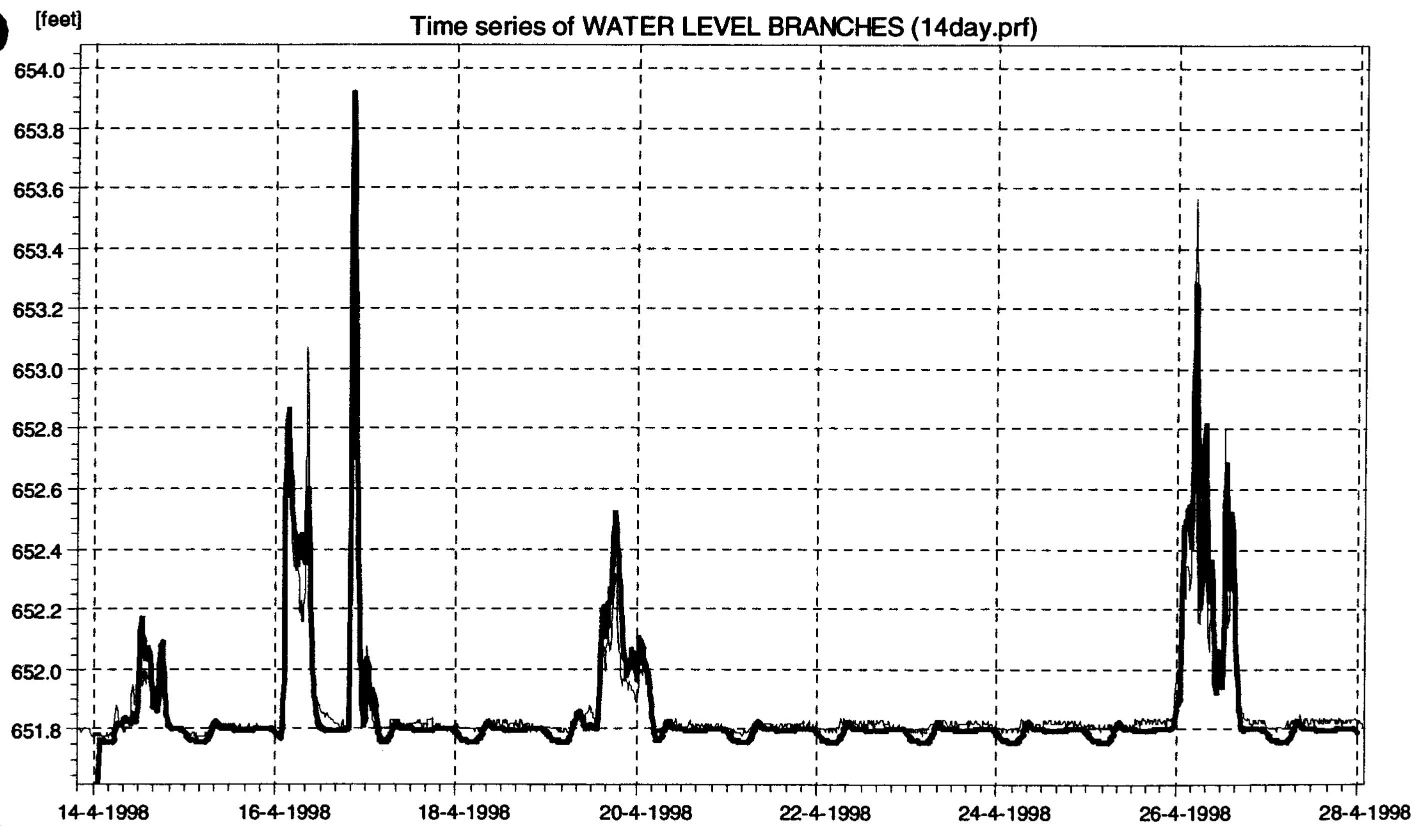
Time series of DISCHARGE BRANCHES (14day.prf)
[cfs]
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
14-4-1998
16-4-1998
18-4-1998
20-4-1998
22-4-1998
24-4-1998
26-4-1998
28-4-1998



Time series of WATER LEVEL BRANCHES (14day.prf)
[feet]
602.4
602.2
602.0
601.8
601.6
601.4
601.2
601.0
600.8
600.6
600.4
600.2
600.0
599.8
599.6
14-4-1998
16-4-1998
18-4-1998
20-4-1998
22-4-1998
24-4-1998
26-4-1998
28-4-1998

Meter: EA21





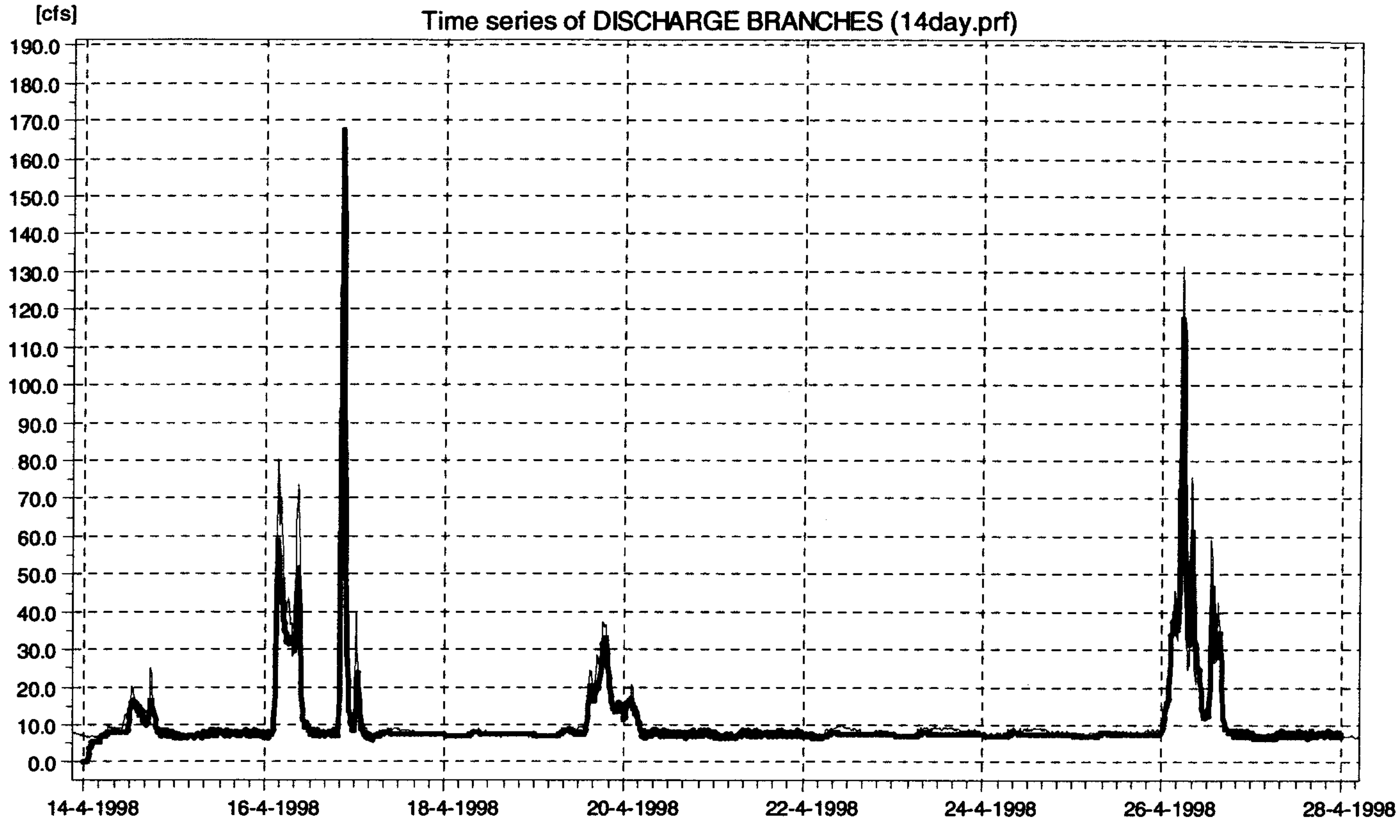
M&E Metcalf & Eddy AQUA ALLIANCE

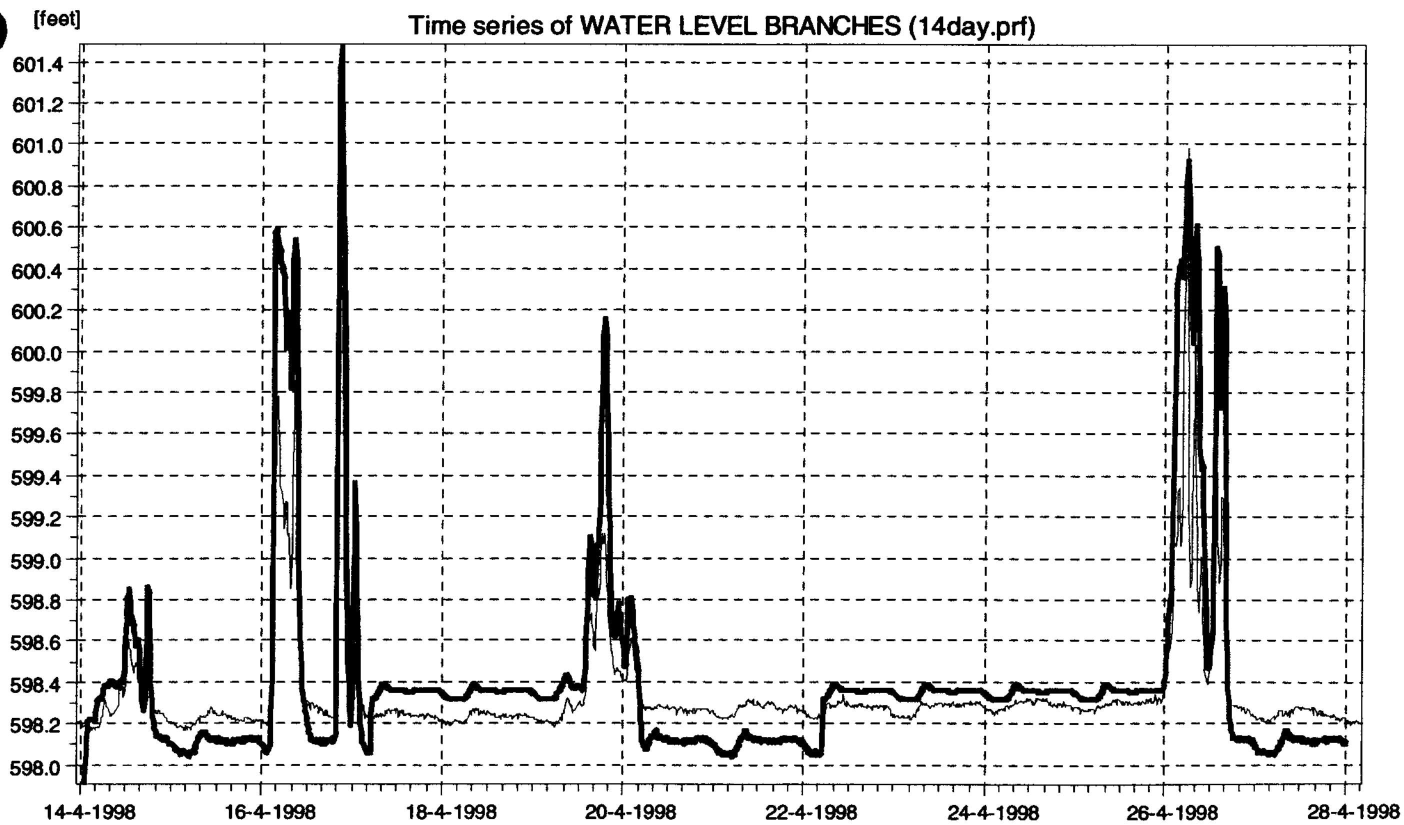
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA15I





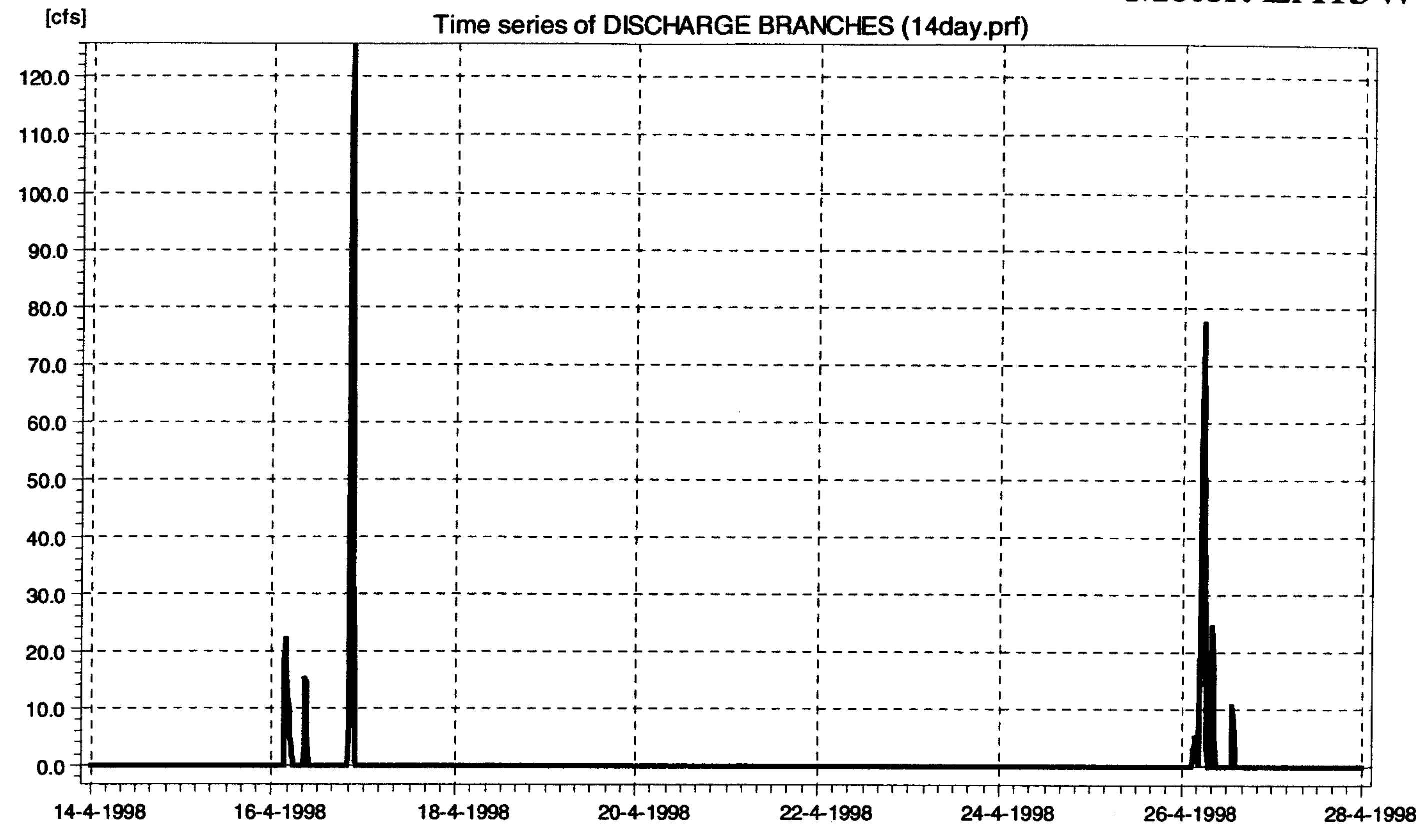
M&E Metcalf & Eddy AQUA ALLIANCE

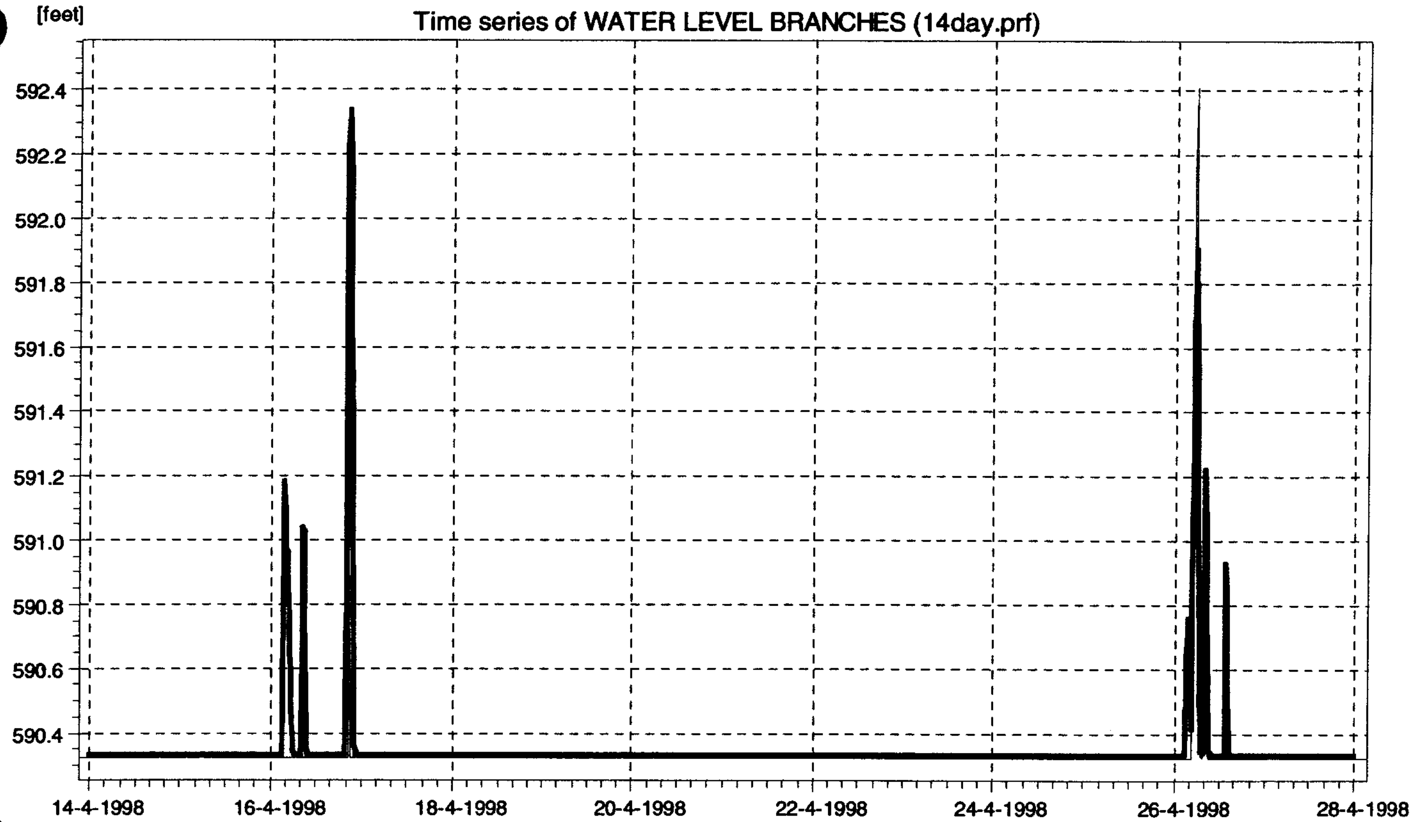
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA15W





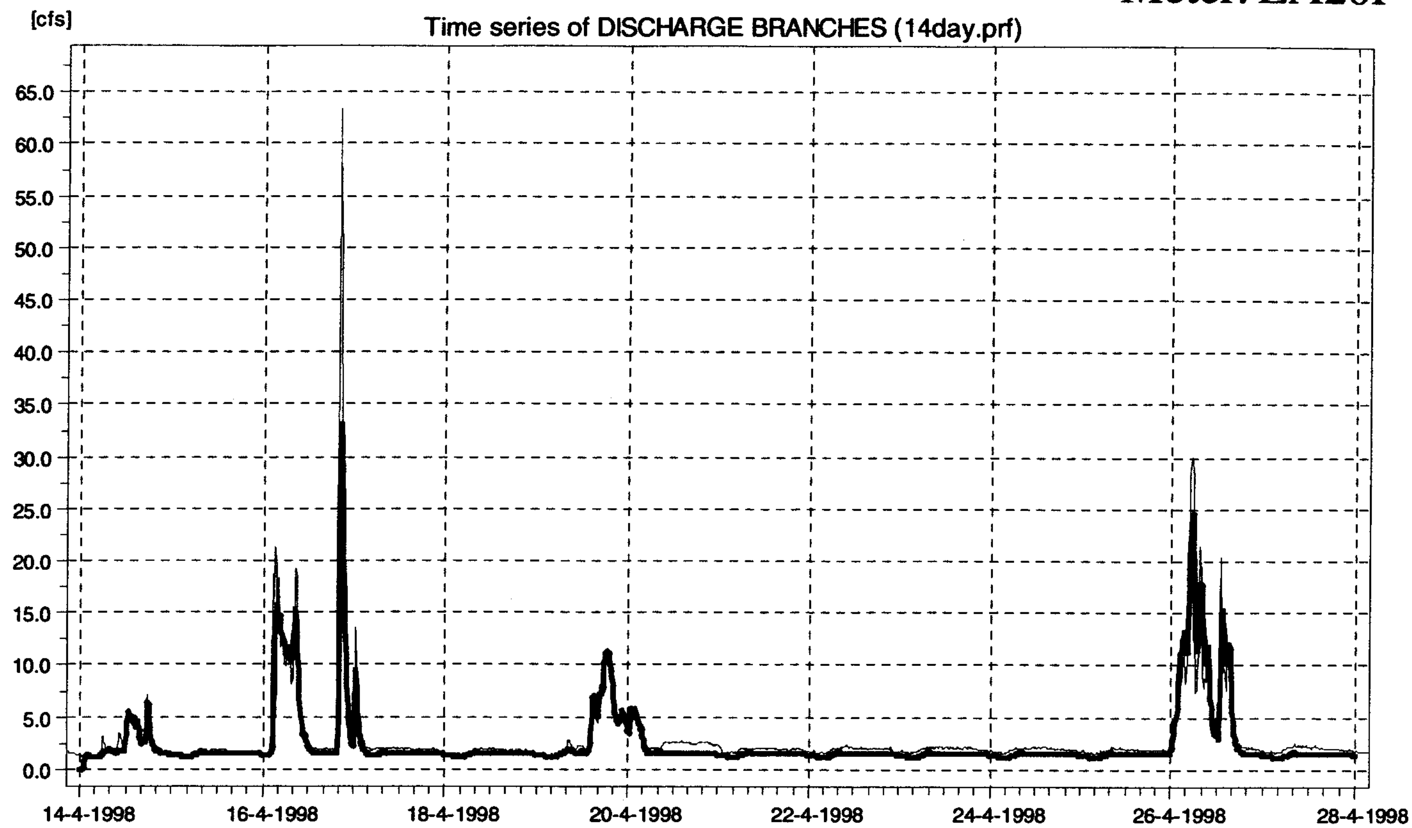
M&E AQUA ALLIANCE Metcalf & Eddy

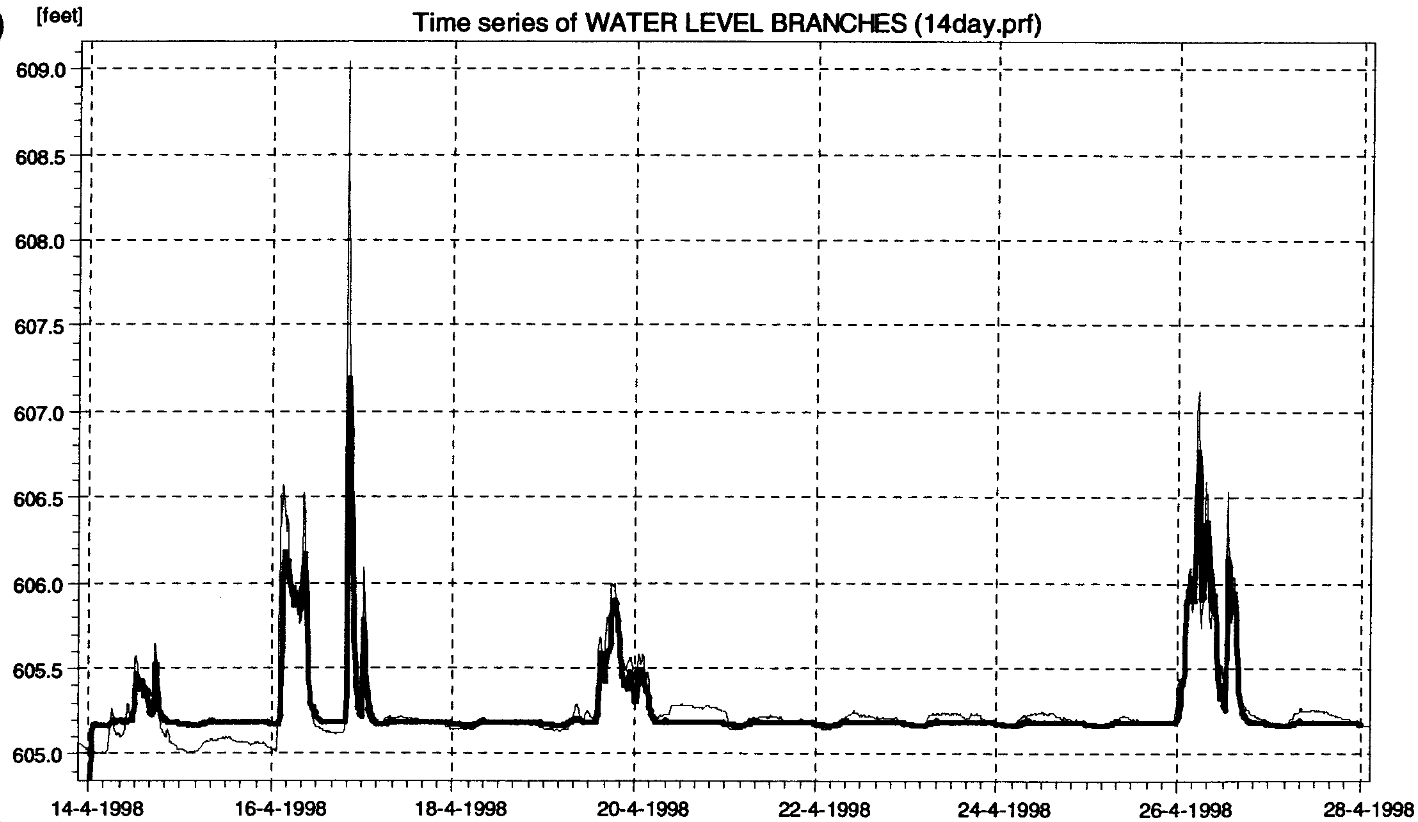
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA20I





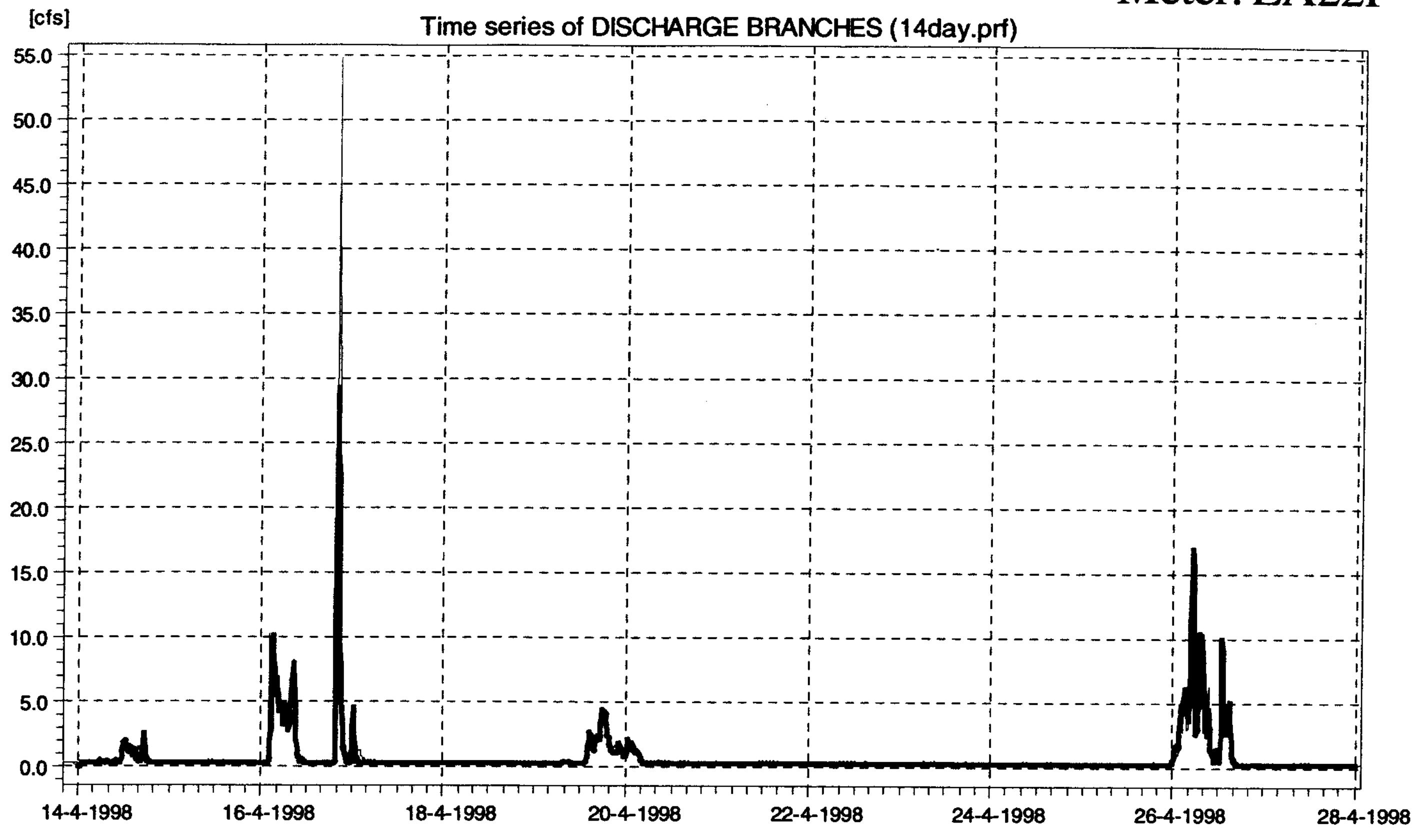
Metcalf & Eddy — M&E AQUA ALLIANCE

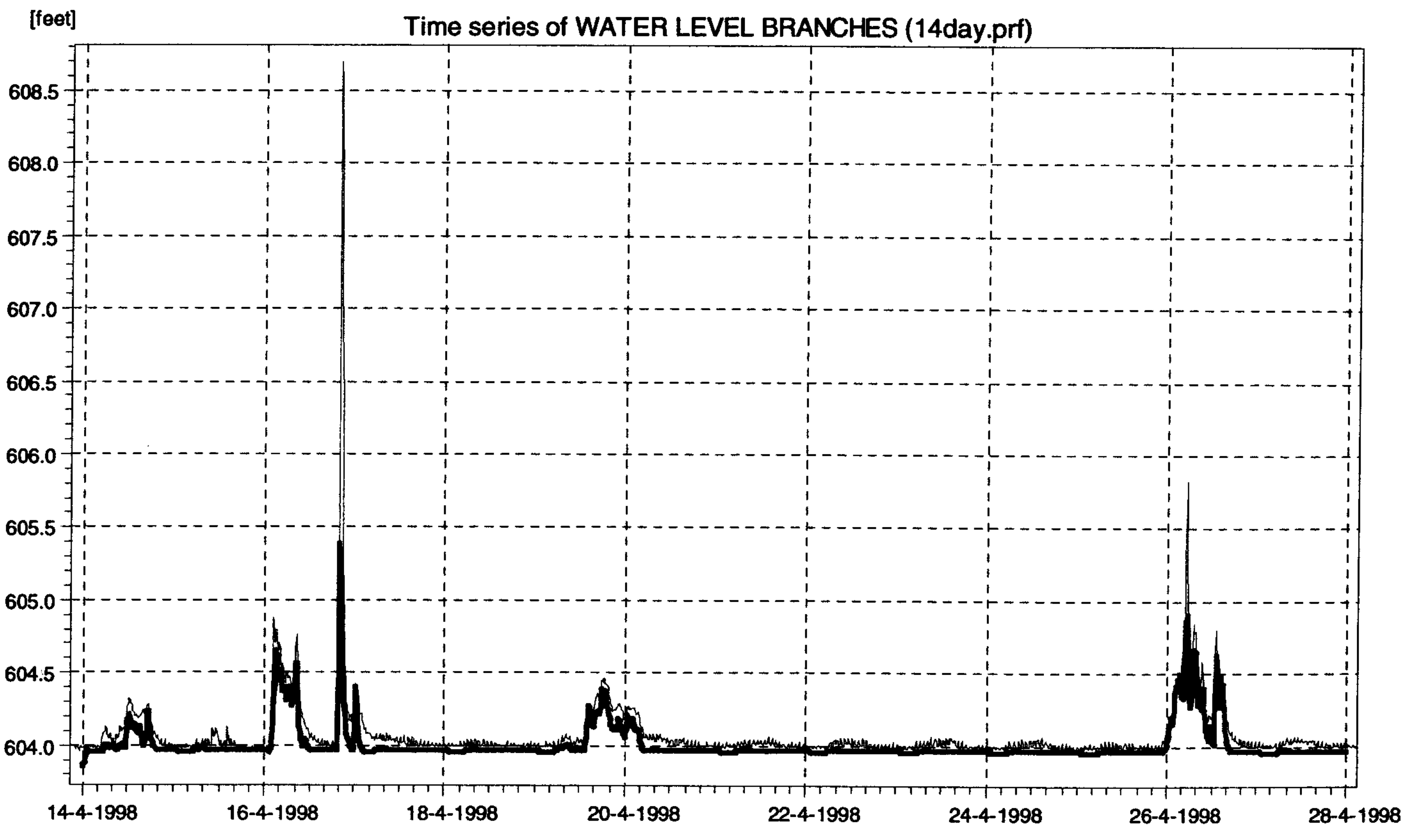
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA22I





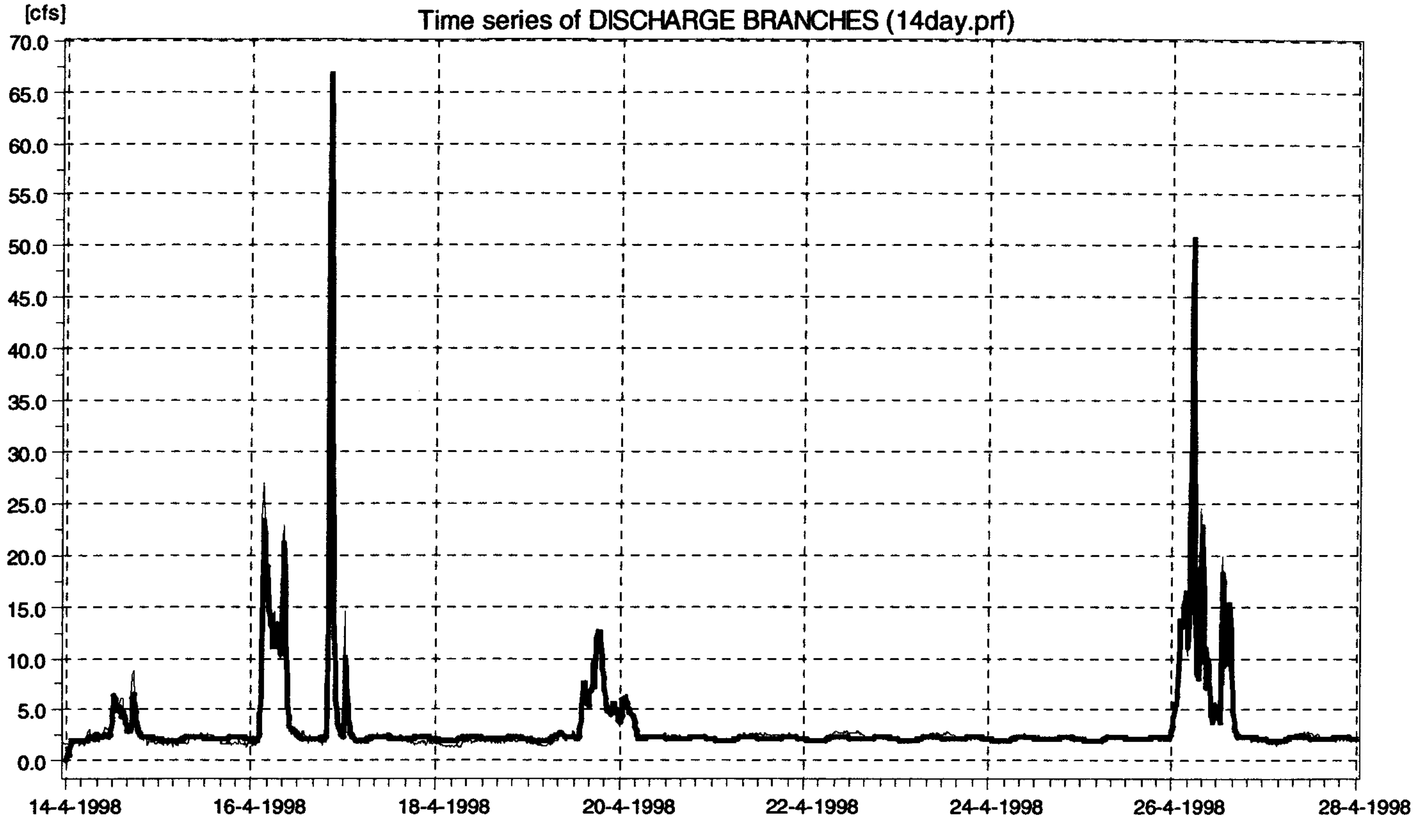
M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

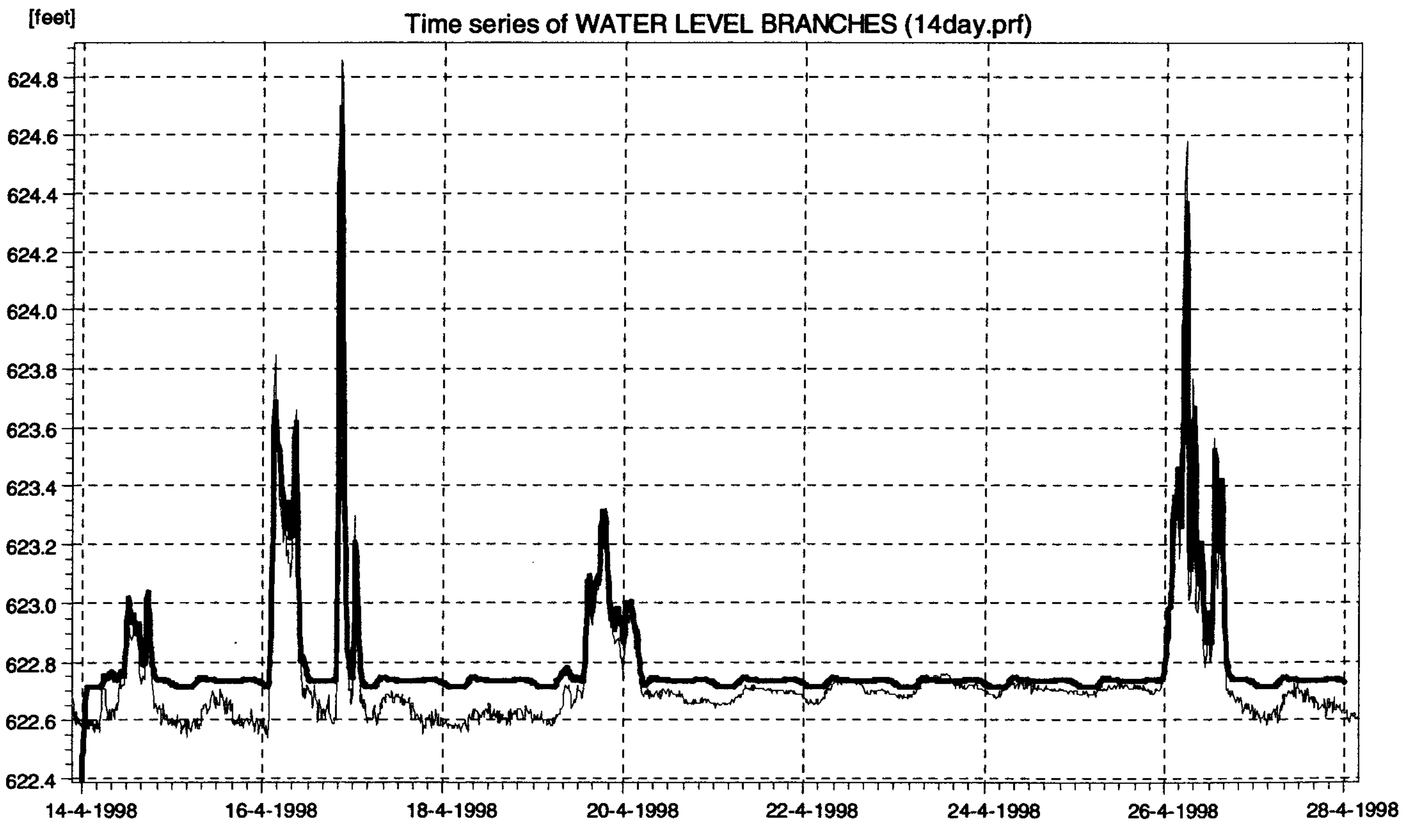
Model Calibration — Model — Meter

CH2MHILL

Meter: EA23

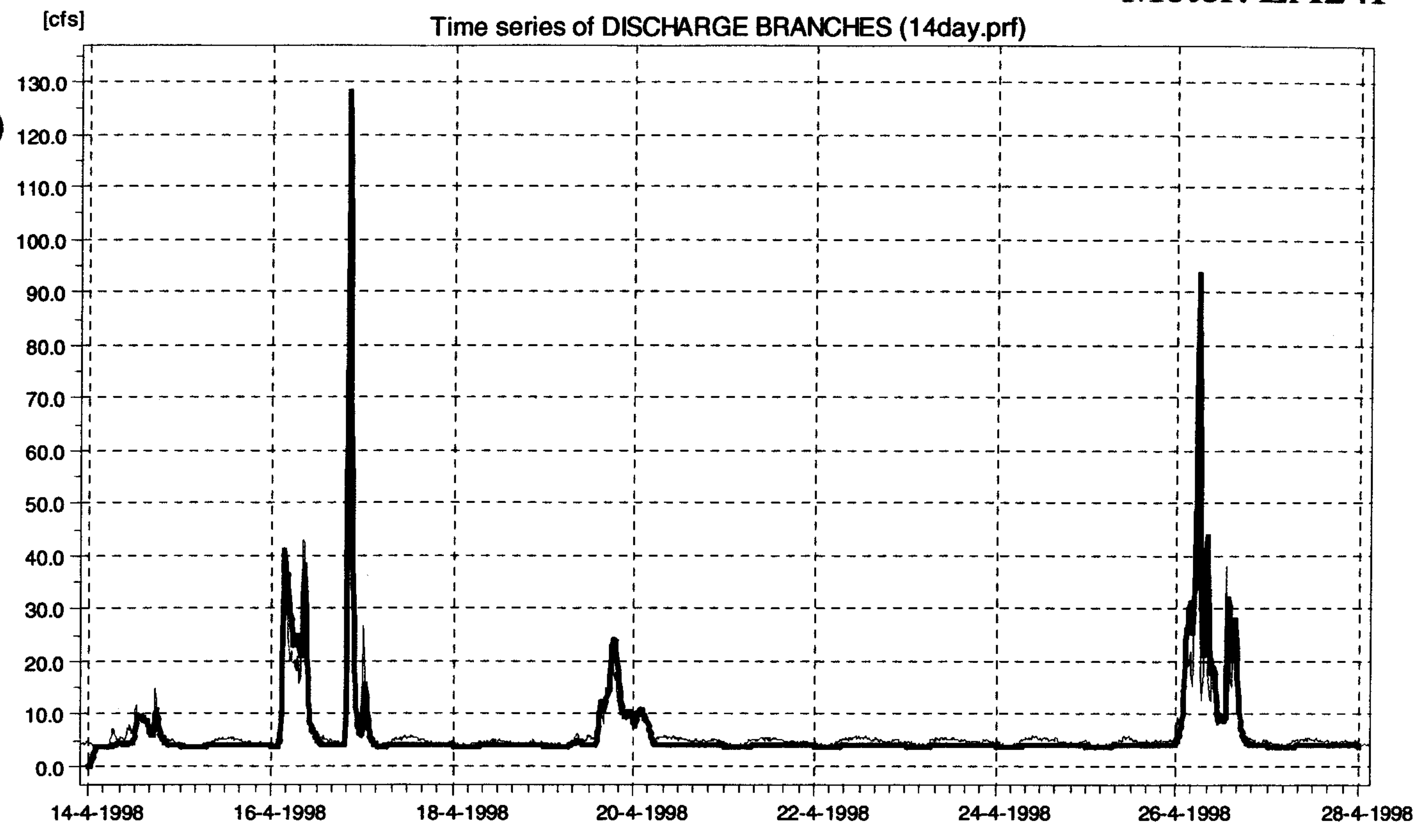


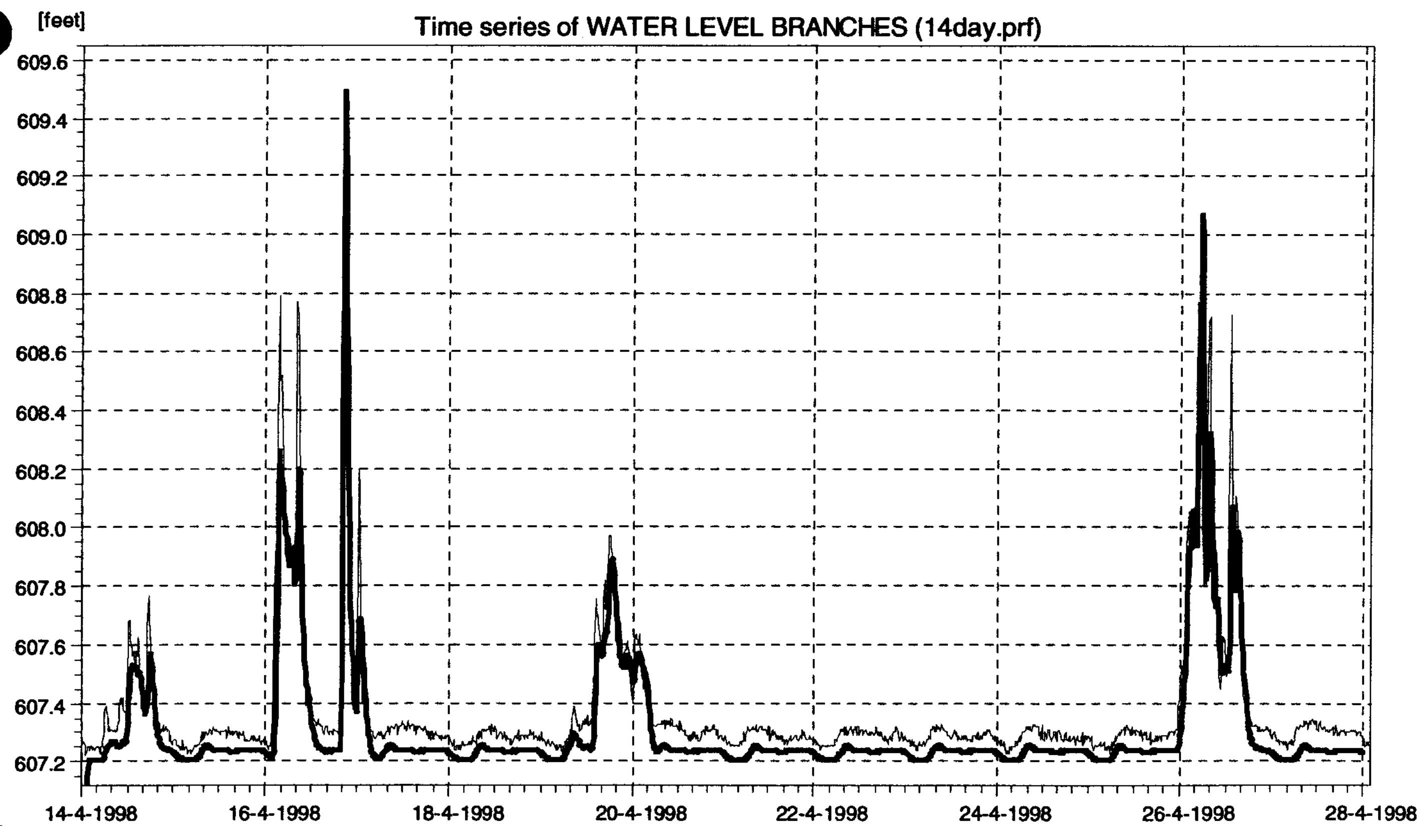
[cfs]
Time series of DISCHARGE BRANCHES (14day.prf)
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
14-4-1998
16-4-1998
18-4-1998
20-4-1998
22-4-1998
24-4-1998
26-4-1998
28-4-1998



[feet]
Time series of WATER LEVEL BRANCHES (14day.prf)
624.8
624.6
624.4
624.2
624.0
623.8
623.6
623.4
623.2
623.0
622.8
622.6
622.4
14-4-1998
16-4-1998
18-4-1998
20-4-1998
22-4-1998
24-4-1998
26-4-1998
28-4-1998

Meter: EA24I





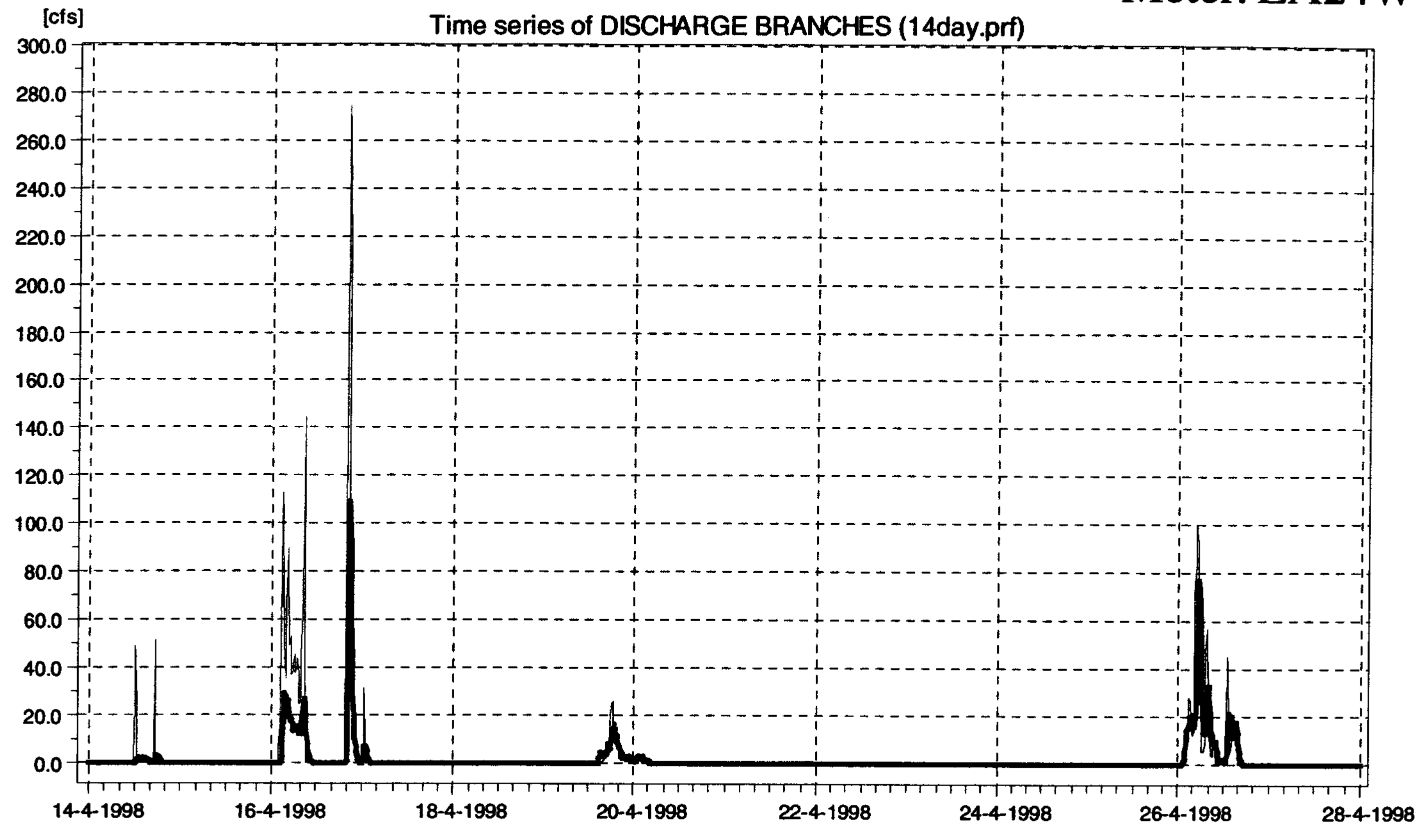
Metcalf & Eddy

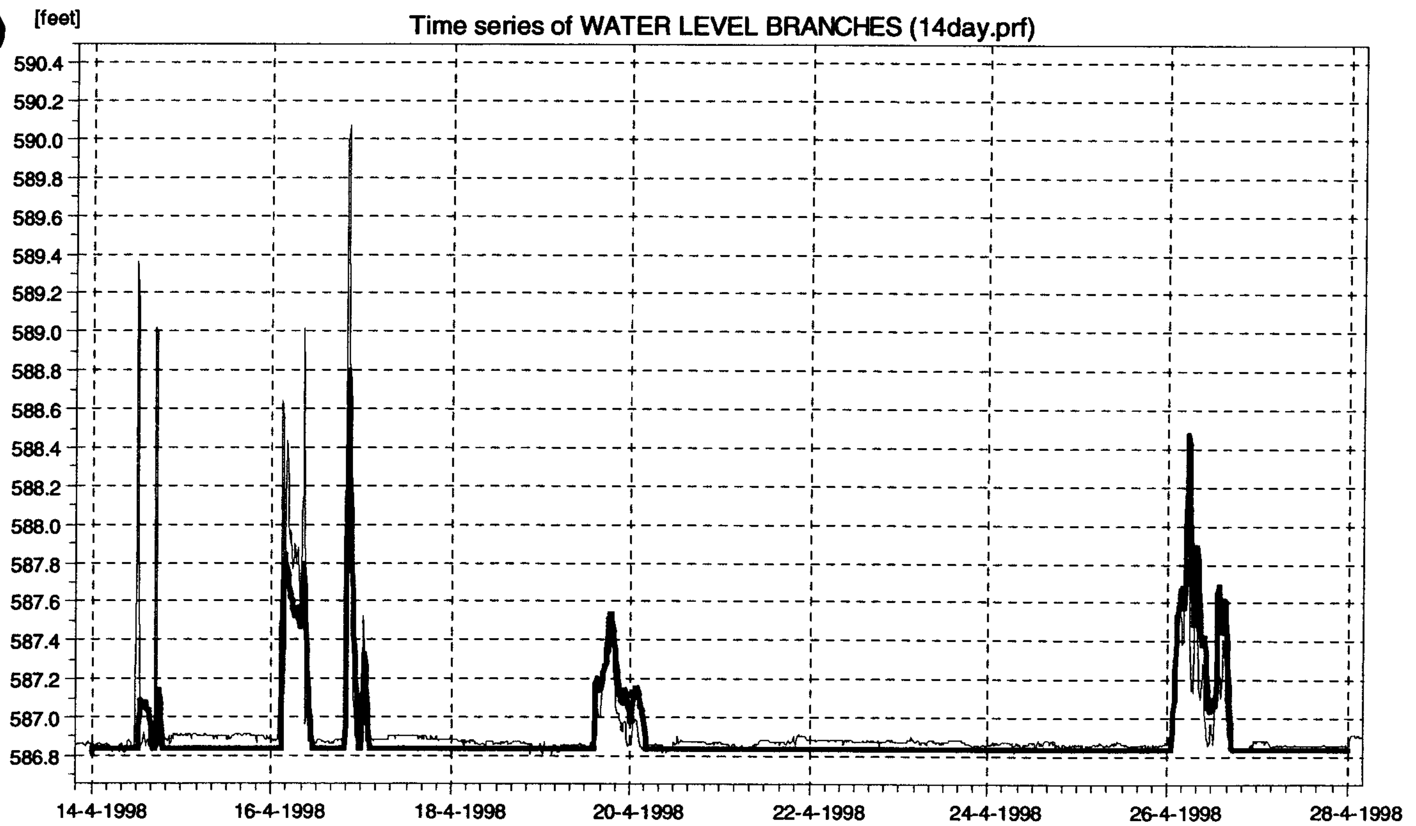
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA24W





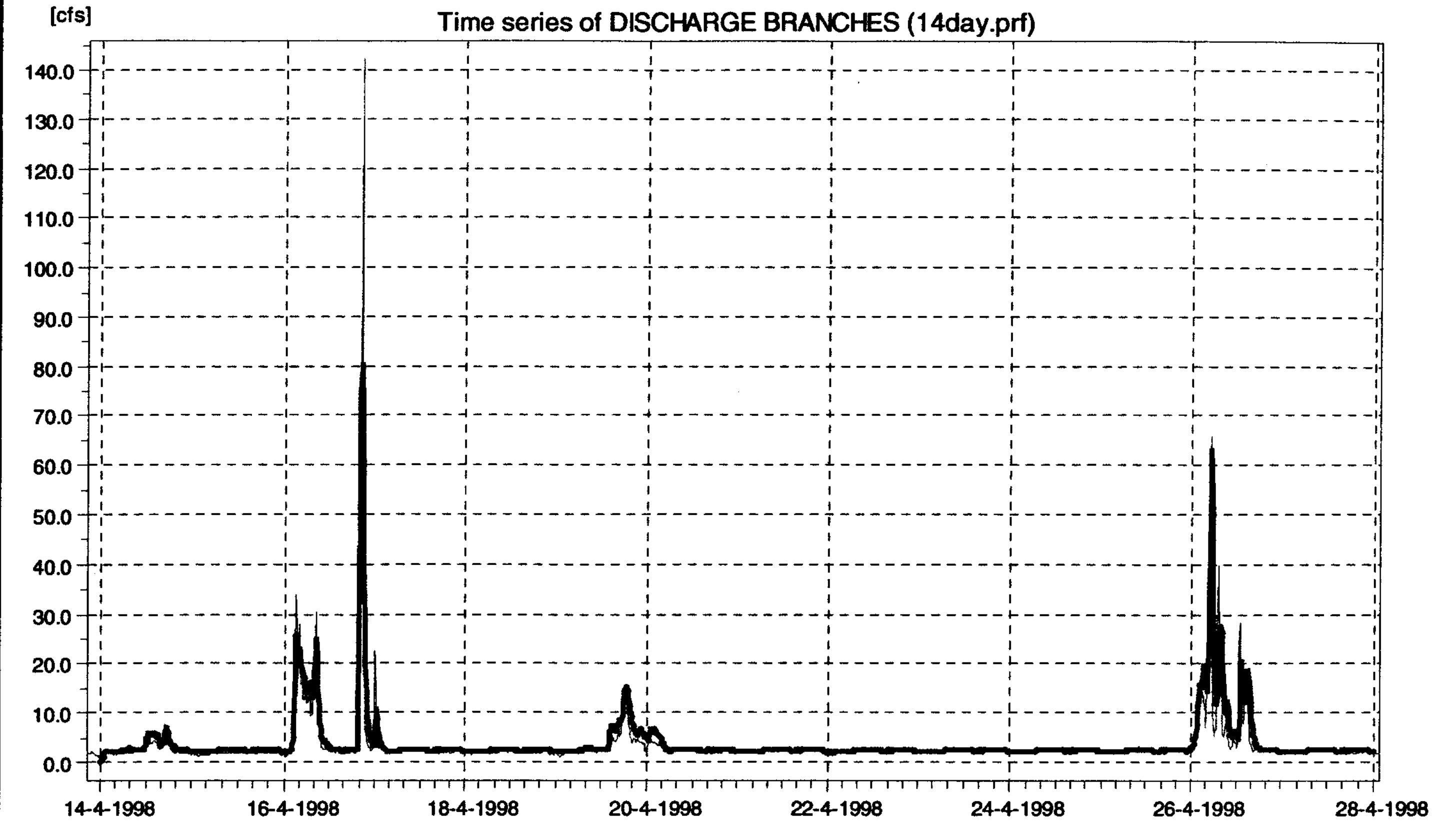
M&E Metcalf & Eddy AQUA ALLIANCE

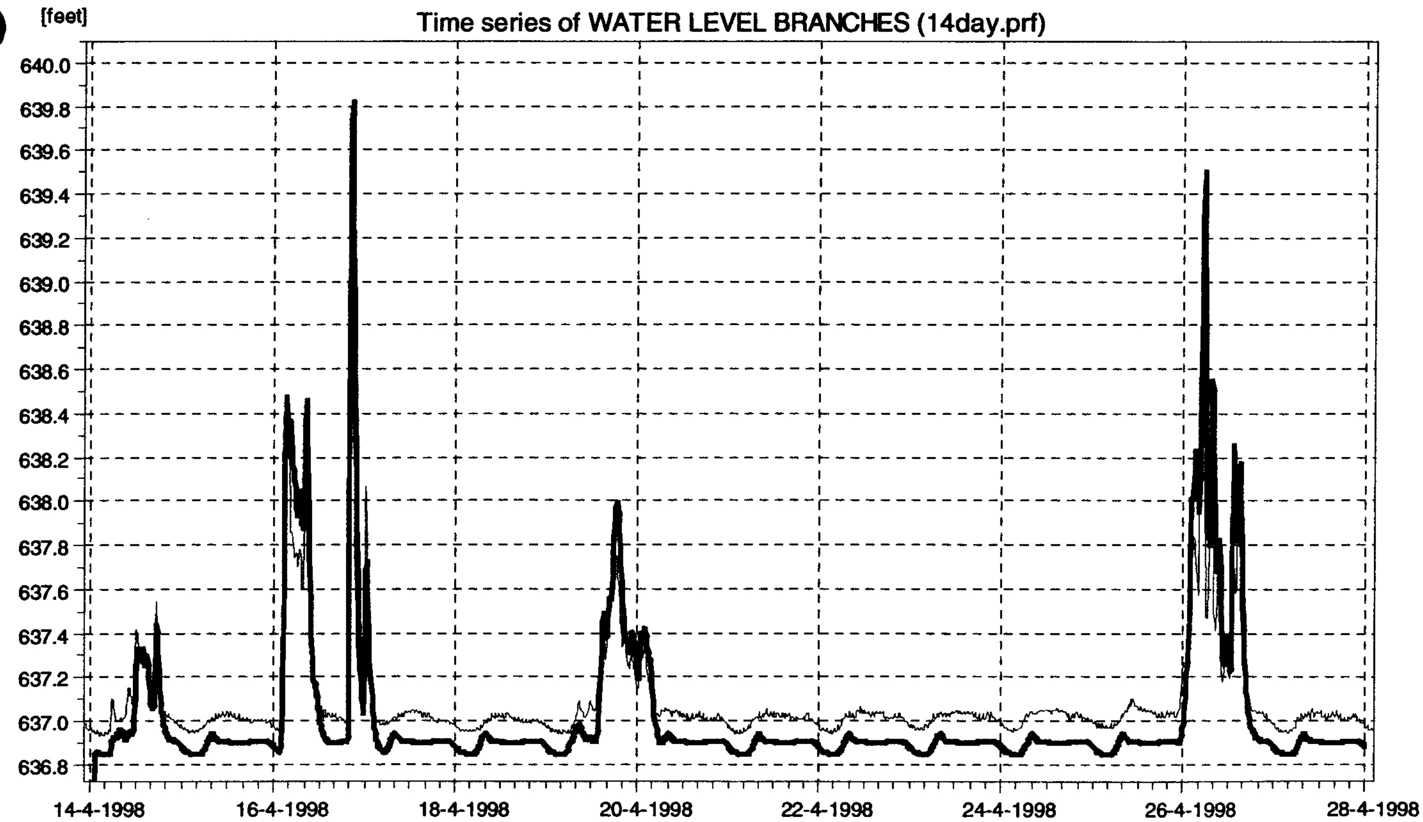
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA25





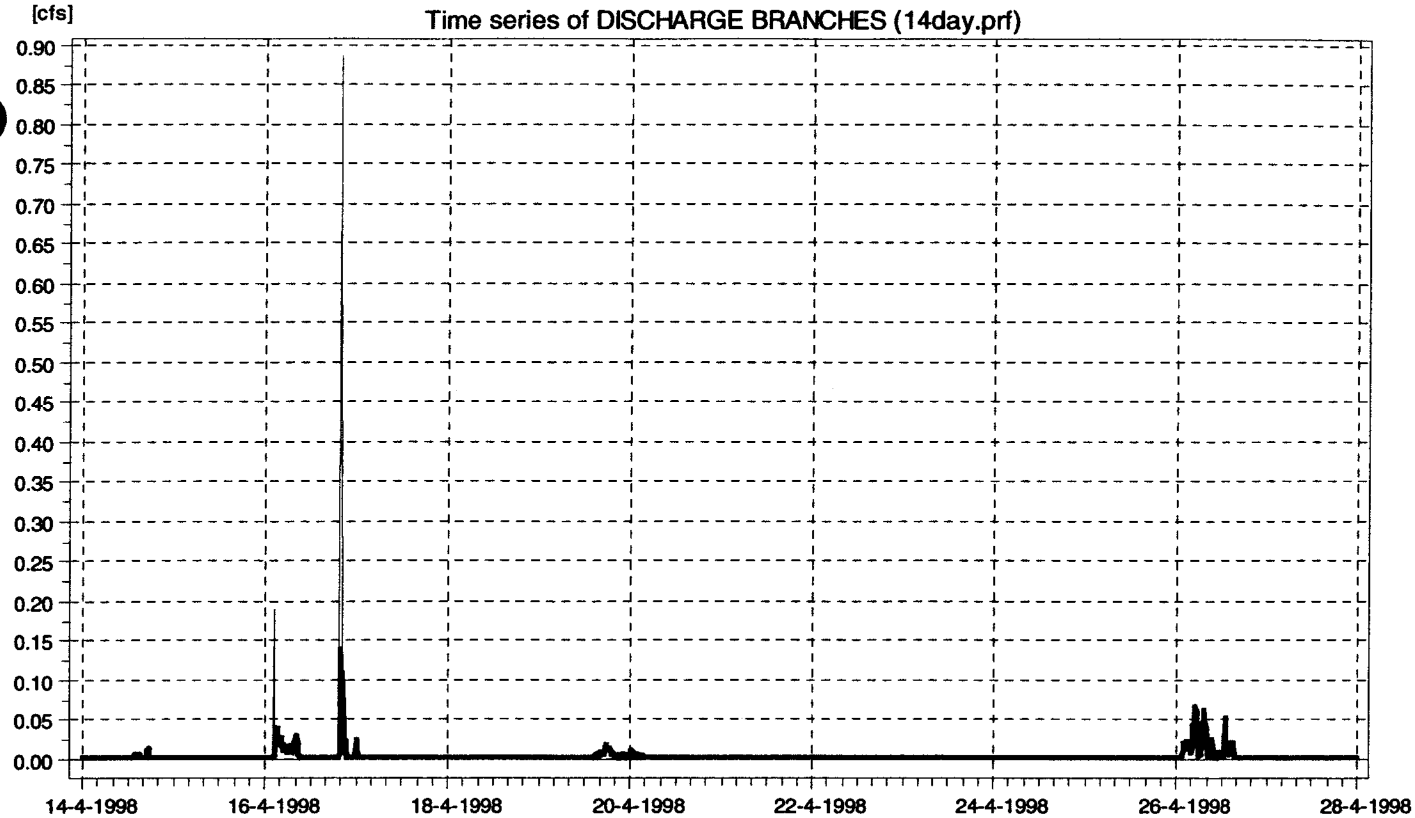
M&E Metcalf & Eddy AQUA ALLIANCE

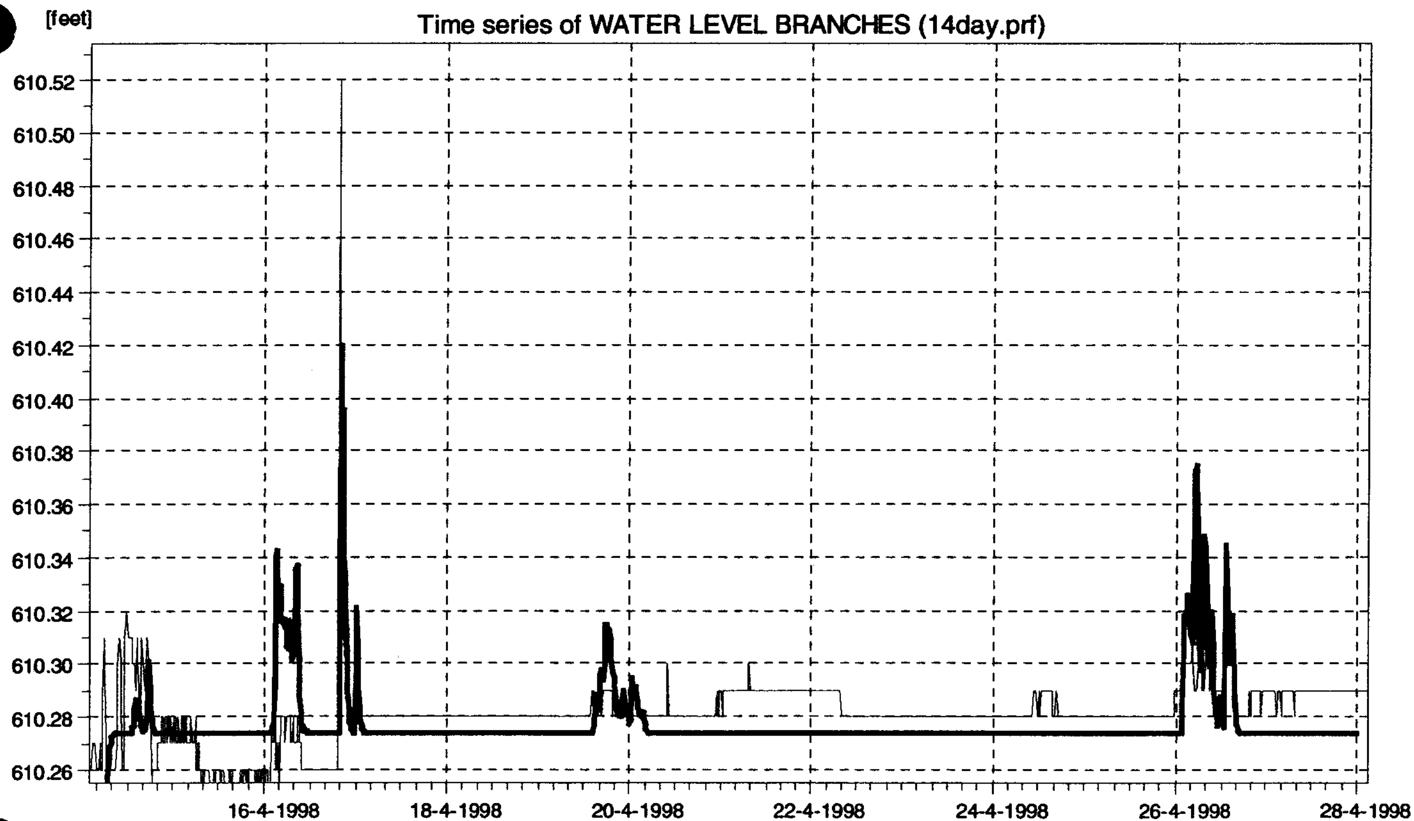
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA26I





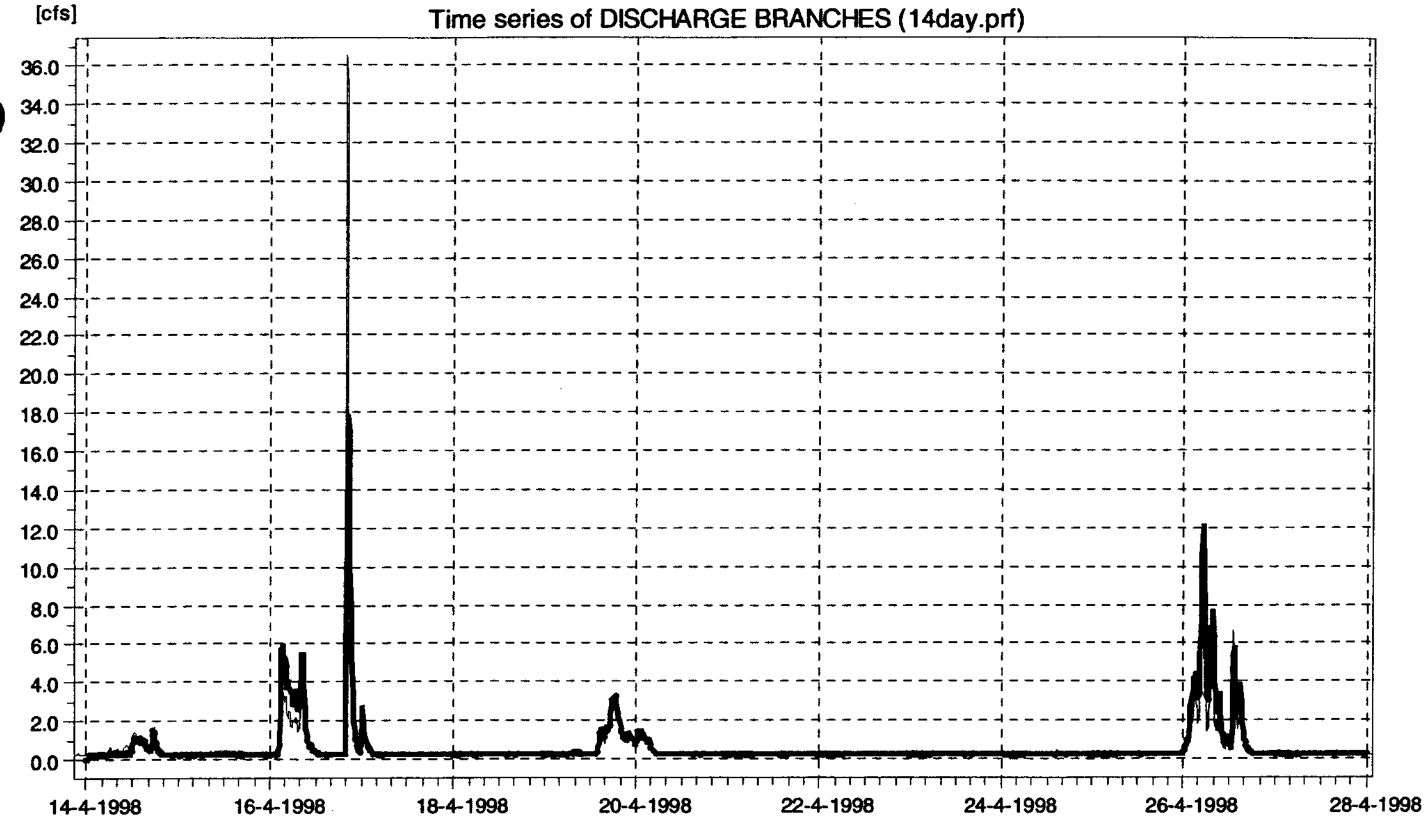
M&E AQUA ALLIANCE Metcalf & Eddy

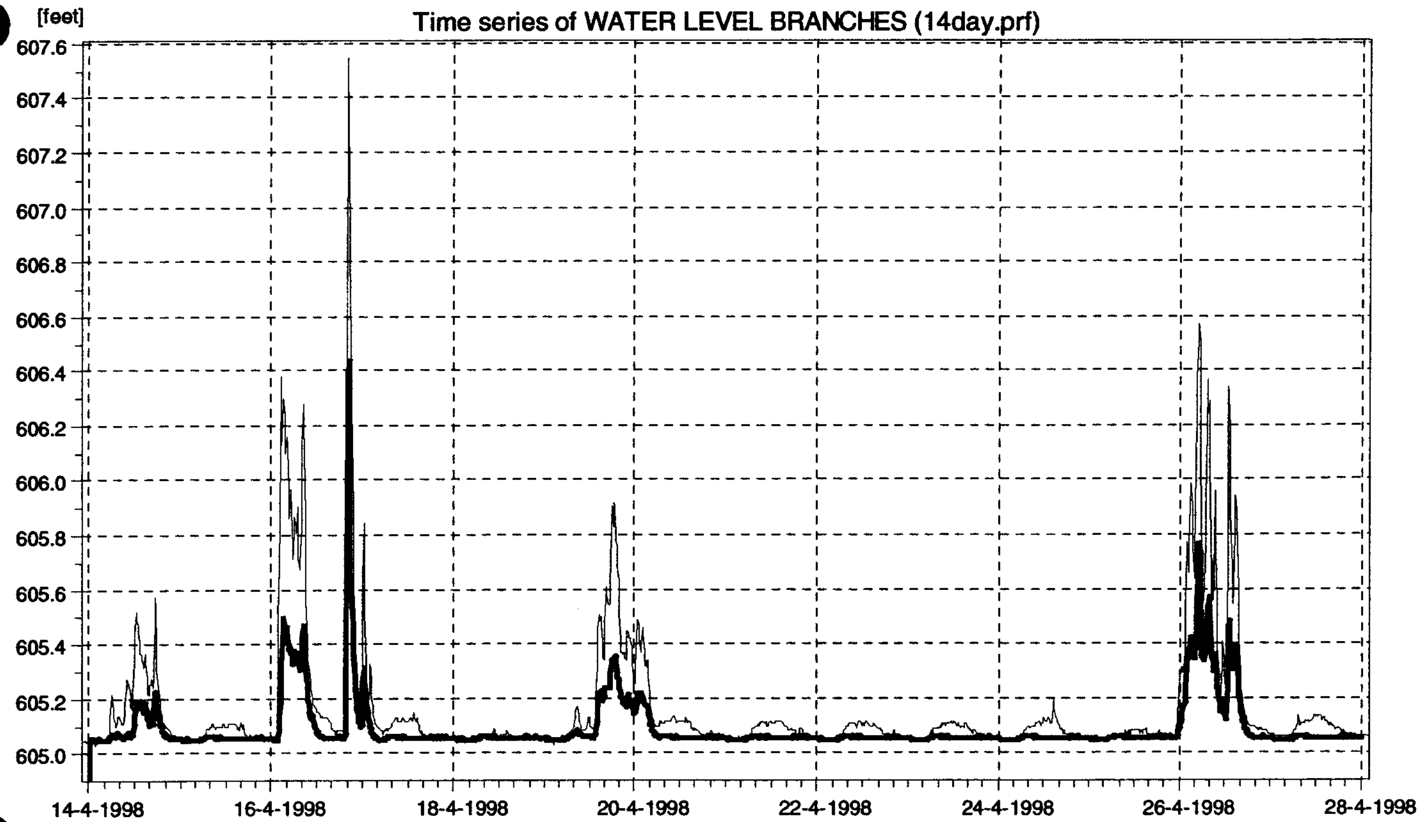
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA28I





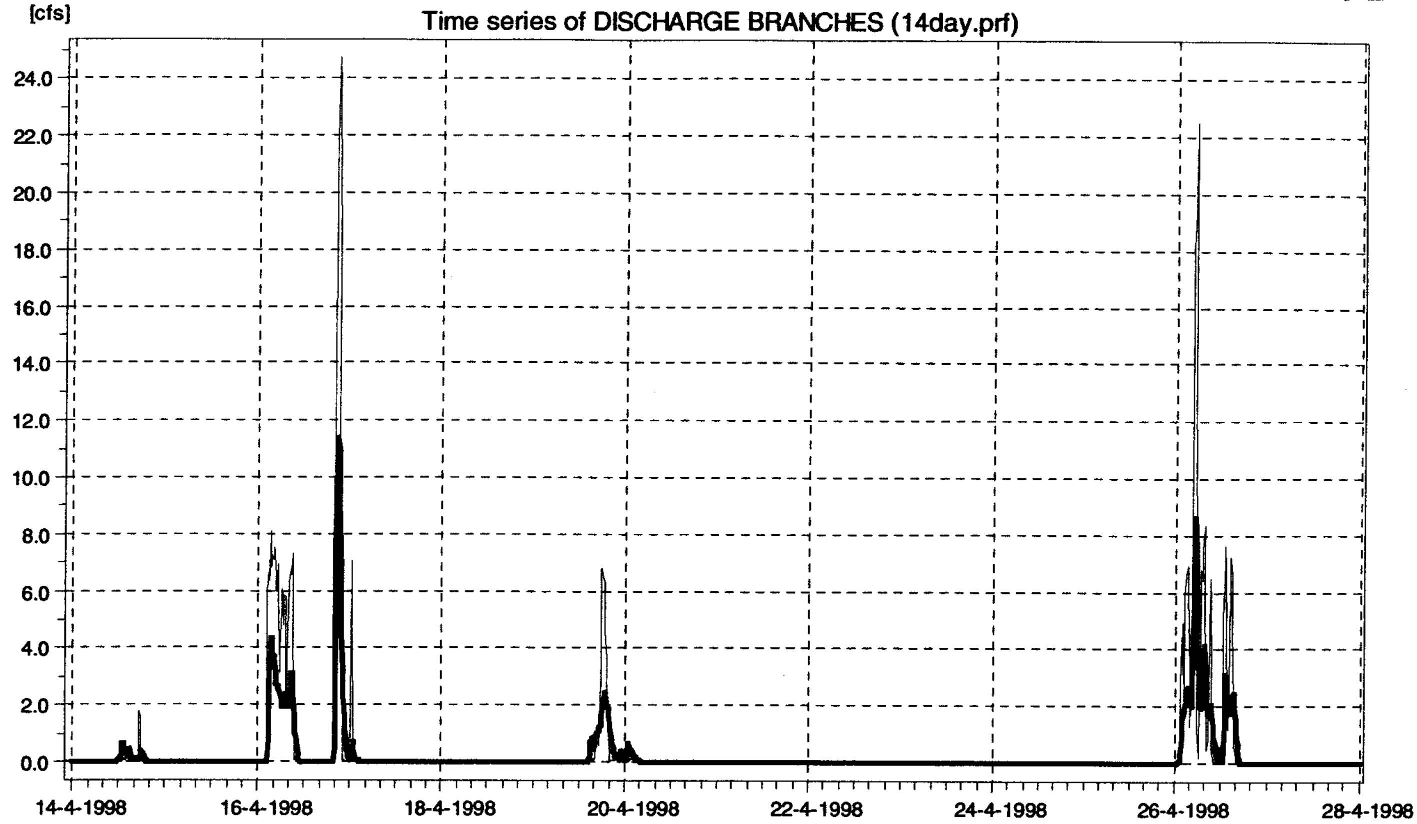
M&E Metcalf & Eddy AQUA ALLIANCE

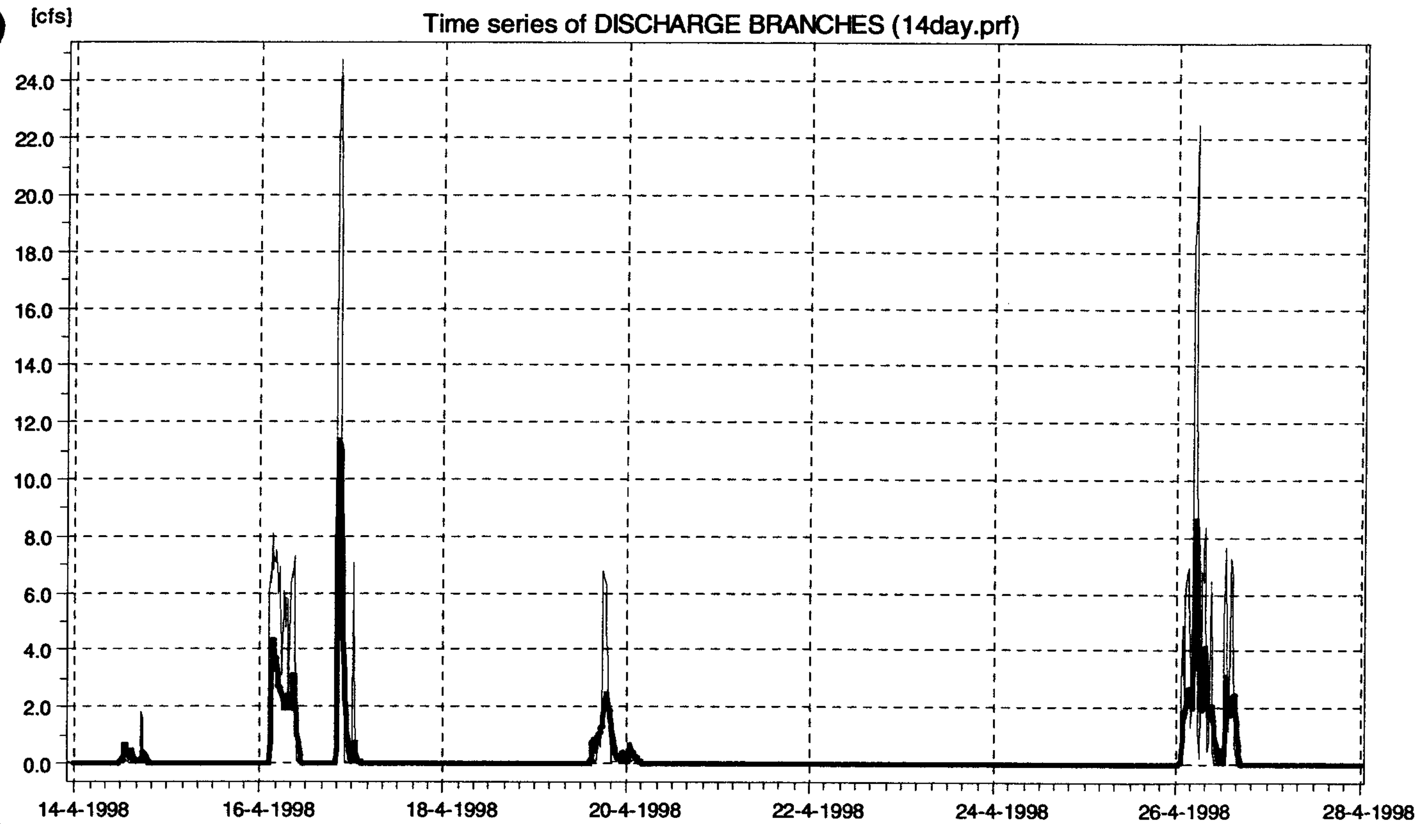
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA29D





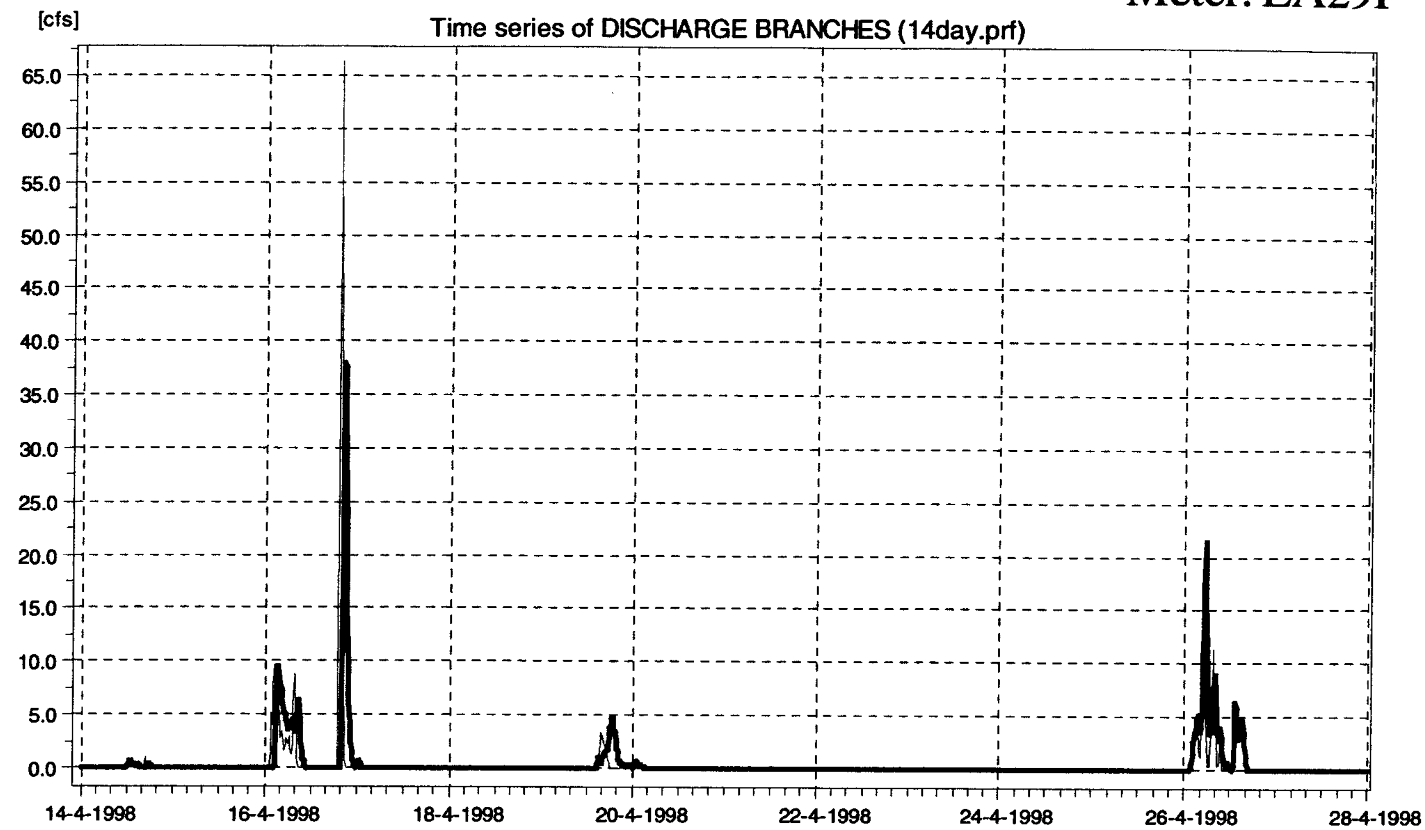
M&E AQUA ALLIANCE Metcalf & Eddy

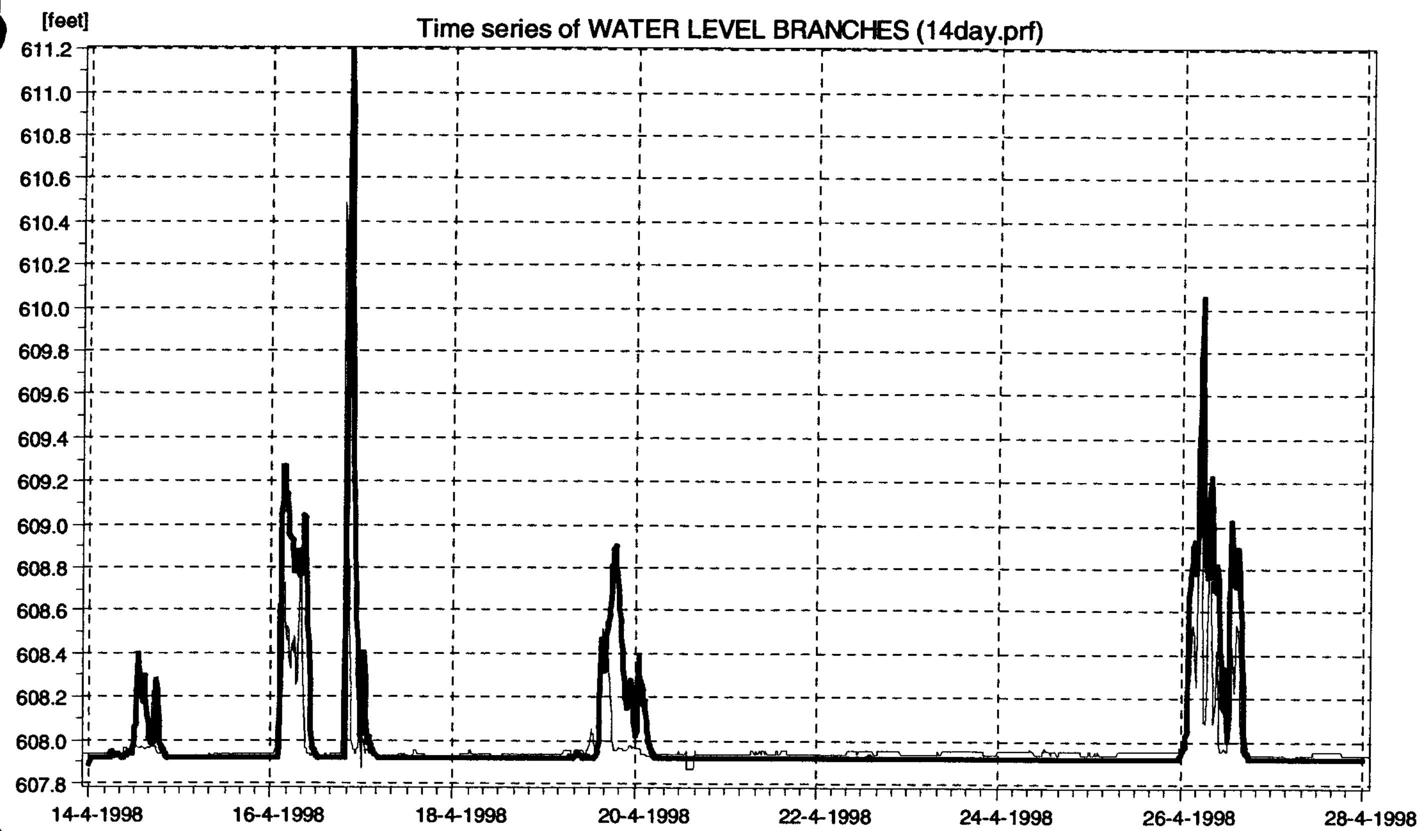
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA29I





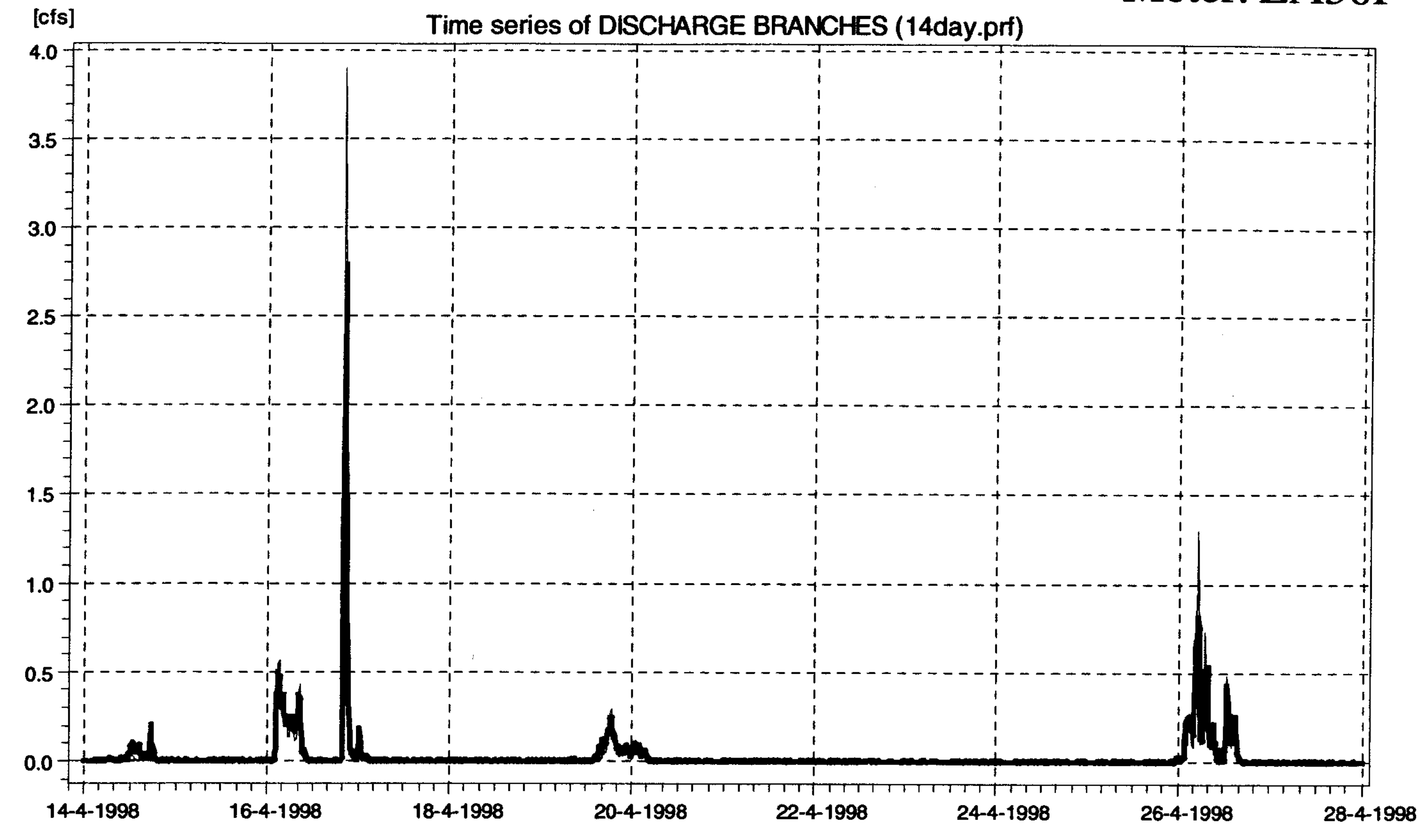
M&E Metcalf & Eddy AQUA ALLIANCE

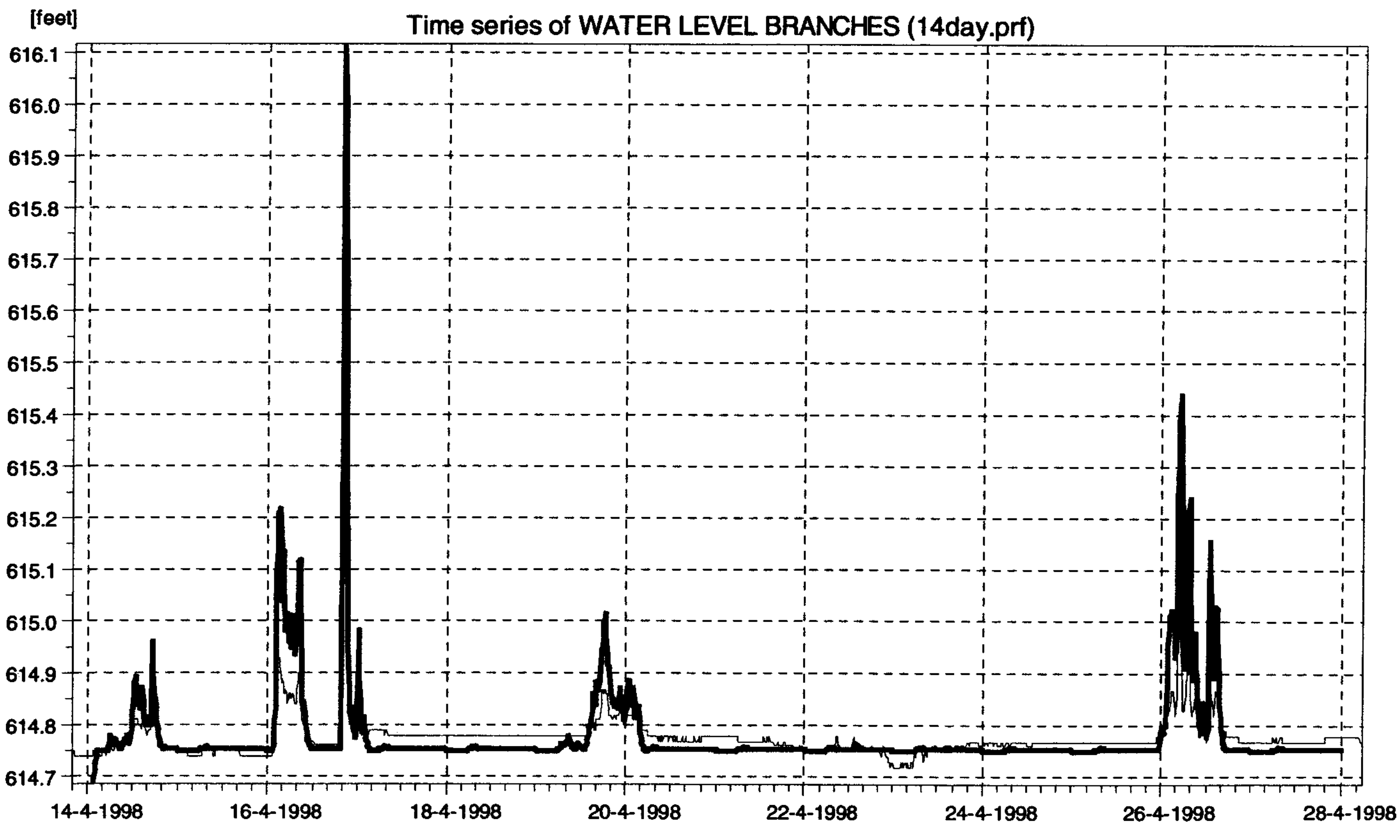
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA30I





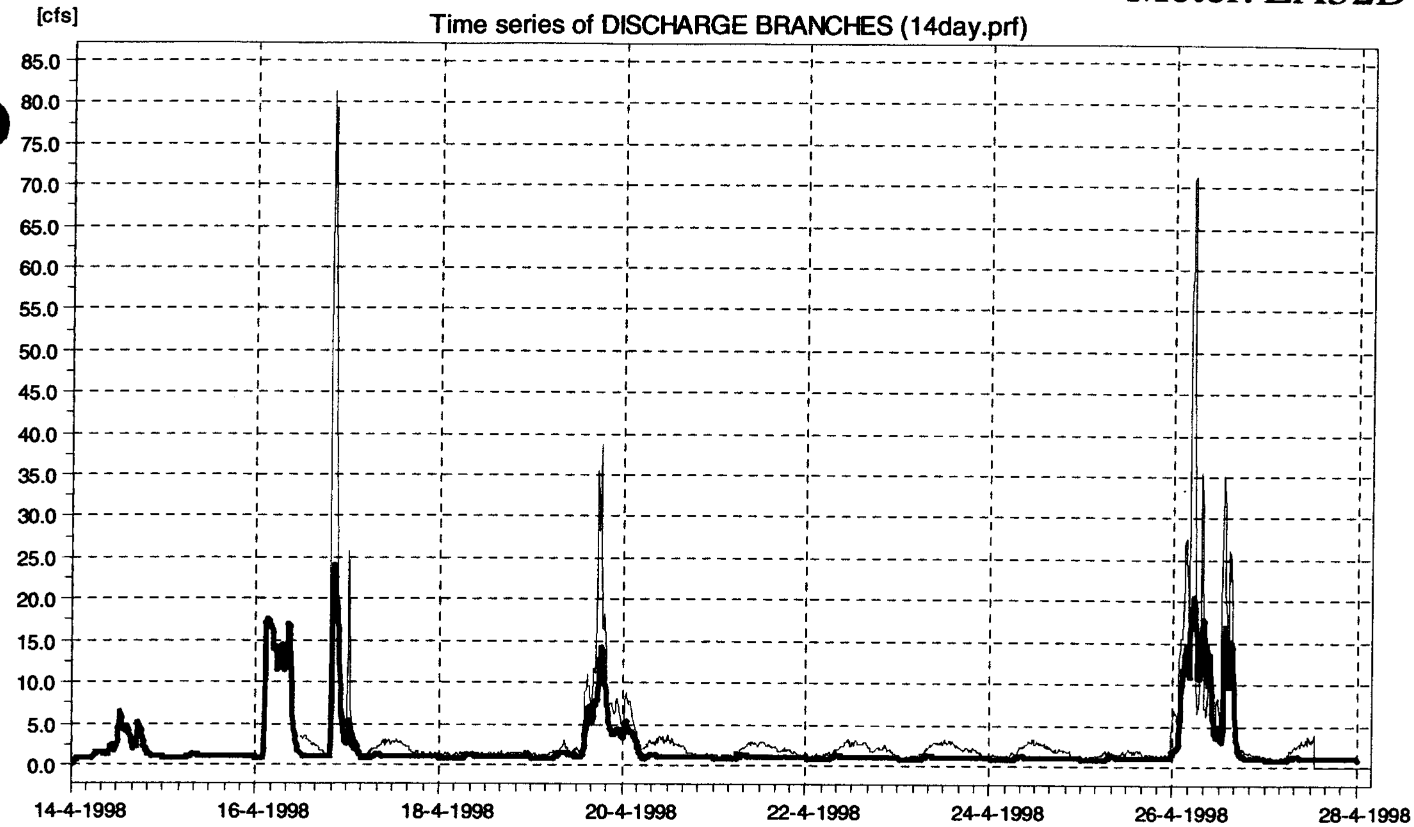
M&E Metcalf & Eddy AQUA ALLIANCE

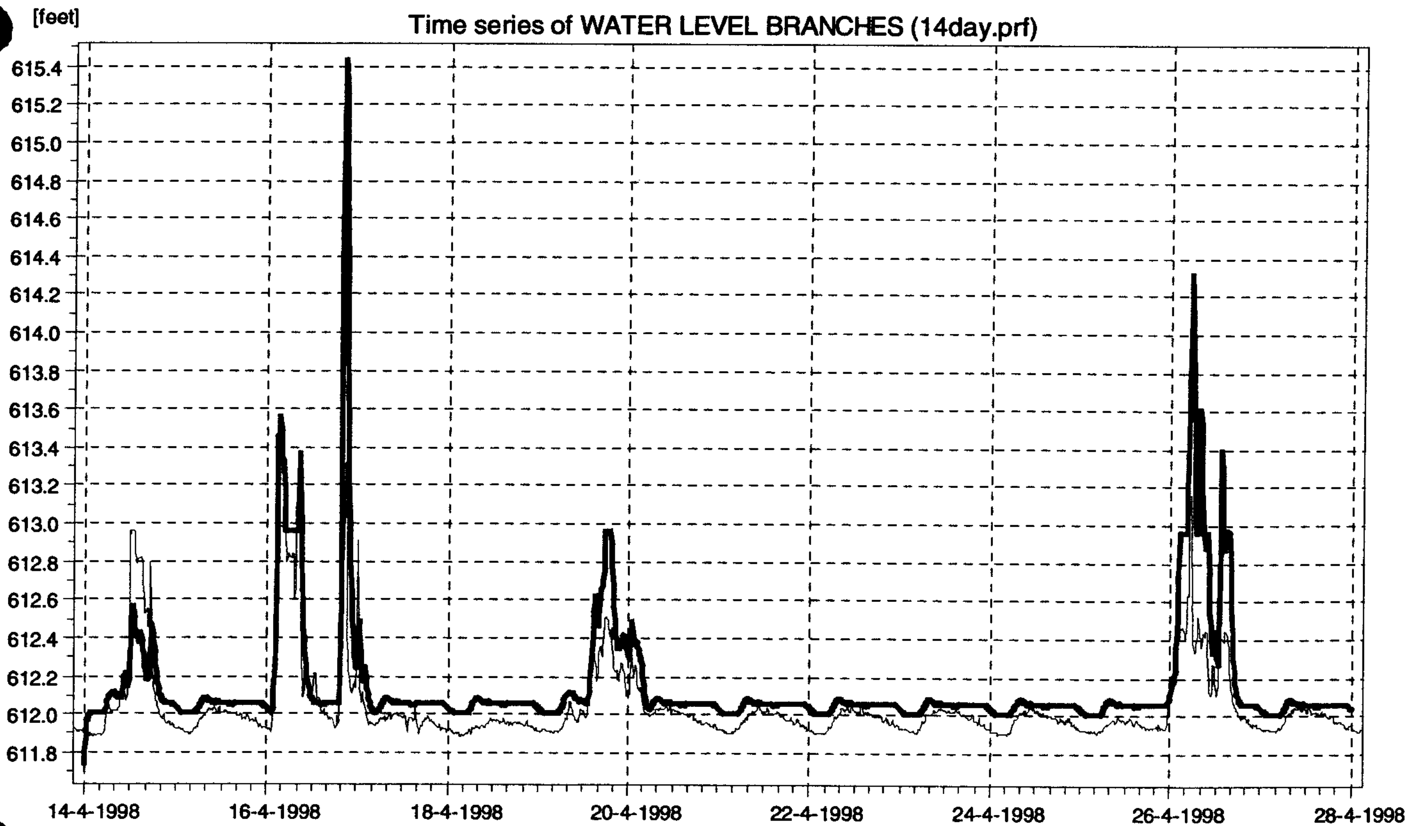
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA32D





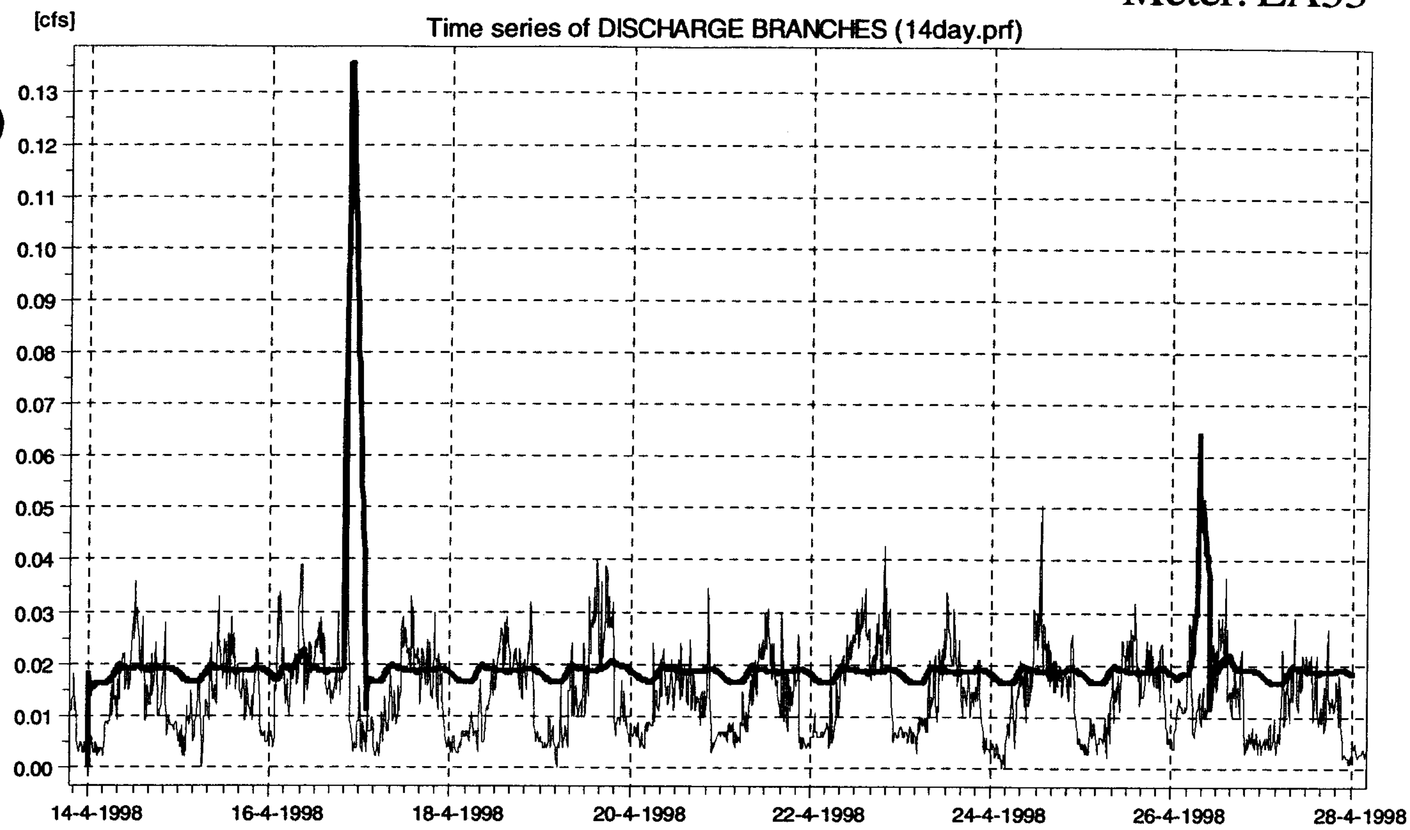
M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

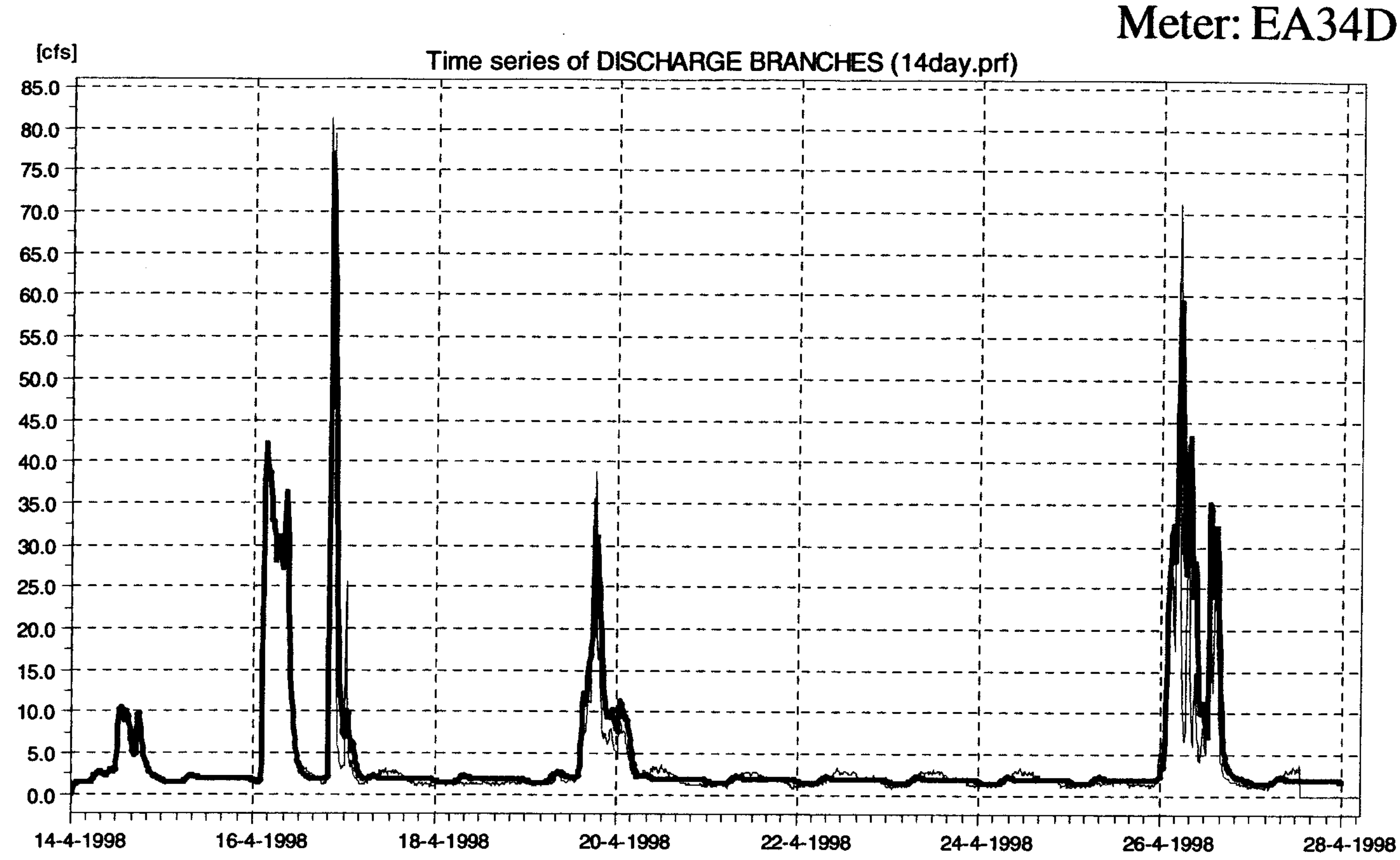
Model Calibration — Model — Meter

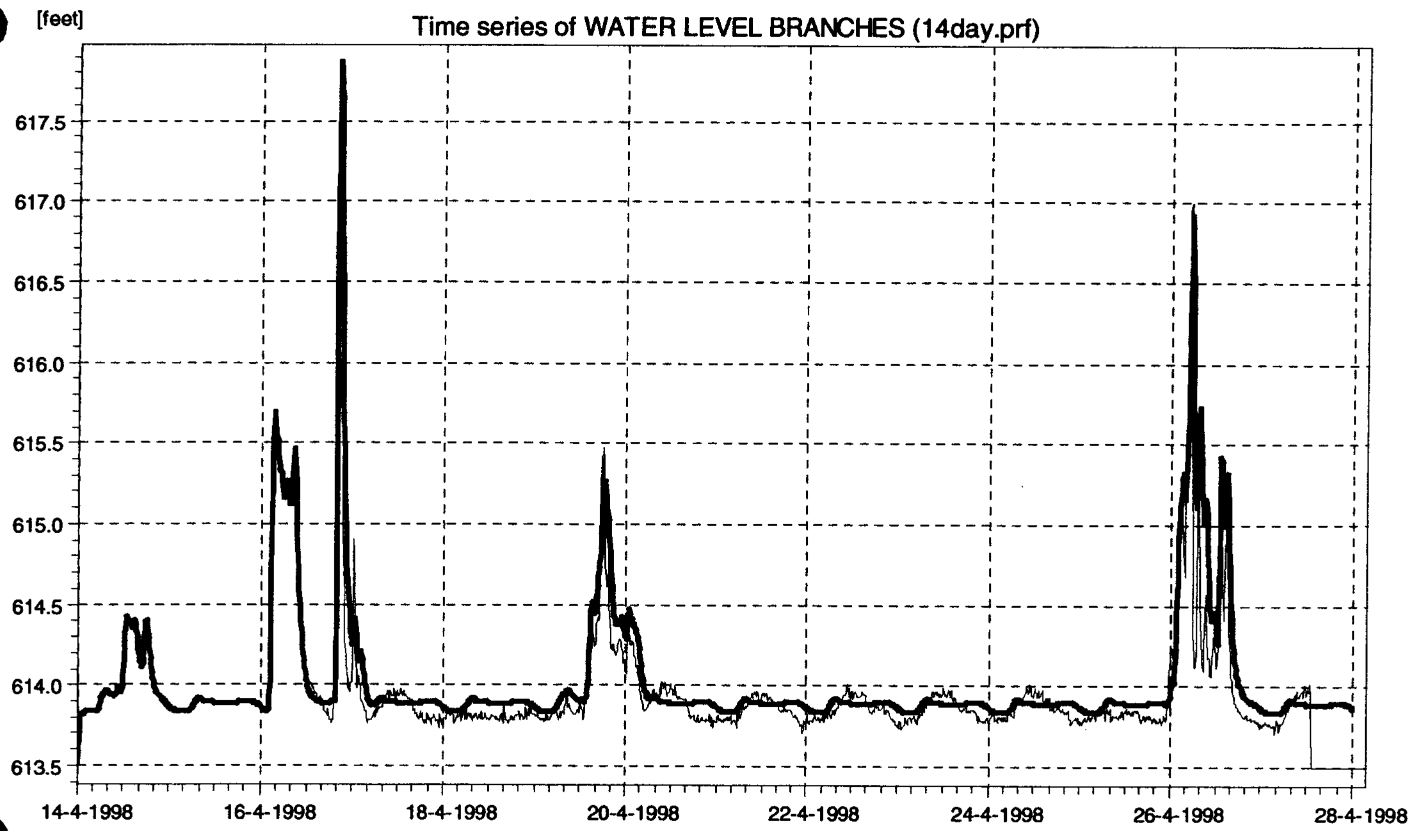
CH2MHILL

Meter: EA33



BURKE LAKEFRONT AIRPORT PUMP STATION, FLOW ONLY





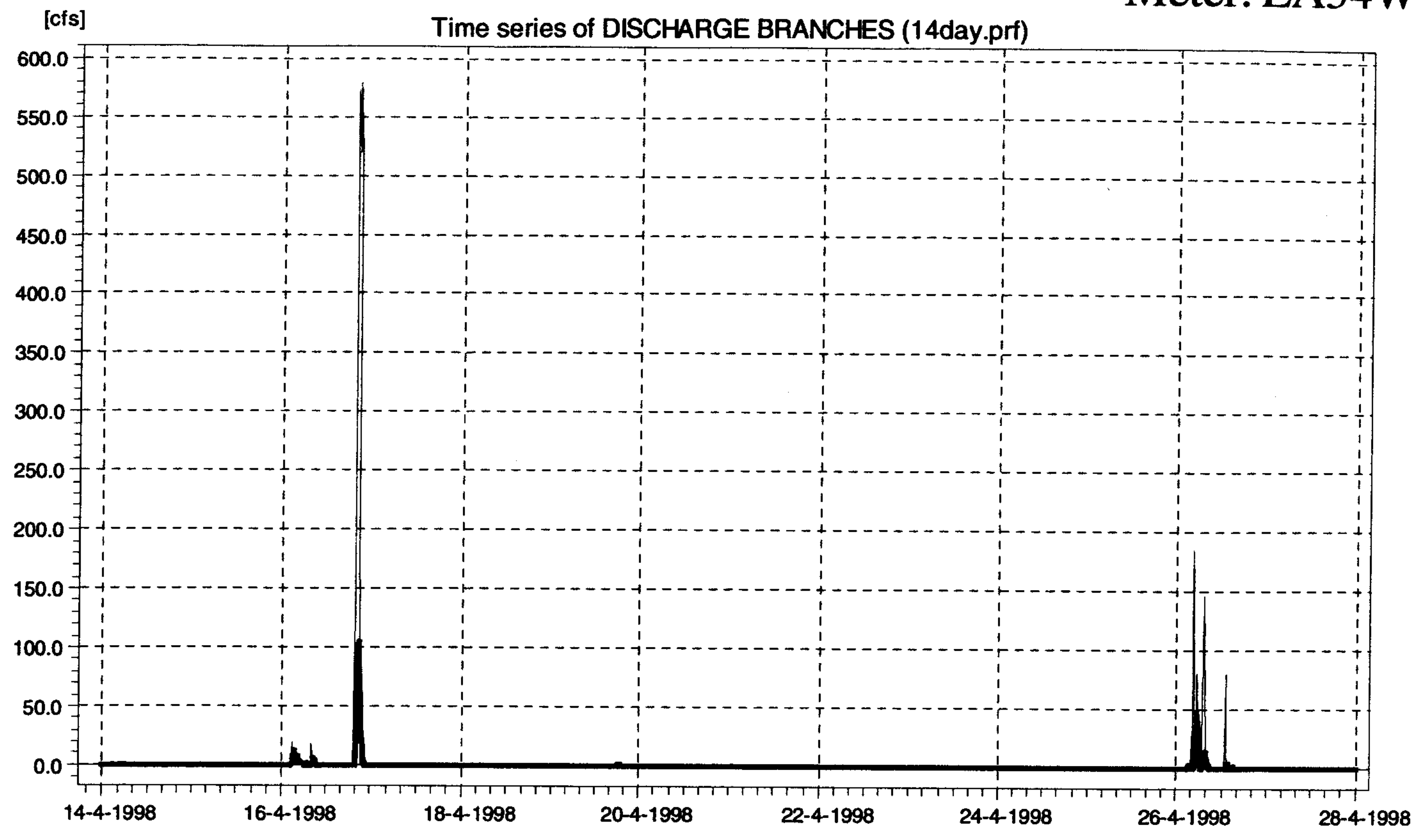
M&E Metcalf & Eddy AQUA ALLIANCE

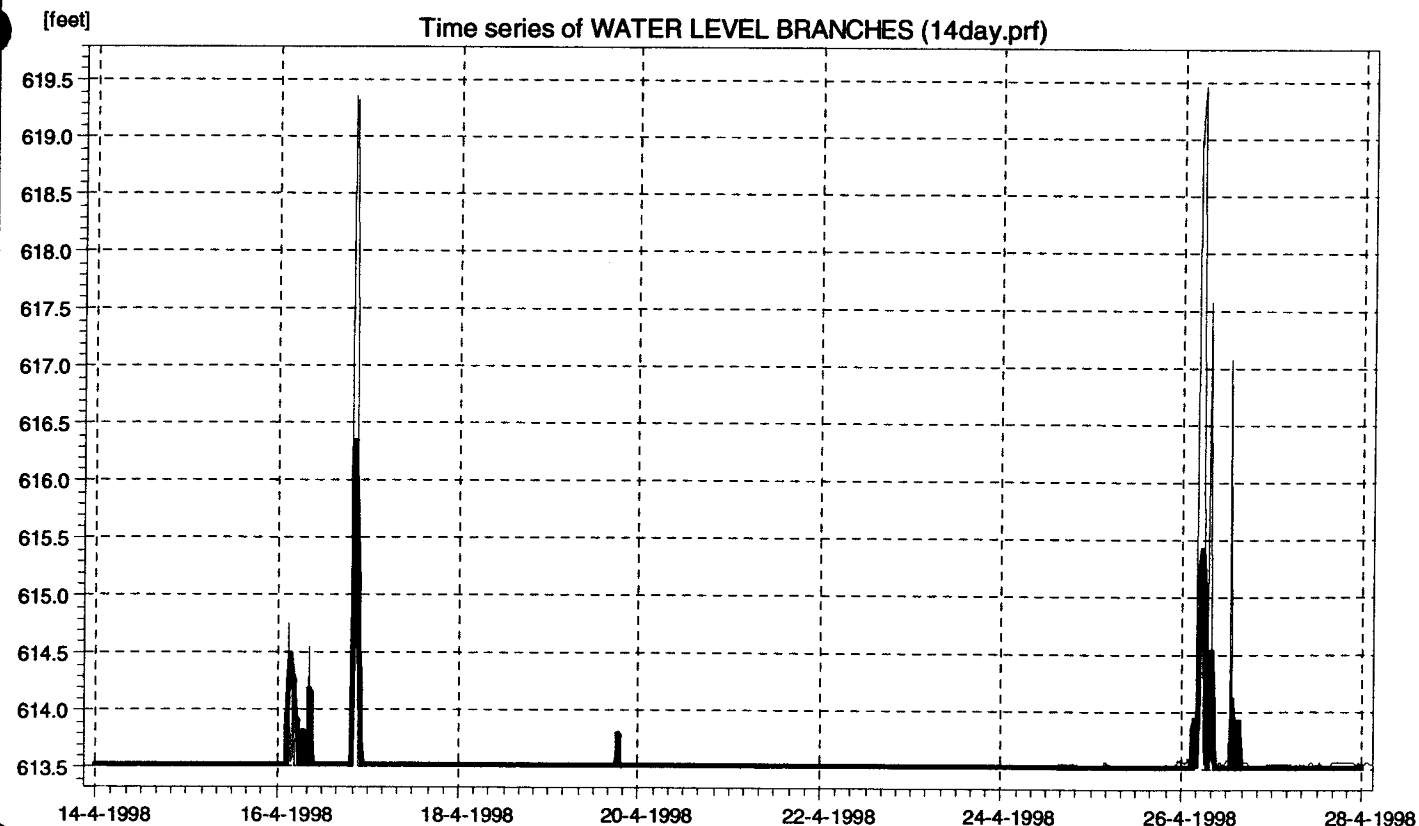
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA34W





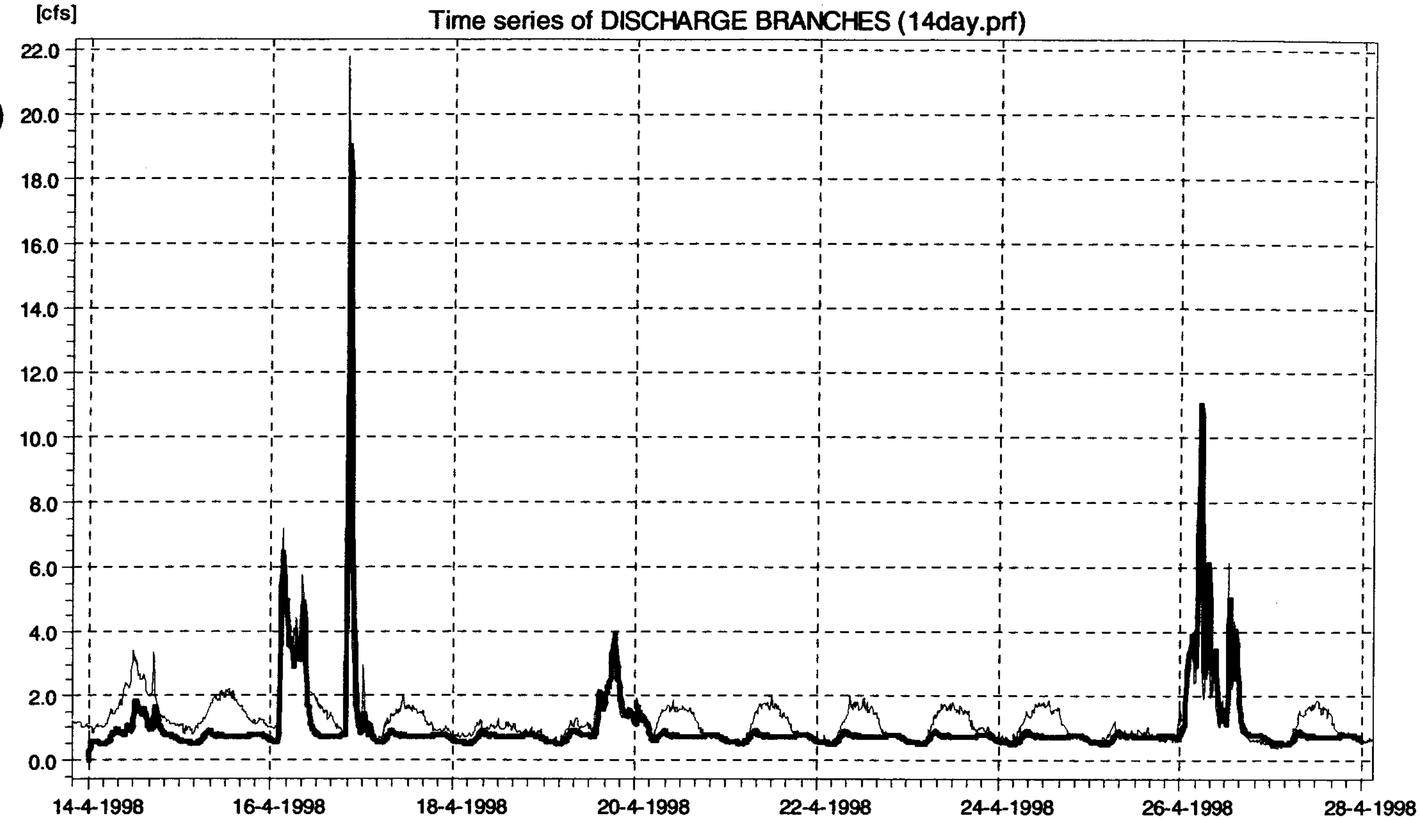
M&E Metcalf & Eddy AQUA ALLIANCE

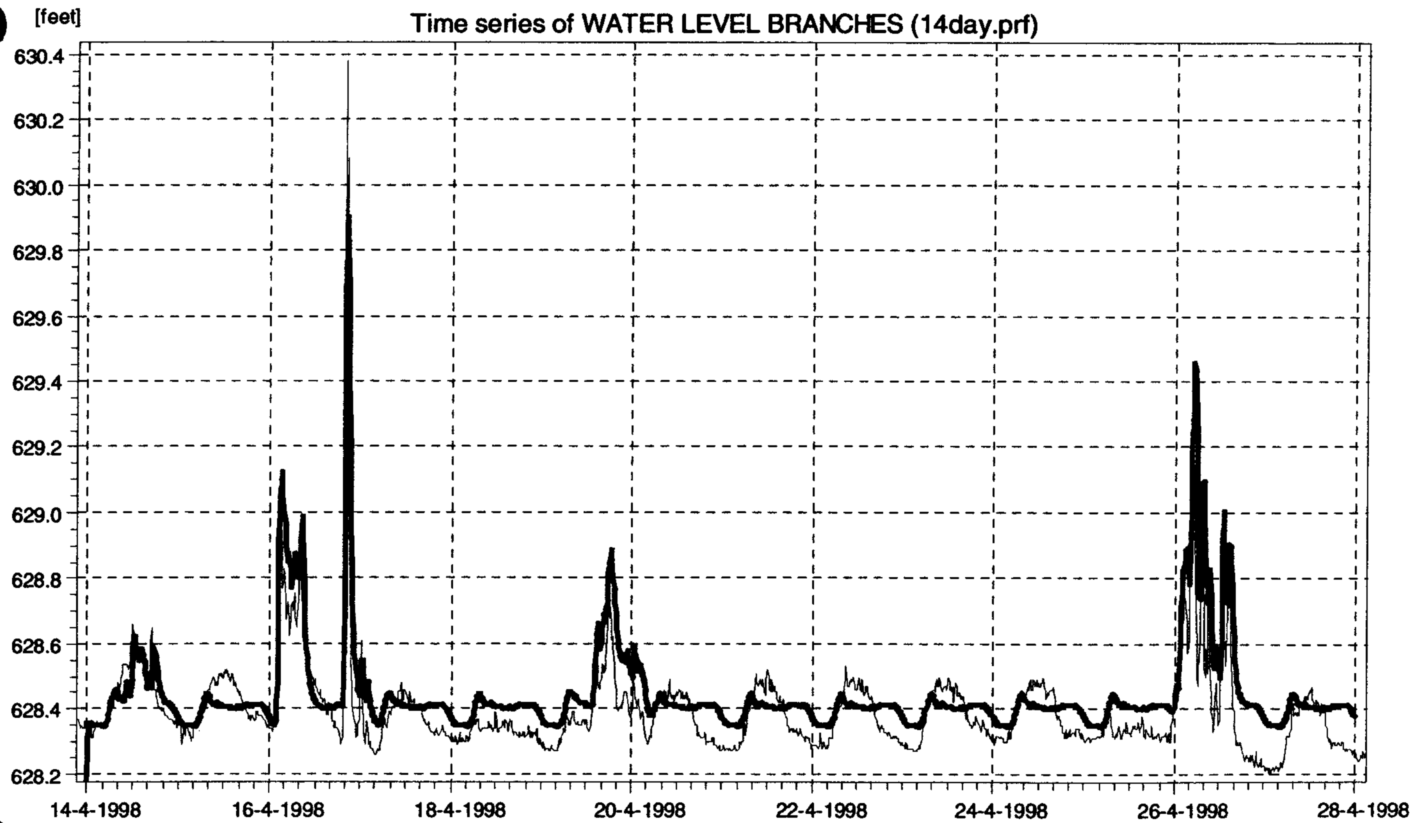
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA36





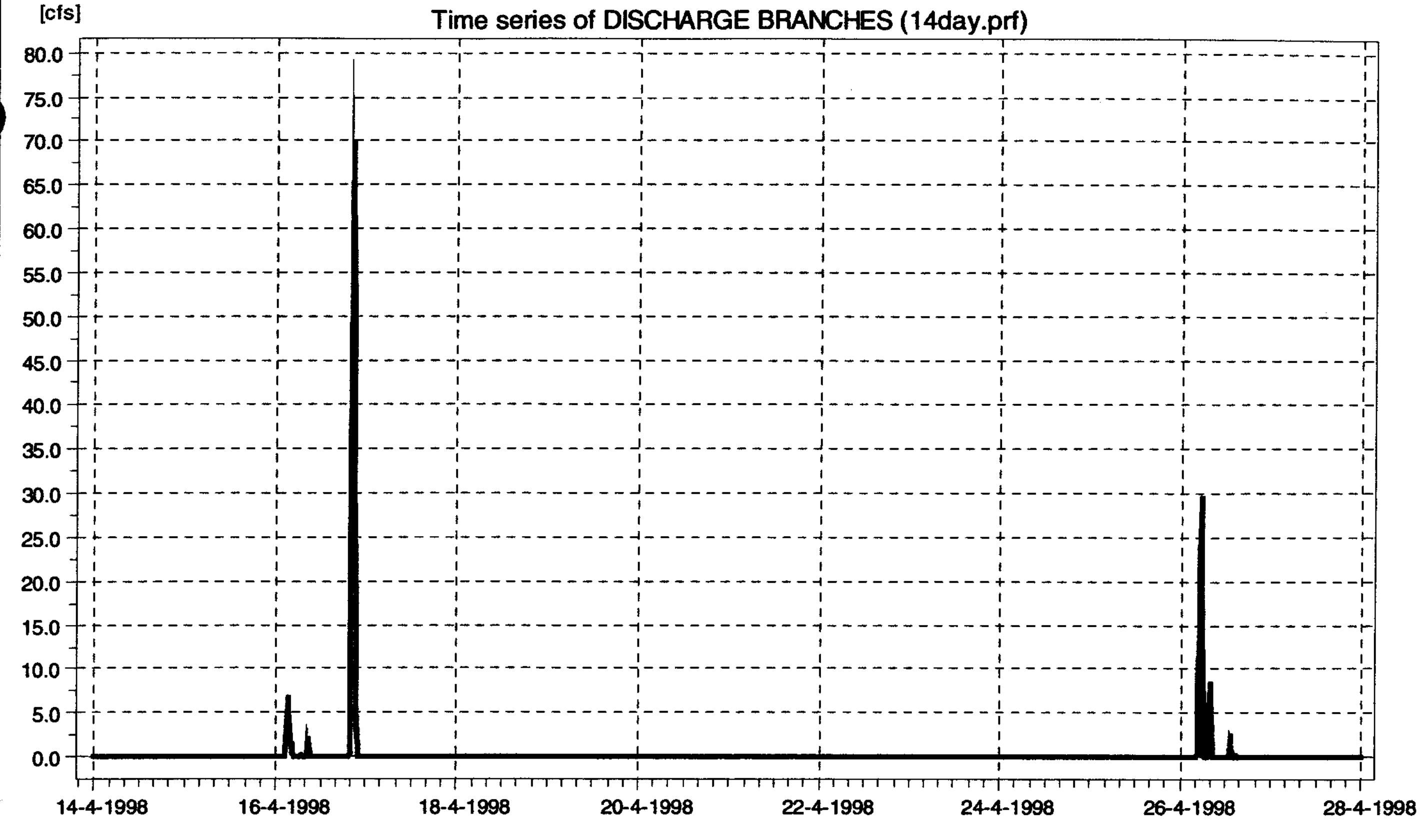
M&E Metcalf & Eddy AQUA ALLIANCE

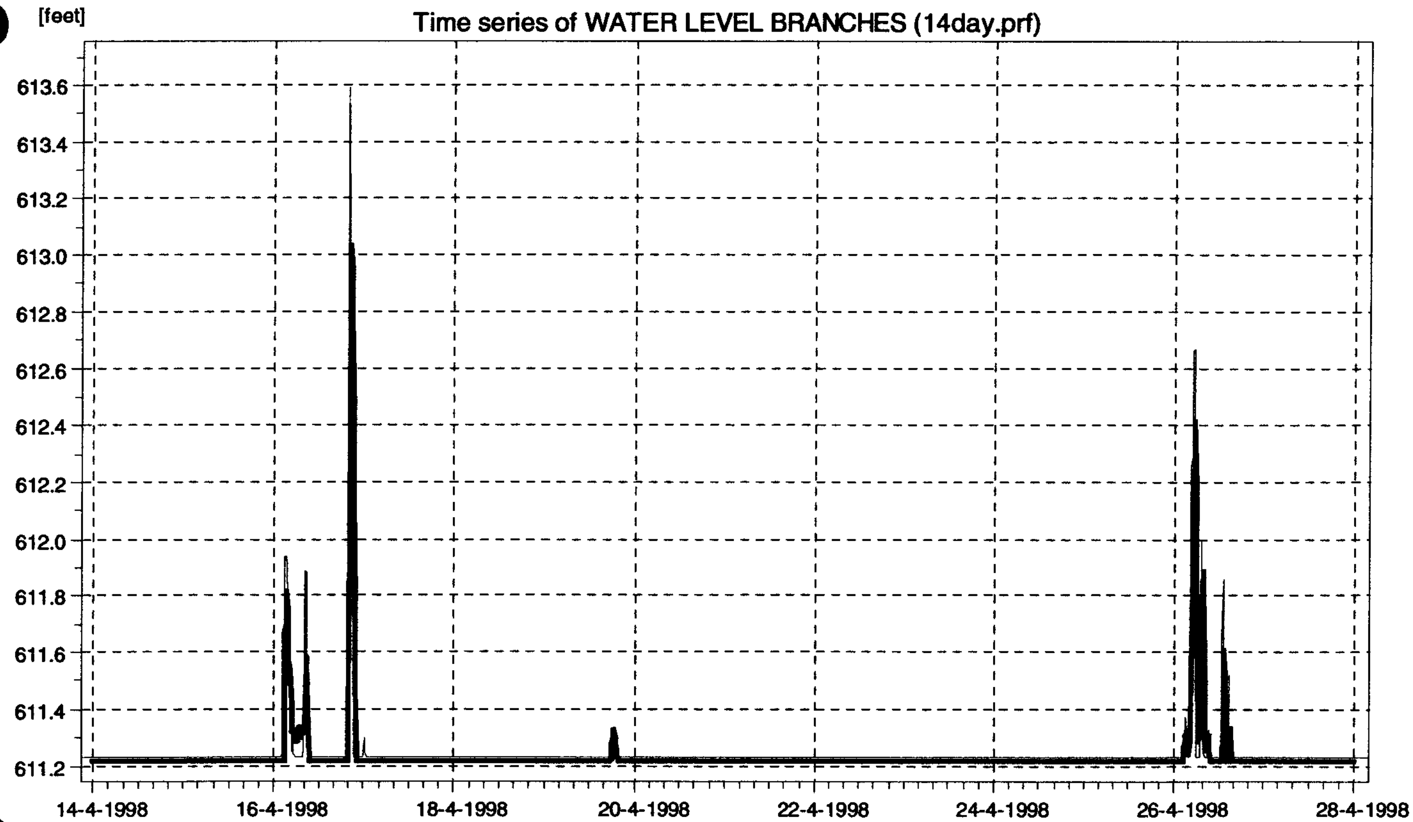
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: LE01





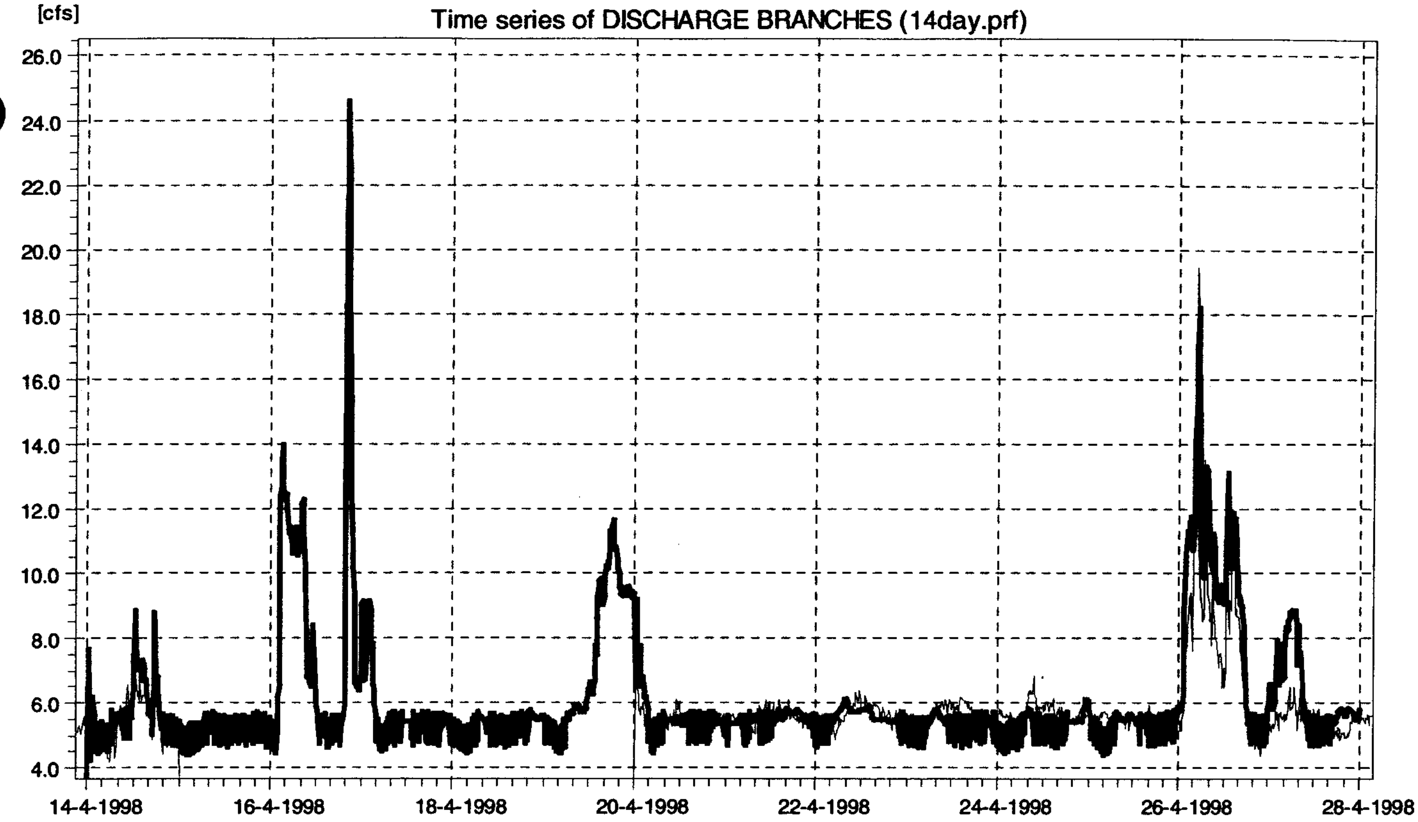
Metcalf & Eddy

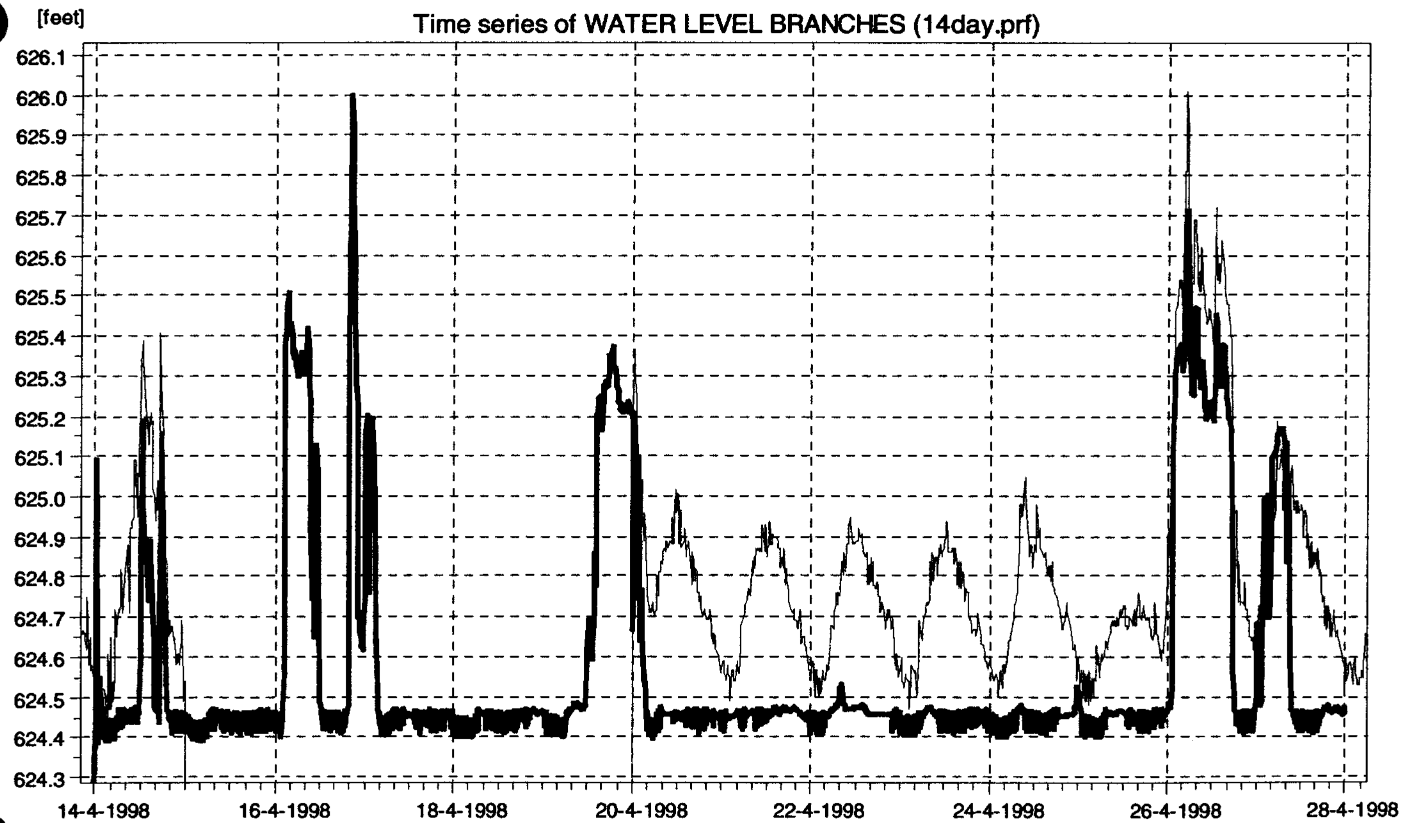
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA38I





M&E AQUA ALLIANCE Metcalf & Eddy

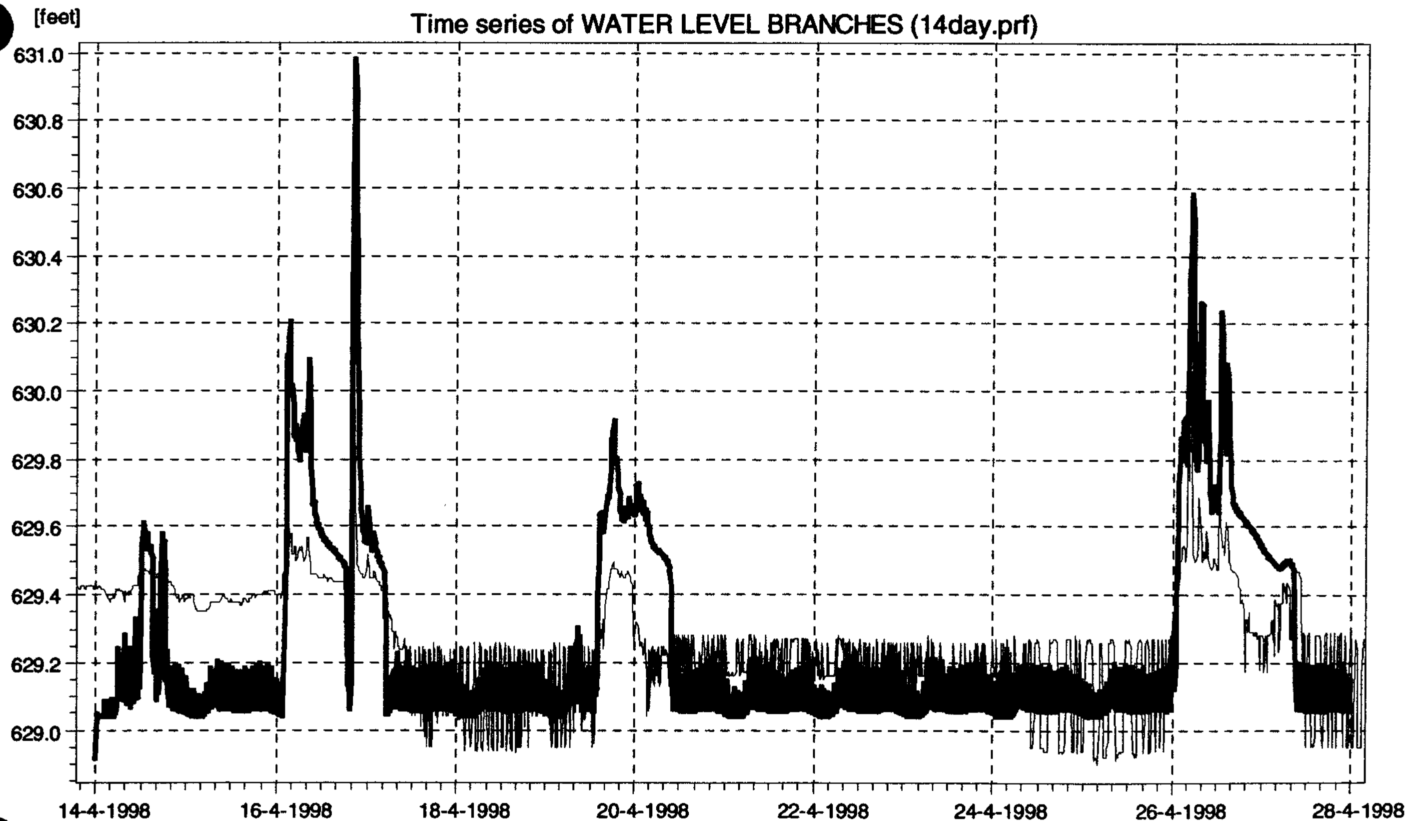
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

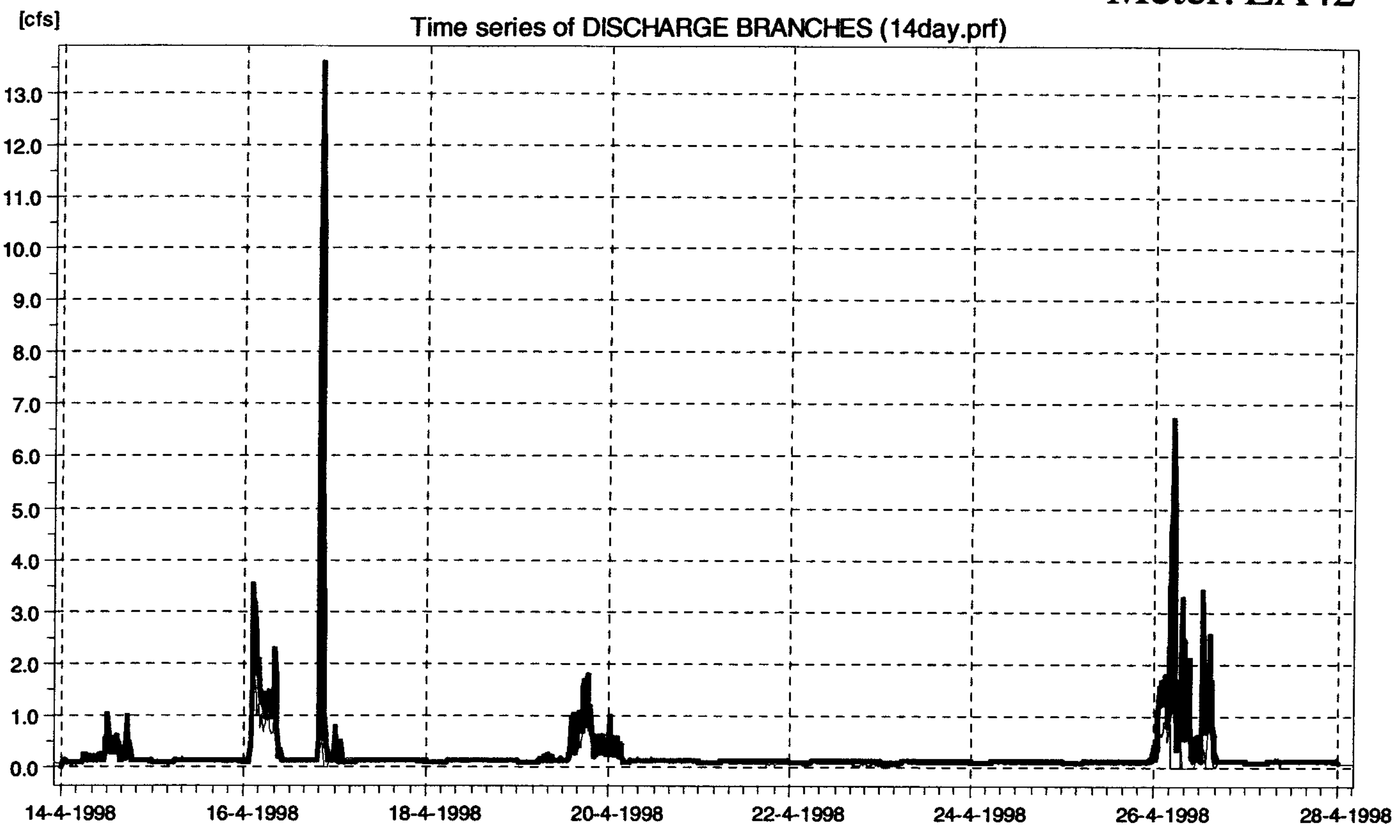
CH2MHILL

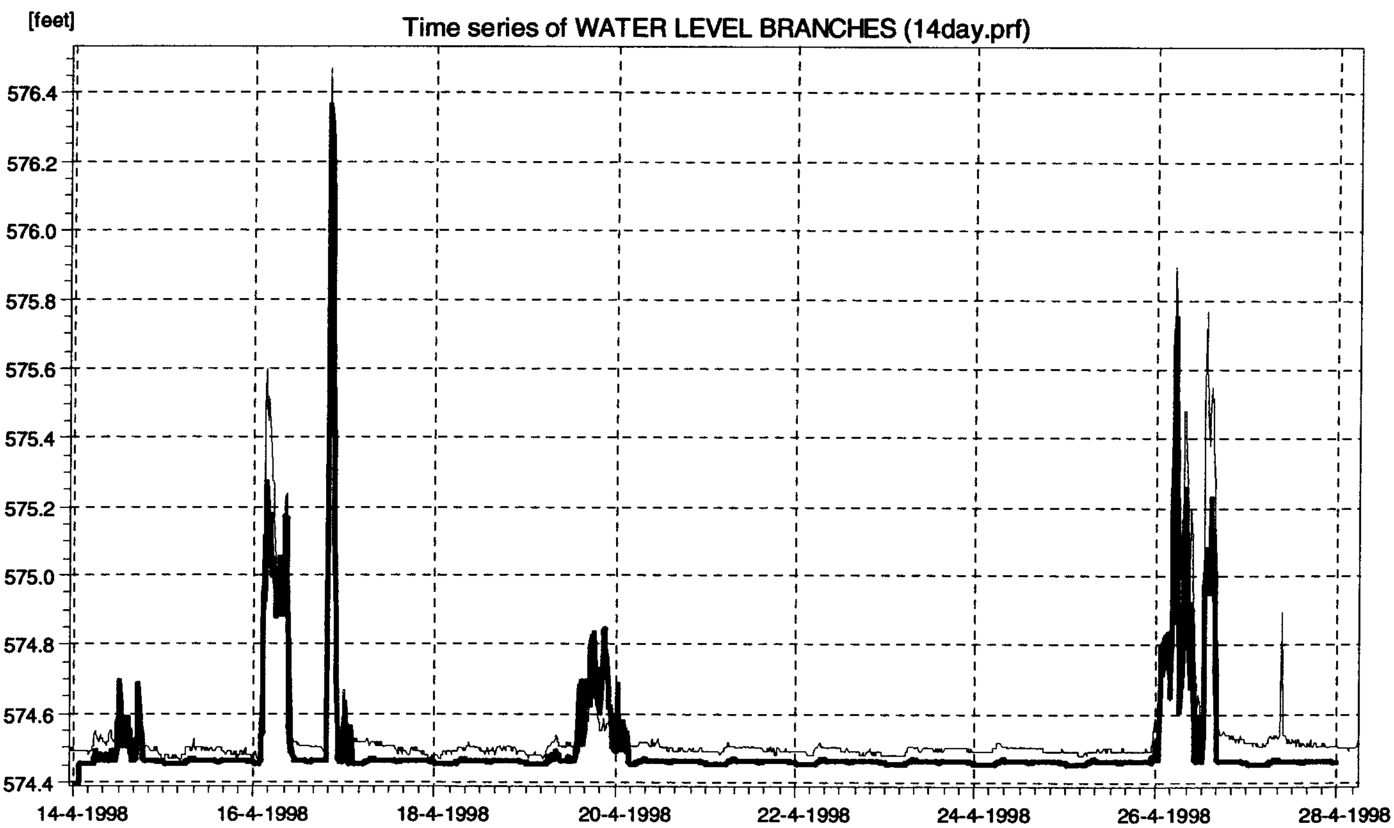
Meter: EA40I

LEVELS IN THIS MANHOLE INFLUENCE BY FRONT STREET PUMP STATION, FLOWS ARE NOT USED



Meter: EA42





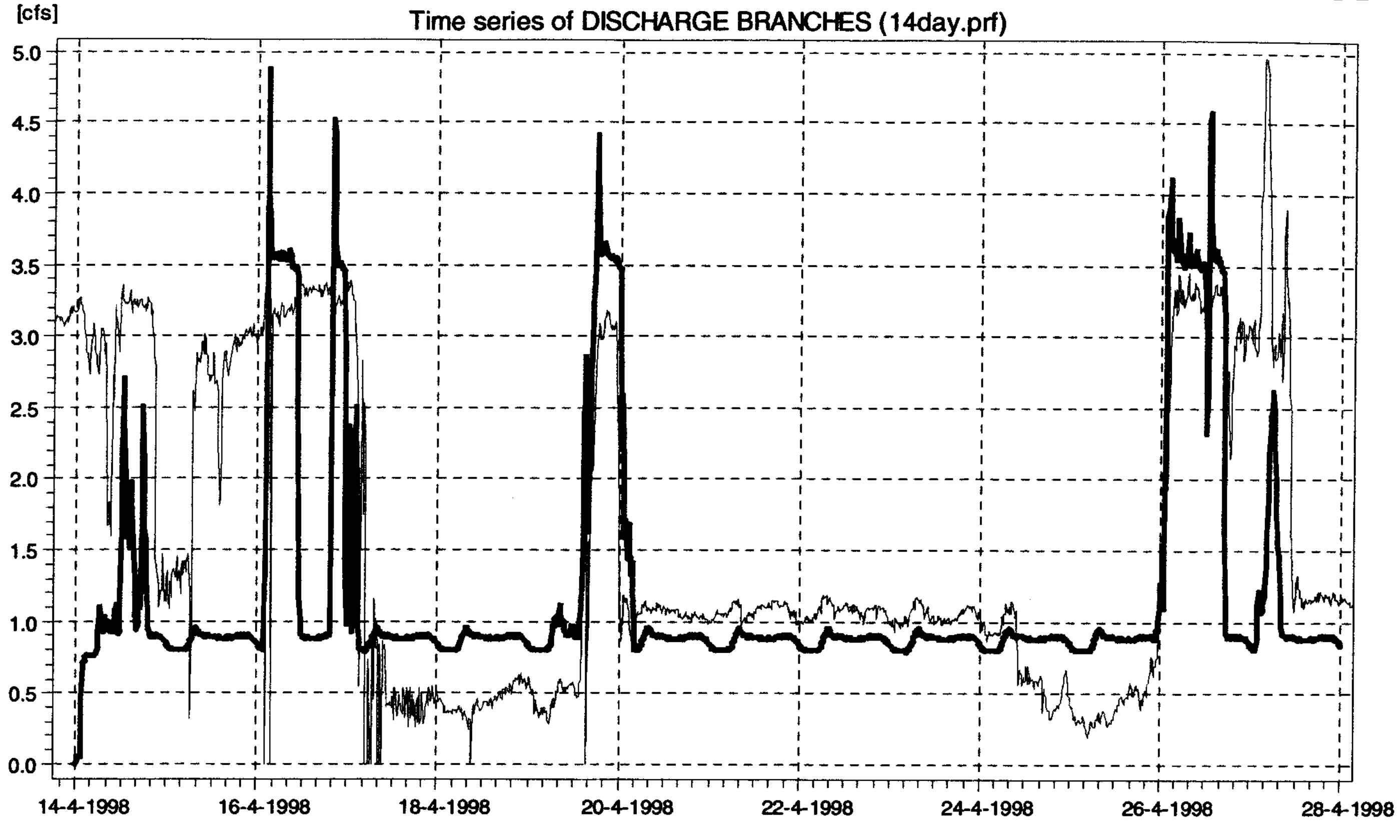
M&E Metcalf & Eddy AQUA ALLIANCE

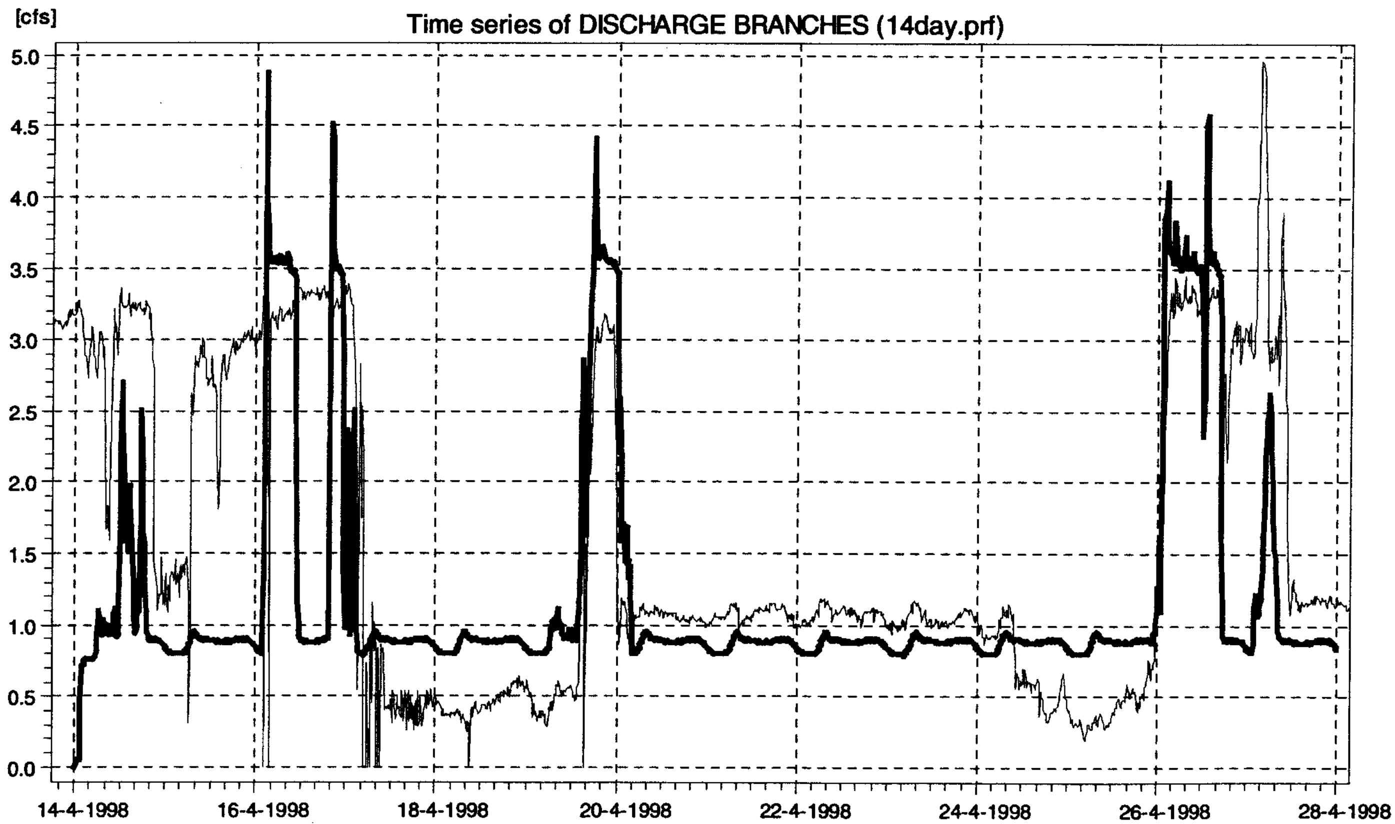
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA43I





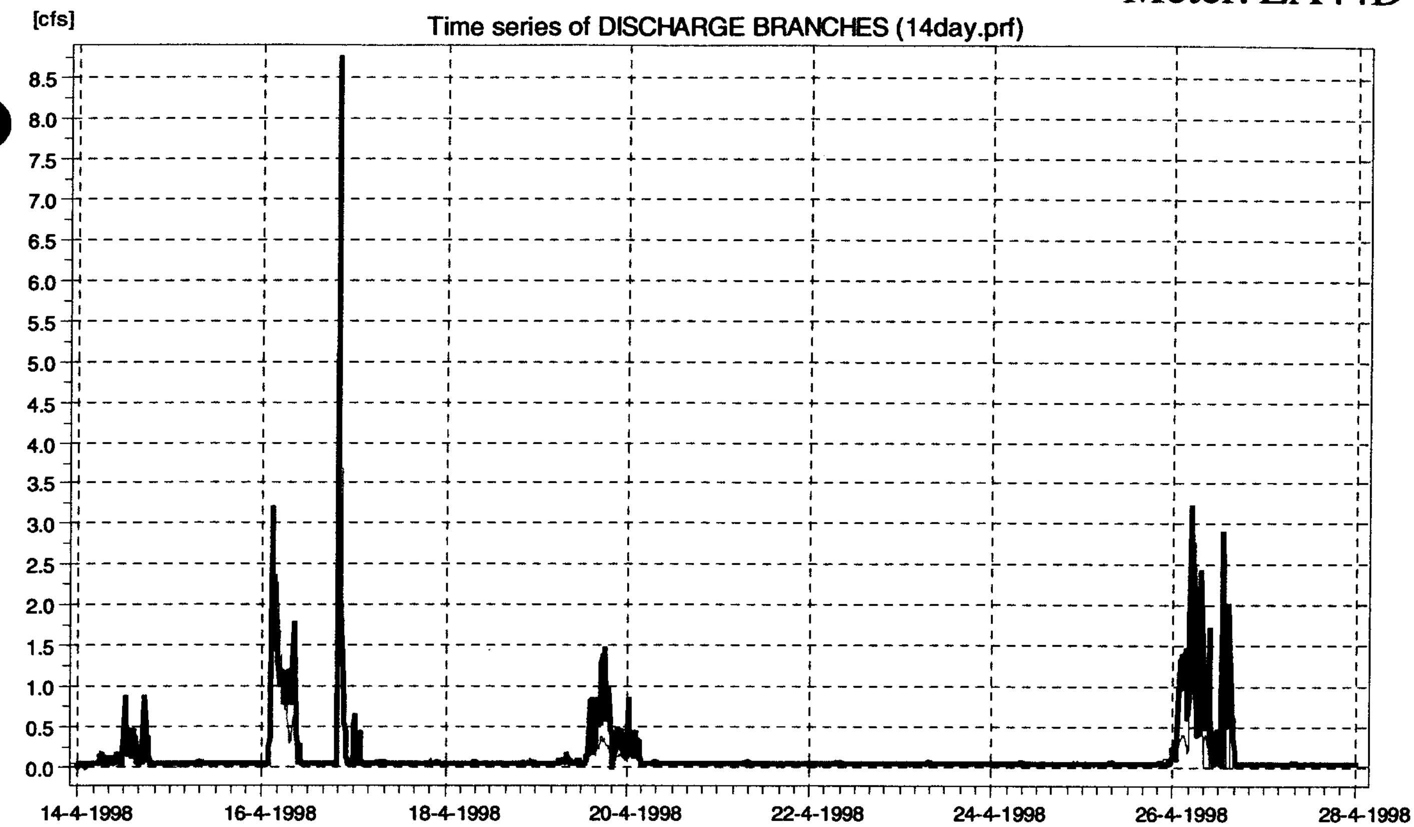
M&E Metcalf & Eddy AQUA ALLIANCE

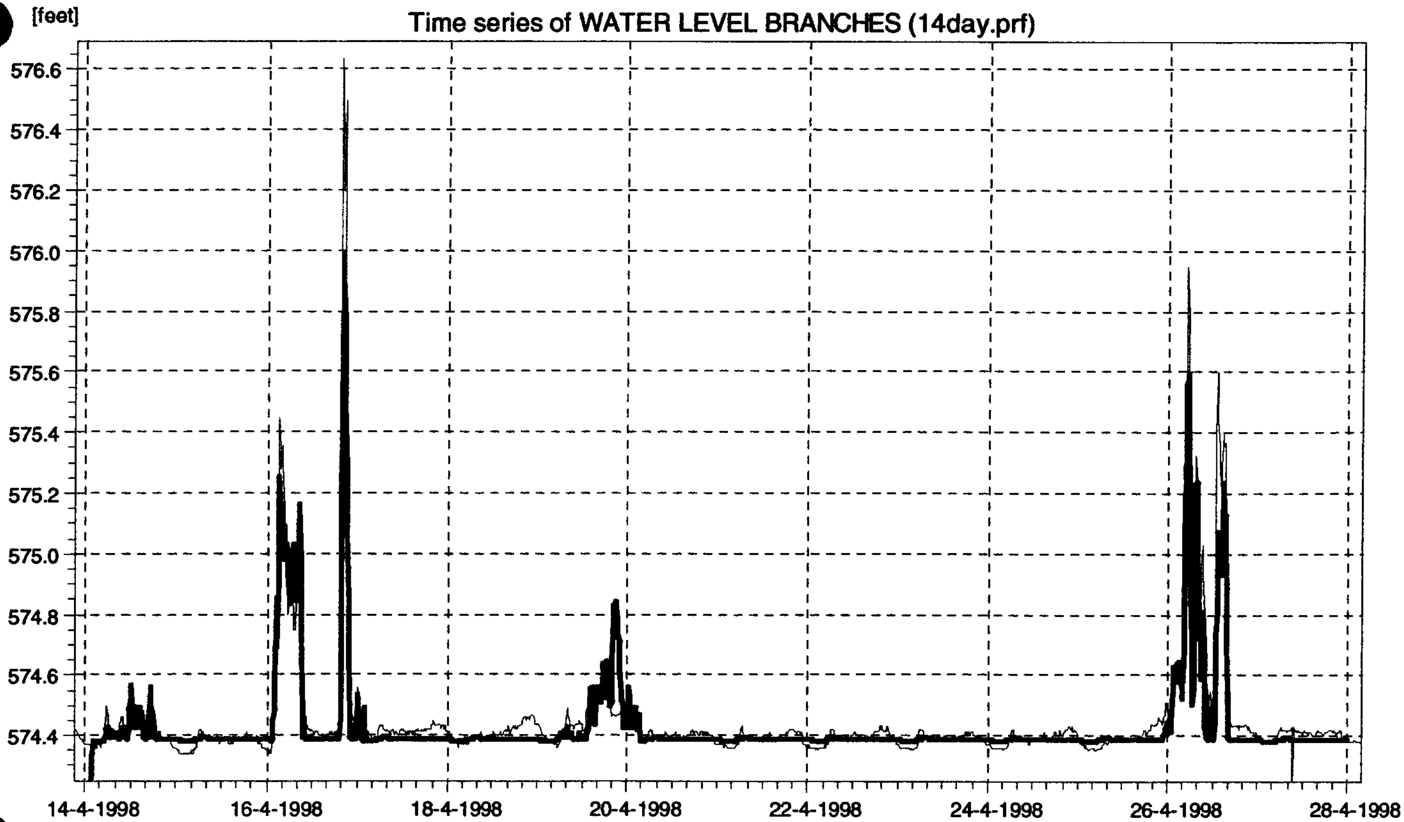
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA44D





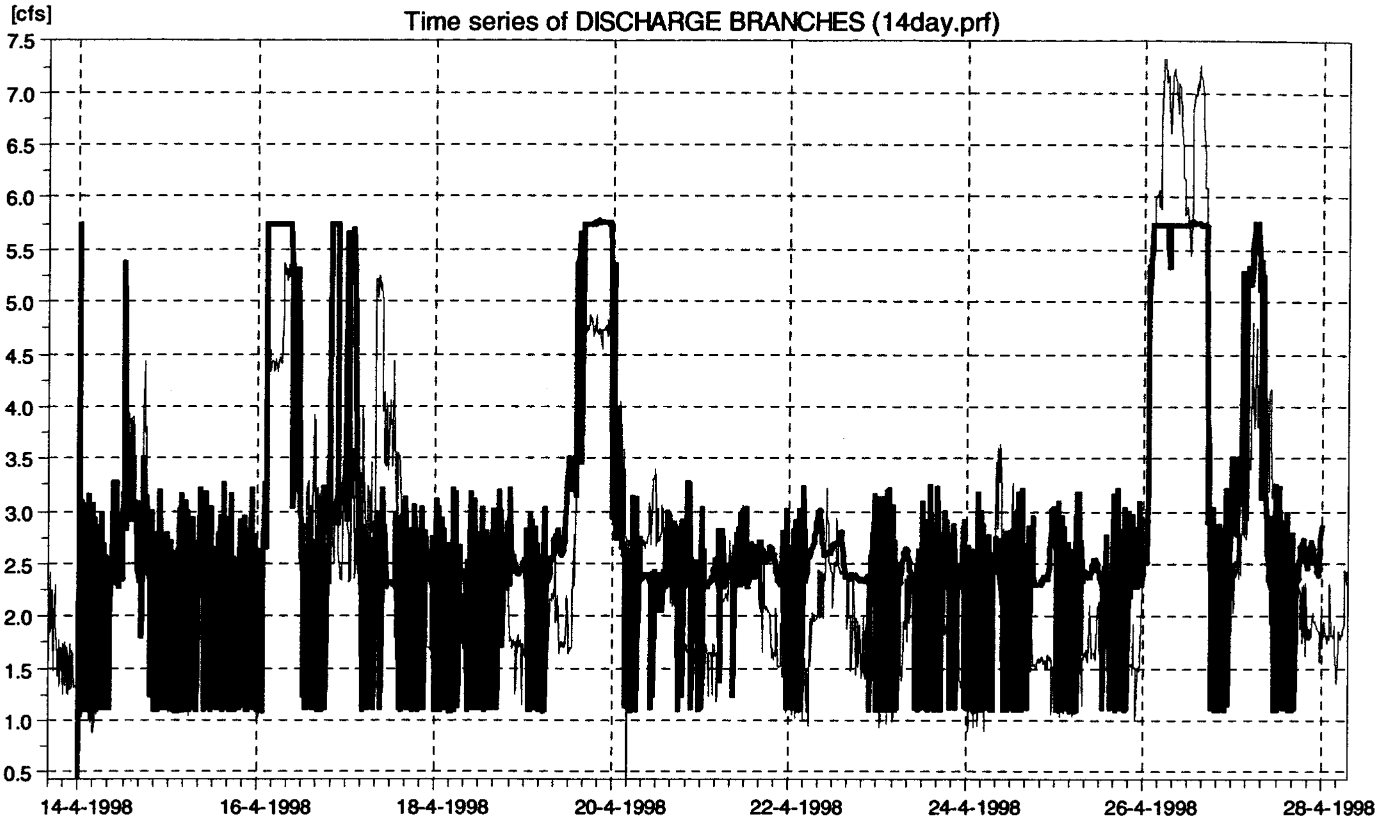
M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

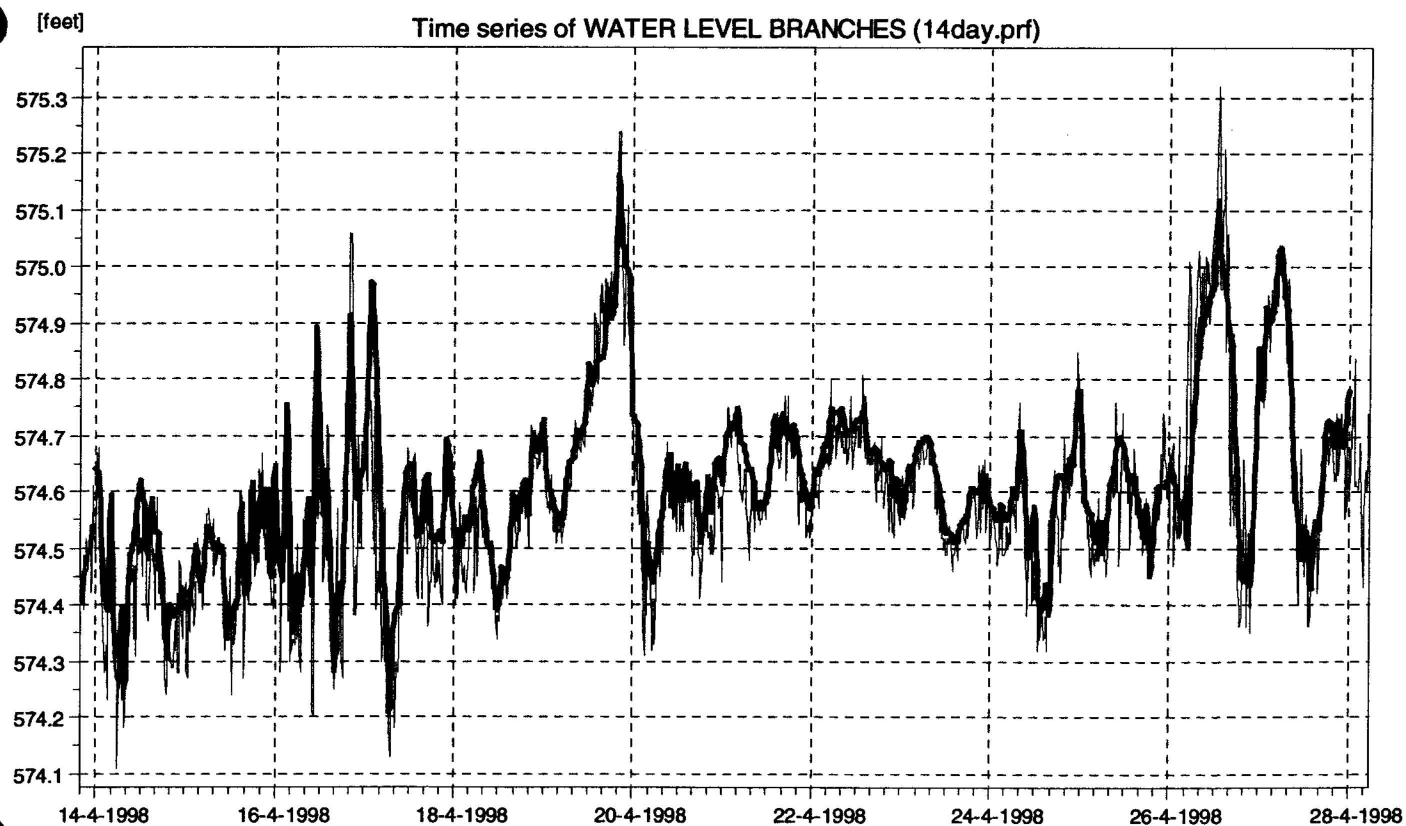
Meter: EA45



SUPERIOR PUMP STATION OUTFLOWS, HGL NOT MODELED

Meter: EA46W

HGL INFLUENCED BY LAKE LEVEL, FLOWS ARE NOT RELIABLE



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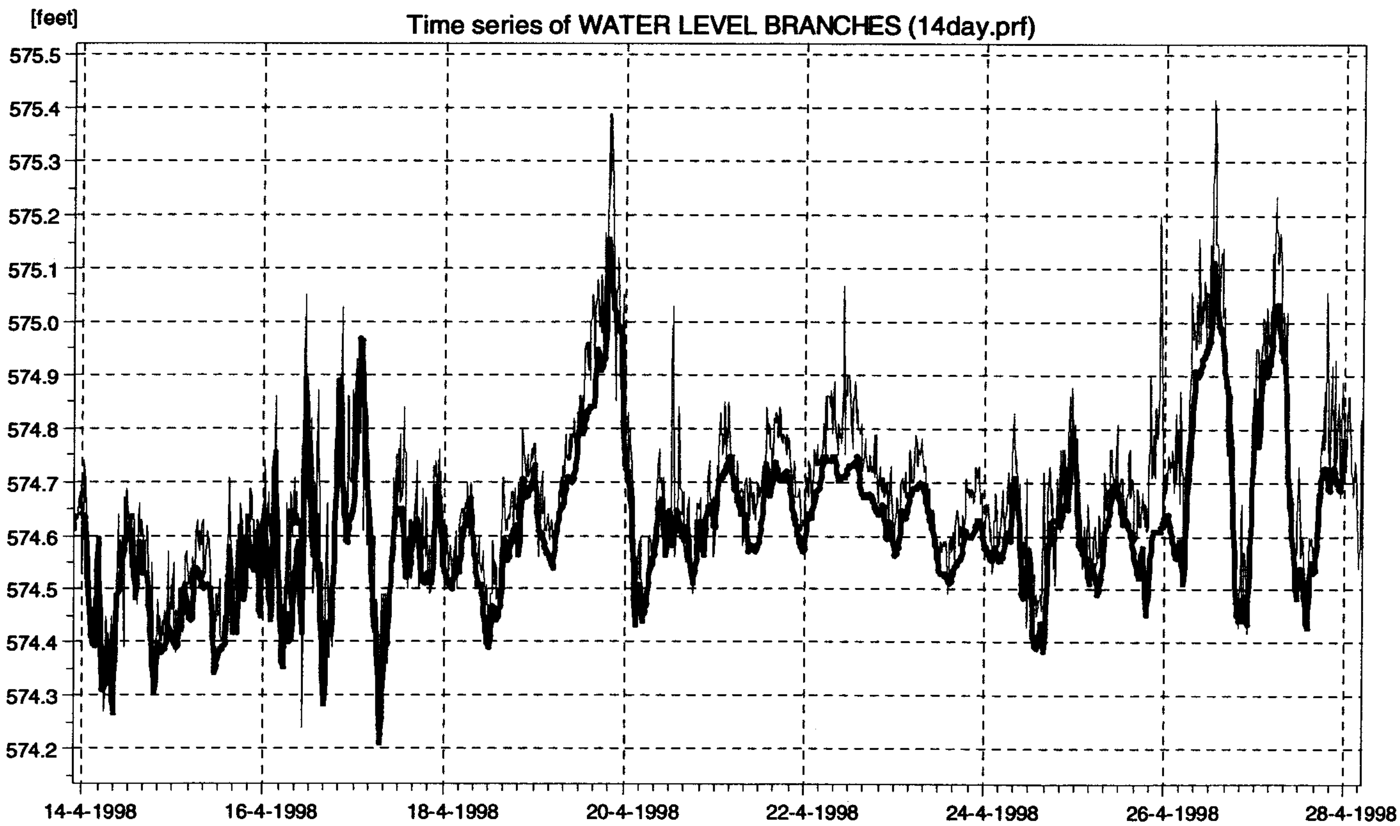
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA48W

HGL INFLUENCED BY LAKE LEVEL, FLOWS ARE NOT RELIABLE



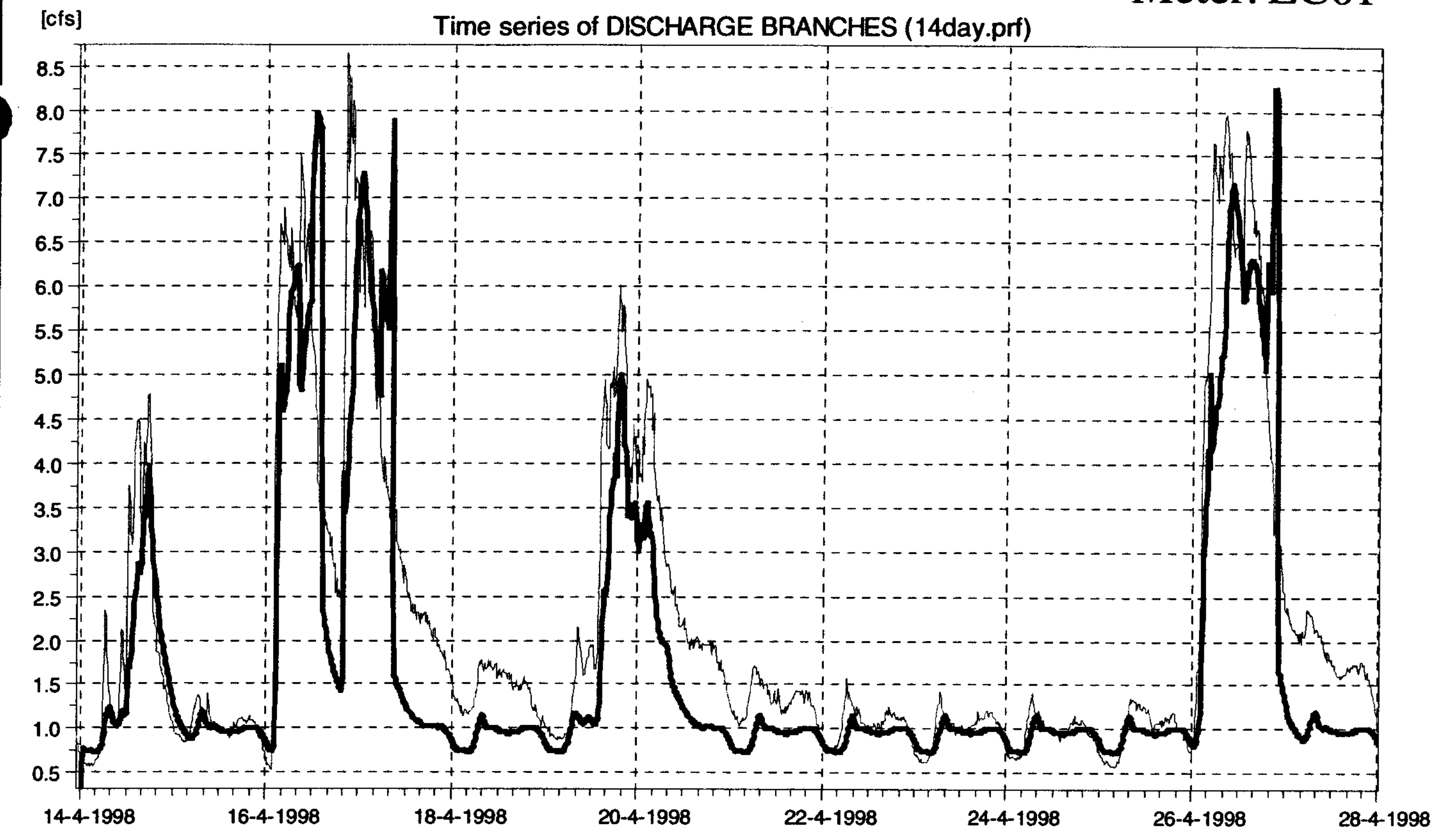
Metcalf & Eddy

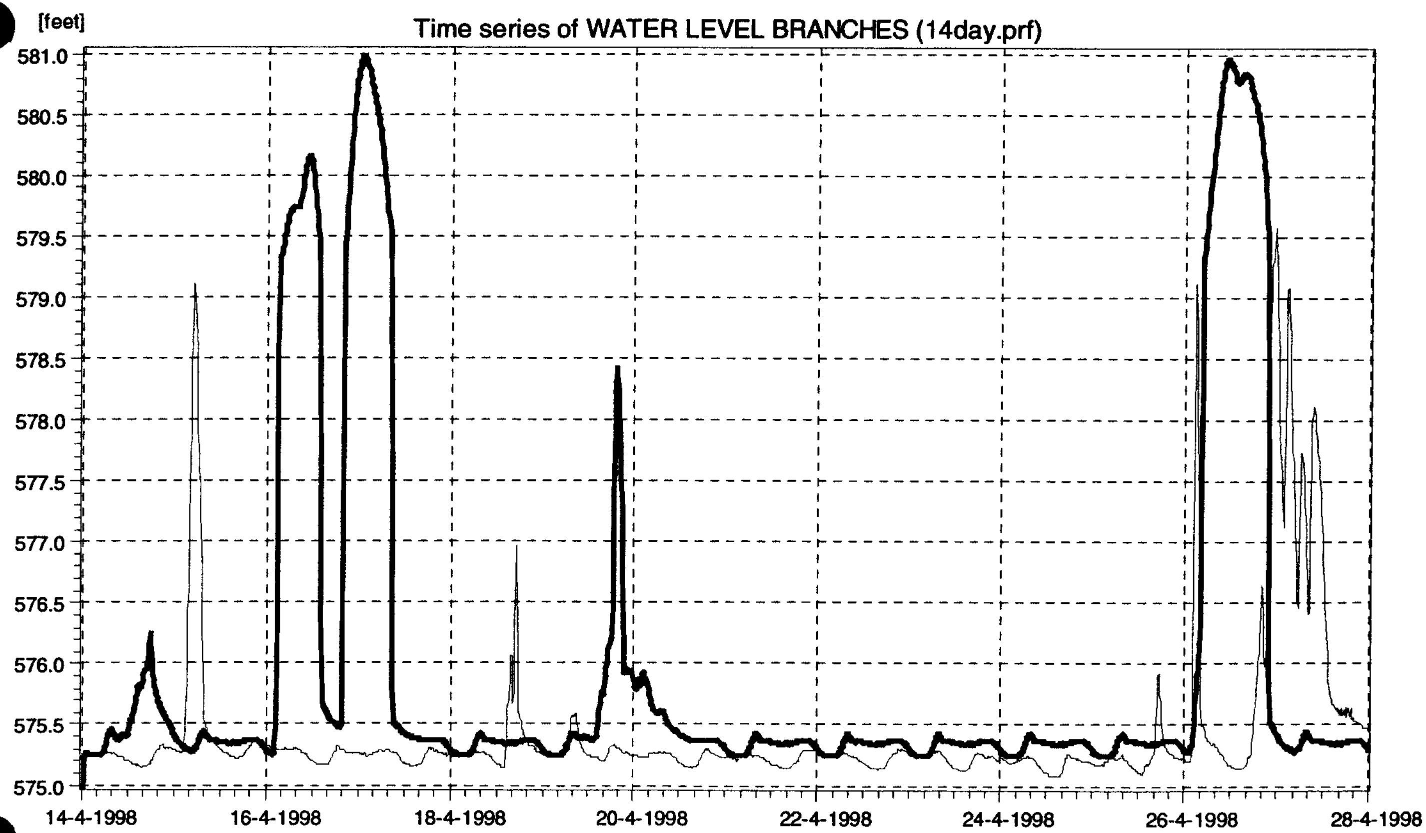
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model — Meter

CH2MHILL

Meter: EC01





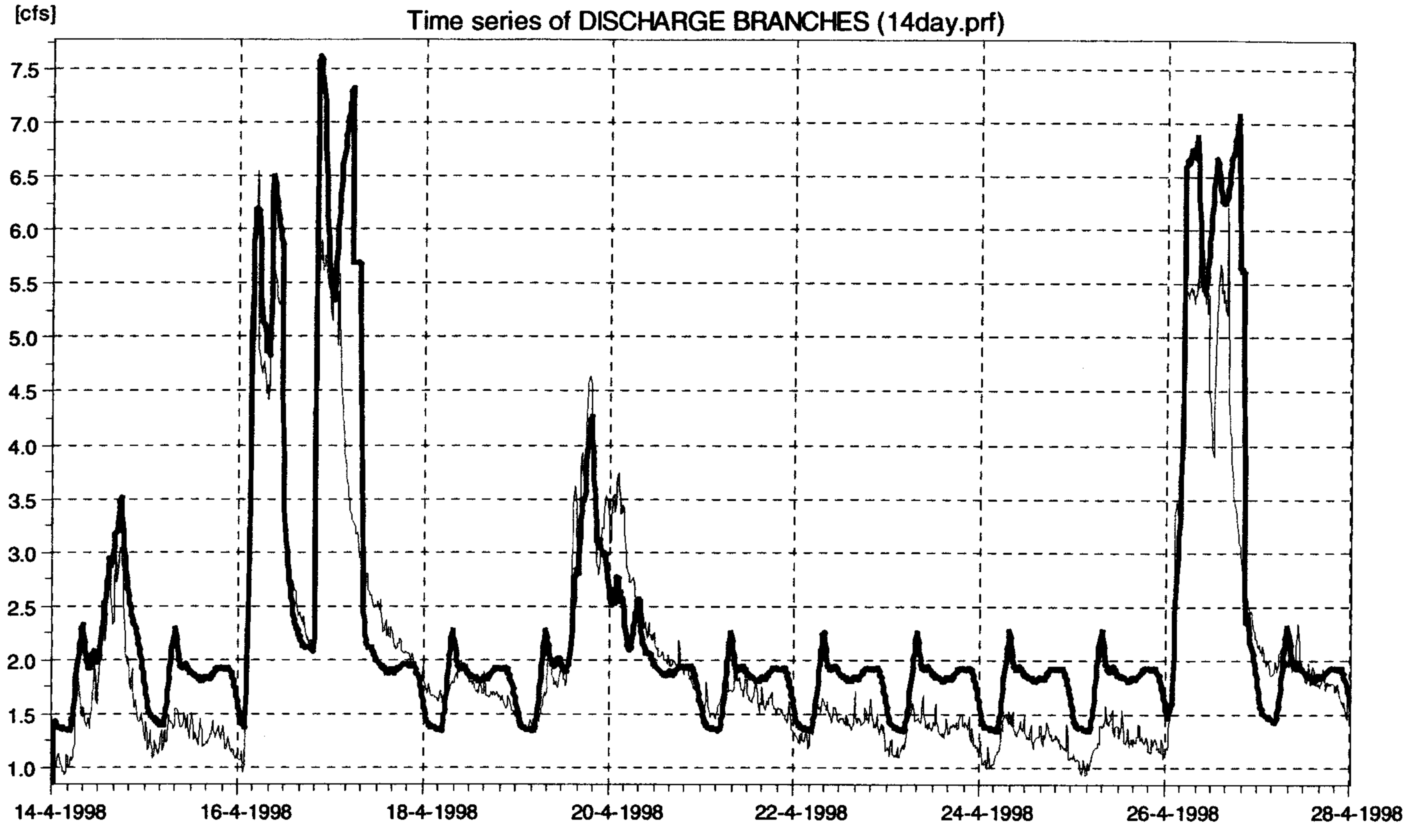
Metcalf & Eddy

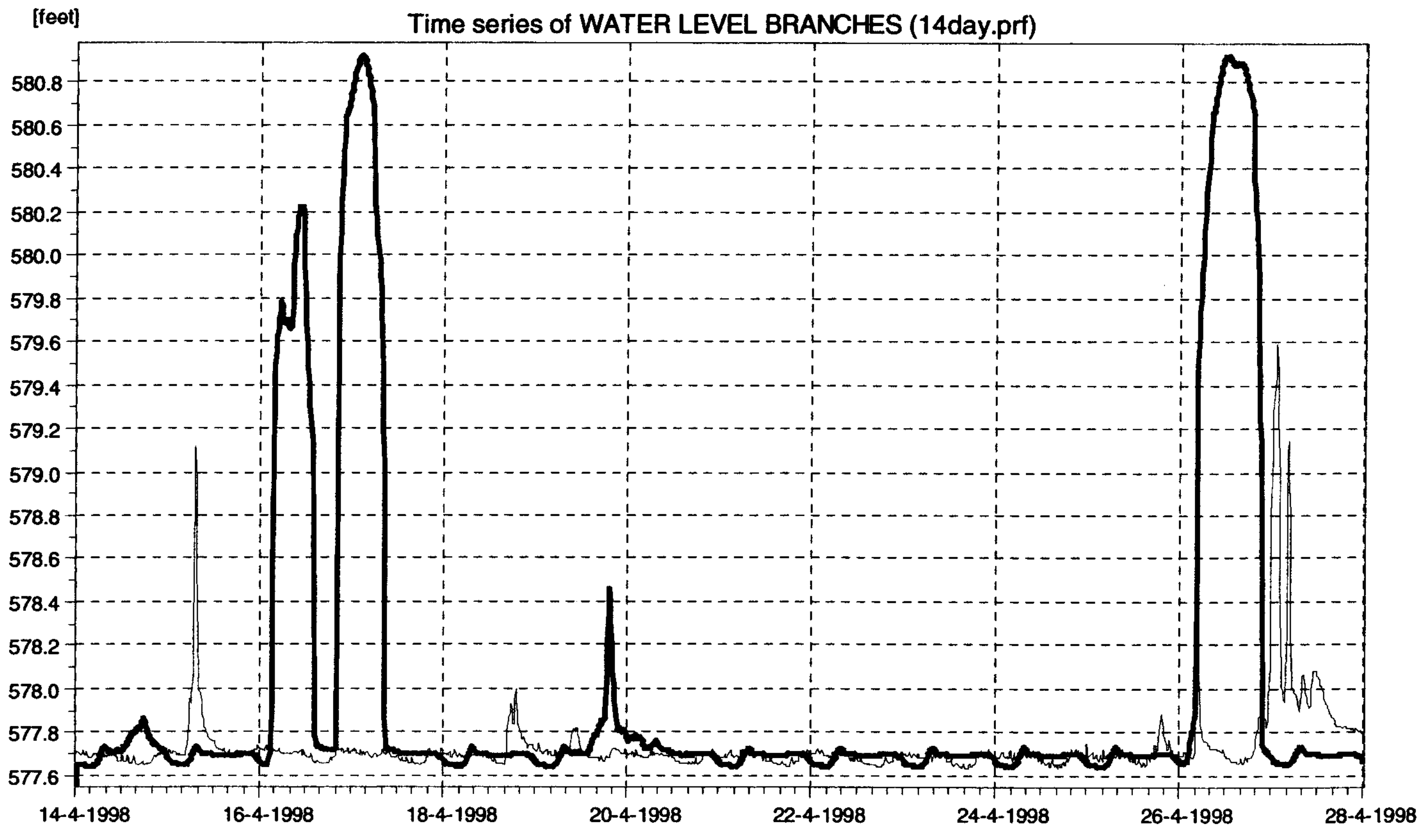
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EC02





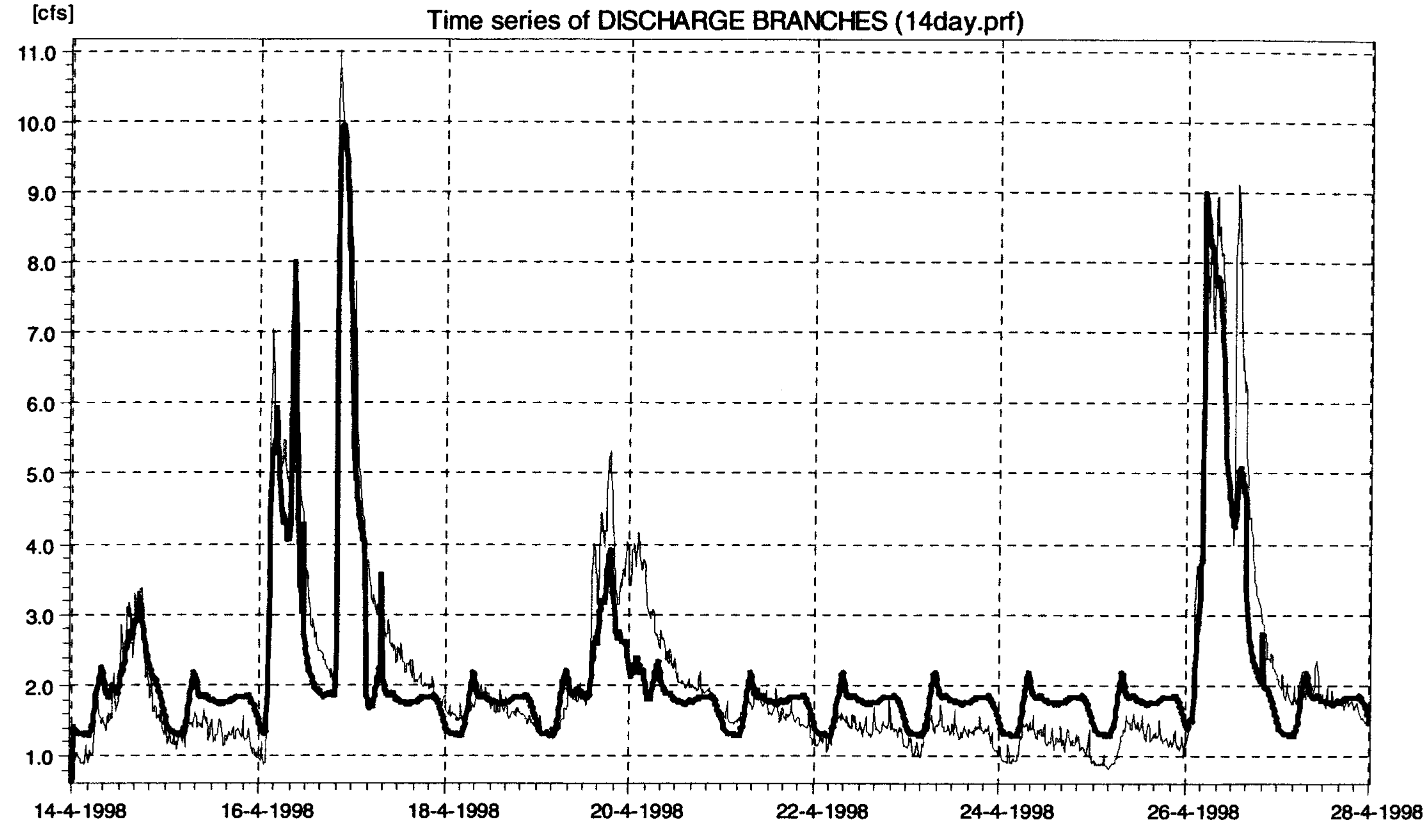
M&E Metcalf & Eddy AQUA ALLIANCE

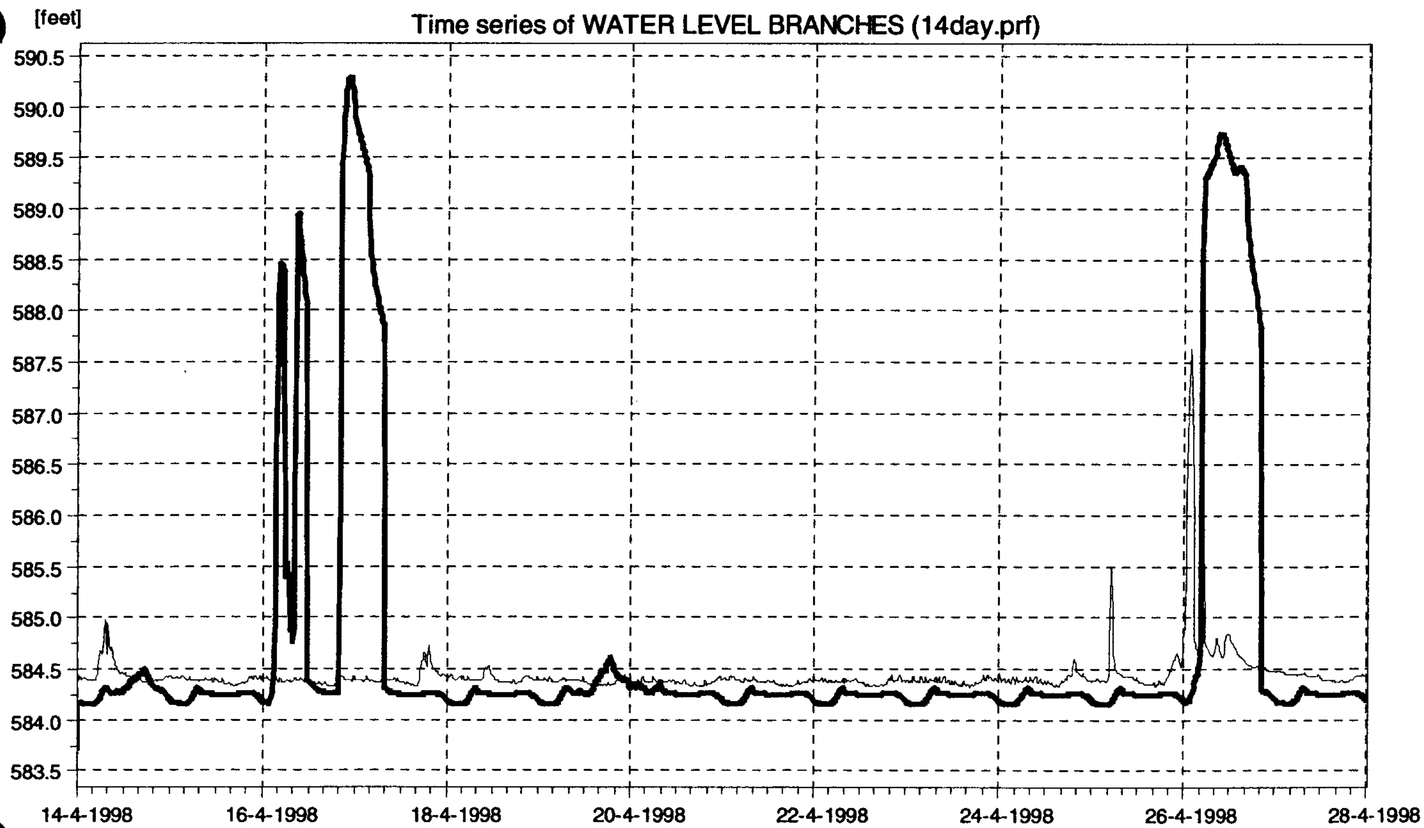
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EC03





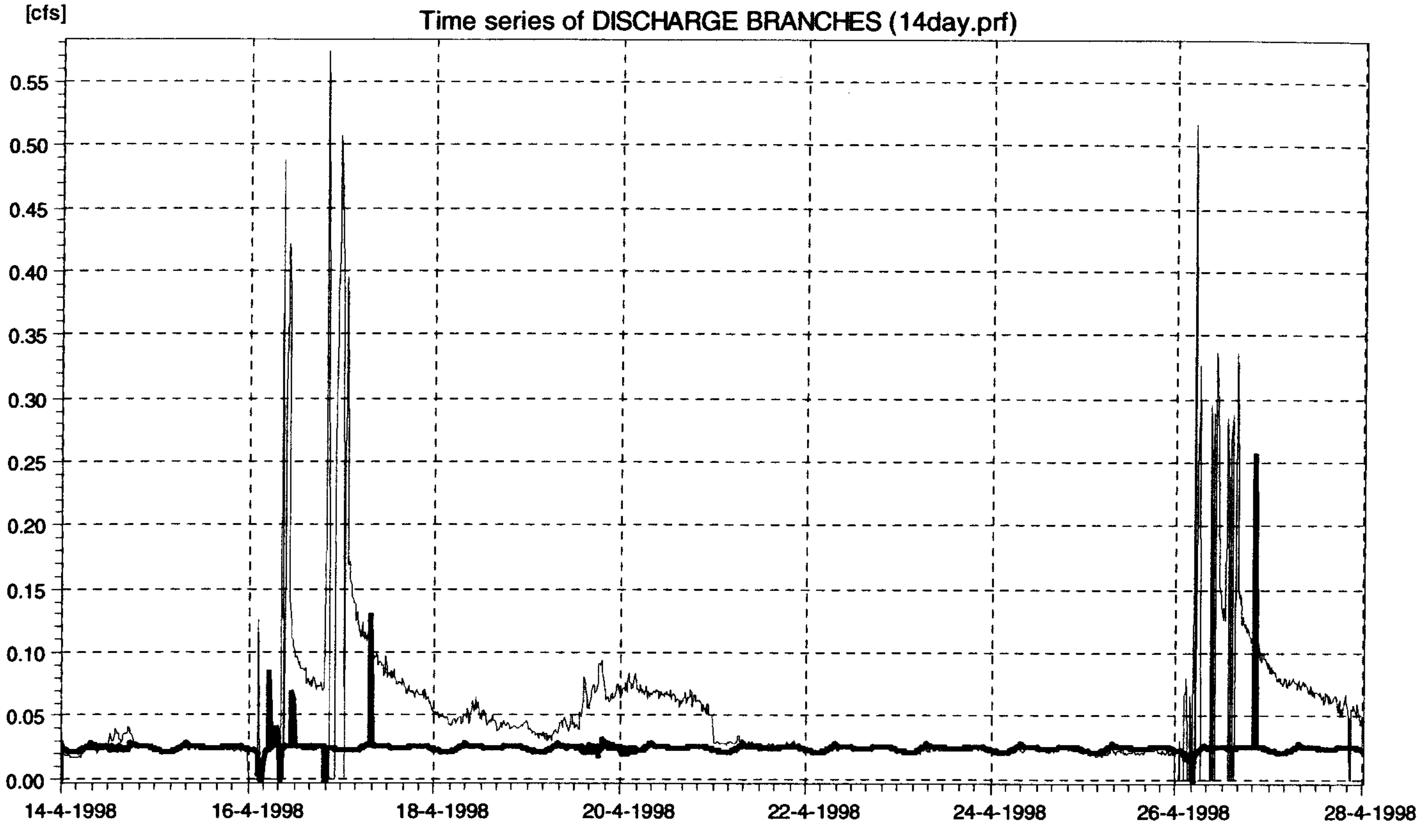
M&E Metcalf & Eddy AQUA ALLIANCE

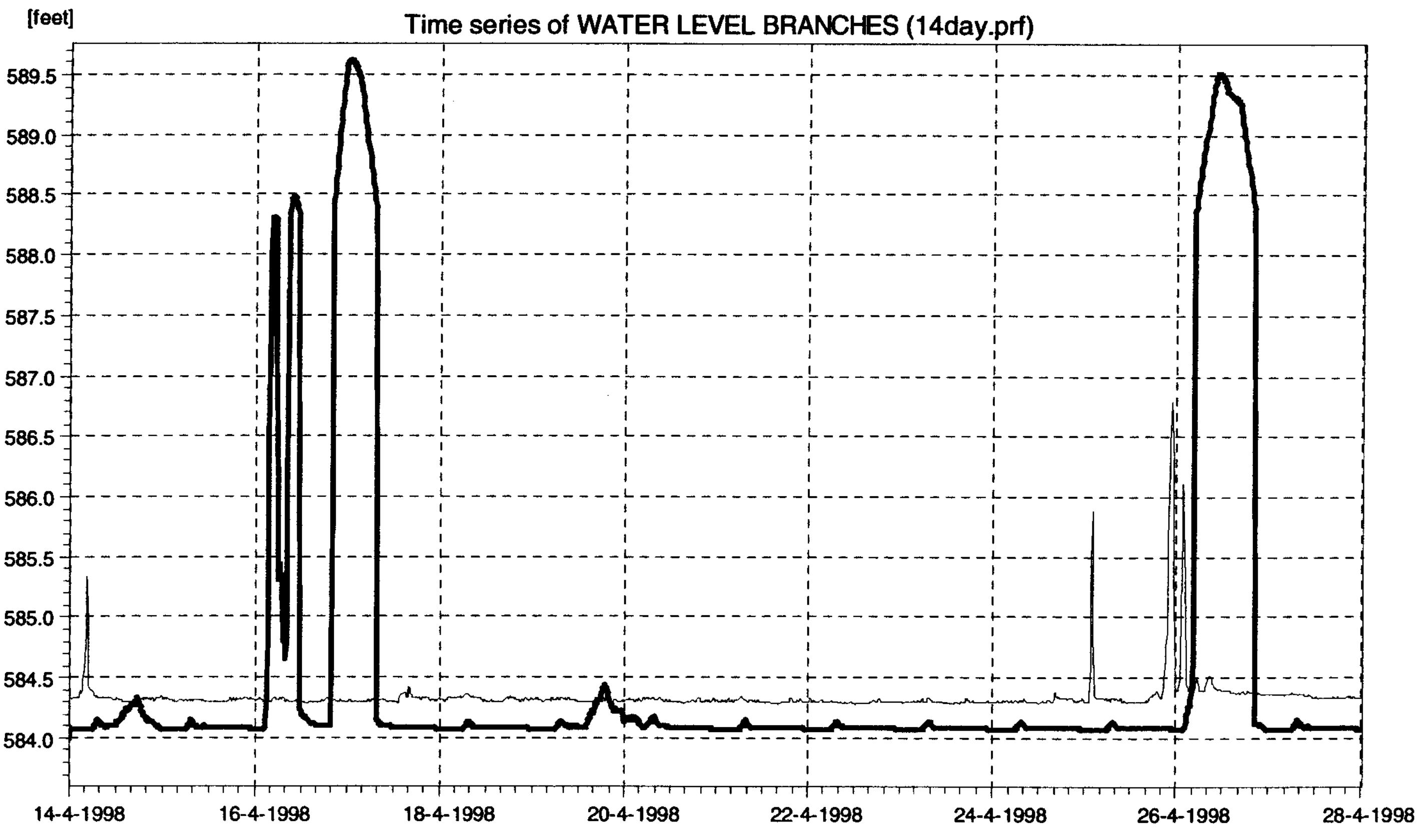
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EC04





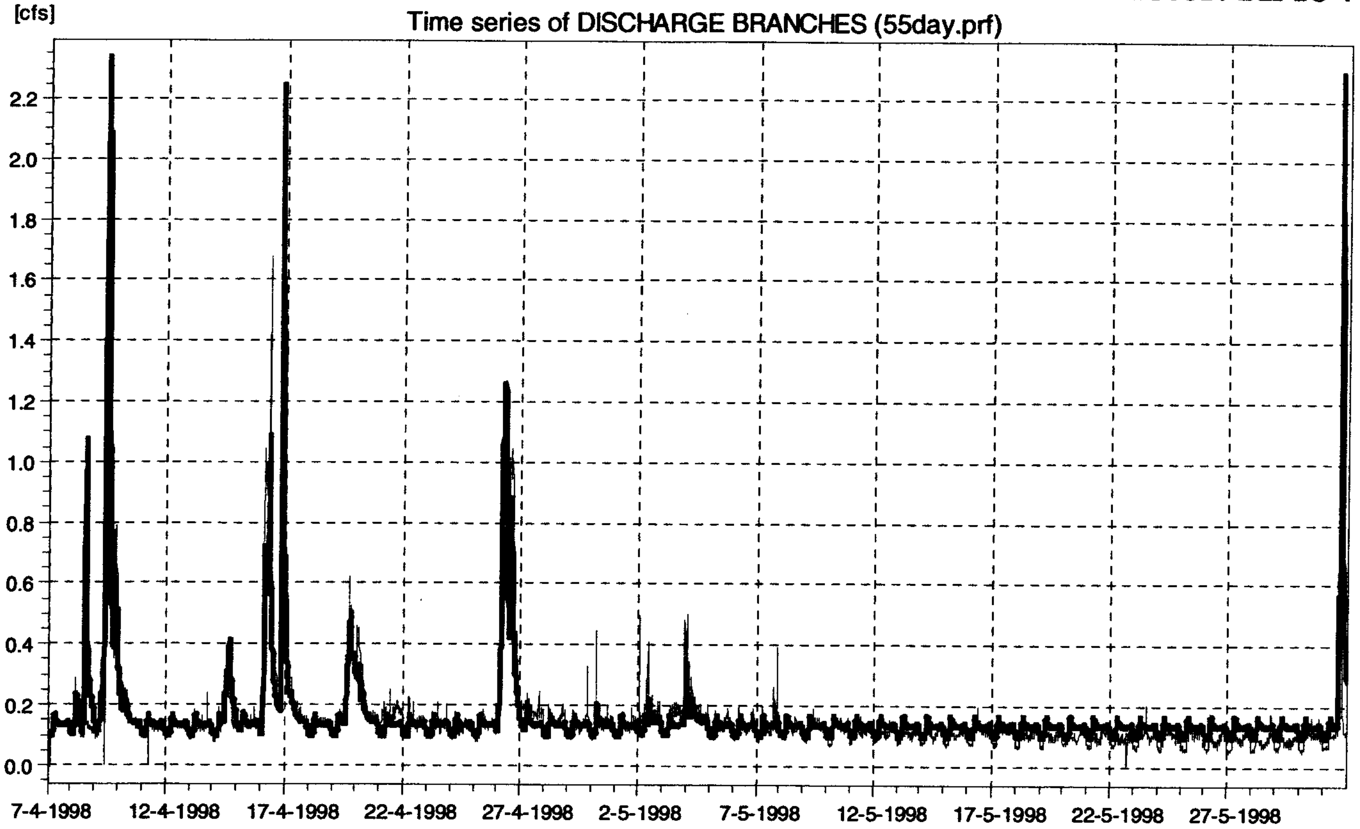
M&E AQUA ALLIANCE Metcalf & Eddy

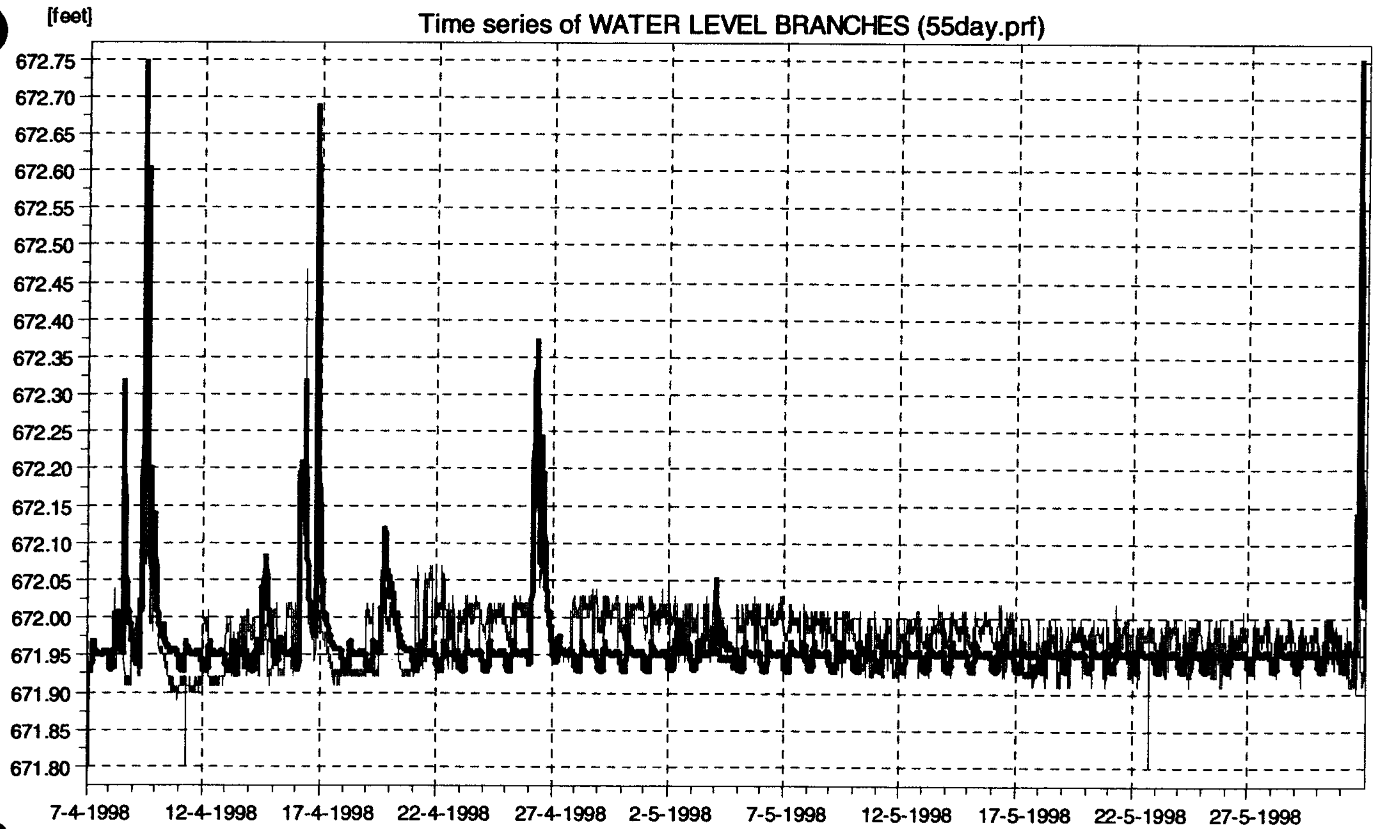
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: HA04





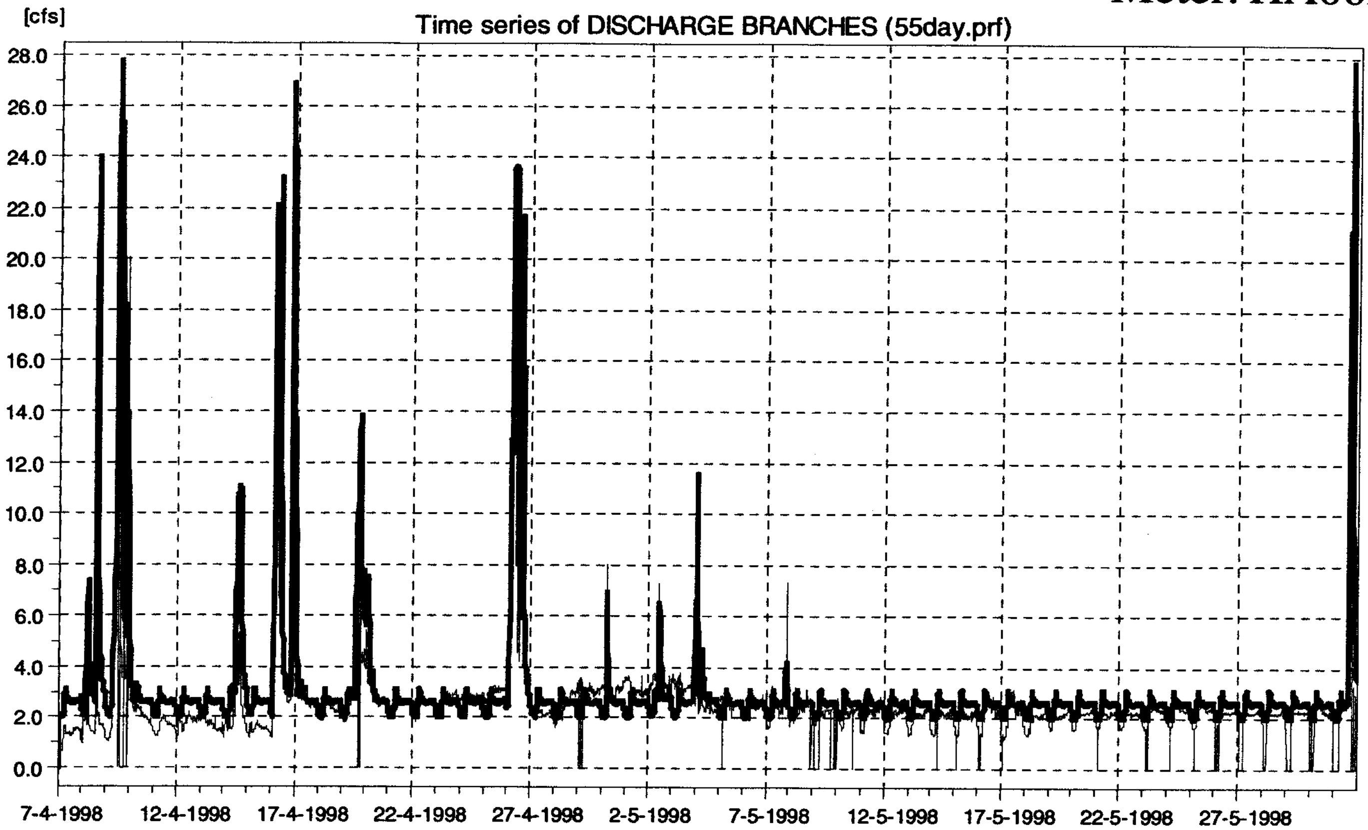
M&E Metcalf & Eddy AQUA ALLIANCE

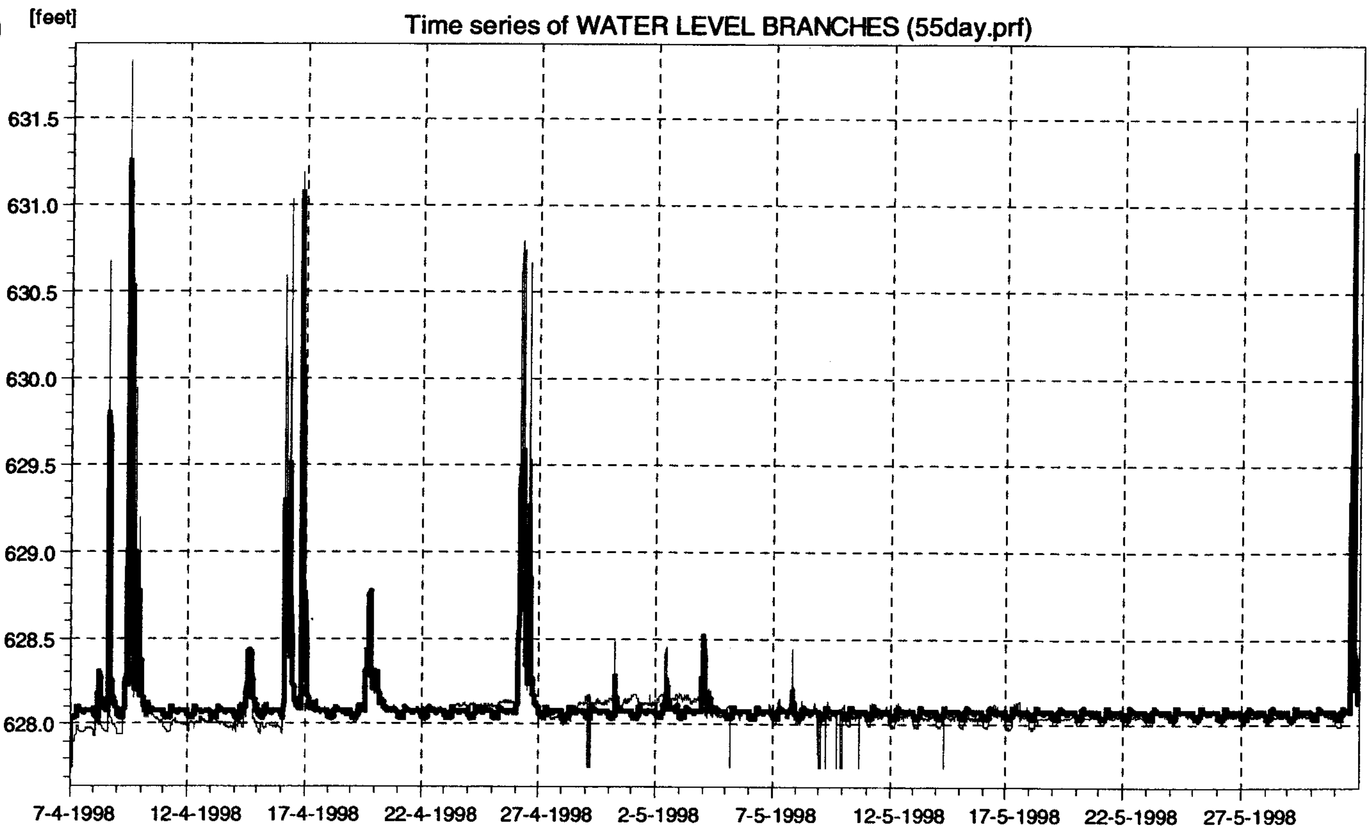
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: HA06D





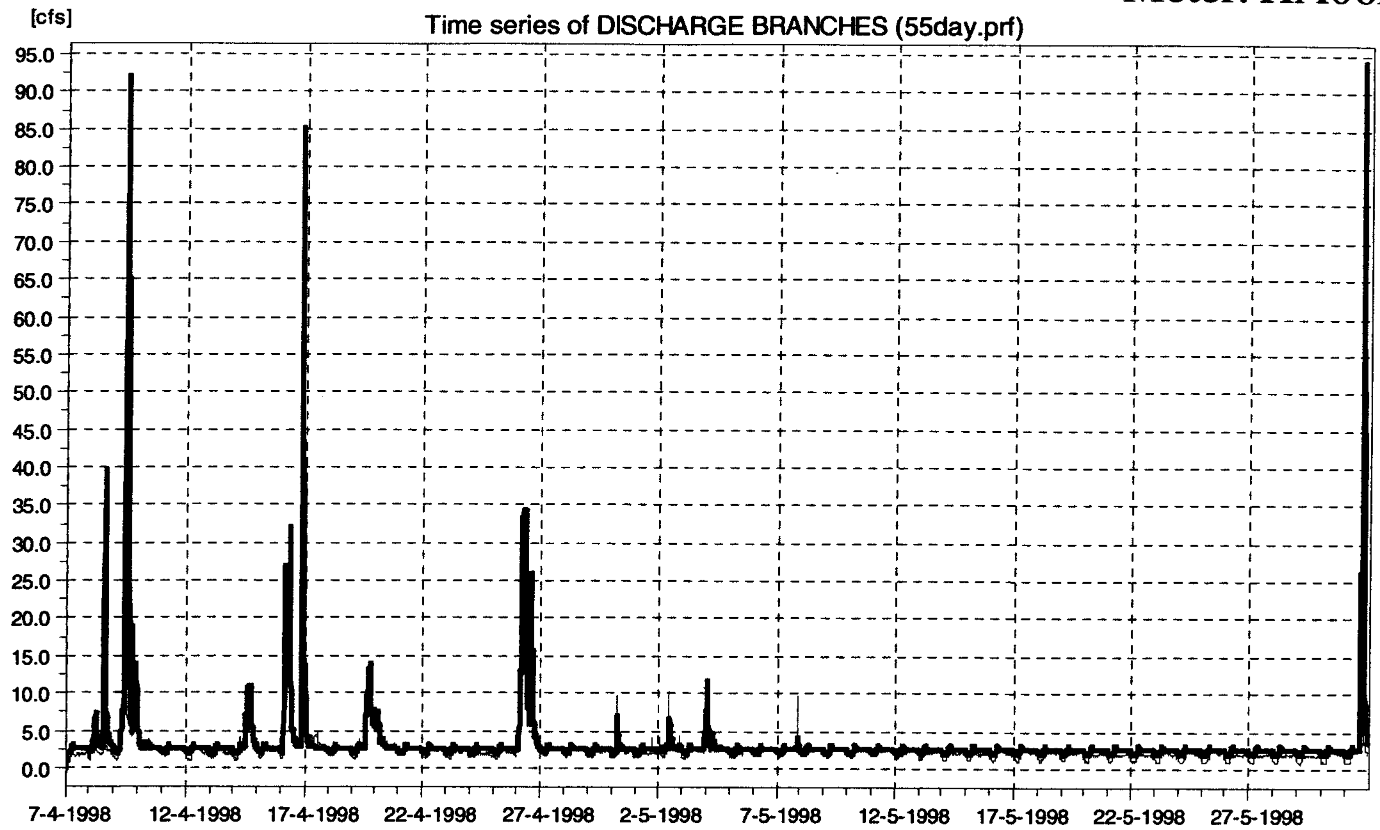
Metcalf & Eddy

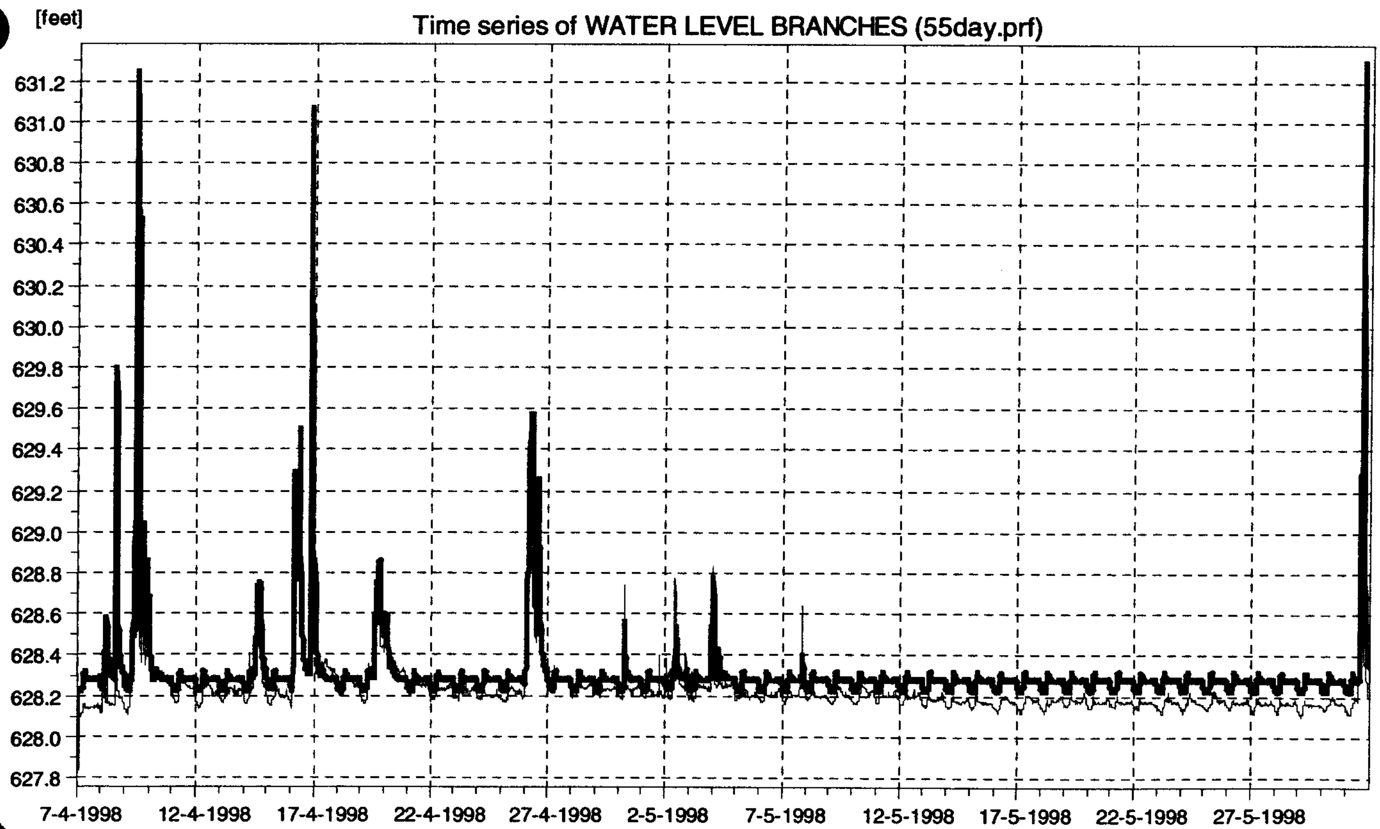
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: HA06I





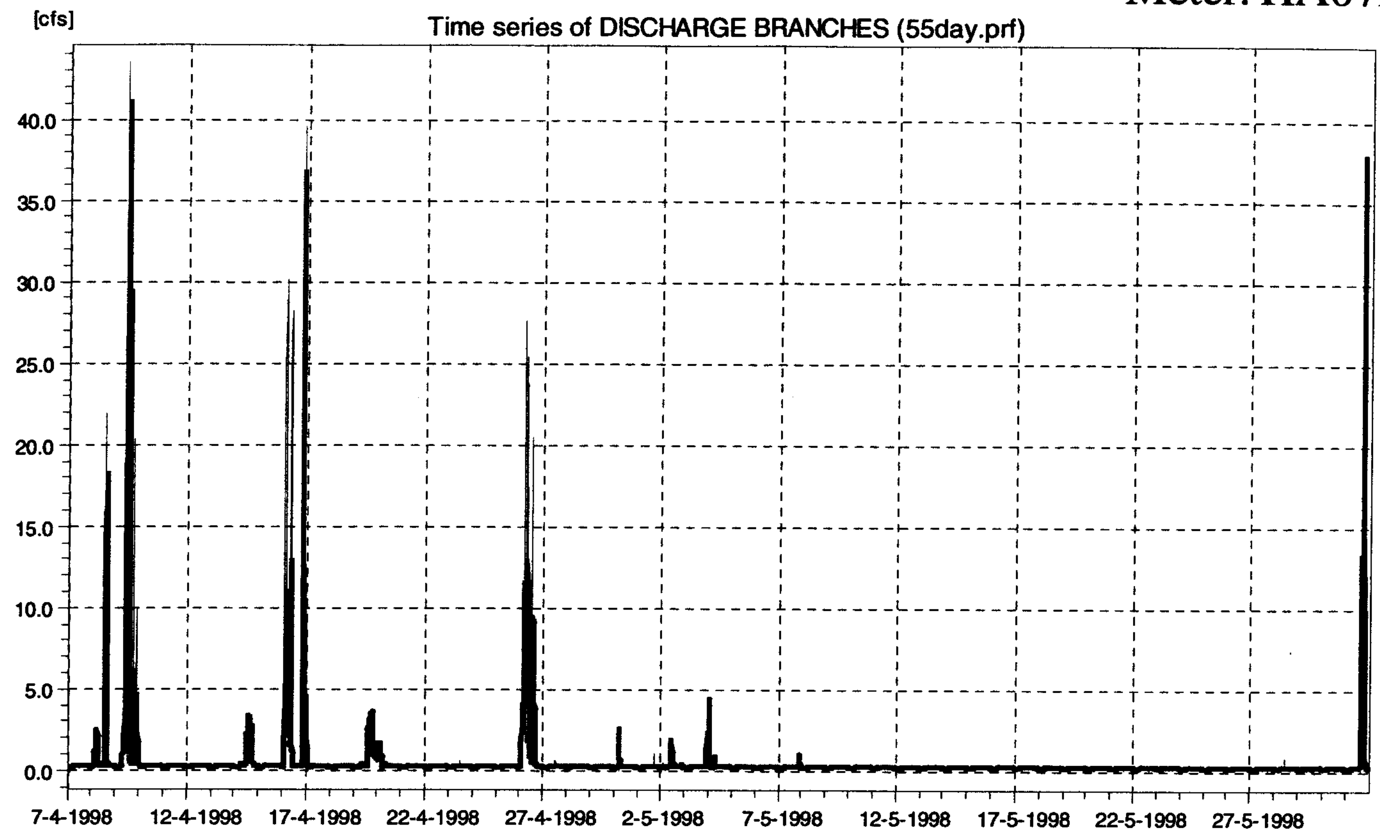
M&E Metcalf & Eddy AQUA ALLIANCE

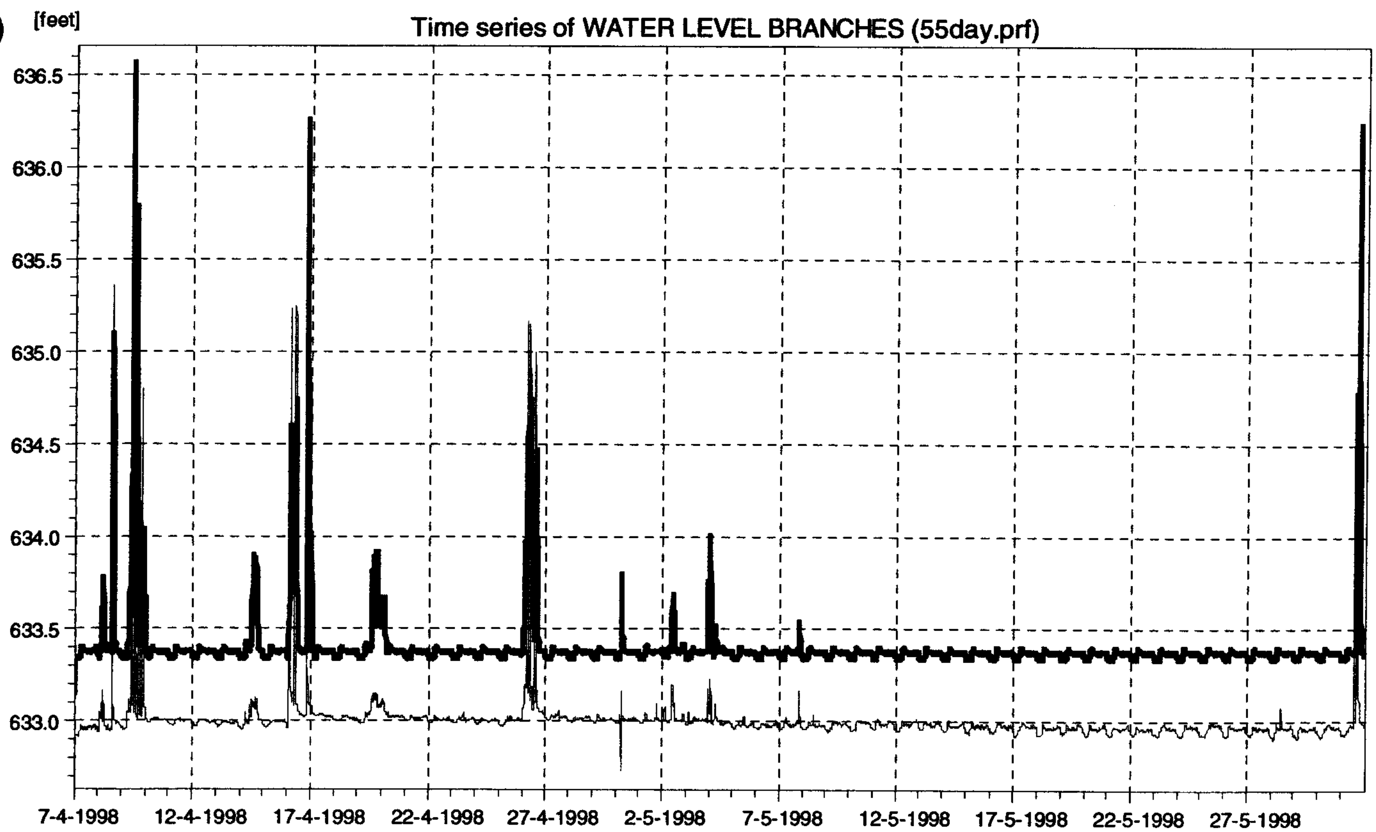
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: HA07D





M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

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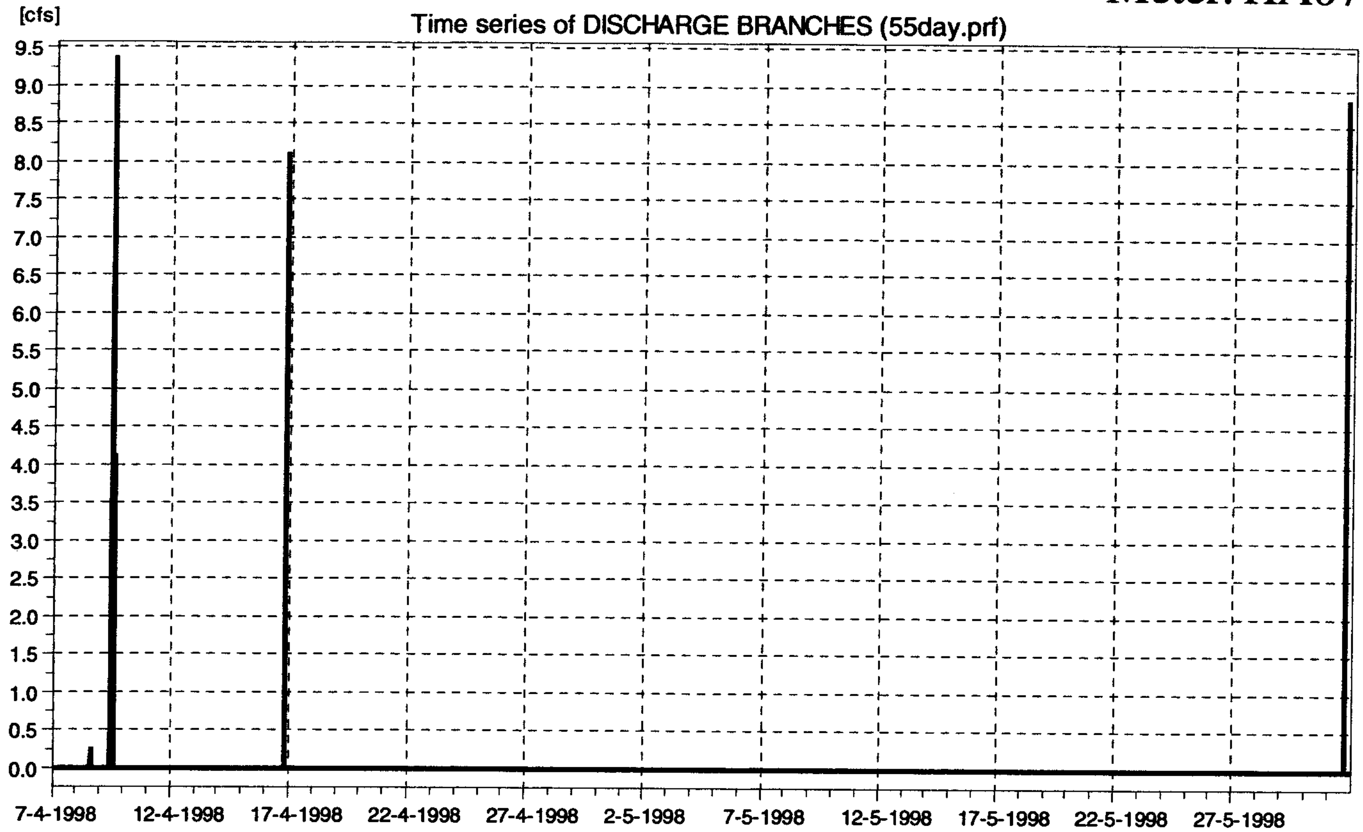
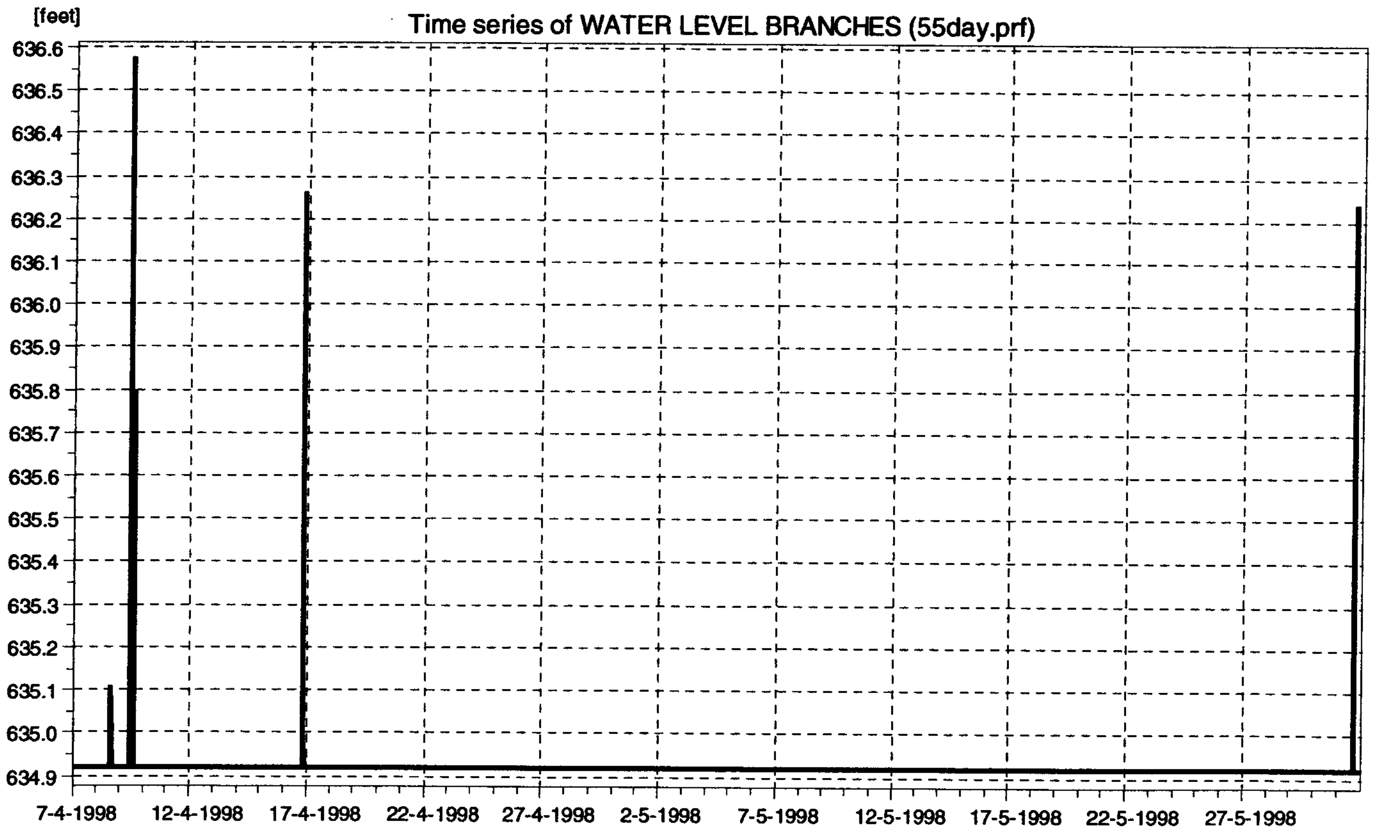




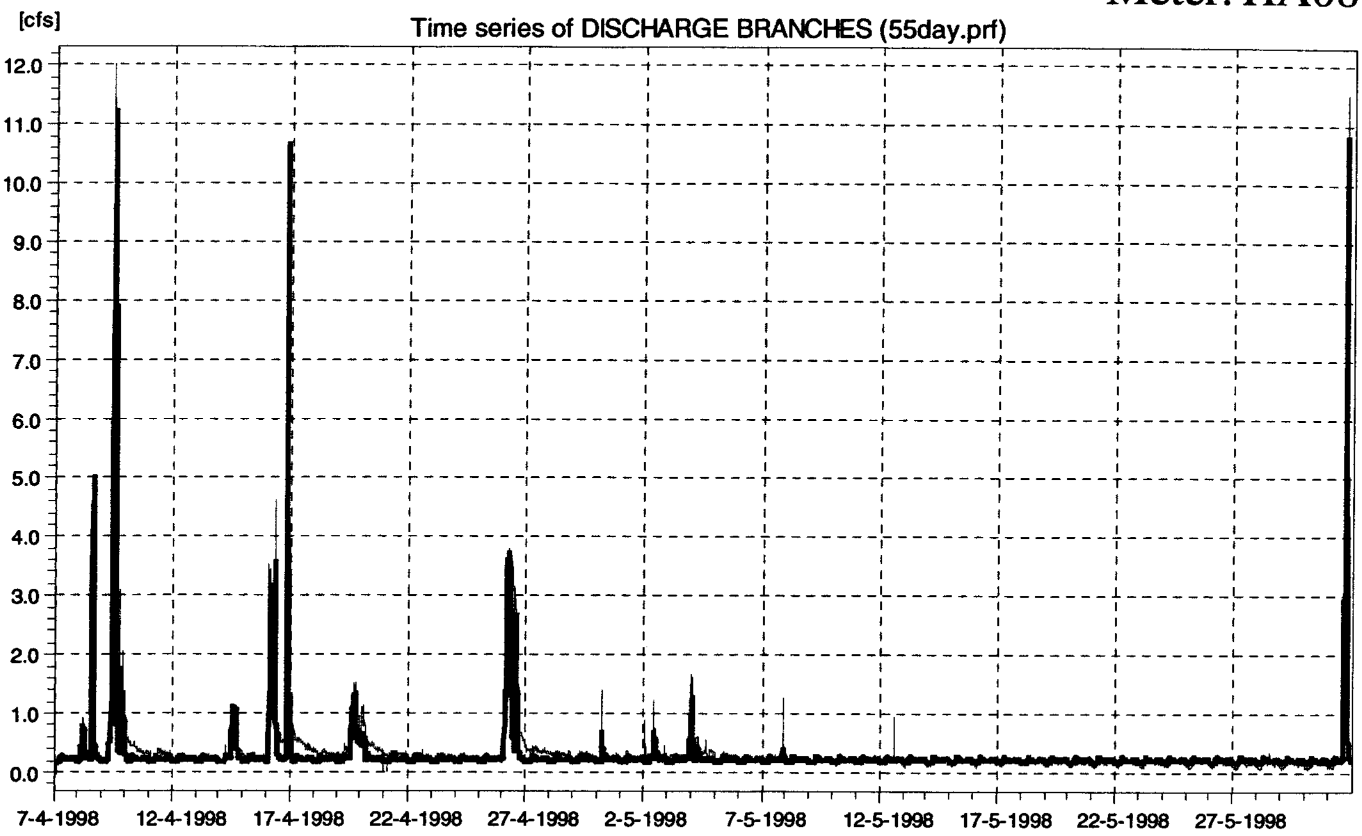
Metcalf & Eddy

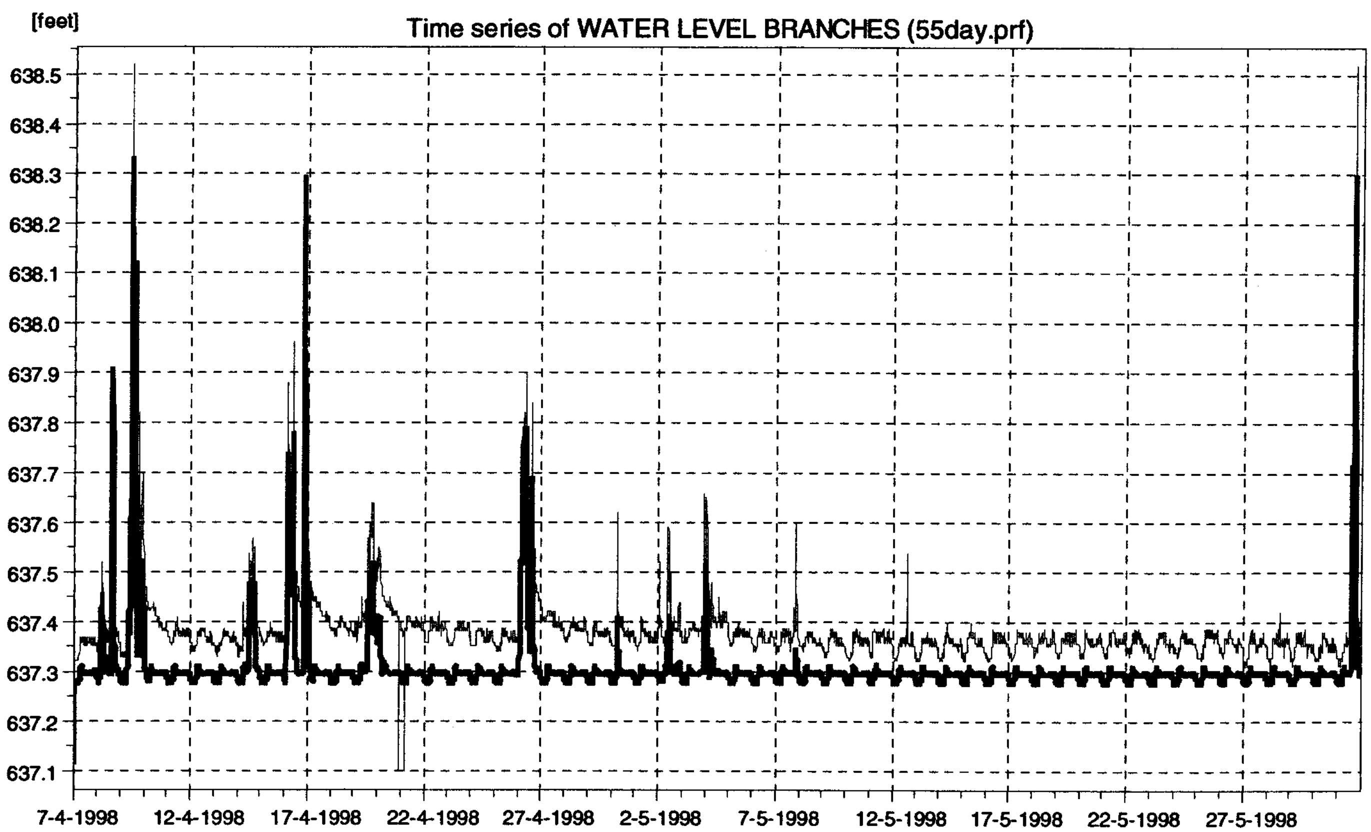
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: HA08





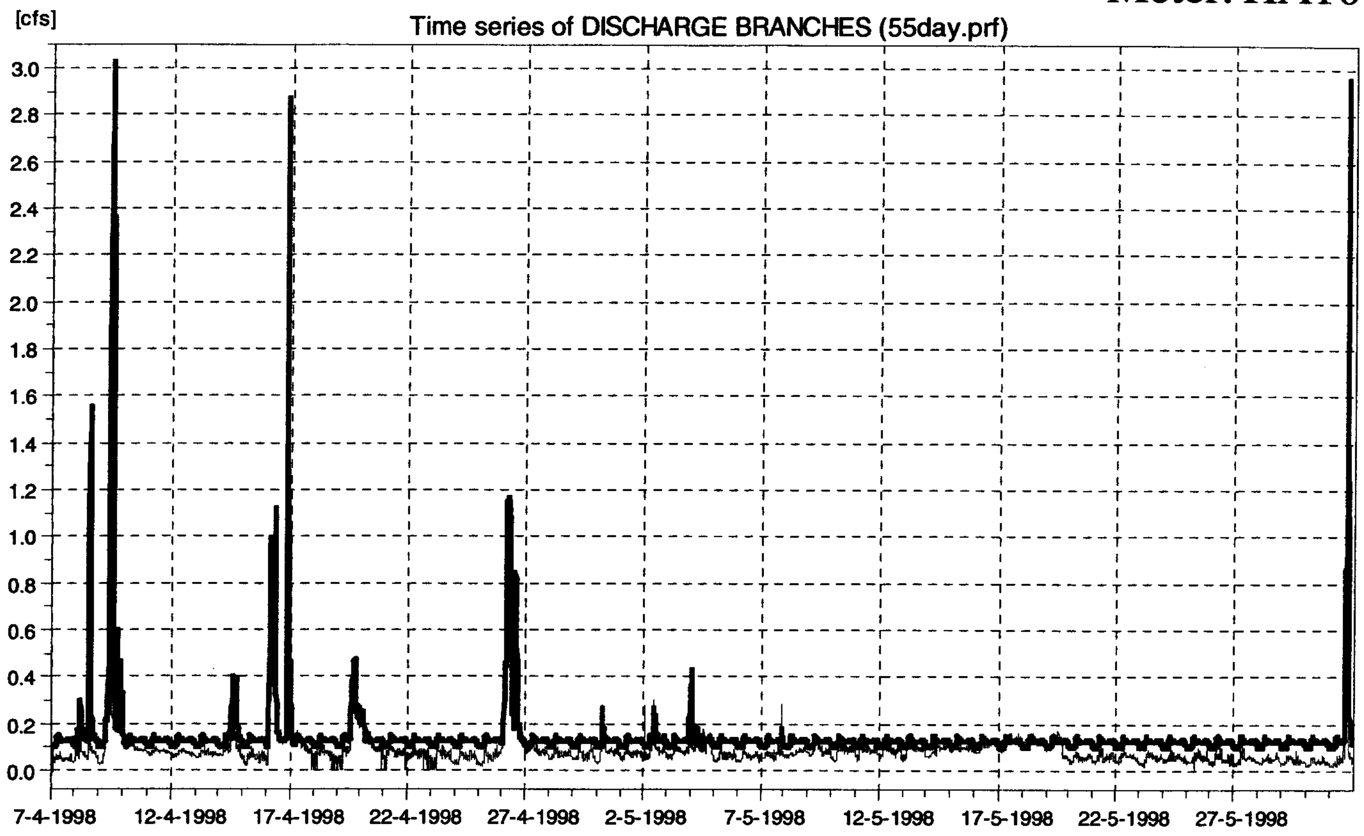
M&E Metcalf & Eddy AQUA ALLIANCE

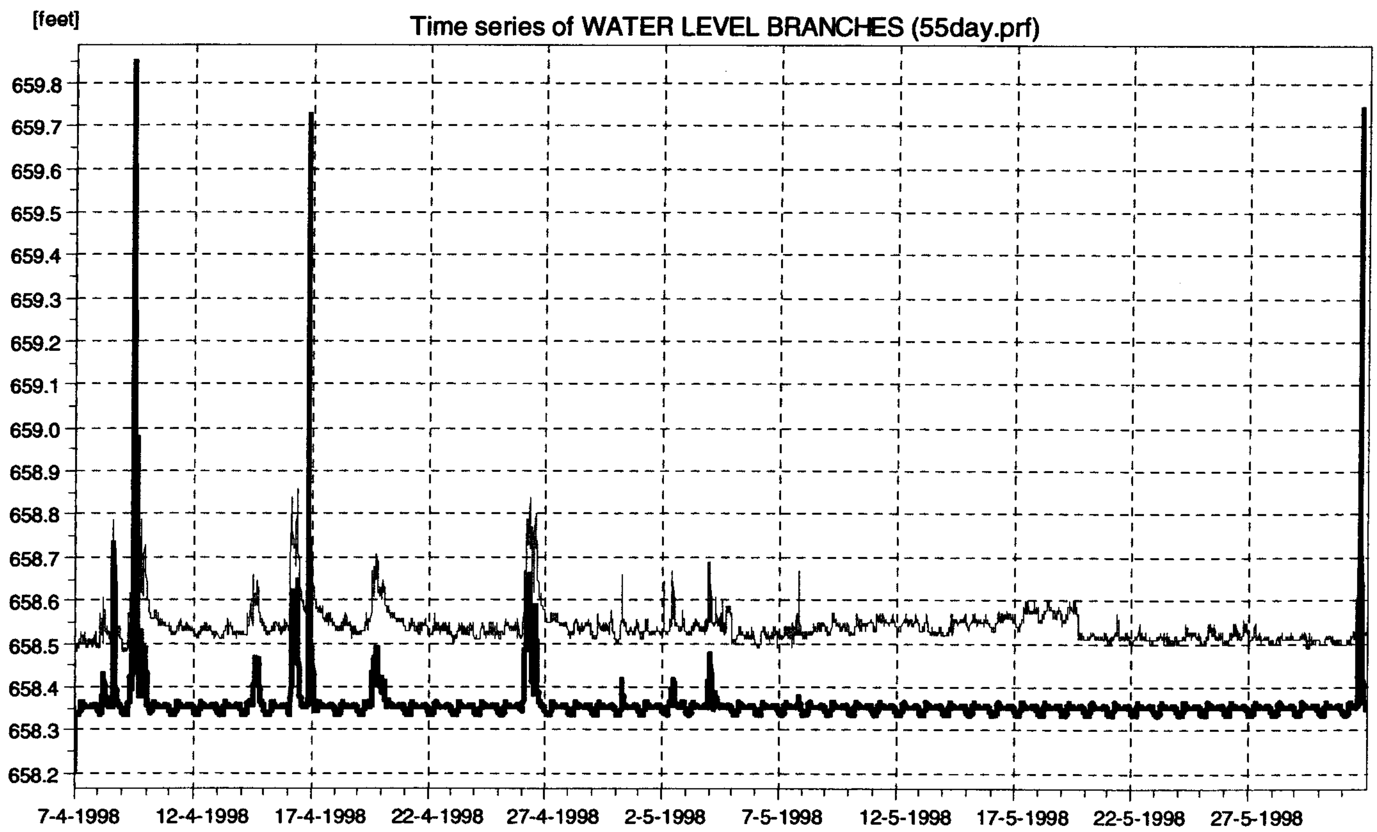
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: HA10





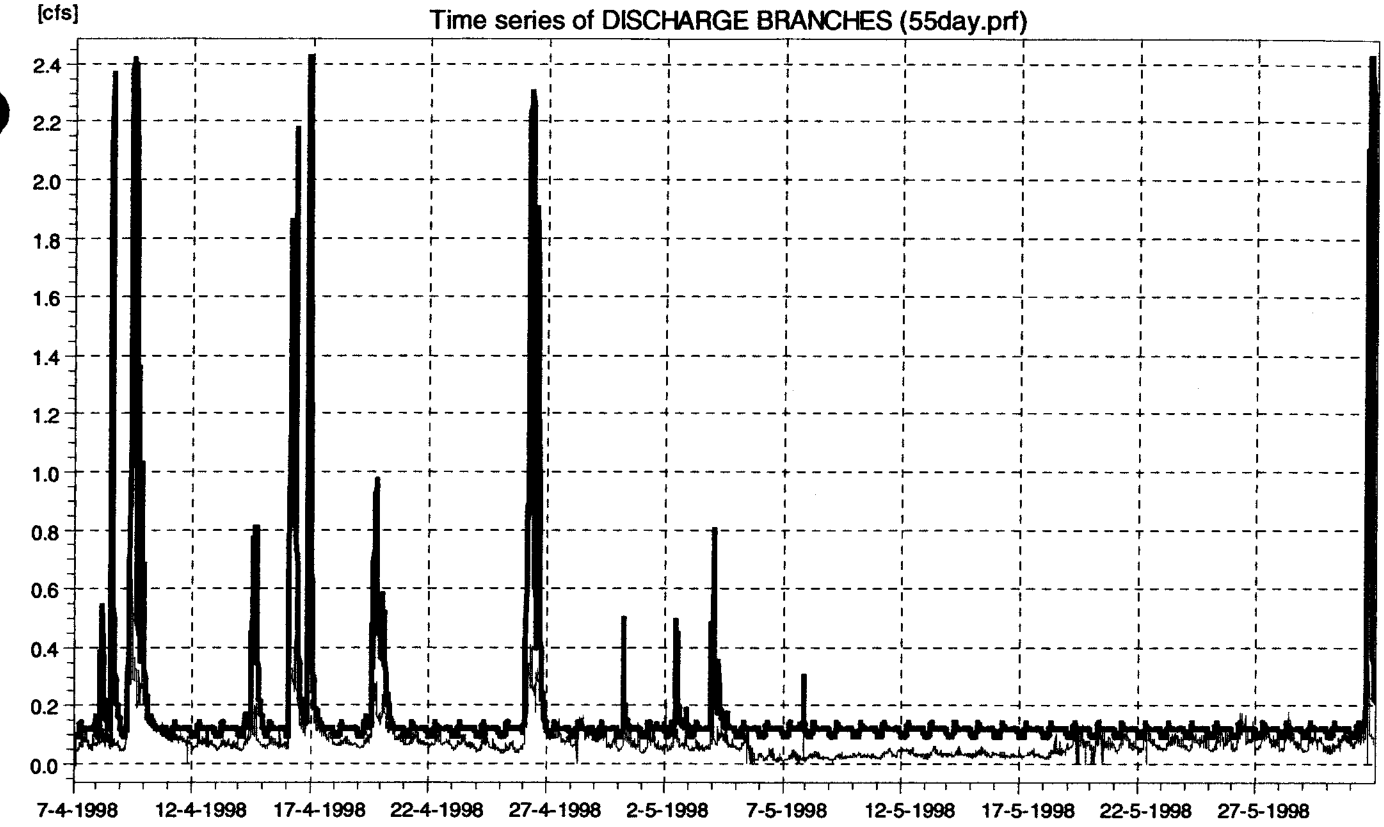
M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: HA12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Time series of DISCHARGE BRANCHES (55day.prf)
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2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
7-4-1998
12-4-1998
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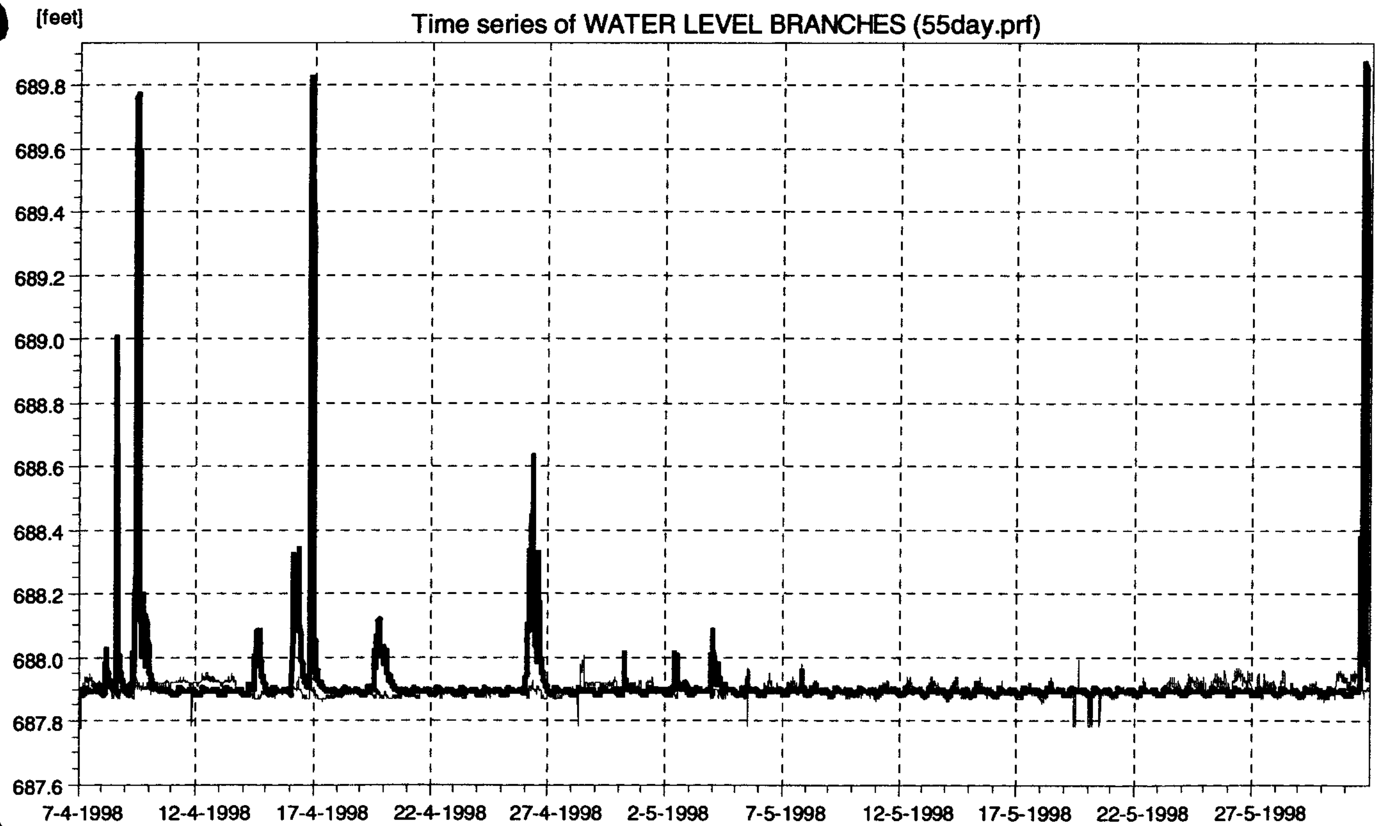
22-5-1998
27-5-1998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Time series of WATER LEVEL BRANCHES (55day.prf)
689.8
689.6
689.4
689.2
689.0
688.8
688.6
688.4
688.2
688.0
687.8
687.6
7-4-1998
12-4-1998
17-4-1998
22-4-1998
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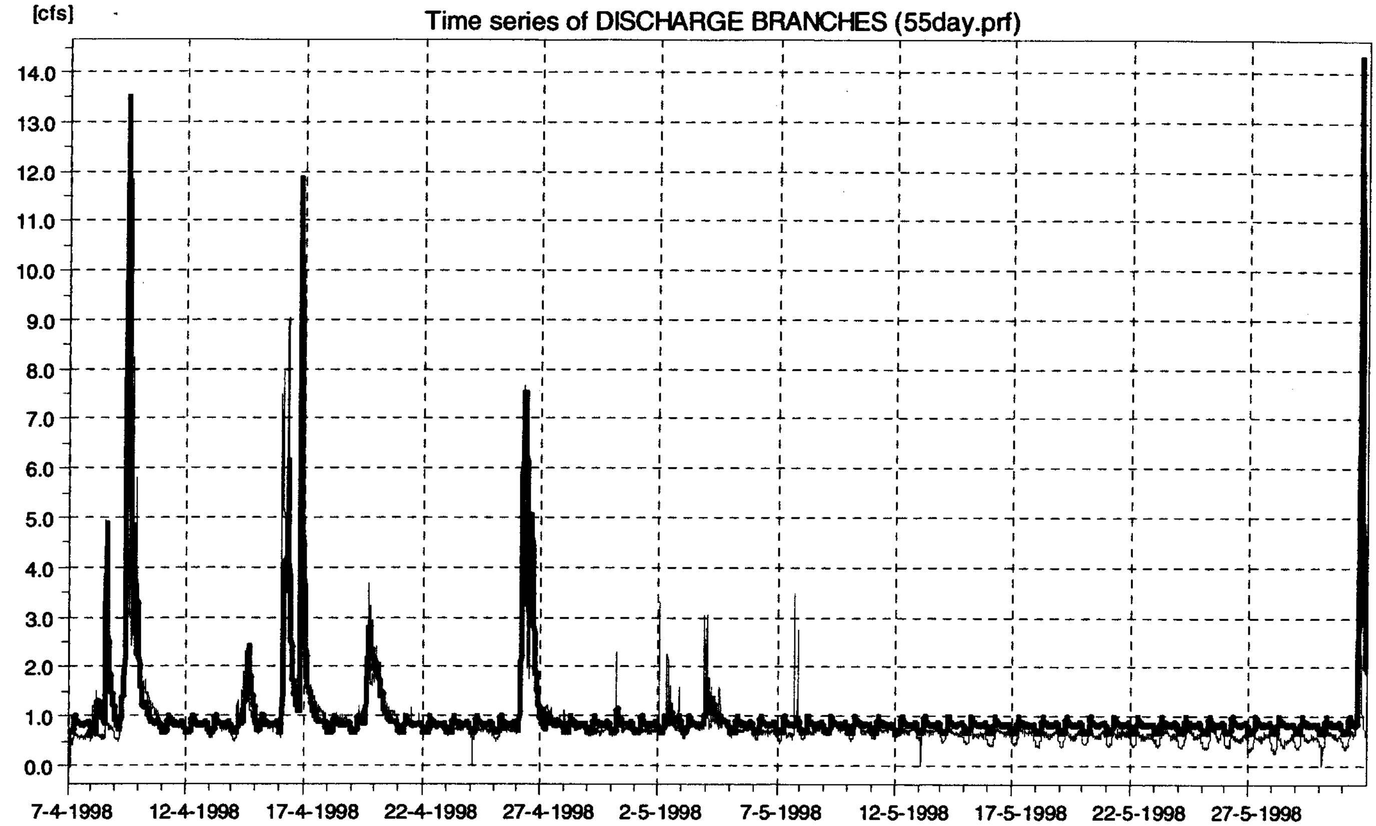
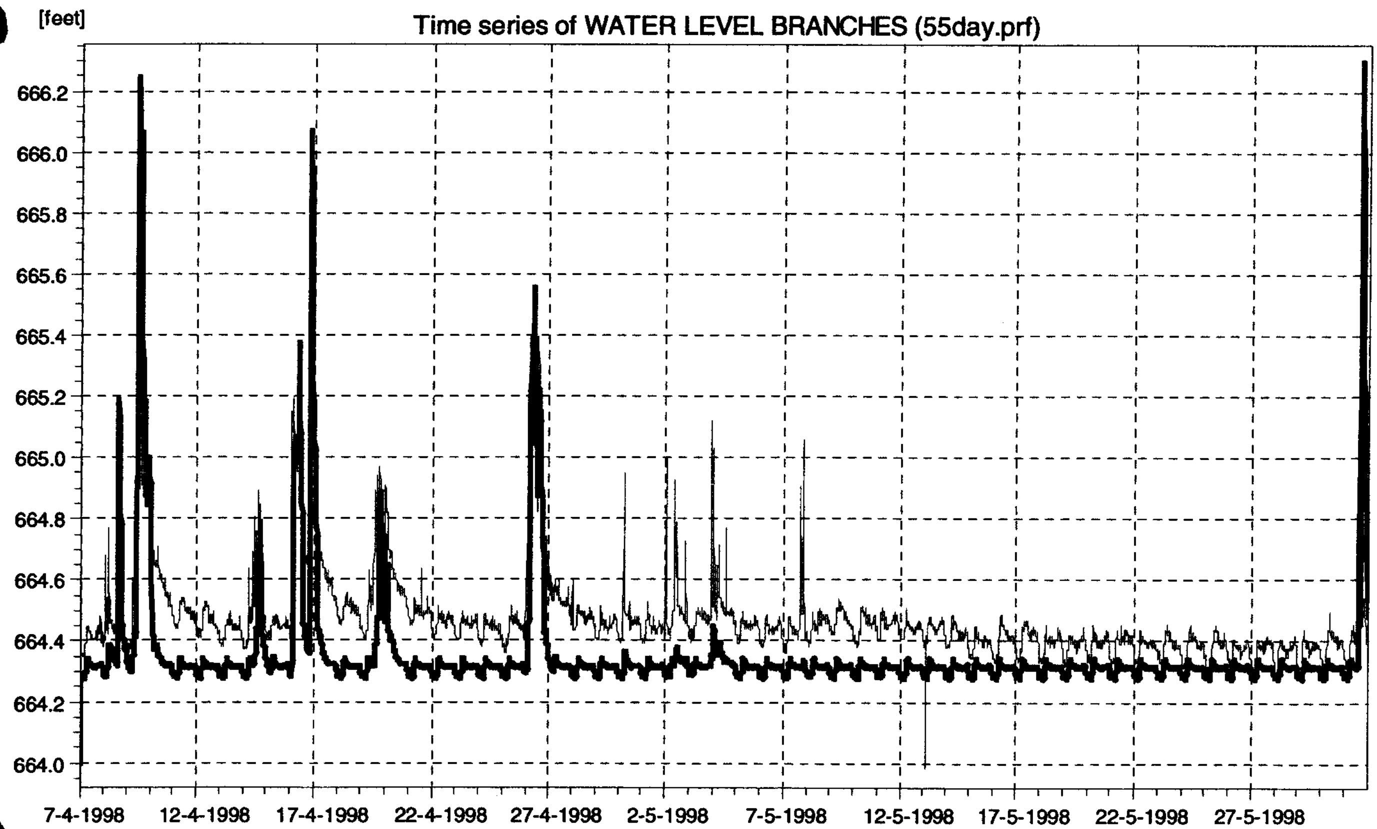
27-5-1998

Meter: HA13I





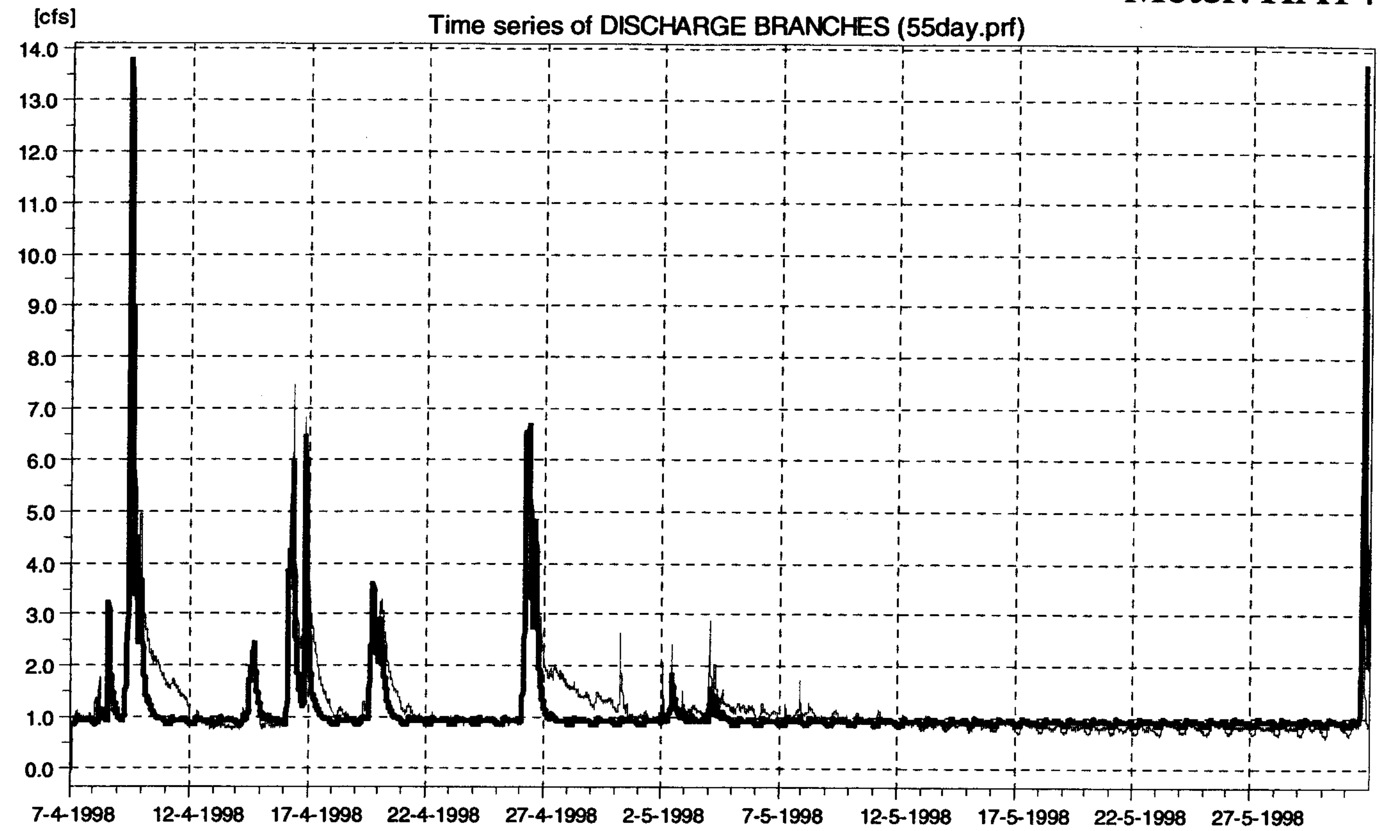
M&E AQUA ALLIANCE Metcalf & Eddy

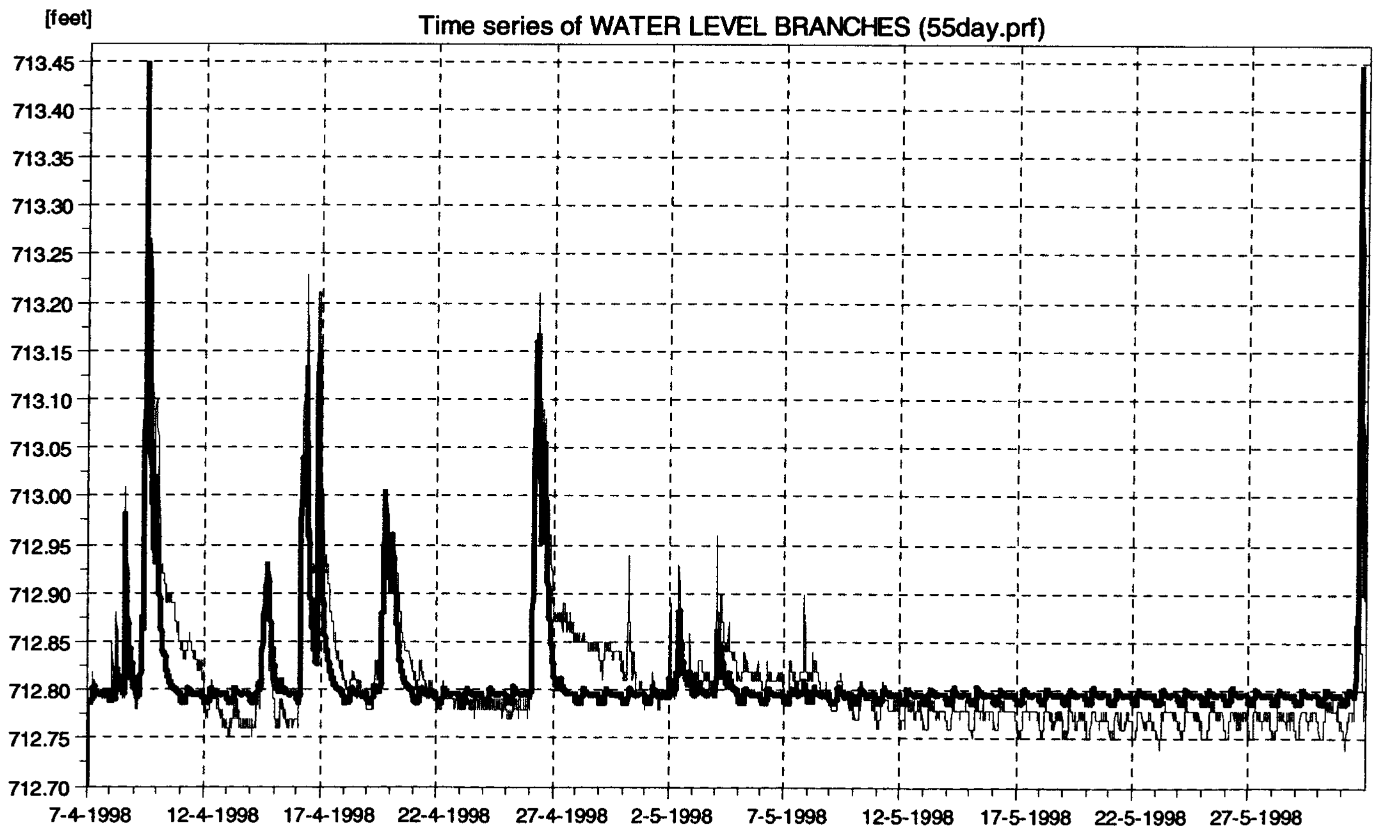
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: HA14





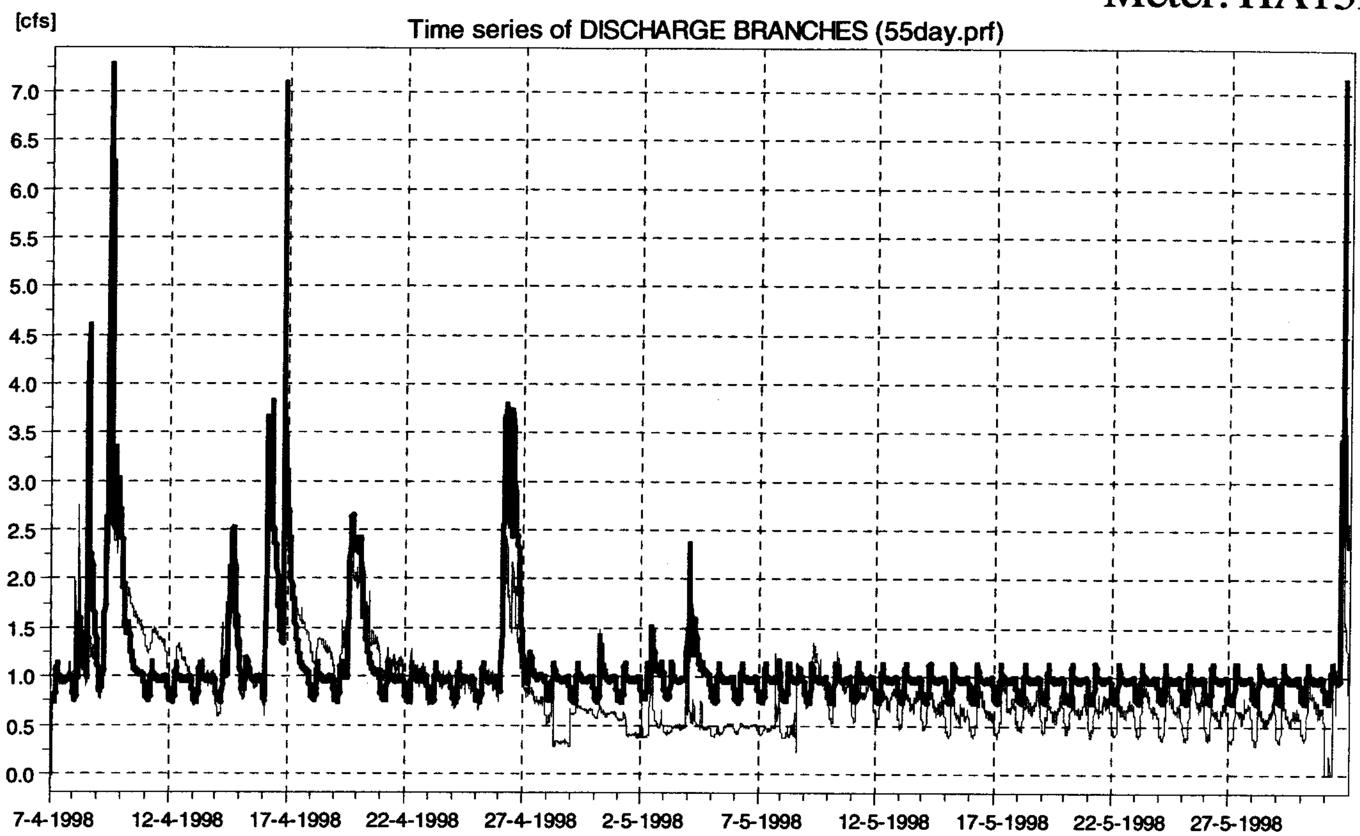
M&E Metcalf & Eddy AQUA ALLIANCE

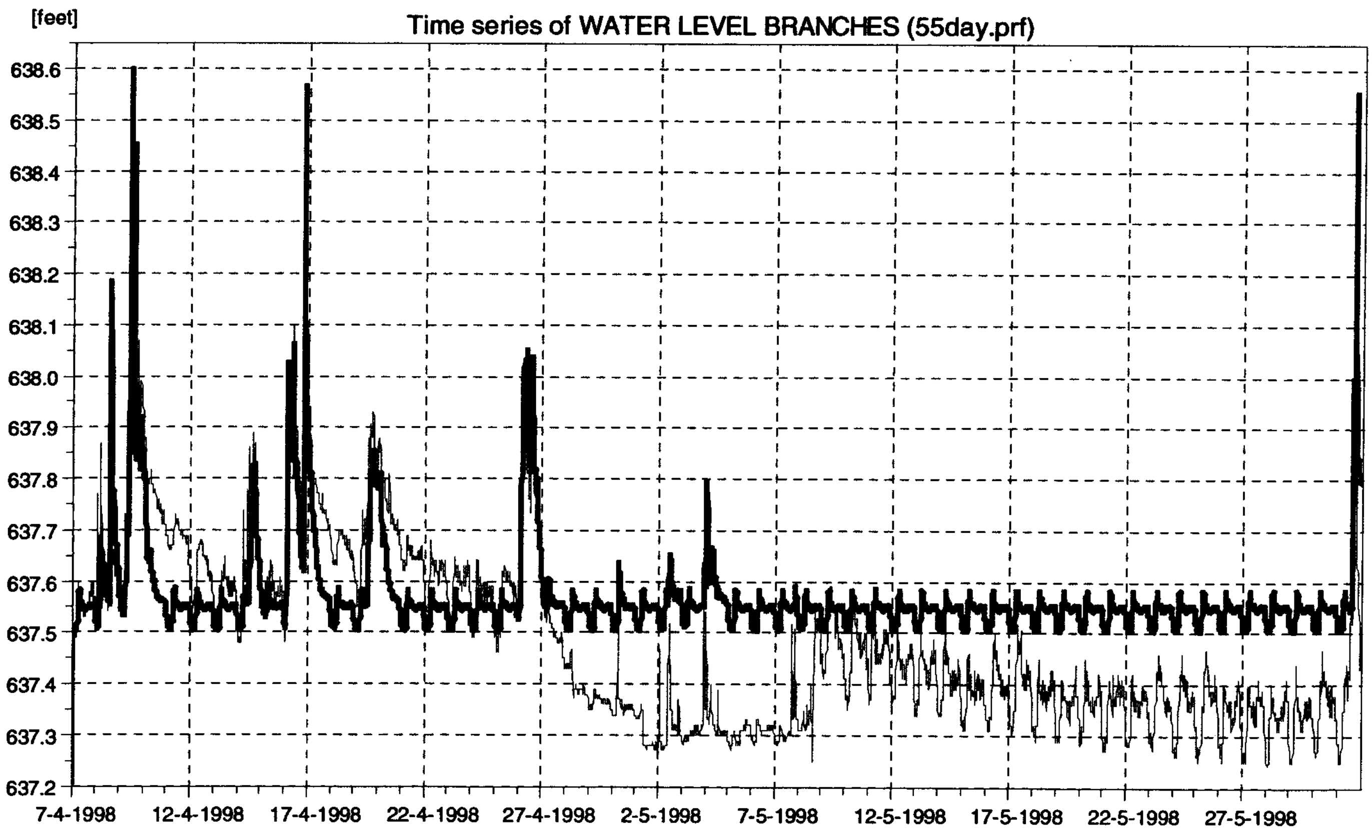
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: HA15I





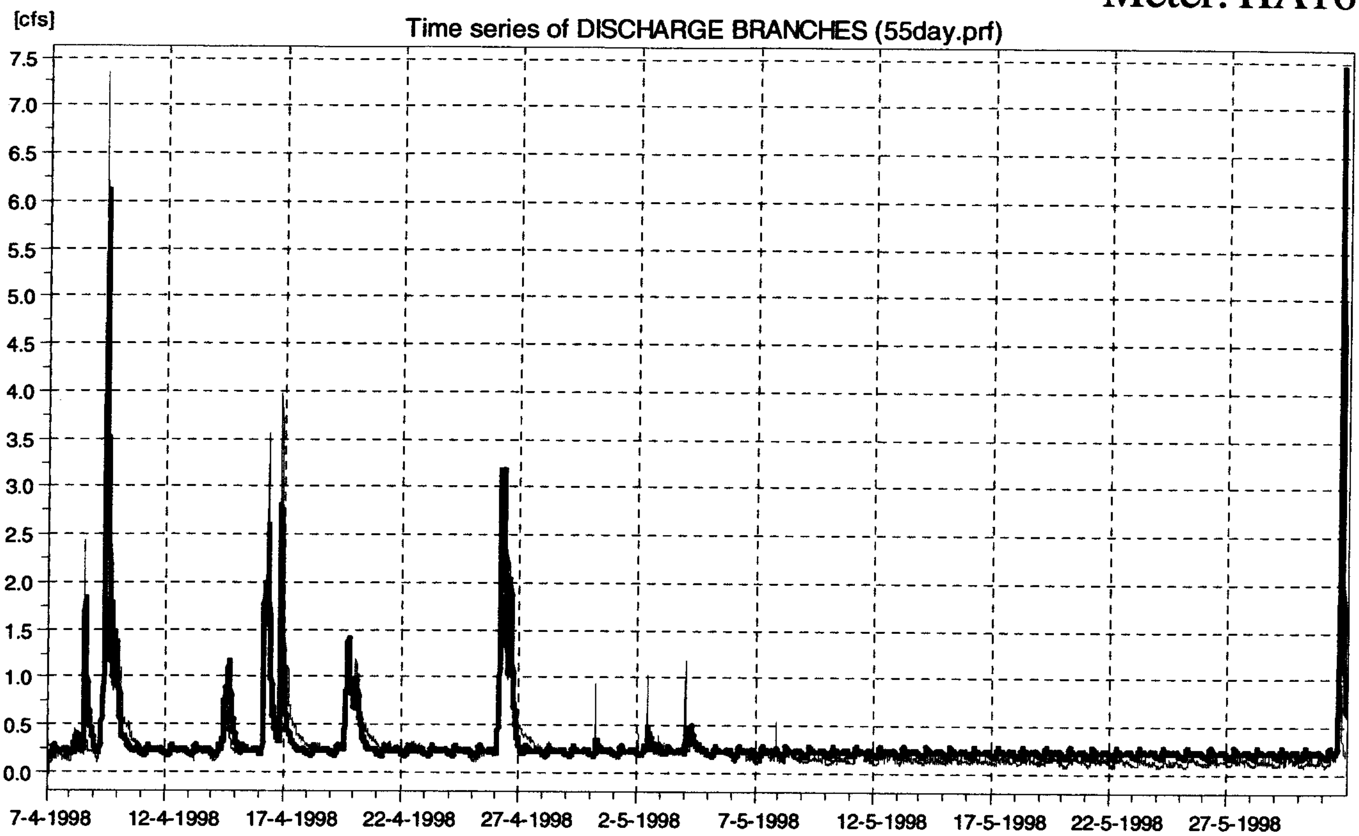
M&E Metcalf & Eddy AQUA ALLIANCE

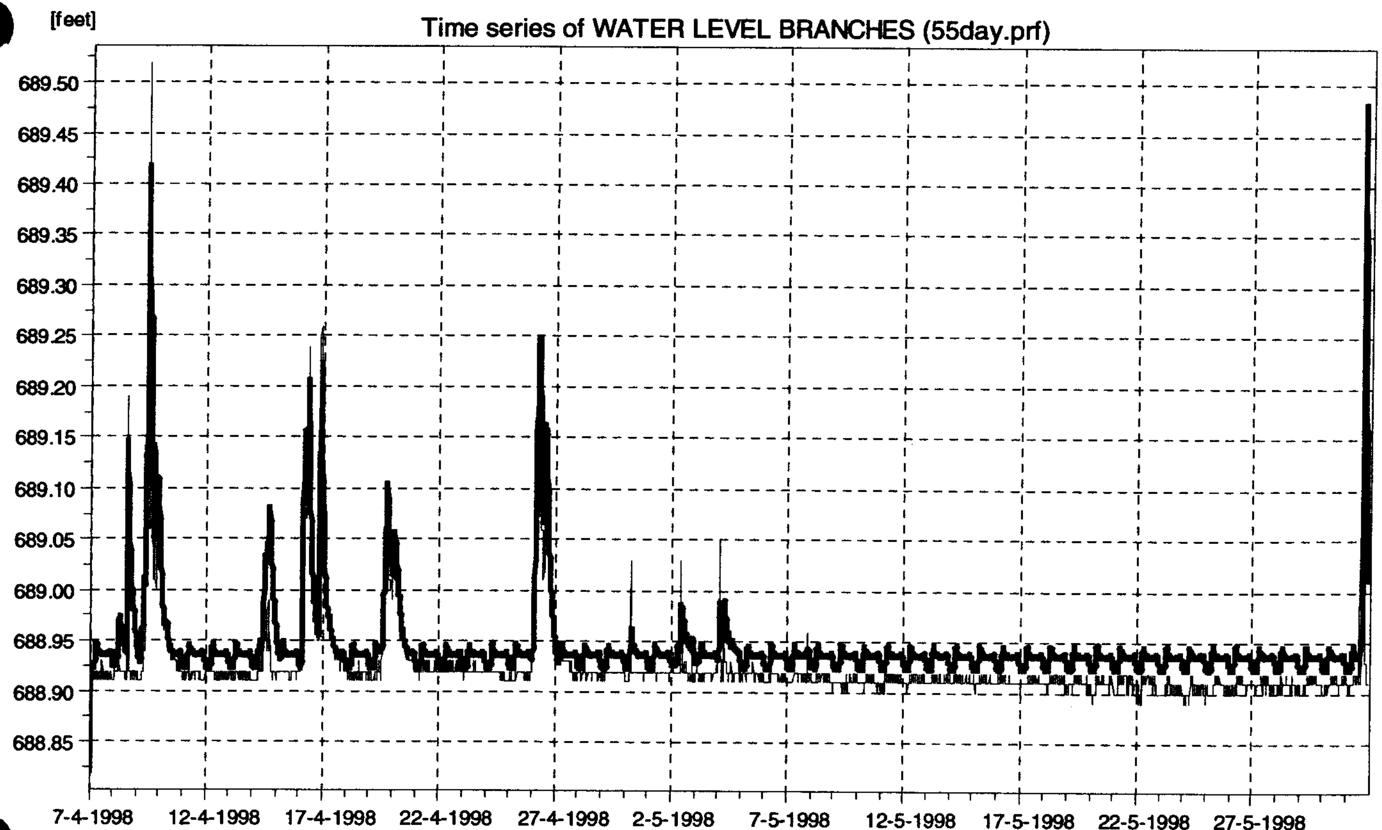
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: HA16





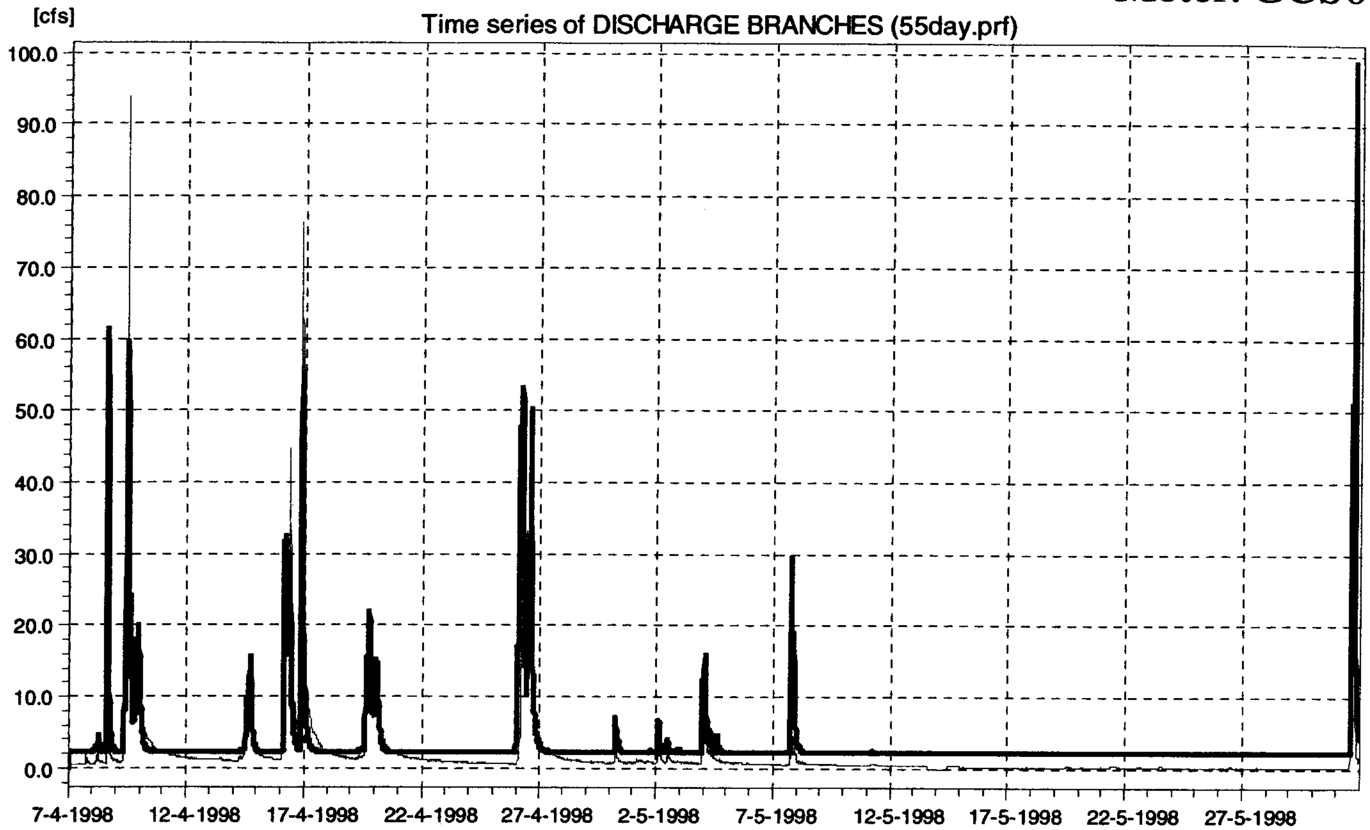
M&E AQUA ALLIANCE Metcalf & Eddy

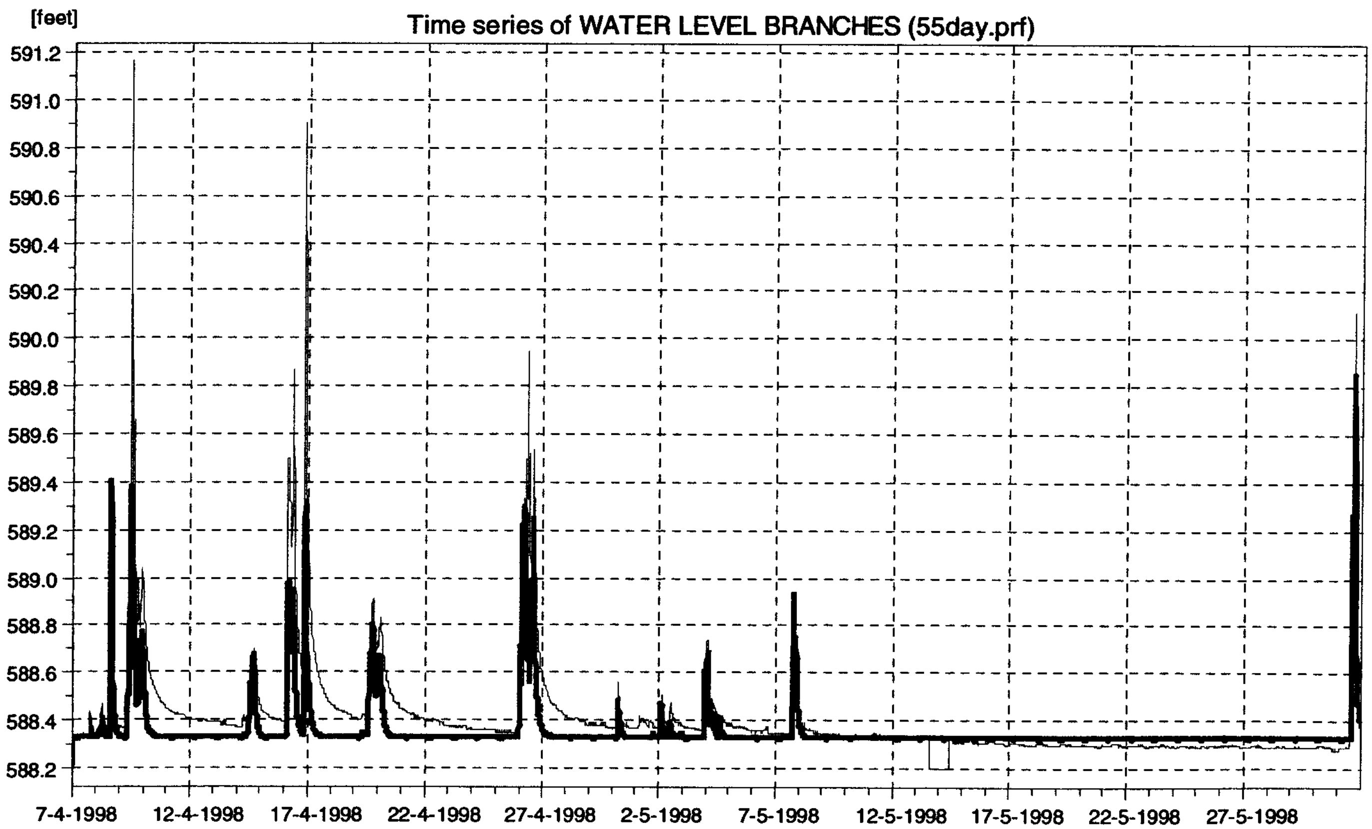
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: GCS01





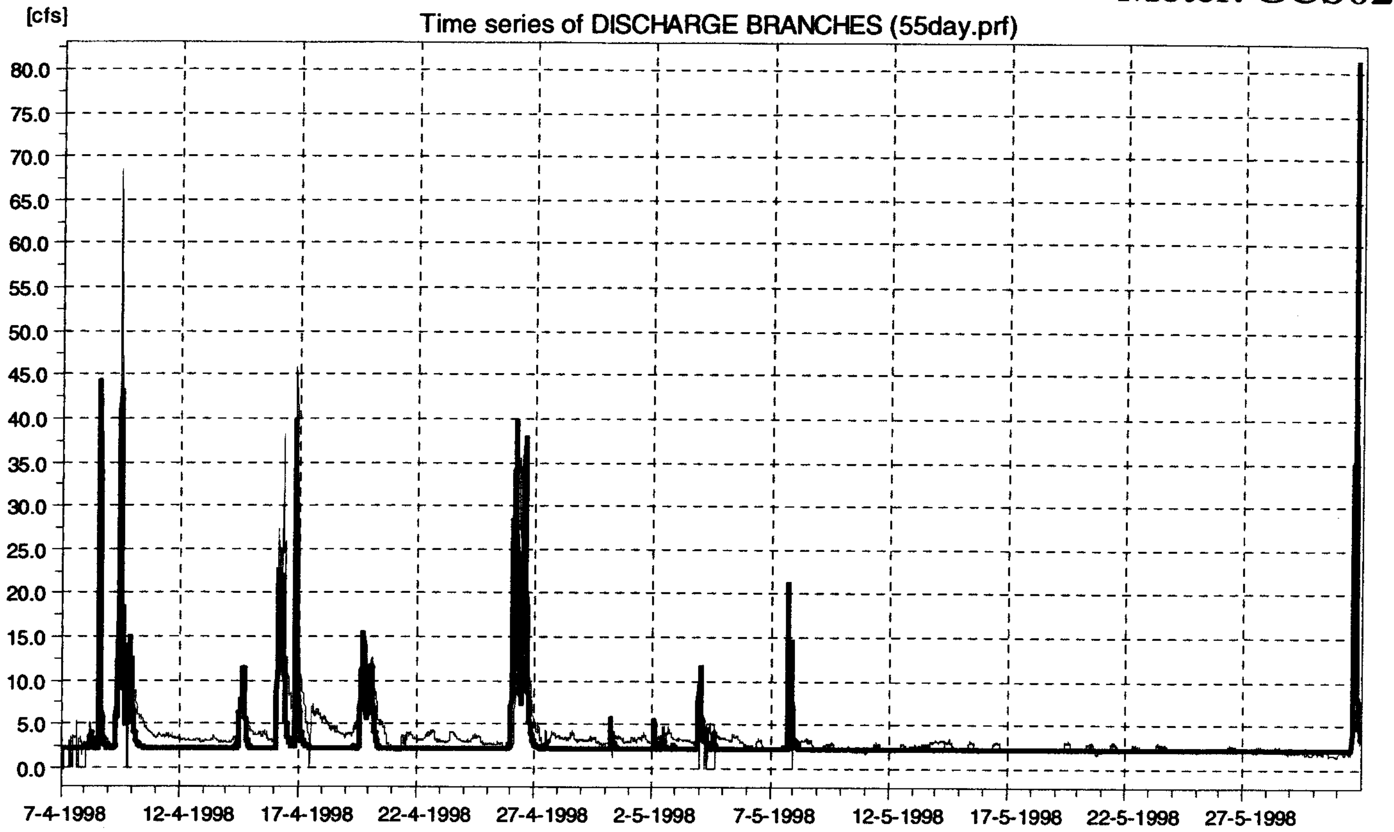
M&E Metcalf & Eddy AQUA ALLIANCE

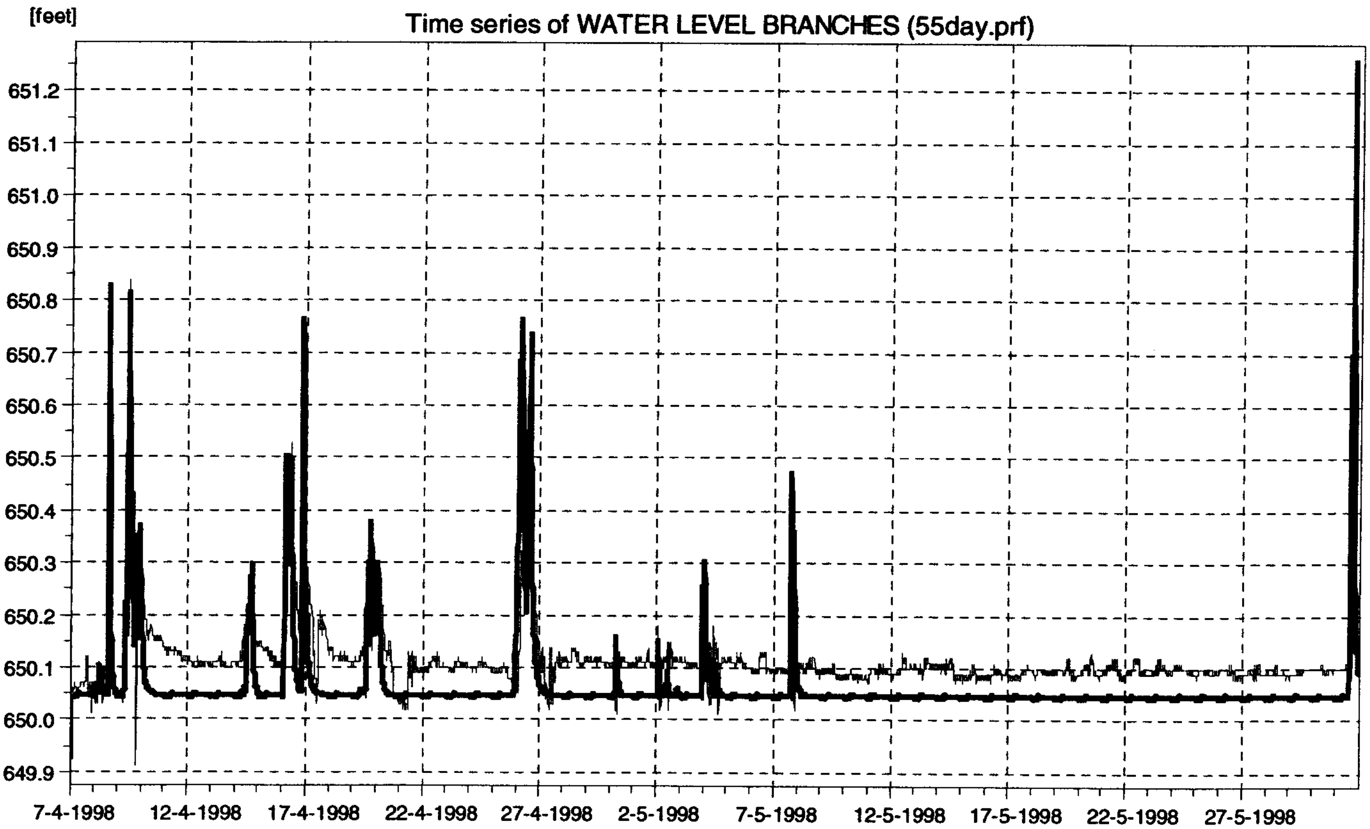
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: GCS02



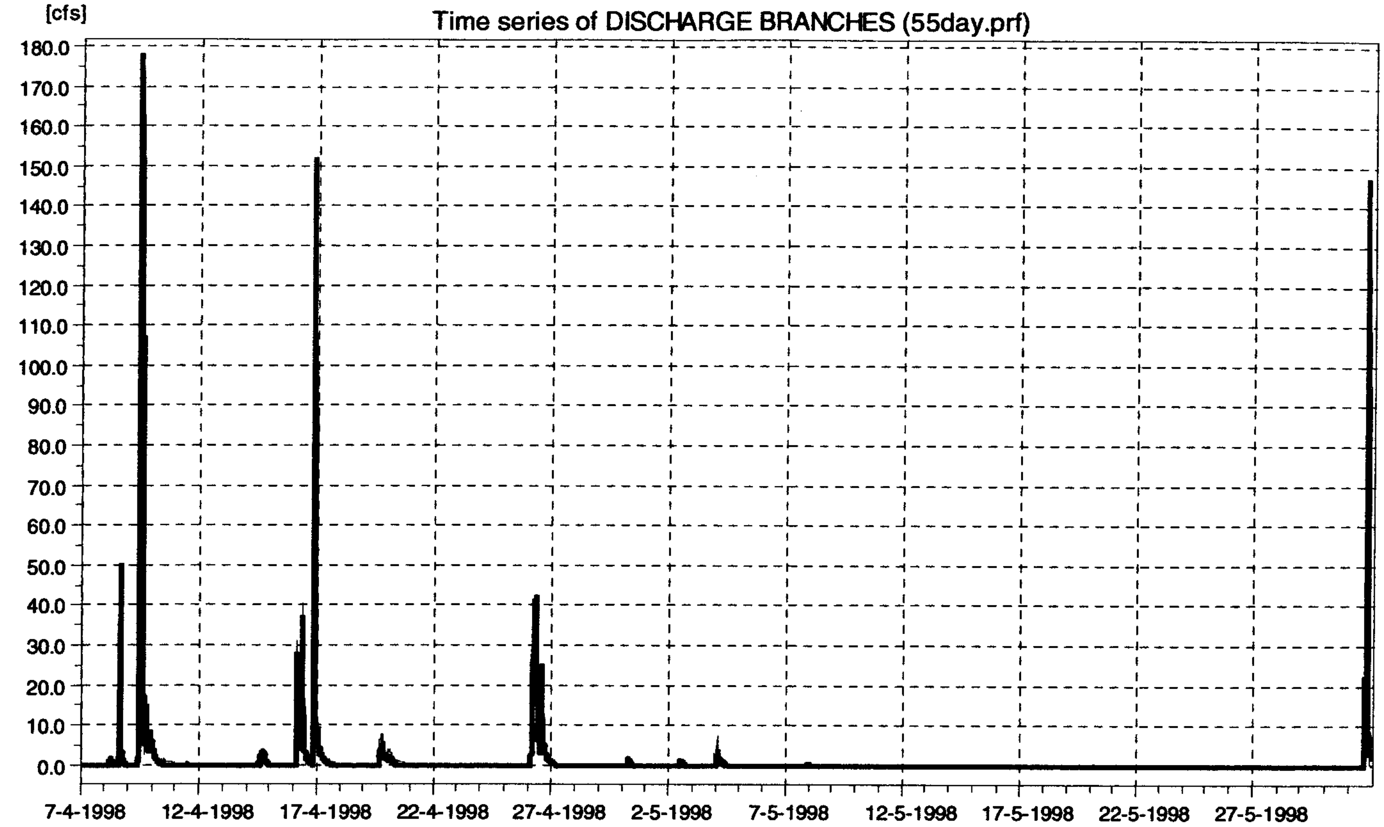


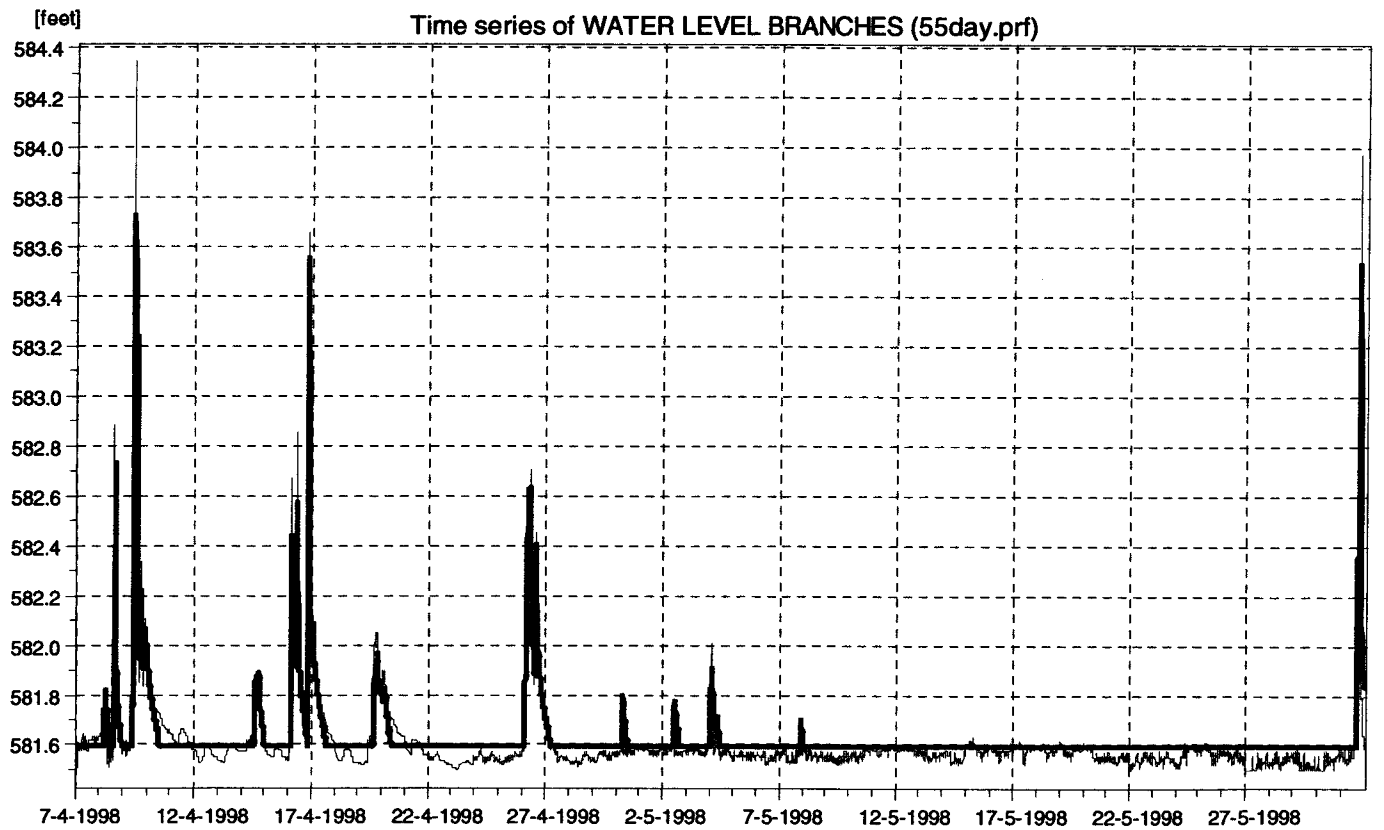
M&E Metcalf & Eddy
AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan
Model Calibration — Model — Meter

CH2MHILL

Meter: SBS01





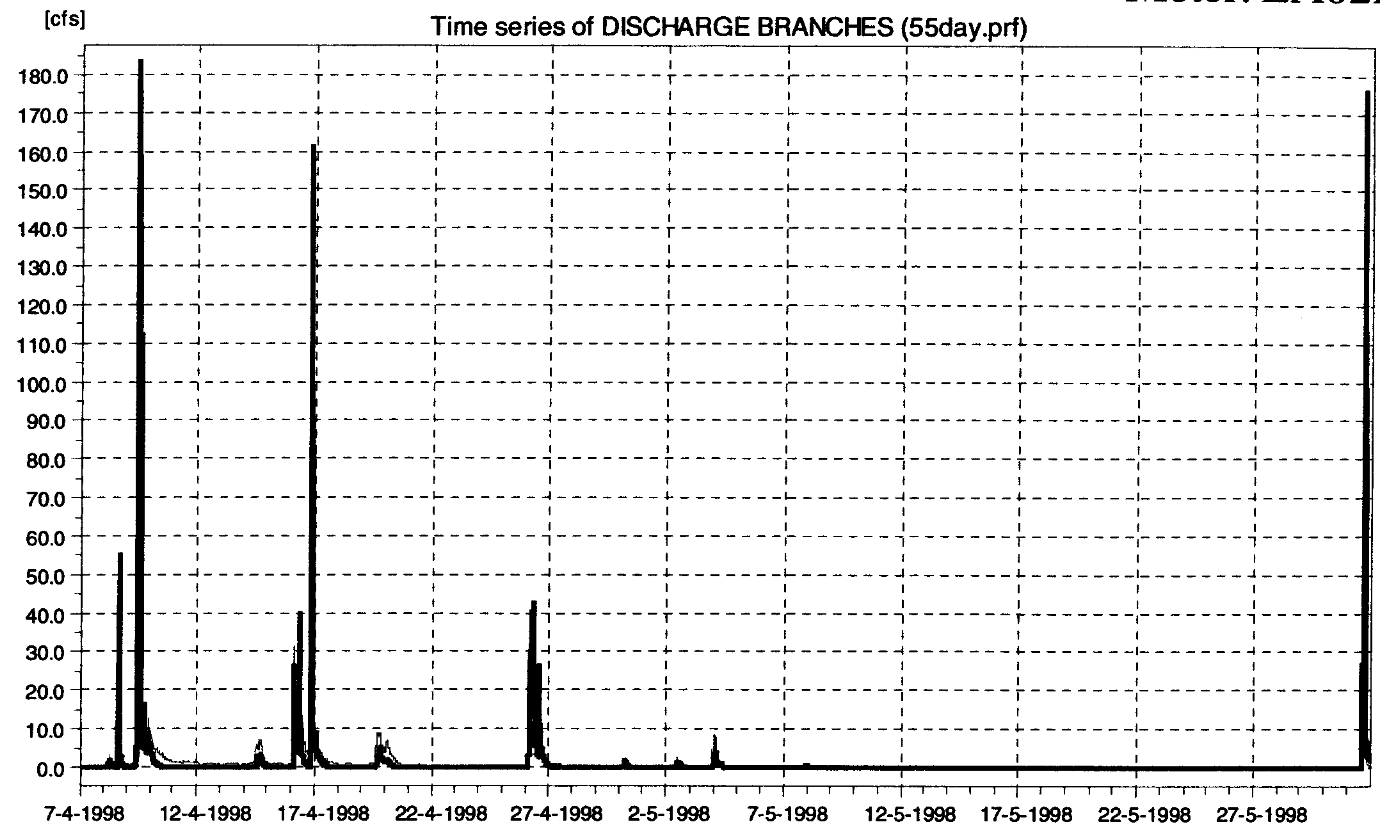
M&E Metcalf & Eddy AQUA ALLIANCE

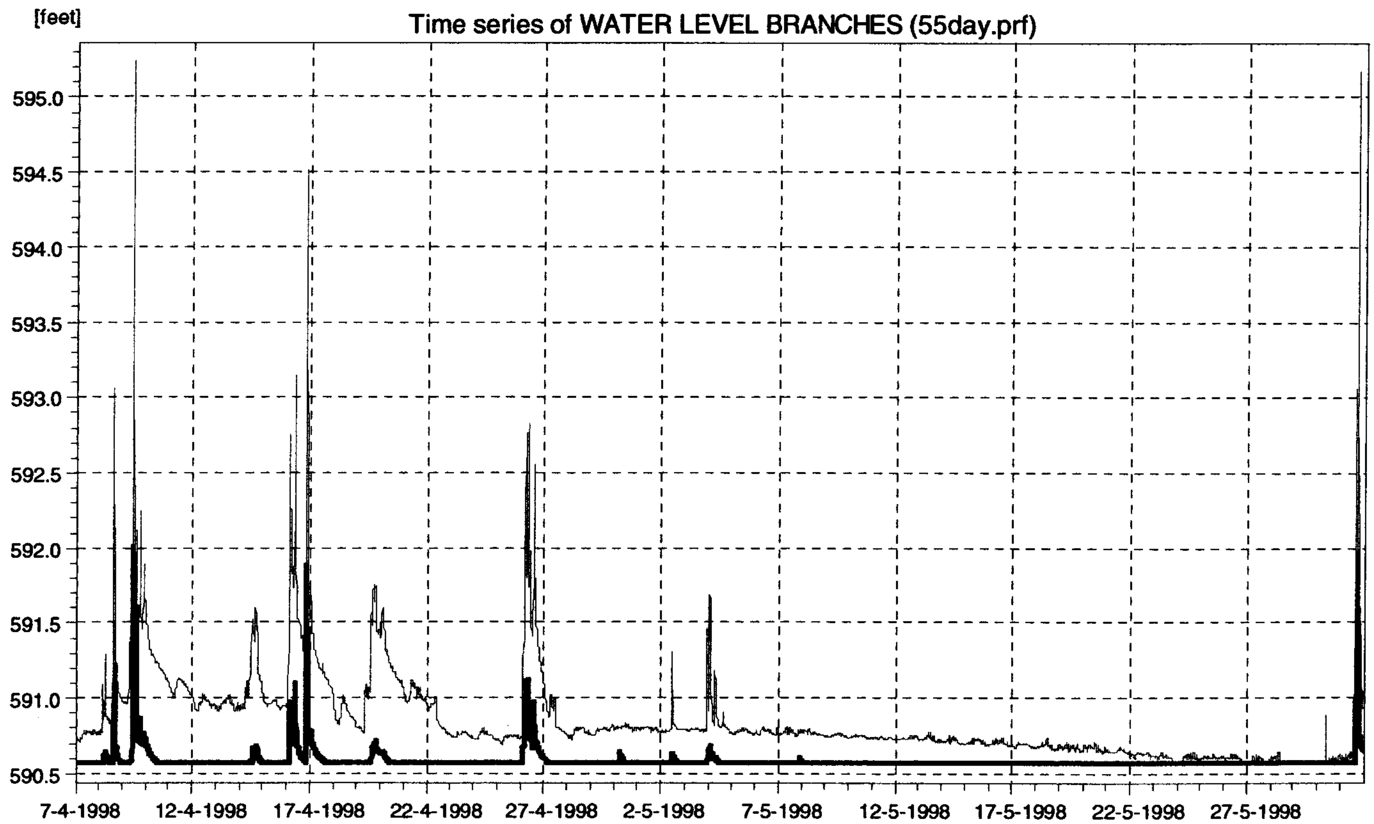
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA02D





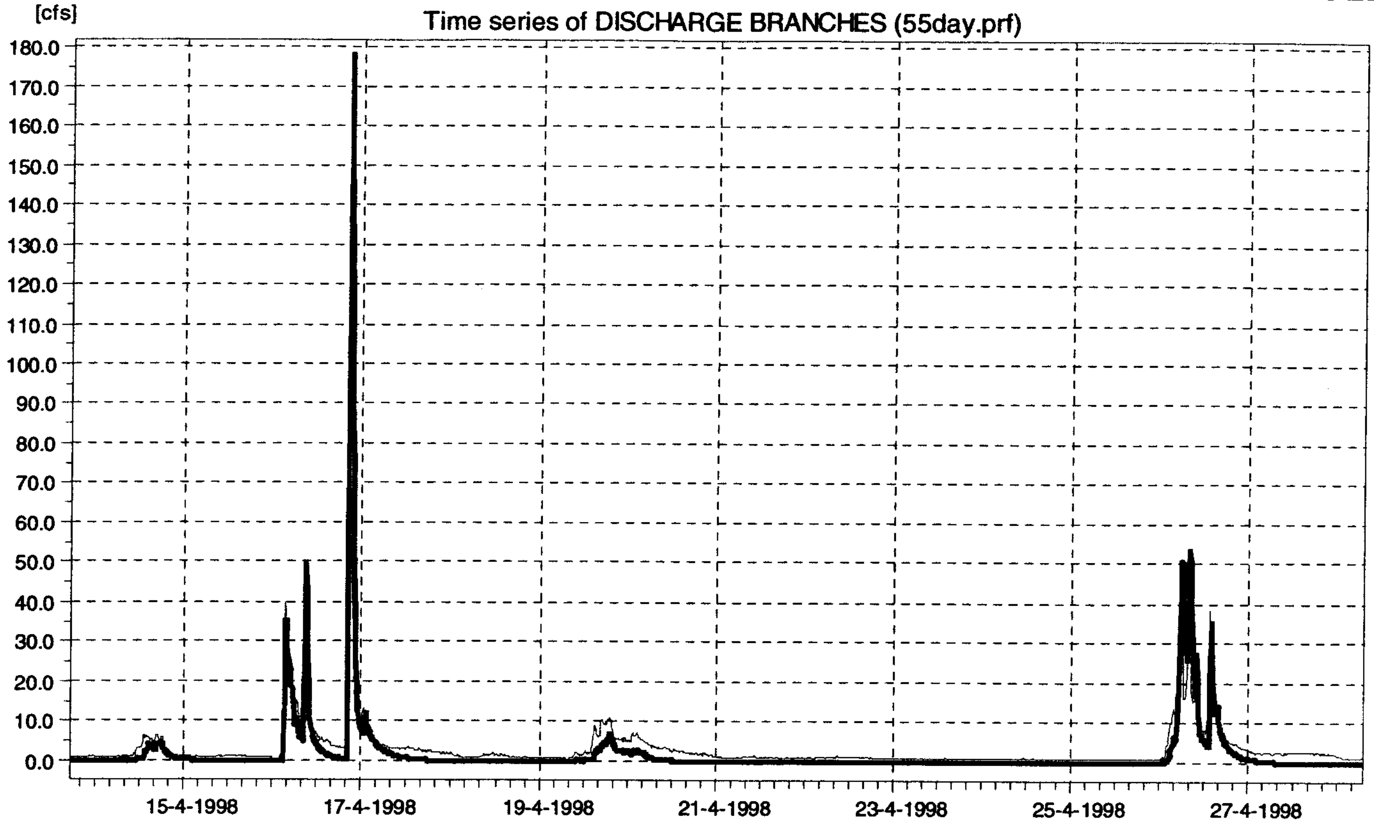
M&E Metcalf & Eddy AQUA ALLIANCE

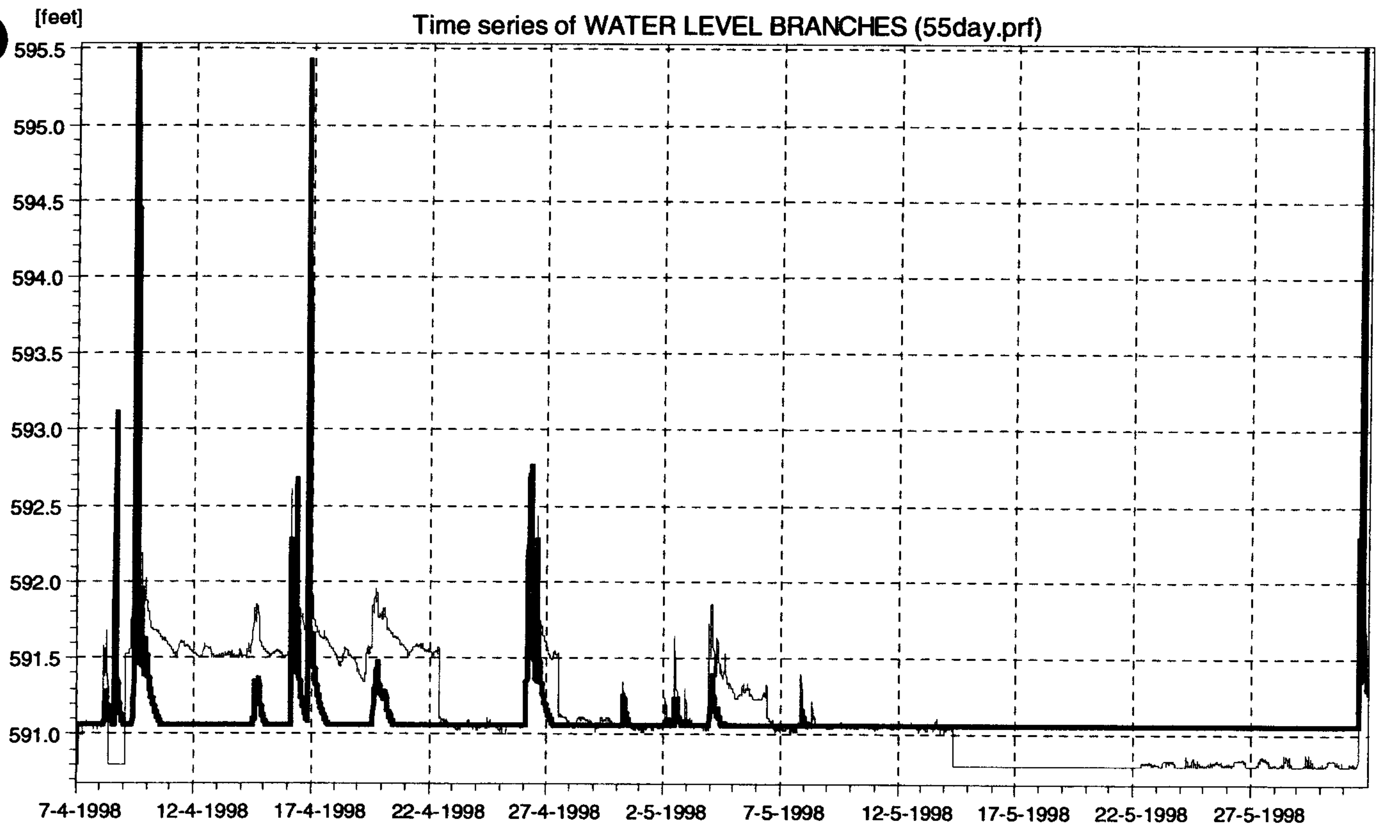
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA02I





M&E AQUA ALLIANCE Metcalf & Eddy

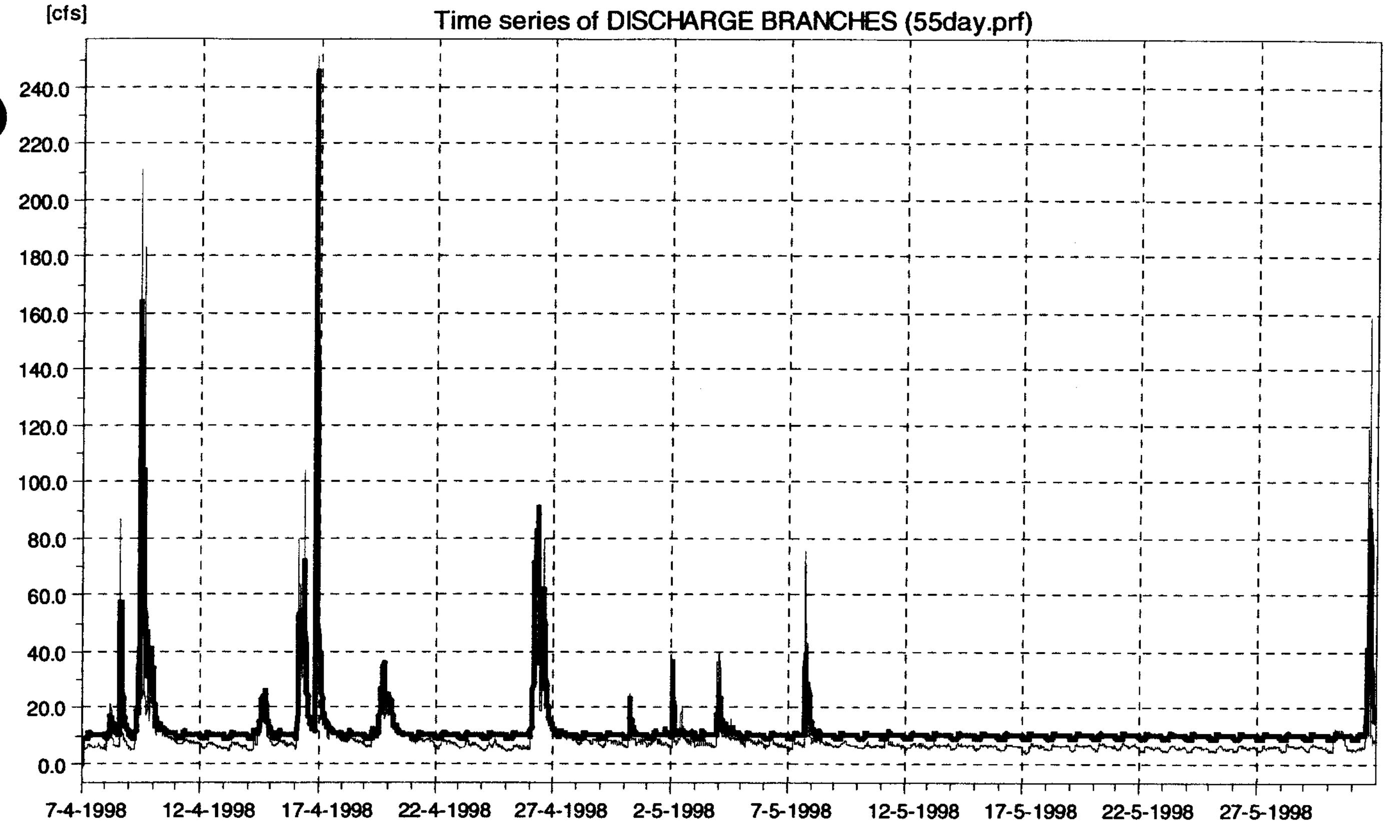
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

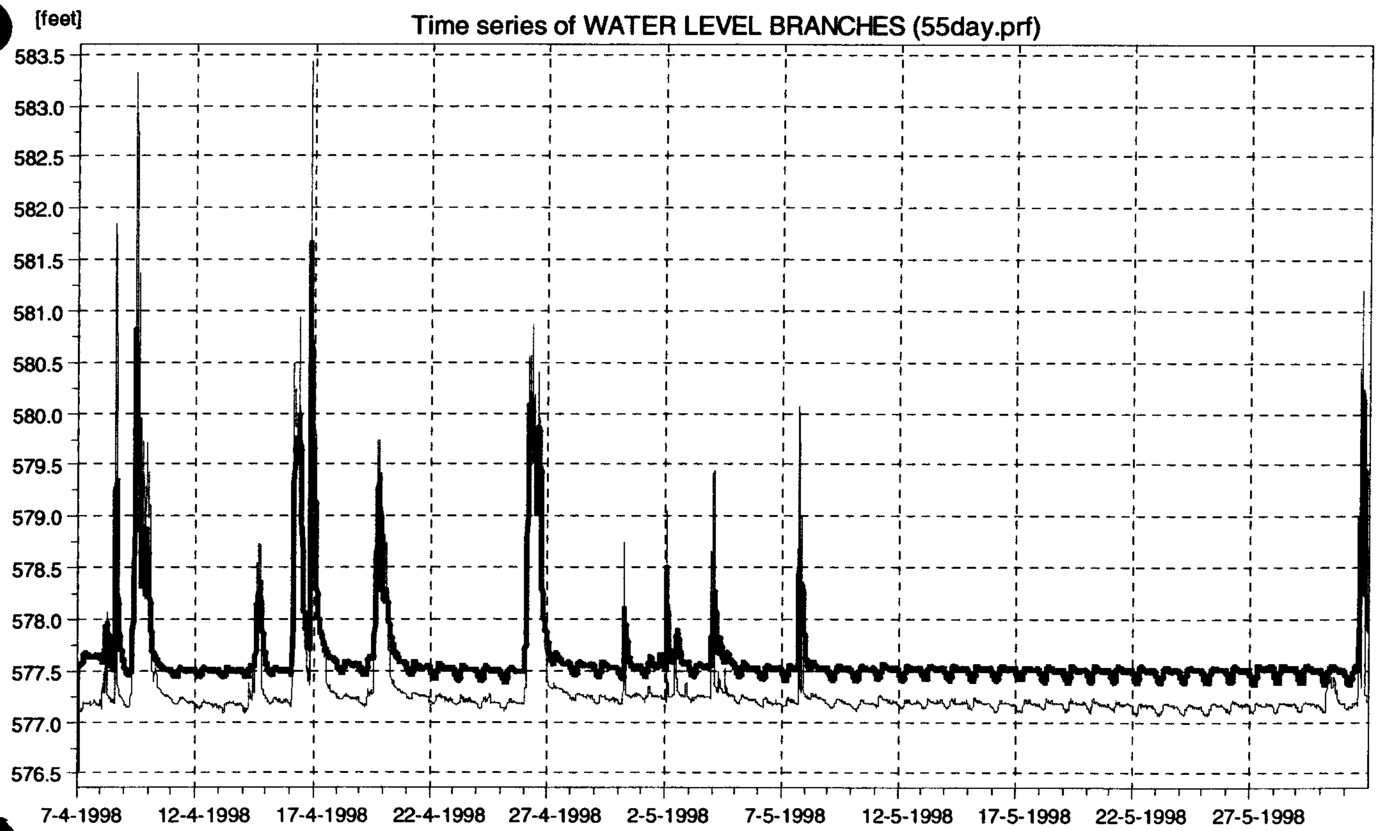
CH2MHILL

Meter: IV00

Time series of DISCHARGE BRANCHES (55day.prf)



Time series of WATER LEVEL BRANCHES (55day.prf)



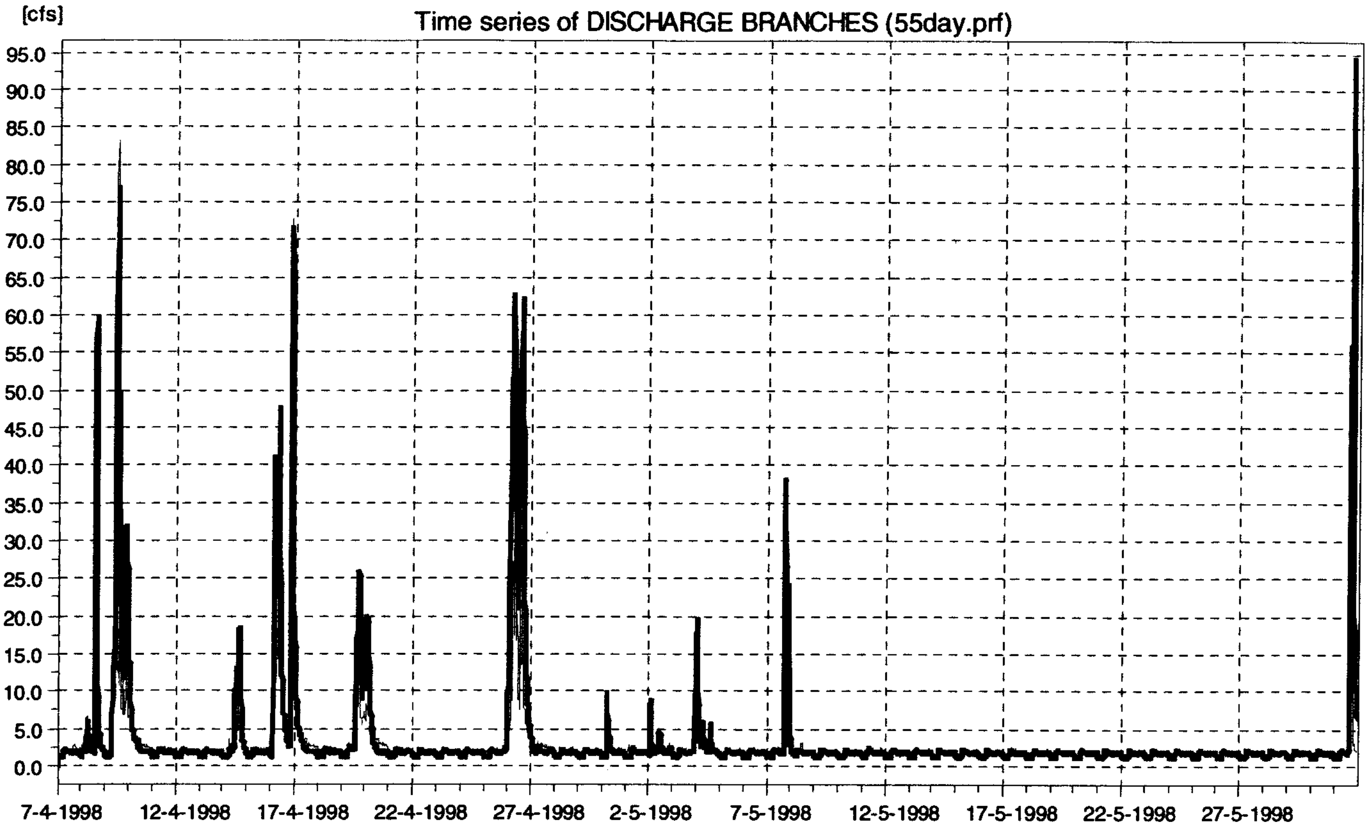
M&E Metcalf & Eddy AQUA ALLIANCE

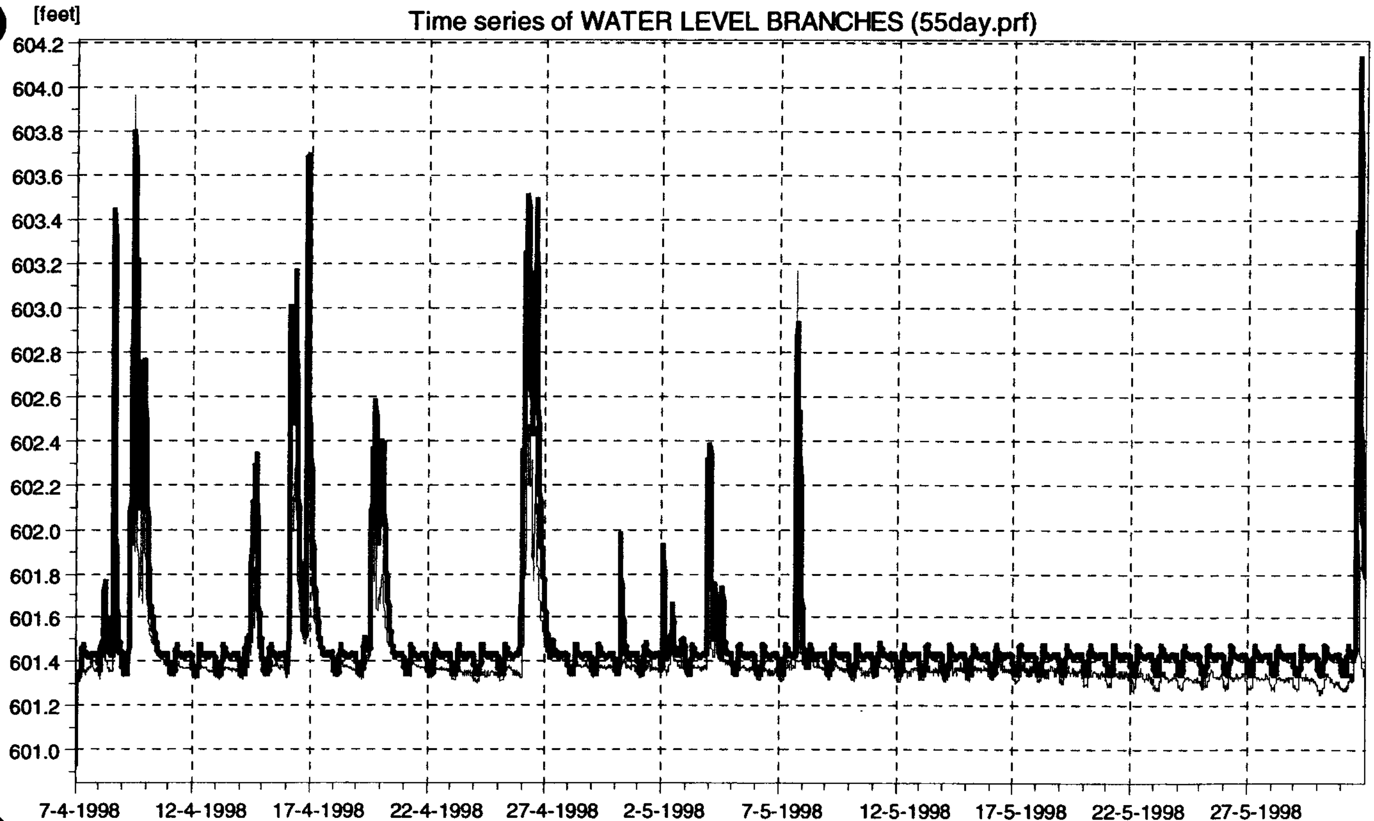
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: IV01





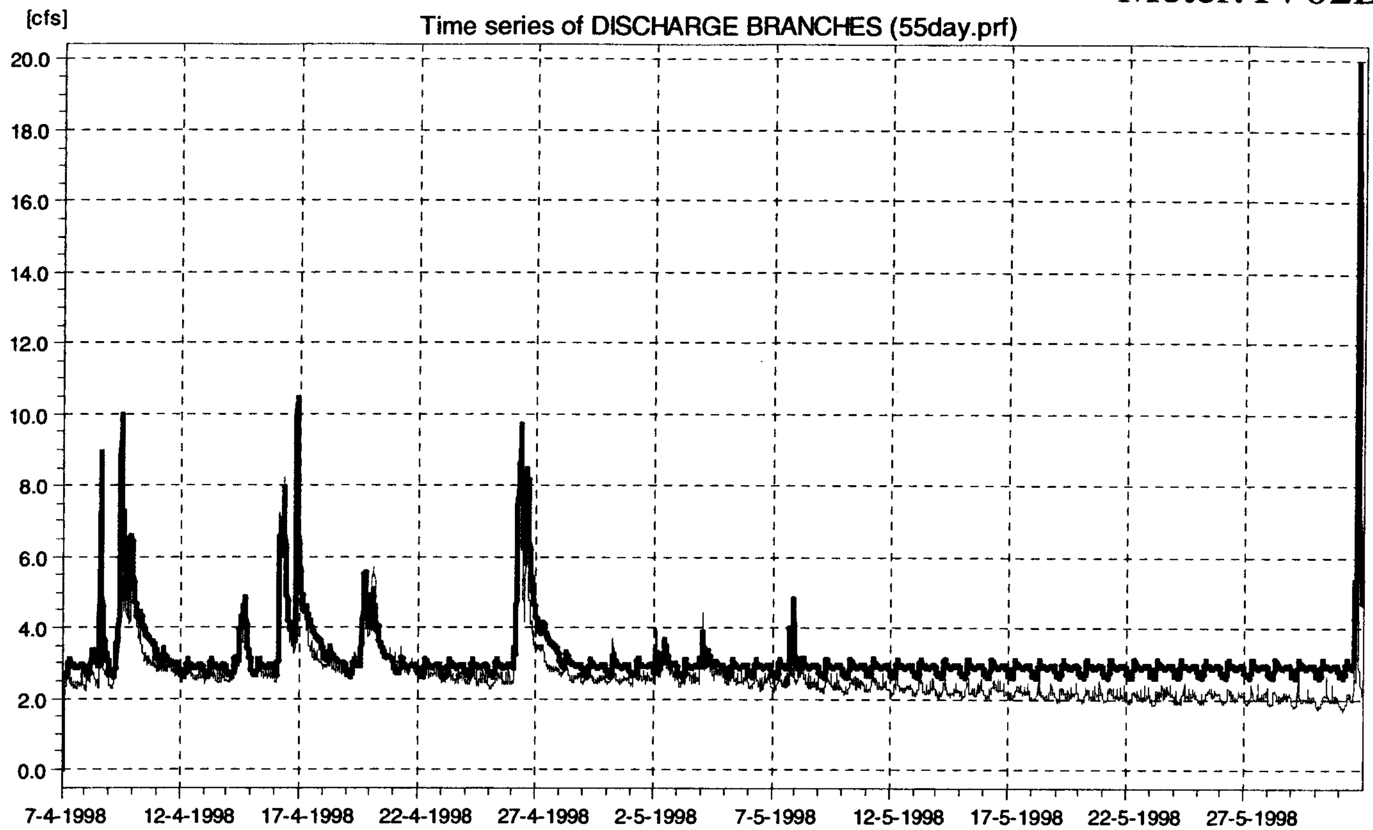
M&E Metcalf & Eddy AQUA ALLIANCE

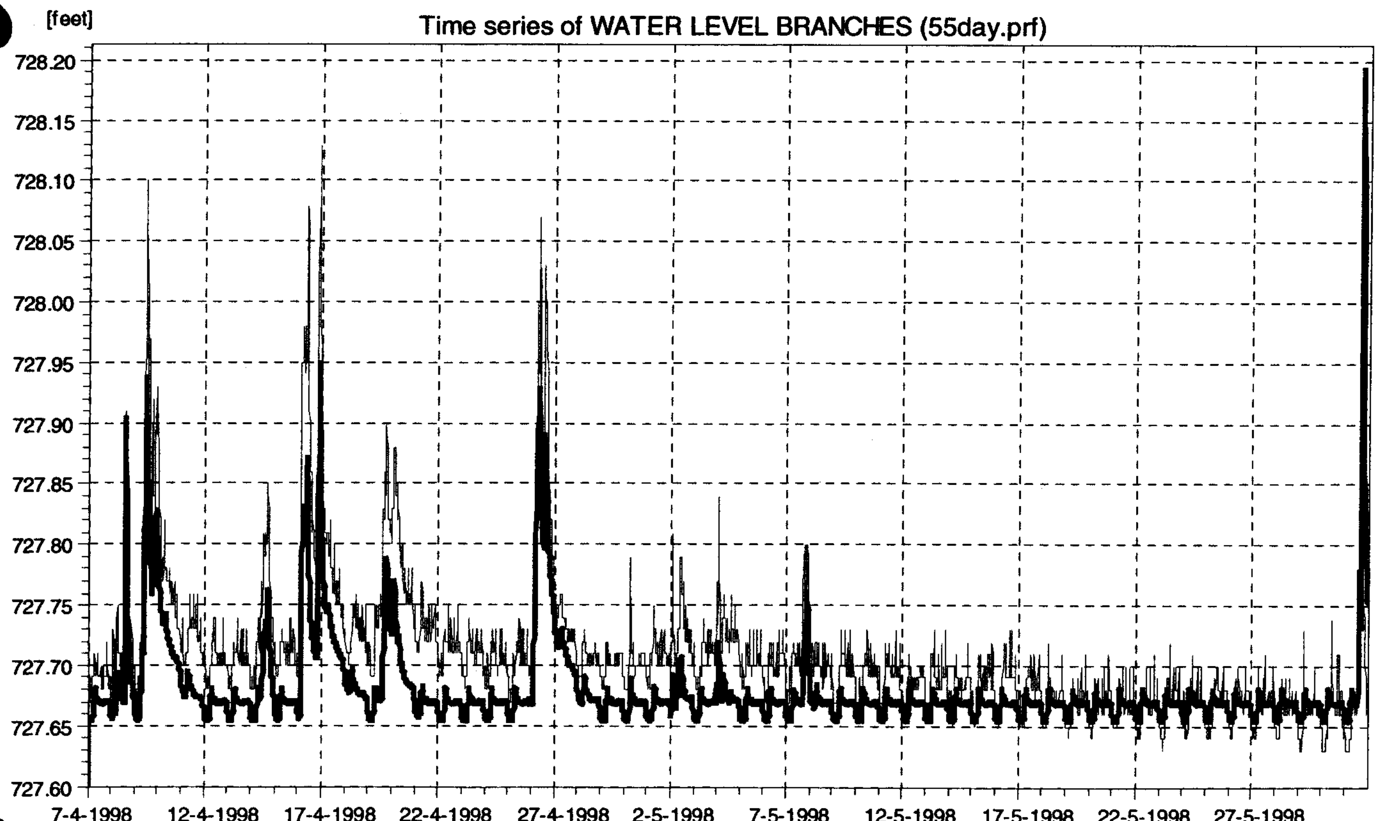
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: IV02D





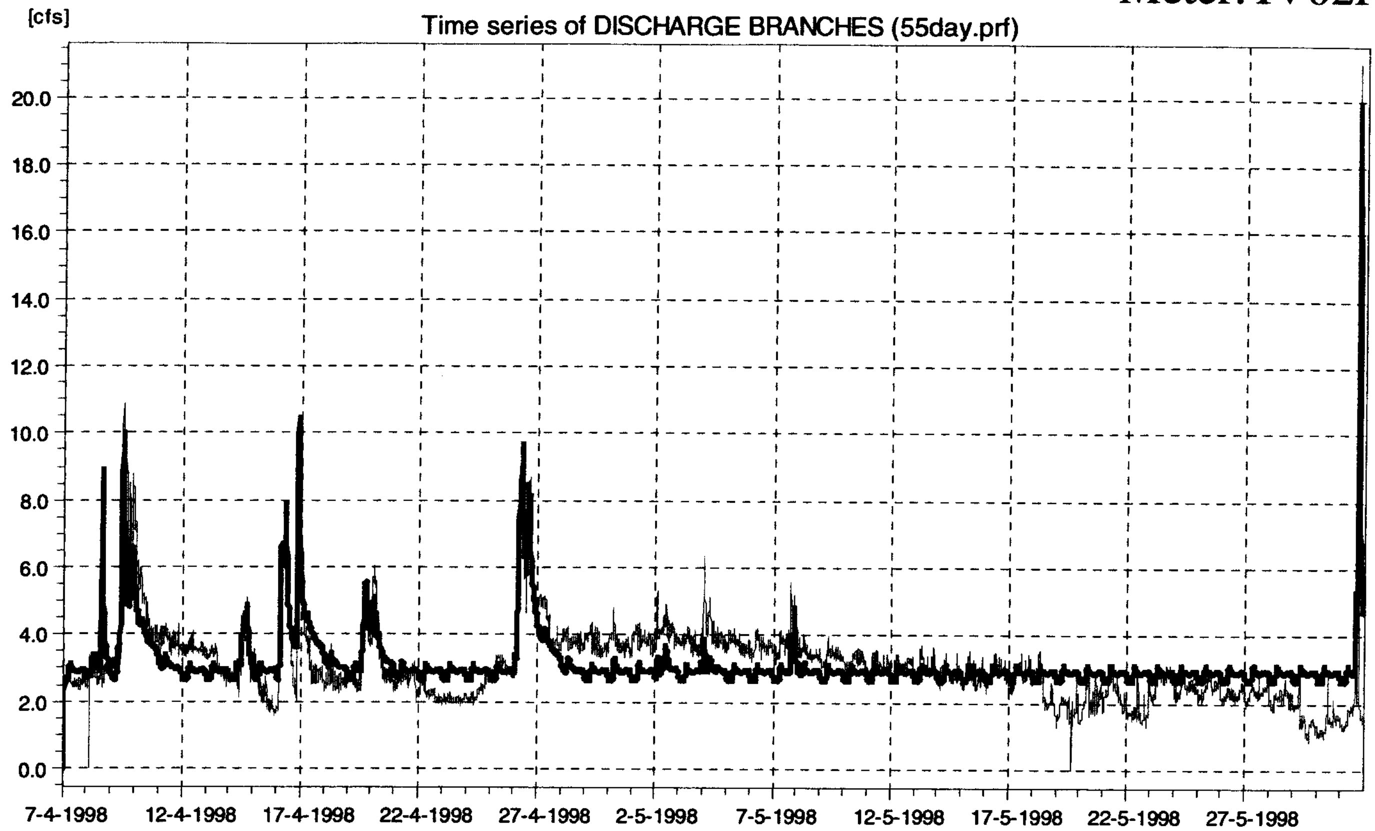
M&E Metcalf & Eddy AQUA ALLIANCE

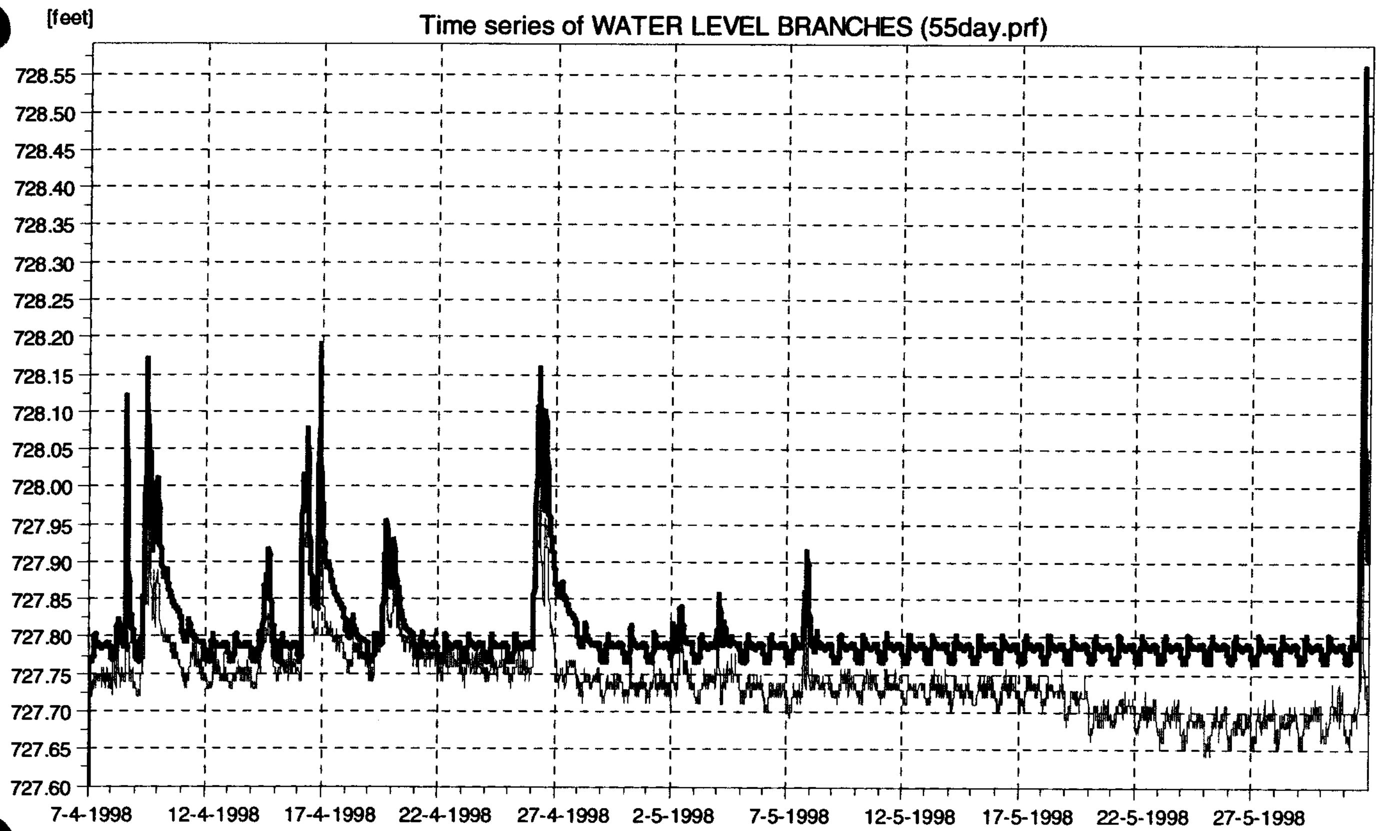
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: IV02I





M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

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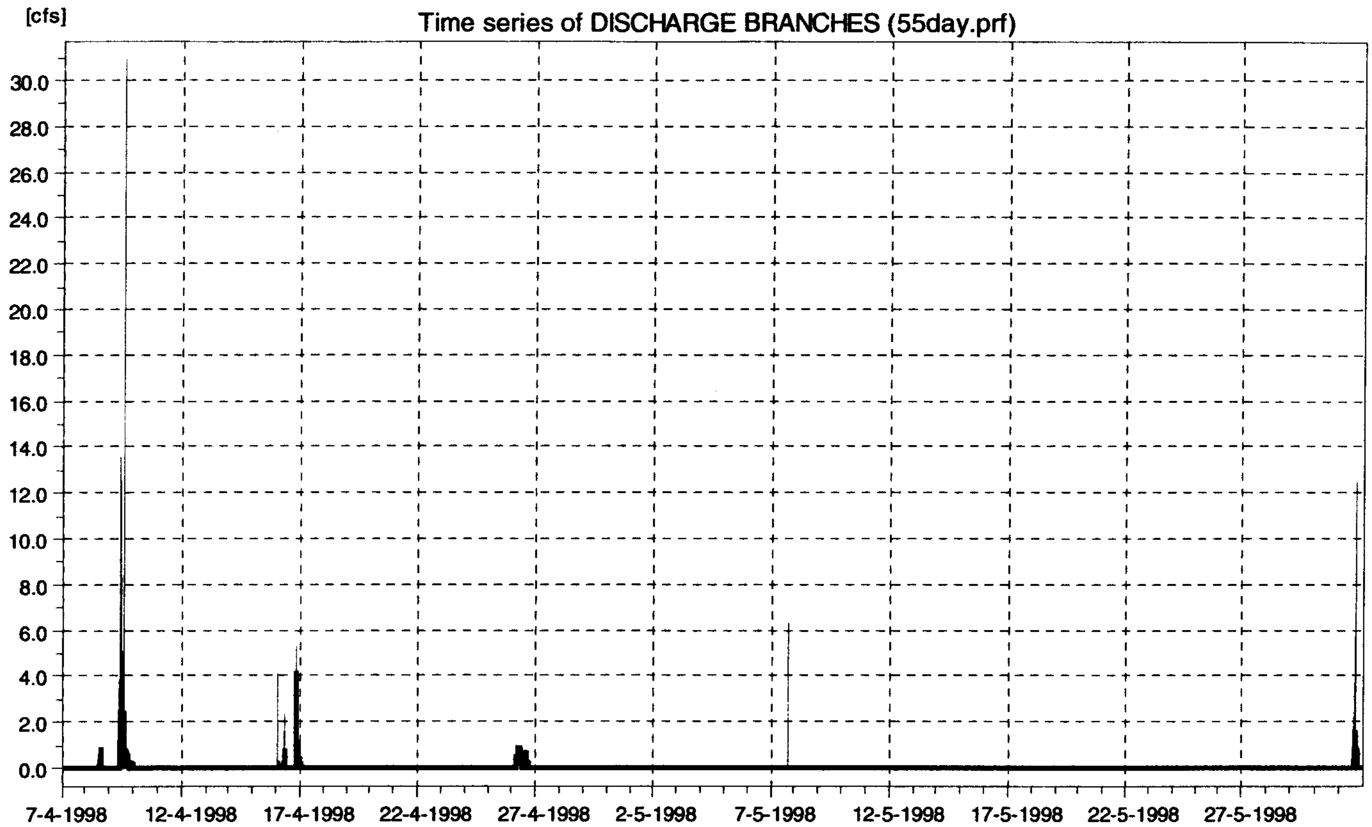
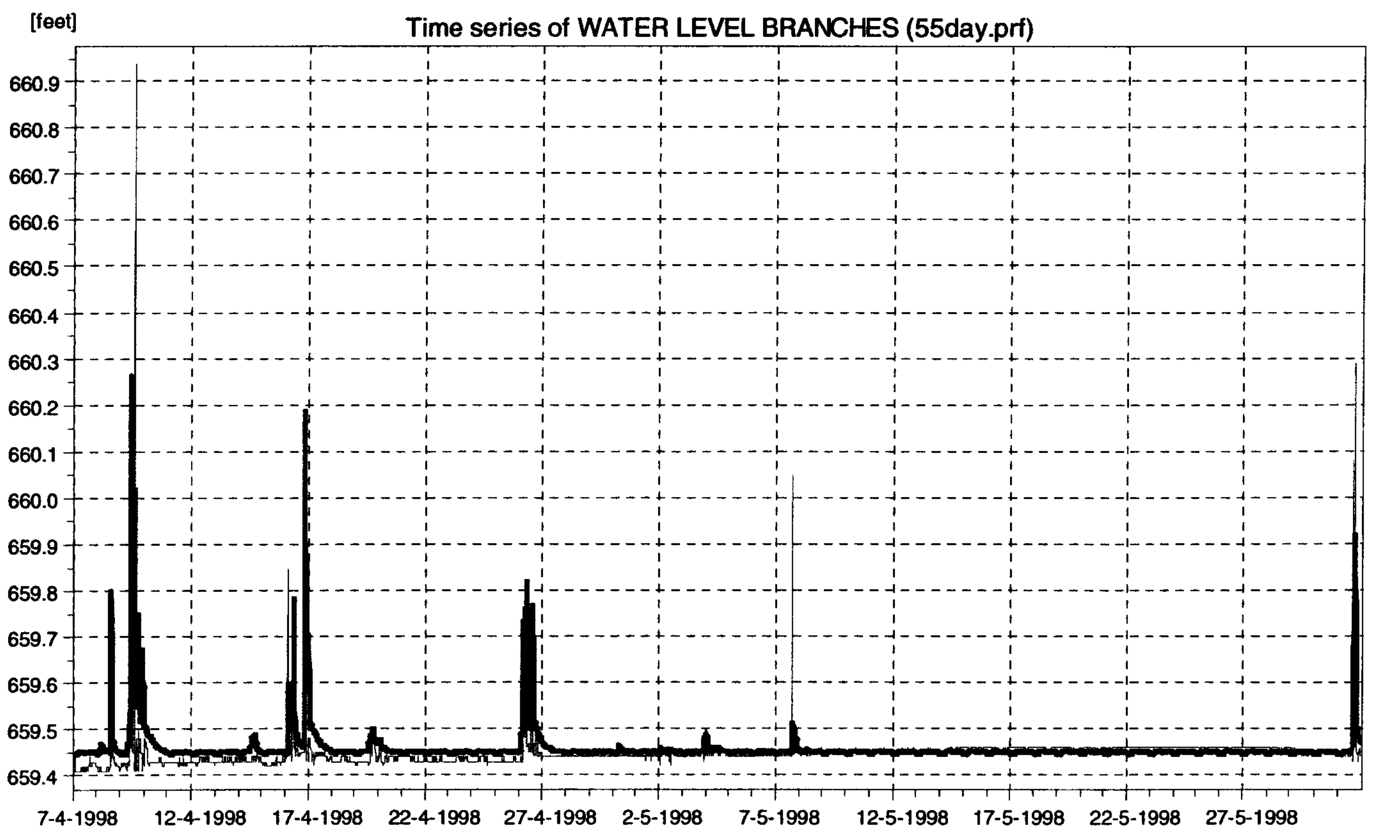




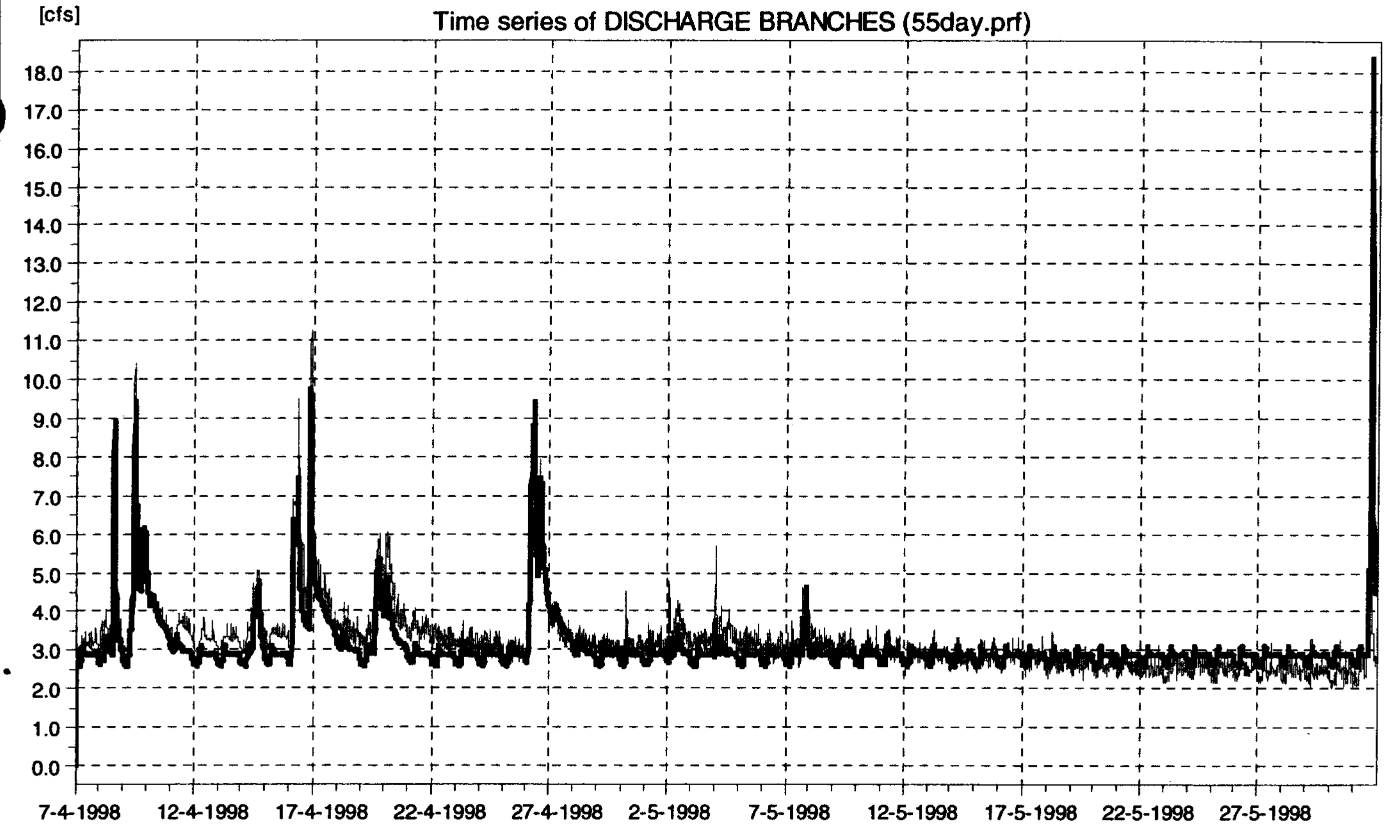
M&E Metcalf & Eddy AQUA ALLIANCE

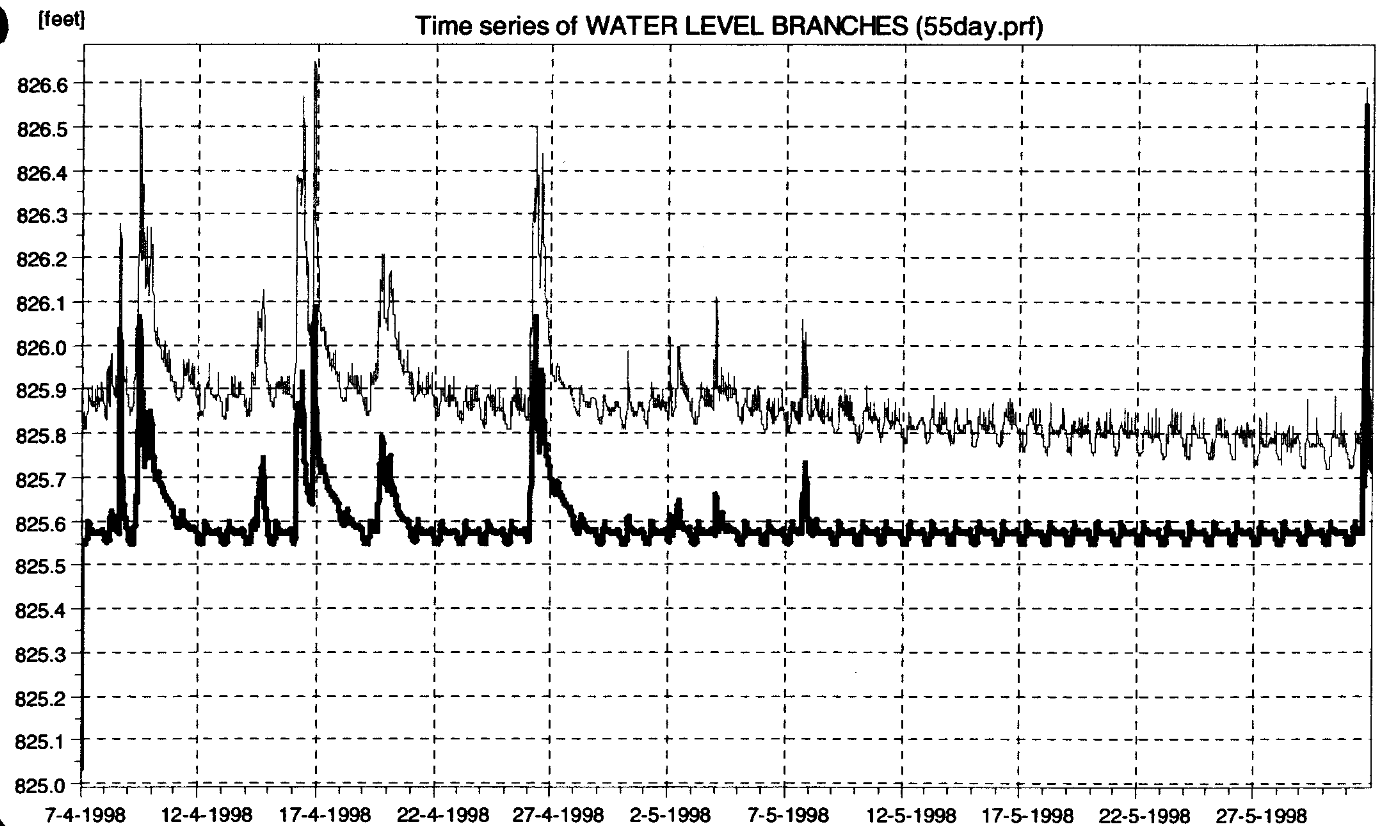
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: IV04D





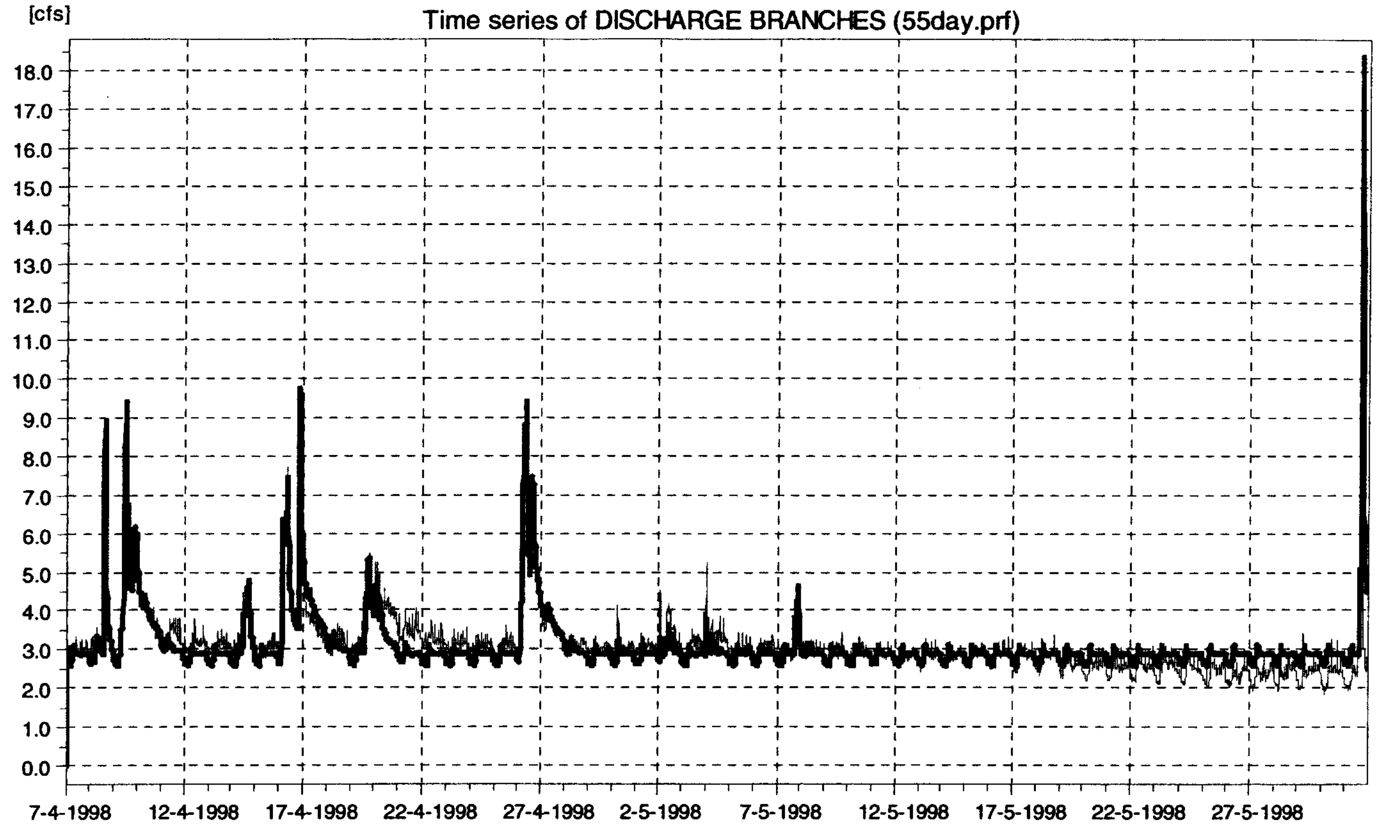
M&E Metcalf & Eddy AQUA ALLIANCE

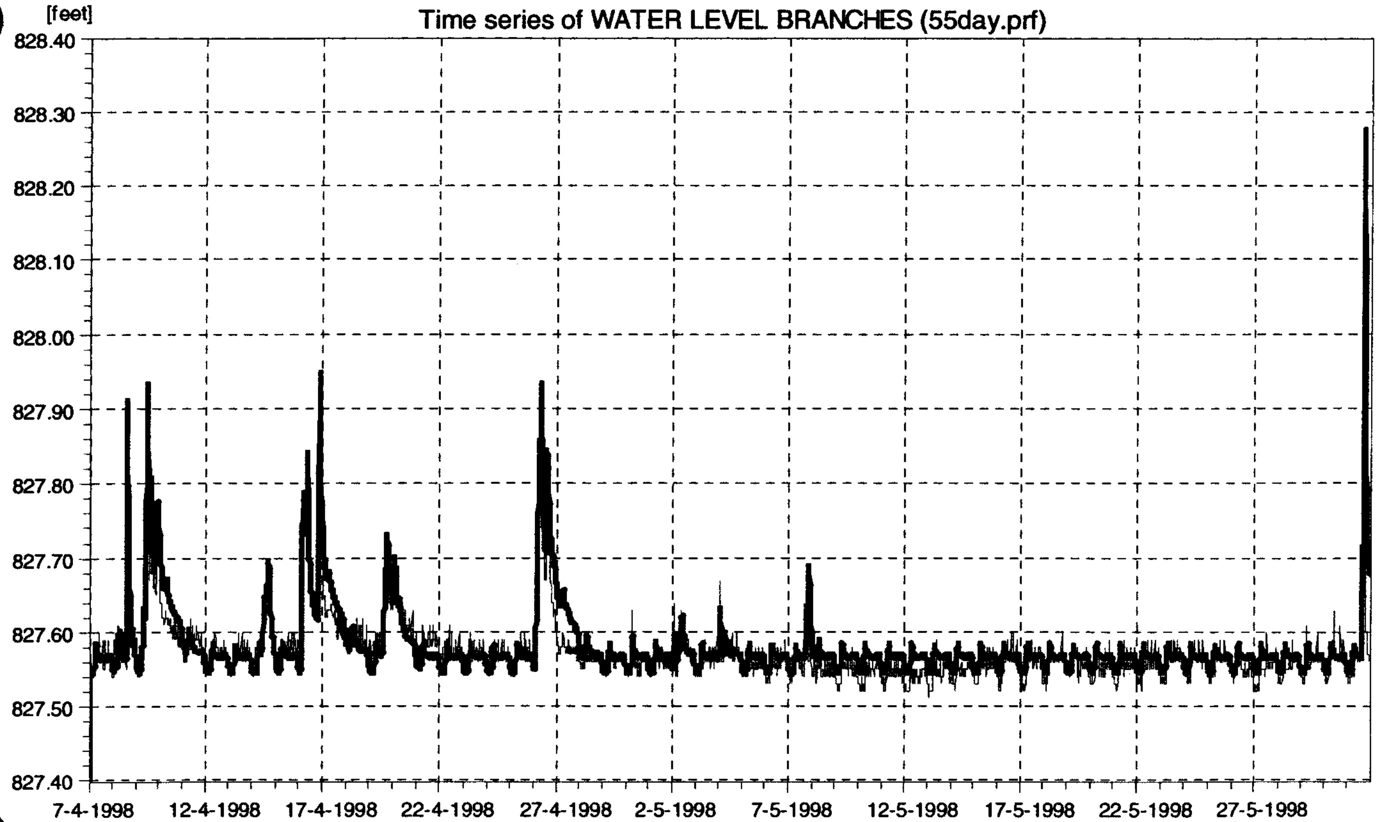
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: IV04I





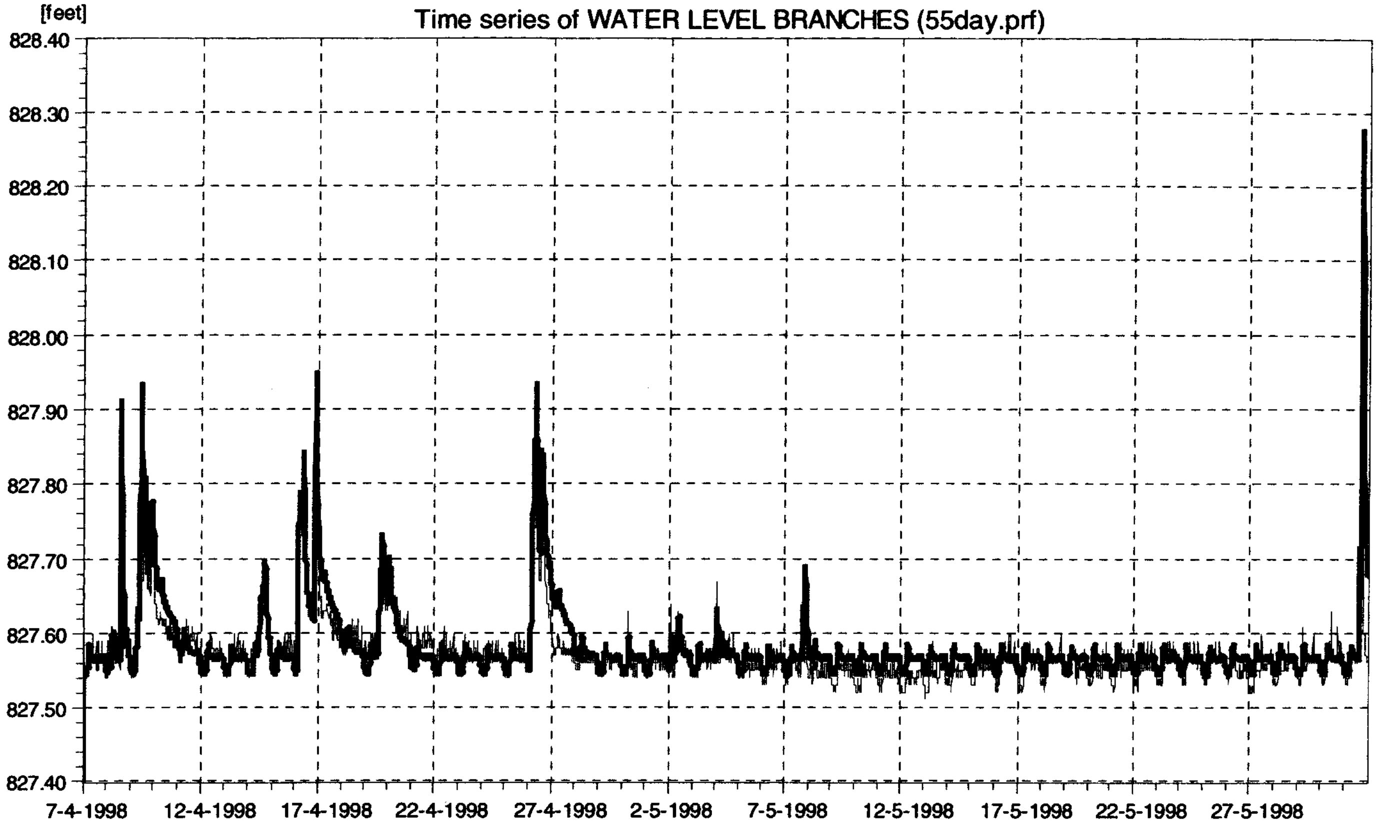
M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: IV06



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Time series of WATER LEVEL BRANCHES (55day.prf)
828.40
828.30
828.20
828.10
828.00
827.90
827.80
827.70
827.60
827.50
827.40
7-4-1998
12-4-1998
17-4-1998
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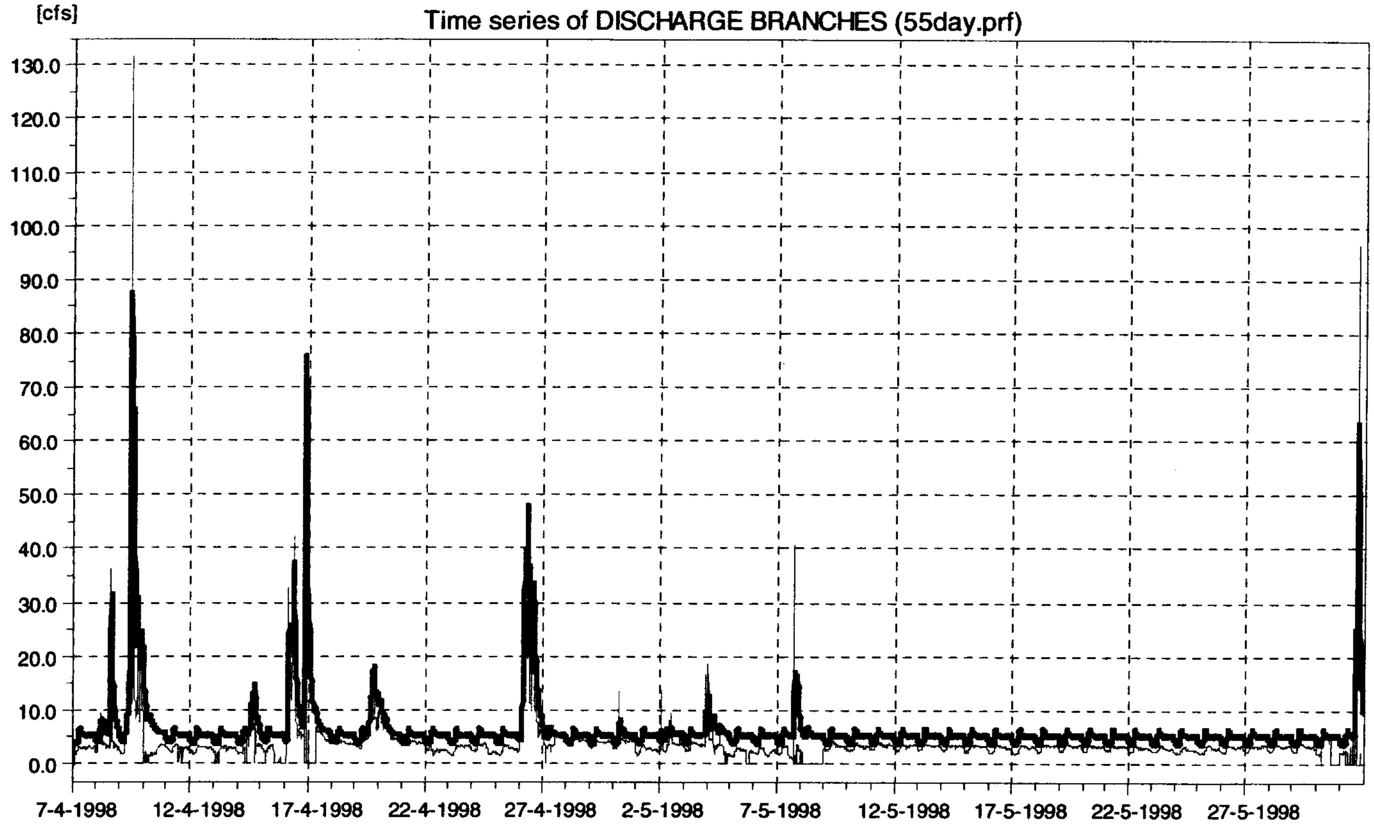
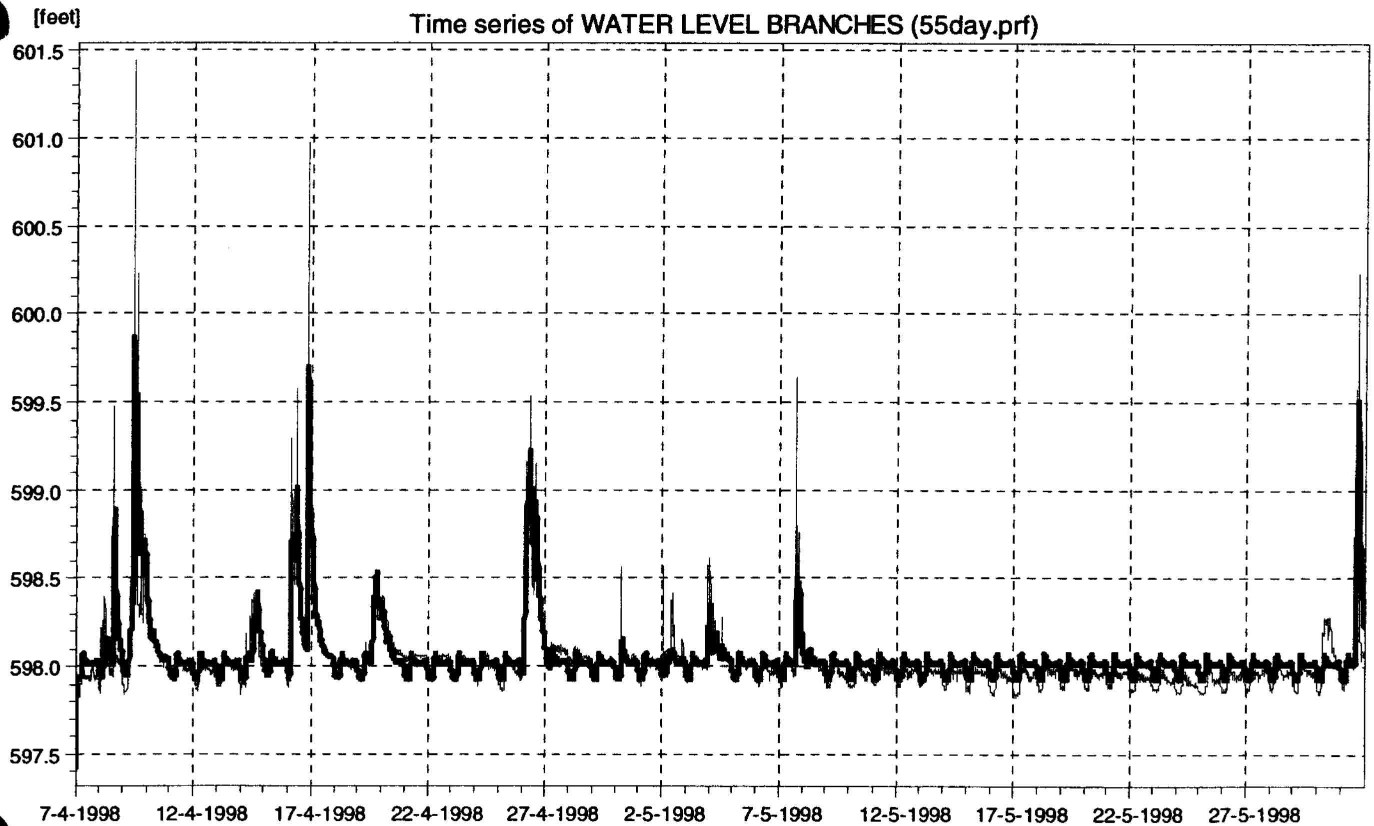
Meter: IV08





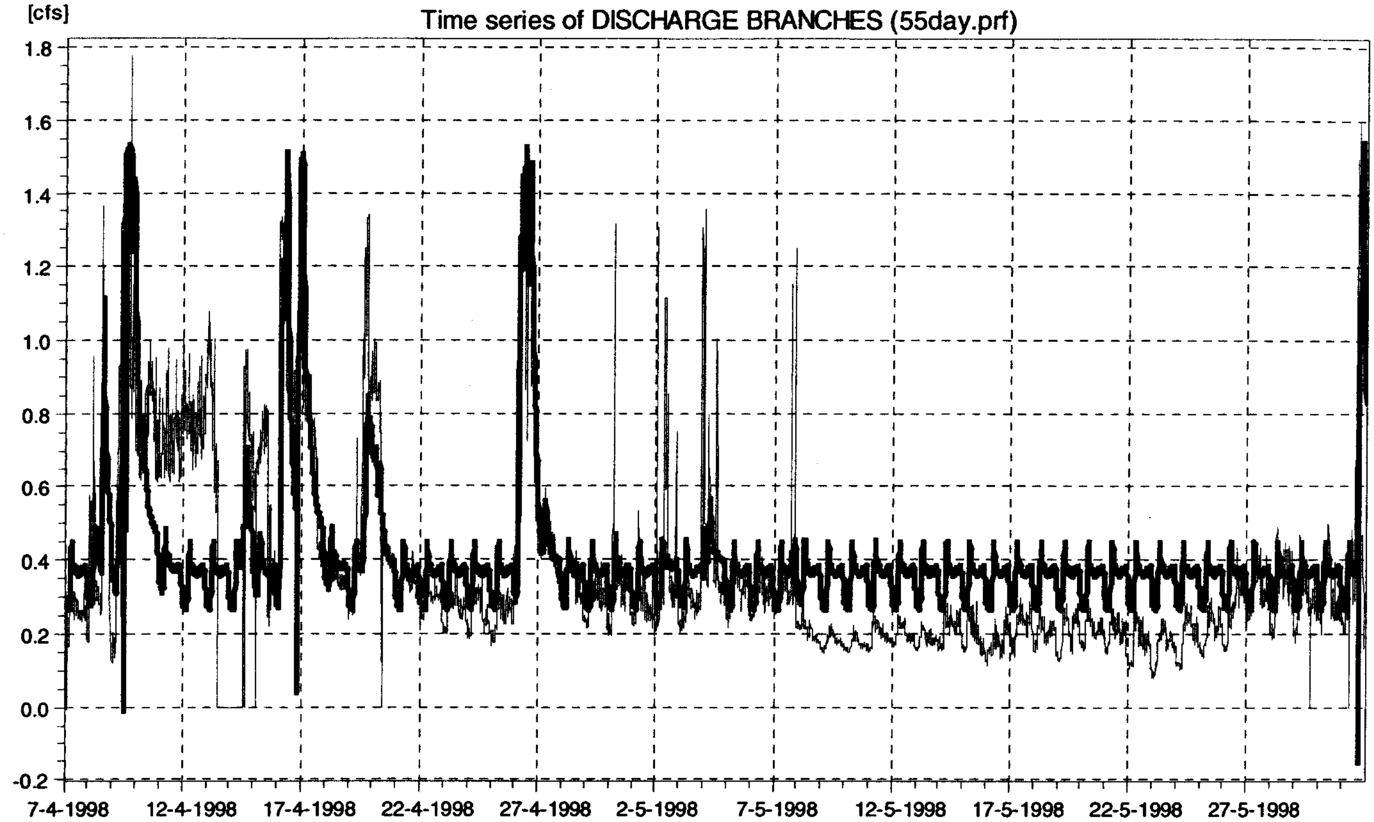
Metcalf & Eddy

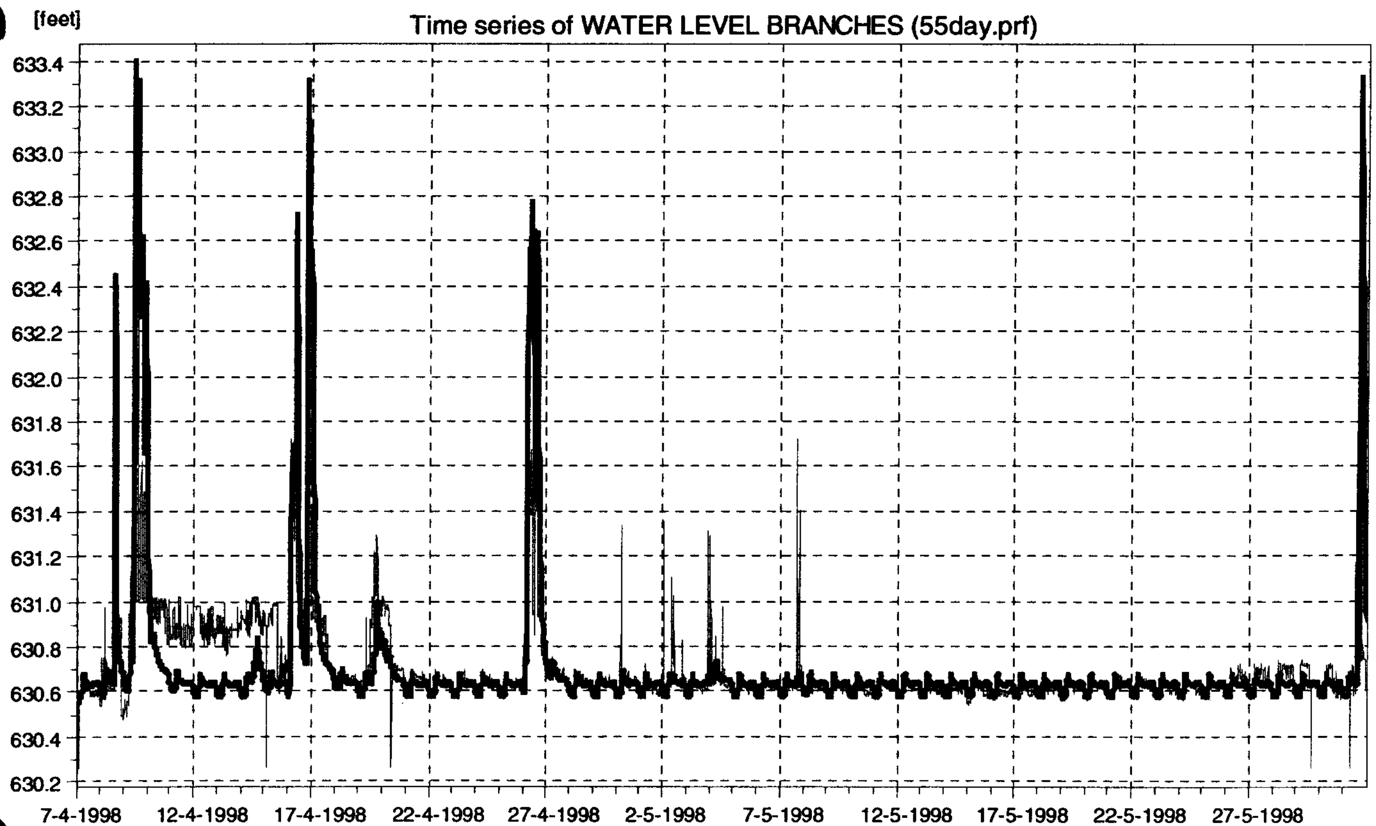
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: IV10





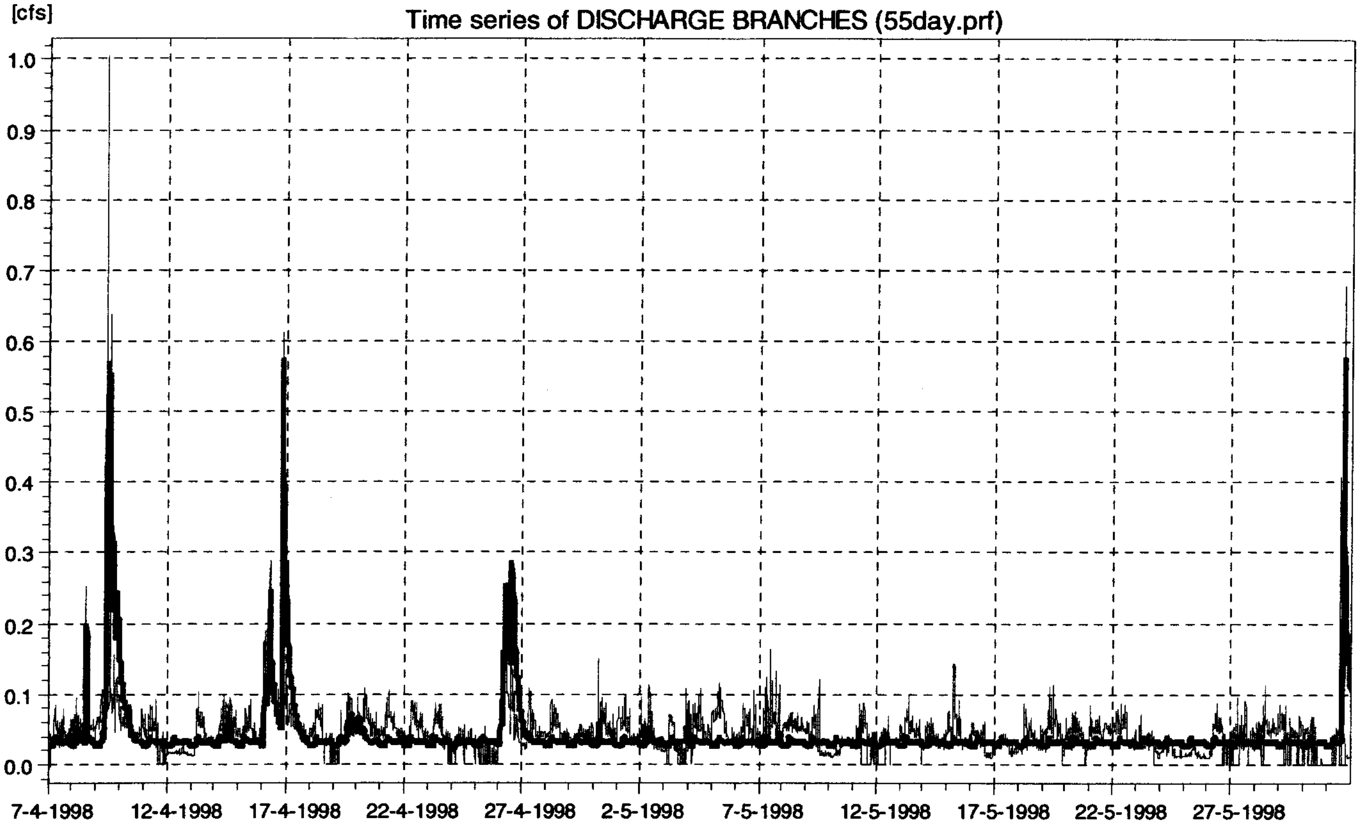
M&E Metcalf & Eddy AQUA ALLIANCE

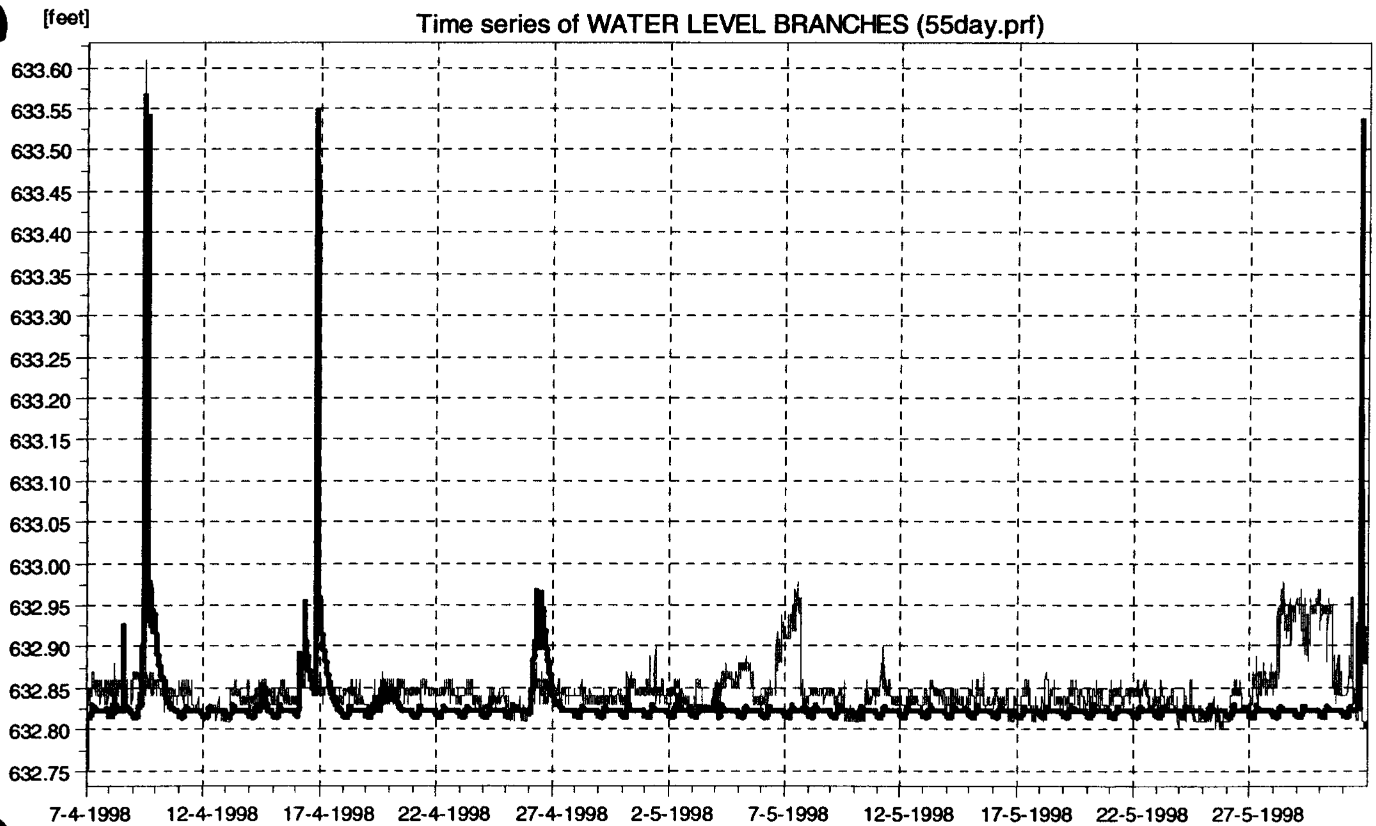
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: IV12





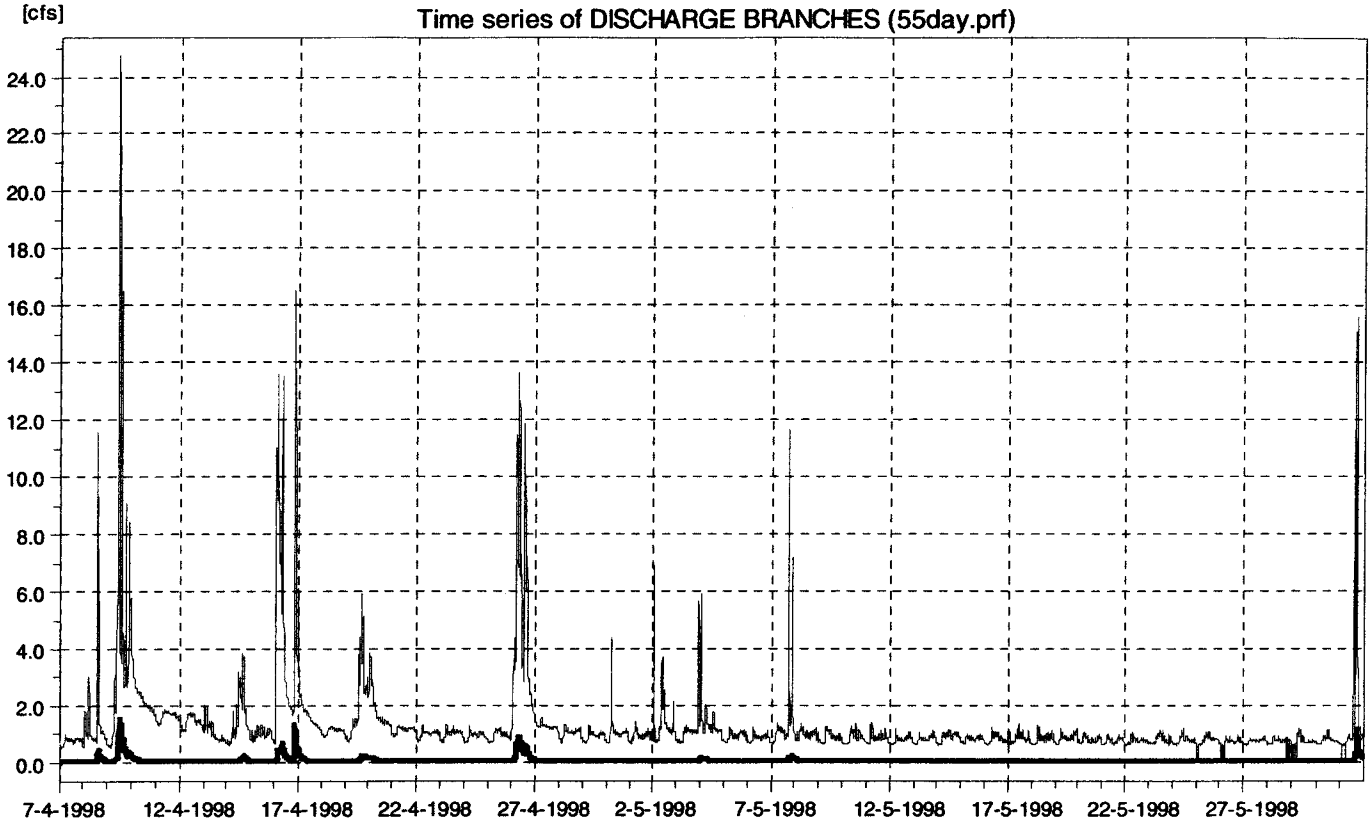
M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: IV14


[cfs]
Time series of DISCHARGE BRANCHES (55day.prf)
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
7-4-1998
12-4-1998
17-4-1998
22-4-1998
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2-5-1998
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12-5-1998
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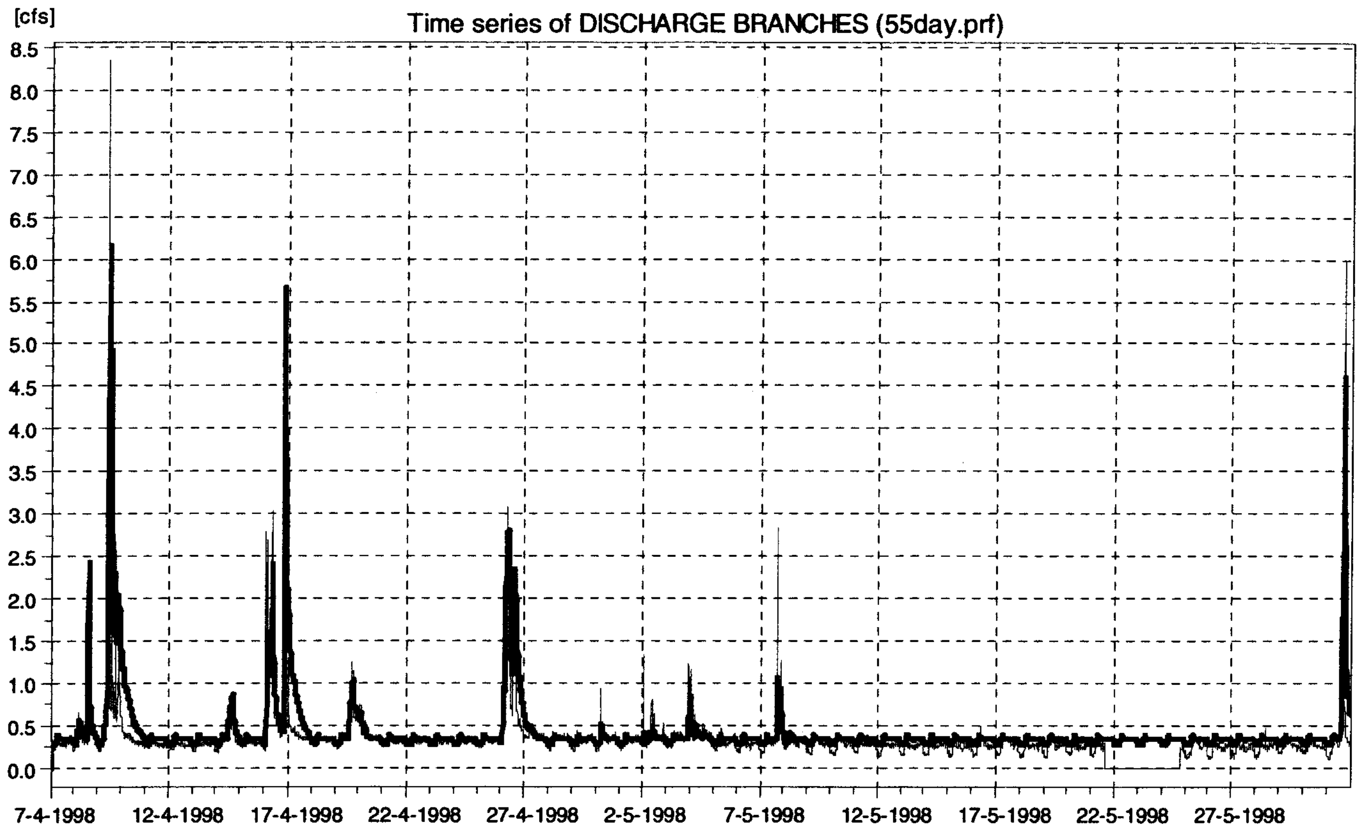
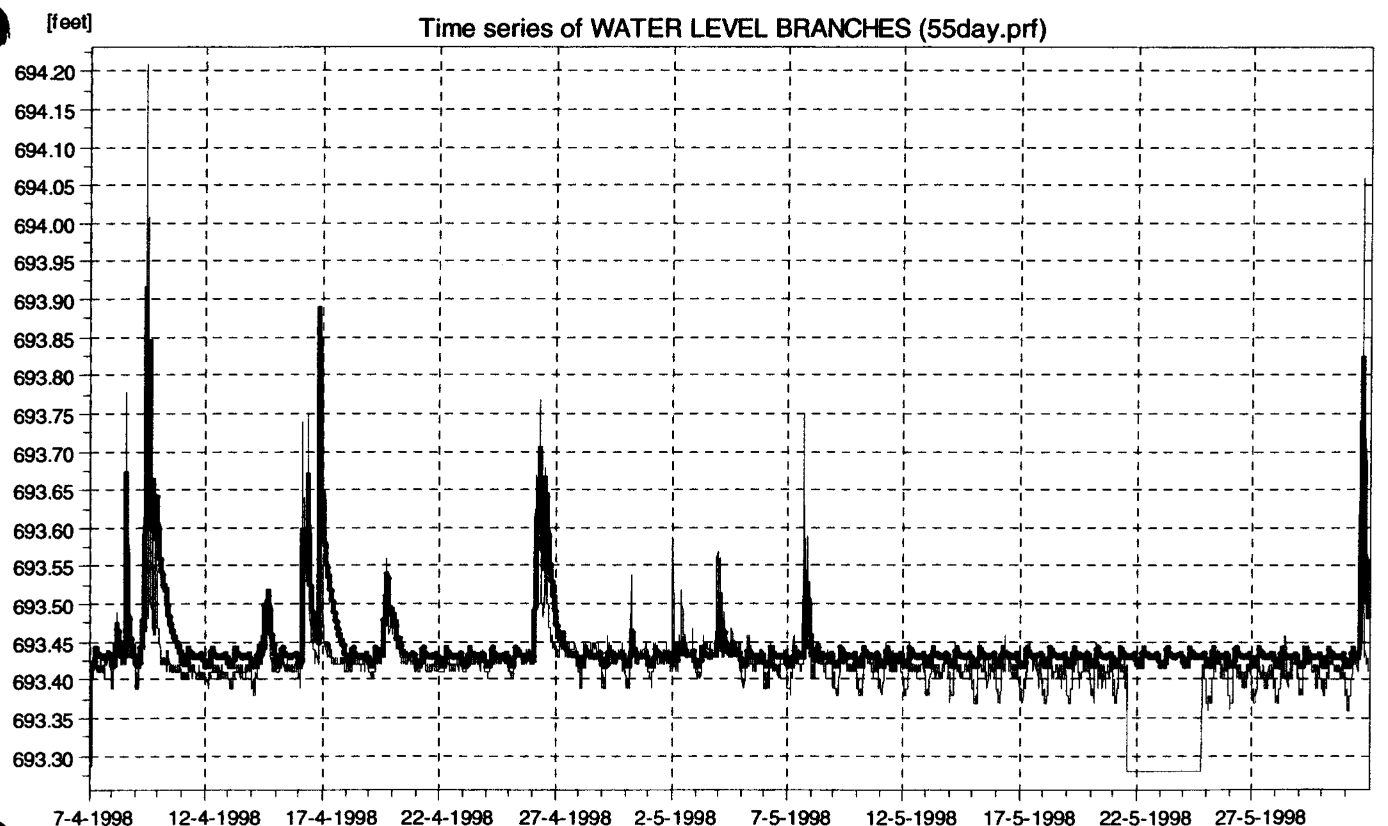
27-5-1998

Meter: IV16





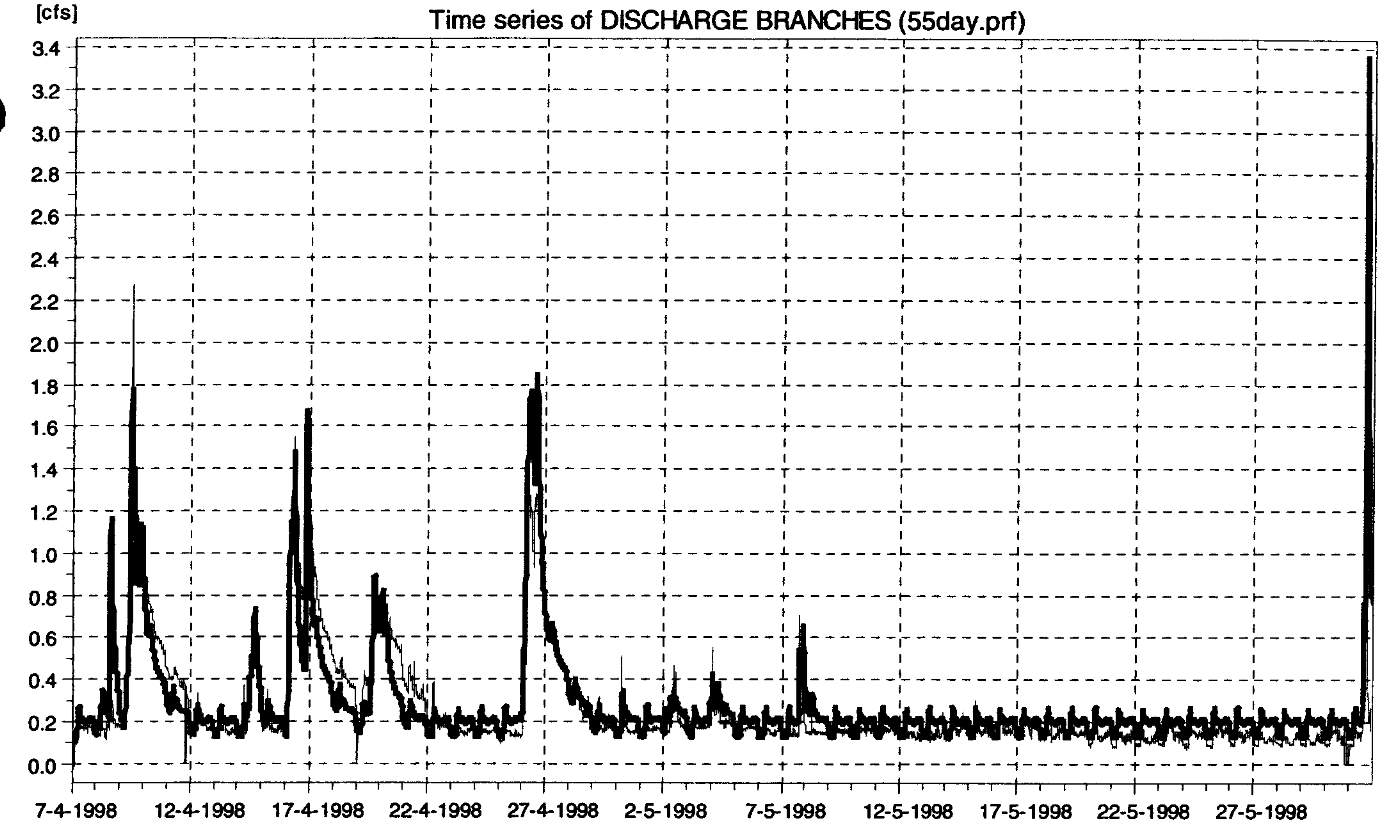
M&E Metcalf & Eddy AQUA ALLIANCE

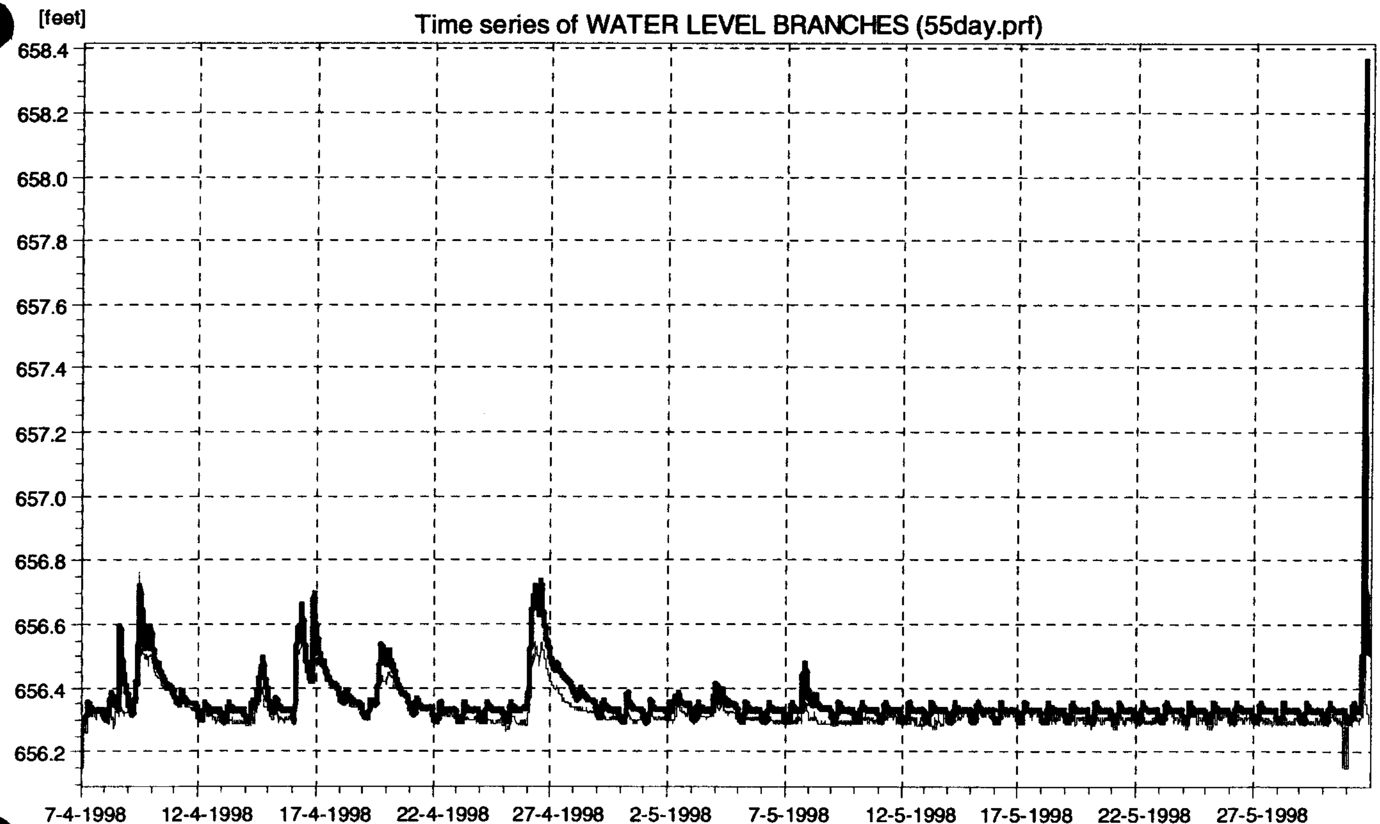
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: IV18





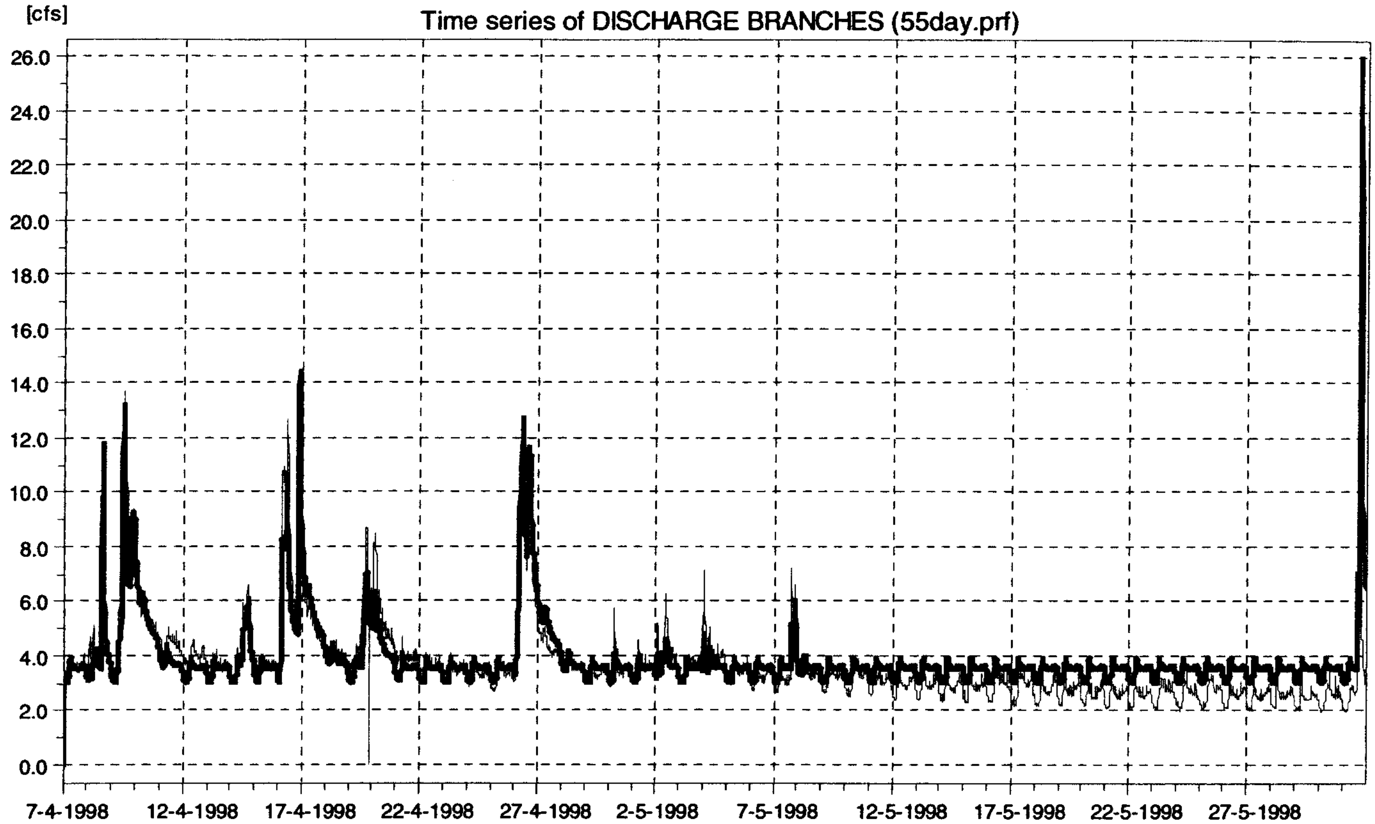
M&E AQUA ALLIANCE Metcalf & Eddy

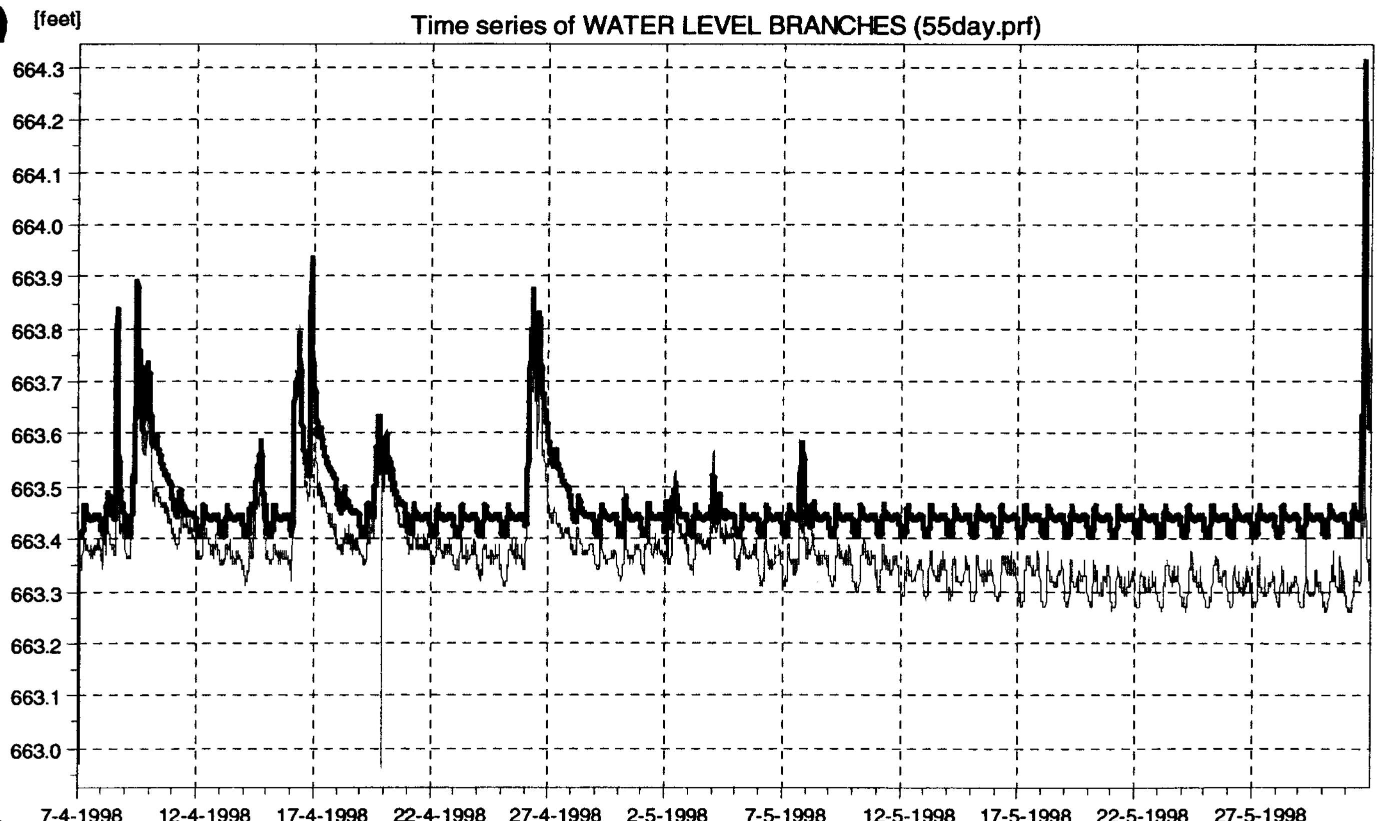
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: IV20





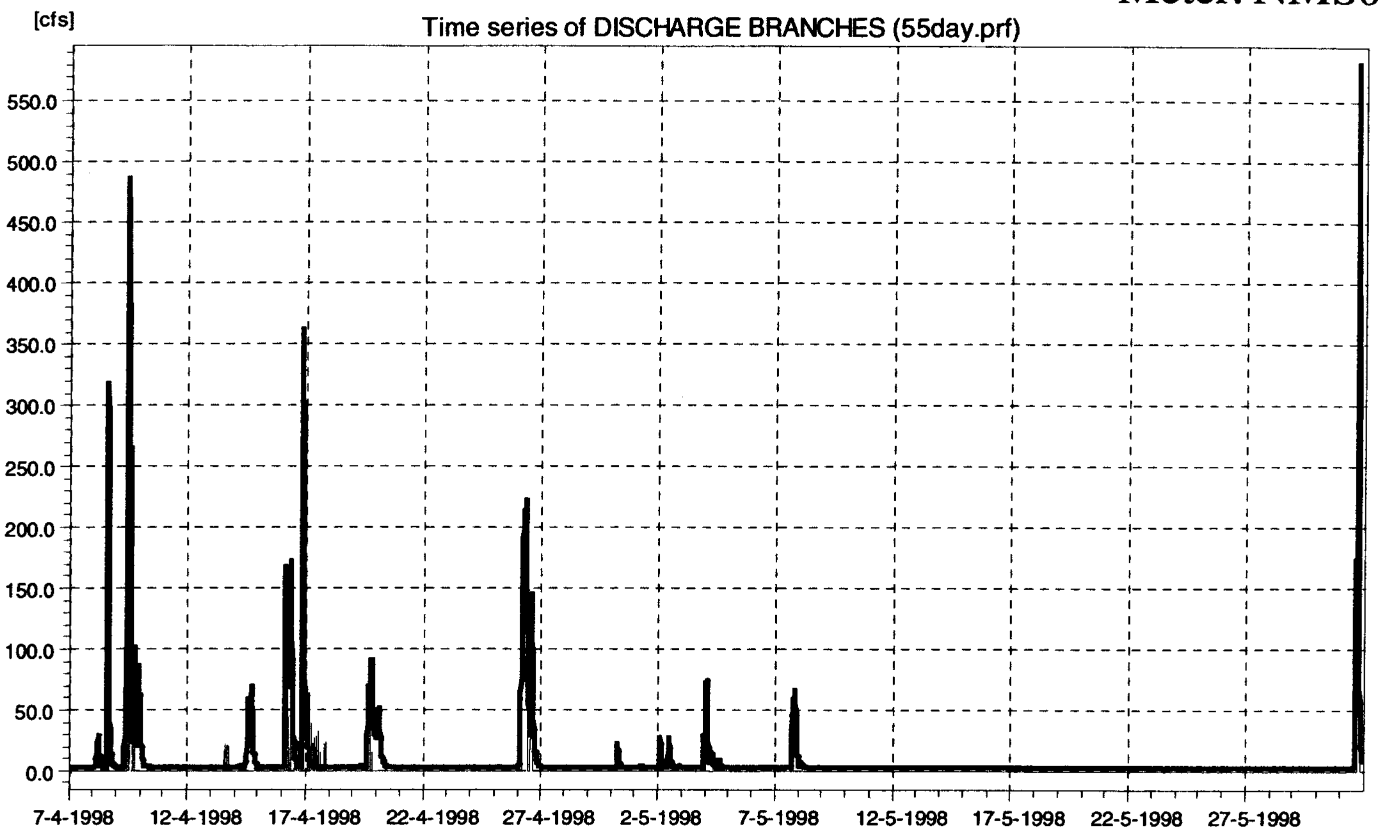
M&E Metcalf & Eddy AQUA ALLIANCE

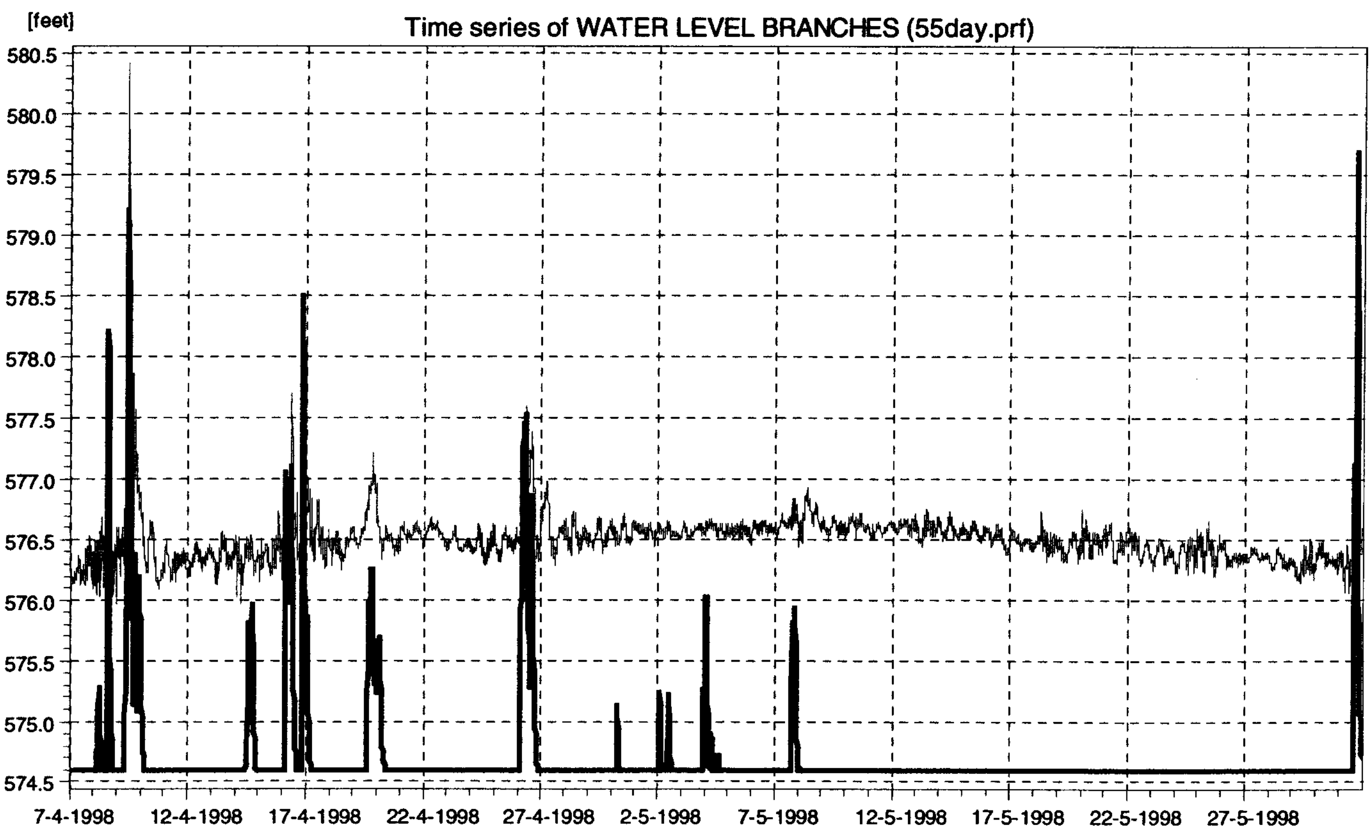
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: NMS01





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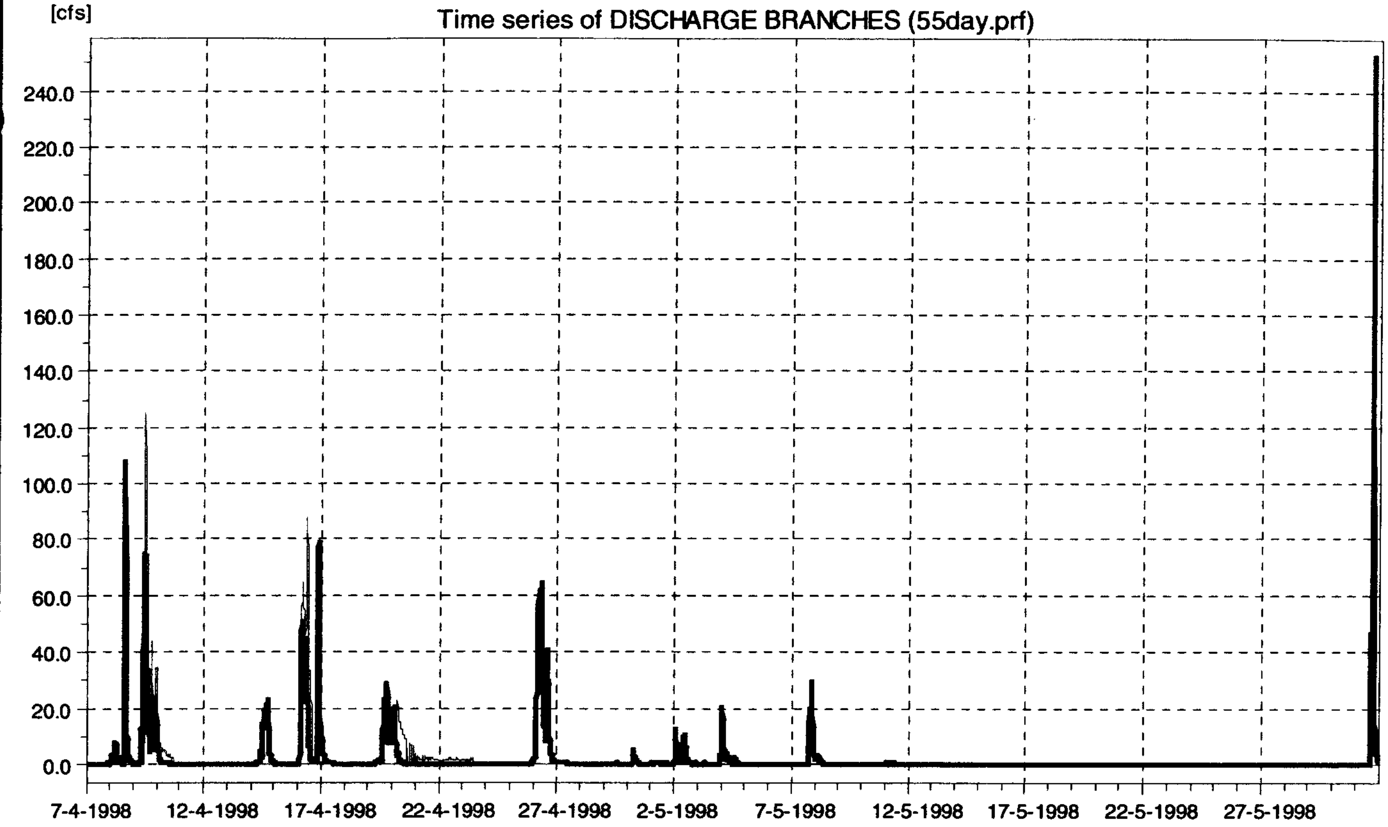
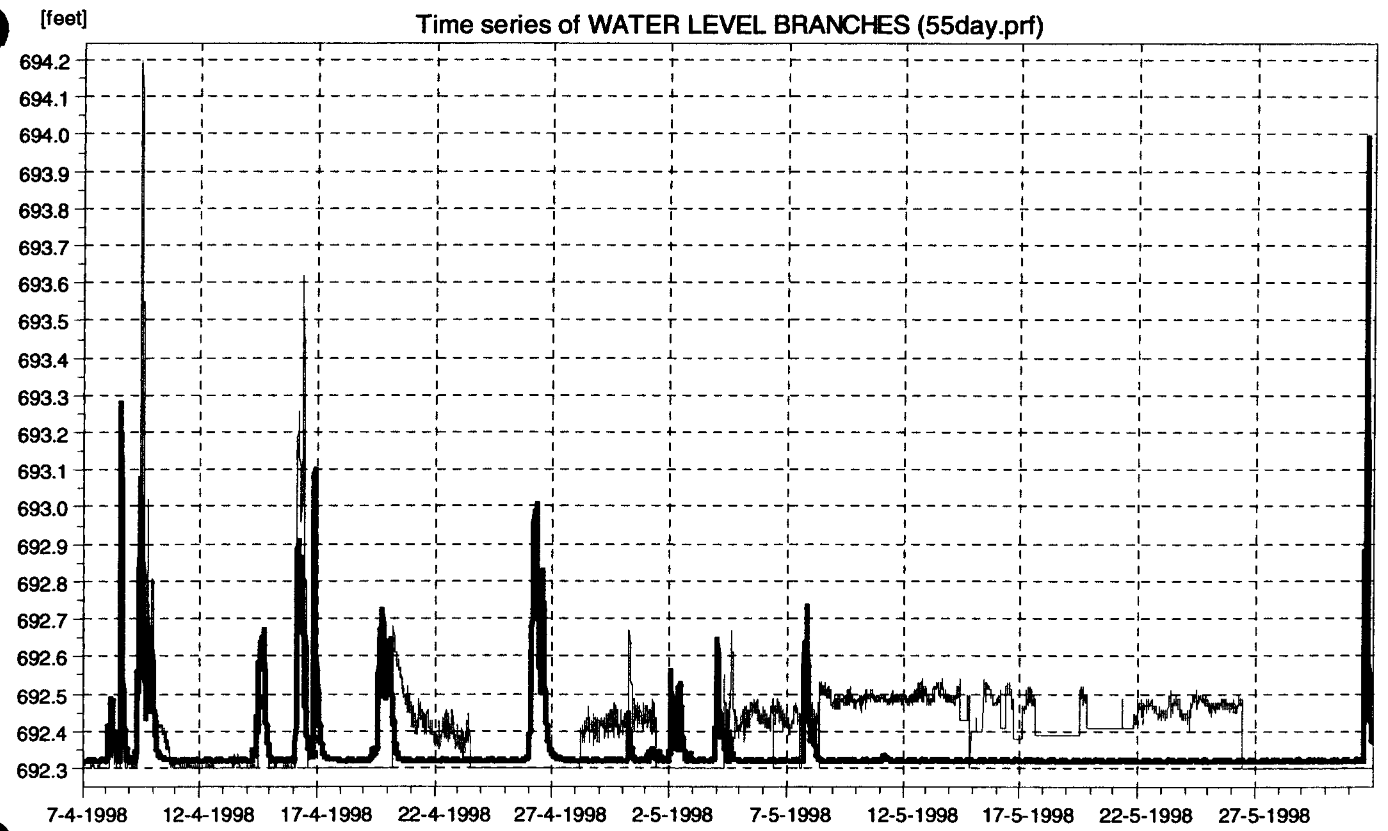
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: NMS02





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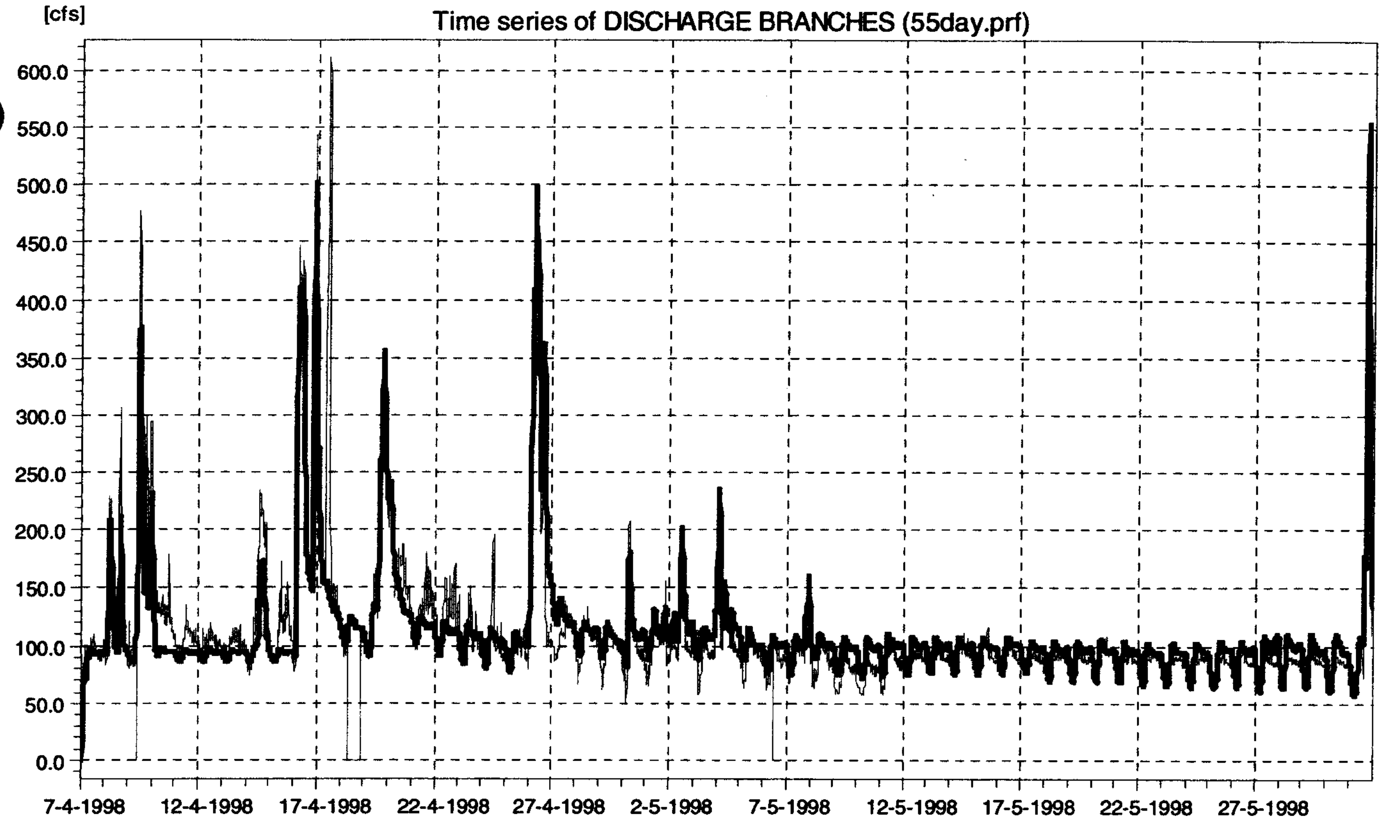
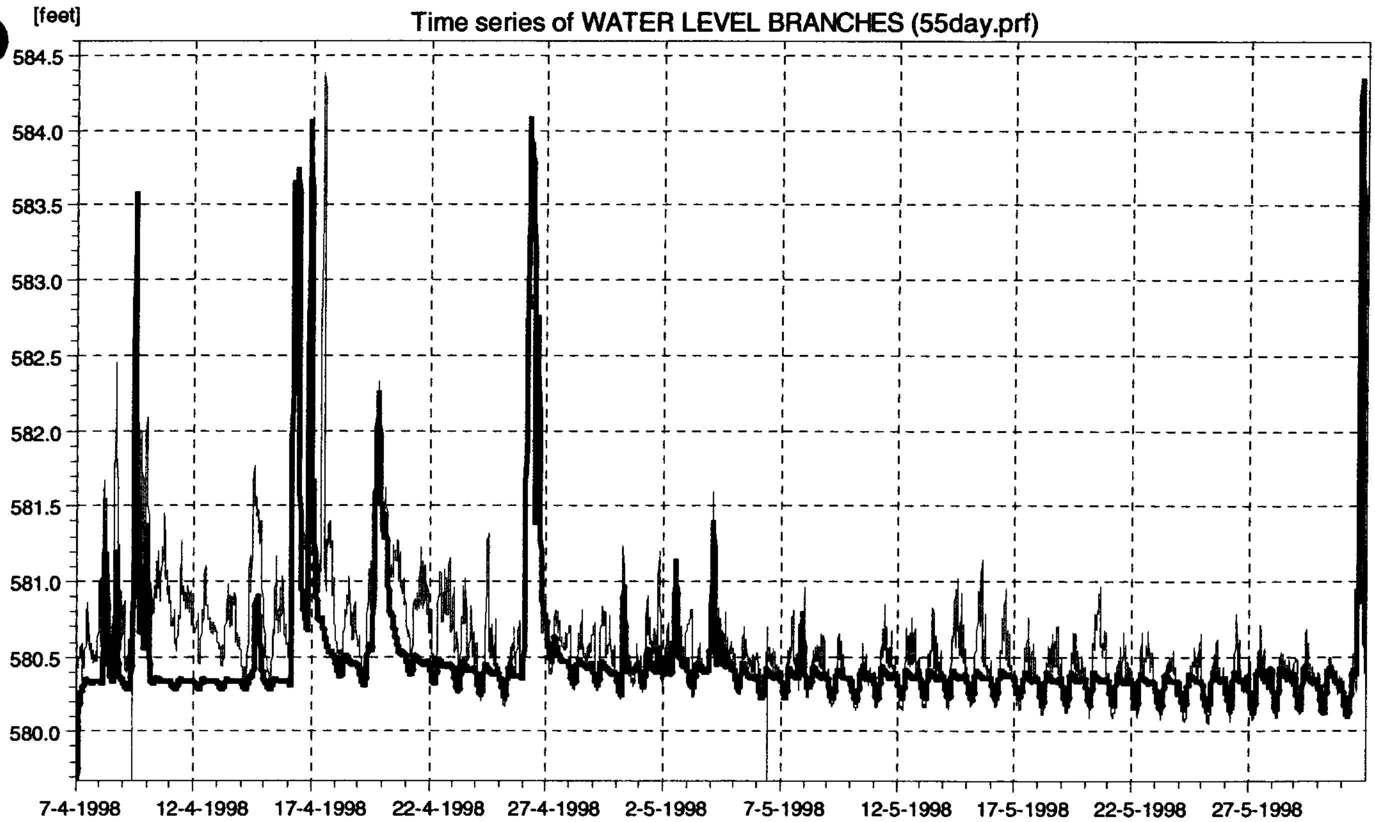
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA00





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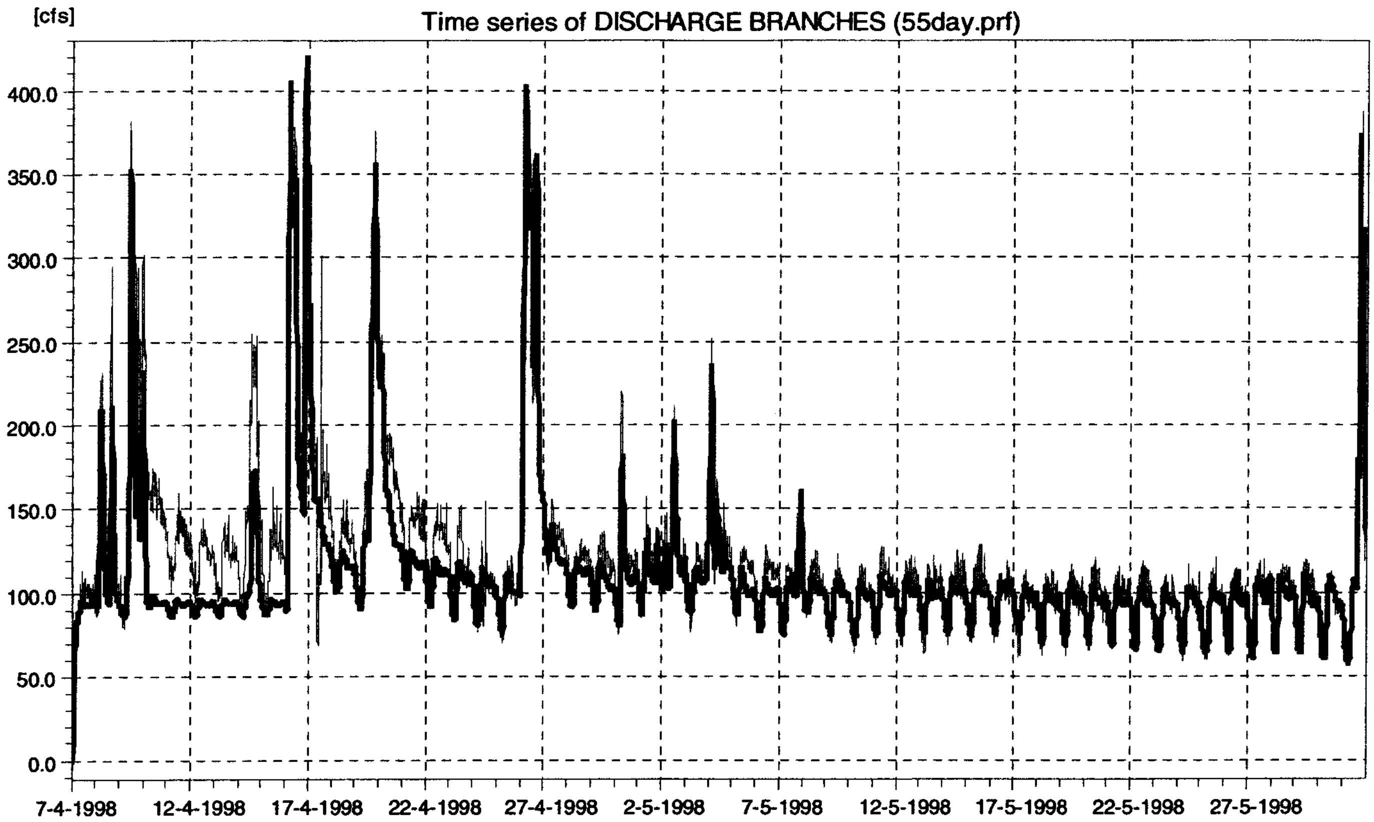
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

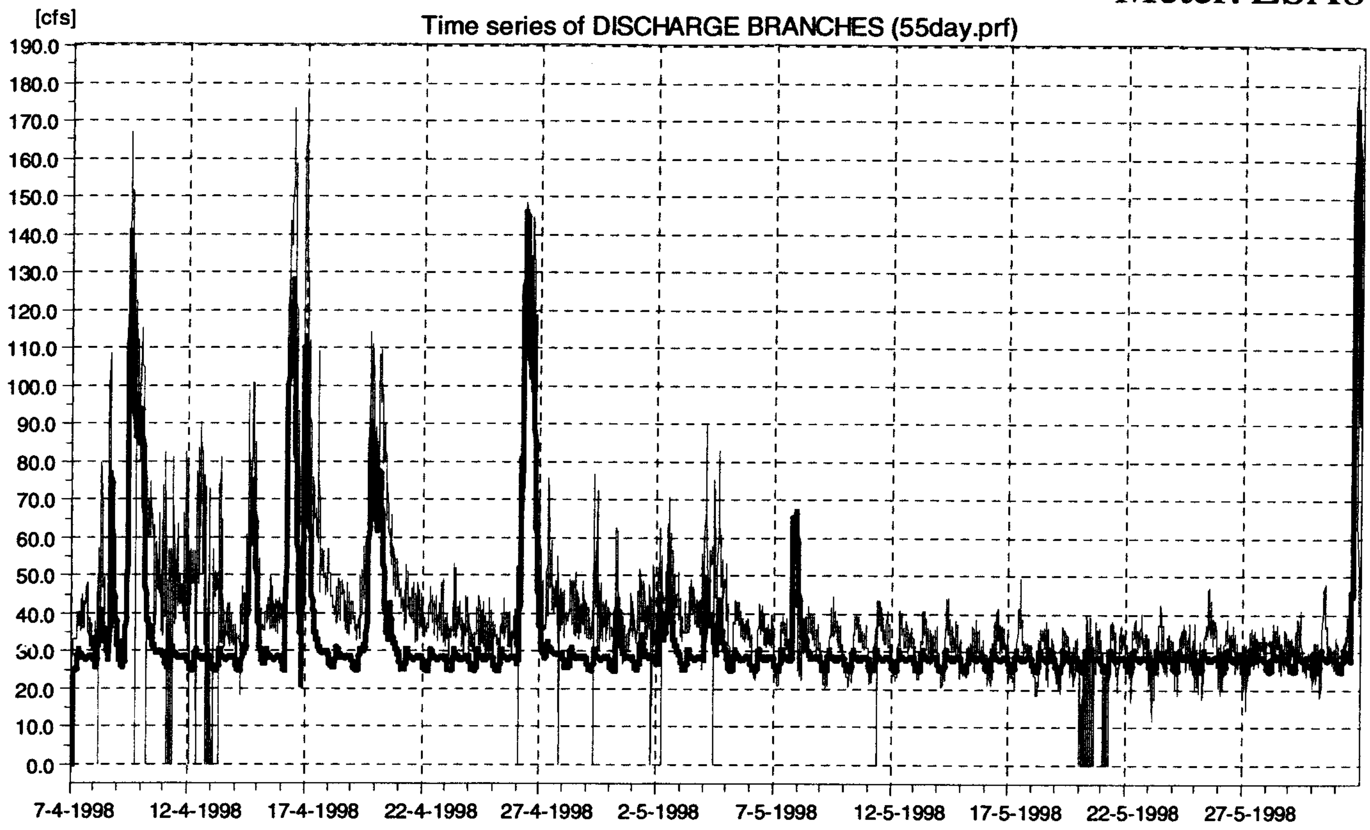
CH2MHILL

Meter:



TOTAL FLOWS FROM EASTERLY INTERCEPTOR=ESA2 +ESA4+ESA6

Meter: ESA8



Metcalf & Eddy

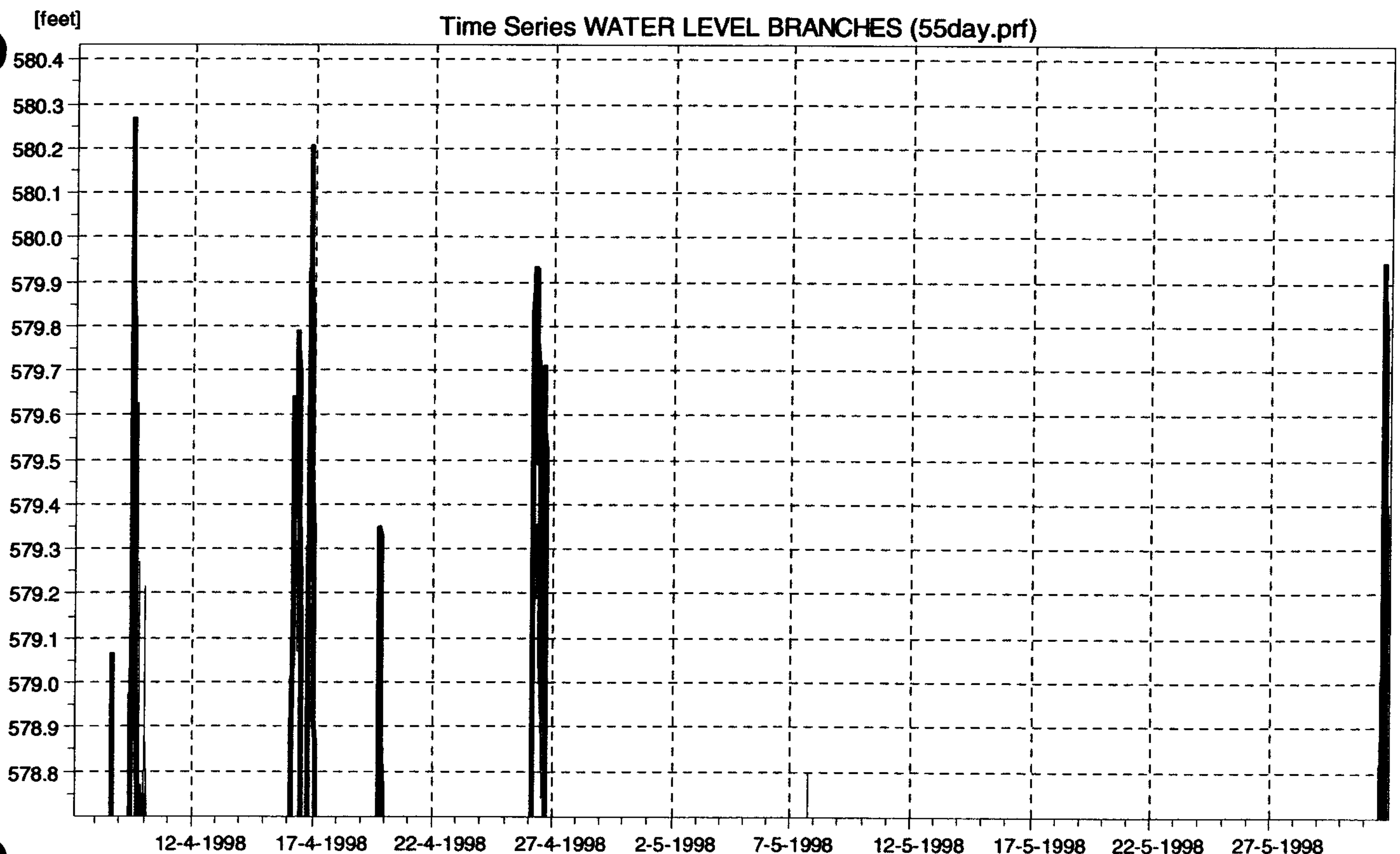
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

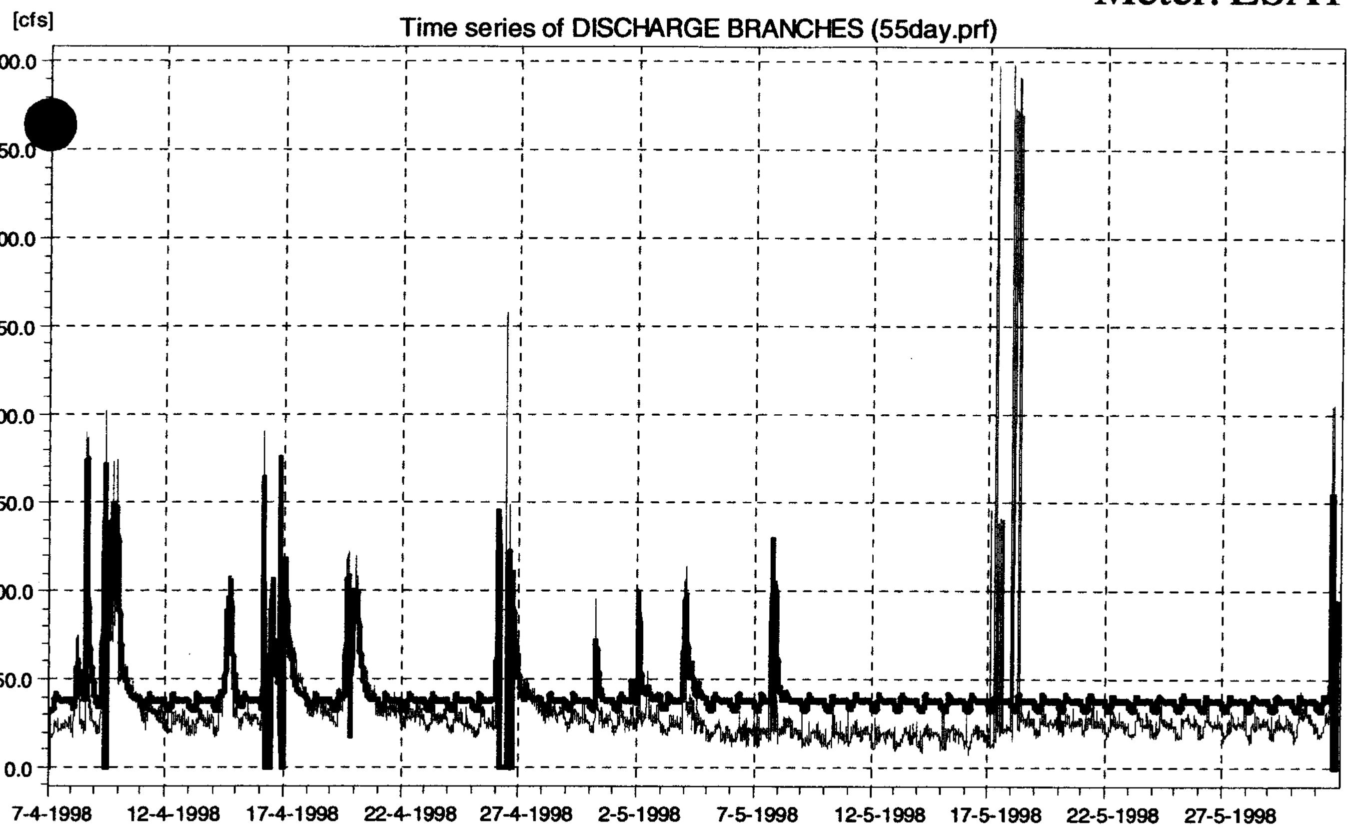
CH2MHILL

Meter: ESA10

Meter located on top of overflow weir



Meter: ESA11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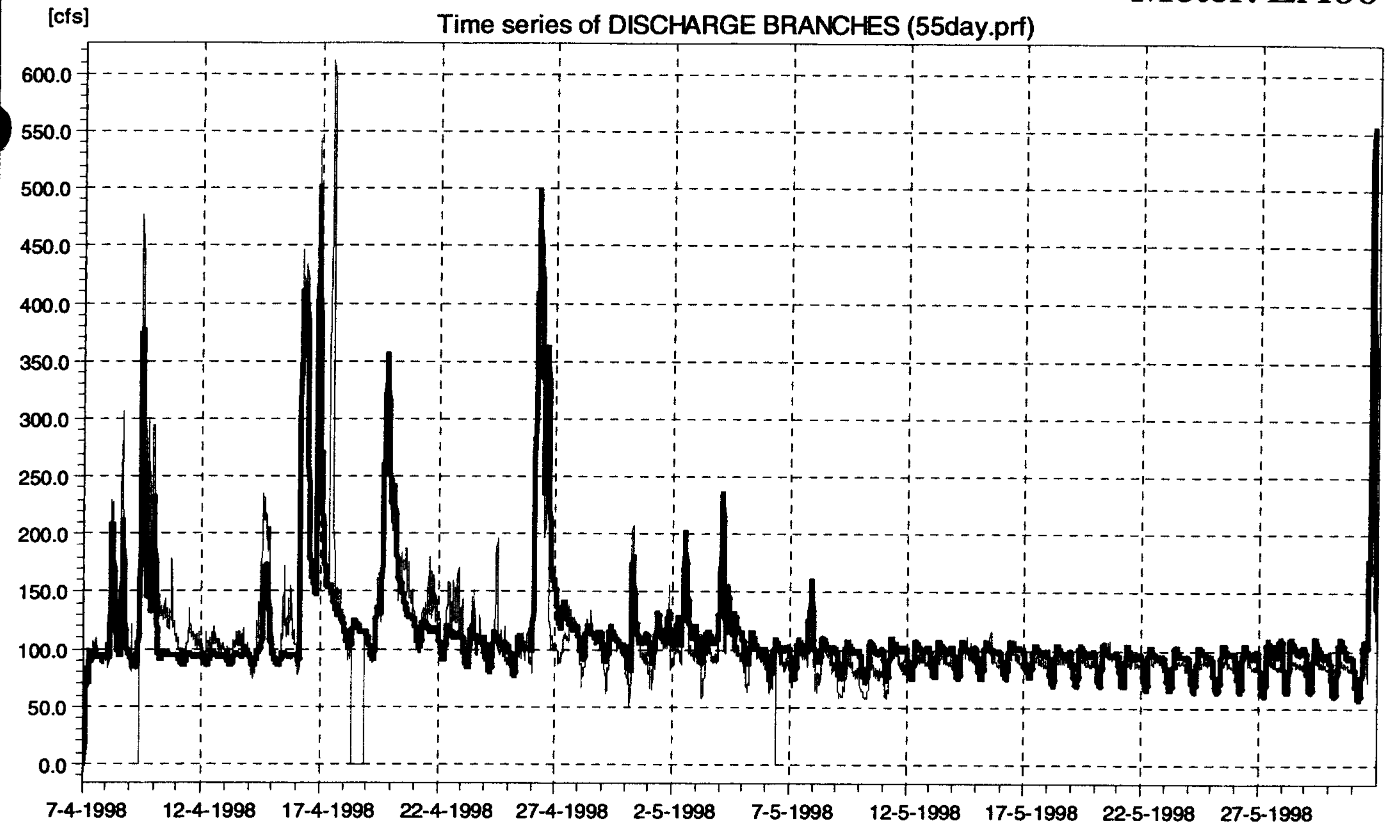
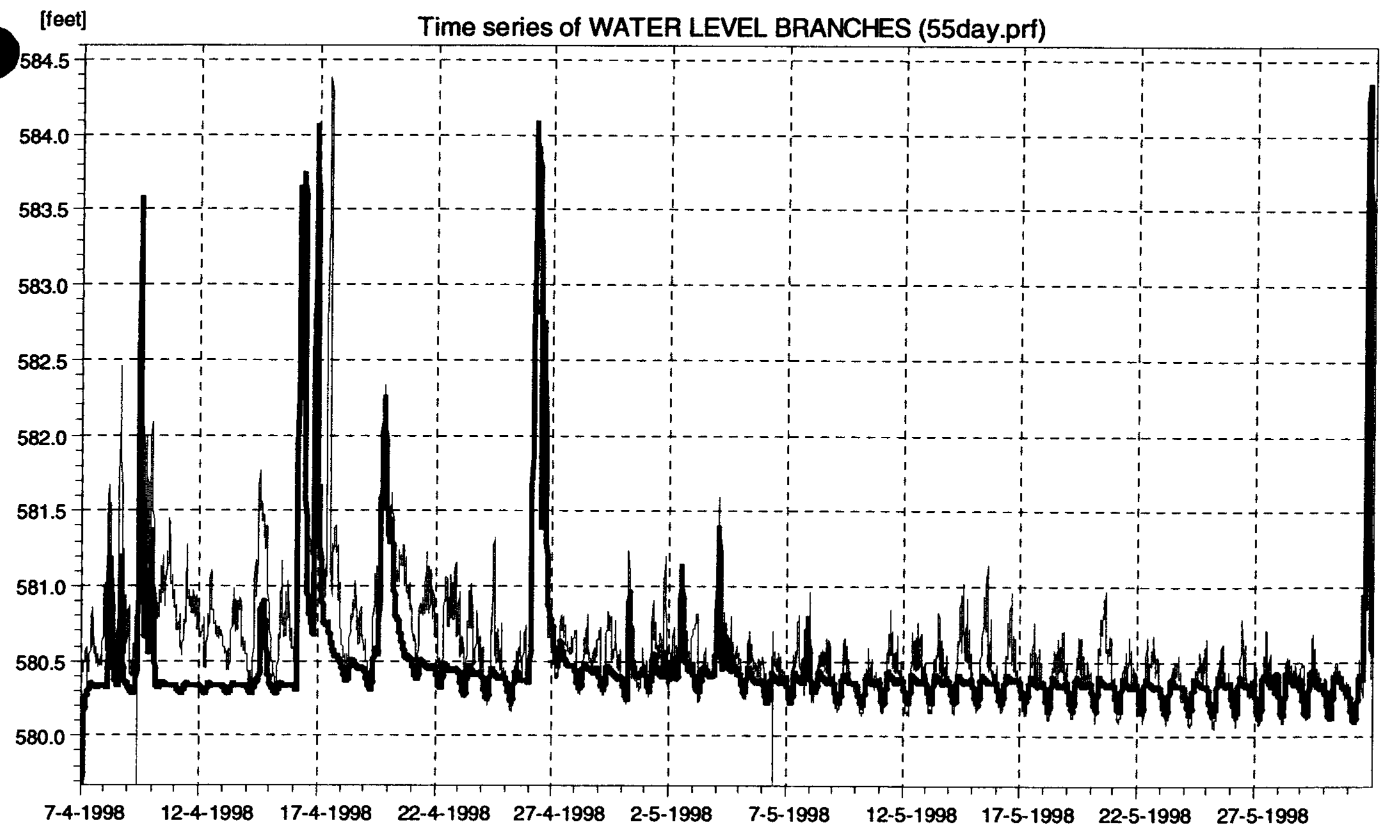
Time series of DISCHARGE BRANCHES (55day.prf)
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
7-5-1998
12-5-1998
17-5-1998
22-5-1998
27-5-1998

Meter: EA00





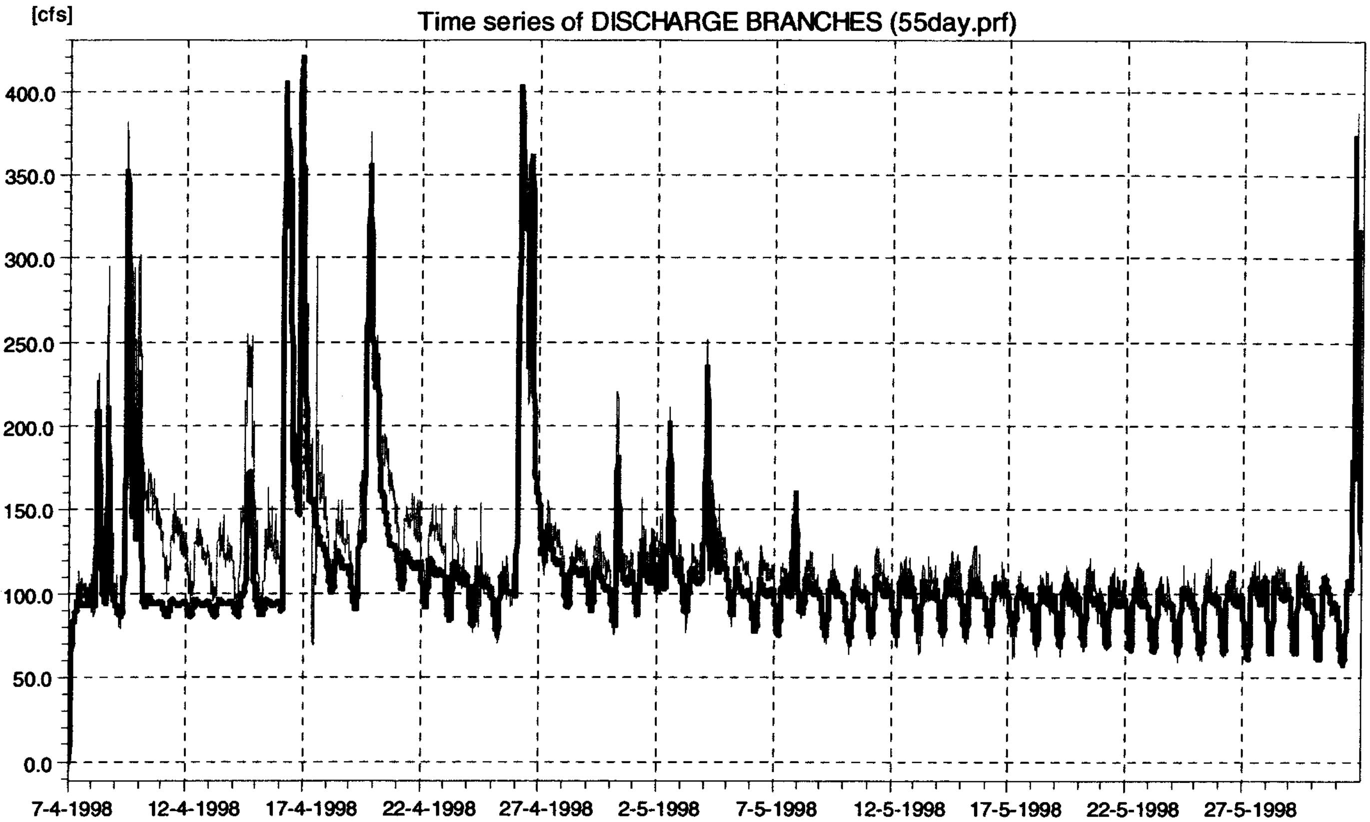
M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

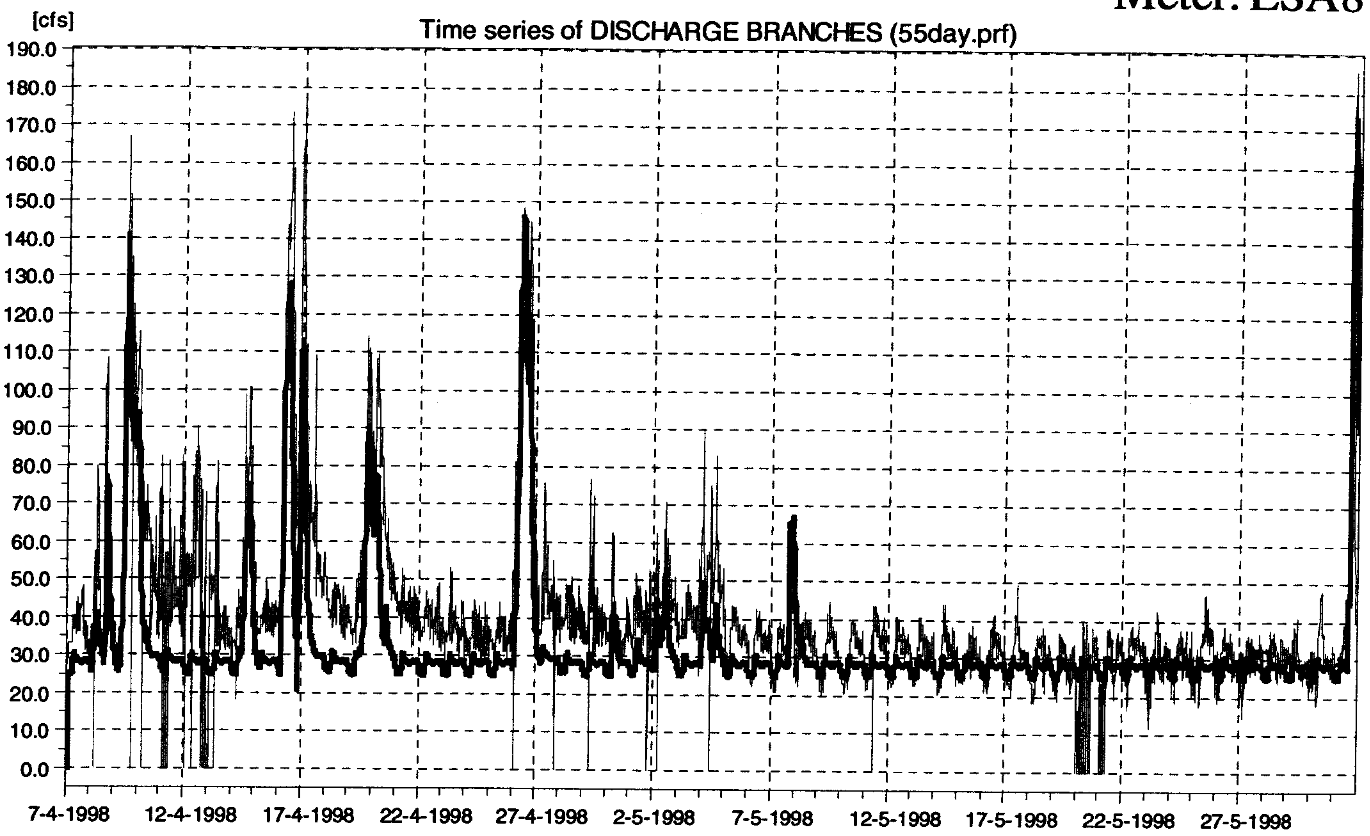
CH2MHILL

Meter:



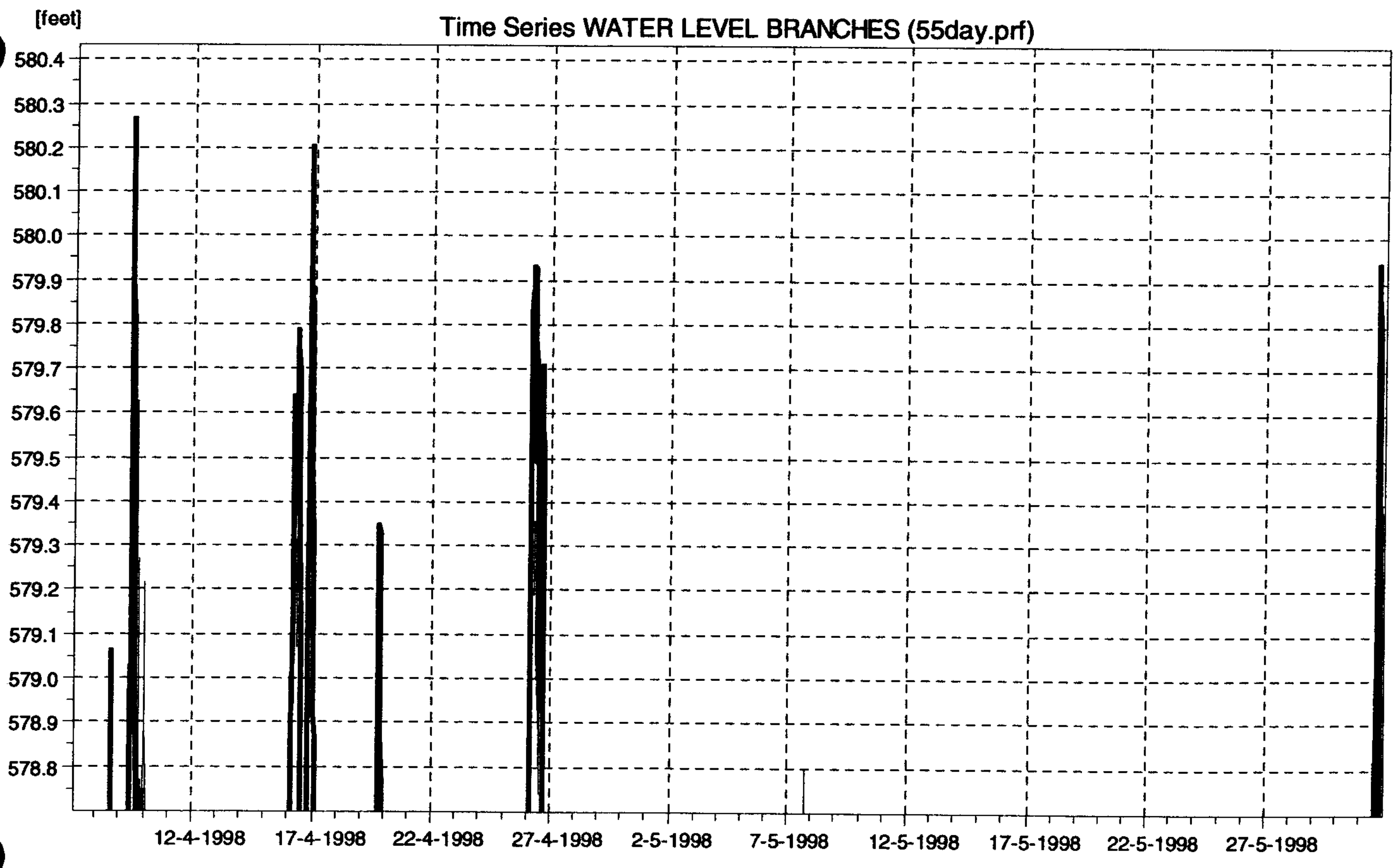
TOTAL FLOWS FROM EASTERLY INTERCEPTOR=ESA2 +ESA4+ESA6

Meter: ESA8


[cfs]
Time series of DISCHARGE BRANCHES (55day.prf)
190.0
180.0
170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
7-5-1998
12-5-1998
17-5-1998
22-5-1998
27-5-1998

Meter: ESA10

Meter located on top of overflow weir



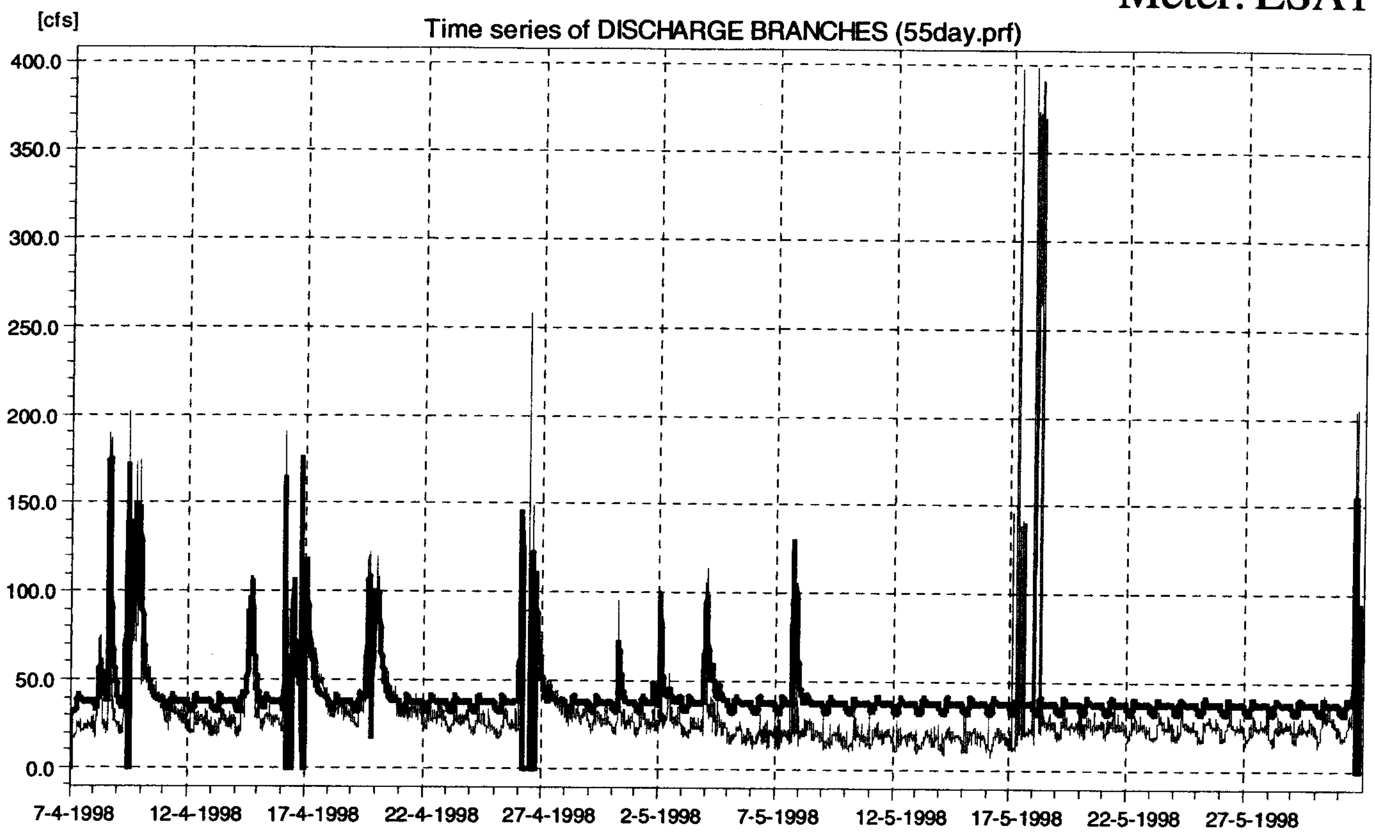
Metcalf & Eddy

Easterly CSO Phase II Facilities Plan

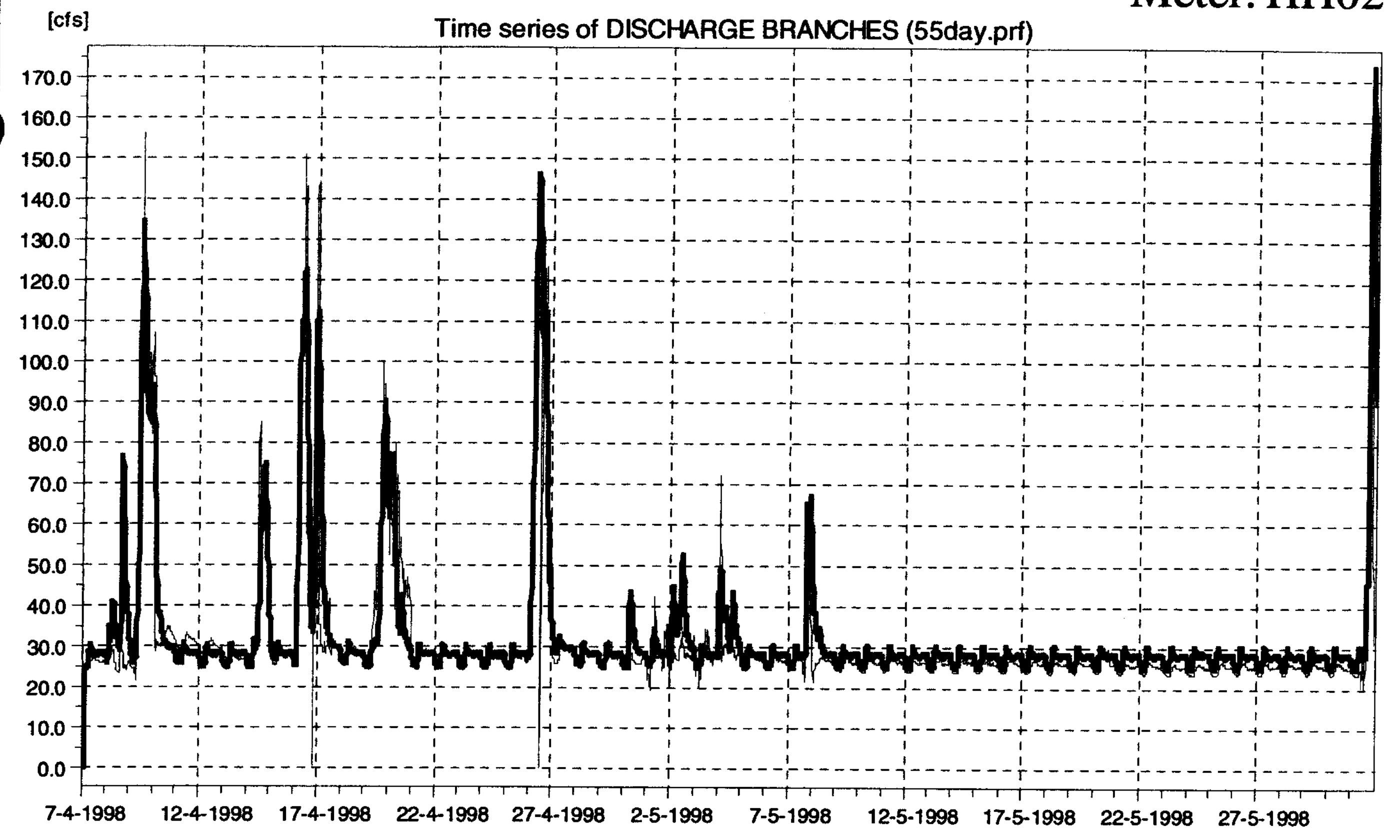
Model Calibration —— Model —— Meter

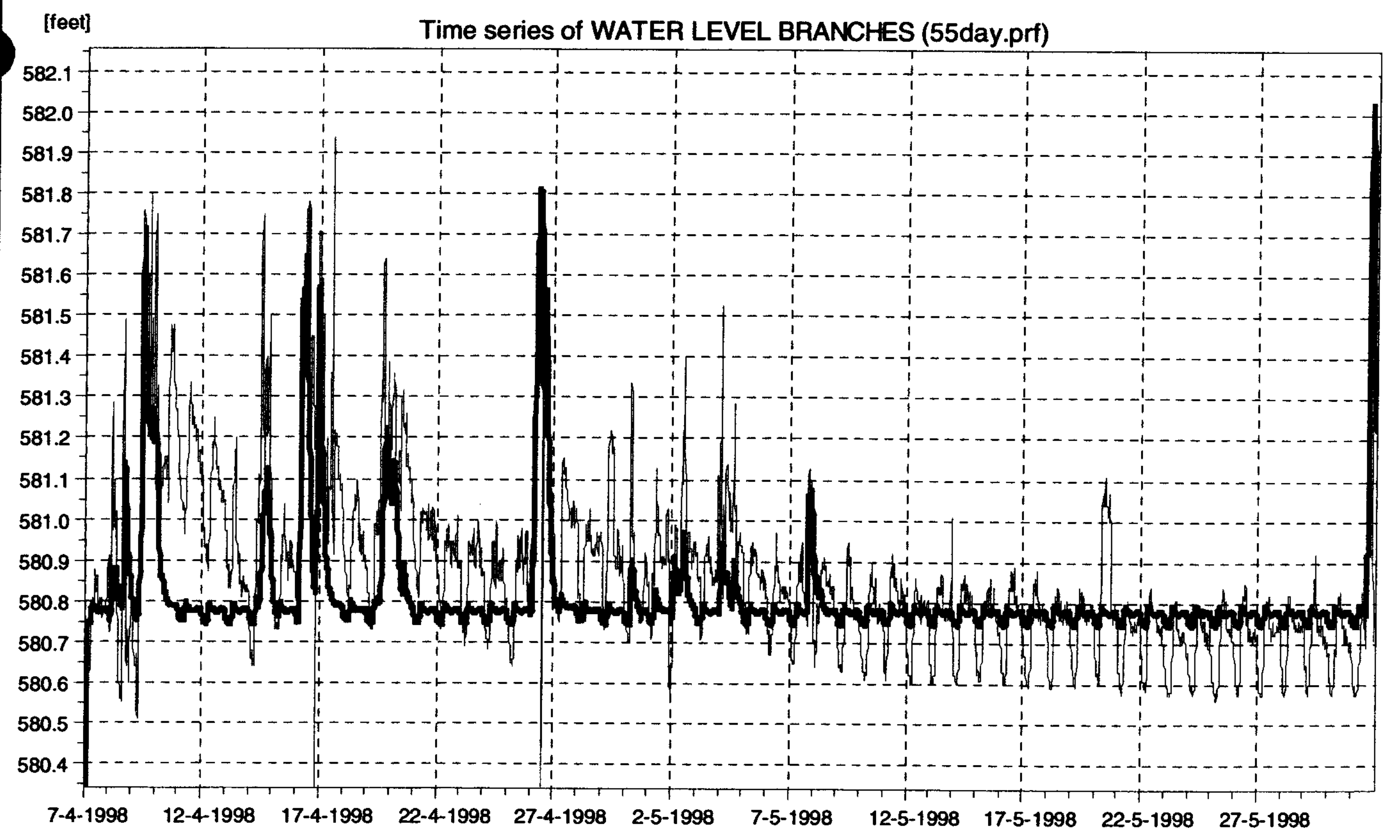
CH2MHILL

Meter: ESA11


[cfs]
Time series of DISCHARGE BRANCHES (55day.prf)
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
7-5-1998
12-5-1998
17-5-1998
22-5-1998
27-5-1998

Meter: HH02





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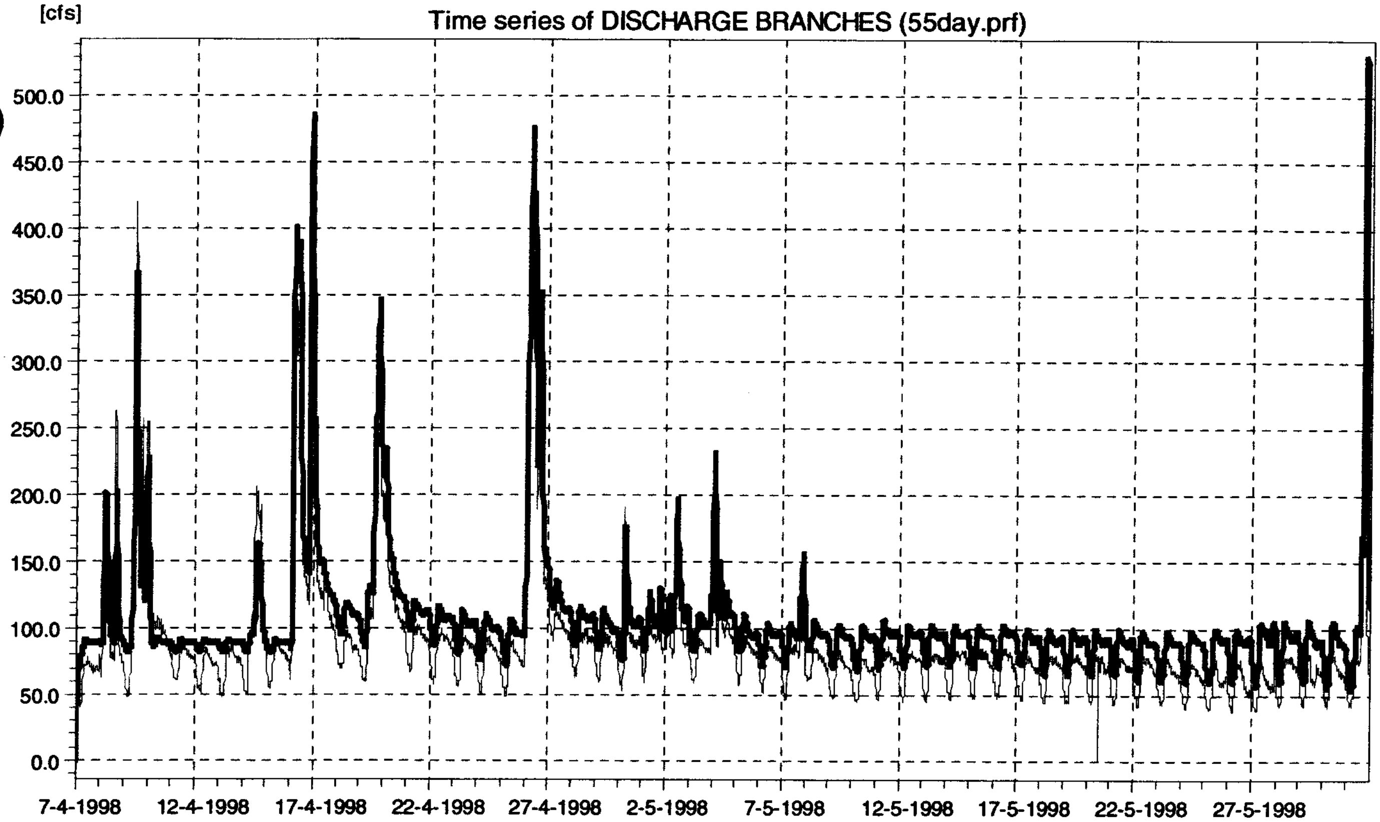
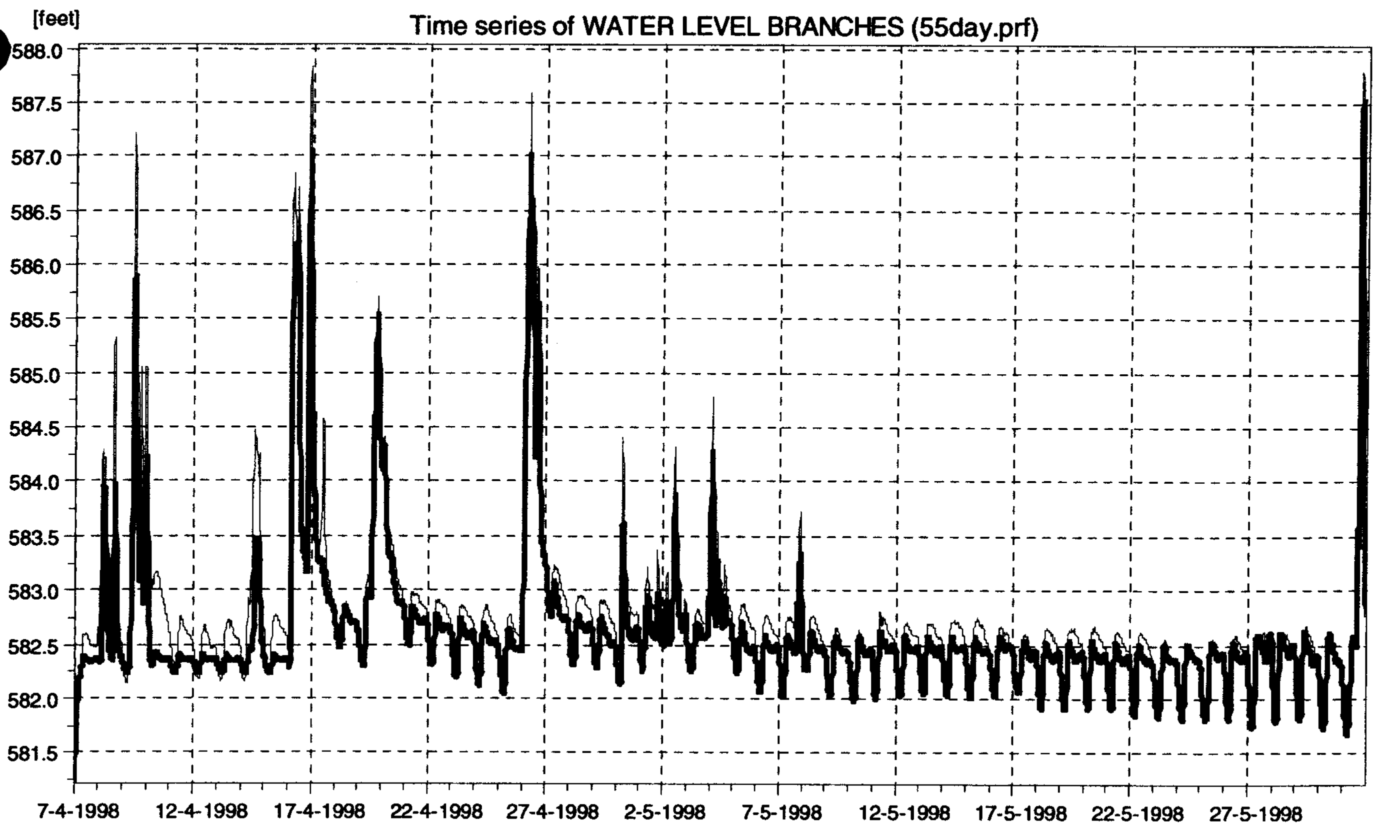
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA03





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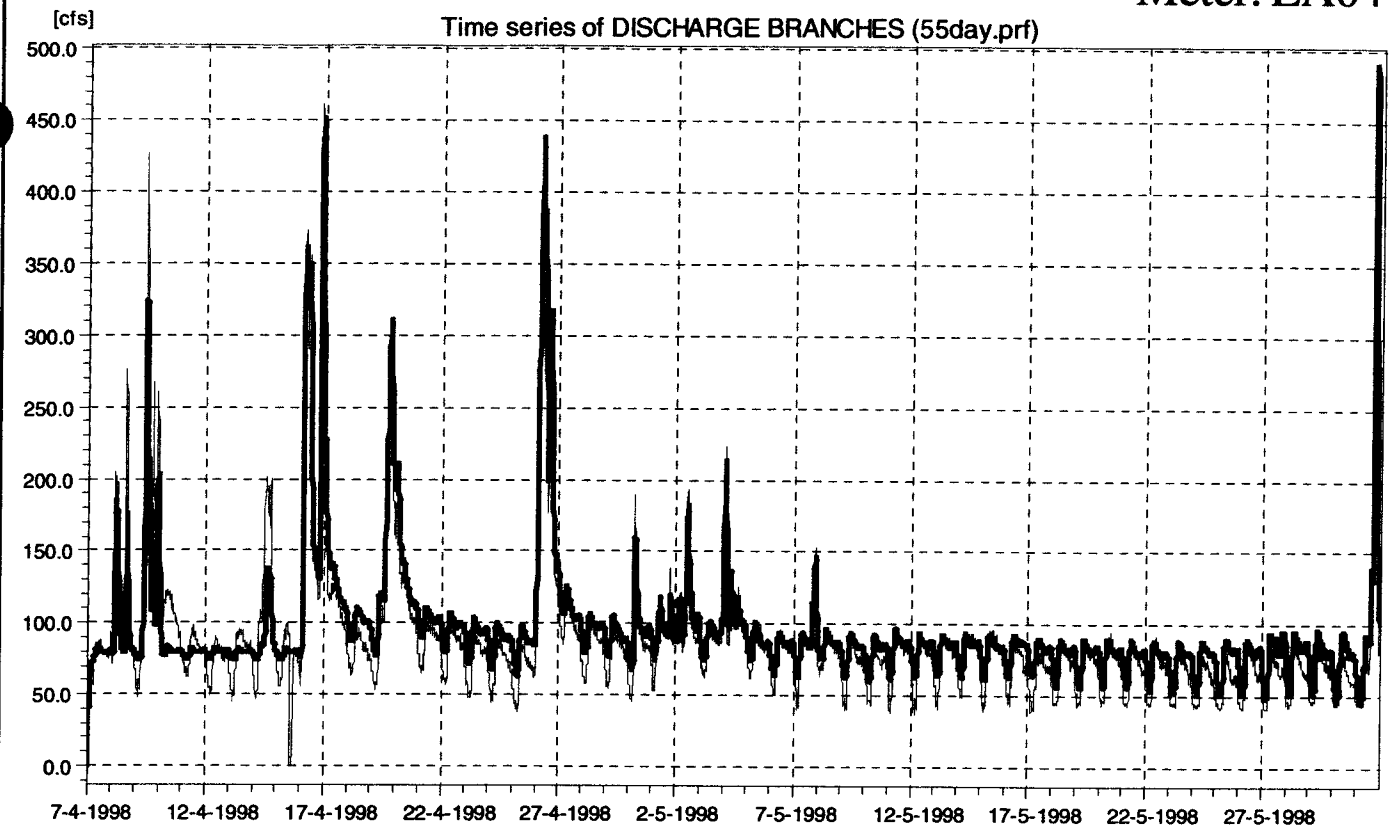
Easterly CSO Phase II Facilities Plan
Model Calibration — Model — Meter

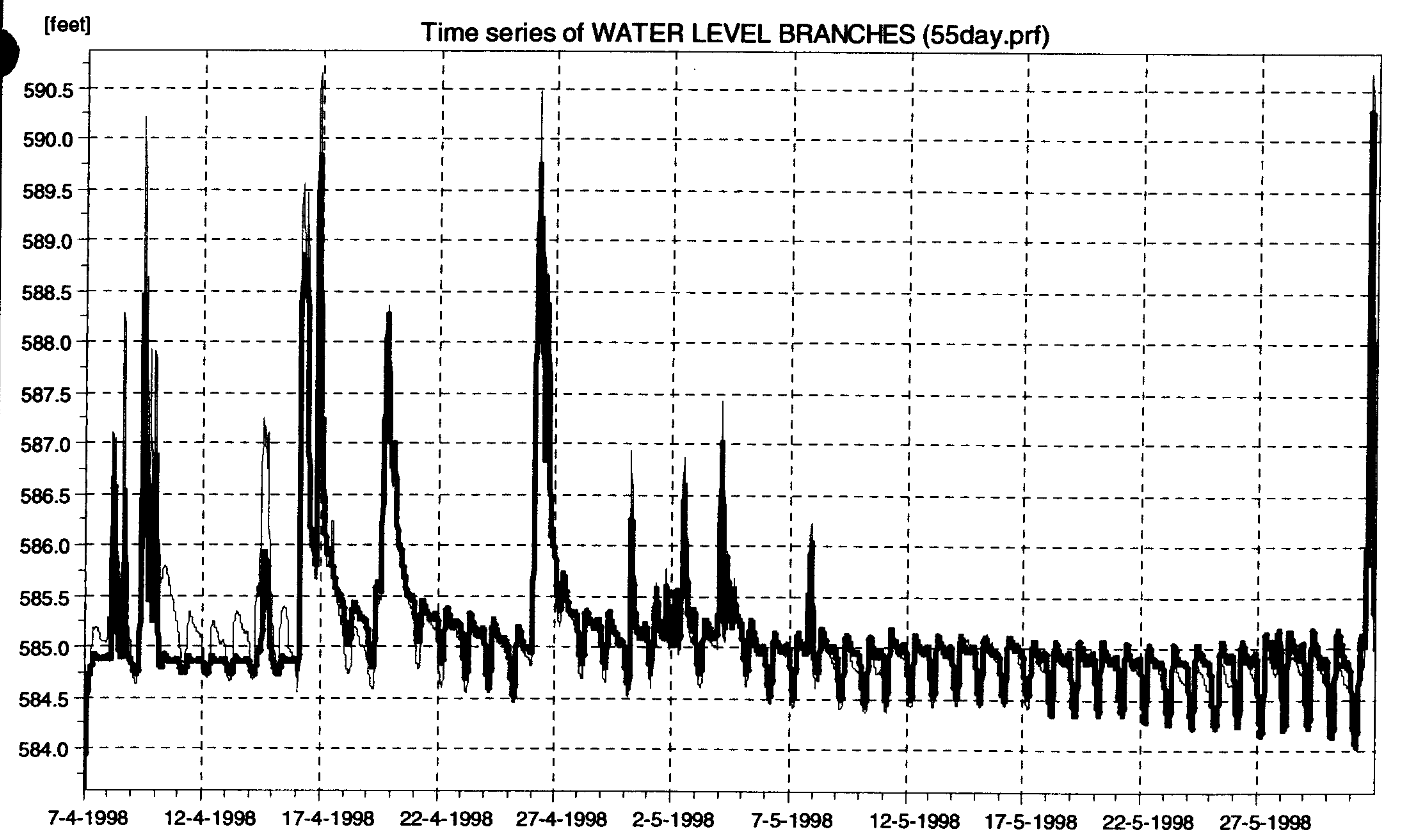
CH2MHILL

Meter: EA04

Time series of DISCHARGE BRANCHES (55day.prf)



Time series of WATER LEVEL BRANCHES (55day.prf)



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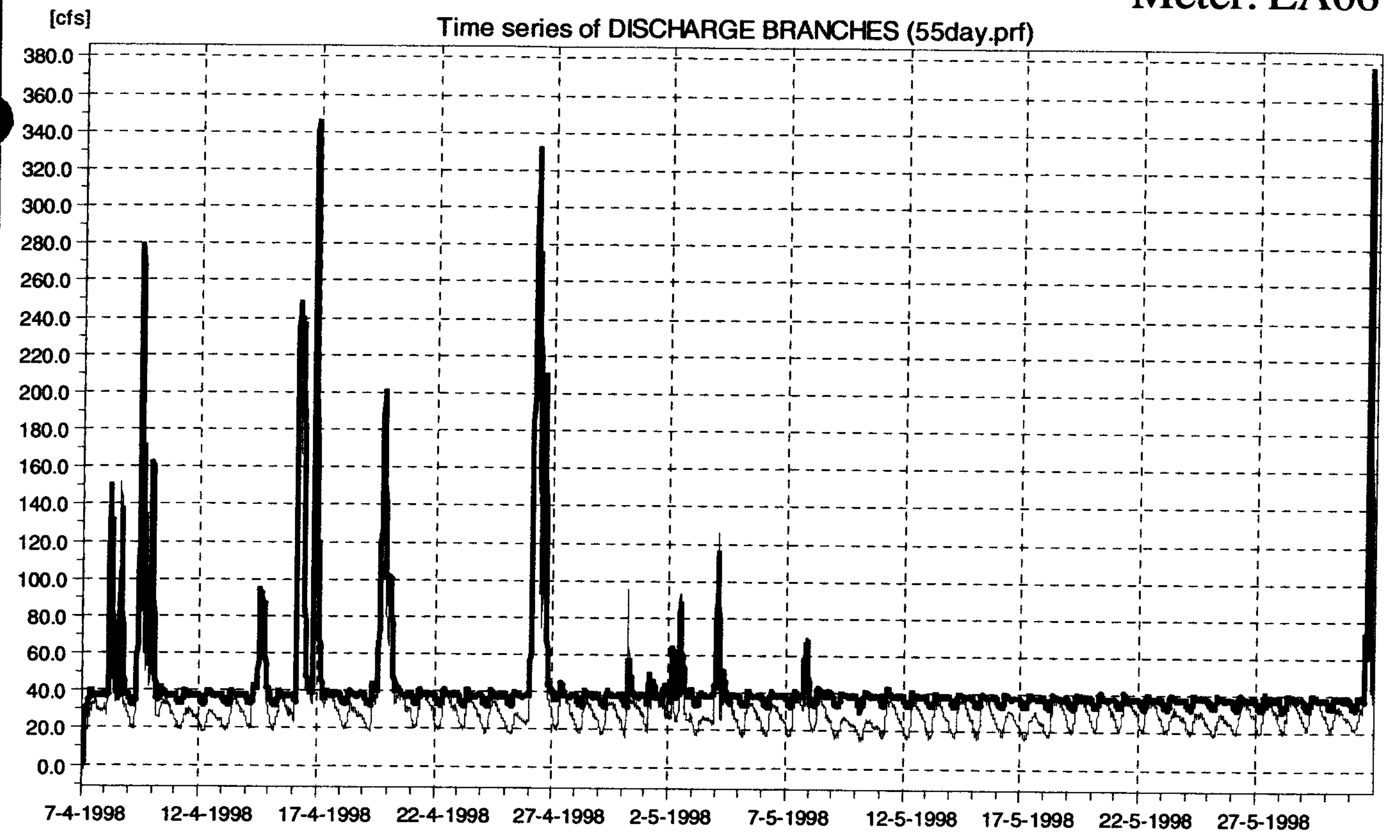
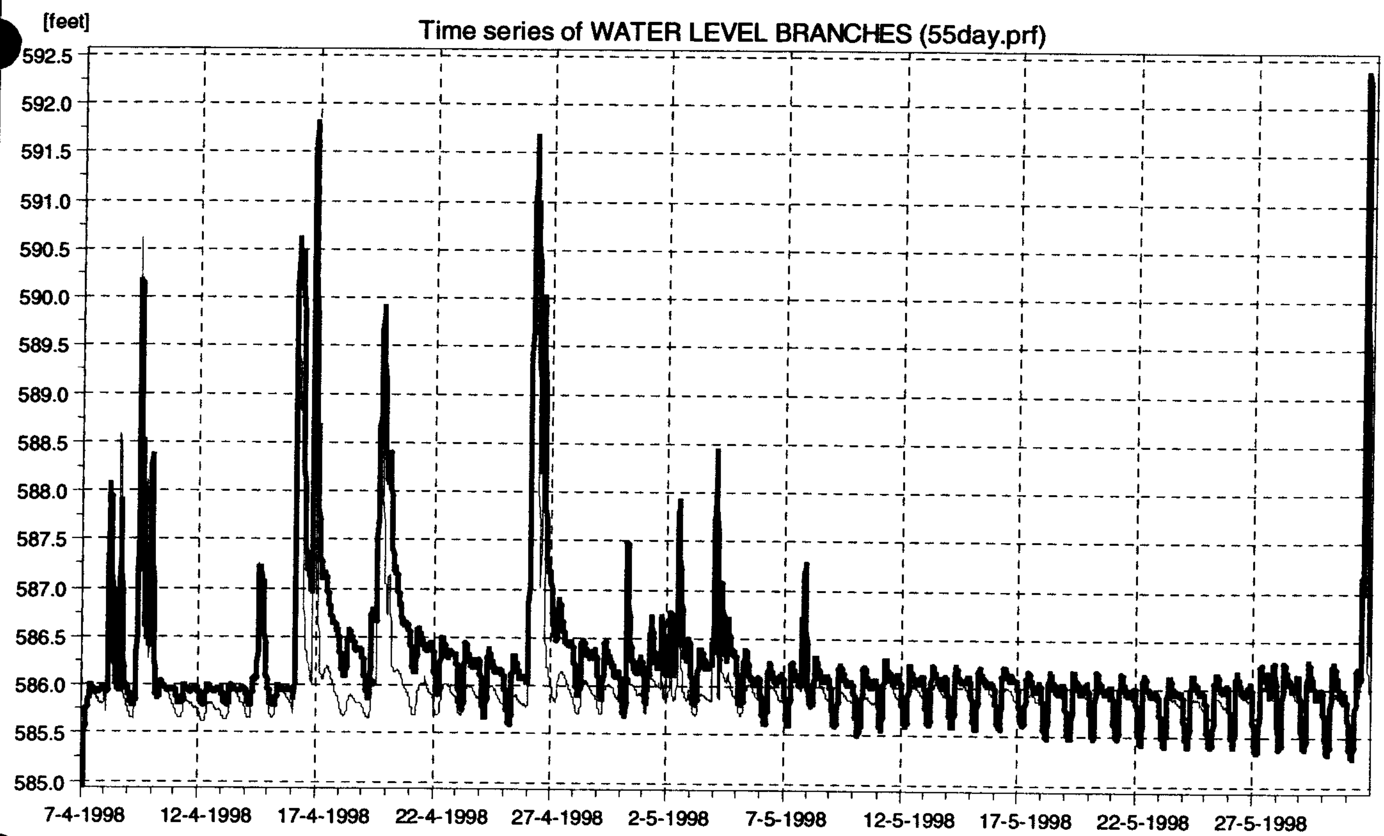
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA06





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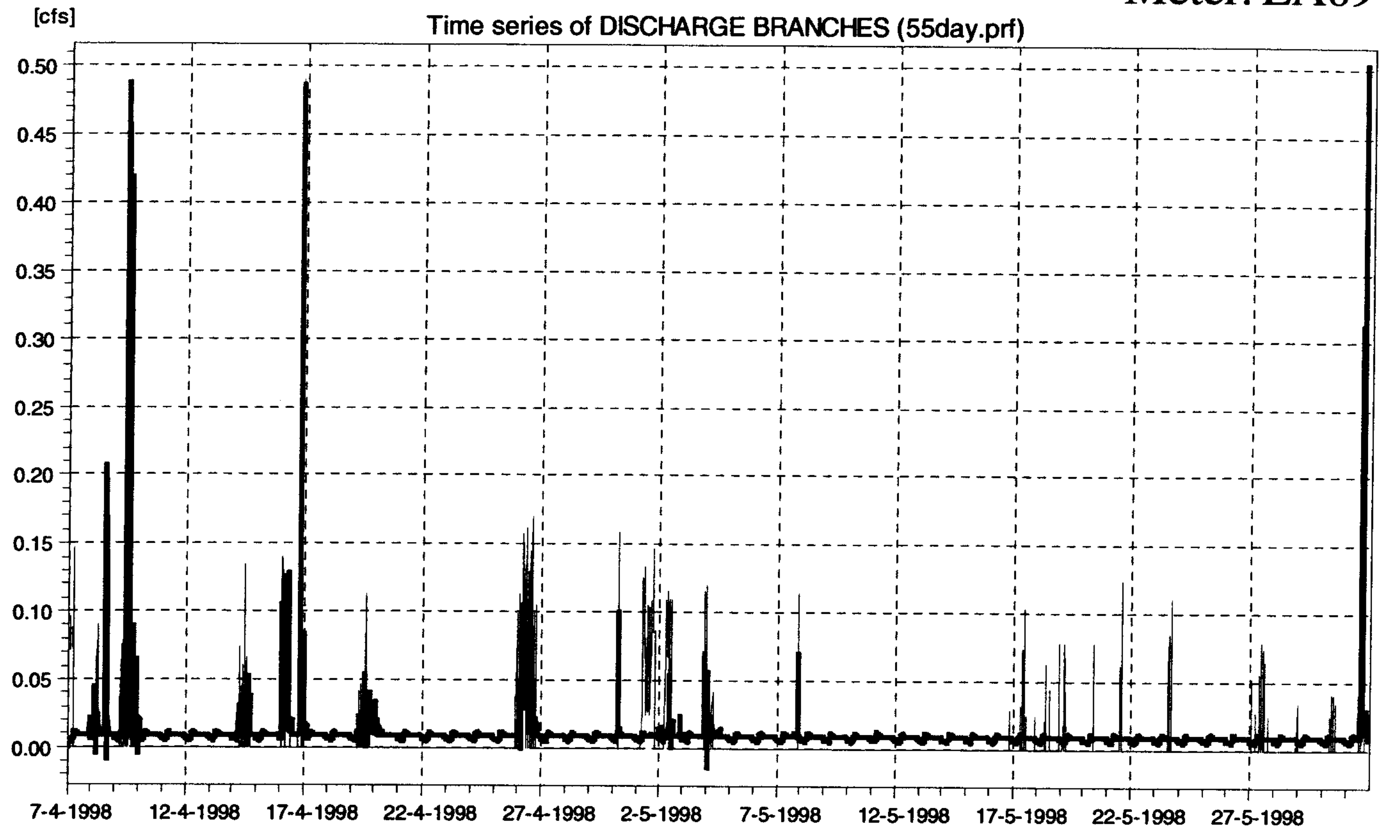
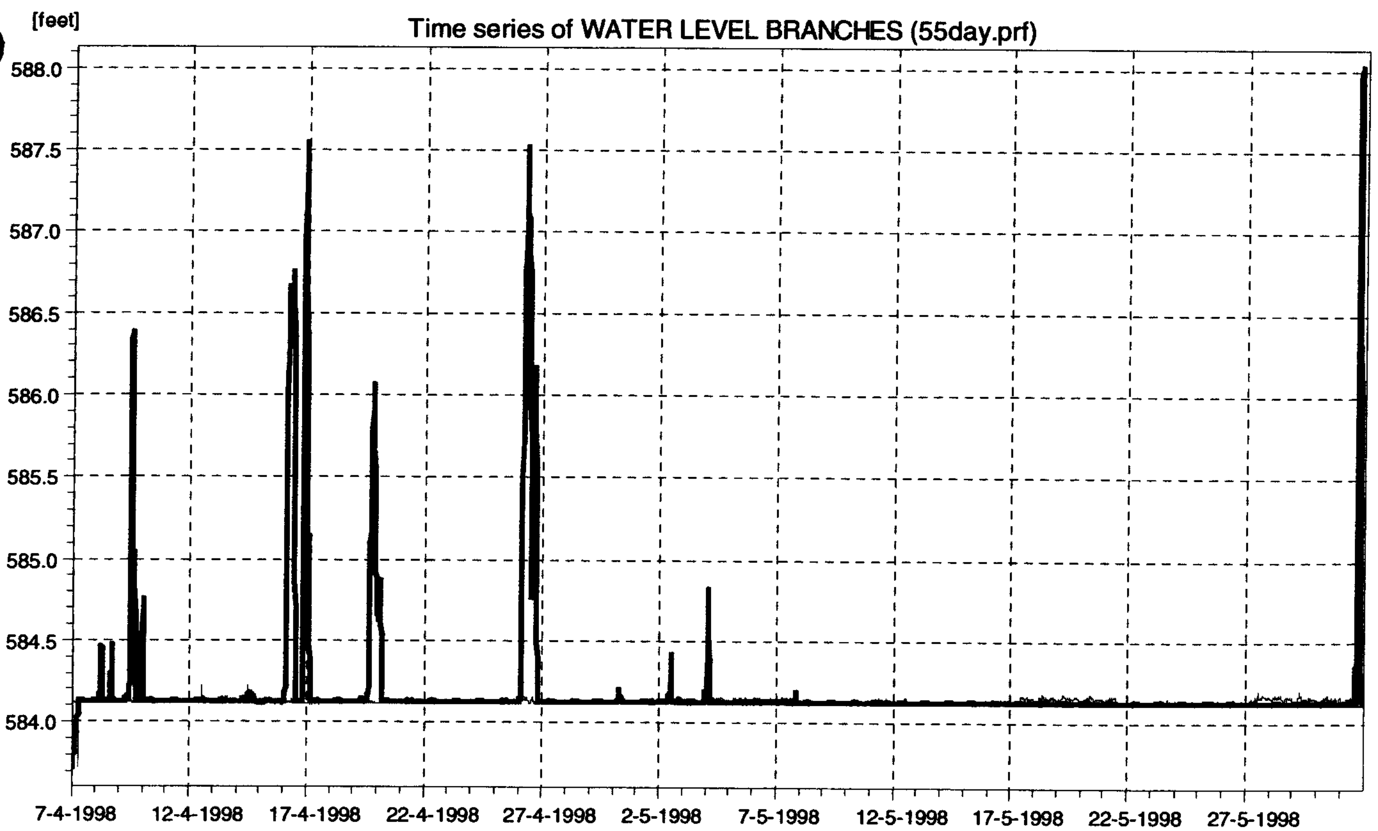
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA09





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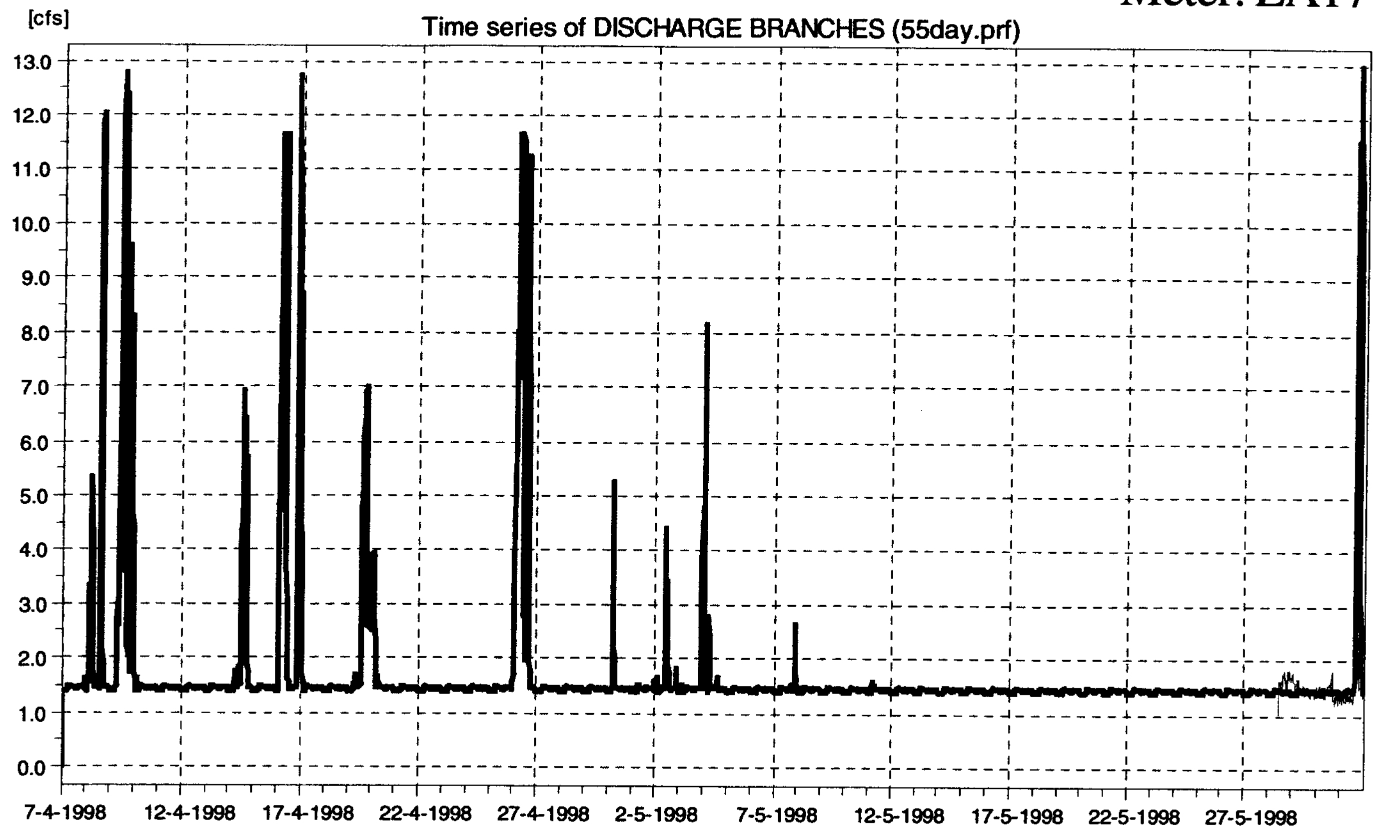
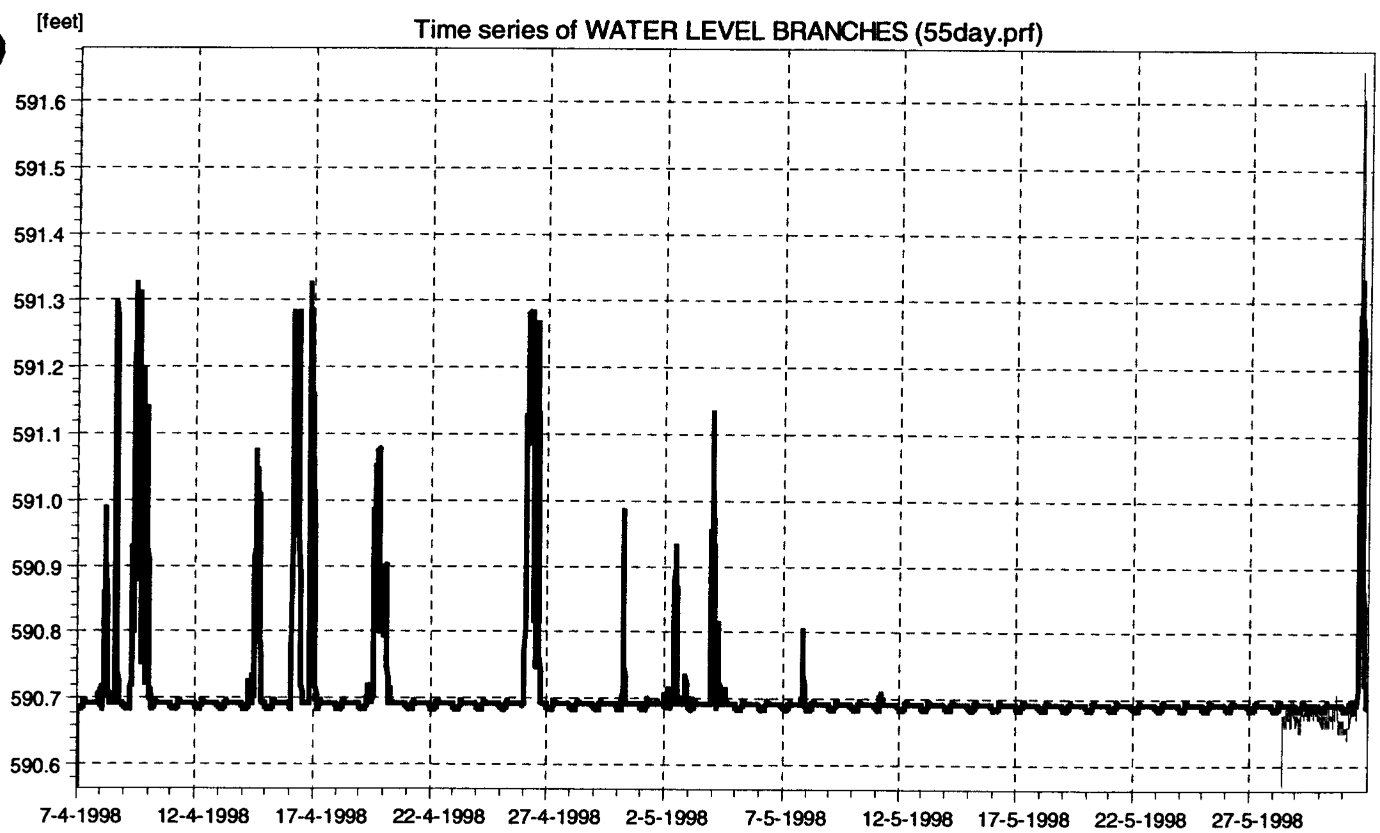
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA17





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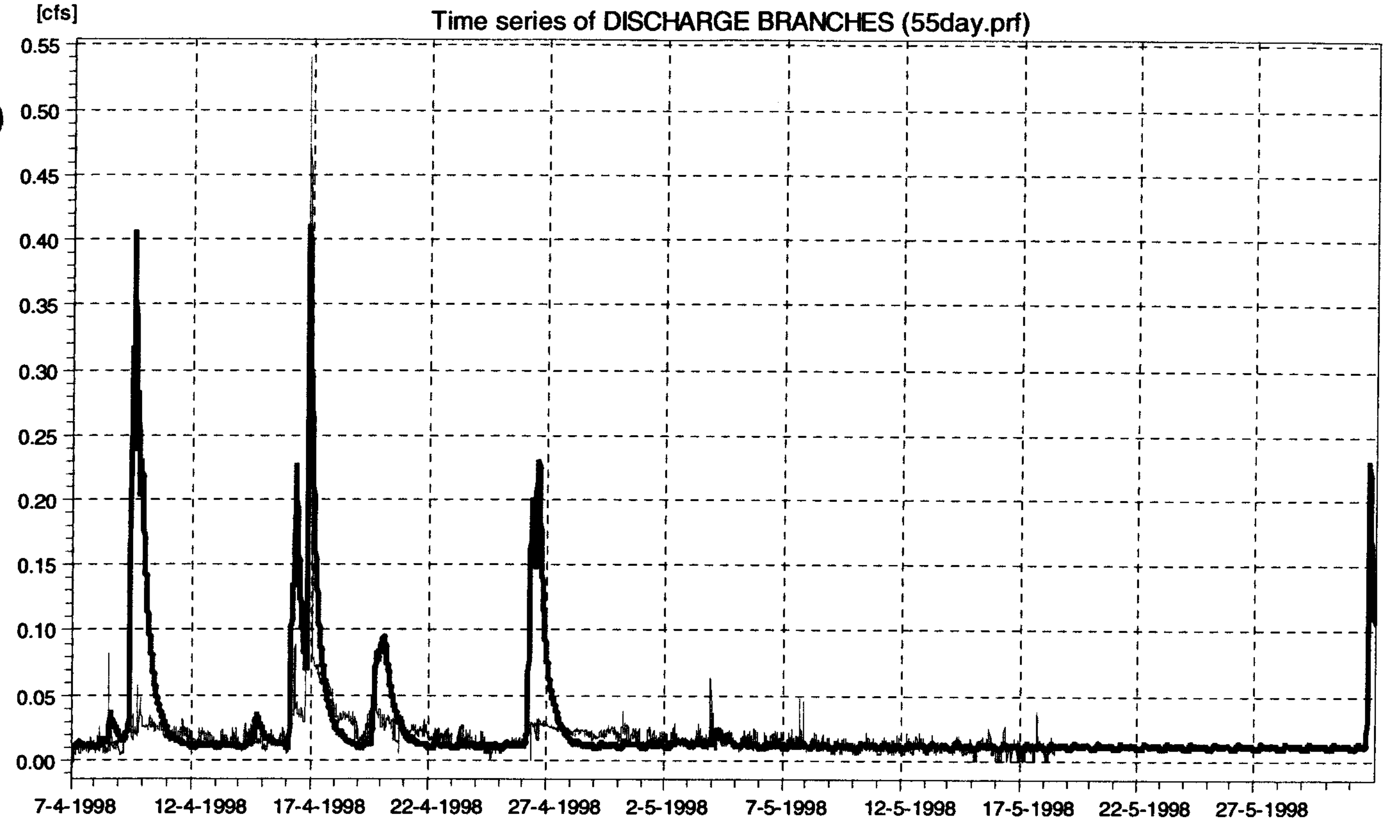
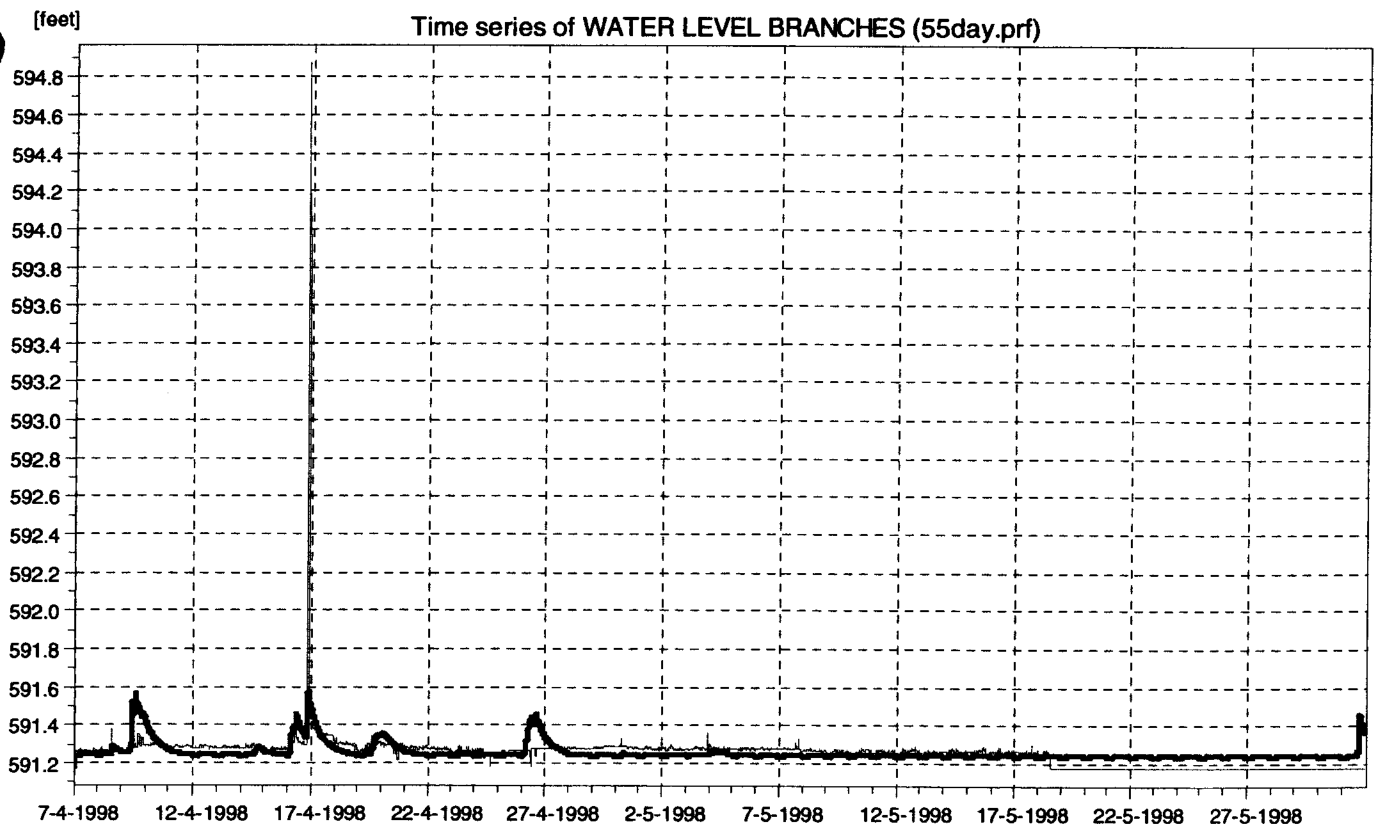
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA17I





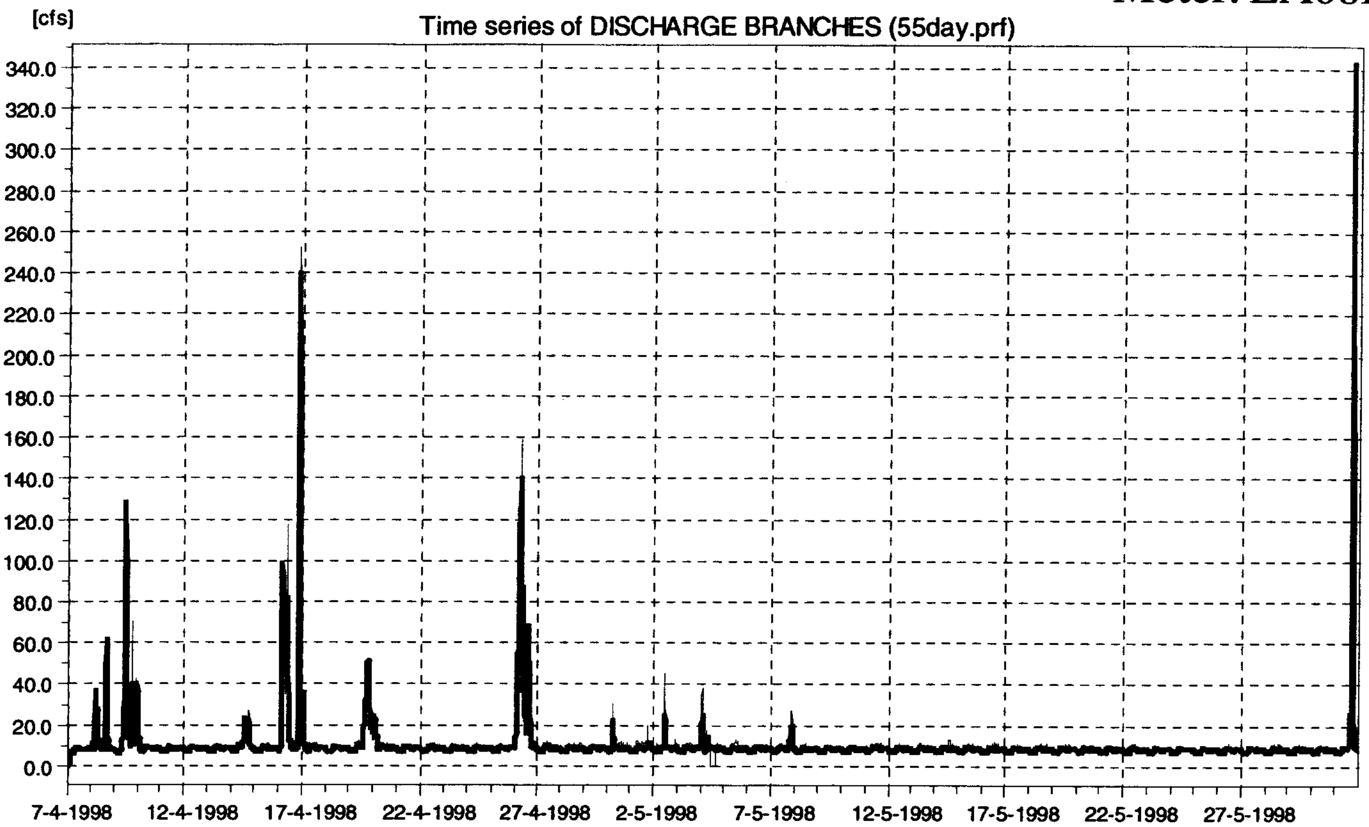
M&E AQUA ALLIANCE Metcalf & Eddy

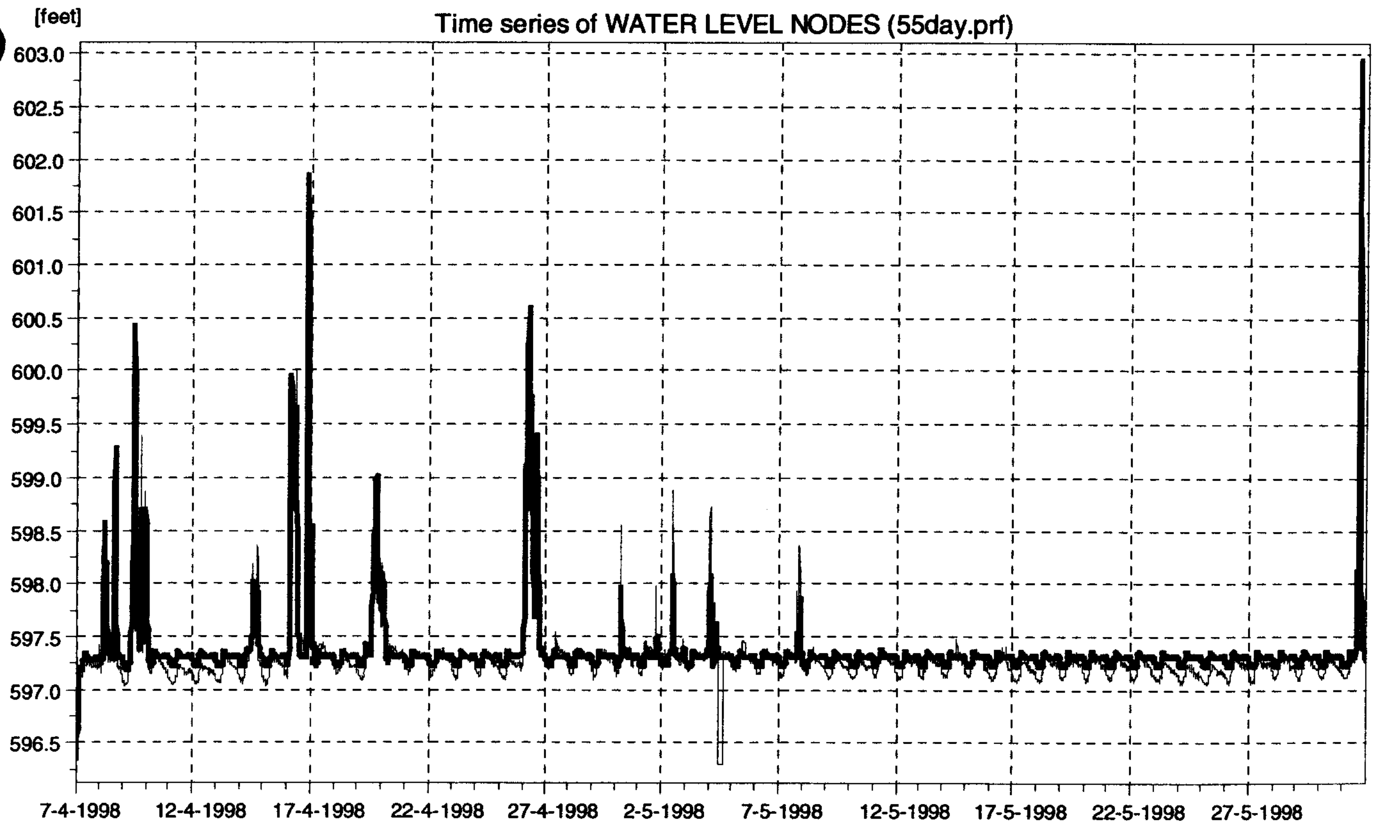
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA08I





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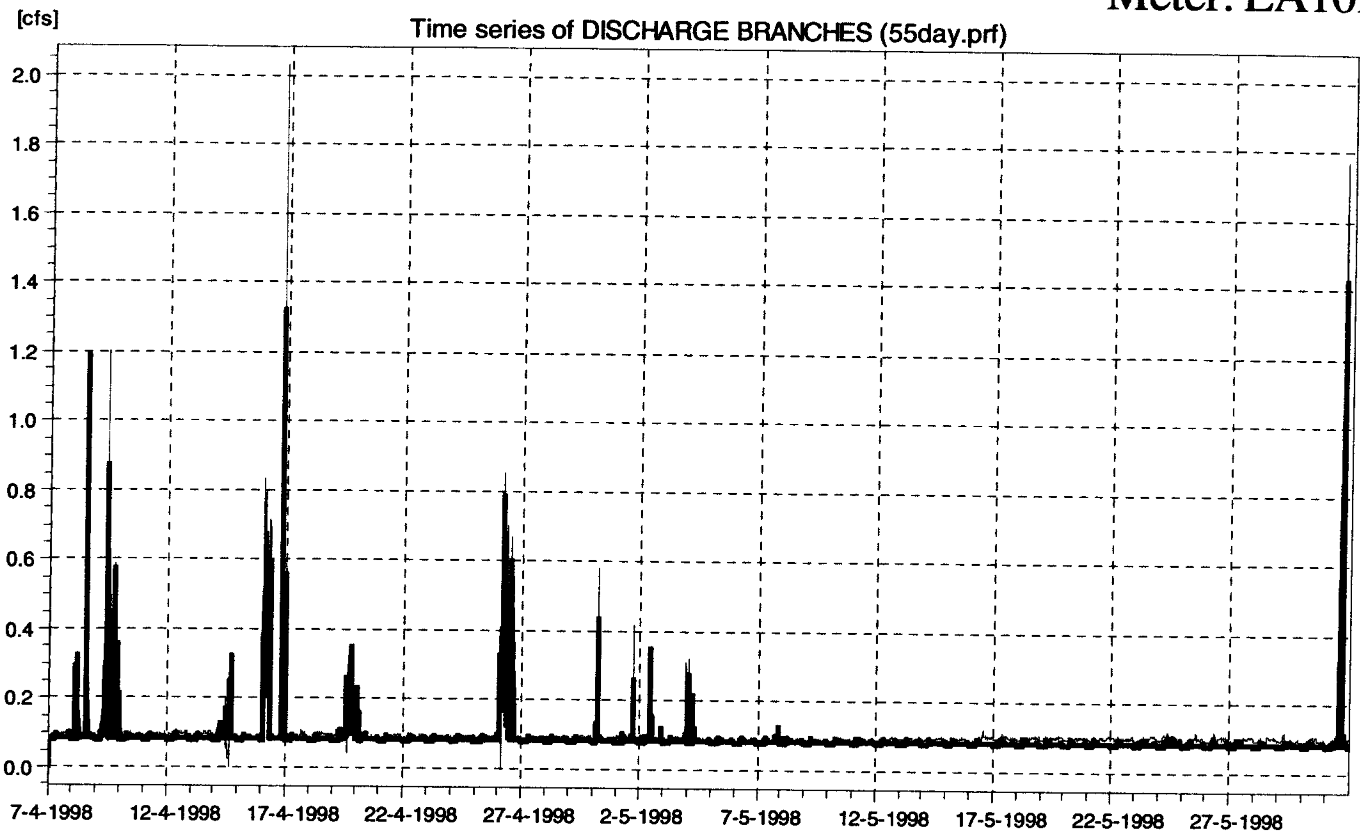
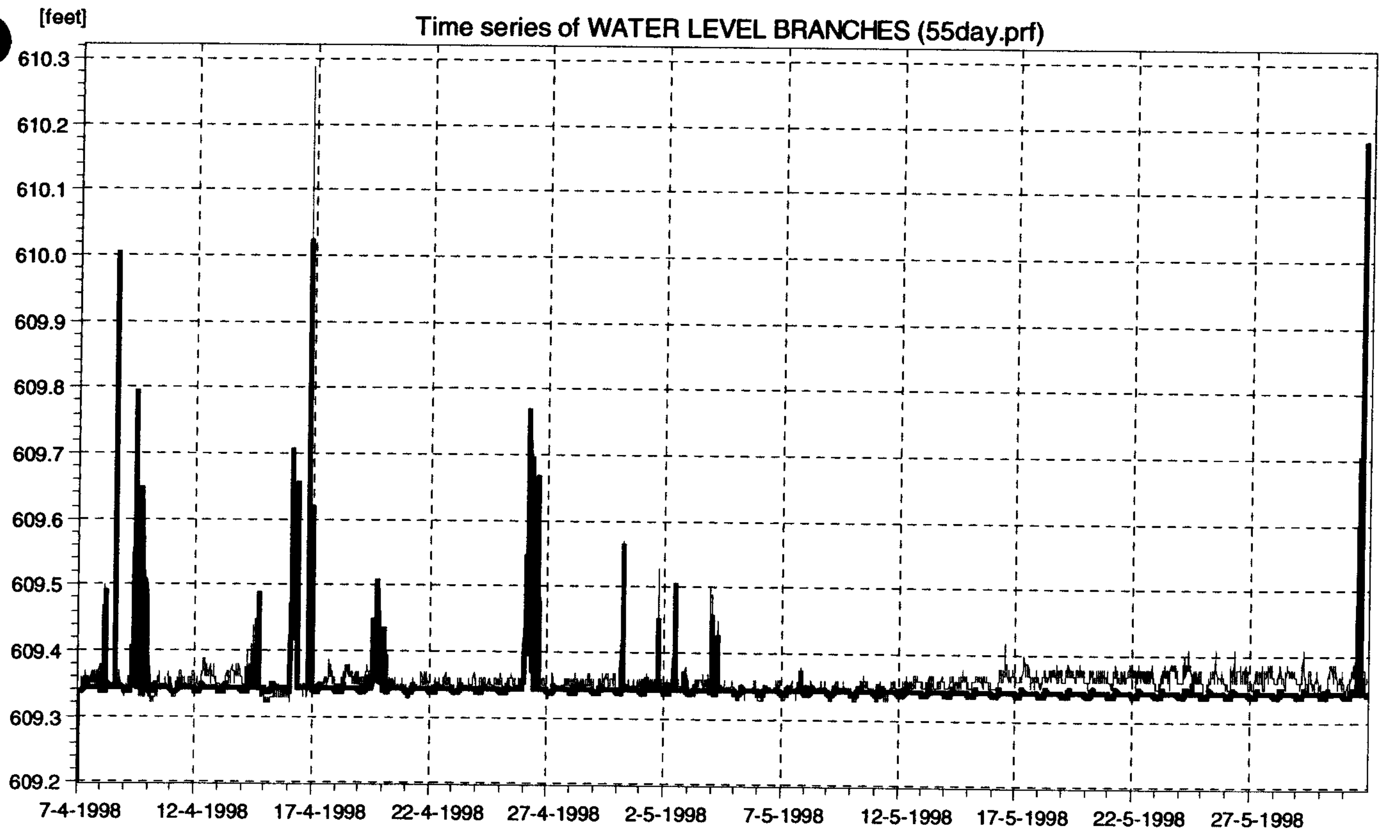
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA10D





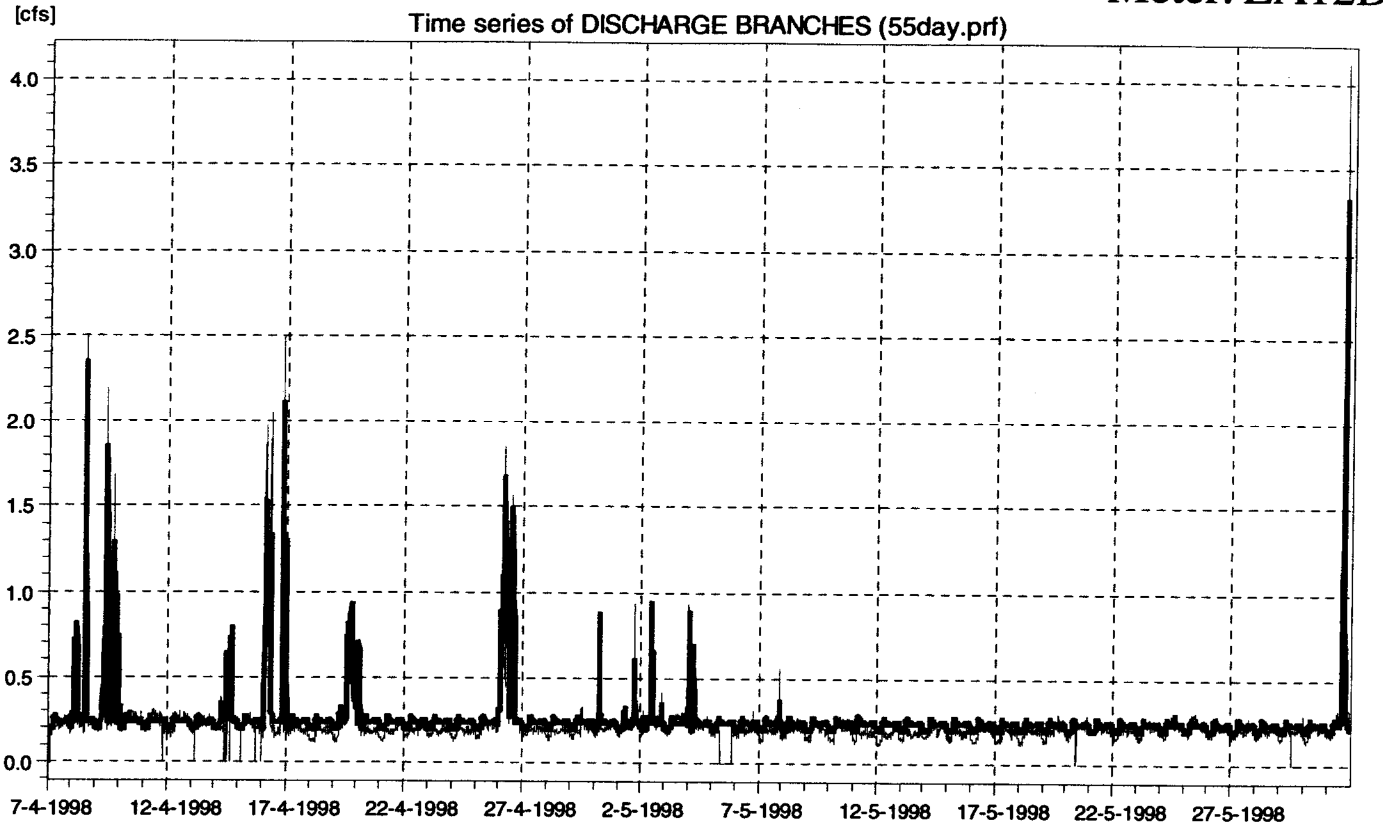
M&E AQUA ALLIANCE Metcalf & Eddy

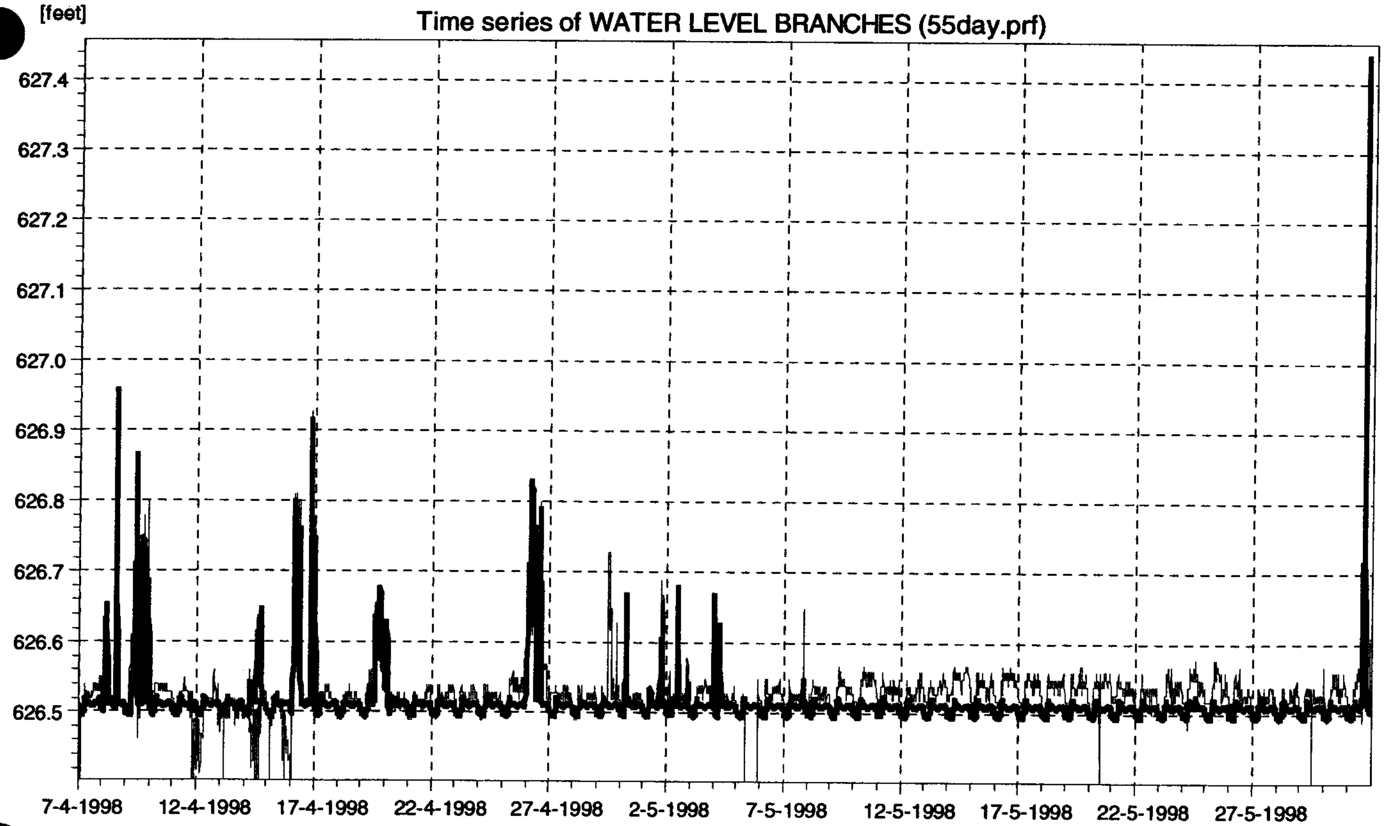
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA12D





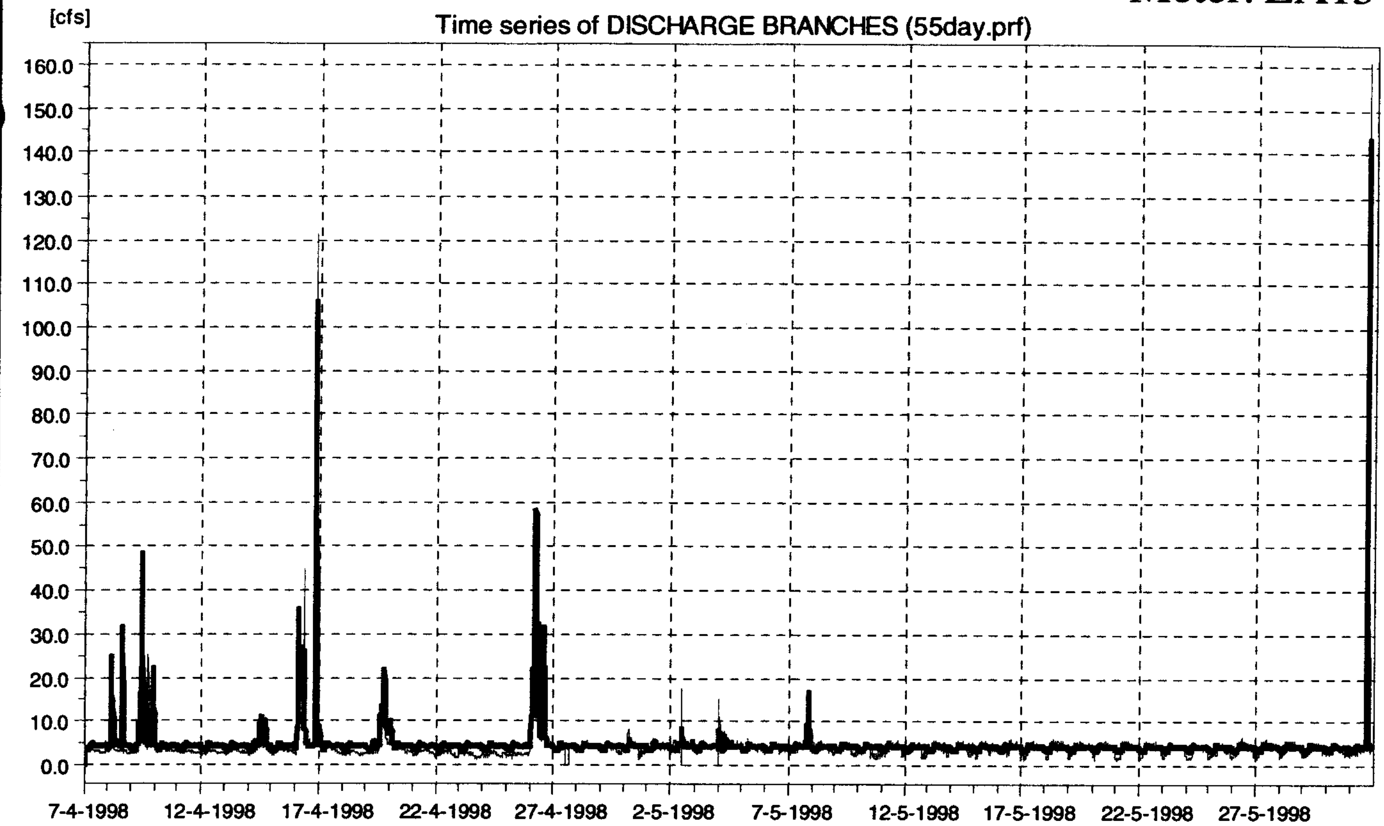
M&E AQUA ALLIANCE Metcalf & Eddy

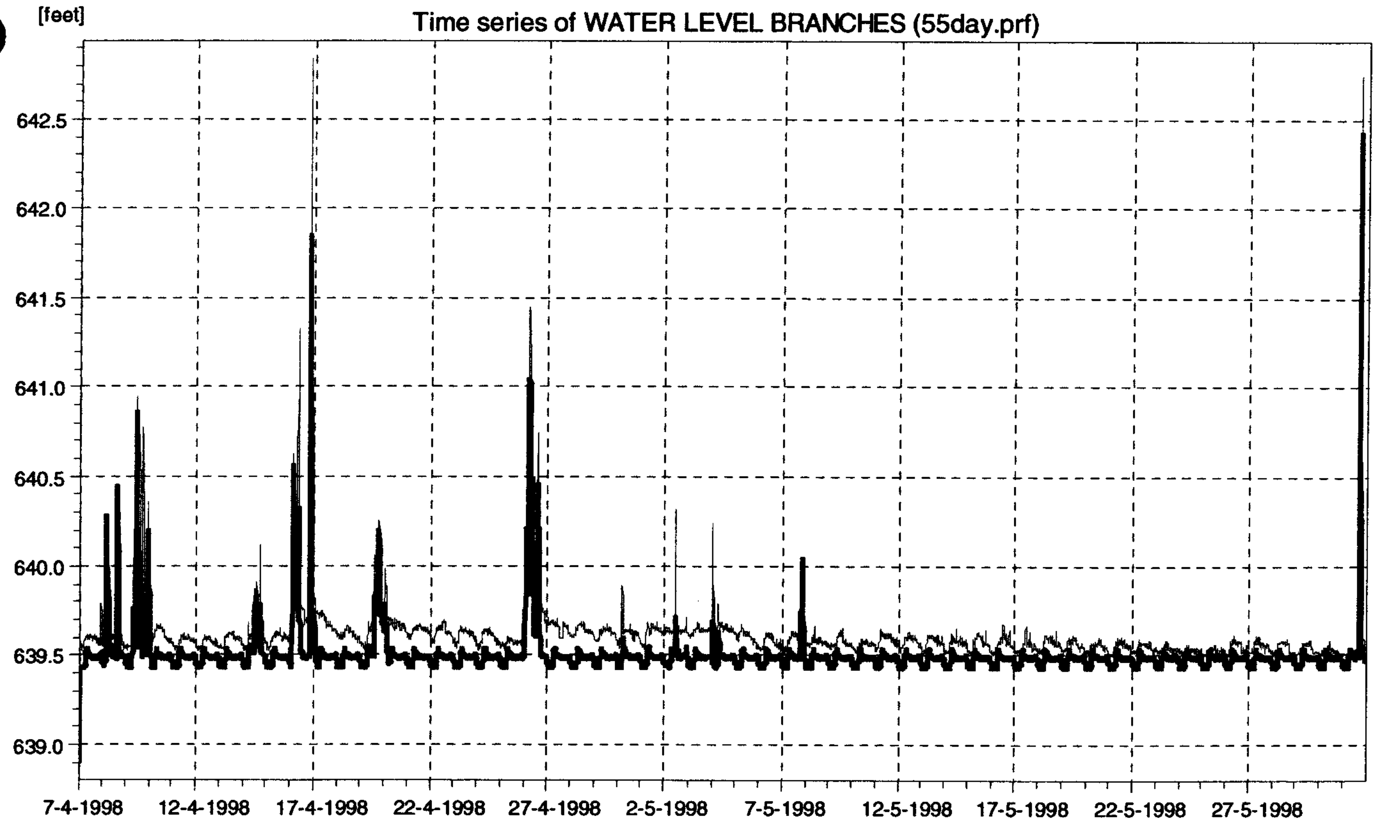
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA13





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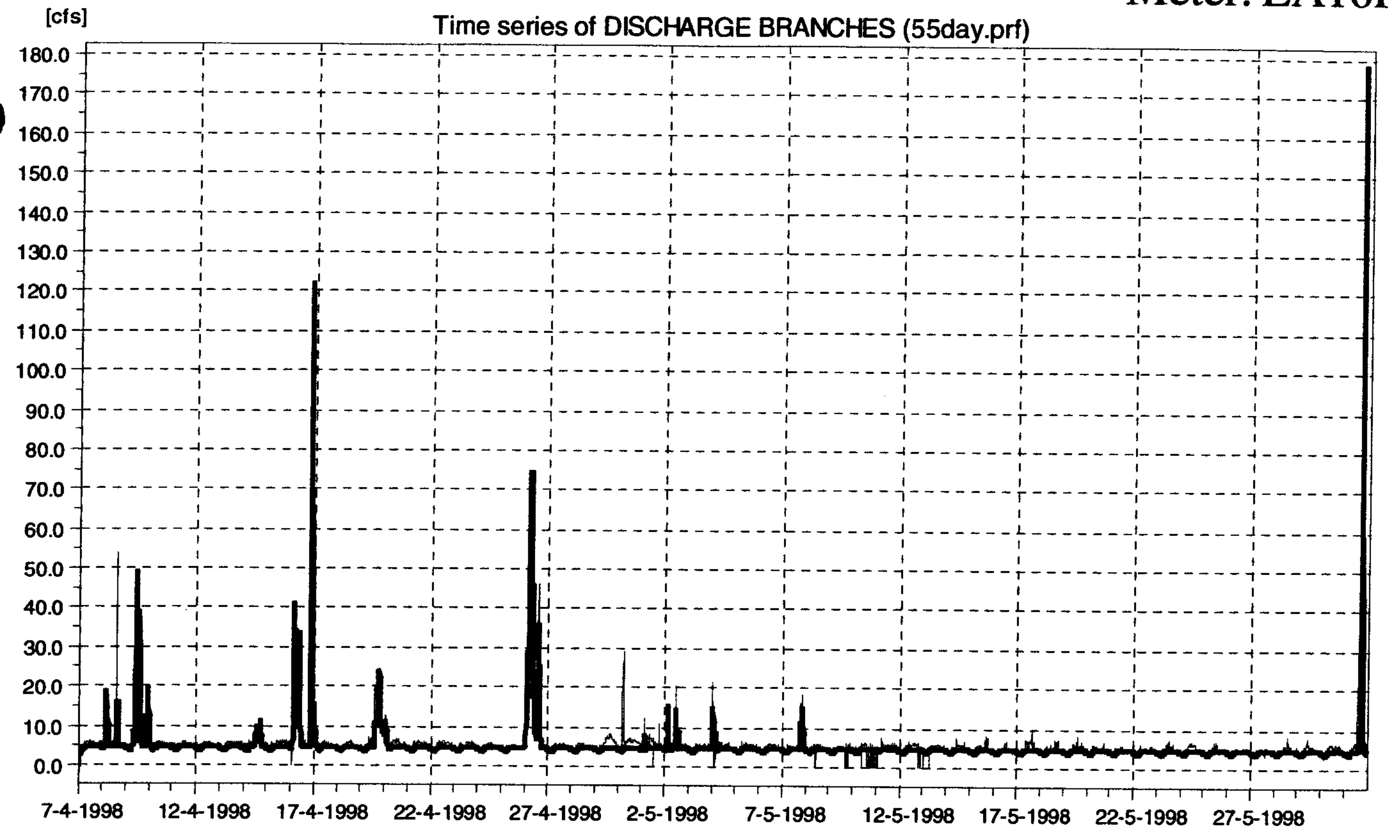
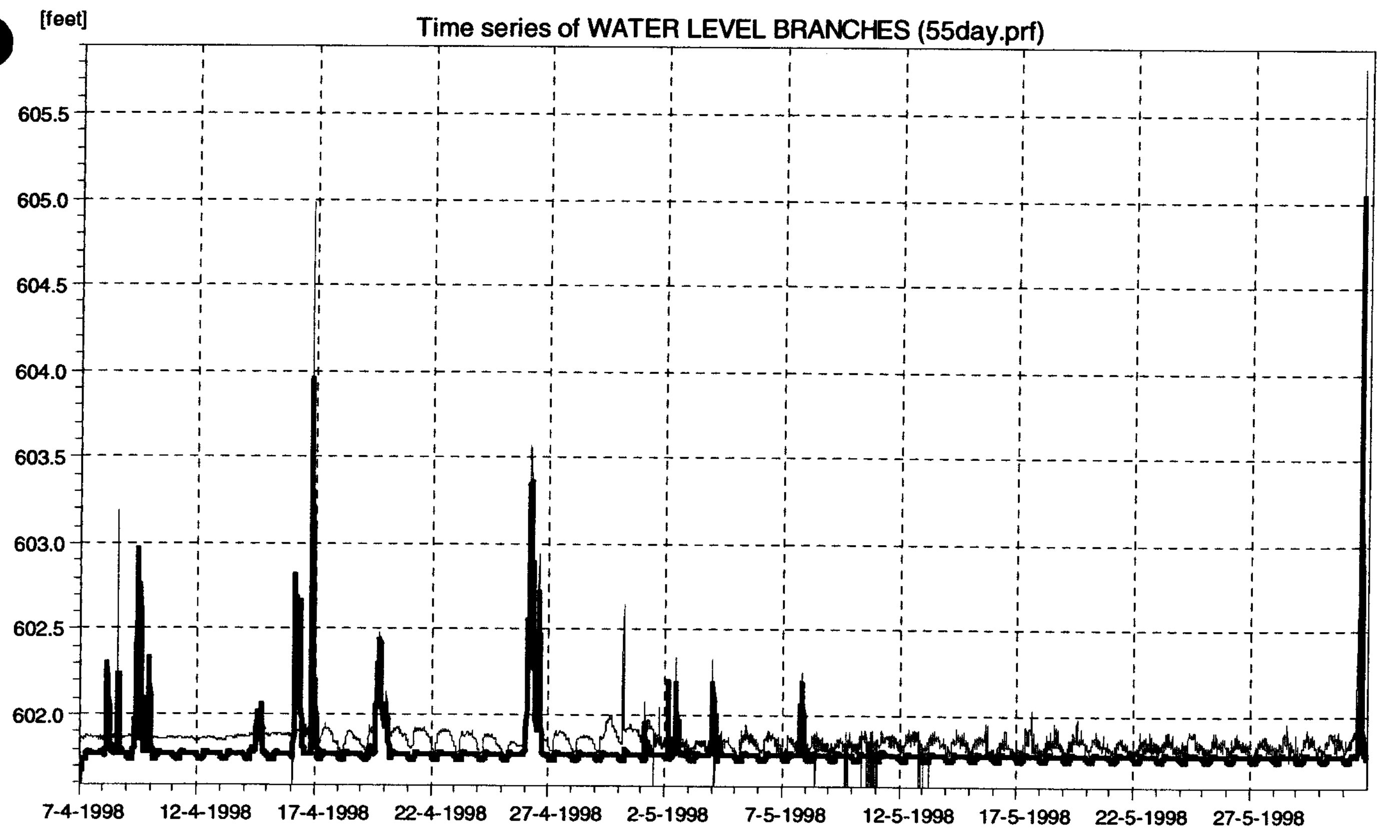
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA16I





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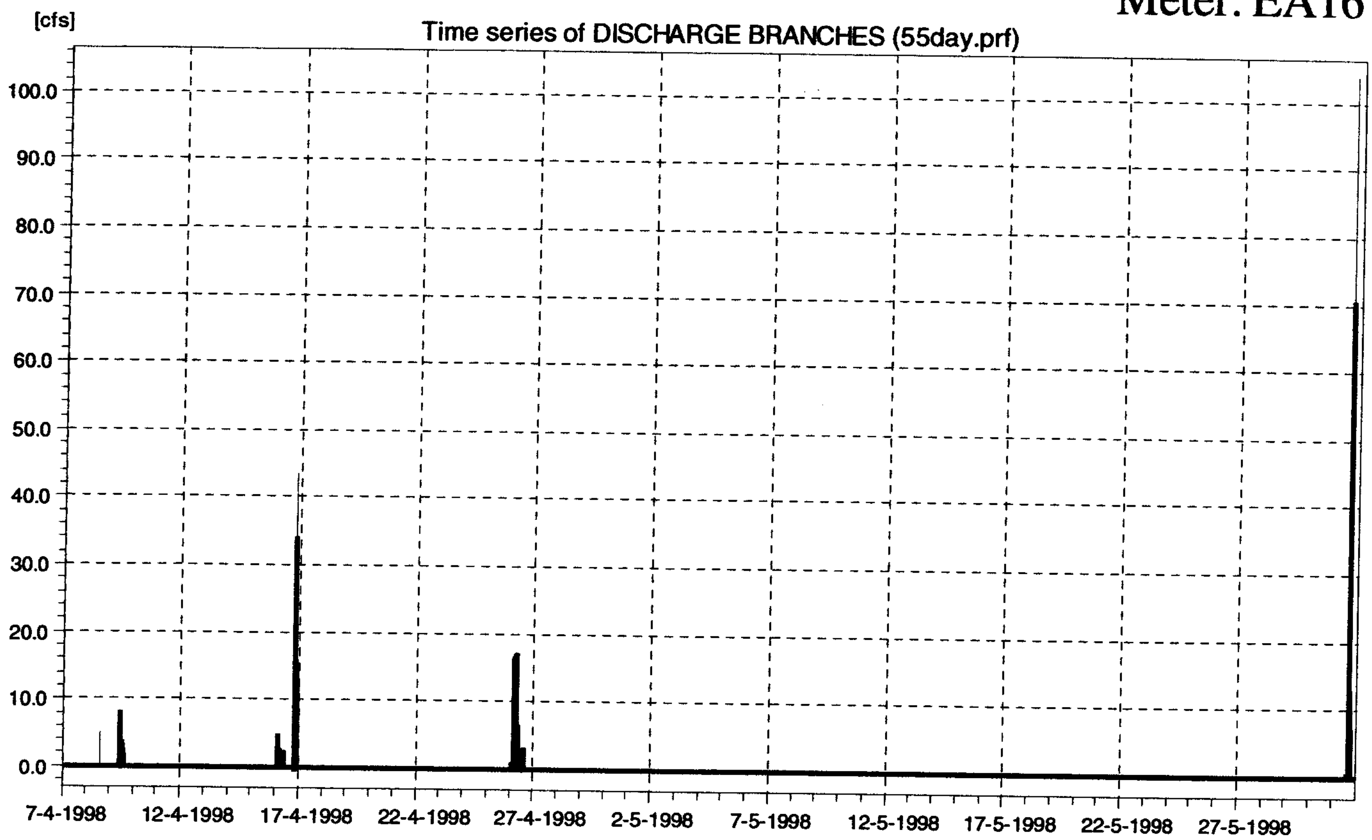
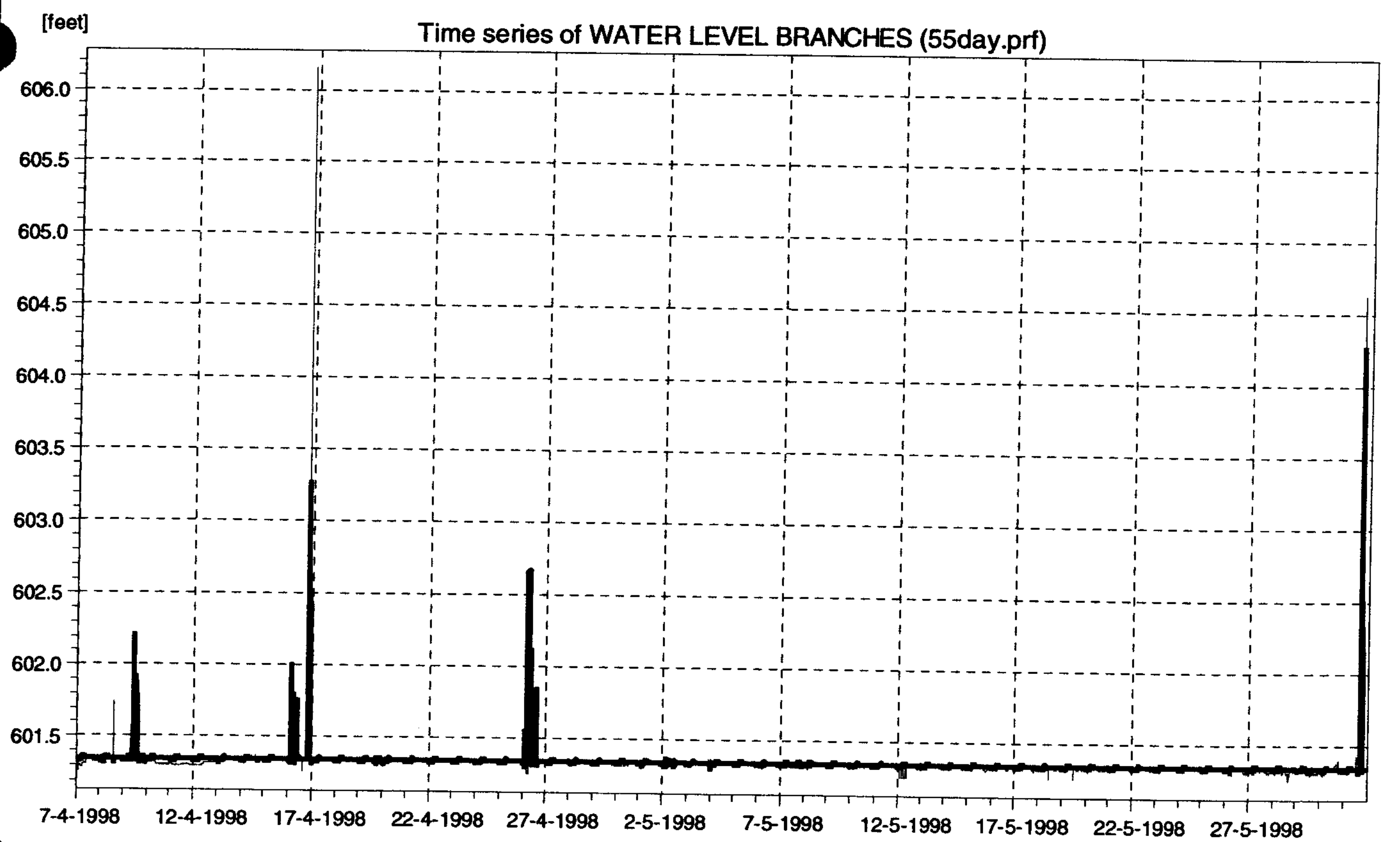
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA16W





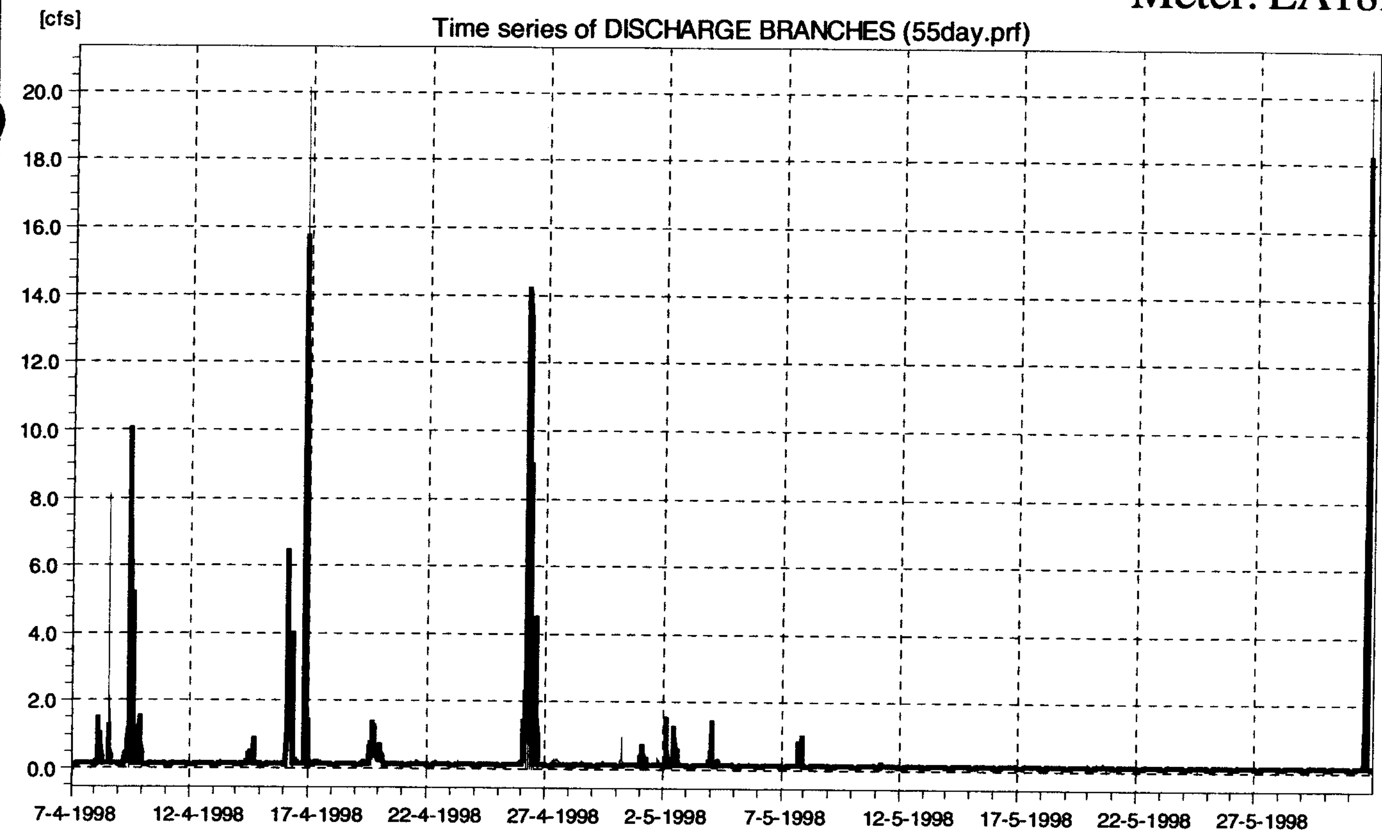
M&E AQUA ALLIANCE Metcalf & Eddy

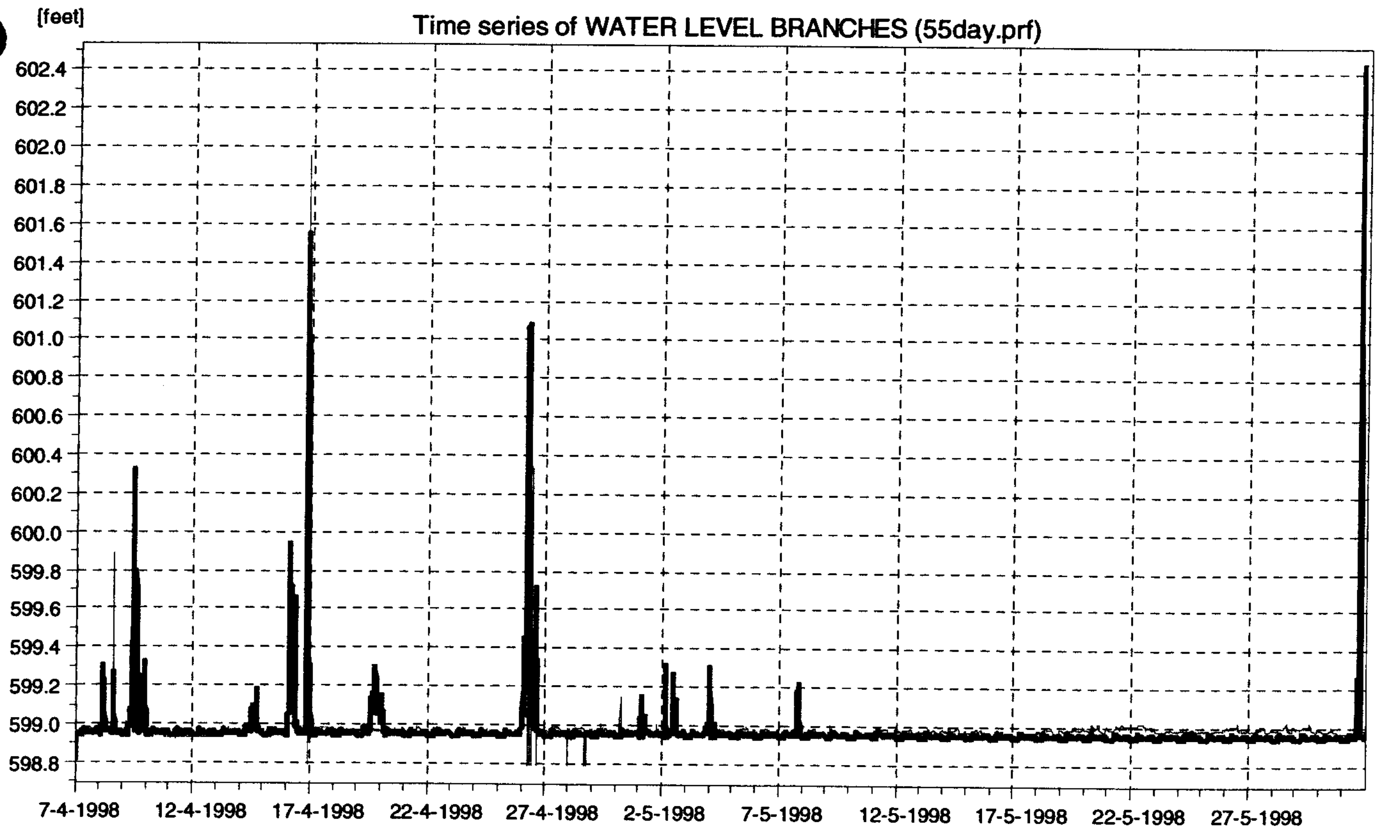
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA18D





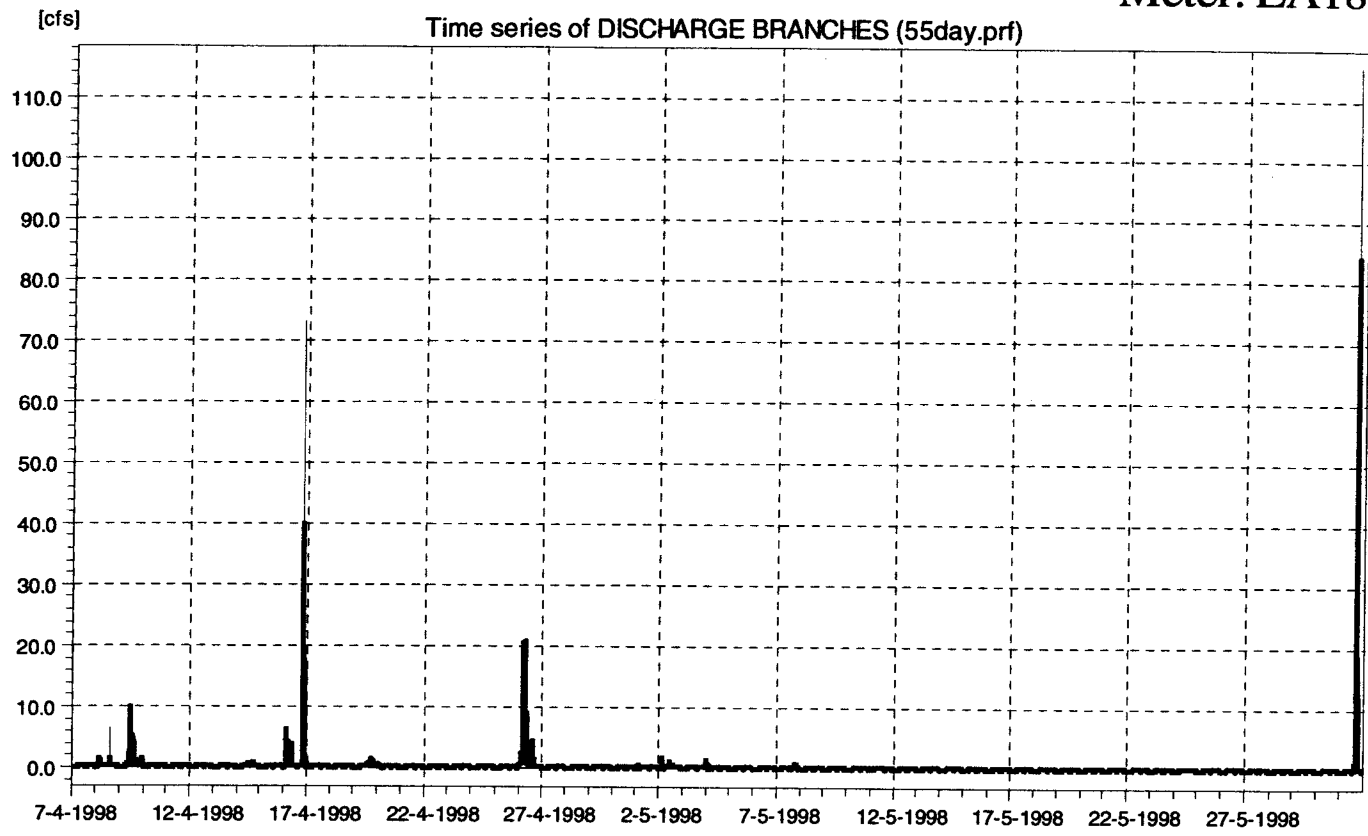
M&E Metcalf & Eddy AQUA ALLIANCE

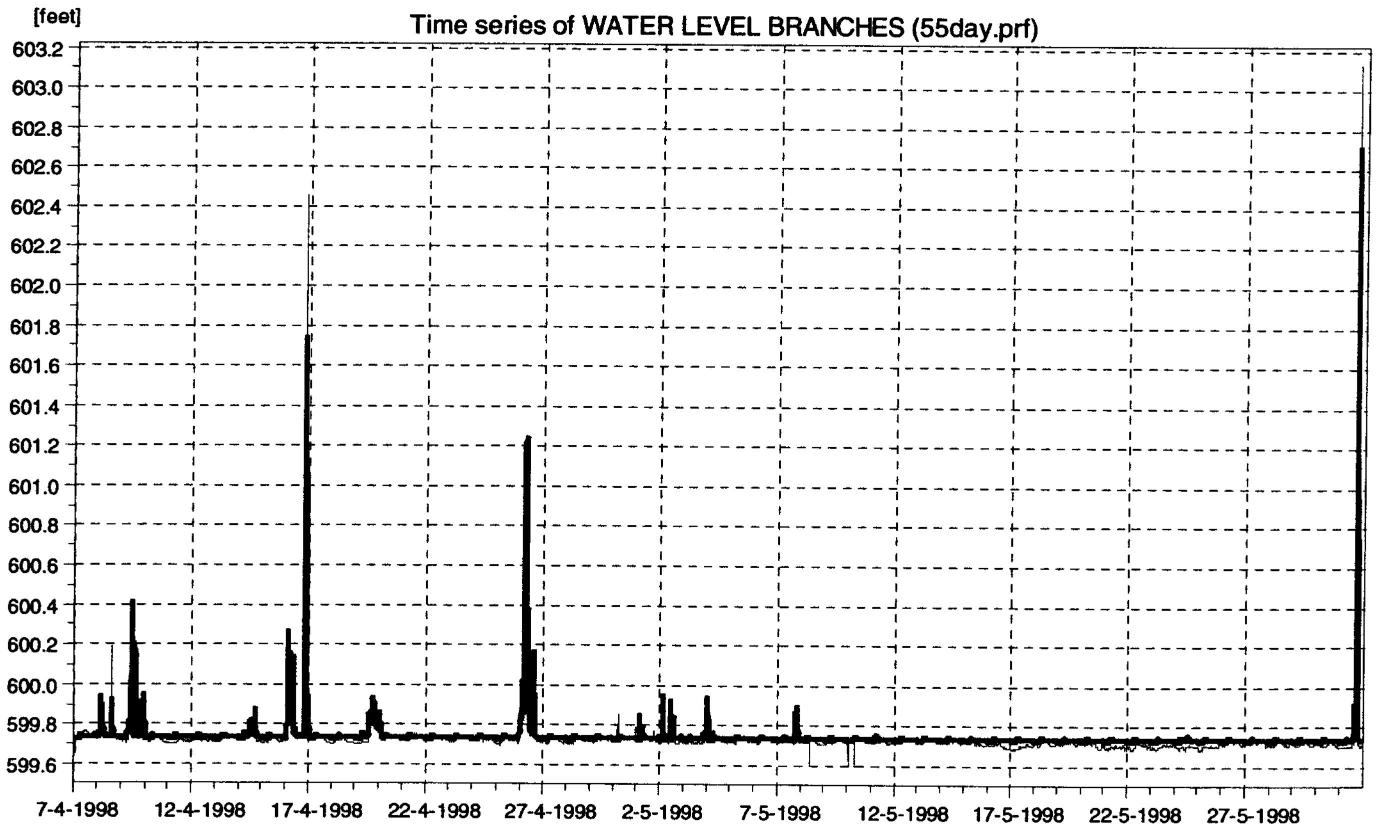
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA18I





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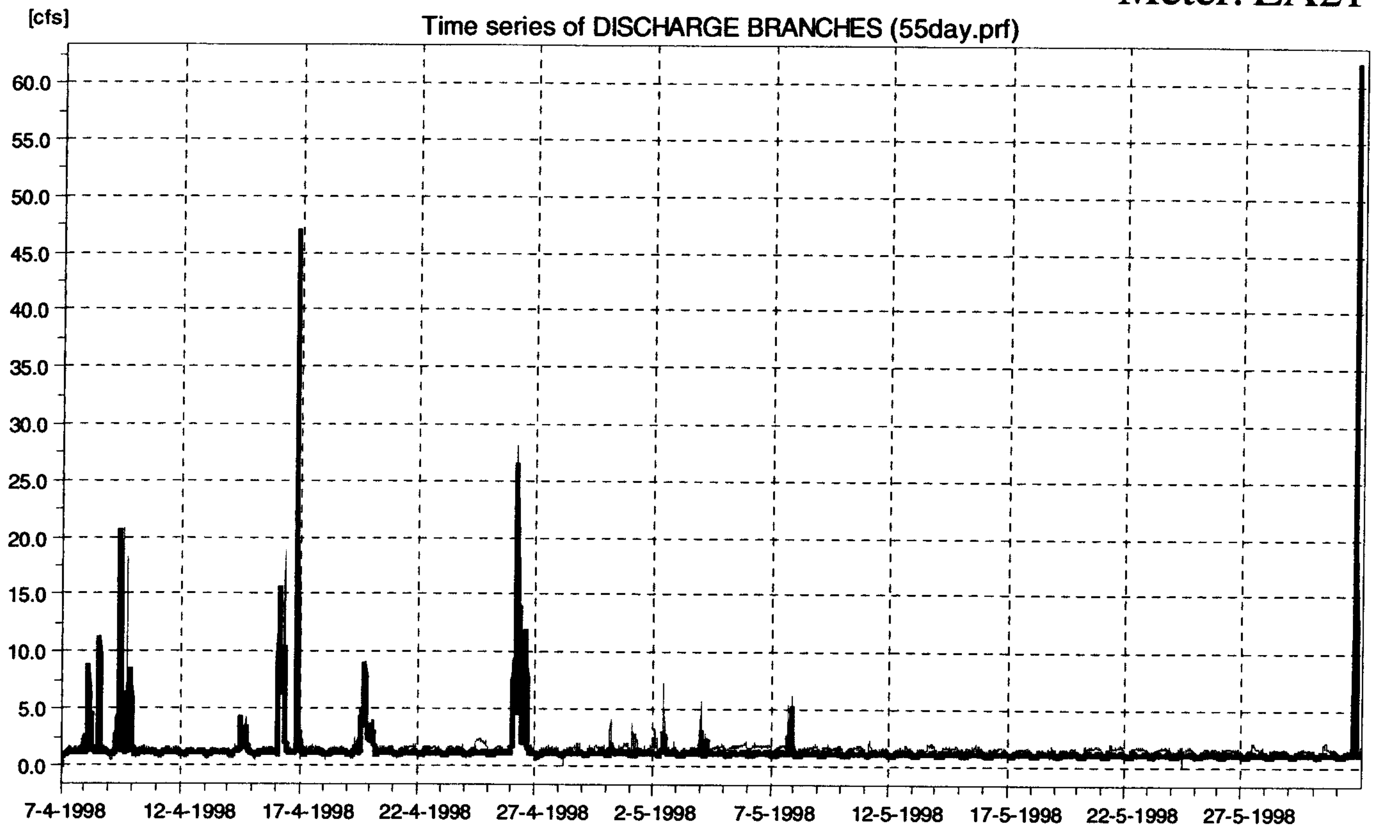
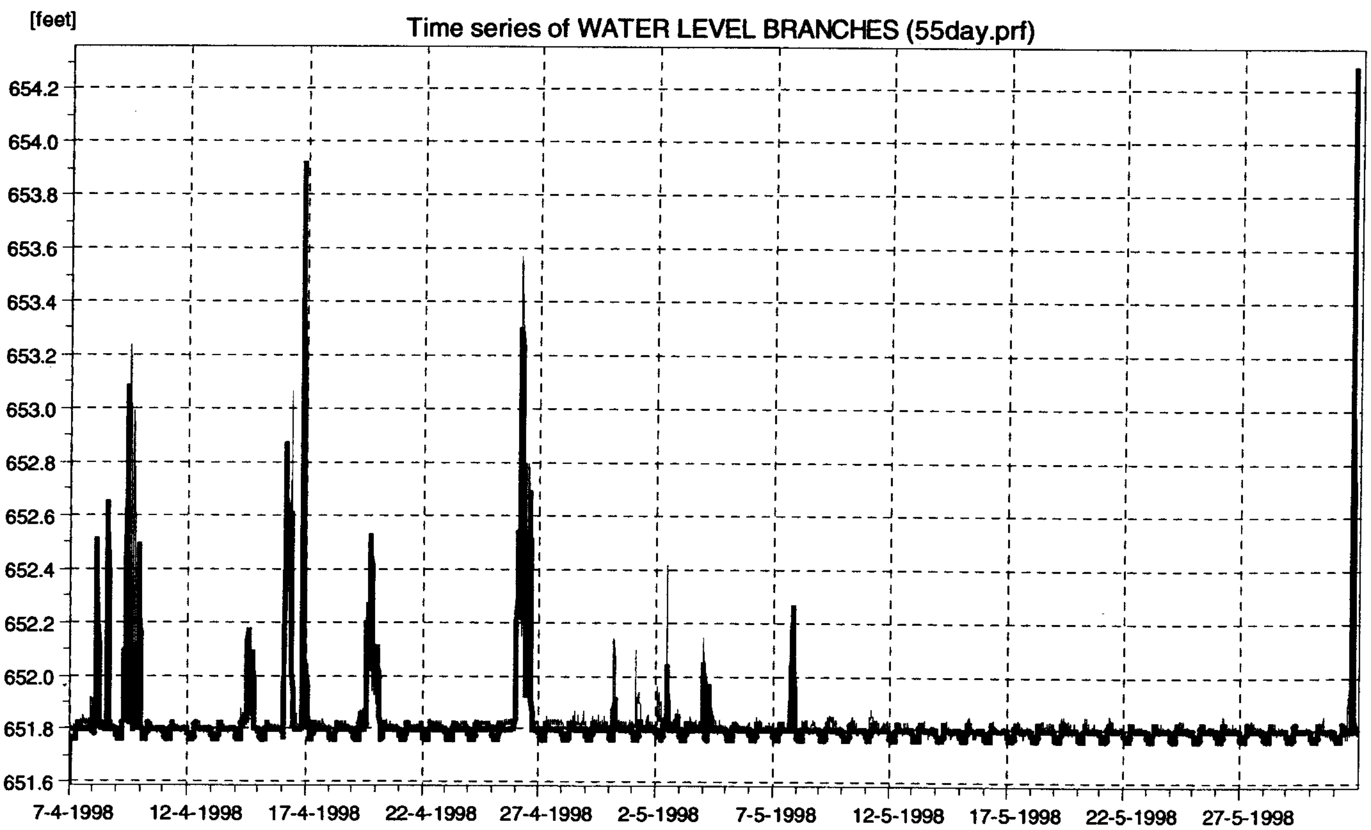
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA21





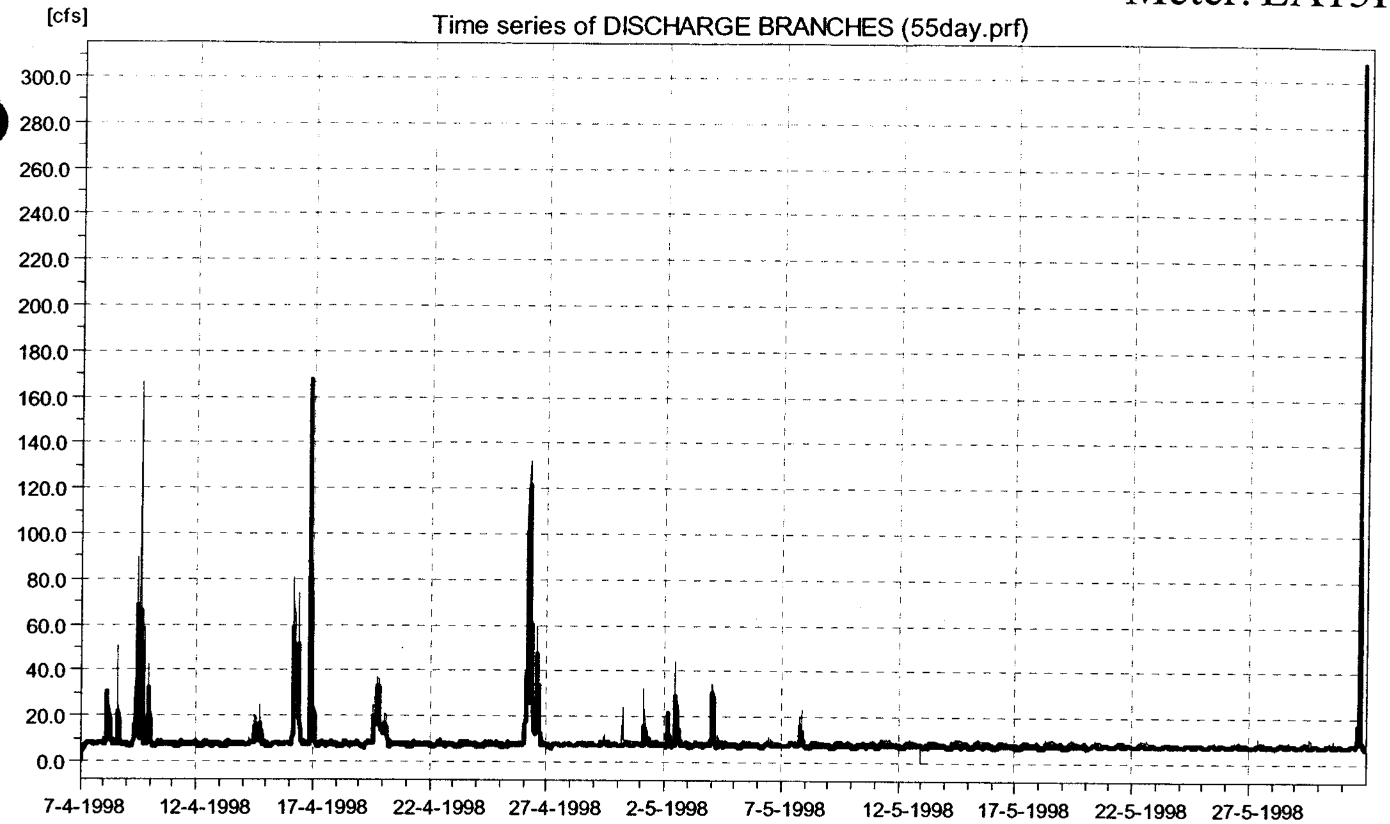
M&E Metcalf & Eddy AQUA ALLIANCE

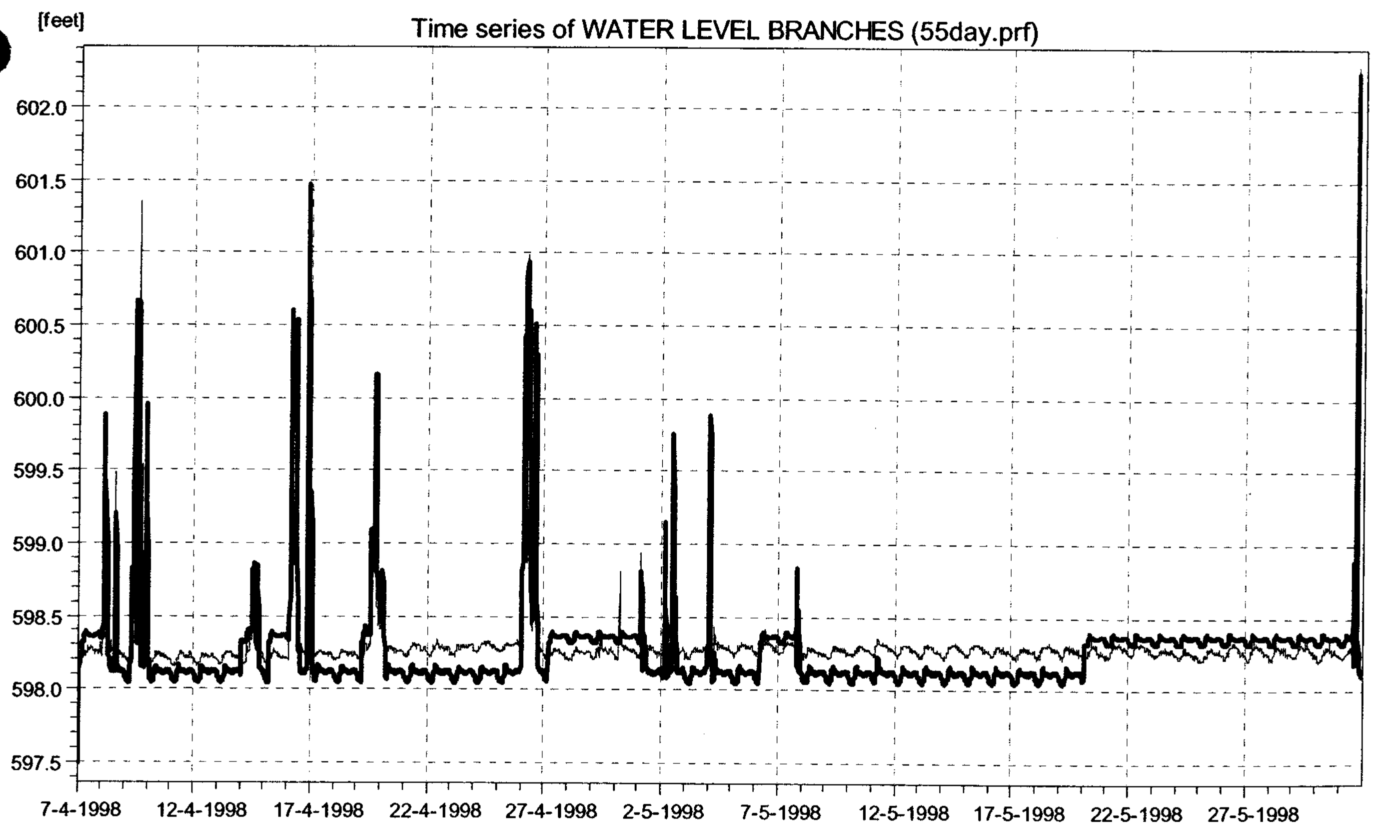
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA15I





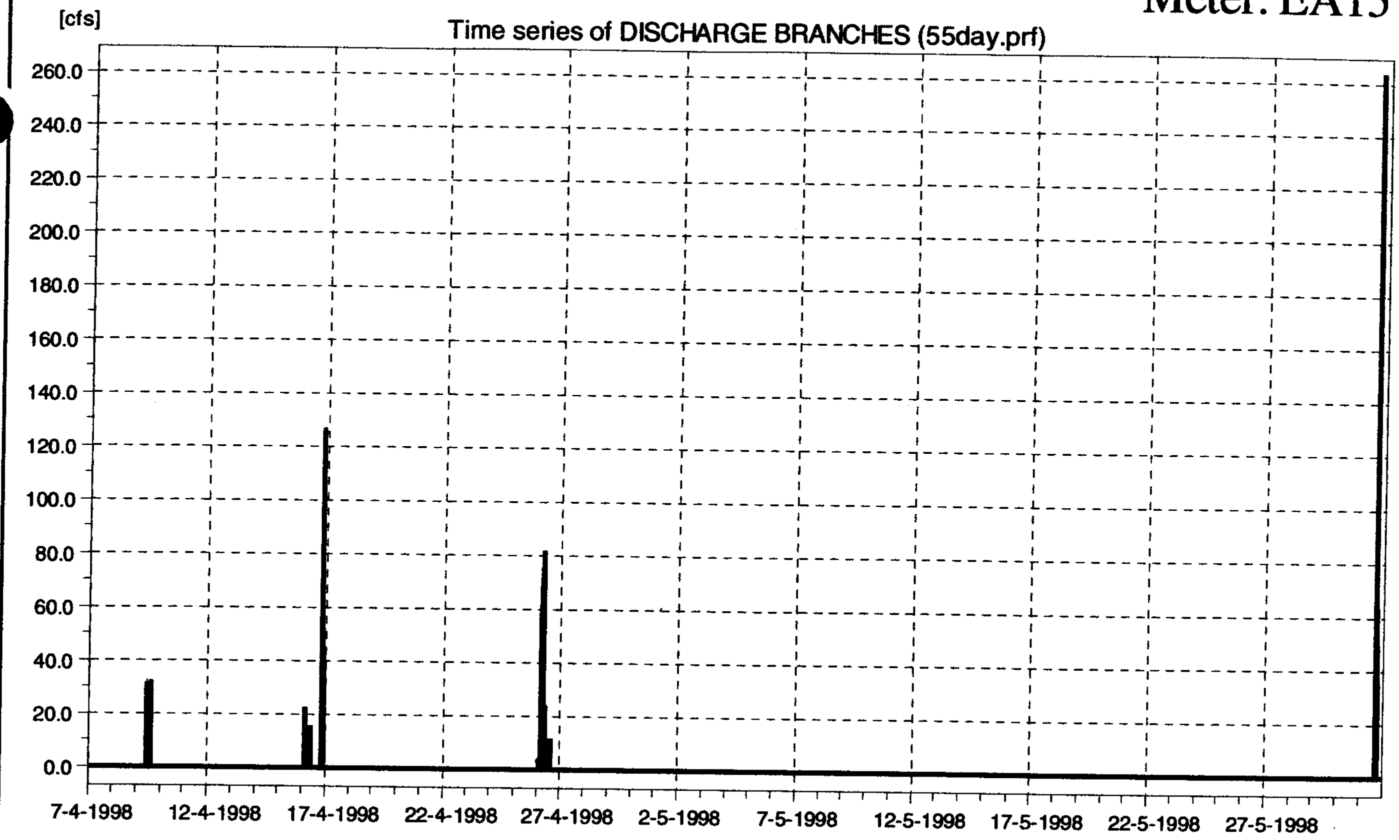
M&E Metcalf & Eddy AQUA ALLIANCE

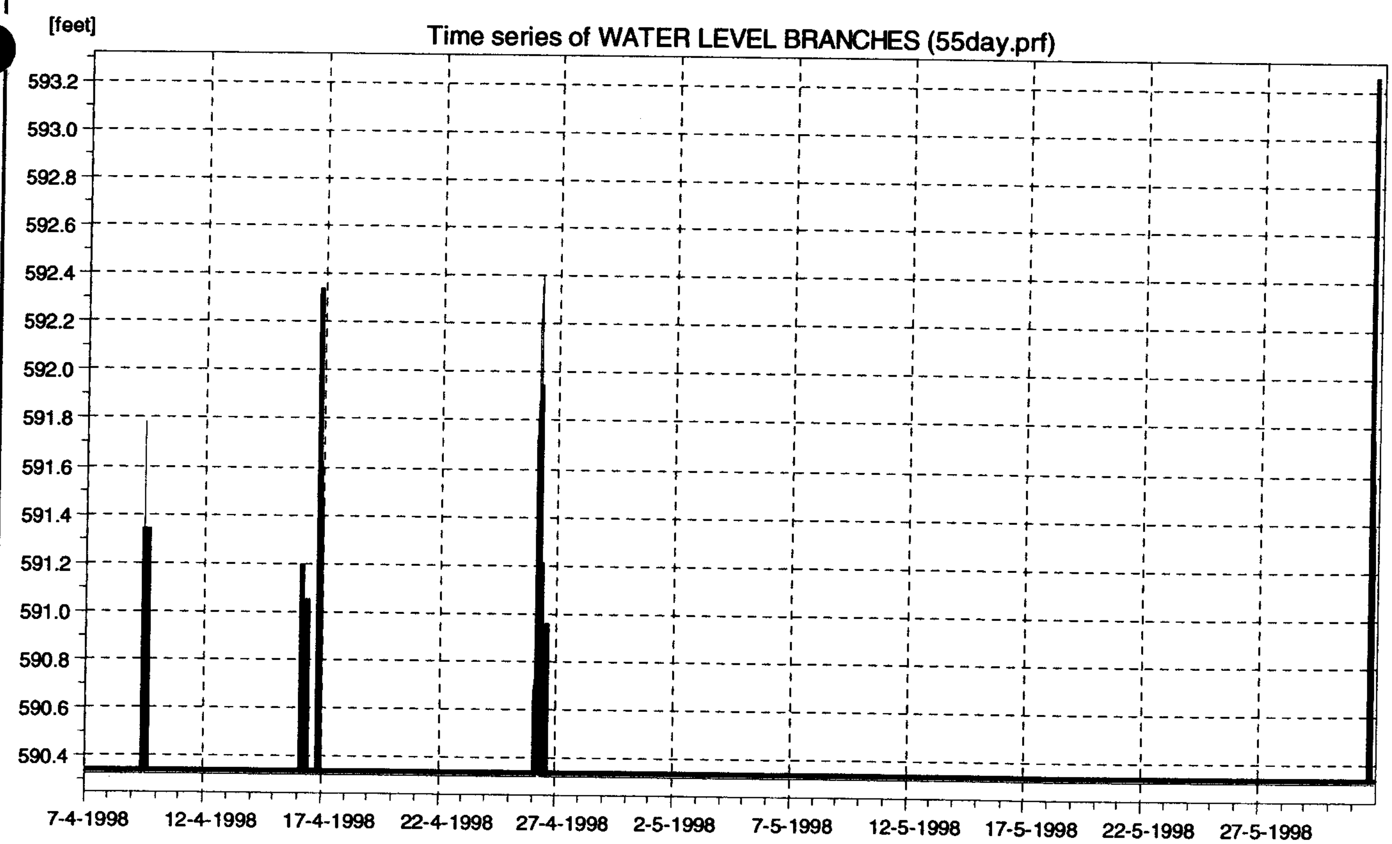
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA15W





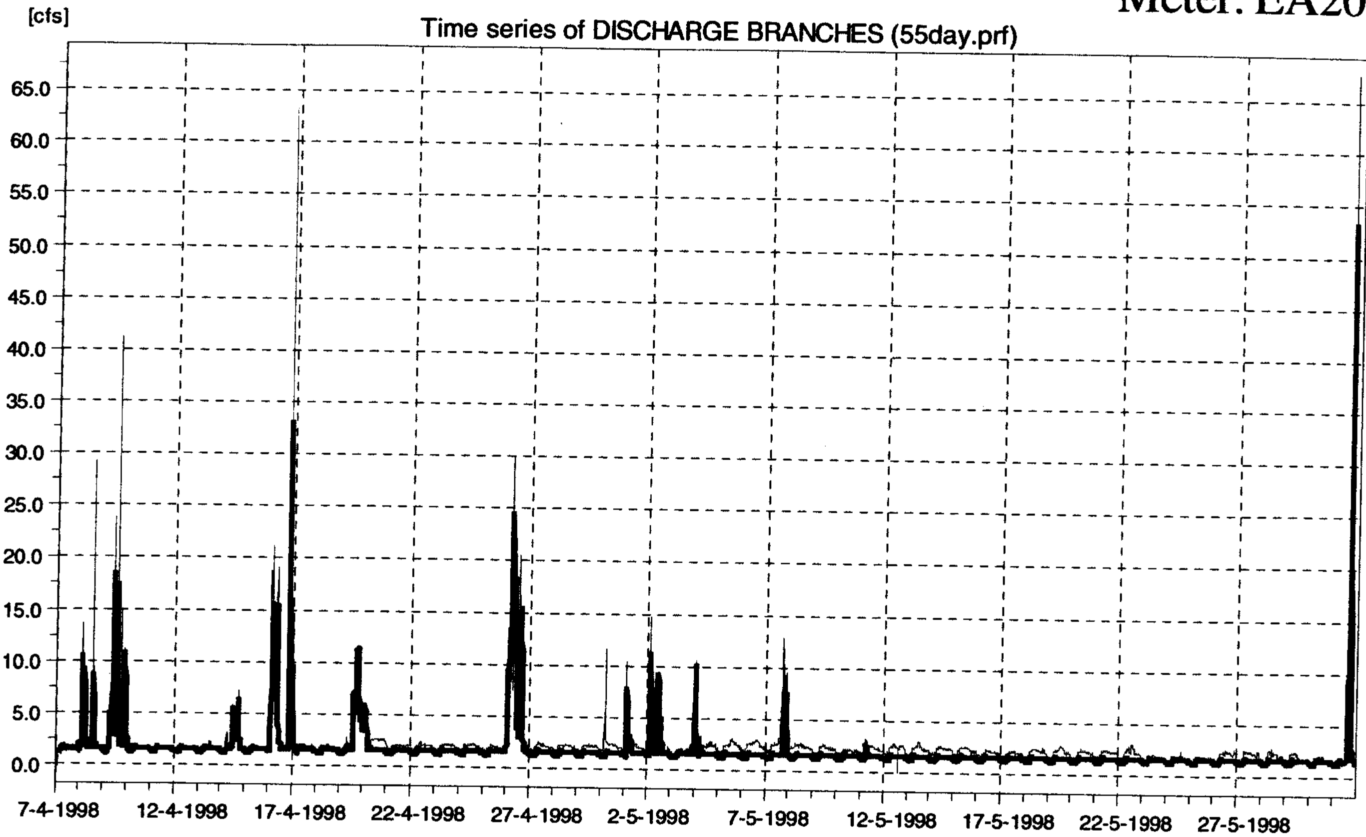
M&E Metcalf & Eddy
AQUA ALLIANCE

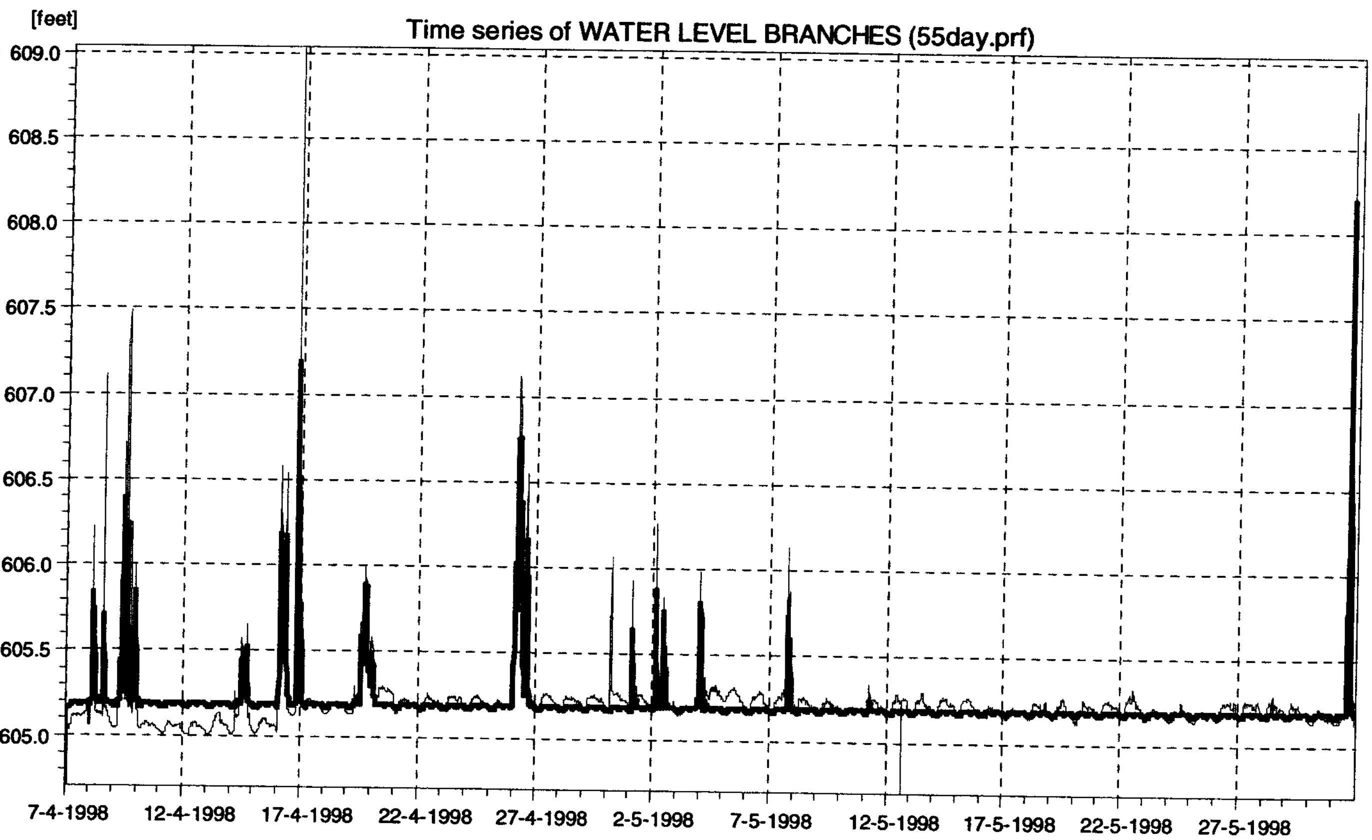
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA20I





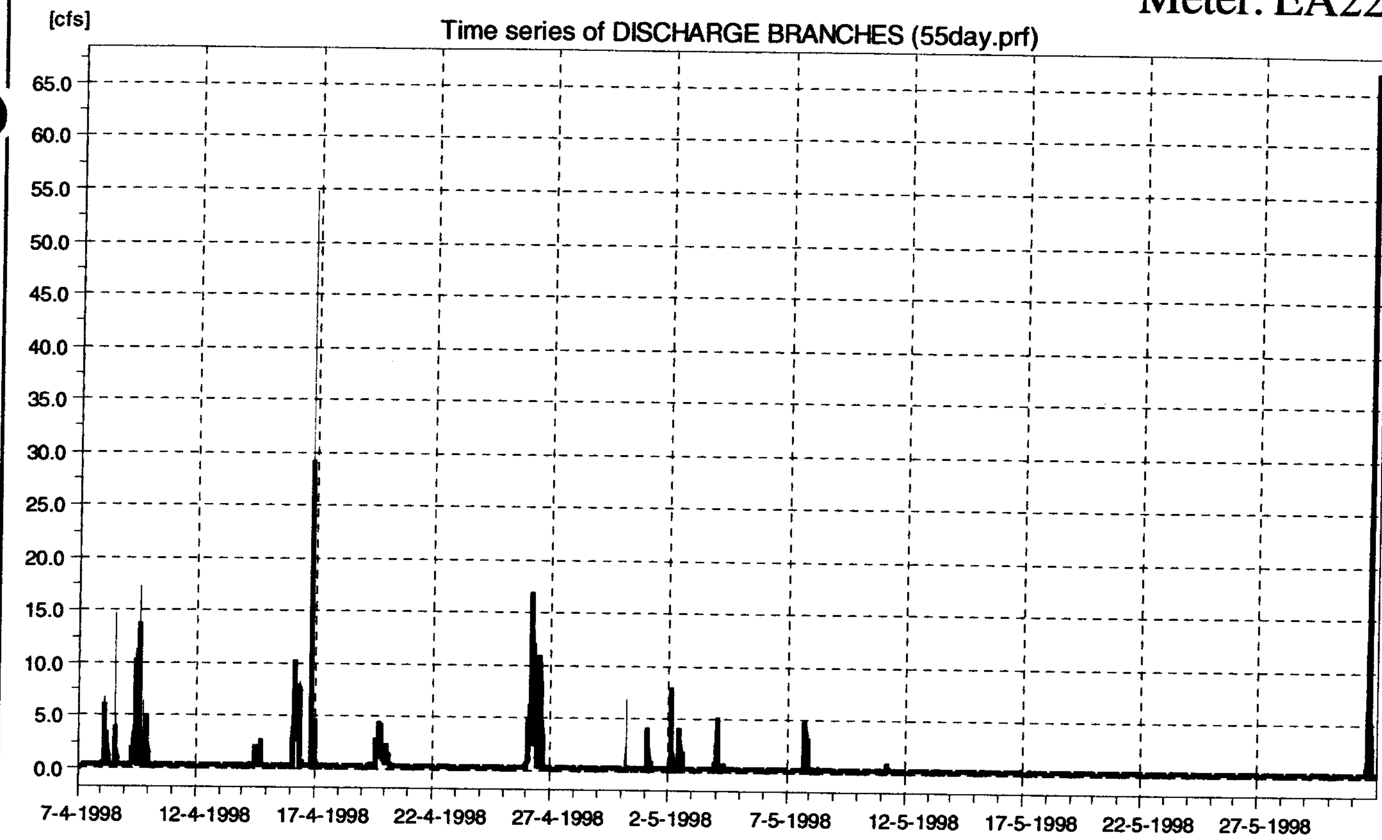
M&E Metcalf & Eddy AQUA ALLIANCE

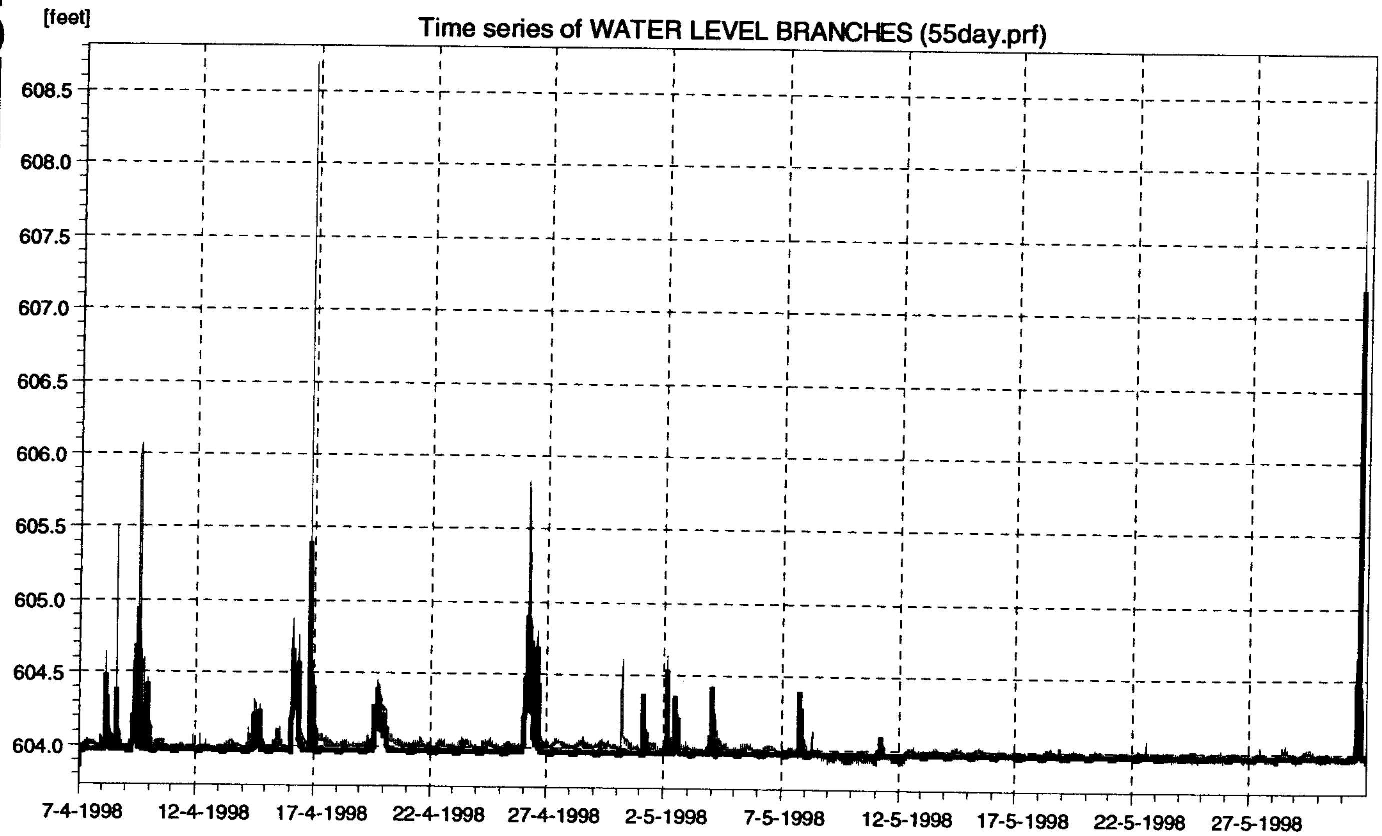
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA22I





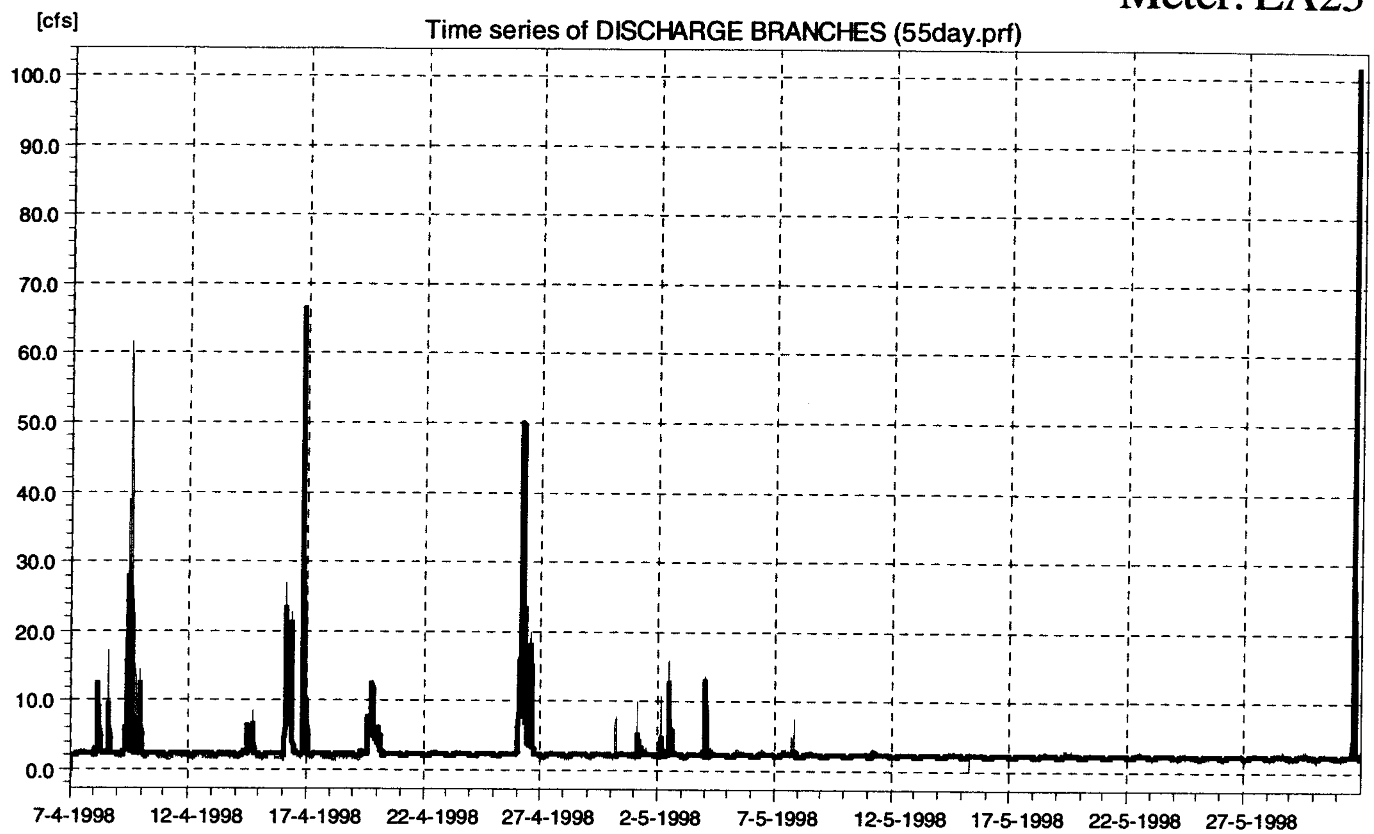
M&E AQUA ALLIANCE Metcalf & Eddy

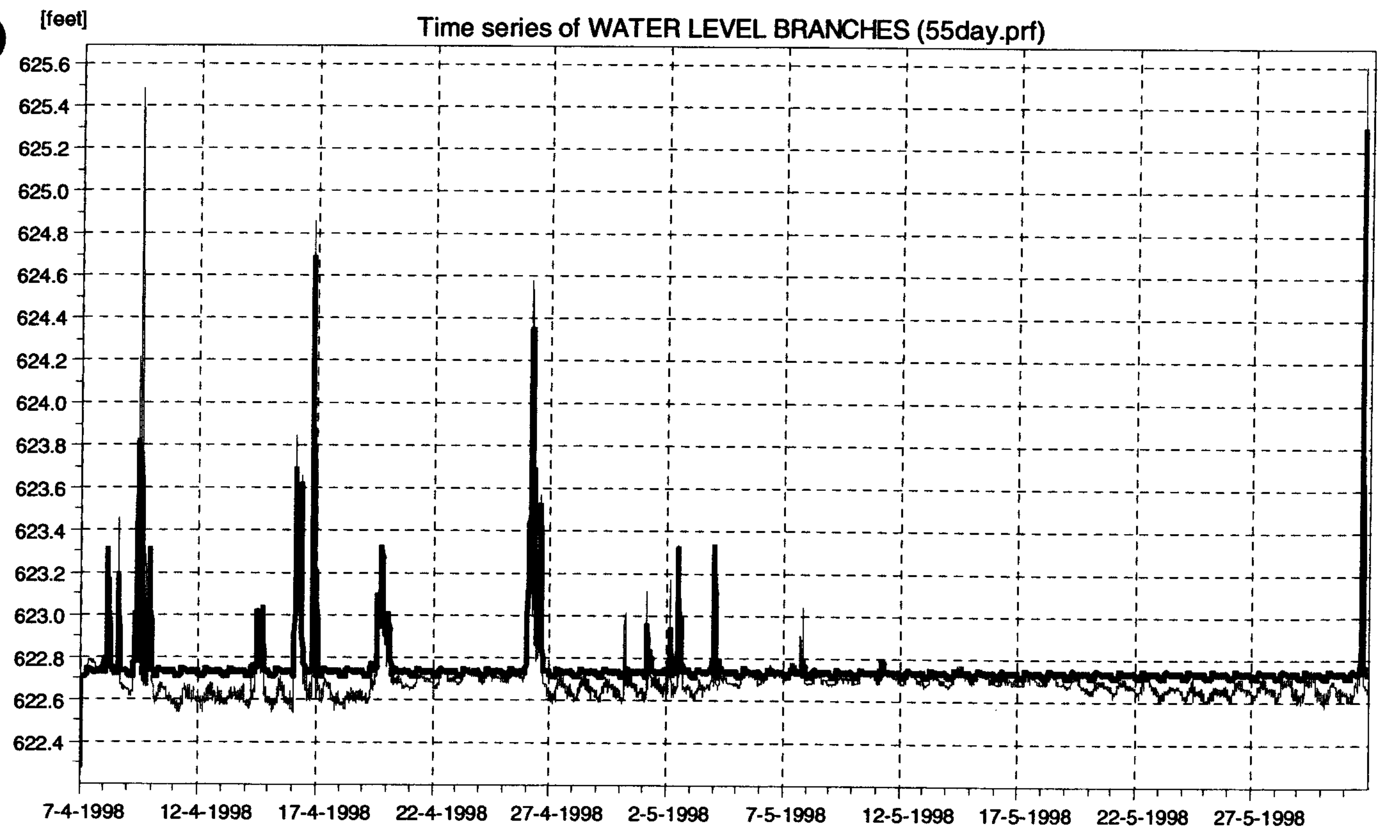
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA23





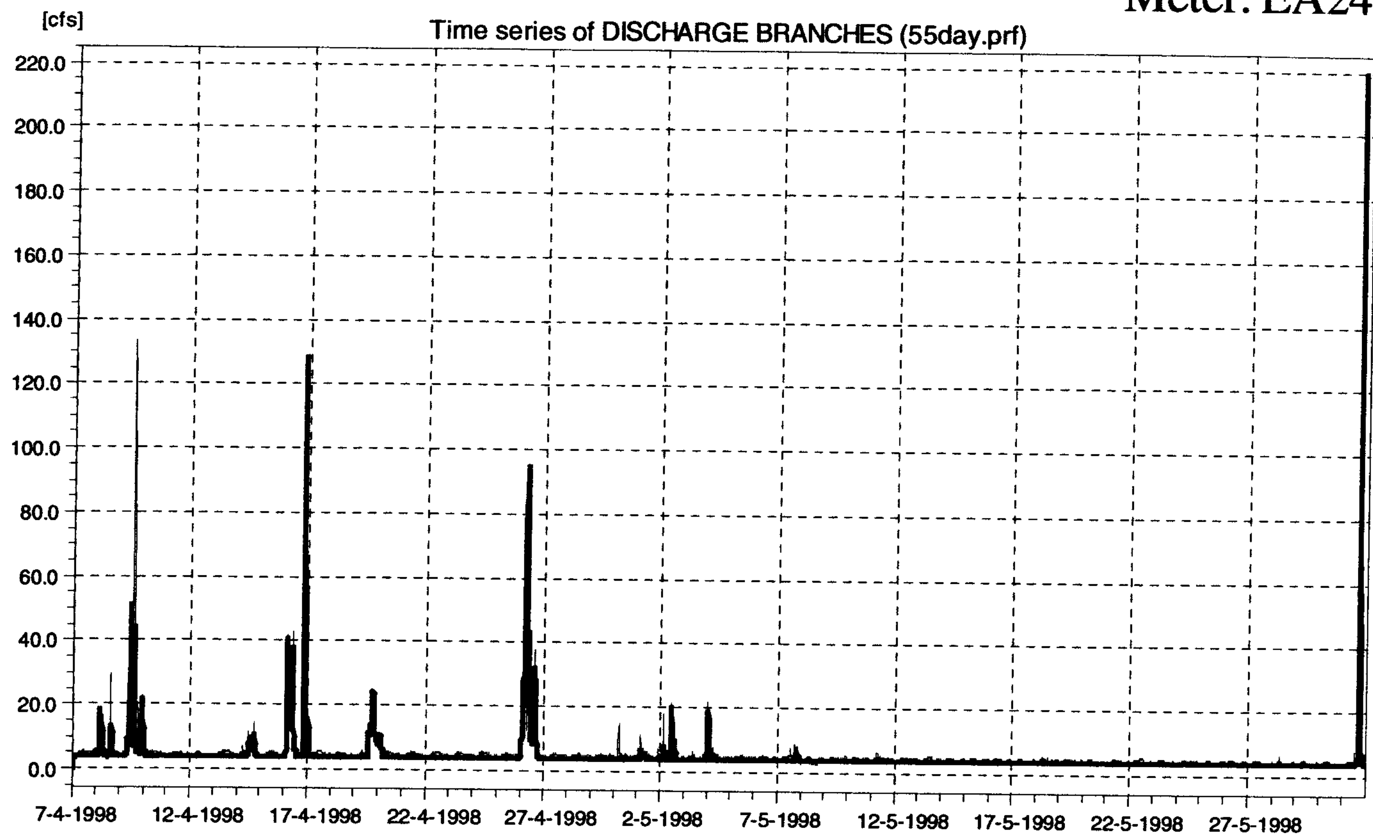
Metcalf & Eddy

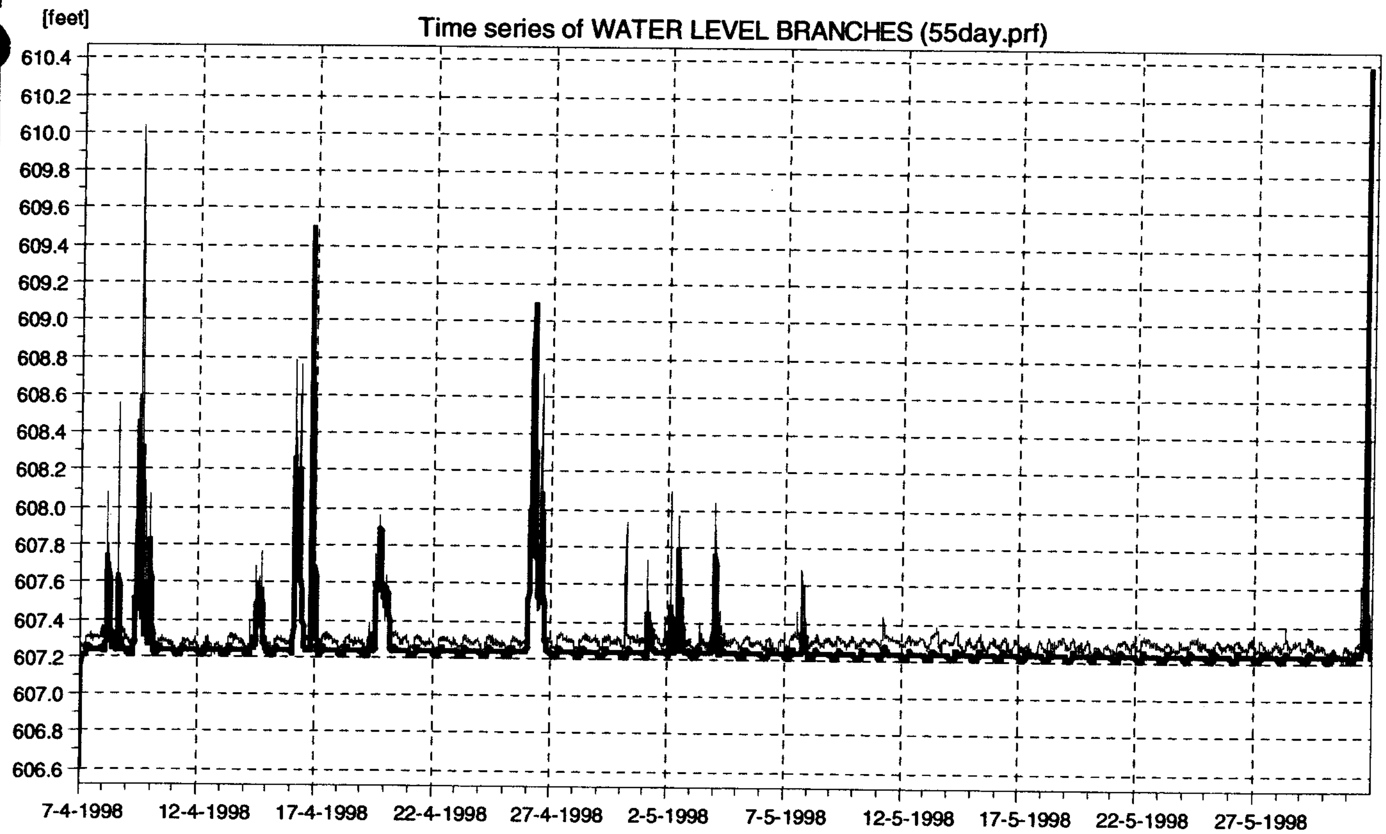
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA24I





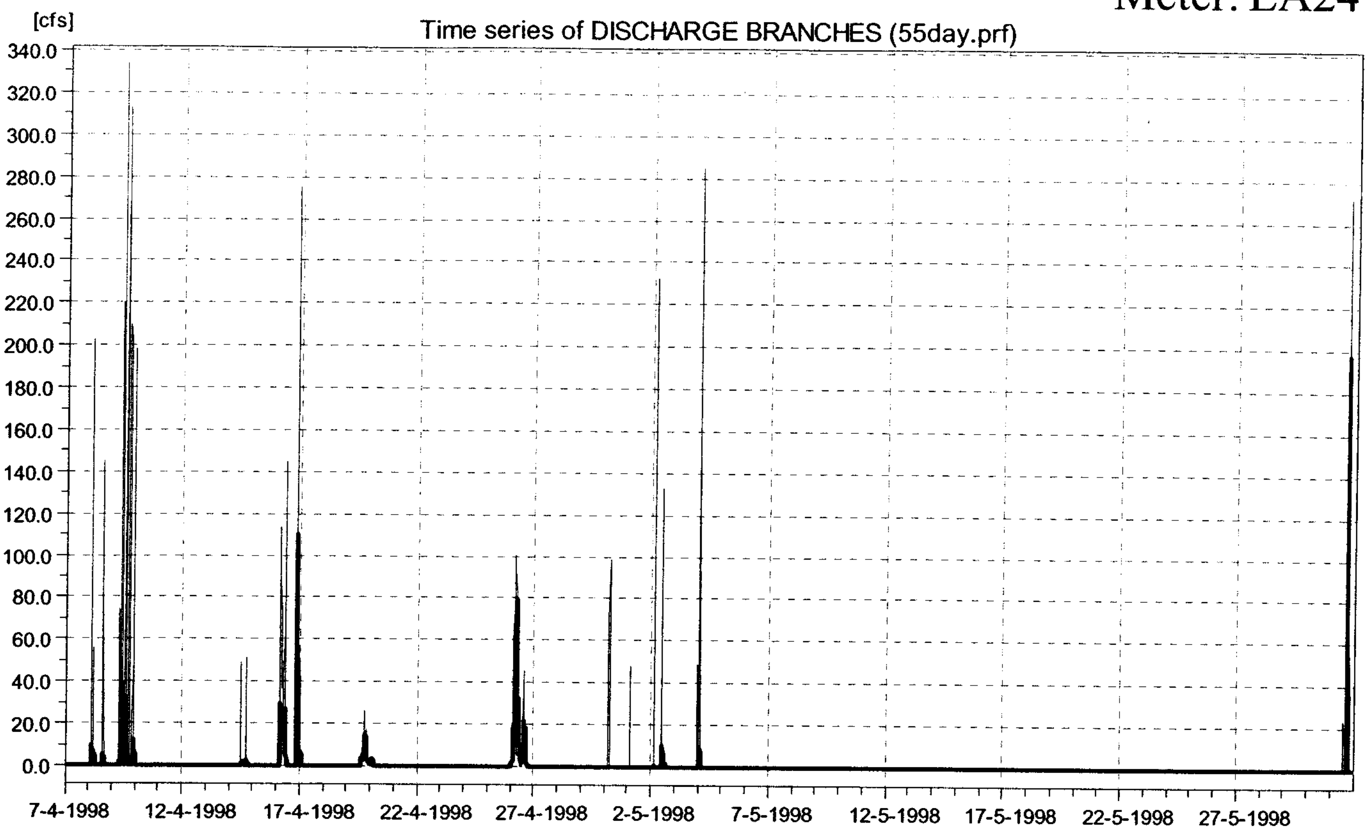
Metcalf & Eddy

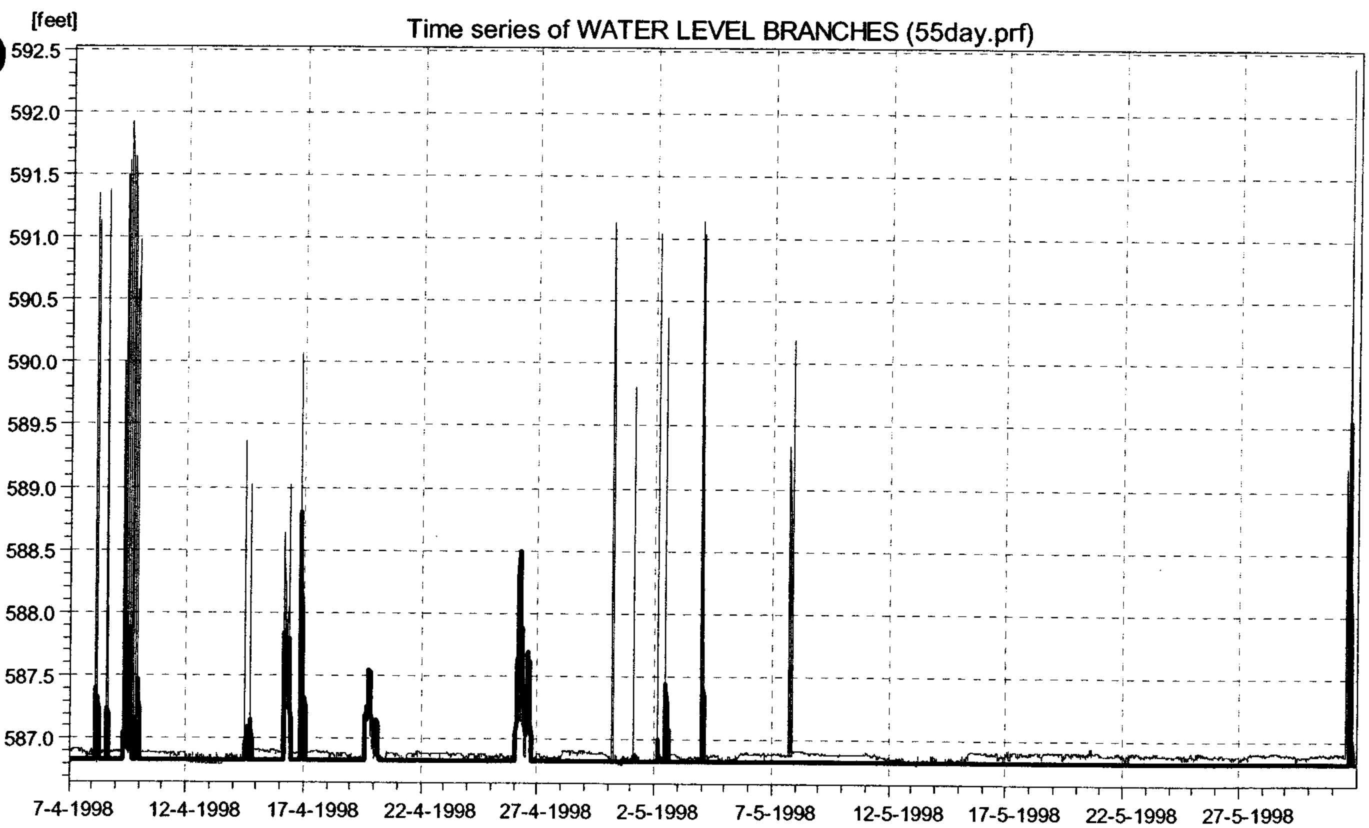
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA24W





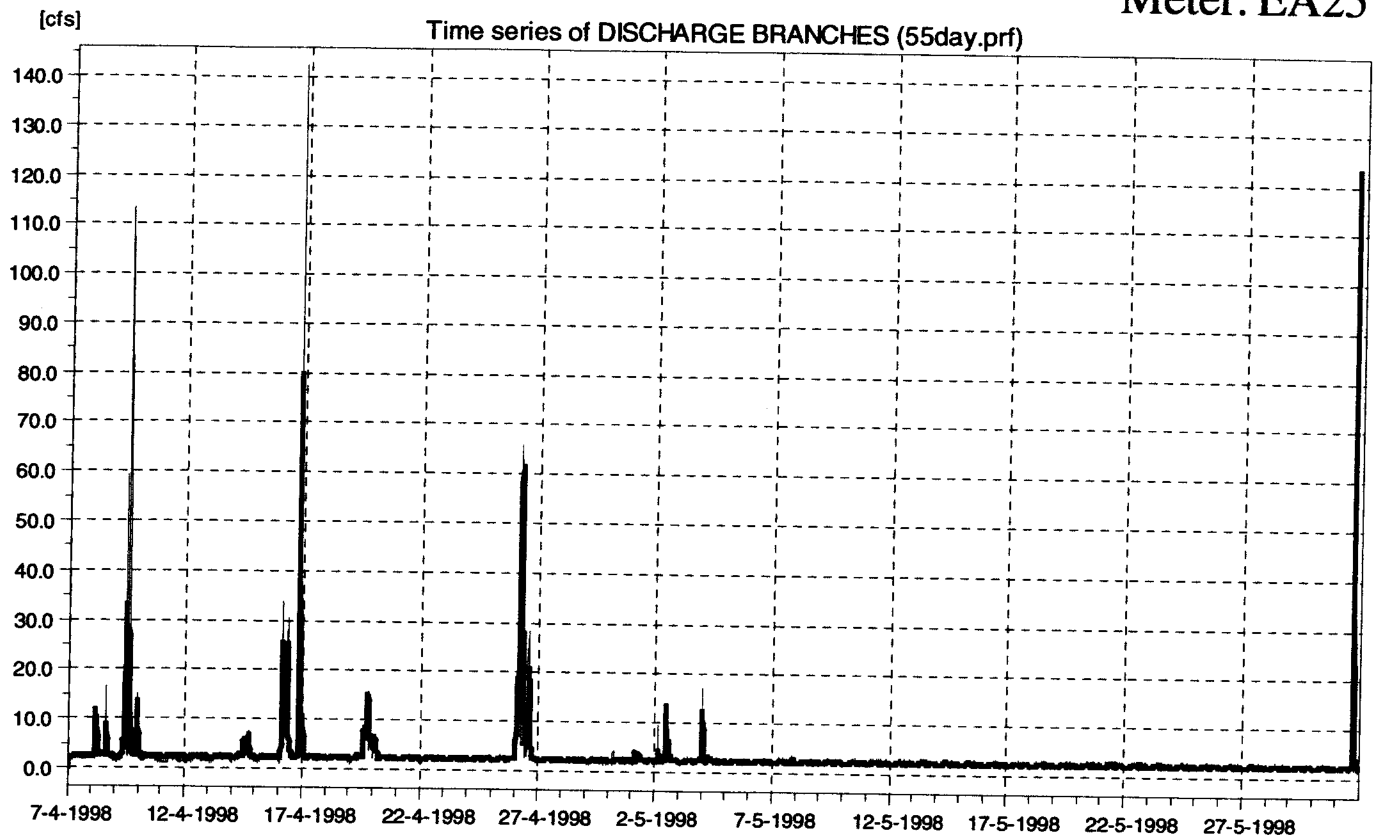
M&E Metcalf & Eddy AQUA ALLIANCE

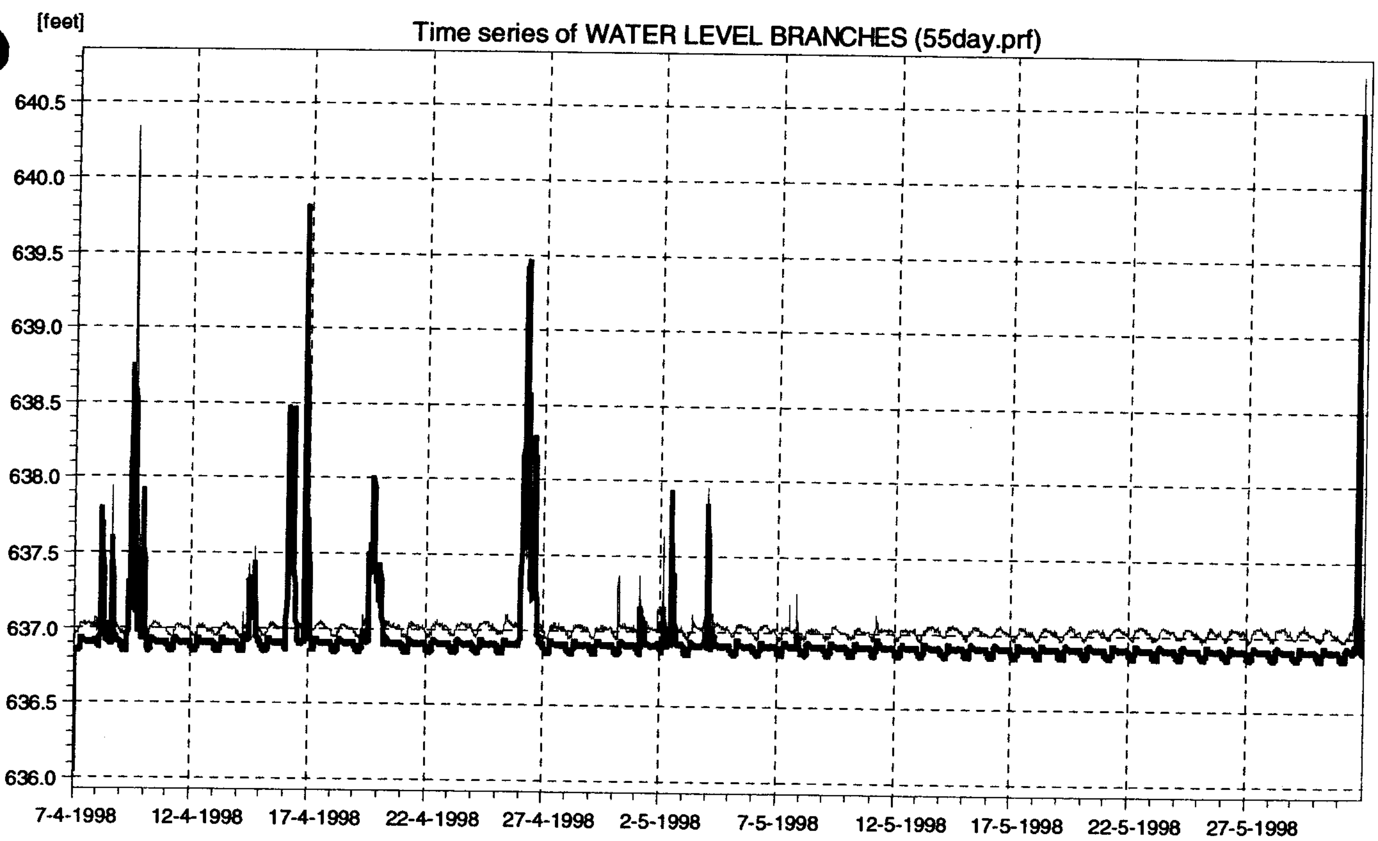
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA25





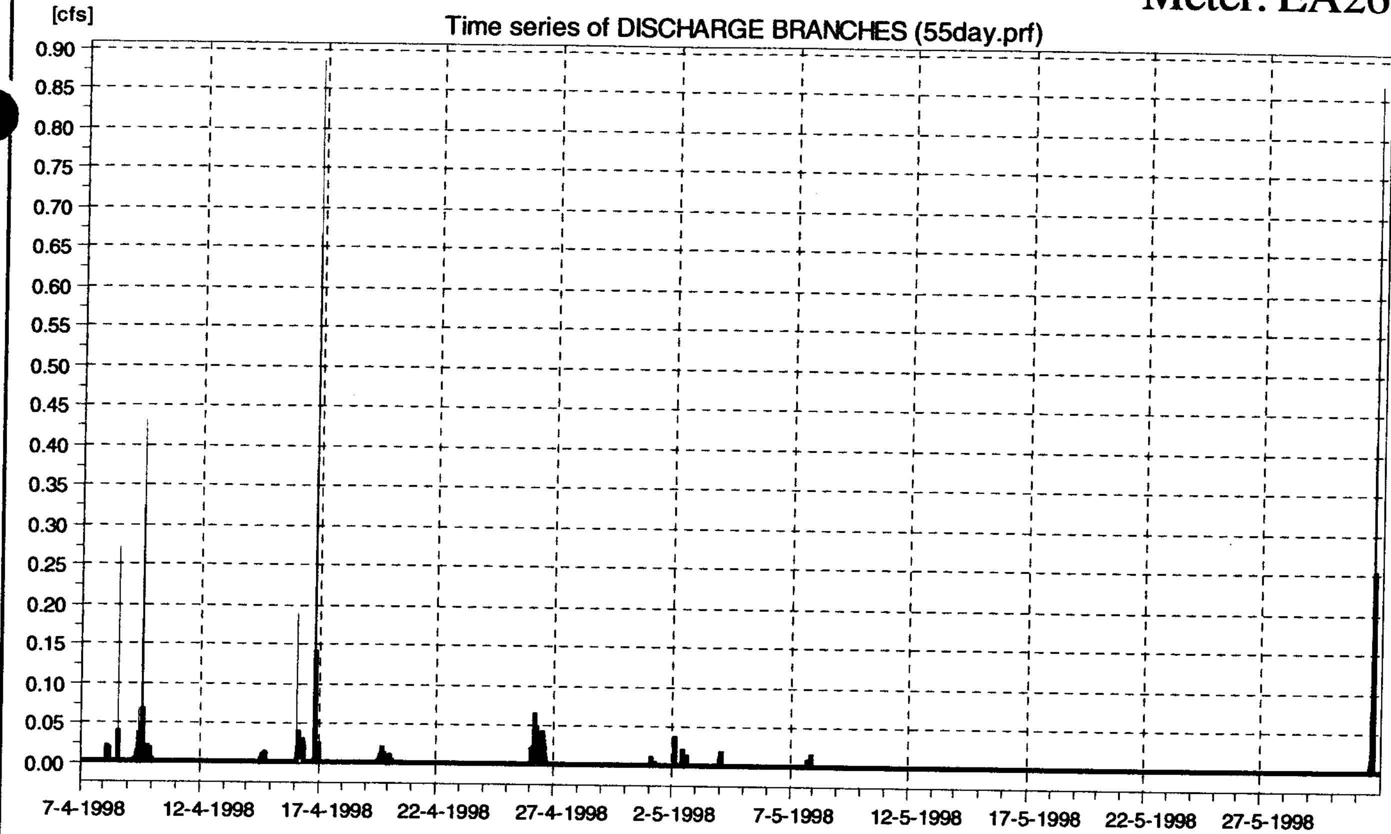
M&E Metcalf & Eddy AQUA ALLIANCE

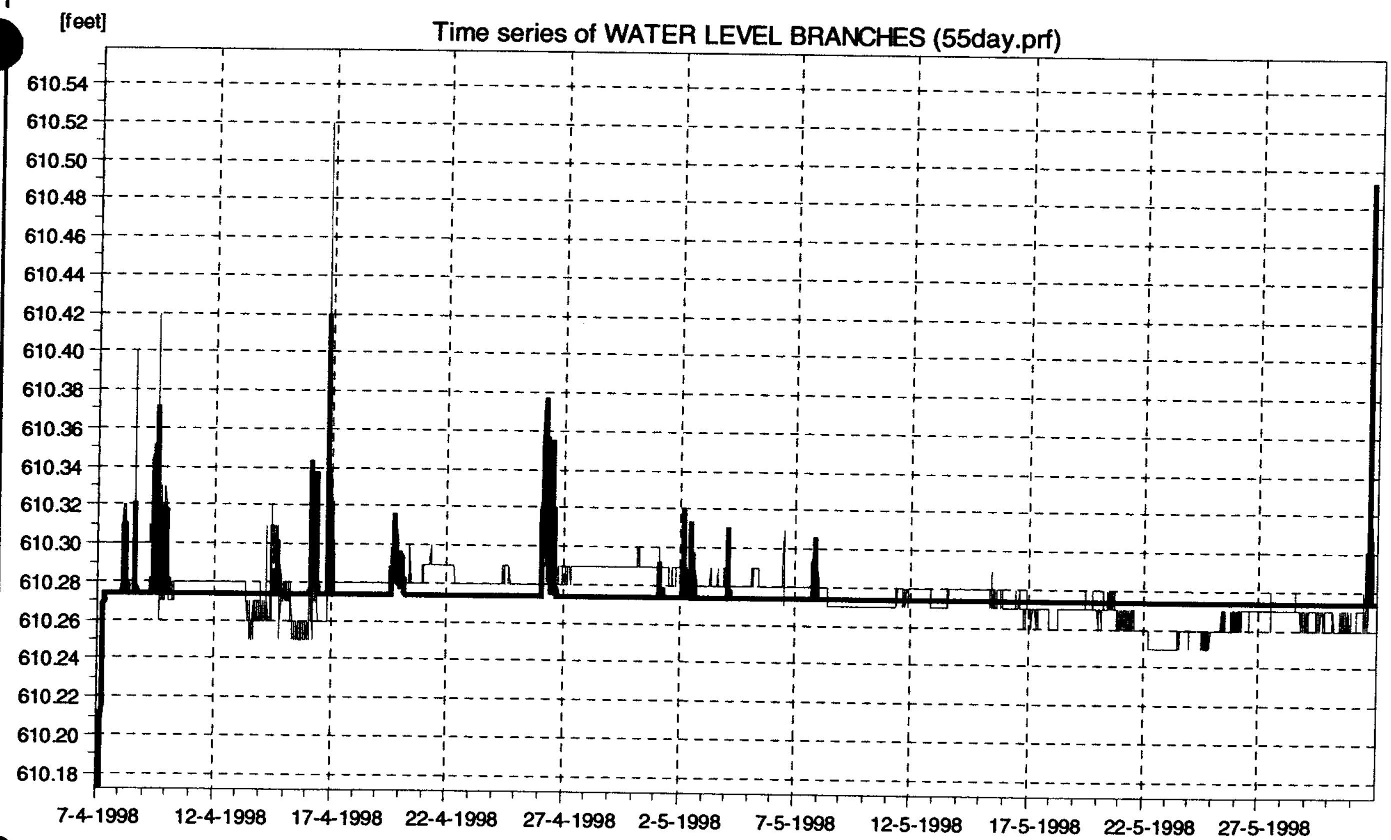
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA26I





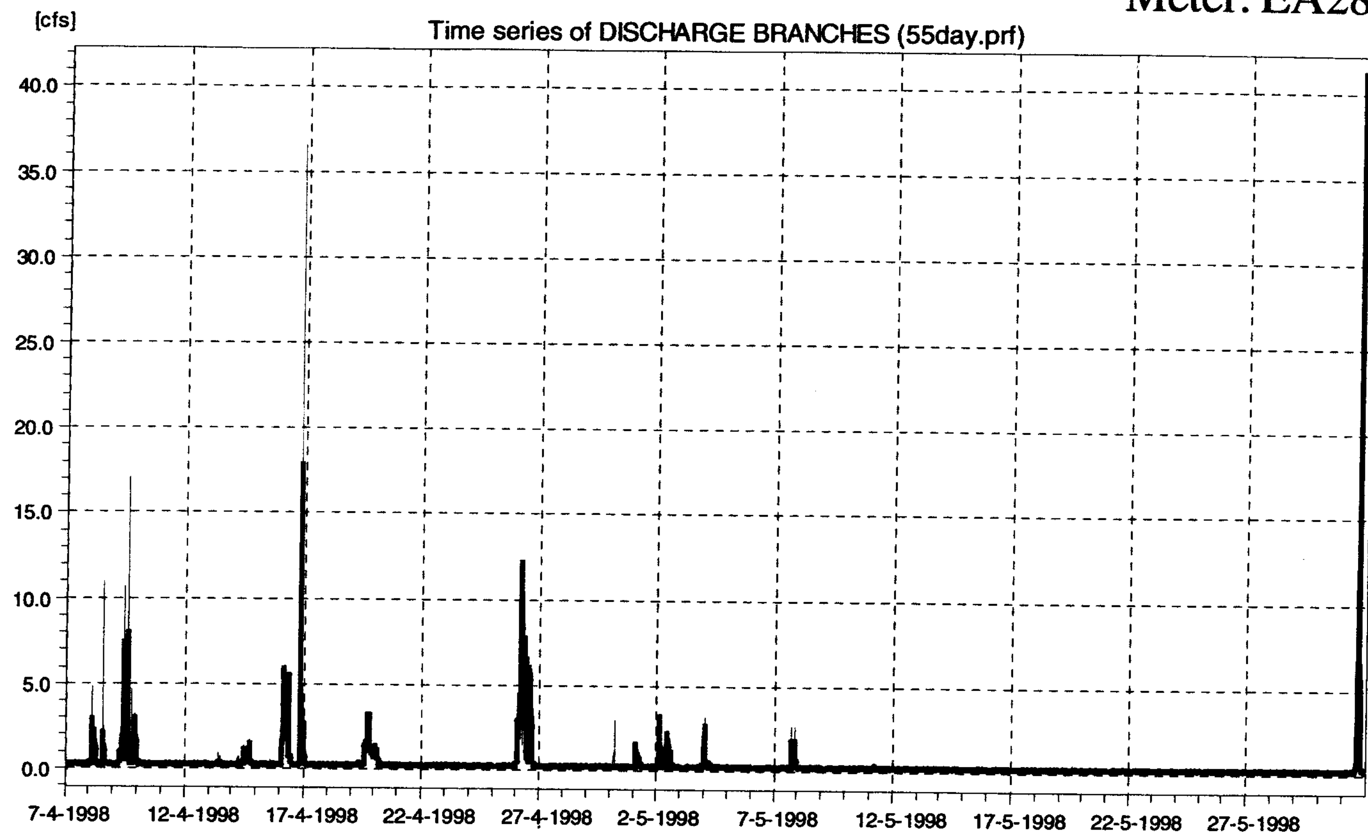
M&E AQUA ALLIANCE Metcalf & Eddy

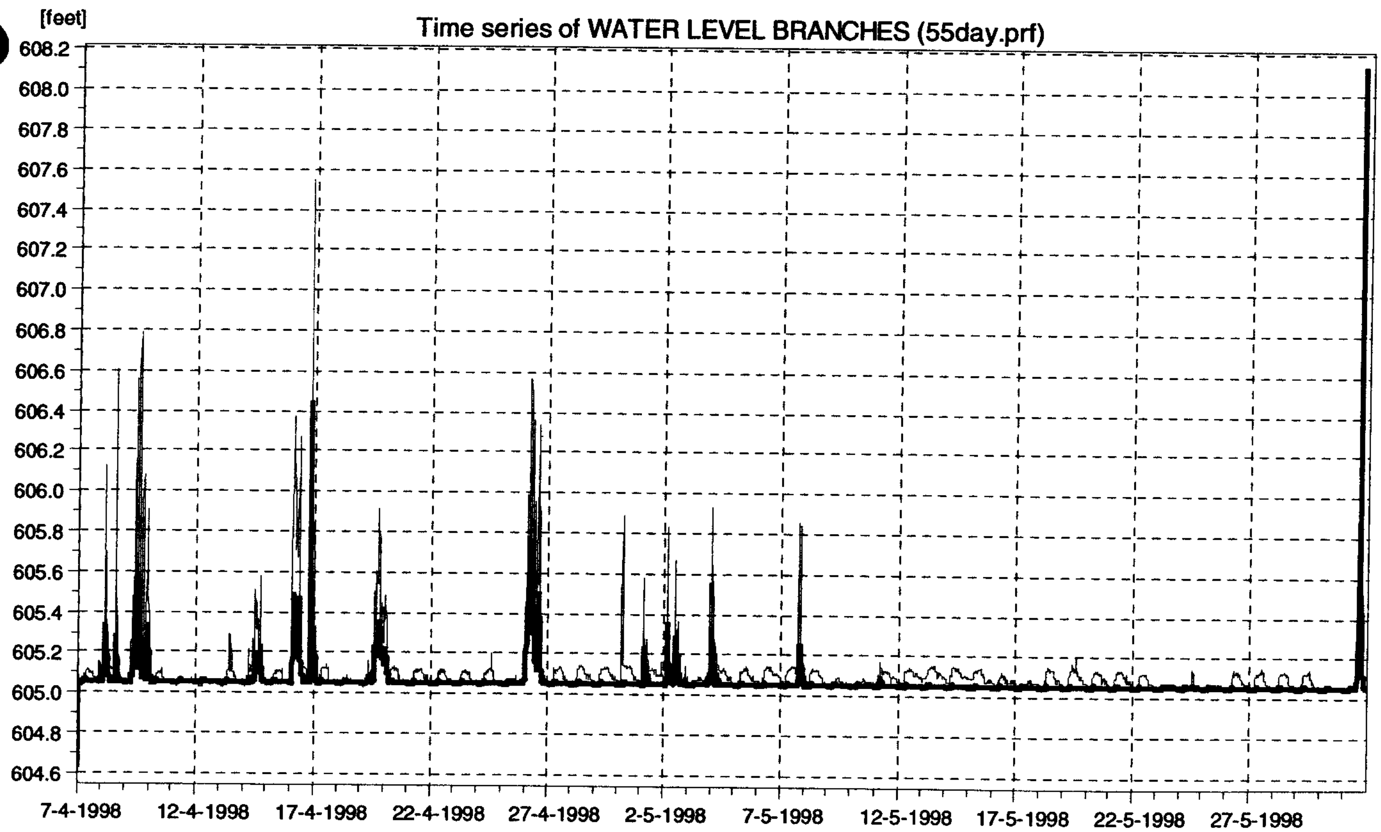
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA28I





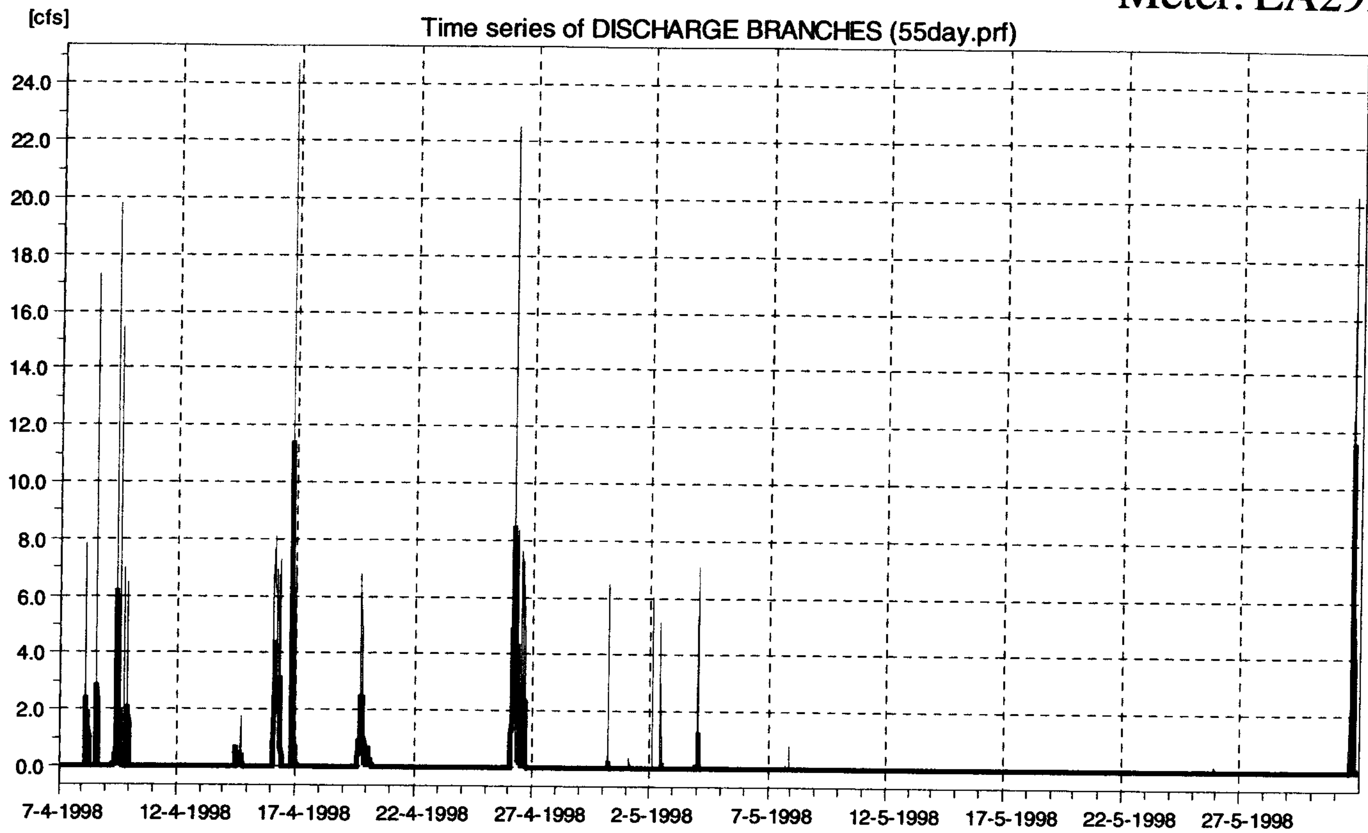
M&E Metcalf & Eddy AQUA ALLIANCE

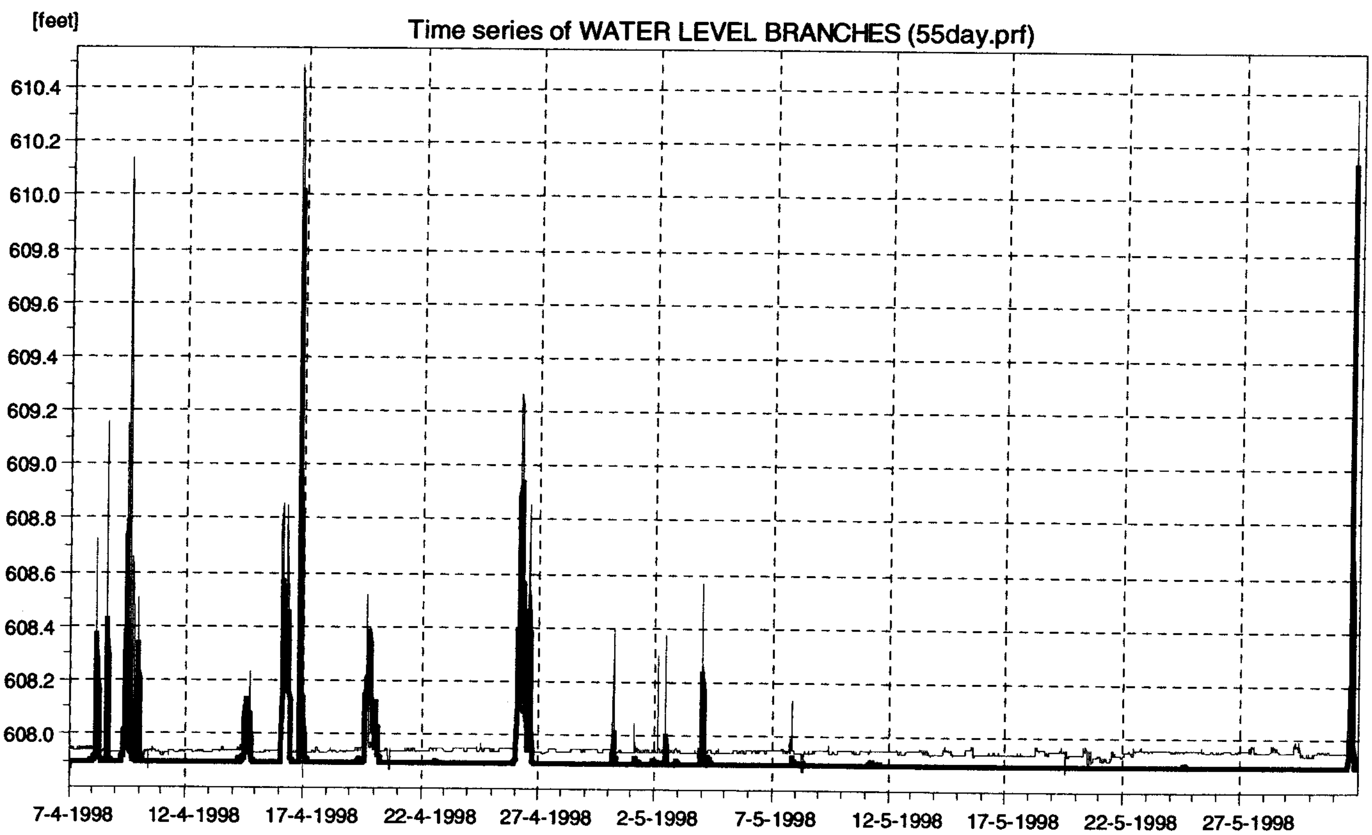
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA29D





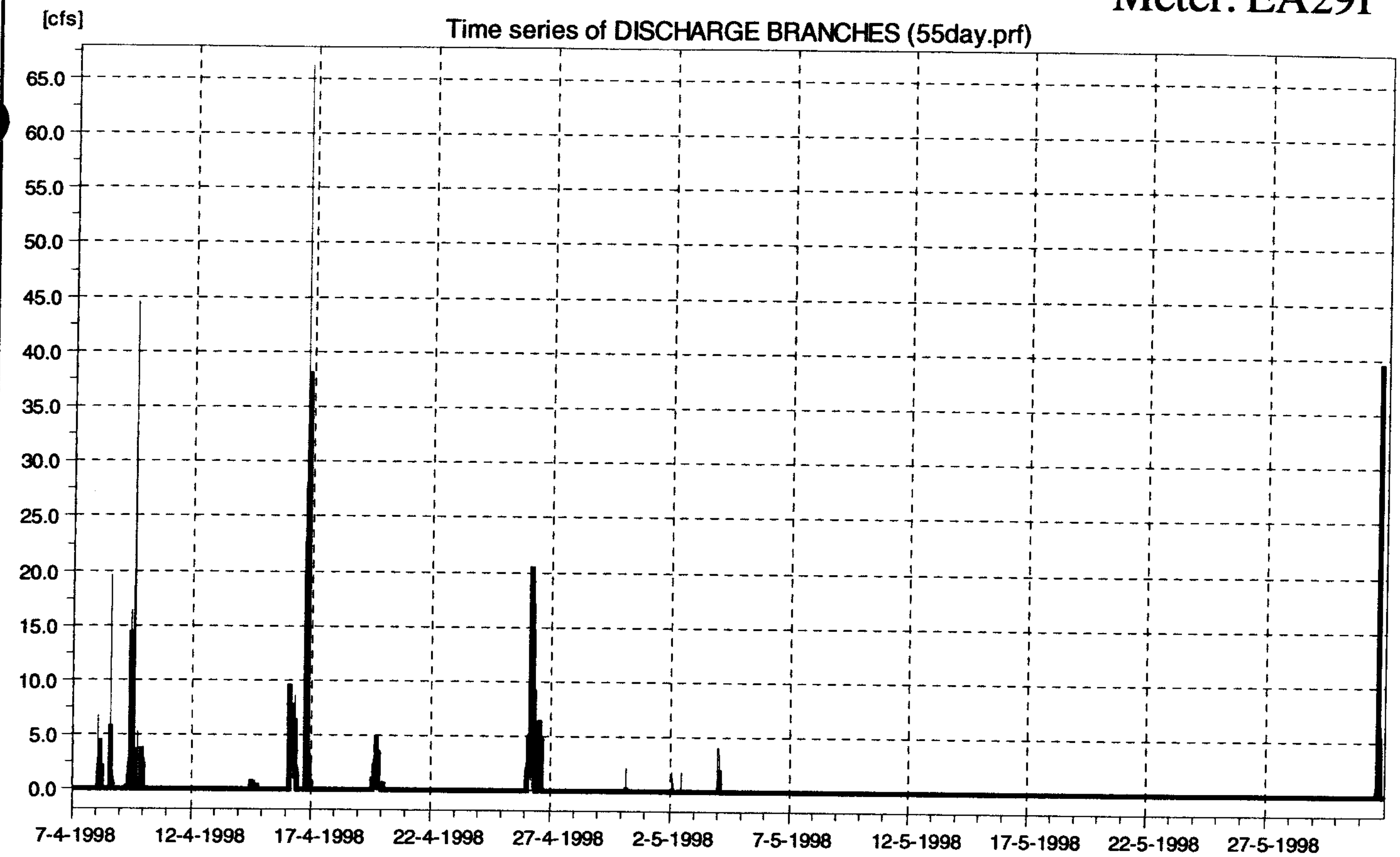
M&E AQUA ALLIANCE Metcalf & Eddy

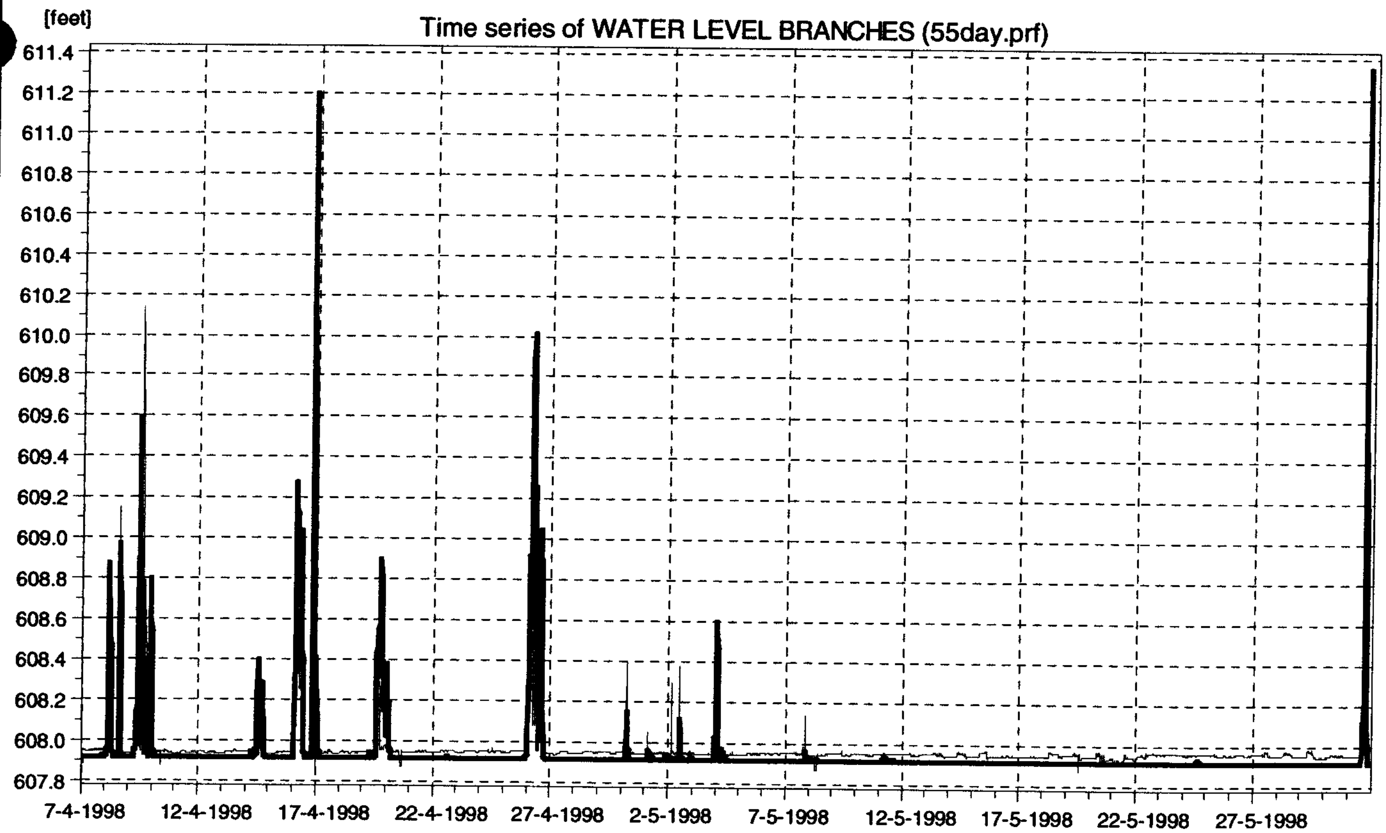
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA29I





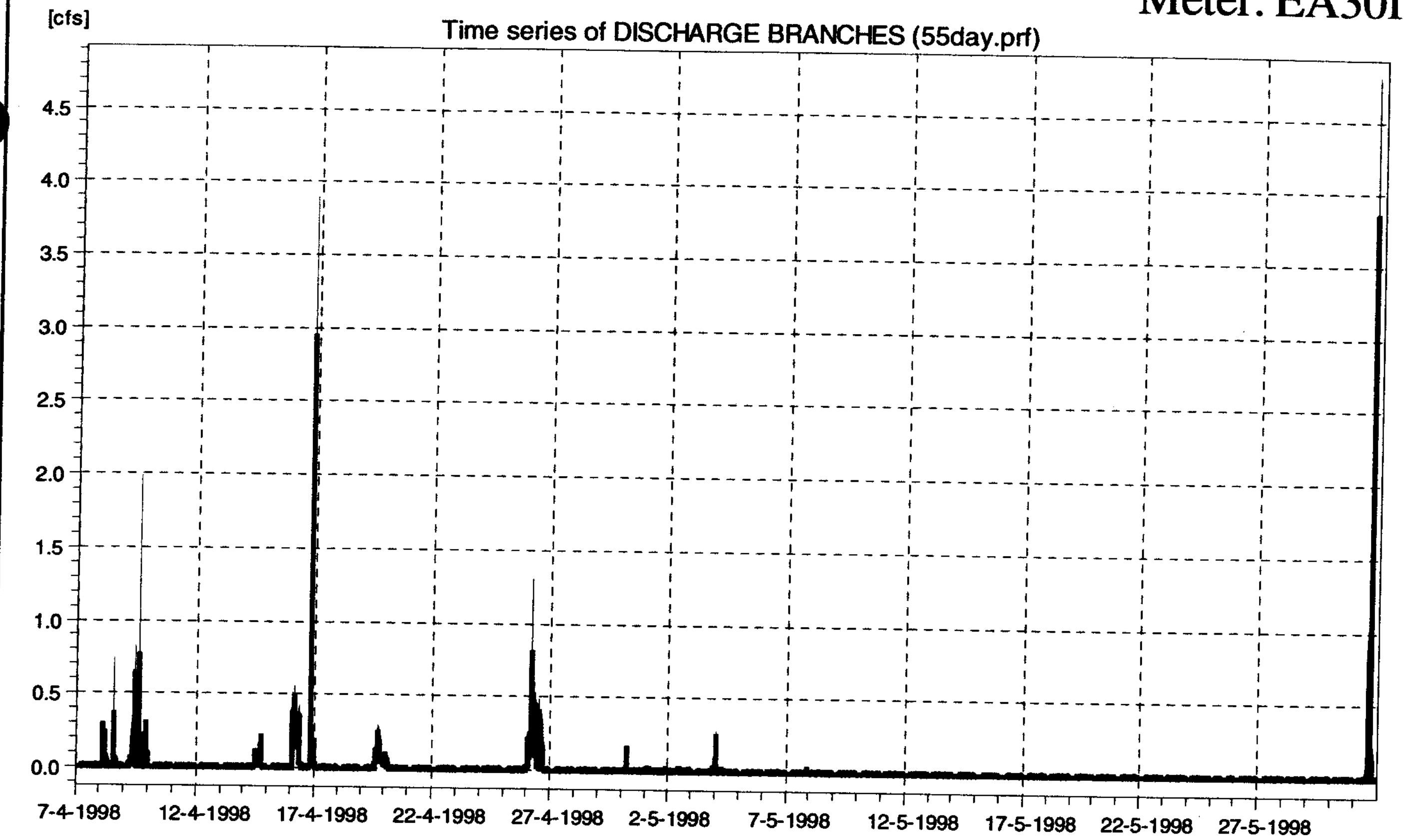
M&E AQUA ALLIANCE Metcalf & Eddy

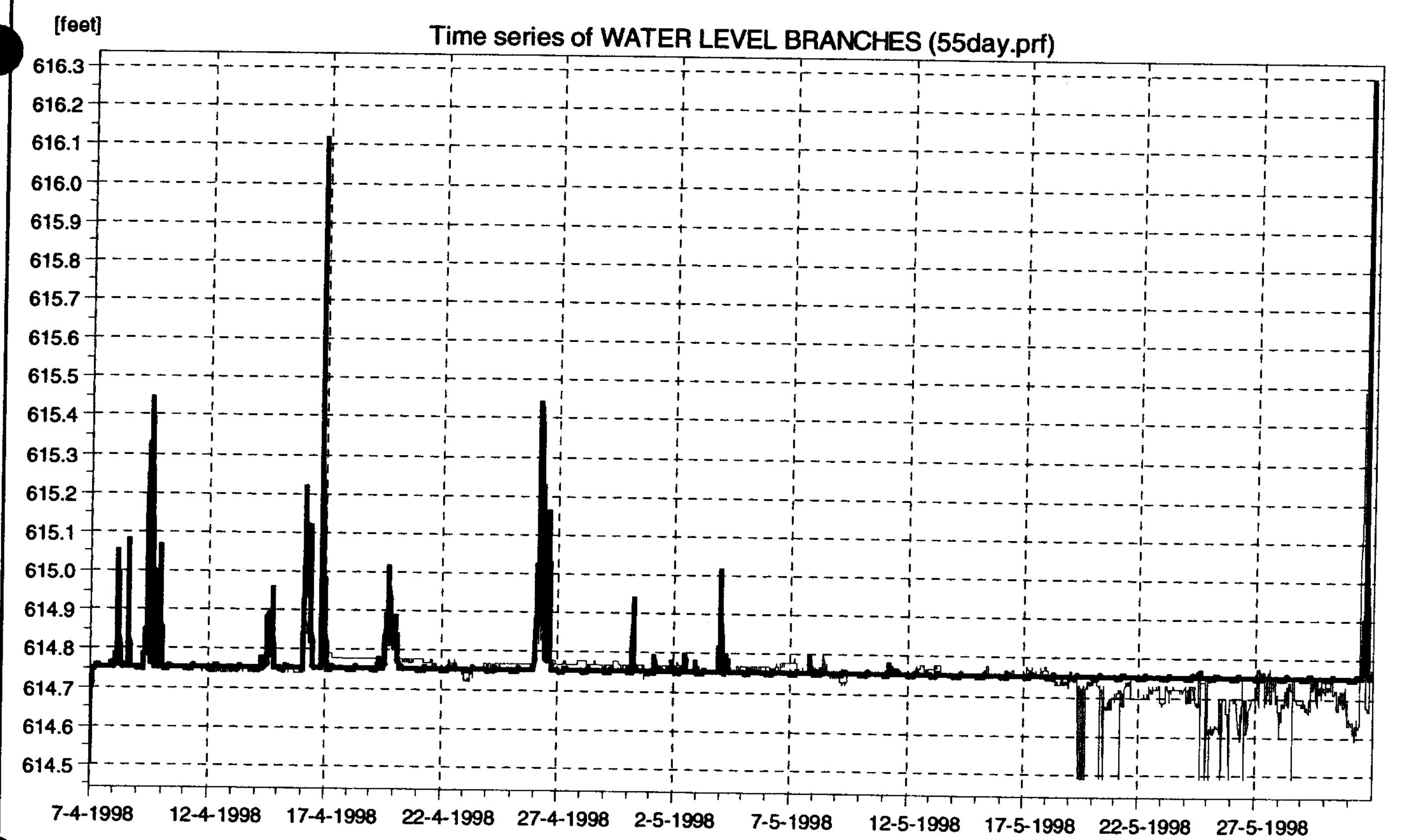
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA30I





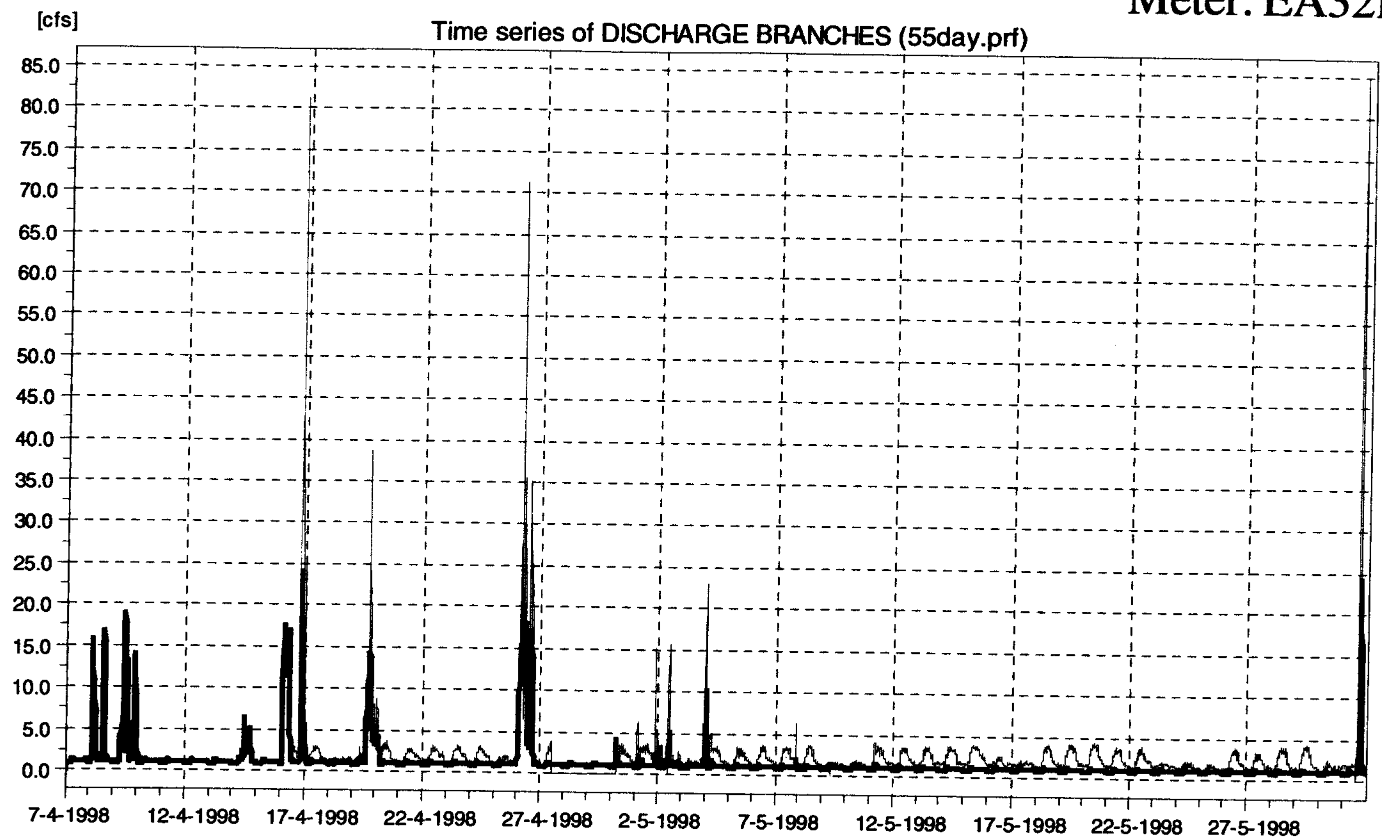
M&E AQUA ALLIANCE Metcalf & Eddy

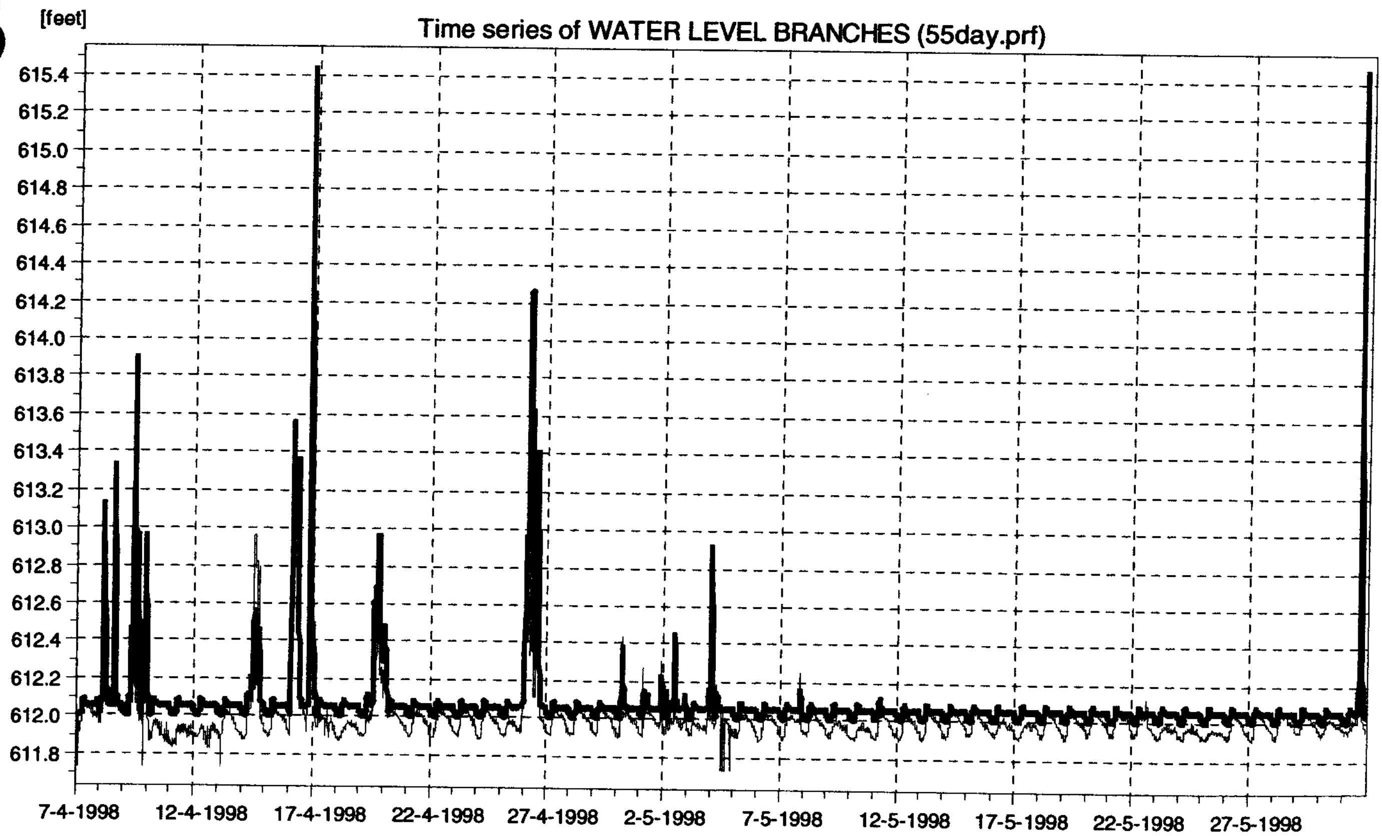
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA32D





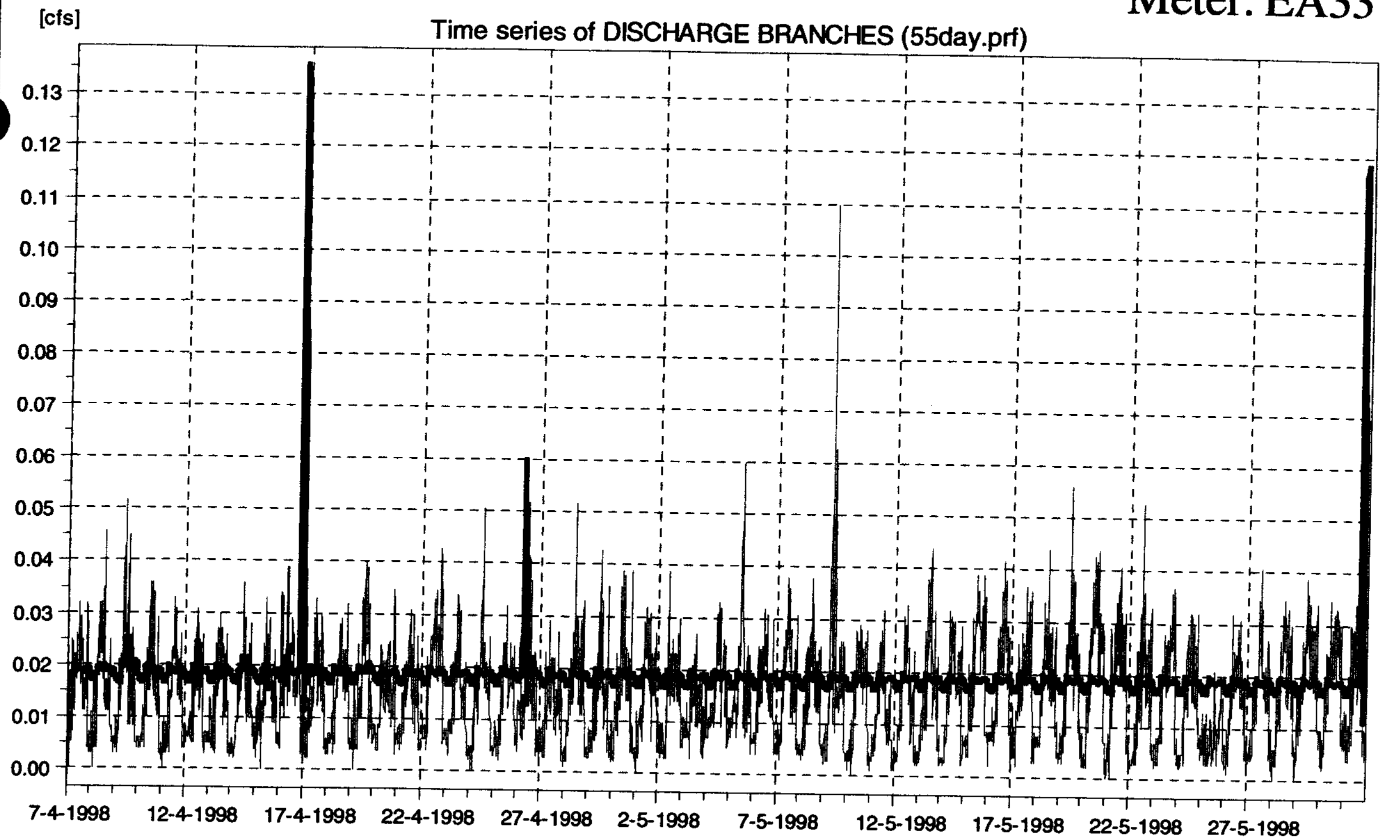
Metcalf & Eddy

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA33



BURKE LAKEFRONT AIRPORT PUMP STATION, FLOW ONLY

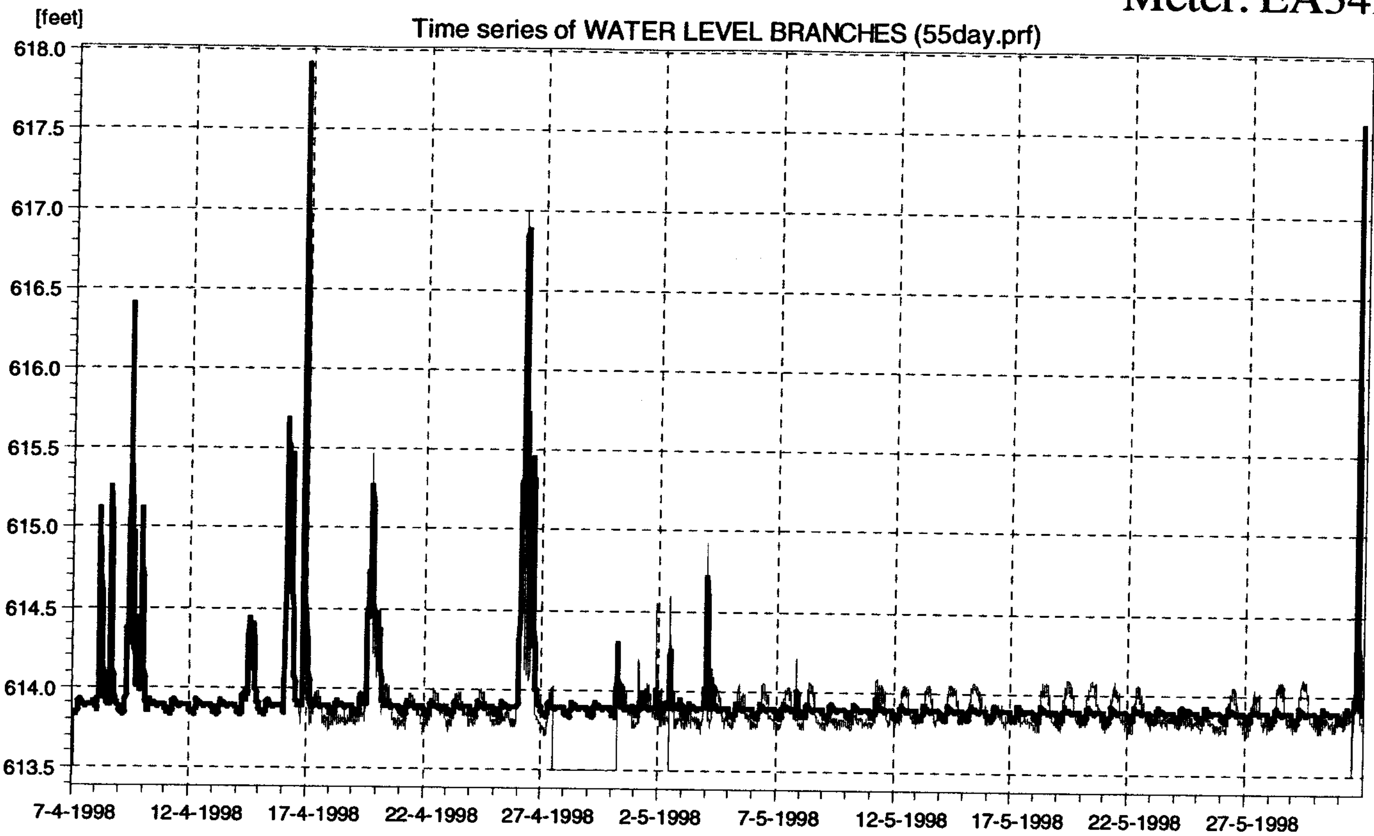
Metcalf & Eddy

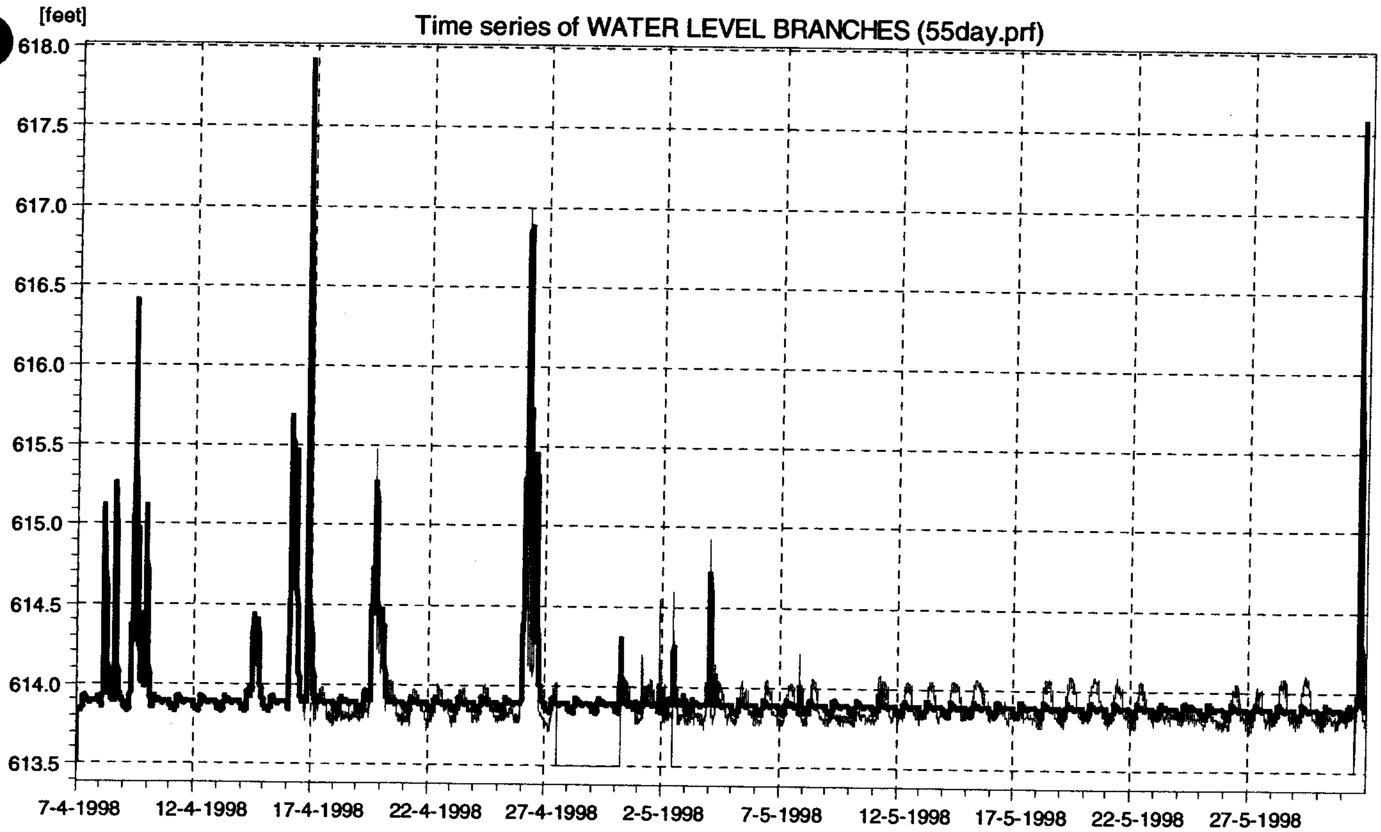
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EA34D





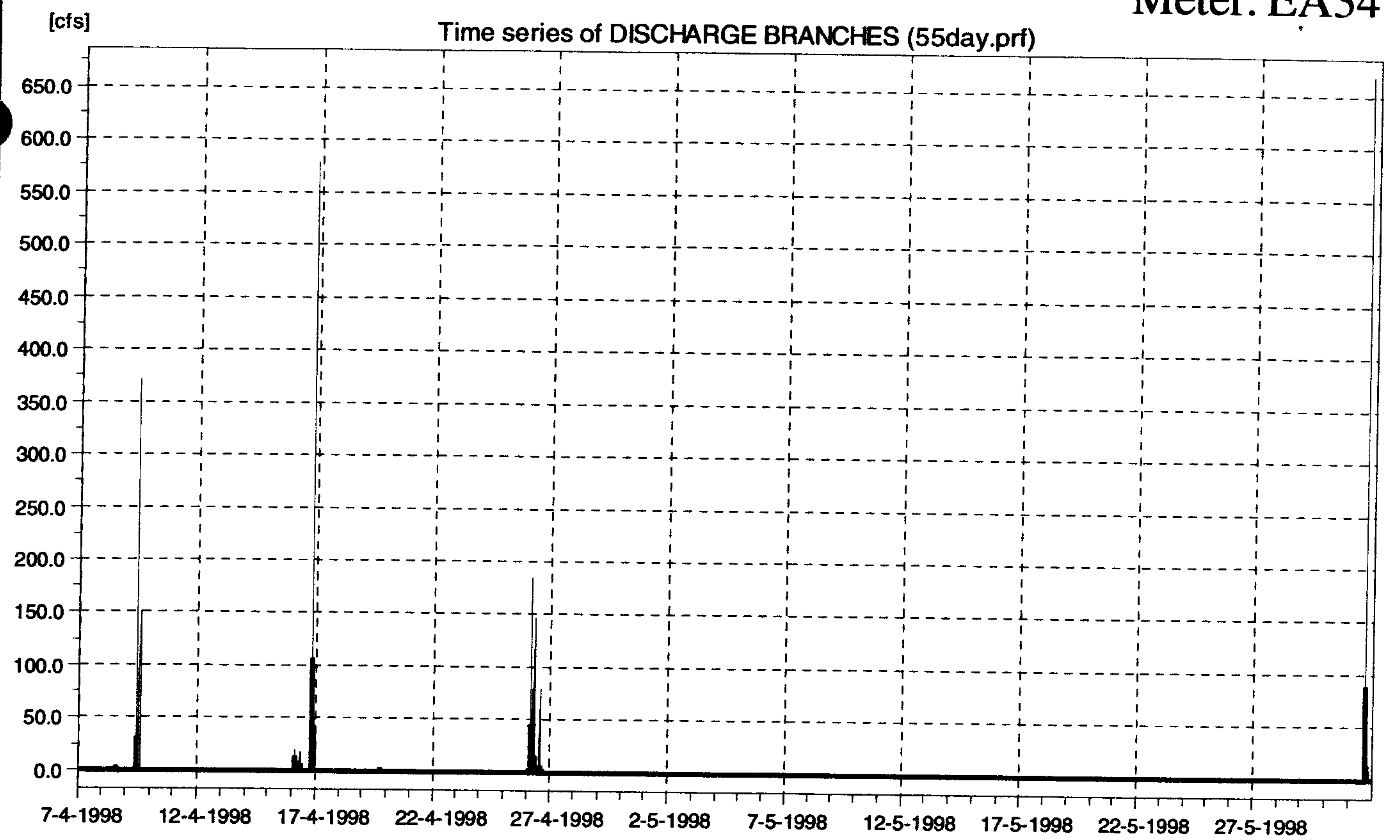
Metcalf & Eddy

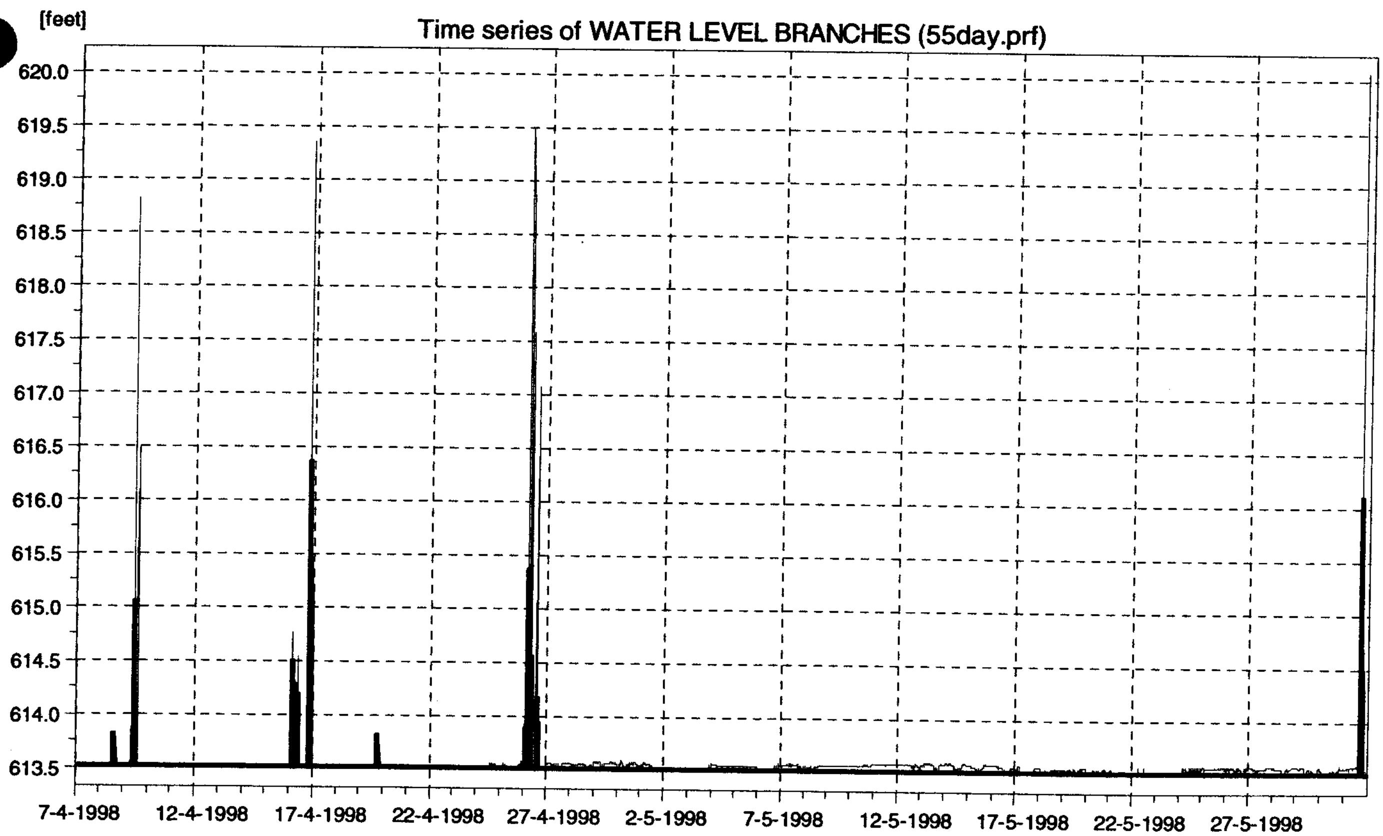
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA34W





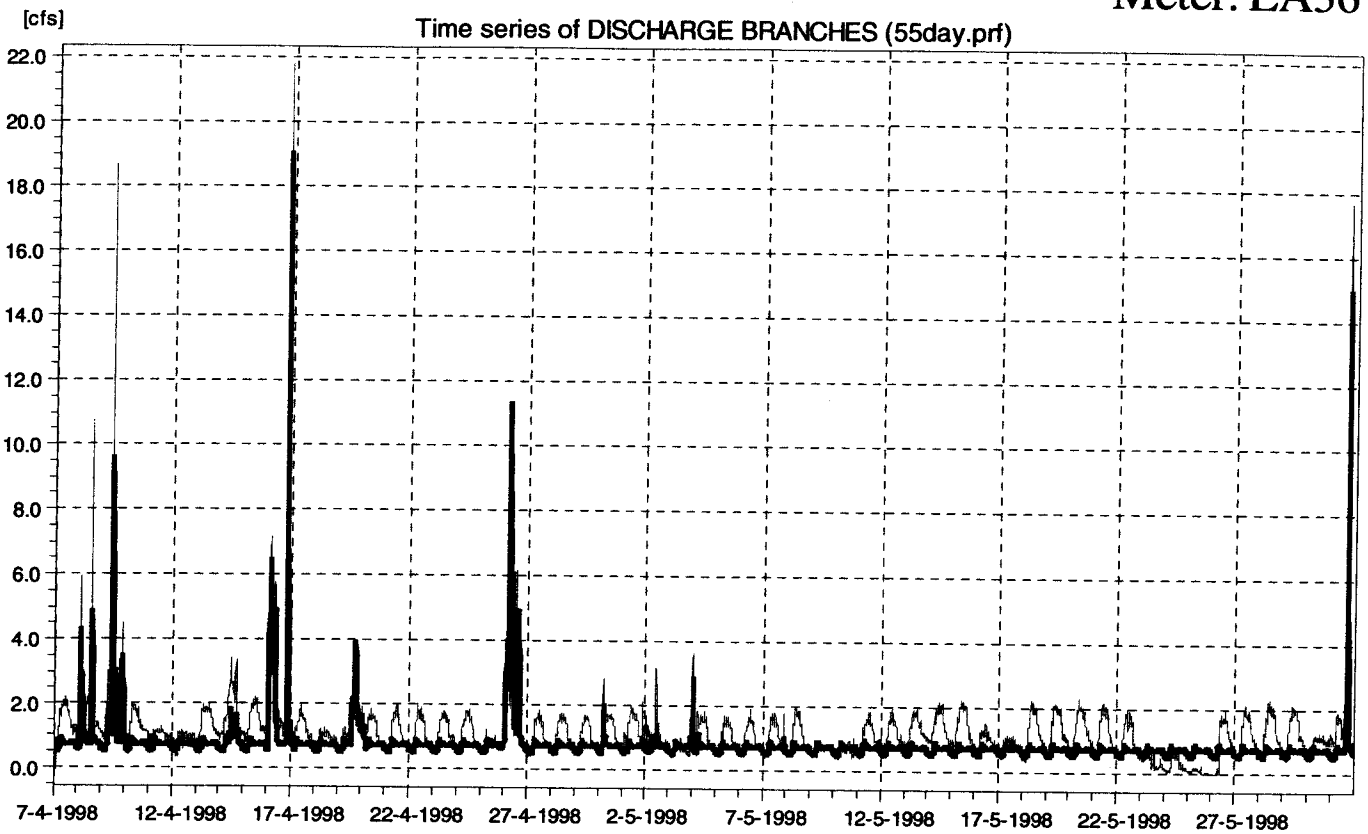
M&E AQUA ALLIANCE Metcalf & Eddy

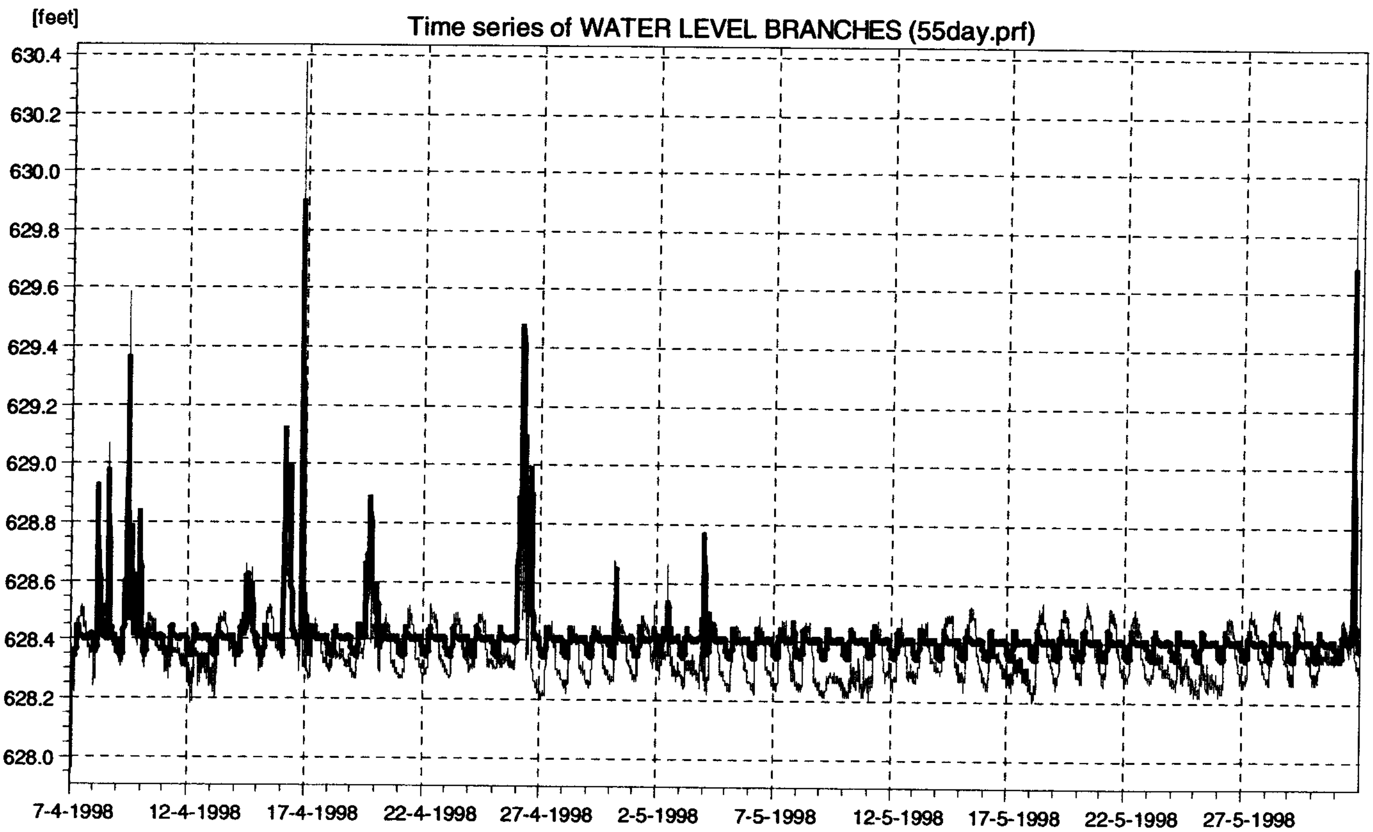
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA36





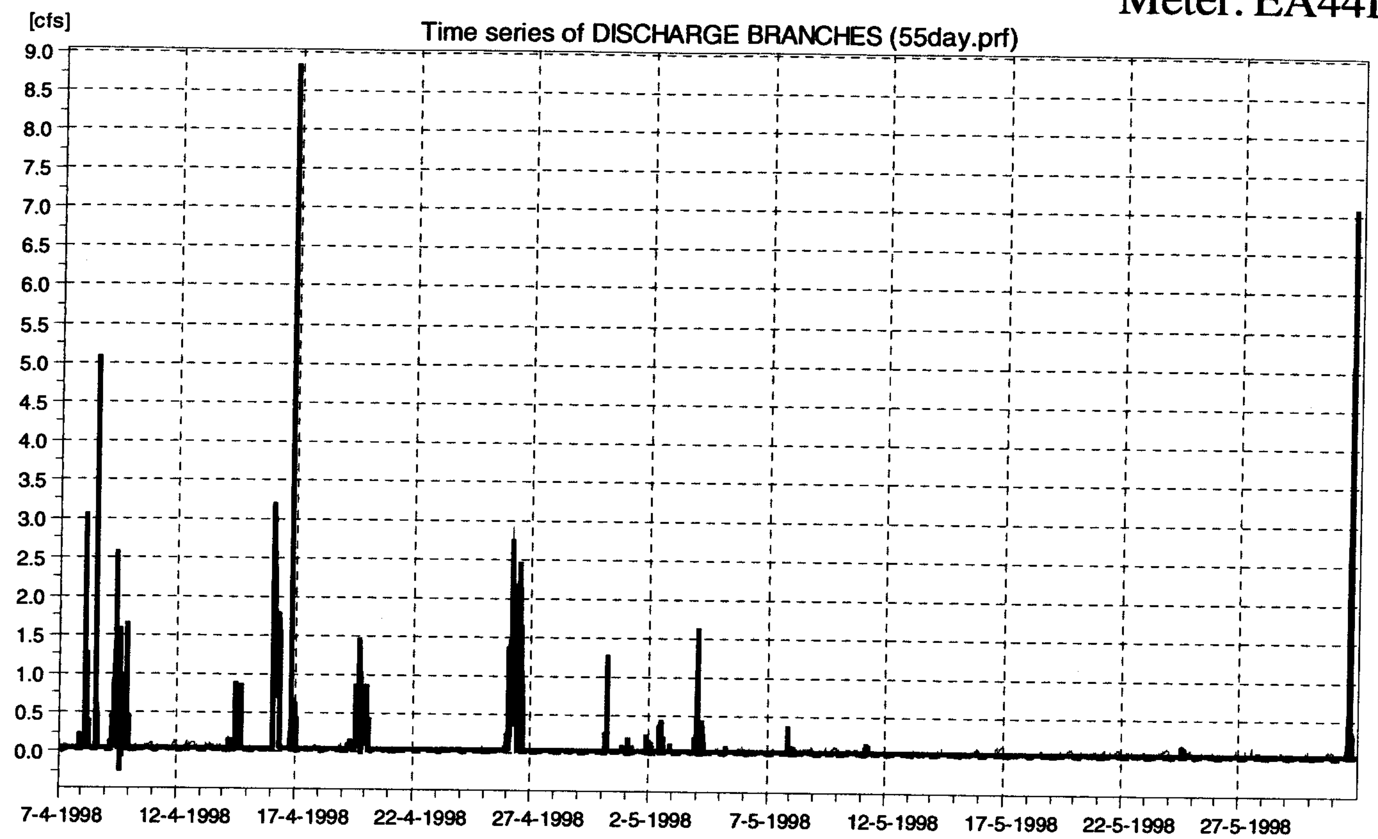
M&E Metcalf & Eddy AQUA ALLIANCE

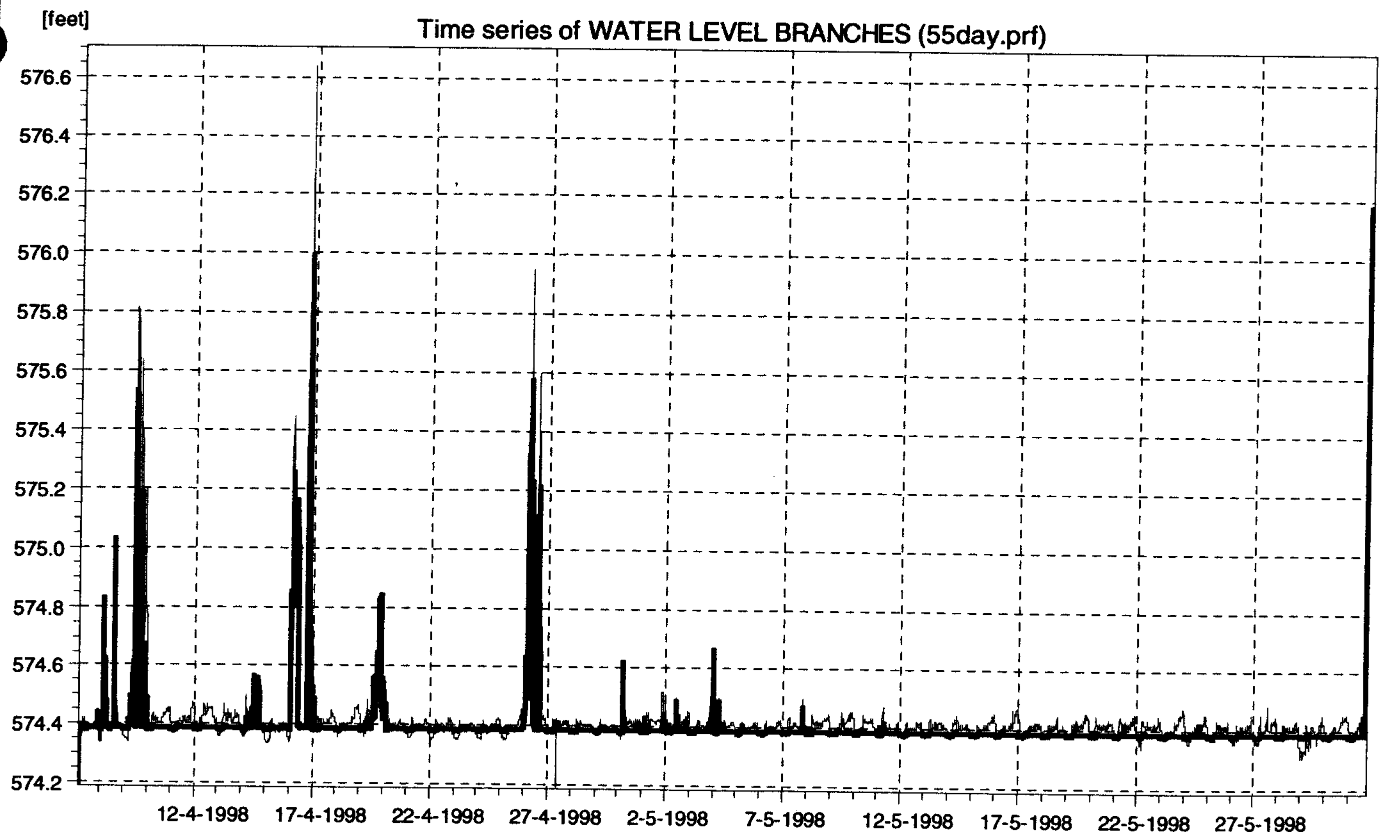
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA44D





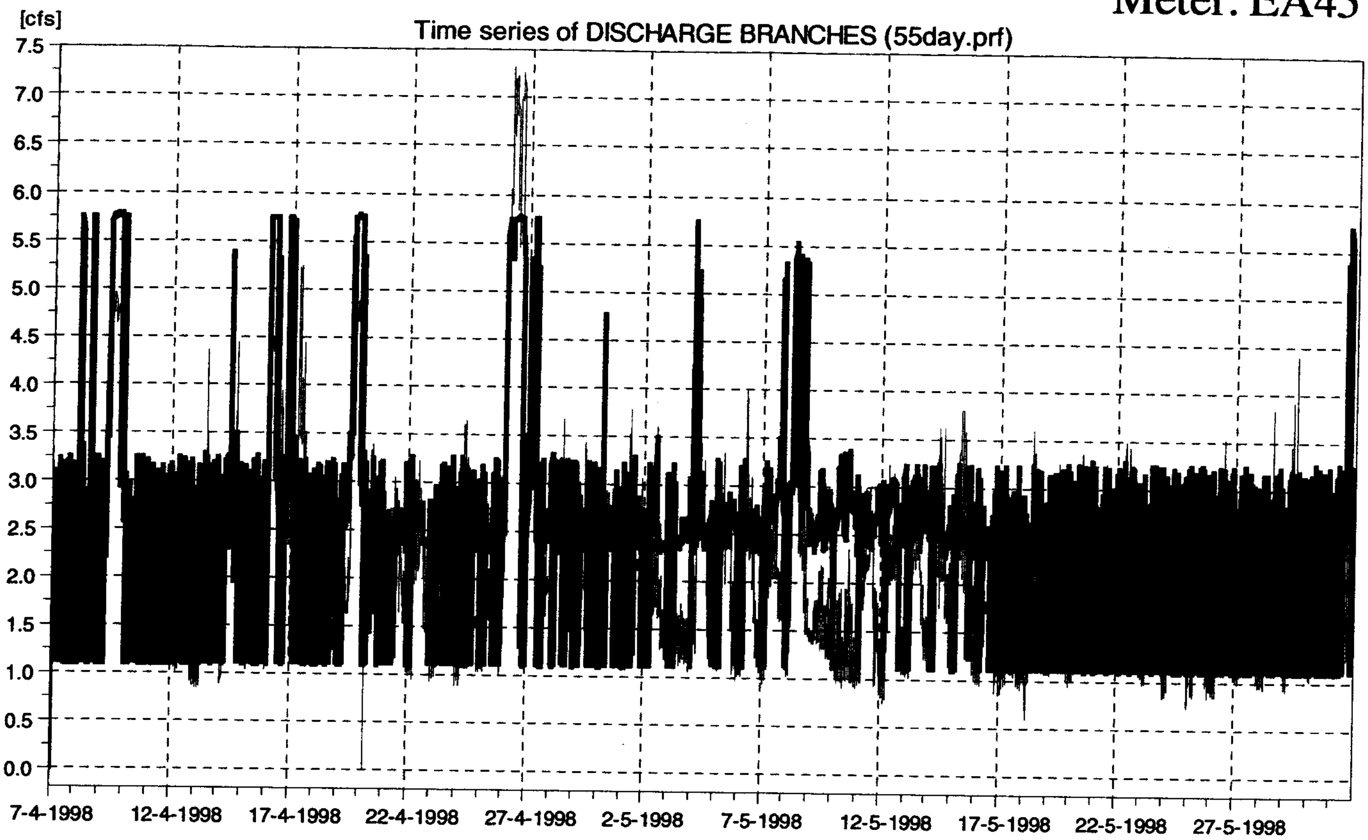
Metcalf & Eddy

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

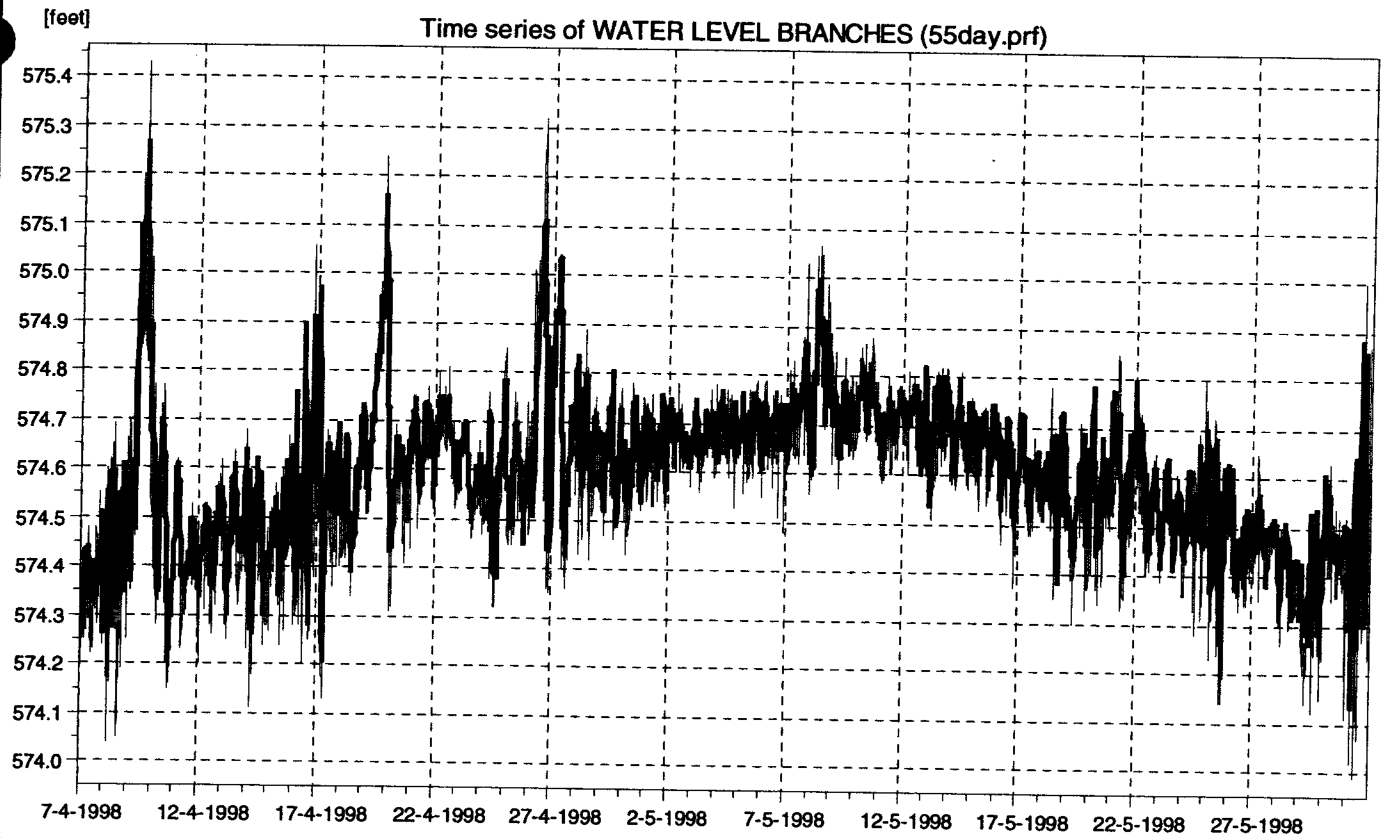
Meter: EA45



SAPS OUTFLOW, DID NOT MODEL HGL

Meter: EA46W

HGL INFLUENCED BY LAKE LEVEL, FLOWS ARE NOT RELIABLE



M&E Metcalf & Eddy AQUA ALLIANCE

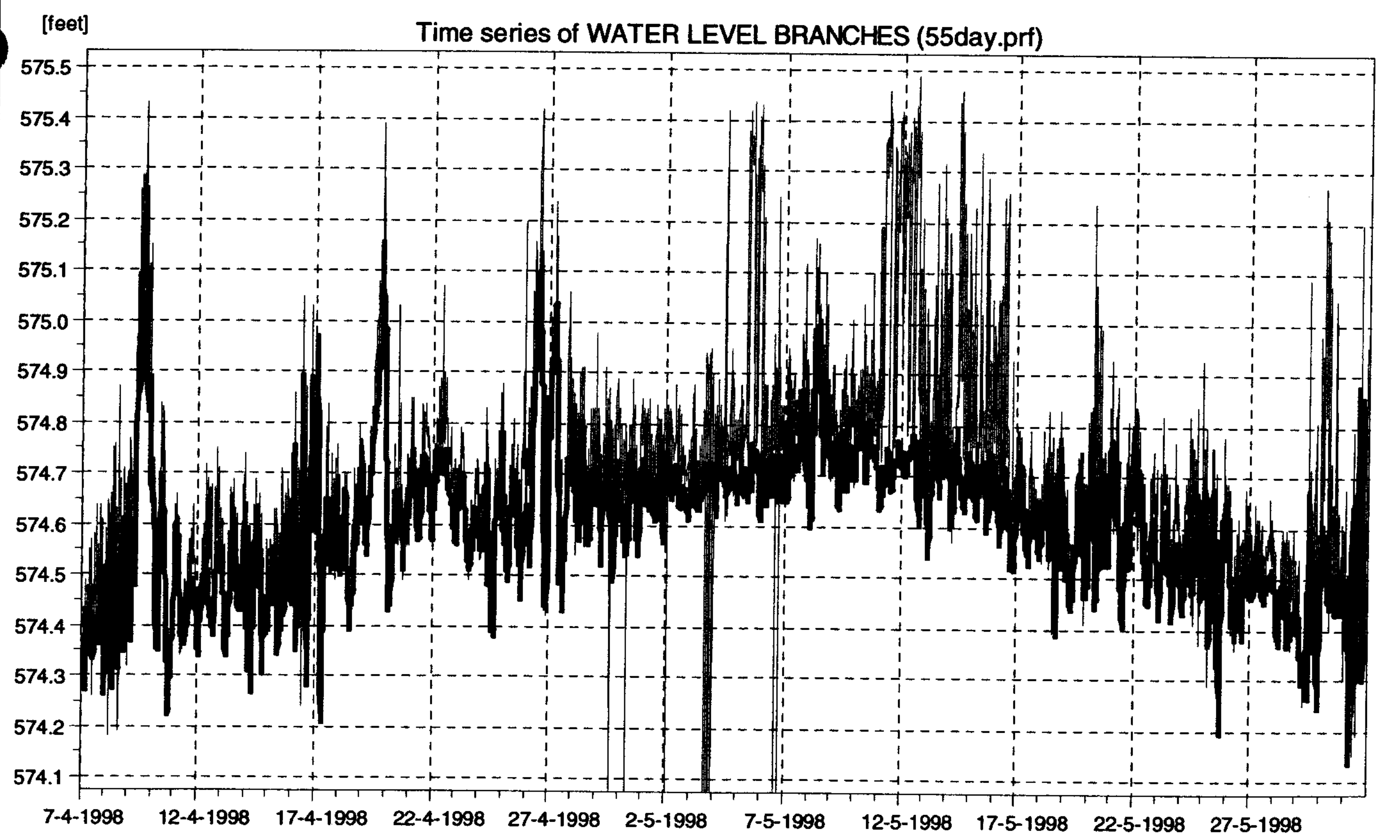
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA48W

HGL INFLUENCED BY LAKE LEVEL, FLOWS ARE NOT RELIABLE



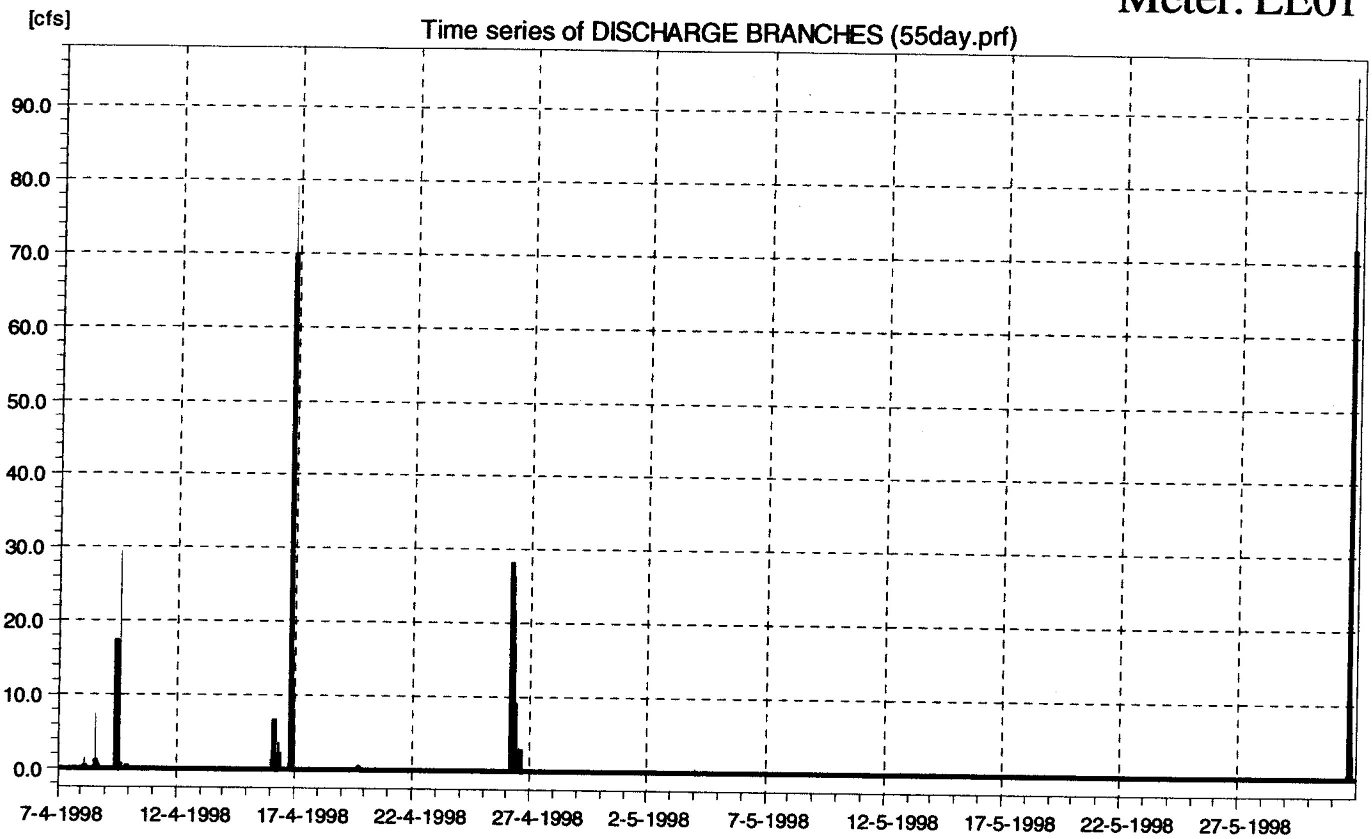
Metcalf & Eddy

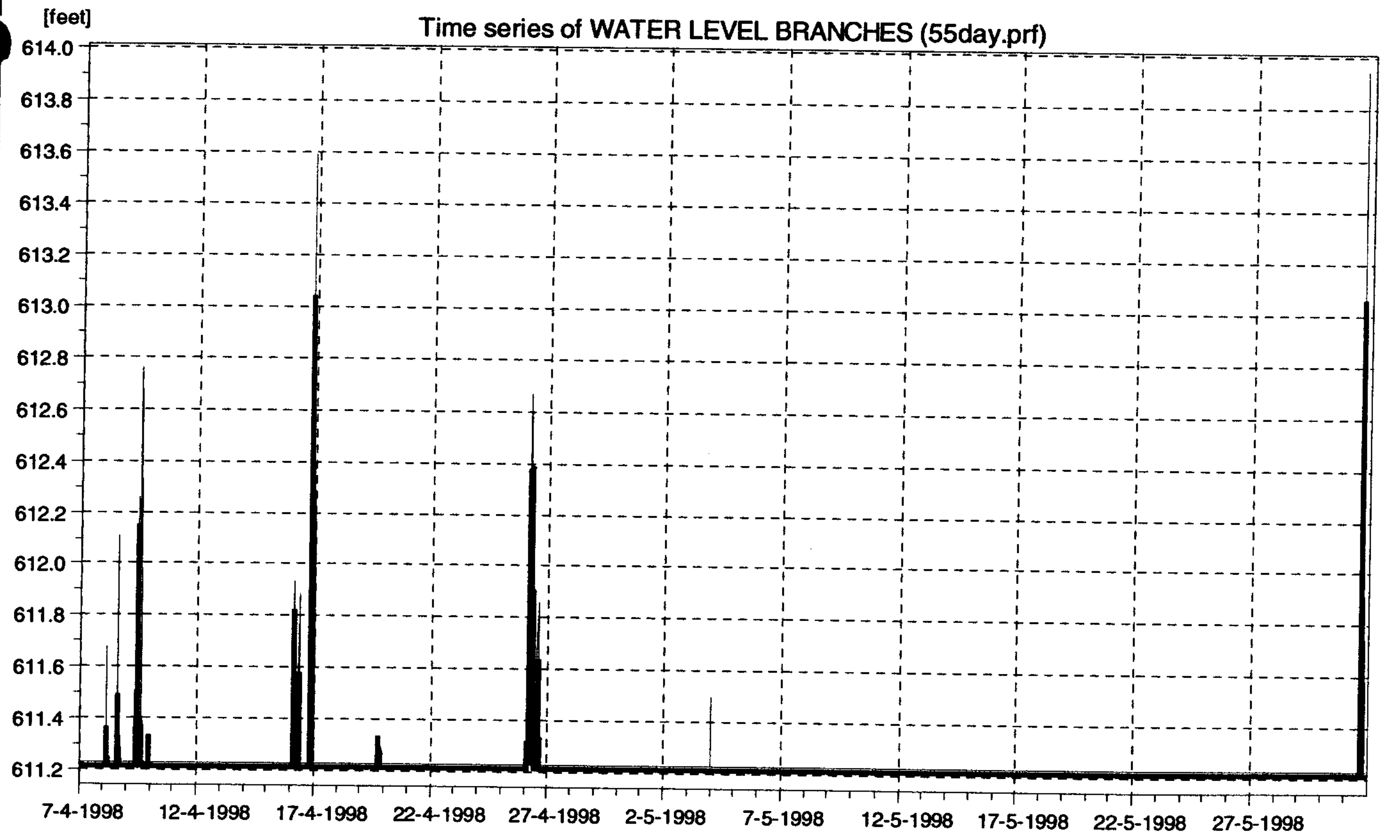
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: LE01





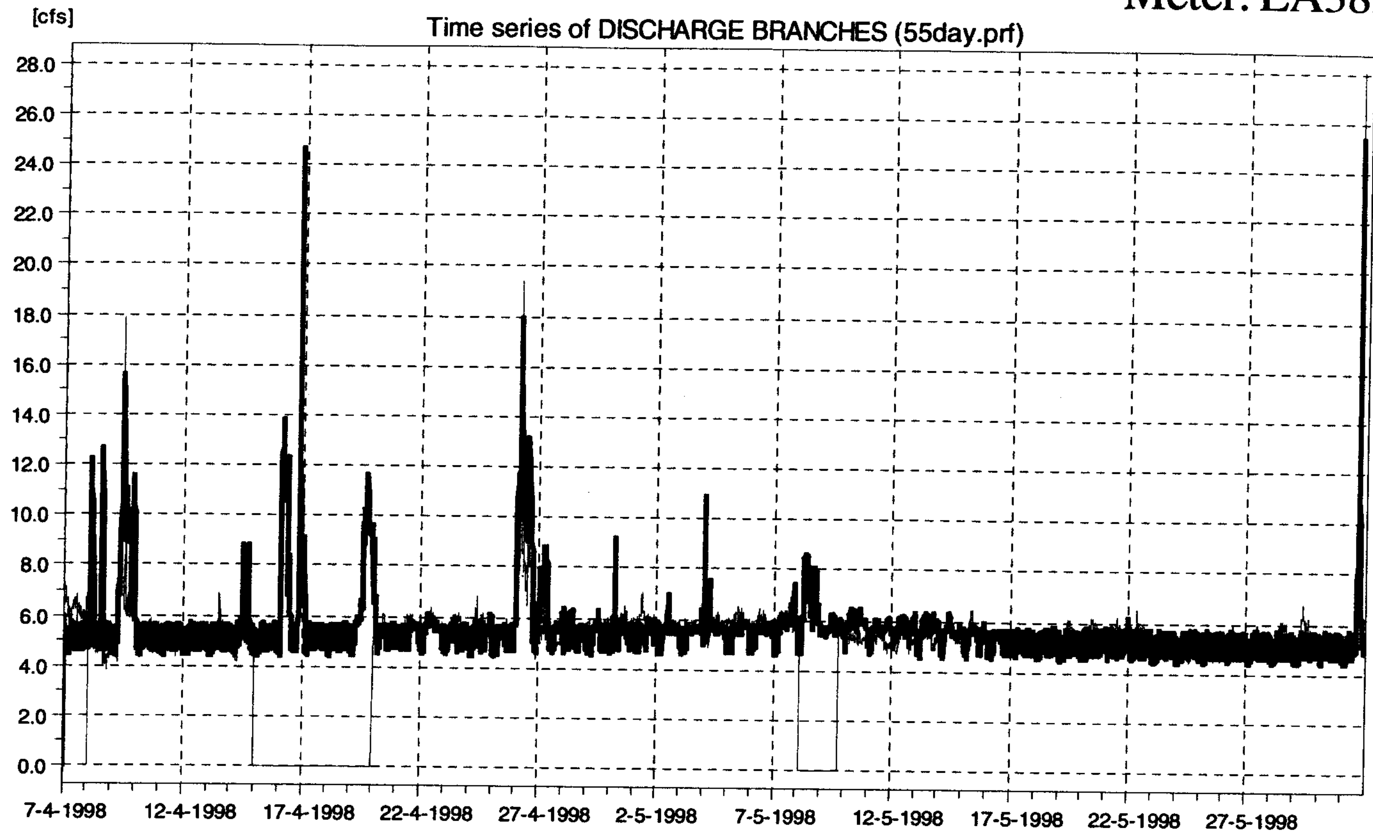
M&E AQUA ALLIANCE Metcalf & Eddy

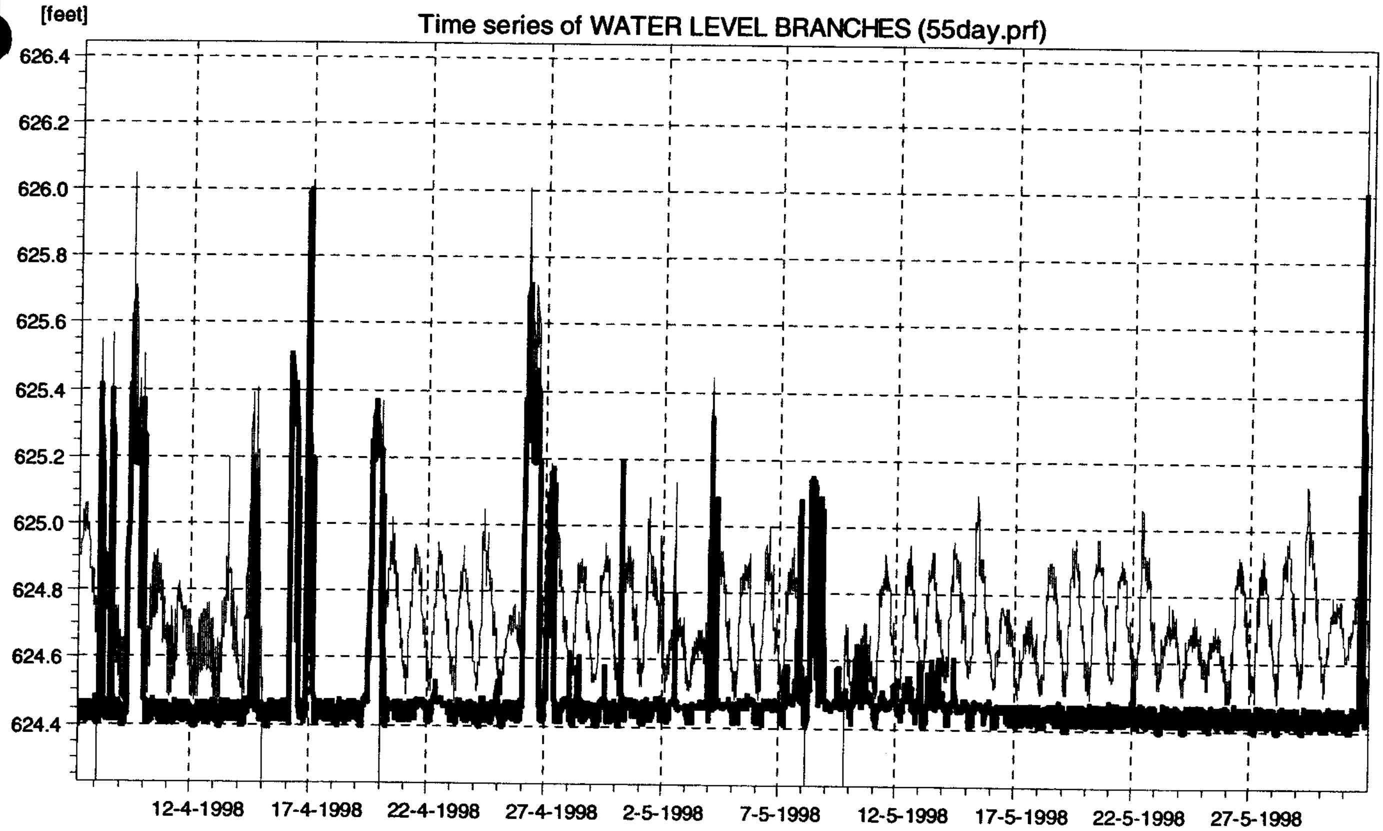
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA38I





M&E AQUA ALLIANCE Metcalf & Eddy

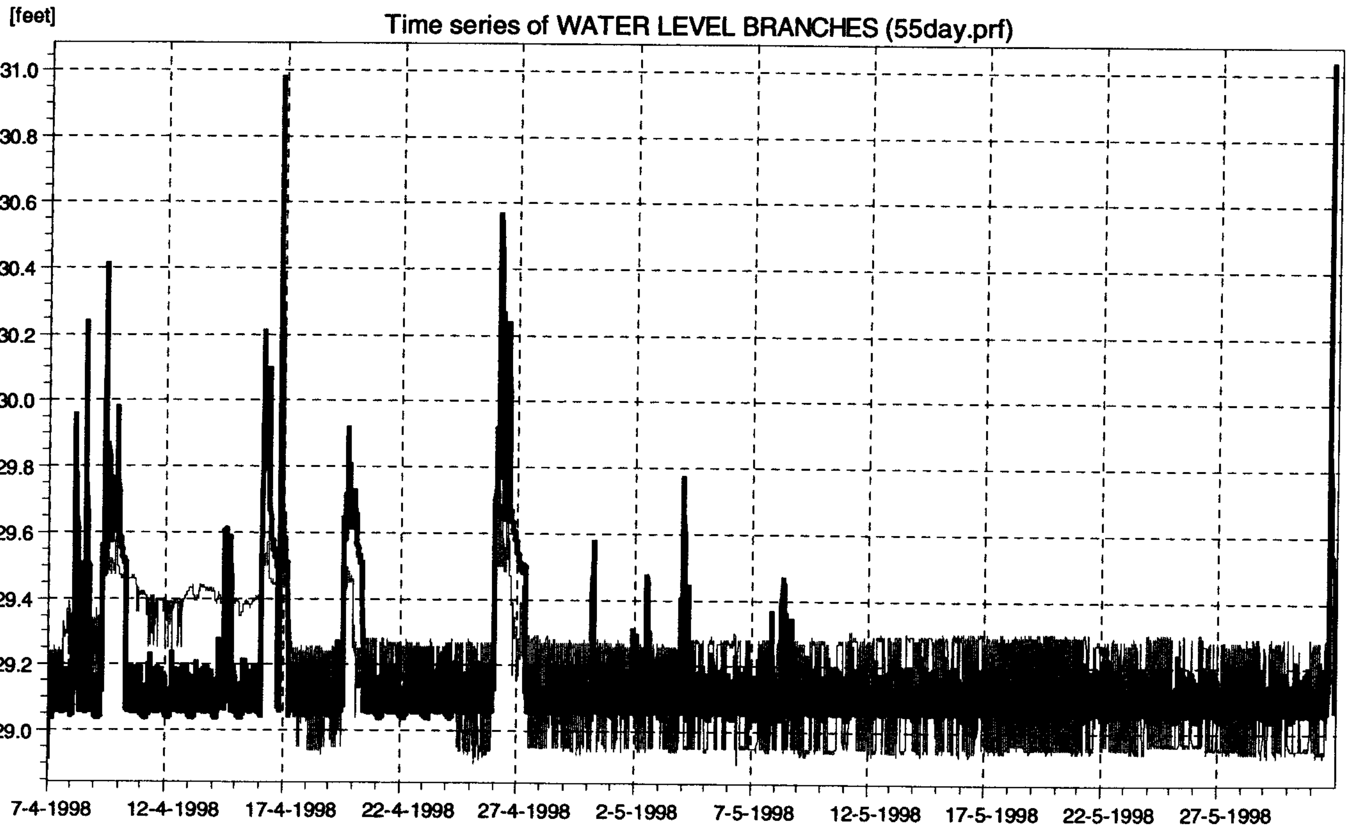
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

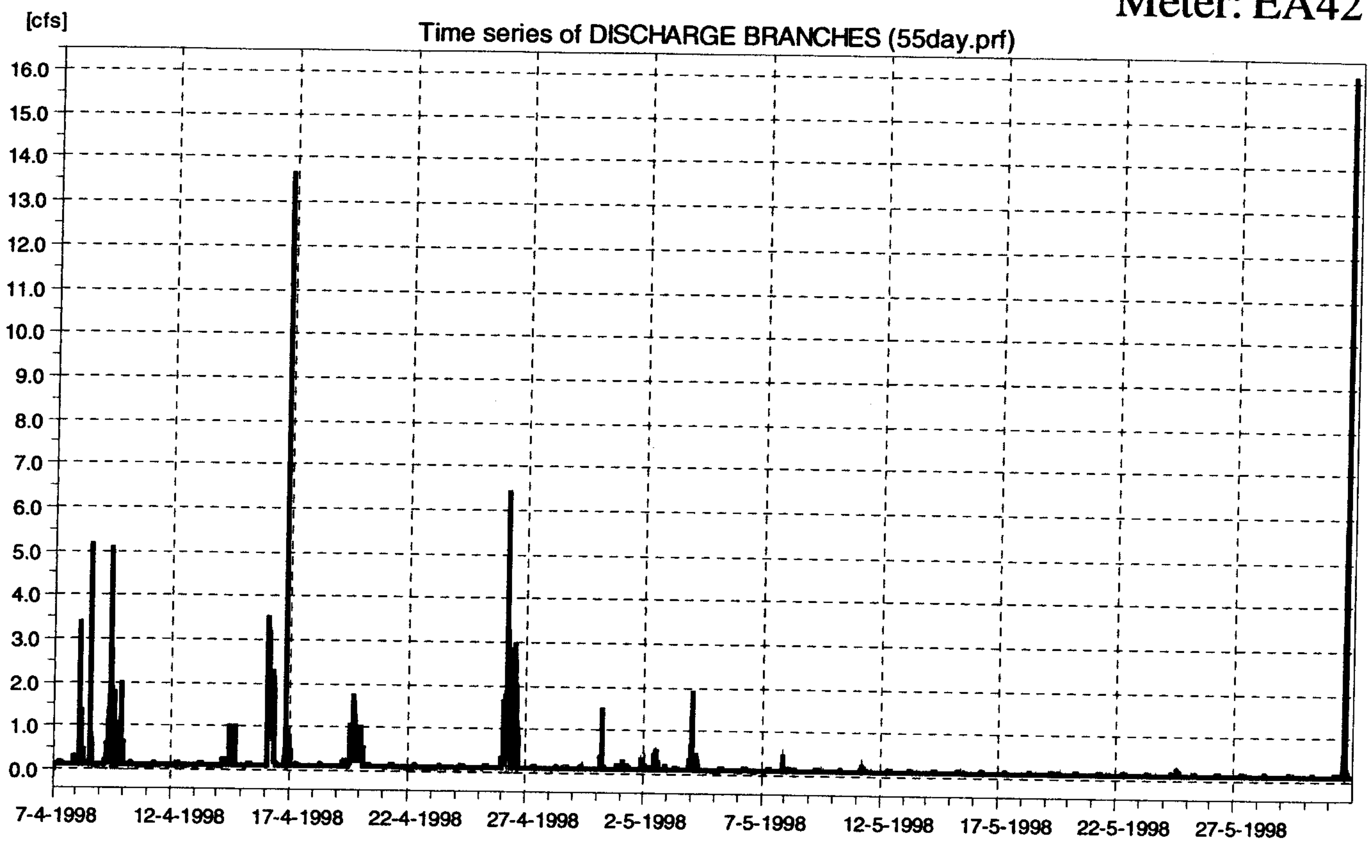
CH2MHILL

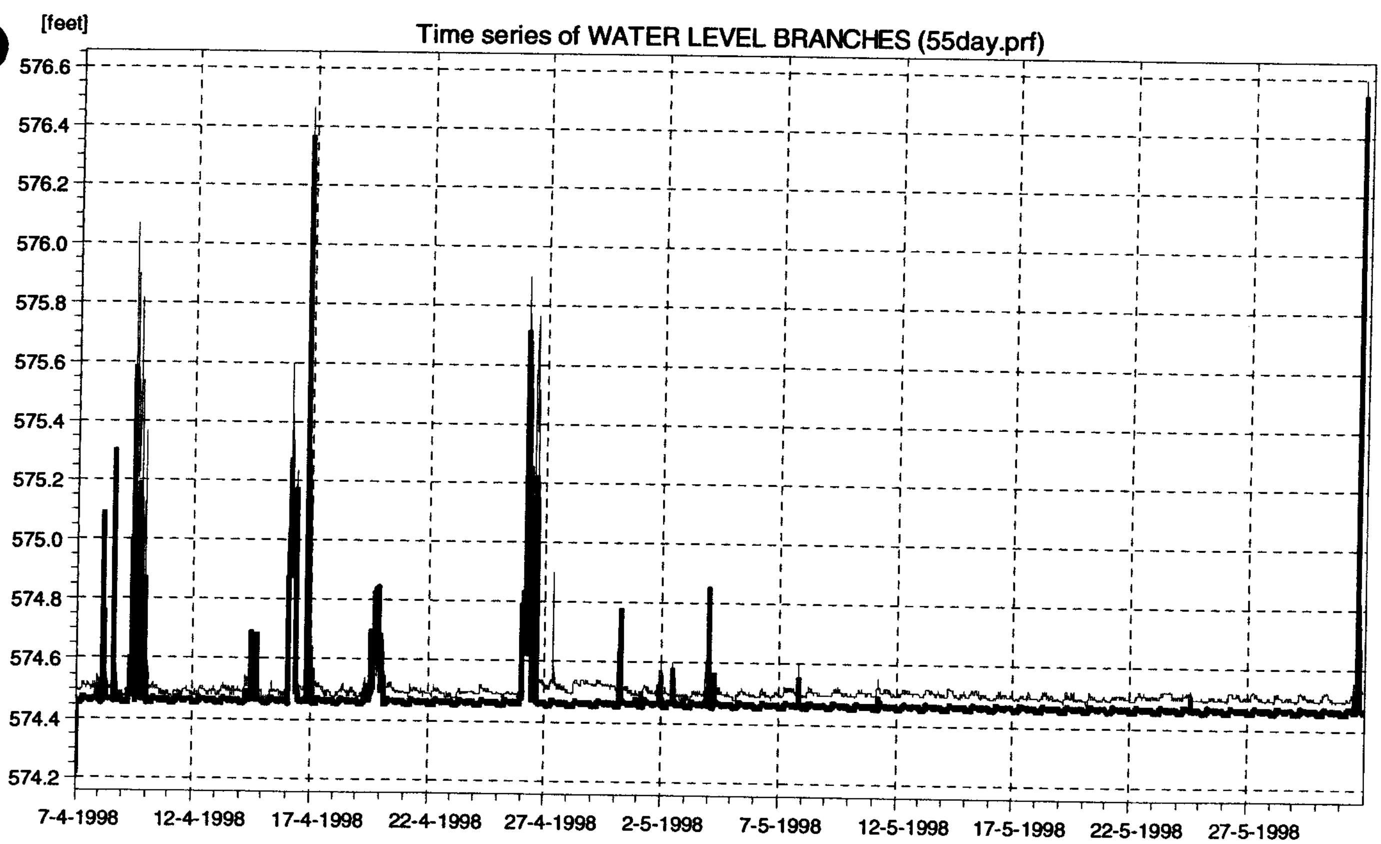
Meter: EA40I

LEVELS IN THIS MANHOLE INFLUENCE BY FRONT STREET PUMP STATION, FLOWS ARE NOT USED



Meter: EA42





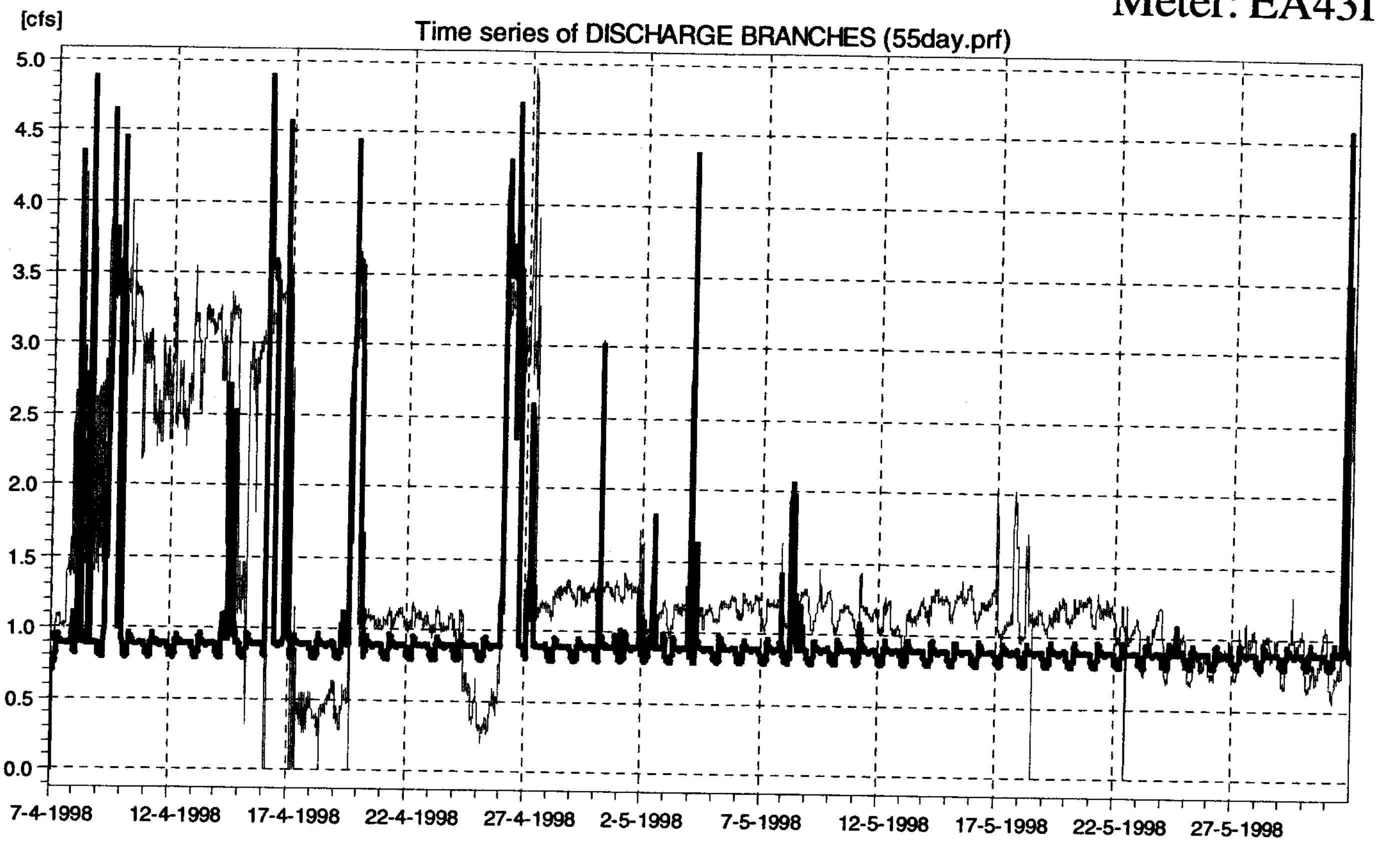
M&E Metcalf & Eddy AQUA ALLIANCE

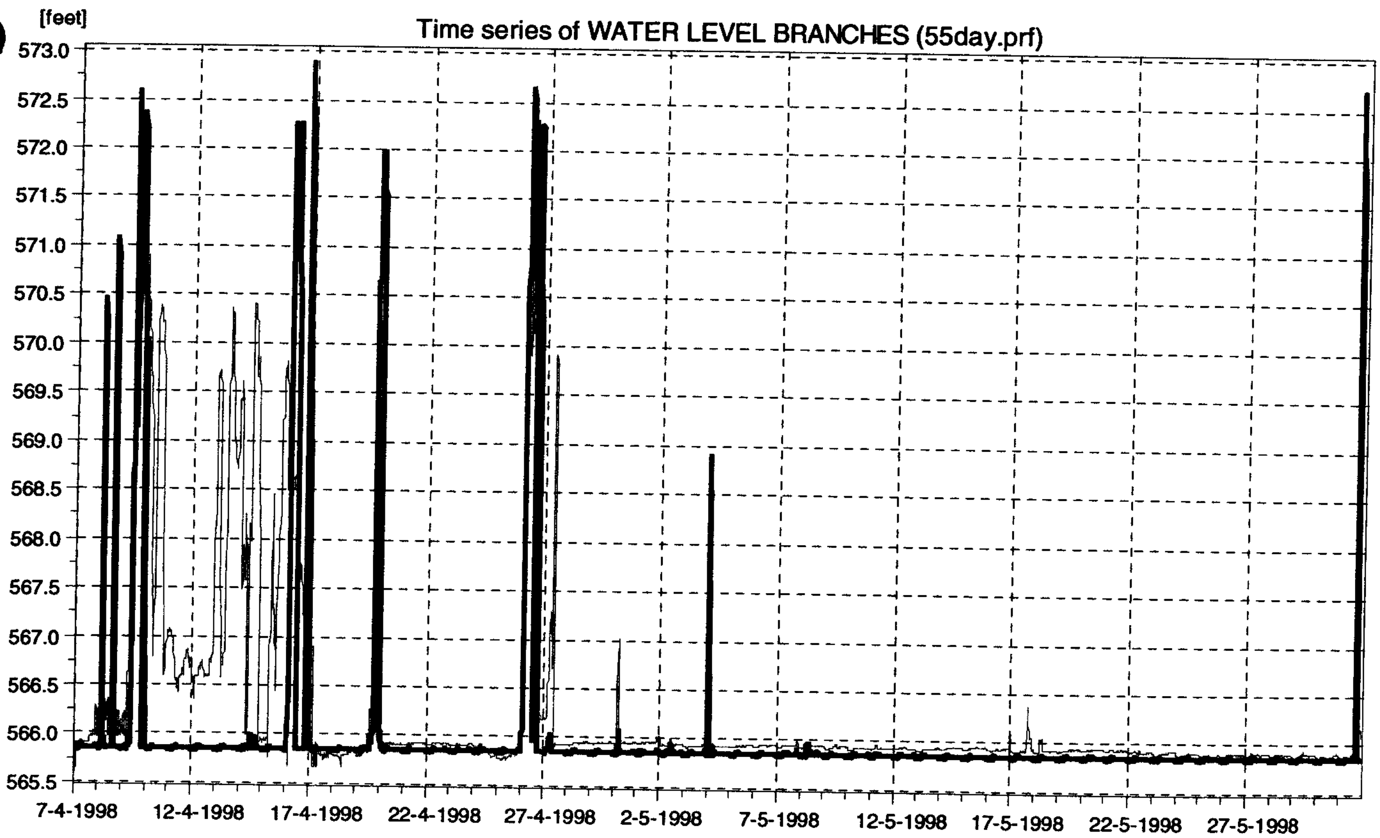
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EA43I





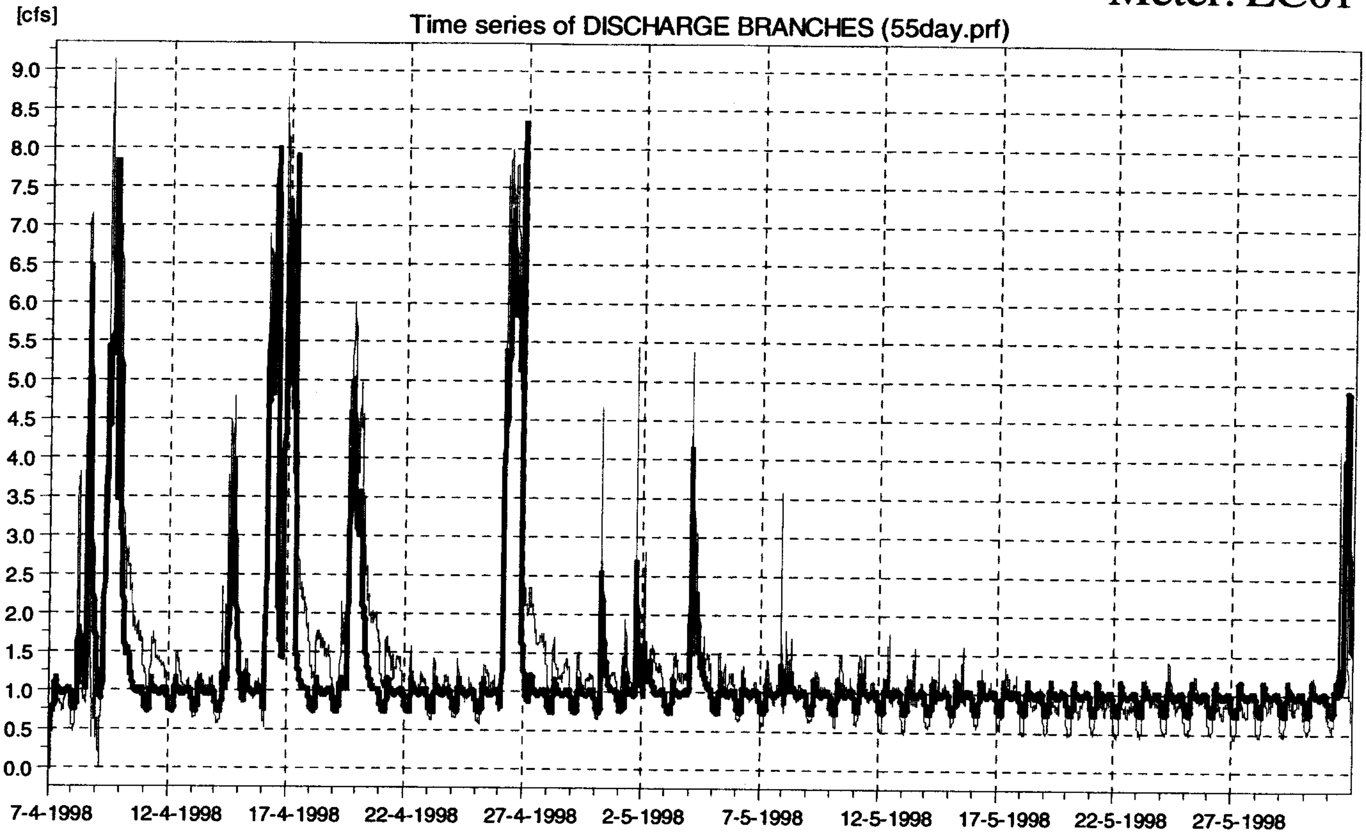
M&E Metcalf & Eddy AQUA ALLIANCE

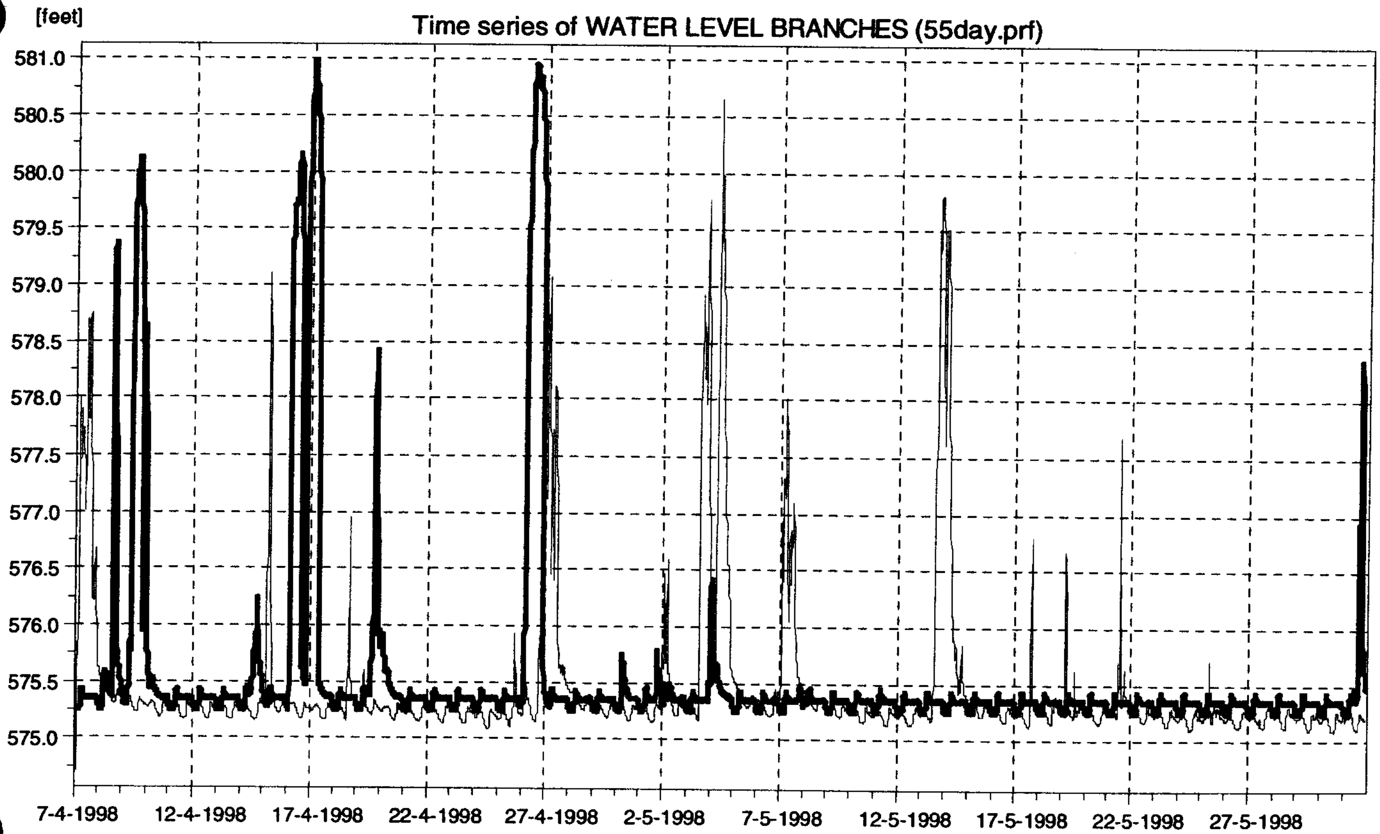
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EC01





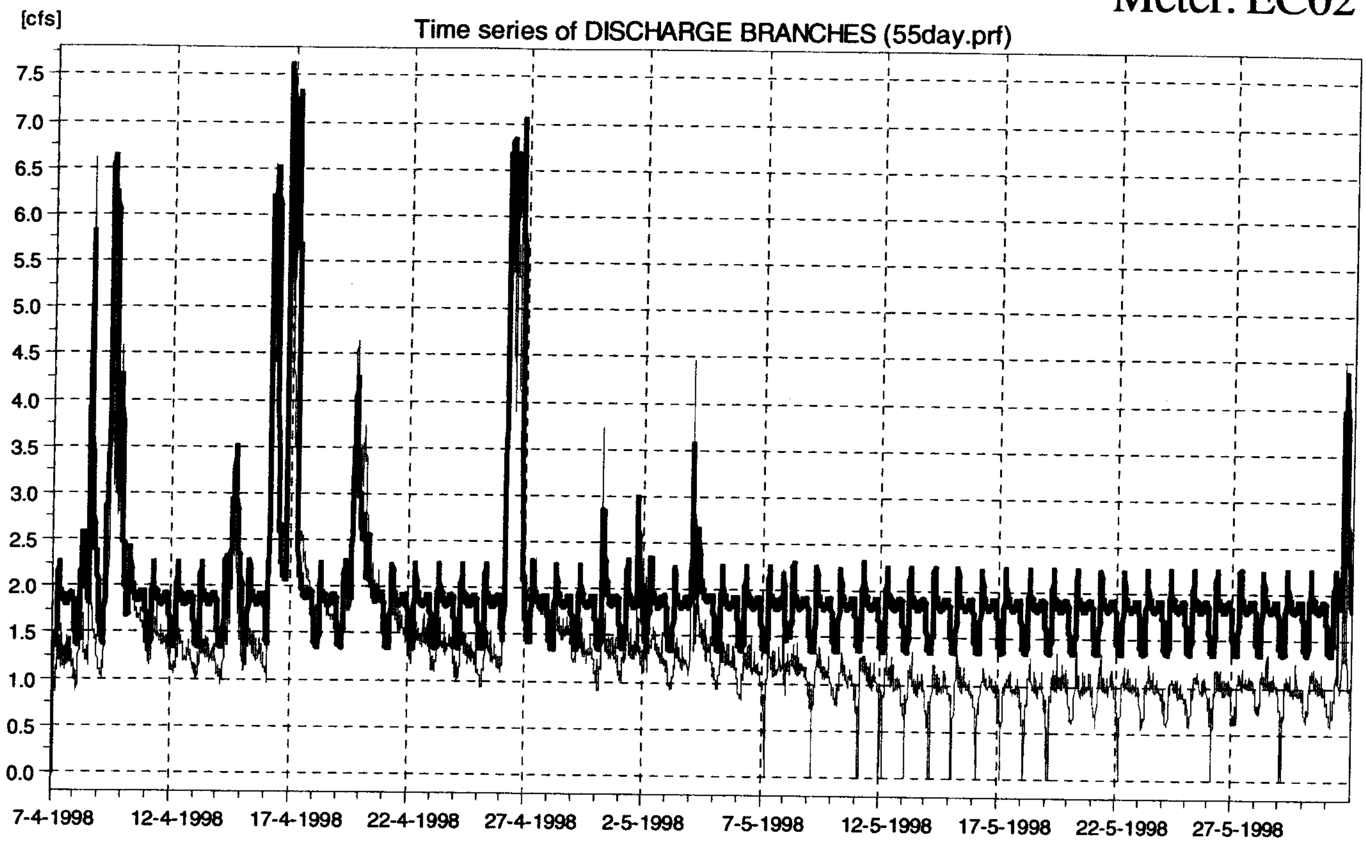
M&E Metcalf & Eddy AQUA ALLIANCE

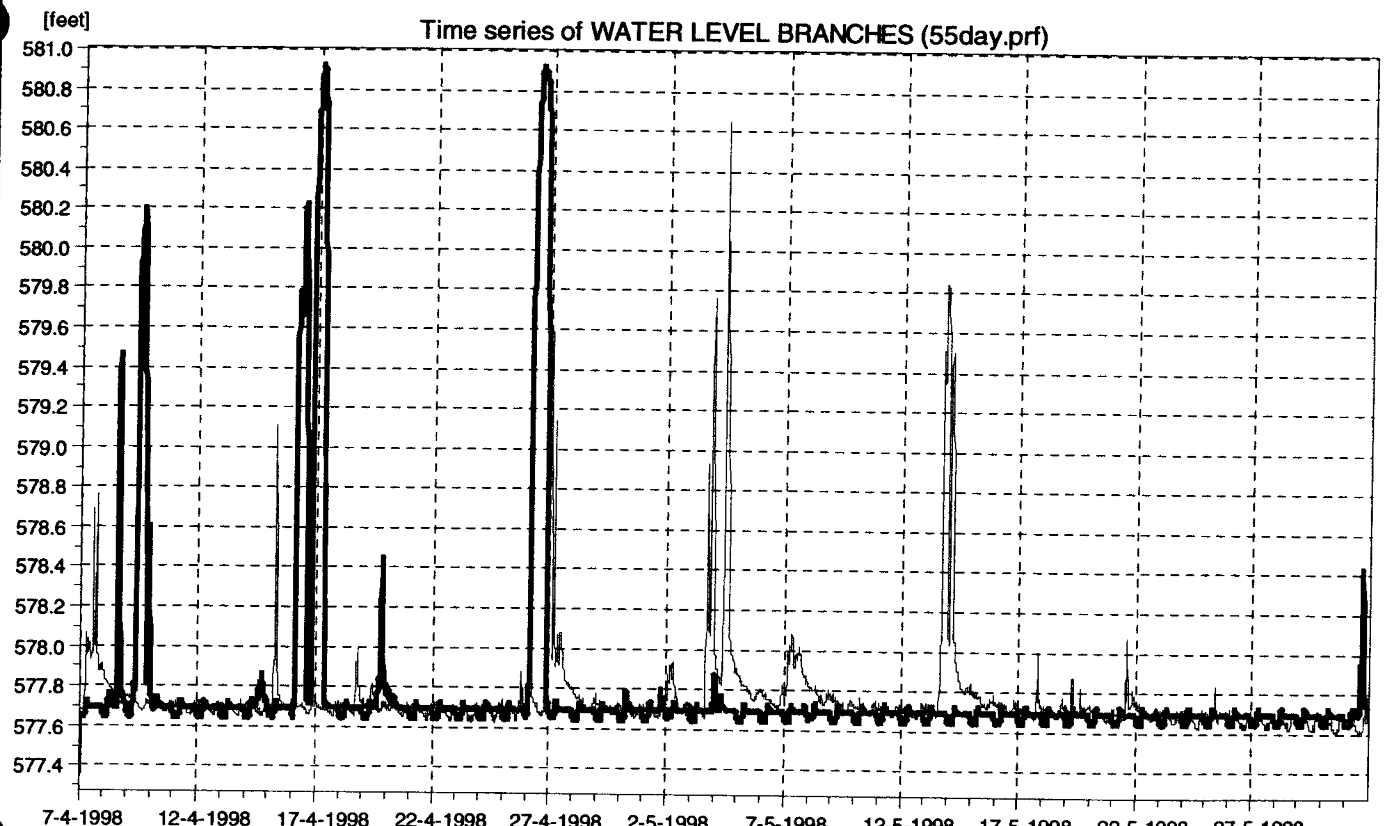
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EC02





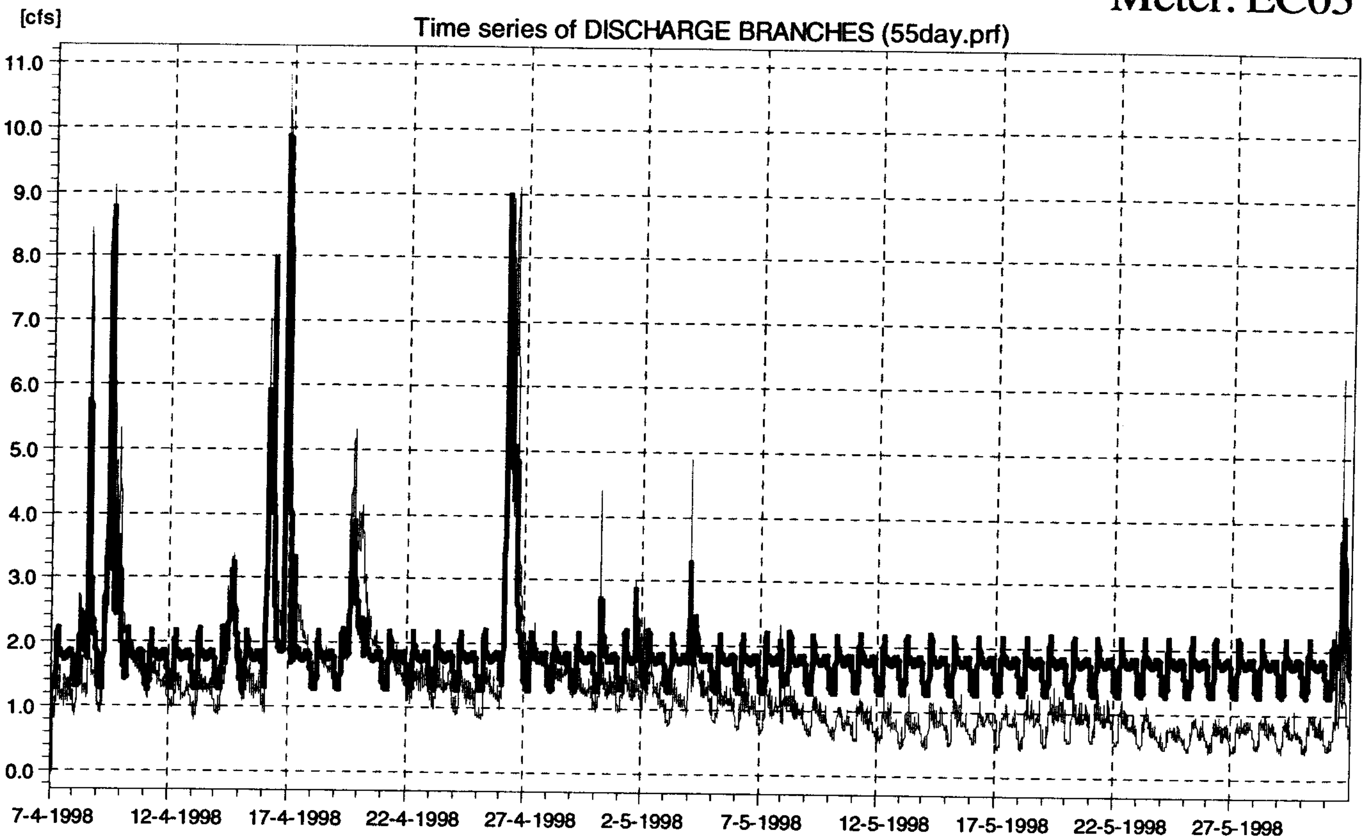
M&E Metcalf & Eddy AQUA ALLIANCE

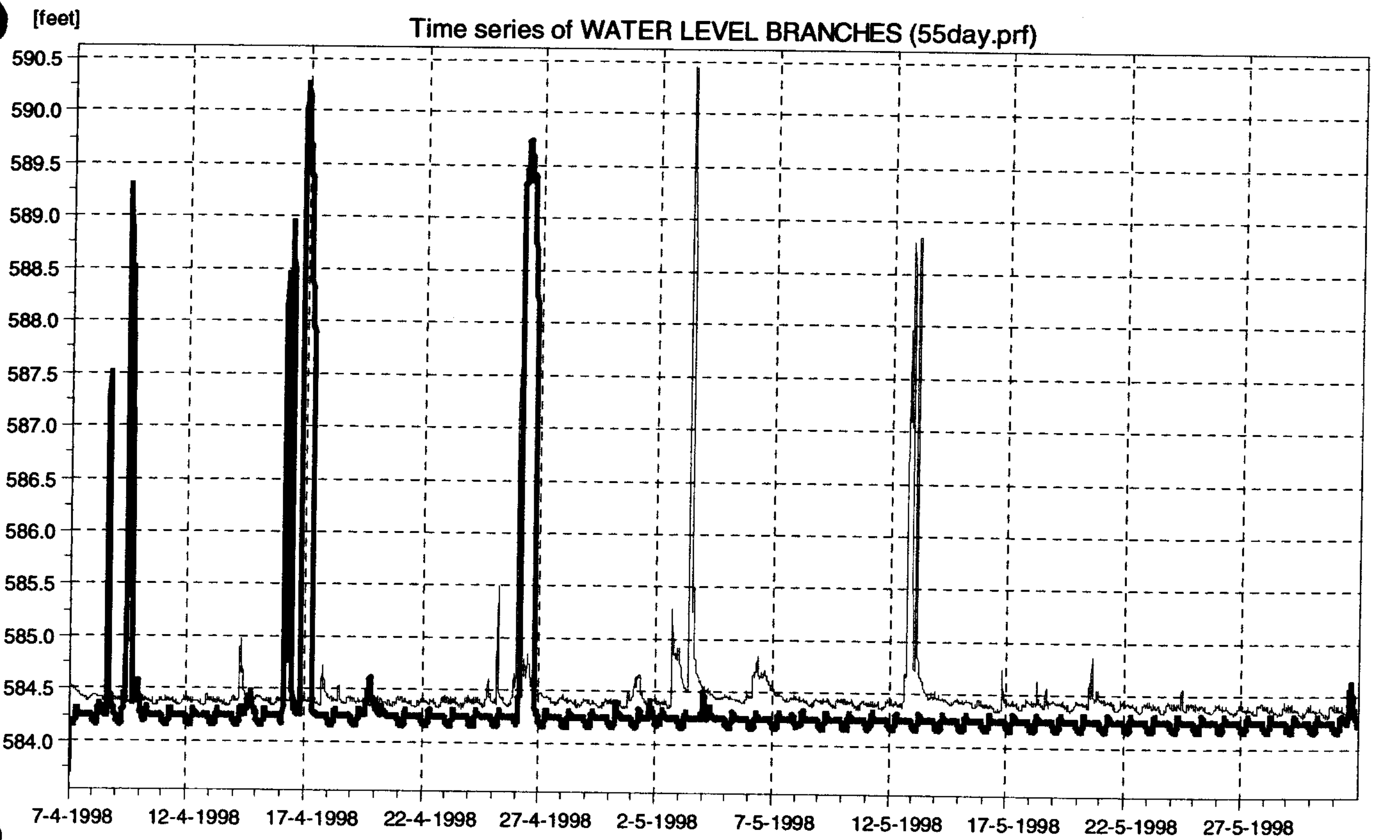
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EC03





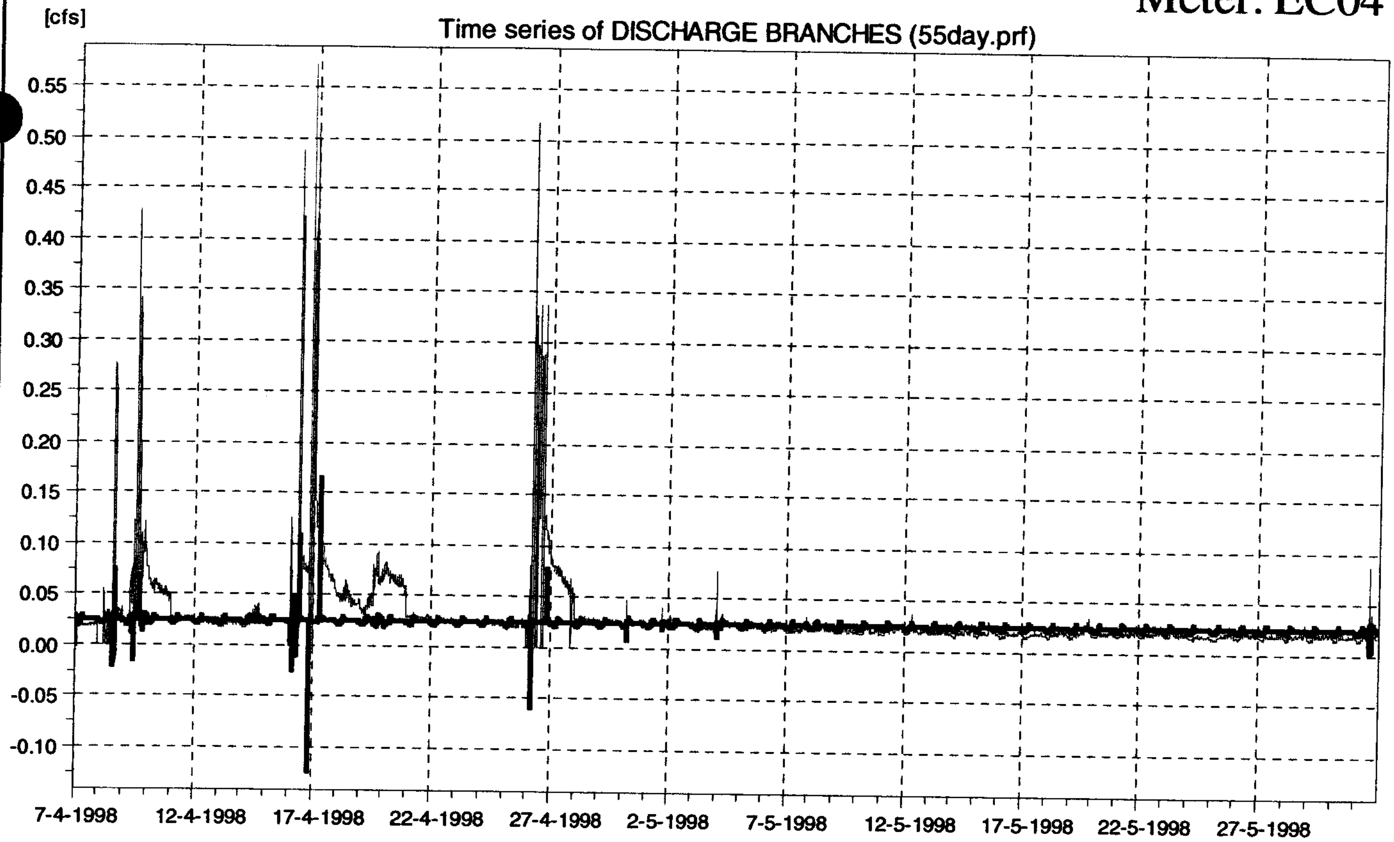
M&E AQUA ALLIANCE Metcalf & Eddy

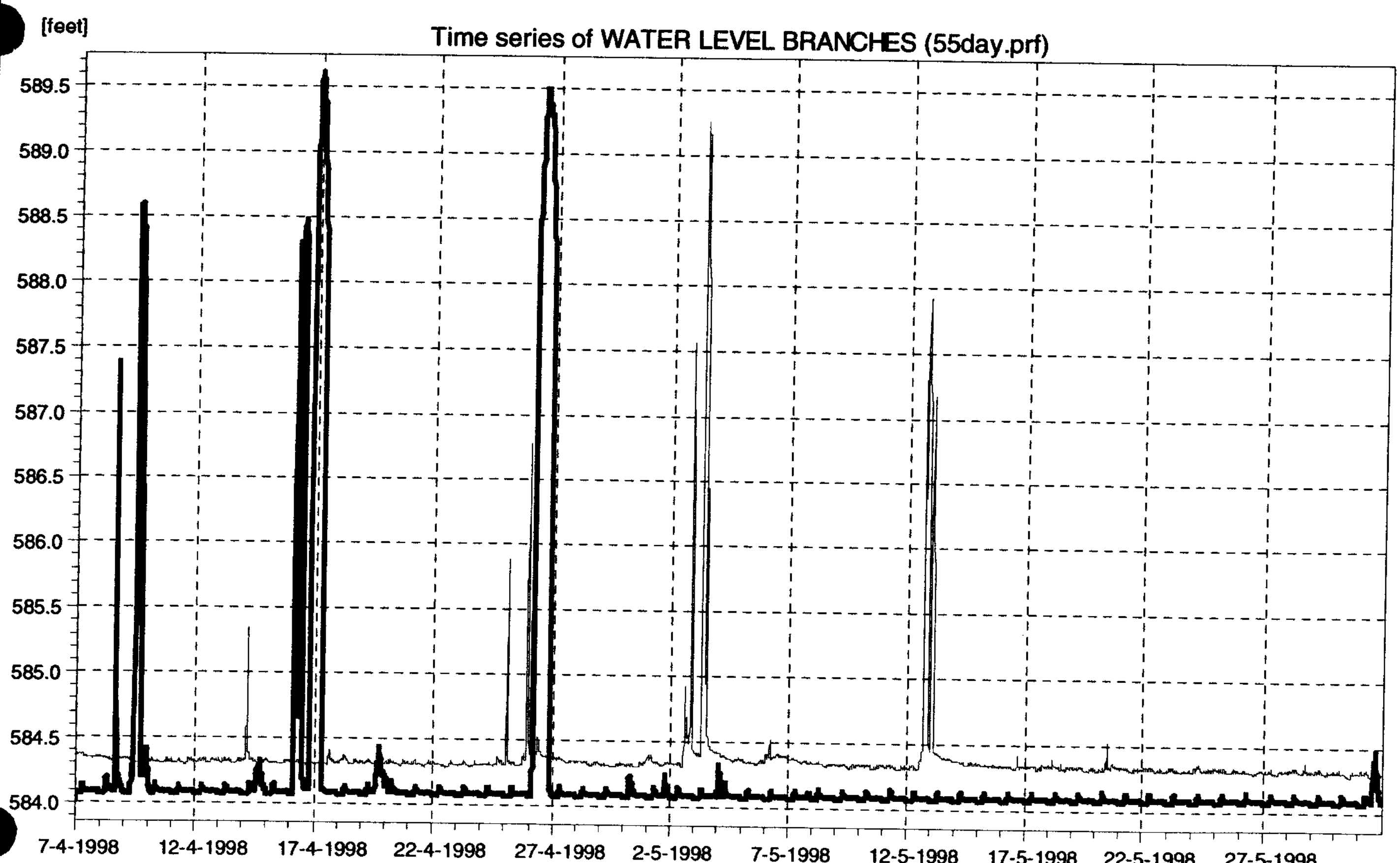
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: EC04





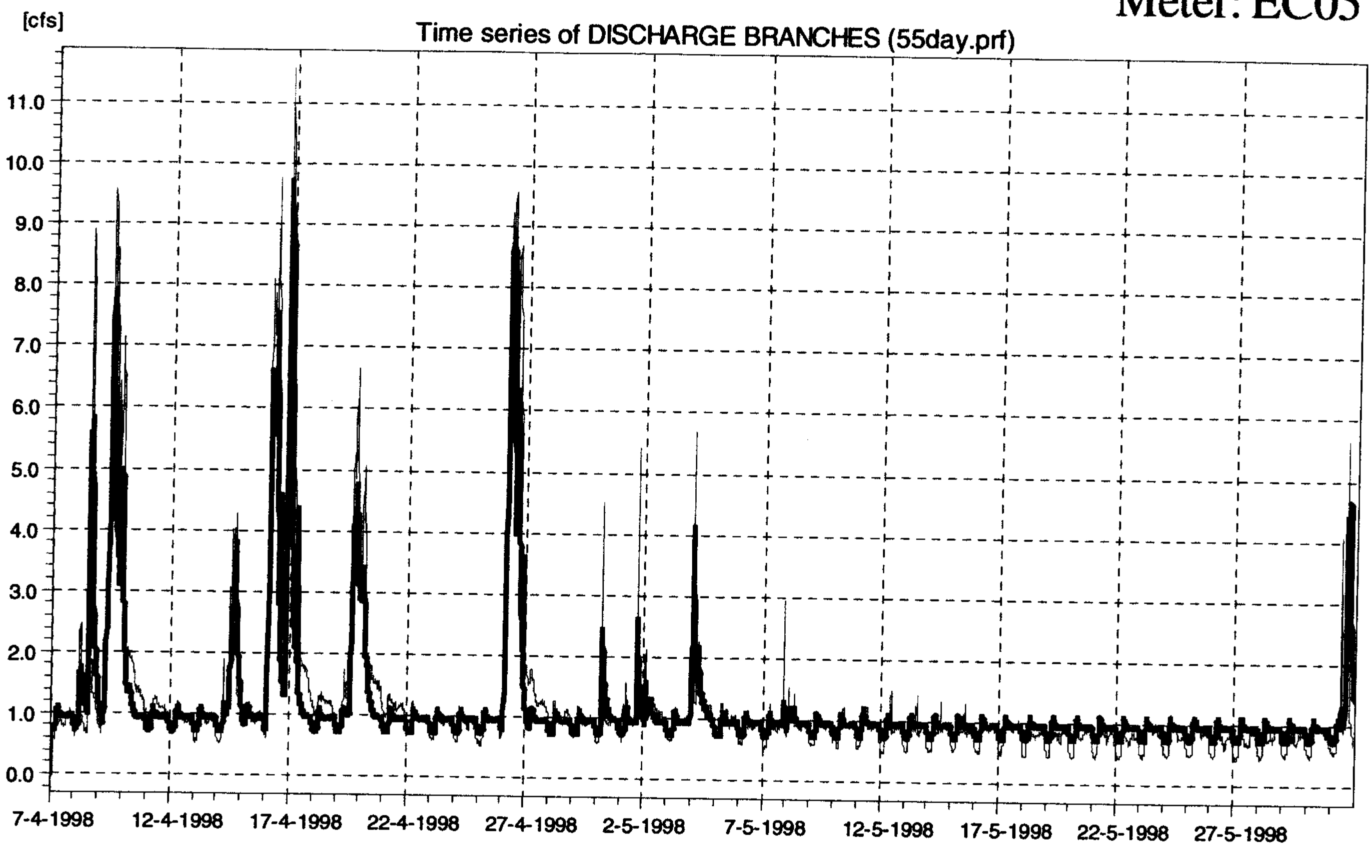
M&E AQUA ALLIANCE Metcalf & Eddy

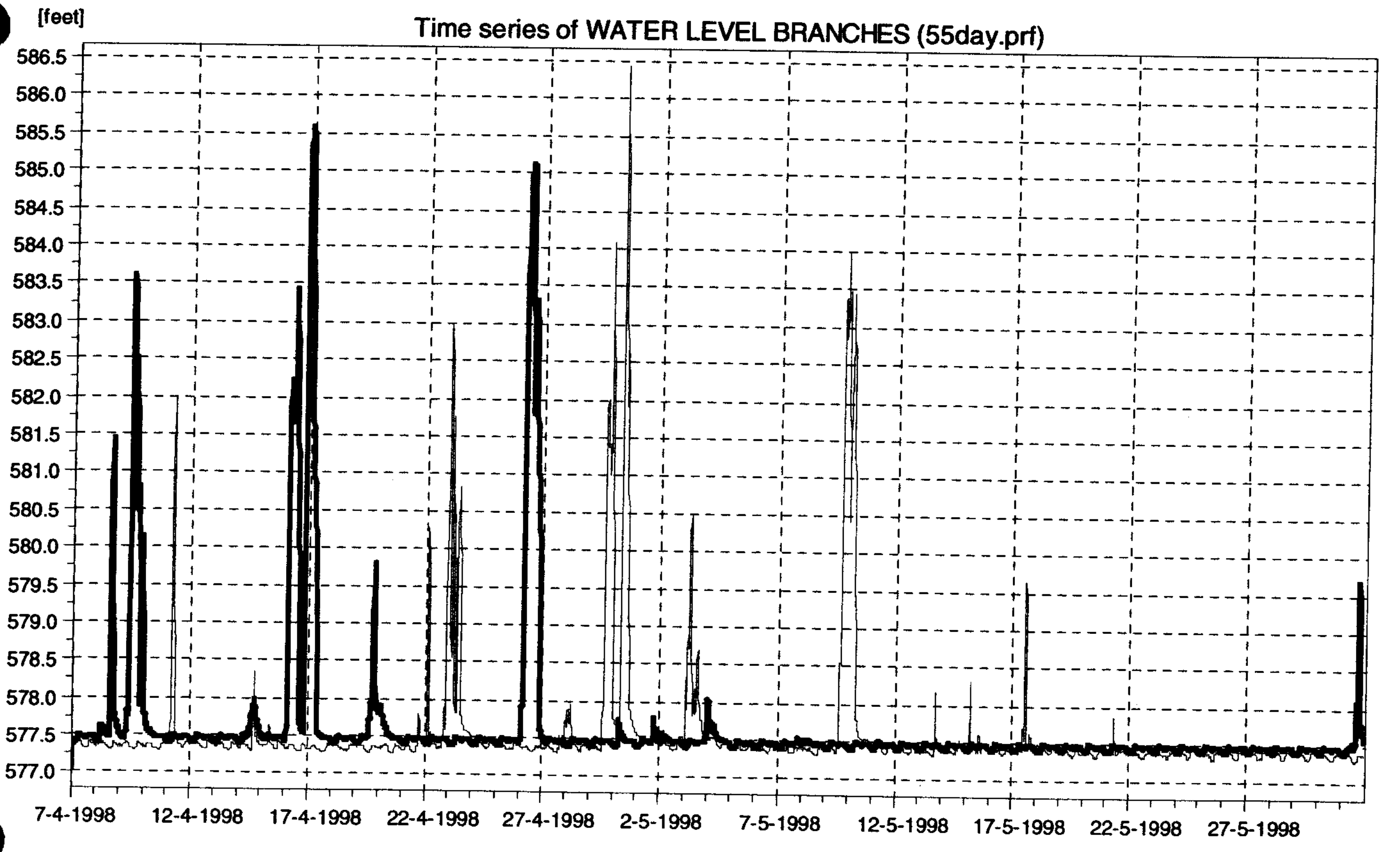
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: EC05





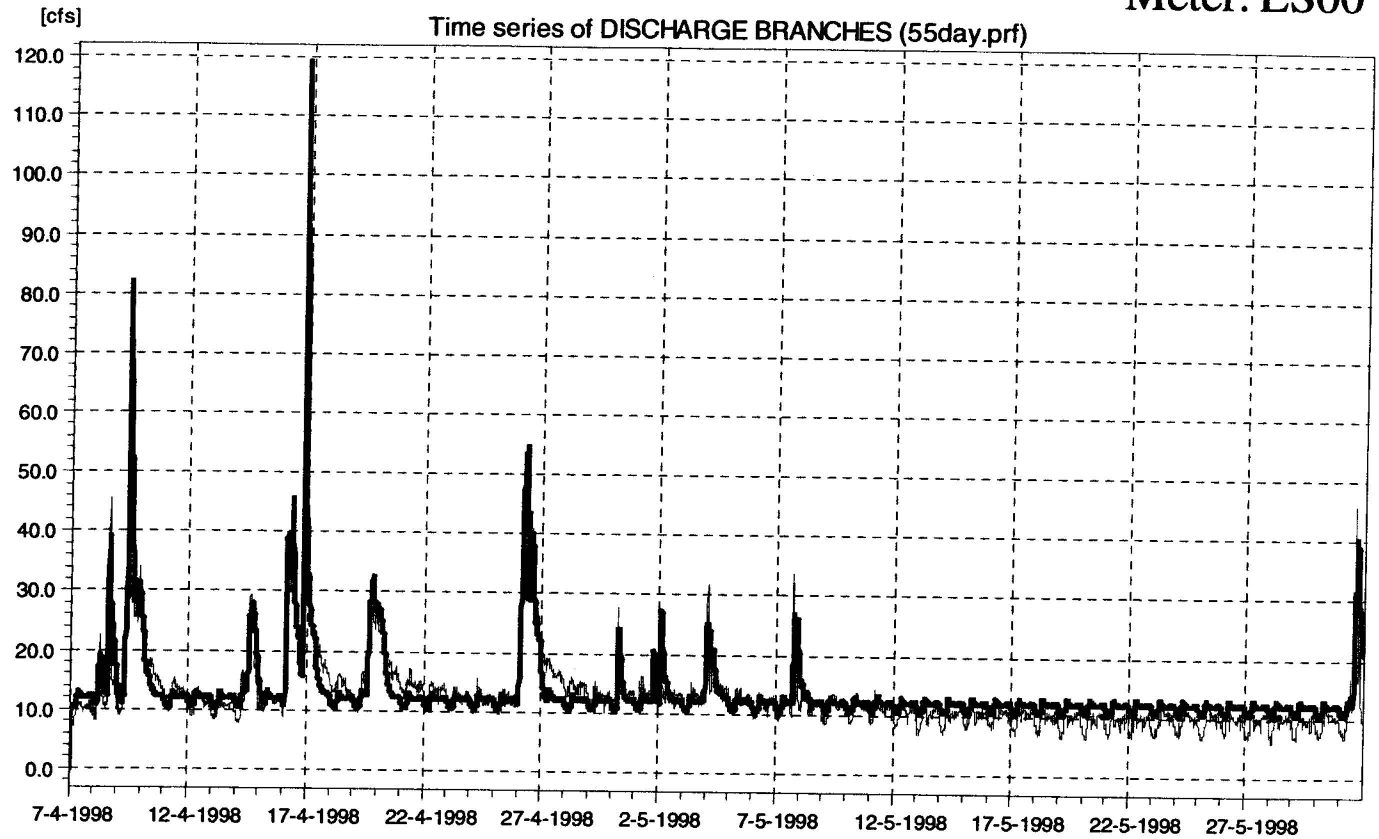
M&E Metcalf & Eddy AQUA ALLIANCE

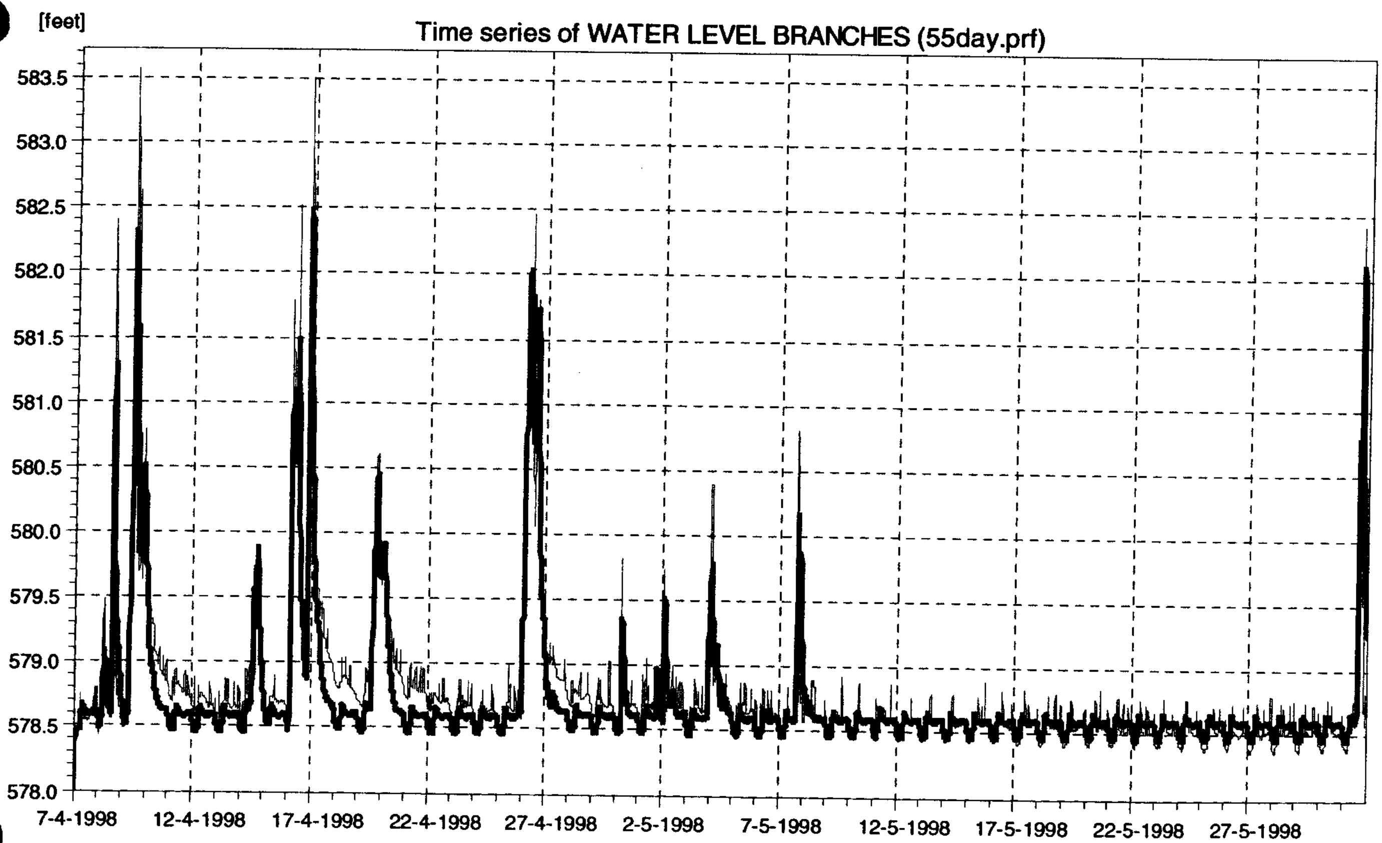
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: LS00





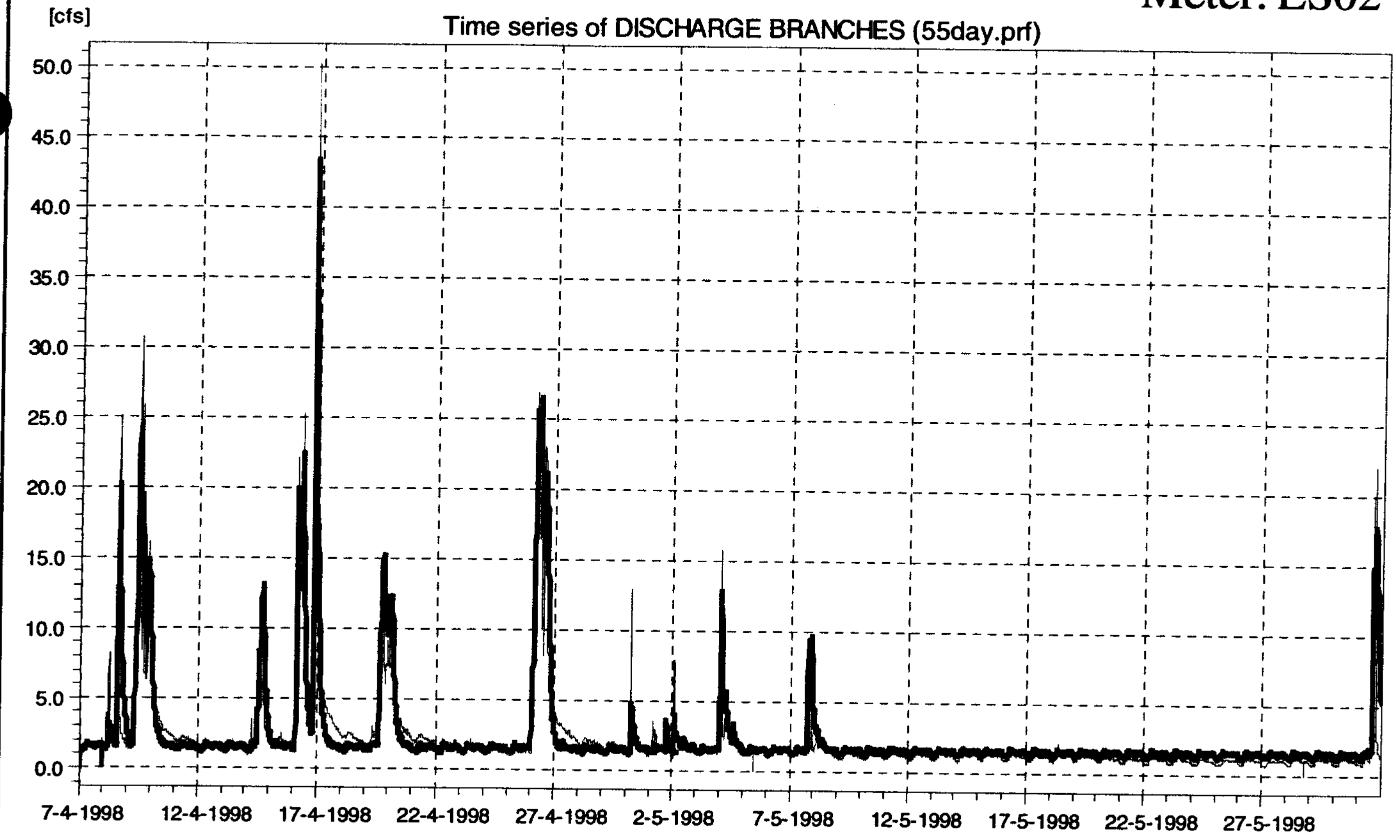
M&E AQUA ALLIANCE Metcalf & Eddy

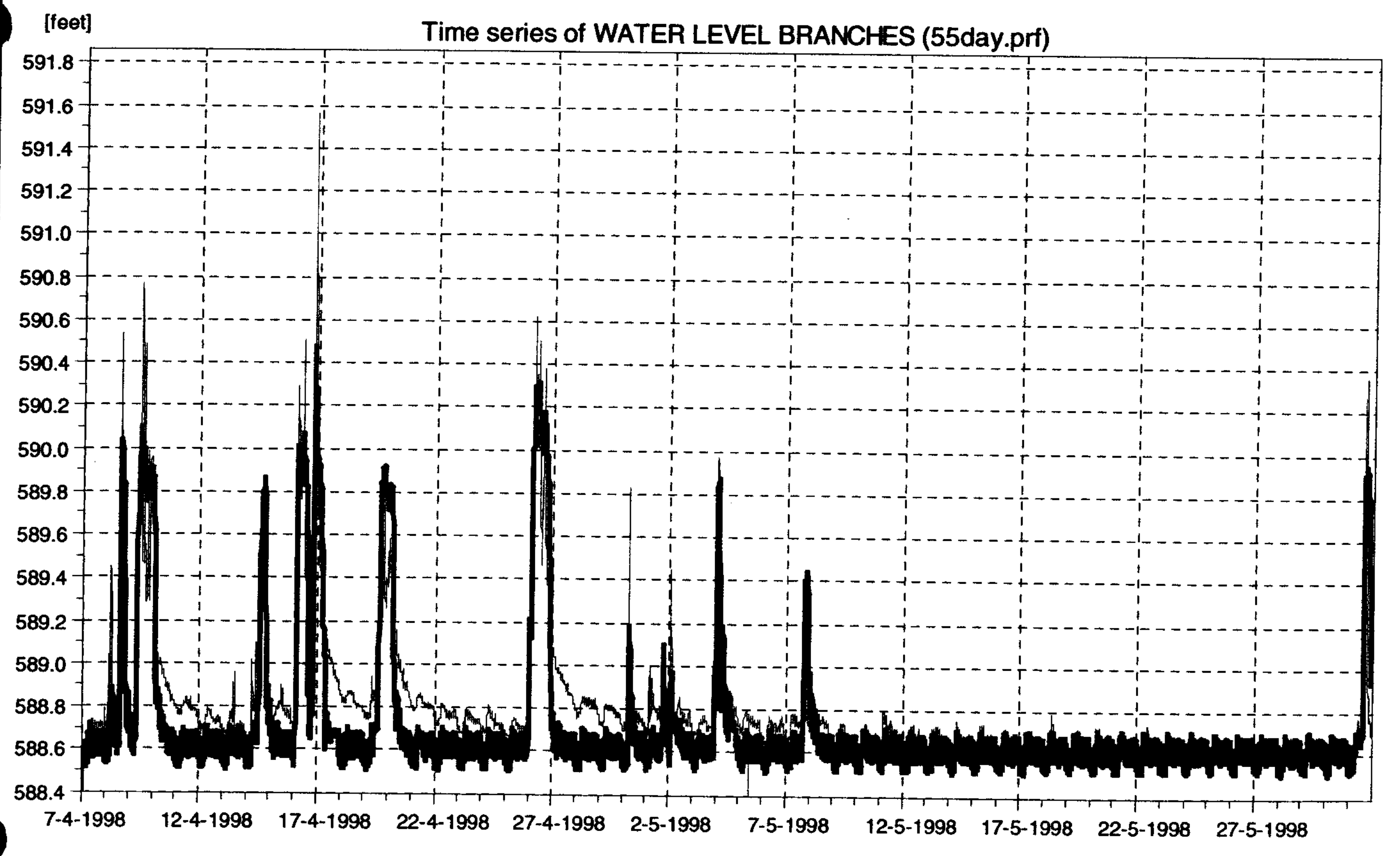
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: LS02





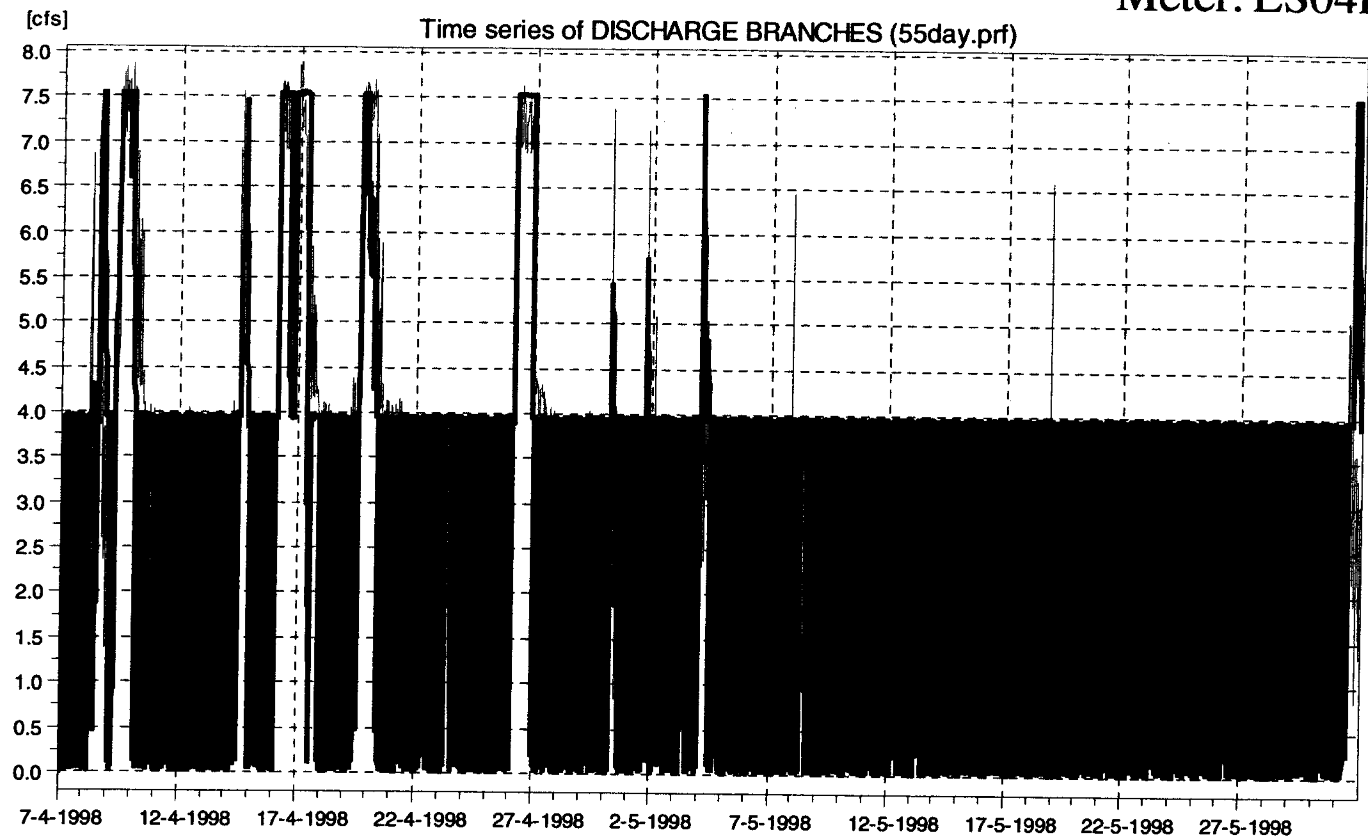
M&E Metcalf & Eddy AQUA ALLIANCE

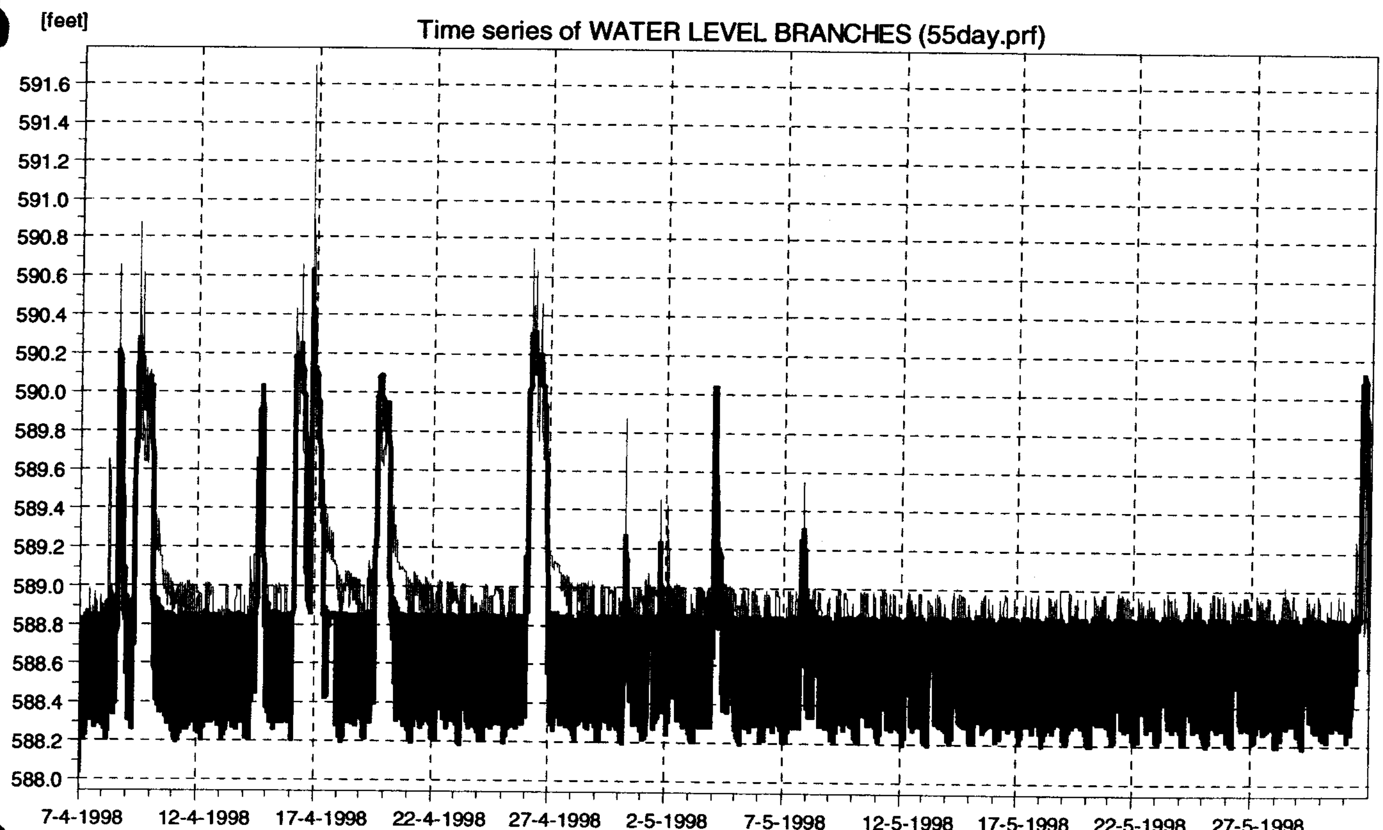
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: LS04D





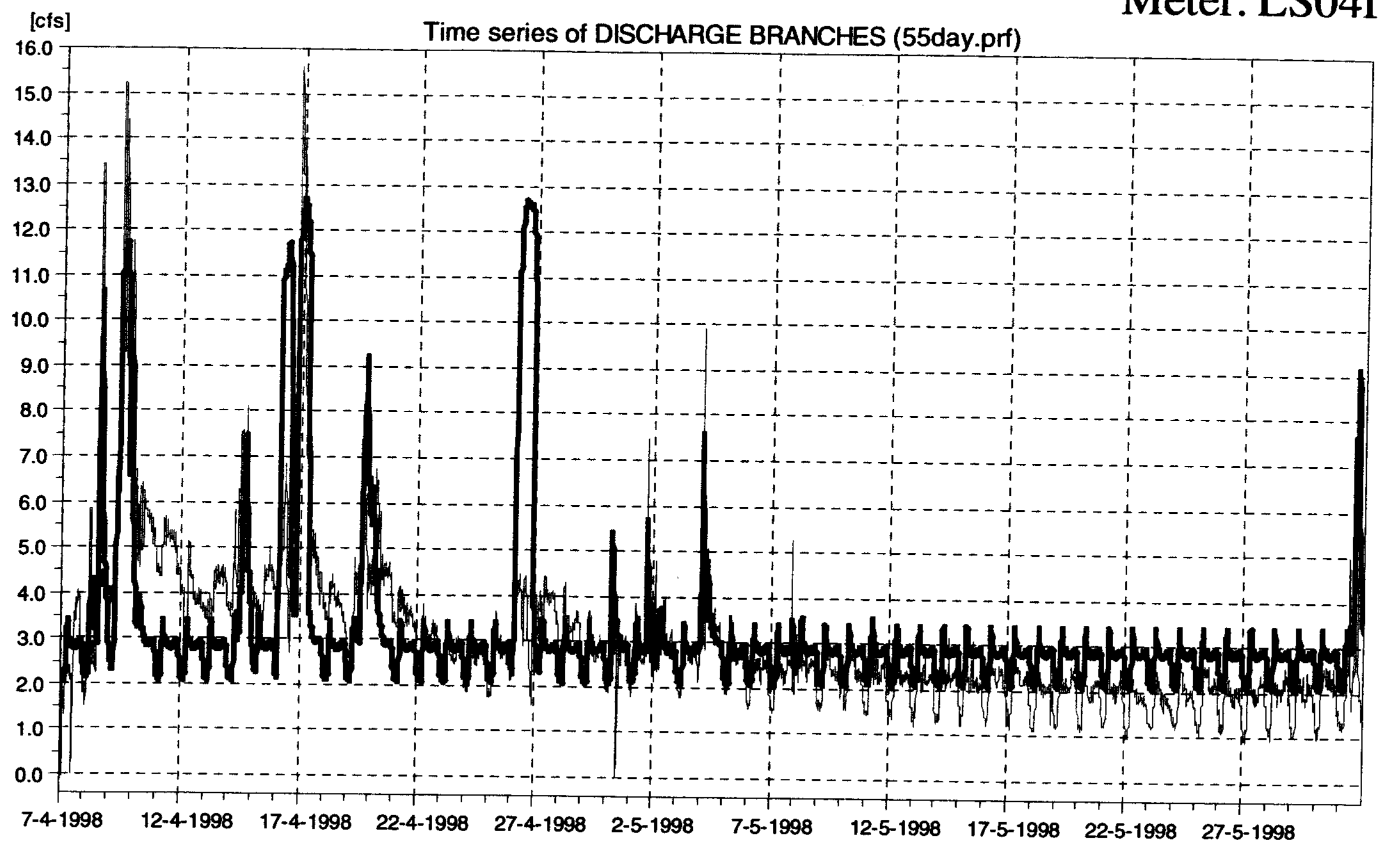
Metcalf & Eddy

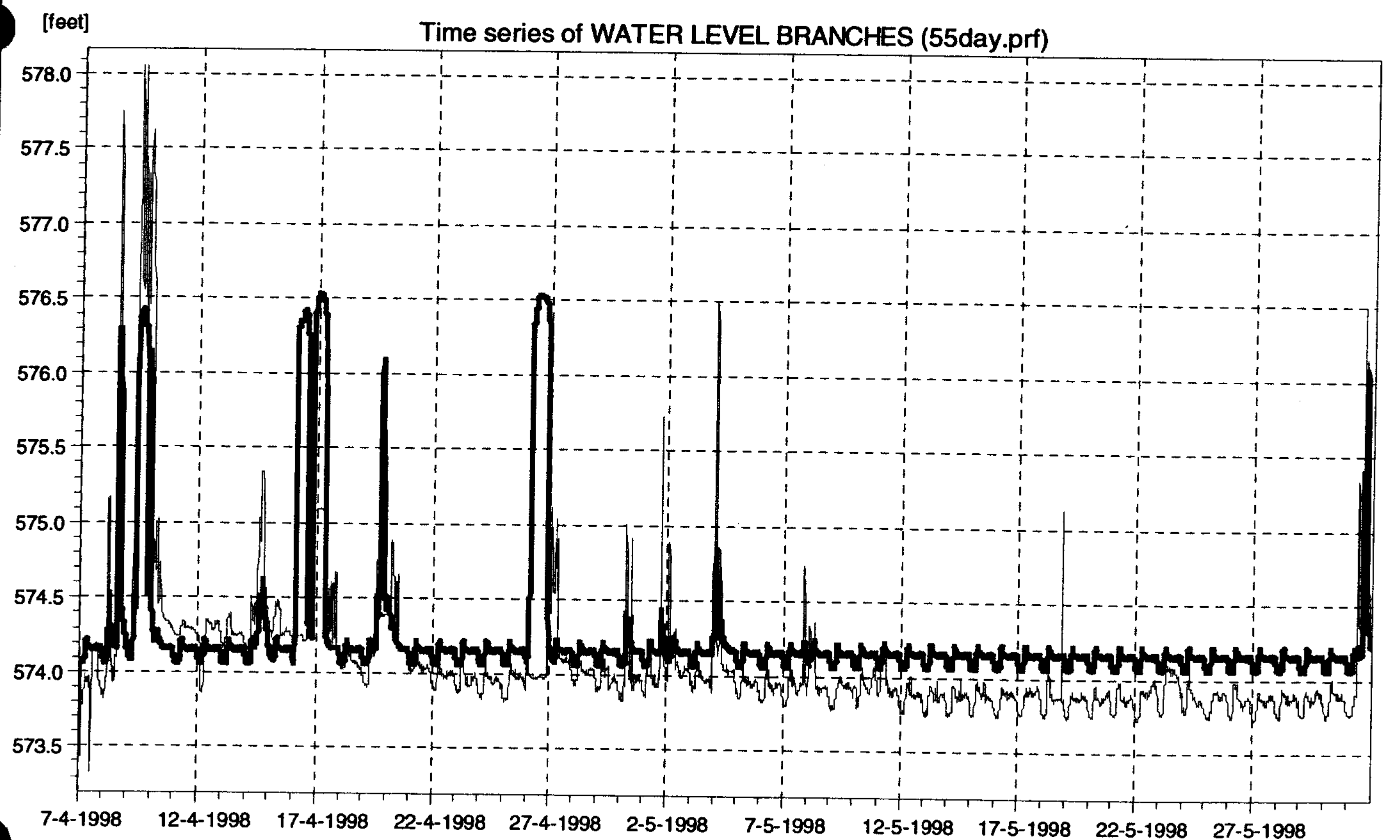
Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: LS04I





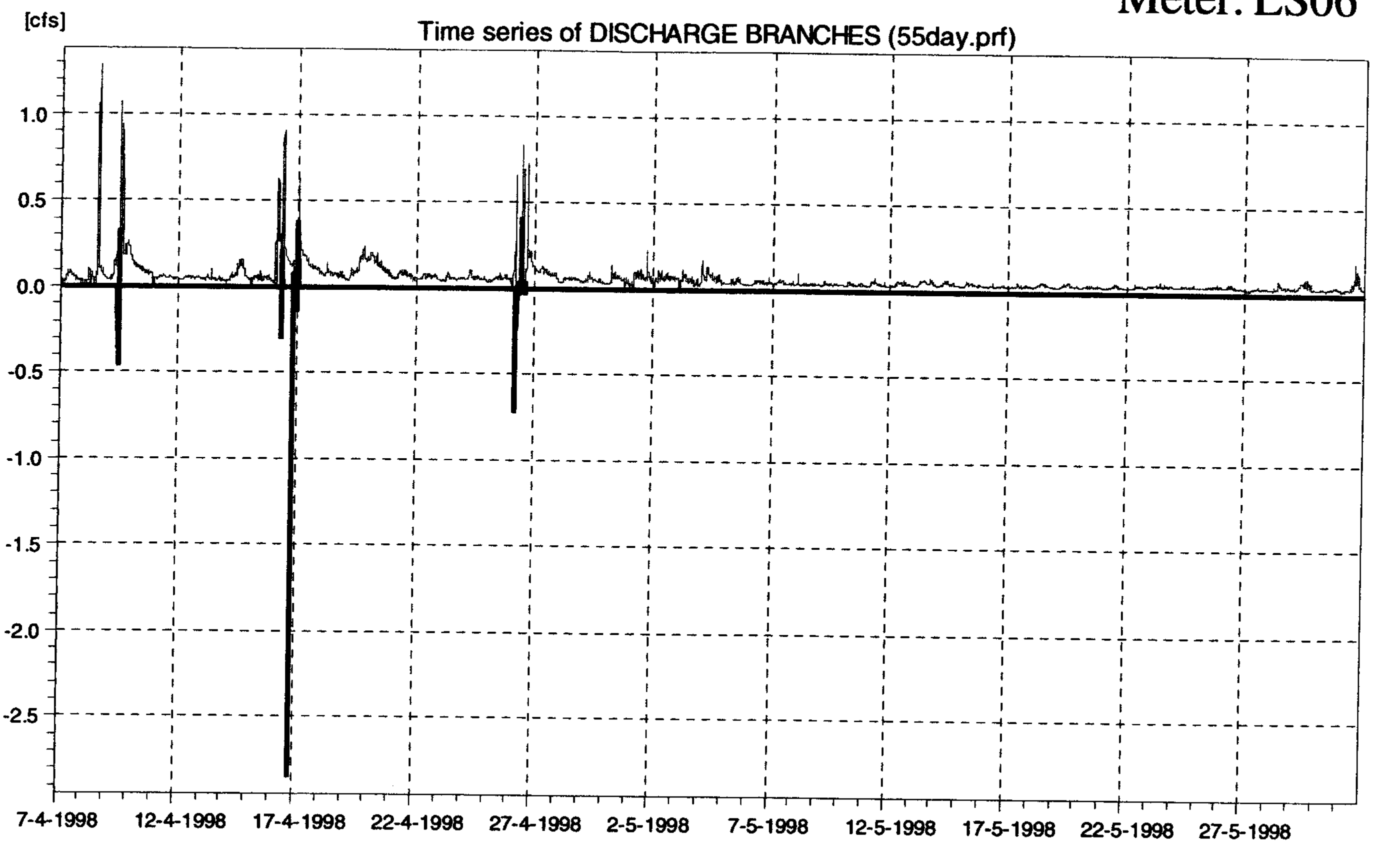
M&E Metcalf & Eddy AQUA ALLIANCE

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

Meter: LS06



[cfs]
Time series of DISCHARGE BRANCHES (55day.prf)
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
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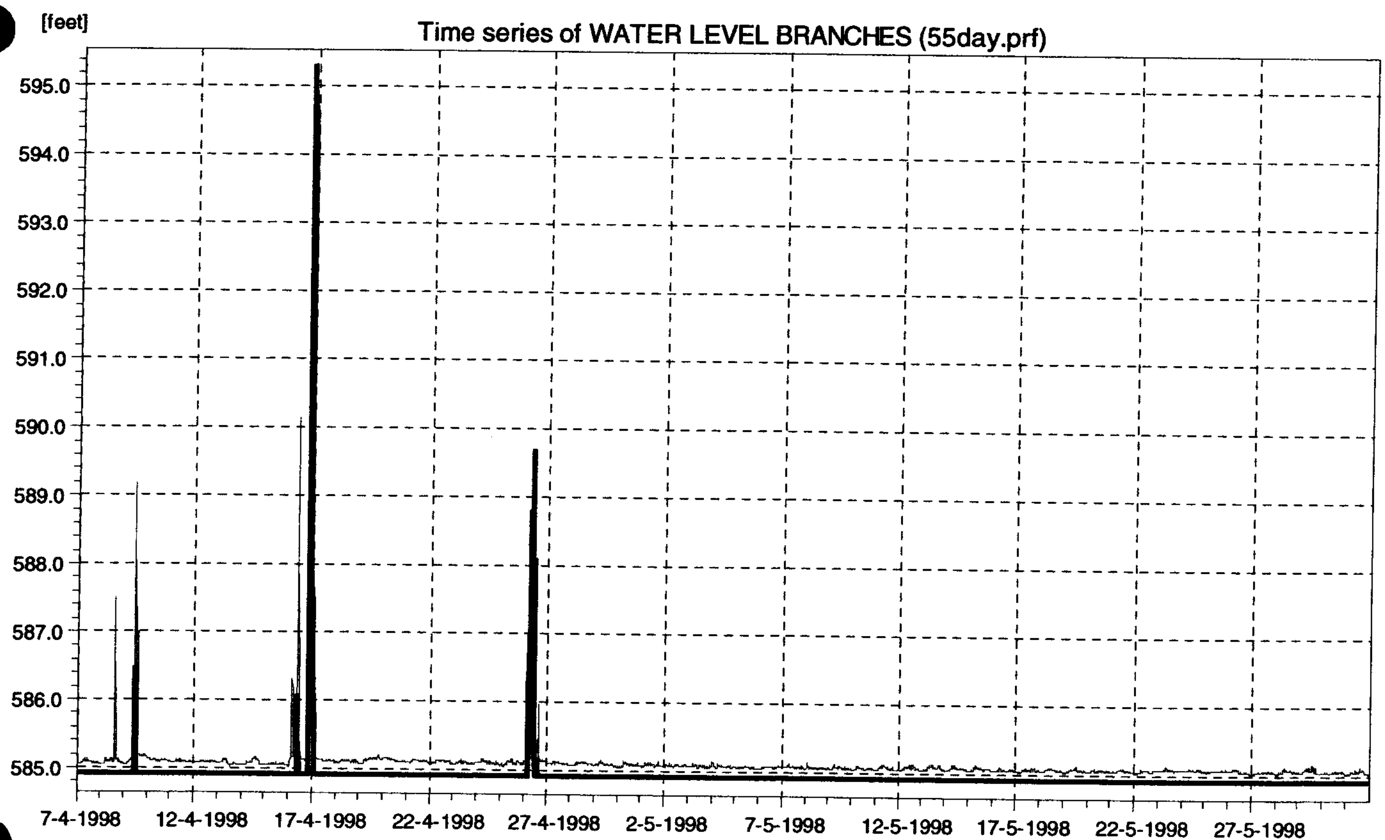
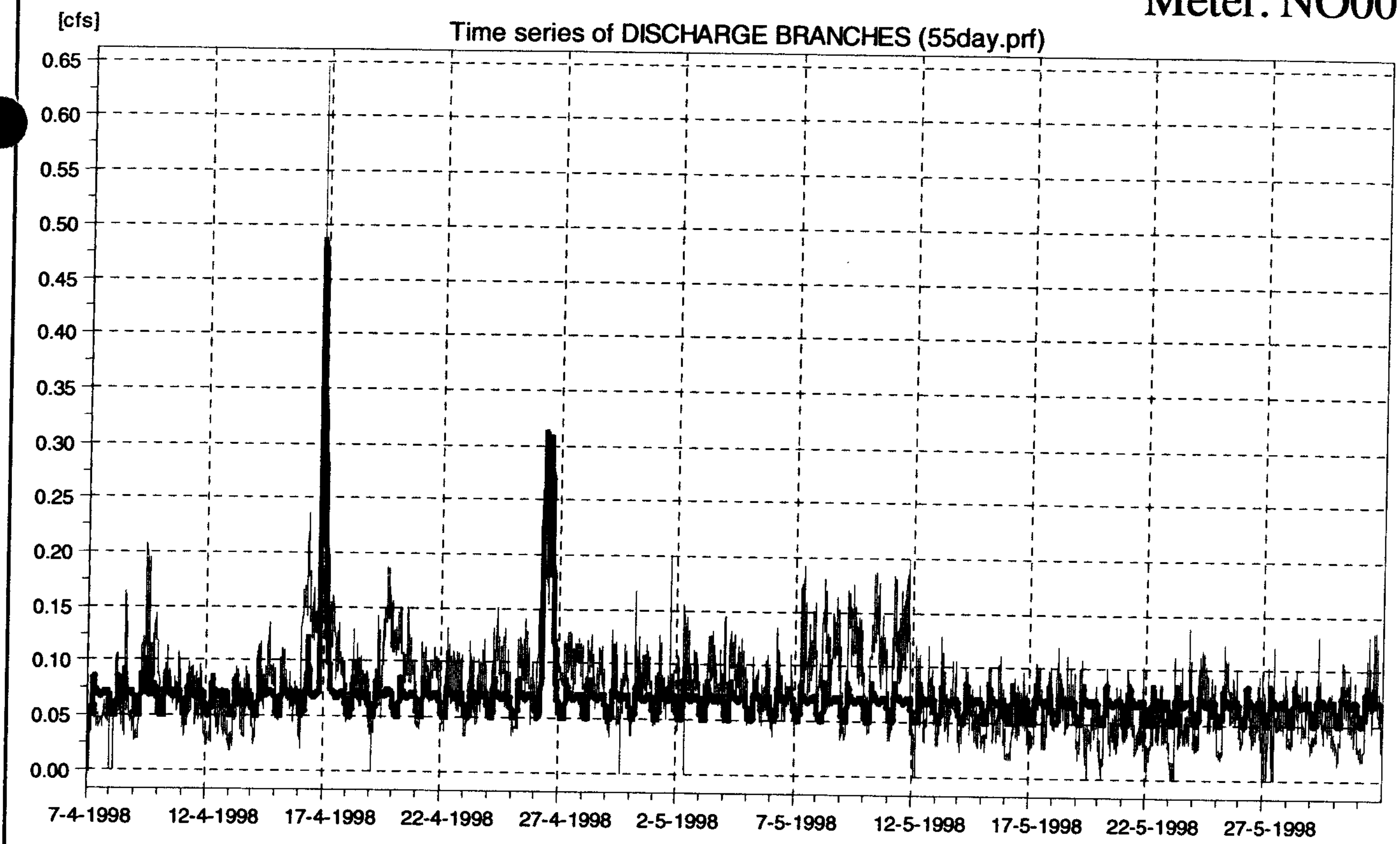
22-5-1998
27-5-1998

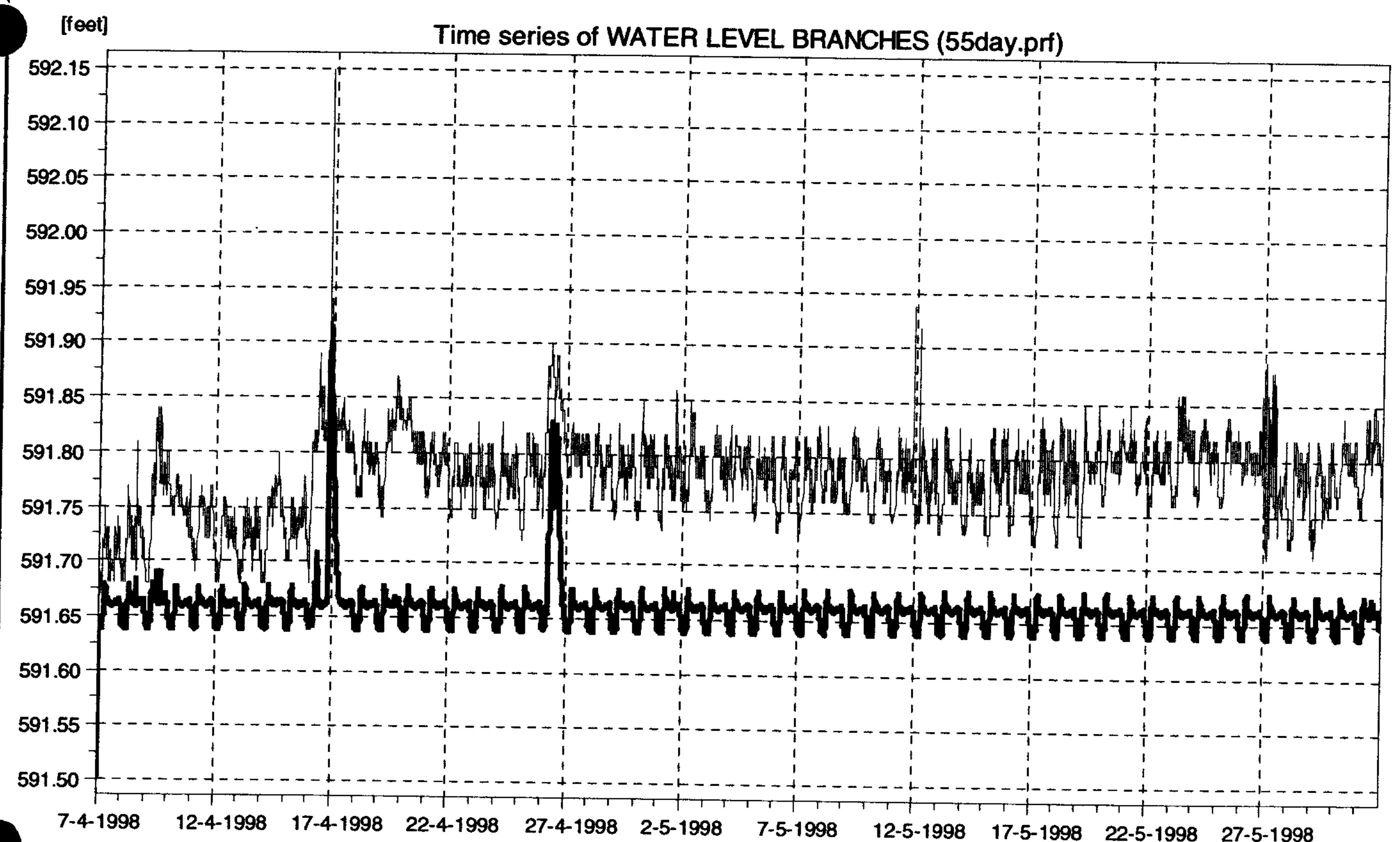


[feet]
Time series of WATER LEVEL BRANCHES (55day.prf)
595.0
594.0
593.0
592.0
591.0
590.0
589.0
588.0
587.0
586.0
585.0
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
7-5-1998
12-5-1998
17-5-1998
22-5-1998
27-5-1998

Meter: NO00

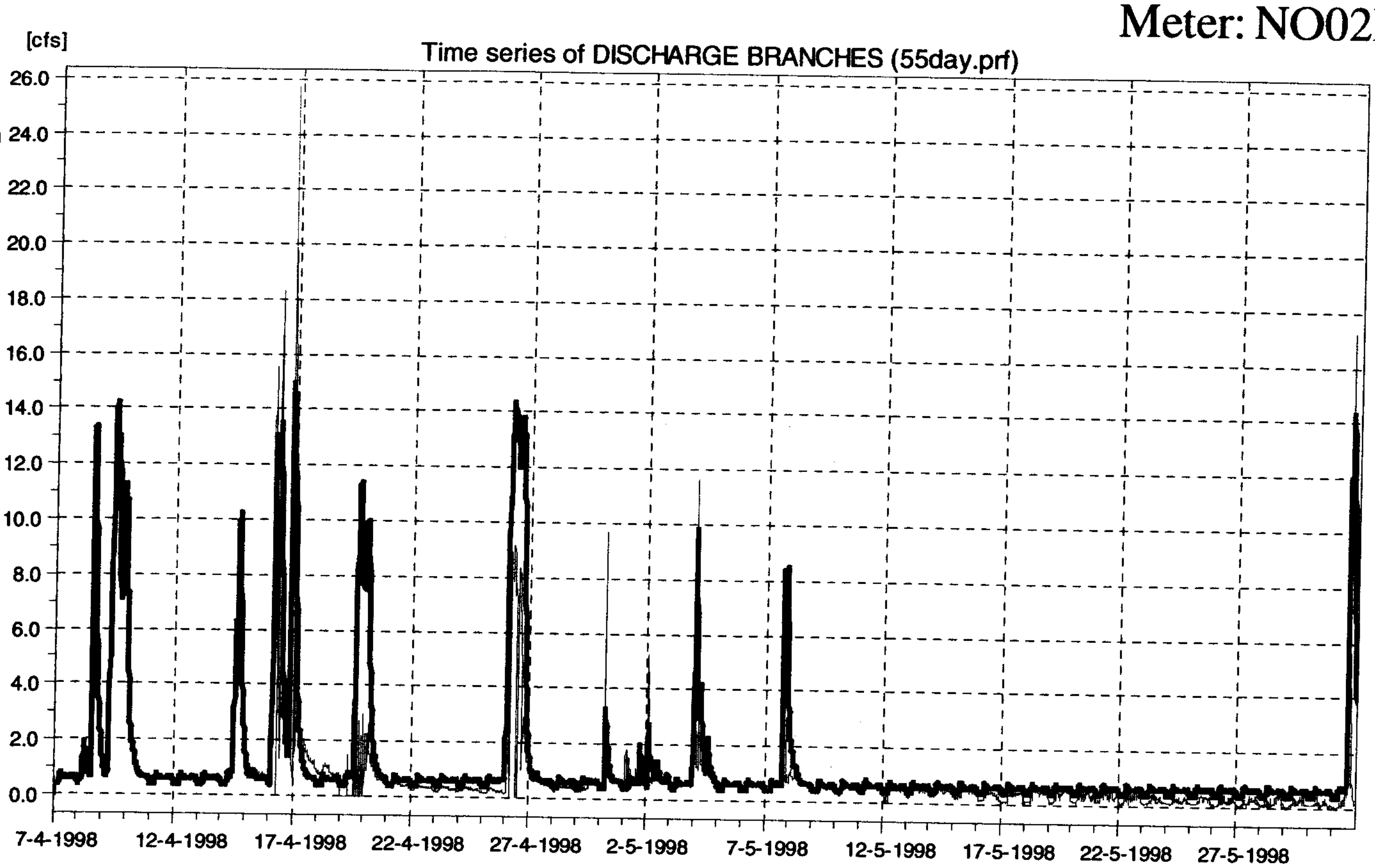


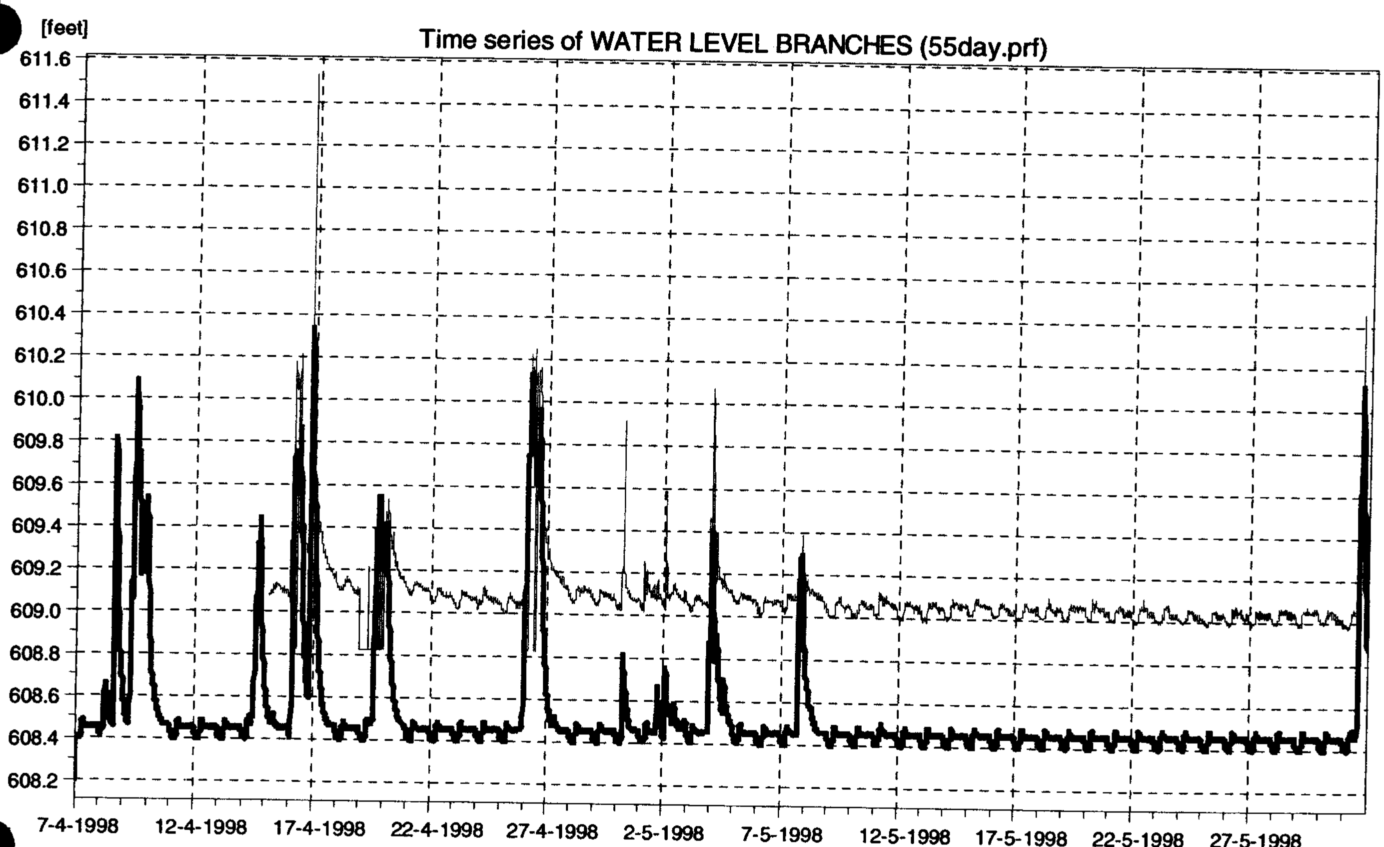
[cfs]
Time series of DISCHARGE BRANCHES (55day.prf)
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
7-5-1998
12-5-1998
17-5-1998
22-5-1998
27-5-1998



[feet]
Time series of WATER LEVEL BRANCHES (55day.prf)
592.15
592.10
592.05
592.00
591.95
591.90
591.85
591.80
591.75
591.70
591.65
591.60
591.55
591.50
7-4-1998
12-4-1998
17-4-1998
22-4-1998
27-4-1998
2-5-1998
7-5-1998
12-5-1998
17-5-1998
22-5-1998
27-5-1998

Meter: NO02D





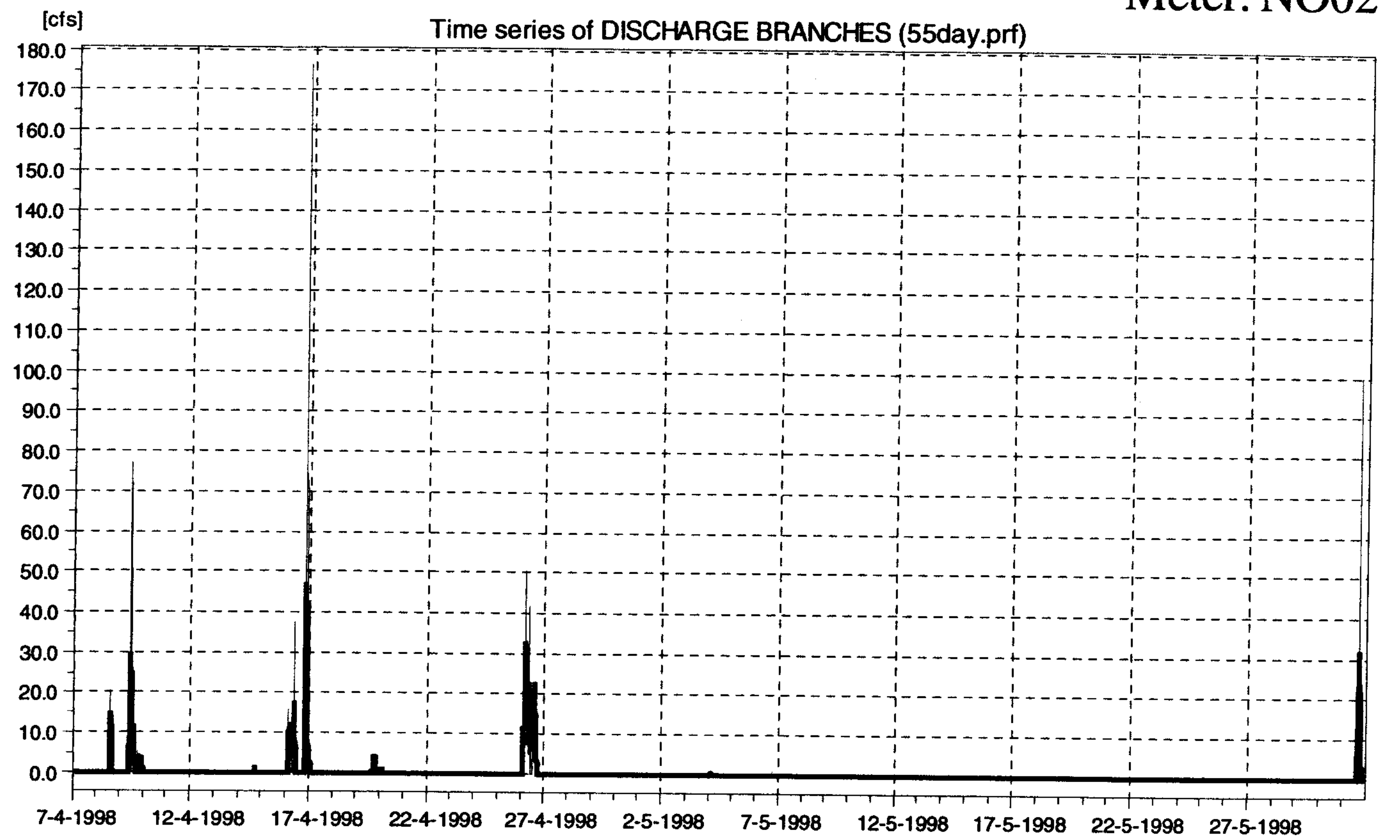
M&E Metcalf & Eddy AQUA ALLIANCE

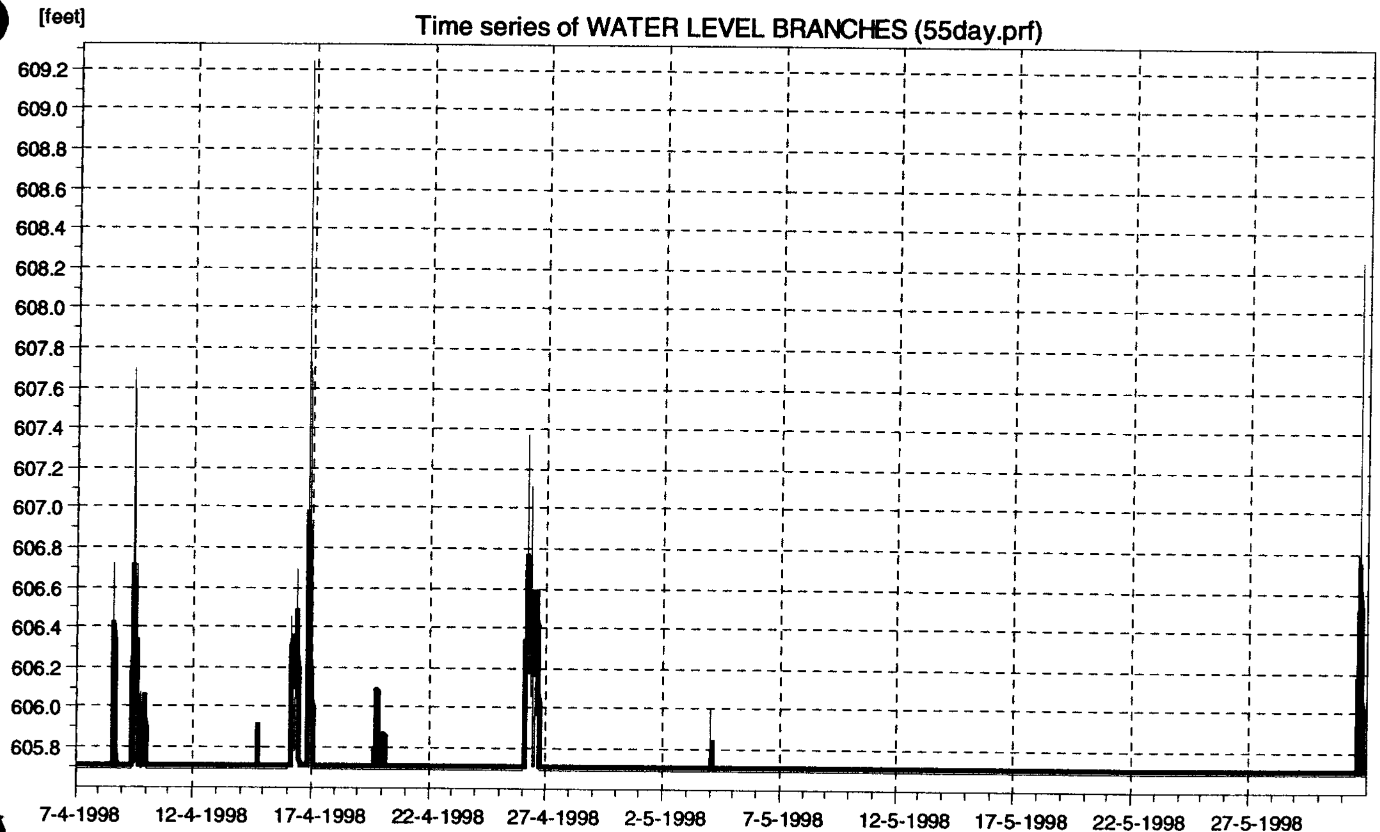
Easterly CSO Phase II Facilities Plan

Model Calibration — Model — Meter

CH2MHILL

Meter: NO02W





M&E AQUA ALLIANCE Metcalf & Eddy

Easterly CSO Phase II Facilities Plan

Model Calibration —— Model —— Meter

CH2MHILL

APPENDIX E

Site-Specific Calibration Issues

APPENDIX E
SITE-SPECIFIC CALIBRATION ISSUES

A total of 145 flow monitors were installed in the Easterly CSO area for the Phase II CSO study. During the model calibration process, parameters involved in dry and wet weather flow generation were adjusted within reasonable limits. In instances where calibration could not be achieved, the model developers began troubleshooting activities to resolve the discrepancies. However, not every discrepancy was resolved completely. These discrepancies are described in this appendix.

East 140th Sub-Model Area

The East 140th area consists of both separate and combined sewer systems. The E. 140th Interceptor area was calibrated using a total of nineteen flow meters: 3 interceptor meters, 8 influent/effluent meters, 4 overflow meters and 4 flow boundary meters. Meters HA04 and HA 14 were flow boundary meters monitoring separate areas only. Meter HA12 did not function properly and could not be used for calibration. The model calibration plots are included in Appendix D.

Model Calibration Issues. Significant system defects were encountered downstream of Regulator H-4, located on the Shaw Branch of the E. 140th Interceptor. At Meter HA03I, located on the influent line to Regulator H-4, the model calibrated well. However, at Meter HA10, located a short distance downstream on the dry weather outlet, most of the flow had been lost. This section of the interceptor ranges from 15-18 inches in diameter. The interceptor inspection noted that this section was almost completely blocked (reportedly with concrete). With nearly complete blockage of the dry weather outlet, backwater at Regulator H-4 would be suspected. However, Meter HA03I indicated that there was no backup occurring and Meter HA03W, located on the overflow line, recorded overflows during the wet weather events only. A 5 foot by 7 foot box culvert tributary to Nine Mile Creek parallels this portion of the interceptor and it is suspected that there is a cross connection to this culvert somewhere between Regulator H-4 and Meter HA10. Due to the nature of the blockage, the line was not CCTV inspected and the existence of this cross connection could not be verified. In the existing conditions model, all flow to this regulator was outletted to the box culvert. This produced a better calibration at Meter HA10. At Meter HA08, located at the downstream end of the Shaw Branch, the model calibrated quite well.

Another calibration issue occurred at Meter HA01D, located on the dry weather outlet from regulator H-19. The peak modeled wet weather flows were consistently higher than the metered results, however, the hydraulic heads calibrated closely. After reviewing the flow monitoring site report, it was discovered that ADS made their flow calculations based on a pipe 25.38 inch high by 30.5 inch wide. The pipe size entered into the model per the survey inspection was a 3'-0" circular brick pipe. Pipes constructed of brick in-place often vary from specified dimensions, but in this case, the pipe size per the Brown and Caldwell inspection (which also agreed with record drawings) was retained in the model. The parameters used in SWMM RUNOFF were reviewed and deemed accurate, therefore, data from Meter HA01D was considered unusable.

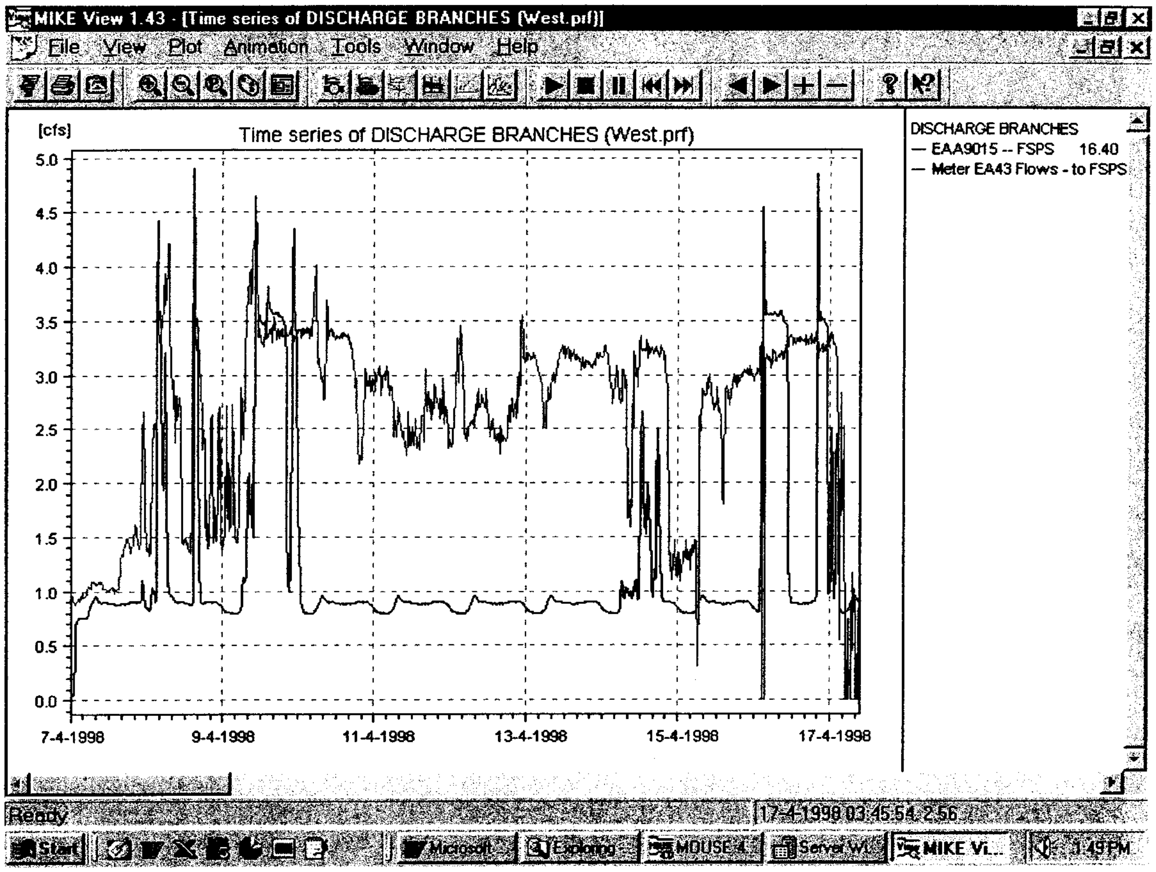
Flats-Area Sub-Model

Meter EA43. Meter EA43 was located on the influent line to the Front Street Pump Station. During early April (4/9/98 through 4/17/98), this meter recorded constantly high flow as shown in Figure 1. On April 9, 1998, the lake level rose above Elevation 574.8 for approximately 14 hours. This lake level elevation appears to have caused inflow at Regulator E-30.

Dugway Interceptor and Easterly Main Interceptor Sub-Model

Meters EA03, EA04 and EA06. After calibration of the Easterly Interceptor meters installed to the west of the connection of the Doan Valley Interceptor, the dry weather flow recorded at Meter EA06 appeared to be approximately 10 cfs less than the model prediction as shown in Figure 2. Meter EA04 was located downstream of Meter EA06 and Meter EA03 was located downstream of Meter EA04. It was noted that the average daily dry weather flow volume at Meter EA04 was higher than the average volume recorded at Meter EA03. The major tributary

Figure 1. Modeled Versus Metered Flows at Front Street Pump Station Influent

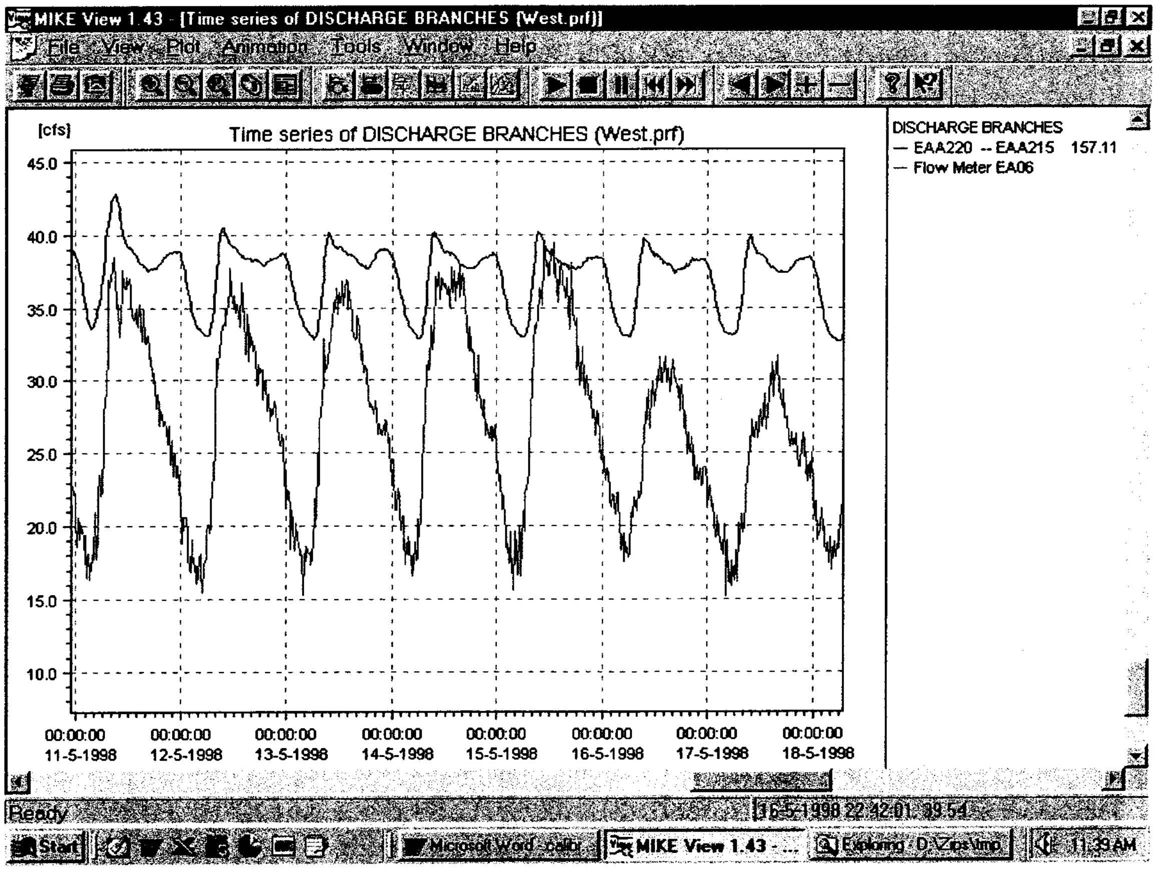


connections to the Easterly Interceptor between meter EA04 and EA03 are the Dugway East and Dugway West Interceptors. The dry weather flow from these two tributaries is approximately 10 cfs. This difference in dry weather flow was not reflected in at Meter EA03. Figure 3 presents the dry weather flow rates at meter EA04. Figure 4 illustrates the model prediction at Meter EA03 versus the meter data at EA03 versus the meter data at EA04.

Calibration of Hydraulic Grade Line in Easterly Main Interceptor and Heights-Hilltop Interceptor. During model calibration, the model initially overestimated the elevation of the hydraulic grade line (HGL) in the mid and downstream sections of the Easterly Main Interceptor. The global default value of Manning's roughness coefficient for a brick sewer was 0.02. However, the Easterly Interceptor is a 13'-0" diameter brick sewer. The frictional forces created by the pipe wall are less dominant in larger diameter pipes, thus the default Manning's roughness coefficient was determined to be invalid in this instance. Manning's roughness coefficient was reduced in the Easterly Main Interceptor to 0.012 in order match the hydraulic heads measured at Meters EA00, EA03, EA04 and EA06.

The Heights-Hilltop Interceptor is a relatively new reinforced concrete sewer. The default value of Manning's roughness coefficient for RCP is 0.015. A reduced Manning's "n" of 0.012 produced better calibration of the HGL in the Heights-Hilltop Interceptor.

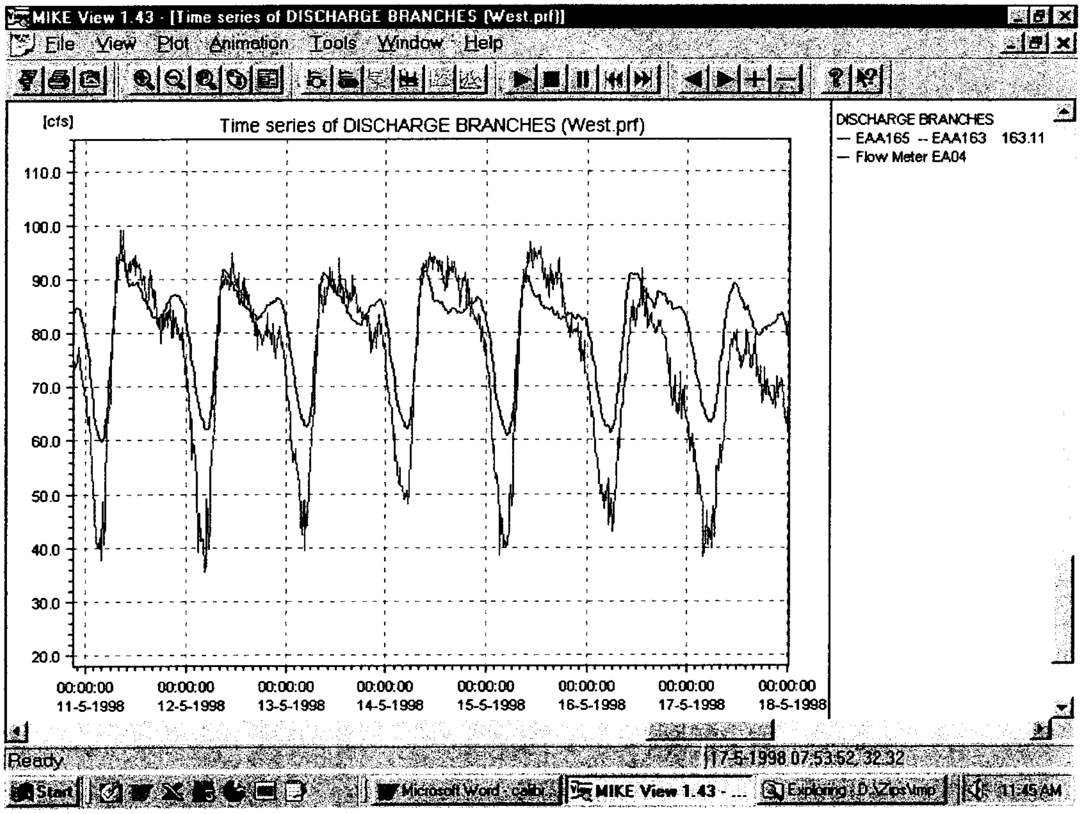
Figure 2. Modeled Versus Metered Dry Weather Flows at EA06



Culverted Stream Model

Nine Mile Creek, Dugway Brook, Shaw Brook and Green Creek were included in the Easterly CSO model for the purpose of determining loadings for the water quality model and to provide realistic tailwater elevations at the overflow connections. A total of eight stream flow meters

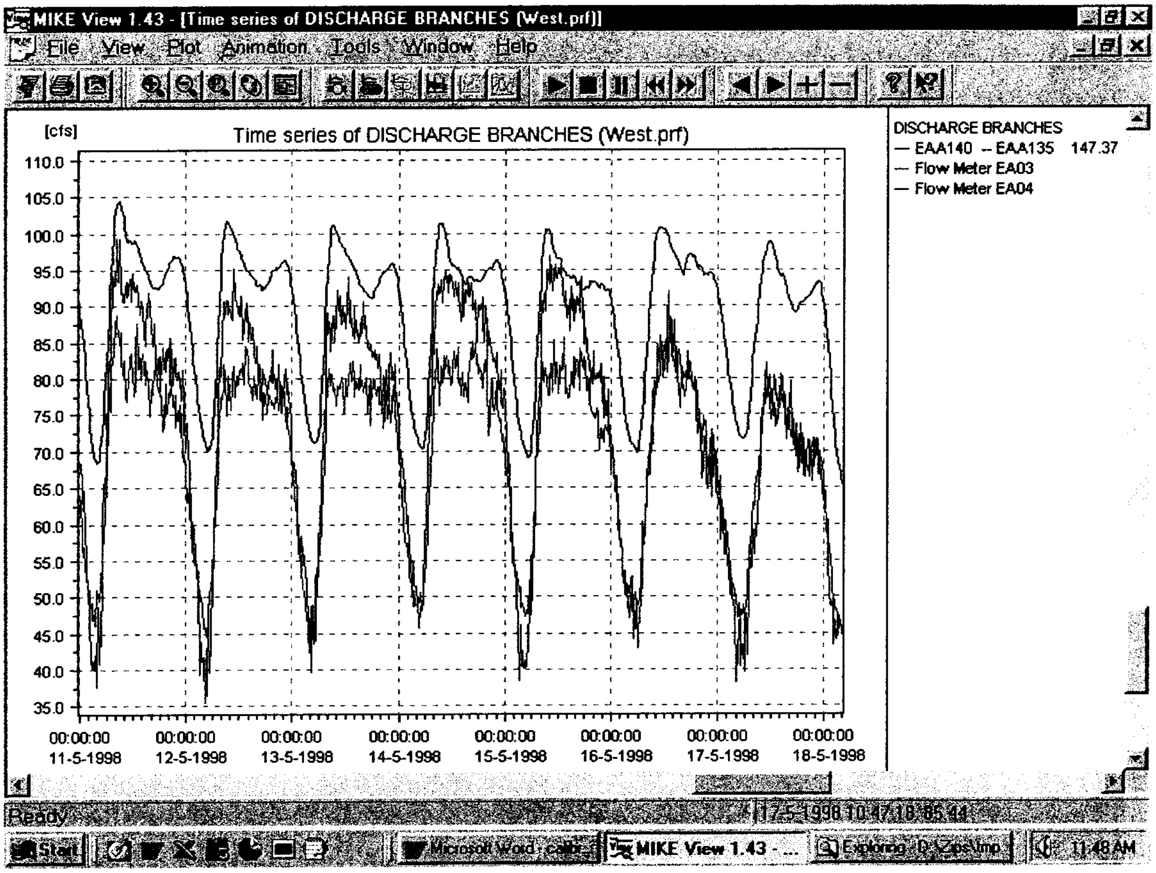
Figure 3. Modeled Versus Metered Flows at Meter EA04



were used for calibration: Meters NMS01, NMS02, DBS01, DBS02, DBS03, SBS01, GCS01 and GCS01.

The drainage basins tributary to each culverted stream flow monitor were delineated using both the topographic and sewer network coverages. Runoff from combined areas within the drainage basin needed to be accounted for in the culverted stream model. Inflow/Infiltration to separate sewers was modeled and input to the sewer network. Runoff from separate areas within the drainage basin was already quantified and input to the sewer network. The portion of stormwater tributary to the storm sewer system was input directly to the culverted stream. The "C-value" for this stormwater component was determined by estimating the imperviousness of the separate area based on land use and subtracting the RDII component "C-value" that was input to the sewer network for the corresponding separate area.

Figure 4. Modeled Versus Metered Flows at Meter EA03 Versus Metered Flows at Meter EA04



Stream Model Calibration Issues. Shaw Brook culvert collects overflows primarily from the E. 140th sub-model regulators. Regulator E-47X was designed to divert Shaw Brook dry weather flow to the Easterly Interceptor. Meter EA02D, located on the overflow weir wall at Regulator E-47X, shows higher flows than meter EA02I, located on the influent line to E-47X. Meter SBS01, located a short distance downstream of EA02D, recorded flows more reasonable relative to EA02I, hence, meter SBS01 was used for calibration in lieu of EA02D.

The operation of meters NMS01 and NMS02, located on Nine Mile Creek, was sporadic, thus these meters were of limited use for calibration. A careful estimation of the runoff parameters was made as a best attempt to accurately quantify streamflow in Nine Mile Creek.

All of the culverted streams exhibited dry weather flow, possibly due to groundwater seepage and/or illicit connections. A constant base flow was input to Green Creek culvert to calibrate the dry weather flow. The dry weather outlet from Regulator D-89 connects to Shaw Brook culvert (the overflow pipe connects to the Shaw Branch of the E. 140th Interceptor), thus contributing to the dry weather flow component of Shaw Brook.

APPENDIX F

Slicer Analysis

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
DE02IA											
	165	21.5	0.0384		0.0767	0.0147		0.0703	41.3920		66.2034
	114b	22.6	0.0607		0.1213	0.0178		0.0854	47.5000		71.6667
	239	6.75	0.0173		0.0347	0.0085		0.0408	4.1834		10.0813
	212	9.91	0.0166		0.0331	0.0129		0.0618	2.9403		8.1751
	191	23.5	0.0342		0.0684	0.0196		0.0941	49.4800		73.4267
	163	26.2	0.0466		0.0931	0.0180		0.0862	41.9114		66.6990
	162	39.6	0.0607		0.1213	0.0309		0.1482	50.2258		73.8051
	156	31.7	0.0487		0.0973	0.0213		0.1019	36.3158		57.6997
	129	60.4	0.0781		0.1563	0.0542		0.2598	52.0141		73.9353
	121	28.9	0.0569		0.1137	0.0219		0.1049	37.6437		59.5892
	116a	34.8	0.0804		0.1608	0.0263		0.1264	44.9451		68.9973
	196	44.1	0.0808		0.1615	0.0327		0.1567	35.3384		56.2991
		349.77	*0.6192*		*1.2383*	*0.2786*		*1.3364*	*42.2166*		*64.2603*
Cumulative		**687.1800**	**1.8451**	**1.4601**	**3.6902**	**0.5274**	**2.2785**	**2.5294**	**39.8173**	**42.2247**	**60.3770**
DE02IB											
	116b	28.7	0.1034		0.2067	0.0206		0.0989	44.4544		68.9056
		28.65	*0.1034*		*0.2067*	*0.0206*		*0.0989*	*44.4544*		*68.9056*
Cumulative		**28.6500**	**0.1034**	**0.0609**	**0.2067**	**0.0206**	**0.0834**	**0.0989**	**44.4544**	**37.3085**	**68.9056**
DE02W	**poor correlation**										

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	116b	28.7	0.1034		0.2067	0.0206		0.0989	44.4544		68.9056
		28.65	*0.1034*		*0.2067*	*0.0206*		*0.0989*	*44.4544*		*68.9056*
	Cumulative	***715.8300***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***40.0028***	***50.8013***	***60.7184***
DE03D											
	225	24.4	0.1258		0.2516	0.0173		0.0832	34.2564		56.2064
	258a	9.69	0.0149		0.0297	0.0069		0.0332	28.9819		49.3673
	213	45.2	0.2180		0.4360	0.0302		0.1450	38.7598		63.0983
	207	13.5	0.0574		0.1148	0.0089		0.0429	41.6753		66.1782
		92.78	*0.4161*		*0.8322*	*0.0634*		*0.3043*	*36.9822*		*60.3049*
	Cumulative	***337.4100***	***1.2260***	***0.4452***	***2.4519***	***0.2487***	***0.8856***	***1.1930***	***37.3300***	***15.9099***	***56.3515***
DE03W	**poor correlation**										
	213	45.2	0.2180		0.4360	0.0302		0.1450	38.7598		63.0983
	225	24.4	0.1258		0.2516	0.0173		0.0832	34.2564		56.2064
	258a	9.69	0.0149		0.0297	0.0069		0.0332	28.9819		49.3673
	207	13.5	0.0574		0.1148	0.0089		0.0429	41.6753		66.1782
		92.78	*0.4161*		*0.8322*	*0.0634*		*0.3043*	*36.9822*		*60.3049*
	Cumulative	***337.4100***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***37.3300***	***1.3925***	***56.3515***
DE04D											
	280	5.85	0.0197		0.0393	0.0038		0.0185	39.0940		61.7179
	297	65.5	0.2225		0.4450	0.0467		0.2238	43.0274		66.5398

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	296	18.2	0.0916		0.1832	0.0126		0.0603	40.9550		60.1884
	289	9.99	0.0198		0.0396	0.0066		0.0316	56.3150		77.6600
	283b	38.8	0.1857		0.3714	0.0278		0.1332	27.5587		45.1090
	262	99.7	0.2420		0.4840	0.0835		0.4007	34.0399		45.9924
	258b	5.88	0.0285		0.0569	0.0039		0.0186	54.0731		75.8844
	287	0.69	0.0002		0.0003	0.0005		0.0022	40.3623		65.2899
		244.63	*0.8099*		*1.6198*	*0.1853*		*0.8888*	*37.4619*		*54.8521*
Cumulative		***244.6300***	***0.8099***	***0.4611***	***1.6198***	***0.1853***	***0.7193***	***0.8888***	***37.4619***	***17.5226***	***54.8521***
DE04I											
	280	5.85	0.0197		0.0393	0.0038		0.0185	39.0940		61.7179
	289	9.99	0.0198		0.0396	0.0066		0.0316	56.3150		77.6600
	297	65.5	0.2225		0.4450	0.0467		0.2238	43.0274		66.5398
	296	18.2	0.0916		0.1832	0.0126		0.0603	40.9550		60.1884
	283b	38.8	0.1857		0.3714	0.0278		0.1332	27.5587		45.1090
	258b	5.88	0.0285		0.0569	0.0039		0.0186	54.0731		75.8844
	262	99.7	0.2420		0.4840	0.0835		0.4007	34.0399		45.9924
	287	0.69	0.0002		0.0003	0.0005		0.0022	40.3623		65.2899
		244.63	*0.8099*		*1.6198*	*0.1853*		*0.8888*	*37.4619*		*54.8521*
Cumulative		***244.6300***	***0.8099***	***0.4562***	***1.6198***	***0.1853***	***0.6770***	***0.8888***	***37.4619***	***19.5027***	***54.8521***
DW00											

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	270	4.99	0.0108		0.0217	0.0033		0.0157	40.0000		65.0000
	274	4.28	0.0062		0.0124	0.0028		0.0135	40.0000		65.0000
	269	10.1	0.0205		0.0410	0.0073		0.0351	44.0099		68.5644
	267	4.74	0.0084		0.0167	0.0031		0.0150	50.0526		73.0421
	230a	5.35	0.0087		0.0173	0.0043		0.0207	34.1463		57.6372
	211	3.79	0.0036		0.0073	0.0048		0.0231	61.7940		84.3724
	161	1.88	0.0009		0.0019	0.0015		0.0070	44.5964		64.5964
	155	4.31	0.0040		0.0080	0.0054		0.0261	2.5121		22.5121
	148	1.59	0.0027		0.0054	0.0019		0.0092	2.8669		23.2253
	132	1.98	0.0014		0.0028	0.0015		0.0074	27.6923		51.1538
	124	6.23	0.0039		0.0079	0.0043		0.0208	38.5790		62.5988
	104	61.0	0.0090		0.0179	0.0570		0.2733	22.7540		34.7523
	176	16	0.0000		0.0000	0.0115		0.0554	58.4293		80.1083
		126.23	*0.0802*		*0.1603*	*0.1089*		*0.5224*	*33.1547*		*50.8259*
Cumulative		**645.7100**	**1.1521**	**0.5697**	**2.3041**	**0.5164**	**2.2445**	**2.4768**	**43.7868**	**6.0861**	**67.1001**
DW02I											
	151	2.33	0.0047		0.0094	0.0030		0.0142	1.8736		21.8736
		2.33	*0.0047*		*0.0094*	*0.0030*		*0.0142*	*1.8736*		*21.8736*
Cumulative		**256.7500**	**0.4494**	**0.4285**	**0.8988**	**0.1887**	**0.7726**	**0.9049**	**41.6349**	**4.0412**	**65.3602**
DW03I											

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	186	50.3	0.0877		0.1753	0.0441		0.2114	48.1323		71.7662
		50.32	*0.0877*		*0.1753*	*0.0441*		*0.2114*	*48.1323*		*71.7662*
	Cumulative	**50.3200**	***0.0877***	***0.1511***	***0.1753***	***0.0441***	***0.7265***	***0.2114***	***48.1323***	***42.9406***	***71.7662***
DW04D											
	143	3.3	0.0113		0.0226	0.0024		0.0117	31.4825		55.2426
	138	34.6	0.0888		0.1776	0.0250		0.1199	41.2276		62.3711
		37.85	*0.1001*		*0.2002*	*0.0274*		*0.1316*	*40.3780*		*61.7495*
	Cumulative	**37.8500**	***0.1001***	***0.0142***	***0.2002***	***0.0274***	***0.0649***	***0.1316***	***40.3780***	***3.2758***	***61.7495***
DW04W											
	138	34.6	0.0888		0.1776	0.0250		0.1199	41.2276		62.3711
	143	3.3	0.0113		0.0226	0.0024		0.0117	31.4825		55.2426
		37.85	*0.1001*		*0.2002*	*0.0274*		*0.1316*	*40.3780*		*61.7495*
	Cumulative	**37.8500**	***0.1001***	***0.0000***	***0.2002***	***0.0274***	***0.0000***	***0.1316***	***40.3780***	***1.9759***	***61.7495***
DW08I											
	263	6.01	0.0000		0.0000	0.0040		0.0190	40.0000		65.0000
	286	7.06	0.0070		0.0139	0.0055		0.0262	21.8999		38.1906
	285	12.7	0.0179		0.0359	0.0092		0.0441	40.7701		64.3911
	277	0.93	0.0018		0.0036	0.0006		0.0029	40.0000		65.0000
	278	4.1	0.0000		0.0000	0.0027		0.0129	40.0000		65.0000
	276	0.86	0.0014		0.0028	0.0006		0.0027	40.0000		65.0000

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	273	5.75	0.0000		0.0000	0.0038		0.0181	40.0000		65.0000
	272	39.0	0.0856		0.1711	0.0286		0.1369	36.0152		57.8048
	268	0.8	0.0000		0.0000	0.0005		0.0025	40.0000		65.0000
	266	2.53	0.0019		0.0037	0.0017		0.0080	40.0000		65.0000
	169	1.47	0.0012		0.0023	0.0010		0.0046	65.0000		85.0000
	256	2.49	0.0033		0.0067	0.0016		0.0079	40.0000		65.0000
	166	1.93	0.0009		0.0017	0.0013		0.0061	59.2746		78.3938
	200	8.53	0.0000		0.0000	0.0080		0.0385	35.2580		55.7535
	215	1.66	0.0023		0.0046	0.0017		0.0079	55.2390		78.5458
	279	3.42	0.0000		0.0000	0.0023		0.0108	40.0000		65.0000
	217	2.33	0.0043		0.0085	0.0020		0.0097	50.8469		74.6417
	229a	2.89	0.0074		0.0149	0.0019		0.0091	40.0000		65.0000
	230b	7.23	0.0113		0.0226	0.0048		0.0229	39.7796		64.7521
	240	20.9	0.0407		0.0814	0.0152		0.0727	45.1324		69.4724
	250	44.9	0.0876		0.1752	0.0299		0.1434	40.0550		64.3661
		177.48	*0.2744*		*0.5488*	*0.1266*		*0.6070*	*39.5426*		*62.7852*
Cumulative		**254.4200**	**0.4447**	**0.3559**	**0.8894**	**0.1857**	**0.8455**	**0.8907**	**41.6179**	**3.1955**	**65.1617**
DW10I											
	216	47.3	0.0968		0.1936	0.0382		0.1831	49.0097		72.9469

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs)			Infiltration (cfs)			Impervious C (%)		
			Min	Slicer	Max	Min	Slicer	Max	Min	Slicer	Max
		47.3	*0.0968*		*0.1936*	*0.0382*		*0.1831*	*49.0097*		*72.9469*
	Cumulative	***47.3000***	***0.0968***	***0.0239***	***0.1936***	***0.0382***	***0.1537***	***0.1831***	***49.0097***	***15.3954***	***72.9469***
DW12I											
	208	1.68	0.0027		0.0054	0.0013		0.0063	47.2000		71.4000
		1.68	*0.0027*		*0.0054*	*0.0013*		*0.0063*	*47.2000*		*71.4000*
	Cumulative	***75.1500***	***0.1675***	***0.1228***	***0.3350***	***0.0578***	***0.3475***	***0.2773***	***46.4356***	***25.1758***	***70.6695***
DW14I											
	227	1.79	0.0028		0.0056	0.0013		0.0064	45.1238		69.5545
		1.79	*0.0028*		*0.0056*	*0.0013*		*0.0064*	*45.1238*		*69.5545*
	Cumulative	***1.7900***	***0.0028***	***0.0015***	***0.0056***	***0.0013***	***0.0045***	***0.0064***	***45.1238***	***52.5168***	***69.5545***
DW15IA											
	209a	8.63	0.0131		0.0261	0.0063		0.0300	48.1546		71.8980
		8.63	*0.0131*		*0.0261*	*0.0063*		*0.0300*	*48.1546*		*71.8980*
	Cumulative	***8.6300***	***0.0131***	***0.0207***	***0.0261***	***0.0063***	***0.0346***	***0.0300***	***48.1546***	***53.6564***	***71.8980***
DW15IB											
	224	4.29	0.0032		0.0063	0.0031		0.0147	43.5730		68.1760
	236	1.06	0.0030		0.0060	0.0013		0.0063	61.4925		84.1045
	462	3.09	0.0055		0.0110	0.0020		0.0098	40.0000		65.0000
	251	5.79	0.0117		0.0234	0.0041		0.0198	43.3732		67.9984

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	243	1.67	0.0035		0.0070	0.0021		0.0100	60.9335		83.6076
	242	4.29	0.0080		0.0159	0.0030		0.0143	42.4834		67.2075
	209b	10.1	0.0254		0.0508	0.0083		0.0400	49.0213		73.0189
	228	1.23	0.0029		0.0057	0.0013		0.0063	57.4627		80.5224
	223	1.02	0.0015		0.0031	0.0011		0.0054	58.3140		81.2791
	219	15.6	0.0396		0.0792	0.0117		0.0562	45.6061		69.9832
	231	1.93	0.0039		0.0079	0.0015		0.0073	47.5647		71.7241
	229b	14.8	0.0436		0.0871	0.0106		0.0508	44.3665		68.8261
		64.84	*0.1517*		*0.3034*	*0.0502*		*0.2410*	*46.1871*		*70.4870*
Cumulative		***64.8400***	***0.1517***	***0.1339***	***0.3034***	***0.0502***	***0.1528***	***0.2410***	***46.1871***	***30.3225***	***70.4870***
DW19I											
	149	8.94	0.0271		0.0542	0.0060		0.0287	45.6161		69.0924
	189	33.6	0.0949		0.1897	0.0295		0.1413	47.5268		70.7235
	183a	0.38	0.0000		0.0000	0.0002		0.0012	63.6486		83.9189
	183	24.6	0.0644		0.1287	0.0201		0.0963	49.6722		71.8928
	180	7.02	0.0215		0.0430	0.0047		0.0224	55.0282		76.4085
	167a	25.6	0.0802		0.1603	0.0211		0.1011	42.7544		63.1149
	120	42.7	0.1097		0.2194	0.0378		0.1812	30.1959		47.4443
	178	7.4	0.0220		0.0439	0.0049		0.0233	40.6766		65.5413

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
		150.29	*0.4196*		*0.8393*	*0.1242*		*0.5955*	*42.0803*		*62.9500*
Cumulative		***212.4100***	***0.5348***	***0.4133***	***1.0697***	***0.1747***	***0.5720***	***0.8381***	***51.6767***	***21.5117***	***77.7691***
DW19W											
	183	24.6	0.0644		0.1287	0.0201		0.0963	49.6722		71.8928
	183a	0.38	0.0000		0.0000	0.0002		0.0012	63.6486		83.9189
	180	7.02	0.0215		0.0430	0.0047		0.0224	55.0282		76.4085
	167a	25.6	0.0802		0.1603	0.0211		0.1011	42.7544		63.1149
	149	8.94	0.0271		0.0542	0.0060		0.0287	45.6161		69.0924
	120	42.7	0.1097		0.2194	0.0378		0.1812	30.1959		47.4443
	189	33.6	0.0949		0.1897	0.0295		0.1413	47.5268		70.7235
	178	7.4	0.0220		0.0439	0.0049		0.0233	40.6766		65.5413
		150.29	*0.4196*		*0.8393*	*0.1242*		*0.5955*	*42.0803*		*62.9500*
Cumulative		***212.4100***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***51.6767***	***146.8964***	***77.7691***
DW20W	**Dry weather to Doan, wet weather to Easterly**										
		174									
		174.31									
Cumulative		***174.3100***		***0.0000***			***0.0000***			***20.7625***	
DW21I											
	160	50.3	0.0968		0.1936	0.0418		0.2004	33.0918		50.3166
	168	11.9	0.0184		0.0368	0.0088		0.0422	31.6355		52.1744

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
		62.12	*0.1152*		*0.2304*	*0.0506*		*0.2425*	*32.8135*		*50.6716*
Cumulative		**62.1200**	**0.1152**	**0.1515**	**0.2304**	**0.0506**	**0.2521**	**0.2425**	**32.8135**	**23.1525**	**50.6716**
DW22I	**Dry weather to Doan, wet weather to Easterly**										
	385	361	0.4100		0.8201	0.2445		1.1728	41.9105		66.3832
	387	4.41	0.0016		0.0032	0.0029		0.0141	57.7902		79.2857
	379	115	0.1284		0.2569	0.0796		0.3819	43.7191		64.0133
	367	137	0.1393		0.2785	0.0952		0.4565	44.7978		66.6156
	220	1220	1.0918		2.1836	0.8606		4.1275	41.1868		62.3925
	334	175	0.2236		0.4472	0.1151		0.5522	39.3659		63.2392
	333	94.6	0.1044		0.2089	0.0714		0.3426	34.5624		53.5716
	364	98.5	0.1069		0.2138	0.0724		0.3471	36.0155		56.0419
		2209.94	*2.2061*		*4.4122*	*1.5418*		*7.3949*	*41.0364*		*62.8321*
Cumulative		**2,209.9400**	**2.2061**	**2.2396**	**4.4122**	**1.5418**	**3.1071**	**7.3949**	**41.0364**	**13.5293**	**62.8321**
DW24I	**Dry weather to Doan, wet weather to Easterly**										
	363	2.99	0.0026		0.0051	0.0020		0.0094	40.0000		65.0000
	349	251	0.2388		0.4777	0.1650		0.7915	41.2690		66.0152
		253.82	*0.2414*		*0.4828*	*0.1670*		*0.8009*	*41.2540*		*66.0032*
Cumulative		**253.8200**	**0.2414**	**0.2408**	**0.4828**	**0.1670**	**0.2431**	**0.8009**	**41.2540**	**10.9405**	**66.0032**
EA02I	**Positive y intercept**										
		795									

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
		795.21									
Cumulative		795.2100		0.0528			0.0000			35.3402	
EA08I											
	344	53.3	0.0998		0.1996	0.0395		0.1894	45.9698		69.7592
	350	25.7	0.0186		0.0373	0.0195		0.0936	43.4193		67.3188
	358	33.2	0.0532		0.1063	0.0225		0.1078	43.7723		67.1452
	361	36.9	0.0878		0.1756	0.0281		0.1346	49.7233		73.0957
	366	33.4	0.0287		0.0574	0.0236		0.1132	45.2467		69.4760
	368	14.9	0.0099		0.0198	0.0110		0.0527	44.7454		69.2181
	393	22.3	0.0200		0.0399	0.0200		0.0960	52.3464		75.9497
	380	50.5	0.0175		0.0350	0.0571		0.2739	61.8827		84.1796
	391	70.6	0.0043		0.0085	0.0564		0.2707	64.4893		84.7738
	329	16.1	0.0172		0.0344	0.0107		0.0515	39.1662		64.0619
	247	24.6	0.0393		0.0786	0.0180		0.0864	44.9233		69.3447
	375	3.8	0.0027		0.0054	0.0025		0.0120	40.0000		65.0000
	326	48.7	0.0654		0.1307	0.0342		0.1639	49.9759		73.2303
	325	38.2	0.1171		0.2343	0.0365		0.1749	50.1949		73.4861
	324	25	0.0297		0.0594	0.0167		0.0801	39.5786		64.2635
	313	22.1	0.0391		0.0783	0.0174		0.0832	50.3546		73.9344
	311	19.4	0.0272		0.0545	0.0130		0.0625	43.8706		67.5316

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	299b	25.9	0.0532		0.1063	0.0182		0.0872	38.2399		62.7315
	299a	39.3	0.0437		0.0874	0.0272		0.1304	43.9373		66.8785
	298	50	0.0968		0.1936	0.0408		0.1957	50.1702		73.9129
	265	39.6	0.0838		0.1676	0.0264		0.1268	42.1715		66.3489
	197b	21.3	0.0053		0.0107	0.0140		0.0670	58.6158		79.1008
	197a	32.9	0.0231		0.0461	0.0216		0.1038	53.2629		75.0410
	293	25.5	0.0422		0.0845	0.0177		0.0851	35.4913		59.9277
		773.03	*1.0256*		*2.0511*	*0.5927*		*2.8426*	*48.9797*		*72.1969*
Cumulative		***1,365.5300***	***1.6556***	***2.6706***	***3.3113***	***1.0109***	***6.1129***	***4.8488***	***44.7372***	***31.5873***	***67.4205***
EA09I											
	85	24	0.0060		0.0119	0.0158		0.0756	39.6784		63.9662
		23.98	*0.0060*		*0.0119*	*0.0158*		*0.0756*	*39.6784*		*63.9662*
Cumulative		***23.9800***	***0.0060***	***0.0000***	***0.0119***	***0.0158***	***0.0000***	***0.0756***	***39.6784***	***1.7923***	***63.9662***
EA10D											
	235	7.72	0.0130		0.0260	0.0051		0.0244	40.4858		65.3886
		7.72	*0.0130*		*0.0260*	*0.0051*		*0.0244*	*40.4858*		*65.3886*
Cumulative		***7.7200***	***0.0130***	***0.0140***	***0.0260***	***0.0051***	***0.0770***	***0.0244***	***40.4858***	***34.1891***	***65.3886***
EA12I											
	304	31.8	0.0706		0.1413	0.0259		0.1240	49.0099		72.9715

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
		31.78	*0.0706*		*0.1413*	*0.0259*		*0.1240*	*49.0099*		*72.9715*
Cumulative		***31.7800***	***0.0706***	***0.0591***	***0.1413***	***0.0259***	***0.1289***	***0.1240***	***49.0099***	***39.7053***	***72.9715***
EA13	**positive y intercept**										
	449	22.9	0.0043		0.0085	0.0151		0.0722	39.7968		62.5612
	454	34	0.0245		0.0491	0.0261		0.1254	29.5471		45.0654
	453	43.1	0.0103		0.0206	0.0331		0.1587	34.9722		51.7041
	452	31.2	0.0109		0.0218	0.0205		0.0984	53.9525		75.3802
	450	19.7	0.0077		0.0155	0.0130		0.0623	36.3323		59.7062
	445	31	0.0406		0.0812	0.0206		0.0988	35.8416		57.0600
	438	28.4	0.0288		0.0576	0.0195		0.0938	39.4093		62.8509
	412b	22.6	0.0367		0.0733	0.0153		0.0732	37.7241		62.4397
	451	33.1	0.0466		0.0931	0.0238		0.1143	45.1298		69.1510
	412a	17.4	0.0185		0.0370	0.0136		0.0651	53.0999		75.7465
	437	86.3	0.0177		0.0354	0.0568		0.2723	25.8124		44.5927
	413	29.5	0.0407		0.0814	0.0203		0.0973	41.9711		66.7521
	414	50.4	0.0750		0.1499	0.0351		0.1685	41.3579		65.8653
	417	33.9	0.0562		0.1125	0.0250		0.1200	47.3014		71.2756
	418	25.4	0.0550		0.1100	0.0173		0.0830	42.2689		66.9551
	435	44.4	0.0730		0.1459	0.0322		0.1546	40.9759		65.3777

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
		553	0.5464		1.0929	0.3874		1.8579	38.6206		60.4532
Cumulative		**553.0000**	**0.5464**	**1.6863**	**1.0929**	**0.3874**	**2.3901**	**1.8579**	**38.6206**	**24.9229**	**60.4532**
EA15I											
	318	30.4	0.1278		0.2556	0.0200		0.0959	43.4809		67.7847
	408	31.9	0.0721		0.1442	0.0233		0.1118	44.7475		69.1986
	406b	69.2	0.0959		0.1919	0.0469		0.2248	45.9111		68.6438
	406a	130	0.0856		0.1711	0.1020		0.4893	29.5779		44.5324
	394b	24.1	0.0200		0.0399	0.0282		0.1354	61.6329		83.8392
	360b	52.8	0.0113		0.0226	0.0679		0.3256	62.0602		84.5929
	347b	31.8	0.0421		0.0842	0.0245		0.1174	36.9059		58.7016
	347a	30.5	0.0373		0.0746	0.0296		0.1421	36.8247		59.4825
	423	57.5	0.1075		0.2151	0.0385		0.1845	46.0159		69.0799
	255a	47.8	0.1014		0.2027	0.0442		0.2122	49.1545		72.4048
	255g	36.9	0.1315		0.2630	0.0269		0.1289	45.9317		70.1322
	255f	37.0	0.0854		0.1708	0.0244		0.1169	40.0473		65.0378
	255e	14.3	0.0314		0.0628	0.0094		0.0451	40.0000		65.0000
	255d	28.9	0.0494		0.0987	0.0213		0.1021	44.8423		69.3043
	255c	60.0	0.0834		0.1668	0.0477		0.2290	26.9304		46.6409
	255b	31	0.0501		0.1003	0.0264		0.1268	48.9861		72.7855
	198b	18.9	0.0605		0.1210	0.0160		0.0767	50.7822		74.5183

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	255h	37.5	0.0261		0.0523	0.0294		0.1409	50.6620		71.5603
		770.3	*1.2188*		*2.4377*	*0.6266*		*3.0054*	*42.6535*		*64.2212*
Cumulative		***1,113.7400***	***1.4485***	***1.6766***	***2.8971***	***0.9375***	***6.5038***	***4.4966***	***45.5834***	***32.0810***	***67.2391***
EA15W											
	347a	30.5	0.0373		0.0746	0.0296		0.1421	36.8247		59.4825
	347b	31.8	0.0421		0.0842	0.0245		0.1174	36.9059		58.7016
	394b	24.1	0.0200		0.0399	0.0282		0.1354	61.6329		83.8392
	198b	18.9	0.0605		0.1210	0.0160		0.0767	50.7822		74.5183
	406b	69.2	0.0959		0.1919	0.0469		0.2248	45.9111		68.6438
	318	30.4	0.1278		0.2556	0.0200		0.0959	43.4809		67.7847
	423	57.5	0.1075		0.2151	0.0385		0.1845	46.0159		69.0799
	360b	52.8	0.0113		0.0226	0.0679		0.3256	62.0602		84.5929
	408	31.9	0.0721		0.1442	0.0233		0.1118	44.7475		69.1986
	255g	36.9	0.1315		0.2630	0.0269		0.1289	45.9317		70.1322
	255f	37.0	0.0854		0.1708	0.0244		0.1169	40.0473		65.0378
	255e	14.3	0.0314		0.0628	0.0094		0.0451	40.0000		65.0000
	255d	28.9	0.0494		0.0987	0.0213		0.1021	44.8423		69.3043
	255c	60.0	0.0834		0.1668	0.0477		0.2290	26.9304		46.6409
	255b	31	0.0501		0.1003	0.0264		0.1268	48.9861		72.7855
	255a	47.8	0.1014		0.2027	0.0442		0.2122	49.1545		72.4048

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	255h	37.5	0.0261		0.0523	0.0294		0.1409	50.6620		71.5603
	406a	130	0.0856		0.1711	0.1020		0.4893	29.5779		44.5324
		770.3	*1.2188*		*2.4377*	*0.6266*		*3.0054*	*42.6535*		*64.2212*
Cumulative		**1,113.7400**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**45.5834**	**15.8767**	**67.2391**
EA16I											
	249	4.87	0.0162		0.0325	0.0032		0.0154	40.1537		65.1230
	365b	22.2	0.0283		0.0566	0.0152		0.0729	36.9177		61.5325
	338	32.2	0.0631		0.1263	0.0279		0.1336	23.7042		46.4269
	319	52.1	0.1442		0.2884	0.0344		0.1650	44.1059		68.2052
	307	48.6	0.1244		0.2488	0.0320		0.1534	43.4039		67.7232
	306	13.7	0.0504		0.1009	0.0090		0.0432	44.5255		68.6204
	300	29.9	0.1225		0.2451	0.0197		0.0945	41.6032		66.2826
	253	56.3	0.2722		0.5444	0.0389		0.1864	44.1949		68.5405
	198c	36.6	0.1569		0.3138	0.0261		0.1254	44.3217		68.7755
	198a	37.4	0.1434		0.2869	0.0246		0.1182	42.8846		67.3077
	198	57.8	0.0336		0.0672	0.0527		0.2525	61.3903		82.7806
	260	40.7	0.1637		0.3274	0.0277		0.1328	43.2783		67.7519
		432.38	*1.3191*		*2.6382*	*0.3114*		*1.4934*	*44.0900*		*67.9511*
Cumulative		**663.6600**	**1.5616**	**1.3238**	**3.1233**	**0.5085**	**3.6317**	**2.4390**	**44.8491**	**28.1302**	**68.3121**
EA16W	**Poor correlation**										

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	300	29.9	0.1225		0.2451	0.0197		0.0945	41.6032		66.2826
	307	48.6	0.1244		0.2488	0.0320		0.1534	43.4039		67.7232
	319	52.1	0.1442		0.2884	0.0344		0.1650	44.1059		68.2052
	365b	22.2	0.0283		0.0566	0.0152		0.0729	36.9177		61.5325
	306	13.7	0.0504		0.1009	0.0090		0.0432	44.5255		68.6204
	253	56.3	0.2722		0.5444	0.0389		0.1864	44.1949		68.5405
	249	4.87	0.0162		0.0325	0.0032		0.0154	40.1537		65.1230
	198c	36.6	0.1569		0.3138	0.0261		0.1254	44.3217		68.7755
	198a	37.4	0.1434		0.2869	0.0246		0.1182	42.8846		67.3077
	198	57.8	0.0336		0.0672	0.0527		0.2525	61.3903		82.7806
	338	32.2	0.0631		0.1263	0.0279		0.1336	23.7042		46.4269
	260	40.7	0.1637		0.3274	0.0277		0.1328	43.2783		67.7519
		432.38	*1.3191*		*2.6382*	*0.3114*		*1.4934*	*44.0900*		*67.9511*
Cumulative		***663.6600***	***0.0000***	***0.0093***	***0.0000***	***0.0000***	***0.0100***	***0.0000***	***44.8491***	***3.5705***	***68.3121***
EA17I	**Poor correlation**										
	82	33.4	0.0000		0.0000	0.0220		0.1054	60.0000		80.0000
	88	56.6	0.0043		0.0087	0.0372		0.1786	59.8542		80.0230
	81	43.1	0.0217		0.0433	0.0303		0.1454	51.9846		74.6799
	461	19.2	0.0011		0.0022	0.0149		0.0715	26.5644		49.1836
	95	22.7	0.0508		0.1015	0.0195		0.0935	50.5739		74.3991

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
		174.98	*0.0778*		*0.1557*	*0.1239*		*0.5944*	*53.0810*		*74.5830*
Cumulative		***174.9800***	***0.0778***	***0.0049***	***0.1557***	***0.1239***	***0.0068***	***0.5944***	***53.0810***	***0.3648***	***74.5830***
EA18D											
	246	29.6	0.0111		0.0223	0.0222		0.1065	60.3867		81.0548
		29.62	*0.0111*		*0.0223*	*0.0222*		*0.1065*	*60.3867*		*81.0548*
Cumulative		***29.6200***	***0.0111***	***0.0269***	***0.0223***	***0.0222***	***0.0967***	***0.1065***	***60.3867***	***99.3838***	***81.0548***
EA18I	**Poor correlation**										
	246	29.6	0.0111		0.0223	0.0222		0.1065	60.3867		81.0548
		29.62	*0.0111*		*0.0223*	*0.0222*		*0.1065*	*60.3867*		*81.0548*
Cumulative		***29.6200***	***0.0111***	***0.0256***	***0.0223***	***0.0222***	***0.0655***	***0.1065***	***60.3867***	***115.2690***	***81.0548***
EA20I	**positive y intercept**										
	308	22	0.0289		0.0579	0.0165		0.0793	53.9857		76.2291
	322	45.4	0.0576		0.1153	0.0383		0.1839	50.7577		74.4903
	339	33	0.0046		0.0093	0.0387		0.1857	59.9779		82.7162
	337b	35.6	0.0428		0.0856	0.0315		0.1510	47.3709		70.6680
	337a	19	0.0076		0.0152	0.0248		0.1192	62.4047		84.9153
	330	35.7	0.0287		0.0574	0.0315		0.1512	52.9670		76.1981
	314a	36.2	0.0237		0.0473	0.0253		0.1214	54.8388		77.1061
	292	26.5	0.0030		0.0060	0.0219		0.1049	61.0138		82.0232
	303	18.4	0.0199		0.0398	0.0162		0.0776	55.8211		78.6667

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	302	57.4	0.0494		0.0989	0.0539		0.2584	55.5148		78.5520
	314b	45.6	0.0507		0.1014	0.0349		0.1675	48.1572		72.0850
		374.8	*0.3170*		*0.6339*	*0.3336*		*1.6001*	*54.0168*		*76.9630*
Cumulative		***374.8000***	***0.3170***	***0.5996***	***0.6339***	***0.3336***	***1.4491***	***1.6001***	***54.0168***	***27.9025***	***76.9630***
EA21											
	403	28	0.0560		0.1120	0.0193		0.0925	42.1027		66.8690
	448	41.8	0.0460		0.0921	0.0328		0.1574	30.7349		50.0531
	415	33.9	0.0429		0.0857	0.0245		0.1176	39.6174		63.7168
	378	60.2	0.0400		0.0800	0.0704		0.3376	60.6735		83.2894
	365a	26.2	0.0248		0.0497	0.0209		0.1001	48.9341		72.8398
	436	41.3	0.0328		0.0656	0.0293		0.1404	47.5669		70.6013
		231.28	*0.2425*		*0.4851*	*0.1971*		*0.9456*	*46.2682*		*68.9869*
Cumulative		***231.2800***	***0.2425***	***0.4772***	***0.4851***	***0.1971***	***0.9630***	***0.9456***	***46.2682***	***29.2620***	***68.9869***
EA22I	**Positive y intercept**										
	291	15.5	0.0002		0.0005	0.0102		0.0489	60.0000		80.0000
	294	40.1	0.0000		0.0000	0.0274		0.1312	60.1804		80.3608
	301	37.8	0.0000		0.0000	0.0248		0.1192	60.0000		80.0000
		93.35	*0.0002*		*0.0005*	*0.0624*		*0.2993*	*60.0775*		*80.1549*
Cumulative		***93.3500***	***0.0002***	***0.0898***	***0.0005***	***0.0624***	***0.1719***	***0.2993***	***60.0775***	***52.0533***	***80.1549***
EA23											

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	404	59.0	0.0153		0.0306	0.0416		0.1995	48.4441		70.6890
	439	51.5	0.0764		0.1527	0.0392		0.1882	44.6729		65.1929
	425	63.9	0.0425		0.0849	0.0486		0.2329	41.6612		64.0217
	360c	64.3	0.0332		0.0664	0.0816		0.3914	62.5361		84.9540
	360a	51.3	0.0016		0.0032	0.0576		0.2763	60.7487		82.4283
	447	37.7	0.0598		0.1196	0.0288		0.1382	52.8922		74.5935
	394a	15.8	0.0009		0.0019	0.0135		0.0648	60.9742		82.2845
		343.44	*0.2297*		*0.4594*	*0.3109*		*1.4912*	*52.1550*		*74.0080*
Cumulative		***343.4400***	***0.2297***	***0.5522***	***0.4594***	***0.3109***	***1.7931***	***1.4912***	***52.1550***	***37.3927***	***74.0080***
EA24I											
	312	36.8	0.0285		0.0569	0.0281		0.1350	55.6639		77.6519
	323	31.7	0.0274		0.0548	0.0332		0.1590	58.4828		81.2691
	359	26	0.0000		0.0000	0.0342		0.1641	62.5000		85.0000
	372	35	0.0074		0.0149	0.0461		0.2209	56.2321		78.4814
	382	33.1	0.0043		0.0087	0.0435		0.2089	59.1191		81.4838
		162.54	*0.0676*		*0.1352*	*0.1851*		*0.8879*	*58.1327*		*80.4912*
Cumulative		***669.6000***	***0.6679***	***0.9134***	***1.3358***	***0.6609***	***3.4776***	***3.1699***	***52.2809***	***29.2811***	***73.5192***
EA24W	**Poor correlation**										
	312	36.8	0.0285		0.0569	0.0281		0.1350	55.6639		77.6519
	382	33.1	0.0043		0.0087	0.0435		0.2089	59.1191		81.4838

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	372	35	0.0074		0.0149	0.0461		0.2209	56.2321		78.4814
	323	31.7	0.0274		0.0548	0.0332		0.1590	58.4828		81.2691
	359	26	0.0000		0.0000	0.0342		0.1641	62.5000		85.0000
		162.54	*0.0676*		*0.1352*	*0.1851*		*0.8879*	*58.1327*		*80.4912*
Cumulative		**669.6000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**52.2809**	**68.3082**	**73.5192**
EA25											
	416	45.5	0.0398		0.0797	0.0364		0.1747	62.6806		83.8530
	440a	42.6	0.1910		0.3820	0.0286		0.1372	62.0147		81.9779
	433	43.1	0.0426		0.0851	0.0284		0.1361	63.0271		82.9378
	427	38.8	0.0640		0.1280	0.0309		0.1483	42.0062		62.0945
	440b	44.9	0.1008		0.2016	0.0361		0.1732	41.8225		57.3556
	422a	40.4	0.0084		0.0169	0.0435		0.2089	9.7900		30.6921
	410a	40	0.0097		0.0193	0.0343		0.1645	42.0860		65.5891
	399	34.3	0.0054		0.0108	0.0448		0.2151	62.3764		84.8621
	398	26.5	0.0024		0.0048	0.0252		0.1208	59.8367		81.3784
	390	30.9	0.0073		0.0147	0.0403		0.1933	60.7525		83.1701
	386	57.8	0.0265		0.0531	0.0760		0.3647	60.7940		83.0157
	422b	37.3	0.0890		0.1779	0.0282		0.1352	43.1559		64.1807
	410b	25	0.0133		0.0266	0.0230		0.1101	41.4579		63.4948

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
		507.06	*0.6003*		*1.2006*	*0.4758*		*2.2819*	*50.4051*		*71.2844*
Cumulative		**507.0600**	**0.6003**	**0.7594**	**1.2006**	**0.4758**	**1.8101**	**2.2819**	**50.4051**	**29.0970**	**71.2844**
EA26I	**Positive y intercept; Poor correlation**										
	309	1.47	0.0000		0.0000	0.0010		0.0046	60.0000		80.0000
		1.47	*0.0000*		*0.0000*	*0.0010*		*0.0046*	*60.0000*		*80.0000*
Cumulative		**1.4700**	**0.0000**	**0.0000**	**0.0000**	**0.0010**	**0.0000**	**0.0046**	**60.0000**	**14.2021**	**80.0000**
EA28I											
	321b	12.3	0.0032		0.0063	0.0142		0.0683	61.5566		83.8753
	332	25.3	0.0094		0.0189	0.0277		0.1328	57.9765		80.9791
	321a	24.8	0.0022		0.0043	0.0250		0.1199	58.2877		80.8831
	316	18.6	0.0000		0.0000	0.0122		0.0586	53.4025		72.8394
		80.86	*0.0148*		*0.0296*	*0.0791*		*0.3796*	*57.5653*		*79.5215*
Cumulative		**80.8600**	**0.0148**	**0.0695**	**0.0296**	**0.0791**	**0.2098**	**0.3796**	**57.5653**	**41.5921**	**79.5215**
EA29D											
	328	24.8	0.0125		0.0251	0.0185		0.0889	32.0458		50.0923
	336	45.9	0.1170		0.2340	0.0354		0.1696	46.9179		71.1158
	340	47.5	0.0473		0.0947	0.0536		0.2571	57.1572		79.2862
	354	69.2	0.1102		0.2203	0.0794		0.3807	59.6668		82.4403
	320	5.73	0.0000		0.0000	0.0038		0.0181	57.6963		77.6963

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
		193.11	*0.2870*		*0.5741*	*0.1907*		*0.9145*	*52.4184*		*74.6839*
Cumulative		***193.1100***	***0.2870***	***0.0010***	***0.5741***	***0.1907***	***0.0015***	***0.9145***	***52.4184***	***24.3418***	***74.6839***
EA29I	**poor regression, 5/31 storm had no RDII**										
	354	69.2	0.1102		0.2203	0.0794		0.3807	59.6668		82.4403
	320	5.73	0.0000		0.0000	0.0038		0.0181	57.6963		77.6963
	328	24.8	0.0125		0.0251	0.0185		0.0889	32.0458		50.0923
	336	45.9	0.1170		0.2340	0.0354		0.1696	46.9179		71.1158
	340	47.5	0.0473		0.0947	0.0536		0.2571	57.1572		79.2862
		193.11	*0.2870*		*0.5741*	*0.1907*		*0.9145*	*52.4184*		*74.6839*
Cumulative		***193.1100***	***0.2870***	***0.0020***	***0.5741***	***0.1907***	***0.0048***	***0.9145***	***52.4184***	***18.7970***	***74.6839***
EA30I											
	342	3.89	0.0000		0.0000	0.0051		0.0246	62.1787		84.6658
		3.89	*0.0000*		*0.0000*	*0.0051*		*0.0246*	*62.1787*		*84.6658*
Cumulative		***3.8900***	***0.0000***	***0.0000***	***0.0000***	***0.0051***	***0.0000***	***0.0246***	***62.1787***	***84.6370***	***84.6658***
EA32D											
	355	23.9	0.0015		0.0031	0.0304		0.1459	62.5887		85.0000
	370b	49.1	0.0209		0.0418	0.0364		0.1744	64.4382		85.0000
	374a	18.8	0.0000		0.0000	0.0124		0.0592	64.4592		84.4592
	374b	25.3	0.0003		0.0006	0.0166		0.0797	65.0000		85.0000
	381	9.79	0.0000		0.0000	0.0104		0.0501	62.7928		84.6694

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	400	54.6	0.0583		0.1167	0.0368		0.1764	57.6870		76.6267
	421	38.4	0.0786		0.1572	0.0253		0.1213	60.2640		79.2224
		219.81	*0.1597*		*0.3194*	*0.1683*		*0.8071*	*61.8237*		*81.8498*
Cumulative		**219.8100**	**0.1597**	**0.5551**	**0.3194**	**0.1683**	**0.7952**	**0.8071**	**61.8237**	**34.7444**	**81.8498**
EA32I											
	374a	18.8	0.0000		0.0000	0.0124		0.0592	64.4592		84.4592
	421	38.4	0.0786		0.1572	0.0253		0.1213	60.2640		79.2224
	400	54.6	0.0583		0.1167	0.0368		0.1764	57.6870		76.6267
	374b	25.3	0.0003		0.0006	0.0166		0.0797	65.0000		85.0000
	370b	49.1	0.0209		0.0418	0.0364		0.1744	64.4382		85.0000
	355	23.9	0.0015		0.0031	0.0304		0.1459	62.5887		85.0000
	381	9.79	0.0000		0.0000	0.0104		0.0501	62.7928		84.6694
		219.81	*0.1597*		*0.3194*	*0.1683*		*0.8071*	*61.8237*		*81.8498*
Cumulative		**219.8100**	**0.1597**	**0.6034**	**0.3194**	**0.1683**	**0.6175**	**0.8071**	**61.8237**	**15.9498**	**81.8498**
EA33	**Positive y intercept**										
	341	0.02	0.0000		0.0000	0.0000		0.0001	70.0000		90.0000
	343	1.29	0.0000		0.0000	0.0008		0.0041	70.0000		90.0000
	351	0.19	0.0000		0.0000	0.0001		0.0003	70.0000		90.0000
		1.5	*0.0000*		*0.0000*	*0.0009*		*0.0044*	*70.0000*		*90.0000*
Cumulative		**1.5000**	**0.0000**	**0.0110**	**0.0000**	**0.0009**	**0.0041**	**0.0044**	**70.0000**	**4.4537**	**90.0000**

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs)			Infiltration (cfs)			Impervious C (%)		
			Min	Slicer	Max	Min	Slicer	Max	Min	Slicer	Max
EA34D											
	419	43.0	0.0116		0.0232	0.0284		0.1361	53.7236		71.1396
	369	26.5	0.0562		0.1123	0.0333		0.1597	60.6787		82.7732
	441	51.9	0.1041		0.2083	0.0341		0.1637	47.9805		67.4889
	431	62	0.1117		0.2234	0.0408		0.1956	62.2406		81.9727
	428	52.1	0.1755		0.3509	0.0342		0.1643	36.4553		56.4553
	397b	77.6	0.0611		0.1222	0.0514		0.2467	64.1435		84.0936
	392	37.4	0.2338		0.4676	0.0247		0.1186	63.9878		83.8627
	371	29.1	0.0008		0.0015	0.0306		0.1466	53.1991		73.3154
	376	30.9	0.0000		0.0000	0.0285		0.1366	29.2445		40.6631
		410.36	*0.7548*		*1.5096*	*0.3060*		*1.4679*	*53.5668*		*72.6694*
Cumulative		***410.3600***	***0.7548***	***0.8558***	***1.5096***	***0.3060***	***1.1265***	***1.4679***	***53.5668***	***49.2605***	***72.6694***
EA34W	**Positive y intercept**										
	369	26.5	0.0562		0.1123	0.0333		0.1597	60.6787		82.7732
	371	29.1	0.0008		0.0015	0.0306		0.1466	53.1991		73.3154
	376	30.9	0.0000		0.0000	0.0285		0.1366	29.2445		40.6631
	392	37.4	0.2338		0.4676	0.0247		0.1186	63.9878		83.8627
	397b	77.6	0.0611		0.1222	0.0514		0.2467	64.1435		84.0936
	419	43.0	0.0116		0.0232	0.0284		0.1361	53.7236		71.1396
	428	52.1	0.1755		0.3509	0.0342		0.1643	36.4553		56.4553

Slicer Output - Easterly CSO Phase II

Flow			Sanitary Flow (cfs)			Infiltration (cfs)			Impervious C (%)		
Monitor	Ecsoname	Area	Min	Slicer	Max	Min	Slicer	Max	Min	Slicer	Max
	431	62	0.1117		0.2234	0.0408		0.1956	62.2406		81.9727
	441	51.9	0.1041		0.2083	0.0341		0.1637	47.9805		67.4889
		410.36	*0.7548*		*1.5096*	*0.3060*		*1.4679*	*53.5668*		*72.6694*
Cumulative		***410.3600***	***0.7548***	***0.0000***	***1.5096***	***0.3060***	***0.0000***	***1.4679***	**53.5668**	***-96.1750***	**72.6694**
EA36	**positive y intercept**										
	397a	12.5	0.0000		0.0000	0.0090		0.0430	54.0946		71.4773
	388	22.8	0.0000		0.0000	0.0172		0.0823	49.5303		65.9567
		35.29	*0.0000*		*0.0000*	*0.0261*		*0.1254*	*51.1470*		*67.9121*
Cumulative		***35.2900***	***0.0000***	***0.5329***	***0.0000***	***0.0261***	***0.5170***	***0.1254***	***51.1470***	***78.7806***	***67.9121***
EA38I											
	395	28.3	0.0355		0.0710	0.0188		0.0902	63.9062		83.6437
		28.32	*0.0355*		*0.0710*	*0.0188*		*0.0902*	*63.9062*		*83.6437*
Cumulative		***28.3200***	***0.0355***	***0.8148***	***0.0710***	***0.0188***	***4.3762***	***0.0902***	**63.9062**	***153.1578***	**83.6437**
EA40I	**positive y intercept**										
	411	21.5	0.0037		0.0074	0.0141		0.0678	59.0829		78.6034
		21.48	*0.0037*		*0.0074*	*0.0141*		*0.0678*	*59.0829*		*78.6034*
Cumulative		***21.4800***	***0.0037***	***0.0985***	***0.0074***	***0.0141***	***0.0996***	***0.0678***	***59.0829***	***19.0857***	***78.6034***
EA42	**positive y intercept**										
	396	3.55	0.0000		0.0000	0.0023		0.0112	57.5562		77.7247

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	402	3.83	0.0029		0.0059	0.0025		0.0121	65.0000		85.0000
	405b	11.2	0.0000		0.0000	0.0094		0.0452	30.3038		50.5377
		18.53	*0.0029*		*0.0059*	*0.0143*		*0.0685*	*42.6962*		*62.8693*
Cumulative		***18.5300***	***0.0029***	***0.0484***	***0.0059***	***0.0143***	***0.0819***	***0.0685***	***42.6962***	***45.3659***	***62.8693***
EA43I	**positive y intercept**										
	401	5.72	0.0000		0.0000	0.0038		0.0181	56.9580		77.7185
	409	6.54	0.0000		0.0000	0.0043		0.0206	51.4067		73.5550
		12.26	*0.0000*		*0.0000*	*0.0081*		*0.0387*	*53.9967*		*75.4976*
Cumulative		***43.4200***	***0.0049***	***0.2161***	***0.0097***	***0.0312***	***0.6807***	***0.1498***	***47.7510***	***97.5935***	***67.9709***
EA44D											
	405a	12.6	0.0019		0.0039	0.0089		0.0426	49.1044		68.1495
		12.63	*0.0019*		*0.0039*	*0.0089*		*0.0426*	*49.1044*		*68.1495*
Cumulative		***12.6300***	***0.0019***	***0.0296***	***0.0039***	***0.0089***	***0.0175***	***0.0426***	***49.1044***	***63.9973***	***68.1495***
EA45											
	432	51.1	0.0004		0.0008	0.0345		0.1654	52.1599		73.3810
		51.11	*0.0004*		*0.0008*	*0.0345*		*0.1654*	*52.1599*		*73.3810*
Cumulative		***51.1100***	***0.0004***	***0.7017***	***0.0008***	***0.0345***	***1.0593***	***0.1654***	***52.1599***	***101.5821***	***73.3810***
EA46W											
	424	5.84	0.0000		0.0000	0.0038		0.0184	65.0000		85.0000

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	430a	8.02	0.0028		0.0056	0.0059		0.0285	49.6729		66.7018
		13.86	*0.0028*		*0.0056*	*0.0098*		*0.0469*	*56.1311*		*74.4118*
Cumulative		***13.8600***	***0.0028***	***0.0000***	***0.0056***	***0.0098***	***0.0000***	***0.0469***	***56.1311***	***819.1146***	***74.4118***
EA48W											
	429	27.7	0.0000		0.0000	0.0231		0.1107	34.0194		51.5906
	430b	29.8	0.0000		0.0000	0.0208		0.0999	54.8057		73.6335
	434a	8.74	0.0000		0.0000	0.0066		0.0317	39.7913		59.7913
	434b	11.9	0.0000		0.0000	0.0078		0.0375	44.1120		64.1120
	442	7.69	0.0000		0.0000	0.0051		0.0243	58.2835		78.2835
	443	24.5	0.0000		0.0000	0.0163		0.0784	54.8570		75.0826
	444	31.2	0.0000		0.0000	0.0205		0.0986	53.1188		72.7089
		141.48	*0.0000*		*0.0000*	*0.1003*		*0.4810*	*48.7405*		*67.9669*
Cumulative		***141.4800***	***0.0000***	***0.0000***	***0.0000***	***0.1003***	***0.0000***	***0.4810***	***48.7405***	***27.0464***	***67.9669***
EC01											
	6	22	0.0244		0.0487	0.0208		0.0998	47.2359		68.3776
		21.97	*0.0244*		*0.0487*	*0.0208*		*0.0998*	*47.2359*		*68.3776*
Cumulative		***320.3900***	***0.3328***	***0.4015***	***0.6657***	***0.2488***	***0.4319***	***1.1934***	***44.9941***	***23.4939***	***68.4746***
EC02											
	9	23.5	0.0144		0.0288	0.0158		0.0758	40.9559		65.8496

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
		23.53	*0.0144*		*0.0288*	*0.0158*		*0.0758*	*40.9559*		*65.8496*
Cumulative		**170.1800**	**0.2219**	**0.2153**	**0.4438**	**0.1408**	**0.1866**	**0.6751**	**40.6749**	**26.8303**	**60.8303**
EC03											
	7	132	0.1993		0.3986	0.1120		0.5374	39.7895		58.8624
		131.88	*0.1993*		*0.3986*	*0.1120*		*0.5374*	*39.7895*		*58.8624*
Cumulative		**131.8800**	**0.1993**	**0.3147**	**0.3986**	**0.1120**	**0.4516**	**0.5374**	**39.7895**	**44.0251**	**58.8624**
EC03I	positive y intercept										
	7	132	0.1993		0.3986	0.1120		0.5374	39.7895		58.8624
		131.88	*0.1993*		*0.3986*	*0.1120*		*0.5374*	*39.7895*		*58.8624*
Cumulative		**131.8800**	**0.1993**	**0.1920**	**0.3986**	**0.1120**	**0.3037**	**0.5374**	**39.7895**	**12.8119**	**58.8624**
EC04											
	14	14.8	0.0082		0.0164	0.0129		0.0620	48.1330		70.4050
		14.77	*0.0082*		*0.0164*	*0.0129*		*0.0620*	*48.1330*		*70.4050*
Cumulative		**14.7700**	**0.0082**	**0.0056**	**0.0164**	**0.0129**	**0.0139**	**0.0620**	**48.1330**	**14.3714**	**70.4050**
EC05											
	2	170	0.1799		0.3598	0.1326		0.6360	46.2460		69.8990
	3	16.4	0.0133		0.0266	0.0134		0.0643	30.1105		48.6402
	4	8.23	0.0142		0.0285	0.0063		0.0300	46.1450		70.4622
	5	97.2	0.0989		0.1977	0.0686		0.3292	43.7836		68.2995

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
		291.55	*0.3063*		*0.6126*	*0.2209*		*1.0596*	*44.5167*		*68.1887*
Cumulative		***298.4200***	***0.3085***	***0.3300***	***0.6169***	***0.2280***	***0.4620***	***1.0936***	***44.8290***	***26.6098***	***68.4817***
HA00	**positive y intercept**										
	50	84.4	0.0665		0.1329	0.0611		0.2929	49.9962		71.3634
	57	24.0	0.0318		0.0636	0.0158		0.0758	48.5393		71.4045
	54a	22.8	0.0215		0.0430	0.0195		0.0934	27.6351		42.0490
	43	27.6	0.0415		0.0829	0.0217		0.1043	44.4100		67.0363
	55	42.2	0.0006		0.0012	0.0413		0.1980	46.1068		66.5761
		200.92	*0.1619*		*0.3237*	*0.1594*		*0.7645*	*45.7059*		*66.4488*
Cumulative		***1,728.3900***	***3.6293***	***2.4103***	***7.2586***	***1.3579***	***4.8119***	***6.5128***	***40.4766***	***9.0563***	***61.4996***
HA01D	**positive y intercept**										
	73	44.6	0.1208		0.2417	0.0360		0.1726	49.6508		73.4622
	68a	19.7	0.0396		0.0792	0.0154		0.0739	48.3191		72.2298
	97	9.83	0.0158		0.0316	0.0065		0.0310	49.3483		72.0112
	93	28.5	0.1021		0.2042	0.0234		0.1120	48.8225		72.8423
	87	47.1	0.1540		0.3079	0.0340		0.1629	47.9965		71.3912
	75b	9.91	0.0223		0.0446	0.0104		0.0498	61.8599		83.7199
	75a	27.7	0.0000		0.0000	0.0228		0.1095	61.0130		82.0259
	68b	33.5	0.0252		0.0504	0.0287		0.1375	55.2158		77.8639
	102	22.9	0.0894		0.1789	0.0162		0.0775	34.8513		58.9043

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	61b	25.1	0.0291		0.0582	0.0210		0.1008	50.0000		73.8638
	61a	39.6	0.1199		0.2398	0.0292		0.1402	46.3826		70.5438
	140	11.2	0.0429		0.0857	0.0108		0.0516	49.8991		72.0550
	105	46.9	0.1247		0.2494	0.0409		0.1964	47.9134		70.7448
	72	29	0.0693		0.1386	0.0308		0.1479	60.0277		82.5454
		395.36	*0.9552*		*1.9103*	*0.3260*		*1.5635*	*50.2907*		*73.4952*
Cumulative		**1,527.4700**	**3.4674**	**1.6501**	**6.9349**	**1.1985**	**5.4164**	**5.7483**	**39.7888**	**2.2617**	**60.8485**
HA01W											
	87	47.1	0.1540		0.3079	0.0340		0.1629	47.9965		71.3912
	93	28.5	0.1021		0.2042	0.0234		0.1120	48.8225		72.8423
	75b	9.91	0.0223		0.0446	0.0104		0.0498	61.8599		83.7199
	75a	27.7	0.0000		0.0000	0.0228		0.1095	61.0130		82.0259
	73	44.6	0.1208		0.2417	0.0360		0.1726	49.6508		73.4622
	72	29	0.0693		0.1386	0.0308		0.1479	60.0277		82.5454
	68a	19.7	0.0396		0.0792	0.0154		0.0739	48.3191		72.2298
	61b	25.1	0.0291		0.0582	0.0210		0.1008	50.0000		73.8638
	61a	39.6	0.1199		0.2398	0.0292		0.1402	46.3826		70.5438
	140	11.2	0.0429		0.0857	0.0108		0.0516	49.8991		72.0550
	97	9.83	0.0158		0.0316	0.0065		0.0310	49.3483		72.0112
	105	46.9	0.1247		0.2494	0.0409		0.1964	47.9134		70.7448

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	102	22.9	0.0894		0.1789	0.0162		0.0775	34.8513		58.9043
	68b	33.5	0.0252		0.0504	0.0287		0.1375	55.2158		77.8639
		395.36	*0.9552*		*1.9103*	*0.3260*		*1.5635*	*50.2907*		*73.4952*
	Cumulative	***1,527.4700***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***0.0000***	***39.7888***	***94.1279***	***60.8485***
HA02D	**negative slope, positve y intercept; poor correlation**										
	142	2.07	0.0121		0.0241	0.0014		0.0065	40.0000		65.0000
	153	2.69	0.0124		0.0248	0.0018		0.0085	51.4312		74.1450
	136	8.81	0.0361		0.0721	0.0058		0.0278	40.0000		65.0000
	128	0.08	0.0000		0.0000	0.0001		0.0005	62.5000		85.0000
	123	23.7	0.0996		0.1993	0.0165		0.0790	39.4085		64.0288
		37.36	*0.1601*		*0.3203*	*0.0255*		*0.1223*	*40.4958*		*65.0849*
	Cumulative	***185.4100***	***0.4042***	***0.0000***	***0.8085***	***0.1354***	***0.0000***	***0.6496***	***37.4247***	***-0.0837***	***57.6289***
HA02I											
	128	0.08	0.0000		0.0000	0.0001		0.0005	62.5000		85.0000
	136	8.81	0.0361		0.0721	0.0058		0.0278	40.0000		65.0000
	142	2.07	0.0121		0.0241	0.0014		0.0065	40.0000		65.0000
	153	2.69	0.0124		0.0248	0.0018		0.0085	51.4312		74.1450
	123	23.7	0.0996		0.1993	0.0165		0.0790	39.4085		64.0288
		37.36	*0.1601*		*0.3203*	*0.0255*		*0.1223*	*40.4958*		*65.0849*
	Cumulative	***185.4100***	***0.4042***	***0.2757***	***0.8085***	***0.1354***	***0.3194***	***0.6496***	***37.4247***	***12.2320***	***57.6289***

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
HA03I											
	187a	12.3	0.0085		0.0170	0.0089		0.0428	57.7712		78.6162
	195	3.91	0.0070		0.0139	0.0031		0.0148	63.7872		84.7021
	201	38.9	0.1275		0.2550	0.0300		0.1441	40.5716		62.2032
	221	13.6	0.0206		0.0412	0.0144		0.0689	10.8978		16.8003
	222	37.8	0.1328		0.2655	0.0376		0.1806	35.1765		51.4805
		106.48	*0.2963*		*0.5926*	*0.0941*		*0.4512*	*37.6919*		*55.3014*
Cumulative		**472.8200**	**0.4819**	**0.3302**	**0.9638**	**0.3787**	**1.0501**	**1.8164**	**33.4879**	**37.4664**	**52.7208**
HA03W											
	195	3.91	0.0070		0.0139	0.0031		0.0148	63.7872		84.7021
	222	37.8	0.1328		0.2655	0.0376		0.1806	35.1765		51.4805
	221	13.6	0.0206		0.0412	0.0144		0.0689	10.8978		16.8003
	187a	12.3	0.0085		0.0170	0.0089		0.0428	57.7712		78.6162
	201	38.9	0.1275		0.2550	0.0300		0.1441	40.5716		62.2032
		106.48	*0.2963*		*0.5926*	*0.0941*		*0.4512*	*37.6919*		*55.3014*
Cumulative		**472.8200**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**33.4879**	**65.3086**	**52.7208**
HA04											
	182a	5.33	0.0104		0.0207	0.0043		0.0207	25.0000		40.6250
	182b	3.41	0.0062		0.0124	0.0022		0.0108	41.0997		65.8798
	192a	39.7	0.0459		0.0918	0.0315		0.1511	26.3931		42.8801

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	192b	3.66	0.0070		0.0141	0.0047		0.0227	0.7232		1.1752
		52.14	*0.0695*		*0.1390*	*0.0428*		*0.2053*	*25.4106*		*41.2263*
Cumulative		***52.1400***	***0.0695***	***0.0400***	***0.1390***	***0.0428***	***0.0600***	***0.2053***	***25.4106***	***14.8844***	***41.2263***
HA06D	**positve y intercept**										
	241a	14.0	0.0472		0.0944	0.0092		0.0442	37.2432		60.4422
	248b	10.6	0.0319		0.0638	0.0070		0.0335	45.1130		68.8418
	238	1.04	0.0031		0.0062	0.0007		0.0033	40.0000		65.0000
	226	12.3	0.0215		0.0430	0.0081		0.0388	27.0610		46.9228
	214	40.8	0.1656		0.3311	0.0325		0.1558	36.6913		56.5789
	204	7	0.0413		0.0826	0.0047		0.0226	41.1018		65.9763
	173a	11.3	0.0727		0.1454	0.0078		0.0375	52.9149		75.5139
	159	19.1	0.0542		0.1083	0.0126		0.0603	49.8509		72.8807
	158	14.1	0.0141		0.0282	0.0124		0.0593	21.9814		36.7473
	150	30.8	0.0902		0.1804	0.0214		0.1024	38.7831		61.2307
	146	9.52	0.0362		0.0724	0.0063		0.0300	44.1754		68.3403
	134	26.2	0.0964		0.1928	0.0224		0.1073	50.3235		74.1765
	173b	82.2	0.3983		0.7966	0.0568		0.2726	41.8314		65.9447
	254	5.4	0.0158		0.0316	0.0036		0.0170	46.5556		68.9537
		284.28	*1.0884*		*2.1768*	*0.2053*		*0.9849*	*40.9468*		*63.4022*
Cumulative		***842.5400***	***1.6910***	***0.5810***	***3.3820***	***0.6645***	***0.7741***	***3.1871***	***35.4722***	***9.2644***	***55.3581***

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
HA06I											
	158	14.1	0.0141		0.0282	0.0124		0.0593	21.9814		36.7473
	254	5.4	0.0158		0.0316	0.0036		0.0170	46.5556		68.9537
	248b	10.6	0.0319		0.0638	0.0070		0.0335	45.1130		68.8418
	241a	14.0	0.0472		0.0944	0.0092		0.0442	37.2432		60.4422
	238	1.04	0.0031		0.0062	0.0007		0.0033	40.0000		65.0000
	226	12.3	0.0215		0.0430	0.0081		0.0388	27.0610		46.9228
	214	40.8	0.1656		0.3311	0.0325		0.1558	36.6913		56.5789
	204	7	0.0413		0.0826	0.0047		0.0226	41.1018		65.9763
	173b	82.2	0.3983		0.7966	0.0568		0.2726	41.8314		65.9447
	159	19.1	0.0542		0.1083	0.0126		0.0603	49.8509		72.8807
	150	30.8	0.0902		0.1804	0.0214		0.1024	38.7831		61.2307
	146	9.52	0.0362		0.0724	0.0063		0.0300	44.1754		68.3403
	134	26.2	0.0964		0.1928	0.0224		0.1073	50.3235		74.1765
	173a	11.3	0.0727		0.1454	0.0078		0.0375	52.9149		75.5139
		284.28	*1.0884*		*2.1768*	*0.2053*		*0.9849*	*40.9468*		*63.4022*
Cumulative		**842.5400**	**1.6910**	**0.8830**	**3.3820**	**0.6645**	**0.9838**	**3.1871**	**35.4722**	**15.1164**	**55.3581**
HA07D											
	232	11.5	0.0450		0.0901	0.0075		0.0362	40.2400		65.1920
	241b	7.95	0.0251		0.0501	0.0052		0.0251	40.7799		64.0629

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	259	12.1	0.0464		0.0928	0.0080		0.0383	39.1235		62.2140
	199	19.1	0.0941		0.1882	0.0129		0.0619	42.1381		66.8145
	175	17.4	0.0665		0.1331	0.0129		0.0618	31.1747		55.0715
	185	7.35	0.0272		0.0545	0.0071		0.0340	30.6784		53.1506
	210	28.7	0.1126		0.2253	0.0189		0.0907	42.9287		66.9113
		104.16	*0.4170*		*0.8340*	*0.0726*		*0.3480*	*39.0505*		*62.9888*
Cumulative		***104.1600***	***0.4170***	***0.0809***	***0.8340***	***0.0726***	***0.1073***	***0.3480***	***39.0505***	***58.8350***	***62.9888***
HA07W	**positve y intercept; no correlation**										
	175	17.4	0.0665		0.1331	0.0129		0.0618	31.1747		55.0715
	185	7.35	0.0272		0.0545	0.0071		0.0340	30.6784		53.1506
	199	19.1	0.0941		0.1882	0.0129		0.0619	42.1381		66.8145
	210	28.7	0.1126		0.2253	0.0189		0.0907	42.9287		66.9113
	232	11.5	0.0450		0.0901	0.0075		0.0362	40.2400		65.1920
	241b	7.95	0.0251		0.0501	0.0052		0.0251	40.7799		64.0629
	259	12.1	0.0464		0.0928	0.0080		0.0383	39.1235		62.2140
		104.16	*0.4170*		*0.8340*	*0.0726*		*0.3480*	*39.0505*		*62.9888*
Cumulative		***104.1600***	***0.4170***	***0.0000***	***0.8340***	***0.0726***	***0.0000***	***0.3480***	***39.0505***	***0.3194***	***62.9888***
HA08											
	173c	15.4	0.0282		0.0563	0.0104		0.0497	41.6709		66.4231
	177a	0.88	0.0044		0.0088	0.0006		0.0028	40.0000		65.0000

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	177b	2.2	0.0031		0.0062	0.0014		0.0069	40.0000		65.0000
		18.47	*0.0357*		*0.0713*	*0.0124*		*0.0594*	*41.3923*		*66.1858*
Cumulative		**514.1300**	**0.5523**	**0.0821**	**1.1046**	**0.4094**	**0.1084**	**1.9636**	**34.5690**	**3.5646**	**54.1865**
HA10											
	181	13.8	0.0214		0.0427	0.0119		0.0572	53.4785		76.7420
	193	9.07	0.0134		0.0268	0.0064		0.0306	48.3230		71.9143
		22.84	*0.0347*		*0.0695*	*0.0183*		*0.0878*	*51.4312*		*74.8249*
Cumulative		**495.6600**	**0.5167**	**0.0222**	**1.0333**	**0.3970**	**0.0294**	**1.9042**	**34.3147**	**0.8255**	**53.7393**
HA12											
	203a	51.5	0.0275		0.0551	0.0487		0.2336	16.9701		32.2349
	203b	9.71	0.0095		0.0190	0.0067		0.0323	36.7122		58.8927
	218	8.11	0.0051		0.0102	0.0061		0.0294	29.6885		48.2438
		69.36	*0.0422*		*0.0843*	*0.0616*		*0.2954*	*21.2210*		*37.8387*
Cumulative		**69.3600**	**0.0422**	**0.0286**	**0.0843**	**0.0616**	**0.0452**	**0.2954**	**21.2210**	**4.0252**	**37.8387**
HA13I											
	157a	49.8	0.1092		0.2185	0.0351		0.1685	38.7884		59.5936
	157b	6.15	0.0145		0.0291	0.0046		0.0221	38.8698		56.2589
	187b	9.27	0.0121		0.0243	0.0067		0.0320	45.2318		63.3925

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
		65.23	*0.1359*		*0.2719*	*0.0464*		*0.2226*	*39.7117*		*59.8191*
Cumulative		***117.3700***	***0.2054***	***0.2228***	***0.4108***	***0.0892***	***0.3628***	***0.4279***	***33.3587***	***35.8065***	***51.5595***
HA14											
	257	214	0.1046		0.2092	0.1491		0.7150	38.4959		60.6019
	233a	23.2	0.0128		0.0255	0.0155		0.0745	38.5233		62.6208
	288	24.0	0.0070		0.0141	0.0284		0.1363	6.4208		11.6327
	233b	10.7	0.0073		0.0147	0.0133		0.0640	3.9048		6.4776
	245	25.4	0.0117		0.0234	0.0167		0.0802	40.7087		65.5669
		296.98	*0.1434*		*0.2869*	*0.2231*		*1.0699*	*34.8455*		*55.2712*
Cumulative		***296.9800***	***0.1434***	***0.1860***	***0.2869***	***0.2231***	***0.6165***	***1.0699***	***34.8455***	***14.3497***	***55.2712***
HA15I	**positive y intercept**										
	141	30.7	0.0387		0.0774	0.0207		0.0995	49.2402		71.7687
		30.68	*0.0387*		*0.0774*	*0.0207*		*0.0995*	*49.2402*		*71.7687*
Cumulative		***148.0500***	***0.2441***	***0.2785***	***0.4882***	***0.1099***	***0.3398***	***0.5273***	***36.6497***	***13.4450***	***55.7474***
HA16											
	244	29.9	0.0424		0.0848	0.0313		0.1500	15.0884		24.0848
	248a	14.3	0.0079		0.0158	0.0185		0.0887	1.6162		2.7732
		44.13	*0.0503*		*0.1006*	*0.0498*		*0.2387*	*10.7289*		*17.1886*
Cumulative		***44.1300***	***0.0503***	***0.0512***	***0.1006***	***0.0498***	***0.0930***	***0.2387***	***10.7289***	***44.4453***	***17.1886***

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
IV00											
	34	24	0.0117		0.0234	0.0209		0.1003	58.9950		80.2265
	40	9.91	0.0249		0.0498	0.0068		0.0328	37.2570		59.6150
	45	16.2	0.0000		0.0000	0.0170		0.0815	54.5837		76.6189
	47	72.3	0.0338		0.0676	0.0568		0.2726	46.1924		66.5843
		122.37	*0.0704*		*0.1408*	*0.1016*		*0.4872*	*49.0847*		*70.0175*
Cumulative		***643.8300***	***0.4106***	***1.6406***	***0.8212***	***0.3961***	***4.2123***	***1.9000***	***51.4262***	***59.9319***	***72.5971***
IV01											
	98	14.7	0.0306		0.0613	0.0097		0.0464	40.0000		65.0000
	74	42.5	0.0121		0.0241	0.0281		0.1346	58.8631		79.2792
	76	11.1	0.0053		0.0105	0.0073		0.0350	61.1306		80.5135
	78	17	0.0104		0.0207	0.0119		0.0570	54.0205		71.5578
	80	67.3	0.0576		0.1153	0.0532		0.2553	30.6922		45.7633
	83	30.7	0.0146		0.0292	0.0266		0.1277	54.8171		77.8132
	86	58.2	0.0425		0.0849	0.0455		0.2181	27.3636		47.5177
	90	32.3	0.0280		0.0560	0.0216		0.1035	38.8560		63.2459
	94	17.9	0.0166		0.0331	0.0186		0.0894	10.9778		17.3438
	101a	11.8	0.0121		0.0243	0.0125		0.0599	9.7104		15.7794
	71	40.7	0.0194		0.0388	0.0304		0.1457	35.0726		53.1304
	99	36.5	0.0412		0.0825	0.0258		0.1237	34.7742		56.9852

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	96	21.7	0.0113		0.0226	0.0165		0.0790	51.9177		75.0599
	101b	27.4	0.0354		0.0709	0.0210		0.1009	28.5178		46.3415
	69	13.3	0.0193		0.0387	0.0095		0.0455	54.8128		71.6782
	64	17.8	0.0087		0.0173	0.0160		0.0766	60.1608		81.2902
	63	47.8	0.0686		0.1372	0.0334		0.1604	42.4675		63.4327
	60	5.07	0.0022		0.0045	0.0052		0.0248	15.4459		26.0255
	59c	21.1	0.0200		0.0401	0.0207		0.0992	55.2306		78.4924
	59b	18.3	0.0091		0.0183	0.0126		0.0603	51.4618		73.8808
	59a	20.1	0.0354		0.0707	0.0132		0.0634	42.7164		67.0373
	58	8.01	0.0002		0.0005	0.0086		0.0411	57.3636		80.4343
	56	50.4	0.0016		0.0032	0.0397		0.1902	55.1286		75.0846
	53	23.8	0.0026		0.0053	0.0157		0.0752	60.0000		80.0000
	70	48.3	0.0680		0.1360	0.0318		0.1525	47.4110		70.8599
	106	26.1	0.0129		0.0258	0.0266		0.1277	11.6856		19.8393
		729.61	*0.5860*		*1.1720*	*0.5615*		*2.6932*	*41.5582*		*61.0258*
Cumulative		**775.0300**	**0.6078**	**0.5353**	**1.2156**	**0.5927**	**1.1943**	**2.8430**	**41.9981**	**24.9468**	**61.5451**
IV02I	**Positive Y-intercept**										
	107	12.1	0.0044		0.0088	0.0138		0.0661	6.1450		9.9857
		12.1	*0.0044*		*0.0088*	*0.0138*		*0.0661*	*6.1450*		*9.9857*
Cumulative		**296.1500**	**0.2364**	**0.4388**	**0.4727**	**0.2298**	**1.8856**	**1.1022**	**32.5508**	**18.2154**	**51.1099**

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
IV03W											
	119	30.2	0.0279		0.0559	0.0199		0.0953	56.9427		78.5459
	133	1.73	0.0015		0.0029	0.0011		0.0055	40.0000		65.0000
	139	5.09	0.0019		0.0039	0.0033		0.0160	61.6142		83.0118
		37.01	*0.0313*		*0.0627*	*0.0243*		*0.1168*	*56.7932*		*78.5269*
	Cumulative	**112.3600**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**54.5037**	**48.4893**	**75.6123**
IV04I											
	84b	284	0.2319		0.4639	0.2160		1.0361	33.6757		52.8617
		284.05	*0.2319*		*0.4639*	*0.2160*		*1.0361*	*33.6757*		*52.8617*
	Cumulative	**284.0500**	**0.2319**	**0.5554**	**0.4639**	**0.2160**	**1.8986**	**1.0361**	**33.6757**	**12.0129**	**52.8617**
IV06											
	126	45.4	0.0218		0.0436	0.0312		0.1498	49.0636		69.8873
		45.42	*0.0218*		*0.0436*	*0.0312*		*0.1498*	*49.0636*		*69.8873*
	Cumulative	**45.4200**	**0.0218**	**0.0105**	**0.0436**	**0.0312**	**0.0169**	**0.1498**	**49.0636**	**4.4832**	**69.8873**
IV08											
	89	30	0.0009		0.0019	0.0215		0.1033	60.3910		80.8277
	79c	18.8	0.0140		0.0280	0.0147		0.0706	53.8462		76.6771
	92	37.7	0.0069		0.0138	0.0284		0.1363	56.3310		76.5868
	79a	15.7	0.0227		0.0453	0.0125		0.0599	52.9779		75.8031
	77b	27.3	0.0499		0.0998	0.0180		0.0865	46.6624		70.0310

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	67	49.2	0.0699		0.1399	0.0338		0.1623	42.3095		64.4294
	66	43.2	0.0610		0.1219	0.0367		0.1758	50.9291		74.6409
	65	37.6	0.0460		0.0919	0.0272		0.1303	43.1868		64.4077
	122	4.9	0.0037		0.0074	0.0047		0.0225	16.3796		28.5154
	108	56.5	0.0042		0.0084	0.0372		0.1786	57.5672		78.1257
	79b	9.48	0.0002		0.0003	0.0062		0.0299	60.0000		80.0000
	77a	24.2	0.0028		0.0056	0.0186		0.0894	52.1257		71.9191
		354.53	*0.2821*		*0.5642*	*0.2597*		*1.2455*	*51.1075*		*72.5488*
Cumulative		***521.4600***	***0.3402***	***1.0091***	***0.6804***	***0.2946***	***1.9560***	***1.4128***	***51.9756***	***39.7876***	***73.2024***
IV10											
	125	5.8	0.0161		0.0322	0.0038		0.0183	55.0602		77.0482
	131b	19.9	0.0190		0.0381	0.0131		0.0626	58.1940		79.4786
	130	0.53	0.0000		0.0000	0.0004		0.0017	64.9074		84.9074
	131a	6.64	0.0157		0.0314	0.0044		0.0210	47.9066		71.3253
		32.82	*0.0508*		*0.1017*	*0.0216*		*0.1036*	*55.6673*		*77.4872*
Cumulative		***32.8200***	***0.0508***	***0.0625***	***0.1017***	***0.0216***	***0.1295***	***0.1036***	***55.6673***	***32.5788***	***77.4872***
IV12											
	135	1.73	0.0015		0.0029	0.0011		0.0055	43.0347		67.4277
	144	4.05	0.0012		0.0023	0.0027		0.0128	60.2970		81.2376

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
		5.78	0.0026		0.0053	0.0038		0.0182	55.1303		77.1042
Cumulative		**5.7800**	**0.0026**	**0.0133**	**0.0053**	**0.0038**	**0.0287**	**0.0182**	**55.1303**	**16.3479**	**77.1042**
IV14											
	115	16	0.0046		0.0093	0.0095		0.0455	44.7328		60.5413
		15.97	0.0046		0.0093	0.0095		0.0455	44.7328		60.5413
Cumulative		**128.3300**	**0.0046**	**0.2471**	**0.0093**	**0.0095**	**0.5666**	**0.0455**	**53.2877**	**48.8242**	**73.7368**
IV16											
	154	10.4	0.0060		0.0119	0.0068		0.0327	57.3433		79.2478
	145	14.7	0.0218		0.0436	0.0097		0.0464	59.4826		80.5888
	170	9.88	0.0190		0.0381	0.0083		0.0398	22.7302		36.9365
	152a	31.6	0.0036		0.0073	0.0208		0.0998	62.5206		83.7160
	152b	8.76	0.0202		0.0404	0.0058		0.0276	40.0000		65.0000
		75.35	0.0706		0.1413	0.0513		0.2463	53.3791		74.1807
Cumulative		**75.3500**	**0.0706**	**0.1236**	**0.1413**	**0.0513**	**0.1393**	**0.2463**	**53.3791**	**15.4500**	**74.1807**
IV18											
	117	121	0.1465		0.2929	0.0814		0.3902	38.5442		62.6343
	127	57.6	0.0355		0.0710	0.0408		0.1957	34.3613		55.8371
		179.02	0.1820		0.3639	0.1222		0.5859	37.1976		60.4461
Cumulative		**179.0200**	**0.1820**	**0.0466**	**0.3639**	**0.1222**	**0.0811**	**0.5859**	**37.1976**	**6.3506**	**60.4461**

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
IV20											
	110b	152	0.1356		0.2712	0.1058		0.5072	36.9677		59.1865
		152.45	*0.1356*		*0.2712*	*0.1058*		*0.5072*	*36.9677*		*59.1865*
Cumulative		***448.6000***	***0.3720***	***0.7101***	***0.7440***	***0.3356***	***1.8810***	***1.6094***	***34.0518***	***14.7039***	***53.8546***
LS00I											
	21	46.7	0.0730		0.1461	0.0373		0.1791	44.9744		68.2123
	8	108	0.2883		0.5765	0.1049		0.5030	30.8733		42.1168
	31	74.9	0.0005		0.0011	0.0554		0.2655	18.3959		35.1135
	29b	10.9	0.0359		0.0718	0.0072		0.0345	33.3654		54.7619
	29a	63.3	0.0894		0.1787	0.0498		0.2388	45.9245		69.3762
	28	14.6	0.0018		0.0036	0.0173		0.0831	56.7711		78.5535
	25	20.4	0.0292		0.0585	0.0139		0.0668	40.3706		64.5822
	24	69.4	0.1008		0.2016	0.0487		0.2338	44.1590		68.5799
	20a	57	0.0780		0.1560	0.0496		0.2377	52.0250		75.5935
	19	24	0.0303		0.0607	0.0198		0.0952	50.2901		74.0517
	18	20.5	0.0225		0.0450	0.0138		0.0662	40.5338		65.2240
	17	20.7	0.0200		0.0399	0.0136		0.0653	40.0000		65.0000
	16	34.8	0.0500		0.1000	0.0239		0.1148	40.9343		65.2075
	15	28.7	0.0321		0.0642	0.0192		0.0923	38.5089		62.1802
	12	13.7	0.0973		0.1947	0.0107		0.0513	61.5590		82.8844

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	10	16.5	0.0383		0.0766	0.0173		0.0830	59.2716		81.4131
	20b	18.4	0.0292		0.0583	0.0121		0.0581	53.9734		76.1407
		642.52	*1.0166*		*2.0332*	*0.5147*		*2.4686*	*40.4244*		*61.1266*
Cumulative		**1,693.6000**	**2.2183**	**3.3794**	**4.4365**	**1.3634**	**6.3219**	**6.5394**	**44.8984**	**11.9729**	**66.3429**
LS02											
	13	61.9	0.0426		0.0851	0.0424		0.2032	41.8805		65.0761
	22	35	0.0005		0.0011	0.0333		0.1599	40.7006		60.3572
		96.89	*0.0431*		*0.0862*	*0.0757*		*0.3631*	*41.4549*		*63.3739*
Cumulative		**554.5800**	**0.6448**	**0.3787**	**1.2895**	**0.4535**	**0.7977**	**2.1749**	**51.1836**	**32.8959**	**72.6943**
LS04I											
	455	5.93	0.0022		0.0043	0.0057		0.0274	57.8917		80.5760
		5.93	*0.0022*		*0.0043*	*0.0057*		*0.0274*	*57.8917*		*80.5760*
Cumulative		**496.5000**	**0.5569**	**0.8501**	**1.1138**	**0.3953**	**1.0202**	**1.8959**	**43.6677**	**27.9197**	**65.9990**
LS06											
	1	6.87	0.0022		0.0043	0.0071		0.0340	58.0844		80.9184
		6.87	*0.0022*		*0.0043*	*0.0071*		*0.0340*	*58.0844*		*80.9184*
Cumulative		**6.8700**	**0.0022**	**0.0123**	**0.0043**	**0.0071**	**0.0303**	**0.0340**	**58.0844**	**40.0992**	**80.9184**
NO00											
	11	16.4	0.0091		0.0181	0.0108		0.0516	40.0000		65.0000

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs)			Infiltration (cfs)			Impervious C (%)		
			Min	Slicer	Max	Min	Slicer	Max	Min	Slicer	Max
		16.35	*0.0091*		*0.0181*	*0.0108*		*0.0516*	*40.0000*		*65.0000*
Cumulative		***16.3500***	***0.0091***	***0.0276***	***0.0181***	***0.0108***	***0.0240***	***0.0516***	***40.0000***	***9.3741***	***65.0000***
NO02D	**positive y intercept**										
	30	63.5	0.0749		0.1498	0.0667		0.3197	56.0276		78.1170
	32	27.8	0.0569		0.1139	0.0218		0.1043	31.0965		48.9217
	33	83.2	0.0636		0.1272	0.0643		0.3085	53.1026		73.1021
	36	53.9	0.0147		0.0294	0.0388		0.1860	59.6937		80.3097
	37	23.1	0.0404		0.0808	0.0152		0.0728	45.5399		69.3452
	39	13.1	0.0060		0.0121	0.0100		0.0480	53.4527		75.9396
	42	34.3	0.0136		0.0272	0.0304		0.1456	58.5501		79.1190
	49	82.7	0.2518		0.5035	0.0694		0.3328	57.0278		78.6986
	27	59.8	0.0707		0.1414	0.0506		0.2425	53.2138		76.3365
		441.34	*0.5926*		*1.1853*	*0.3670*		*1.7603*	*53.7337*		*75.0255*
Cumulative		***441.3400***	***0.5926***	***0.1441***	***1.1853***	***0.3670***	***0.0869***	***1.7603***	***53.7337***	***14.8826***	***75.0255***
NO02W											
	37	23.1	0.0404		0.0808	0.0152		0.0728	45.5399		69.3452
	42	34.3	0.0136		0.0272	0.0304		0.1456	58.5501		79.1190
	49	82.7	0.2518		0.5035	0.0694		0.3328	57.0278		78.6986
	39	13.1	0.0060		0.0121	0.0100		0.0480	53.4527		75.9396
	33	83.2	0.0636		0.1272	0.0643		0.3085	53.1026		73.1021

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs) Min	Sanitary Flow (cfs) Slicer	Sanitary Flow (cfs) Max	Infiltration (cfs) Min	Infiltration (cfs) Slicer	Infiltration (cfs) Max	Impervious C (%) Min	Impervious C (%) Slicer	Impervious C (%) Max
	32	27.8	0.0569		0.1139	0.0218		0.1043	31.0965		48.9217
	27	59.8	0.0707		0.1414	0.0506		0.2425	53.2138		76.3365
	30	63.5	0.0749		0.1498	0.0667		0.3197	56.0276		78.1170
	36	53.9	0.0147		0.0294	0.0388		0.1860	59.6937		80.3097
		441.34	*0.5926*		*1.1853*	*0.3670*		*1.7603*	*53.7337*		*75.0255*
Cumulative		**441.3400**	**0.5926**	**0.0000**	**1.1853**	**0.3670**	**0.0000**	**1.7603**	**53.7337**	**14.1808**	**75.0255**
RF02D											
	41	41.9	0.0141		0.0282	0.0291		0.1396	57.3654		78.3548
	51	46.7	0.0812		0.1625	0.0334		0.1604	45.3158		69.5730
	46	61.7	0.0865		0.1730	0.0423		0.2026	51.2817		73.7066
	38	52.4	0.0026		0.0053	0.0346		0.1660	40.9183		59.2243
	35	33.1	0.1165		0.2330	0.0218		0.1043	36.3536		59.1863
	26	99.9	0.0128		0.0257	0.0883		0.4237	45.8335		65.7397
	48	43.8	0.0215		0.0430	0.0370		0.1775	59.9653		81.3534
		379.44	*0.3353*		*0.6706*	*0.2865*		*1.3741*	*48.0558*		*69.2321*
Cumulative		**2,848.0700**	**3.1614**	**2.7854**	**6.3227**	**2.2426**	**4.0183**	**10.7564**	**43.7473**	**19.1440**	**64.3077**
RF02I											
	51	46.7	0.0812		0.1625	0.0334		0.1604	45.3158		69.5730
	26	99.9	0.0128		0.0257	0.0883		0.4237	45.8335		65.7397
	35	33.1	0.1165		0.2330	0.0218		0.1043	36.3536		59.1863

Slicer Output - Easterly CSO Phase II

Flow Monitor	Ecsoname	Area	Sanitary Flow (cfs)			Infiltration (cfs)			Impervious C (%)		
			Min	Slicer	Max	Min	Slicer	Max	Min	Slicer	Max
	38	52.4	0.0026		0.0053	0.0346		0.1660	40.9183		59.2243
	41	41.9	0.0141		0.0282	0.0291		0.1396	57.3654		78.3548
	46	61.7	0.0865		0.1730	0.0423		0.2026	51.2817		73.7066
	48	43.8	0.0215		0.0430	0.0370		0.1775	59.9653		81.3534
		379.44	*0.3353*		*0.6706*	*0.2865*		*1.3741*	*48.0558*		*69.2321*
Cumulative		***1,154.4700***	***0.9431***	***1.2110***	***1.8862***	***0.8792***	***2.7332***	***4.2171***	***42.0588***	***32.8492***	***61.3220***

APPENDIX G

Precipitation Analysis

																		EASTERLY CSO PHASE II				
																		COMPARSION OF DISTRICT AND ADS RAIN DATA				
	EASTERLY CSO PHASE II				DAILY TOTAL RAIN IN INCHES														NEORSD			NEORSD
	RG-01	RG-02	RG-03	RG-04	RG-05	RG-06	RG-07	RG-08	RG-09	RG-10	RG-11	RG-12	RG-13	RG-14	RG-15	RG-16	RG-17	RG-22	EASTERLY	RG-25	RG-ECO	S. EUCLID
3/31/98	0	0	0	0.22	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
4/1/98	0.18	0.18	0	0	0	0.55	0	0	0.34	0.34	0	0.45	0	0	0.65	0	0	0.28	0.29	0.38	0.18	0.34
4/2/98	0.01	0.01	0.41	0.41	0.41	0.01	0.2	0.04	0.01	0.01	0	0.21	0.04	0	0.01	0.22	0.3	0.02	0.02	0.02	0.01	
4/3/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
4/4/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
4/5/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
4/6/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
4/7/98	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.11	0.01	0.02	0.11	0.01	0.02	0.03	0.01	0.02	0.01	0.01	0.02
4/8/98	0.45	0.45	0.31	0.31	0.31	0.45	0.34	0.47	0.5	0.5	0.4	0.47	0.47	0.4	0.36	0.4	0.17	0.48	0.45	0.6	0.43	0.53
4/9/98	0.85	0.85	0.77	0.77	0.77	0.85	1.13	1.51	1.56	1.56	0.9	1.09	1.51	0.9	1.53	1.23	1.25	1.5	1.28	1.16	1.11	1.01
4/10/98	0	0	0	0	0	0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0	0.01	0.01	0.02
4/11/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
4/12/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
4/13/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
4/14/98	0.27	0.27	0.21	0.21	0.24	0.27	0.4	0.51	0.39	0.39	0.28	0.42	0.51	0.28	0.41	0.46	0.42	0.36	0.37	0.54	0.34	0.47
4/15/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
4/16/98	1.6	1.6	1.36	1.36	1.39	1.6	0	1.41	1.68	1.68	1.48	1.22	1.41	1.48	1.32	1.3	1.44	2.23	2.1	1.43	1.93	1.2
4/17/98	0.05	0.05	0.03	0.03	0.05	0.05	0	0.04	0.09	0.09	0.1	0.03	0.04	0.1	0.03	1.49	0.05	0.09	0.11	0.04	0.12	0.04
4/18/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.51	0	0		0	0	
4/19/98	0.58	0.58	0.48	0.48	0.4	0.58	0	0.6	0.56	0.56	0.54	0.6	0.6	0.54	0.62	0.6	0.52	0.59	0.45	0.63	0.52	0.49
4/20/98	0.1	0.1	0.09	0.09	0.08	0.1	0	0.18	0.12	0.12	0.11	0.18	0.18	0.11	0.19	0.29	0.18	0.12	0.12	0.21	0.12	0.18
4/21/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
4/22/98	0	0	0	0	0.01	0	0	0.01	0	0	0	0	0	0	0.01	0	0.01	0		0	0	
4/23/98	0	0.32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
4/24/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
4/25/98	0.05	0.05	0.04	0.04	0.03	0.05	0	0.06	0.02	0.02	0.04	0.15	0.04	0.04	0.05	0.04	0.03	0.01		0.02	0	
4/26/98	1.43	1.38	1.36	1.31	1.05	1.43	1.22	1.42	1.41	1.46	1.32	1.27	1.45	1.32	1.32	1.33	1.33	1.6	1.55	1.49	1.62	1.31
4/27/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
4/28/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
4/29/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0.01	0	
4/30/98	0.11	0.08	0	0	0.1	0.07	0.09	0.11	0.11	0.13	0.12	0	0	0.12	0	0.12	0.12	0.16	0.17	0.1	0.12	0.09
5/1/98	0.09	0.13	0.12	0.11	0.08	0.05	0.07	0.07	0.05	0.02	0.11	0	0	0.11	0.07	0.15	0.14	0.06	0.07	0.11	0.17	0.1
5/2/98	0.12	0.14	0.26	0.23	0.08	0.16	0.08	0.22	0.2	0.21	0.11	0	0	0.18	0.27	0.26	0.2	0.32	0.29	0.3	0.08	0.27
5/3/98	0.06	0.05	0.06	0.04	0.06	0.02	0.07	0.07	0.14	0.16	0.17	0	0	0.04	0.06	0.04	0.05	0.07	0	0.09	0.08	0.06
5/4/98	0.14	0.12	0.13	0.13	0.11	0.12	0.19	0.2	0.17	0.21	0.14	0	0	0.16	0.2	0.26	0.27	0.16	0.17	0.23	0.22	0.21
5/5/98	0.01	0	0	0.01	0	0.01	0.01	0	0	0.01	0	0	0	0	0.01	0	0.01	0.01		0.01	0.01	
5/6/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/7/98	0.05	0.04	0.14	0.03	0.03	0.15	0.05	0.06	0.08	0.38	0.09	0	0	0.04	0.08	0.33	0.09	0.3	0.24	0.33	0.05	0.29
5/8/98	0.01	0.01	0.01	0.01	0.02	0.01	0.04	0.02	0.01	0.01	0.01	0	0	0.02	0.02	0.04	0.04	0.02	0.02	0.04	0.05	0.02
5/9/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/10/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/11/98	0.06	0.05	0.06	0.05	0.04	0.04	0.05	0.06	0.04	0.04	0.05	0	0	0.06	0.05	0.03	0.02	0.06	0.05	0.05	0.05	0.04
5/12/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/13/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/14/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/15/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/16/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/17/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/18/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/19/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/20/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/21/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/22/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/23/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/24/98	0.02	0	0.02	0	0.02	0	0	0.03	0	0	0	0	0	0.02	0.02	0.03	0	0		0	0	
5/25/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/26/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/27/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/28/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/29/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/30/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
5/31/98	0.66	0.69	1.04	0.81	0.82	0.87	0.32	1.08	1.08	0.86	1.04	0	0	1.08	1.07	1.01	0.9	0.55	0.51	1.25	0.36	1.04
April total	5.7	5.94	5.07	5.02	4.85	6.03	3.4	6.39	6.82	6.89	5.41	6.11	6.28	5.41	6.52	8.02	5.86	7.46	6.93	6.65	6.52	5.7
May total	1.22	1.23	1.84	1.42	1.26	1.43	0.88	1.81	1.77	1.9	1.72	0	0	1.71	1.85	2.15	1.72	1.55	1.35	2.41	1.07	2.03

Precipitation Analysis

TO: Dave Cox/CLE

COPIES: Phil Cheung/KWO

FROM: Peter von Zweck/BOS
Perrin Niemann/BOS

DATE: August 6, 1999

This memo describes the results of an analysis performed on the precipitation data being used in the NEORSD CSO Project. The primary objective was to compare the range of storms for which the hydrologic and hydraulic models were calibrated to the design storms, average annual year, and pollutant loading storms that will be used in the project's analyses.

There were a large number of rain gauges to choose from for the calibration data. Figure 1 shows the total rainfall that fell during the calibration period (April to May, 1999) according to each of the gauges. A line showing the average of all the datasets is also plotted. Rain gauge 08 was chosen to represent the calibration storms. As can be seen from Figure 1, its total rainfall was above the average but it was considered to be a representative gauge.

Figure 2 shows a comparison of the volumes of rainfall for the different types of storms. More detail about what is shown for each storm type is highlighted below:

- Calibration Storms – the six largest storms out of 20 are indicated on the plot. A 6-hour interevent time was used in calculating event statistics.
- Average Year Storms – the six largest storms for the specified "typical" year are shown.
- Design Storms – six design storms with return frequencies ranging from 1-month to 5-years are shown.
- Pollutant Loading Storm – data for the six rain gauges with the largest volumes are shown for a storm on 8/24/98.

From the figure, it can be seen that five of the largest storms in the average year and 2 of the design storms are outside of the calibrated range of the model. The volume of the pollutant loading storm is well within the calibrated range.

Figure 3 shows a similar figure for the maximum hourly intensities of the various types of storms. The 1-year, 2-year, and 5-year design storms are outside the calibrated range. The intensities of the largest storms in the average year are not as far outside the range of the model's calibration as are the volumes. The intensity of the pollutant loading storm is again within the model's calibrated range.

It is important that the limitations of the model be understood as it is employed as a tool to develop CSO control alternatives. Some care should be used when applying the model outside of its calibrated range. These results are similar to other CSO projects—we can discuss this further on August 17th.

Figure 1: Total Rainfall During Calibration Period

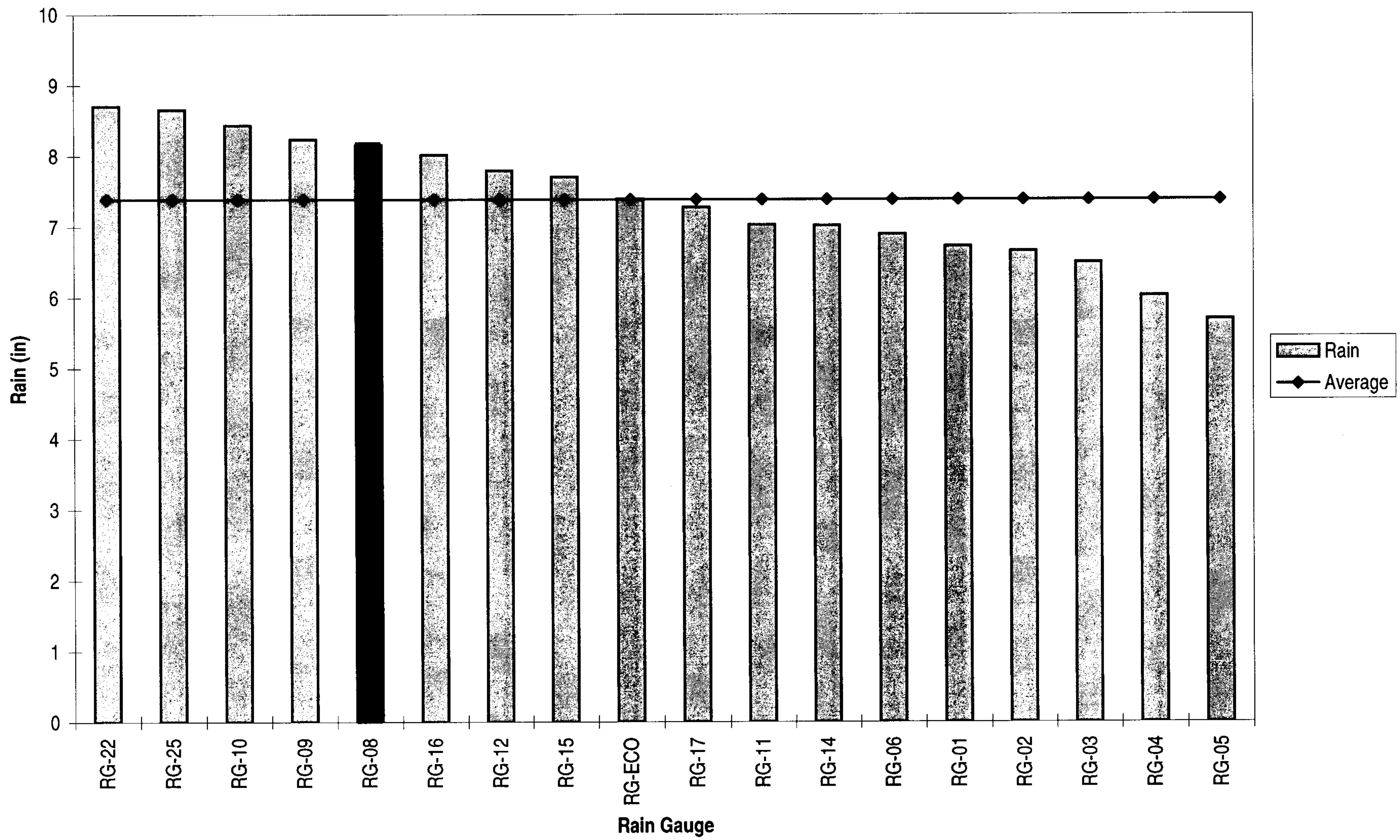


Figure 2: Comparison of Storms by Volume

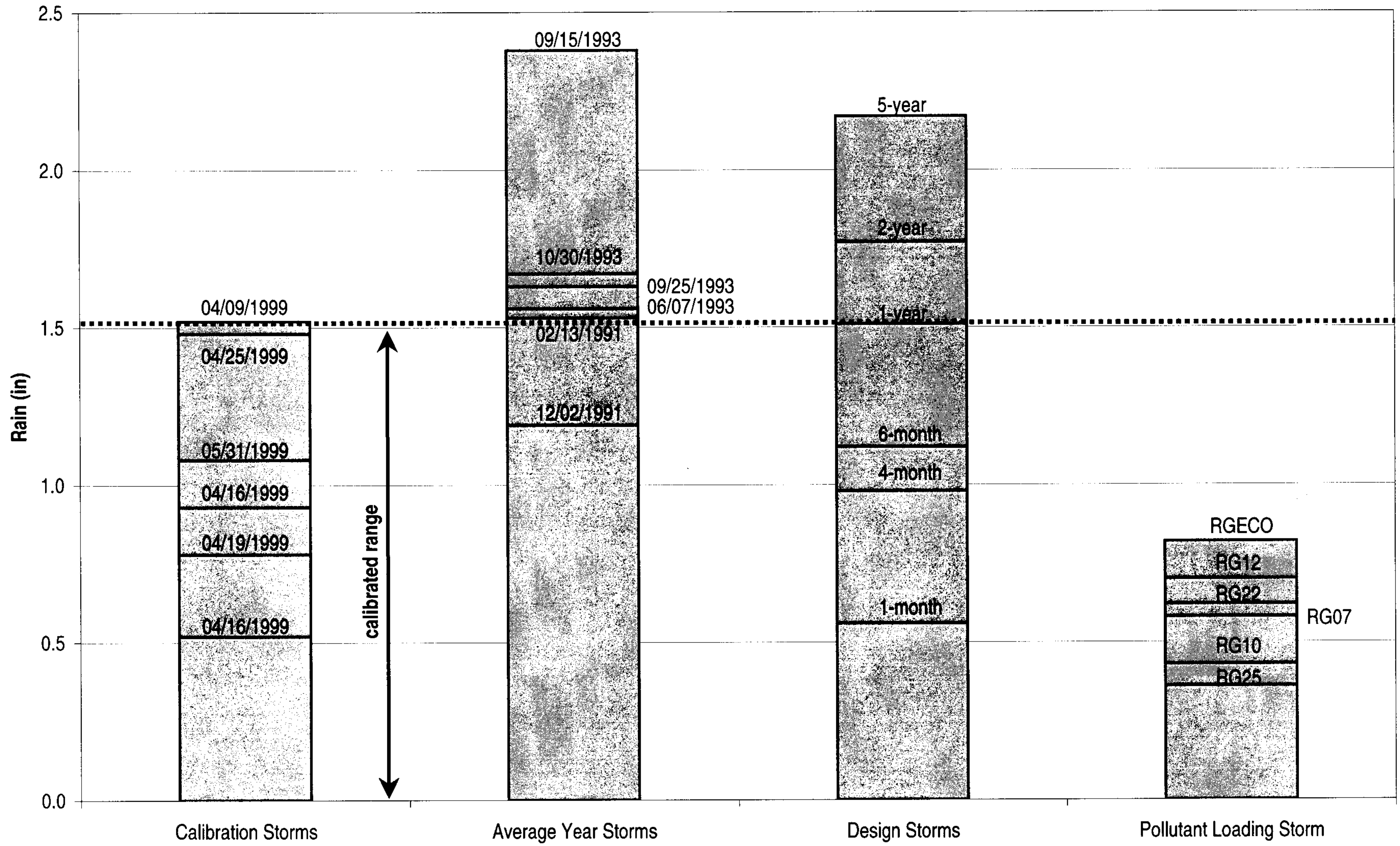
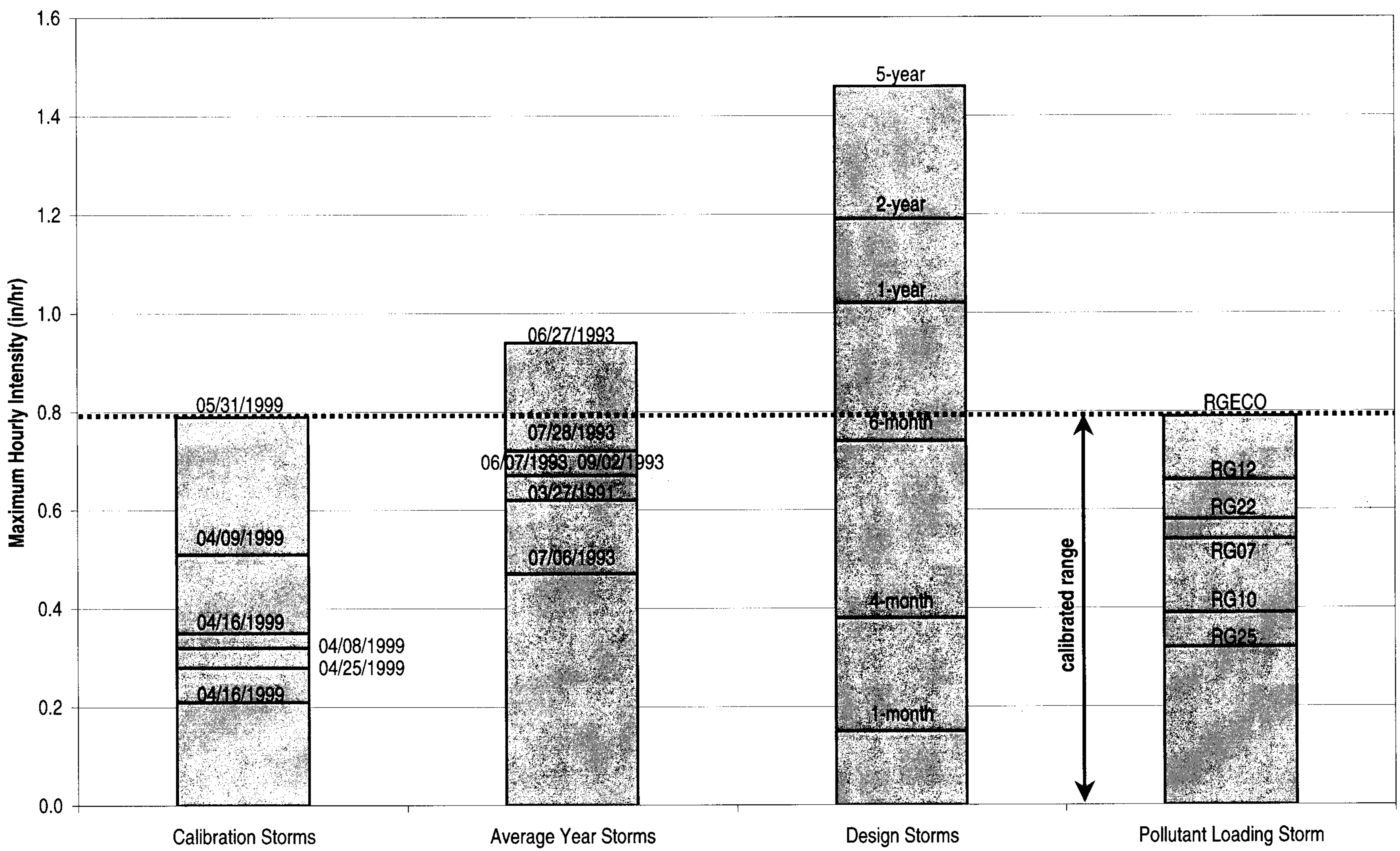


Figure 3: Comparison of Storms by Intensity



APPENDIX H

Flow Monitoring Summary Table

Easterly District Flow Monitoring Summary Table

Monitor I.D.	Address	System Component	Pipe Size	Site Rating	Uptime
DB03	Corning Dr & Lake Shore Blvd	Comb. Trunk	20"		89.62%
DBS01	Dugway Brook	Stream	75.5" X 140"	C	99.20%
DBS02	Dugway Brook	Stream	60.5" X 84"	C+	95.90%
DBS03	Dugway Brook	Stream	82" X 107"	C	93.65%
DE02IA	Field by Dundee Dr & Corbus Rd	REG D-63	86" X 74" (EGG)	C+	98.89%
DE02IB	Field by Dundee Dr & Corbus Rd	REG D-63	48"	C+	99.54%
DE02W	Field by Dundee Dr & Corbus Rd	REG D-63	85" X 75"	C+	98.22%
DE03D	Arlington Rd at Eddy Rd	REG D-66	52.5" X 39.75"	B	99.87%
DE03W	Arlington Rd at Eddy Rd	REG D-66	52.75" X 40"	B	99.76%
DE04D	1641 Eddy Rd between Euclid Ave & Hayden Ave	REG D-80	24"	C-	95.70%
DE04I	1641 Eddy Rd between Euclid Ave & Hayden Ave	REG D-80	58.25" X 44.25"	C-	99.22%
DW00	Beginning of interceptor	Interceptor	30"	C	99.69%
DW02D	Elk Ave between E 107th & E 107th Pl	REG D-4	18"	C	99.28%
DW02I	Elk Ave between E 107th & E 107th Pl	REG D-4	18"	C	98.96%
DW03I	Helena Ave and E 105th St	Separate trunk	77" X 58"	C	94.21%
DW04D	E 106th St & Elk Ave	REG D-5	8"	C	95.83%
DW04W	E 106th St & Elk Ave	REG D-5	15"	C-	95.90%
DW08I	543 E 106th St, between Glenville Ave & Clairdoan Ave	REG D-10	18"	C+	99.54%
DW10I	E 105th St at Yale Ave	REG E-41	56" X 35"	D+	87.63%
DW12I	851 Linn Dr, N of Willowmere St (in front yard)	REG D-24A	30"	C	73.18%
DW14I	E of Linn Dr on Greenview Ave	REG D-29	12"	C-	91.80%
DW15I (A)	Lakeview Ave & Hopkins Ave	REG D-30	20"	B	99.61%
DW15I (B)	Lakeview Ave & Hopkins Ave	REG D-30	18"	B	99.67%
DW19I	Top of E 110th St	REG D-61	72.75" X 57"	B	83.40%
DW19W	Top of E 110th St	REG D-61	4' X 6'	C	97.61%
DW20W	Superior Ave at E 123rd St & Lakeview Ave	REG D-58	82"	C-	100.00%
DW21I	St Clair Ave between E 110th St & E 112th St	REG D-60	61.75" X 49.5"	C	95.44%
DW22I	Mayfield Rd at Hampshire Ln	SSO DV-6	36"	C	99.22%
DW24D	Hampshire Ln at Mayfield Rd	SSO DV-7	20"	C	100.00%
DW24I	Hampshire Ln at Mayfield Rd	SSO DV-7	20"	C	98.63%
EA00	Just before entering the WWTP	Interceptor	162"	C+	97.71%
EA02D	Shaw Brook at Easterly Interceptor	Interceptor	96" X 120"	C	94.27%
EA02I	Shaw Brook at Easterly Interceptor	REG E-47X	92.5" X 96"	C	91.77%
EA03	Easterly Interceptor	Interceptor	164" X 156"	C+	99.48%
EA04	Easterly Interceptor @ MH North of E 101st St	Interceptor	164" X 156"	C	99.80%
EA06	Easterly Interceptor @ MH Northeast of E 83rd St	Interceptor	143"	B	99.74%
EA08I	Gordon Park W Entrance	REG E-37	141" X 142"	C	99.34%
EA09I	Corning Ave and Lake Shore Blvd	Separate trunk	12"	C	99.22%
EA10D	St Clair Ave at Wheelock Rd	REG E-38	15"	D	99.80%
EA12D	Ansel Rd near E 93rd St	REG E-44	12"	C	96.81%
EA12I	Ansel Rd near E 93rd St	REG E-44	42" X 38"	C	96.16%
EA13	E 83rd St and Carnegie Ave	Interceptor	109"	C+	97.79%
EA15I	E 61st St & Gardina Dr behind Backstop	REG E-33	142"	C+	98.50%
EA15W	E 61st St & Gardina Dr behind Backstop	REG E-33	165.25" X 107.5"	C+	99.48%
EA16I	Addison Rd, South of Metta Ave	REG E-34	99.5" X 109.5"	C	97.14%
EA16W	Addison Rd, South of Metta Ave	REG E-34	55.25" X 111"	C	97.01%
EA17	Kirby Ave near Coit Rd	Comb. Trunk	18"	C	97.92%
EA17I	Coit Rd and Lake Shore Blvd	Separate trunk	8"	C	94.93%
EA18D	N of Addison Rd & R.R. Tracks, E of Norwalk Dr	REG E-35	24"	C-	98.44%
EA18I	N of Addison Rd & R.R. Tracks, E of Norwalk Dr	REG E-35	101" X 111"	D-	96.03%
EA20I	1235 Marquette Ave at Lakeside Ave	REG E-1	91" X 66"	C+	99.35%
EA21	E 79th St and Chester Ave	Interceptor	63" X 74"	C	98.05%
EA22I	West side of Marquette Ave at Lakeside Ave	REG E-2	84"	C	98.76%
EA23	Quimby Ave between E 55th St & E 65th St	Interceptor	79"	C	99.54%
EA24I	E 40th St & Lakeside Ave	REG E-3	108"	C-	99.44%

Easterly District Flow Monitoring Summary Table

Monitor I.D.	Address	System Component	Pipe Size	Site Rating	Uptime
EA24W	E 40th St & Lakeside Ave	REG E-3	75" X 80"	C	94.93%
EA25	E 40th St and Chester Ave	Interceptor	107" X 104"	C+	99.74%
EA26I	1163 E 40th St, N of King Ave	REG E-4	6'-2"H X 5'-0"W	D	100.00%
EA28I	E 38th St, N of Lakeside Ave	REG E-7	61.5" X 49"	C	99.87%
EA29D	E 33rd St, 50' S of King Ave	REG E-8	20"	C-	80.99%
EA29I	E 33rd St, 50' S of King Ave	REG E-8	5'-9" X 4'-8"	C-	98.57%
EA30I	Davenport Ave, E of E 20th St	REG E-15	26" X 24"	D-	98.18%
EA32D	E 20th St, S of Lakeside Ave	REG E-13	18"	C	97.85%
EA32I	E 20th St, S of Lakeside Ave	REG E-13	93" X 74"	C+	98.18%
EA33	Burke Lakefront Airport Pump Station	Pump Station	8"	B	97.20%
EA34D	E 12th St, N of Lakeside Ave	REG E-18	51.75" X 42.25"	B-	79.02%
EA34W	E 12th St, N of Lakeside Ave	REG E-18	9'-0"	B-	98.35%
EA36	E 9th St & Lakeside Ave	Interceptor	53.25" X 49.5"	C+	98.18%
EA38I	W 3rd St at Lakeside Ave	REG E-21	62"	D-	82.10%
EA40I	W 9th St at Lakeside Ave, NE Corner	REG E-23	2'-10"	D+	99.61%
EA42	Front Ave (between W 10th St and W 11th Pl)	Combined trunk	49"	C-	98.76%
EA43	Front Ave Pump Station	Pump Station	15"	C-	98.76%
EA44D	W 11th St (Old River Road) under Main Ave Bridge	REG E-29	30"	D+	98.18%
EA45	Superior Ave Pump Station	Pump Station	20"	C	99.35%
EA46W	W 11th St at Superior Ave, N of Superior Ave P.S.	REG E-27	51"	C	99.06%
EA48W	W 11th St at Superior Ave P.S.	REG E-26	5'-0"	C	95.51%
EC01	Lake Shore Blvd and Marcella Rd (20")	Separate Trunk	20"	B	99.80%
EC02	Lake Shore Blvd and Marcella Rd (18")	Separate Trunk	18"	B	97.79%
EC03	Marcella Rd and E 185th St (12")	Separate Trunk	18"	C	99.35%
EC03I	Marcella Rd and E 185th St (12")	Separate Trunk	18"	C	100.00%
EC04	Marcella Rd and E 185th St (12")	Separate Trunk	12"	C-	97.40%
EC05	Lake Shore Blvd and Neff Rd (20")	Separate Trunk	20"	B	99.80%
ECS01	Euclid Creek	Stream	95" X 240"	C+	10.24%
ECS02	Euclid Creek	Stream	74.5" X 96.5"	C	72.36%
ESA02	Influent gate closest to overflow to Lake Erie	Easterly WWTP	71.5" X 83"	C+	99.86%
ESA04	Influent gate 2nd closest to overflow to Lake Erie	Easterly WWTP	71.5" X 83"	C+	99.58%
ESA06	Influent gate 3rd closest to overflow to Lake Erie	Easterly WWTP	71.5" X 83"	C+	99.27%
ESA08	Influent gate farthest from overflow to Lake Erie	Easterly WWTP	102.75" X 83"	C+	98.33%
ESA10	On weir of elevation 579.0	Easterly WWTP	75"	C+	100.00%
ESA11	Collinwood Pump Station	Easterly WWTP	83.5" X 72"	C+	95.90%
GC01	Green Creek	Storm	54.35" X 57.5"	B	90.94%
GCS01	Green Creek	Stream	45.35" X 104"	B	90.49%
GCS02	Green Creek	Stream	49.63" X 96"	C+	97.50%
HA00	East 140th St Interceptor at junction chamber	Interceptor	75"	C+	98.54%
HA01D	Aspinwall Ave at E 140th St	REG H-19	25.35" X 30.5"	D+	95.66%
HA01W	Aspinwall Ave at E 140th St	REG H-19	86.5" X 75"	C+	99.61%
HA02D	Woodworth Ave at Hayden Ave	REG H-9	24"	C	99.02%
HA02I	Woodworth Ave at Hayden Ave	REG H-9	24"	B	99.87%
HA03I	Strathmore Ave South of Elderwood Ave	REG H-4	66" X 53"	B	99.09%
HA03W	Strathmore Ave South of Elderwood Ave	REG H-4	61" X 54"	B	99.83%
HA04	Euclid Ave and Taylor Ave	Separate trunk	8"	C	88.00%
HA06D	Hayden Ave, S of Woodworth Ave	REG H-8	24"	C-	93.29%
HA06I	Hayden Ave, S of Woodworth Ave	REG H-8	64"	B	99.09%
HA07D	Hayden Ave at Shaw Ave, SW of intersection	REG H-10	52" X 40.5"	B	97.46%
HA07W	Hayden Ave at Shaw Ave, SW of intersection	REG H-10	23.5" X 24.5"	C	99.74%
HA08	Hayden Ave & Shaw Ave	Interceptor	24"	B	98.37%
HA10	Shaw Ave at RR tracks near D-91	Separate trunk	18"	D	96.61%
HA12	N of Stanwood Ave/Euclid Ave intersection near D-99	Separate trunk	8"	C	96.88%
HA13I	1762 Coit Rd near Euclid Ave	REG H-13	33" X 27.5"	B	98.24%
HA14	Lee Rd and Terrace Ave	Separate trunk	24"	C-	99.22%

Easterly District Flow Monitoring Summary Table

Monitor I.D.	Address	System Component	Pipe Size	Site Rating	Uptime
HA15I	Coit Rd, S of Woodworth Ave	REG H-14	24.25" X 24"	C-	99.41%
HA16	Euclid Ave and Marloes Ave	Separate trunk	27.5" X 27.25"	C	97.20%
HH02	Heights/Hilltop Interceptor at WWTP	Interceptor	111" X 92.5"	B	96.98%
IV00	East 152nd St Interceptor at junction chamber	Interceptor	9'-0"	C+	99.27%
IV01	Holmes Ave (between E 155th St and E 156th St)	Interceptor	68" X 53"	C+	98.83%
IV02D	Belvoir Ave at Nine Mile Creek Regulator	SSO I-11	36"	B	99.93%
IV02I	Belvoir Ave at Nine Mile Creek Regulator	SSO I-11	27"	C+	96.03%
IV03D	16300 Euclid Ave	REG I-9	18"	C	98.68%
IV03W	16300 Euclid Ave	REG I-9	40" X 31"	B	99.62%
IV04D	Belvoir Ave at Lancaster Ave	SSO I-13	36"	C+	99.93%
IV04I	Belvoir Ave at Lancaster Ave	SSO I-13	42"	C	99.67%
IV06	Lancaster Ave and Green Rd	Separate trunk	8"	D-	98.05%
IV08	E 154th St & School Ave	Interceptor	79.5" X 77.5"	C	93.36%
IV10	E 152nd St & Woodworth Ave	Separate trunk	12"	D-	96.16%
IV12	S of E 152nd St & Woodworth Ave intersection	Separate trunk	10"	C	90.56%
IV14	Ivanhoe Rd, East of R.R.	Separate trunk	34.5" X 27"	C	92.38%
IV16	Noble Rd and Euclid Ave (SE corner)	Separate trunk	20"	C	94.14%
IV18	S of Euclid Ave & Belvoir Ave Int. (east side of street)	Separate trunk	12"	C	92.69%
IV20	S of Euclid Ave & Belvoir Ave Int. (west side of street)	Separate trunk	33"	B	99.80%
LE01	Manhole N of Davenport Ave on E 20th St	Storm	93" X 74.63"	C	99.78%
LE02	North End of E 156th St at Lake Erie	Storm	93.13" X 92"	D	50.67%
LS00	Lake Shore Interceptor at Regulator L-23	Interceptor	78"	C	99.97%
LS02	1st MH d/s of L-32 (int. of Lake Shore Blvd & E 174th St)	Interceptor	64" X 48"	B	98.70%
LS04D	Euclid Creek Pump Station 24" Effluent	Pump Station	24"	B	98.57%
LS04I	Euclid Creek Pump Station 24" Influent	Pump Station	24"	B-	99.54%
LS06	E 185th St & Lake Shore Blvd	Separate trunk	20"	D+	96.74%
NM02	Lake Shore Blvd & Nine Mile Creek	Storm	15"	C	78.89%
NMS01	Nine Mile Creek	Stream	142.5" X 240"	C	81.88%
NMS02	Nine Mile Creek	Stream	63.63" X 134.5"	D+	31.46%
NO00	Nottingham Pump Station	Pump Station	8"	C-	97.53%
NO02D	St Clair Ave at E 185th St	REG L-34	24"	C	76.37%
NO02W	St Clair Ave at E 185th St	REG L-34	65" X 61"	C-	96.50%
RF02D	E 142nd St & Lake Shore Blvd	REG L-23	76" X 78"	C	100.00%
RF02I	E 142nd St & Lake Shore Blvd	REG L-23	120"	C	95.14%
SBS01	Shaw Brook	Stream	101.75" X 156"	C	80.97%

Average Uptime= 94.97%