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November 13, 2008

Certified Mail
Return Receipt Requested

Mr. Douglas F. Mundrick, P.E., Chief
Water Programs Enforcement Branch
Water Management Division
United States Environmental Protection Agency
Atlanta Federal Center
62 Forsyth Street
Atlanta, Georgia 30303-8960

Re: Capacity Assurance Program – Jefferson County, Alabama
Civil Action No. 93-G-2492-S and 94-G-2947-S

Mr. Mundrick:

The County offers the following in response to your comments dated October 3, 2008 regarding our draft Capacity Assurance Program (CAP). Your questions are shown in italics with the County's response following in regular font.

(1) The County uses the "Peak Dry Daily Flow" (from the flow meter system) for purposes of determining capacity in the gravity system. The County should also specifically outline what wet-weather standards will be used to determine wet-weather capacity in the gravity systems (e.g., 50% of pipe depth reserved for "Peak Dry Daily Flow" events; limiting connections in basins experiencing surcharging, etc.).

Item 1 response:
Jefferson County proposes to use the previous year average of the peak (1) one hour flow readings for dry-weather days in the determination of available capacity in the gravity sewer system. Wet-weather capacity will be allotted for in the reservation of capacity within the sewer using the ratio of average peak dry-weather flow depth to pipe diameter (d/D) as measured and recorded at each flowmeter location as the standard of measurement for analysis. The following criteria will be used to reserve wet-weather capacity: eight inch (8") diameter and smaller gravity sewer lines will be limited to 50% d/D; ten to fifteen inch (10"-15") diameter gravity sewer lines will be limited to 65% d/D; and sixteen inch (16") diameter and greater gravity sewer lines will be limited to 75% d/D.

(2) The County uses a sixteen (16) hour maximum run-time for determining capacity in the Pump Stations. However, this run-time standard may not capture the Pump Stations' ability to handle instantaneous peak-flow events. Explain what standards the County uses to determine capacity in the Pump Stations for wet-weather/peak flow events (e.g., upstream flowmeter readings vs. pump curves).

Item 2 response:
All County pump stations are constructed as duplex pump stations (2 pumps) at a minimum. Each pump is designed to pump three (3) times the average daily flow. The sixteen (16) hour maximum run-time is the cumulative pump run time for all pumps in the pump station, providing for 48 hours of total pump run time for each pump station. Therefore, a 16 hour run time reserves 67% of the pump stations nominal capacity for peak flow events.

(3) The County's flow chart (Appendix IV) shows that if capacity is not available at either the WWTPs, the Pump Stations or the Gravity System(s) receiving flow from proposed development(s), then the County documents the reason for denying service and consults with a representative of the development(s) for further analysis and to discuss options. What options does the County use in cases of denial of service (e.g., Owner/Developer pays for upgrades, Sewer Impact Fees, further I/I removal (ratios) to allow capacity certification, etc.)?

Item 3 response:
The County will consider several options in circumstances where initial capacity is not available including, but not limited to, the following: (1) a study of the sewer system networking to determine if flow can be re-routed to a different portion of the sewer system with available capacity; (2) a more in-depth hydraulic analysis of the affected segments to verify the initial determination, determine the extent of the capacity limitation, and determine whether capacity is actually available; (3) an upstream I/I analysis to determine if sufficient I/I can be removed by making specific repairs to remove the extraneous flow; (4) the design and construction of capacity improvements (e.g. WWTP expansion, pump station pump/motor upgrade, sewer line replacements, sewer line rehabilitation) to increase capacity in order to accommodate the additional proposed flow. Any of the above options including the funding and contracting of capital improvements are available to the County or Owner/Developer to provide the needed capacity for said development.

(4) The County states (in the Long Term CAP) that the first phase dynamic model will be in place by the end of the first quarter of 2009, and that additional phases of work will have to be developed to finalize the dynamic model for capacity assurance purposes. When does the County propose to have all these phases of work completed and begin implementation of the dynamic model CAP?

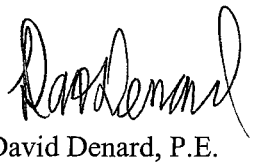
Item 4 response:
The County will begin developing the first phase of the dynamic model in the first quarter of 2009. The County intends to model one of the nine complete waste treatment systems each year until complete in 2017. Each system's model will be incorporated into the CAP within two years following the model's completion, beginning in 2012, with final completion no later than 2019.

(5) The County states (in the Long Term CAP) that the dynamic model will be recalibrated and re-run on a "periodic basis" for the purpose of establishing the available capacity for every sewer pipe in the collection system. How often does the County propose to re-calibrate and/or re-run the dynamic model for this purpose?

Item 5 response:
As stated in Section 2.E.8 of the Collection System Management, Operation and Maintenance Program, *"Once fully implemented, the County will update the model for the nine wastewater collection systems on an as needed basis but no less than every five years"*.

After these responses have been considered and accepted by the EPA, the CAP will be modified to include these points of clarification and revision. If there are any further questions, please fell free to contact me at 205-325-5979.

Sincerely,



David Denard, P.E.
Director, Environmental Services Department

pc: Brad Ammons, U.S. EPA
Bill Weinischke, U.S. DOJ
Charlie Wagner, JCC
Daniel White, ESD

JEFFERSON COUNTY COMMISSION

Environmental Services Department

CAPACITY ASSURANCE PROGRAM

JEFFERSON COUNTY COMMISSION

June 24, 2008

TABLE OF CONTENTS

SECTION 1 – INTRODUCTION

1.1 BACKGROUND

The Jefferson County Commission (herein after called County or Commission) is the public agency responsible for providing wastewater collection and treatment for Jefferson County, Alabama. The Commission holds National Pollutant Discharge Elimination System (NPDES) Permits for the Cahaba River (AL0023027), Five Mile Creek (AL0026913), Leeds (AL0067067), Prudes Creek (AL0056120), Trussville (AL0022934), Turkey Creek (AL0022926), Valley Creek (AL0023655), Village Creek (AL0023647) and Warrior (AL0050881) Wastewater Treatment Plants (WWTPs). These collection systems include approximately 16-million linear feet of pipe, over 185 pump stations, and nine WWTPs.

1.2 CONSENT DECREE

On October 21, 1996, Jefferson County entered into a Consent Decree (93-G-2492-S) with the United States and the Citizen Plaintiffs. Under the Consent Decree, Jefferson County has provided extensive wastewater treatment plant and collection system rehabilitation. The main objectives of the Consent Decree were to reduce bypasses and unpermitted discharges to the Black Warrior and Cahaba River basins, reduce sanitary sewer overflows, and achieve compliance with NPDES permits and the Clean Water Act. The Consent Decree contained specific remedial actions which the County has substantially completed.

1.3 MOM

The United States Environmental Protection Agency (USEPA) has proposed legislation to clarify the prohibition on sanitary sewer overflows and NPDES permitting requirements. The legislation requires the development and implementation of programs to provide wastewater capacity assurance through proper management, operations, and maintenance of wastewater assets. The MOM framework provides a guide for municipalities to better manage, operate, and maintain collection systems, investigate collection system capacity, and respond to sanitary sewer overflows (SSOs).

The program described herein, **Capacity Assurance Program (CAP)**, is a component of the management section of the overall MOM Program and addresses the County's activities for capacity assurance at WWTPs and within the overall collection system. CAP components ensure that County collection systems have sufficient capacity to convey flows without the occurrence of sanitary sewer overflows (SSOs) and that WWTPs have the available capacity to treat those additional flows.

1.4 CAP Objective

The purpose of the CAP is to ensure that the entire County wastewater system, both collection and treatment, has sufficient capacity to convey and treat all wastewater generated by County customers. The goal of the CAP is to promote compliance with the Clean Water Act, through both prevention of collection system overflows and compliance with NPDES permits at County WWTPs, by ensuring that County collection systems and WWTPs have capacity sufficient to convey and treat all flows received.

1.5 CAP Goals

The goal of the CAP is for ESD to develop an internal system that measures system capacity, tracks growth, and provides numerical data for near term and long term capital planning.

SECTION 2 – DEFINITIONS

This section presents definitions of terms used throughout this report related to the CAP Program.

Collection Capacity: The estimated capacity of the network of ESD pipes and manholes that conveys flow by gravity from homes and businesses.

Collector Sewer: The network of ESD pipes and manholes that conveys flow by gravity from homes and businesses.

Complete Waste Treatment System: All the treatment works, as defined in 40 CFR § 122.2 (July 1, 1992), necessary to meet the requirements of Title III of the Act, and which involve: (a) the transport of wastewaters from individual homes or other buildings (not including individual service lines that are owned and maintained by the owners of the homes or other buildings that are connected to such service lines) to a plant or facility where treatment of the wastewater is accomplished; (b) the treatment of the wastewater to remove pollutants; and (c) the ultimate disposal, including recycling or reuse, of the treated wastewaters and residues which result from the treatment process. A complete waste treatment system will typically include at least one treatment plant or facility, but may also include two or more connected or integrated treatment plants.

Consent Decree: The agreement identified as Civil Action No. 93-G-2492-S and Civil Action No. 94-G-2947-S, Consolidated, as entered in U. S. District Court on December 9, 1996, between Plaintiffs R. Allen Kipp, Jr., et al., and Cahaba River Society, Inc., Intervenor, and Plaintiff the United States of America, and Defendant Jefferson County, Alabama, Jefferson County Commission, State of Alabama, for the purpose of achieving full compliance with the Clean Water Act in regard to Jefferson County's Complete Wastewater Treatment Systems.

ESD: Environmental Services Department.

EPA: The United States Environmental Protection Agency

Essential Services: Health care facilities, public safety facilities, public schools, other government facilities and facilities where a pollution or sanitary nuisance exists (as determined by the Jefferson County Health Department).

Flow Monitor: An electronic device installed in a sewer pipe that continuously records elements of sewer flow, typically velocity and depth, at regular intervals.

Force Main: A pressurized line owned and maintained by ESD that conveys wastewater from a pump station.

Gravity or Main Lines: A non pressurized line generally 8" or greater in diameter owned and maintained by ESD that conveys wastewater via gravity flow.

I/I: Inflow and Infiltration, the total quantity of water from inflow, infiltration, and rainfall-dependent inflow and infiltration, without distinguishing the source.

Infiltration: The introduction of groundwater into a sanitary sewer system through cracks, pipe joints, manholes, or other system defects.

Inflow: The introduction of extraneous water into a sanitary sewer system by direct or inadvertent connections with stormwater infrastructure, such as gutters, roof drains, uncapped cleanouts, and cross-connections with storm drains.

Pump Station: An ESD owned and maintained facility located within the collection system that conveys wastewater via mechanical means to a higher elevation in the collection system.

Manhole or Junction Box: A structure which provides a connection point for gravity lines, service laterals, or force mains, as well as an access point for maintenance and repair activities, and in limited circumstances, flow control.

Minor Sewer Connection: A connection with an average estimated flow not to exceed 2,500 gallons per day.

NPDES: National Pollutant Discharge Elimination System.

SIMS: Sewer Information Management System, a GIS based interactive interface with ESD's wastewater asset database and associated information.

SSO: Sanitary Sewer Overflow, an overflow, spill, or release of wastewater from the wastewater collection and treatment system including all unpermitted discharges that may have reached the waters of the United States or State.

Surcharge Condition: The condition that exists when the volume of wastewater is greater than the capacity of the pipes to carry it in an open channel hydraulic regime, and the wastewater hydraulic grade line rises to an elevation under the manhole rim or junction box, and the sewer is under pressure or head, rather than at atmospheric pressure.

SECTION 3 – CURRENT PROGRAM DESCRIPTION

3.1 PROJECT LEVEL REVIEW

At present, Capacity Assurance is performed collaboratively at the individual project level by the ESD Plans Review Office staff and ESD Engineering staff for the collection system and WWTPs.

Plans for new development (residential, commercial, industrial) which would need County sewer service must be submitted to the ESD's Plans Review Office initially. This office reviews the development's plans for conformance to County design standards and checks for sewer availability and capacity. Sewer availability is checked by cross-referencing the submitted plans against County sewer maps in SIMS.

Institutional knowledge of the County's collection systems is key to the current CAP. At present, available capacity of the sewer main to which a connection is proposed is checked only in cases where Plans Review Office staff are aware of current capacity concerns in that area, or in the infrequent instance of proposals for very large developments. Such capacity concerns may include known overflows or pump stations operating near capacity. For smaller developments, or for ordinary developments in areas with no previous history of capacity problems, no specific capacity analysis is performed.

When the Plans Review Office is presented with a development proposal in an area with known capacity concerns and needs to verify the sewer's available capacity, it turns the proposal over to the ESD Engineering staff. The Engineering staff reviews plans for the proposed development, along with corresponding flow monitoring records, pump station operating records, sewer maintenance work orders, and sewer overflow reports to assess current loading in the sewer. Sewer as-built drawings, pump station as-builts and pump curves, and other available information are used to assess overall capacity of the collection and/or pumping system. The Engineering staff develops its own estimate of wastewater to be generated by the development and adds that to estimated current flow for comparison purposes against the estimated capacity of the collection and/or pumping system.

ESD engineers also verify treatment capacity at the appropriate County WWTP. Projected wastewater flows are added to the historical annual average daily flow and compared to the design flow rate of the WWTP to verify treatment capacity.

In some instances, developers request verification of available sewer capacity before they undertake design of a potential development. In these cases, ESD uses the same process of checking for sewer availability and comparing the projected flows to calculated capacity. The results of this evaluation are transmitted to the developer in a "Letter of Sewer Availability".

3.2 COLLECTION SYSTEM REVIEW

ESD routinely verifies capacity at the collection system level. This component of the CAP was initiated in the Consent Decree's Capacity Analysis Plan, and is continued under the Collection System Operation and Maintenance Plan. In the former, the County developed hydraulic models of each collection system for lines 18" and larger to identify potential capacity problems, as required by the Consent Decree. In the latter, the County committed to comply with the Consent Decree's requirement to "maintain" those collection system models by regularly updating them. ESD has operated and maintained a flow monitor network, which includes 148 permanent flowmeters and 37 rain gauges for more than a decade. ESD reviews capacity analysis reports

quarterly that identify monitor sites that have experienced a surcharged condition. ESD also investigates the cause of each known SSO to determine if it was capacity related.

SECTION 4 – NEAR TERM PROGRAM DESCRIPTION

In advance of the full implementation of the Long Term Plan for the CAP, ESD is developing a Near Term Plan to better track and record flow additions to Complete Waste Treatment Systems. All requests for connections to the system will be tracked in a Capacity Assurance database and the effect of projected flows will be evaluated in accordance with written guidelines and procedures. Capacity within the collection system and at the treatment plant will be confirmed and documented prior to issuance of approved plans for construction or a "Letter of Sewer Availability".

4.1 CAPACITY EVALUATION

4.1.1 Integration of CAP with Jefferson County

Jefferson County has a developed process in place for reviewing all submitted sanitary sewer construction plans and requests for "Letters of Sewer Availability". A new aspect of this review process is to incorporate the Capacity Assurance portion by establishing procedures for the County representative who reviews all plans to obtain all pertinent information needed for ESD to determine if the complete waste treatment system has adequate capacity to accept the proposed wastewater flows. The capacity assurance review process is intended to provide the least inconvenience possible to the County's customers and to all intended project stakeholders while insuring that adequate capacity exists within the County's complete waste treatment systems.

4.1.2 Flow Estimates for Proposed Additional Flows

For each sewer availability request or plans review, the ESD will estimate the average daily flow. From water usage, it has been determined that the average daily flow from a typical single-family residence in the County is approximately 200 gpd. Proposed flows from commercial or industrial developments will be required to be submitted in writing by the developer or their engineer.

4.1.3 Capacity Analysis of Collector Sewers

The ESD's Long Term Plan for the CAP involves a dynamic model, which is discussed in section 5.2. Since the ESD has not yet developed a dynamic model for its sanitary sewers, historical Flow Monitor data will be utilized along with WWTP Flow Data. The County has 146 long term flow monitors in its collection system. At each flow monitor location, the peak dry daily flow will be subtracted from the theoretical capacity in order to develop the available capacity. This data will be entered into the Gravity Sewer Line Capacity Assurance Database as a baseline for each flow monitor location (see Appendix I).

As sewer availability is requested or plans are submitted for review, the proposed flow will be entered into the database to verify capacity. The first flow monitor located downstream of the development will be the starting point to determine if there is available capacity. A flow monitor diagram will be utilized to trace the proposed flow from the development to the WWTP. If the proposed flow passes through additional flow monitors when tracing the flow to the WWTP, the proposed flow will be entered into the database for all flow monitors affected.

Additional data that will be entered in the database includes the first manhole downstream of the proposed development. If a sewer availability letter is issued, the date of the letter will also be entered for tracking purposes. A sewer availability letter is honored for a period of one year from the date of issue. When a sewer availability letter is no longer valid, the proposed flow from the proposed development will be removed from the database.

4.1.4 Capacity Analysis of Pump Stations

The ESD currently records the daily average run time for all of its pump stations. If a proposed development ties into an existing pump station, the Pump Station Capacity Assurance Database (see Appendix II) will be used to calculate the impact on pump run times. With the daily average run time, the known pump station capacity and a maximum run time of 16 hours per day, the Pump Station Capacity Assurance Database will determine if there is available capacity at each of the County's 185 pump stations. Proposed run times will be calculated from the proposed flow as discussed in 4.1.2 and entered into the database. If a sewer availability letter is issued, the date of issue will also be entered into the database for tracking purposes as discussed in 4.1.3.

4.1.5 Capacity Analysis of WWTPs

Certification of adequate treatment capacity shall confirm that the WWTP is capable of treating the proposed new flow along with existing and previously projected flows and maintaining full compliance with the requirements of the NPDES discharge permit. The available capacity of each WWTP shall be determined annually based upon a review of the previous year flow and discharge data. The annual capacity evaluation will begin with determining the annual average daily flow treated, identifying the month with the highest average mass loading values for the previous 12 month period, and determining the most limiting permit parameters from a review of the average monthly average mass loadings. If there have been no bypasses and there is not a pattern of the plant maintaining a mass loading of 80% or higher of an allowable discharge limit, the initial available capacity of a treatment plant will be measured by subtracting the previous year's annual average daily flow from the design flow rate. This initial available treatment capacity will establish the baseline from which all proposed new flows are subtracted. Certification of capacity will be performed by subtracting the projected average daily flow from the net available capacity. Industrial flows with higher pollutant loadings will be converted into a residential equivalent flow for the capacity evaluation. Certification of capacity will be made if the net available capacity is greater than that of the proposed flow. All approved additional flows to a WWTP will be tracked in the WWTP Capacity Assurance Database (see Appendix III).

Monthly reviews of Discharge Monitoring Reports for each WWTP will be performed to ensure each WWTP has maintained compliance with all requirements of the respective NPDES permits. If a WWTP reports a permit violation, the cause of the violation will be investigated. If the cause is determined to be the result of influent characteristics or hydraulic washout and not equipment or operational errors, a more in-depth hydraulic analysis and biological process evaluation will be conducted to confirm remaining available treatment capacity and determine the need for expansion or upgrades to unit processes. A similar evaluation will be performed once the net available capacity has been depleted or the plant maintains a mass loading of 80% or higher of an allowable discharge limit for two consecutive months. Certification of capacity will only be made after the evaluations have been completed and available treatment capacity can be confirmed.

4.2 CAPACITY CERTIFICATION

4.2.1 Overview

Figure 4.2 in Appendix IV is a flow diagram which presents the step by step process for ESD's Near Term CAP.

4.2.2 Certification Procedures

The following narratives describe each step involved in the certification of capacity. Each item number correlates to the steps shown in Figure 4.2:

1. Request for Sewer Availability or Plans Submitted to ESD Plans Review Office.

When the ESD receives a request for sewer availability from an engineer or developer, the information will be entered into the CAP for analysis. A sewer availability letter is honored for one year from the date of issue unless renewed. When plans for new development are submitted to the ESD for review of conformance to County standards and specifications, the information will be entered into the CAP for analysis.

2. Determine Location/Basin in SIMS.

The ESD staff will utilize SIMS to identify the first downstream manhole from the development and the corresponding sewer basin for the proposed development.

3. Calculate Proposed Flow.

For each sewer availability letter or plan review, the ESD will estimate the proposed flow based on 200 gallons per day per unit. The proposed flow for commercial and industrial development will be supplied by the developer's engineer.

4. Does Average Daily Flow Exceed 2500 Gallons?

The ESD considers a proposed flow of 2500 gallons or less per day a minor flow contributor. If the proposed flow is 2500 gallons or less, proceed to Step 5. If the proposed flow is more than 2500 gallons proceed to Step 6.

5. Enter Proposed Flow in the WWTP Capacity Assurance Database and Gravity Sewer Line Capacity Assurance Database for Tracking.

In order to track sewer availability letter dates and flow from smaller contributors, the proposed flow will be entered into the two databases, but a full analysis will not be performed.

6. Enter Proposed Flow in WWTP Capacity Assurance Database.

The proposed flow calculated in Step 3 will be entered into the database for the sewer basin determined in Step 2.

7. Is WWTP Capacity Available?

Check WWTP capacity from the WWTP Capacity Assurance Database. If WWTP does not have capacity, proceed to Step 15. If WWTP has capacity, proceed to Step 8.

8. Does Projected Flow Impact an Existing Pump Station?

If there is no impact to an existing pump station, proceed to Step 9. If there is impact to an existing pump station, proceed to Step 10.

9. Enter Proposed Flow in Gravity Sewer Line Capacity Assurance Database.
The proposed flow calculated in Step 3 will be entered into the database for the sewer basin determined in Step 2. The flow is entered in the database at the downstream flow monitor that corresponds with the manhole that was identified in Step 2. Proceed to Step 12.

10. Enter Proposed Run Time in Pump Station Capacity Assurance Database.
The proposed flow calculated in Step 3 will be utilized to calculate the projected run time to be entered into the database for the corresponding pump station. The projected run time will be subtracted from the available run time. Proceed to Step 11.

11. Is Pump Station Capacity Available?
Check pump station run time from the Pump Station Capacity Assurance Database. If the pump station has capacity, proceed to Step 9. If the pump station does not have capacity, proceed to Step 14.

12. Is Gravity Sewer Line Capacity Available?
Check gravity sewer line capacity from the Gravity Sewer Line Capacity Assurance Database. If the gravity sewer has capacity, proceed to Step 13. If the gravity sewer does not have capacity, proceed to Step 14.

13. Certify Capacity is Available.
The capacity is certified in the WWTP Capacity Assurance Database, Gravity Sewer Line Capacity Assurance Database, and Pump Station Capacity Assurance as required. Proceed to Step 16.

14. Document Reason for Denial.
If capacity is not available, the reason for the denial is documented in the WWTP Capacity Assurance Database and the Gravity Sewer Line Capacity Assurance Database. Proceed to Step 15.

15. Consult with Representative of Owner for Further Analysis and to Discuss Options.
If the future development is denied due to capacity, the ESD staff will meet with a representative of the owner to discuss alternative options for development.

16. Issue Sewer Availability Letter (Enter Date in Database) or Forward Plans for Review.
If capacity is available, a sewer availability letter can be issued by the ESD to the Developer. If capacity is available, the plans can be forwarded to the ESD Plans Review Office.

4.3 APPROVAL IN LIEU OF CERTIFICATION

The following describes the special conditions for approval without a certification of capacity for the proposed flow:

4.3.1 Minor Sewer Connections

A minor sewer connection is defined as a connection with an average flow not to exceed 2,500 gallons per day. ESD will approve minor connections without performing individual certifications for each connection. All minor connections will be added into in the Capacity Assurance database. The cumulative effect of flow from all minor sewer connections issued will be evaluated in the first capacity analysis following approval.

4.3.2 Essential Services

ESD may authorize a request for additional flow to the system from essential service facilities, even if adequate capacity cannot be certified. Essential services are defined as health care facilities, public safety facilities, public schools, other government facilities, and in cases where a pollution or sanitary nuisance exists as determined by the Jefferson County Health Department. A subtraction shall be made from the respective capacity assurance database in an amount equal to the average projected flow from these essential services.

4.3.2 Existing Illicit Connections

ESD may authorize a request for additional flow to the system, provided the additional flow eliminates illicit connections or discharges of wastewater to the stormwater system or waters of the State, even if adequate capacity cannot be certified. A subtraction shall be made from the respective capacity assurance database in an amount equal to the average projected flow from the removal of illicit connections or discharges.

SECTION 5 – LONG TERM PROGRAM DESCRIPTION

5.1 CAP – LONG TERM PLAN

As described in the Near Term Plan, the Long Term CAP program will utilize a similar certification program for all new flow entering the system to ensure that Adequate Treatment, Transmission and Collection Capacity are available. The critical differences in the programs are the extent and method of evaluation for available capacity. Instead of estimating available capacity at only discrete locations within the transmission system (existing flow monitor points), the Long Term CAP will measure capacity through the development of a dynamic flow model that can simulate both dry and wet weather flows for any proposed flow addition and determine available capacity and the effects of additional flows to the system at the point of connection, upstream, and downstream. The model will also be able to assess capacity improvements and their impact on the performance of the entire system from the connection to the treatment facility.

The development of the dynamic flow model is the first phase of work needed to implement the Long Term CAP. ESD has initiated steps to upgrade the static models established in the Capacity Analysis Reports to a more robust dynamic model. This dynamic model will be the centerpiece of the County's Long Term CAP. It is expected that the first phase model will be in place by the end of the first quarter of 2009. Following the implementation of the model for each basin, the final phases of the CAP can be developed. Other phases of work will include the development of a capacity assurance database that is integrated with both the flow model and SIMS that will automate the capacity analysis calculations for the sewer system.

The dynamic model will be operated and maintained by ESD staff rather than by contracted consultants. This will enable the County to be much more hands-on with calibrating the model, adding new system features, creating and running "what-if" scenarios, and performing other routine management tasks.

5.2 DYNAMIC FLOW MODEL

The dynamic model will be re-calibrated and re-run on a periodic basis for the purpose of establishing the available capacity for every sewer pipe in the collection system. The available capacity will be calculated from the difference between the modeled maximum pipe capacity and modeled pipe flow. Projected wastewater flows from proposed new developments will be compared to the net available capacity for the entire route to the terminus of the collection system. When a development plan is approved, the projected flows will be subtracted from each pipes available capacity. When a development is completed, the charge of projected flow will be removed, as real flows will have been generated by the development, and will be reflected in subsequent calibrations of the model.

5.2.1 Model Inputs

Performance of the dynamic model will depend on the model engine itself, which has not yet been selected, and equally as much on the data inputs: flow data, rainfall data, and system mapping. Those data are generated under other County MOM programs, ensuring continuity and integrity of the data.

5.2.2 Flow and Rain Data

Flow data is vital to calibration of a model; it serves as a real-world check of model output. Where model results differ from actual flow data, calibration or fine-tuning of the model is needed. Rain gauge data is vital to, in concert with flow data, calibrate the model with respect to I/I response. The system's I/I

response (as indicated by flow data) to actual rainfall events (as indicated by rain gauge data) is established, and subsequently used to predict system response to future, hypothetical rainfall events.

5.2.3 System Mapping

System mapping is housed in SIMS. This GIS is the repository for sewer system information: pipe coordinates, elevations, orientations, sizes, materials, defects, and other information important to model development. The dynamic model will integrate with SIMS, to draw the information directly from the central source.

Refinement of the data in SIMS is an enormous undertaking and an ongoing process. Since completion of unification, the County has conducted a thorough survey and mapping program built around SIMS. To date, approximately 75% of the system has been surveyed and integrated into SIMS. The remaining 25% will be completed throughout the next five (5) years.

SECTION 6 – PERFORMANCE MEASURES

Performance measures for this program as listed below will be monitored by ESD supervisory staff. As the program progresses, additional performance measures may be recommended.

- Number of sewer availability letters evaluated for sewer capacity
- Number of development plans evaluated for sewer capacity
- Number of connections approved in lieu of certification
- Volume of flow addition approved for each system
- Number of capacity deficiencies identified
- Percentage of sewer system surveyed and reflected in SIMS and the dynamic model
- Percentage complete toward implementation of the dynamic model

SECTION 7 – REVIEW, EVALUATION AND REVISION

An annual review of the Capacity Assurance Program will be conducted. Any needed changes are made accordingly. The ESD Engineering staff will be the primary reviewing body.

END OF DOCUMENT