

**North San Mateo County Sanitation District
Collection System Capacity Evaluation/Assurance,
Management and Improvement Plan**

**EXHIBIT A
Scope of Services**

Task 1 – Review Information

Subtask 1.1 – Review Documents and Data

The objective of this task is to gain an understanding of the District's existing sewer system facilities, their condition and operation, and to provide background information. The District will provide available pertinent information related to the sewer system. At a minimum, this information will include the following items:

- 1989 Infiltration/Inflow (I/I) Study
- 1993 Collection System Master Plan
- Grid Maps with rim elevations, inverts, pipe sizes (ArcView GIS and hard copy)
- Pipe sizes, materials, length and age
- Pump station plans, pump sizes and performance curves
- Force main locations
- Preventive maintenance records for lift stations
- Preventive maintenance records for flushing of the sewer system
- Cleaning maintenance records
- Hot Sheet (of frequent maintenance areas)
- CCTV tapes and reports (Consultant will review only recent videos of areas identified as problematic during staff interviews or through review of maintenance records, as identified in Subtask 4.4)
- District's standard CCTV observation codes
- Currently identified capital projects
- District sewer design and construction standards/guidelines
- Relevant sections of the District's current Sewer System Management Plan (SSMP), e.g., Measures and Activities (Operation and Maintenance Program), Design and Construction Standards, etc.
- Wastewater treatment plant (WWTP) influent flow data as needed to perform analyses identified in Subtask 2.2.

Subtask 1.2 – Interview Key Staff

The Consultant will interview sewer system engineering, operations and maintenance staff to gain information about the system. The interviews will be held in conjunction with a half-day field tour of the system. The purpose of these interviews will be to obtain additional information that may not be contained in the data and documents collected in Subtask 1.1 and to identify known or suspected problem areas in the District's sewer system.

Deliverables:

- Listings and descriptions of available information
- Summaries of information obtained from staff interviews and field tour

Task 2 – Confirm Master Plan

The intent of this task is to provide a thorough analysis of the District's existing 1993 Master Plan to determine whether it is sufficient to meet the intent of the regulations governing preparation of a system evaluation and capacity assurance plan for the SSMP. If data gaps are identified, the Consultant shall prepare a proposed Work Plan to fill those gaps.

Subtask 2.1 – Review the 1993 Master Plan

Subtask 2.1.1 – Compare Model Data

The Consultant shall compare model data (as presented in the 1993 Master Plan and appendices) to the current sewer system maps (ArcView GIS format) to assess whether the 1993 Master Plan accurately depicts the existing sewer system.

Subtask 2.1.2 – Review Flow Basis

The Consultant shall review the basis for flows in the 1989 I/I Evaluation and 1993 Master Plan and the methodology used to project peak design flows to assess whether the methodology provides a valid approach for capacity evaluation in accordance with SSMP requirements. The Consultant shall also evaluate the design storm basis for flows for appropriateness with respect to current regulatory expectations.

Subtask 2.1.3 – Review Land Use Basis

The Consultant shall review the land use data (to the extent that it is described in the 1993 Master Plan Report) that was used in the previous master plan as the basis for projecting flows to the 2010 horizon to assess whether the service area has developed in accordance with those land use projections and whether land use projections or zoning has changed significantly since the previous master plan was prepared or is anticipated to change in the future. This assessment will be performed through review of current land use documents (General Plan and relevant Specific Plans) and discussions in person or by phone, as appropriate, with representatives from the planning departments of the City of Daly City and the planning jurisdictions for areas outside the City that contribute flow to the District's sewer system (Town of Colma, San Mateo County, and City of South San Francisco).

Subtask 2.2 – Analyze WWTP Flows

The Consultant shall review daily WWTP flows to identify trends since 1988 (the last period of flow monitoring), as well as conduct an analysis of hourly data for recent large wet weather events (e.g., 2004/05 or 2005/06 wet weather seasons) to quantify I/I and wet weather peaking factors. The results of this analysis will be used to determine if I/I appears to have changed or increased since 1988 and if the total system flow projections in the 1993 Master Plan report still appear to be valid.

Subtask 2.3 - Assess Lift Station Flows versus Capacity

Using the 1993 Master Plan as a basis for design flow predictions, the Consultant shall review the existing capacity of the District's existing pump stations to determine if capacity deficiencies may exist. Capacity shall be evaluated based on data made available by the District. These data may include pump station design documents, summaries, or pump station manuals. Consultant shall not perform detailed hydraulic analyses to confirm the data provided by the District.

Subtask 2.4 - Assess Need for Additional Work

Based on the findings of Subtasks 2.1 through 2.3, the Consultant shall determine whether additional data collection and/or hydraulic modeling should be conducted in order to comply with SSMP requirements. Data may be required to fill gaps, update data that is considered to be outdated or inaccurate, or to provide a defensible basis for development of the system evaluation and capacity assurance plan for the District's SSMP.

Subtask 2.5 – Prepare Technical Memorandum

The Consultant shall prepare a Technical Memorandum (TM) to summarize the findings and recommendations of Subtasks 2.1 through 2.4 (Draft and Final, incorporating District comments into the final TM).

Subtask 2.6 – Conduct Workshop

The Consultant shall conduct a workshop with District staff to discuss the findings of Task 2 and the recommended additional work (if needed).

Subtask 2.7 – Prepare Work Plan for Task 3

Based on the results of Subtasks 2.1 through 2.5, and the discussions held at the Workshop (Subtask 2.6), the Consultant shall prepare a detailed work plan for Task 3. The work plan will identify the level of effort required to gather additional data and conduct additional analyses, as needed, the schedule for such work, and the estimated cost. See Task 3 for additional information.

Deliverables

- Technical Memorandum
- Workshop agenda and attachments
- Work Plan for Task 3

Task 3 – Modeling and Capacity Assessment (as needed, scope TBD)

At the conclusion of Task 2, the Consultant will have developed an approved Work Plan for Task 3. Since the Work Plan will be based on the analyses conducted as a part of Task 2, the exact scope of work for Task 3 cannot be developed until Task 2 is complete. The estimated level of effort and task descriptions shown below are based on the assumptions listed and may require adjustment. The intent of Task 3 is to fill the data gaps identified under Task 2 and provide the District with the data required to prepare a system evaluation and capacity assurance plan in accordance with SSMP regulations.

Subtask 3.1 – Conduct Flow Monitoring Program

Flow and rainfall monitoring, if required, would be performed at locations throughout District's sewer system to quantify dry and wet weather flows in various areas of the system. This Scope of Services assumes that up to ten flow meters will be installed for up to two months. The number of meters and length of metering period are approximate based on the size of the District's system and Consultant's experience, and assume a "macro"-level assessment. As part of the development of the Work Plan in Subtask 2.7, a review of the District's sewer system maps will be conducted, and discussions will be held with District staff to determine the appropriate number and location of meters. The metering equipment used will be appropriate for the anticipated site and hydraulic conditions at the meter sites based on a site reconnaissance conducted prior to meter

installation. It is anticipated the equipment will consist of standard gravity sewer depth-velocity flow meters using ultrasonic and/or pressure transducer depth sensors and ultrasonic doppler velocity sensors. Rainfall monitoring will utilize tipping bucket recording gauges. Meter sites will be checked at least weekly during the monitoring period and the meters interrogated and data reviewed to verify that the meters are recording properly. The meters will be calibrated using field measurements of flow depth and velocity taken over a range of flow conditions during the monitoring period.

Subtask 3.2 – Develop Hydraulic Model

If it is determined based on the results of Task 2 that updated hydraulic modeling of the District's sewer system is warranted, then the Consultant will develop a model using commercially available hydraulic modeling software suitable for modeling the District's sewer system. Only the sewer system tributary to the District's WWTP will be included in the model. This Scope of Services assumes that the Consultant will utilize its own software license, and that InfoWorks CS (Wallingford Software) modeling software or a similar program will be used.

Subtask 3.2.1 – Construct Model Network

The level of effort represented in this Scope of Services is based on the development of a trunk sewer line hydraulic model. The Consultant shall assess the data contained in the District's sewer system GIS mapping and inventory database for its suitability and completeness for use in constructing the hydraulic model. For this project, the system to be modeled will include most 10-inch and larger lines plus 8-inch lines that effectively function as trunk sewers, including additional lines identified by the District that are specifically of concern with respect to existing or future hydraulic capacity. The portion of the sewer network to be modeled will be "extracted" from the GIS of the entire sewer system for import into the model database. The Consultant shall validate the data in the model data set and identify any missing or suspect data. The validation will utilize data checking, connectivity traces, and sewer profiling tools contained in the model software. Where necessary, the Consultant shall identify the need to supplement or confirm network data with data from other sources. The District will be responsible for providing information (e.g., as-built drawings or survey data) needed to fill in missing data or verify suspect data.

The Consultant shall also refine the delineation of sewer subbasins based on the configuration of the District's sewer system and the subbasins previously delineated for the 1993 Master Plan. A sewer subbasin represents an area of the sewer system draining to a manhole in the model network.

Subtask 3.2.2 – Develop Model Flows

The Consultant shall review flow monitoring and water use data (provided by the District in a format specified by the Consultant) to refine the flow factors to be used for estimating base wastewater flow (BWF), groundwater infiltration (GWI), and rainfall dependent infiltration/inflow (RDI/I). Criteria to be developed will include BWF unit factors for the various land use categories; BWF diurnal curves; GWI rates; and RDI/I volume and hydrograph shape parameters. The criteria will be verified and refined during the model calibration process (see Subtask 3.2.3 below).

Based on the model loading factors developed above, the Consultant shall develop associated subbasin data with which to estimate the wastewater flows generated by each subbasin. Subbasin loadings will be developed for existing and future (buildout)

conditions. It is anticipated that existing BWF loadings will be based on water use data on a parcel basis, and that future loadings will be based on unit flow factors applied to the type of land use of anticipated new development or redevelopment.

Subtask 3.2.3 – Model Calibration

The Consultant shall use a multi-step process to verify and calibrate the model. The first step will confirm the unit flow factors and diurnal curves used for estimating dry weather flows and GWI during non-rainfall periods. The next step is the calibration for wet weather flow conditions. In this process, the model will be run for one or more actual storm events for which flow monitoring data are available. Based on these model runs, parameters in the model used to simulate RDI/I flows will be adjusted so that the model simulated flows are in reasonable agreement with the monitored flows.

Subtask 3.3 – Prepare Model Files and Documentation

At the conclusion of the project, the Consultant shall provide model files to the District in the form of ArcView GIS shape files and data tables (e.g., MS Excel or Access format) that could be used by the District for future modeling efforts. The Consultant shall also document the contents of the model files.

Subtask 3.4 – Conduct Capacity Analysis

The Consultant shall propose criteria for the design storm to be used for analyzing and determining the required capacity of sewer system facilities, if different than that used in the 1993 Master Plan. The selection of design storm will take into consideration existing or potential future regulations or regulatory policy on sanitary sewer overflows (SSOs), precedent set by other Bay Area agencies, and published historical rainfall intensity-duration-frequency statistics.

The Consultant shall also propose hydraulic criteria to be used for evaluating and sizing system facilities. Criteria will include Manning's n value, maximum allowable d/D values and/or allowable surcharge, and minimum and maximum slopes and velocities. It is anticipated that these criteria will be consistent with the District's standard design criteria.

The Consultant shall conduct model simulations of the existing sewer system for existing and future (buildout) conditions for dry weather and design storm wet weather flows. Based on the model results, the Consultant shall identify capacity deficiencies and resulting hydraulic gradeline elevations in the existing sewer system under existing and future flow conditions. Thematic maps will be generated to present the model results graphically. The Consultant shall identify those areas of the modeled network that require capacity relief.

Subtask 3.5 – Develop Capacity Improvements

The Consultant shall develop potential solutions to the capacity deficiencies identified in Subtask 3.4. Solutions may include flow diversions, upsizing existing sewers, new sewer alignments, and pump station capacity expansions if necessary. The Consultant shall develop preliminary "solutions models" for the most viable solutions and use these models to determine if the preliminary solutions would be effective in alleviating the identified capacity deficiencies. Based on the solutions model results, the Consultant shall develop required capacity improvement projects and estimated costs. Costs shall be based on unit cost criteria and cost factors from Consultant's previous master planning studies for similar Bay Area cities and agencies.

Subtask 3.6 – Prepare Technical Memorandum

The Consultant shall prepare a TM to present the model results and identified capacity deficiencies, solutions, and recommended projects (Draft and Final, incorporating District comments into the final TM).

Subtask 3.7 – Conduct Workshop

The Consultant shall conduct a workshop with District staff to discuss capacity deficiencies and improvement strategies.

Deliverables

- Flow monitoring data
- Model files and documentation
- Technical Memorandum, including capacity assurance CIP projects
- Workshop agenda and attachments

Task 4 – Refine Condition Assessment and Rehabilitation Program

The objective of this task is to identify near-term sewer system rehabilitation needs based on existing available information, and to develop a methodology and procedures for an on-going condition assessment program to be used to update and refine the District's future sewer system rehabilitation program.

Subtask 4.1 - Develop CCTV Codes and Data Documentation Procedures

The Consultant shall review the current codes and documentation procedures used by the District for CCTV inspection, including format of data in proposed new CCTV software and maintenance management system (Hansen). Based on experience from other programs and discussions with District staff, the Consultant shall propose new or updated codes and data documentation procedures to be used for future CCTV inspection, including possible use of standardized systems such as the Pipeline Assessment and Certification Program (PACP) developed by NASSCO.

Subtask 4.2- Develop Condition and Impact Rating Approach

The Consultant shall propose a methodology for using CCTV inspection data to assess the condition of inspected sewers and to prioritize rehabilitation needs based on "impact factors" that reflect the relative consequences of failure. Condition rating would involve scoring and categorizing (as structural or maintenance problems) of observed defects based on their type and severity. Impact factors would be based on tributary area size (as reflected by pipe diameter) and proximity to sensitive areas, commercial or high traffic corridors, or critical utilities. The methodology would be documented so that it can be incorporated into a future database application or maintenance management program.

Subtask 4.3 - Develop CCTV Inspection Schedule

The Consultant shall develop a plan for baseline inspection of the entire sewer system over a 5- to 10-year period. The plan will be based on prioritizing areas of the system based on their age, I/I characteristics, and maintenance and repair history.

Subtask 4.4 - Identify Near-term Sewer Rehabilitation Needs

The Consultant shall review identified sewer rehabilitation projects in the District's current CIP as well as other problem areas identified through discussions with District

staff and review of maintenance records. If necessary to confirm rehabilitation needs, the Consultant shall review available CCTV inspection data in order to recommend suitable rehabilitation methods and estimate project costs. The level of effort for this subtask is based on review of CCTV video for up to ten pipe segments.

Subtask 4.5 - Project Future Sewer Renewal/Replacement Needs

The Consultant will develop a long-term projection of sewer renewal/replacement needs and budgets. It is anticipated that this methodology will be based on establishing a range in anticipated useful lives for various types of gravity pipe materials in the District's sewer system based on industry standard practices and consensus. Useful life will be determined based on information provided by the District on the age and material of pipelines in the system. Assumed construction methods and unit costs for rehabilitation and replacement will be developed based on the Consultant's experience and available cost data. Financial parameters for long-term budget projections will also be developed in consultation with District staff.

Subtask 4.6 - Conduct Workshop

The Consultant shall conduct a workshop with District staff to discuss the proposed condition assessment methodology and planning for near- and long-term sewer rehabilitation programs.

Subtask 4.7 - Prepare TM

The Consultant shall prepare a TM to summarize the recommendations of Subtasks 4.1 through 4.6 (Draft and Final, incorporating District comments into the final TM).

Deliverables

- Technical Memorandum, including sewer rehabilitation CIP projects
- Workshop agenda and attachments

Task 5 – Project Management

Subtask 5.1 – Prepare and Update Workplan

After receiving notice to proceed and prior to beginning project work, the Consultant shall prepare a workplan which identifies the steps to complete the project, key decision points, contact information and protocol and other similar items. The Consultant shall update this workplan as required during the course of the project.

Subtask 5.2 – Project Controls

The Consultant shall maintain project schedule and shall track budget in Microsoft Excel and/or the Consultant's internal accounting system. Monthly progress reports, in bullet format, shall accompany monthly invoices and shall describe progress completed during the billing period, issues encountered during the period, and planned activities for next billing period. Progress reports shall include budget and schedule updates. Budget will be tracked at the task level according to the task structure outlined above.

Subtask 5.3 – Meetings

In addition to the workshops included in the tasks above, the Consultant shall attend up to five project meetings to discuss schedule, status, budget, the project workplan, or other project-related items. It is anticipated that one of these five meetings will be the project kick-off. Meetings are assumed to be held at District offices.

Subtask 5.4 – Coordinate with District on Preparation of SSMP Sections

The Consultant shall review and comment on the draft SSMP sections on the system evaluation and capacity assurance plan, and condition assessment and rehabilitation plan. The District will be responsible for preparing these sections of the SSMP. It is anticipated that these sections will summarize the results and recommendations of the tasks of this study, and will reference the TMs and other pertinent documents as needed.

Deliverables:

- Monthly status reports
- Monthly invoices
- Meeting agendas and minutes
- Review comments on SSMP sections