Lexington-Fayette
Urban County Government

Request for Proposal

The Lexington-Fayette Urban County Government hereby requests proposals for **RFP #27-2022 Professional Engineering Services Town Branch 5 Sub Drainage Area to** be provided in accordance with terms, conditions and specifications established herein.

Online proposals will be received at https://lexingtonky.ionwave.net/ until **2:00 PM**, prevailing local time, on **May 11, 2022**.

Proposals received after the date and time set for opening proposals will not be considered for award of a contract and will be returned unopened to the Proposer. It is the sole responsibility of the Proposer to assure that his/her proposal is received (uploaded to https://lexingtonky.ionwave.net/) by the Division of Central Purchasing before the date and time set for opening proposals.

Additional copies of this Request For Proposals are available from the Division of Central Purchasing, Room 338 Government Center, 200 East Main Street, Lexington, KY 40507, (859)-258-3320, at no charge.

Proposals, once submitted, may not be withdrawn for a period of sixty (60) calendar days.

The Proposer must upload one (1) electronic version in PDF format to https://lexingtonky.ionwave.net/.

The Lexington-Fayette Urban County Government reserves the right to reject any or all proposals, and to waive technicalities and informalities when such waiver is determined by the Lexington-Fayette Urban County Government to be in its best interest.

Signature of this proposal by the Proposer constitutes acceptance by the Proposer of terms, conditions and requirements set forth herein.

Minor exceptions may not eliminate the proposal. Any exceptions to the specifications established herein shall be listed in detail on a separate sheet and attached hereto. The Lexington-Fayette Urban County Government shall determine whether any exception is minor.

The Lexington-Fayette Urban County Government encourages the participation of minority- and women-owned businesses in Lexington-Fayette Urban County Government contracts. This proposal is subject to Affirmative Action requirements attached hereto.

Please do not contact any LFUCG staff member or any other person involved in the selection process other than the designated contact person(s) regarding the project contemplated under this RFP while this RFP is open and a selection has not been finalized. Any attempt to do so may result in disqualification of the firm's submittal for consideration.

Laws and Regulations

All applicable state laws, ordinances and resolutions (including but not limited to Section 2-33 (Discrimination due to sexual orientation or gender identity) and Chapter 13 (Licenses and Regulations) of the Lexington-Fayette Urban County Government Code of Ordinances, and Resolution No. 484-17 (Minority, Women, and Veteran-Owned Businesses)) and the regulations of all authorities having jurisdiction over the project shall apply to the contract, and shall be deemed to be incorporated herein by reference.

Equal Employment Opportunity

The Entity (regardless of whether construction contractor, non-construction contractor or supplier) agrees to provide equal opportunity in employment for all qualified persons, to prohibit discrimination in employment because of race, color, religion, sex (including pregnancy, sexual orientation or gender identity), national origin, disability, age, genetic information, political affiliation, or veteran status, and to promote equal employment through a positive, continuing program from itself and each of its sub-contracting agents. This program of equal employment opportunity shall apply to every aspect of its employment policies and practices.

Kentucky Equal Employment Opportunity Act

The Kentucky Equal Employment Opportunity Act of 1978 (KRS 45.560-45.640) requires that any "county, city, town, school district, water district, hospital district, or other political subdivision of the state shall include in directly or indirectly publicly funded contracts for supplies, materials, services, or equipment hereinafter entered into the following provisions:

"During the performance of this contract, the contractor agrees as follows:

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, age, or national origin;

(2) The contractor will state in all solicitations or advertisements for employees placed by or on behalf of the contractors that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, age, or national origin;

(3) The contractor will post notices in conspicuous places, available to employees and applicants for employment, setting forth the provision of the nondiscrimination clauses required by this section; and

(4) The contractor will send a notice to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding advising the labor union or workers' representative of the contractor's commitments under the nondiscrimination clauses."

The Act further provides:

"KRS 45.610. Hiring minorities -- Information required

(1) For the length of the contract, each contractor shall hire minorities from other sources within the drawing area, should the union with which he has collective bargaining agreements be unwilling to supply sufficient minorities to satisfy the agreed upon goals and timetables.

(2) Each contractor shall, for the length of the contract, furnish such information as required by KRS 45.560 to KRS 45.640 and by such rules, regulations and orders issued pursuant thereto and will permit access to all books and records pertaining to his employment practices and work sites by the contracting agency and the department for purposes of investigation to ascertain compliance with KRS 45.560 to 45.640 and such rules, regulations and orders issued pursuant thereto.

KRS 45.620. Action against contractor -- Hiring of minority contractor or subcontractor

(1) If any contractor is found by the department to have engaged in an unlawful practice under this chapter during the course of performing under a contract or subcontract covered under KRS 45.560 to 45.640, the department shall so certify to the contracting agency and such certification shall be binding upon the contracting agency unless it is reversed in the course of judicial review.

(2) If the contractor is found to have committed an unlawful practice under KRS 45.560 to 45.640, the contracting agency may cancel or terminate the contract, conditioned upon a program for future compliance approved by the contracting agency and the department. The contracting agency may declare such a contractor ineligible to bid on further contracts with that agency until such time as the contractor complies in full with the requirements of KRS 45.560 to 45.640.

(3) The equal employment provisions of KRS 45.560 to 45.640 may be met in part by a contractor by subcontracting to a minority contractor or subcontractor. For the provisions of KRS 45.560 to 45.640, a minority contractor or subcontractor shall mean a business that is owned and controlled by one or more persons disadvantaged by racial or ethnic circumstances.

KRS 45.630 Termination of existing employee not required, when

Any provision of KRS 45.560 to 45.640 notwithstanding, no contractor shall be required to terminate an existing employee upon proof that employee was employed prior to the date of the contract.

KRS 45.640 Minimum skills

Nothing in KRS 45.560 to 45.640 shall require a contractor to hire anyone who fails to demonstrate the minimum skills required to perform a particular job."

It is recommended that all of the provisions above quoted be included as special conditions in each contract. In the case of a contract exceeding $250,000, the contractor is required to furnish evidence that his workforce in Kentucky is representative of the available work-force in the area from which he draws employees, or to supply an Affirmative Action plan which will achieve such representation during the life of the contract.

LFUCG Non-Appropriation Clause

Contractor acknowledges that the LFUCG is a governmental entity, and the contract validity is based upon the availability of public funding under the authority of its statutory mandate.

In the event that public funds are unavailable and not appropriated for the performance of the LFUCG's obligations under this contract, then this contract shall automatically expire without penalty to the LFUCG thirty (30) days after written notice to Contractor of the unavailability and non-appropriation of public funds. It is expressly agreed that the LFUCG shall not activate this non-appropriation provision for its convenience or to circumvent the requirements of this contract, but only as an emergency fiscal measure during a substantial fiscal crisis, which affects generally its governmental operations.

In the event of a change in the LFUCG's statutory authority, mandate and mandated functions, by state and federal legislative or regulatory action, which adversely affects the LFUCG's authority to continue its obligations under this contract, then this contract shall automatically terminate without penalty to the LFUCG upon written notice to Contractor of such limitation or change in the LFUCG's legal authority.

Contention Process

Vendors who respond to this invitation have the right to file a notice of contention associated with the RFP process or to file a notice of appeal of the recommendation made by the Director of Central Purchasing resulting from this invitation.

Notice of contention with the RFP process must be filed within 3 business days of the bid/proposal opening by (1) sending a written notice, including sufficient documentation to support contention, to the Director of the Division of Central Purchasing or (2) submitting a written request for a meeting with the Director of Central Purchasing to explain his/her contention with the RFP process. After consulting with the Commissioner of Finance the Chief Administrative Officer and reviewing the documentation and/or hearing the vendor, the Director of Central Purchasing shall promptly respond in writing findings as to the compliance with RFP processes. If, based on this review, a RFP process irregularity is deemed to have occurred the Director of Central Purchasing will consult with the Commissioner of Finance, the Chief Administrative Officer and the Department of Law as to the appropriate remedy.

Notice of appeal of a RFP recommendation must be filed within 3 business days of the RFP recommendation by (1) sending a written notice, including sufficient documentation to support appeal, to the Director, Division of Central Purchasing or (2) submitting a written request for a meeting with the Director of Central Purchasing to explain his appeal. After reviewing the documentation and/or hearing the vendor and consulting with the Commissioner of Finance and the Chief Administrative Officer, the Director of Central Purchasing shall in writing, affirm or withdraw the recommendation.

SELECTION CRITERIA:

Proposals shall contain the appropriate information necessary to evaluate based on these criteria. A committee composed of government employees as well as representatives of relevant user groups will evaluate the proposals.

A. Fees; 20 pts
B. Consistency and clarity in the application of hourly rates used to determine fee. 10 pts.
C. Specialized experience and technical competence of the person or firm. 25 pts
D. Capacity of the person or firm organization to perform the work. 15 pts
E. Character, integrity, reputation, judgment, experience and efficiency of the person or firm; 10 pts
F. Past record and performance on contracts or services with the Urban County Government or other governmental agencies and private industry with respect to such factors as control of costs, quality of work and ability to meet schedules; 10 pts
G. Degree of local employment to be provided by the person or firm in the performance of the contract by the person or firm; 10 pts

Questions will be submitted in Ionwave at: **https://lexingtonky.ionwave.net**

Proposals shall contain the appropriate information necessary to evaluate based on these criteria. A committee composed of government employees as well as representatives of relevant user groups will evaluate the proposals.

Affirmative Action Plan

All vendors must submit as a part of the proposal package the following items to the Urban County Government:

1. Affirmative Action Plan for his/her firm;
2. Current Work Force Analysis Form;

Failure to submit these items as required may result in disqualification of the submitter from award of the contract. All submissions should be directed to:

Director, Division of Central Purchasing
Lexington-Fayette Urban County Government
200 East Main Street, 3rd Floor
Lexington, Kentucky 40507

All questions regarding this proposal must be directed to the Division of Central Purchasing, (859)-258-3320.

AFFIDAVIT

Comes the Affiant, _____, and after being first duly sworn, states under penalty of perjury as follows:

1. His/her name is _____ and he/she is the individual submitting the proposal or is the authorized representative of_____, the entity submitting the proposal (hereinafter referred to as "Proposer").

2. Proposer will pay all taxes and fees, which are owed to the Lexington-Fayette Urban County Government at the time the proposal is submitted, prior to award of the contract and will maintain a "current" status in regard to those taxes and fees during the life of the contract.

3. Proposer will obtain a Lexington-Fayette Urban County Government business license, if applicable, prior to award of the contract.

4. Proposer has authorized the Division of Central Purchasing to verify the above-mentioned information with the Division of Revenue and to disclose to the Urban County Council that taxes and/or fees are delinquent or that a business license has not been obtained.

5. Proposer has not knowingly violated any provision of the campaign finance laws of the Commonwealth of Kentucky within the past five (5) years and the award of a contract to the Proposer will not violate any provision of the campaign finance laws of the Commonwealth.

6. Proposer has not knowingly violated any provision of Chapter 25 of the Lexington-Fayette Urban County Government Code of Ordinances, known as "Ethics Act."

Continued on next page

7. Proposer acknowledges that "knowingly" for purposes of this Affidavit means, with respect to conduct or to circumstances described by a statute or ordinance defining an offense, that a person is aware or should have been aware that his conduct is of that nature or that the circumstance exists.

Further, Affiant sayeth naught.

_____

STATE OF _____

COUNTY OF _____

The foregoing instrument was subscribed, sworn to and acknowledged before me by _____ on this the _____ day of _____, 20__.

My Commission expires: _____

_____
NOTARY PUBLIC, STATE AT LARGE

EQUAL OPPORTUNITY AGREEMENT

The Law

- Title VII of the Civil Rights Act of 1964 (amended 1972) states that it is unlawful for an employer to discriminate in employment because of race, color, religion, sex, age (40-70 years) or national origin.

- Executive Order No. 11246 on Nondiscrimination under Federal contract prohibits employment discrimination by contractor and sub-contractor doing business with the Federal Government or recipients of Federal funds. This order was later amended by Executive Order No. 11375 to prohibit discrimination on the basis of sex.

- Section 503 of the Rehabilitation Act of 1973 states:

  The Contractor will not discriminate against any employee or applicant for employment
  because of physical or mental disability.

- Section 2012 of the Vietnam Era Veterans Readjustment Act of 1973 requires Affirmative Action on behalf of disabled veterans and veterans of the Vietnam Era by contractors having Federal contracts.

- Section 206(A) of Executive Order 12086, Consolidation of Contract Compliance Functions for Equal Employment Opportunity, states:

  The Secretary of Labor may investigate the employment practices of any Government contractor or sub-contractor to determine whether or not the contractual provisions specified in Section 202 of this order have been violated.

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The Lexington-Fayette Urban County Government practices Equal Opportunity in recruiting, hiring and promoting. It is the Government's intent to affirmatively provide employment opportunities for those individuals who have previously not been allowed to enter into the mainstream of society. Because of its importance to the local Government, this policy carries the full endorsement of the Mayor, Commissioners, Directors and all supervisory personnel. In following this commitment to Equal Employment Opportunity and because the Government is the benefactor of the Federal funds, it is both against the Urban County Government policy and illegal for the Government to let contracts to companies which knowingly or unknowingly practice discrimination in their employment practices. Violation of the above mentioned ordinances may cause a contract to be canceled and the contractors may be declared ineligible for future consideration.

Please sign this statement in the appropriate space acknowledging that you have read and understand the provisions contained herein. Return this document as part of your application packet.

Bidders

I/We agree to comply with the Civil Rights Laws listed above that govern employment rights of minorities, women, Vietnam veterans, handicapped and aged persons.

_____ _____

Signature *Name of Business*

WORKFORCE ANALYSIS FORM

Name of Organization: _____

Categories	**Total**	White (Not Hispanic or Latino)		Hispanic or Latino		Black or African-American (Not Hispanic or Latino		Native Hawaiian and Other Pacific Islander (Not Hispanic or Latino		Asian (Not Hispanic or Latino		American Indian or Alaskan Native (not Hispanic or Latino		Two or more races (Not Hispanic or Latino		**Total**	
		M	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Administrators																	
Professionals																	
Superintendents																	
Supervisors																	
Foremen																	
Technicians																	
Protective Service																	
Para-Professionals																	
Office/Clerical																	
Skilled Craft																	
Service/Maintenance																	
Total:																	

Prepared by: _____ **Date:** _____/_____/_____

(Name and Title)

Revised 2015-Dec-15

DIRECTOR, DIVISION OF CENTRAL PURCHASING
LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT
200 EAST MAIN STREET
LEXINGTON, KENTUCKY 40507

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITIES AND DBE CONTRACT PARTICIPATION

Notice of requirement for Affirmative Action to ensure Equal Employment Opportunities and Disadvantaged Business Enterprises (DBE) Contract participation. Disadvantaged Business Enterprises (DBE) consists of Minority-Owned Business Enterprises (MBE) and Woman-Owned Business Enterprises (WBE).

The Lexington-Fayette Urban County Government has set a goal that not less than ten percent (10%) of the total value of this Contract be subcontracted to Disadvantaged Business Enterprises, which is made up of MBEs and WBEs. The goal for the utilization of Disadvantaged Business Enterprises as subcontractors is a recommended goal. Contractor(s) who fail to meet such goal will be expected to provide written explanations to the Director of the Division of Purchasing of efforts they have made to accomplish the recommended goal, and the extent to which they are successful in accomplishing the recommended goal will be a consideration in the procurement process. Depending on the funding source, other DBE goals may apply.

For assistance in locating Disadvantaged Business Enterprises Subcontractors contact:

Sherita Miller, Division of Central Purchasing
Lexington-Fayette Urban County Government
200 East Main Street, 3rd Floor, Room 338
Lexington, Kentucky 40507
smiller@lexingtonky.gov

Lexington-Fayette Urban County Government
MWDBE PARTICIPATION GOALS

A. GENERAL

1) The LFUCG request all potential contractors to make a concerted effort to include Minority-Owned (MBE), Woman-Owned (WBE), Disadvantaged (DBE) Business Enterprises and Veteran-Owned Businesses as subcontractors or suppliers in their bids.

2) Toward that end, the LFUCG has established 10% of total procurement costs as a Goal for participation of Minority-Owned, Woman-Owned and Disadvantaged Businesses on this contract.

3) **It is therefore a request of each Bidder to include in its bid, the same goal (10%) for MWDBE participation and other requirements as outlined in this section.**

4) The LFUCG has also established a 3% of total procurement costs as a Goal for participation for of Veteran-Owned Businesses.

5) **It is therefore a request of each Bidder to include in its bid, the same goal (3%) for Veteran-Owned participation and other requirements as outlined in this section.**

B. PROCEDURES

1) The successful bidder will be required to report to the LFUCG, the dollar amounts of all payments submitted to Minority-Owned or Woman-Owned subcontractors and suppliers for work done or materials purchased for this contract. (See Subcontractor Monthly Payment Report)

2) Replacement of a Minority-Owned or Woman-Owned subcontractor or supplier listed in the original submittal must be requested in writing and must be accompanied by documentation of Good Faith Efforts to replace the subcontractor / supplier with another MWDBE Firm; this is subject to approval by the LFUCG. (See LFUCG MWDBE Substitution Form)

3) For assistance in identifying qualified, certified businesses to solicit for potential contracting opportunities, bidders may contact:

    a) The Lexington-Fayette Urban County Government, Division of Central Purchasing (859-258-3320)

4) The LFUCG will make every effort to notify interested MWDBE and Veteran-Owned subcontractors and suppliers of each Bid Package, including information on the scope of work, the pre-bid meeting time and location, the bid date, and all other pertinent information regarding the project.

C. DEFINITIONS

1) A Minority-Owned Business Enterprise (MBE) is defined as a business which is certified as being at least 51% owned and operated by persons of African American, Hispanic, Asian, Pacific Islander, American Indian or Alaskan Native Heritage.

2) A Woman-Owned Business Enterprise (WBE) is defined as a business which is certified as being at least 51% owned and operated by one or more Non-Minority Females.

3) A Disadvantaged Business (DBE) is defined as a business which is certified as being at least 51% owned and operated by a person(s) that are economically and socially disadvantaged.

4) A Veteran-Owned Business is defined as a business which is certified as being at least 51% owned and operated by a veteran and/or a service disabled veteran.

5) Good Faith Efforts are efforts that, given all relevant circumstances, a bidder or proposer actively and aggressively seeking to meet the goals, can reasonably be expected to make. In evaluating good faith efforts made toward achieving the goals, whether the bidder or proposer has performed the efforts outlined in the Obligations of Bidder for Good Faith Efforts outlined in this document will be considered, along with any other relevant factors.

D. OBLIGATION OF BIDDER FOR GOOD FAITH EFFORTS

1) **The bidder shall make a Good Faith Effort to achieve the Participation Goal for MWDBE subcontractors/suppliers. The failure to meet the goal shall not necessarily be cause for disqualification of the bidder; however, bidders not meeting the goal are required to furnish with their bids written documentation of their Good Faith Efforts to do so.**

2) Award of Contract shall be conditioned upon satisfaction of the requirements set forth herein.

3) The Form of Proposal includes a section entitled "MWDBE Participation Form". The applicable information must be completed and submitted as outlined below.

4) **Failure to submit this information as requested may be cause for rejection of bid.**

E. DOCUMENTATION REQUIRED FOR GOOD FAITH EFFORTS

1) Bidders reaching the Goal are required to submit only the MWDBE Participation Form." The form must be fully completed including names

and telephone number of participating MWDBE firm(s); type of work to be performed; estimated value of the contract and value expressed as a percentage of the total Lump Sum Bid Price. The form must be signed and dated, and is to be submitted with the bid.

2) Bidders not reaching the Goal must submit the "MWDBE Participation Form", the "Quote Summary Form" and a written statement documenting their Good Faith Effort to do so. If bid includes no MWDBE participation, bidder shall enter "None" on the subcontractor / supplier form). In addition, the bidder must submit written proof of their Good Faith Efforts to meet the Participation Goal:

   a. Advertised opportunities to participate in the contract in at least two (2) publications of general circulation media; trade and professional association publications; small and minority business or trade publications; and publications or trades targeting minority, women and disadvantaged businesses not less than fifteen (15) days prior to the deadline for submission of bids to allow MWDBE firms to participate.

   b. Included documentation of advertising in the above publications with the bidders good faith efforts package

   c. Attended LFUCG Central Purchasing Economic Inclusion Outreach event

   d. Attended pre-bid meetings that were scheduled by LFUCG to inform MWDBEs of subcontracting opportunities

   e. Sponsored Economic Inclusion event to provide networking opportunities for prime contractors and MWDBE firms

   f. Requested a list of MWDBE subcontractors or suppliers from LFUCG Economic Engine and showed evidence of contacting the companies on the list(s).

   g. Contacted organizations that work with MWDBE companies for assistance in finding certified MWBDE firms to work on this project. Those contacted and their responses should be a part of the bidder's good faith efforts documentation.

   h. Sent written notices, by certified mail, email or facsimile, to qualified, certified MWDBEs soliciting their participation in the contract not less that seven (7) days prior to the deadline for submission of bids to allow them to participate effectively.

   i. Followed up initial solicitations by contacting MWDBEs to determine their level of interest.

j. Provided the interested MWBDE firm with adequate and timely information about the plans, specifications, and requirements of the contract.

k. Selected portions of the work to be performed by MWDBE firms in order to increase the likelihood of meeting the contract goals. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate MWDBE participation, even when the prime contractor may otherwise perform these work items with its own workforce

l. Negotiated in good faith with interested MWDBE firms not rejecting them as unqualified without sound reasons based on a thorough investigation of their capabilities. Any rejection should be so noted in writing with a description as to why an agreement could not be reached.

m. Included documentation of quotations received from interested MWDBE firms which were not used due to uncompetitive pricing or were rejected as unacceptable and/or copies of responses from firms indicating that they would not be submitting a bid.

n. Bidder has to submit sound reasons why the quotations were considered unacceptable. The fact that the bidder has the ability and/or desire to perform the contract work with its own forces will not be considered a sound reason for rejecting a MWDBE quote. Nothing in this provision shall be construed to require the bidder to accept unreasonable quotes in order to satisfy MWDBE goals.

o. Made an effort to offer assistance to or refer interested MWDBE firms to obtain the necessary equipment, supplies, materials, insurance and/or bonding to satisfy the work requirements of the bid proposal

p. Made efforts to expand the search for MWBE firms beyond the usual geographic boundaries.

q. Other--any other evidence that the bidder submits which may show that the bidder has made reasonable good faith efforts to include MWDBE participation.

Failure to submit any of the documentation requested in this section may be cause for rejection of bid. Bidders may include any other documentation deemed relevant to this requirement. Documentation of Good Faith Efforts are to be submitted with the Bid, if the participation Goal is not met.

MINORITY BUSINESS ENTERPRISE PROGRAM

Sherita Miller, MPA
Minority Business Enterprise Liaison
Division of Central Purchasing
Lexington-Fayette Urban County Government
200 East Main Street
Lexington, KY 40507
smiller@lexingtonky.gov
859-258-3323

OUR MISSION: The mission of the Minority Business Enterprise Program is to facilitate the full participation of minority and women owned businesses in the procurement process and to promote economic inclusion as a business imperative essential to the long term economic viability of Lexington-Fayette Urban County Government.

To that end the city council adopted and implemented resolution 167-91—Disadvantaged Business Enterprise (DBE) 10% Goal Plan in July of 1991. The resolution states in part (a full copy is available in Central Purchasing):

> *"A Resolution supporting adoption of the administrative plan for a ten percent (10%) Minimum goal for disadvantaged business enterprise participation in Lexington-Fayette Urban County Government construction and professional services contracts; Providing that as part of their bids on LFUCG construction contracts, general Contractors shall make a good faith effort to award at least ten percent (10%) of All subcontracts to disadvantaged business enterprises; providing that divisions of LFUCG shall make a good faith effort to award at least ten percent of their Professional services and other contracts to disadvantaged business enterprises…"*

A Disadvantaged Business Enterprise is defined as a business that has been certified as being at least 51% owned, operated and managed by a U.S. Citizen of the following groups:

- African-American
- Hispanic-American
- Asian/Pacific Islander
- Native American/Native Alaskan
- Non-Minority Female
- Economically and Socially Disadvantaged

In addition, to that end the city council also adopted and implemented resolution 167-91—Veteran-owned Businesses, 3% Goal Plan in July of 2015. The resolution states in part (a full copy is available in Central Purchasing):

"A resolution adopting a three percent (3%) minimum goal for certified veteran-owned small businesses and service disabled veteran-owned businesses for certain of those Lexington-Fayette Urban County contracts related to construction for professional services, and authorizing the Division of Purchasing to adopt and implement guidelines and/or policies consistent with the provisions and intent of this resolution by no later than July 1, 2015."

We have compiled the list below to help you locate certified MBE, WBE and DBE certified businesses. Below is a listing of contacts for LFUCG Certified MWDBEs in Economic Engine (https://lexingtonky.ionwave.net)

Business	Contact	Email Address	Phone
LFUCG	Sherita Miller	smiller@lexingtonky.gov	859-258-3323
Commerce Lexington – Minority Business Development	Tyrone Tyra	ttyra@commercelexington.com	859-226-1625
Tri-State Minority Supplier Diversity Council	Sonya Brown	sbrown@tsmsdc.com	502-625-0137
Small Business Development Council	Dee Dee Harbut UK SBDC	dharbut@uky.edu	859-257-7668
	Shirie Mack	smack3@email.uky.edu	859-257-7666
Community Ventures Corporation	James Coles	jcoles@cycky.org	859-231-0054
KY Department of Transportation	Melvin Bynes	Melvin.bynes2@ky.gov	502-564-3601
	Shella Eagle	Shella.Eagle@ky.gov	502-564-3601
Ohio River Valley Women's Business Council (WBENC)	Rea Waldon	rwaldon@gcul.org	513-487-6534
Kentucky MWBE Certification Program	Yvette Smith, Kentucky Finance Cabinet	Yvette.Smith@ky.gov	502-564-8099
National Women Business Owner's Council (NWBOC)	Janet Harris-Lange	janet@nwboc.org	800-675-5066
Small Business Administration	Robert Coffey	robertcoffey@sba.gov	502-582-5971
LaVoz de Kentucky	Andres Cruz	lavozdeky@yahoo.com	859-621-2106
The Key News Journal	Patrice Muhammad	paatricem@keynewsjournal.com	859-373-9428

LFUCG MWDBE PARTICIPATION FORM
Bid/RFP/Quote Reference #_____

The MWDBE subcontractors listed have agreed to participate on this Bid/RFP/Quote. If any substitution is made or the total value of the work is changed prior to or after the job is in progress, it is understood that those substitutions must be submitted to Central Purchasing for approval immediately.

MWDBE Company, Name, Address, Phone, Email	Work to be Performed	Total Dollar Value of the Work	% Value of Total Contract
1.			
2.			
3.			
4.			

The undersigned company representative submits the above list of MWDBE firms to be used in accomplishing the work contained in this Bid/RFP/Quote. Any misrepresentation may result in the termination of the contract and/or be subject to applicable Federal and State laws concerning false statements and false claims.

_____ _____

Company **Company Representative**

_____ _____

Date **Title**

LFUCG MWDBE SUBSTITUTION FORM
Bid/RFP/Quote Reference #_____

The substituted MWDBE subcontractors listed below have agreed to participate on this Bid/RFP/Quote. These substitutions were made prior to or after the job was in progress. These substitutions were made for reasons stated below and are now being submitted to Central Purchasing for approval. By the authorized signature of a representative of our company, we understand that this information will be entered into our file for this project.

SUBSTITUTED MWDBE Company Name, Address, Phone, Email	MWDBE Formally Contracted/ Name, Address, Phone, Email	Work to Be Performed	Reason for the Substitution	Total Dollar Value of the Work	% Value of Total Contract
1.					
2.					
3.					
4.					

The undersigned acknowledges that any misrepresentation may result in termination of the contract and/or be subject to applicable Federal and State laws concerning false statements and false claims.

_____ _____
Company **Company Representative**

_____ _____
Date **Title**

MWDBE QUOTE SUMMARY FORM

Bid/RFP/Quote Reference #_____

The undersigned acknowledges that the minority subcontractors listed on this form did submit a quote to participate on this project.

Company Name	Contact Person
Address/Phone/Email	Bid Package / Bid Date

MWDBE Company Address	Contact Person	Contact Information (work phone, Email, cell)	Date Contacted	Services to be performed	Method of Communication (email, phone meeting, ad, event etc)	Total dollars $$ Do Not Leave Blank (Attach Documentation)	MBE * AA HA AS NA Female	Veteran

(MBE designation / AA=African American / HA= Hispanic American/AS = Asian American/Pacific Islander/ NA= Native American)

The undersigned acknowledges that all information is accurate. Any misrepresentation may result in termination of the contract and/or be subject to applicable Federal and State laws concerning false statements and claims.

_____ _____

Company **Company Representative**

_____ _____

Date **Title**

LFUCG SUBCONTRACTOR MONTHLY PAYMENT REPORT

The LFUCG has a 10% goal plan adopted by city council to increase the participation of minority and women owned businesses in the procurement process. In order to measure that goal LFUCG will track spending with MWDBE vendors on a monthly basis. By the signature below of an authorized company representative, you certify that the information is correct, and that each of the representations set forth below is true. Any misrepresentation may result in termination of the contract and/or prosecution under applicable Federal and State laws concerning false statements and false claims. Please submit this form monthly to the Division of Central Purchasing/ 200 East Main Street / Room 338 / Lexington, KY 40507.

Bid/RFP/Quote #_____

Total Contract Amount Awarded to Prime Contractor for this Project_____

Project Name/ Contract #	**Work Period/ From: To:**
Company Name:	**Address:**
Federal Tax ID:	**Contact Person:**

Subcontractor Vendor ID (name, address, phone, email	Description of Work	Total Subcontract Amount	% of Total Contract Awarded to Prime for this Project	Total Amount Paid for this Period	Purchase Order number for subcontractor work (please attach PO)	Scheduled Project Start Date	Scheduled Project End Date

By the signature below of an authorized company representative, you certify that the information is correct, and that each of the representations set forth below is true. Any misrepresentations may result in the termination of the contract and/or prosecution under applicable Federal and State laws concerning false statements and false claims.

_____ _____

Company **Company Representative**

_____ _____

Date **Title**

LFUCG STATEMENT OF GOOD FAITH EFFORTS
Bid/RFP/Quote #_____

By the signature below of an authorized company representative, we certify that we have utilized the following Good Faith Efforts to obtain the maximum participation by MWDBE business enterprises on the project and can supply the appropriate documentation.

_____ Advertised opportunities to participate in the contract in at least two (2) publications of general circulation media; trade and professional association publications; small and minority business or trade publications; and publications or trades targeting minority, women and disadvantaged businesses not less than fifteen (15) days prior to the deadline for submission of bids to allow MWDBE firms to participate.

_____ Included documentation of advertising in the above publications with the bidders good faith efforts package

_____ Attended LFUCG Central Purchasing Economic Inclusion Outreach event

_____ Attended pre-bid meetings that were scheduled by LFUCG to inform MWDBEs of subcontracting opportunities

_____ Sponsored Economic Inclusion event to provide networking opportunities for prime contractors and MWDBE firms

_____ Requested a list of MWDBE subcontractors or suppliers from LFUCG Economic Engine and showed evidence of contacting the companies on the list(s).

_____ Contacted organizations that work with MWDBE companies for assistance in finding certified MWBDE firms to work on this project. Those contacted and their responses should be a part of the bidder's good faith efforts documentation.

_____ Sent written notices, by certified mail, email or facsimile, to qualified, certified MWDBEs soliciting their participation in the contract not less that seven (7) days prior to the deadline for submission of bids to allow them to participate effectively.

_____ Followed up initial solicitations by contacting MWDBEs to determine their level of interest.

_____ Provided the interested MWBDE firm with adequate and timely information about the plans, specifications, and requirements of the contract.

_____ Selected portions of the work to be performed by MWDBE firms in order to increase the likelihood of meeting the contract goals. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate MWDBE participation, even when the prime contractor may otherwise perform these work items with its own workforce

_____ Negotiated in good faith with interested MWDBE firms not rejecting them as unqualified without sound reasons based on a thorough investigation of their capabilities. Any rejection should be so noted in writing with a description as to why an agreement could not be reached.

_____ Included documentation of quotations received from interested MWDBE firms which were not used due to uncompetitive pricing or were rejected as unacceptable and/or copies of responses from firms indicating that they would not be submitting a bid.

_____ Bidder has to submit sound reasons why the quotations were considered unacceptable. The fact that the bidder has the ability and/or desire to perform the contract work with its own forces will not be considered a sound reason for rejecting a MWDBE quote. Nothing in this provision shall be construed to require the bidder to accept unreasonable quotes in order to satisfy MWDBE goals.

_____ Made an effort to offer assistance to or refer interested MWDBE firms to obtain the necessary equipment, supplies, materials, insurance and/or bonding to satisfy the work requirements of the bid proposal

_____ Made efforts to expand the search for MWDBE firms beyond the usual geographic boundaries.

_____ Other - any other evidence that the bidder submits which may show that the bidder has made reasonable good faith efforts to include MWDBE participation.

Failure to submit any of the documentation requested in this section may be cause for rejection of bid. Bidders may include any other documentation deemed relevant to this requirement. Documentation of Good Faith Efforts are to be submitted with the Bid, if the participation Goal is not met.

The undersigned acknowledges that all information is accurate. Any misrepresentations may result in termination of the contract and/or be subject to applicable Federal and State laws concerning false statements and claims.

Company	**Company Representative**
Date	**Title**

GENERAL PROVISIONS

1. Each Respondent shall comply with all Federal, State & Local regulations concerning this type of service or good.

   The Respondent agrees to comply with all statutes, rules, and regulations governing safe and healthful working conditions, including the Occupational Health and Safety Act of 1970, *29 U.S.C. 650 et. seq.*, as amended, and KRS Chapter 338. The Respondent also agrees to notify the LFUCG in writing immediately upon detection of any unsafe and/or unhealthful working conditions at the job site. The Respondent agrees to indemnify, defend and hold the LFUCG harmless from all penalties, fines or other expenses arising out of the alleged violation of said laws.

2. Failure to submit ALL forms and information required in this RFP may be grounds for disqualification.

3. Addenda: All addenda, if any, shall be considered in making the proposal, and such addenda shall be made a part of this RFP. Before submitting a proposal, it is incumbent upon each proposer to be informed as to whether any addenda have been issued, and the failure to cover in the bid any such addenda may result in disqualification of that proposal.

4. Proposal Reservations: LFUCG reserves the right to reject any or all proposals, to award in whole or part, and to waive minor immaterial defects in proposals. LFUCG may consider any alternative proposal that meets its basic needs.

5. Liability: LFUCG is not responsible for any cost incurred by a Respondent in the preparation of proposals.

6. Changes/Alterations: Respondent may change or withdraw a proposal at any time prior to the opening; however, no oral modifications will be allowed. Only letters, or other formal written requests for modifications or corrections of a previously submitted proposal which is addressed in the same manner as the proposal, and received by LFUCG prior to the scheduled closing time for receipt of proposals, will be accepted. The proposal, when opened, will then be corrected in accordance with such written request(s), provided that the written request is contained in a sealed envelope which is plainly marked “modifications of proposal”.

7. Clarification of Submittal: LFUCG reserves the right to obtain clarification of any point in a bid or to obtain additional information from a Respondent.

8. Bribery Clause: By his/her signature on the bid, Respondent certifies that no employee of his/hers, any affiliate or Subcontractor, has bribed or attempted

to bribe an officer or employee of the LFUCG.

9. Additional Information: While not necessary, the Respondent may include any product brochures, software documentation, sample reports, or other documentation that may assist LFUCG in better understanding and evaluating the Respondent's response. Additional documentation shall not serve as a substitute for other documentation which is required by this RFP to be submitted with the proposal,

10. Ambiguity, Conflict or other Errors in RFP: If a Respondent discovers any ambiguity, conflict, discrepancy, omission or other error in the RFP, it shall immediately notify LFUCG of such error in writing and request modification or clarification of the document if allowable by the LFUCG.

11. Agreement to Bid Terms: In submitting this proposal, the Respondent agrees that it has carefully examined the specifications and all provisions relating to the work to be done attached hereto and made part of this proposal. By acceptance of a Contract under this RFP, proposer states that it understands the meaning, intent and requirements of the RFP and agrees to the same. The successful Respondent shall warrant that it is familiar with and understands all provisions herein and shall warrant that it can comply with them. No additional compensation to Respondent shall be authorized for services or expenses reasonably covered under these provisions that the proposer omits from its Proposal.

12. Cancellation: If the services to be performed hereunder by the Respondent are not performed in an acceptable manner to the LFUCG, the LFUCG may cancel this contract for cause by providing written notice to the proposer, giving at least thirty (30) days notice of the proposed cancellation and the reasons for same. During that time period, the proposer may seek to bring the performance of services hereunder to a level that is acceptable to the LFUCG, and the LFUCG may rescind the cancellation if such action is in its best interest.

    A. Termination for Cause

    (1) LFUCG may terminate a contract because of the contractor's failure to perform its contractual duties

    (2) If a contractor is determined to be in default, LFUCG shall notify the contractor of the determination in writing, and may include a specified date by which the contractor shall cure the identified deficiencies. LFUCG may proceed with termination if the contractor fails to cure the deficiencies within the specified time.

(3) A default in performance by a contractor for which a contract may be terminated shall include, but shall not necessarily be limited to:

(a) Failure to perform the contract according to its terms, conditions and specifications;

(b) Failure to make delivery within the time specified or according to a delivery schedule fixed by the contract;

(c) Late payment or nonpayment of bills for labor, materials, supplies, or equipment furnished in connection with a contract for construction services as evidenced by mechanics' liens filed pursuant to the provisions of KRS Chapter 376, or letters of indebtedness received from creditors by the purchasing agency;

(d) Failure to diligently advance the work under a contract for construction services;

(e) The filing of a bankruptcy petition by or against the contractor; or

(f) Actions that endanger the health, safely or welfare of the LFUCG or its citizens.

B. At Will Termination

Notwithstanding the above provisions, the LFUCG may terminate this contract at will in accordance with the law upon providing thirty (30) days written notice of that intent**,** Payment for services or goods received prior to termination shall be made by the LFUCG provided these goods or services were provided in a manner acceptable to the LFUCG. Payment for those goods and services shall not be unreasonably withheld.

13. Assignment of Contract: The contractor shall not assign or subcontract any portion of the Contract without the express written consent of LFUCG. Any purported assignment or subcontract in violation hereof shall be void. It is expressly acknowledged that LFUCG shall never be required or obligated to consent to any request for assignment or subcontract; and further that such refusal to consent can be for any or no reason, fully within the sole discretion of LFUCG.

14. No Waiver: No failure or delay by LFUCG in exercising any right, remedy, power or privilege hereunder, nor any single or partial exercise thereof, nor the exercise of any other right, remedy, power or privilege shall operate as a waiver hereof or thereof. No failure or delay by LFUCG in exercising any right, remedy, power or privilege under or in respect of this Contract shall affect the rights, remedies, powers or privileges of LFUCG hereunder or shall operate as a waiver thereof.

15. Authority to do Business: The Respondent must be a duly organized and

authorized to do business under the laws of Kentucky. Respondent must be in good standing and have full legal capacity to provide the services specified under this Contract. The Respondent must have all necessary right and lawful authority to enter into this Contract for the full term hereof and that proper corporate or other action has been duly taken authorizing the Respondent to enter into this Contract. The Respondent will provide LFUCG with a copy of a corporate resolution authorizing this action and a letter from an attorney confirming that the proposer is authorized to do business in the State of Kentucky if requested. All proposals must be signed by a duly authorized officer, agent or employee of the Respondent.

16. Governing Law: This Contract shall be governed by and construed in accordance with the laws of the Commonwealth of Kentucky. In the event of any proceedings regarding this Contract, the Parties agree that the venue shall be the Fayette County Circuit Court or the U.S. District Court for the Eastern District of Kentucky, Lexington Division. All parties expressly consent to personal jurisdiction and venue in such Court for the limited and sole purpose of proceedings relating to this Contract or any rights or obligations arising thereunder. Service of process may be accomplished by following the procedures prescribed by law.

17. Ability to Meet Obligations: Respondent affirmatively states that there are no actions, suits or proceedings of any kind pending against Respondent or, to the knowledge of the Respondent, threatened against the Respondent before or by any court, governmental body or agency or other tribunal or authority which would, if adversely determined, have a materially adverse effect on the authority or ability of Respondent to perform its obligations under this Contract, or which question the legality, validity or enforceability hereof or thereof.

18. Contractor understands and agrees that its employees, agents, or subcontractors are not employees of LFUCG for any purpose whatsoever. Contractor is an independent contractor at all times during the performance of the services specified.

19. Contractor [or Vendor or Vendor's Employees] will not appropriate or make use of the Lexington-Fayette Urban County Government (LFUCG) name or any of its trade or service marks or property (including but not limited to any logo or seal), in any promotion, endorsement, advertisement, testimonial or similar use without the prior written consent of the government. If such consent is granted LFUCG reserves the unilateral right, in its sole discretion, to immediately terminate and revoke such use for any reason whatsoever. Contractor agrees that it shall cease and desist from any unauthorized use immediately upon being notified by LFUCG.

20. If any term or provision of this Contract shall be found to be illegal or unenforceable, the remainder of the contract shall remain in full force and such term or provision shall be deemed stricken.

_____ _____

Signature Date

AMENDMENT 1 —
CERTIFICATION OF COMPLIANCE FOR AMERICAN RESCUE PLAN ACT EXPENDITURES

The Lexington-Fayette Urban County Government ("LFUCG") may classify the subject matter of this bid as an expenditure under the American Rescue Plan Act of 2021. Expenditures under the American Rescue Plan Act of 2021 require evidence of of the contractor's compliance with Federal law. Therefore, by the signature below of an authorized company representative, you certify that the information below is understood, agreed, and correct. Any misrepresentations may result in the termination of the contract and/or prosecution under applicable Federal and State laws concerning false statements and false claims.

The bidder agrees and understands that in addition to all conditions stated within the attached bid documents, the following conditions will also apply to any Agreement entered between bidder and LFUCG, if LFUCG classifies the subject matter of this bid as an expenditure under the Amerian Rescue Plan Act. The bidder further certifies that it can and will comply with these conditions, if this bid is accepted and an Agreement is executed:

1. Any Agreement executed as a result of acceptance of this bid may be governed in accordance with 2 CFR Part 200 and all other applicable Federal law and regulations and guidance issued by the U.S. Department of the Treasury.

2. Pursuant to 24 CFR 85.43, any Agreement executed as a result of acceptance of this bid can be terminated if the contractor fails to comply with any term of the award. This Agreement may be terminated for convenience in accordance with 24 CFR 85.44 upon written notice by LFUCG. Either party may terminate this Agreement with thirty (30) days written notice to the other party, in which case the Agreement shall terminate on the thirtieth day. In the event of termination, the contractor shall be entitled to that portion of total compensation due under this Agreement as the services rendered bears to the services required. Either party may terminate this Agreement for good cause shown with forty-five (45) days written notice, which shall explain the party's cause for the termination. If the parties do not reach a settlement before the end of the 45 days, then the Agreement shall terminate on the forty-fifth day.

3. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

(1) Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.
(3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.
(4) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
(5) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
(6) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
(7) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part, and the contractor may be declared ineligible for further government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
(8) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance.

Provided, however, that in the event a contractor becomes involved in or is threatened with litigation with a subcontractor or vendor as a result of such direction by the administering

agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

4. If fulfillment of the contract requires the contractor to employ mechanic's or laborers, the contractor further agrees that it can and will comply with the following:

(1) Overtime requirements: No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such a workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such a workweek.

(2) Violation: liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.

(3) Withholding for unpaid wages and liquidated damages. LFUCG shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower-tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower-tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section.

5. The contractor shall comply with all applicable standards, orders, or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq.

6. The contractor shall report each violation to LFUCG and understands and agrees that LFUCG will, in turn, report each violation as required to assure notification to the Treasury Department and the appropriate Environmental Protection Agency Regional Office.

7. The contractor shall include these requirements in numerial paragraphs 5 and 6 in each subcontract exceeding $100,000 financed in whole or in part with American Rescue Plan Act funding.

8. The contractor shall comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq.

9. The contractor shall report each violation to LFUCG and understands and agrees that LFUCG will, in turn, report each violation as required to assure notification to the Treasury Department and the appropriate Environmental Protection Agency Regional Office.

10. The contractor shall include these requirements in numerical paragraphs 8 and 9 in each subcontract exceeding $100,000 financed in whole or in part with American Rescue Plan Act funds.

11. The contractor shall comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq.

12. The contractor shall report each violation to LFUCG and understands and agrees that LFUCG will, in turn, report each violation as required to assure notification to the Treasury Department and the appropriate Environmental Protection Agency regional office.

13. The contractor shall include these requirements in numerical paragraphs 11 and 12 in each subcontract exceeding $100,000 financed in whole or in part with American Rescue Plan Act funds.

14. The contractor shall include this language in any subcontract it executes to fulfill the terms of this bid: “the sub-grantee, contractor, subcontractor, successor, transferee, and assignee shall comply with Title VI of the Civil Rights Act of 1964, which prohibits recipients of federal financial assistance from excluding from a program or activity, denying benefits of, or otherwise discriminating against a person on the basis of race, color, or national origin (42 U.S.C. § 2000d et seq.), as implemented by the Department of the Treasury’s Title VI regulations, 31 CFR Part 22, which are herein incorporated by reference and made a part of this contract (or agreement). Title VI also includes protection to persons with ‘Limited English Proficiency’ in any program or activity receiving federal financial assistance, 42 U.S.C. § 2000d et seq., as implemented by the Department of the Treasury’s Title VI regulations, 31 CFR Part 22, and herein incorporated by reference and made a part of this contract or agreement.”

15. Contractors who apply or bid for an award of $100,000 or more shall file the required certification that it will not and has not used federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency. Each tier certifies to the tier above that it will not and has not used federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-federal funds that takes place in connection with obtaining any federal award. Such

disclosures are forwarded from tier to tier, up to the recipient. The required certification is included here:

a. The undersigned certifies, to the best of his or her knowledge and belief, that:
   (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
   (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
   (3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.
b. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

_____ _____

Signature Date

Firm Submitting Proposal: _____

Complete Address: _____
Street City Zip

Contact Name: _____ Title: _____

Telephone Number: _____ Fax Number: _____

Email address: _____

RISK MANAGEMENT PROVISIONS
INSURANCE AND INDEMNIFICATION

INDEMNIFICATION AND HOLD HARMLESS PROVISION

(1) It is understood and agreed by the parties that Consultant hereby assumes the entire responsibility and liability for any and all damages to persons or property caused by or resulting from or arising out of any act or omission on the part of Consultant or its employees, agents, servants, owners, principals, licensees, assigns or subcontractors of any tier (hereinafter "Consultant") under or in connection with this agreement and/or the provision of goods or services and the performance or failure to perform any work required thereby.

(2) Consultant shall indemnify, save, hold harmless and defend the Lexington-Fayette Urban County Government and its elected and appointed officials, employees, agents, volunteers, and successors in interest (hereinafter "LFUCG") from and against all liability, damages, and losses, including but not limited to, demands, claims, obligations, causes of action, judgments, penalties, fines, liens, costs, expenses, interest, defense costs and reasonable attorney's fees that are in any way incidental to or connected with, or that arise or are alleged to have arisen, directly or indirectly, from or by Consultant's performance or breach of the agreement and/or the provision of goods or services provided that: (a) it is attributable to personal injury, bodily injury, sickness, or death, or to injury to or destruction of property (including the loss of use resulting therefrom), or to or from the negligent acts, errors or omissions or willful misconduct of the Consultant; and (b) not caused solely by the active negligence or willful misconduct of LFUCG.

(3) Notwithstanding, the foregoing, with respect to any professional services performed by Consultant hereunder (and to the fullest extent permitted by law), Consultant shall indemnify, save, hold harmless and defend LFUCG from and against any and all liability, damages and losses, including but not limited to, demands, claims, obligations, causes of action, judgments, penalties, fines, liens, costs, expenses, interest, defense costs and reasonable attorney's fees, for any damage due to death or injury to any person or injury to any property (including the loss of use resulting therefrom) to the extent arising out of, pertaining to or relating to the negligence, recklessness or willful misconduct of Consultant in the performance of this agreement.

(4) In the event LFUCG is alleged to be liable based upon the above, Consultant shall defend such allegations and shall bear all costs, fees and expenses of such defense, including but not limited to, all reasonable attorneys' fees and expenses, court costs, and expert witness fees and expenses, using attorneys approved in writing by LFUCG, which approval shall not be unreasonably withheld.

(5) These provisions shall in no way be limited by any financial responsibility or insurance requirements, and shall survive the termination of this agreement.

(6) LFUCG is a political subdivision of the Commonwealth of Kentucky. CONSULTANT acknowledges and agrees that LFUCG is unable to provide indemnity or otherwise save, hold harmless, or defend the CONSULTANT in any manner.

FINANCIAL RESPONSIBILITY

CONSULTANT understands and agrees that it shall, prior to final acceptance of its proposal and the commencement of any work or services, demonstrate the ability to assure compliance with the above Indemnity provisions and these other risk management provisions.

INSURANCE REQUIREMENTS

YOUR ATTENTION IS DIRECTED TO THE INSURANCE REQUIREMENTS BELOW, AAND YOU MAY NEED TO CONFER WITH YOUR INSURANCE AGENTS, BROKERS, OR CARRIERS TO DETERMINE IN ADVANCE OF SUBMISSION OF A RESPONSE THE AVAILABILITY OF THE INSURANCE COVERAGES AND ENDORSEMENTS REQUIRED HEREIN. IF YOU FAIL TO COMPLY WITH THE INSURANCE REQUIREMENTS BELOW, YOU MAY BE DISQUALIFIED FROM AWARD OF THE CONTRACT.

Required Insurance Coverage

CONSULTANT shall procure and maintain for the duration of this contract the following or equivalent insurance policies at no less than the limits shown below and cause its subcontractors to maintain similar insurance with limits acceptable to LFUCG in order to protect LFUCG against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work or services hereunder by CONSULTANT. The cost of such insurance shall be included in any bid:

Coverage	**Limits**
General Liability (Insurance Services Office Form CG 00 01)	$1 million per occurrence, $2 million aggregate or $2 million combined single limit
Professional Liability	$1 million per occurrence
Worker's Compensation	Statutory
Employer's Liability	$100,000

The policies above shall contain the following conditions:

a. All Certificates of Insurance forms used by the insurance carrier shall be properly filed and approved by the Department of Insurance for the Commonwealth of Kentucky. LFUCG shall be named as an additional insured in the General Liability Policy and Commercial Automobile Liability Policy using the Kentucky DOI approved forms.

b. The General Liability Policy shall be primary to any insurance or self-insurance retained by LFUCG.

c. The General Liability Policy shall include a Products and Completed Operations endorsement or Premises and Operations Liability endorsement and a Products Liability endorsement unless they are deemed not to apply by LFUCG.

d. The General Liability Policy shall have a Professional Liability endorsement (including Errors and Omissions) for any services performed pursuant to the contract, and/or a separate Professional Liability Policy shall be obtained unless it is deemed not to apply by LFUCG.

e. The Professional Liability policy shall be maintained for a minimum of three years beyond the completion date of the project, to the extent commercially available. If not commercially available, CONSULTANT shall notify LFUCG and obtain similar insurance that is commercially available and acceptable to LFUCG.

f. LFUCG shall be provided at least 30 days advance written notice via certified mail, return receipt requested, in the event any of the required policies are canceled or non-renewed.

g. Said coverage shall be written by insurers acceptable to LFUCG and shall be in a form acceptable to LFUCG. Insurance placed with insurers with a rating classification of no less than Excellent (A or A-) and a financial size category of no less than VIII, as defined by the most current Best's Key Rating Guide shall be deemed automatically acceptable.

Renewals

After insurance has been approved by LFUCG, evidence of renewal of an expiring policy must be submitted to LFUCG, and may be submitted on a manually signed renewal endorsement form. If the policy or carrier has changed, however, new evidence of coverage must be submitted in accordance with these Insurance Requirements.

Deductibles and Self-Insured Programs

IF YOU INTEND TO SUBMIT A SELF-INSURANCE PLAN IT MUST BE FORWARDED TO LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT, DIVISION OF RISK MANAGEMENT, 200 EAST MAIN STREET, LEXINGTON, KENTUCKY 40507 NO LATER THAN A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO THE RESPONSE DATE. Self-insurance programs, deductibles, and self-

insured retentions in insurance policies are subject to separate approval by Lexington-Fayette Urban County Government's Division of Risk Management, upon review of evidence of CONSULTANT's financial capacity to respond to claims. Any such programs or retentions must provide LFUCG with at least the same protection from liability and defense of suits as would be afforded by first-dollar insurance coverage. If CONSULTANT satisfies any portion of the insurance requirements through deductibles, self-insurance programs, or self-insured retentions, CONSULTANT agrees to provide Lexington-Fayette Urban County Government, Division of Risk Management, the following data prior to the final acceptance of bid and the commencement of any work:

a. Latest audited financial statement, including auditor's notes.

b. Any records of any self-insured trust fund plan or policy and related accounting statements.

c. Actuarial funding reports or retained losses.

d. Risk Management Manual or a description of the self-insurance and risk management program.

e. A claim loss run summary for the previous five (5) years.

f. Self-Insured Associations will be considered.

Safety and Loss Control

CONSULTANT shall comply with all applicable federal, state, and local safety standards related to the performance of its works or services under this Agreement and take necessary action to protect the life, health and safety and property of all of its personnel on the job site, the public, and LFUCG.

Verification of Coverage

CONSULTANT agrees to furnish LFUCG with all applicable Certificates of Insurance signed by a person authorized by the insurer to bind coverage on its behalf prior to final award, and if requested, shall provide LFUCG copies of all insurance policies, including all endorsements.

Right to Review, Audit and Inspect

CONSULANT understands and agrees that LFUCG may review, audit and inspect any and all of its records and operations to insure compliance with these Insurance Requirements.

DEFAULT

CONSULTANT understands and agrees that the failure to comply with any of these insurance, safety, or loss control provisions shall constitute default and that LFUCG

may elect at its option any single remedy or penalty or any combination of remedies and penalties, as available, including but not limited to purchasing insurance and charging CONSULTANT for any such insurance premiums purchased, or suspending or terminating the work.

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ENGINEERING SERVICES AGREEMENT

THIS IS AN AGREEMENT made as of_____, 2022, between the **LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT**, an urban county government of the Commonwealth of Kentucky pursuant to KRS Chapter 67A ("**OWNER**") and _____ with offices located at_____ ("**CONSULTANT**"). **OWNER** intends to proceed with the _____as described in the attached **EXHIBIT A**, Scope of Engineering Services and Related Matters RFP #27-2022 (the "**PROJECT**"). The **CONSULTANT** shall perform professional engineering services and deliverables as described in **EXHIBIT A** which include customary master planning, civil, geotechnical, electrical, mechanical, structural, programming, water quality and sanitary engineering services as related to providing the deliverables specific to this agreement–that will assist the **OWNER** in successfully implementing the **PROJECT** and complying with any requirements which are related to the Consent Decree entered in a case styled *United States & Commonwealth of Kentucky* v. *Lexington Fayette Urban County Government,* United States District Court for the Eastern District of Kentucky, Civil Action No. 5:06-cv-386-KSF (the "**CONSENT DECREE**"). The services are hereinafter referred to as the **PROJECT**. **The primary goal of the PROJECT is to provide the OWNER with the technical support necessary to successfully meet the obligations and deadlines of the CONSENT DECREE. OWNER** and **CONSULTANT** in consideration of their mutual covenants herein agree in respect of the performance of professional engineering services by **CONSULTANT** and the payment for those services by **OWNER** as set forth below.

CONSULTANT shall provide professional consulting services for **OWNER** in all phases of the **PROJECT** to which this Agreement applies, serve as **OWNER'S** professional engineering representative for the **PROJECT** as set forth below and shall give professional consultation and advice to **OWNER** during the performance of services hereunder.

SECTION 1 - BASIC SERVICES OF CONSULTANT

1.1. General

CONSULTANT shall perform professional services as hereinafter stated that include customary civil, geotechnical, structural, mechanical, electrical and sanitary engineering services incidental thereto.

1.2. Incorporated Documents

The following documents are incorporated by reference as part of this Agreement:

1. The **CONSENT DECREE**, as may be amended, including all appendices.
2. **EXHIBIT A** – Scope of Engineering Services and Related Matters RFP #27-2022 (Including Addendums).
3. **EXHIBIT B** – Certificate of Insurance and Evidence of Insurability.
4. **EXHIBIT C** – Proposal of Engineering Services and Related Matters (the **CONSULTANT'**s response to RFP 27-2022).
5. **EXHIBIT D** – Further Description of Basic Engineering Services and Related Matters.

To the extent of any conflict among the provisions of these documents and/or this Agreement, the provisions of this Agreement shall control, followed by the provisions of **EXHIBIT A**, then **EXHIBIT D, and then EXHIBIT C**.

1.3 Project Phase

A complete description of the duties and responsibilities of the **CONSULTANT** are as indicated in **EXHIBIT A**, Scope of Engineering Services and Related Matters RFP #27-2022, **EXHIBIT C** Proposal of Engineering Services and Related Matters, and **Exhibit D** Further Description of Basic Engineering Services and Related Matters. After written authorization to proceed from the **OWNER**, **CONSULTANT** shall:

1.3.1. Notify the **OWNER** in writing of its authorized representative who shall act as Project Engineer and liaison representative between the **CONSULTANT** and the **OWNER**. **OWNER** has the right to approve the Project Engineer, or any change thereto, which approval shall not be unreasonably withheld.

1.3.2. The **CONSULTANT** **must perform all duties** **necessary to fully complete the deliverables as further described in attached EXHIBIT A,** Scope of Engineering Services and Related Matters RFP #27-2022, attached **EXHIBIT C,** Proposal of Engineering Services and Related Matters**,** and attached **EXHIBIT D** Further Description of Basic Engineering Services and Related Matters **unless otherwise agreed to in writing by the parties.**

1.3.3 The **CONSULTANT** shall provide written documentation of all meetings and be responsible for incorporating all comments and changes resulting therefrom in final work product.

1.3.4. The **CONSULTANT** shall submit five (5) copies (hardcover) of all initial draft final work products for this **PROJECT** unless otherwise described in Exhibit A. The copies of the initial draft final reports are submitted for review and comment by the **OWNER**, and should be presented in person to the **OWNER**.

1.3.5. After the **OWNER'S** detailed review, the **CONSULTANT** will revise the initial draft final for all work products for this **PROJECT**, and the **CONSULTANT** shall submit five (5) copies (hardcover) unless otherwise described in Exhibit A. One electronic copy of the all work products for this **PROJECT**, including all appendices, shall be provided and prepared in such a manner that it can readily be converted to a quick-link accessible form for the **OWNER'S** Website. The **OWNER** shall have ten (10) business days within which to accept or deny each such final draft. If it is denied, the **OWNER** shall provide a detailed explanation in writing for the basis of such denial. Once the OWNER accepts the draft as final, a total of five (5) final copies (hardcover) are required in addition to an electronic copy unless otherwise described in Exhibit A.

1.3.6 Immediately notify **OWNER** of any delay in the delivery of a work product or deliverable, regardless of cause. Give written notice to **OWNER** within five (5) business days whenever **CONSULTANT** observes or otherwise becomes aware of any development that affects the scope or timing of **CONSULTANT'S** services, or any defect in the work of Contractor(s).

SECTION 2 - EXTRA WORK BY CONSULTANT

2.1. The **OWNER** may desire to have the **CONSULTANT** perform work or render services in connection with this **PROJECT** other than provided by the expressed intent of this Agreement. Such work shall be considered as Extra Work, subject to a change order, supplemental to this Agreement, setting forth the character and scope thereof and the compensation therefore. Work under such change order shall not proceed until the **OWNER** gives written authorization. Should the **OWNER** find it desirable to have previously satisfactorily completed and accepted plans or parts thereof revised, the **CONSULTANT** shall make such revisions as directed, in writing, by the **OWNER**. This work shall be considered as Extra Work and shall be paid as such.

2.2. All Extra Work is subject to prior written authorization of **OWNER** and necessary appropriations made by the Urban County Council.

SECTION 3 - OWNER'S RESPONSIBILITIES

OWNER shall:

3.1. Provide criteria and information as to **OWNER'S** requirements for the **PROJECT**, including design objectives and constraints, space, capacity and performance requirements, flexibility and expandability, and any budgetary limitations.

3.2. Assist **CONSULTANT** by placing at his disposal available information pertinent to the Project.

3.3. Examine all studies, reports, sketches, drawings, specifications, proposals and other documents presented by **CONSULTANT**, and provide written approval or disapproval thereof within a reasonable time so as not to delay the services of **CONSULTANT**.

3.4. Designate in writing a person to act as **OWNER'S** representative agent with respect to the services to be rendered under this Agreement (see Section 8.1.1.). Such person shall have complete authority to transmit instructions, receive information, interpret, and define **OWNER'S** policies and decisions with respect to materials, equipment, elements, and systems pertinent to **CONSULTANT'S** services.

3.5. Give written notice to **CONSULTANT** whenever **OWNER** observes or otherwise becomes aware of any development that affects the scope or timing of **CONSULTANT'S** services, or any defect in the work of **CONSULTANT**.

3.6. Furnish or direct **CONSULTANT** to provide, Extra Work as stipulated in Section Two (2) of this Agreement or other services as required.

SECTION 4 - PERIOD OF SERVICES

4.1. Time is of the essence in the performance of this Agreement. **CONSULTANT** is aware that the **OWNER** is subject to penalties for non-compliance with the **CONSENT DECREE** deadlines. See attached **EXHIBIT A** for the overall current project schedule.

4.2. The provisions of this Section Four (4) and the various rates of compensation for **CONSULTANT'S** services provided for elsewhere in this Agreement have been agreed to in anticipation of the orderly and continuous progress of the **PROJECT** through completion.

4.3. If a delay results from the acts of **OWNER** or another entity that is required to permit or

approve the work or services, an extension of time for such delay will be considered by **OWNER**.

4.3.1. If the above type of delay occurs and **CONSULTANT** wants an extension of time, it must, within ten (10) days from the date of the delay, apply in writing to **OWNER** for an extension of time for a reasonable period, which must be agreed upon by **OWNER**.

4.3.2. If the extension of time is approved by **OWNER**, the **PROJECT** schedule shall be revised to reflect the extension. Such extension of time to the completion date shall in no way be construed to operate as a waiver on the part of **OWNER** of any of its other rights in the Agreement.

4.3.3. If the above type of delay would prevent complete performance of the **PROJECT** within sixty (60) days of the time specified therein, **OWNER** shall have the option of cancelling the **PROJECT** or otherwise adjusting the scope of the services or work.

4.3.4. If the parties cannot mutually agree to an extension of time or an adjustment, Section 6.5 under "DISPUTES" of this Agreement shall apply.

4.4. If delays result solely by reason of acts of the **CONSULTANT**, the **CONSULTANT** shall be held liable for any financial penalties incurred by the **OWNER** as a result of the delay**, including but not limited to those assessed pursuant to the CONSENT DECREE**. Section 6.5 of this Agreement (**Disputes**), shall apply in the event the parties cannot mutually agree upon the cause(s) associated with delays in completing project deliverables. The **CONSULTANT** must immediately notify the **OWNER** in the event of such delay, and provide the **OWNER** a written action plan within five (5) business days on how it will attempt to resolve the delay.

SECTION 5 - PAYMENTS TO CONSULTANT

5.1. Methods of Payment for Services of CONSULTANT.

5.1.1. For Basic Services

OWNER shall issue individual task orders for each work assignment performed under this Agreement by **CONSULTANT** or its sub-consultant/s. Each task order shall contain scope of work, fee, and schedule for performance of the work. Individual task orders shall be of the form included in **EXHIBIT D**.

5.1.1.a Fee payable to **CONSULTANT** under individual task order shall be developed using hourly rates included in **EXHIBIT D** or as amended in accordance with provisions therein.

5.1.1.b Terms of payment to **CONSULTANT** shall be specified in each task order. For assignments with defined scope, lump sum task orders shall be issued. Otherwise, task orders shall include time and materials payment terms.

5.1.1.c Each task order issued shall receive prior written approval of **OWNER** prior to **CONSULTANT** proceeding with said work. The **OWNER's** designated agent in Section 8.1.1. shall be the only person authorized to provide such approval.

5.1.2. For Extra Work

Extra Work shall be paid for by the **OWNER** on the basis of a fixed fee, the amount of which shall be determined by negotiation. The **OWNER** shall have the right to negotiate alternate methods of payment for Extra Work if the **OWNER** determines that the fixed fee basis is not feasible. In the event the **OWNER** and the **CONSULTANT** are unable to agree upon the amount of payment for Extra Work, then the amount of such payment shall be determined pursuant to Section 6.5 (**Disputes**).

5.2. Times of Payment

5.2.1 **CONSULTANT** shall submit to **OWNER** detailed monthly statements for Basic Services and Extra Work rendered. The Statements will be based upon **CONSULTANT'S** estimate of the proportion of the total services actually completed at the time of billing. **OWNER** shall respond to **CONSULTANT'S** monthly statements within thirty (30) days, either denying payment or making payment.

5.3. Other Provisions Concerning Payments

5.3.1. In the event the Agreement is terminated by the **OWNER** without fault on the part of the **CONSULTANT**, the **CONSULTANT** shall be paid for the work performed or services rendered for which it has not already been paid in an amount bearing the same ratio to the total Agreement fee as the amount of work completed or partially completed and delivered to the **OWNER** is to the total amount of work provided for herein, as determined by mutual agreement between the **OWNER** and the **CONSULTANT**.

5.3.2. In the event the services of the **CONSULTANT** are terminated by the **OWNER** for fault on the part of the **CONSULTANT**, the **CONSULTANT** shall be paid reasonable value of the work performed or services rendered and delivered for which it has not already been paid, and the amount to be paid shall be determined by the **OWNER**.

SECTION 6 - GENERAL CONSIDERATIONS

6.1. Termination

6.1.1. **CONSULTANT may only terminate this Agreement** due to **OWNER'S** material breach of the terms hereof which breach causes **CONSULTANT** to be unable to perform its duties and responsibilities under this Agreement and upon forty-five (45) days written advance notice to **OWNER**.

6.1.2. The **OWNER** may terminate this Agreement for cause upon seven (7) business days written advance notice to the **CONSULTANT**. The **OWNER** reserves the right to terminate the Agreement for any reason whatsoever, with or without cause, at any time upon thirty (30) days written advance notice to the **CONSULTANT**.

6.2. Ownership and Reuse of Documents

All documents, including raw data, reports, drawings and specifications, prepared by the **CONSULTANT** pursuant to this Agreement shall be delivered to and become the property of the **OWNER**. The **OWNER** shall have the right to reuse same without restriction or limitation, but without liability or legal exposure to **CONSULTANT**.

6.3. Legal Responsibilities and Legal Relations

6.3.1. The **CONSULTANT** shall familiarize itself with and shall at all times comply with the **CONSENT DECREE** and all federal, state, and local laws, ordinances, and regulations that in any manner affect the services of this Agreement.

6.3.2. In performing the services hereunder, the **CONSULTANT** and its consultants, employees, agents and representatives shall not be deemed or construed to be employees of **OWNER** in any manner whatsoever. Except as otherwise provided in this Agreement, the **CONSULTANT** shall be acting as an independent contractor. The **CONSULTANT** shall not hold itself out as, nor claim to be, an officer or employee of **OWNER** by reason hereof and shall not make any claim, demand or application to or for any right or privilege applicable to an officer or employee of **OWNER**. The **CONSULTANT** shall be solely responsible for any claims for wages or compensation by **CONSULTANT'S** employees, agents and representatives, including consultants, and shall save and hold **OWNER** harmless therefrom.

6.3.3. The parties hereto agree that causes of actions between the parties shall be governed by applicable provisions of the Kentucky Revised Statues, and that venue of any legal action shall be a court of appropriate jurisdiction in Fayette County, Kentucky. The parties further agree that Kentucky law shall apply with respect to the interpretation of any provision of this Agreement.

6.4. Successors and Assigns

6.4.1. **CONSULTANT** binds itself and its partners, successors, assigns and legal representatives to this Agreement. **CONSULTANT** shall not assign any interest in this Agreement without prior written consent of **OWNER**. **OWNER'S** consent shall not relieve the **CONSULTANT** of any responsibility for compliance with the provisions of this Agreement.

6.4.2. **In no event shall** the **CONSULTANT** subcontract more than fifty percent (50%) of the work, based upon dollar value of the work.

6.4.3. Nothing herein shall be construed to give any rights or benefits hereunder to anyone other than **OWNER** and **CONSULTANT**.

6.5. Disputes

Except as otherwise provided in this Agreement, any dispute hereunder may be resolved by agreement of the **OWNER'S** Agent (Section 8.1.1) and the **CONSULTANT.** In the absence of such an agreement, the dispute shall be submitted to the **OWNER'S** Commissioner, Department of Environmental Quality, whose decision shall be final and conclusive unless determined by a court of competent jurisdiction to have been fraudulent, capricious,

arbitrary, or so grossly erroneous as necessarily to imply bad faith. Pending a final decision of a dispute hereunder, the **CONSULTANT** shall proceed diligently with the performance of the Agreement in accordance with the directions of the **OWNER**.

6.6. Accuracy of Consultant's Work

CONSULTANT shall be required to perform this Agreement in accordance with the degree of ordinary and reasonable skill and care usually exercised by professional engineers prevailing at the time, place and under similar conditions as the services hereunder are rendered. **CONSULTANT** shall be responsible for the accuracy of all work, even though raw data, reports, Drawings and Specifications have been accepted by **OWNER**, and it shall make any necessary revisions or corrections resulting from its errors and/or omissions for no additional compensation. By submission of reports, soils and subsurface information, quantities estimates, calculations and Drawings and Specifications to **OWNER**, **CONSULTANT** has made an incontrovertible representation that the information is accurate within the appropriate standard of skill and care. Failure on the part of **CONSULTANT** to provide the expected level of accuracy may be grounds for **OWNER** to terminate this Agreement

6.7. Security Clause

The **CONSULTANT** certifies that he shall not at any time release or divulge any information concerning the services covered by this Agreement to any person or any public or private organization without prior approval of the **OWNER** unless otherwise required by law

6.8. Access to Records

The **CONSULTANT** and its sub-consultants shall maintain all books, documents, papers, and accounting records, and make such materials available at their respective offices at all reasonable times during the Agreement period and for three (3) years from the date of final payment under the Agreement for inspection by the **OWNER**, and copies thereof shall be furnished if requested. Failure to maintain such records for three (3) years after the date of final payment may be grounds for the **OWNER** to disqualify the **CONSULTANT** from consideration for future consultant engineering Agreements.

6.9. Risk Management Provisions, Insurance and Indemnification

6.9.1. DEFINITIONS

The **CONSULTANT** understands and agrees that the Risk Management Provisions of this Agreement define the responsibilities of the **CONSULTANT** to the **OWNER**.

As used in these Risk Management Provisions, the terms "**CONSULTANT"** and "**OWNER"** shall be defined as follows:

a. **CONSULTANT** means the consultant and its employees, agents, servants, owners, principals, licensees, assigns and subcontractors of any tier.

b. **OWNER** means the Lexington-Fayette Urban County Government and its elected and appointed officials, employees, agents, boards, assigns, volunteers, and successors in interest.

6.9.2. INDEMNIFICATION AND HOLD HARMLESS PROVISION

a. It is understood and agreed by the parties that **CONSULTANT** hereby assumes the entire responsibility and liability for any and all damages to persons or property caused by or resulting from or arising out of any act or omission on the part of **CONSULTANT** or its employees, agents, servants, owners, principals, licensees, assigns or subcontractors of any tier (hereinafter "**CONSULTANT**") under or in connection with this agreement and/or the provision of goods or services and the performance or failure to perform any work required thereby.

b. **CONSULTANT** shall indemnify, save, hold harmless and defend the Lexington-Fayette Urban County Government and its elected and appointed officials, employees, agents, volunteers, and successors in interest (hereinafter "**OWNER**") from and against all liability, damages, and losses, including but not limited to, demands, claims, obligations, causes of action, judgments, penalties, fines, liens, costs, expenses, interest, defense costs and reasonable attorney's fees that are in any way incidental to or connected with, or that arise or are alleged to have arisen, directly or indirectly, from or by **CONSULTANT**'s performance or breach of the agreement and/or the provision of goods or services provided that: (a) it is attributable to personal injury, bodily injury, sickness, or death, or to injury to or destruction of property (including the loss of use resulting therefrom), or to or from the negligent acts, errors or omissions or willful misconduct of the **CONSULTANT**; and (b) not caused solely by the active negligence or willful misconduct of **OWNER**.

c. Notwithstanding, the foregoing, with respect to any professional services performed by **CONSULTANT** hereunder (and to the fullest extent permitted by law), **CONSULTANT** shall indemnify, save, hold harmless and defend **OWNER** from and against any and all liability, damages and losses, including but not limited to, demands, claims, obligations, causes of action, judgments, penalties, fines, liens, costs, expenses, interest, defense costs and reasonable attorney's fees, for any damage due to death or injury to any person or injury to any property (including the loss of use resulting therefrom) to the extent arising out of, pertaining to or relating to the negligence, recklessness or willful misconduct of **CONSULTANT** in the performance of this agreement.

d. In the event **OWNER** is alleged to be liable based upon the above, **CONSULTANT** shall defend such allegations and shall bear all costs, fees and expenses of such defense, including but not limited to, all reasonable attorneys' fees and expenses, court costs, and expert witness fees and

expenses, using attorneys approved in writing by **OWNER**, which approval shall not be unreasonably withheld.

e. These provisions shall in no way be limited by any financial responsibility or insurance requirements, and shall survive the termination of this agreement.

f. **OWNER** is a political subdivision of the Commonwealth of Kentucky. **CONSULTANT** acknowledges and agrees that **OWNER** is unable to provide indemnity or otherwise save, hold harmless, or defend the **CONSULTANT** in any manner.

6.9.3. DAMAGES RELATED TO NONPERFORMANCE OR DELAY BY CONSULTANT

In the event that **CONSULTANT**'S delay or other nonperformance of its obligations hereunder results in the imposition of penalties against the **OWNER** pursuant to the **CONSENT DECREE**, or the **OWNER** otherwise suffers damage as a result of such delay or nonperformance, **CONSULTANT s**hall be solely liable to **OWNER** for any and all such damages, including any costs and attorney's fees.

6.9.4. FINANCIAL RESPONSIBILITY

The **CONSULTANT** understands and agrees that the **CONSULTANT** shall, prior to final acceptance of the **CONSULTANT'S** proposal and the commencement of any work; demonstrate the ability to assure compliance with the Indemnity Agreement and other provisions of this Agreement.

6.9.5. INSURANCE REQUIREMENTS

6.9.5.1. Required Insurance Coverage

CONSULTANT shall procure and maintain for the duration of this Agreement the following or equivalent insurance policies at no less than the limits shown below and cause its subcontractors to maintain similar insurance with limits acceptable to **OWNER** in order to protect **OWNER** against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by **CONSULTANT**. The cost of such insurance shall be included in any proposal:

Coverage	**Limits**
General Liability (Insurance Services Office Form CG 00 01)	$1 million per occurrence, $2 million aggregate or $2 million combined single limit
Commercial Automobile Liability (Insurance Services Office Form CA 0001)	combined single, $1 million per occurrence
Professional Liability	$1 million per occurrence, $ 2 million aggregate
Worker's Compensation	Statutory
Employer's Liability	$500,000.00

The policies above shall contain the following conditions:

a. **OWNER** shall be named as an additional insured in the General Liability Policy and Commercial Automobile Liability Policy.

b. The General Liability Policy shall be primary to any insurance or self-insurance retained by **OWNER**.

c. The General Liability Policy shall include Business Interruption coverage.

d. The Contractor shall carry Builders Risk coverage at a level sufficient to cover the replacement cost of any equipment or machinery used at the work site, if applicable.

e. The General Liability Policy shall include a Pollution Liability endorsement and/or Environmental Casualty coverage unless it is deemed not to apply by **OWNER**.

f. The General Liability Policy shall have a Professional Liability endorsement (including Errors and Omissions), which shall include Business interruption coverage and this policy or endorsement shall include Environmental Casualty coverage for any services performed pursuant to the contract, and/or a separate Professional Liability Policy shall be obtained unless it is deemed not to apply by **OWNER**. (**OWNER** does not need to be named as additional insured).

g. **OWNER** shall be provided at least 30 days advance written notice via certified mail, return receipt requested, in the event any of the required policies are canceled or non-renewed.

h. The Professional Liability policy shall be maintained for a minimum of three years beyond the completion date of the project, to the extent commercially available. If not commercially available, **CONSULTANT** shall notify **OWNER** and obtain similar insurance that is commercially available and acceptable to **OWNER**.

i. Said coverage shall be written by insurers acceptable to **OWNER** and shall be in a

form acceptable to **OWNER**. Insurance placed with insurers with a rating classification of no less than Excellent (A or A-) and a financial size category of no less than VIII, as defined by the most current Best's Key Rating Guide shall be deemed automatically acceptable.

6.9.5.2. Renewals

After insurance has been approved by **OWNER**, evidence of renewal of an expiring policy must be submitted to **OWNER**, and may be submitted on a manually signed renewal endorsement form. If the policy or carrier has changed, however, new evidence of coverage must be submitted in accordance with these Insurance Requirements.

6.9.5.3. Right to Review, Audit and Inspect

CONSULTANT understands and agrees that **OWNER** may review, audit and inspect any and all of **CONSULTANT'S** records and operations to insure compliance with these Insurance Requirements.

6.9.6. SAFETY AND LOSS CONTROL

CONSULTANT shall comply with all applicable federal, state, and local safety standards related to the performance of its works or services under this Agreement and take necessary action to protect the life, health and safety and property of all of its personnel on the job site, the public, and **OWNER**.

6.9.7. DEFINITION OF DEFAULT

CONSULTANT understands and agrees that the failure to comply with any of these insurance, safety, or loss control provisions shall constitute default under this Agreement. **CONSULTANT** also agrees that **OWNER** may elect as its option any single remedy or penalty or any combination of remedies and penalties, as available, including but not limited to purchasing insurance and charging **CONSULTANT** for any such insurance premiums purchased, or suspending or terminating this Agreement.

SECTION 7 - EQUAL EMPLOYMENT OPPORTUNITY

During the performance of this Agreement, the **CONSULTANT** agrees as follows:

7.1. The **CONSULTANT** will not discriminate against any employee or application for employment because of race, color, religion, national origin, sex, age, or handicap. The **CONSULTANT** will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, national origin, sex, age, or handicap. Such action shall include, but not be limited to the following: employment upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeships. The **CONSULTANT** agrees to post in conspicuous

places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this non-discrimination clause.

7.2. The **CONSULTANT** will, in all solicitations or advertisements for employees placed by or on behalf of the **CONSULTANT**, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, national origin, sex, age (between forty and seventy), or handicap.

SECTION 8 - SPECIAL PROVISIONS, EXHIBITS, AND SCHEDULES

8.1. This Agreement is subject to the following provisions.

8.1.1. Pursuant to subparagraph 3.4 of this Agreement, **OWNER** has assigned Charles H. Martin, P.E., Director of the Division of Water Quality (the "**OWNER'S** Agent"), as the authorized agent of **OWNER**, to monitor, direct and review the performance of work of the **CONSULTANT**. Documents, data, reports, and all matters associated with carrying out this Agreement shall be addressed to the **OWNER'S** Agent or his designee. Questions by the **CONSULTANT** regarding interpretations of the terms, provisions and requirements under this Agreement shall be addressed to the **OWNER'S** Agent or his designee. The **CONSULTANT** shall look only to the **OWNER'S** Agent or his designee for direction in its performance under this Agreement; no other direction shall be binding upon **OWNER**. **OWNER** shall respond to written requests by **CONSULTANT** within thirty (30) days.

8.2. This Agreement, together with the Incorporated Documents (Section 1.2) constitutes the entire Agreement between **OWNER** and **CONSULTANT** and supersedes all prior written or oral understandings. This Agreement and **EXHIBITS A, B, C and D** and any related schedules or documents may only be amended, supplemented, modified or canceled by a duly executed written instrument.

8.3. **NO THIRD PARTY RIGHTS.** This agreement does not create a contractual relationship with or right of action in favor of a third party against either **OWNER** or **CONSULTANT.**

8.4 **UNENFORCEABLE TERMS/SURVIVABILITY**. If any term or provision of this Agreement shall be found to be illegal or unenforceable, this Agreement shall remain in full force and such term or provision shall be deemed stricken. The provisions of Section 6 of this Agreement shall survive its termination.

8.5. **NON-WAIVER.** The failure of either party to enforce any right reserved to it in this Agreement shall not be a waiver of any such right to which the party is entitled.

IN WITNESS WHEREOF, the parties hereto have made and executed this Agreement as of the day and year first above written.

OWNER:
LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT

BY: _____
LINDA GORTON, MAYOR

ATTEST:

_____
URBAN COUNTY COUNCIL CLERK

CONSULTANT:
_____

BY: _____

COMMONWEALTH OF KENTUCKY)
)
COUNTY OF FAYETTE)

The foregoing Agreement was subscribed, sworn to and acknowledged before me by _____, as the duly authorized representative for and on behalf of _____, on this the ____ day of _____, 2022.

My commission expires: _____.

_____
NOTARY PUBLIC

Scope of Services RFP #27-2022
Request for Proposals (RFP) and Hourly Rates for
Professional Engineering Services
Town Branch 5 Sub Drainage Area

Overview

This RPF covers two TASKS that have deliverables that have a physical relationship with each other.

TASK A: Complete a condition assessment of a defined area. This includes mapping, coordinating physical inspection of assets, hydraulic / hydrologic (H&H) modeling, public outreach and communication with production of a final report.

TASK B: Provide a recommendation, supported by a physical assessment / survey of system geometry, which allows for the future relocation of existing storm and sanitary sewers that are under existing structure and within/adjacent to the area being evaluated in TASK A.

Details regarding each task are provided in the Scope of Services section beginning on page 5.

Background

The defined project area identified as Town Branch 5 has historically experienced chronic surface water flooding and basement backup events that have increased in frequency over the past decade. These events typically occur during and after intense storm events (greater than 3 inches with a six-hour period) but more recently events have occurred in the absence of an intense storm event. The true root causes of these flooding and basement backup events are unknown. The primary goals of this project is to fully evaluate the infrastructure intended to convey stormwater and sewage safely away from the neighborhood, make recommendations for improving that infrastructure and to provide preliminary cost estimates for the final design and construction of recommended improvements. Recommendations for further evaluation will be accepted but are not likely to become part of this scope. There will be no design, program management or construction management services associated with this project, the selected firm(s) responsibility will contractually end upon acceptance of the final report.

Goals and Objectives

The primary goal and objective of this project is to identify alternatives and develop a future action plan for abating storm water and sanitary sewer service complaints within the project area for the target design storms.

Overview

This Scope of Engineering Services provides a minimum set of project management guidelines, tasks, and activities requiring:

1. The development of infrastructure mapping, compatible with LFUCG's GIS database, which validates the actual connectivity and geometry of the exiting sanitary sewer and storm sewer network within the defined project area.
2. The management of LFUCG employed contractors who have the skill and capacity to:
    a. Internally clean and inspect storm and sanitary infrastructure using conventional jet-vacuum cleaning and close circuit television (CCTV) inspection equipment.
    b. Execute smoke testing of the sanitary sewers during the dry weather months so that less visible sanitary infrastructure defects can be identified.
3. Procurement and direction of Consultant employed contractors with the capacity to install, calibrate and maintain rain gauges and in-pipe flow meters for a period of 120 days.
4. The development of compatible hydrological and hydraulic models that, utilizing field collected data, can be used to predict sanitary and storm sewer system behavior for a 2-year / 24-hour rain event applied to the sanitary system and a 25-year / 24-hour rain event applied to the storm system.
5. Extensive public engagement documenting the severity and extent of a) sanitary sewer backups, b) structural home flooding from overland flow of water (entering through a door, window or other exterior opening and c) street flooding where the crown of the street is fully submerged.
6. The production of a final report detailing all findings and recommendations.

General Submittal Requirements

Individual Statement of Qualifications (SOQ's) should be submitted as required by the Division of Central Purchasing and further described in prior sections of this solicitation. SOQs shall be no more than twenty-five (25) pages, excluding tabs/dividers, and shall be structured as follows:

1. Letter of Transmittal (one page maximum)

2. Firm Qualifications (five pages maximum)
    - Provide an executive summary explaining why the firm should be selected to provide services for this project, along with general information about the firm (and field consultants) related to their history and general qualifications. The executive summary should describe any unique qualifications provided by the firm that demonstrate proficiency in completing the tasks associated with a traditional Sanitary Sewer Evaluation Survey (SSES), Sanitary Sewer Assessment (SSA) and/or comprehensive drainage study within an urban setting. Emphasis on the Project Manager's experience in these areas is of utmost importance and will be viewed favorably over experience of the firm.

3. Project Team (ten pages maximum)
    - Provide an organizational chart identifying the project manager(s), project engineers, surveyors, geotechnical sub-Consultant (as necessary), Disadvantaged Business Enterprise (DBE) Firm / Minority Business Enterprise Firm (MBE), and others as required. The identified team members must have measurable experience and contributions associated with the Firm Reference Projects identified in Item 5 below. The organizational chart should clearly indicate the services to be provided by all sub-Consultant firms. Include locations and one-page resumes of key project team individuals that will be providing substantial contributions to work products. This section shall also include a Risk Management Plan for substitute staffing in the event that key staff leaves the project team prior to completion of any Task Order.

4. List of Three (3) Clients for which similar work has been performed (one page maximum)
    - Provide client name, contact person, contact phone number, and email address, and identify by name similar projects completed for each client.

5. Four (4) Firm Reference Projects (four pages maximum)
    - Provide the project name, date, services provided, and a project description detailing the scope of the project and project construction cost. List only those projects where a key member of the project team provided a substantive contribution to the project completion.

6. Local Office (one page maximum)
    - Statement of presence of local office(s) for all firms comprising a Project Team, when the local office was established, local office staffing (number in each local office), and local office utilization (estimated percent of potential project services to be performed by the local offices). "Local office" shall be defined as being located in Fayette County Kentucky of a county whose boarder is contiguous with Fayette County (Franklin, Scott, Bourbon, Clark, Madison, Jessamine or Woodford counties)

7. Disadvantaged Business Enterprise (DBE) Involvement (one page maximum)
    - Provide a statement regarding the commitment to meeting the goals of LFUCG's DBE program (see below).

8. Statement of Hourly Rates (format provided)
    - Provide detailed information regarding the hourly rate and estimated hours per subtask for all personnel expected to work on the project(s), including project managers, project engineers, engineering/CAD technicians, clerical and two-man survey party crews. Hourly rates should be clearly assigned to all position titles that are identified on the Project Team section. In spreadsheet form, provide an estimate for the overall project completion cost using the quoted hourly rates and the estimated hours needed for each member of the project team. For TASK A, the summary sheet should reflect the estimate lump sum for each subtask along with unit prices to "to be determined" quantities such as flow meters and additional meetings. There are no reimbursable expenses associated with TASK A. TASK B of this scope is a LUMP SUM effort.

The final deliverable for this project is the written report documenting all findings, recommendations and preliminary cost estimates. Overall project expenses are expected to be incurred as follows:

LFUCG - The Division of Water Quality (DWQ) will be contractually responsible for all field contractors providing smoke testing, pipe cleaning and CCTV inspection services. DWQ will manage and direct the field contractors using advice and direction from the Consultant. DWQ must approve all work directives issued to the field contractors. DWQ will be responsible for reviewing and approving all invoicing received from the field contractors. DWQ will provide one full time equivalent employee (FTE) to act as the liaison between the Consultant and the field contractors while also providing field inspection services as needed to ensure an acceptable work product from the field contractors.

Consultant – While DWQ retains the contractual relationship with the field contractors listed above, the Consultant is responsible for the contractual relationship with all geographic survey crews, flow monitoring, or rain gauge crews (subconsultants) working on the project. The Consultant will be responsible for providing functional direction in collecting required field work data and analyzing all data collected by the field contractors and subcontractors. Field data must be mutually accepted by the Consultant and LFUCG. Once accepted, the data must then be exclusively utilized by the Consultant to produce the final deliverables.

The Consultant's estimated fee for the project should be clearly presented in spreadsheet form as requested in the General Requirements – Statement of Hourly Rates section. The requested hourly rates and unit lump sums cost presented in that section of the SOQ section will be used if there is a scope of services modification requested and mutually approved by both LFUCG and the Consultant.

Scope of Services

The project area is more accurately defined in exhibits titled Task A Sanitary Sewer and Task A Storm Sewer. Those areas are further described as follows**:**

TASK A

The control points for the field evaluation and modeling effort should be limited to:

1. Sanitary:
    a. Downstream termination point: TB5_351
    b. Upstream termination points - starter manholes with the following exceptions, which should be implicitly modeled as point loads.
        i. TB5_368A
        ii. TB5_376
        iii. TB3_326A
2. Storm:
    a. Downstream termination points – TB4_428CI and TB5_153MH with inclusion of a rationale for the assumed tail water condition.
    b. Upstream termination points – starter manholes and inlets with the following exceptions, which should be implicitly modeled as point loads.
        i. TB5_201 MH
        ii. TB5_252 MH
        iii. TB5_260 MH

The requested Scope of Services, as applied to the study area, are as follows:

1. Review of all existing data, records and reports including,

a. Previous reports in the study area on file and provided by LFUCG, including associated surveys and modeling information,
b. Effective FEMA Flood Insurance Study and any Letter of Map Change documents,
c. LFUCG provided GIS data of mapped infrastructure, as currently understood, in ESRI format, Consultant shall execute the appropriate license agreement with LFUCG Division of Computer Services,
d. Any previous questionnaires on file or drainage/flooding calls reported through LFUCG LexCall (311) system and provided by LFUCG,
e. Any Accela or LexCall information regarding sanitary sewer of flooding related service calls within the project area.
f. Maintenance records for sanitary sewer infrastructure located within the project area including 2016 CCTV records / videos of the storm sewer system along Slashes Road (Accela record 16-TVM-0278).
g. Interview key operations staff for historical insight related to sanitary and/or stormwater infrastructure problems within the project area.

2. Develop a written work plan and schedule for directing field contractors in the collection of system data needed to prepare the final report.
   a. Assist DWQ in scheduling and directing the cleaning/televising/smoke testing field contractor(s) so that data is collected in an orderly fashion that maximizes an efficient scope of work. Data collected during the cleaning and CCTV phase must be compatible in format with Lexington's Accela asset management system so that results can be downloaded into the system.
   b. Procure, schedule, and direct the work of subcontractors, working for the Consultant, in the installation of the rain gauges and flow monitors needed to construct and calibrate the hydraulic models.

3. Modeling. The primary goal of the modeling effort is to evaluate what can be done to abate sanitary sewer backups and overland flooding within the project area without simply moving the problem downstream beyond the established project area control points. More specifically, modeling should be executed as follows:
   a. Conduct a sanitary sewer hydraulic modeling effort consistent with the requirements of DWQ's Hydraulic Model Report and Capacity Assessment Work Plan.
   b. Conduct H&H modeling of the stormwater system, including calibration, verification and/or modification of any existing modeling provided by LFUCG, to be used for justification and design purposes and shall include analysis of the 25- year, 24-hour frequency storm event at a minimum. The Consultant shall:
      i. Complete all H&H work using the latest version of a SWMM based software. LFUCG shall not be charged directly for purchasing, maintaining, or upgrading this software.
      ii. H&H parameters shall be those listed in the current version of the LFUCG Stormwater Manual.
      iii. LFUCG has a raster Digital Elevation Model (DEM) with the following attributes:
         A. The DEM is a processed raster
         B. Cell size is 5 ft. (approximately 1.5m)
         C. Sinks are not filled
         D. Hydro features are flattened
         E. The DEM is a 32-bit, floating point, AIG format raster. The DEM was generated from LiDAR data collected by the Kentucky Division of Water in 2019.
            LFUCG can make this data available to the selected Consultant.

iv. Model calibration shall make every effort to include documented and verified past history, such as witness reporting and pictures from a documented storm event.

4. Identify the location and facilitate the installation of one precipitation (rain) gauge in the project area. This gauge shall be the tipping bucket type and capable of recording precipitation on a 5-minute interval. The gauge should be operated for a 120-day period.

5. Using LFUCG GIS data and Consultant employed survey crews, verify and correct, as necessary, the geometry of the sanitary and storm sewers, verifying connectivity where appropriate and assisting with correcting existing map discrepancies. More specifically, conduct field surveying in the project area including, but not limited to:
   a. Provide notification to property owners/residents regarding survey and access,
   b. Verification and quality check of any survey data provided by LFUCG,
   c. Location and elevation features of all existing sanitary infrastructure and stormwater drainage infrastructure, any discrepancy between survey information (location, size, material, etc.) and GIS data shall be documented and reported on the appropriate Map Discrepancy Form (see exhibits).
   d. Location of any surface features that potentially alter or impede the flow of surface water or influence natural overland stormwater flow.
   e. Provide LFUCG a survey drawing and electronic submittal of survey information as part of the final report.

6. Facilitate public engagement and involvement in the following forms:
   a. Direct contact with property owners/residents located within the project area that have historically reported flooding or basement backup events via LexCall and/or Accela sometime between January 1, 2015, and December 31, 2021. In order to get a clearer understanding of sanitary and storm water problems experienced by residents, the Consultant should contact each property owner/residents in the project area (approximately 460 parcels) by one of the following methods:
      i. Written Questionnaire (approved by LFUCG)
      ii. Telephone interview
      iii. Face to Face interview

      The findings of each direct contact should be documented by the Consultant in a format suitable for review and follow up action. A maximum of two contact efforts (questionnaire, telephone, or face to face) are to be made for each parcel located in the project area. The Consultant may create a unique email address to allow residents to submit scanned copies of questionnaires or photos/videos of flooding events.
   b. A draft questionnaire format must be prepared for LFUCG review and approval. Once approved, questionnaires are to be mailed to each parcel within the project area with a stamped, addressed return envelope back to the Consultant. LFUCG will assist in providing the successful Consultant with the parcel list. The Consultant should coordinate with LFUCG throughout this process.
      i. Scanned and/or emailed responses are acceptable. Consultant can set up a unique email address or web-based questionnaire for property owners/residents as an optional approach.
      ii. Consultant may create their own version of the Questionnaire, subject to LFUCG approval prior to any distribution.
   c. Telephone interviews or electronic communication with any property owner/resident claiming structural or street flooding as defined in the Stormwater Severity Scoring report.

d. Collecting any information regarding flooding from property owners/residents, including but not limited to, photographs, videos, high water marks, etc. Dates of storm events if known by the property owner/resident, should also be provided.
e. Consultant shall maintain all files and documents of interviews and provide copies (paper and electronic) to LFUCG. LFUCG must pre-approve telephone and face to face interview questions before proceeding.
f. The Consultant shall compile, analyze, and process all interview data and provide summary tables / maps to illustrate the findings.
g. Consultant shall create and maintain a web-based system of allowing residents to respond to written communication in lieu of US Mail. Web based system shall be capable of collating data and producing suitable reports.
h. The Consultant's lump sum fee proposal should allow for two public meetings to be scheduled and hosted by LFUCG (one kickoff meeting and one 90% findings meeting). The Consultant will be responsible for preparing all meeting materials (maps, sketches, and other exhibits), preparing meeting agendas and recording / compiling meeting minutes.
i. Consultant shall field verify any reports of flooding received between the notice to proceed date and the date of the 90% draft report submittal. Photographs, measurements, or other data necessary to corroborate the reports should be collected during this field verification effort.

7. Complete a final report detailing the findings and conclusions obtained from Scope of Services subtasks 1 – 6. Referring back to the stated Goals and Objectives of this project, provide recommendations for next steps and estimated costs for implementing those next steps. Based on the findings of the work, recommend future capital projects that will support the Goals and Objectives of this project, recommending no more than three projects in each category (sanitary / storm) for near-term action. Any projects recommended for near-term action should also include a preliminary capital cost for implementation (including property or right of way acquisitions). The final report should also identify, when apparent, obstacles to implementing a recommendation including:
   a. Parcels containing surface structures that restrict access to potential future improvement corridors,
   b. The location of natural, continuous, or intermittent springs identified during the field investigation and public outreach phases that influence outcomes.
8. The 90% Final Report deliverable shall be provided in three hard copies and one electronic copy. The 100% Final Report deliverable requires five hard copies and one pdf copy. The format of the final report should be presented as follows:
   a. Executive Summary
   b. Field Work Plan / Presentation of Key Findings Impacting Goals and Objectives Achievement
   c. Hydraulic and Hydrologic Modeling Results
   d. Public Outreach Findings
      i. A map of each project area showing roads, parcels, addresses (annotated to show addresses contacted), responses and non-responses, type of flooding reported (if any), new development that has occurred within the last five years, and mapped floodplains (if any).
      ii. Searchable summary of stormwater questionnaire responses.
      iii. Copies of all stormwater questionnaires returned (digital & hardcopy).
      iv. Copies of all "raw" data received by Consultant (digital & hardcopy).
      v. Any photographs/correspondence submitted by property owners/residents (digital & hardcopy).

      For all above sections, if any responses are received via web-based application, provide a compilation of the responses in both Excel and pdf format.
   e. Analysis and Conclusions Reached

f. Summary of Recommended Next Steps / Capital Project Recommendations
g. Appendices with Supporting Data
h. Required formats
    i. Text and surveys in pdf format.
    ii. Photos is jpg format

9. Related Matters
    a. LFUCG will be responsible investigating and inspecting the physical connection of sump pumps connected to the sanitary sewer within the service area. The Consultant's responsibility is limited to inquiring and documenting "*do you have a sump pump?*" responses during the public engagement phase. Residents should be informed that future sump pump redirects within the project area will be suspended until the final project report is received and evaluated by LFUCG.
    b. The development / implementation of an effective communications and work plan involving LFUCG, the Consultant and field contractors is essential for collecting, analyzing and processing that volume of data likely acquired during this project. The Consultant is responsible for continuously evaluating the process throughout the project and notifying LFUCG when systems are not performing in a matter that generates a less than optimal outcome.
    c. The Consultant will be required to attend monthly progress meetings via virtual format – with a maximum of 12 meetings. Typical meetings should have not more than four (4) representatives of the Consultant in attendance.

TASK B

TASK B is a separate deliverable whose findings will be submitted in a separate report from TASK A. Relevant information gathered from TASK A can be used to make informed conclusions for TASK B but this task's goal is limited to evaluating potential realignments of the current pipe network, not for assessing the condition or capacity of the existing pipe network.

As illustrated in the exhibit titled Task B Sanitary and Storm Sewer, pipe upstream of sanitary manhole TB4_355A and stormwater structure TB4_428CI are located on private property and under existing structures. The TASK B deliverable is to complete the horizontal and vertical surveying necessary to evaluate the feasibility of relocating the highlighted facilities to the public right of way. A Technical Memorandum must be prepared that thoroughly describes the evaluation methods used, identifies known potential utility conflicts, and verifies grade conflicts that would prevent the successful relocation of target infrastructure away from private property and onto public right of way.

The fee for **TASK B** should be submitted in lump sum format.

List of Exhibits

1. Task A Sanitary Sewer Map
2. Task A Storm Sewer Map
3. Task B Sanitary and Storm Sewer Map
4. Map Discrepancy Form (two unique versions)
5. Fee schedule

Tentative Project Schedule

Task A	**Calendar**
Award Contract / Project Kick Off	June 1, 2022
Begin Public Outreach / Involvement Efforts	July 1, 2022
Flow Monitoring Period	March 1 – June 30, 2023
Smoke Testing	Fall 2022
Mapping and Field Data Collection	Complete by March 1, 2023
90% Findings Ready for Public Review	October 1, 2023
Submit Final Report	December 31, 2023
TASK B	
Draft Technical Memorandum due	June 1, 2023
Final Technical Memorandum due	August 31, 2023

Method of Invoice and Payment

The Consultant shall submit monthly invoices for basic services or work rendered, based upon the Consultant's estimate of the portion of the total services actually completed during the billing cycle. Each invoice shall show the amount to be paid, the subtotal of all prior invoices, and the LFUCG Purchase Order Number against which the invoice is to be charged. Each invoice shall also include documentation showing the amount attributed to each Task for both the billing cycle and the cumulative project period and shall include, as a separate document, a monthly progress report summarizing completed work. Each invoice shall note the portion of the amount invoiced that is for work performed by a DBE subcontractor. The actual work performed by the DBE shall be included on the monthly progress report.

The Division of Water Quality - Project Manager will either approve or deny each invoice within fourteen (14) calendar days of receipt.

STOP WORK NOTICE:

The Consultant shall at all times monitor time allotted and amounts invoiced for tasks and activities as compared to their original estimates and expectations. The Consultant shall notify the Division of Water Quality immediately upon discovery of facts that may necessitate a change in the contract amount or may extend the contract time. If the change is expected to exceed ten percent (10%) of the original contract amount, the Consultant shall immediately stop all work related to this Scope of Services. Work shall not recommence without written notification from the Division of Water Quality. The Consultant shall submit all requests for changes to the Division of Water Quality in writing and shall be present when the issue is discussed before the Urban County Council. Failure by the LFUCG to endorse the requested change does not relieve the Consultant of the contractual requirements and activities defined by this entire Scope of Services.

LFUCG reserves the right to terminate the contract when a mutually satisfactory agreement cannot be reached in a timely manner. All engineering project data must be submitted to LFUCG upon request. If it is determined that the Consultant failed to notify LFUCG on a timely basis regarding insufficient fee or inadequate schedule, LFUCG reserves the right to terminate the contract at any time thereafter.

Disadvantaged Business Enterprise (DBE) Notice

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITIES AND DBE CONTRACT PARTICIPATION

The Lexington-Fayette Urban County Government has set a goal that not less than ten percent (10%) of the total value of work conducted in this program be subcontracted to DBEs. The goals for the utilization of certified DBEs as subcontractors are recommended goals. Consultants who fail to meet such goals will be expected to provide written explanation to the EEO Officer and the Director of the Division of Purchasing of efforts they have made to accomplish the recommended goals, and the extent to which they are successful in accomplishing the recommended goals will be a consideration in the procurement process. For assistance in locating DBE subcontractors contact the following Urban County Government agency:

Sherita Miller, Division of Central Purchasing
Lexington-Fayette Urban County Government
200 East Main Street
Lexington, KY 40507
(859) 258-3320

Note: Consultants may, but are not required to, identify specific DBE subconsultants in their prequalification submittal. However, they must state their commitment to meeting the goals of LFUCG's DBE initiatives.

RFP# 27-2022 TOWN BRANCH 5 SUBDRAINAGE AREA EVALUTION

Project Duration - 365 Days
Flow Monitoring Duration - 120 days

	TASK A	UNIT PRICE	LUMP SUM
1	**Existing data, records and reports review**		
2	**Submission of overall project work plan and schedule**		
3.a	**Modeling - stormwater**		
	Installation and maintenance of suitable flow meters (per meter) from entire flow monitoring duration		
	Collection / Synthesis of data and final model calibration		
3.b	**Modeling - sanitary**		
	Installation and maintenance of suitable flow meters (per meter) from entire flow monitoring duration		
	Collection / Synthesis of data and final model calibration		
4	**Rain guage installation, maintenance and data collection for entire flow monitoring duration**		
5	**Surveying**		
6	**Public Engagement**		
	questionaires / direct contact (max 460 parcels)		
	Two required public meetings		
	Additional public meetings		
7	**Meetings**		
	Twelve required progress meetings		

RFP# 27-2022 TOWN BRANCH 5 SUBDRAINAGE AREA EVALUTION

Project Duration - 365 Days
Flow Monitoring Duration - 120 days

	Additional progress meetings		
8	**Project Management**		
9	**Other project costs not identified**		
		SUM: TASK A	$0

	TASK B		LUMP SUM

TOTAL (TASK A AND B)

CLASSIFICATION	EMPLOYEE NAME	ACTUAL TITLE	HOURLY RATE		ESTIMATED HOU		
					A.1	A.2	A.3.a
Technician	Joe Smith	Tech III	$100		10	5	40
Project Manager							
Senior Engineer							
Engineer							
Technican							
GIS Technician							
Survey Crew							
Subcontractors							
Other							
					0	0	0

URS FOR TASK A			TOTAL	
A.4	A.5	A.7		
40	0	20	$11,500	EXAMPLE
			$0	
			$0	
			$0	
			$0	
			$0	
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LEXINGTON

Task A Sanitary Sewer

Task Area Stats

Total Pipes: 96
Total Length: 20,668 ft.
Min Diameter: 4 in.
Max Diameter: 15 in.
Total Parcels: 458

TB5_351

Task A Manhole
- Collection
- Trunk
- Cleanout

Task A Pipes
- Collection
- Trunk
- Lateral
- Stub

Task A Sanitary Project Area

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N W E S

Scale: 1:4,800

LEXINGTON

Task A
Storm Sewer

Task Area Stats

Total Inlets: 82
Total Manholes: 47

Total Pipes: 134
Total Length: 13,902 ft.
Min Diameter: 4 in.
Max Diameter: 45 in.

Total Parcels: 422

TB4_428CI
TB5_153MH
Task A Stormwater Inlets
Task A Stormwater Manhole
Task A Stormwater Pipe
Task A Stormwater Project Area

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S

Scale: 1:3,600

LEXINGTON

Task B
Sanitary & Storm Sewer

Task Area Stats

Total Parcels: 15

Stormwater

Total Inlets: 2
Total Pipes: 2
Total Length: 1,135 ft.
Pipe Diameter: 36 in.

Sanitary

Total Manholes: 5
Total Pipes: 4
Total Length: 907 ft.
Min Diameter: 8 in.
Max Diameter: 10 in.

- TB4_355A
- TB4_428CI
- Task B Sanitary Manhole
- Task B Stormwater Structure
- Task B Sanitary Pipe
- Task B Stormwater Pipe
- Task B Area

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N
W E
S

Scale: 1:1,200

Hydraulic Model Report

Lexington-Fayette Urban County Government

July 2008

Prepared by:

CDM

and

HAZEN AND SAWYER
Environmental Engineers & Scientists

Lexington-Fayette Urban County Government
Hydraulic Model Report

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

(LFUCG Official)

Charles H. Martin
(Printed Name)

Director - Division of Water Quality
(Title)

7-8-08
(Date)

Table of Contents

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List of Tables

Acronyms/Definitions

CAP = Capacity Assurance Program

Correctable/Corrected Recurring SSOs = one of the Recurring SSOs that can be corrected by maintenance measures instead of related to capacity deficiencies.

H&H = hydrologic and hydraulic

HGL = hydraulic grade line

HMR = Hydraulic Model Report

LFUCG = Lexington-Fayette Urban County Government

Recurring SSO = an SSO that occurs in the same location more than once per twelve (12) month rolling period.

SSO = Sanitary Sewer Overflow

Trunk Sewers = the "Major Gravity Lines" as defined in the Consent Decree, which are gravity sewer lines that are 12 inches in diameter or larger.

Section 1 – Introduction

The Lexington-Fayette Urban County Government (LFUCG) is initiating the development of a hydrologic and hydraulic (H&H) computer model of its wastewater collection system that will become a critical tool in assisting LFUCG in meeting a variety of objectives. A team of experienced modeling professionals will be applying sound modeling techniques and approaches that will lead to the development of a reliable H&H model that will enable its application for the evaluation of various planning scenarios.

Through LFUCG's H&H computer model, a long-term investment is being made in a sophisticated tool that will assist LFUCG in better managing the large sewer system under its control. This investment leverages LFUCG's existing system data and knowledge and builds upon previous modeling efforts of LFUCG's wastewater collection system. Once developed, the H&H model will provide LFUCG with a tool to support a variety of sewer system management functions, which include sanitary sewer overflow (SSO) control planning, improved operations, enhanced maintenance planning and evaluation, and capacity assurance evaluations.

The H&H computer model will be developed in phases that will enable the timely development of the model datasets. The corresponding field data collection programs (e.g., field survey, flow monitoring, rainfall monitoring) will be coordinated with their respective portions of the collection system.

The purpose of this Hydraulic Model Report (HMR) is to define how the model will be developed to support the Consent Decree requirements. The report focuses on the technical activities necessary to achieve this objective. This report is intended to satisfy Section VII, Paragraph 15, E, ii of the LFUCG Consent Decree which identifies the following to be included in the HMR:

- A description of the Model which shall be a widely accepted model,
- Digitized maps and schematics that identify and characterize the portions of the Sanitary Sewer System that shall be included in the Model,
- Identification of input data,
- Configuration of the Model,
- Procedure and protocols for performance of sensitivity analyses,
- Procedures for calibrating the Model, and
- A schedule for complete implementation of the Model.

Section 2 – Project Goals and Schedule

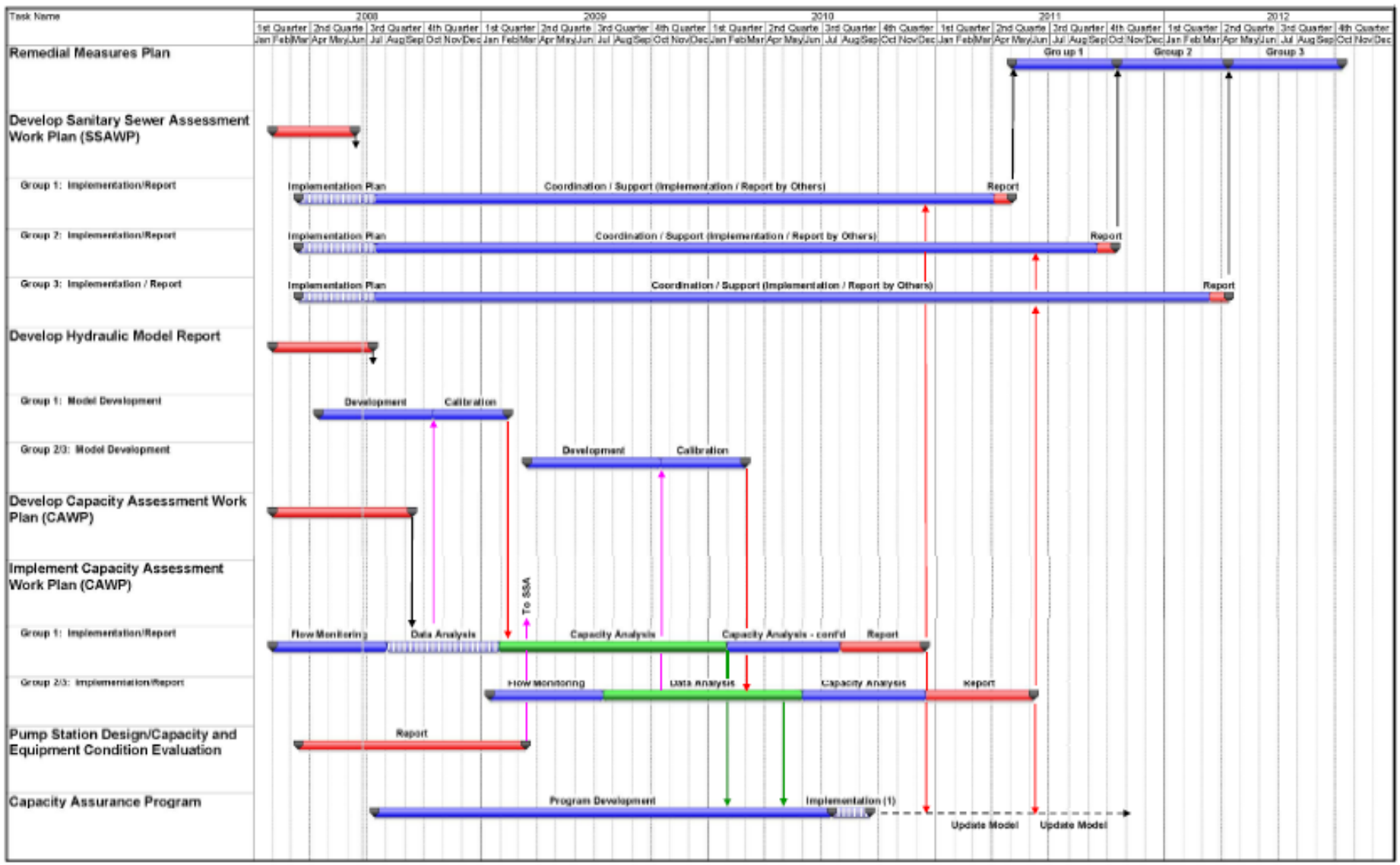
The investment in a reliable H&H computer model of the LFUCG's Sanitary Sewer System will benefit a variety of both short and long-term goals and objectives. The primary objective for developing the H&H computer model is to satisfy current Consent Decree requirements. LFUCG is also developing the H&H computer model to support other internal agency objectives as well as to provide a sustainable tool that can be applied to support LFUCG's long-term commitment to providing reliable sanitary sewer service to its customers.

The goal is to develop a reliable H&H model acceptable to the EPA that adequately supports LFUCG's short and long-term needs. The H&H model will be used to meet the following Consent Decree requirements:

1. Assess the hydraulic capacity of the sewer system (support capacity assessment work plan implementation)
2. Identify causes of known Recurring SSOs
3. Assess proposed remedial measures with the goal to eliminate the Recurring SSOs
4. Evaluate alternatives to develop a Capacity Assurance Program (CAP)
5. Support the Sanitary Sewer Assessment (SSA) program
6. Perform post-construction performance validation of system improvements

The H&H model is scheduled to be developed in two phases in order to have model datasets available to support the Consent Decree schedule. The Group I Sewersheds is scheduled to be developed first followed by the development of Groups II and III. In short, the Group I Sewersheds are scheduled to be developed and calibrated in 2008 while Group II is scheduled to be developed and calibrated in 2009. It is desirable that the Group III Sewersheds be developed along with Group II Sewersheds. **Figure 2-1** illustrates the schedule of development of the H&H models corresponding to the three different Sewershed Groups in relation to other Consent Decree programs.

Figure 2-1 Schedule for H&H Computer Model Development and Implementation



Section 3 – Summary of Existing Information

A variety of types of existing data are available to assist with the development of LFUCG's H&H computer model. These resources are discussed below.

3.1 Sewer Network Data

The representation of the physical wastewater collection system in the H&H computer model is a fundamental component of developing a reliable model. The accurate and up-to-date representation of the collection system physical attributes is important in order to ensure that the simulated flow rates and water depths represent real-world conditions. The sewer system network data is comprised of the following attribute data:

1. connectivity of the pipes and manholes,
2. sewer sizes,
3. sewer shapes,
4. sewer material,
5. invert elevations of the pipes at the manholes, and
6. manhole rim elevations.

The sewer network data will be developed first based on currently available information and only followed by field investigation work if deemed necessary. Below is a discussion of available resources available to assist with the sewer network.

3.1.1 GIS and Other Digital Data

LFUCG has a geographic information (GIS) database with sewer system attributes. The GIS database includes important information such as all gravity pipe IDs, force main IDs, manhole IDs, the pipe connectivity, the locations of Recurring SSOs, pump stations, as well as the X and Y coordinates of all listed items.

3.1.2 Paper-based Sewer Mapping

Paper-based record drawings for pipes and sewer appurtenances are available as a resource if other existing digital data does not prove adequate to resolve sewer system attribute data. LFUCG has drawings for the replacement of trunk sewers that occurred since the development of the trunk sewer models under what was known as the "Bond Projects." These are important in order to have a model that is up-to-date and represents real-world conditions. The paper maps that are not certified to represent "as-built" or "record" conditions will be confirmed prior to inclusion in the model. These projects are listed below.

1. Winburn Estates Sanitary Sewer Rehabilitation
2. Phase 1 and Phase 2, Elkhorn Park & Radcliff Neighborhood Sanitary and Storm Improvements
3. West Hickman Watershed Sub-Area, Lansdown Trunk, Zandale Drive Sanitary Sewer Improvements
4. New Dixie Trunk Sewer Rehabilitation
5. Upper Wolf Run/Picadome Pumping Station

3.1.3 Sewer System Studies

LFUCG has conducted a number of sewer system studies over the years and they are available in hard-copy with some available in digital format. Trunk sewer studies corresponding to the seven Sewersheds were conducted between 1998 and 2002. The reports associated with these studies are available as resources to understand the historical hydraulic performance of the collection systems and how the models were developed to support the specific studies.

3.2 Sewershed Characteristics Data

Sources for understanding the sewershed characteristic data were also investigated. The key sewershed data to assist in the H&H computer model development include sewershed delineations and areas, land use, zoning, parcels, population, ground contours, and aerial photographs.

3.2.1 GIS and Other Digital Data

Within LFUCG's GIS are ArcGIS shapefiles that contain information regarding sewershed delineations, land use, parcels, and ground contours. These are valuable resources currently available that will assist in characterizing the characteristics for each of the seven Sewersheds. The GIS data is anticipated to be the primary source for information that will be used to characterize the Sewersheds.

3.2.2 Paper-based Sewershed Mapping

Paper-based sewershed mapping products are available for some of the trunk sewers. Existing paper-based sewershed mapping are largely based on LFUCG's information from LFUCG's GIS.

3.2.3 Studies and Reports

The trunk sewer studies are resources available to help understand the historical sewershed characteristics. They are available as a secondary source to the GIS data.

3.3 Existing Sanitary Sewer System Models

A number of existing hydraulic computer models related to portions of LFUCG's wastewater collection system have been identified as important resources for the development of LFUCG's H&H computer model. All of the hydraulic models are models based on the EPA SWMM software. They include:

1. trunk sewer models for each of the seven Sewersheds,
2. the Downtown Collector Sewer Study model related to the downtown Lexington area,
3. a more recent hydraulic model of a portion of the North Elkhorn Sewershed pumping systems.
4. WH7 re-calibration effort

LFUCG has had hydraulic computer models developed for each of the seven sewershed trunk systems spanning a period of time dating back approximately ten years. These hydraulic

models are a key resource for developing the sewer system network for the new H&H computer models. The models do not contain data related to the hydrology of their respective Sewersheds. Hydraulic loads to the models were developed outside of the existing trunk sewer models and input directly. **Table 3-1** lists the trunk sewer studies and summary information related to each.

Table 3-1 Summary of Sewershed Trunk Sewer Models

Sewershed	Period of Development	Consent Decree Sewershed Group	No. Modeled Pipes
Wolf Run	2002	I	428
East Hickman	2002	I	303 [1]
West Hickman	2001	I	617
Cane Run	2001	II	164
Town Branch	2002	II	528
South Elkhorn	2001	III	318
North Elkhorn	2002	III	303 [1]

[1] The number of pipes is based on the hydraulic model where the East Hickman and North Elkhorn Sewersheds are modeled together, in one model.

The model of the downtown area represents a model with more recent information than the Town Branch trunk sewer model. Information from this model will be reviewed to determine how to use the more detailed information.

The recent North Elkhorn study includes a hydraulic model that includes additional features and accounts for new development beyond its trunk sewer study and focuses on the force mains.

3.4 Other Existing Data

Other existing data were identified that may assist with the development of the H&H computer model of LFUCG's wastewater collection system. These data are summarized below.

3.4.1 Flow Monitoring

Water depth flow monitoring data are available in electronic format at the five cross-connections between the sanitary and storm sewer systems in the Sanitary Sewer System. The recorded water depth data are used to estimate when flow occurred through these cross-connections. The flow rates and volumes through the cross-connections are estimated based an estimated depth of flow in the cross-connection. The reliability of the flow monitoring data will be assessed and the data will be utilized accordingly during the model development and calibration. The five cross connections are listed below.

1. MH CR3_51, 772 N Broadway
2. MH TB2_33, 648 S Broadway

3. MH TB5_14, 441 Park Ave.
4. MH TB5_17, 443 Oldham Ave.
5. MH WR5_9, 782 Allendale Dr.

Flow monitoring data from previous studies may be useful to understand the historical performance of the Sanitary Sewer System.

3.4.2 TV Inspections

Recent CCTV records available in the West Hickman Sewershed (WH1, WH2, and WH7 sub-sewersheds) are available to assist with the model development as well as data from the previous trunk sewer studies. Understanding the condition of the sewers will help in model calibration.

3.4.3 WWTP Effluent Flow Records

Existing effluent flow rates at the West Hickman and Town Branch wastewater treatment plants will be used to assist with the model calibration. The effluent flow data will be used in conjunction with the flow data from the temporary flow monitoring program specific to the model development and calibration (See Section 5).

3.4.4 Pump Station Data

LFUCG maintains information related to the pump stations within its collection system. **Table 3-2** below lists the pump stations within the LFUCG collection system and flow meter types. **Figure 3-1** illustrates the LFUCG pump station locations which are labeled according to the "No." column in Table 3-2. LFUCG performs pump drawdown tests on each of the pump stations annually. Results from the drawdown tests are available in electronic format and will be important for accurately modeling the pump stations. Also available in electronic format are the estimated pump station overflow rates and descriptive information about the pumps at each pumping station.

Table 3-2 Pump Station Metering Summary

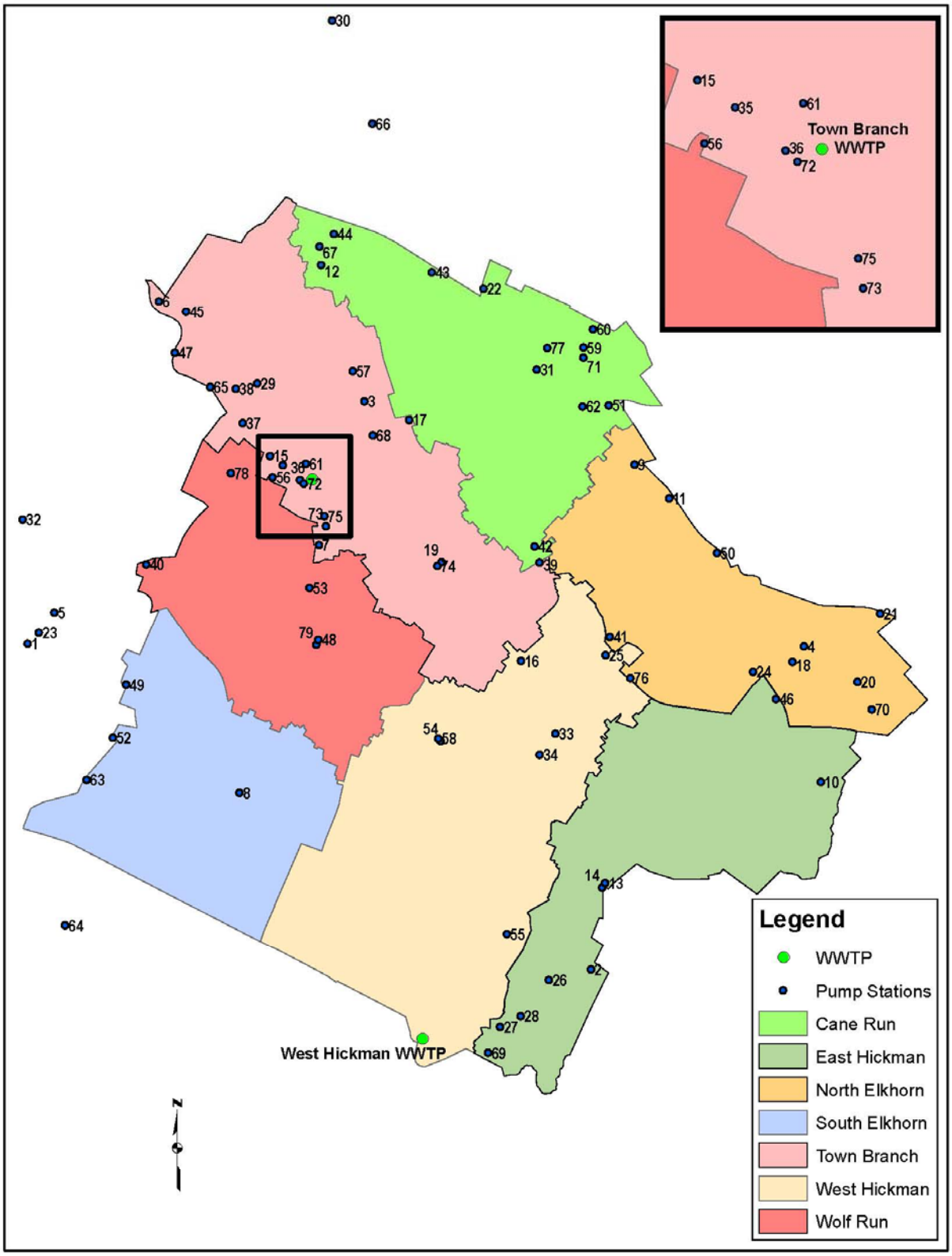
No.	Station Name	Station Address	Flow Meter Type	Comments
1	Armory	4309 Airport Rd	Note 1	
2	Armstrong Mill Road	2755 Armstrong Mill Rd	Note 1	
3	Baker Court	1331 Baker Ct	Note 1	
4	Blackford Property	3200 Mahala Cv	Note 1	
5	Blue Grass Field	1031 Air Frieght Dr	Note 1	
6	Bracktown	210 Betty Hope Ln	Note 1	
7	Cisco Road	109 Cisco Rd	Note 1	
8	Clays Mill	3330 Clays Mill Rd	Note 1	
9	Deep Springs	469 Anniston Dr	Note 1	
10	Deer Haven	1220 Deer Haven Ln	Note 1	
11	Dixie	1459 Huntsville Dr	Note 1	
12	Dotson Property	2828 Spurr Rd	Note 1	
13	East Hickman	3316 Buckhorn Dr	Flow meter in the inflow channel	

No.	Station Name	Station Address	Flow Meter Type	Comments
14	East Lake	1326 Fenwick Rd	Note 1	
15	Electronics Park	609 Bizzel Dr	Note 1	
16	Fincastle	1711 Clays Spring Ln	Note 1	
17	Georgetown Fire	1136 Finney Dr	Note 1	
18	Gleneagle	3095 Caversham Park Ln	Note 1	
19	Government Bld.	200 E Main St	Note 1	
20	Greenbrier # 1	3770 Katkay Dr	Note 1	
21	Greenbrier # 2	3592 Winchester Rd	Note 1	
22	Griffin Gate	1960 Stanton Way	Note 1	
23	Grinder	4260 Airport Rd	Note 1	
24	Hamburg Place	1936 Pavilion Way	Note 1	
25	Harbor Freight	1393 E. New Circle Rd	Note 1	
26	Hartland # 1	3630 Timberwood Ln	Note 1	
27	Hartland # 2	2140 Leafland Pl	Note 1	
28	Hartland # 3	4904 Hartland Pkwy	Note 1	
29	Hillenmeyers	2459 Leestown Rd	Note 1	
30	Horse Park	4020 John Henry Ln	Flow meter in the inflow channel Inaccurate at Higher Flows	Recorder not functioning
31	Johnson Property	1860 Millbank Rd	Note 1	
32	Keeneland	4091 Versailles Rd	Dopler in the force main	
33	Lake Tower	543 Laketower Dr	Note 1	
34	Lakeshore Drive	550 Lakeshore Dr	Note 1	
35	Landfill #1	1765 Old Frankfort Pike	Note 1	
36	Landfill #2	315 Jimmie Dr	Note 1	
37	Leestown Industrial	168 Trade St	Note 1	
38	Leestown West	150 Venture Ct	Note 1	
39	Lexington Manor	850 Byars Ave	Note 1	
40	Lexingtonian Estates	3300 Versailles Rd	Note 1	
41	Liberty Road	2101 Liberty Rd	Note 1	
42	Loudon	682 E Loudon Ave	Note 1	
43	Lower Cane Run	1760 Mcgrathiana Pkwy	Mag. Meter in the force main	
44	Lower Cane Run # 2	2908 Sullivans Trce	Mag. Meter in the force main	
45	Lower Town Branch	3231 Leestown Rd	Transient response meter in the force main Not Consistent Readings	Recorder not functioning
46	Man O War	2079 Bryant Rd	Note 1	
47	Marshall	249 Long Branch Ln	Note 1	
48	Mccubbin	526 Mccubing Dr	Note 1	
49	Mint Lane	1510 Man O War	Note 1	
50	North Elkhorn	2201 Elkhorn Rd	Flow meter in the	

No.	Station Name	Station Address	Flow Meter Type	Comments
			inflow channel	
51	Old Paris Pike	2138 Old Paris Rd	Note 1	
52	Palomar Hills	2212 Silktree Ct	Note 1	
53	Picadome	495 Parkway Dr	Mag. Meter in the force main	
54	Pizza Hut	2920 Tates Creek Rd	Note 1	
55	River Park	1419 Trent Blvd	Note 1	
56	Roll Call Center	1793 Old Frankfort Pike	Note 1	
57	Sandersville Road	1673 Jaggie Fox Way	Note 1	
58	Shadeland	857 Glendover	Note 1	
59	Shandon Park # 1	2335 Pierson Dr	Note 1	
60	Shandon Park # 2	765 Kingston Dr	Note 1	
61	Sharkey Property	315 Lisle Industrial Ave	Note 1	
62	Sharon Village	1985 Haggard Ct	Note 1	
63	South Elkhorn	2500 Bowman Mill Rd	Mag. Meter in the force main	
64	Southland Christian	4343 Harrodsburg Rd	Note 1	
65	Spicewood	253 Chestnut Ridge Dr	Note 1	
66	Spindle Top	2330 Research Dr	Mag. Meter in the force main	Recorder not functioning
67	Spurr Rd	3316 Sandersville Rd	Note 1	
68	St. Martins	959 St Martins Ave	Note 1	
69	The Reserve	5399 Tates Creek Rd	Note 1	
70	Thompson Property	2209 Walnut Grove Ln	Note 1	
71	Thoroughbred Acres	619 Parkside Dr	Note 1	
72	Town Branch	335 Jimmie Dr	Note 1	
73	Trafton	150 Trafton St	Note 1	
74	Transit Center	220 East Vine St	Note 1	
75	Vaughan	255 S Forbes Rd	Note 1	
76	Wilderness Trace	535 Wilderness Rd	Note 1	
77	Winburn	1985 Russell Cave Rd	Note 1	
78	Wolf Run	755 Enterprise Dr	Note 1	
79	Woodbine	525 Woodbine Dr	Note 1	

Note 1: These pump station flows are measured by the use of pump run time hour meters located at the pump stations, elapsed run times recorded by the pump station telemetry system, and individual pump draw-down records.

Figure 3-1 Locations of LFUCG Pump Stations



Section 4 – Model Selection

A key component of the Hydraulic Model Report and LFUCG's short and long-term wet-weather flow program is the selection of a hydraulic modeling software package. The process that led to the selection of the hydrologic/hydraulic modeling software package is described below.

4.1 Model Selection Process

The software selection process is a three-step process as identified below followed by a description of each.

1. identify LFUCG modeling needs,
2. evaluate the candidate software packages, and
3. recommend a software package.

4.2 Identify LFUCG Modeling Needs

The first step leading to the selection of an appropriate hydrologic/hydraulic modeling software package is to identify the needs of LFUCG. Identifying LFUCG's modeling needs occurred through a series of discussions on the topic in meetings with LFUCG staff, through gaining an understanding of LFUCG's Sanitary Sewer System, and through an understanding of the Consent Decree and its requirements. The following is a description of the items considered in clearly identifying the modeling needs of LFUCG.

4.2.1 Model Uses

The primary reasons why LFUCG is investing in the development of an H&H computer model are documented in Section 2. The H&H computer model of the wastewater collection system needs to be capable of being applied to meet these goals.

4.2.2 Modeling Software Capabilities

The following capabilities were identified as considerations in the appropriate modeling software package. A qualitative assessment was made as to the importance of each consideration.

Simulate surcharge, backwater conditions - Surcharging and backwater conditions exist in the LFUCG wastewater collection system. A modeling software package that is fully dynamic is necessary. A modeling package that offers anything less than a solution technique that can model gradually varied, unsteady flow conditions in a closed pipe system will not meet LFUCG's modeling goals.

Model can simulate inflow/infiltration (I/I) – The LFUCG collection system is a separate sanitary sewer system with no combined sewer system. The modeling software must have the capability to simulate I/I.

Customization capable – The ability to customize the software to LFUCG's needs is an important consideration. At the onset of the model development, no immediate customization

is identified. Some customization capability is desired to meet potential needs that may arise through its either short- or long-term application.

Scenario management – The capability to manage multiple modeling scenarios is an important consideration. This is particularly important when evaluating remedial measures and capacity assurance alternatives. Scenario management is considered a valuable capability.

Supports continuous simulation – The capability to simulate flow rates and water depths over a long period of time (e.g., for a one-year period or multiple years as opposed to single rainfall events) is an important consideration. This capability is considered important as it may be applied during the evaluation of the remedial measures and capacity assurance alternatives.

Real-Time Control (RTC) support – The capability to dynamically model changing settings in the collection system is a consideration. In-system and offline storage may be considered as remedial alternatives.

Support WWTP linkage (hydraulics, not water quality or process) – The capability to simulate the hydraulics of a wastewater treatment plant, effectively moving the boundary conditions of the computer model from the headworks of the WWTP to its effluent discharge point, is a consideration. This could be helpful for evaluating alternatives at the plants. This capability is considered necessary.

Pump stations – The capability to explicitly (i.e., pumping curves, wet-wells, operational strategy, etc.) model pumping stations is an important consideration for LFUCG since there are numerous pump stations across their collection system. This capability is necessary for LFUCG.

Force mains – The capability to model force mains is an important software consideration. Force mains are a part of the LFUCG Sanitary Sewer System. It may not be necessary to explicitly model each force main, but at least the flows from the pump stations will be simulated and discharged to a manhole along a gravity sewer line. The modeling software should have the capability to model force mains using a pressure equation.

GIS compatibility/sophistication – The capability of the software to use GIS technology and be compatible with LFUCG's in-house GIS is important to LFUCG.

Data interchange capabilities – The capability to import data primarily from LFUCG's GIS and export data as well to usable formats is considered valuable.

Data management capabilities – The ability to manage the modeling related data is an important consideration in the selection of an appropriate modeling software package. The ability to create sub-models, use metadata, customize the model database, track changes, and skeletonize the system are capabilities to be considered. The capability to be compatible with LFUCG's asset management plan is also important. The ability to query data and efficiently store the model attribute data is important to LFUCG.

History of proven performance – Has the model been used previously to support similar types of studies?

Model acceptance to regulators– Has the model been accepted by the US EPA previously?

Model performance – The reliability of the model engine to be numerically stable and the overall software performance reliability are important considerations when selecting the modeling software. In addition to model reliability is the model simulation speed. Software that is relatively fast in performing the model simulations is preferred. This will enable more efficient modeling.

Model user interface – The user interface must be suitable to the identified users/caretakers.

Model output – Does the model provide the results in a clear and usable format?

Vendor support – The reliability and competence of the software support is an important consideration.

Sustainability – The ability to maintain and sustain an up-to-date model over the long-term is important. Is the software flexible to accommodate future needs to expand, change, upgrade, etc.? Will outside users be able to use the model to support other agency objectives?

Model Results Viewer Software – This is a piece of software than can only be used to view model results and not change or edit the model. This can be valuable in sharing modeling results and enabling different stakeholders to view profiles of any portion of the modeled Sanitary Sewer System as well as dynamic model results. The availability of this option at a relatively easy and affordable manner is considered a valuable option.

4.3 Evaluate Candidate Modeling Software Packages

The more commonly used hydrologic/hydraulic modeling software packages that are available today and used for sanitary sewer wastewater collection system modeling are identified below as candidate software packages. The company or organization that provides the software is provided in parentheses. A brief discussion is provided of the advantages and disadvantages of each relative to each other, based on experience with the modeling software packages, vendor demonstrations, and basic research of the software as needed to understand capabilities available in the most recent versions of the software at the time of the evaluation.

4.3.1 InfoWorks (Wallingford Software) - good for medium to very large projects, good comprehensive capabilities including database management, not SWMM-based

4.3.2 PC-SWMM (Computational Hydraulics International) - good for small to medium projects, adequate GIS compatibility, SWMM5-based, database management not as strong as others

4.3.3 MIKE URBAN (Danish Hydraulic Institute) - good for medium to large projects, good GIS capability and compatibility, SWMM5-based, good database capability

4.3.4 XP-SWMM (XP Software) - good for small to medium size projects, SWMM-based, GIS capabilities not as strong as others, simulation speed not as strong as others

4.3.5 InfoSWMM (MWHSoft) - good for small to medium sized projects, good GIS compatibility, data management capability not as strong as others

4.3.6 EPA SWMM5 (U.S. EPA) - good for a range of project sizes, this is the EPA developed and approved SWMM5 software, not strong GIS capability, not strong on database management

4.4 Model Recommendation

Based on the described understanding of LFUCG's modeling needs and the capabilities of the candidate software packages, the MIKE URBAN hydraulic modeling software is the selected software that best meets LFUCG's short-term and long-term hydraulic modeling needs. The following is a brief description of the reasons for selecting the MIKE URBAN software.

1. is fully dynamic model
2. offers the capability to model the size and complexity of LFUCG's collection system, including pump stations and force mains,
3. simulation run times are reasonable; this is a notable advantage over XP-SWMM,
4. has scenario management capability,
5. has good GIS compatibility with LFUCG's existing GIS (ArcGIS),
6. is SWMM5-based, representing the recently EPA created and endorsed software
7. has good database management capability; searchable
8. offers technical support from a company (DHI) that has been around for a long-time and has a viable long-term strength
9. has a free model results viewer software that enables the opportunity to share results with a variety of stakeholders with minimal training and no cost.

Section 5 - Flow Monitoring and Rainfall Data Programs

A temporary flow monitoring program and accompanying rainfall monitoring program have been established to collect the necessary data to support the calibration and verification of LFUCG's H&H computer model. This section describes how the flow and rainfall data will be used to support the H&H model development, particularly model calibration and verification. It also provides basic documentation of the flow and rainfall monitoring programs.

5.1 Flow Monitoring Objectives

The primary objective for the flow monitoring program is to measure flow rates and water depths in the sanitary sewers in response to a range of storm events, which will provide an accurate basis for calibrating and verifying the hydraulic model. The flow and rain data will also be utilized to document areas experiencing high levels of rainfall-dependent inflow and infiltration (RDII) that will be used as part of the Sanitary Sewer Assessment work in identifying focus areas.

5.2 Flow Monitoring Procedures and Documentation

Procedures have been established to develop a flow monitoring program that will be sufficient to provide reliable data to support the objectives of the development, calibration, and verification of the H&H computer model for all seven Sewersheds.

5.2.1 Monitoring Periods

The monitoring periods of the drainage sewersheds are arranged to meet the CD deadline requirements. Each sewershed group will be monitored for a minimum of four months: Group I Sewersheds are being monitored from April 2008 through the end of July 2008; Group II Sewersheds will be monitored in the spring of 2009, while it is desirable that the Group III Sewersheds also be monitored at the same time with the Group II Sewersheds. Because of the necessity to understand the functioning of the entire sewer network, all monitors in a given phase must be operational by the beginning of that phase. If within the 4-month monitoring period for either group, the storm events monitored do not provide sufficient data for the calibration requirements as originally intended, an assessment will be made regarding extending the monitoring periods to meet the project objectives.

5.2.2 Preliminary Flow Monitor Locations

The entire LFUCG service area was divided into three major groups and seven drainage sewersheds. A thorough review of the sewer system maps for each major drainage sewershed further delineated contributing sub-sewersheds, with each representing a significant portion of the flow in that drainage basin.

The preliminary location of the flow monitors focuses on isolating the flow at each Recurring SSO location and in each sub-sewershed. Recurring SSOs that are the result of maintenance issues instead of hydraulic capacity deficiencies are generally excluded. See Section 6.2.2 for a detailed description of these SSOs. The meters will be strategically located to provide detailed

monitoring of the inflows from other sub-sewersheds and the outflows to the trunk sewers and outflow through manhole, basement, and pump station SSOs. Each flow monitor is equipped with level and velocity sensors to measure the water depth and velocity in the sewer pipes at 5-minute intervals. Flow rates are then calculated from the depth and velocity values.

The elements essential for the determination of the preliminary locations include:

1. ***Thorough understanding of the system layout***—Certain system features have flow characteristics, which define system performance. The understanding of these features is critical to properly represent the system with a hydraulic model, and often, therefore, require flow monitoring. These features include Recurring SSOs, pump stations, treatment plants, and outfalls.

2. ***Determination of sub-sewershed discharge points to the trunk sewers***—The confluence of major tributary sub-sewersheds with trunk sewers provides the primary locations for the flow monitors.

3. ***Upstream of key SSOs***—Monitors are located upstream of Recurring SSOs tributary to major sanitary sub-sewersheds. Some Recurring SSOs have tributary areas sufficiently small to have no significant impact on the sewer system hydraulics; these require no monitors.

4. ***Pump Stations***—Pump stations where SSOs are identified will have flow monitors installed on the influent side. Pump stations with SSOs that are determined to be maintenance related may be excluded. This is important in order to help accurately quantify the flows arriving at the pump station. Select pump stations will be monitored if the pump station records are not available or are available, but not in a usable format. Flow monitors will also be considered at the discharge points from the pump station force mains into the gravity sewer lines.

5. ***Trunk sewer***—Flow meters will be located at critical points along the trunk sewer, including points of major confluence and upstream of crossover points between parallel trunk sewers. Trunk sewers are the "Major Gravity Lines" as defined in the Consent Decree, which are gravity sewer lines that are 12 inches in diameter or larger.

6. ***Treatment plants***—Locate flow monitors on all gravity influent lines to the treatment plants near the WWTP. Some force mains discharge directly to the headworks of a WWTP.

The project team, using the criteria above, will identify locations for flow monitoring covering all the major drainage sewersheds.

5.2.3 Final Flow Monitor Locations

Prior to field investigations, the detailed sewer maps showing the proposed flow monitor locations will be reviewed with LFUCG staff. In the proximity of each preliminary location, several candidate manholes will be identified. From these candidates a primary manhole will be selected. Detailed field investigation of the primary manhole and the other candidates will

yield a single site for each preliminary location. These investigations will include verification of existing flow boundaries, physical inspection of manholes including manhole access, pump station operation, health and safety, and any other pertinent items that influence the selection of a specific flow monitoring site.

In some cases, the primary monitoring manhole may not meet the requirements of the selection criteria; consequently, the investigations will continue to check upstream and downstream manholes. The manhole inspection process will be documented in a standard site inspection report. Once the suitable location for each monitoring site is identified, a final site report will be generated that includes the location of the manhole, pipe sizes, flow direction, hydraulic conditions, depth of sediment, traffic conditions, and special notes on the access to the manhole, etc. For some flow monitoring locations that do not meet all the selection criteria and have no substitute manholes, a special monitoring plan will be prepared that includes best access to the manhole, special equipment required to open the manhole for data collection, best time for data collection, whether the manhole is in a busy street, and special safety equipment required.

5.3 QA/QC

The purpose of the QA/QC efforts is to identify problems or potential problems with the flow and rain data being collected and to submit findings to the flow monitoring crew quickly so that any concerns can be addressed promptly. This will help maximize the value of the project flow monitoring effort. To ensure the data quality, two levels of QA/QC will be implemented throughout the flow monitoring task.

First, the flow monitoring crew performs an initial QA/QC of the data once the data is downloaded from the designated flow site. QA/QC measures are taken at the flow monitor site and additional steps are taken to QA/QC the flow data once back in the office. After collection of the first round of data, depth versus velocity scatter plots are developed. Based upon a review of the data, it will be determined whether the site has hydraulic characteristics conducive to meeting the objectives of the study. If appropriate, a recommendation will be made to change the monitoring configuration, equipment, or location.

The second step is for the modeling team to review the monitoring data to identify any obvious questions which are relayed promptly back to the monitoring crew so that they can quickly address any issues. The flow monitoring crew makes the flow and rain data available via their website each week and emails the modeling team to advise when the flow and rain data has been posted. The efforts are intended to further strengthen the QA/QC effort in order to minimize the collection of unreliable or un-useful data and serves to help better prepare the team to utilize the data appropriately and understand the system hydraulic behavior. A simple spreadsheet has been created to track and document the QA/QC of the flow monitoring data and rainfall data. Key potential problems to look for include:

- Missing data
- Sensor drift (depth or velocity)
- Data shifts - sudden changes in flow response may be indicative of a problem

- Dramatic change from previous observations in the pattern of the flow response to rainfall
- Any other unusual response or changes from previous observations

In this step, the data obtained weekly will be promptly reviewed and documented in the QA/QC spreadsheet. The scattergraph of the data obtained since the last download will be plotted and overlaid on the scattergraph of the previous data. Data problems associated with sensor fouling or drift will be identified and the field maintenance crew alerted for appropriate action. Upon any changes in system hydraulics indicating a need for pipeline maintenance, LFUCG will be alerted. The QA/QC measure will verify that the system-wide flow monitoring uptime of 90% has been achieved per the Consent Decree requirement.

5.4 Rainfall Data Analysis

Rainfall data provide the basic time-variable input to the model, and therefore the precision, accuracy, and resolution of these data are of critical importance to the project. Inadequate or erroneous rainfall data introduce calibration errors, or misrepresent model input, which in turn reduce model accuracy and reliability for simulation of the sewer system.

Rainfall data will be collected through a temporary rain gage network that will be implemented at the Sewershed level at the same time of the flow monitoring program for the respective Sewersheds. The rainfall data will be collected in 5-minute time intervals for the duration of the flow monitoring program. The rainfall data collected from the temporary ground rain gage network will be used to develop input hyetographs to the H&H model and to correlate wet-weather flow response in the Sanitary Sewer System to rainfall. The rainfall data collected at these locations provide good measurement of rainfall at the point of collection.

A total of approximately thirty rain gages will be installed across the seven Sewersheds which should provide an adequate characterization of the spatial variability of rainfall. The installation of the rain gages will seek locations that avoid rain shade where obstacles may interfere with an accurate collection of rainfall data. These locations are generally on the roofs of accessible buildings away from tall trees and other buildings. Preliminary locations are identified based on an appropriate spatial distribution of the rain gages and initial potential buildings that may accommodate them. The final locations are determined in large on the ability to obtain permission to access the property and building rooftops. Public buildings are initially considered. The rainfall data will be collected on a regular basis and the quality checked to assure that reliable data are being collected.

Section 6 – Model Development Procedures

This section of the Hydraulic Model Report defines the procedures to develop the model, including mapping, data management, determination of flow inputs, and model calibration procedures. Critical data needs (sewer data, rainfall data, and flow, etc.) for model development are identified and described.

The model development process will apply the SWMM5 modeling capability with the MIKE URBAN software package (See Section 4) as the modeling environment in which the sewer network and sewershed catchment data will be formulated, maintained and calibrated.

6.1 Model Organization and Linkage

The LFUCG's Sanitary Sewer System is organized at five different levels. They are listed below in order from the level representing the largest area to the smallest area.

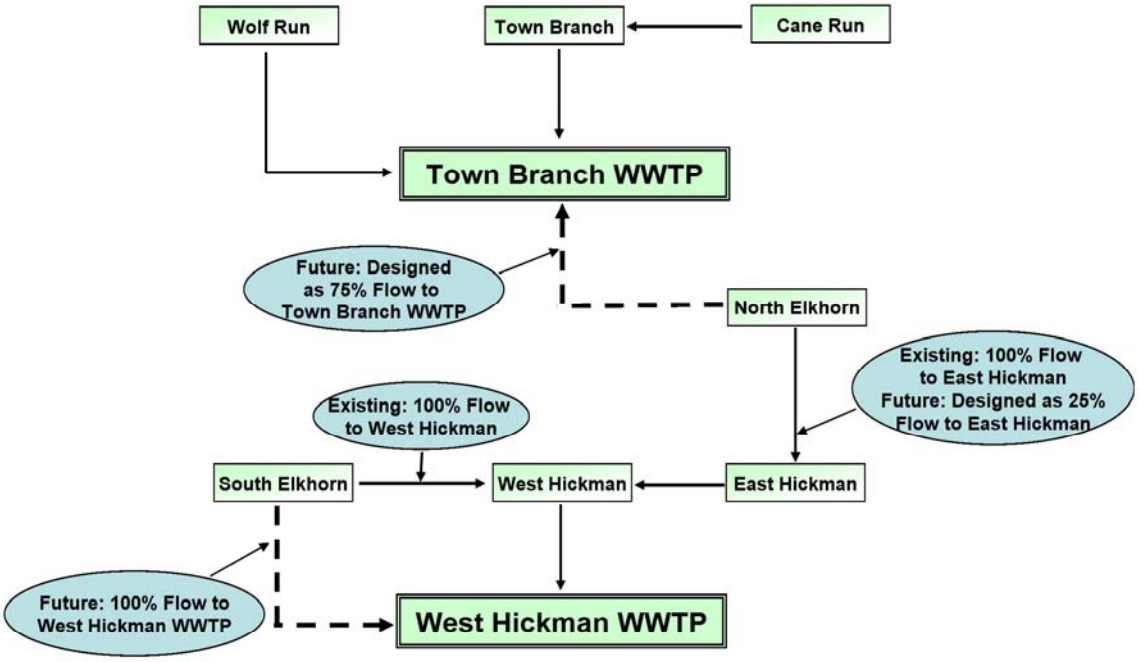
1. WWTP service area
2. Groups
3. Sewersheds
4. Sub-Sewersheds, and
5. Catchments

These delineations will be used to organize and manage the model datasets and execute the project. The various sewersheds delineations, and their significance to the modeling effort, are discussed individually below.

6.1.1 WWTP Service Area

The WWTP service area represents the area that contributes its wastewater flow to one of the two LFUCG wastewater treatment plants; the West Hickman WWTP or the Town Branch WWTP. This is important to understand in order to organize the model datasets and perform the planning evaluations. Two configurations will be used for the planning evaluations; a current (2008) configuration as well as a new configuration that will exist in the near future that involves re-directing some flow from the North Elkhorn Sewershed from the West Hickman WWTP to the Town Branch WWTP. **Figure 6-1** illustrates these two WWTP Service Area configurations.

Figure 6-1 Existing and Future WWTP Service Area Configurations



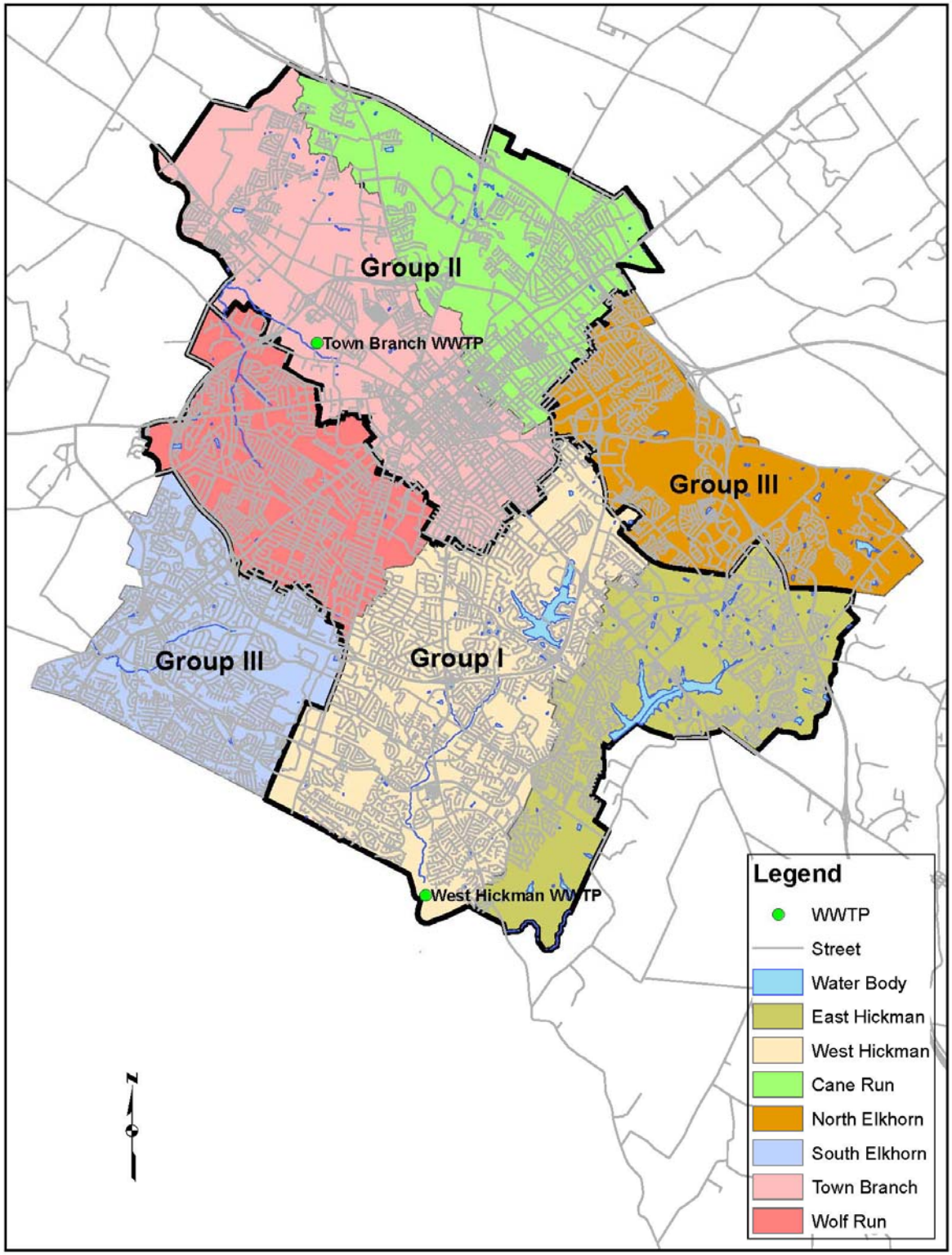
6.1.2 Drainage Sewersheds and Groups

The LFUCG service area is divided into seven drainage Sewersheds as illustrated in **Figure 6-2**. Sewershed is defined in the Consent Decree as "a section of LFUCG's WCTS that is a distinct drainage or wastewater collection area and designated as such by LFUCG." These seven sewersheds are grouped into three Groups in the Consent Decree. The three Groups of Sewersheds are listed below.

- Group One: West Hickman, East Hickman, and Wolf Run Sewersheds
- Group Two: Cane Run, and Town Branch Sewersheds
- Group Three: North Elkhorn and South Elkhorn Sewersheds

These sewersheds follow watershed boundaries, and thus more closely reflect the topology of the sewer system. This delineation is directly relevant to the modeled network organization, as this delineation represents the seven distinct model networks that have been developed. Modeling team assignments will be organized at the sewershed level.

Figure 6-2 Seven LFUCG Drainage Sewersheds and Groups



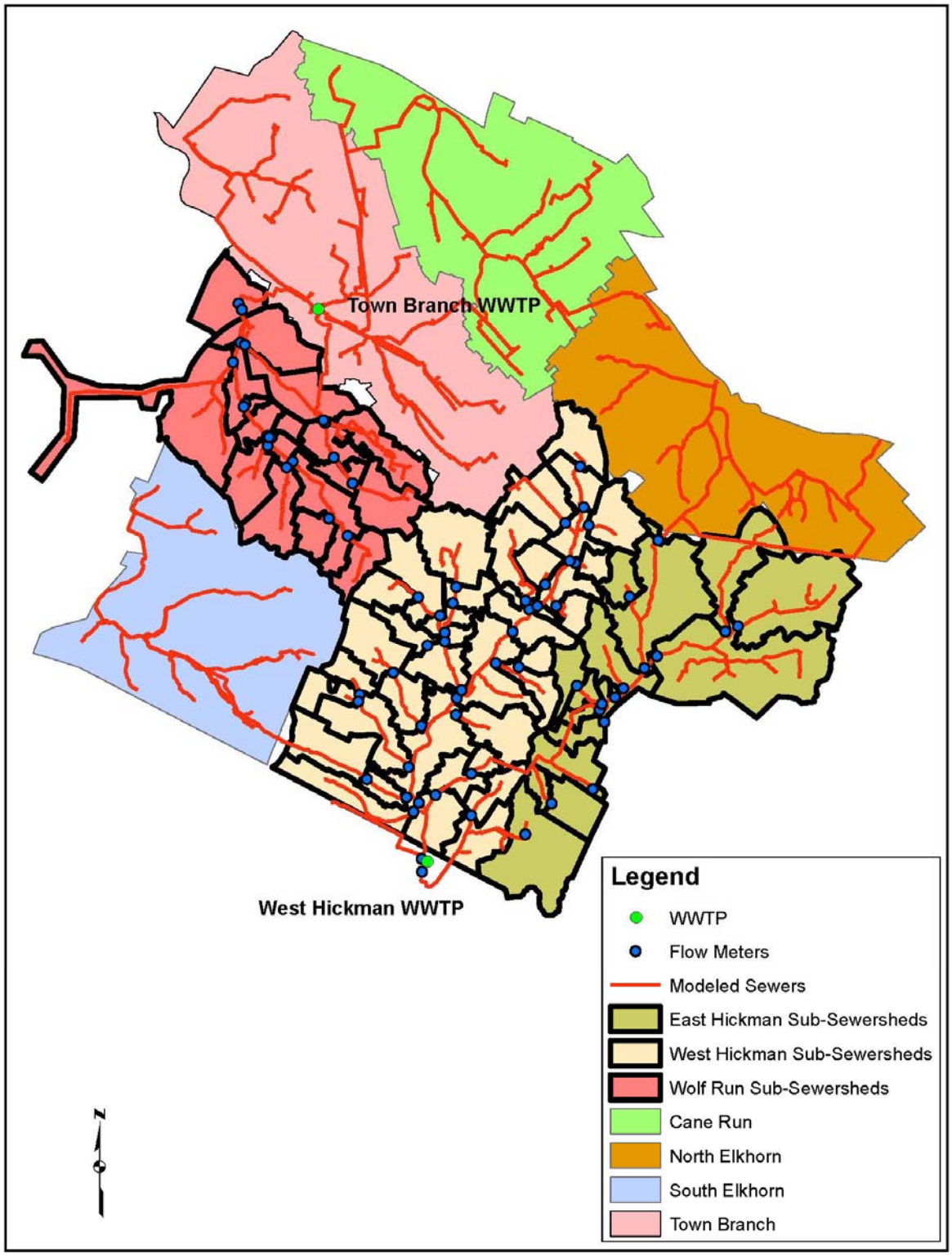
6.1.3 Drainage Sub-Sewersheds

A finer level of sewershed delineation is at the sub-sewershed level. The seven drainage sewersheds have been subdivided into sub-sewershed areas to provide a finer level of detail in supporting project execution. The locations of the flow monitors that are part of the temporary flow monitoring program (See Section 5.1) primarily determine how the sub-sewersheds are defined. Modeling work will also be organized at this level, especially during the calibration stage of the project. **Figure 6-3** identifies the individual sub-sewersheds that have been delineated for the Group I Sewersheds.

6.1.4 Catchment Areas

The finest level of basin delineation is at the catchment level. This level of delineation is the level at which individual model basin areas (i.e., RUNOFF catchments) will be delineated. These basins will be delineated during model development to represent the drainage area associated with each flow loading point on the modeled sewer network. The sewershed characteristics (i.e., I/I parameters for sewersheds) will be determined at the catchment level and used as model input.

Figure 6-3 LFUCG Sub-Sewersheds – Group I



6.2 Model Extents

The LFUCG's models will include all Major Gravity Lines, Pumping Stations, locations with Recurring SSOs, and Force Mains. Modeled features, including the sewer network, SSOs, pump stations and force mains, are discussed below.

6.2.1 Modeled Sewer Network

All Major Gravity Lines will be included in the model network. Major Gravity Lines are defined as any of the following: all gravity sewer lines that are twelve inches in diameter or larger; all eight-inch gravity sewer lines that are necessary to accurately represent flow attributable to a service area in each of the sewersheds; all gravity sewer lines that convey wastewater from one pumping station service area to another pumping station service area; and all gravity sewer lines that substantially contribute, or that LFUCG knows will likely substantially contribute to Recurring SSOs. The modeled sewer network is shown in **Figure 6-4**.

6.2.2 Modeled SSOs

The model will be configured to represent all Recurring SSO locations as defined in the Consent Decree. Recurring SSOs include manhole SSOs, pump station SSOs as well as building backups. A total of 111 Recurring SSO and un-permitted discharge locations are identified in Appendix A of the Consent Decree and will be included in the model, except for a relatively small group of SSOs where historical maintenance data is available that support that they are caused by a correctable condition via maintenance and operations management measures. These listed Recurring SSOs show no history of being related to hydraulic capacity deficiencies in the Sanitary Sewer System and are referred to as Correctable/Corrected Recurring SSOs. These Correctable/Corrected Recurring SSOs are listed in **Table 6-1** along with a brief history of their activation conditions. The modeled Recurring SSOs are presented in Figure 6-4.

Figure 6-4 Modeled Sewer Network, SSOs, and Pump Stations

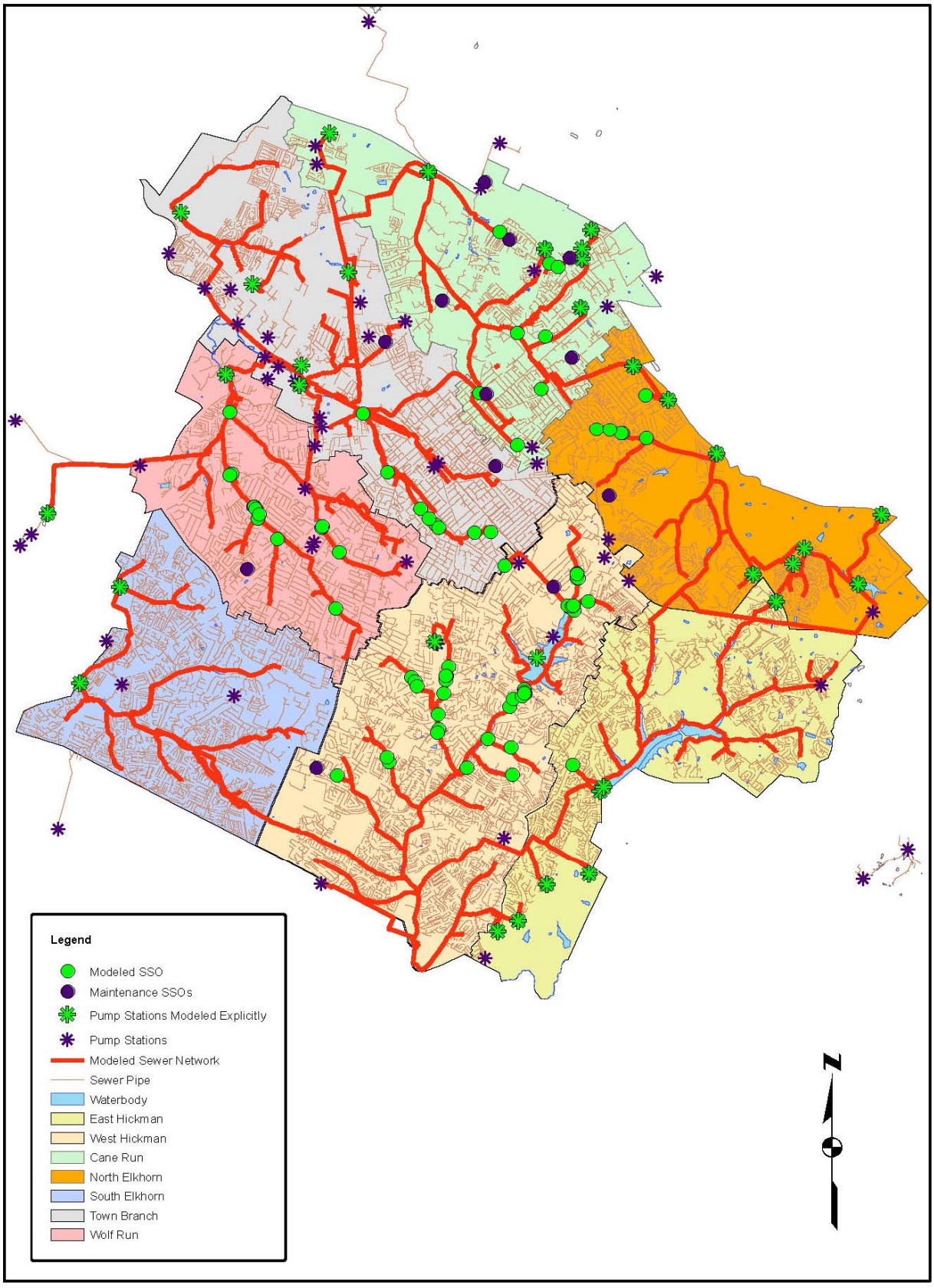


Table 6-1 List of Correctable/Corrected Recurring SSOs

No.	Consent Decree Recurring SSO ID Number	LFUCG ID Number	Geographic Location	2001-2006 SSO History
1	30	basement	245 Radcliffe	Records associated with this location indicate backup problems are attributed to either 1) privately owned lateral problems or 2) "hard" rains. LFUCG has previously identified this area for a priority stormwater management project. Design of the SW project is complete and LFUCG has purchased two homes across the street from this location for the construction of SW detention basin. Sanitary sewers in this location are also being relocated.
2	31	basement	209 Radcliffe	**No SSOs** reported since the two events that occurred within one-week period in 2002.
3	78	MH CR6_130A	7th & Jackson	**5/5/02 SSO** -grease- 0" of precipitation in 3 days prior to event, 0.42" precipitation over 3 day previous to that. No other recorded SSO events in 2001-2006 timeframe. SSO location pre-dates 2000 SSOP update.
4	79	MH CR6_132A	Shelby St.	Manhole removed from system per Consent Decree Appendix A.
5	91	Hamburg Pump Station		Four Separate SSO events in 2003 due to force main repairs, one SSO event due to electrical breaker problem. Zero SSO events otherwise in 2001-2006 timeframe.
6	93	basement	265 Vanderbilt Dr.	**7/15/03 SSO** - grease and **7/17/03 SSO** - grease-1.27" precipitation on July 15 but zero precipitation on July 17.
7	94	MH WH10_400	Nichloasville Rd.	**1/7/02 SSO** - grease -0.32' of precipitation on 1/6/02/0.2' precipitation of 1/7/02. 1.14" of precipitation on 1/23 and 1/24, no SSO. **12/16/02 SSO** - grease-0.16' of precipitation 2 days before event, no precipitation day before or day of event.
8	96	MH WR3_103A	Poppy Ln.	**12/16/02 SSO** - grease-0.16' of precipitation 2 days before event, no precipitation day before or day of event. **4/11/03 SSO** - grease-0.03" of precipitation on 4/10/03 and 0.09" of precipitation on 4/11/03.

No.	Consent Decree Recurring SSO ID Number	LFUCG ID Number	Geographic Location	2001-2006 SSO History
9	97	MH NE2_154	1454 Jingle Bell Ln.	**1/2/03 SSO** - grease-0.17' precipitation on 1/2/03/0.05" precipitation on 1/3/03. **6/18/03** SSO-grease-0.03" on 6/17/03/ 0" precipitation on 6/18/03.
10	102	MH CR7_134	1943 Stanton Way	**7/1/03 SSO** - grease -0.17" precipitation over previous 13 days. **10/16/03 SSO** - grease -0.58" precipitation over previous 11 days
11	105	MH CR3_18C	115 W. Loudon Ave.	**2003 - 2SSO events 2004-3 SSO events 2006-1 SSO event**, Some with measured precipitation, others with zero precipitation. All maintenance records say "grease".

6.2.3 Modeled Pump Stations

The model will include the critical pump stations and force mains owned or operated by LFCUG within the collection system. The only exception is pump stations that serve a single structure or building and for the pump station serving Southland Christian Church in Jessamine County. The pump stations will be represented in the model by one of the two methods:

1. Pump stations with Recurring SSOs and pump stations that deliver large quantity of flows will be modeled explicitly. Pump curves defining discharge head-flow rate relationship will be determined either from on-site pump testing or from "manufacturers" records. Detailed understanding of the physical structure of the pump station wet well, as well as the number of pumps and the control philosophy that is in operation at the station, will also be investigated.

2. Small pump stations with relatively insignificant impact on system flows will be modeled as a flow loading point. These pump stations are generally used to deliver sewer flows from a few homes or a small subdivision.

Table 6-2 lists the pump stations where Recurring SSOs are located. These pump stations will be modeled using method#1 described above.

Table 6-2 LFUCG Pump Stations with Recurring SSOs

Pump Station Name	Pump Station Address
Armstrong Mill Road	2755 Armstrong Mill Rd
Bluegrass Field	1031 Air Freight Dr
Deep Springs	469 Anniston Dr
Dixie	1459 Huntsville Dr
East Hickman	3316 Buckhorn Dr
Eastlake	1326 Fenwick Rd
Greenbriar 1	3770 Katay Dr
Greenbriar 2	3592 Winchester Rd
Hartland 1	3630 Timberwood Ln
Hartland 2	2140 Leafland Pl
Hartland 3	4904 Hartland Pkwy
Lower Cane Run	1760 Mcgrathiana Pkwy
Man O War	2079 Bryant Rd
Mint Lane	1510 Man O War
North Elkhorn	2201 Elkhorn Rd
Shadeland	857 Glendover
Shandon Park 2	765 Kingston Dr

Pump Station Name	Pump Station Address
Sharon Village	1985 Haggard Ct
South Elkhorn	2500 Bowman Mill Rd
Thoroughbred Acres	619 Parkside Dr
Town Branch	335 Jimmie Dr
Winburn	1985 Russell Cave Rd
Wolf Run	755 Enterprise Dr

6.3 Network Data Development

6.3.1 Data Transfer

LFUCG developed and maintained seven sewer system models (one for each sewershed) in XPSWMM format. MIKE URBAN software has been selected to develop the new hydraulic models. Modeled sewer network data will be derived from the existing models as the primary data source. The existing models will be directly imported into the new model interface.

LFUCG also developed GIS data to define the network elements (individual database records with unique identifiers), spatial data (topology, x-y grid coordinates, invert elevations, etc. for each record) and attribute data (pipe diameters, plan lengths, pipe material, etc. for each record). The GIS data will be used to perform QA/QC check on the existing models.

6.3.2 Dataset Development Procedure

Currently, LFUCG maintains seven separate models, one for each Sewershed. In the future, there may be needs to merge some of the models into one. The modeling team intends to keep the current pipe IDs for easy reference. If multiple Sewershed models are merged into one model, no duplicate manhole IDs should exist since each manhole in the LFUCG Sanitary Sewer System has a unique ID. Therefore, no additional naming convention is anticipated to be needed.

Once the existing models are converted into MIKE URBAN format, the modeler will review the plan view of the model to determine any connectivity data gaps. Similarly, the modeler will review the profiles to identify any questionable sewer system attribute data or data gaps. When such data problems are found, the modeler will first review the GIS sewer system attribute data and attempt to resolve any data discrepancies. If the discrepancies cannot be explained by referencing GIS, the project team will then use the procedures outlined in Section 7 including using paper records search or through field investigations.

6.3.3 Network Data Verification Procedure

Once the data problems have been resolved by the paper records search or through field investigations, the model files will be revised. If appropriate, an electronic file containing the corrections will be submitted to LFUCG staff responsible for GIS data maintenance to update the GIS database.

6.4 Sewershed/Sub-Sewershed Data Development

Two key aspects of sewer system behavior are defined by the sewershed and sub-sewershed areas that are hydraulically connected to the system: (1) base, or dry-weather, flow conditions; and (2) wet-weather flow conditions. Each aspect is discussed individually below.

6.4.1 Base Flow Development

There are two components of base flow: (1) the sanitary wastewater component (or base wastewater flow, BWF); and (2) the groundwater infiltration (GWI) component. Each component is addressed below.

6.4.1.1 Sanitary Wastewater Component

The sanitary wastewater component of base flow (BWF) has historically been developed from several sources, often used together to define both sanitary and groundwater flows. The typical approach involves the use of population data, oftentimes derived from land use data (or census data), together with an assumed unit wastewater flow rate (gallons per day per capita) to define BWF. Flow monitoring data within the system, as well as flow data collected at the WWTP, are then used to define the composite base flow (BWF plus GWI). Finally, the difference between the observed flow and the computed BWF is attributed to GWI.

6.4.1.2 Groundwater Infiltration Component

The LFUCG model will incorporate groundwater infiltration (GWI) estimates based on two sources of data.

1. Inferred measurement of GWI - the dense network of flow monitors used for model calibration (see Section 5 of this Hydraulic Model Report) will provide data that can be used to estimate GWI throughout the system. This will be accomplished in the smaller basin areas where diurnal low flows can be attributed primarily to GWI. The specific procedure is described below (see Section 6.4.2) in greater detail.

2. WWTP flow-based estimates - at the WWTP service area level, GWI is attributed to the difference between observed flows and the estimated BWF for the service area.

Taken together, the above sources of data will enable accurate GWI estimates to be made at the modeled-basin level of precision.

6.4.2 Hydrologic Response to Wet Weather Conditions

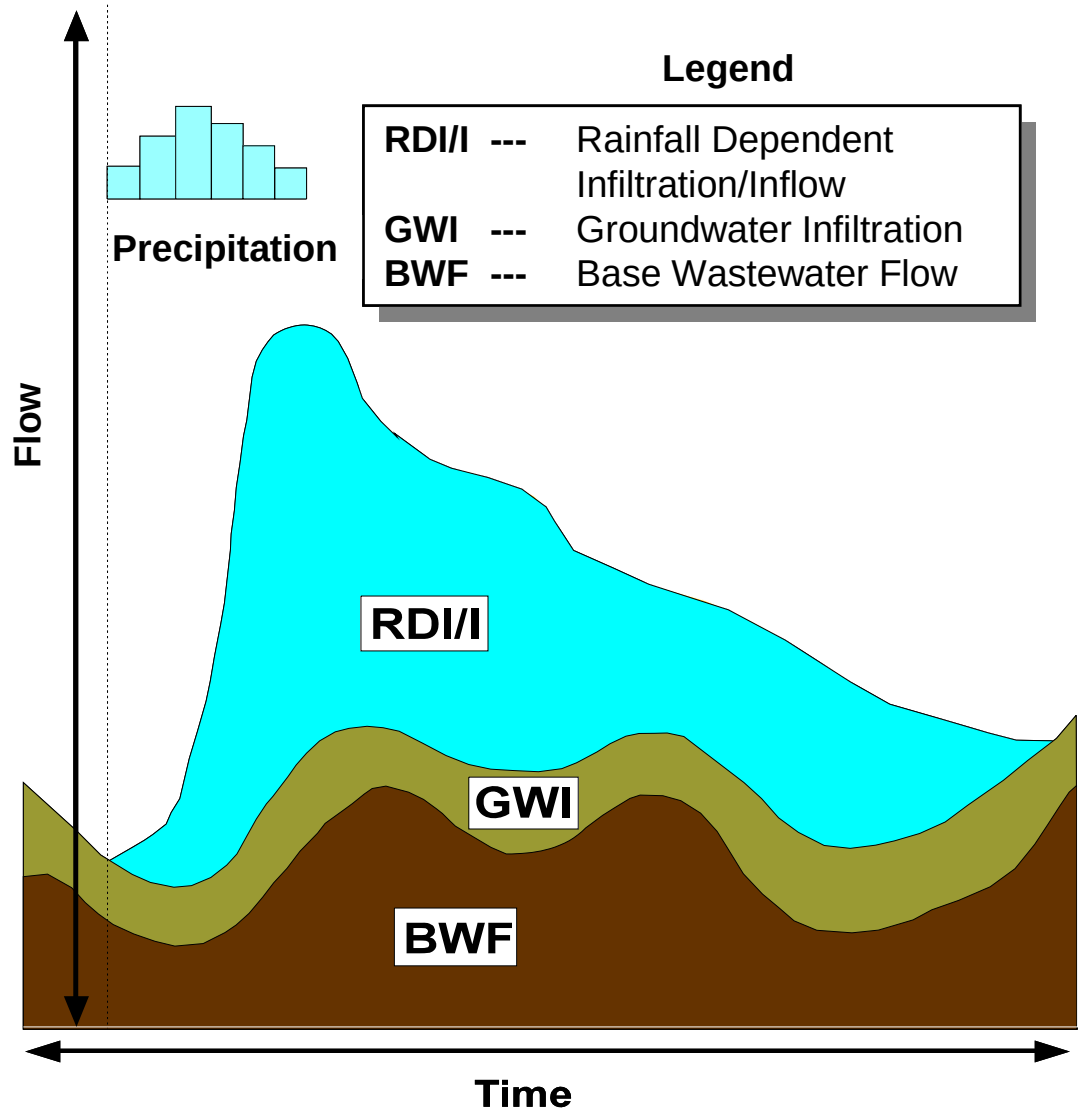
The hydrologic processes that contribute wet-weather flow in a sanitary sewer system are not understood well enough to deterministically model the physical processes with typically available data. As a result, empirical data are used to estimate the hydrologic response in the sanitary sewer system. The approach is described below.

The rainfall and flow monitoring data will be analyzed to develop an understanding of the system RDI/I characteristics using a computer program designed for this purpose known as SHAPE. SHAPE consists of a set of computer utility programs to evaluate the complete record of flow and rainfall data, isolate typical dry- and wet-weather periods, define characteristic

sanitary flows, determine seasonal dry-weather infiltration rates; and develop unit hydrographs representative of I/I.

The project team using the SHAPE computer program will divide the measured flow data into characteristic flow components appropriate for flow forecasting. As illustrated in **Figure 6-5,** these components are dry-weather flow (DWF), and rainfall dependent infiltration and inflow (RDI/I) in response to wet-weather conditions. DWF consists of base wastewater flow (BWF) from residential, commercial, and industrial users, and groundwater infiltration (GWI) that enters the collection system through defective pipes, pipe joints, and leaking manhole walls. Decomposition of the flow data into each of the major wastewater components is essential to understanding the sources of flow in the system, the relative quantities of I/I into the system, and whether I/I is excessive in the system.

Figure 6-5 Components of Wet-Weather Wastewater Flow



Dry-Weather Flow Characterization

The characteristic flows for each catchment will be determined in the following manner:

1. Identify periods where flows are clearly not influenced by rainfall.

2. Identify the minimum flow each day (this usually occurs about 4:00 a.m.). Different methods are available to estimate the groundwater infiltration (GWI) component which is subtracted from the minimum flow to yield an estimate of the base wastewater flow (BWF) which can be developed as an average value or a hydrograph.

3. Divide the BWF hydrographs into weekdays and weekends. Statistically evaluate the weekday and weekend hydrographs for the period of record to determine characteristic hydrographs for the meter.

4. Allocate the meter's BWF hydrographs to each tributary catchment.

5. Statistically evaluate the GWI for the period of record to determine average GWI and seasonal minimum and maximum GWI.

6. Allocate the meter's average, minimum, and maximum GWI to each tributary catchment.

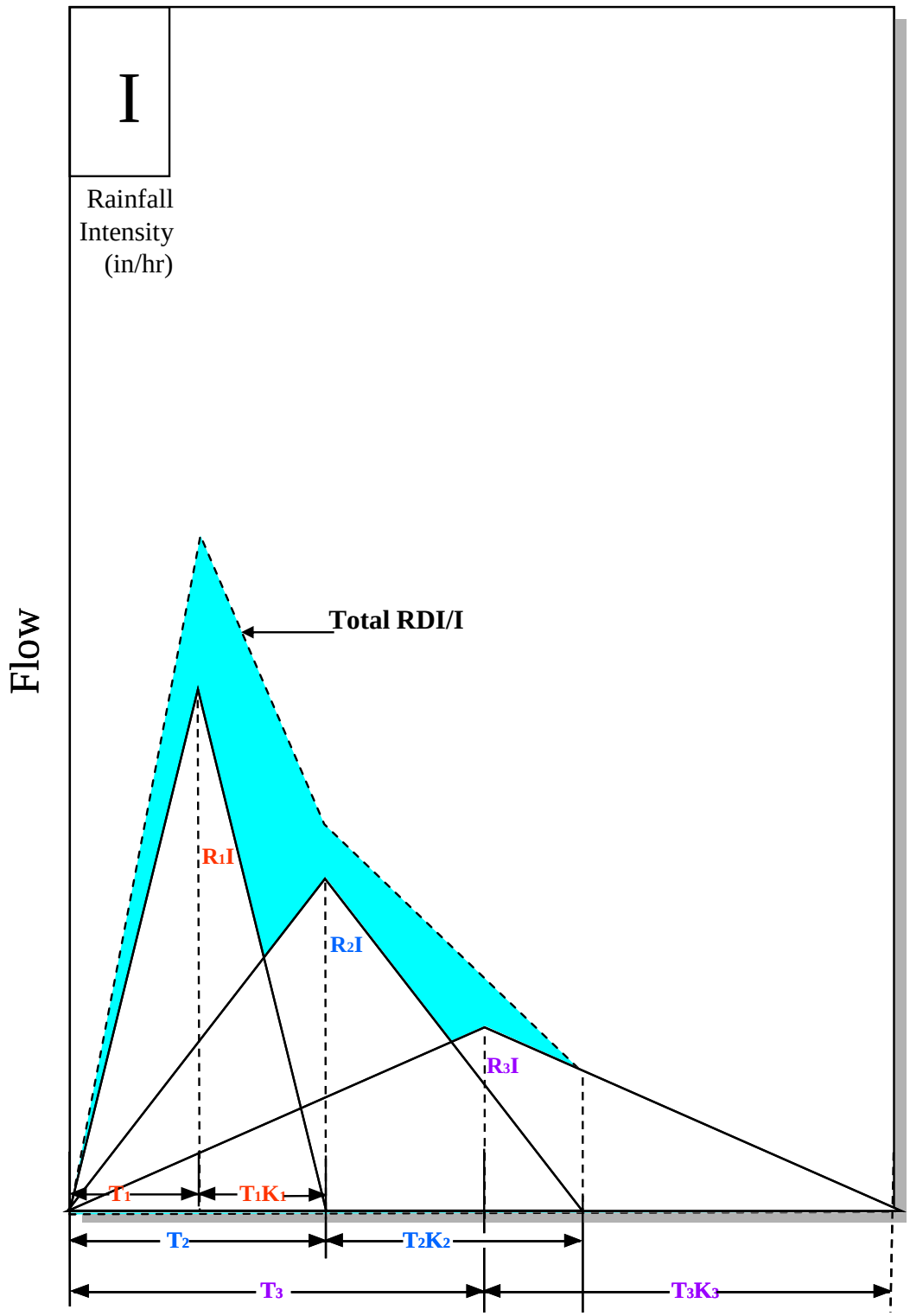
7. Verify the level of groundwater monitoring data collected during the Sanitary Sewer Assessment or monitoring program.

Rainfall-Dependent Infiltration/Inflow (RDI/I) Characterization

The project team will use a unit hydrograph approach to determine a characteristic relationship between rainfall and RDI/I for each meter. **Figure 6-6** illustrates how the RDI/I from a single hour of rainfall with an intensity of "I" is characterized under this approach. Experience indicates that it often requires up to three unit hydrographs to adequately represent the various ways that rainfall becomes RDI/I. Each unit hydrograph is characterized by the following three parameters:

- R: The fraction of rainfall volume that enters the sanitary sewer system
- T: The time to peak in hours
- K: The ratio of time to recession to the time to peak

Figure 6-6 Triangular Unit Hydrograph Approach to Decomposition of the Wet-Weather Sanitary Sewer Hydrograph



This approach allows estimating unit flow parameters appropriate for forecasting design flows. This method of hydrograph decomposition considers a range of parameters including rainfall depths, sewered area, antecedent moisture conditions (AMC), and groundwater elevations to better quantify individual wastewater flow components in the system. Unit hydrograph parameters are developed through a systematic analysis of measured flow and rainfall. Once developed, these unit hydrograph parameters and design rainfall hyetographs can be used to define RDI/I inflow hydrographs for collection system modeling/evaluation. The approach to developing RDI/I unit hydrograph parameters follows:

1. First, the project team will define RDI/I events by subtracting the characteristic dry-weather flows (BWF and GWI) from the measured flow record, as illustrated in Figure 6-5. For each event, the total R will be calculated for the event by dividing the RDI/I volume by the rainfall volume.

2. Then, the project team will identify events where most RDI/I is due to direct inflow and/or very rapid infiltration. Typically, these are intense, short-duration thunderstorms preceded by relatively dry antecedent conditions. These events are used to determine R1, T1, and K1, characterizing the first unit hydrograph.

3. Next, the project team will identify events where infiltration is maximized. These are typically long duration, low intensity events preceded by wet antecedent conditions. These events are used to determine R2, T2, and K2, characterizing the second unit hydrograph. If these events have very long recession limbs, it will be necessary to develop R3, T3, and K3, for the third unit hydrograph.

4. R, T, and K parameters for the three unit hydrographs characterizing RDI/I at the meter are assigned to all catchments tributary to the meter.

5. Finally, the project team will verify the R, T, and K parameters by using them along with catchment areas to develop inflow hydrographs for a more complex rainfall event. These hydrographs are then routed through the collection system with the model developed and compared with measured hydrographs for this event.

Using the above procedure, the project team will determine the appropriate R, T, and K values of the above-mentioned hydrographs for model input. This allows the model to easily accommodate monitored system hydrographs, and facilitates the calibration of the model, as well as evaluating rehabilitation alternatives.

6.5 WWTP Flow Rates and Hydraulics

The WWTP hydraulics will be modeled as a boundary condition for the sewer system model. Data will be collected from the available WWTP effluent flow records for the purpose of building boundary conditions at each of the downstream (WWTP) individual model boundaries. The project team has investigated the available data in a series of meetings with LFUCG WWTP staff and is currently working with LFUCG staff to define specific data acquisition requirements, which will vary from plant to plant based on the specific data collection processes and equipment used at each plant. Initially, effluent flow rates and water

surface elevation at the plant headworks are the data of interest, as these data will be used to define boundary conditions. The specific representation of each boundary condition will be established after detailed review of the data and after reviewing plant headworks operating practices with each plant manager.

6.6 Model Calibration Procedures - Separate Sewers

Model calibration involves collection of flow monitoring data (rainfall and sewer flow rates/elevations) and development of an initial model input dataset, followed by successive applications of the model by adjusting calibration parameters until the model results are in agreement with the observed data. Note that the model calibration is a critical step in ensuring the model will properly simulate the prototype system over a range of storm events. Model calibration is accomplished by adjusting initial estimates of the selected variables, within a specified range, to obtain a satisfactory correlation between simulated and observed values.

The variables selected to adjust or calibrate are the parameters that cannot be observed precisely (e.g., percent impervious, soil infiltration parameters, etc.), and which have the greatest effect on the accuracy of the results. The calibration parameters are prioritized according to their influence on the model results, which can vary from one drainage system to other. The calibration parameters are prioritized based on knowledge of modeling case studies of similar sewer systems.

This section presents the model calibration procedures to correlate the simulated hydraulic grade line (HGL) and flow rates with the observed values at the flow monitoring sites during the calibration storm events.

6.6.1 Dry-Weather Flow Calibration

The dry-weather flow input for the model will be developed based on the available flow monitoring data for the project area. Using the DWF analysis of the measured flow data, the diurnal flow patterns will be established. These patterns are then applied to the average DWF from each catchment that are estimated based on the available flow monitoring data. The estimated DWF with appropriate diurnal patterns will be used as flow inputs to the model and then calibrated using the measured flow monitoring data during dry periods. In addition, land use and population data may be used to support the dry-weather calibrations.

6.6.2 Wet-Weather Flow Calibration

The project team will use field data collected from the flow monitors to perform the wet-weather calibration. At least two (2) storms from the flow monitoring data will be selected for the model calibration and verification in each sub-model. Additional events will be used for further verification if required for specific sub-models. Note that the storm events selected for wet-weather calibration of the sewer-system model shall produce a sewer-system response to a range of antecedent moisture conditions.

The model calibration and verification will be performed using estimates of R, T and K during selected storm events, which are derived based on the flow monitoring data. The model calibration efforts will be performed to obtain the best correlation of the simulated and observed flow data for the two events. These efforts include adjusting base flow rates to

calibrate antecedent flow conditions and adjusting the R, T and K parameters to produce the sewer system response similar to the measured values for the calibration and verification events. Through the calibration and verification effort, the representation of the sewer system hydraulic characteristics and I/I response will be confirmed.

6.6.3 Sensitivity Analysis

To maximize the calibration, a sensitivity analysis will be conducted to examine and confirm the model response to changes in various input parameters within acceptable ranges. Either existing analyses for the Model or separate sensitivity analyses will be performed in order to maximize the effectiveness of the calibration.

Section 7 - Field Investigations

This section describes the requirements and protocol for field investigations that will be necessary in the course of the model development. The primary objective of the field investigation protocol is to develop a focused approach that will result in optimal effort and expenditure in conducting the field investigations. In addition, this protocol will enable LFUCG to systematically identify and correct the deficiencies in existing GIS data, and eventually update the GIS sewer system database.

7.1 Field Investigation Requirements

The field investigations will primarily include verification of the sewer attribute data that are in question and filling missing values. In general, the requirements include verification of manhole invert and rim elevations, sewer sizes, pipe material, and attributes of special structures (drop manholes, flow diversion chambers, flow control gates, etc.). Other activities are expected to include verification of sewershed delineations, confirmation of land use data, and other miscellaneous data that affect estimation of the model input parameters.

7.2 Field Investigation Protocol

The modeling team will initially generate the model sewer networks and profiles in MIKE URBAN from existing XPSWMM models. After a thorough review of plan and profile views and referencing GIS data, the modeling team will assess the completeness and reliability of the sewer system data. Subsequently, the modeling team will prepare a list of sewer system data deficiencies and discrepancies that require verification. As a next step, the modeling team will review the paper based sewer maps and recent sewer system studies obtained during data collection task to resolve the data issues. In addition, the modeling team will coordinate with LFUCG staff to review their records to address data problems. Finally, if the data verification cannot be achieved by review of the paper maps and sewer system studies, the modeling team will prepare a Request for Field Investigation (RFI) for each data discrepancy and or data gap. Issues to trigger RFI include pipe size difference, connectivity ambiguity, and invert elevation discrepancy, etc.

The modeling team will document in a spreadsheet the process to determine the need for field investigation. This spreadsheet will include, at minimum, the following fields:

		Step 1		Step 2		Step 3		
Item No.	Description of GIS Data Problem	Paper Maps/ Records Review (yes or no)	Problem Resolved? (yes or no)	LFUCG Review (yes or no)	Problem Resolved (yes or no)	Need Field Investigation (yes or no)	RFI No.	Comments

Each RFI will be assigned a unique tracking number and include detailed information such as manhole and/or pipe ID, a map indicating the location of the manhole/pipe that need to be investigated, and a list of sewer attribute data to be verified or recorded. The modeling team will also indicate any specific directions for field crew for observing and measuring special features during field investigation (e.g., sewer connections in a drop manhole, flow regulator configuration in a SSO diversion structure). A blank RFI is depicted in **Figure 7-1**.

The modeling team will provide the RFI to the field investigation team on as needed basis during the model development. The field investigation team will then schedule the work and perform the field investigations according to the RFI. The field investigation team consists of experienced staff who will document the results in a Field Investigation Report (FIR). This team will sometimes be accompanied by the modeling team that initiated the request, as required (e.g., especially critical, unusual, or otherwise key features of the system).

A unique tracking number (with reference to RFI) will be assigned to each FIR. **Figure 7-2** includes a blank FIR to show the key results that will be recorded. The field team, as an attachment to the FIR, will prepare a detailed sketch that depict the location of the subject manholes and pipes and specific locations where the field measurements are obtained. In addition, digital photographs will be obtained and attached to the FIR. Note that Figures 7-1 and 7-2, if necessary, will be finalized during the initial stage of model development, prior to commencing any field investigations.

In addition to verifying sewer attribute data, the field investigations during model development may require confirmation of the sewershed delineations, land use data, and other miscellaneous data that affect estimation of the model input parameters. The modeling team will include a detailed description of the request in the RFI and necessary maps to enable the field team to perform the investigations. The field observations will be documented in the FIR.

The field investigation team will comply with Occupational Safety and Health Administration (OSHA) requirements for confined space entry and other safety procedures during entering/investigating manholes and similar structures. In addition, the field team will coordinate the investigations with LFUCG staff. The coordination involves advance notification of the field activities, scheduling the field work to avoid conflict with other LFUCG operations, and requesting the presence of LFUCG staff to perform investigations, if required.

The modeling team will use the field investigation results to supplement the GIS data to develop sewer networks and forward that information to LFUCG if the GIS data require an update.

Figure 7.1 Request for Field Investigation (RFI) Form

Request for Field Investigation (RFI)
H&H Model
Lexington-Fayette Urban County Government

Tracking number: _____ Requested by: _____ Date requested: _____

Drainage Basin: _____ Neighborhood: _____

Pipe ID: _____ Upstream MH ID: _____ Downstream MH ID: _____

Pipe Length: _____ U/S MH Coordinate: _____ D/S MH Coordinate: _____

Street Location Description: _____

Map Attached: Y ☐ N ☐ Interceptor (High Flow) ☐ Combined Trunk (Low Flow): ☐ Sanitary Trunk (Moderate Flow) ☐

Problem Description: _____

Specific Instructions: Please complete a Field Investigation Results (FIR) Form for the information checked below. Please include a field sketch and a disk with digital photo(s) labeled with the RFI tracking number.

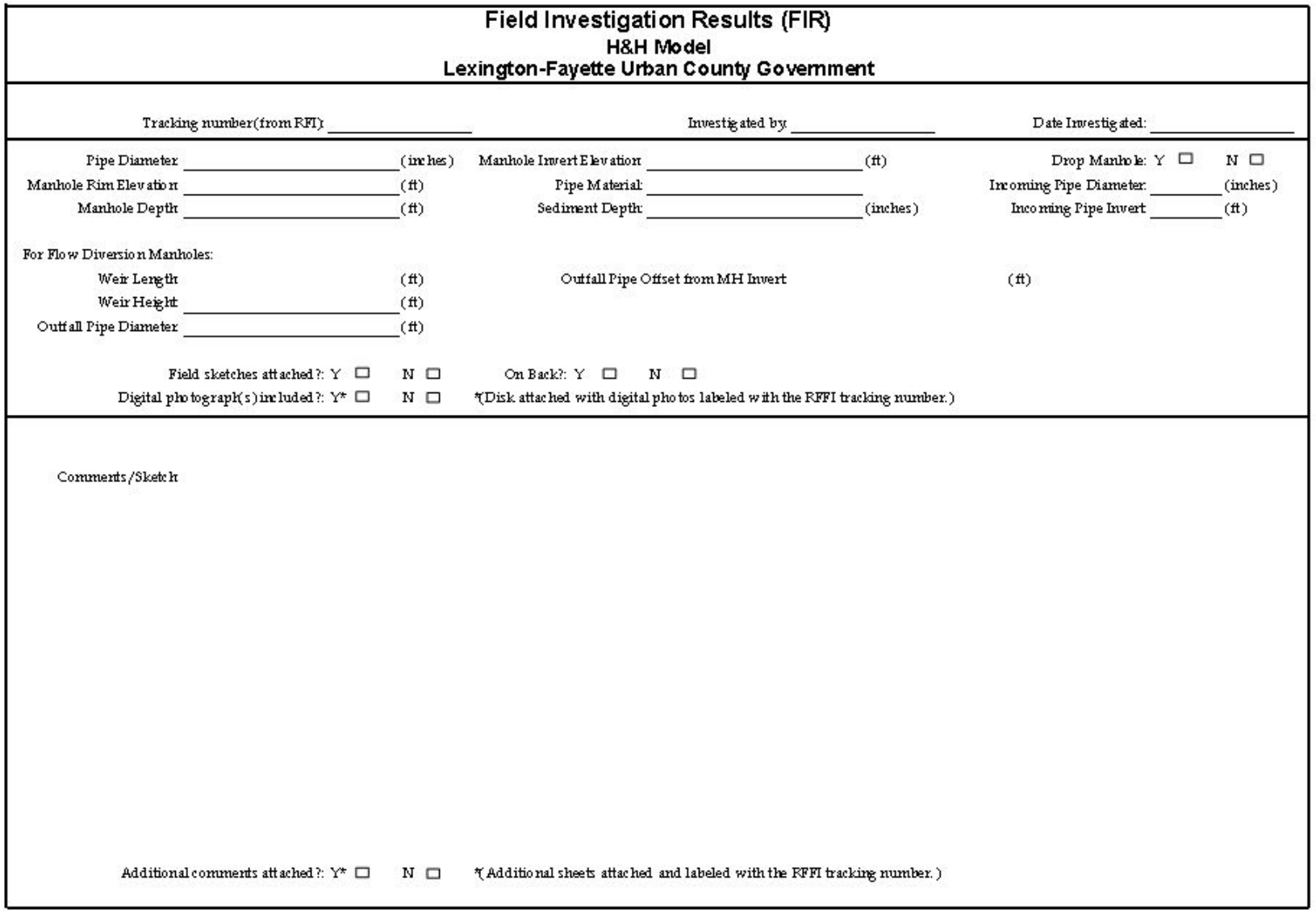
- ☐ Pipe Diameter
- ☐ Manhole Rim Elevation
- ☐ Manhole Depth
- ☐ Manhole Invert Elevation
- ☐ Pipe Material
- ☐ Sediment Depth
- ☐ Drop Manhole
- ☐ Incoming Pipe Diameter
- ☐ Incoming Pipe Invert

For Flow Diversion Manholes:

- ☐ Weir Length
- ☐ Weir Height
- ☐ Outfall Pipe Diameter
- ☐ Outfall Pipe Offset from MH Invert

Other Instructions: _____

Figure 7.2 Field Investigation Results (FIR) Form



Field Investigation Results (FIR)
H&H Model
Lexington-Fayette Urban County Government

Tracking number(from RFI) _____ Investigated by _____ Date Investigated: _____

Pipe Diameter _____ (inches) Manhole Invert Elevation _____ (ft) Drop Manhole: Y ☐ N ☐

Manhole Rim Elevation _____ (ft) Pipe Material: _____ Incoming Pipe Diameter: _____ (inches)

Manhole Depth _____ (ft) Sediment Depth: _____ (inches) Incoming Pipe Invert _____ (ft)

For Flow Diversion Manholes:

Weir Length (ft) Outfall Pipe Offset from MH Invert (ft)

Weir Height _____ (ft)

Outfall Pipe Diameter _____ (ft)

Field sketches attached?: Y ☐ N ☐ On Back?: Y ☐ N ☐

Digital photograph(s) included?: Y* ☐ N ☐ *(Disk attached with digital photos labeled with the RFFI tracking number.)

Comments/Sketch

Additional comments attached?: Y* ☐ N ☐ *(Additional sheets attached and labeled with the RFFI tracking number.)

Capacity Assessment Work Plan

Lexington-Fayette Urban County Government

September 2008

Prepared by:

CDM

and

HAZEN AND SAWYER
Environmental Engineers & Scientists

Lexington-Fayette Urban County Government
Capacity Assessment Work Plan

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed

9-8-08
Date

Charles H. Martin, P.E., Director
Division of Water Quality
Lexington-Fayette Urban County Government

Contents

Figures

Section 1
Overview

1.1 Consent Decree Requirements

Section VII, Paragraph 15.D of the Consent Decree (CD) requires LFUCG to prepare a Capacity Assessment Work Plan (CAWP) for review and comment by the U.S. Environmental Protection Agency (EPA) and the Energy & Environment Cabinet (EEC), (formerly known as the Environmental and Public Protection Cabinet) within 6 months of CD lodging. The work plan must describe how LFUCG will assess the existing capacity of the Sanitary Sewer System and the wastewater treatment plants (WWTPs). The capacity assessment will include all Pumping Stations, all Major Gravity Lines, all Force Mains and siphons and their respective related appurtenances, all Recurring SSO points, and all other portions of the Sanitary Sewer System that must be assessed so as to allow a technically-sound evaluation of the causes of Recurring SSOs or wet-weather Unpermitted Bypasses at the WWTPs.

This Capacity Assessment Work Plan (CAWP) has been prepared to satisfy the requirements stated in Section VII, Paragraph 15.D of the CD for work plan preparation. Once implemented, all of the requirements of this section of the CD will have been satisfied.

1.2 Goals and Objectives

The capacity assessment will specifically identify, at a minimum, the hydraulic capacities of portions of the Sanitary Sewer System and compare those capacities to existing and future projected average and peak dry flow and Peak Flow, which are defined herein, and in the CD. Future projected flows will be estimated consistent with accepted industry standards and/or local practice for design purposes. This assessment will identify, within the aforementioned portions of LFUCG's Wastewater Collection and Transmission Systems (WCTS), those portions of the WCTS that are expected to cause or contribute to Recurring SSOs, Bypasses and/or overloading at the WWTPs under existing and projected future, average and peak dry flow and Peak Flow, and the degree to which those portions of the WCTS experience or cause, under current or projected future conditions, SSOs, Bypasses and/or overloading at the WWTPs.

As part of the capacity assessment, LFUCG will use the information it is required to develop to assess existing and future projected capacity of the Sanitary Sewer System and the ability of the Sanitary Sewer System to transmit Peak Flows experienced by and predicted for the Sanitary Sewer System.

The capacity assessment will be completed using the calibrated hydraulic model which will be developed in accordance with the Hydraulic Model Report submitted for EPA and EEC review on July 8, 2008 (CD Section VII, Paragraph 15.E).

1.3 Definitions and Acronyms

In order to provide a clear understanding of terms used, some of the more common and significant definitions and acronyms are provided. They are organized into ones that are defined in the CD and other related ones.

1.3.1 Definitions included in the CD

The following definitions and acronyms are included in the CD (Section IV) and are relevant to capacity assessment activities:

"Building Backup" shall mean a subcategory of SSOs which occurs when a wastewater backup occurs into a building and is caused by blockages, malfunctions, or flow conditions in the Sanitary Sewer System. A wastewater backup that is caused by a blockage or other malfunction of a Private Lateral is not a Building Backup.

"Capacity, Management, Operations, and Maintenance" or "CMOM" shall mean, for the purpose of the Consent Decree only, a flexible program of accepted industry practices to properly manage, operate and maintain sanitary wastewater collection, transmission and treatment systems, investigate capacity-constrained areas of these systems, and respond to SSO events.

"Consent Decree" or "Decree" shall mean the United States of America and The Commonwealth of Kentucky v. Lexington-Fayette, Civil Action No. 5:06-cv-386 and all its attachments.

"Day" (whether or not capitalized) shall mean a calendar day unless expressly stated to be a working day. In computing due dates under the Consent Decree, where the last day would fall on a Saturday, Sunday, or federal holiday, the period shall run until the close of business of the next working day.

"EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.

"EPPC" shall mean the Environmental and Public Protection Cabinet of the Commonwealth of Kentucky. (Note: the EPPC has been replaced by the Energy & Environment Cabinet or EEC).

"Excessive Inflow/Infiltration" Or "Excessive I/I" shall mean the Inflow/Infiltration ("I/I") that LFUCG determines can be cost-effectively eliminated as determined by a cost-effectiveness analysis that compares the costs of eliminating the I/I with the total costs for transportation and treatment of the I/I (including capital costs of increasing transmission and treatment capacity, and resulting operating costs).

"Force Main" shall mean all sanitary sewer lines that operate under pressure due to pumping of sanitary wastewater at a pump station except for those sanitary sewer lines that serve a single structure or building.

"Gravity Sewer Line" shall mean a pipe that receives, contains and conveys wastewater not normally under pressure, but is intended to flow unassisted under the influence of gravity. Gravity sewers are typically not intended to flow full under normal operating conditions.

"I/I" shall mean the total quantity of water from Infiltration and Inflow without distinguishing the source.

"Infiltration" as defined by 40 C.F.R. § 35.2005(b)(20) shall mean water other than wastewater that enters a sanitary sewer system (including sewer service connections and foundation drains) from the ground through such means as defective pipes, pipe joints, connections, or manholes.

"Inflow" as defined by 40 C.F.R. § 35.2005(b)(21) shall mean water other than wastewater that enters a sanitary sewer system (including sewer service connections) from sources such as, but not limited to, roof leaders, cellar drains, yard drains, area drains, drains from springs and swampy areas, manhole covers, cross connections between storm sewers and sanitary sewers, catch basins, cooling towers, storm water, surface runoff, street wash waters, or drainage.

"LFUCG" shall mean the Lexington-Fayette Urban County Government, a municipality within the meaning of that term in CWA, established under the laws of the Commonwealth of Kentucky.

"LFUCG's WWTPs" shall mean West Hickman Creek WWTP and the Town Branch WWTP.

"Major Gravity Line" shall mean any of the following: all Gravity Sewer Lines that are twelve inches in diameter or lager; all eight-inch Gravity Sewer Lines that are necessary to accurately represent flow attributable to a service area in each of the Sewersheds; all Gravity Sewer Lines that convey wastewater from one Pumping Station service area to another pumping station service area; and all Gravity Sewer Lines that substantially contribute, or that LFUCG knows will likely substantially contribute, to Recurring SSOs.

"One Hour Peak Flow" as that term is used in Paragraph 16.B of the CD for the CMOM Capacity Assurance Program only, shall mean the greatest flow in a sewer averaged over a sixty (60) minute period at a specific location expected to occur as a result of a representative 2-year 24-hour storm event.

"Paragraph" shall mean a portion of the Consent Decree identified by an Arabic numeral.

"Parties" shall mean a portion of the Consent Decree: the United States, the Commonwealth, and LFUCG.

"Peak Flow" as that term is used in Subparagraphs 15.D – 15.G of the CD, shall be determined based upon sound engineering judgment and commonly accepted design practice.

"Private Lateral" shall mean that portion of a sanitary sewer conveyance pipe, including that portion in the public right of way, that extends from the wastewater main to the single-family, multi-family, apartment, other dwelling unit, business, industry, institution or structure to which wastewater service is or has been provided. Private Laterals do not include connector joints at LFUCG;'s sewer line.

"Pumping Station" shall mean all pumping stations owned or operated by LFUCG except for pump stations that serve a single structure or building, and except for the pump station serving Southland Christian Church in Jessamine County.

"Recurring SSO" shall mean, for the purpose of the Consent Decree only, an SSO that occurs in the same location more than once per twelve (12) month rolling period.

"Reporting Year" shall mean each annual period commencing at the start of LFUCG's fiscal year on July 1 of each year.

"Reporting Year Covered by the Consent Decree." A Reporting Year is covered by this Consent Decree if any part of the Reporting Year falls after the Effective Date of, and before the termination of this Decree.

"Sanitary Sewer Overflow" or "SSO" shall mean, for the purpose of the Consent Decree only, any discharge to waters of the United States from the Sanitary Sewer System through point sources not specified in any KPDES permit (otherwise known as "unpermitted Discharges"), as well as any release of wastewater from the Sanitary Sewer System to public or private property that does not reach waters of the United States, such as a release to a land surface or structure that does not reach waters of the United States; provided, however, that releases or wastewater backups into buildings that are caused by blockages, flow conditions, or malfunctions in a Private Lateral, or other piping or conveyance system that is not owned or operationally controlled by LFUCG are not SSOs. SSOs include any cross-connections between LFUCG's Sewer System and its MS4 which allow wastewater to pass from the Sanitary Sewer System to the MS4, but does not include exfiltration that does not reach waters of the United States, or land surface or structures.

"Sanitary Sewer System" shall mean the WCTS owned or operated by LFUCG designed to collect and convey municipal sewage (domestic, commercial and industrial) to a WWTP. The Sanitary Sewer System does not include LFUCG's MS4.

"Section" shall mean a portion of the Consent Decree identified by a Roman numeral.

"Sewershed" shall mean a section of LFUCG's WCTS that is a distinct drainage or wastewater collection area and designated as such by LFUCG. For purposes of this Consent Decree, the Sewersheds have been grouped as follows: Group One consists of

West Hickman, East Hickman, and Wolf Run Sewersheds; Group Two consists of Cane Run and Town Branch Sewersheds; and Group Three consists of North Elkhorn and South Elkhorn Sewersheds.

"Ten States Standards" shall mean the applicable edition, incorporated by reference by Kentucky Regulation 401 KAR 5:005 § 29, of the "Recommended Standards for Wastewater Facilities: Policies for the Design, Review, and Approval of Plans and Specifications for Wastewater Collection and Treatment Facilities, Wastewater Committee of the Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers."

"Town Branch WWTP" shall mean the wastewater treatment plant located at 301 Lisle Industrial Avenue, Lexington, Kentucky, owned and operated by LFUCG, which discharges to Town Branch Creek from outfall 001 and pursuant to KPDES Permit No. KY0021491.

"Unpermitted Bypass" shall mean any discharge to the waters of the United States from any of LFUCG's WWTPs which constitutes a prohibited bypass as defined in 40 C.F.R. § 122.41(m), and 401 KAR 5:065 Section 1(13).

"Wastewater Collection and Transmission Systems" or "WCTS" shall mean the municipal sanitary wastewater collection and transmission systems, including all pipes, force mains, gravity sewer lines, lift stations, pumping stations, manholes and appurtenance thereto, which are owned or operated by LFUCG.

"WWTP" shall mean wastewater treatment plant.

"West Hickman Creek WWTP" shall mean the wastewater treatment plant located at 645 West Hickman Plant Road/Ash Grove Pike, Nicholasville, Jessamine County, Kentucky, owned and operated by LFUCG, which discharges to West Hickman Creek from outfall 001 and pursuant to KPDES Permit No. KY0021504.

1.3.2 Additional Definitions and Acronyms

The following additional definitions and acronyms are used in this CAWP:

"Average Daily Flow" (ADF) shall mean the total flow over a given period, divided by the number of days in the period.

"BWWF" or "Base Wastewater Flow" is domestic (or sanitary) wastewater from residential, commercial, institutional (schools, churches, hospitals, etc.) sources, and industrial wastewater sources.

"CAP" shall mean Capacity Assurance Program.

"CAWP" shall mean Capacity Assessment Work Plan.

"gpcd" means gallons per capita per day and refers to wastewater generation rate per person.

"GWI" means GroundWater Infiltration which is defined as the groundwater entering the collection system through defective pipes, pipe joints, and manhole walls.

"ICI" means industrial/commercial/institutional.

"RDI/I" means rainfall-dependent infiltration/inflow.

"RMP" means Remedial Measures Plan(s).

"SWI" means stormwater inflow.

"TBWWTP" shall mean Town Branch Wastewater Treatment Plant.

"WHWWTP" shall mean West Hickman Wastewater Treatment Plan.

1.4 Schedule and Report

The capacity assessment schedule will be consistent with the schedule for completing the Sewer System Assessment activities required by CD Section VII, Paragraph 15.B. Capacity Assessment reports will be in accordance with relevant reporting requirements stated in CD Section VII, Paragraph 15.F. The intent is for the Sanitary Sewer Assessment Reports to document both sewer and pump station condition assessment activities and capacity assessment activities, and provide support for the Remedial Measures Plan(s).

Additional schedule information is provided in Section 4.

Section 2
Capacity Assessment Process

2.1 Overview

LFUCG recently initiated development of a systemwide hydraulic model which will be used initially to assess existing system capacity and to evaluate system performance under current and future flow conditions. Ultimately, the hydraulic model will be used to support the Sanitary Sewer System and WWTP Remedial Measures Plan(s) (RMP – Section VII, Paragraph 15.G) and the System Capacity Assurance Program (CAP – Section VII, Paragraph 16.B).

The model will be used to simulate hydrologic conditions that result in rainfall and/or groundwater entering the Sanitary Sewer System and the hydraulic performance of the Sanitary Sewer System and WWTPs under a variety of flow conditions, including both dry and wet weather conditions.

2.2 Capacity Definition

Capacity of Sanitary Sewer System components and the WWTPs must be specifically defined so that system performance can be evaluated. In general, capacity will be assessed in terms of the ability of existing facilities to convey and treat current (or future) flows resulting from a defined flow generation condition, within specified performance conditions. Therefore, capacity assessment requires determination of flow conditions and evaluation of facility performance under those conditions. For purposes of this CAWP, the capacity performance conditions of system components shall be defined as follows:

2.2.1 Gravity Sewers

The capacity of gravity sewers flowing less than full can be calculated using Manning's equation. However, Manning's equation cannot be used to calculate capacity under surcharge conditions, or to evaluate the impacts of backwater conditions. However, the hydraulic model will be capable of evaluating conveyance capacity under surcharge and backwater conditions.

For purposes of this CAWP, capacity of the gravity sewer system pipes will be evaluated on the basis of flows that do not result in surcharging that causes the hydraulic grade line to exceed 24-inches above top of pipe at any location or to within three (3) feet of a manhole rim elevation, based on One Hour Peak Flow conditions for both existing and projected future flows. Exceptions will be made for locations where the collection or transmission system is specifically designed and constructed to operate under surcharge conditions. These locations include siphons and flat sections such as highway or railroad crossings in carrier pipes. This definition is consistent with the Capacity Assurance Program (CAP) criteria contained in the CD (Section VII, Paragraph 16.B(ii)(d)) for One Hour Peak Flow in the collection and transmission system.

2.2.2 Pump Stations and Force Mains

The maximum capacity of pump stations will be defined as the total pumping capacity with all pumps in service, and with wetwell conditions that do not cause a surcharge condition in the influent sewer(s) that exceeds the maximum surcharge conditions described above for gravity sewers.

For pump stations, the maximum 3-hour peak flow will be used for capacity assessment since wet wells will provide flow attenuation.

The maximum capacity of force mains will generally be based on the flow capacity at a velocity of 7.0 feet per second, however velocities of up to 10.0 feet per second are considered to be acceptable depending on the situation (pipe size, material, length, etc.). In some cases, velocities of less than 7.0 fps will be necessary to minimize friction head on the pumps. Therefore force main capacity will be evaluated on a case by case basis.

For force mains, the One Hour Peak Flow will be used for capacity assessment (existing and future projected flows).

2.2.3 Wastewater Treatment Plants

For the TBWWTP and the WHWWTP, the maximum capacity will be defined as the maximum flow that can be passed through the plant without causing an Unpermitted Discharge, or a surcharge condition in influent sewers that exceeds the maximum surcharge conditions described above for gravity sewers.

For the WHWWTP, the firm pumping capacity as described for pump stations shall apply to the influent pump stations consisting of the Primary Raw Sewage Pumping Station and the Old Raw Sewage Pumping Station.

For the TBWWTP, the firm pumping capacity as described for pump stations shall apply to the intermediate pump station that transfers primary effluent to secondary treatment.

2.3 System Components to be Assessed

The system components to be evaluated will include:

- all collection system and transmission system gravity lines included in the hydraulic model
- all pump stations that will be explicitly modeled with the hydraulic model
- WHWWTP and TBWWTP

It should be noted that the hydraulic model will be extended to cover all WCTS system components as described in the Hydraulic Model Report.

2.4 Hydraulic Model Development

A complete description of the hydraulic model development and calibration process is described in the Hydraulic Model Report.

The extent of the sewer network to be modeled is depicted in **Figure 2-1**.

2.5 System Flows

The capacity assessment requires that existing and future average and peak dry weather flows as well as Peak Flows be determined. These are defined as follows for the purpose of this CAWP:

- Average dry weather flow is the total dry weather flow volume over a specific period (typically one year or the flow monitoring period) divided by the number of dry weather days in the period covered (RDI/I and the days on which it occurred are not included).
- Peak dry weather flow is the projected or measured diurnal peak flow that occurs on dry weather days.
- Peak Flow for Gravity Sewer Lines is as defined as the One Hour Peak Flow as defined in the CD.
- Peak Flow for Pump Stations is the greatest flow into a pump station averaged over a 3-hour period at a specific pump station expected to occur as a result of a 2-year 24-hour storm event.

This section describes the calculation of existing and future wastewater flows that will be used to analyze the performance of the LFUCG WCTS and the WWTPs. Central to the analysis of wastewater flow is an understanding of its various components and the decomposition process, discussed in detail in Section 2.5.1. The allocation and projection of future dry-weather flows is discussed in Section 2.5.2 followed by the analysis of wet-weather flows in Section 2.5.3. Section 2.5.4 presents the methodology for developing a planning storm event and predicting hydrographs from such an event.

2.5.1 Wastewater Flow Components

In general, wastewater flows can be divided into three components: base wastewater flow (BWWF), groundwater infiltration (GWI), and rainfall dependent infiltration/inflow (RDI/I). The wet-weather component (i.e., RDI/I) is of particular importance because it is the increased portion of flow that occurs during a rainfall event. **Figure 2-2** illustrates a data analysis flow chart that will be used to analyze rainfall and flow monitoring data obtained from the LFUCG system.

Figure 2-1: Modeled Sewer Network, SSOs, and Pump Stations

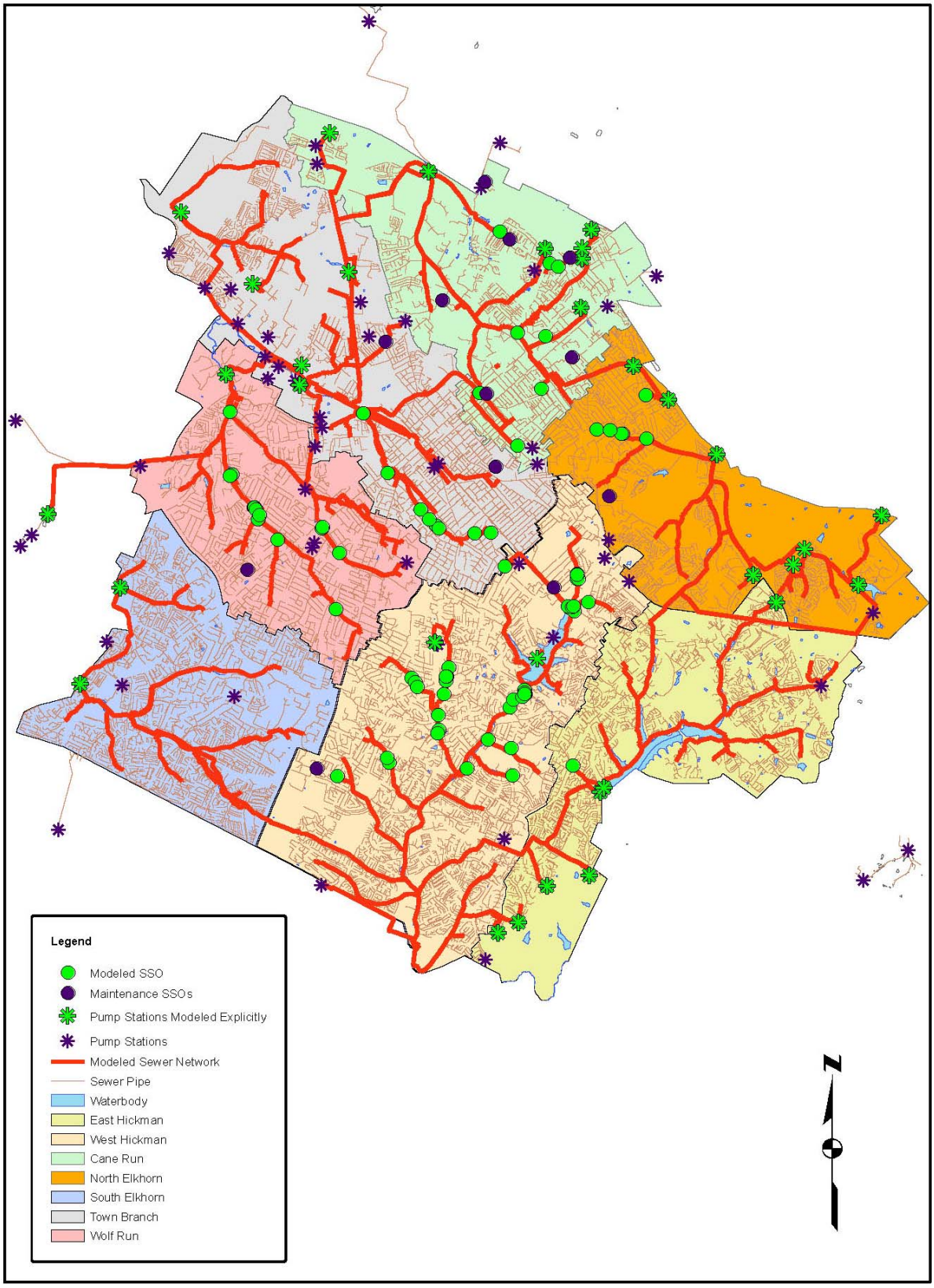
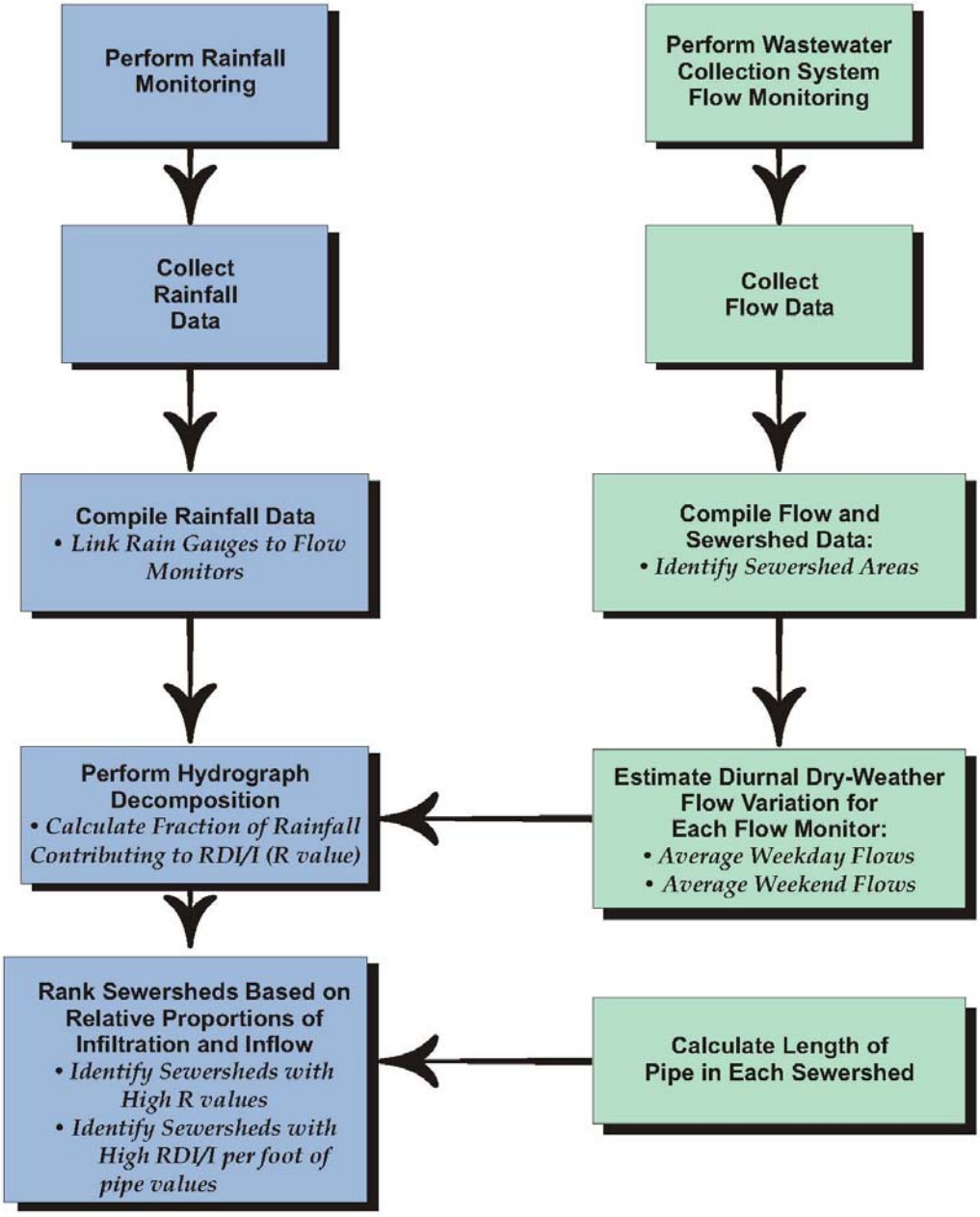


Figure 2-2: Data Analysis Flow Chart



A. Base Wastewater Flow (BWWF)

BWWF is domestic (or sanitary) wastewater from residential, commercial, institutional (schools, churches, hospitals, etc.) sources, and industrial wastewater sources. It is affected by the population and land uses in an area and varies throughout the day in response to personal habits and business operations. BWWF is normally estimated by applying unit flow factors to land use units. For example, these unit flow factors might be expressed in terms of average gallons per day (gpd), per single-family residential unit or per acre of commercial development. Diurnal and statistical variations are normally accounted for by applying multipliers, called peaking factors, to the average BWWF.

B. Groundwater Infiltration (GWI)

GWI is defined as groundwater entering the collection system through defective pipes, pipe joints, and manhole walls. The magnitude of GWI depends on the depth of the groundwater table above the pipelines, the percentage of the system that is submerged, and the physical condition of the sewer system. The variation in groundwater levels and the amount of GWI is seasonal in nature. Typically, maximum groundwater levels occur in February or March, and minimum groundwater levels occur in the fall due to the impact of high summertime evapotranspiration rates. While GWI is also affected by rainfall, it responds gradually and is not directly related to any individual rainfall event. It is evidenced by a general increase in wastewater flow that persists for periods of many days or weeks. From a practical standpoint, it is often not possible to differentiate infiltration of groundwater (saturated zone) from infiltration due to long-term drainage of unsaturated soils, and the term GWI is used in this CAWP to describe both types of flows.

C. Rainfall-Dependent Infiltration/Inflow (RDI/I)

RDI/I refers to storm water that enters the collection and trunk sewer system in direct response to the intensity and duration of rainfall events. RDI/I can be further broken down into storm water inflow (SWI) and rainfall-dependent infiltration (RDI), based on the pathways through which the flow enters the sewers or manholes. SWI reaches the collection system by direct connections rather than by first percolating through the soil. SWI sources may include roof downspouts illegally connected to the sanitary sewers, yard and area drains, holes in manhole covers, cross-connections with storm drains or catch basins. RDI includes all other rainfall-dependent flow that enters the collection system, including storm water that enters defective pipes, pipe joints, and manhole walls after percolating through the soil.

Many correction projects throughout the country that have emphasized SWI reduction have been shown to be less effective than expected. A major reason for this result was probably the assumption that any increase in wastewater flow that responded immediately to rainfall could be attributed to SWI. In fact, it has been shown that in many common situations it is possible for storm water to rapidly reach and infiltrate into defective sewers. An example is a shallow sewer bedded in granular material essentially functioning as a French drain. Thus, RDI may respond as rapidly as SWI (time to peak of less than one hour), or may respond much more

gradually (time to peak of up to a day or more) depending on the depth of cover and the soil and bedding materials. Due to complexity of the interactions between GWI and RDI, judgment is required to distinguish between the two components during data analysis.

D. Decomposition of Flow Monitoring Data

These three components (BWWF, GWI, and RDI/I) make up a total flow hydrograph that shows the quantities of wastewater over a period of time. Hydrograph decomposition is performed to identify BWWF and to determine the portion of the flow hydrograph attributed to RDI/I. Results of the hydrograph decomposition will be used to evaluate existing conditions within the basins.

Computer software will be used to assist in separating measured wastewater flows into base flow (including groundwater infiltration) and RDI/I components. The computer program develops an average base flow hydrograph for a typical weekday and weekend day from the recorded data for dry-weather conditions. The typical base flow hydrographs are then subtracted from a wet-weather hydrograph to determine the RDI/I component. This method of hydrograph decomposition is an important step in analyzing and simulating wet-weather flows in the sewer system.

Figure 2-3 presents an example of hydrograph decomposition. The average dry-weather flow is 0.05 mgd. The peak total flow rate during the event was 0.28 mgd.

The difference between the dry-weather hydrograph and the total wet-weather hydrograph gives the volume of rain that entered the collection system from this sub-basin.

BWWF exhibits a diurnal variation, with peaks occurring between 6:00 a.m. and 9:00 a.m. and minimum flows occurring at night. Weekdays and weekends will typically exhibit different flow patterns; therefore, for each flow monitor, average diurnal flow patterns will be developed for weekdays and weekends independently.

The GWI flow component represents the relatively constant infiltration of groundwater into the sewer system as a result of the sewer being located below the water table. It is often difficult to determine the exact groundwater infiltration component of the dry-weather flow. For this reason, Figure 2-3 shows the BWWF and GWI components together as the combined dry-weather flow to be subtracted from the total wet-weather flow to produce the RDI/I component.

GWI often does not change significantly over the course of a few days before, during, and after a rainfall event. Groundwater level changes are typically dramatic during the course of a year. **Figure 2-4** shows a typical relationship between groundwater elevation, rainfall, and the average daily wastewater flow at a WWTP. This shows that the groundwater level is higher during the winter months, which is common in the

Figure 2-3: Example Hydrograph Decomposition
Fourth Creek Flow Monitor 33B4

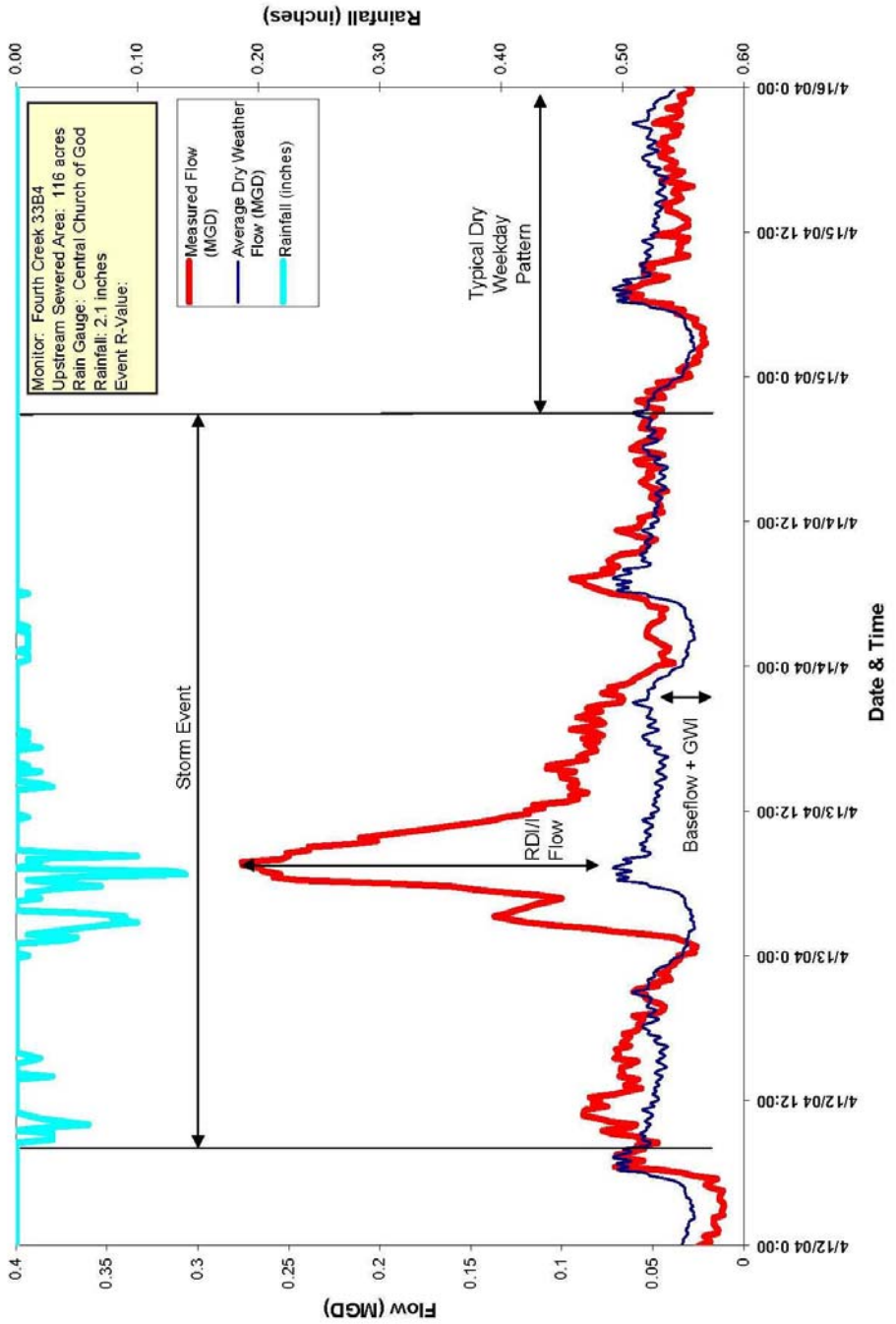
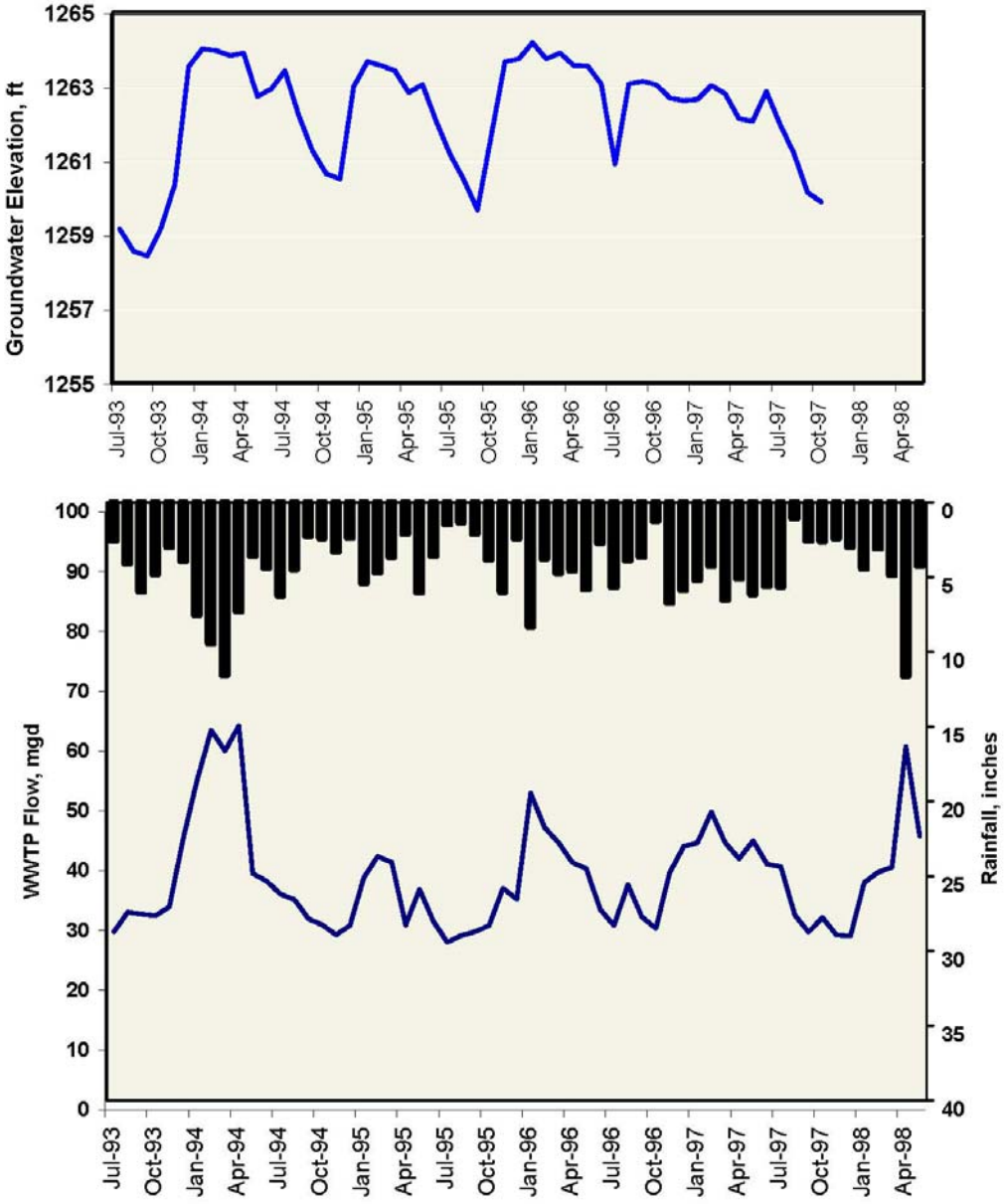


Figure 2-4: Comparison of Wastewater Flow, Groundwater Elevation, and Rainfall



southeast. It is important to note that increases in wastewater flow often coincide with large rainfall events, and peaks in flow are greater if rainfall events occur during periods of high groundwater. This indicates that the greatest volume of RDI/I can be expected to occur during the winter months, when groundwater levels tend to be highest.

2.5.2 Dry-Weather Wastewater Flows

The first step in analyzing the flow data is to allocate dry-weather flows recorded at the flow monitors among the various sub-basins in the study areas. This is important for subsequent analysis of the amount of system capacity that is currently being used. It is also important in the estimation of per capita residential flows and per employee flows, which are required to estimate future wastewater flow rates. The basic information needed to perform the dry-weather flow analysis is monitored wastewater flows, a delineation of the upstream contributing area to a flow monitor, estimates of the residential population, and number of employees within each of the contributing areas. Dry-weather flows during the monitoring period will be estimated by averaging dry-weather days from the temporary monitoring data in which there was no recorded rainfall affecting the flow.

Contour lines provided in GIS format in combination with flow monitoring locations will be used to develop sub-basins. The extent of the existing sewer service areas will be estimated from sewer plans, which include the most recent sewer service extensions. From these plans, the percentage of each sub-basin currently receiving sewered service will be estimated. The majority of the basins are fully developed. In the future, sewer service could be extended to currently undeveloped areas.

The 2007 Comprehensive Plan for Fayette County, and the corresponding data provided by the LFUCG Division of Planning will be used as a basis for the geographic distribution of current and future population and employment projections throughout the study areas. Each planning area, within the LFUCG service area, has existing and future population and employment projection data specific to that area. Using GIS, the sub-basin maps will be superimposed upon the planning area map to obtain current and projected future population and employment data for each sub-basin. Because more detailed information is typically not available, the population and employment numbers will be assumed to be evenly distributed throughout a sub-basin. With this assumption, some individual industries may be divided between two sub-basins.

As stated previously, dry-weather or base flow is comprised of GWI and BWWF. Before this data can be used to project future flows, it is necessary to divide the flows into their GWI and BWWF components and then further divide BWWF into two subcomponents: residential flow and industrial/commercial/institutional (ICI) flow. The most recent population data available will be used with the updated flow monitoring data to calibrate these flow factors. The calibrated unit flow factors will be used with the population projection data to model existing conditions. The

methodology for calculating the population projections and average daily flow components is presented in the following paragraphs.

A. Groundwater Infiltration (GWI)

There are several ways of calculating GWI at upland meters (meters on the sub-basins that receive no external inflow). One standard practice, and the method to be used for this assessment is to estimate GWI as 50 percent of the minimum nighttime flow, unless groundwater monitoring results indicate otherwise. This assumes that half of the nighttime dry-weather flow during the early spring conditions is the groundwater infiltration. This will be used to calculate a GWI flow rate per sewered acre for each of the metered basins. GWI for the remainder of the sub-basins will be calculated by applying a flow rate per sewered acre from an upland metered sub-basin. This metered sub-basin will be chosen based on the proximity to the downstream sub-basin. This calculated GWI will be subtracted from the observed dry-weather flow at each flow monitor to determine the BWWF for each flow monitor. A typical range of GWI is 100 to 600 gallons per acre per day.

B. Residential Wastewater Flow (BWWF and GWI)

The residential flow for each sub-basin will be estimated by multiplying the residential population obtained from planning data by a unit flow factor of 65 gpcd unless more accurate estimates can be substantiated from public documents. The residential unit flow of 65 gpcd falls within industry standards (Metcalf & Eddy Inc., 1979), however this will be checked for selected areas based on flow monitoring results. Actual water consumption data is not available for the LFUCG service area since water is supplied by a private entity.

C. Industrial/Commercial/Institutional Flow (ICI)

The industrial, commercial, and institutional (ICI) component of flow for each metered sub-basin are typically estimated as the flow remaining after the residential flow and GWI are subtracted from the total dry-weather flow. The upland metered sub-basins will be used to calculate the ICI components. The upland metered ICI components will be used as surrogate data, with ICI unit flow factors applied to the downstream sub-basins based on proximity to the upland meter and on land use. The numbers of ICI employees within each sub-basin will be estimated based on population projection data using a GIS analysis of the overlaid population projection boundaries on the sewer service area boundaries. Commercial/ industrial employees will be assumed to be 100 percent sewered.

D. Future Dry-Weather Wastewater Flows

TAZ population and employment projections, as well as LFUCG planning information will be used in conjunction with the unit flow factors to project future dry-weather flows.

Future projections of residential wastewater flows will be developed by multiplying the 65 gpcd unit flow factor (or other substantiated rate) by the population projection for each sub-basin. As stated previously, the population projections will be evenly

distributed within a given planning area boundary and the boundaries will be intersected with the sub-basins to estimate population projections for that sub-basin.

ICI flows will be projected by multiplying the number of new employees given by projections in each sub-basin by the average unit flow factor derived for each respective sub-basin.

Groundwater infiltration will be assumed to increase in proportion with the increase in the sewered area of each sub-basin. The GWI/acre, calculated for existing conditions, will be applied to the future sewered area to calculate future GWI flows.

2.5.3 Existing Wet-Weather Wastewater Flows

This section describes the proposed methodology to predict RDI/I flows in the study area during rain events. The method is based on a unit hydrograph approach that is similar to the approach used in traditional storm water hydrologic analyses. Flow monitoring data is used to calibrate the unit hydrograph parameters. Once calibrated, this method may be used to predict RDI/I into the sewer system for any given rainfall event.

To evaluate the benefit of alternative sewer system improvements (as part of Remedial Measures Plan development) to reduce wet-weather overflows, it is prudent to develop one planning storm event and associated RDI/I flows. In developing a planning storm event, a rainfall frequency analysis will be performed to estimate the probability that different intensities and durations of rainfall will occur in the Lexington area. The results of this analysis will be used to develop a synthetic rainfall event that simulates rainfall, which occurs on average once every two years during the winter-spring period when flow monitoring studies will be conducted.

Base wet-weather conditions will be established for the purpose of evaluating system capacity enhancement projects. However, it is significant to note that the ultimate system performance goal (i.e., elimination of SSOs) is based on implementation of both the capacity enhancement projects and capacity restoration efforts. Thus, the design storm coupled with specified performance criteria alone is not the basis for evaluating the ultimate performance of LFUCG's system. Continuous system performance improvements and RDI/I removal achieved through LFUCG's CMOM Program will enhance system capacity.

For the system capacity assessment, a representative 2-year, 24-hour design storm will be used as the basis for developing a synthetic rainfall hyetograph. Historical records (January through May when R values are highest) will be used to develop the design storm depth. The analysis will use a 24-hour inter-event period (i.e., if at least 24-hours of no measurable rainfall occurred since the last hour of measurable rainfall, the next hour of measurable rainfall will be considered a new event).

The long duration storm is appropriate for several reasons:

1. Long duration events result in initial soil saturation which must occur prior to RDI/I rates reaching maximum levels.

2. Long duration events result in higher rainfall volumes which significantly affect storage capacity required.

3. The longer duration storms include a higher percentage of historical events.

In addition to storm volume considerations, storm intensity is also significant as it affects RDI/I rates and therefore peak sewer flows. To address this issue, the synthetic design storm should feature:

1. Approximately one third of the total rainfall during first twelve hours to saturate soils prior to peak intensities occurring.

2. A peak intensity equivalent to a 2-year return period for a 1-hour duration.

The methodology for predicting wet-weather flows is further described in the following four sections, which present a method of predicting RDI/I volume for a given rainfall event, the unit hydrograph methodology, a rainfall frequency analysis, and a discussion of the synthetic planning storm events.

A. Calculation of RDI/I volume and "R" value

As discussed in Section 2.5.1, flow monitoring data will be analyzed with a computer program to separate the recorded flows into dry-weather flows (BWWF and GWI) and wet-weather (RDI/I) components. This method of "hydrograph decomposition" is an important step in analyzing and simulating wet-weather flows in the sewer system. Once the hydrograph decomposition is completed for each sub-basin, the volume of RDI/I is compared to the volume of rain that fell on the area contributing flow to each monitor. The ratio of RDI/I volume to rainfall volume (which is the inches of rain over the sub-basin area times the area) is defined as the R value. In other words, the R value is the fraction of rainfall from a storm event that enters the sewer system as RDI/I. The higher the R value, the more RDI/I a sewer system conveys to the treatment plant. The R value can then be applied to any planning storm event to estimate the volume of RDI/I from such a storm event. The volume of RDI/I per linear foot of sewer can also then be used to prioritize sub-basins for condition assessment activities.

R values will be determined for each flow monitor for a representative rainfall event. The R value is a key parameter in the development of the hydrologic model that simulates RDI/I flows into the sewer system.

B. Unit Hydrograph Methodology

Typically, the flow monitoring periods don't capture relatively large storm events on which the capacity assessment will be based. Therefore, a method is needed to predict flows from such an event. Because a dynamic hydraulic model will be employed for this study, the method must predict flows for the entire duration of the event,

including the peak flow and the total volume of RDI/I entering the system from the event.

A methodology will be used to simulate wet-weather RDI/I hydrographs into the sewer system that is based on a unit hydrograph technique. This method is similar to unit hydrograph methods that are commonly used to simulate flows in storm water runoff analyses. This method has been used on sewer system master planning projects throughout the country since the early 1980s.

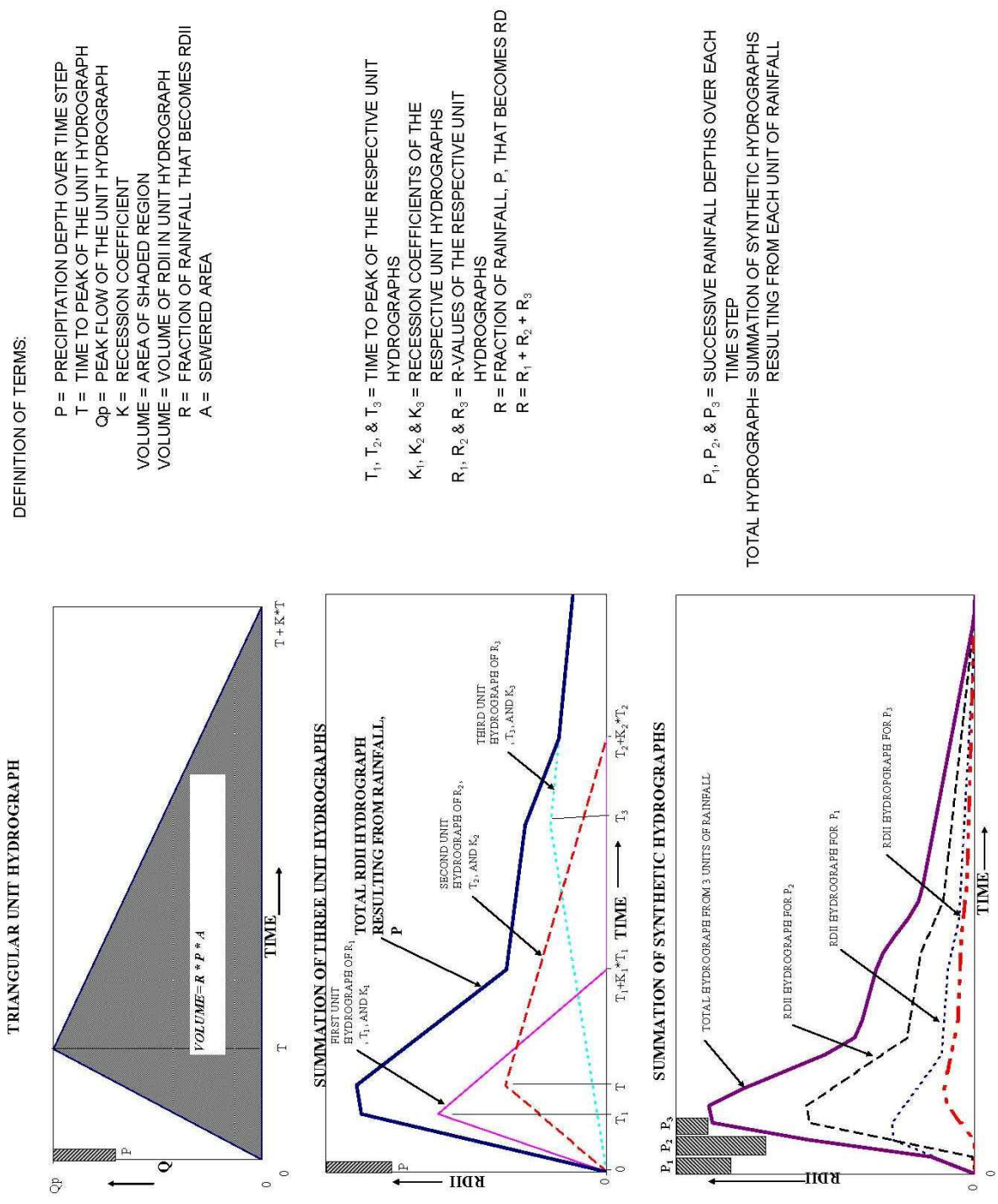
The method is based on fitting three triangular unit hydrographs to an actual RDI/I hydrograph. A unit hydrograph is defined as the flow response that results from one unit of rainfall during one unit of time. A unit of time is defined as one 5-minute time step, because the rain gauge data will be provided in 5-minute increments and the unit of rainfall will be one inch. This methodology has two basic steps, and is illustrated in **Figure 2-5**.

The first step is to define three parameters, R, T, and K, for each of the three triangles. R represents the fraction of rainfall entering the sewer system as RDI/I. T is the time to the peak RDI/I flow, and K is the ratio of the time of recession to the time of peak as shown in the top of Figure 2-5. The sum of the R values for each of the three unit hydrographs (R1, R2, and R3) must equal the total R value for the storm event. Three unit hydrographs are used because the shape of an RDI/I hydrograph is too complex to be well represented by a single unit hydrograph as shown in the middle of Figure 2-5. The first triangle represents the most rapidly responding flow component (including storm water inflow), and has a T of 1 to 3-hours. The second triangle includes both rainfall-dependent inflow and infiltration, and has a longer T value. The third triangle includes infiltration that may continue long after the storm event has ended and has the longest T value.

The second step of the unit hydrograph methodology is to sum all of the unit hydrographs that are developed for each unit of time to develop a total RDI/I hydrograph. The bottom of Figure 2-5 illustrates the summation of three hydrographs as an example. This would represent the hydrograph from a storm lasting 3 time steps, or 15 minutes. If a storm event has rainfall over a period of 2-hours, then the hydrograph developed by this method would be the summation of the 24 unit hydrographs that resulted from each 5-minute rainfall increment.

A computer program will be used to find the combination of R, T, and K values for each of the three triangles that would result in a simulated hydrograph that best matched the observed RDI/I hydrographs. This process is referred to as calibrating the unit hydrographs. To calibrate the unit hydrographs, first the flow monitoring data is decomposed into the base flow and RDI/I components. The base flow component is then subtracted from the total hydrograph to leave only the RDI/I component. The best combination of the R, T, and K values for each of the three

Figure 2-5: Triangular Unit Hydrograph Definition Summation



triangular unit hydrographs is determined iteratively until the predicted RDI/I hydrograph closely approximates the RDI/I hydrograph from the flow monitor.

Typically, unit hydrographs will be developed and calibrated for all "upland sub-basins" for which good flow monitoring data are available. An upland sub-basin is one that does not require subtraction of flows from an upstream monitor to determine the contributing flows of that sub-basin. Only upland sub-basins are typically used to calibrate the unit hydrographs to minimize the effect of the inherent errors in basing calculations upon multiple flow monitors. The potential error in a calculation is greater when data from more than one flow monitor are used in a calculation. For sub-basins that are not upland, unit hydrographs from representative upland sub-basins may be used to estimate flows in the sub-basin.

2.5.4 Predicting RDI/I Hydrographs from Planning Storm Events

The ability to predict the shape of an RDI/I hydrograph from a given rainfall distribution will be a key component of the capacity assessment. This ability allows the flexibility of simulating RDI/I from any storm for which rainfall records are available.

A. Rainfall Intensity-Duration-Frequency Analysis

A frequency analysis will be performed on historical rainfall records for the Lexington area to determine the probability that a storm of a given size or larger will occur in any given year. This analysis will be used to determine the intensities and the durations of the planning storm events to be used in simulating RDI/I flow conditions in the system. Hourly rainfall data will be obtained from the National Climatic Data Center for the Bluegrass Airport.

Through evaluation of long-term flow monitoring data, past experience, and from discussions with LFUCG staff members, it was determined that surcharging and overflow conditions in the sewer system are most prevalent and severe during the winter and early spring. This is primarily the result of seasonal variations in rainfall and evapotranspiration that lead to generally higher groundwater elevations and more saturated soil conditions in the winter and early spring. Therefore, the planning storm analysis for this study will be based on groundwater conditions found in the Lexington area during the winter and spring, and the typical rainfalls that occur during the winter and spring based on historical records. This will result in a capacity assessment that addresses wet-weather problems in the LFUCG system during the winter and spring when the most severe surcharging and overflow conditions occur.

A rainfall intensity-duration-frequency (IDF) analysis will be performed for rainfall that occurs during the months of January to May. Rainfall events that occur during other periods of the year typically do not cause significant surcharging and overflow problems, even if they are very large events. These data, along with the use of R values representing high groundwater conditions as described previously, will result in predicted flows from the planning events that more accurately match wet-weather flows for the simulated return period.

B. Planning Storm Events

In analyzing the capacity of the sanitary sewer system, it is important to know how frequently the simulated wet-weather flow conditions will occur. If a condition that produces overflows in a portion of the sewer system occurs frequently, perhaps more often than once per year, then it is a higher priority problem than one that will occur less frequently.

Rainfall events for the Bluegrass Airport will be screened to identify historical rainfall events that are representative of the 2-year return period rainfall event. The return period of rainfall durations from 1 to 24-hours and total rainfall volume will be determined for all events. In selecting the planning rainfall events for use in the evaluation of sewer system capacity using the dynamic model, it is critical that all durations from 1-hour through the duration of the storm have the desired return period. Short durations will be critical in the upper portions of the system, whereas longer durations may be more critical further down in the trunk system. A storm that does not have the desired return period over all durations up to the total travel time may overestimate flows in portions of the sewer system while underestimating flows in others.

C. Predicting RDI/I Hydrographs

Planning storm RDI/I flows used in the evaluation of the LFUCG WCTS will be generated by applying the unit hydrograph methodology described above to the rainfall distributions of the representative 24-hour planning storm.

When combining the dry-weather and wet-weather flow hydrographs, consideration will be given to how the peak wet-weather flows for the synthetic event are timed as compared to the average dry-weather flow conditions. The peak rainfall intensity in the synthetic event typically occurs in the middle of the event. Typically, the model sub-basins (about 0.5 to 3 square miles in size) will have a lag time of 0.5 to 2-hours (the peak RDI/I will occur approximately 0.5 to 2-hours after the peak rainfall).

Therefore, peak RDI/I flows from the sub-basins into the trunk sewer system will typically occur at approximately hour 14 to 15 of the synthetic storm event. Base flow during hour 14 (i.e., 2:00 pm) is typically near the average daily flow. Peak RDI/I flows would typically occur in the lower end of the trunk sewer system 0 to 8-hours later, based on a total travel time of 8-hours.

2.6 Capacity Assessment of System Components

This section describes the capacity assessment process that will be used to analyze available hydraulic capacity and system performance under design flow condition.

A. Gravity Sewer Components

Major gravity lines will be analyzed using the hydraulic model. Flows into the system will be represented by hydrographs developed from dry and wet weather flow conditions. The model will be capable of computing the hydraulic grade line at various flow conditions, and comparing it to available capacity.

B. Individual Pump Stations and Force Mains
The available total capacity of individual pump stations and force mains will be compared to existing and future peak flow (for design storm weather conditions) conditions to determine if sufficient capacity exists for each condition. Of particular interest will be three hour peak flow conditions that result from wet weather.

C. Wastewater Treatment Plants
The hydraulic model will be used to develop WWTP influent hydrographs under each condition (existing conditions and future conditions, both dry weather and wet weather design storm conditions). Of particular interest will be three hour peak flow and One Hour Peak Flow conditions that result from wet weather. Other sustained peak flow conditions may also be of interest, depending on any WWTP operational constraints.

Previously completed studies and discussions with operations staff will be used to identify WWTP hydraulic capacities to avoid Unpermitted Discharges and any other process-related operational constraints.

Section 3
Documentation of Results

Results of the capacity assessment using the hydraulic model (gravity sewers, modeled pump stations and force mains) will be presented with the use of color-coded GIS maps to show percent of capacity used up to full pipe, (i.e., high level of the hydraulic grade line at the condition analyzed) or excessive surcharge conditions under each flow condition. SSO locations and volumes calculated by the model will also be identified. System maps will be presented for the following conditions:

- Exiting Conditions
  - Average Dry Weather Flow
  - Peak Flow
- Future Conditions
  - Average Dry Weather Flow
  - Peak Flow

Other facilities (pump stations and force mains not explicitly modeled, but included in the hydraulic analysis, and WWTPs) will be tabulated with existing firm capacity and existing and future flow conditions.

This documentation of capacity assessment results is intended to identify existing system components that do not provide sufficient capacity to convey (or treat) existing and/or future flows with the capacity definitions provided in this work plan. It is significant to point out that the capacity assessment will not address system components downstream of SSOs that appear to have sufficient capacity, but may not provide sufficient capacity if the upstream SSO(s) are mitigated. Alternatives for restoring capacity (removal of excess I/I) or enhancing capacity will be identified and evaluated in the Remedial Measures Plan (RMP) development process. The RMP will address correction of unacceptable downstream capacity impacts of capacity enhancement projects.

Section 4
Capacity Assessment Schedule

The Capacity Assessment schedule will comply with the requirements of the CD. The Schedule provided in **Figure 4-1** indicates the capacity assessment work which will be conducted in two phases (Group 1 initially and then Groups 2 and 3 concurrently) and its relationship to other CD activities.

The Capacity Assessment results will be incorporated in the Sanitary Sewer Assessment (SSA) reports. The CD requires that the SSAs be completed by the following dates:

- Group One March 14, 2011 (36 months after CD lodging date)
- Group Two September 14, 2011 (42 months after CD lodging date)
- Group Three March 14, 2012 (48 months after CD lodging date)

Each SSA report must be completed and submitted to EPA for approval within 30 days of completing the SSA. Each SSA report will include the results of the Capacity Assessment and the Pump Station Design, Capacity, and Equipment Condition Adequacy Evaluation for group components covered by the report.

Documentation of the Capacity Assessment activities and results will be completed at least three months prior to completion of the SSAs, and will be incorporated in the SSA reports.

Figure 4-1: Schedule