

**SCOPE OF SERVICES (5/26/20)**  
**LEE'S SUMMIT WASTEWATER MASTER PLAN**  
**CITY OF LEE'S SUMMIT**

**SCOPE OF SERVICES**

This scope of services describes the work to be performed by HDR on behalf of the City of Lee's Summit for the Wastewater Master Plan.

The purpose of the Master Plan is to identify procedures and projects that will be required to maintain existing demands and service levels, and meet future demands and service levels. The planning period of the master plan is 20 years.

The Master Plan CIP planning period will be broken into two (2) 10-year periods. The first 10-year period (FY 2020 to FY 2030) will provide phased, viable improvements based on current conditions and anticipated short-term growth. The second 10-year period (FY 2030 to FY 2040) will outline improvements based on projections of development and system decay.

**Assumptions**

1. City engineering and operations staff can provide significant time commitments to project during program workshops, field visits and other onsite activities.
2. Due to the nature of this work, the schedule and tasks included in this scope of this authorization will remain flexible, and may be modified at the direction of the City to best achieve the goals of the Master Plan.
3. City will provide access to updated GIS and CityWorks databases, as well as historical inspection records.

***TASK 1 – Field Data Collection***

**Services Provided by HDR:**

1. Flow data processing and data delivery
  - a. *Flow Data Processing*

During and following completion of the flow monitoring, process the gathered data and develop tabular and graphical summaries. The impact of silt and debris will be evaluated and any necessary data adjustments will be made at this time. Hydrographs, level and velocity graphs, and scatterplots will be created for each site.
  - b. *Data Delivery*

Provide raw and final flow and rainfall data in electronic format (excel spreadsheets). Site assessment forms will also be delivered for each site.

2. Coordinate with City staff to move City-owned meters as needed during the study period to collect supplemental data to evaluate areas of interest to the study.
3. Field survey sanitary sewer manholes along trunk sewer alignments (10-inch and larger) and at key areas in smaller diameter lines, in order to confirm network connectivity and invert information necessary for model development. It is assumed that approximately 900 manholes will require confirmation.

**Deliverables:**

Flow and Rainfall Data

**Meetings:**

Onsite coordination, as needed

***TASK 2 Hydraulic Models Development (4 separate)***

**Services Provided by HDR:**

1. Model network updates (4 models)
  - a. Establish recommended extents of modeled network within each basin area. In general, the model extents will include all 10-inch and larger lines, and key areas within the smaller diameter system that are critical to planning.
  - b. Evaluate all modeled lines through City's GIS and identify areas where network connectivity and/or elevation information needs confirmed. If reliable as-built information is available, compare data gaps to as-builts and update GIS with as-built information.
  - c. Identify locations requiring field surveys to confirm model network.
  - d. Update GIS/model network for field survey data, including flagging data source for future reference in City's GIS.
  - e. For major modeled pumping facilities, confirm current pump station operations and incorporate pump curves and operations into the model.
  - f. Incorporate major excess flow holding basin facilities into model and confirm operations.
  - g. Prepare system mapping showing key facilities, major trunk lines, major roads and other relevant features.
2. Flow and rainfall data analysis
  - a. Compile and review existing flow and rainfall meter data and past analyses, and data collected through the study.
  - b. Analyze and characterize rainfall events captured during the study period for total rainfall, duration, intensity, and recurrence frequency.
  - c. To support model calibration, provide an analysis of flow metering and rainfall monitoring data to estimate average dry weather flow (ADWF), peak dry weather flow (PDWF), and infiltration/inflow.
  - d. Develop ADWF curves for each metering site within the Project Area.
3. Existing conditions models (4) calibration and verification

- a. Complete dry weather calibration to calibrate models to typical dry weather flow conditions.
  - b. Select up to three (3) calibration rainfall events for each modeled area that best enable the model to simulate typical wet weather response.
  - c. Complete wet weather model calibration for each hydraulic model.
  - d. Complete quality control verification runs to confirm model performance.
4. Prepare materials for and facilitate Model Calibration Workshop with City staff to review results of task. Prepare meetings minutes and address City comments.

**Deliverables:**

Calibrated Existing Conditions Model

**Meetings:**

Model Calibration Workshop

***TASK 3 Existing System Capacity Evaluation***

**Services Provided by HDR:**

1. Add near term improvements for current and committed projects to hydraulic models (e.g. Cedar Creek Interceptor Phase 3, Downtown Sewer Improvements).
2. Establish downstream boundary condition constraints for LBVSD and MBC systems and incorporate into model.
3. Complete capacity assessment model runs for each basin. Assume up to four (4) design storm events to be evaluated per basin.
4. Develop mapping and characterization of existing condition performance.
5. Identify modeled capacity bottlenecks, and define design flows at key locations (e.g. connection point to downstream facilities, major pump stations, and other key points). Compare bottlenecks to known capacity constraints and identify key findings.
6. Identify areas of high I/I that will be focus areas for evaluating I/I reduction measures during the alternatives analysis.
7. Prepare for and facilitate Existing Capacity Evaluation Workshop with City staff to review results of task. Prepare meetings minutes and address City comments.
8. Complete field investigation to confirm model results in key areas. Investigate issues and determine any updates needed to model.
9. Update and refine model calibration in specific areas if needed to improve model accuracy.

**Deliverables:**

Capacity Analysis results

**Meetings:**

Capacity Evaluation Workshop

#### ***TASK 4 Develop Future Growth Projections***

##### **Services Provided by HDR:**

1. Review and compile Comprehensive Plan growth projection information including locations and types of developments, and assumed population projection standards. Develop list of questions.
2. Facilitate meeting with City Comprehensive Plan team leads to review projections from plan and confirm understanding of projections.
3. Develop initial growth projection mapping in GIS for 20-year, and Ultimate Conditions. Mapping will indicate standard characteristics of developments such as land use, area, and projected population, as well as attributes for any unique information relevant to Master Plan (e.g. high or low flow developments). Areas not included in 20-year projections (ultimate conditions areas) will be evaluated at a less detailed level than 20-year growth areas.
4. Develop initial timing projections for developments for 10-year, 20-year, and ultimate planning horizons.
5. Facilitate up to three (3) meetings with City and other stakeholders to help confirm characteristics and timing of future developments.
6. Provide mapping and documentation of growth projections to City for review and comments. Update per comments.
7. Facilitate workshop with City and Comprehensive Plan team to review projections, incorporate final comments and finalize projections used for Master Plan.

##### **Deliverables:**

Growth Projections Mapping

##### **Meetings:**

Meetings with Comprehensive Plan Team Members

#### ***TASK 5 Flow Planning Criteria for Future Growth***

##### **Services Provided by HDR:**

1. Compile flow data set to utilize for evaluation of wet weather flows produced by developments in the metro area with modern sewer construction standards and building codes. Characterize each basin in the study based on size, system age, and other relevant factors.
2. Compile planning criteria utilized by similar regional utilities.
3. Evaluate flows produced in the study areas, this may include but not be limited to the following factors
  - a. Typical inflow “k factors” and range within these areas
  - b. Typical peaking factors, ratio of normal dry weather to peak wet weather flows

- c. Total wet weather flow per acre or length of system for a standard design storm event
  - d. Typical dry weather and peak dry weather flows
- 4. Characterize data from relevant City basins and comparable regional areas and identify key findings.
- 5. Develop recommended alternative design criteria.
- 6. Complete comparative projections identifying projected planning flows produced by alternative design criteria. Compare to City's current criteria and best regional comparable criteria.
- 7. Facilitate Workshop to review results of design criteria evaluation and recommendations. Prepare meetings minutes and address City comments.
- 8. Update criteria per comments and document recommended criteria to be used for Master Plan.

**Deliverables:**

Recommended Planning Criteria

**Meetings:**

Workshop to Review Recommended Criteria

***TASK 6 Future Conditions Model Development and Capacity Evaluation***

**Services Provided by HDR:**

- 1. Identify conceptual locations of major gravity interceptor and trunk sewer extensions, and potential pump station locations to serve anticipated future growth areas that cannot be served with the existing collection system.
- 2. Develop dry weather flow response contributions for future developments and incorporate into model.
- 3. Develop wet weather flow response contributions for future developments and incorporate into model.
- 4. Develop 2030 Condition Models.
- 5. Develop 2040 Conditions Models.
- 6. Complete capacity assessment model runs for each basin, for each planning period. Assume up to three (3) design storm events to be evaluated per basin.
- 7. Develop mapping and characterization of future conditions performance for each planning period.
- 8. Identify modeled capacity bottlenecks, and define design flows at key locations (e.g. connection point to downstream facilities, major pump stations, and other key points). Document key findings.
- 9. In areas where Ultimate Conditions may have significant impact on improvements needed for 10-year and 20-year planning period, complete abbreviated modeling and or/flow projections to estimate ultimate design flows.
- 10. Develop initial recommendations for Level of Service goals to evaluate in each basin based on system performance and downstream constraints.

11. Prepare for and Facilitate Workshop Future Conditions Capacity Evaluation and Alternatives Development Workshop to review findings, and review alternatives to be evaluated for future conditions (alternatives identified in Task 8).

**Deliverables:**

Future Conditions Models

**Meetings:**

Future Conditions Capacity Evaluation and Alternatives Development Workshop

***TASK 7 System Renewal and I/I Reduction Strategies and Needs Forecasting***

**Services Provided by HDR:**

1. Compile past City historical records:
  - a. CCTV
  - b. Manhole inspections
  - c. Renewal work
    - i. Pipe
    - ii. MH
    - iii. Lateral Connections
2. Work with City to develop assumptions for areas without age information in GIS
3. Compile planned near term renewal work and schedule, and estimated unit costs for current and future work.
4. Compile available PACP coded CCTV observation data and format for condition/risk evaluation:
  - a. Contracted CCTV inspection data
  - b. City staff CCTV data
5. Utilize HDR Automated Risk and Prioritization Decision Model to characterize results of past condition assessment work and characterize findings by age and condition. Document any key trends that different in comparison to other regional utilities.
6. Facilitate Workshop with City to review:
  - a. Future proactive inspection plans
  - b. City's current system renewal prioritization and decision strategies for structural and I/I focused work.
  - c. Areas of focus based on City knowledge of system
7. Work with City to establish preferred inspection and renewal strategies for 20-Year planning period.
8. Utilizing past inspection findings, future plan for condition assessments, age and material of system, and engineering judgment, estimate quantity of system renewal work to completed during planning period and planning level costs and corresponding programmatic costs:
  - a. Typical structural renewal work
  - b. I/I focused renewal – may be multiple tiers based on goals

9. Extrapolate results of public sector condition and renewal plan to estimate % I/I reduction for baseline public sector renewal in areas of focus.
10. Develop private sector I/I reduction approach alternatives, and characterize benefits and challenges of each.

**Deliverables:**

Project System Renewal Forecasts

**Meetings:**

Workshop on inspection planning, renewal prioritization and strategies

***TASK 8 Alternatives Evaluation -Level of Service (LOS) Evaluation and Determination of Preferred Wet Weather Management Strategy for Each Basin***

**Services Provided by HDR:**

1. Alternative Development
  - a. In areas where baseline I/I reduction is anticipated to be achieved through public sector program, incorporate I/I reduction into base alternative evaluation model.
  - b. Feasible alternative solutions to eliminate system capacity restrictions will be developed and evaluated using the model and engineering judgment to determine facilities sizing and probable costs for future conditions to ensure that recommended improvements are adequate for expected growth. Cost will be based on planning level unit costs.
    - i. Conveyance capacity improvements
    - ii. I/I reduction
      1. Evaluate areas where increased focus on I/I reduction including private sources will be evaluated.
      2. Identify areas where I/I reduction is assumed to not be cost effective and will be excluded from alternative analysis.
    - iii. Storage (holding or linear storage)
  - c. Develop alternative service options for future growth areas where applicable, including pumping flow to different areas of collection system, and evaluate impacts on alternatives.
2. Alternatives Evaluation – 20-Year Planning Period
  - a. Develop capital costs for recommended improvements alternatives for each Level of Service scenario.
  - b. Develop life cycle operations costs for improvements that are not common between alternatives.
  - c. Complete economic analysis of alternatives.
  - d. Define non-monetary factors to consider in alternative analysis.
  - e. Develop recommended improvements and results of comparative analysis.
3. Prepare materials for and Facilitate Alternatives Evaluation workshop with City staff to review findings and recommendations. Prepare meetings minutes and address City comments.

4. Update recommended improvements for 20-Year planning period based on City comments.
5. Develop recommended improvements required to address growth for 10-Year planning period, and recommended phasing of improvements to occur to address both planning periods.
6. Develop recommended I/I reduction strategies and corresponding plan corresponding to preferred alternatives. Incorporate into programmatic R/R approach.
7. Resiliency analysis for Tudor and Scruggs service areas
  - a. Define up to two events to evaluate using High Resolution Gauge-Adjusted Radar Rainfall (GARR) storm characteristics from past HDR projects. These will be high intensity events that are greater than the feasible design storms to be handled by these facilities.
  - b. Model impacts on existing system and identify key findings, particularly any potential for damaging facility flooding and areas where basement backups are likely to occur.
  - c. Evaluate impact of proposed future improvements on resiliency of system.
  - d. Identify any potential operational improvements that could help mitigate negative consequences.
  - e. Evaluate “trigger point” where rainfall exceeds normal system operations and requires special wet weather operational protocols.

**Deliverables:**

Alternatives Evaluation and Recommendations

**Meetings:**

Alternatives Evaluation Workshop

***TASK 9 Stakeholder Engagement Support***

**Services Provided by HDR:**

1. Coordinate Master Plan updates and strategies to be incorporated into Strategic Plan.
2. Support the City in communication and engagements with external stakeholders.

**Deliverables:** Stakeholder Presentation

**Meetings:** Up to three (3) with Water Utility Advisory Board, and up to two (2) City Council, and up to two (2) miscellaneous meetings.

***TASK 10 CIP Development and Implementation Plan***

**Services Provided by HDR:**

1. Establish Preliminary 20-year CIP



- a. Establish capital improvement projects list
  - b. Determine development “triggers” for recommended capital projects
  - c. Incorporate major R/R project and programmatic system renewal, including FAMP information, SCADA Master Plan, and High Consequence of Failure Pipelines program.
  - d. Incorporate recommended operational cost changes including staffing.
2. Financial impacts analysis
    - a. Evaluate potential alternative CIP scenarios
    - b. Support City in evaluating rate impacts of proposed plan
    - c. Support City in prioritizing projects and adjusting to plan if needed based on rate impacts
  3. Establish Final CIP and Implementation Plan for improvements

**Deliverables:**

Capital Improvements Plan

**Meetings:**

Financial Analysis with City financial team as needed

***TASK 11 Tools Integration and Training***

**Services Provided by HDR:**

1. Facilitate up to three (3) workshops with City staff to support training on hydraulic model use.
2. Provide GIS data developed through project to City. Support City in integrating with GIS and CityWorks.

**Deliverables:**

Hydraulic Modeling Training  
Project data to incorporate in GIS/CityWorks

**Meetings:**

Training sessions

***TASK 12 Final Report***

**Services Provided by HDR:**

1. Document results of Master Plan in Draft report and submit to City for review and comment.
2. Facilitate review meeting to discuss City comments.
3. Update report and submit final report.

**Deliverables:**

Draft and Final Report

**Meetings:**

Review Meeting

***TASK 13 Project Management***

**Services Provided by HDR:**

1. Project management and administration (project setup)
2. Budget and invoice management
3. Quality Control and Project Approach and Resource Review