



# **WATER UTILITY REVIEW APPLICATION**

**Water Department  
City of Fort Worth**

## Water Utility Record Types – Definitions

WUWCSF / WUSCSF: Water Utility Water and/or Sewer Comprehensive Study Facility. Modeling is required for this type of review. Review type triggers vertical facility improvements, large water-sewer transmission main extensions or oversizing. Review type utilized for large master planned areas and infill high density development.

WUWCS / WUSCS: Water Utility Water and/or Sewer Comprehensive Study. Modeling is required for this type of review. Review type does not trigger facility improvements or large diameter main improvements.

WUWSLF: Water Demand and/or Sewer Loading: Review requiring exhibits and calculation tables for development water demand and/or sewer loading. Review type for infill areas with adjacent infrastructure that does not meet current standards. Review type also for cases where density has increased from the previous existing uses or an increase in density from a previously accepted review.

WUWSLR: Water Demand and/or Sewer Loading Reduced: Review requiring exhibits and calculation tables for development water demand and/or sewer loading. Review within area that has infrastructure that meets current standards. Example: Remaining developable area within a previous accepted master planned development. Need for review typically for change in land use from the previous accepted review.

WUNS: Water Utility No Study Letter: Review type typically for platting less than 4 lots within the City corporate limits with no change in land use or same lot count or less out in the City's Extra Territorial Jurisdiction.

WUR: Water Utility Record: Accela record type for initial application to categorize which review type applies to the submittal.



# **WATER & SEWER STUDY GUIDELINES**

**Water Department  
City of Fort Worth**

## 1. General Guidelines

A Water and Sewer Study of the immediate and surrounding area of development is needed to evaluate the adequacy of existing and proposed facilities for present and future needs. This document is meant to serve as a general guideline for preparing and submitting demand/loading & layout and comprehensive studies. Every study is unique; therefore, this guide is not designed to incorporate all possible design approaches. An application of sound judgment is necessary in preparing the comprehensive study. A list of major goals that each study must accomplish is provided below.

### Major Study Goals:

- Describe the existing conditions and show the proposed facilities
- Calculate the demand/loads expected to be generated by the proposed development
- Demonstrate the impact of the proposed development
- Describe the potential issues associated with the proposed development (if there are any) or demonstrate that the existing system is not likely to be impacted by the proposed development
- Provide figure (s) and table (s) summarizing the existing conditions, identifying problems (i.e., potential issues) and proposed solutions
- Show how adjacent undeveloped properties are not blocked from future access to utilities (Please refer to the of “Installation Policy and Design Criteria for Water, Wastewater, and Reclaimed Water infrastructure” for more information.
- Provide recommendations for improvements needed to adequately serve the proposed development
- Justify the water meter sizes and quantities are consistent with the study demands

This guide recommends minimum requirements for submitting either a demand/loading & layout or comprehensive study. Different approaches can be utilized as long as the primary goals of the demand/loading and study are accomplished. However, required policies and procedures, i.e., design criteria, are not negotiable and must be used.

The demand/loading & layout and comprehensive studies serve the City of Fort Worth Water Department as a historical record of the assumptions and analysis methods utilized at the time the proposed development is submitted. Please be sure to include any and all pertinent information that may not be known to future readers of this document. The



document should be prepared as though the reader does not have any previous knowledge of the development and any associated issues negotiated during the development process.

## 2. **Water and Sewer Loading & Layout Map**

While this can be requested apart from performing an entire comprehensive water/sewer study, these figures should be included as part of every comprehensive water/sewer (W/S) study. General guidelines for preparing a water demand/sewer loading and layout map exhibits are provided below.

### Goals:

- Provide overall summary of proposed water and sewer facilities.

### DO include:

- Provide Color Coded water and sewer lines.
- Distinguish existing vs proposed lines.
- Demonstrate how the proposed system connects to the existing system
- Label Pipes, and Streets.
- Include a Vicinity Map with a North Arrow.
- Include W/S calculation table.
- PDF format of figures

### DON'T include:

- Extraneous line layers
- Easements
- Non-Water/Sewer utility lines
- Storm water lines
- Street center lines
- Contours

### 3. Comprehensive Water and Sanitary Sewer Study Submittal

The comprehensive water and sanitary sewer study submittal should consist of the scenario exhibits as discussed in Section 4 and Section 5. Include clearly labeled calculation result tables for the various modeling scenarios and an engineering-type report with a cover sheet signed and sealed by a licensed professional engineer currently licensed in the State of Texas. The study shall be developed as an engineering report, including narrative, maps, layouts, exhibits, and other materials and should be submitted digitally as a single PDF document for review. The comprehensive study report should contain the following additional information:

- Hydraulic modeling software used in the analysis of water network, (e.g. InfoWater, WaterCad, H2Onet, H2Omap, EPAnet2.0). All water model files should be submitted in (\*.inp) format.
- A Map clearly identifying the site location with respect to nearby facilities.
- A Site Map for the immediate area of development and the surrounding properties that includes the following:
  - ✓ Topographical Information.
  - ✓ Existing and proposed streets.
  - ✓ Pressure plane (and boundaries if more than one pressure plane is involved).
  - ✓ Drainage area (i.e., area from which wastewater flows).
  - ✓ Location, alignment and size of the existing water/sewer that will provide service to the proposed development.
  - ✓ Legend.
  - ✓ Scale and North arrow.
  - ✓ Show potential sewer connection points for up gradient adjacent undeveloped parcels



- Phasing map identifying immediate and future phases of the proposed development.
- Water and Sewer Study Loading & Layout Map (See Section 2)

The narrative portion of the study report should include the following sections:

- Purpose and scope: Provide any necessary background information related to the project.
- Design criteria: Describe demand assumptions & site references
  - Verifiable citations from the current version of the “Installation Policy and Design Criteria for Water, Wastewater, and Reclaimed Water infrastructure”, the current version of the “International Building Code” adopted by the City and the current version of the “International Fire Code” adopted by the City that specify the type of construction and fire flow demand.
- Hydraulic Analysis: Discuss demand/load calculation, phasing, hydraulic analysis results, and the impact of the development
- Figure(s): Exhibits of various scenarios, model network map (s) and site map(s)
- Recommendations: Final pipe size(s), slopes (sewer), alignments, special features such as pressure reduction valves, City required cost-participation, phasing of construction or any other aspect of the proposed development that has direct bearing on the water and sewer service to the proposed development. Contractual capacity or infrastructure obligations related to special utility districts, development agreements, annexation requirements, or other agreements with the City should be referenced in the study.

As a condition of receiving the approval letter, the engineering consultant shall submit the finalized digital copy of the report (or one bound hard copy) and water model files in (\*.inp) format. The submittal should have (i) legal description of the project name, (ii) project address, (iii) developer/owner’s name and (iv) contact information of the consulting engineering firm that conducted the analysis and PE stamp.



#### 4. Comprehensive Water Study

Assumptions, minimum system requirements for analysis and design criteria are extracted from the most recent version of “Installation Policy and Design Criteria for Water, Wastewater, and Reclaimed Water infrastructure for City of Fort Worth.”

- In areas with high velocity, low pressure, or when the proposed development projects a low water demand, the city may request a meter size and total meter count for the entire proposed development. The meter size and count maximum flow rate shall be required to match the proposed demands in the study.
- Please provide water demand calculation and phasing summary tables (see example below)

Table 1. Summary of water demand calculation								
Types of land use	Land areas (acre)	Population (persons)	Capita factor	Average Daily flow	Maximum Daily flow	Maximum Daily Flow + Fire flow	Maximum Hour flow	Design flow
				(gpm)	(gpm)	(gpm)	(gpm)	(gpm)
Residential			3.5 persons per lot					
Multifamily			2.5 persons per unit					
Commercial			See design criteria					
School			60 – 75 students per acre					
Industrial			See design criteria					
Undeveloped (residential)			14 persons per acre					
Other			See design criteria					
Total								





**Table 2. Phasing Summary**

Development data (based on construction timeline)	Year 1	Year 5	Year 10	Built Out
Pressure plane				
Areas (acres)				
Population (persons)				
Average daily flow (gpm)				
Maximum daily flow (gpm)				
Fire flow (gpm)				
Design flow (gpm)				

For conditions or situations not addressed in City of Fort Worth Water Department Installation Policy and Design Criteria for Water, Wastewater, and Reclaimed Water infrastructure for City of Fort Worth, please either contact City of Fort Worth Water Department (Water Planning) or refer to Title 30 Texas Administrative Code, Chapter 290 for rules regarding PUBLIC WATER SYSTEMS or 30 Texas Administrative Code, Chapter 217 for rules regarding DESIGN CRITERIA FOR DOMESTIC WASTEWATER SYSTEMS of the Texas Commission on Environmental Quality rules and regulations. These rules can be found at <https://www.tceq.texas.gov/rules/indxpdf.html>.

#### 4.1 Water Model Basics

The water model was developed and is maintained using the InnoVizy InfoWater software. A separate pressure plane specific model has been developed for each major service area (Northside, Southside, Westside, etc), which includes all the sub pressure planes as well. For example, the Northside water model includes Northside 2, 3, and 4. The South side model includes Southside 2, 3, and 4. This is provided to make it easier to analyze developments that may be on the border of two pressure plane boundaries. Models between major pressure planes are not available.

NO REVISIONS TO THE EXISTING PIPING NETWORK OR OPERATIONAL PARAMETERS IS ACCEPTABLE. Any revisions of existing network pipes, valves, or operating parameters will result in the study being rejected and returned without review.

- I. Request the pressure plane specific water model from Fort Worth Water Department. Contact [WPD@fortworthtexas.gov](mailto:WPD@fortworthtexas.gov). Before every study the applicant should check with Department to ensure the appropriate model is utilized.
- II. Existing model demands are Max Day Demands. Each existing demand in the model has a diurnal pattern specific to the overall water use pattern within each pressure plane. Existing wholesale water demands may be constant or have a demand pattern that reflects their specific use pattern.

- III. Insert the proposed node demands as Maximum Day Demands. Apply the development specific demand pattern shown at the end of Section 4. This pattern represents typical use patterns of new developments and includes a 2.0 multiplier at the peak hour. Using this pattern allows the engineer to model maximum day demands as well as maximum hour conditions for proper sizing of pipes. For some industrial developments, an alternate use pattern may be proposed if the engineer can show historical data from similar projects.
- IV. Fire flow will typically be 1,000 gpm for single family lot residential and 1,500 gpm for commercial and multi-family. The fire marshal may require an even higher flow rate depending on the type of development and construction type. Fire flow duration is 3 hours. Use the fire flow diurnal pattern at the end of Section 4. Multiple locations may need to be tested and reported if there are multiple pressure planes serving the development, multiple fire flow requirements (i.e. residential and commercial) and if there are multiple dead-end lines.
- V. Please include a copy of the diurnal patterns used in the development (including the Fire Flow pattern) in the report.
- VI. Study for Phased Development: As for large development with multiple phase construction, water and sewer study requirements should meet the minimum standards for each phase of construction.
- VII. Hazen-Williams coefficient (C factor) should be assumed 130 for the proposed water lines.
- VIII. All water model files must be submitted in (\*.inp) format

#### 4.2 **Modeling Scenarios, Analysis and Exhibits**

The exhibits listed below are a minimum requirement for water comprehensive studies. Additional mapping may be required to demonstrate that the study objectives (discussed in Section 1) are met. The maximum figure size should be 11 X 17. Use different colors for pipes and nodes, and label them clearly.

When running the model simulations, the existing water model diurnal curves provided by the City should not be edited or used for proposed developments. Any proposed developments should use a unique, development-only diurnal curve that represents the correct 2.0 multiplier for maximum hour required.

##### 4.2.1 **Simulation #1 – Base Condition: Maximum Day Demand with Existing Developments**

- Run the existing model, and display results for all nodes and pipes in Exhibit 1.
- Provide Pipe and Node I.D.'s legibly on this map. Display the results for all the nodes and pipes for the minimum pressure experienced in the area being developed.
- The existing system network map (i.e., Exhibit 1, Existing Water System Network Map) should include the project area and an appropriate radius around the project



(typically 0.1 to 0.5 mile). For example, draw a 0.1 mile radius if the project is in or near a developed area. Draw at least a 0.5 mile radius around the project if the project is located in a rural area.



#### 4.2.2 **Simulation #2: Maximum Day Demand with Proposed Development**

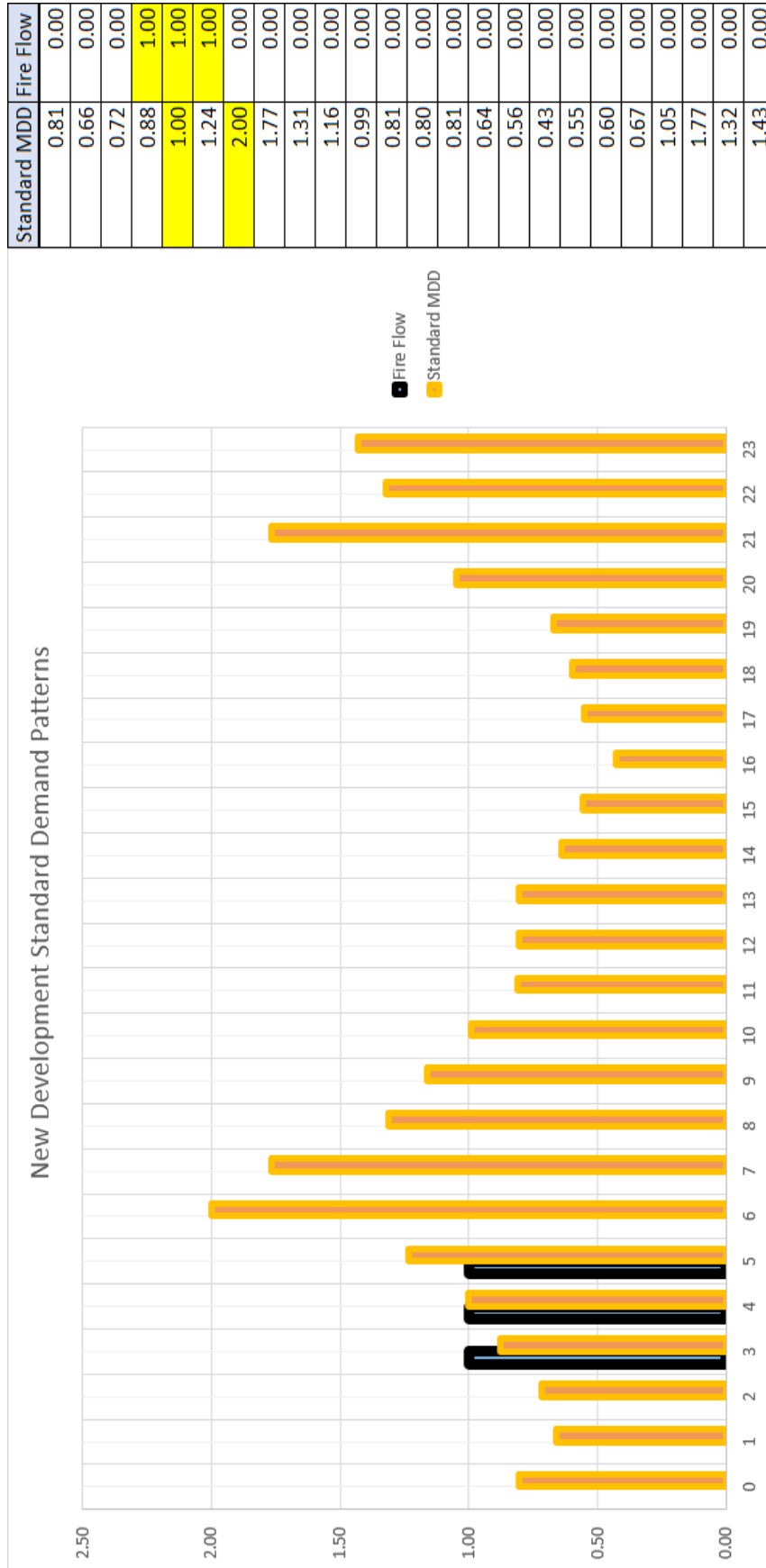
- Add the Maximum Day Demands (MDD) of the proposed system development to the existing model.
- Assign the standard development diurnal pattern (see end of Section 4) to the proposed demands. The standard pattern includes a 2.0 multiplier which represents maximum hour demand. Commercial patterns or industry specific patterns may be different than residential. If a pattern different from the standard pattern is proposed, include historical data based justification in the report as an appendix. This pattern should be used only if maximum hour demand is larger than maximum day + fire flow demand.
- Adjust the proposed pipe sizes to eliminate any low pressure (lower than 40 psi), head loss above 5 ft/1000 ft, and velocity above 5 ft/s (for pipes 12-inches and smaller) and head loss above 7 ft/1000 ft, and velocity above 7 ft/s (for pipes 16-inches and larger).
- Run the model and analyze results. Report the minimum pressure, maximum velocity, and head loss obtained compared to the Installation Policy and Design Criteria for Water, Wastewater, and Reclaimed Water infrastructure for City of Fort Worth.
  - Display minimum system pressure during 24 hours for all nodes in an exhibit including node Identification No. and corresponding pressure (i.e., Exhibit 2a).
  - Display maximum velocity and head loss during 24 hours for all pipes in an exhibit including pipe Identification No., corresponding pipe sizes, and corresponding velocity and head loss (i.e., Exhibit 2b).

#### 4.2.3 **Simulation #3: Maximum Day + Fire Flow Demand with Proposed Development**

- Simulation #3 extends the work that was done in simulation #2. In the second simulation, the node with the lowest pressure in a well looped system (typically the highest elevation) should be selected within the development. This node is taken as the critical fire node and should be used as the fire node to which the fire flow demand is applied. Some developments with multiple pressure planes, multiple development types or dead-end pipes may have to prove adequate fire flow performance at more than one junction.
- Assign the Fire Flow development pattern to the proposed Fire Flow Demand applied to the fire node.
- Adjust the proposed pipe sizes to eliminate any low pressure (lower than 20 psi) and velocity above 10 ft/s in all pipes.
- For fire flow analysis, prepare mapping that shows the available pressure at each node and pipe velocity during the fire flow analysis with the full fire flow demand applied.
- Run the model and analyze results. Report the minimum pressure and maximum velocity obtained compared to the Installation Policy and Design Criteria for Water, Wastewater, and Reclaimed Water infrastructure for City of Fort Worth.
  - Display minimum system pressure during 24 hours for all nodes in an exhibit including node Identification No. and corresponding pressure (i.e., Exhibit 3a).



- Display maximum velocity during 24 hours for all pipes in an exhibit including pipe Identification No., corresponding pipe size, and corresponding velocity (i.e., Exhibit 3b).





## 5. Comprehensive Sewer Study

Assumptions and minimum system requirements for analysis and design criteria are extracted from the Installation Policy and Design Criteria for Water, Wastewater, and Reclaimed Water infrastructure for City of Fort Worth.

- Provide sewer load calculation and phasing summary table for existing, proposed and ultimate(if applicable) conditions (i.e., Table 1).
- Proposed Condition includes existing and proposed developments, while Ultimate Condition includes proposed condition and off-site areas.

**Table 1. Sewer Load Summary Table for each condition (Proposed and Ultimate)**

Sub-Basin ID	Type of Land Use	Size of Basin	Dwelling Units	Population Per Dwelling Units/acres	Population Served	Sewer flow per capita (gpcd)	Average Flow	Peaking Factor	Peak Design Flow
		(acres)		(Persons/units)	(capita)		(gpm)		(gpm)
Total									

\* Off-site area is not part of the development, but its sewer flow is upstream of the proposed development

**Table 2. Sewer modeling results summary**

Beginning Design Point	Ending Design Point	Sewer Main ID	Sub-Basin Served	Cumulative Sub-basins Served	Cumulative Basin Size	
					(acres)	
Cumulative Population	Average Flow	Peaking Factor	Peak Flow	Proposed Pipe Size	Proposed Slope	Proposed Pipe Capacity
(capita)	(gpm)		(gpm)	(inches)	(%)	(gpm / MGD)

- Sewer Study includes domestic, industrial, or commercial sewer load (gpm) for the proposed area of development and the surrounding properties.
- Sewer Study Includes total flow summaries for the overall development by sub-basin for any existing/proposed/ultimate flows.
- Display design points, sewer lines and corresponding slopes in an exhibit (i.e., Exhibit 1).



## 6. Conclusion and Recommendations

Discuss and summarize the results and findings. Propose the final pipe sizes, system deficiency, water and sewer system improvements (Pump stations, Lift stations, etc.) and requirements for developments with multiple phase construction, if applicable.

### **Water and Sewer Study Submission**

Water Planning, Strategic Developments and Asset Management Section

Water Department – City of Fort Worth

200 Texas St.

Fort Worth, Texas 76102-6311

[WPD@fortworthtexas.gov](mailto:WPD@fortworthtexas.gov)





# WATER UTILITY REVIEW CHECKLIST

**WATER DEPARTMENT**  
200 Texas St, Fort Worth, TX 76102

WWW Planning and Horizontal Asset Management  
Section | Strategic Operations Division  
[WPD@fortworthtexas.gov](mailto:WPD@fortworthtexas.gov)

**Project Information:**

Name: \_\_\_\_\_  
Location: \_\_\_\_\_  
Description: \_\_\_\_\_

Submittal Date: \_\_\_\_\_  
Site / Plat Area (ac): \_\_\_\_\_  
PDC DDate: \_\_\_\_\_

**Owner:**

Name: \_\_\_\_\_  
Firm: \_\_\_\_\_  
Phone: \_\_\_\_\_  
Email: \_\_\_\_\_  
Address: \_\_\_\_\_

**Engineer:**

Name: \_\_\_\_\_  
Firm: \_\_\_\_\_  
Phone: \_\_\_\_\_  
Email: \_\_\_\_\_  
Address: \_\_\_\_\_

PE No.: \_\_\_\_\_  
Firm No.: \_\_\_\_\_

**Additional Design Contact**

Name: \_\_\_\_\_  
Phone: \_\_\_\_\_  
Email: \_\_\_\_\_

**This Water Review is submitted for the purpose of supporting the following development applications (check all that apply)**

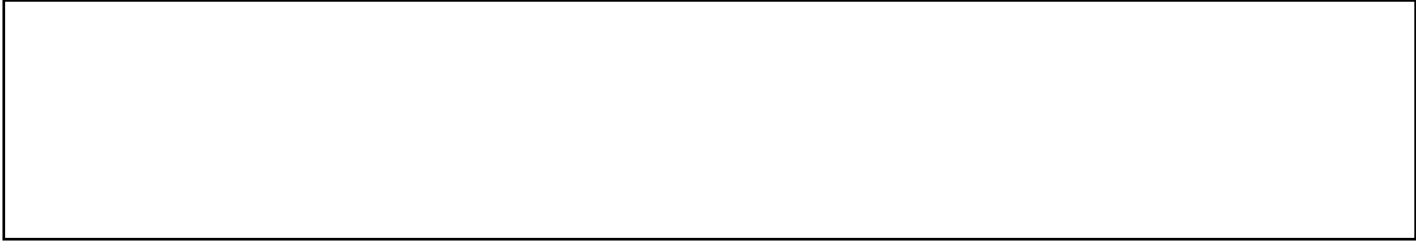
- |  |  |   |
|--|--|---|
| <input type="checkbox"/> Concept Plan (Multi-Phase)      | <input type="checkbox"/> Final Plat                        | <input type="checkbox"/> Update To Previous Study |
| <input type="checkbox"/> Preliminary Plat (Single-Phase) | <input type="checkbox"/> Infrastructure Plan Review (IPRC) | _____ - 20__ - 0__                                |
| <input type="checkbox"/> Preliminary Plat (Multi-Phase)  |  |   |

**If you know your review type(s), please check the applicable box below (refer to definitions page of this application). If you are unsure of your review type, please select WUR.**

- |                                 |                                |                                 |                               |
|---------------------------------|--------------------------------|---------------------------------|-------------------------------|
| <input type="checkbox"/> WUWCSF | <input type="checkbox"/> WUWCS | <input type="checkbox"/> WUWSLF | <input type="checkbox"/> WUNS |
| <input type="checkbox"/> WUSCSF | <input type="checkbox"/> WUSCS | <input type="checkbox"/> WUWSLR | <input type="checkbox"/> WUR  |
|                                 | <input type="checkbox"/>       | <input type="checkbox"/>        | <input type="checkbox"/>      |

**Provide a brief description about the development / review**

**Describe any proposed waivers or variances:**



**Disclaimer:** *This checklist is intended to assist the developers engineer in preparing a water utility review, and the City's engineer in reviewing said submittal. The checklist is not an exhaustive list of requirements and is not a substitute for familiarity with the Fort Worth Water Department Installation Policy and Design Criteria Manual for Water, Wastewater, and Reclaimed Water Infrastructure, or other relevant resources or experience applying hydraulic engineering practices and principles.*

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**Following items apply to both loading and major study submittals**

- Signed and sealed cover page for report in pdf format showing legal description of project name, project address, developer/owner name, engineering consultant contact information, and PE stamp.
- Map exhibit of plat development with existing infrastructure/facilities and proposed land use improvements.
- Provide color coded water and sewer lines. Distinguish between existing and proposed lines.
- Table exhibit showing calculation of demands/loads generated by the proposed land use improvements and adjacent off-site areas.
- Map exhibit of plat development showing how proposed infrastructure connects to the existing infrastructure
- Table exhibit showing proposed pipe sizing, slopes, and capacities

**Following items apply to major study submittals**

- EPS Models shall be submitted in (\*.Inp) format. At a minimum, three models shall be submitted for existing max day demand (MDD Exist), max day demand proposed (MDD Prop), and max day demand plus fire flow (MDDFF). Demonstrating how existing infrastructure handles proposed infrastructure.
- Map exhibit showing development phasing
- Report describing the development's purpose and scope, design assumptions/criteria, hydraulic analysis results, and infrastructure improvement conclusions and recommendations.

**For additional information about the requirements, standards, criteria, or policies that apply to the preparation or review of a drainage study, please refer to the relevant portions of the CFW Ordinances, Fort Worth Water Installation Policy and Design Criteria Manual, NCTCOG Technical Manuals, and applicable engineering technical publications.**

I certify that this water utility review and all attached and referenced exhibits, documents and appendices were prepared under my responsible supervision and that the information presented on the checklist, report, and attachments is correct to the best of my knowledge. I also understand that an acceptance of this plan by the City of Fort Worth does not waive any City standards or requirements unless a specific waiver request was submitted and approved.

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

(Adhere Texas PE Seal)

Name: \_\_\_\_\_ Firm No: \_\_\_\_\_