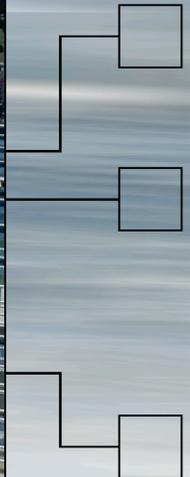




# Lake Worth Utilities Water Distribution System Modeling Update

April 2013



Report prepared by Mock•Roos  
at request of the City of Lake Worth



## Engineer's Certification

I hereby certify, as a Professional Engineer in the State of Florida, that this report titled "Water Distribution System Modeling Update" dated April 2013 was prepared and assembled under my direct responsible charge. The certifying Engineer cannot be responsible for added or deleted information once distributed. This report is not intended or represented to be suitable for any reuse without specific verification or adoption by the Engineer. This Certification is provided in accordance with the Florida Board of Professional Engineers' Rule on Certification under Chapter 61G15-18.011(4).



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5-6-13

Date

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In 2005, Mock•Roos developed a computer model (“Model”) of the City of Lake Worth’s water distribution system (“System”) using Watergems by Haested Methods. The City requested that Mock•Roos update this Model to include System improvement projects completed since 2005. The primary objective of the Model update was to identify fire hydrants in the System that do not meet the target flow rate of 1,000 gpm. The City will use this information to help determine future Capital Improvement Projects for the System.

### Physical Information

The City’s Water Atlas was used to provide the physical information about the City’s System in the 2005 Model. The Atlas had not been updated since 2005. The City requested that Mock•Roos update the Atlas in concurrence with the Model update. Information provided by the City and record drawings for completed projects were used for the updates. A schematic of the City’s System is shown in *Figure 1*.

### Water Demand

The water demand used for the Model update was based on the City’s 2005 water use records (see 2005 Model report). The water demand was distributed throughout the City’s water service area based on existing land use designations. The water demand for each land use was distributed as shown below in *Table A*. The existing land use map for the water service area is shown in *Figure 2*.

**Table A – Average Water Demand per Day by Land Use Type**

<b>Land Use Designation</b>	<b>Water Demand (GPD/acre)</b>	<b>Total Acres in Service Area</b>
Single Family Residential	1,760	1,942
Medium Density Residential	2,500	494
High Density Residential	2,560	156
Mixed Use – East	2,870	286
Mixed Use – West	800	161
Downtown Mixed Use	8,370	46
Transit Oriented Development	720	4
Industrial	870	278
Public	590	510
Public Recreation and Open Space	150	1,115

The water demand for future conditions was derived by increasing the System demand by a factor of 1.2. This increase corresponds to the increase in water use determined in the City's recent SFWMD Water Use Permit (Permit No. 50-00234, Application No. 101215-11). A peaking factor of 1.5 was used to simulate peak flow conditions in the System.

### Simulations

The following three scenarios were developed for the model:

**Scenario 1 – Existing Conditions:** The existing System using average daily demand. The results are represented in *Figure 3*.

**Scenario 2 – Existing Conditions:** The existing System using peak daily demand. The results are represented in *Figure 4*.

**Scenario 3 – Future Conditions:** The existing System using future peak daily demand. The results are represented in *Figure 5*.

### Verification

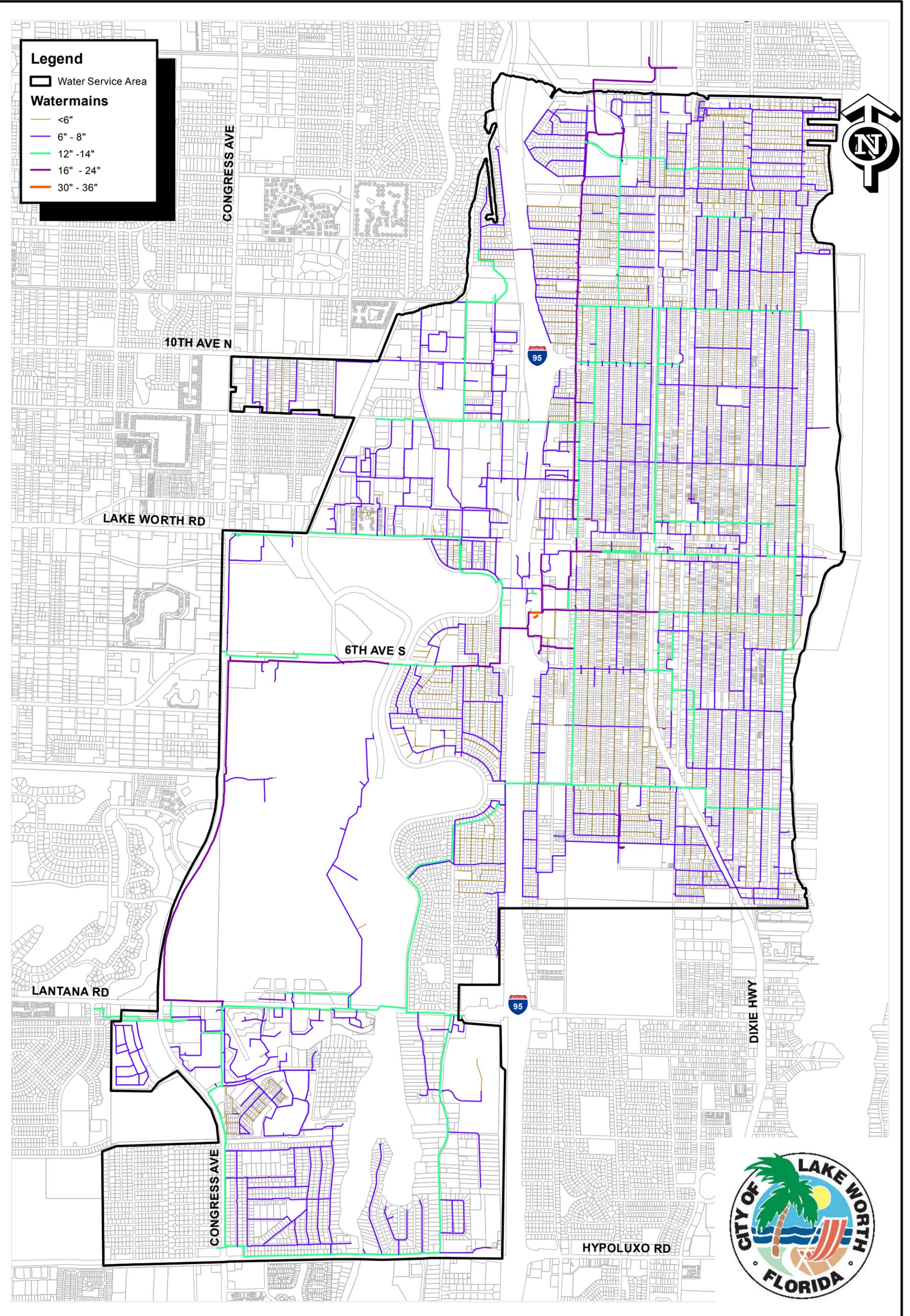
The City conducts annual field tests on fire hydrants within the System. Test data includes recorded static pressure, residual pressure and the flow rate at each fire hydrant. Mock•Roos received fire hydrant flow data from tests conducted in 2011. The fire hydrant flow data at each location was used to generate a map of field conditions (*Figure 6*). A comparison of this information with Model results for Scenario 1 was conducted for Model verification.

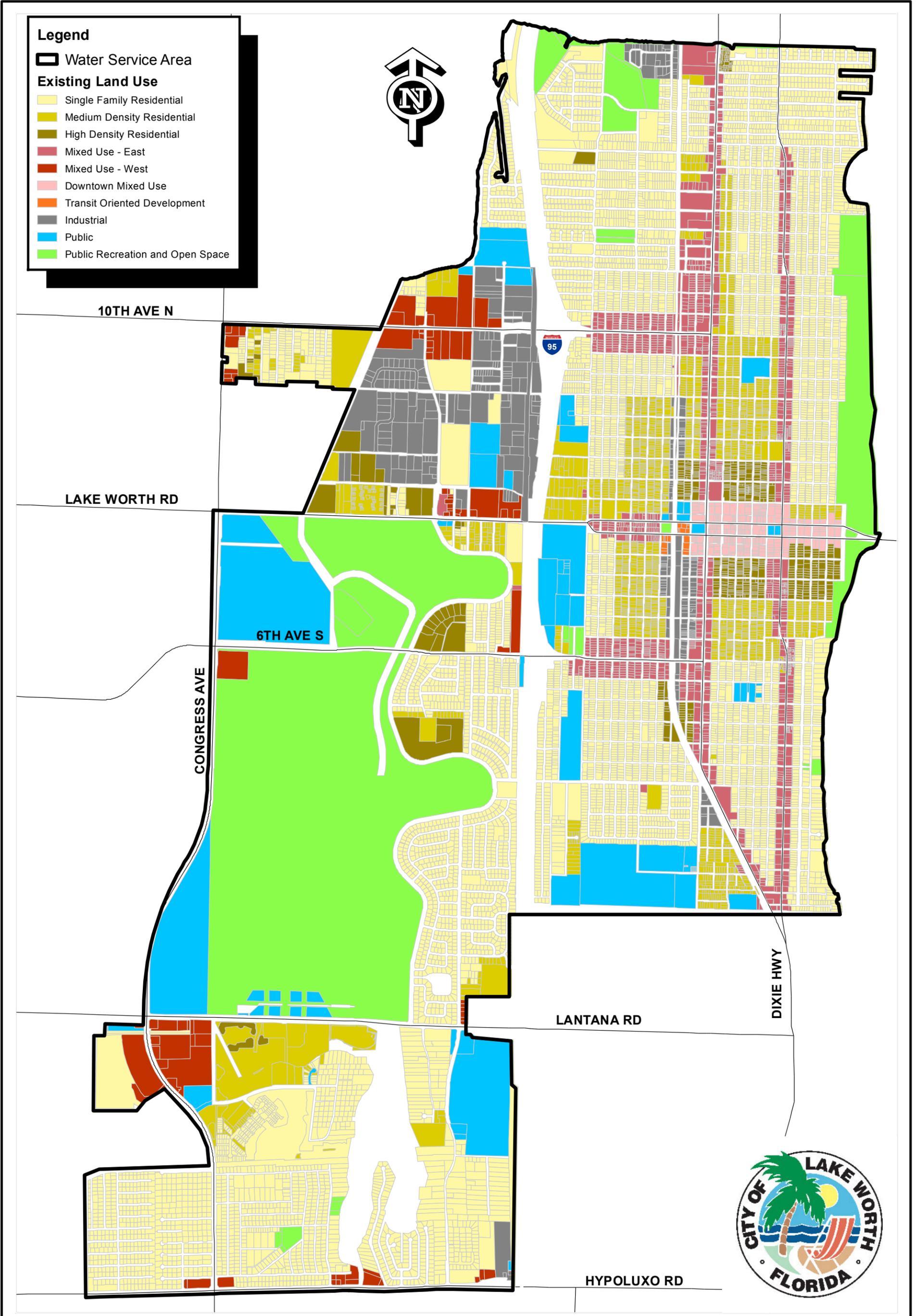
### System Mapping

In addition to the model update, the City requested a mapping of the following to assist with determining and prioritizing System improvements:

- a. Location of utility work orders for watermain breaks (*Figure 7*).
- b. Existing fire hydrant coverage using a 300- foot radius for the area of coverage of each hydrant (*Figure 8*).
- c. Existing areas outside of the 300-foot radius of coverage excluding recreational areas and bulk customers.
- d. Overlap of the System model results with the location of future storm sewer, sanitary sewer, and roadway improvements projects.

A series of maps including Model results for Scenario 2 and items b through d are included in *Figure 9*.





**Legend**

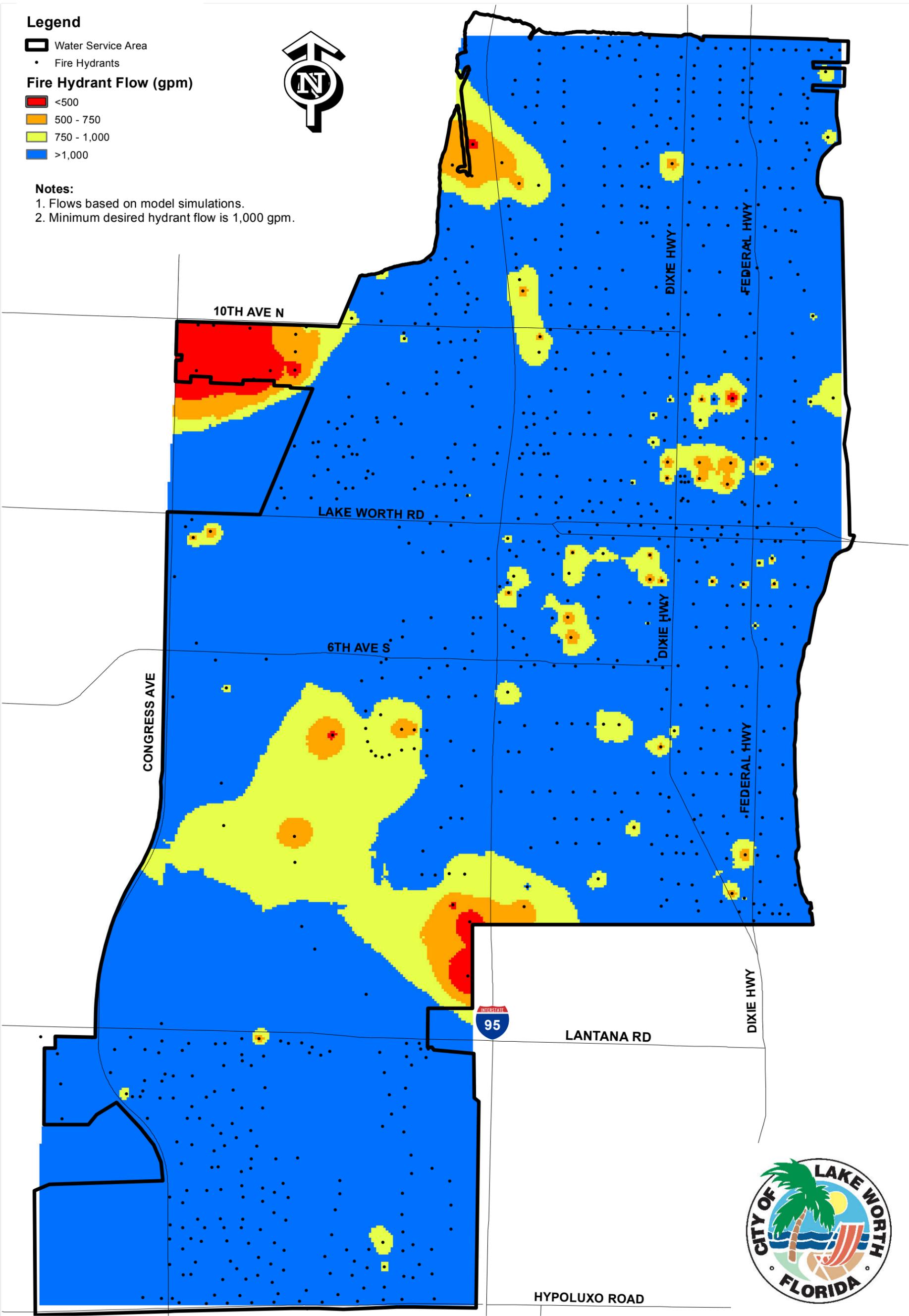
-  Water Service Area
-  Fire Hydrants

**Fire Hydrant Flow (gpm)**

-  <500
-  500 - 750
-  750 - 1,000
-  >1,000

**Notes:**

1. Flows based on model simulations.
2. Minimum desired hydrant flow is 1,000 gpm.



**Legend**

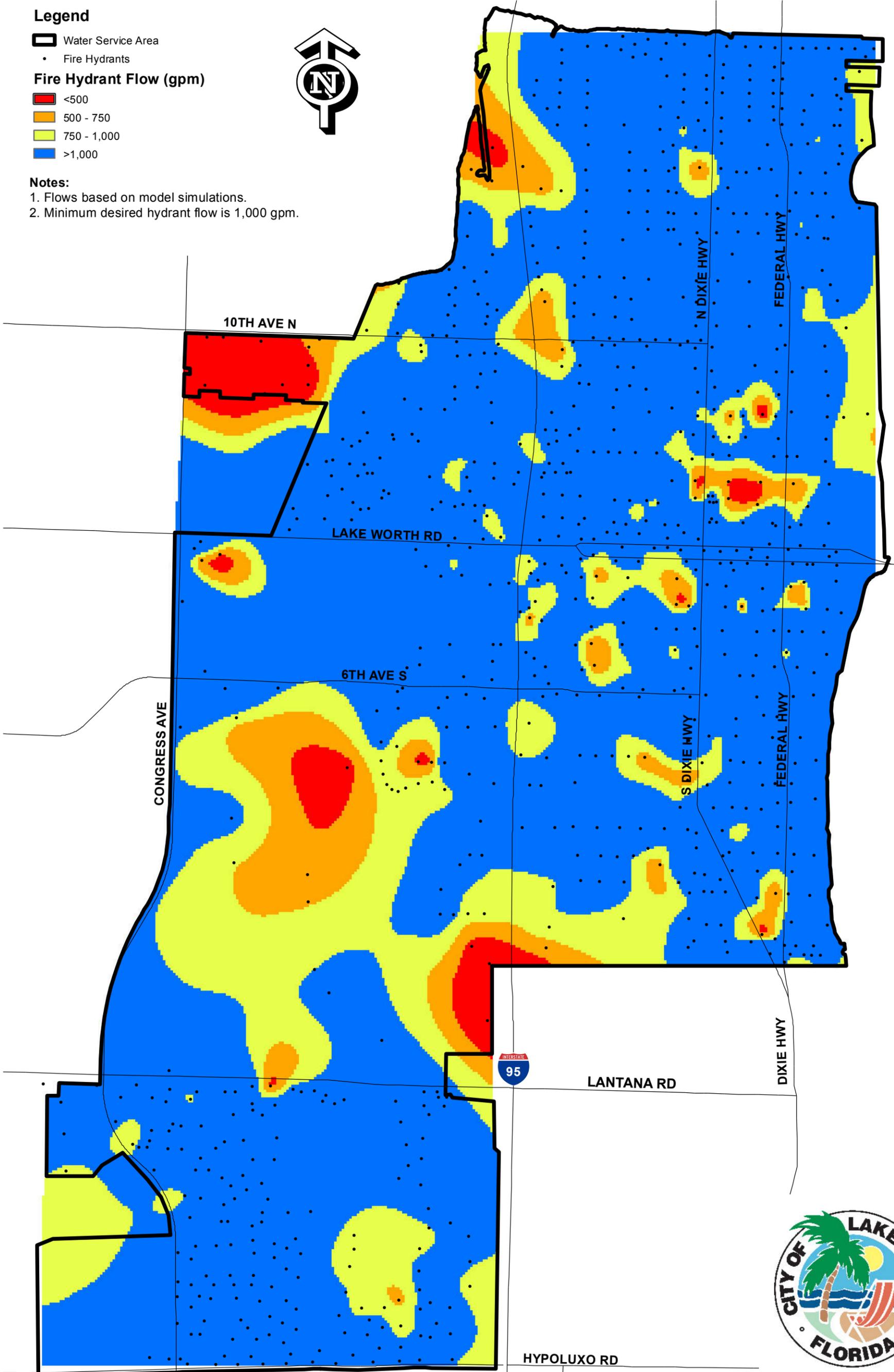
-  Water Service Area
-  Fire Hydrants

**Fire Hydrant Flow (gpm)**

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**Legend**

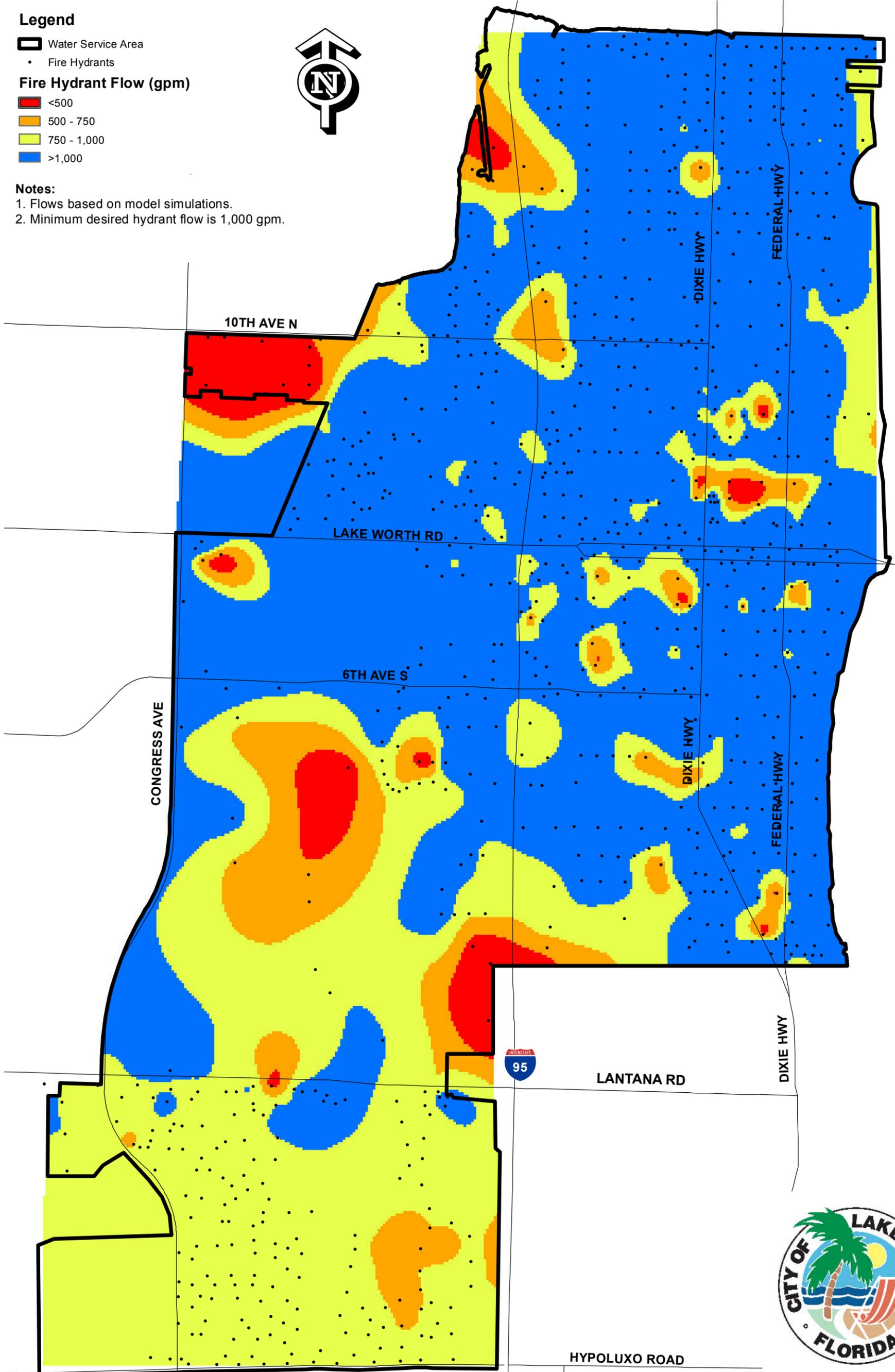
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**Legend**

-  Water Service Area
-  Fire Hydrants

**Fire Hydrant Flow (gpm)**

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