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December 15, 2014

Mr. Russell Rietveld, P.E.
Senior Civil Engineer
Lake County Department of Public Works
650 West Winchester Road
Libertyville, Illinois 60048

SUBJECT: PROPOSAL FOR 2015 FLOW MONITORING AND SSES SERVICES
NORTHWEST AND SOUTHEAST LAKE FPA FLOW MONITORING
INGLESIDE SHORE LIFT STATION SSES

Dear Mr. Rietveld:

RJN Group, Inc. (RJN) has been providing flow monitoring services for the Lake County Department of Public Works (County) in the Northwest Lake Facility Planning Area (FPA) sanitary sewer system since December 2013. The nine meters, four lift station Telog units and two rain gauges on that contract were all installed and fully operational by December 6, 2013. The contract for these services was for 365 days and therefore expired on December 6, 2014.

RJN previously provided flow monitoring services for the Southeast Lake FPA in 2013. The only meter currently installed in the Southeast Lake FPA is the Trinity meter, which is currently being maintained by County staff. The RJN contract to process data from this meter expired on December 1, 2014.

The County intends to continue with flow monitoring in select locations in each FPA. The selected locations are shown on the attached exhibits and listed as follows:

NW Lake FPA:

- LCNW-1 (Meter to remain in service)
- LCNW-3 (Meter to remain in service)
- LCNW-4 (Meter to remain in service and be relocated upstream and renamed LCNW-4A in February 2015)
- LCNW-8 (Meter to remain in service)
- LCNW-10: New site to monitor 24" on Lotus Drive from Round Lake (Install in February 2015)
- LCNW-11: New site to monitor 24" from Round Lake Beach (Install in February 2015)
- LS-1, 2, 3 and 4 (Telog units at all four lift stations to remain in service)

SE Lake FPA:

- Trinity (Meter to remain in service)
- LS-01 (Previous Lincolnshire meter to be reinstalled in February 2015)
- LZ-01 (Previous Lake Zurich meter to be reinstalled in February 2015)

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RJN will provide full services for these meters through November 30, 2015. The services for the five meters to remain (including LCNW-4 to be relocated in February) and the four lift station units will start in early December and be provided for 12 months. The four new/reinstalled meters are expected to be in service by the beginning of March (weather permitting) and service will be provided for 9 months. RJN will also continue maintaining the two County owned rain gauges. The Petite Lake LS rain gauge will be relocated to the Southeast Lake FPA (LC-RG-2) and the other Northwest Lake FPA rain gauge will remain in the current location.

The services to be provided by RJN staff are summarized below.

**EQUIPMENT**

The flow meters supplied by RJN that are owned by the County are FlowShark Triton flow meters that include an in-flow sensor that measures continuous wave peak velocity, uplooking ultrasonic depth, and pressure depth. It also includes an ultrasonic level sensor for flow depth calculations, a wireless modem and an antenna package (with SIM card) for wireless transmission of data. All of these components may need to be replaced at any time. Since the probes are located in the sewers, they are typically the most likely to need replacement. The meter also includes batteries and desiccant that need to be replaced on a regular basis.

As part of this proposal, RJN will continue with responsibility for acquiring the needed items for the Northwest Lake FPA meters to remain in service. RJN staff will confirm that the Trinity meter (currently maintained by the County) is in proper working order. The County is currently storing the unused meters and RJN will utilize equipment from the County stock. At the time of installation, RJN will notify the County if any equipment is not in proper working order and will utilize replacement parts from the County stock. After the meters are installed and in proper operation, RJN will take over responsibility for acquiring the needed items for these meters as well. RJN will also cover the wireless charges for each site.

**METER MAINTENANCE**

The meter equipment requires regular maintenance. This includes standard maintenance and corrective maintenance. The corrective maintenance is directed by the data analyst that identifies a maintenance need based on the data from the meter. This could be an immediate need where there is a risk of losing data or it could be a “next visit” need such as batteries starting to run low.

The standard maintenance is expected to be quarterly visits to each site to check operation and complete a calibration. The calibration includes manual depth and velocity readings taken by the field staff to confirm that the meter is reading to manufacturer’s operating standards. As part of this proposal, RJN will take full responsibility for all needed maintenance and calibrations.

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**DATA HANDLING**

RJN utilizes a host software support application program for remote wireless flow meter and rain gauge data collection. On a daily basis, all data recorded and stored in the meter is collected by the host system. The system utilizes a client/server architecture to store all project flow and rainfall data. On a daily basis, flow meter measurements are posted to the web site for viewing by authorized parties.

Web module software allows any networked computer (with the appropriate access rights) access to the data stored using a common web browser (e.g. Microsoft Internet Explorer). The web module enables the users to view the data and download the data in Microsoft Excel format.

The RJN data group reviews the flow monitoring and rainfall data at least once per week. The analysis of the data includes the identification of data gaps, hydraulic anomalies and monitor performance issues. Any equipment service needs will be immediately conveyed to the RJN field service crews. The data is processed and edited in accordance with the field confirmations to produce final data sets for each site. The final data is posted when completed.

**SANITARY SEWER EVALUATION SURVEY**

One of the basins with the highest excess flow is the area tributary to LCNW-3. In particular, the lift station on Ingleside Shore Road just south of Fox Lake experiences significant excess flow. A sanitary sewer evaluation survey (SSES) will be completed for the area tributary to this lift station. According to our GIS records, the area contains 4,241 linear feet of sewer and 21 manholes.

The SSES will consist of dual blower smoke testing for the entire length of sewer and a detailed surface inspection of each manhole. Up to five dye flooding setups will also be provided as a follow up to cross connections between the sanitary and storm systems identified in the smoke testing. The purpose of the dye flooding is to identify the exact location where the cross connection exists and the quantity of flow from the defect. This pinpoints the required repair recommendation.

## PROPOSED SCOPE OF SERVICES

Our proposed scope of services is as follows:

**FLOW MONITORING**

1. Investigate targeted sites for the relocation of LCNW-4 and for the new LCNW-10 and LCNW-11. Determine the meter sites that are hydraulically suitable for flow monitoring. Prepare Investigation Site Reports for approval by the County.

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2. Obtain flow meter equipment from the County. Prepare flow meters and rain gauges for installation. Relocate meter LCNW-4 and install meters at LCNW-10, LCNW-11, LS-01 and LZ-01. Relocate rain gauge to LC-RG-2.

3. During installation, calibrate each flow meter by taking manual depth and velocity measurements and comparing with meter readings.

4. Provide standard traffic control measures (portable signs and cones) at each site in or near a roadway. If a higher level of traffic control is required, traffic control assistance will be provided by County staff.

5. Prepare the host system for handling all flow and rain gauge data and posting the data for viewing and access by County staff (and any municipalities approved by the County). Review the data at least twice per week during the "settling in" period, once per week, thereafter, and immediately report any equipment service needs to the field crews.

6. Calibrate each meter a second time within two weeks of installation. Utilize the calibrations to adjust the data and prepare final data sets.

7. Provide meter and rain gauge maintenance as necessary to keep meters and rain gauges in proper operation for the duration of the monitoring period. Calibrate each meter at least one additional time within the first three months of operation and at least quarterly thereafter.

8. Provide maintenance on the Telog units as necessary. Notify the County of any needed maintenance on the lift station meters.

9. Procure spare and replacement equipment, such as batteries, probes and desiccant, as needed to keep meters, Telog units and rain gauges within operating standards.

10. This proposal does not include removal or relocation of the flow meters after the flow monitoring period has ended.

11. Process the collected raw data. Analyze the processed data for wet- and dry-weather flow patterns. Create hydrographs and scattergraphs for each meter and determine if there have been any major variations from the previously collected data.

12. For the new meter locations (LCNW-10 and LCNW-11), determine peaking factors of each basin. Perform an inflow analysis, a peak infiltration analysis and look for evidence of downstream control and surcharging.

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13. Prepare quarterly summaries of the data collected, including the following:
    - Short summary of the findings for each meter and any variation from previous findings with a more extensive summary for LCNW-10 and LCNW-11
    - Quarterly hydrographs and scattergraphs from each meter
    - Storm specific hydrographs and scattergraphs from each meter for any rain event greater than a 1-year recurrence for a 60-minute event

14. Provide project management services for the duration of the project. Attend up to two meetings with County staff.

**SSES**

1. Use handheld electronic data collection equipment for collecting smoke testing, manhole inspection and dye flooding data. Provide equipment necessary for this work.
2. Prepare a draft resident smoke testing notification letter for the County to send to the affected residents and business owners. The letters will include RJN contact information for use during the smoke testing.
3. Prepare smoke testing door hangers to be hung by RJN staff at each address less than one week prior to smoke testing. The door hangers will also include RJN contact information. Talk to businesses prior to smoke testing as applicable.
4. Notify the local fire and police departments of planned smoke testing activities, including daily updates.
5. During smoke testing, erect smoke testing signs near the testing area and answer resident and owner field and phone questions.
6. Smoke test approximately 4,241 linear feet of sanitary sewers tributary to the lift station on Ingleside Shore Road.
7. GPS locate (sub-meter mapping grade) each identified defect and take a minimum of one digital photograph of each defect.
8. Complete approximately 21 surface manhole inspections for manholes tributary to the lift station on Ingleside Shore Road. Collect the following attribute data, as it can be determined:
    - Mapping grade GPS locate of manhole;
    - Manhole diameter;
    - Manhole material;
    - Pipe invert measurements;
    - Connecting sewer diameter(s);
    - Connecting sewer material(s); and
    - Connecting sewer flow direction.

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9. Identify and document manhole condition, including:
    - Direct evidence of I/I;
    - Open pickholes in lid;
    - Frame and adjusting ring condition, including needed adjustments and chimney seals;
    - Corbel condition and defects;
    - Wall condition and defects;
    - Trough and bench condition and defects; and
    - Pipe seal condition and defects.
10. Take a minimum of four digital photographs at each manhole structure
    - Surrounding area;
    - Manhole cover;
    - Topside - looking down; and
    - Manhole frame.
11. Provide list of recommended dye flooding locations to the County for approval.
12. The sewer televising needed for dye flooding will be provided by County staff. Coordinate with County staff on dye flooding activities.
13. Complete up to five dye flood setups. Document results with digital photographs of the dye test setup and where possible, dye coming through the sewer and manhole structures. The remaining documentation will be from the video provided by County staff.
14. Provide data analysis as follows:
    - Compile field data and develop complete list of defects;
    - Assign an estimated flow to each defect; and
    - Determine an estimated rehabilitation method and estimate an associated cost for each defect.
15. Provide a letter report addressing the following:
    - Summary of work completed;
    - GIS map of identified defects;
    - List of defects prioritized by cost effectiveness for rehabilitation;
    - Recommendations for rehabilitation, including potential procurement methods and recommended contractors/vendors for various type of rehabilitation
16. Provide the following deliverables:
    - Up to 5 color copies and PDF of draft report;
    - Address County comments and submit up to 10 color copies of final report; and
    - Provide a digital copy of final report files, data, and photographs.

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17. Provide project management services for the duration of the project. Attend up to two meetings with County staff.

**ITEMS TO BE PROVIDED BY THE COUNTY**

1. Provide flow monitoring equipment for the new and reinstalled flow monitoring locations.
2. Provide traffic control assistance as needed.
3. Send smoke testing letters to affected residents and businesses.
4. Procure water for dye flooding.
5. Provide sewer televising as needed to assist in dye flooding.

**SCHEDULE**

The flow monitoring services for the meters to remain in service will begin in December 2014 when the existing agreement expires. Weather permitting, the new and reinstalled meters will be in service by March 1, 2015. It is anticipated that the monthly charges for these meters will begin in March 2015.

The SSES work will be completed when the weather is suitable for each type of work. It is anticipated that the manhole inspections will be completed in Spring 2015. Smoke testing requires dry conditions and it is anticipated this work will be done in Summer 2015. The dye flooding will be determined after the smoke testing is complete and it is anticipated that this work will be done in Fall 2015.

**FEE**

The work will be invoiced on a unit price basis per the attached spreadsheet. The total not-to-exceed amount is $135,174.

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Please feel free to contact me at (630) 682-4700 x314 if you would like to discuss this proposal further. We appreciate the opportunity to continue providing sanitary sewer services to the County.

Sincerely,

RJN Group, Inc.

Michael N. Young

Michael N. Young, P.E.
Principal

Enclosures

Attachment A

**LAKE COUNTY DEPARTMENT OF PUBLIC WORKS**

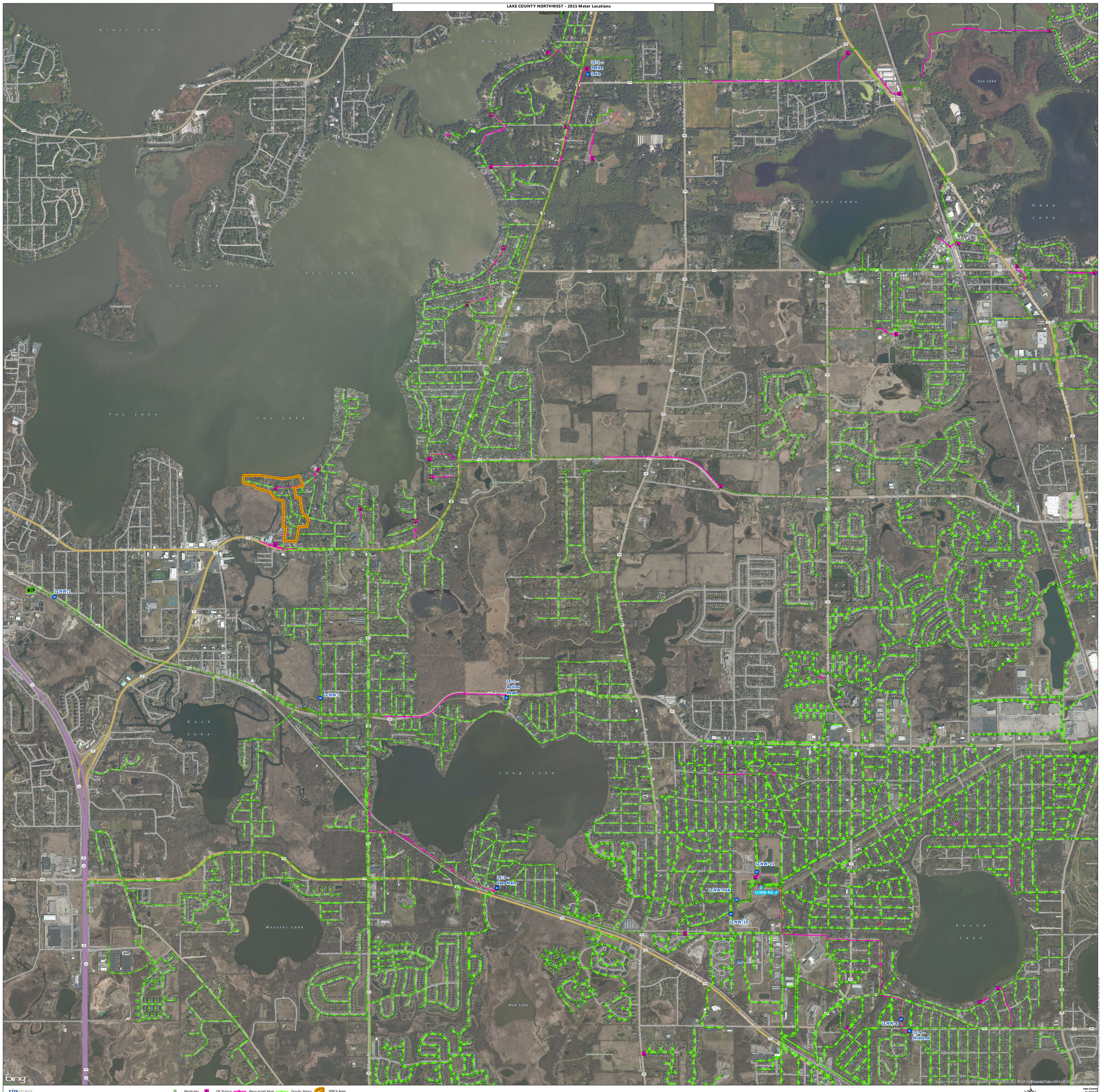
**2015 FLOW MONITORING AND SSES SERVICES**

**Summary of Engineering Services Fees**

| Task No. | Task Description | Units | Quantity | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 1001 | Flow Meter Site Investigations | EA | 3 | $800 | $2,400 |
| 1002 | Flow Meter Preparation and Installation | EA | 5 | $1,200 | $6,000 |
| 1003 | Rain Gauge Site Relocation | EA | 1 | $350 | $350 |
| 1004 | Flow Meter Calibration, Maintenance and Data Analysis (12-Months Sites) | Meter-Month | 60 | $1,000 | $60,000 |
| 1005 | Flow Meter Calibration, Maintenance and Data Analysis (9-Months Sites) | Meter-Month | 36 | $1,000 | $36,000 |
| 1006 | Lift Station - Telog Unit Calibration, Maintenance and Data Analysis | Meter-Month | 48 | $200 | $9,600 |
| 1007 | Rain Gauge Calibration, Maintenance and Data Analysis | RG-Month | 12 | $170 | $2,040 |
| 1008 | Smoke Testing | LF | 4,241 | $1.80 | $7,634 |
| 1009 | Manhole Inspection | EA | 21 | $150 | $3,150 |
| 1010 | Dye Flooding | EA | 5 | $1,000 | $5,000 |
| 1011 | SSES Report | LS | 1 | $3,000 | $3,000 |
| | | | | **TOTAL** | **$135,174** |

# LAKE COUNTY NORTHWEST - 2015 Meter Locations

Attachment A




Manholes | Lift Station | Pressurized Main | Gravity Mains | SSES Area

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Lake County
31.2727.00
2015 NW Proposed Meters
December 2014

Attachment A

Half Day Forest Preserve

Half Day Rd

Trinity Meter

LC-RG-2

LS-01

Des Plaines River Water Reclamation Facility

LZ-01

Meter
Pump Station
Manholes
Collector
Interceptor
Force Mains

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Lake County
11264001
SE Proposed Meter
December 2014