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John S. Howard
Director – FERC Hydro Compliance

November 30, 2012

Honorable Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
88 First Street, NE
Washington, DC 20426

Re: Northfield Mountain Pumped Storage Project (FERC No. 2485)
Sediment Management Plan – Report of 2012 Activities

Dear Secretary:

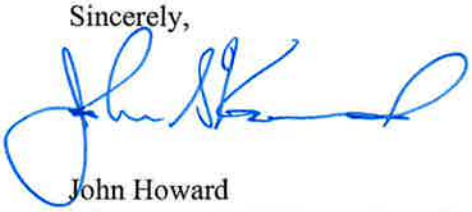
FirstLight Power Resources Services, LLC submits the enclosed report on behalf of FirstLight Hydro Generating Company (FirstLight) for the Northfield Mountain Pumped Storage Project (Project No. 2485), located along the Connecticut River near Northfield, MA.

On July 15, 2011, FirstLight filed with FERC a Sediment Management Plan (Plan) for the Project which was developed in consultation with the US Environmental Protection Agency (USEPA) and the Massachusetts Department of Environmental Protection (MADEP). The Plan contained proposed methods to assess sediment dynamics in the Project's upper reservoir and Turners Falls Impoundment (Connecticut River) from 2011 through 2014. On February 15, 2012, FirstLight filed its revised Sediment Management Plan with the Commission.

On March 28, 2012, FERC issued its Order approving the Plan. The Revised Sediment Management Plan specifies that a report summarizing sediment monitoring activities of the past calendar year be provided to the MADEP, EPA, and the Commission by December 1 of the year in which the sediment monitoring was conducted. Components of the Plan applicable to this reporting period include: 1) conducting an annual bathymetric survey in the upper reservoir, 2) collecting turbidity and TSS samples from the Project area, 3) measuring suspended sediment concentration and PSD at three locations in the Project area, and 4) reporting requirements.

Enclosed is a summary report of activities conducted under this Plan in 2012. If you have any questions or concerns, please contact me at 413-659-4489.

Sincerely,



John Howard
Director – FERC Hydro Compliance

cc: Joseph Enrico, FERC NYRO
Robert J. McCollum, MADEP Western Regional Office
Michael Fedak, USEPA Region 1
Toby Stover, USEPA Region 1
Nora Conlan, USEPA Region 1
Mark Wamser, Gomez and Sullivan Engineers
Mike Swiger, Van Ness Feldman
Adam Kahn, Foley Hoag

Attachment

Document Accession #: 20121130-5123 Filed Date: 11/30/2012

NORTHFIELD MOUNTAIN PUMPED STORAGE PROJECT

FERC NO. 2485-058

SEDIMENT MANAGEMENT PLAN – 2012 SUMMARY OF ANNUAL MONITORING

Prepared for:

FirstLight Power Resources
GDF SUEZ

Prepared by:

Gomez and Sullivan Engineers, P.C.

NOVEMBER 30, 2012

1 BACKGROUND

FirstLight Power Resources Services, LLC on behalf of FirstLight Hydro Generating Company (collectively "FirstLight") owns and operates the Northfield Mountain Pumped Storage Project (Project), a 1,192.2-MW pumped storage project constructed in 1972 along the Connecticut River near Northfield, MA. The project consists of an underground powerhouse, four reversible pump-turbine generators, an underground pressure shaft, four unit penstocks and draft tubes, and a mile-long tailrace tunnel connecting the powerhouse to a 20-mile-long reach of the Connecticut River known as the Turners Falls Impoundment, which serves as the lower reservoir. The manmade upper reservoir was formed with four earth-core rockfill embankment structures and a concrete gravity dam.

By letter dated January 20, 2011, Federal Energy Regulatory Commission (FERC, the Commission) staff requested a plan to avoid or minimize the entrainment of sediment into the Project works during reservoir maintenance drawdowns. FirstLight filed its Sediment Management Plan (the Plan) on July 15, 2011. The Plan was developed in consultation with the US Environmental Protection Agency (USEPA) and the Massachusetts Department of Environmental Protection (MADEP). The Plan contained proposed methods to assess sediment dynamics in the Project's upper reservoir and Turners Falls Impoundment (Connecticut River) from 2011 through 2014. The main components of the Plan applicable to this reporting period included conducting annual bathymetric surveys in the upper reservoir, collecting turbidity and total suspended solids data routinely from the Project area, and reporting requirements. The Plan specifies that a report summarizing the bathymetric survey and sediment monitoring data will be provided to MADEP, USEPA Region 1, and FERC by December 1 of the year in which the sediment monitoring is conducted.

FirstLight's first sediment monitoring report was submitted to MADEP, USEPA and the Commission on December 1, 2011. Based on the results of initial suspended sediment sampling efforts, FirstLight determined that technical improvements and revisions to the original plan were necessary. FirstLight proposed to continuously measure suspended sediment concentration and particle size distribution (PSD) in lieu of turbidity to provide a more accurate measure of sediment load in the river. The Commission accepted FirstLight's 2011 report by letter dated December 6, 2011 and requested that a modified plan be filed after consultation with the MADEP and the EPA.

The main components of the revised plan included: 1) conducting annual bathymetric surveys in the upper reservoir, 2) collecting turbidity and total suspended solids (TSS) data routinely from the Project area, 3) continuously measuring suspended sediment data at three locations in the Project area, and 4) reporting requirements. Per the Commission's request, a draft of the revised plan was provided to the MADEP and the EPA by letter dated December 22, 2011. MADEP provided comments by letter dated January 17, 2012 stating that FirstLight's revised plan was satisfactory and appropriately incorporated changes in response to comments earlier made by the MADEP. On February 15, 2012, FirstLight filed the revised Sediment Management Plan with the Commission.

In its letter of February 16, 2012, the EPA provided several comments relating to the revised plan. EPA made comments about the scope of the sampling and requested that FirstLight develop a Quality Assurance Project Plan (QAPP). In response, FirstLight agreed to develop a QAPP in cooperation with the EPA and proposed additional sampling in 2013 with possible changes in its plan based on the 2012

study. FirstLight provided an initial draft of the QAPP to the EPA on June 28, 2012. The EPA provided comments to FirstLight on July 31, 2012. FirstLight addressed the EPA's comments and submitted revision 1 of the QAPP to EPA on October 19, 2012. At the time of this report, revision 1 of the QAPP is going through the EPA approval process.

On March 28, 2012, FERC issued its Order Approving Revised Sedimentation Plan. The Revised Sediment Management Plan specifies that a report summarizing sediment monitoring activities of the past calendar year be provided to the MADEP, EPA, and the Commission by December 1 of the year in which the sediment monitoring was conducted. Components of the Plan applicable to this reporting period include: 1) conducting an annual bathymetric survey in the upper reservoir, 2) collecting turbidity and TSS samples from the Project area, 3) measuring suspended sediment concentration and PSD at three locations in the Project area, and 4) reporting requirements. This report provides a summary of activity for 2012.

2 BATHYMETRIC SURVEY

Ocean and Coastal Consultants, Inc. (OCC), in cooperation with SeaVision Underwater Solutions[1], conducted a bathymetric survey of the upper reservoir on September 29-30, 2012. Deliverables for the hydrographic survey included a contour plan and a sounding plan which were generated from the 2012 survey data. The purpose of the bathymetric surveys is to estimate the change in sediment volume in the reservoir intake channel from year to year.

2.1 Methods

OCC worked with SeaVision Underwater Solutions to perform a multi-beam bathymetric survey of the upper reservoir. Horizontal positioning data was collected using a Hemisphere GPS R320 Differential Global Positioning System with Real-Time Kinematic corrections transmitted from the KeyNet GPS Virtual Reference Station Network. A Teledyne Odom ES3 260 kHz multi-beam echosounder, a TSS DMS-05 Motion Reference Unit, and a ComNav G4 Heading Sensor were used to collect the data. Sound velocity corrections were made using a Valeport MiniSVS Sound Velocity Profiler to collect acoustic velocity data. All of the positioning and bathymetric data was collected and integrated using the Hypack Hysweep Software package and post-processed to the Project datum to account for water level and vessel motion. A contour plan and a sounding plan were created from this data (Appendix A).

The bathymetric data collected during the survey was imported into a geographic information system (GIS) database to create a Triangulated Irregular Network (TIN). These TINs were then used in "cut-fill" and "raster-minus" operations to determine the sediment volume change between the November 5, 2011, and September 29-30, 2012 surveys as well as the relative changes in elevation, as shown in Appendix A – Drawing 3.

2.2 Data Analysis

To estimate the total sediment volume flux within the reservoir intake channel, the 2012 survey data was compared to the 2011 survey data. A GIS was used to organize and analyze the data. The survey

[1] This same company has conducted the 2010, 2011 and 2012 bathymetric mapping surveys.

data was used to generate a contour plan for the reservoir. The contours were then used to create a TIN. A cut/fill calculation was then performed by comparing the TINs created from the 2010, 2011, and 2012 surveys, as shown in Figure 2.2.

The multi-beam system used in the 2012 survey obtained much greater swaths of sounding data than could be obtained in 2010 and 2011 using the single beam system thus resulting in a much greater resolution of the bathymetry for the 2012 survey. The increase in resolution for the 2012 survey can clearly be seen by comparing the survey images in Figure 2.2.

2.3 Summary

In general, an analysis of the entire reservoir comparing the 2012 and 2011 surveys indicates that there has not been any significant change in the survey contours since the last survey (Appendix A - Drawings 01a and 01b). As shown in Appendix A - Drawing 3, the areas of greatest relative loss or gain in sediment volume between the 2011-2012 surveys are located along the terraced sides of the intake channel (see photo below of intake channel after initial construction). We believe the volume changes between 2011 and 2012 are therefore due to greater data resolution obtained with the multi-beam survey equipment along the steep sides of the channel than from any significant loss (or gain) of material in the channel.

Comparing 2010-2011, the cut/fill analysis showed that the 2011 intake channel has approximately 239,000 cubic yards less than it did in 2010. The reduction in volume reflects the approximately 234,000 cubic yards (wet) of sediment that was removed from the intake channel in connection with the May 2010 outage.

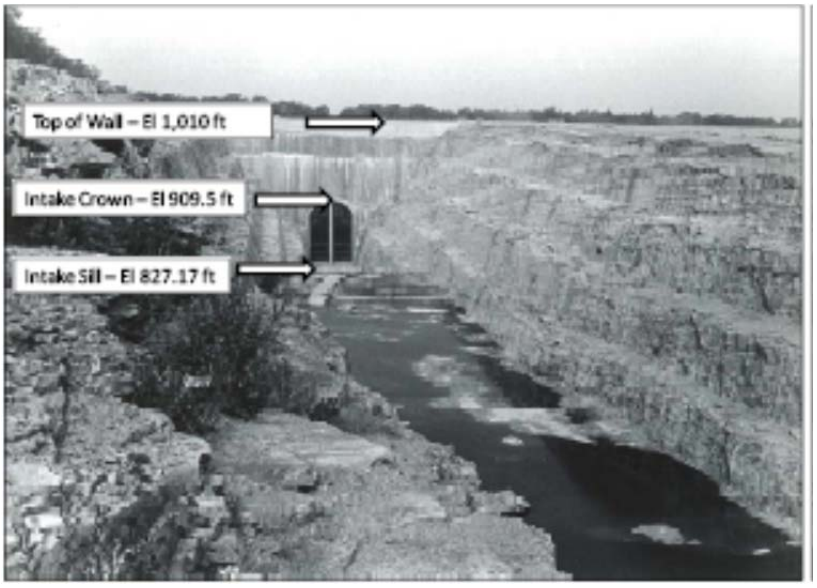


Photo of intake channel after initial construction.

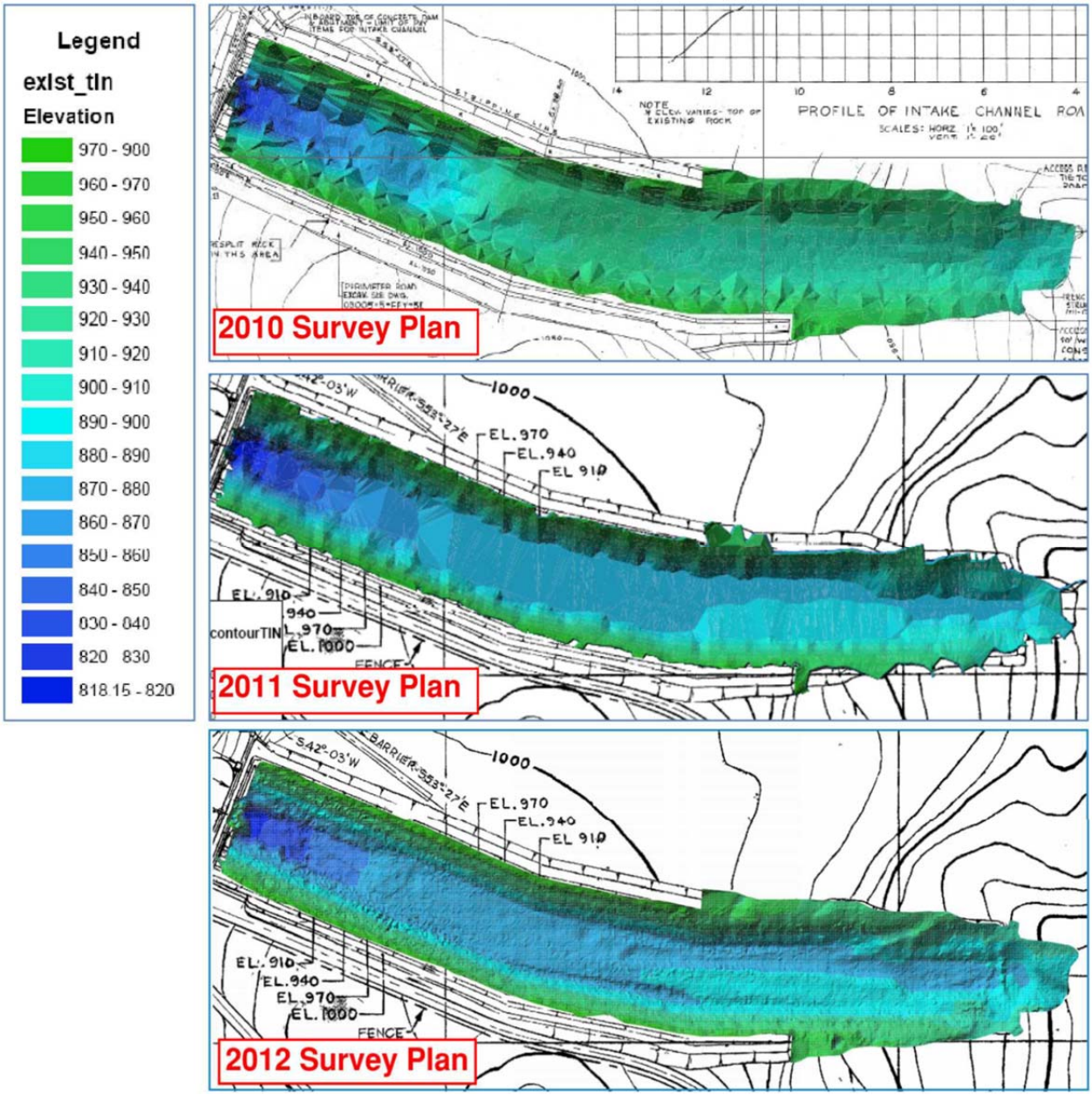


Figure 2.2 Comparison of the Upper Reservoir Intake Channel TIN surfaces from the 2010, 2011, and 2012 hydrographic surveys

3 CONTINUOUS SUSPENDED SEDIMENT MONITORING

In May-June 2012, FirstLight installed continuous suspended sediment monitors at three locations in the Project area (Figure 3.0- note that two monitors are located in the Northfield Mountain Station, but shows as one location in Figure 3.0). A LISST StreamSide instrument was installed upstream of the Route 10 Bridge in Northfield, MA to provide data on sediment transport in the Turners Falls Impoundment over a range of flows. Two LISST HYDRO instruments, LISST HYDRO North and LISST HYDRO South, were installed in the Northfield Mountain Station to monitor suspended sediment concentrations moving into and out of the upper reservoir. The HYDRO instruments were installed in-line to service water lines that tie directly into the tailrace tunnel. The tailrace tunnel contains the same water that is flowing through the reversible turbines and allows FirstLight to understand suspended sediment levels during pumping and generating cycles. The North device monitors sediment being transported through Units 1 and 2, while the South device monitors Units 3 and 4. As of the filing of this report, the StreamSide unit had been removed from the water for the field season due to freezing air temperatures. The HYDRO units are currently offline due to mechanical failures; the causes of the failures have been identified and the units are undergoing repair.

3.1 Methods

LISST StreamSide

The continuously recording sampler was installed in a secure closet on the bank of the Connecticut River upstream of the Route 10 Bridge in Northfield, MA. The sampler was connected to a pump installed at a fixed location in the Connecticut River approximately 10-15 feet offshore. Water was pumped from the Connecticut River through the instrument where detailed PSD and suspended sediment concentration were measured using laser diffraction technology. After flowing through the instrument the water was returned to the river. A water sample was not retained. Prior to each sampling event, distilled water was run through the sampler to automatically "zero" the instrument for each measurement. All data collected was stored on the instrument's hard drive until it was downloaded to a computer by field technicians.

Samples were collected at the top of every hour with the average sampling duration lasting 60 seconds. Each sample consisted of a 15 second clean water flush, 45 second intake flush (river water from the pump), and a 3 second post sample flush. Clean water background readings were taken and stored every three samples. The clean water background is a comparison of the manufacturer preset clean water reading with that of the clean water reading taken in the field. For the device to be working properly, these readings should be similar.

The instrument was serviced on a weekly schedule during which time the data was downloaded, the clean water tank was refilled, the optical cells were cleaned, the battery voltage was checked, and, if necessary, the connectors, casing, and hoses were cleaned.

LISST HYDRO

Two LISST HYDRO instruments were installed in-line to two separate 30-inch service water lines at Northfield Mountain Station. The 30-inch service water lines tie into the draft tube area which contains the same water that is flowing through the pump/turbines. The LISST Hydro North instrument was installed to monitor Units 1 and 2, while the LISST HYDRO South was installed to monitor Units 3 and

4. During pumping, the water transports sediment that is being taken into the system from the Connecticut River through the tailrace intake. During generation, the water transports sediment that is being discharged from upper reservoir back to the river. Using laser diffraction technology the suspended sediment concentration and PSD were measured at 15 minute intervals. Prior to each sampling event distilled water was run through the sampler to automatically "zero" the instrument.

The HYDRO units are connected directly to FirstLight secure servers allowing for secure data storage. The instruments are visually inspected regularly to ensure proper working order. Clean water background readings are taken and stored at regular intervals for comparison to manufacturer preset readings.

3.2 Data Results

FirstLight began setting up and testing the LISST instruments in May-June 2012. Following installation several logistical issues were identified with each device which affected the usability of the data, as described further below.

LISST StreamSide

Following installation in May several equipment problems were encountered. Initially the power supply for the pump and sampling equipment was insufficient. After troubleshooting various alternatives, solar panels were installed to ensure adequate power. Once the power supply was resolved, the StreamSide device began to shut down at random intervals. After ruling out the power supply as a recurring problem, FirstLight worked with the manufacturer to identify the cause of this issue. Based on field observations and conversations with the manufacturer it was revealed that a bad pump was causing the device to shut down. FirstLight personnel replaced the bad pump with a new one provided by the manufacturer; data collection resumed in late July. Following several weeks of data collection under this configuration it was determined through data quality evaluations that the device was still not working properly. Upon further investigation, troubleshooting, and consultation with the manufacturer it was determined that a bad hose configuration at the sampling device was the cause of the problem. The hose configuration was corrected and as of the week of September 16, 2012 data collection resumed.

Figures 3.1 through 3.6 depict the Total Concentration and Mean Particle Size of suspended sediment plotted against the Turners Falls Computed Natural Routed Flow. LISST StreamSide data depicted was continuously collected from September 21 through November 7, 2012. The Turners Falls Computed Natural Routed Flow is a calculation used to determine the amount of flow present in the Turners Falls Impoundment at a given time. The natural routed flow is derived by taking into account Connecticut River flow upstream of the Project at the Vernon, VT gage, combined with the flow of all major tributaries discharging into the impoundment. Based on the preliminary review of the data it was determined that, in general, higher levels of sediment were present in the river during high flow conditions. FirstLight will continue to examine the data in more detail including computation of suspended sediment being transported in the Turners Falls Impoundment as it relates to river conditions such as water levels and variations in flow.

LISST HYDRO

On June 1, 2012, two separate LISST HYDRO devices were installed in the Northfield Mountain Plant and were programmed with the assistance of the manufacturer. The data were initially stored on

dedicated laptop computers connected directly to each device, however, problems were encountered. After extensive troubleshooting and consultation with the manufacturer, it was determined that one device had a faulty circuit board. The data storage method compounded this issue and caused problems with the instrument operation. To remedy this situation, the HYDRO devices were disconnected from their dedicated laptops and connected directly to the Plant Historian computer system.

Once the HYDRO units were connected to the Plant Historian system several data storage issues were encountered. Following the initial review of the data it was determined that only a portion of the instrument output fields were being captured. Due to the fact that the Historian was not capturing all of the data outputted by the HYDRO devices, quality control and assessment of the sediment measurements was impossible. Following consultation with FirstLight's IT contractor, the Historian connection was corrected and the system began to capture all data outputted by the HYDRO devices as of August 2012.

Following the quality assessment of several weeks of data collected under this configuration, it was determined that the Optical Transmission values were outside the acceptable range (>1). As stated in the QAPP and recommended by the manufacturer, Optical Transmission is one of the primary quality control indicators of LISST data. Through investigation and consultation with the manufacturer it was determined that the cause of these spikes were the presence of micro-bubbles in the clean water line. The high Optical Transmission and presence of the bubbles indicated: 1) that the instrument was viewing the sample as clearer than the actual clean water or 2) that some interference (bubbles) was affecting the background measurement. High Optical Transmission values were typically present during sampling events when suspended sediment concentration and PSD were low. Sampling events when suspended sediment concentration and PSD were high did not appear to be as adversely affected.

It was the manufacturer's belief that the presence of bubbles was due to the absence of a clean water holding tank at each device. FirstLight plans to install a clean water tank at each device in December 2012.

In November both the South and North HYDRO units suffered mechanical failures and were taken offline. As of the date of this report FirstLight was working with the manufacturer to troubleshoot and repair these issues. Once all mechanical issues have been resolved it is the intention of FirstLight to reinstall the HYDRO units and resume data collection.

3.3 Summary

The logistical issues identified above have limited the usability of some of the data collected during the 2012 field season. FirstLight and its technical team are currently in the process of evaluating all LISST data collected in 2012 in conjunction with the quality control measures identified in the QAPP and recommended by the manufacturer. Based on this evaluation a determination will be made by the technical team regarding the usability and reliability of the 2012 LISST data. If the data, or portions thereof, are deemed inadequate, adjustments will be made prior to the 2013 sampling effort.

The StreamSide unit was removed from its location on November 7, 2012 due to freezing air temperatures. The North and South HYDRO units are currently offline due to mechanical failures. Following successful repair of each instrument they will be reinstalled and data collection will resume.

Figure 3.0 Continuous Suspended Sediment and TSS Sampling Locations

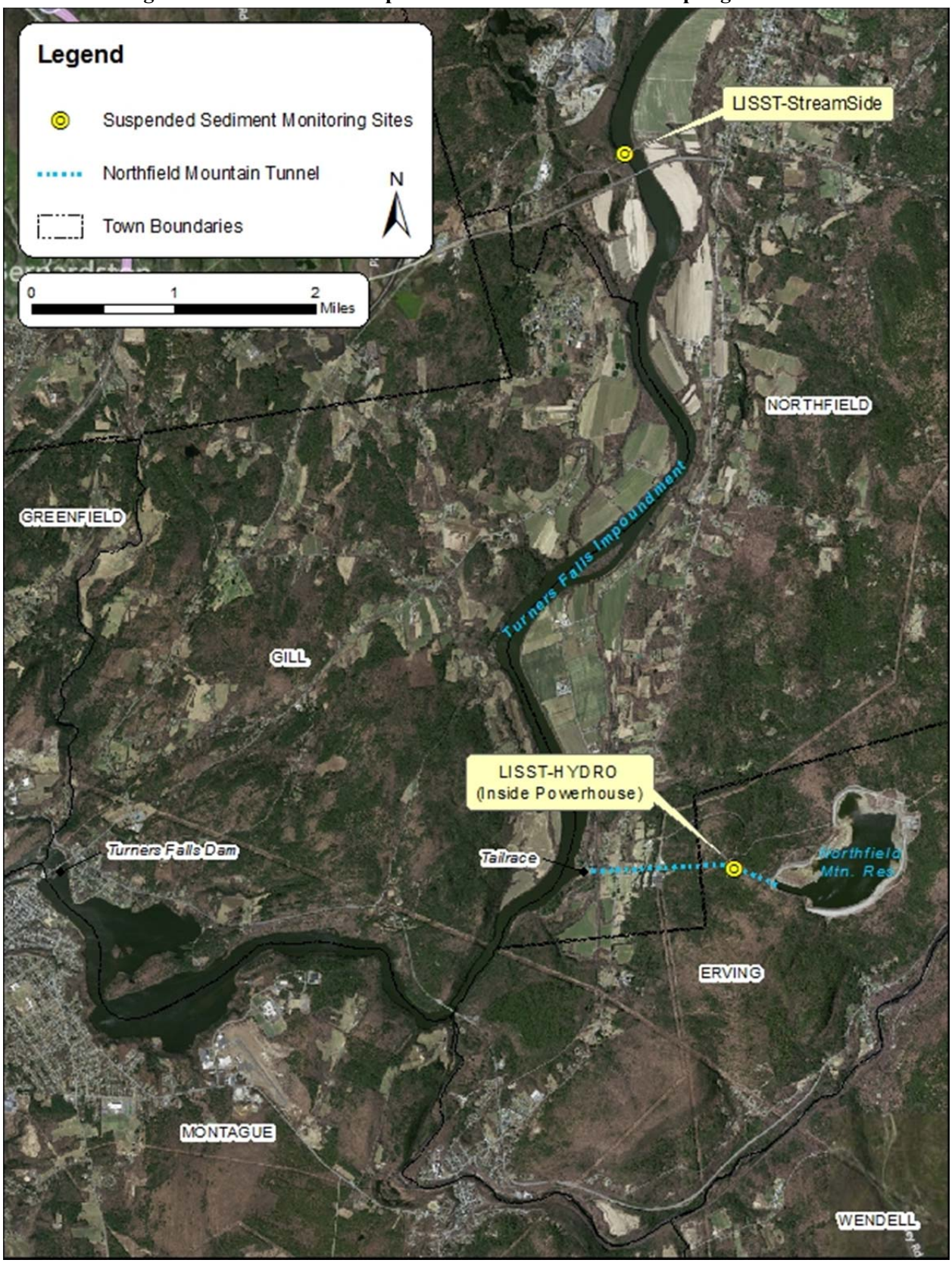


Figure 3.1 LISST StreamSide Total Concentration (ul/L) 9/21/2012 – 10/05/2012

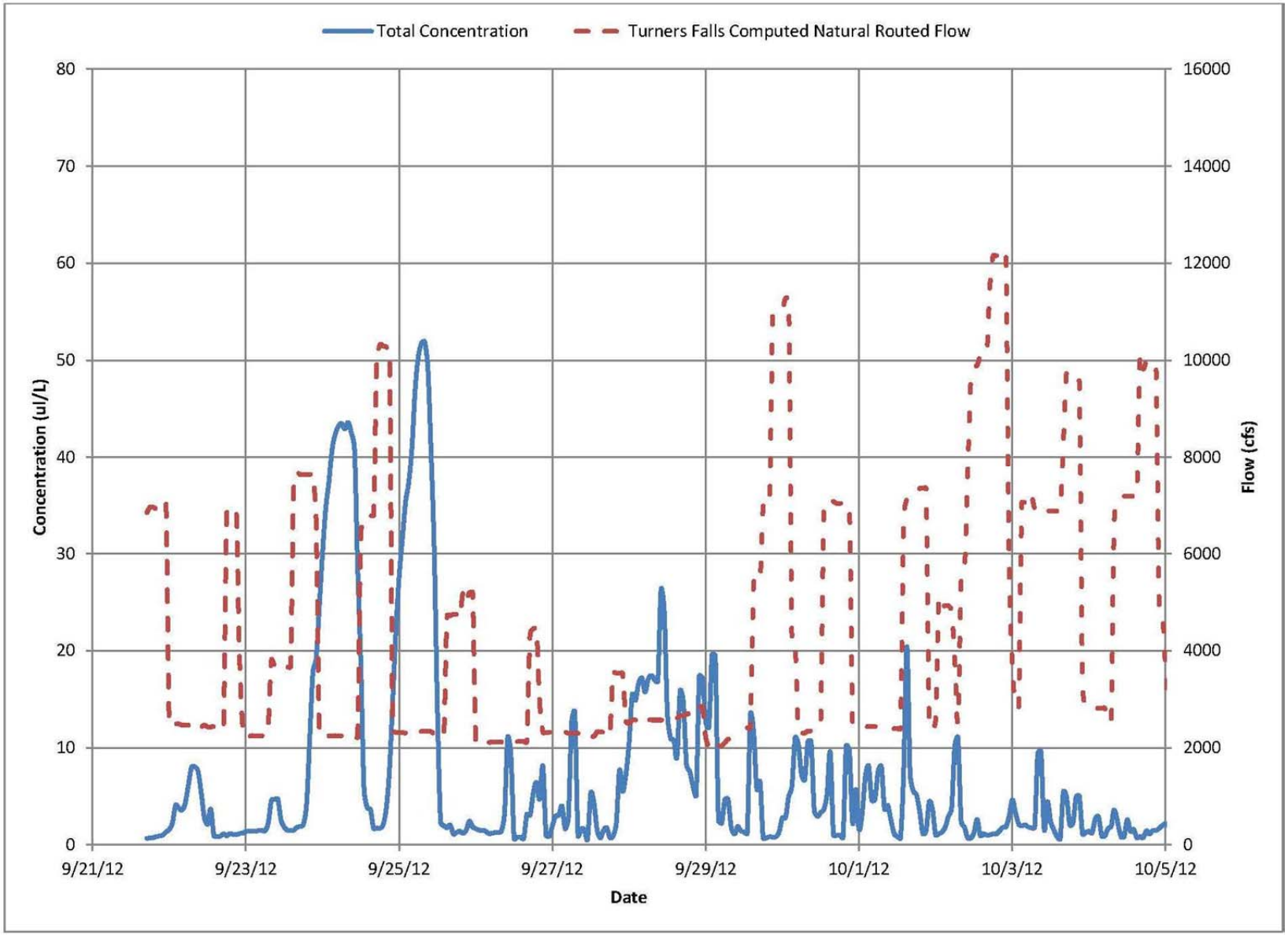


Figure 3.2 LISST StreamSide Total Concentration (ul/L) 10/06/2012 – 10/20/2012

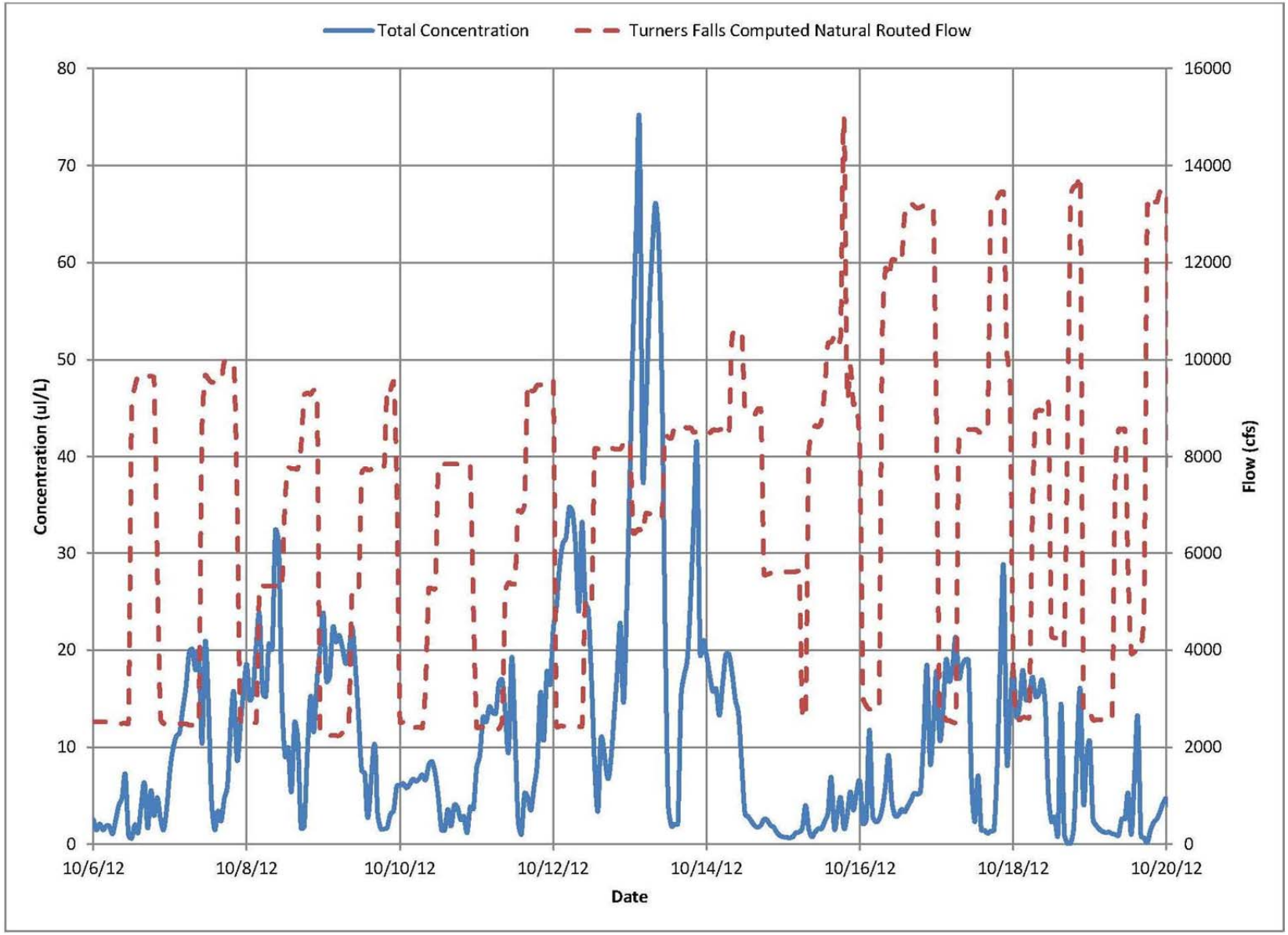


Figure 3.3 LISST StreamSide Total Concentration (ul/L) 10/21/2012 – 11/05/2012

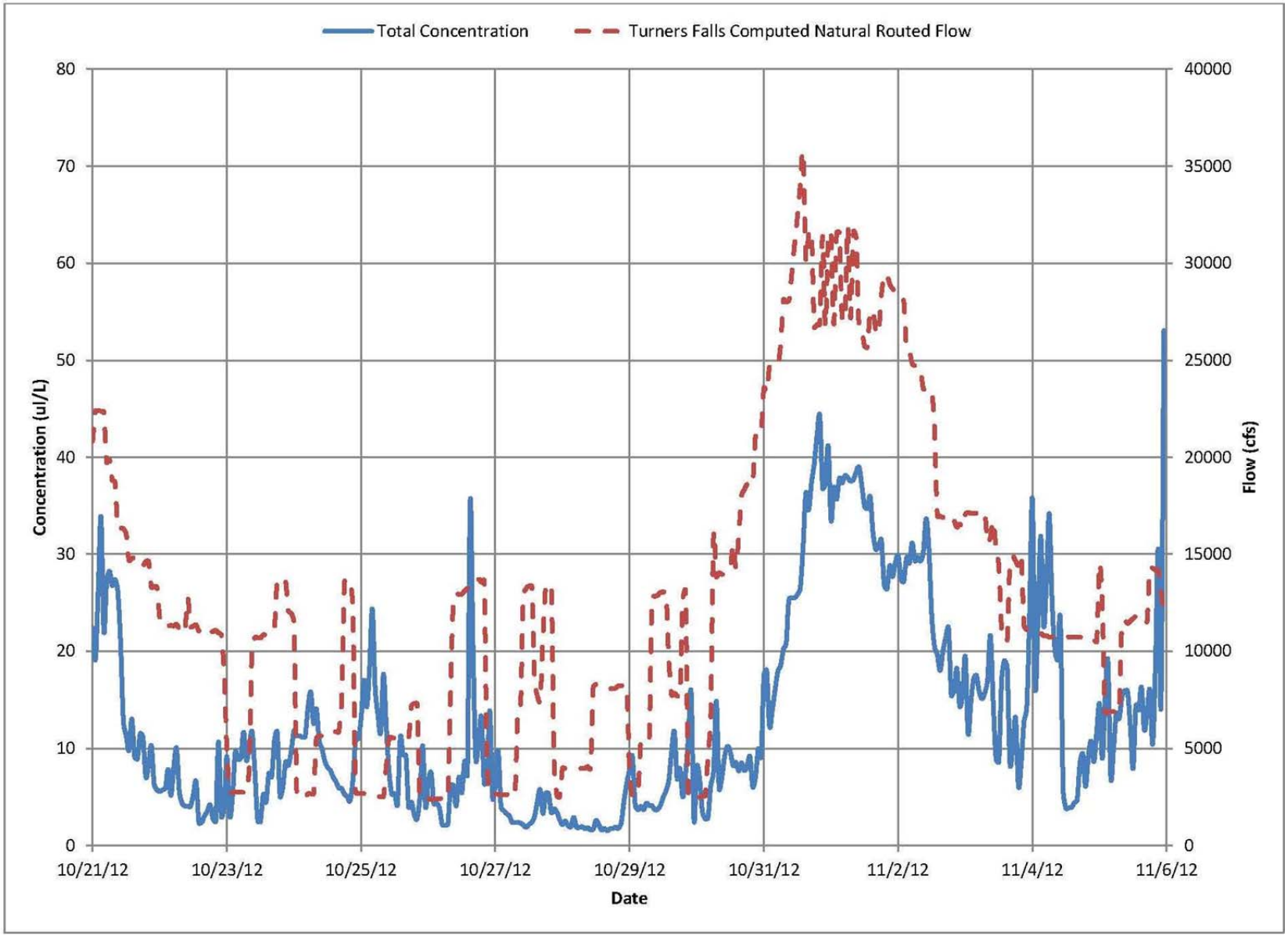


Figure 3.4 LISST StreamSide Mean Particle Size 9/21/2012 – 10/05/2012

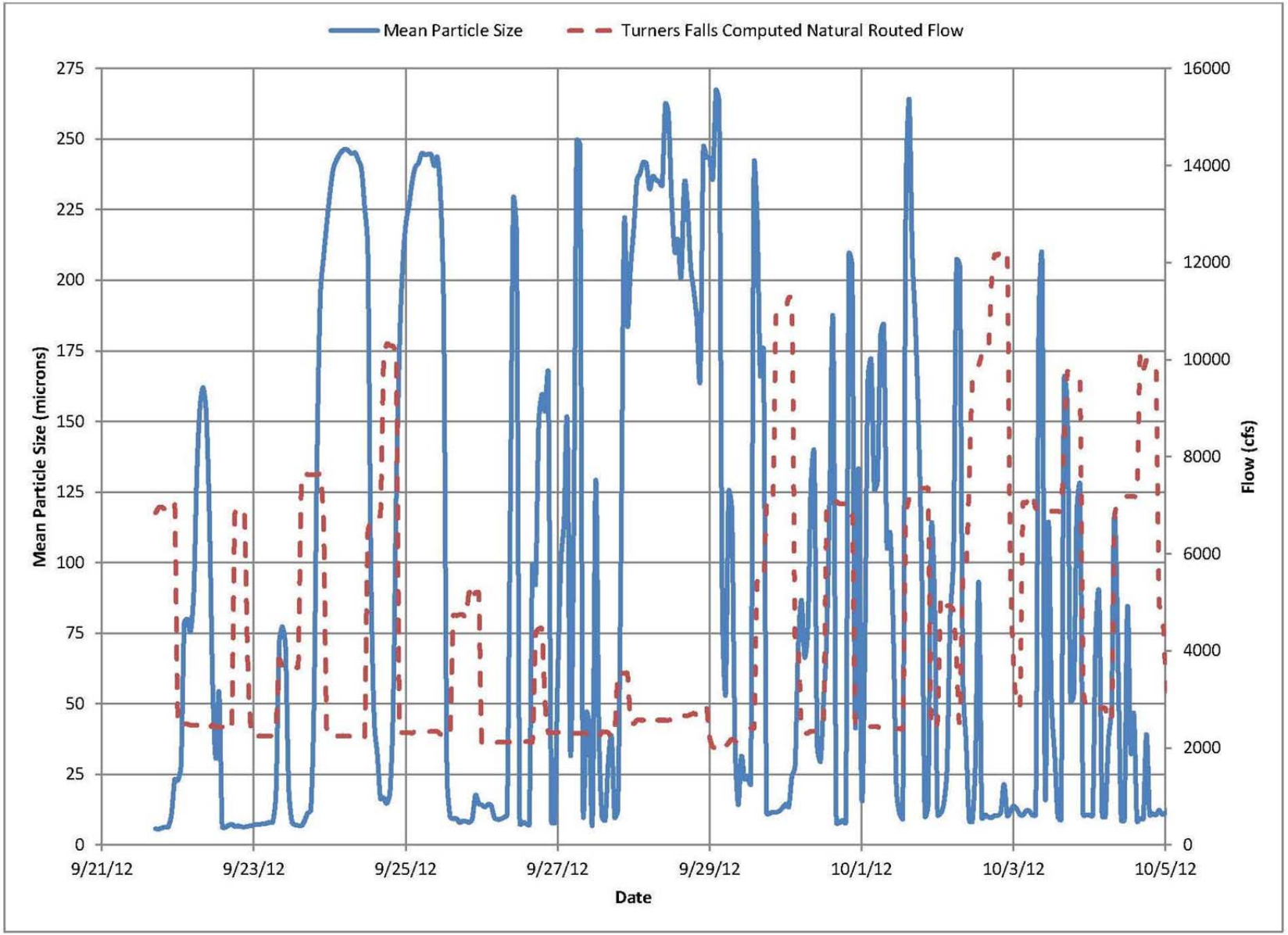


Figure 3.5 LISST StreamSide Mean Particle Size 10/06/2012 – 10/20/2012

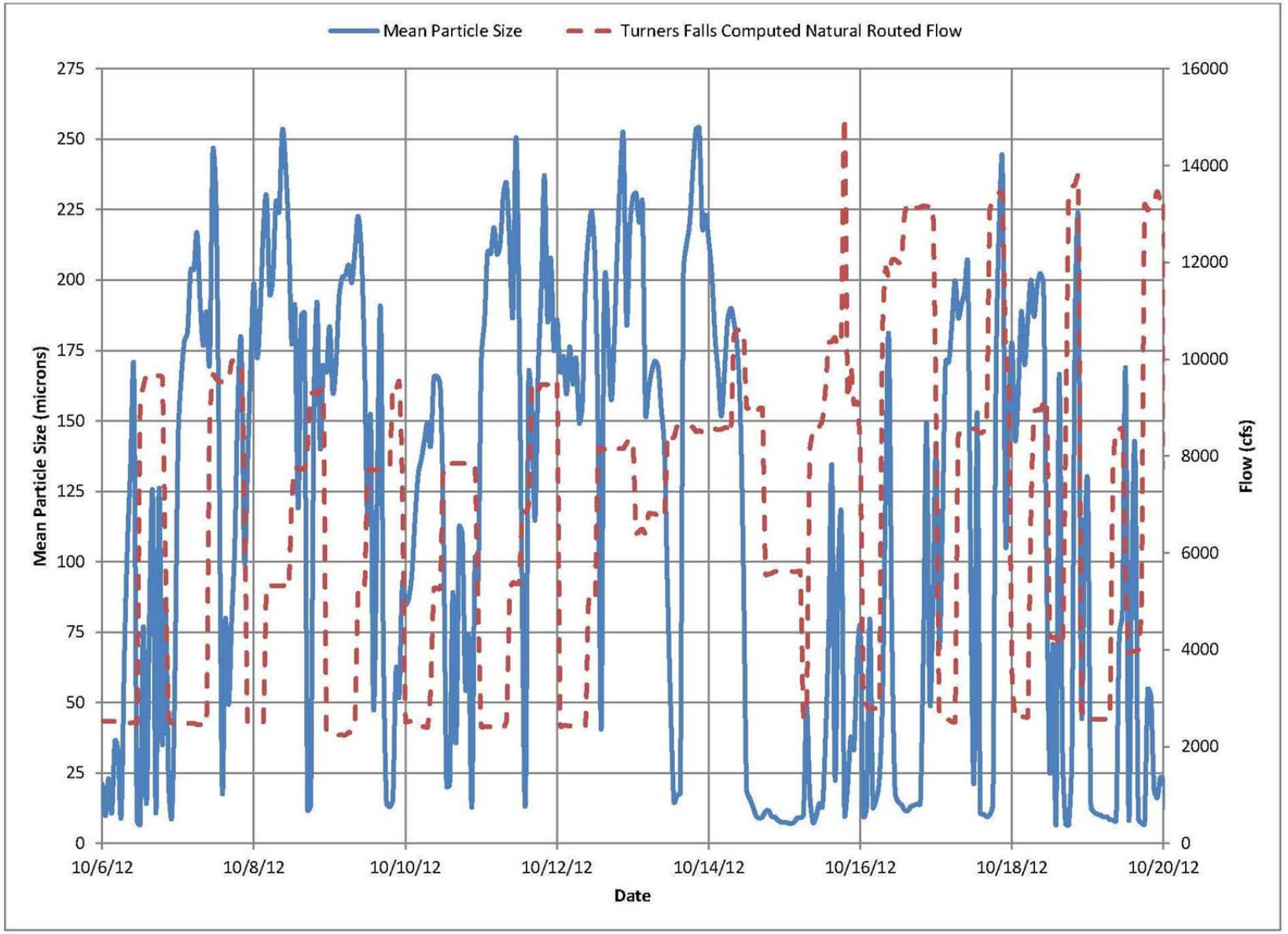
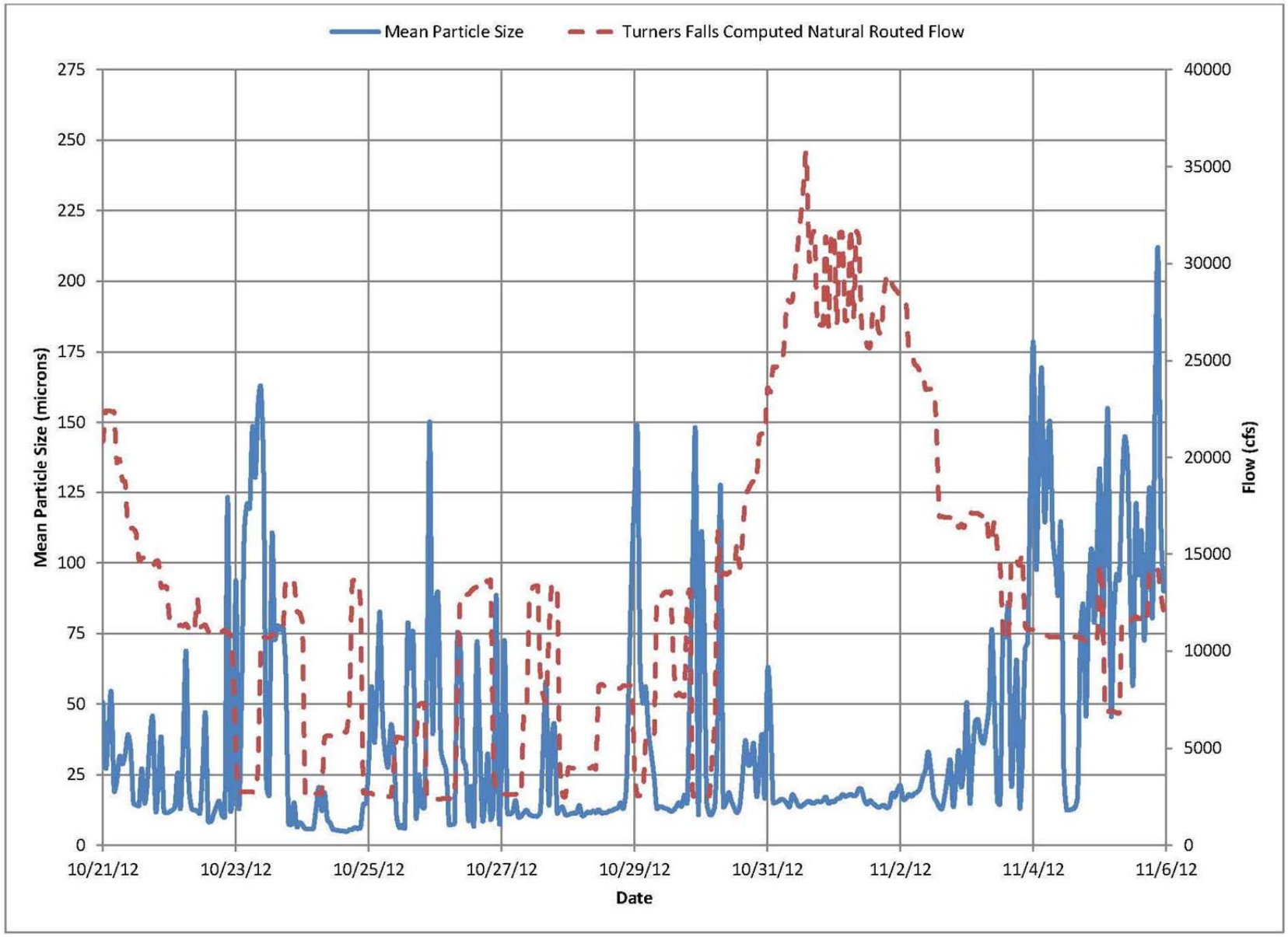


Figure 3.6 LISST StreamSide Mean Particle Size 10/21/2012 – 11/05/2012



4 TOTAL SUSPENDED SOLIDS & TURBIDITY SAMPLING

As requested by the EPA, FirstLight collected periodic TSS and turbidity samples during the 2012 sampling period. Grab samples were collected at the three continuous suspended sediment monitoring locations; these locations included: 1) adjacent to the LISST StreamSide intake, 2) the overflow hose at the LISST HYDRO North location, and 3) the overflow hose at the LISST HYDRO South location (Figure 3.0). All grab samples were analyzed by TestAmerica laboratory in Westfield, MA for TSS and turbidity.

4.1 Methods

Grab samples were collected in 1 liter sterile white polyethylene containers and were analyzed for TSS and turbidity by TestAmerica using standard method 2540D. The standard reporting limit for TSS ranged from 2.5 mg/L to 4 mg/L while the maximum holding time for all samples was 7 days. Sample containers were marked with identification labels that were matched to the identification information on the field data sheets. All samples were transported in a cooler on wet ice to TestAmerica under chain of custody.

An overview map of the sampling locations is provided in Figure 3.0; descriptions of these locations are described below:

Site	Description
• LISST StreamSide	Upstream of the Rt. 10 Bridge in Northfield, MA at the LISST StreamSide intake
• Northfield Mountain Station – North	Northfield Mountain Station, tap into service water line feeding Units 1 and 2
• Northfield Mountain Station – South	Northfield Mountain Station, tap into service water line feeding Units 3 and 4

Grab samples collected at the StreamSide location were collected approximately 6-10 feet offshore adjacent to the StreamSide intake. Samples collected at the HYDRO locations were captured from a hose exiting the service line tap.

On the days of sampling, flow conditions were recorded from USGS gaging stations at North Walpole, NH (upstream of the Project) and at Montague, MA (downstream of the Project); weather conditions were documented; and the status of the Northfield Project was noted (pumping, generating, or off-line).

4.2 Data Results

Flow conditions, Northfield operational status, and weather conditions on the sampling dates are presented in Table 4.2-1. Due to initial complications with the LISST equipment, as outlined in Section 3, TSS sampling for laboratory analysis did not commence until September 2012.

Table 4.2-1 Summary of Sampling Conditions

Date	CT River Mean Daily River Flow (cfs)		Northfield Status	Weather
	North Walpole, NH	Montague City, MA		
9/26/2012	2,280	4,410	Off-line	Sunny, clear
10/24/2012	5,420	9,940	Unit 2 Generating	Overcast, calm
10/31/2012	22,200	33,700	Unit 3 Generating	Overcast, calm. Day after Superstorm Sandy

Table 4.2-2 depicts the results of the turbidity and TSS sampling conducted at the Northfield Project locations. LISST StreamSide and HYDRO grab samples were taken September 26, October 24, and October 31. An extra sampling event was added on October 31 in anticipation of the Superstorm Sandy; although the data were captured, Sandy did not materially affect river flows and visual observations did not suggest excessive or unusual total suspended solid or turbidity levels. The StreamSide unit was removed from the field on November 7 due to freezing air temperatures. HYDRO grab samples were not collected in November due to the mechanical failure experienced at both the North and South units. Once the HYDRO units are repaired and reinstalled, monthly TSS and turbidity sampling will resume.

Table 4.2-2 2012 TSS and Turbidity Results from the Northfield Project Location

Sample Location	Date	Time	Turbidity (NTU)	TSS (mg/L)	TSS Reporting Limit (mg/L)
StreamSide	9/26/2012	8:00 AM	0.71	ND*	2.5
HYDRO – North *(offline)*	9/26/2012	8:56 AM	0.82	ND*	2.5
HYDRO – South *(offline)*	9/26/2012	8:53 AM	0.74	ND*	2.5
StreamSide	10/24/2012	8:15 AM	21	22	2.5
HYDRO – North *(generating)*	10/24/2012	9:10 AM	7.8	5.0	2.5
HYDRO – South *(offline)*	10/24/2012	9:08 AM	8.2	ND*	2.5
StreamSide	10/31/2012	9:40 AM	8.5	22	4.0
HYDRO – North *(offline)*	10/31/2012	10:45 AM	5.6	8.0	4.0
HYDRO – South *(generating)*	10/31/2012	10:40 AM	6.6	23	4.0

** ND = Not Detected at the Reporting Limit*

4.3 Summary

Grab sample collection was delayed at the start of the field season due to the LISST equipment logistical issues discussed in Section 3. Although the StreamSide unit has been removed from the field for the season, it is FirstLight's intention to operate the LISST HYDRO's, once repaired, throughout the winter.

As a result, grab samples will continue to be collected on a monthly basis at the LISST HYDRO locations.

It is FirstLight's intention to continue independent laboratory analysis of TSS on a monthly basis for sampling in 2013. Although the USGS advises that suspended sediment concentration and TSS data collected from natural waters are not comparable and should not be used interchangeably (Gray, et al., 2000), the TSS results will continue to be used as a further quality control measure to check corresponding suspended sediment concentration at various levels as measured throughout the 2013 sampling season.

5 CONCLUSIONS

Analysis of the entire reservoir comparing the 2012 and 2011 bathymetric surveys indicates that there has not been any significant change in the survey contours since the last survey (Appendix A - Drawings 01a and 01b). As shown in Appendix A - Drawing 3, the areas of greatest relative loss or gain in sediment volume between the two surveys are located along the terraced sides of the intake channel. We believe the volume changes indicated are therefore due to greater data resolution obtained with the multi-beam survey equipment along the steep sides of the channel than from any significant loss (or gain) of material in the channel.

Logistical issues encountered with the LISST equipment limited the usability of some of the data collected during the 2012 field season. Based on the preliminary review of the LISST StreamSide data, it was determined that, in general, higher levels of sediment were present in the river during high flow conditions. FirstLight will continue to examine the data in more detail including computation of suspended sediment being transported in the Turners Falls Impoundment as it relates to river conditions such as water levels and variations in flow.

FirstLight and its technical team are currently in the process of evaluating all LISST data (both StreamSide and HYDRO) collected in 2012 in conjunction with the quality control measures identified in the QAPP and recommended by the manufacturer. Based on this evaluation a determination will be made by the technical team regarding the usability and reliability of the 2012 LISST data as well as any potential modifications to the sampling program for 2013-2014.

FirstLight plans to continue sampling in 2013. The data collected by FirstLight will continue to be evaluated to support the development of potential management measures to address entrainment of sediment into the Project works during upper reservoir drawdown or dewatering activities.

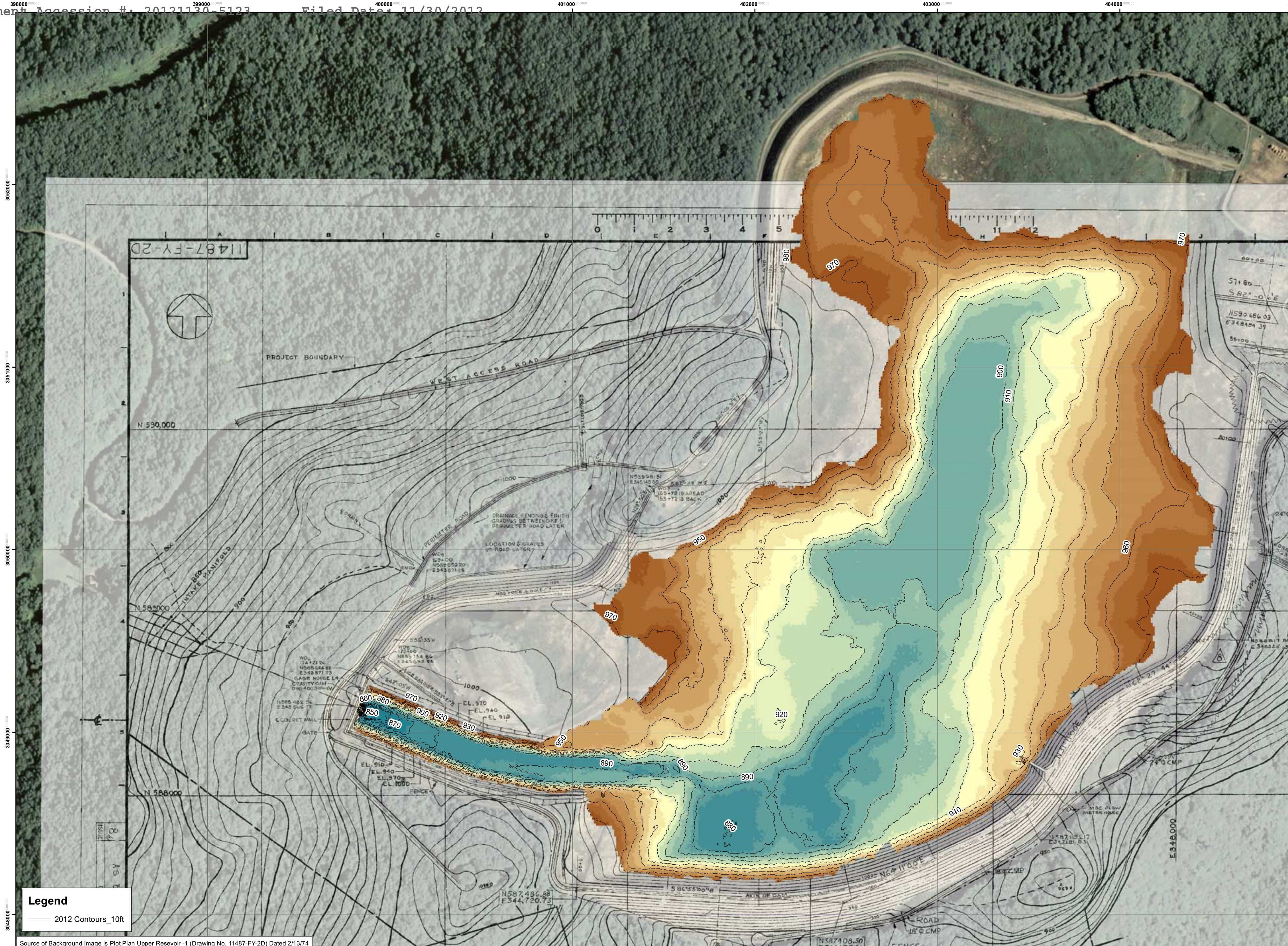
6 REFERENCES

Gray, J.R., G.D. Glysson, L.M. Turcios, and G.E. Schwarz, 2000. Comparability of Suspended-Sediment Concentration and Total Suspended Solids Data. U.S. Geological Survey Water-Resources Investigations Report 00-4191 (http://water.usgs.gov/osw/pubs/WRIR00-4191.pdf).

United States Geological Survey. 2012. USGS 01170500 Connecticut River at Montague City, MA. Available from: http://waterdata.usgs.gov/nwis/nwisman/?site_no=01170500

United States Geological Survey. 2012. USGS 01154500 Connecticut River at North Walpole, NH. Available from: http://waterdata.usgs.gov/nwis/nwisman/?site_no=01154500

APPENDIX A – BATHYMETRIC SURVEY DRAWINGS



Source of Background Image is Plot Plan Upper Resevoir -1 (Drawing No. 11487-FY-2D) Dated 2/13/74

SEAVISION UNDERWATER SOLUTIONS

1. The bathymetry depicted on these digital products represents the results of a survey performed by SeaVision Underwater Solutions, Inc. on September 29-30, 2012 and can only be considered to indicate the general conditions existing at that time.

2. The multibeam bathymetry data was collected using a HemisphereGPS R320 Differential Global Positioning System with Real-Time Kinematic corrections transmitted from the KeyNet GPS Virtual Reference Station Network. SeaVision utilized a Teledyne Odom ES3 260 kHz multibeam echosounder, a TSS DMS-05 Motion Reference Unit, and a ComNav G4 Heading Sensor to collect the data. For sound velocity corrections, we utilized a Valeport MiniSVS Sound Velocity Profiler to collect acoustic velocity data. All data was collected and integrated using the Hypack Hysweep Software package and post-processed to the project datums to account for water level and vessel motion.

3. Horizontal positioning is expressed in feet and references the North American Datum of 1983, Massachusetts-Mainland Zone State Plane (Feet). Vertical elevations are in feet and reference the site datum, equivalent to the National Geodetic Vertical Datum of 1929.

4. Water level observations were performed in real-time using the RTK-GPS Receiver, and checked against observations from the GDF-Suez/FirstLight Power control room at Northfield Mountain.

DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY

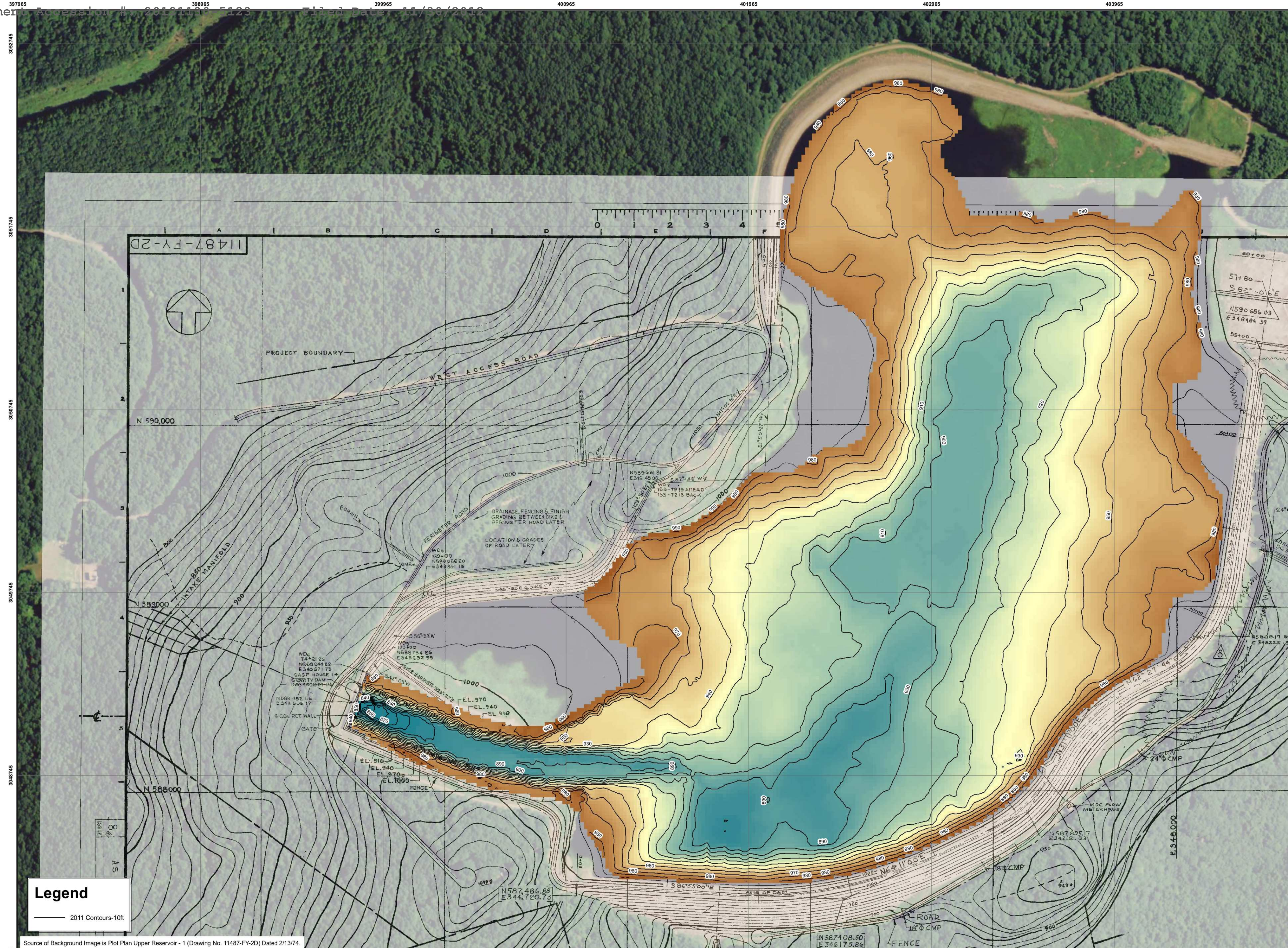
OCEAN AND COASTAL CONSULTANTS
a COWI company

Ocean and Coastal Consultants, Inc.
475 School Street, Unit 9
Marshfield, MA 02050
Tel: (508) 830-1110
Fax: (781) 834-4635

FirstLight Power Resources
GDF SUEZ

FirstLight Power
99 Millers Falls Road
Northfield, MA 01360

DESIGNED BY: RYAR	NORTHFIELD STATION RESERVOIR, NORTHFIELD, MA HYDROGRAPHIC SURVEY	SCALE 1:3,000	REVISION 0
DRAWN BY: RYAR		DATE 9-30-2012	
CHECKED BY: BRJO	OVERALL SURVEY - 2012 CONTOUR PLAN	DRAWING NO. 1a	
209080.3			



Legend

2011 Contours-10ft

Source of Background Image is Plot Plan Upper Reservoir - 1 (Drawing No. 11487-FY-2D) Dated 2/13/74.

SEAVISION UNDERWATER SOLUTIONS

1. The hydrographic survey information depicted on this drawing represents a survey performed by SeaVision Underwater Solutions on November 5, 2011 and can only be considered to indicate the general condition existing at that time.

2. The hydrographic survey data was collected using a Trimble 5700 Differential Global Positioning System and a Knudsen 3212 (200 kHz) Echosounder. Horizontal and vertical positioning corrections were provided by using the KeyNet GPS Subscription Virtual Reference Station Real-Time Kinematic (RTK) GPS system. Bar check sound velocity calibrations were performed using an Innerspace 443a Digital Sound Velocity Profiler.

3. Horizontal positioning is expressed in feet and references the North American Datum of 1983, Massachusetts (Mainland) State Plane (Feet).

4. Elevations are expressed in feet (subscripts are tenths) and reference elevations relative to the Site Datum. Site Datum is assumed to have an elevation of +0.398 feet relative to the North American Vertical Datum of 1988 (NAVD 1988) based on a comparison of Site Benchmark CP-9 to observations made with a Trimble 4000 SSi and processed with the NGS OPUS system.

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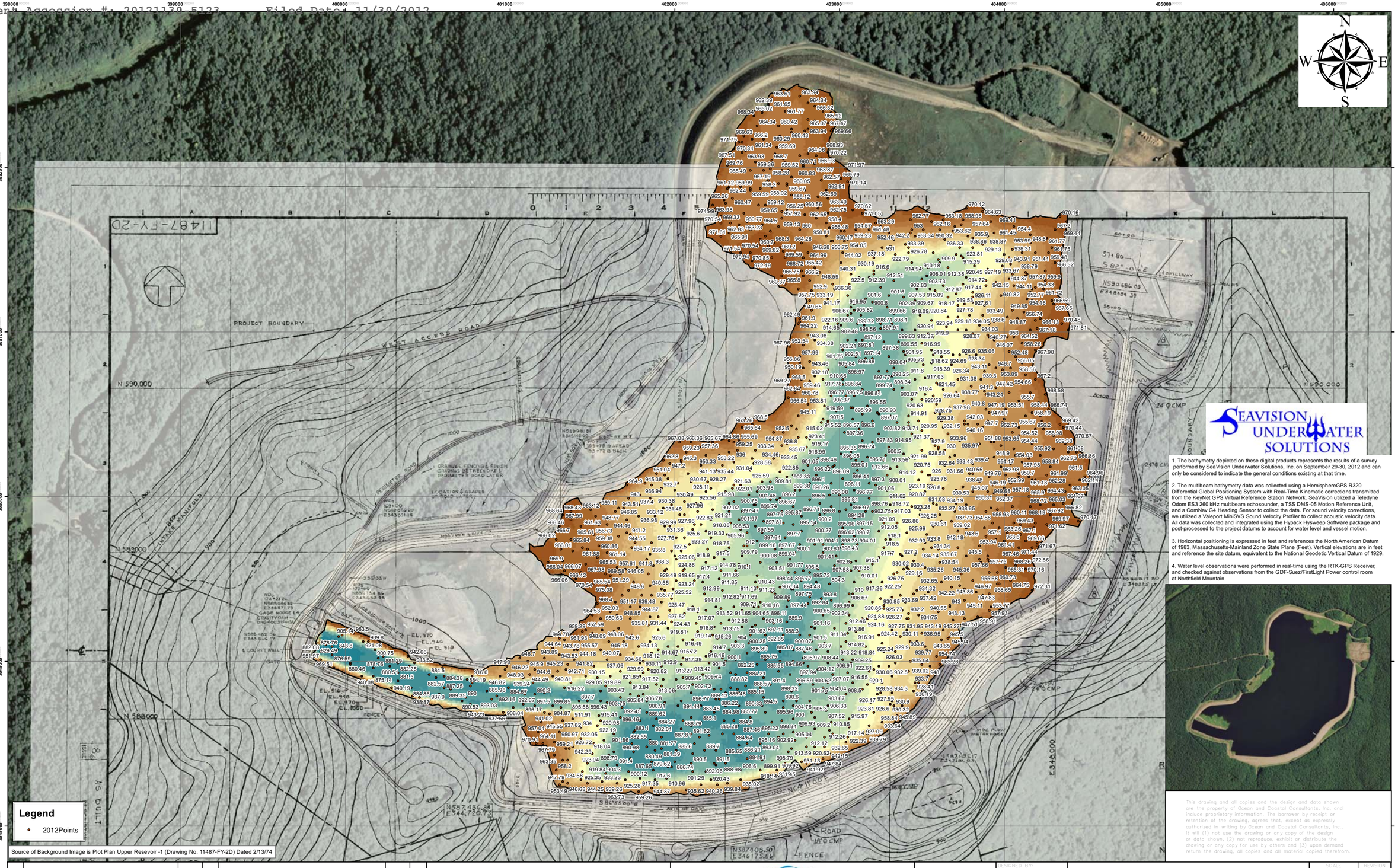
DESIGNED BY: FDGO
DRAWN BY: FDGO
CHECKED BY: BRJO
209080.3

NORTHFIELD STATION RESERVOIR, NORTHFIELD, MA
HYDROGRAPHIC SURVEY

2011
OVERALL SURVEY - CONTOUR PLAN

SCALE: 1:3000
DATE: 11/14/11
REVISION: 0
DRAWING NO. 1b



SEAVISION UNDERWATER SOLUTIONS

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4. Water level observations were performed in real-time using the RTK-GPS Receiver, and checked against observations from the GDF-Suez/FirstLight Power control room at Northfield Mountain.

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DESIGNED BY:	RYAR
DRAWN BY:	RYAR
CHECKED BY:	BRJO
	209080.3

NORTHFIELD STATION RESERVOIR, NORTHFIELD, MA
HYDROGRAPHIC SURVEY

OVERALL SURVEY - 2012 SOUNDING PLAN

SCALE	REVISION
1:5,000	0
DATE	
9-30-2012	
DRAWING NO.	
2	

398000 399000 400000 401000 402000 403000 404000 405000 406000

3052000 3051000 3050000 3049000 3048000

N E S W

11487-FY-2D

PROJECT BOUNDARY

WEST ACCESS ROAD

PERIMETER ROAD

INTAKE MANIFOLD

SPILLWAY

24" CMP

74" CMP

18" CMP

ACCESS ROAD

FENCE

N 590,000

N 588,000

E 348,000

N587,486.88
E344,720.73

N587,408.30
E346,175.86

N590,686.03
E348,484.39

N587,095.17
E347,181.83

Legend

ras_12min11

Elev. Change

- greater than 10' accretion
- 8' to 10' accretion
- 6' to 8' accretion
- 4' to 6' accretion
- 2' to 4' accretion
- 0' to 2' accretion
- 0' to 2' erosion
- 2' to 4' erosion
- 4' to 6' erosion
- 6' to 8' erosion
- 8' to 10' erosion
- greater than 10' erosion

Source of Background Image is Plot Plan Upper Resevoir -1 (Drawing No. 11487-FY-2D) Dated 2/13/74

SEAVISION UNDERWATER SOLUTIONS

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Northfield, MA 01360

DESIGNED BY: RYAR
DRAWN BY: RYAR
CHECKED BY: BRJO
209080.3

NORTHFIELD STATION RESERVOIR, NORTHFIELD, MA
HYDROGRAPHIC SURVEY

OVERALL SURVEY - 2011-2012 ELEVATION CHANGE

SCALE: 1:3,000
REVISION: 0
DATE: 9-30-2012
DRAWING NO.: 3

Document Accession #: 20121130-5123 **Filed Date: 11/30/2012**

Document Content(s)