State-Licensed Disposal Area at West Valley: 2017 Annual Report

Final Report - March 2018

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Mission Statement:

Advance innovative energy solutions in ways that improve New York's economy and environment.

Vision Statement:

Serve as a catalyst – advancing energy innovation, technology, and investment; transforming New York's economy; and empowering people to choose clean and efficient energy as part of their everyday lives.

State-Licensed Disposal Area at West Valley:

2017 Final Report

Prepared by:

New York State Energy Research and Development Authority

West Valley, NY

March 2018

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Acronyms and Abbreviations

AMSL	Above Mean Sea Level
BGS	Below Ground Surface
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
Consent Order	Administrative Order on Consent
DEC	New York State Department of Environmental Conservation
EPA	United States Environmental Protection Agency
ft	Feet
GMP	Groundwater Monitoring Plan for the State-Licensed Disposal Area (SDA) at West Valley
LiDAR	Light Detection and Ranging
LMP	Leachate Monitoring Plan for the State-Licensed Disposal Area (SDA) at West Valley
MDC	Minimum Detectable Concentration
mg/L	Milligrams per Liter
mR/Qtr	Milliroentgens per Quarter
NAD	North American Datum
NAVD	North American Vertical Datum
NGVD	National Geodetic Vertical Datum
NDA	Nuclear Regulatory Commission-Licensed Disposal Area
NTU	Nephelometric Turbidity Unit
NYCRR	New York State Codes, Rules, and Regulations
NYSERDA	New York State Energy Research and Development Authority
RCRA	Resource Conservation and Recovery Act
S.U.	Standard Unit
SDA	State-Licensed Radioactive Waste Disposal Area
SPDES	State Pollution Discharge Elimination System
TLD	Thermoluminescent Dosimeter
TSS	Total Suspended Solids
µCi/mL	Microcuries per Milliliter
µmhos/cm	Micromhos per Centimeter
µrem/hr	Microrem/hour
UPL	Upper Predictive Limit
UTL	Upper Tolerance Limit
VLDPE	Very-Low Density Polyethylene
VOC	Volatile Organic Compound
WP-91	Well Point-91
WNYNSC	Western New York Nuclear Service Center
WVDP	West Valley Demonstration Project
WVSMP	West Valley Site Management Program
XR-5	Ethylene Interpolymer Alloy Geomembrane

Summary

S.1 2017 PERFORMANCE

The New York State Energy Research and Development Authority (NYSERDA) maintains and monitors the State-Licensed Radioactive Waste Disposal Area (SDA) to protect public health, safety, and the environment. This report summarizes the results of environmental monitoring, erosion monitoring, facility operations and maintenance, and waste management activities conducted during calendar year 2017 at the SDA, which is located at the Western New York Nuclear Service Center (WNYNSC).

In 2017, NYSERDA safely, successfully, and in full compliance with our permits and licenses completed several priority field sampling activities, including:

- Removal of 24 obsolete penetrations from the SDA trenches, thereby reducing the number of locations where precipitation could infiltrate into the trenches.
- Removal of the former leachate transfer pipe from the western fenceline of the SDA, reducing the potential for residual soil contamination along the fenceline.
- Removal of one of the Stormwater Outfall locations (W03), improving the efficiency of SDA stormwater management.
- Installation of a new geomembrane cover on Trenches 1 through 12, including improvements to the stormwater detention areas, regrading and reducing the stress potential for ponding water on the new cover, and installing weighted ballasts to limit potential damage from wind. In 2018, NYSERDA will update the topographic surveys and drawings with these changes to the geomembrane cover and stormwater detention areas.
- Completed sampling of the leachate from Trenches 1 through 5, Trenches 8 through 14 (Well Point-91 [WP-91]), thereby providing NYSERDA with current radiological and chemical information for the trenches, as the previous sampling activities were completed over 25 years ago.

The 2017 environmental monitoring data (from groundwater, surface water, stormwater, and gamma radiation measurements) indicate radioactive and/or chemical constituents in the SDA trenches are being effectively contained. In addition, inspections indicate that the SDA trench cap subsidence remains fairly stable, with additional mitigation planned for areas of Trench 13 and 14.

The subsurface barrier wall along the western side of the southern trenches and the geomembrane cover are generally effective at keeping water out of the SDA trenches, although the slight increase in Trench 14 continues to be evaluated.

NYSERDA's monitoring data and the ongoing evaluations show that the current leachate levels in the SDA trenches are not a public health and safety concern.

The erosion control measures are keeping the slopes surrounding the SDA stable, and the West Valley Site Management Program's (WVSMP) operations and maintenance actions continue to keep the SDA systems functioning properly, and the grounds in good condition.

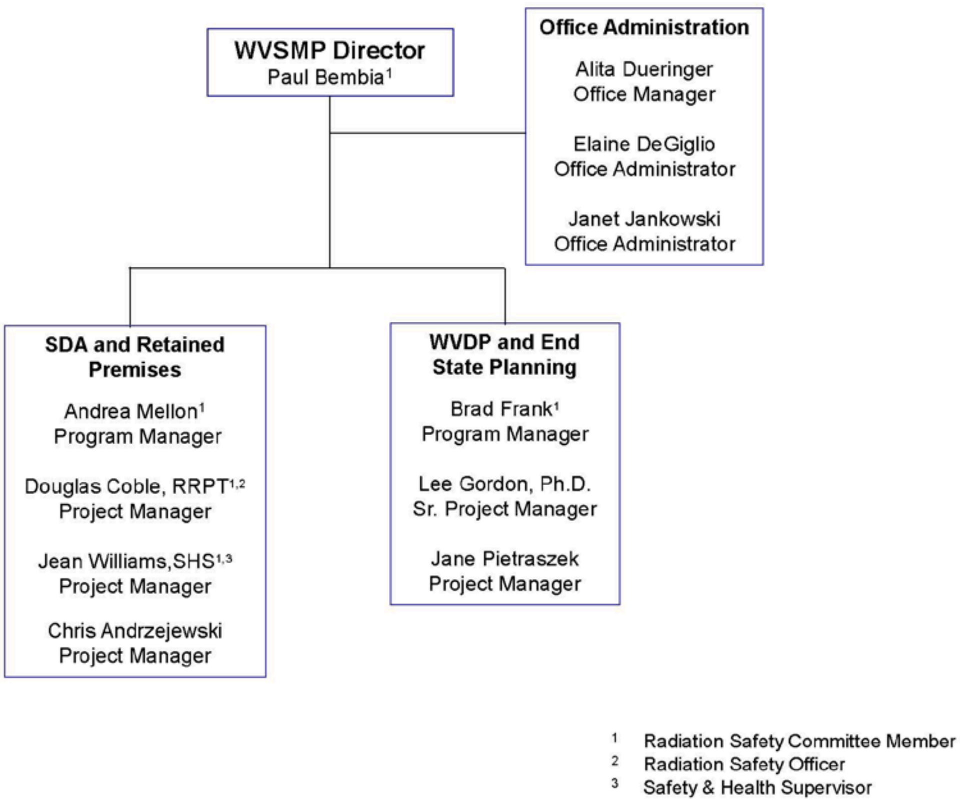
This report is prepared in accordance with the New York State Department of Environmental Conservation (DEC) radiation control regulations and the SDA radiation control program. Annual reporting requirements are specified in:

- Title 6 of the Official Compilation of Codes, Rules, and Regulations of the State of New York (6 NYCRR) Part 380, Rules and Regulations for the Prevention and Control of Environmental Pollution by Radioactive Materials, February 2, 2002.
- NYSDEC Radiation Control Program #137-6, Permit No. 9-0422-00011/00011, March 13, 2015.

Part 380 permit inspections were conducted on June 27 and 28, 2017, and on November 9, 2017. The inspections included records review, visual walkover inspection of the facility and surrounding slopes and streams, and surface water and soil sample collection. The inspections demonstrated that NYSERDA is managing the SDA in compliance with the Part 380 regulations and the conditions of the permit.

S.2 West Valley Site Management Program

NYSERDA's WVSMP is responsible for the monitoring and maintenance, and the protection of public health, safety, and the environment at the WNYNSC. The WVSMP is comprised of 11 professionals with diverse talents and expertise. The mission of the WVSMP is to be responsible stewards of the WNYNSC, including the SDA, by using objective analysis, and soliciting multiple perspectives to identify, assess, and implement effective, enduring approaches to protect the environment, and the well-being of our workers and neighbors.



1 SDA Description

The SDA occupies approximately 15 acres of the WNYNSC (Figure 1-1) immediately adjacent to the West Valley Demonstration Project (WVDP). The SDA consists of three filled lagoons and two sets of parallel trenches that contain radioactive waste: 1 through 7 in the northern area and 8 through 14 in the southern area (see Figure 1-2). The SDA is surrounded by an eight-foot-high, chain-link fence. NYSERDA controls access to the SDA by limiting the issuance of keys to the seven, locked SDA gates. In addition, a contracted security service conducts routine patrols of the SDA's perimeter.

Between 1963 and 1975, Nuclear Fuel Services, Inc. (the SDA operator at that time), placed approximately 2.4 million cubic feet (ft) of radioactive waste in trenches constructed in the native silty-clay soil. These trenches are 450 to 650 ft in length and are approximately 20 ft deep. Trench cross-sections are trapezoidal in shape, with a top width of 35 ft and a bottom-floor width of 20 ft. During construction, the trench floors were sloped along their length to allow water to drain to a low point where a trench sump was located. A vertical pipe, which extends from above the trench cap to each sump, provides a way to routinely monitor trench water elevations. The sump pipe also serves as a conduit through which water can be sampled or removed from the trenches. Each trench is covered with an eight- to 10-ft-thick mounded cap of compacted clay, and a drainage swale is located between adjacent trenches to direct precipitation away from the trenches.

Differing in both physical form and construction from other trenches, Trenches 6 and 7 were built to hold high-activity wastes that required immediate shielding. Trench 6 is a series of individual holes in which waste was placed, while Trench 7 is a narrow, shallow trench where waste containers were placed and encased in concrete. A sump was not installed in either of these two trenches.

Efforts to minimize erosion of the clay caps and infiltration of water into the trenches began in the late 1970s and early 1980s. These efforts included rolling and reseeding the trench caps as well as several larger-scale regrading, recapping, and water infiltration controls projects. Rising water elevations in Trenches 13 and 14 led NYSERDA to investigate additional water management measures; and, in 1990, NYSERDA began implementing several projects aimed at reducing water accumulation in the SDA trenches.

Figure 1-1. Map of the WNYNSC

Source: NYSERDA

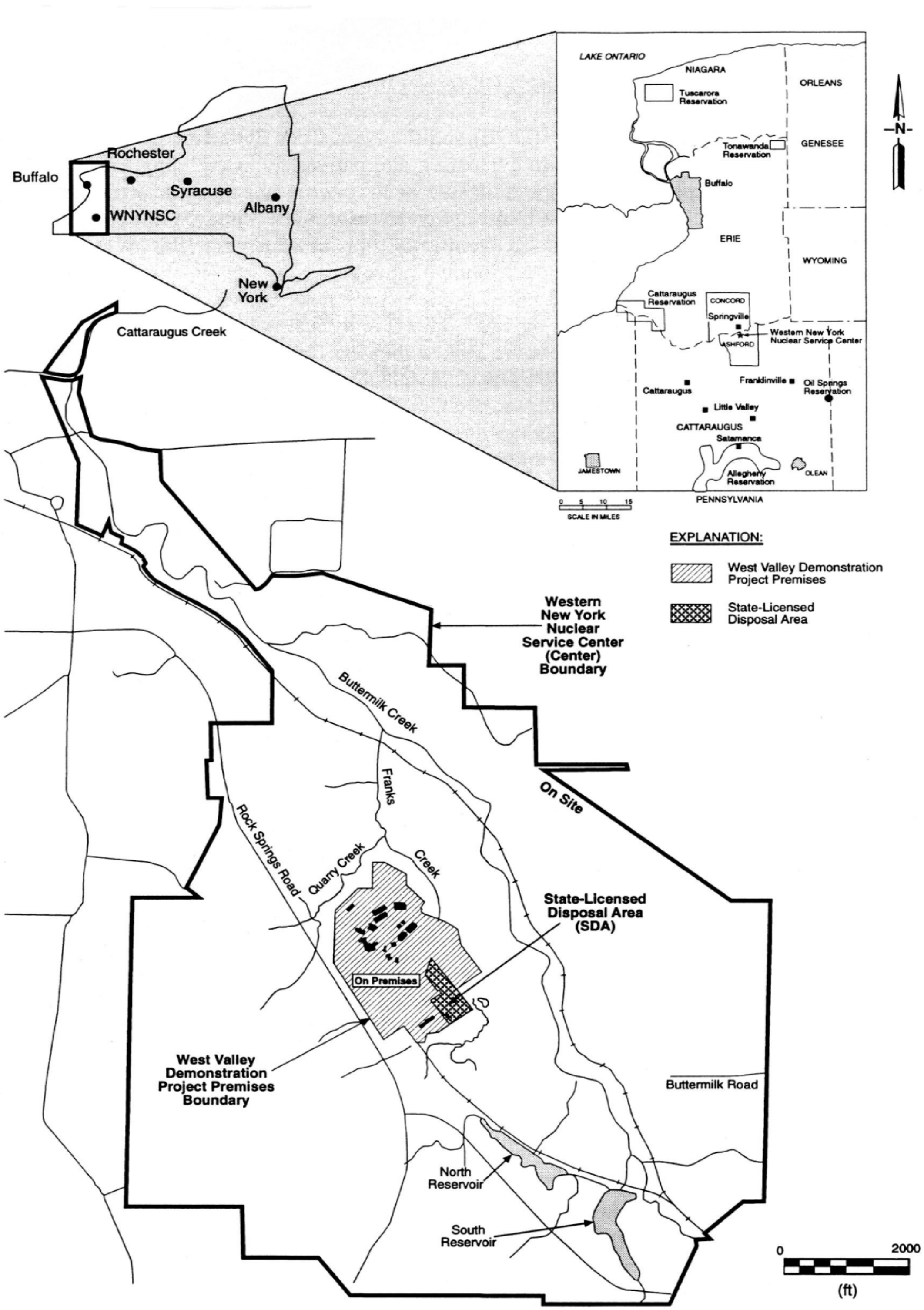


Figure 1-2. Aerial Photograph of the SDA

Source: NYSERDA

1.1 Leachate Management

Between 1990 and 1991, NYSERDA installed three tanks in two adjoining buildings at the SDA. In 1991, 8,000 gallons of leachate were pumped from Trench 14 into a 9,200-gallon fiberglass tank, located in the smaller of the two buildings. In 2009, the 8,000 gallons of leachate were removed from the fiberglass tank, placed in U.S. Department of Transportation-approved shipping containers, and shipped to a licensed and permitted treatment and disposal facility. The empty tank was removed in 2010 and shipped to a licensed facility for off-site disposal.

On December 29, 2011, NYSERDA received certification of clean closure from DEC when the portion of the Leachate Treatment Facility (SDA Solid Waste Management Unit No. 5) that stored mixed waste (i.e., leachate and Tank T-1) was removed, shipped and treated, and the facility was sampled for confirmation that it was free of hazardous waste. Subsequently, on April 24, 2012, DEC approved NYSERDA's Protective Filer Certification for the unused portion of the Leachate Treatment Facility (two Frac tanks). NYSERDA has no further closure actions to complete with the combined clean-closure certification and approval of protective filing status, and is currently awaiting an amendment of the operational status of this unit to "no further action."

1.2 Trench Water Infiltration Controls

In September 1992, NYSERDA installed a soil-bentonite subsurface barrier wall along the western side of Trench 14 to prevent groundwater flow toward the south trenches (eight through 14). In June 1993, the project was completed with the installation of a very low-density polyethylene (VLDPE) geomembrane cover over the surface of the trenches, extending from the centerline of Trench 12; across Trenches 13, 14, and the barrier wall; and terminating in a stormwater drainage swale excavated just beyond the barrier wall. Slit-trench monitoring wells were also installed on either side of the barrier wall to monitor for possible groundwater mounding upgradient of the wall. This project was conducted as an interim measure under the Resource Conservation and Recovery Act (RCRA) 3008(h) Administrative Order on Consent (Docket No. II RCRA-3008(h)92-0202) (Consent Order). The Consent Order authorized the U.S. Environmental Protection Agency (EPA) and DEC to issue orders requiring corrective action or such other responses as necessary to protect human health or the environment.

In 1995, NYSERDA expanded the use of the geomembrane covers at the SDA with the installation of a reinforced, ethylene interpolymer alloy geomembrane (XR-5) cover over Trenches 1 through 8, and 10 through 12. As part of this project, NYSERDA installed a stormwater management system consisting of five, geomembrane-lined stormwater basins to detain and release precipitation without increasing peak runoff from preproject conditions. This project was also conducted as an interim measure under the Consent Order.

In the fall of 1999, NYSERDA installed an XR-5 geomembrane cover on Trench 9, replacing a bioengineering management cover that was installed as a pilot project in September 1993. Nondestructive testing of the VLDPE geomembrane material in 2008 confirmed the cover was nearing the end of its useful life. In 2010, NYSERDA installed a new XR-5 geomembrane cover over the existing VLDPE to ensure continuation of effective water infiltration controls in this area of the SDA.

In the summer and fall of 2017 NYSERDA installed an XR-5 geomembrane cover on Trenches 1 through 12, placing the new geomembrane over the existing geomembrane covers, as they were reaching the end of their useful life. The placement of the new XR-5 geomembrane also included reconfiguration and elimination of one stormwater detention area (W03), regrading of select areas, removal of obsolete pipe penetrations, reconfiguration of the hardstand barrier area, and installation of weighted ballasts to limit potential damage from wind.

1.3 Corrective Measures Study

In addition to radionuclides, the SDA trenches are known to contain materials that are classified as hazardous constituents under RCRA. Because there is a possibility that these materials could be released from the trenches, NYSERDA is required to prepare a corrective measures study under the requirements of the Consent Order. On October 6, 2010, NYSERDA submitted the *Final Focused Corrective Measures Study for the State-Licensed Disposal Area at the Western New York Nuclear Service Center West Valley, New York.*[1] NYSERDA is required to submit a Final Corrective Measures Study at the time a decision is made on the ultimate disposition of the SDA.

1.4 Hazardous Waste Management Permit Application

In 2010, DEC requested that NYSERDA move from an interim status permit to a final status permit. In response, on January 6, 2011, NYSERDA submitted a draft 6 NYCRR Part 373 Hazardous Waste

[1] NYSERDA. 2010. “Final Focused Corrective Measures Study for the State-Licensed Disposal Area at the Western New York Nuclear Service Center West Valley, New York.” Prepared by Ecology and Environment, Inc.

Management Permit Application (i.e., Corrective Action Permit Application). On February 10, 2011, DEC requested that the timeframe for review and processing of NYSERDA's Hazardous Waste Management Permit be suspended per 6 NYCRR Part 621 of the Uniform Procedures Act. NYSERDA agreed to suspend the timeframes for this application on February 23, 2011. NYSERDA met with DEC on July 18, 2012, to discuss a regulatory path forward, and on October 23, 2012, DEC informed NYSERDA that a new regulatory document (i.e., Corrective Action Only Order) for the WNYNSC would be developed when information from the Phase 1 Studies is available to better inform additional corrective action activities.

2 Environmental Monitoring

2.1 Trench Leachate Elevations

2.1.1 Leachate Elevation Monitoring

Because the SDA trenches are constructed in a highly impermeable clay, water that enters the trenches has a tendency to accumulate. As such, routine measurements of water in the trenches (called leachate) are conducted in each sump to monitor the leachate level in each trench. One SDA trench sump is located in each of Trenches 1 through 5, 8, 9, and 11 through 13. Two sumps, designated 10N and 10S, are located in Trench 10; and, two sumps designated Trench 14 and WP-91, are located in Trench 14 (see Figure 2-1).

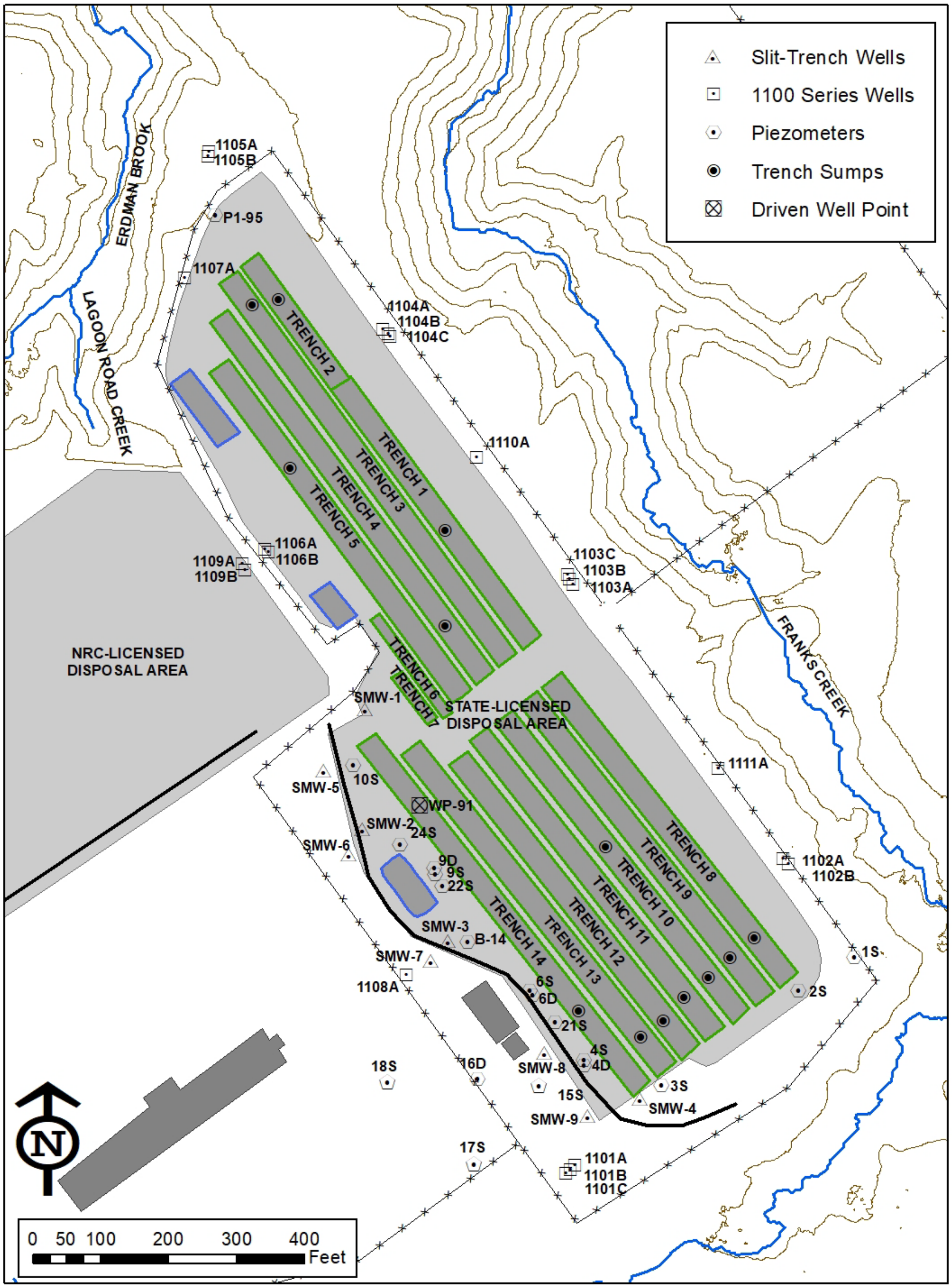
Leachate elevations are measured in the 13 trench sumps at the SDA in accordance with the *Leachate Monitoring Plan for the State-Licensed Disposal Area (SDA) at West Valley* (LMP[2]). In addition to requiring the leachate elevation measurements, the LMP specifies data assessment, notification, and reporting requirements. Table A-1 presents leachate elevation data for 2017. Graphical presentations of leachate elevations over the 10-year time period (2007 through 2017) are presented using regression lines (red) and prediction intervals (green) in Figures A-1 through A-12. In addition, the slope (rate of increase or decrease) and the R^2 value (coefficient of determination) are shown on these figures. These plots will aid in the identification of leachate elevation trend changes in the trenches.

A regression analysis is a statistical process for estimating the relationship among dependent and independent “predictor” variables. It takes into account how the typical value of the dependent variable changes with a change in the independent variables, while other independent variables remain fixed. In this manner, the regression analysis can estimate a conditional expectation of the dependent variable (in this case, the leachate levels), with a change in the independent variable (time). The 95 percent prediction intervals presented on the graphs are an estimate of the interval in which future observations will occur, with a 95 percent probability, given what has already been observed at that particular location. The R^2 value is a statistical measure of how close the data are to the fitted regression line. In general, the higher the value of R^2, the better the model fits the data.

[2] Throughout this report, LMP refers to the Leachate Monitoring Plan:
NYSERDA. 2014. “Leachate Monitoring Plan for the State-Licensed Disposal Area, ENV501.05.”

Figure 2-1. Trench Sump and Groundwater Monitoring Locations

Source: NYSERDA



Leachate elevation measurements for 2017 were collected quarterly in March, June, September, and December (see Table A-1). Additional monthly leachate elevation measurements were taken in Trenches 13 and 14 (including WP-91) (see discussion below).

2.1.2 Leachate Elevation Trend Assessment

The LMP requires an annual assessment of long-term leachate elevation trends. The long-term statistical data assessment for 2017 (*Annual Statistical Assessment of SDA Water Elevations - Data Through 2017*[3]) indicates that from 2000 through 2017, most trenches show a decreasing long-term leachate elevation trend (Figure 2-2). Until 2017, Trench 1 was shown to be exhibiting an increasing long-term trend. However, Trench 1 was sampled in September 2017, and the leachate level decreased by approximately six inches, and has not recovered (see Figure A-1). This potentially indicates that there is little water in this trench, or the sump is responding like a well in a lower-permeability material. NYSERDA will continue to monitor and evaluate the leachate elevation in Trench 1.

As described below, an increase in the Trench 14 leachate elevation has been observed since 2011 following a period of consistent decrease (Figures 2-3 and A-13); but due to the long-term decreasing trend for Trench 14, this increase is not identified using the Mann-Kendall with Sen's method test. As such, NYSERDA instituted the regression analysis as another tool to evaluate leachate elevation changes. Based on the regression analysis plotted in Figures 2-4 and A-14, Trench 14 has been increasing at approximately 0.87 inches per year (since 2011). Monitoring of Location WP-91 began in 2013 to supplement data from Trench 14. Based on the regression analysis plotted in Figure A-15, Trench 14 at WP-91 has been increasing at approximately 0.67 inches per year.

In addition to the increasing trends identified in Trenches 1 and 14, a potential trend change had been noted for Trench 3 between 2014 and 2016 (see Figure A-3). A new measurement probe was installed in the third quarter of 2016, and measurements with the new indicator show that the leachate level is consistent with the long-term historical decreasing trend; thereby suggesting that the deviation from the historical trend was due to a malfunctioning measurement probe.

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[3] NYSERDA. 2018. "Annual Statistical Assessment of SDA Water Elevations – Data Through 2017." Prepared by AECOM.

Figure 2-2. SDA Water Elevation Trends

Source: NYSERDA

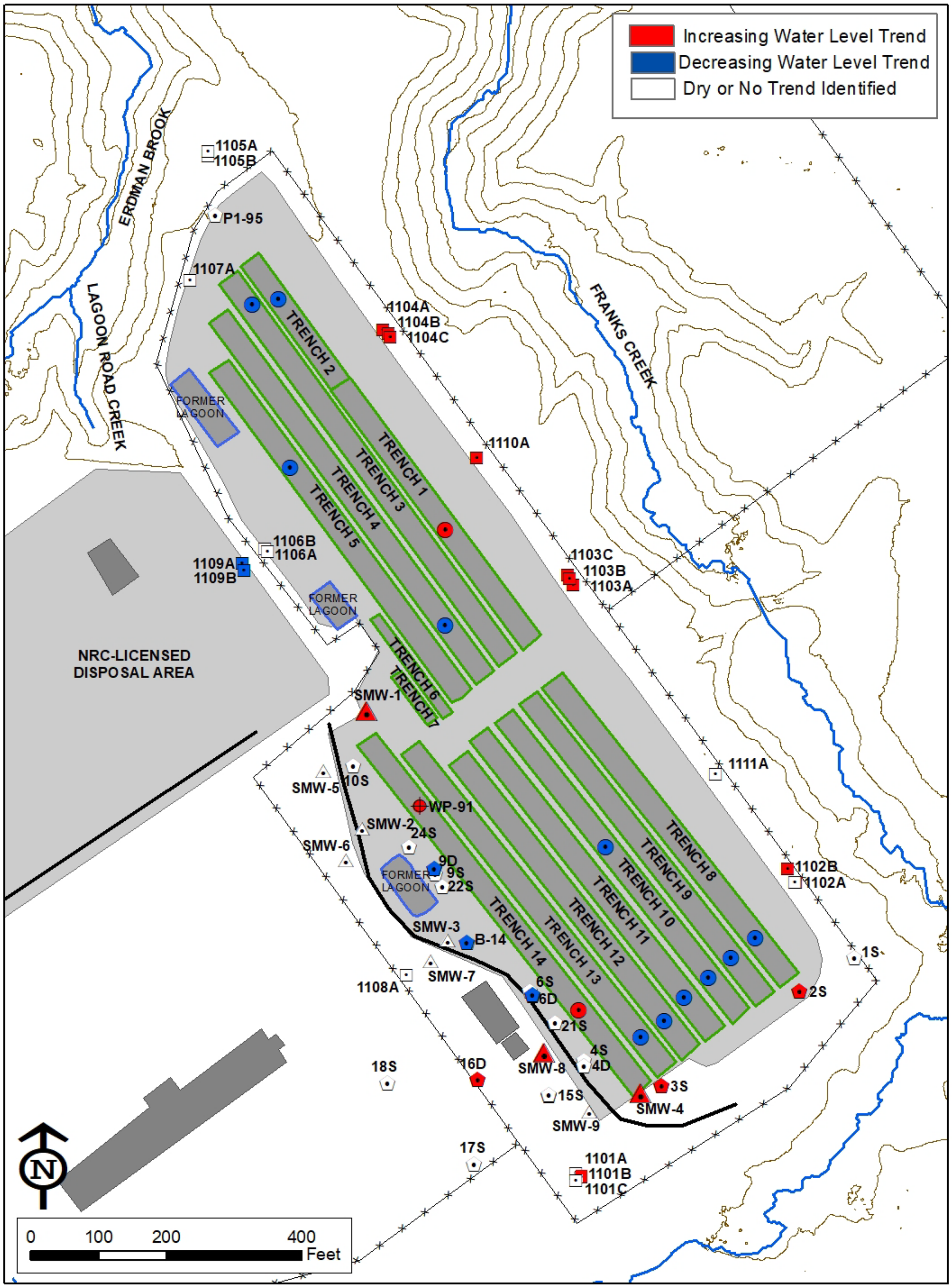
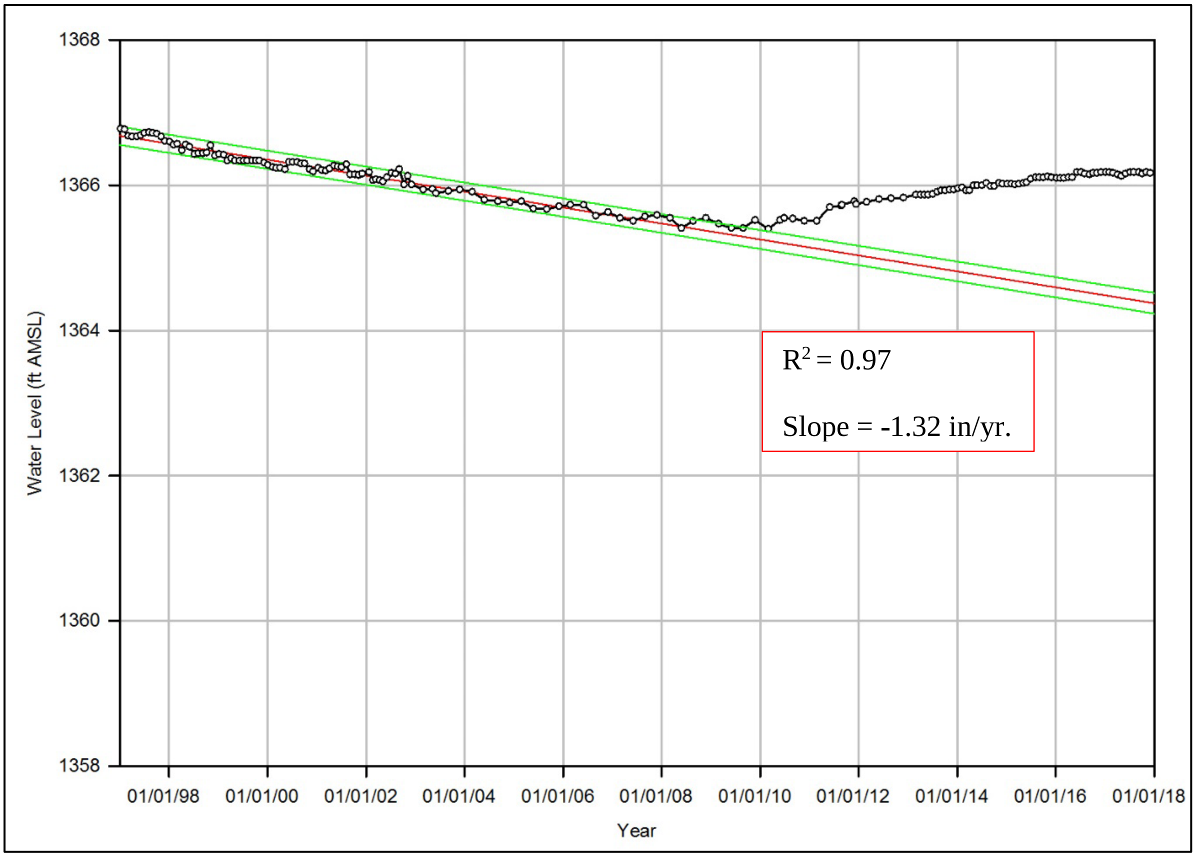


Figure 2-3. Trench 14 Leachate Elevation for the Period 1997 to 2017, Regression Analysis Shown for 1997 to 2008

Regression line shown in red. 95% Prediction intervals shown in green.

Source: NYSERDA

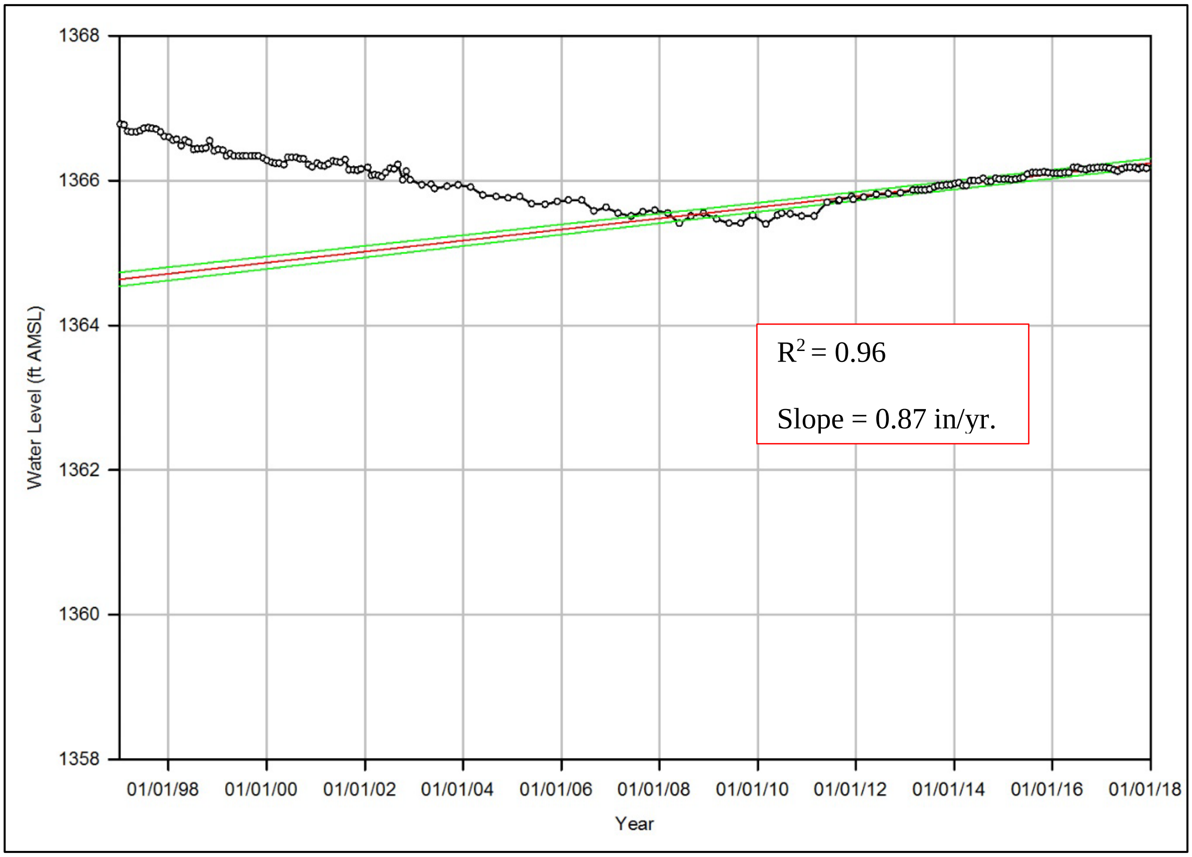


In September 2017, as part of the geomembrane cover installation, the ground surface around the Trench 8 sump was raised and a 24-inch-long extension was added to the trench sump riser. The new Trench 8 sump riser pipe was surveyed to determine the new reference elevation for leachate level measurements, and the new reference elevation was surveyed at 1391.60 ft above mean sea level (AMSL) (National Geodetic Vertical Datum [NGVD] 1929). When the leachate level taken in September 2017 (prior to the riser extension) was compared to the new reference elevation, a difference of 0.25 ft was noted (Figure A-6). This difference is attributed to changes in survey locations and processes, and not representative of a change in leachate level at Trench 8.

Figure 2-4. Trench 14 Leachate Elevations for the Period 1997 to 2017, Regression Analysis Shown for 2011 to 2017

Regression line shown in red. 95% Prediction intervals shown in green.

Source: NYSERDA



The current leachate levels do not represent a threat of release, or concern to health and safety to the public or the environment. NYSERDA will continue to review and evaluate leachate trends in the trenches using the regression analyses to identify changes in trends that may not be identified using the historical long-term statistical analysis.

2.1.3 Trench 14 and Trench 1 Leachate Investigation

Following the installation of infiltration controls in the mid-1990s, the Trench 14 leachate elevation followed a consistent and generally predictable decreasing trend (Figures 2-3 and A-13). A noteworthy change in behavior of this trend occurred in approximately 2008 through 2011 when the decreasing trend leveled off, as shown in Figure 2-3.

Small increases and decreases have been observed since 2011; but overall, up until 2016, the Trench 14 leachate elevation had continued to increase each year, although none of the increases were large enough to trigger regulatory reporting requirements.

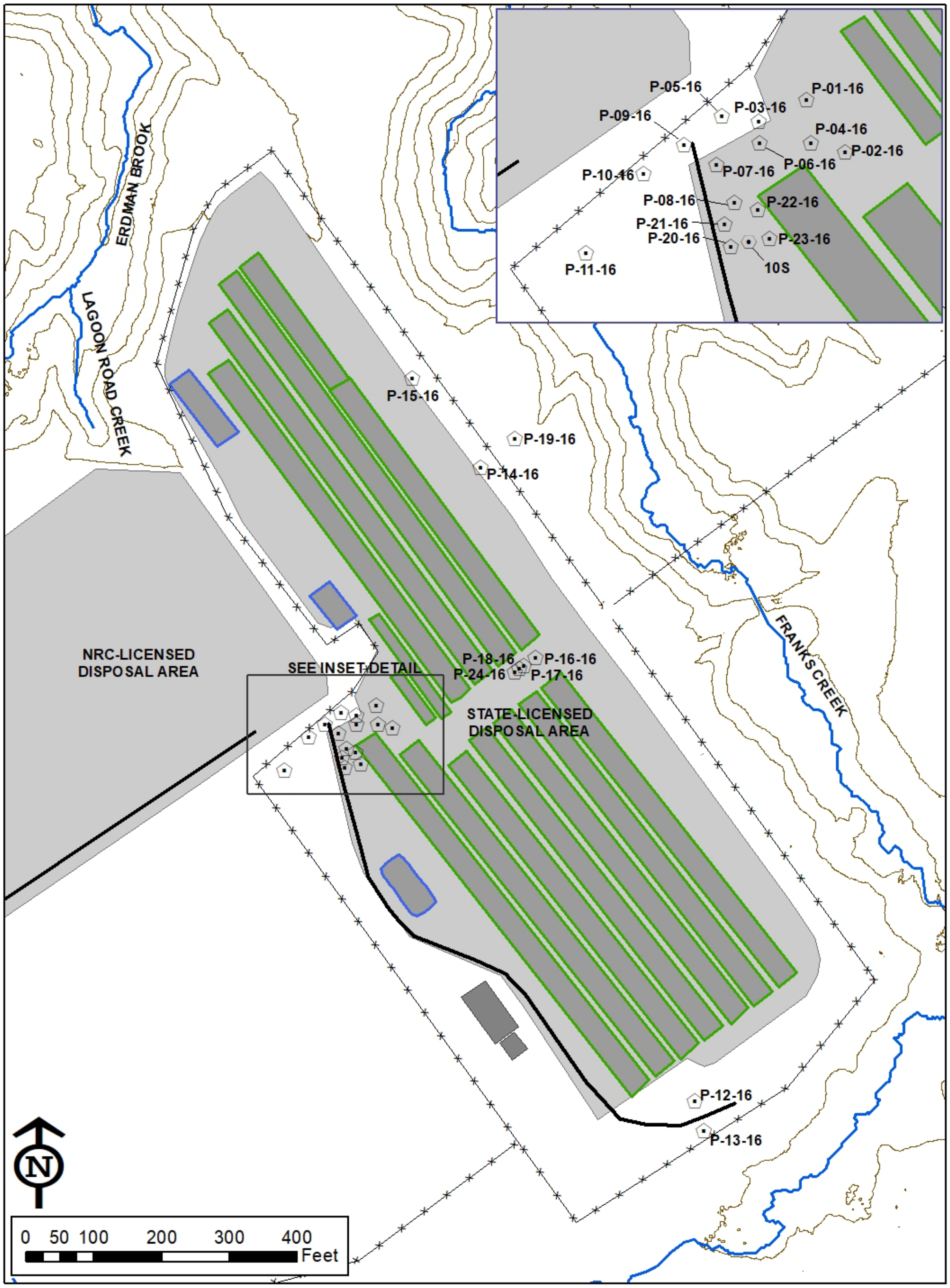
In 2014, NYSERDA issued a contract with an independent consulting company to conduct a detailed evaluation of the leachate increases in Trenches 14 and 1 (to address a very slow increase in the leachate elevation that had been observed for several years within Trench 1). The purpose of this evaluation was to identify a cause or potential cause for the increase in the leachate elevation that has been observed for several years within both trenches, and to present findings and recommendations for mitigating the increases. This evaluation has included extensive geologic and hydrologic data evaluation, resulting in a preliminary Findings and Recommendations Report, which was submitted to DEC in 2015. A work plan to address the findings and recommendations presented in the 2015 report was finalized, and submitted to DEC and the EPA in 2016. Field activities began during the second quarter 2016 and included the installation of 24 piezometers (Figure 2-5). In addition, groundwater samples were collected from 22 of the 24 installed piezometers, and analyzed for radiological and chemical constituents. Due to their proximity to Trench 14, and their potential to contain elevated radiological constituents, P-22-16 and P-23-16 were not sampled in 2016; but were added to the leachate sampling activities described below. These activities were completed during the fourth quarter of 2016. At this time, water levels are being collected from the newly installed piezometers and select monitoring wells, and are being evaluated in regard to leachate elevation increases. A final Leachate Increase Investigation Findings and Recommendations Report is anticipated to be completed during the spring of 2018.

Evaluation of the 2017 data set with the data from the second half of 2016 shows that the leachate levels in Trench 14 appear to have stabilized. During 2017, monthly leachate elevation measurements have intermittently increased or decreased by 0.01 or 0.02 ft, resulting in a net change of 0 ft.

The leachate elevation measured in the Trench 1 sump, which had been slowing increasing for several years, dropped 0.48 ft (approximately six inches) after the September 2017 sampling, and remained at that level through 2017. A review of the Trench 1 construction and disposal history determined that a large volume of backfill was added to the trench during disposal operations. In an effort to evaluate the leachate elevation in Trench 1 in the 1970s, NFS installed multiple well points in the trench and concluded due to the significant amount of backfill used during disposal operations, there was little water present. The drop in leachate elevation in Trench 1 is consistent with the NFS evaluation. The leachate elevation in Trench 1 will continue to be measured and evaluated.

Figure 2-5. 2016 Piezometer Locations

Source: NYSERDA



2.1.4 Leachate Sampling

NYSERDA conducted a leachate and groundwater sampling activity in August and September 2017 at all trench sumps (excluding Trench 14, which was inaccessible due to equipment obstructions within the sump pipe), and locations WP-91, B-14, P-22-16, and P-23-16. Samples were collected for analysis of radiological and chemical constituents.

Elevation measurements were collected immediately before and after sampling was conducted at each location indicate that the leachate levels in every trench sump and WP-91, with the possible exception of Trench 1, recovered quickly, and are representative of, and in communication with, the area of the trench in which they are located. The analytical data from the leachate and groundwater sampling event (both radiological and chemical) will be provided to DEC and EPA when it is received and validated.

2.2 Groundwater Monitoring

The SDA groundwater monitoring network consists of 21 groundwater monitoring wells (the 1100-series wells), 19 piezometers, and nine slit-trench wells. The location of each monitoring well is shown in Figure 2-1. The purpose of the groundwater monitoring program is twofold: (1) to provide data of sufficient quality and quantity to allow detection of the migration of radionuclides or volatile organic compounds (VOCs) from the SDA via groundwater; and, (2) to provide information on hydrologic conditions near the disposal trenches. The Groundwater Monitoring Program is conducted in accordance with the *Groundwater Monitoring Plan for the State-Licensed Disposal Area (SDA) at West Valley* (GMP[4]). The 1100-series wells, piezometers, and slit-trench wells are inspected and maintained as described in the GMP.

2.2.1 Groundwater Elevation Monitoring

The GMP requires quarterly groundwater elevation measurements in the 1100-series wells, the piezometers, and the slit-trench wells. Well summary information for each type of well is presented in Tables B-1, B-3, and B-5. In 2017, measurements were taken in March, June, September, and December; and the results for each well are presented in Tables B-2, B-4, and B-6, respectively. In addition, monthly

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4 Throughout this report, GMP refers to the Groundwater Monitoring Plan:
NYSERDA. 2014. "Groundwater Monitoring Plan for the State-Licensed Disposal Area (SDA) at West Valley, ENV502.05."

groundwater elevation measurements were taken at a number of locations in support of the Trench 14 leachate investigation (see Section 2.1.3). A tabulation of these supporting levels will be presented in the final Leachate Increase Investigation Findings and Recommendations Report, anticipated to be completed during the spring of 2018.

Groundwater elevation data are used to construct quarterly groundwater elevation contour maps for the weathered Lavery till and the Kent recessional sequence (see Figures B-1 through B-8). The 2017 groundwater contour maps show the hydraulic gradient in the weathered Lavery till, in the vicinity of the disposal trenches, to be inward toward the trenches. The path of the groundwater movement in the Kent recessional sequence is northeasterly. These trends are consistent with historical data.

2.2.2 Groundwater Elevation Trend Assessment

An assessment of upward or downward trends in groundwater elevations was conducted for the data collected in 2017 (*Annual Statistical Assessment of SDA Water Elevations – Data through 2017*[5]). The statistical assessment used groundwater elevation data from January 2000 through December 2017, and the results of the trend assessment show increasing long-term water elevation trend in: Wells 1101B, 1102B, 1103A, 1103B, 1103C, 1104A, 1104B, 1104C, and 1110A; Piezometers 2S, 3S, and 16D; and Slit-Trench Wells SMW-1, SMW-4, and SMW-8. A long-term decreasing water elevation trend was observed in: Wells 1109A, Well 1109B; and Piezometers 6D, 9D, and B-14. Piezometers 4S and 9S; and Slit-Trench Wells SMW-2 and SMW-3 have been dry throughout the statistical assessment period. No upward or downward trends were found in the remaining groundwater wells at the SDA.

A short-term increasing elevation trend was identified at Piezometer 6D (2013 through 2016). Overall, a long-term decreasing water elevation trend is present at this location; but since 2013, this trend appeared to have reversed and become an increasing water elevation trend through 2016. However, the water elevations in 2017 may indicate that the trend is no longer increasing (levels were lower than those in 2016). Water levels will continue to be collected at 6D-91 as per the GMP to determine elevation trending at this location.

[5] AECOM, pg. 9.

As Figure 2-2 shows, the majority of the wells located within the area covered by the geomembrane and immediately downgradient of the slurry wall are dry, or exhibit no trend. Several wells located on the upgradient side of the slurry wall show an increasing trend. This distribution of groundwater elevations near the west side of Trench 14, and the decreasing long-term leachate elevation trends in all but two of the SDA trenches, reflect the continued effectiveness of the water infiltration controls system (i.e., subsurface barrier wall and geomembrane cover). The majority of the wells on the east side of the SDA show an increasing trend, potentially due to their locations away from the influence of the slurry wall and geomembrane cover.

2.2.3 Groundwater Parameter Monitoring

In accordance with the GMP, the 1100-series wells were sampled semiannually (June and December) during 2017. Analytical parameters monitored semiannually included gross alpha, gross beta, and tritium; and field water quality parameters (conductivity, pH, temperature, and turbidity). Analytical parameters monitored annually in 2017 included gamma-emitting radionuclides (by gamma spectroscopy); four beta-emitting radionuclides (carbon-14 [C-14], iodine-129 [I-129], strontium-90 [Sr-90], and technetium-99 [Tc-99]); and VOCs. Checklists of the parameters sampled at each well are presented in Tables B-7 and B-8. Groundwater analytical results for all parameters, except VOCs, are presented in Tables B-9 and B-10.

2.2.3.1 Gross Alpha

For the June 2017 sampling event, the Upper Tolerance Limits (UTLs) or Upper Predictive Limits (UPLs) were exceeded for Wells 1103A and 1110A. Due to laboratory issues, these exceedances were not identified in a timeframe to enable resampling from the June event; therefore, duplicate samples were collected from Wells 1103A and 1110A for gross alpha during the December 2017 sampling event.

For the December sampling event, the UTL/UPL was exceeded for Well 1103A. Review of the historical data for this location indicates that the December 2017 result is above the mean of the detected results for that location but is within the historical range. As the result is consistent with historical results, resampling was not recommended.

Gross alpha results were assessed using the statistical intrawell comparison protocol described in the GMP. Results of gross alpha monitoring are consistent with historical results.

2.2.3.2 Gross Beta

In June 2017, the UTL/UPL was exceeded for Well 1101C. Due to laboratory issues, this exceedance was not identified in a timeframe to enable resampling from the June event; therefore, a duplicate sample was collected from Well 1101C for gross beta during the December 2017 sampling event. In December 2017, none of the UTLs or UPLs were exceeded for any of the sampled wells.

Gross beta results were assessed using the statistical intrawell comparison protocol described in the GMP. Results of gross beta monitoring are consistent with historical results.

2.2.3.3 Tritium

In June 2017, the UTL/UPL was exceeded for Well 1104C. The tritium result (1.34E-07 µCi/mL) did not exceed the secondary concentration limit of 6E-07 µCi/mL; therefore, this well was not recommended for resampling. In December, none of the UTLs or UPLs were exceeded for any of the sampled wells.

Tritium results were assessed using the statistical intrawell comparison protocol described in the GMP. Results of tritium monitoring are consistent with historical results.

2.2.3.4 Gamma-Emitting Radionuclides

In June, gamma spectroscopy was performed for the 14 routinely reported radionuclides. The results were generally consistent with historical results. All results for actinium-228, cesium-134, cesium-137 (Cs-137), cobalt-57, cobalt-60 (Co-60), potassium-40, lead-214, thorium-234, and uranium-235 were below their minimum detectable concentrations (MDCs) or 2-sigma uncertainties.

Bismuth-214, lead-212, radium-224, radium-226, and thallium-208 all exceeded their MDCs; and all are considered qualified data due to either an uncertainty greater than 50 percent, the nondetection of the parent radionuclide, or new laboratory MDCs that are more than two standard deviations below the previous laboratory's MDC.

Calculation of statistics (mean, standard deviation, and control charting) for the 14 routinely reported gamma emitters was not required because five positive detections (as defined in the GMP) had not occurred for any gamma-emitting radionuclide.

2.2.3.5 Beta-Emitting Radionuclides

Beta-emitting radionuclide sampling for C-14, I-129, Sr-90, and Tc-99 was performed in 2017.

Results for C-14 were consistent with historical results and below the MDC, which did not exceed the reporting criteria set forth in the GMP.

All June 2017 results for I-129 were below their MDCs and the program detection limit of 1E-09 µCi/mL, which is consistent with historical results. The June 2016 I-129 results, which had shown anomalous detections (Wells 1101A, 1102A, 1103A, 1109B, 1110A, and 1111A), returned to nondetects for the June 2017 event. The 2016 detections may be attributed to matrix interference.

The Sr-90 result for Well 1107A (9.09E-09±1.64E-09 µCi/mL) exceeded the criteria in the GMP, but was similar to historical results. After the fifth value above the GMP for Sr-90 in the well (2002) was reported, control charting was initiated. The current calculated mean and control limits are based upon the initial five positive detections. Based upon the control chart for Sr-90 in Well 1107A, no trends in the data have been identified.

In June 2017, 15 Tc-99 results exceeded their MDCs and the program detection limit (5E-09 µCi/mL): 1101A, 1101C, 1102A, 1102B, 1103B, 1104A, 1104B, 1105A, 1105B, 1106A, 1107A, 1108A, 1109A, 1109B, and 1110A. Well 1103A exceeded its MDC but did not exceed the program detection limit. There have been several anomalous Tc-99 detections in recent data. In June 2016, six of the 21 Tc-99 results had shown anomalous detects. Two of those wells returned to nondetect in June 2017, which is consistent with historical results.

NYSERDA is working with our environmental monitoring contractor to determine if there are potential issues with the laboratory method used by the subcontractor’s laboratory. Specifically, there are questions regarding the spiking of Tc-99 instead of a tracer for recovery determination. NYSERDA requested their contract laboratory send samples from the December 2017 event (no samples remain at the lab from the June 2017 event) to a separate laboratory for confirmatory sampling using the conventional tracer for chemical recovery. Although the results sent from the December 2017 event will not be directly comparable to the June 2017 data, the results could be reviewed against historical results for the selected sampling locations.

NYSERDA and our environmental monitoring contractor will evaluate the December 2017 Tc-99 results to determine if the results vary from historical data. If they are inconsistent with historical data, the environmental monitoring contractor may select a different qualified laboratory for future analysis.

The Tc-99 dataset for Well 1107A meets the minimum requirements for creating a control chart (i.e., five or more positive detects). This is the second positive detect in the last 10 years (and the only detect in the last five years), which may suggest that there is not a definable trend; but small levels of variability in the measurement process. A control chart will be established, and the mean and standard deviation calculated after the fifth data point.

2.2.3.6 Volatile Organic Compounds

VOC results for samples collected in 2017 did not exceed the reporting criteria set forth in the GMP and were generally consistent with historical results. Because the VOC results are all “nondetects,” the VOC data tables are not included in this report.

2.2.3.7 Field Water Quality Parameters

Conductivity, temperature, turbidity, and pH are measured in the field during groundwater sampling. The 2017 water quality measurements were generally consistent with historical results and are reported in Table B-10. New maximum values for pH were recorded at Wells 1105A (8.13 standard unit [S.U.]), 1105B (7.98 S.U.), 1106B (7.90 S.U.), and 1109A (7.91 S.U.). For turbidity, Well 1107A produced a new maximum value of 17.11 Nephelometric Turbidity Unit (NTU). Well 1110A also produced a new maximum value of 811 NTU for turbidity. Well 1101C was out of the meter’s range limit (>1000 NTU), but this has occurred on multiple other occasions at this location. Efforts will be made in future sampling events to avoid disturbing the sediment in the wells during sampling.

2.3 Surface Water Monitoring

During 2017, quarterly surface water samples for gross alpha, gross beta, and tritium analyses were collected at the four SDA monitoring locations (WNDCELD, WNFRC67, WNNDADR, and WNERB53). A background sampling location south (and upgradient) of the SDA on Buttermilk Creek (WFBCBKG) also collected quarterly, is used for data comparison. An annual sample was also collected at location WFBCANL in 2017, approximately 0.75 miles northeast (and downgradient) of the SDA on Buttermilk Creek.

As shown in Figure 2-6, WNNDADR, located in Lagoon Road Creek adjacent to both the SDA and the Nuclear Regulatory Commission-Licensed Disposal Area (NDA), and within the WVDP premises, and WNERB53, located in Erdman Brook downstream of WNNDADR, monitor surface water runoff from the SDA, NDA, and portions of the WVDP Premises. WNDCELD, located in Franks Creek on the south side of the SDA, monitors surface water from areas adjacent to the WVDP Drum Cell upstream of the SDA. WNFRC67, located downstream on Franks Creek, monitors surface water on the eastern and southern portions of the SDA.

Figure 2-7 shows WFBCBKG, located upstream of the WNYNSC in Buttermilk Creek, monitors background surface water conditions, and WFBCANL, also located in Buttermilk Creek, monitors Buttermilk Creek just downstream of where the Kent Recessional unit groundwater is discharged to Buttermilk Creek via groundwater seeps.

Surface water monitoring data are presented in Tables C-1 through C-6. A statistical assessment of radiological constituents (gross alpha, gross beta, and tritium) for the SDA surface water was conducted using the data collected in 2017 (*Statistical Assessment of SDA Surface Water Constituents for 2017*[6]).

2.3.1 Radiological Parameters

2.3.1.1 Gross Alpha

The 2017 gross alpha results at all four surface water sampling locations (WNDCELD, WNFRC67, WNNDADR, and WNERB53) were statistically indistinguishable from background. These findings are consistent with previous annual statistical assessments. The third quarter gross alpha result for WNDCELD was rejected as an outlier due to high solids in the sample. Therefore, the 2017 annual dataset for that location had three data points instead of four. All results were below the 6 NYCRR 703.5 - Table 1 Water Quality Standards for Surface Water and Groundwater (6 NYCRR 703.5[7]) (1.5E-8 µCi/mL), which is used as a comparative value for gross alpha.

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6 NYSERDA. 2018. “Statistical Assessment of SDA Surface Water Constituents for 2017.” Prepared by AECOM.

7 Throughout this report, 6 NYCRR 703.5 refers to Table 1 Water Quality Standards for Surface Waters and Groundwater:
DEC. 1998. “6 NYCRR 703.5 - Table 1 Water Quality Standards for Surface Waters and Groundwater.”

Figure 2-6. Surface Water Monitoring Locations (WNDCELD, WNFRC67, WNNDADR, and WNERB53)

Source: NYSERDA

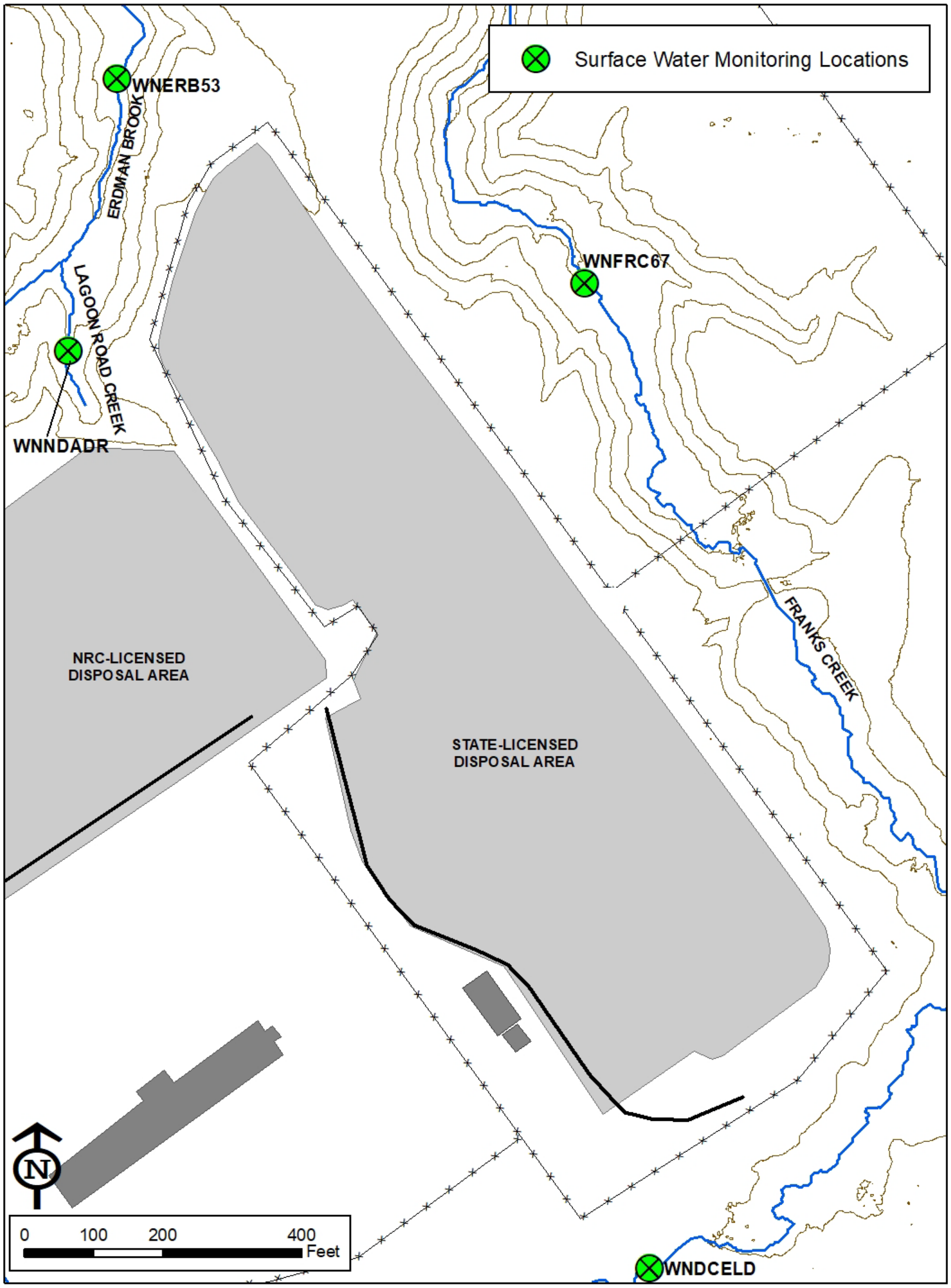
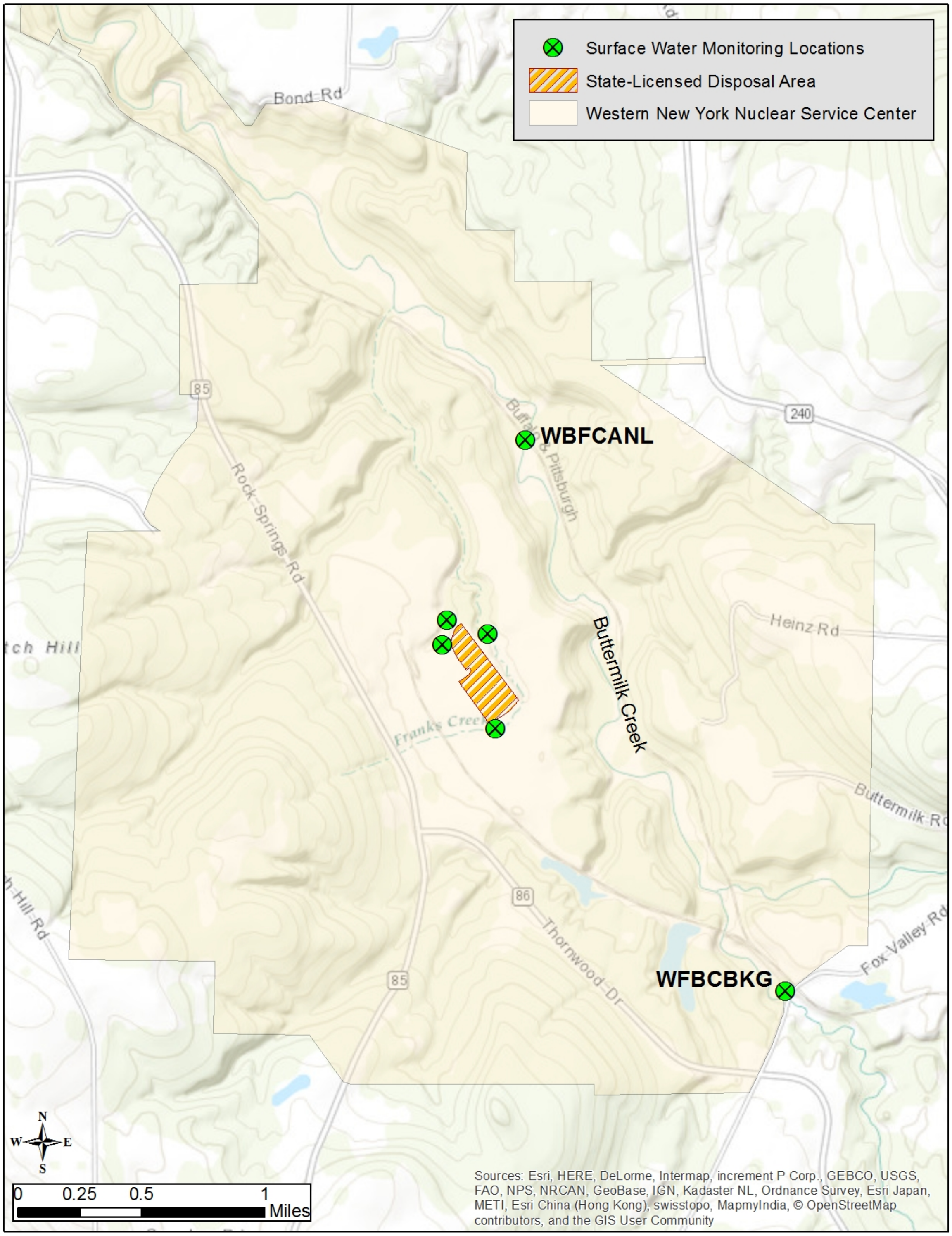


Figure 2-7. Surface Water Monitoring Locations (WFBCBKG and WFBCANL)

Source: NYSERDA



2.3.1.2 Gross Beta

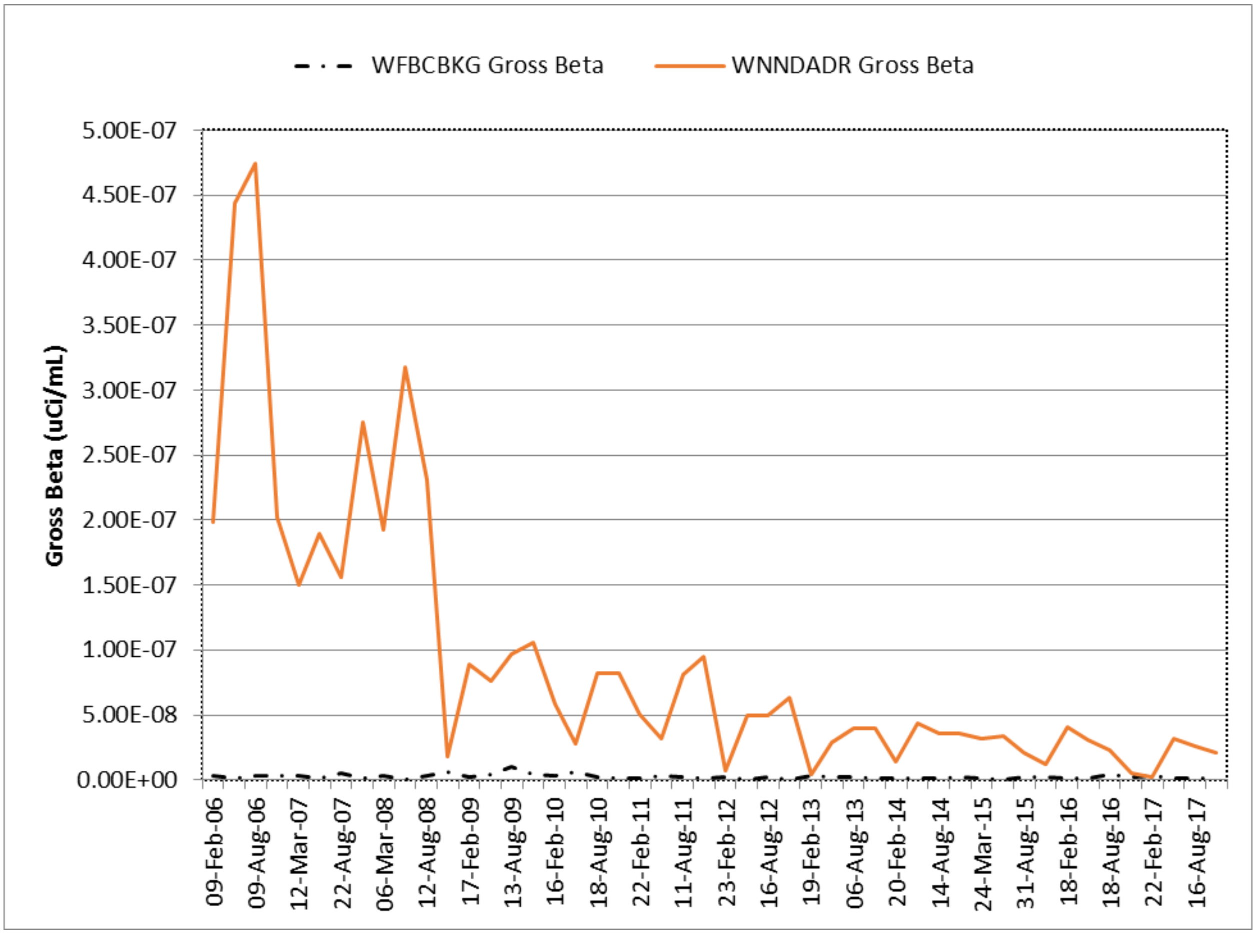
The 2017 gross beta results for WNNDADR were statistically higher than the background locations, which is consistent with historical results, although levels at the WNNDADR have fallen since the NDA geomembrane cover and subsurface barrier wall were installed in 2008. Figure 2-8 shows the gross beta results for the WNNDADR location and the background location (WFBCBKG). Gross beta results for WNERB53 and WNDCELD were statistically higher than background in 2016, but in 2017 were found to be statistically indistinguishable from background. The 2017 results for WNFRC67 were statistically indistinguishable from background, which is consistent with previous annual assessments. All gross beta results were below 6 NYCRR 703.5 (1.0E-6 μCi/mL), which is used as a comparative value for gross beta.

2.3.1.3 Tritium

The tritium result for WNNDADR was statistically higher than background in 2017, which is consistent with historical results, although tritium levels have fallen since the NDA geomembrane cover and subsurface barrier wall were installed in 2008. Figure 2-9 shows an overall decreasing trend for tritium identified since 2008 for the WNNDADR location; however, the third quarter tritium result was elevated above recent data and NYSERDA will continue to monitor results for this location. The location WNFRC67 has shown occasional elevated results for tritium but was determined to be statistically indistinguishable from background in 2017. The 2017 results for WNDCELD and WNERB53 were statistically indistinguishable from background, which is consistent with historical assessments. All tritium results were below the 6 NYCRR 703.5 (2.0E-5 μCi/mL), which is used as a comparative value for tritium.

Figure 2-8. Gross Beta Results for Surface Water Monitoring Location WNNDADR Compared to WFBCBKG

Source: NYSERDA



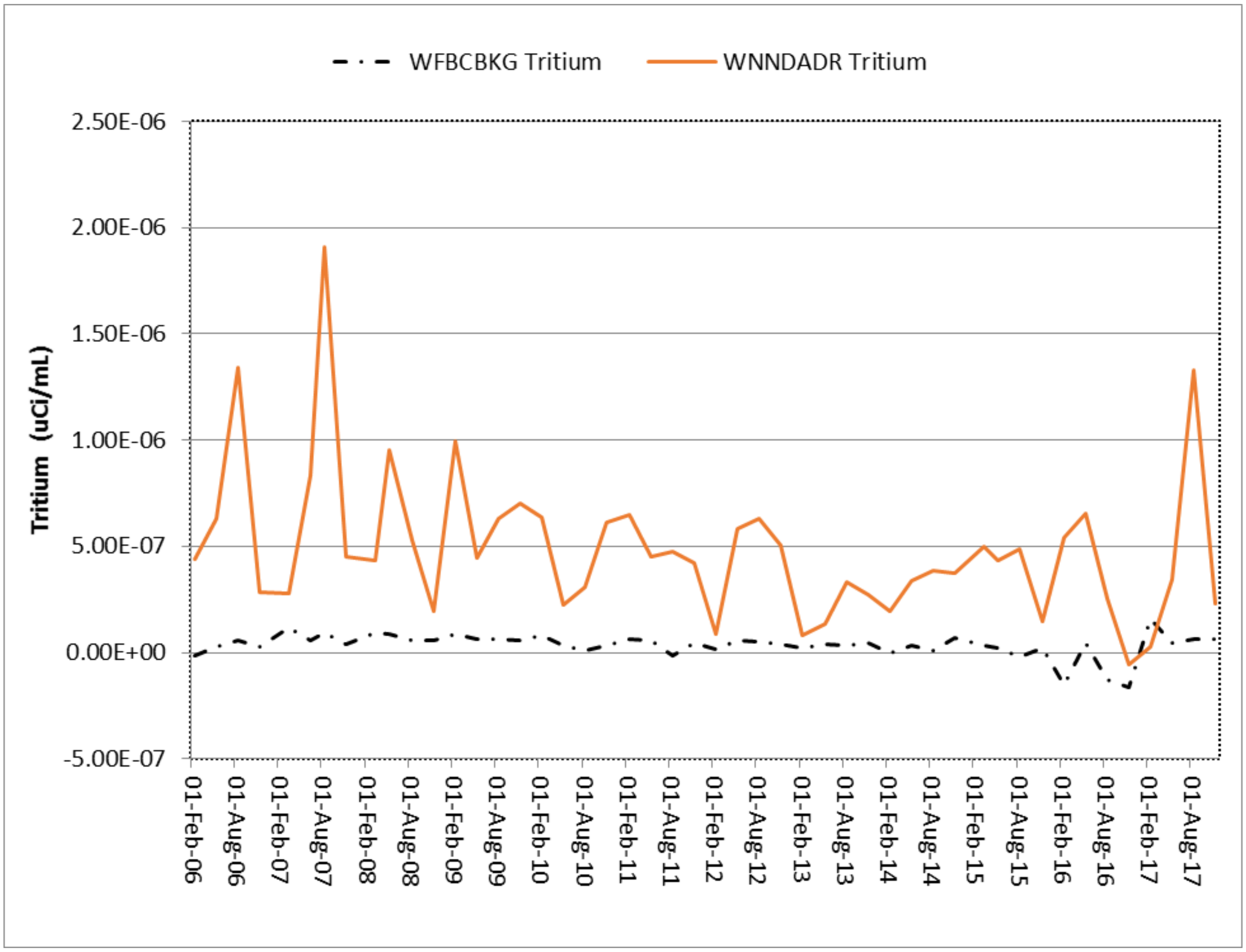
2.4 Stormwater Monitoring

As required by the SDA State Pollution Discharge Elimination System Permit (SPDES) No. NY-026971, semiannual sampling is conducted at one of the four designated SDA stormwater outfalls (as shown in Figure 2-10). Figure 2-10 shows that previous stormwater Outfall W03 was eliminated during the 2017 geomembrane construction project. During 2017, semiannual stormwater samples were collected from Outfall W01 during storm events on April 6 and November 16.

Composite samples from both events were analyzed for biological oxygen demand (BOD), chemical oxygen demand (COD), total nitrate-nitrite and total Kjeldahl nitrogen, total phosphorus, total suspended solids (TSS), gross alpha, gross beta, tritium, and gamma spectroscopy. Grab samples from both events were analyzed for BOD, COD, total nitrate-nitrite and total Kjeldahl nitrogen, oil and grease, total

Figure 2-9. Tritium Results for Surface Water Monitoring Location WNNDADR Compared to WFBCBKG

Source: NYSERDA



phosphorus, TSS, pH, and temperature. Ambient rainfall samples from both events were analyzed for pH and temperature. Stormwater monitoring data for 2017 are provided in Tables C-7 and C-8, and are reported to DEC as required by the SPDES permit.

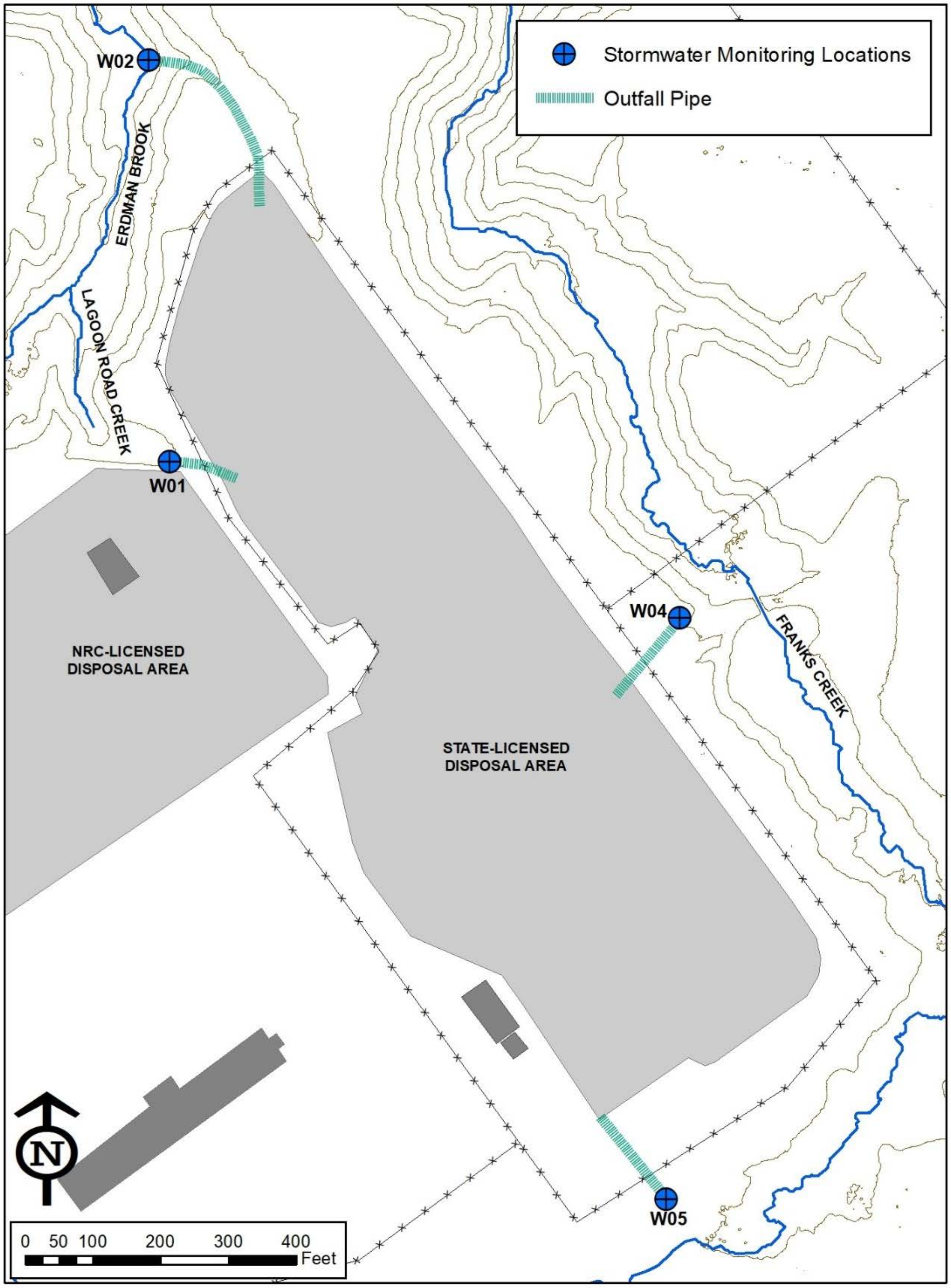
2.4.1 Radiological Parameters

2.4.1.1 Gross Alpha

Gross alpha results from the April and November 2017 sampling events were 2.00E-9 µCi/mL and 1.19E-10 µCi/mL, respectively. The April result was reported above the MDC value of 4.26E-10 µCi/mL, which was a historical high. The November value was below its respective MDC at 6.72E-10 µCi/mL. All

Figure 2-10. Stormwater Monitoring Locations

Source: NYSERDA



results were below the 6 NYCRR 703.5 (1.5E-08 µCi/mL), which is used as a comparative value for gross alpha.

2.4.1.2 Gross Beta

The gross beta results for the April and November 2017 sampling events (6.34E-09 µCi/mL and 2.55E-09 µCi/mL) were both above the reported MDC values of 7.06E-10 µCi/mL and 7.90E-10 µCi/mL, respectively. The April result was somewhat higher than historical results and the November result was consistent with historical events. Statistical trend analyses for gross beta results did not identify any significant trends for either event. All gross beta results were below the 6 NYCRR 703.5 (1.0E-06 µCi/mL), which is used as a comparative value for gross beta.

2.4.1.3 Tritium

The tritium result for the April and November 2017 sampling event were 2.31E-07 µCi/mL and 7.64E-08 µCi/mL, respectively. The April result was above the reported MDC (1.55E-07 µCi/mL). The November result was below the reported MDC (1.36E-07 µCi/mL). Statistical trend analysis did not identify any significant trend for either event.

All tritium results were below the 6 NYCRR 703.5 (2.0E-05 µCi/mL), which is used as a comparative value for tritium.

2.4.1.4 Gamma Spectroscopy

The results for three gamma emitters (Cs-137, Co-60, and potassium-40) are reported for each stormwater sampling event. In addition, gamma spectroscopy results were reviewed for an additional 145 gamma-emitting radionuclides.

Sample analysis from the April 2017 event showed Cs-137, Co-60, and potassium-40 results were below their respective MDC. Gamma spectroscopy analysis for the November 2017 sampling event reported actinium-228 and bismuth-214 were qualified due to field blank contamination, and the radium-226 result was rejected due to an exceedance of the control limit for the method blank caused by contamination.

2.4.2 Chemical and Physical Parameters

Results for all chemical and physical parameters were below the SPDES permit limits. Total suspended solids were reported as 3.4 milligrams per liter (mg/L) for the composite sample collected on November 16, 2017 (9.3 mg/L for the field duplicate). These higher than normal detections, which are atypical, may be attributed to the construction activities associated with placing the new geomembrane cover on the SDA during the fall of 2017.

As required by the SPDES permit, chemical and physical results were reported to DEC's Division of Water in the Discharge Monitoring Report after each semiannual sampling event.

2.5 Gamma Radiation Monitoring

2.5.1 Overland Gamma Radiation Surveys

Gamma radiation surveys are performed semiannually at the SDA to maintain current data on gamma exposure levels and to monitor for changing conditions at the SDA.

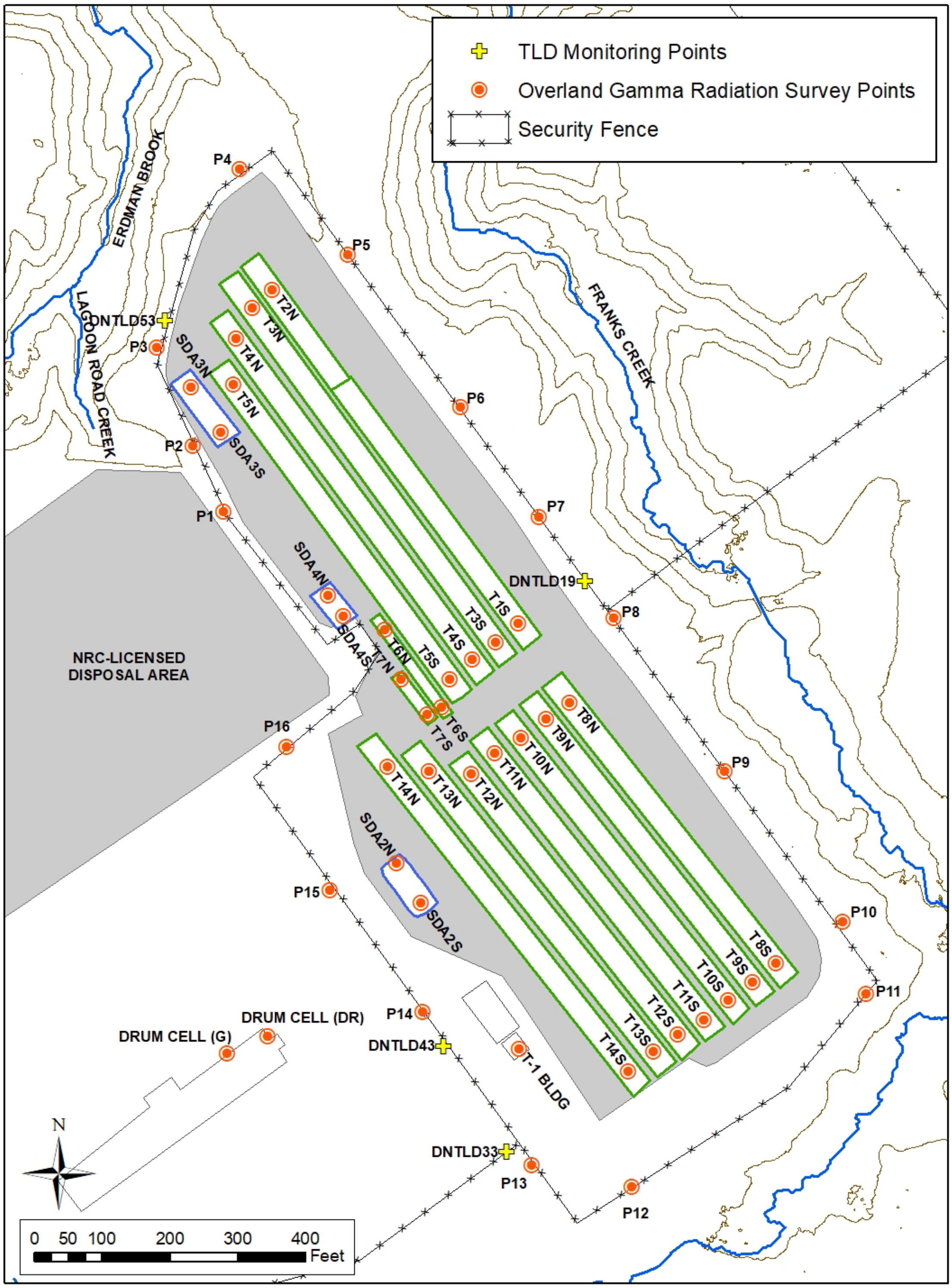
As shown on Figure 2-11, radiation levels are measured at 51 fixed-survey locations in and around the SDA including:

- 32 monument markers located on the north and south ends of each trench (designated as T1s, T1n, etc.), and the three filled lagoons (SDA2, SDA3, and SDA4) to monitor the contribution of underground radioactive materials to the area radiation levels within the SDA.
- 16 SDA perimeter survey points (P-1 through P-16) marked on the chain-link fence surrounding the SDA to monitor external radiation from all sources, including the WVDP.
  One survey point (T-1) inside the T-1 Building. This location was previously used to track radiation levels from the stored Trench 14 leachate. Because the leachate was removed from the tank in 2009 and the Tank was removed in 2010, this measurement is taken in the middle of the now-vacant concrete tank pad.
- Two survey points (DC-[G] and DC-dr) at the WVDP Drum Cell, located west of the SDA, to provide the information on the radiation levels near the Drum Cell. Historically, waste in the Drum Cell created elevated radiation levels at nearby SDA monitoring points. Radiation levels have fallen since the waste was removed from the Drum Cell in 2007.

At each fixed survey point, radiation levels are measured at one meter and one centimeter above the ground, floor, or building surface.

Figure 2-11. Gamma Radiation Monitoring Locations

Source: NYSERDA



Radiation detection instruments are also monitored continuously between fixed-survey locations to identify any anomalous reading(s) exceeding three times those of the nearby fixed-survey monitoring points; any such fluctuations are noted on the survey report form. Survey readings for the 2017 semiannual surveys (May and August) are provided in Table D-1.

Gamma radiation levels observed during both semiannual surveys were consistent with historical data.

2.5.2 Thermoluminescent Dosimetry Monitoring

Each calendar quarter, four environmental thermoluminescent dosimeters (TLDs) placed around the SDA are processed to obtain the integrated gamma radiation exposure from each location (see Figure 2-11). TLD monitoring locations DNTLD43 and DNTLD33 are located north and south of the SDA Tank buildings, respectively, on the western SDA perimeter fence. DNTLD19 is located midway along the SDA east perimeter fence and is farthest from WVDP radiation sources. DNTLD53 monitors the northwestern corner of the SDA, and is the closest to the WVDP and the NDA, which are potential sources of external radiation exposure. In addition to the on-site TLD locations, a background location, NYTLDBK, is located approximately 4.5 miles southwest of the SDA outside of the Ashford Office Complex. Environmental TLD monitoring results for 2017 are included in Table D-2.

The quarterly environmental TLD results for 2017 were reviewed for completeness and accuracy, and to determine whether there were any outliers in the data set. Various outlier tests were performed for the 2017 results for each location, for which no outliers were confirmed; therefore, no results were removed from the 2017 data set.

The results of the statistical tests show that radiation exposures for DNTLD53 were higher than background. DNTLD53 2017 results are consistent with results from 2015 and 2016. TLD exposures for DNTLD19, 33, and 43 were consistent with background and generally consistent with historical results. It should be noted that the DNTLD33 results were significantly higher than background in 2016, but were consistent with background in 2014, 2015, and 2017. There were no known activities performed at or near the SDA in 2017 that would have been expected to affect routine ambient radiation exposure.

2.6 Meteorological and Stream Flow Monitoring

NYSERDA operates and maintains a suite of meteorological instruments at the SDA, including instruments to measure total precipitation (e.g., rain, snow, and sleet); temperature; relative humidity;

barometric pressure; wind speed; and wind direction. The instruments are equipped with a battery-powered backup system to ensure data continuity during power outages. A quarterly summary of the daily precipitation at the SDA is provided in Tables E-1, E-2, E-3, and E-4. There were no interruptions in meteorological data collection in 2017.

Data are logged every 10 minutes and transmitted via cellular modem to NYSERDA's offices. NYSERDA maintains an interactive meteorological database on the internet at: https://wqdatalive.com/public/334.

3 Erosion Monitoring

In accordance with the requirements of the Part 380 Permit #9-0422-00011/00011, NYSERDA has established a comprehensive erosion monitoring program at the SDA, inclusive of the surrounding slopes and streams. The objective of the program is to monitor active erosion processes that could threaten the integrity of the SDA. The monitoring ensures that erosion features are clearly identified, inspected, quantified, and, if necessary, mitigated before erosion damage can occur at the SDA.

3.1 Visual Inspections

3.1.1 General Visual Inspection of the SDA

The SDA and the surrounding land, slopes, gullies, and streams are inspected for erosion at least five times per year under NYSERDA's *Walkover Inspection of the SDA*[8] procedure. Wherever erosion is observed, WVSMP staff determine whether maintenance, mitigation, and/or additional monitoring are necessary. Additional unscheduled inspections are conducted after abnormally large precipitation events (>2.5 inches/24 hours) to check for significant erosion or mass wasting. Field observations are documented and follow-up actions, if necessary, are tracked using NYSERDA's maintenance log database.

NYSERDA conducted five regularly scheduled SDA walkover inspections in 2017, and found no significant impact on the erosion control structures within Erdman Brook or Franks Creek aside from some minor maintenance items.

3.1.2 Visual Inspections of Surrounding Stream Channels

In 2017, NYSERDA conducted monthly visual inspections of the creeks that flow around three sides of the SDA (Erdman Brook, Franks Creek, and Lagoon Road Creek). Stream channel inspections included assessments of installed erosion control structures and the results are documented in NYSERDA's Erosion Monitoring Log. As noted in the Erosion Monitoring Log updates for 2017, there remains an area of minor damage to the erosion control structures on Erdman Brook west of the NDA, which initially occurred as a result of rainstorms in July 2015. NYSERDA is working with the United States Department of Energy, who is responsible for maintenance in this area, to coordinate repairs.

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8 NYSERDA. 2013. "Walkover Inspection of the SDA, OPS003.08"

3.1.3 Quantitative Measurements

Survey data for the North Slope was collected on October 17, 2017 by NYSERDA's survey contractor. Survey data contained herein is being reported in North American Datum (NAD) 83 for horizontal positioning, and the National American Vertical Datum (NAVD) 88 for vertical positioning or elevation.

In 2016, NYSERDA installed 47 new monitoring points on the north slope of the SDA to replace absent or damaged points, and had them surveyed on October 26, 2016. The new monitoring points were surveyed in the NAD 83 and NAVD 88 coordinate system, and will be used as comparative monitoring points from year to year.

3.1.3.1 North Slope Survey

In accordance with the requirements of the Part 380 Permit #9-0422-00011/00011, NYSERDA conducts an annual survey of 47 monitoring points on the north slope of the SDA to detect slope movement. The survey and periodic field inspections of the north slope area during 2017 confirmed no reportable horizontal or vertical movement (e.g., slumping).

The 2017 elevations of the north slope monitoring points (see Figure 3-1) are provided in Table F-1. A comparison between the 2017 and 2016 data did not show any reportable changes (>0.5 ft) in the elevations of the monitoring points.

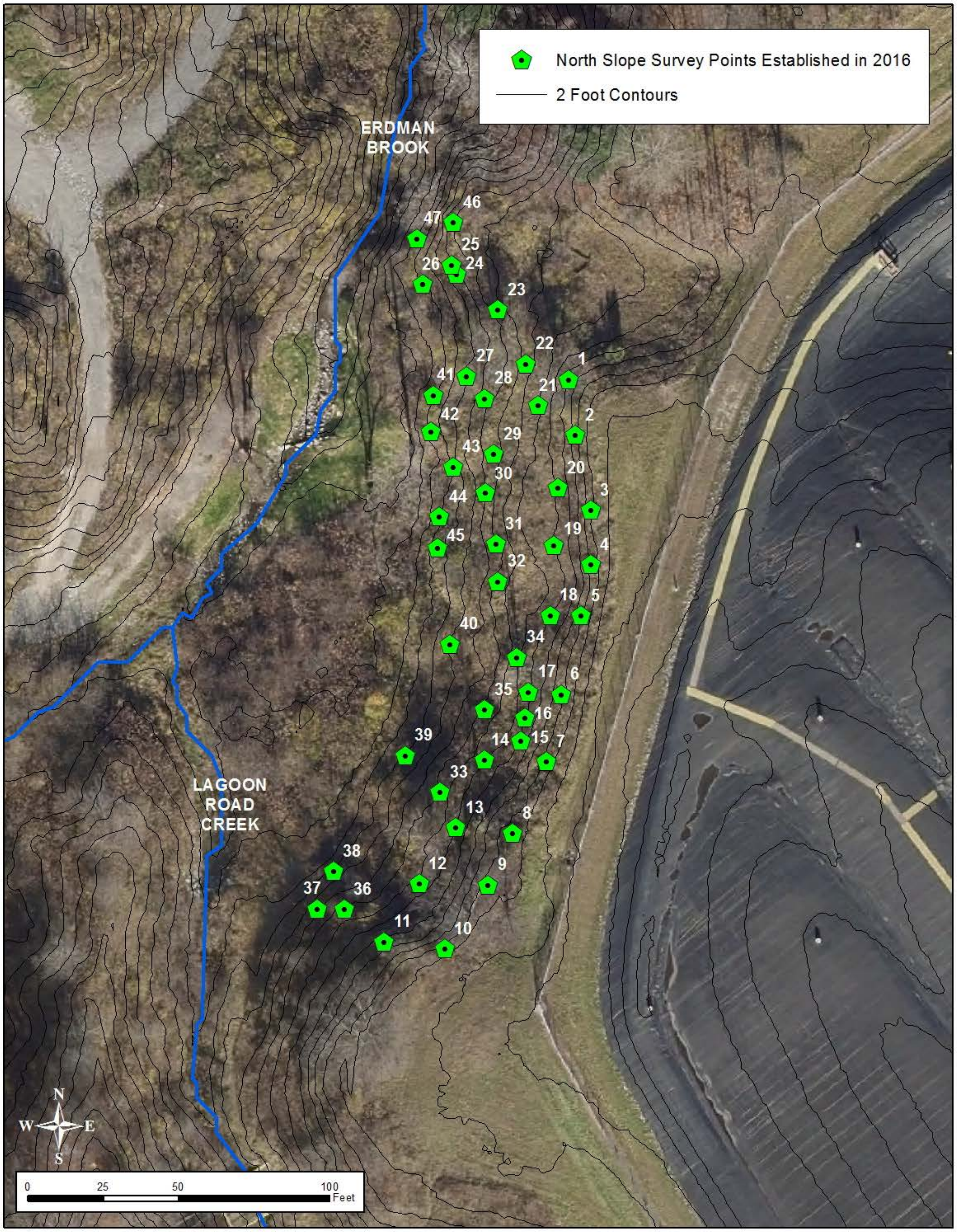
3.1.3.2 SDA Trench Cap Survey

NYSERDA historically surveyed the ground surface elevations along the SDA trench centerlines and monuments to monitor for trench cap settlement. NYSERDA and our survey contractor have discussed and evaluated the lack of effectiveness of the trench cap survey in identifying areas of subsidence, and NYSERDA will be using periodic visual inspections of the trench caps as they are more efficient in identifying changes. NYSERDA will also review Light Detection and Ranging (LiDAR) data sets (every five years) for the SDA to determine if there are any mass areas of settlement.

Areas of settlement have been observed on the southern portions of Trench 8 and 13 in 2013, and recently in the northern area of Trench 14. Trench 8 settlement was mitigated during the installation of the new geomembrane cover by installing lightweight geo-foam blocks to raise the areas of settlement prior to covering with the new geomembrane cover. A settlement gauge was also installed to monitor the area for further subsidence.

Figure 3-1. North Slope Ground Surface Elevation Survey Points

Source: NYSERDA



Engineered mitigative design for the subsidence on Trenches 13 and 14 will be completed in 2018, and constructed after completion of the design.

3.1.4 LiDAR Mapping and Orthophotography

In 2010, NYSERDA conducted an aerial LiDAR mapping and orthoimagery project (survey) for the Buttermilk Creek watershed, covering both the WNYNSC and the SDA. This survey fulfilled NYSERDA's requirement to complete comprehensive topographic mapping of the SDA and adjacent premises (per NYSERDA's *Erosion Monitoring Plan*[9]). A detailed topographic map of the SDA and adjacent premises was developed at a resolution of 0.5 meters. In 2015, NYSERDA conducted a new LiDAR survey of the area and fulfilled the requirement to complete a LiDAR survey once every five years. Figure 3-2 is a high quality topographic map of the SDA and the surrounding area that was derived from a subset of the 2015 LiDAR data. Having separate datasets collected at different times allows the data to be examined for changes to the land surface due to erosion, deposition, and/or subsidence. As would be expected, this examination identified active erosion of streams and gullies in the watershed. There was no evident subsidence or erosion at the SDA, or in areas adjacent to the SDA. There were some topographic changes at points along Erdman Brook and Franks Creek, which were directly attributable to the construction of erosion controls at these locations.

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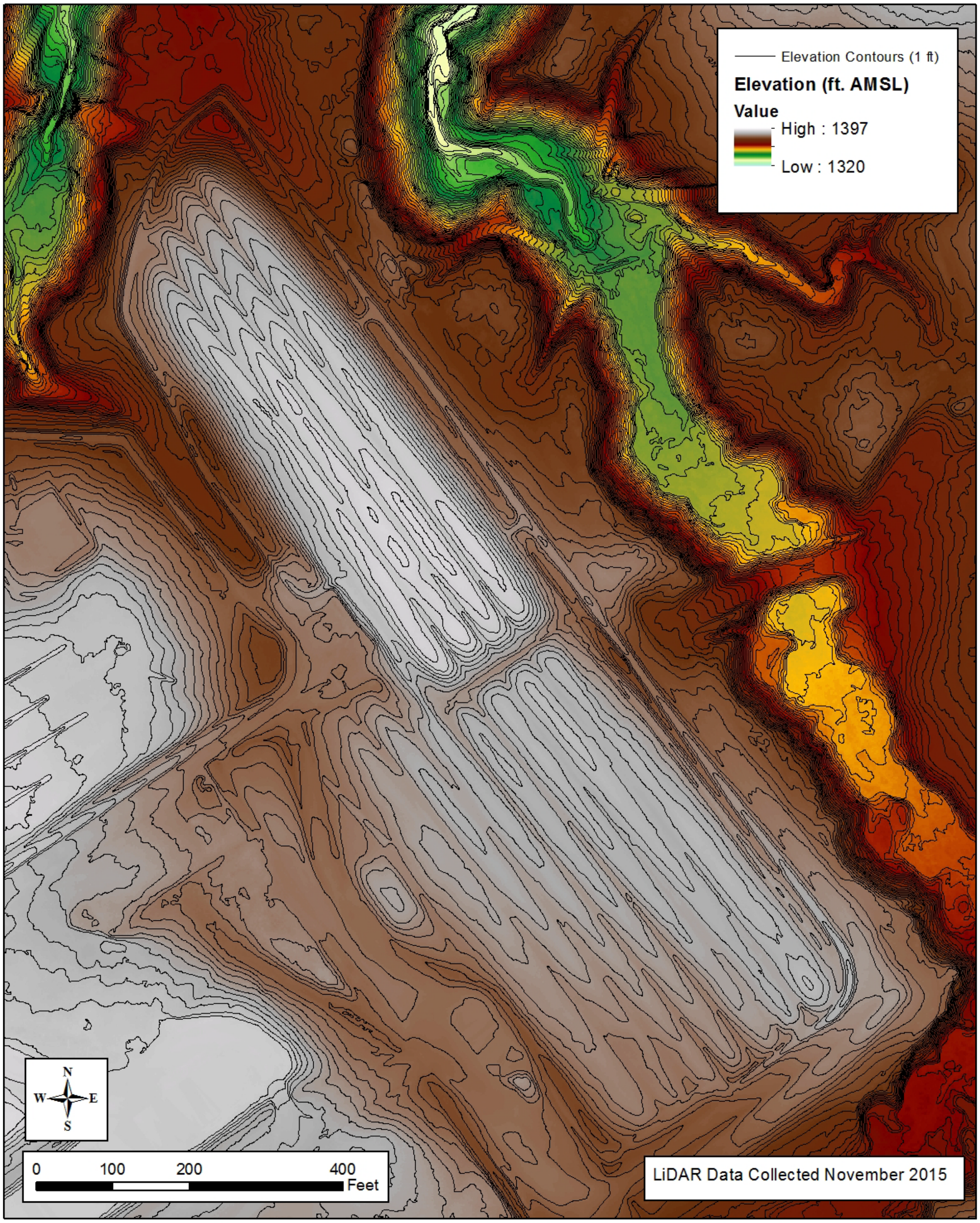
9 NYSERDA. 2014. "Erosion Monitoring Plan (EMP), ENV509.01."

Figure 3-2. LiDAR-Derived Topographic Map of the SDA and Surrounding Area

Source: NYSERDA



4 Facility Operations and Maintenance

NYSERDA is responsible for the safety, operations, and maintenance of the buildings and grounds at the SDA. Both routine and nonroutine facility inspections and maintenance activities are implemented to ensure that the facility is operating as designed. In 2017, facility operations and maintenance at the SDA included:

- Inspections and Testing.
- Maintenance.

4.1 Inspections and Testing

NYSERDA actively maintains the facilities at the SDA through routine inspections and testing of all physical and mechanical systems, followed by prompt corrective actions, as needed. All inspections are documented on standard forms and maintained as WVSMP records. Any deficiencies noted during these inspections and tests are tracked in the WVSMP Maintenance Log, scheduled for completion, and closed out in a timely manner.

In 2017, NYSERDA completed the following inspections and tests:

- Monthly SDA Building inspections.
- Monthly and annual fire extinguisher inspection and testing.
- Five walkover inspections of the entire SDA, and surrounding slopes and streams.
- Annual geomembrane cover system inspection.

All systems and operations at the SDA are performing as designed.

4.2 Operations and Maintenance

In 2017, NYSERDA completed the following routine and preventative maintenance at the SDA:

- Snowplowing and vegetation control at the SDA and Bulk Storage Warehouse.
- Support tasks for the annual deer hunting program on the WNYNSC.

NYSERDA completed the following nonroutine operations and maintenance activities at the SDA in 2017:

- Removed a portion of the obsolete secondary containment structure within the SDA Frac Tank Building to provide a work area for the increase in field activities.
- Removed 24 obsolete penetrations (i.e., well risers, gas vent pipes, reinforcement bar) to below grade (+/- six inches) of the SDA cap.
- Completed the focused topographic survey of Trench 8 and 13 for subsidence.
- Provided support for the leachate sampling activities for the SDA trenches.

- Installed a new geomembrane cover and completed regrading of Trenches 1 through 12, including adjacent areas.
- Removed the former leachate transfer pipe from the western fenceline of the SDA.
- Installed new stormwater discharge structures and piping for the SDA detention basins.

All nonroutine maintenance actions are tracked from start to finish in the WVSMP maintenance log database.

4.3 Engineered Construction Projects

In 2014, NYSERDA's engineering contractor prepared a Geomembrane Life Expectancy Estimate Report[10] advising NYSERDA that the geomembrane cover on Trenches 1 through 12 was nearing the end of its service life. Based on these recommendations, NYSERDA began the process to replace the covers on Trenches 1 through 12.

In May 2015, NYSERDA's engineering contractor prepared an Engineer's Report – Replacement of the SDA Geomembrane Cover on Trenches 1-12.[11] The report describes the performance of the current cover during its 20 years of service, identifies maintenance needs, and provides an outline of recommendations for the SDA cover replacement.

In 2016, NYSERDA's engineering contractor prepared design plans to replace the existing geomembrane cover with enhancements identified in the 2015 Engineer's Report. Enhancements included reconfiguring the geometry of select stormwater detention areas, regrading areas where ponding water has been observed, eliminating obsolete pipe penetrations, and installing weighted ballasts to limit potential damage from wind.

4.3.1 Geomembrane Cover Installation

Site preparation for the placement of the geomembrane cover consisted of enhancing the stormwater system and various earthmoving activities, including raising the elevation of areas that had been ponding water. The stormwater system was enhanced by installing new concrete discharge structures and piping,

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10 McMahon and Mann Consulting Engineers, P.C. July 2014. "Geomembrane Life Expectancy Estimate State Licensed Disposal Area West Valley, New York."

11 McMahon and Mann Consulting Engineers, P.C. 2015. "Design Report - Replacement of the SDA Geomembrane Cover on Trenches 1-12 and North Lagoons."

and combining stormwater catchments No. 2 and 3, thereby reducing the erosion potential to the east slope of the SDA (see Figure 4-1 for a typical base section of the new stormwater structures). Additional preparatory work included removal of wind anchor ballast material from in between the trench caps and along the perimeter. Figure 4-2 shows the vacuum truck operations removing stone ballast from an anchor trench. Some areas of observed subsidence were filled with sand and engineered fabric, while other areas with more subsidence (i.e., south end of Trench 8) had to be built up with geo-foam blocks, and then covered with geomembrane (see Figure 4-3).

The new geomembrane cover installation project was fabricated offsite. The 28 fabricated panels were shipped to the SDA, placed in order of installation, and welded together. (Figure 4-4 shows a panel being pulled and aligned with an adjacent panel for welding.) After the panels were installed, the sand ballast previously removed from the anchor trenches (using a sand throwing machine capable of casting the sand over 100 ft) was replaced. The sand was then graded out at a one percent slope to promote positive drainage and covered with an XR-5 cap. Figure 4-5 demonstrates the sand placement and XR-5 cap installation.

Upon completion of the placement of the geomembrane, NYSERDA's operations and maintenance contractor placed and compacted soil back into the perimeter anchor trench on top of the new geomembrane to prevent wind uplift. The majority of the site restoration was completed by early December 2017, but additional topsoil and seeding in the spring of 2018 is required for full site restoration. In addition, final surveys of the cover installation and surrounding areas will be completed in 2018 when weather conditions safely permit the completion of these activities.

Figure 4-1. New Stormwater Structure Base Section

Source: NYSERDA

Figure 4-2. Removal of Wind Anchor

Source: NYSERDA

Figure 4-3. Geo-foam Blocks

Source: NYSERDA

Figure 4-4. Placement of XR-5 panel

Source: NYSERDA

Figure 4-5. Sand placement and cap strap

Source: NYSERDA

5 Waste Management

NYSERDA has developed and implemented both systems and procedures to manage the SDA in a manner that minimizes the generation of radioactive or hazardous waste.

In 2017, waste management at the SDA included:

- Inspections.
- Waste storage.

5.1 Inspections

In 2017, NYSERDA completed four waste inspections. No deficiencies were noted during these inspections.

5.2 Waste Removal and Disposal

NYSERDA is not a routine generator of waste. In 2017, 0.33m^3 of low-level radioactive waste was generated:

- Equipment from the trenches.
- Used personal protective equipment.

The total volume of waste currently in storage is 0.49 m^3. All waste currently in storage is low-level radioactive waste only.

Appendix A – Trench Leachate Elevation Data

Table A-1. 2017 Trench Leachate Elevation Data

Elevations are referenced to the NGVD of 1929.

Source: NYSERDA

Trench	Jan 5	Feb 1	Mar 1	Apr 3	May 1	Jun 1
Trench 1			1365.85			1365.85
Trench 2			1361.01			1360.98
Trench 3			1359.77			1359.67
Trench 4			1362.58			1362.56
Trench 5			1362.93			1362.89
Trench 8			1361.34			1361.31
Trench 9			1360.19			1360.15
Trench 10N			1361.45			1361.40
Trench 10S			1360.53			1360.50
Trench 11			1360.12			1360.10
Trench 12			1360.93			1360.84
Trench 13	1363.43	1363.45	1363.47	1363.44	1363.44	1363.40
Trench 14	1366.18	1366.18	1366.17	1366.15	1366.13	1366.16
WP-91	1366.06	1366.06	1366.05	1366.06	1366.05	1366.06

Table A-1 continued.

Trench	Jul 5	Aug 1	Sep 7	Oct 2	Nov 1	Dec 1
Trench 1			1365.86			1365.36[a]
Trench 2			1360.98			1360.96
Trench 3			1359.61			1359.60
Trench 4			1362.56			1362.58
Trench 5			1362.91			1362.80
Trench 8			1361.26			1361.01[b]
Trench 9			1360.24			1360.13
Trench 10N			1361.40			1361.16
Trench 10S			1360.50			1360.47
Trench 11			1360.10			1360.05
Trench 12			1360.70[c]			1360.92
Trench 13	1363.40	1363.39	1363.38	1363.37	1363.37	1363.36
Trench 14	1366.18	1366.18	1366.18	1366.16	1366.18	1366.17
WP-91	1366.06	1366.04	1366.04	1366.04	1366.05	1366.05

[a] 0.5 ft decrease due to leachate sampling on September 12, 2017.

[b] Trench 8 sump riser extension and subsequent point survey in September 2017 resulted in an approximate 0.25 ft leachate level difference.

[c] The September 7, 2017 leachate level for Trench 12 was not collected due to a conductivity probe malfunction. The level was collected on September 5, 2017 prior to the leachate sampling event.

Figure A-1. 2007-2017 Leachate Elevations, Trench 1

Slope does not include the December 2017 point due to the September 2017 leachate sampling.

Source: NYSERDA

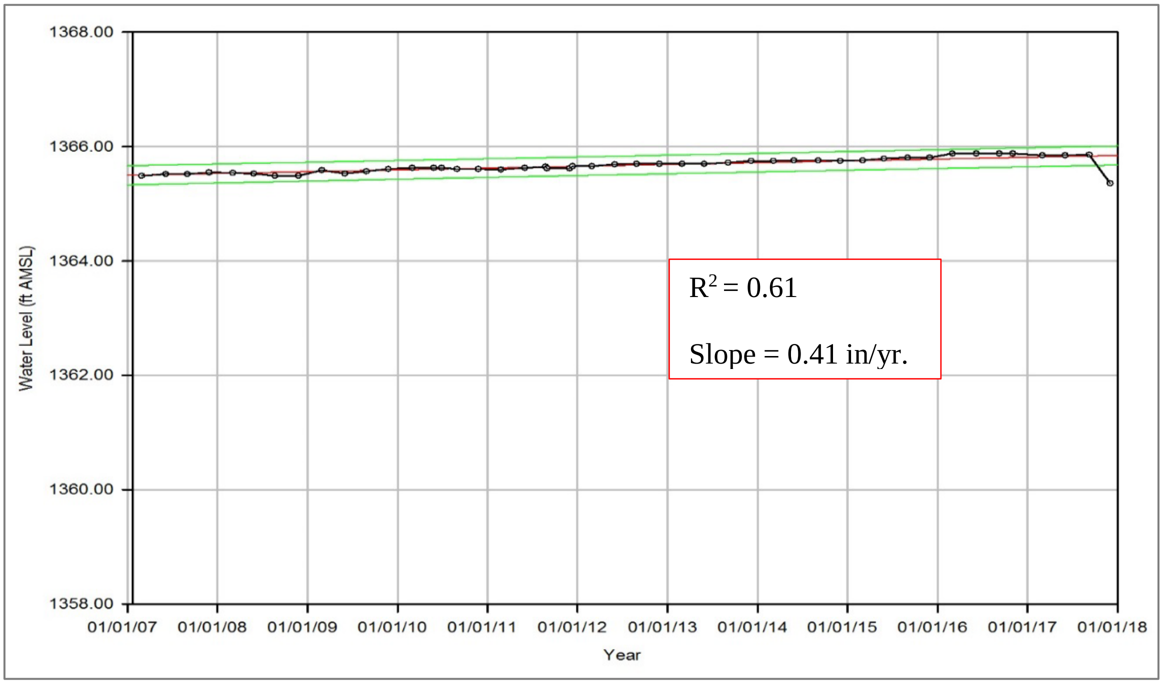


Figure A-2. 2007-2017 Leachate Elevations, Trench 2

Source: NYSERDA

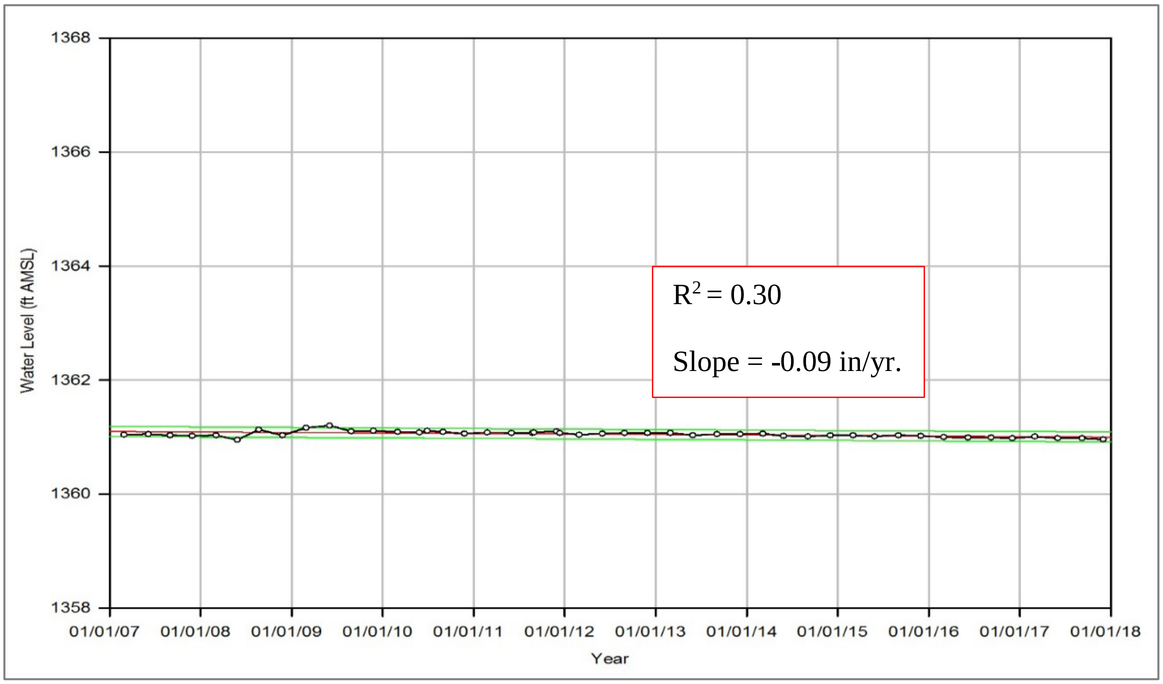


Figure A-3. 2007-2017 Leachate Elevations, Trench 3

Trench 3 measurement probe was replaced in July 2016.

Source: NYSERDA

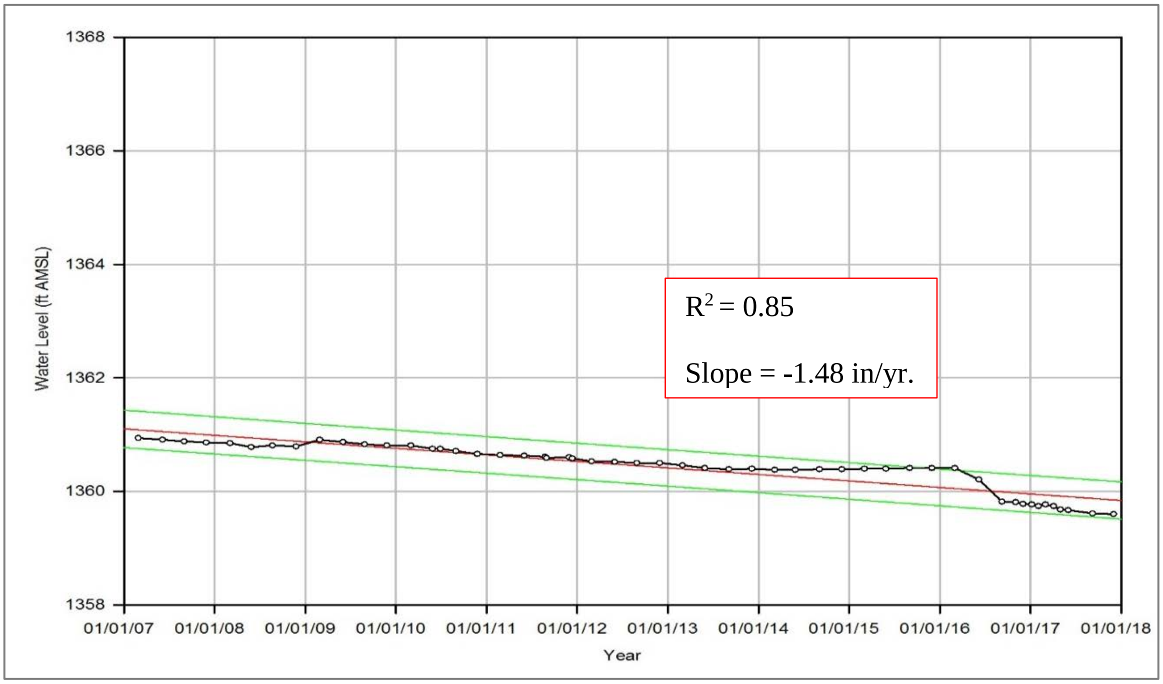


Figure A-4. 2007-2017 Leachate Elevations, Trench 4

Source: NYSERDA

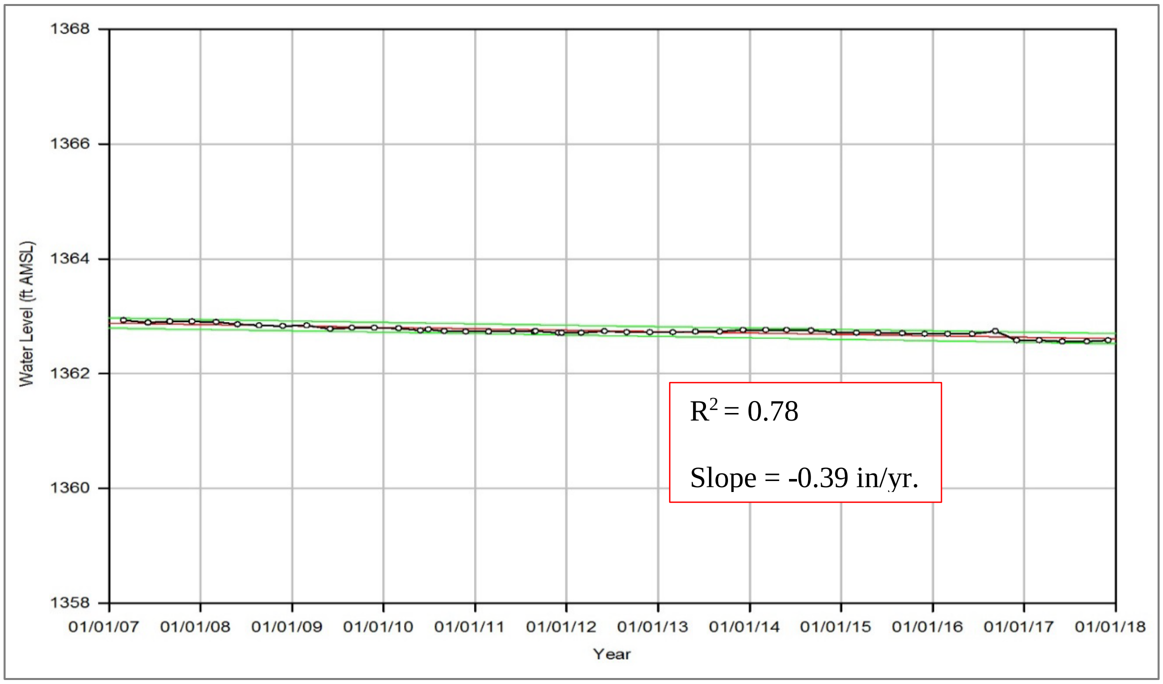


Figure A-5. 2007-2017 Leachate Elevations, Trench 5

Source: NYSERDA

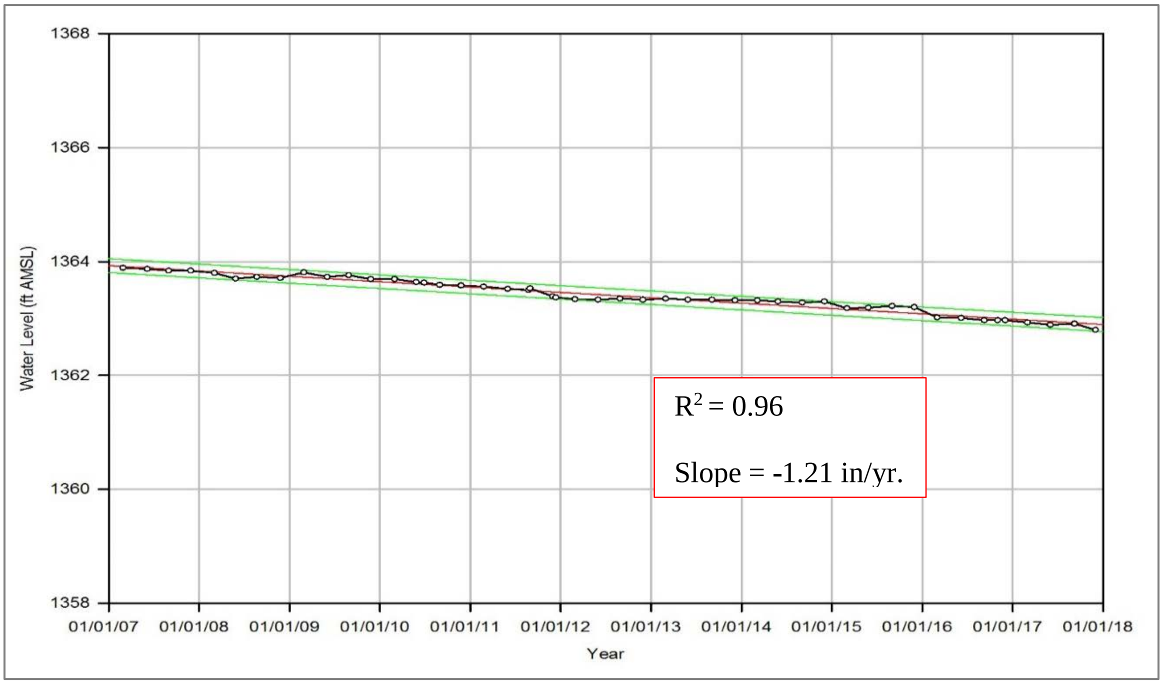


Figure A-6. 2007-2017 Leachate Elevations, Trench 8

Trench 8 sump riser extension was placed in September 2017.

Source: NYSERDA

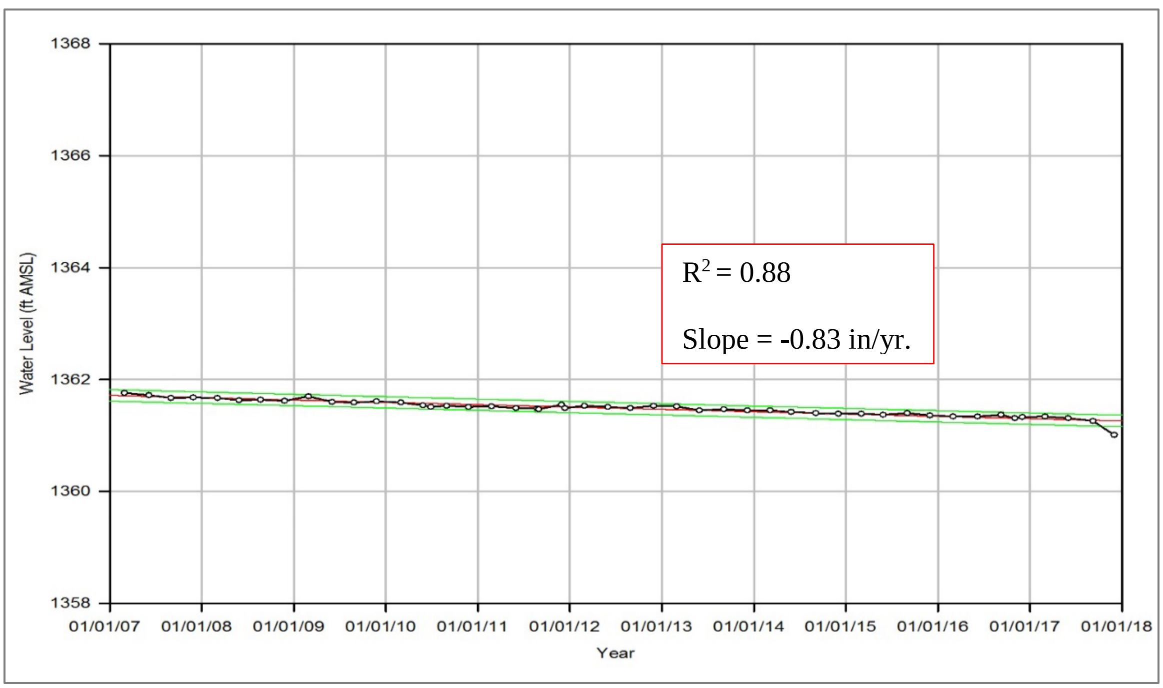


Figure A-7. 2007-2017 Leachate Elevations, Trench 9

Source: NYSERDA

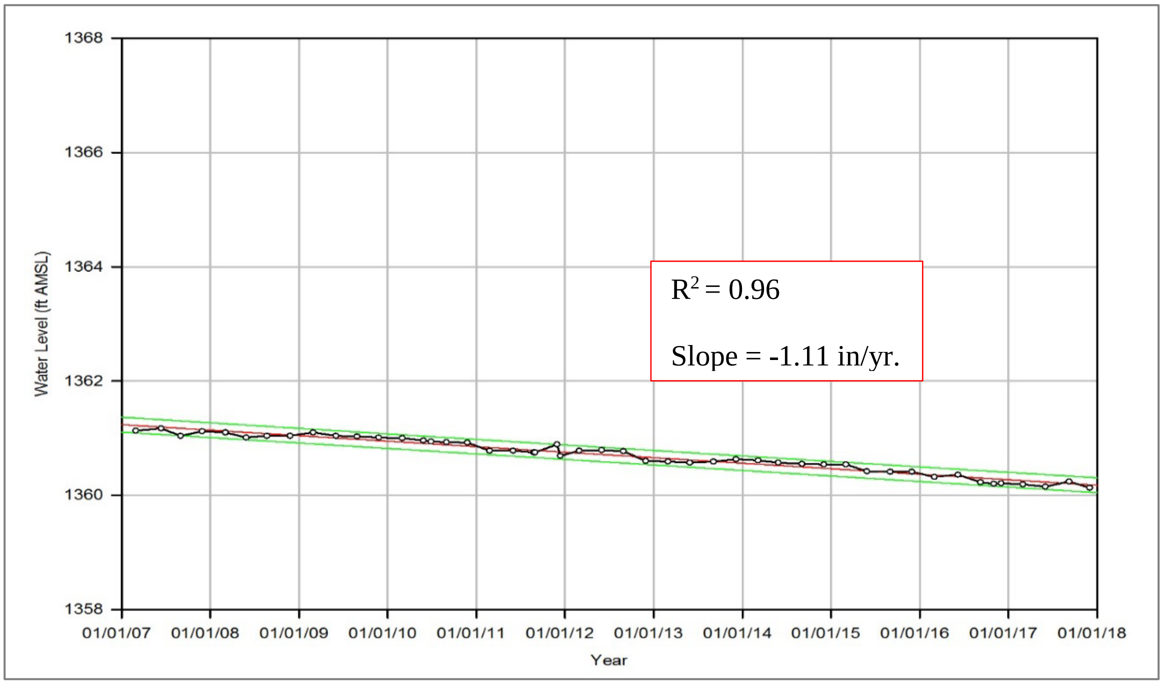


Figure A-8. 2007-2017 Leachate Elevations, Trench 10N

Source: NYSERDA

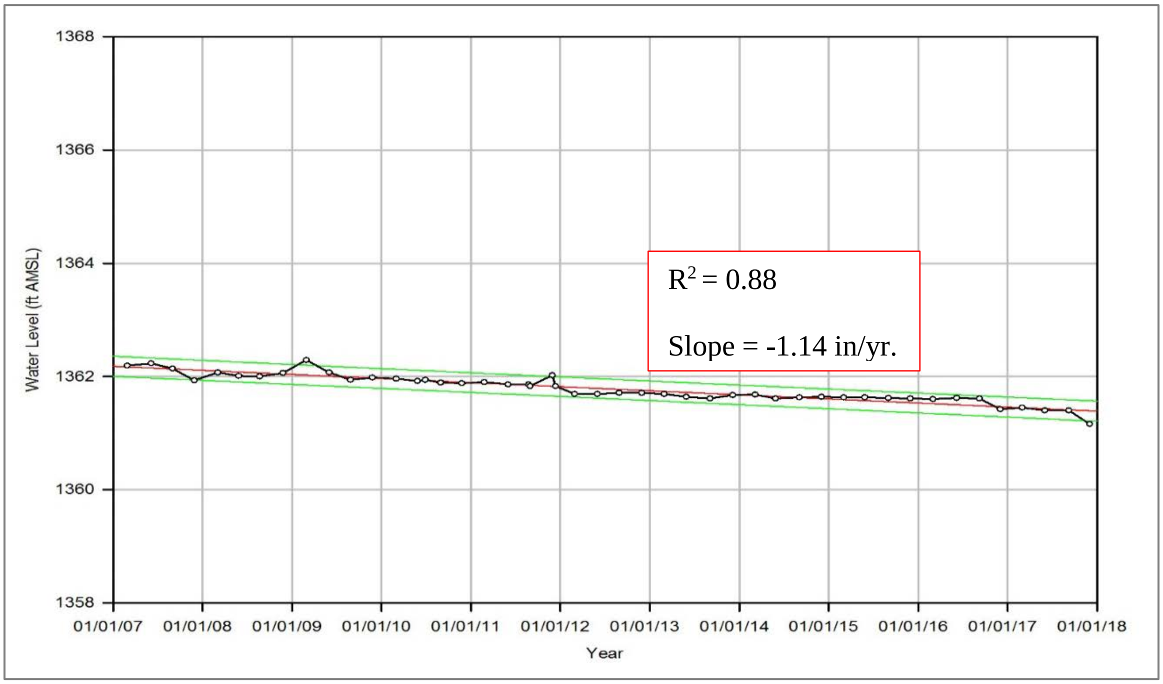


Figure A-9. 2007-2017 Leachate Elevations, Trench 10S

Source: NYSERDA

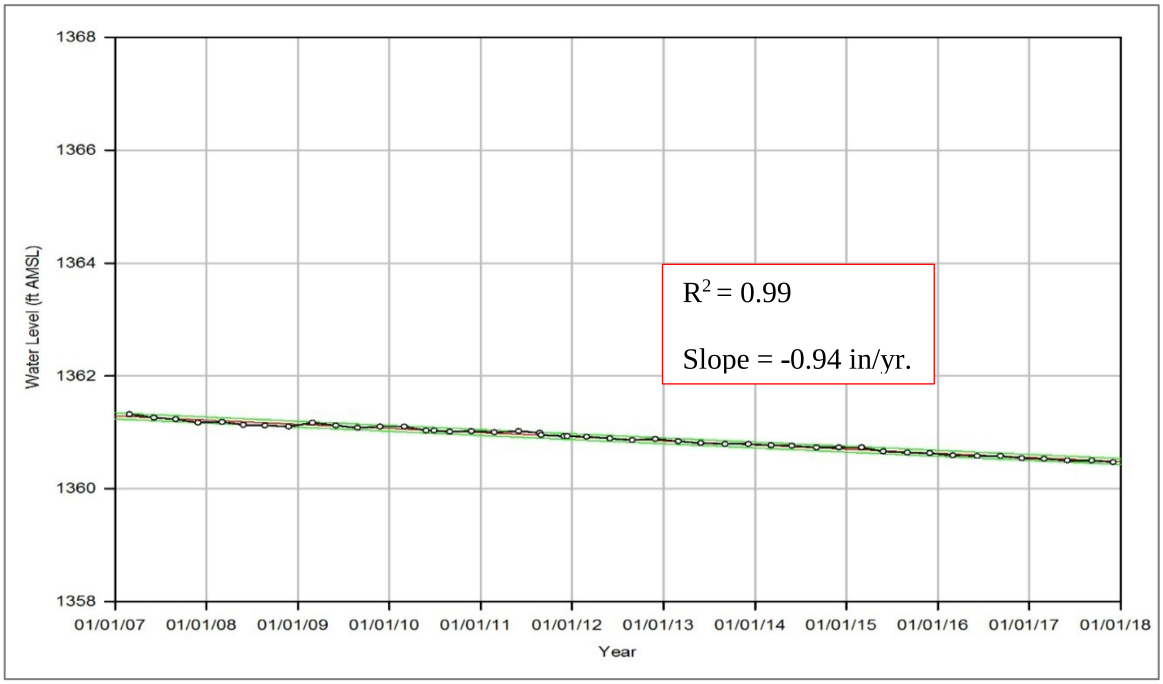


Figure A-10. 2007-2017 Leachate Elevations, Trench 11

Source: NYSERDA

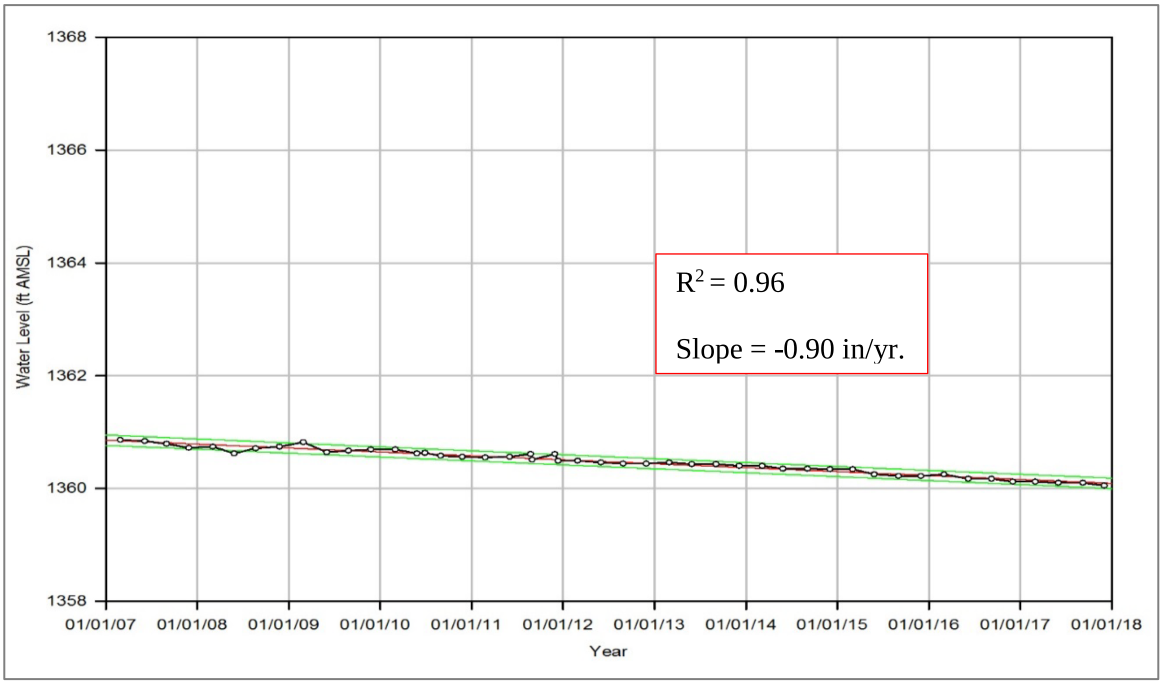


Figure A-11. 2007-2017 Leachate Elevations, Trench 12

Source: NYSERDA

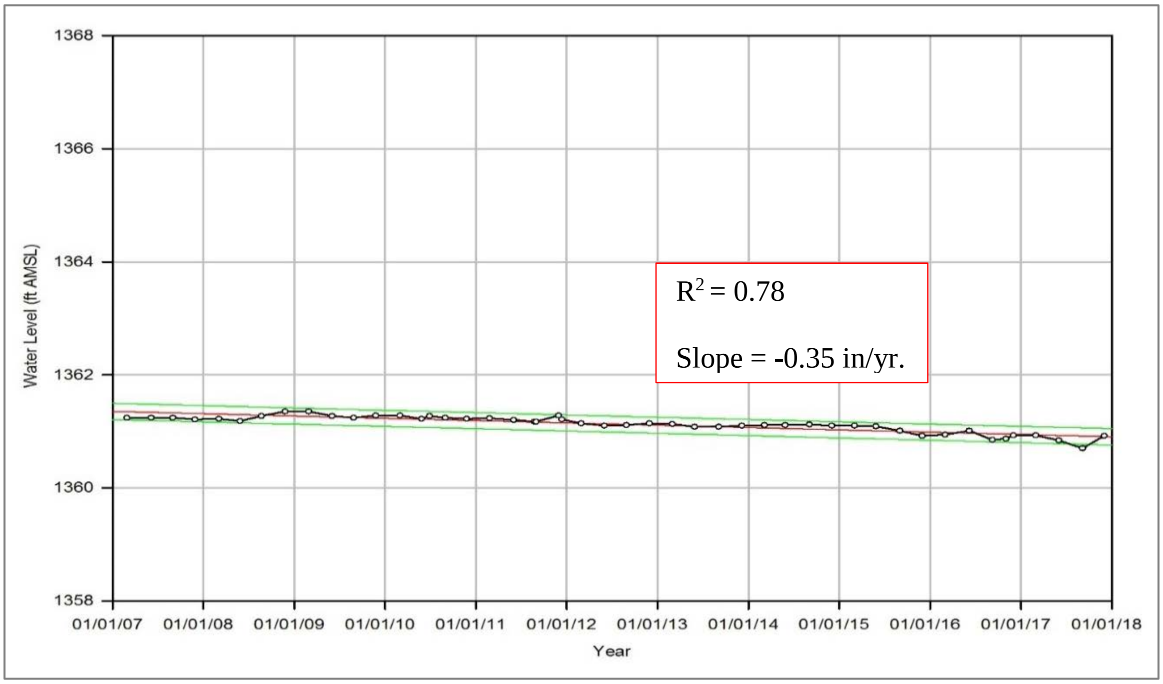


Figure A-12. 2007-2017 Leachate Elevations, Trench 13

Source: NYSERDA

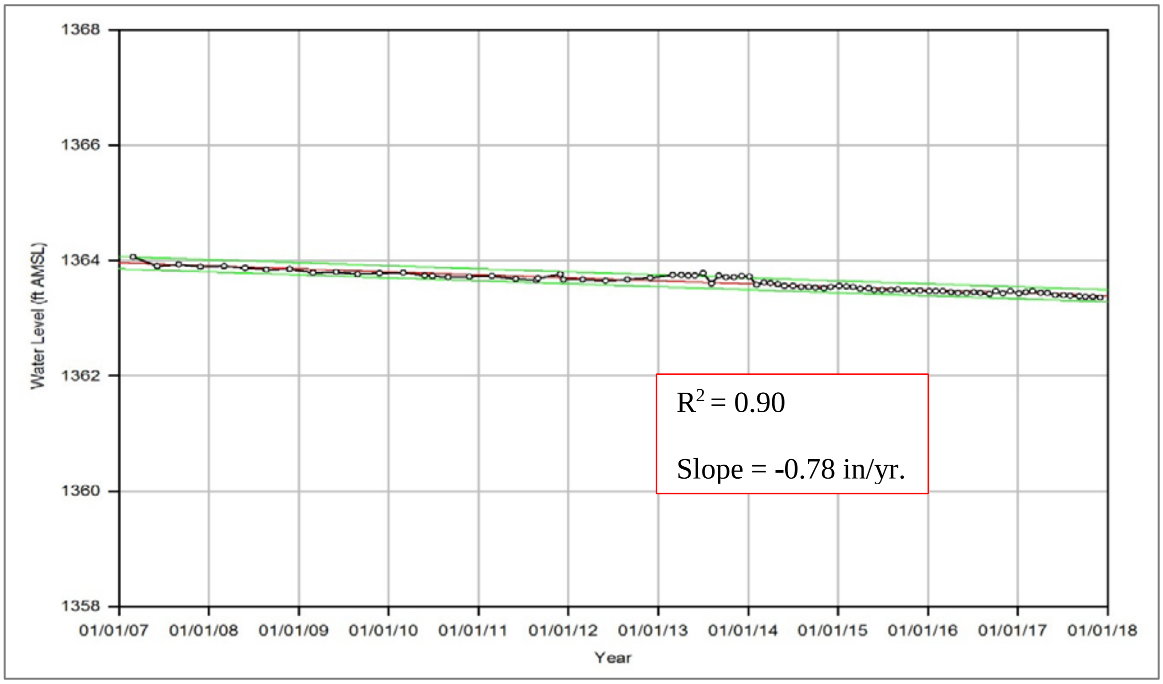


Figure A-13. Trench 14 Leachate Elevations for the Period 1997 to 2017, Regression Analysis Shown for 1997 to 2008

Source: NYSERDA

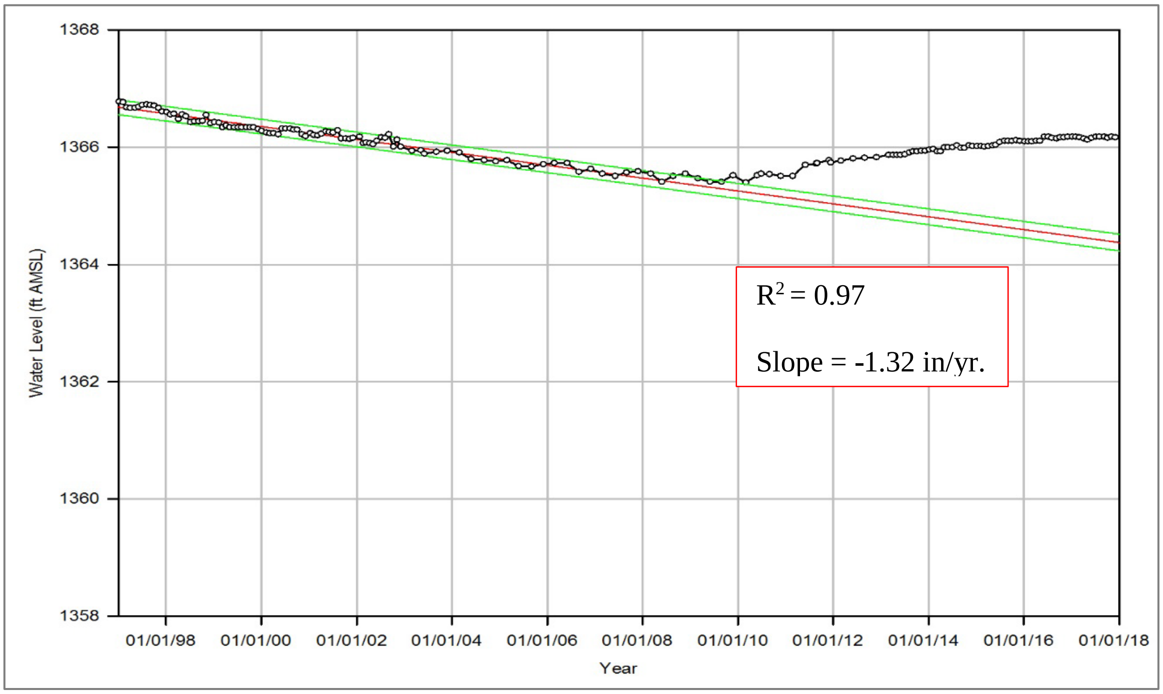


Figure A-14. Trench 14 Leachate Elevations for the Period 1997 to 2017, Regression Analysis Shown for 2011 to 2017

Source: NYSERDA

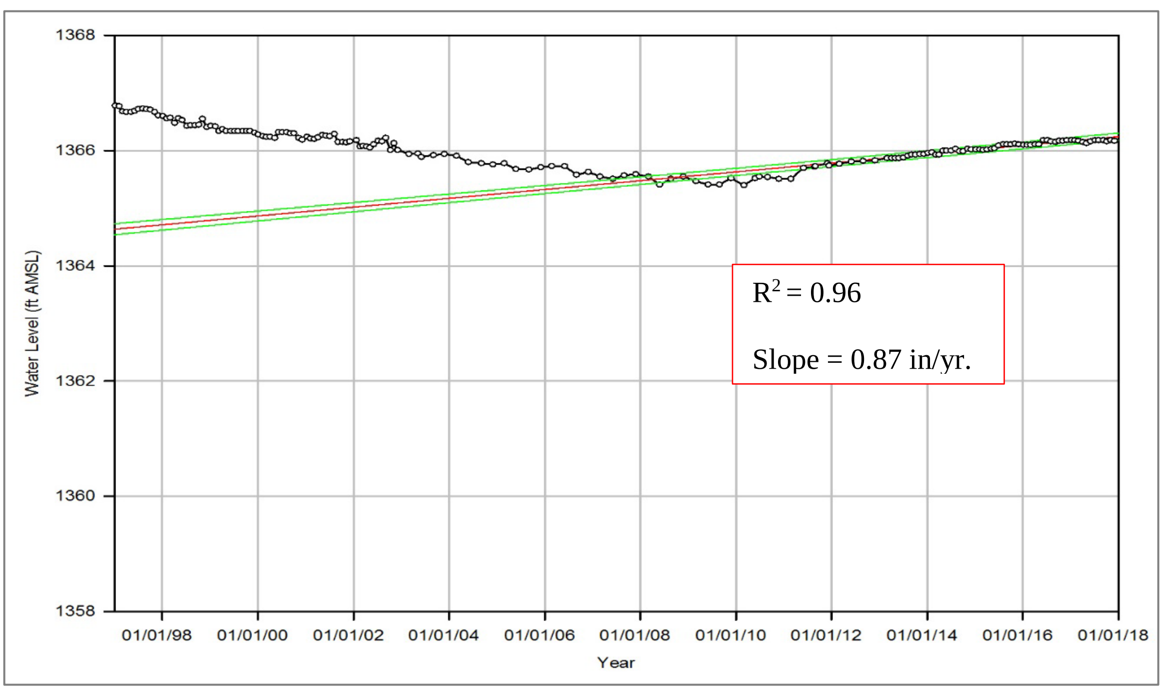
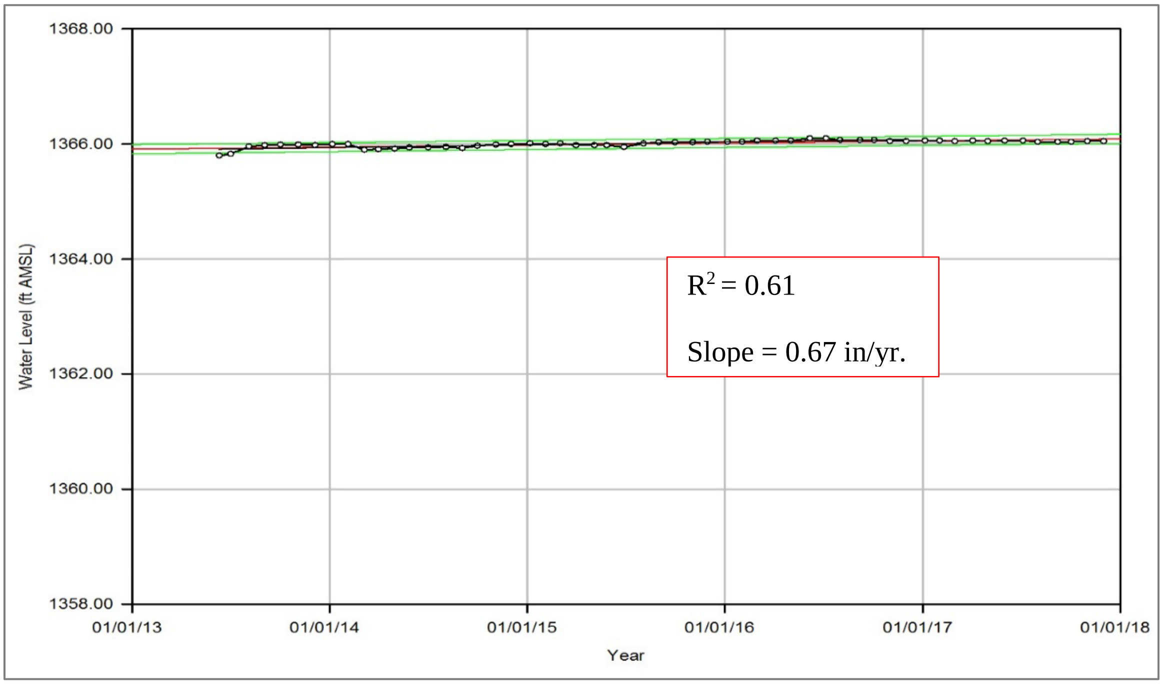


Figure A-15. 2013 to 2017 Leachate Elevations, WP-91

Source: NYSERDA



Appendix B – Groundwater Monitoring

Table B-1. Groundwater Monitoring Well Summary – SDA 1100-Series Wells

Well depths are rounded. Elevations are referenced to the NGVD of 1929 and based on well construction details.

Source: NYSERDA

Well	Well Depth (ft BGS)	Well Bottom Elevation (ft AMSL)	Screened Interval Elevations (ft AMSL)	Geologic Unit Screened
1101A	16	1363.46	1363.88 - 1373.88	W/U
1101B	30	1349.51	1349.93 – 1359.93	U
1101C	109	1270.22	1270.64 - 1285.64	L
1102A	17	1365.80	1366.22 - 1376.22	W/U
1102B	31	1351.68	1352.10 - 1362.10	U
1103A	16	1363.99	1364.41 – 1374.41	W/U
1103B	36	1343.92	1344.34 - 1359.34	U
1103C	121	1258.60	1259.02 - 1274.02	L/O
1104A	19	1357.21	1357.63 – 1372.63	W/U
1104B	36	1340.19	1340.61 - 1355.61	U
1104C	124	1252.05	1252.47 - 1262.47	L/O
1105A	21	1344.90	1345.32 - 1355.32	U
1105B	36	1330.53	1330.53 - 1345.53	U
1106A	16	1358.45	1358.87 – 1368.87	W/U
1106B	31	1343.71	1344.13 - 1354.13	U
1107A	19	1358.26	1358.68 – 1373.68	W/U
1108A	16	1365.02	1365.44 - 1375.44	W/U
1109A	16	1358.95	1359.37 - 1369.37	W/U
1109B	31	1343.11	1343.53 - 1358.53	U
1110A	20	1357.14	1357.56 - 1367.56	W/U
1111A	21	1359.31	1359.73 - 1369.73	U

Key:

L	Lacustrine Unit (Kent recessional sequence)
L/O	Lacustrine/Outwash - Kame Sand and Gravel (Kent recessional sequence)
U	Unweathered Till
W/U	Weathered/Unweathered Till

Table B-2. 2017 Groundwater Elevations – SDA 1100-Series Wells – (Feet AMSL)

Elevations are referenced to the NGVD of 1929. Entries are blank for location/dates for which water elevation was not measured.

Source: NYSERDA

Well	Jan 5	Feb 1	Mar 1	Apr 3	May 1	Jun 1
1101A	1374.14	1377.74	1378.12	1378.15	1378.10	1377.68
1101B	1358.33	1361.65	1363.60	1363.91	1364.09	1363.98
1101C	1282.31	1282.21	1282.10	1282.02	1282.16	1282.04
1102A			1379.57			1379.26
1102B			1367.35			1366.91
1103A			1379.18			1378.91
1103B			1366.12			1365.67
1103C			1259.93			1259.98
1104A			1373.21			1373.44
1104B			1361.56			1362.30
1104C			1253.97			1253.76
1105A			1353.37			1355.74
1105B			1337.54			1340.12
1106A	1371.44	1371.74	1371.53	1372.18	1371.92	1371.98
1106B	1357.95	1358.42	1358.29	1357.89	1357.94	1357.99
1107A			1370.15			1369.81
1108A	1369.20	1370.37	1371.28	1372.14	1372.98	1373.75
1109A		1362.75	1362.83	1362.70	1362.81	1362.81
1109B	1362.36	1362.86	1363.08	1362.72	1362.98	1363.04
1110A			1360.53			1359.72
1111A			1376.73			1376.70

Table B-2 continued.

Well	Jul 5	Aug 1	Sep 7	Oct 2	Nov 1	Dec 1
1101A	1371.80	1376.20	1376.52	1376.91	1377.22	1377.91
1101B	1355.92	1358.91	1362.77	1363.81	1364.28	1364.88
1101C	1281.91	1281.96	1282.24	1281.84	1282.11	1281.96
1102A			1377.61			1379.32
1102B			1366.72			1367.73
1103A			1377.08			1378.54
1103B			1365.11			1366.11
1103C			1260.01			1259.98
1104A			1371.69			1372.10
1104B			1361.83			1361.87
1104C			1253.82			1253.77
1105A			1353.63			1355.87
1105B			1338.14			1340.79
1106A	1366.37	1369.54	1370.69	1370.68	1371.44	1371.70
1106B	1354.83	1358.18	1359.22	1359.62	1359.59	1359.56
1107A			1369.40			1369.03
1108A	1369.77	1371.85	1373.18	1373.44	1373.61	1373.94
1109A	1361.19	1363.00	1364.07	1364.07	1364.12	1363.85
1109B	1361.17	1363.19	1364.08	1364.07	1364.07	1363.84
1110A			1360.38			1360.88
1111A			1375.04			1376.14

Table B-3. Groundwater Monitoring Well Summary – SDA Piezometers

Elevations are referenced to the NGVD of 1929 and based on the piezometer construction details.

Source: NYSERDA

Piezometer	Well Depth (ft BGS)	Well Bottom Elevation (ft AMSL)	Screened Interval Elevations (ft AMSL)	Geologic Unit Screened
1S-91	14	1369.56	1369.56 - 1377.06	W/U
2S-91	16	1369.55	1369.55 - 1379.55	W/U
3S-91	13.5	1365.78	1365.78 - 1373.28	W/U
4S-91	11	1370.16	1370.16 - 1375.16	W/U
4D-91	29	1352.16	1352.16 - 1367.16	U
6S-91	11	1371.20	1371.20 - 1376.20	W/U
6D-91	25	1357.20	1357.20 - 1367.20	U
9S-91	9	1372.71	1372.71 - 1377.71	W/U
9D-91	25	1356.71	1356.71 - 1366.71	U
10S-91	12.4	1367.75	1367.75 - 1375.25	W/U
15S-91	13	1366.59	1366.59 - 1374.09	W/U
16D-91	25	1354.99	1354.99 - 1364.99	U
17S-91	11	1373.23	1373.23 - 1378.23	W/U
18S-91	14	1367.20	1367.20 - 1374.70	U
21S-91	16	1366.20	1366.20 - 1371.20	U
22S-91	21	1362.42	1362.42 - 1367.42	U
24S-91	18	1363.00	1363.00 - 1373.00	W/U
B-14	24	1356.57	1356.57 - 1366.57	U
P1-95[d]	7.7	1360.89	1360.89 - 1365.89	W

[d] P1-95 was installed using the direct push method.

Key:

U	Unweathered Till
W	Weathered Till
W/U	Weathered/Unweathered Till

Table B-4. Groundwater Elevations – SDA Piezometers – (Feet AMSL)

Elevations are referenced to the NGVD of 1929. Entries are blank for location/dates for which water elevation was not measured.

Source: NYSERDA

Well/ Piezometer	Jan 5	Feb 1	Mar 1	Apr 3	May 1	Jun 1
1S-91			1381.25			1381.18
2S-91			1381.20			1381.47
3S-91	1373.37	1373.42	1373.90	1374.27	1374.40	1374.28
4S-91	dry	dry	dry	dry	dry	dry
4D-91	1357.74	1357.08	1356.76	1356.14	1356.12	1356.14
6S-91	dry	dry	dry	dry	dry	dry
6D-91	1362.85	1362.29	1361.76	1361.21	1361.12	1361.15
9S-91	dry	dry	dry	dry	dry	dry
9D-91	1358.44	1358.23	1357.57	1357.25	1357.12	1357.14
10S-91	1372.38	1371.96	1371.78	1372.18	1372.88	1374.50
15S-91	1378.70	1378.85	1379.75	1379.98	1379.94	1380.00
16D-91	1363.51	1363.38	1363.18	1362.84	1362.73	1362.70
17S-91	1382.35	1382.49	1382.59	1382.61	1382.75	1382.15
18S-91	1375.19	1376.41	1377.08	1377.28	1377.71	1377.54
21S-91	dry	dry	dry	dry	dry	dry
22S-91	dry	dry	dry	dry	dry	dry
24S-91	dry	dry	dry	dry	dry	dry
B-14	1360.68	1360.06	1360.01	1359.25	1358.94	1358.90
P1-95			1365.05			1364.60

Table B-4 continued.

Well/ Piezometer	Jul 5	Aug 1	Sep 7	Oct 2	Nov 1	Dec 1
1S-91			1379.96			1380.17
2S-91			1381.07			1378.49
3S-91	1374.58	1374.70	1373.79	1373.30	1373.36	1374.34
4S-91	dry	dry	dry	dry	dry	dry
4D-91	1356.44	1356.90	1357.62	1357.63	1358.00	1357.94
6S-91	dry	dry	dry	dry	dry	dry
6D-91	1361.88	1362.48	1363.14	1363.49	1363.67	1363.33
9S-91	dry	dry	dry	dry	dry	dry
9D-91	1357.23	1357.06	1357.18	1357.95	1358.14	1359.67
10S-91	1375.88	1376.62	1376.70	1375.92	1375.26	1373.80
15S-91	1379.24	1378.71	1378.38	1377.91	1378.27	1377.99
16D-91	1362.93	1363.27	1363.73	1363.96	1364.14	1364.36
17S-91	1382.60	1380.90	1380.45	1380.70	1380.80	1381.40
18S-91	1377.58	1376.86	1376.17	1375.62	1375.17	1375.41
21S-91	dry	dry	dry	dry	dry	dry
22S-91	dry	dry	dry	dry	dry	dry
24S-91	dry	dry	dry	dry	dry	dry
B-14	1359.11	1359.61	1360.18	1360.29	1360.29	1360.43
P1-95			1362.72			1363.96

Table B-5. Groundwater Monitoring Well Summary – SDA Slit-Trench Wells

Elevations are referenced to the NGVD of 1929 and based on the slit-trench well construction details.

Source: NYSERDA

Slit Trench Well	Well Depth (ft BGS)	Well Bottom Elevation (ft AMSL)	Screened Interval Elevations (ft AMSL)	Geologic Unit Screened
SMW-1	7	1373.77	1373.97 - 1376.17	W
SMW-2	6	1375.00	1375.20 - 1377.40	W
SMW-3	6	1374.44	1374.64 - 1376.84	W
SMW-4	11	1367.05	1367.25 - 1369.45	W/U
SMW-5	7	1371.65	1371.85 - 1373.85	W
SMW-6	7	1373.21	1373.41 - 1375.61	W
SMW-7	6.5	1373.41	1373.61 - 1375.81	W
SMW-8	7	1370.19	1370.39 - 1373.39	W
SMW-9	6	1370.66	1370.86 - 1373.06	W

Key:

W	Weathered Till
W/U	Weathered/Unweathered Till

Table B-6. 2017 Groundwater Elevations – SDA Slit-Trench Wells – (Feet AMSL)

Elevations are referenced to the NGVD of 1929. Entries are blank for location/dates for which water elevation was not measured.

Source: NYSERDA

Well	Jan 5	Feb 1	Mar 1	Apr 3	May 1	Jun 1
SMW-1	1379.40	1379.62	1380.32	1380.25	1380.61	1380.21
SMW-2	dry	dry	dry	dry	dry	dry
SMW-3	dry	dry	dry	dry	dry	dry
SMW-4	1371.34	1371.74	1372.89	1373.27	1374.33	1374.38
SMW-5	1376.64	1376.64	1377.23	1377.08	1377.20	1376.94
SMW-6	1380.79	1380.66	1380.75	1380.34	1380.35	1379.68
SMW-7	dry	1374.89	dry	1375.51	1375.82	1375.78
SMW-8	1374.20	1374.15	1374.53	1374.28	1375.37	1375.87
SMW-9	1375.41	1375.89	1376.75	1376.68	1376.70	1376.13

Well	Jul 5	Aug 1	Sep 7	Oct 2	Nov 1	Dec 1
SMW-1	1380.37	1379.88	1379.19	1379.04	1378.51	1378.56
SMW-2	dry	dry	dry	dry	dry	dry
SMW-3	dry	dry	dry	dry	dry	dry
SMW-4	1374.82	1375.10	1374.27	1372.78	1371.86	1371.72
SMW-5	1376.76	1376.65	1376.42	1376.32	1376.42	1376.23
SMW-6	1379.26	1378.49	1377.57	1377.39	1379.63	1379.73
SMW-7	1375.90	1375.84	1375.36	1374.92	dry	dry
SMW-8	1376.78	1377.47	1376.91	1376.36	1375.82	1374.44
SMW-9	1376.07	1375.55	1374.35	1374.29	1374.59	1375.38

Figure B-1. First Quarter 2017 Weathered Lavery Till Groundwater Contour Map

Source: NYSERDA

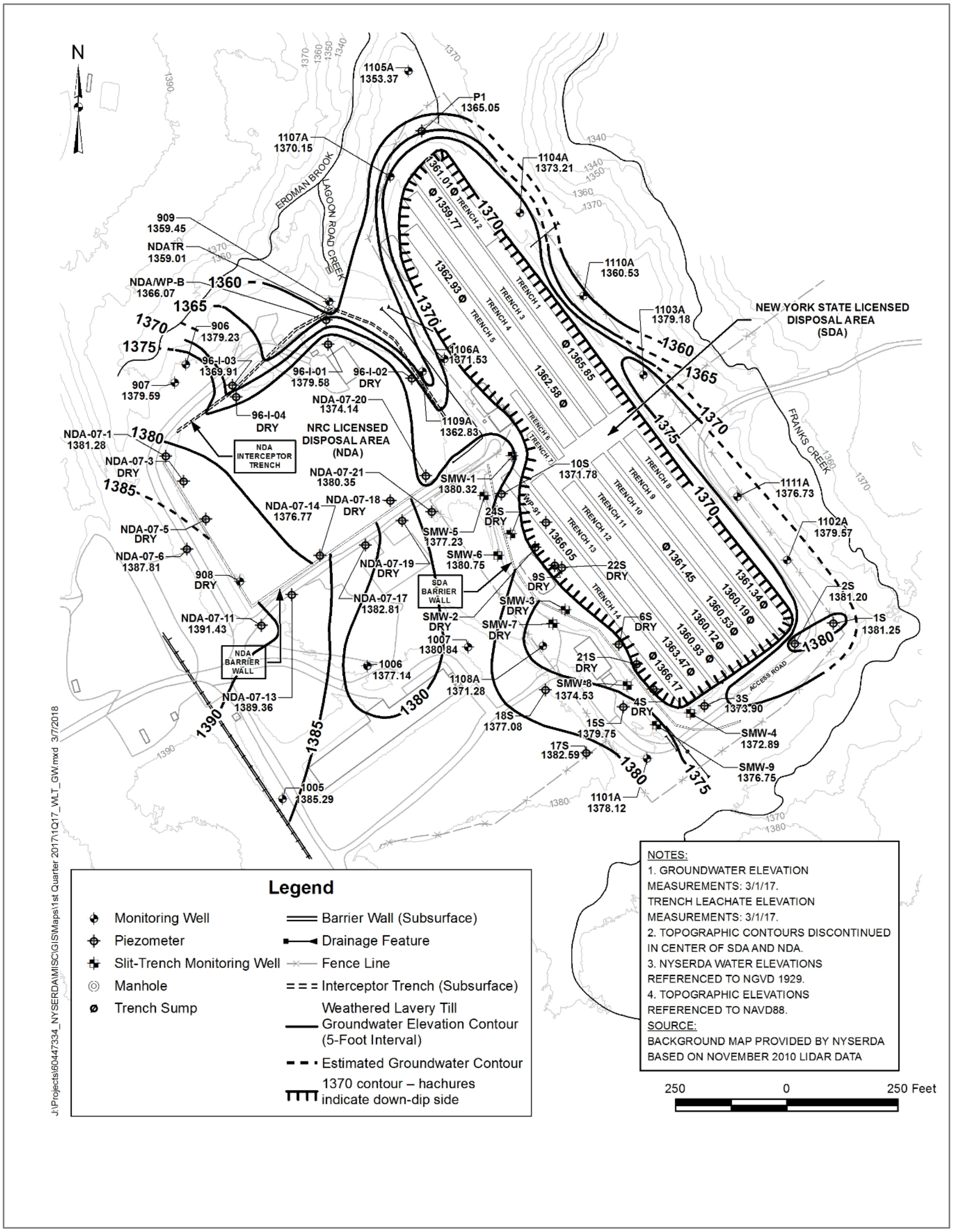


Figure B-2. First Quarter 2017 Kent Recessional Sequence Groundwater Contour Map

Source: NYSERDA

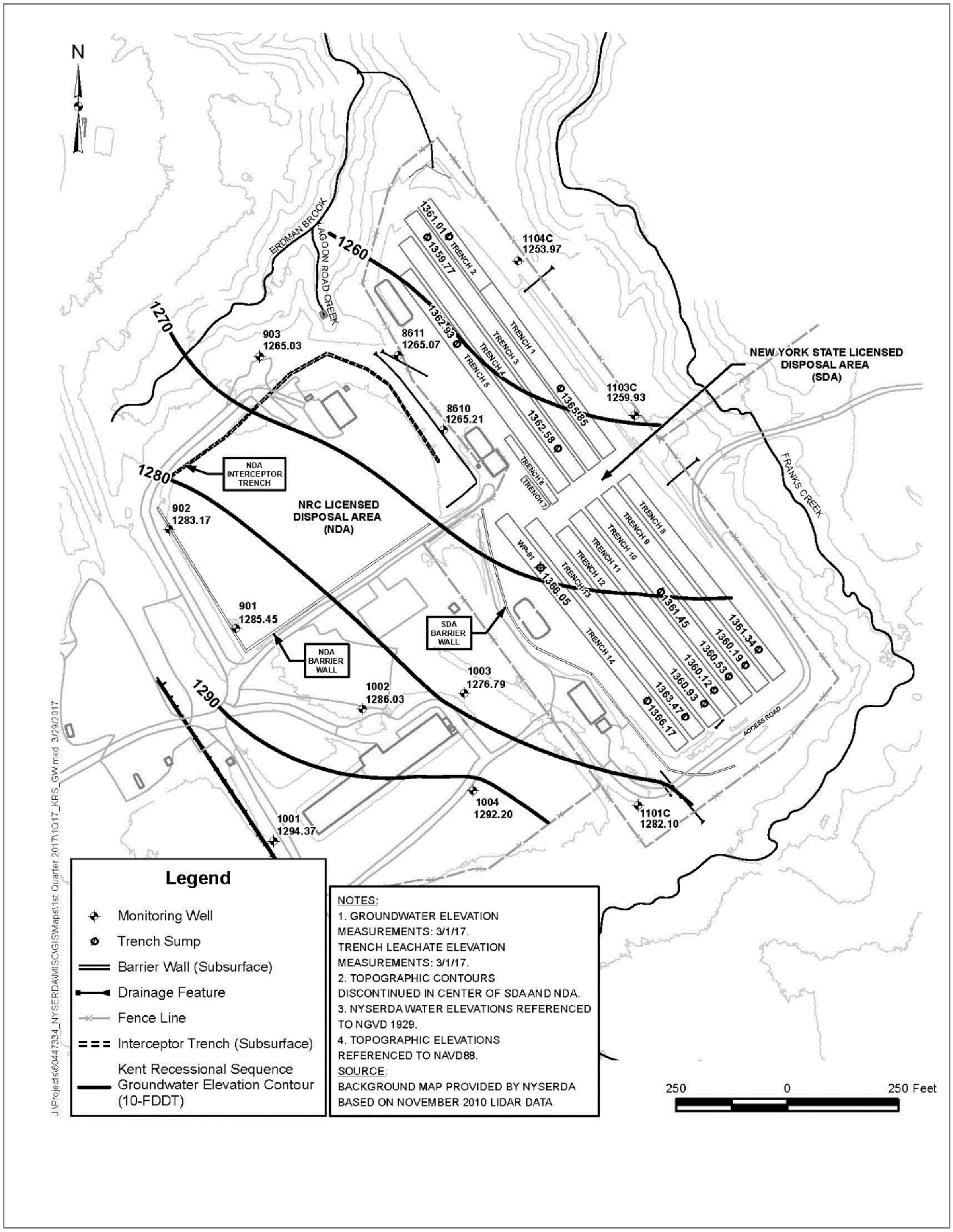


Figure B-3. Second Quarter 2017 Weathered Lavery Till Groundwater Contour Map

Source: NYSERDA

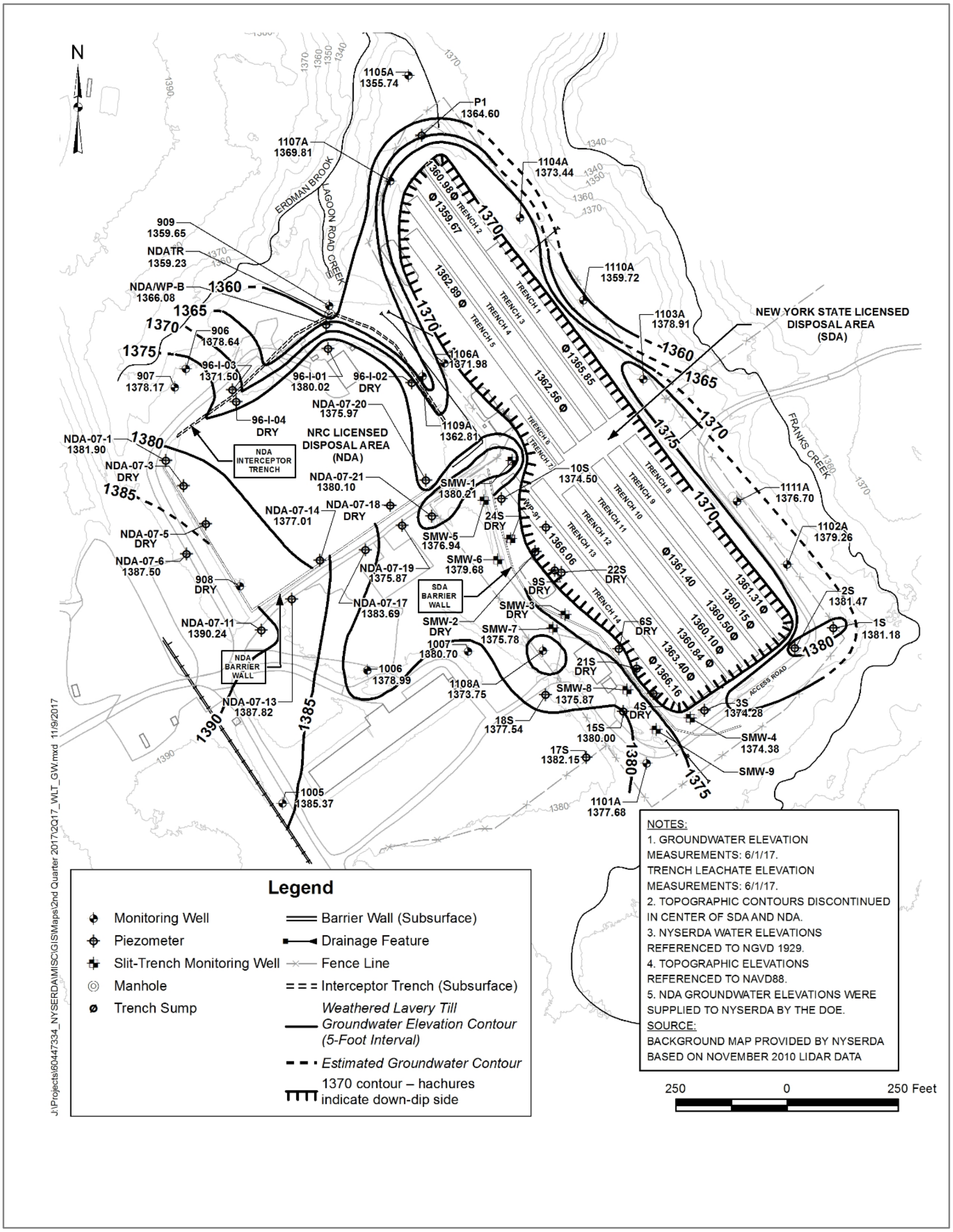


Figure B-4. Second Quarter 2017 Kent Recessional Sequence Groundwater Contour Map

Source: NYSERDA

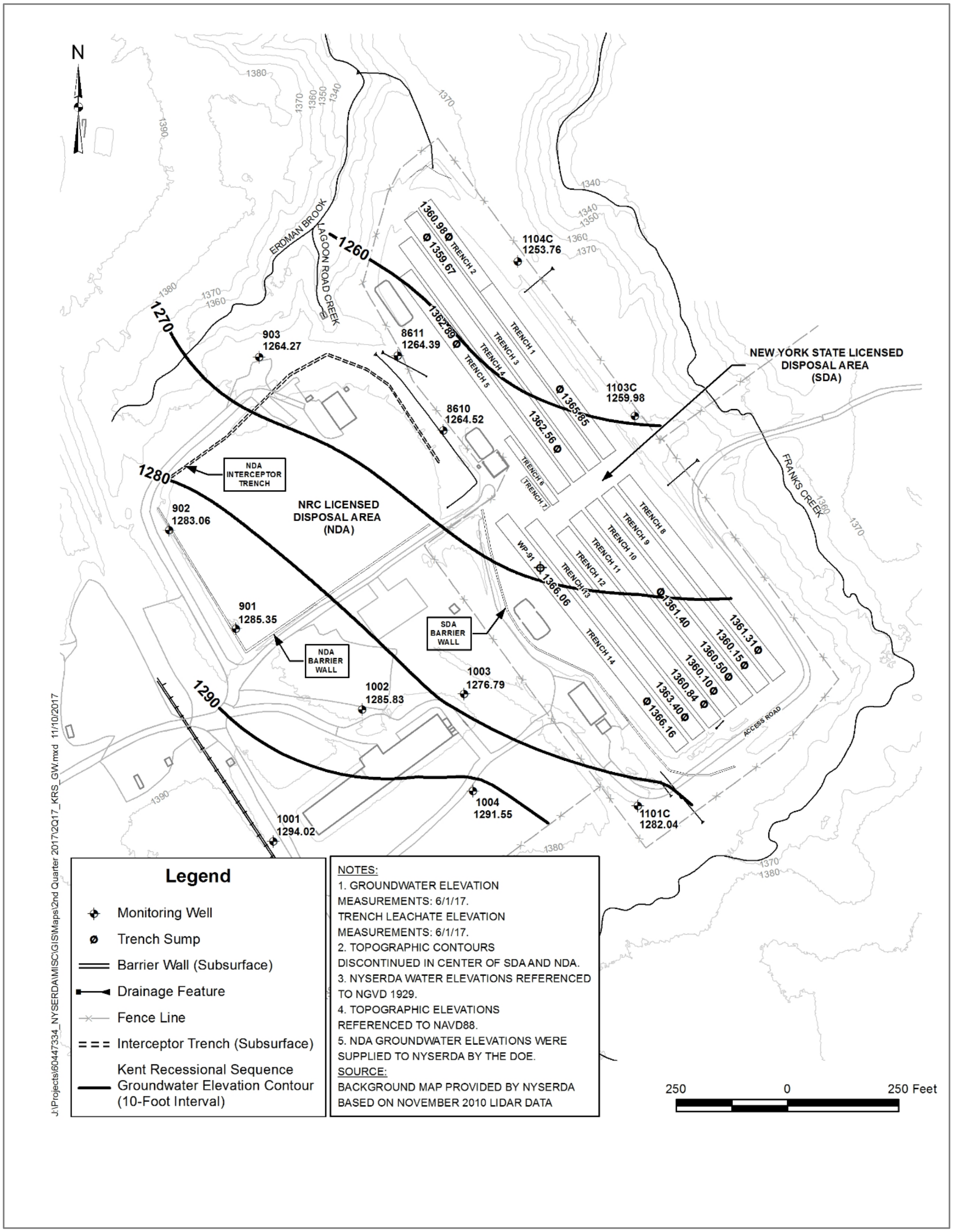


Figure B-5. Third Quarter 2017 Weathered Lavery Till Groundwater Contour Map

Source: NYSERDA

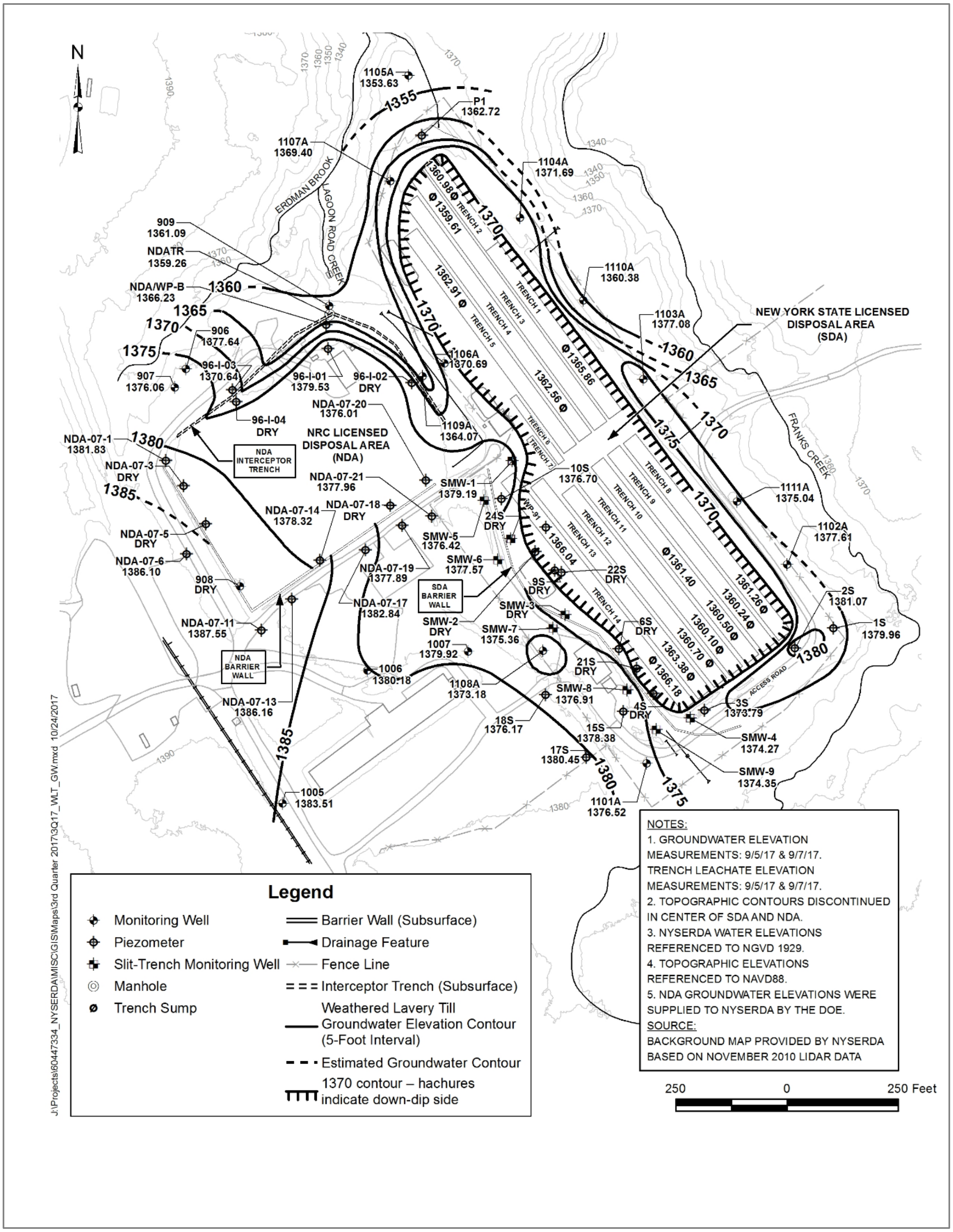


Figure B-6. Third Quarter 2017 Kent Recessional Sequence Groundwater Contour Map

Source: NYSERDA

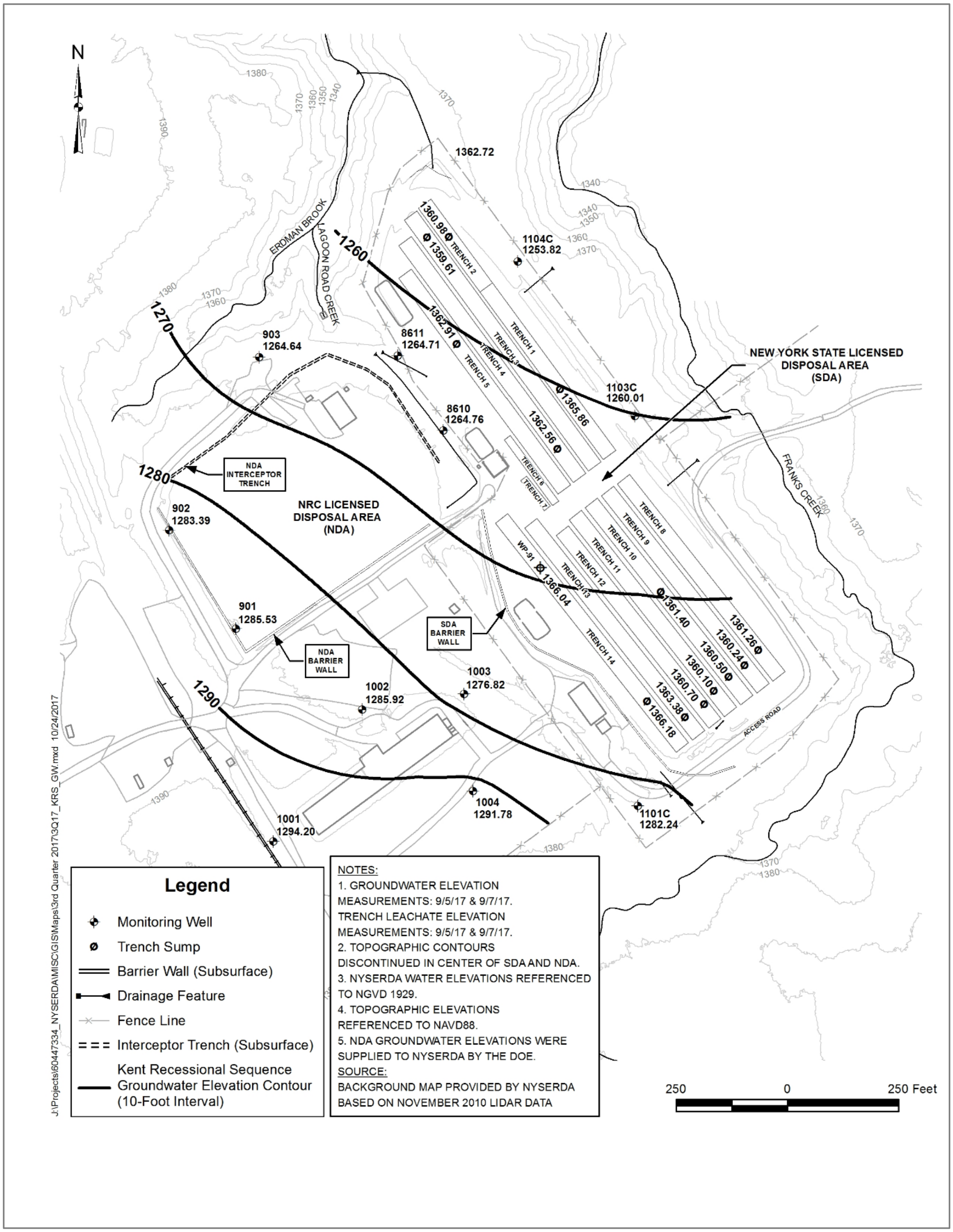


Figure B-7. Fourth Quarter 2017 Weathered Lavery Till Groundwater Contour Map

Source: NYSERDA

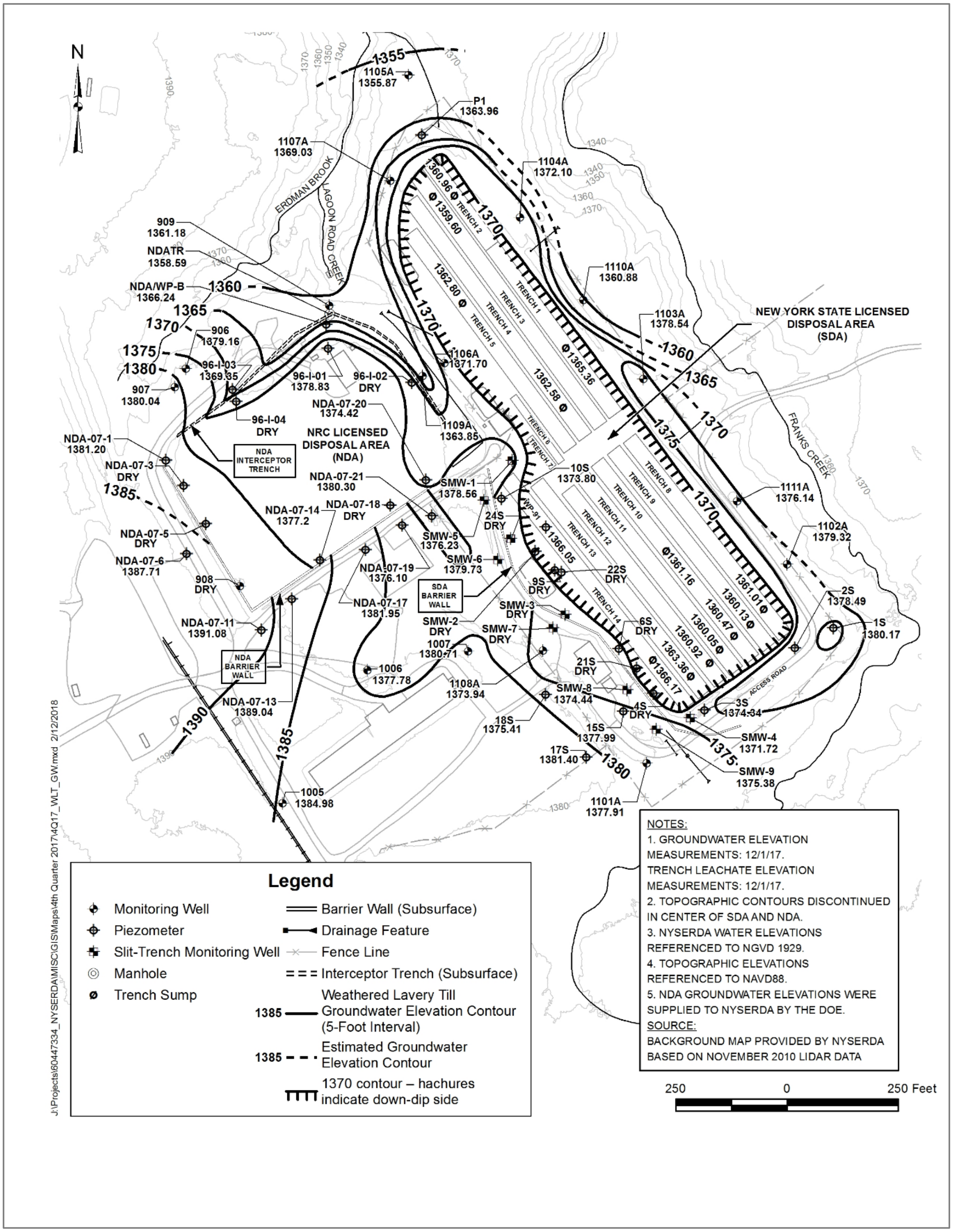


Figure B-8. Fourth Quarter 2017 Kent Recessional Sequence Groundwater Contour Map

Source: NYSERDA

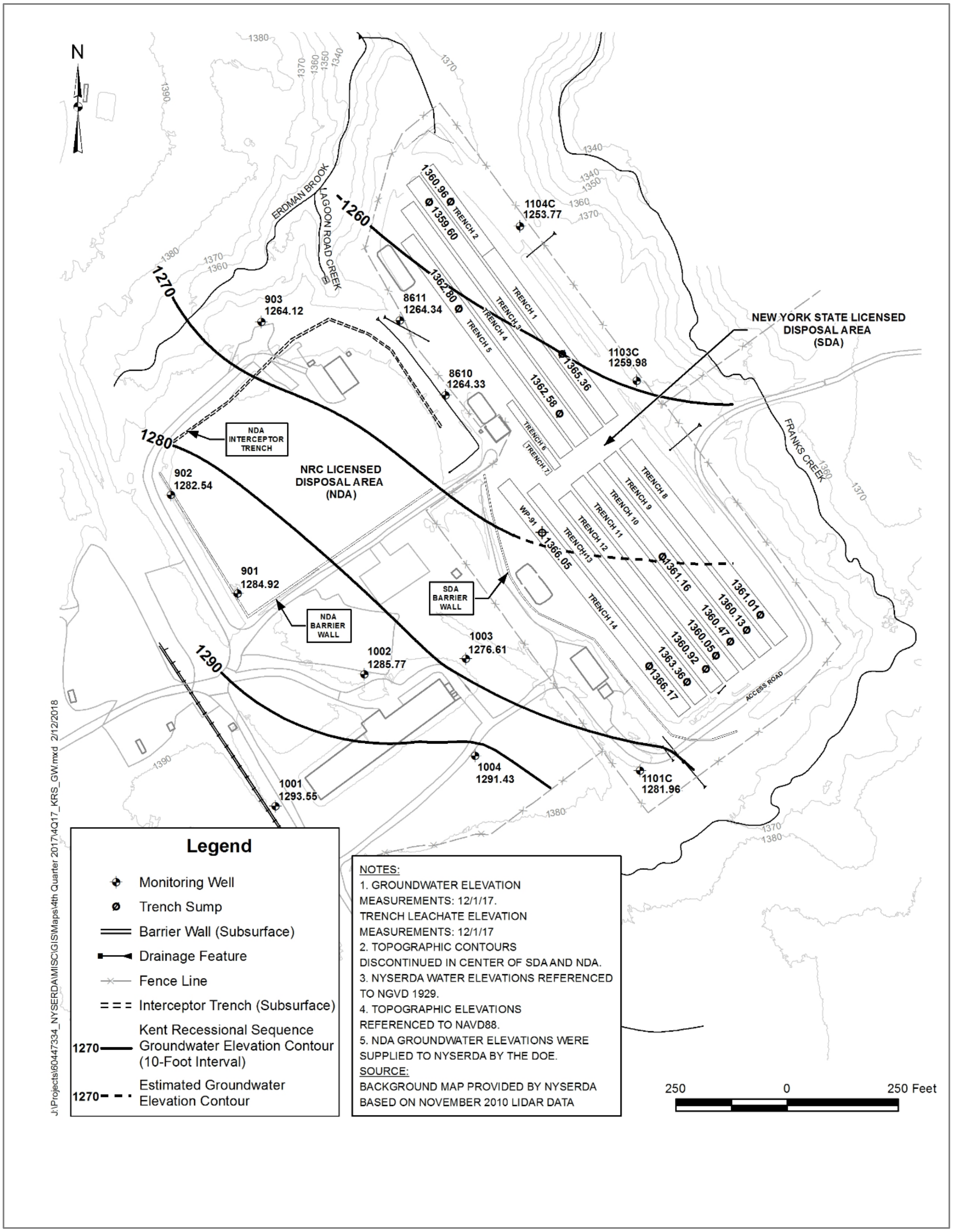


Table B-7. Semiannual Groundwater Sampling Performed in 2017

Source: NYSERDA

Well	Gross Alpha (June)	Gross Alpha (Dec)	Gross Beta (June)	Gross Beta (Dec)	Tritium (June)	Tritium (Dec)	Field Water Quality Parameters (June)	Field Water Quality Parameters (Dec)
1101A	✓	✓	✓	✓	✓	✓	✓	✓
1101B	✓	✓	✓	✓	✓	✓	Insufficient Volume	✓
1101C	✓	✓	✓	✓	✓	✓	✓	✓
1102A	✓	✓	✓	✓	✓	✓	Insufficient Volume	✓
1102B	✓	✓	✓	✓	✓	✓	✓	✓
1103A	✓	✓	✓	✓	✓	✓	✓	✓
1103B	✓	✓	✓	✓	✓	✓	✓	✓
1103C	✓	✓	✓	✓	✓	✓	Insufficient Volume	Insufficient Volume
1104A	✓	✓	✓	✓	✓	✓	✓	✓
1104B	✓	✓	✓	✓	✓	✓	✓	✓
1104C	✓	✓	✓	✓	✓	✓	Insufficient Volume	Insufficient Volume
1105A	✓	✓	✓	✓	✓	✓	✓	✓
1105B	✓	✓	✓	✓	✓	✓	✓	✓
1106A	✓	✓	✓	✓	✓	✓	✓	✓
1106B	✓	✓	✓	✓	✓	✓	✓	✓
1107A	✓	✓	✓	✓	✓	✓	✓	✓
1108A	✓	✓	✓	✓	✓	✓	Insufficient Volume	✓
1109A	✓	✓	✓	✓	✓	✓	✓	✓
1109B	✓	✓	✓	✓	✓	✓	✓	✓
1110A	✓	✓	✓	✓	✓	✓	Insufficient Volume	✓
1111A	✓	✓	✓	✓	✓	✓	✓	✓

Table B-8. Annual Groundwater Sampling Performed in 2017

Source: NYSERDA

Well	Gamma Emitters	Beta Emitters				VOCs
		C-14	I-129	Sr-90	Tc-99	
1101A	✓	✓	✓	✓	✓	✓
1101B	✓	✓	✓	✓	✓	✓
1101C	✓	✓	✓	✓	✓	✓
1102A	✓	✓	✓	✓	✓	✓
1102B	✓	✓	✓	✓	✓	✓
1103A	✓	✓	✓	✓	✓	✓
1103B	✓	✓	✓	✓	✓	✓
1103C	Insufficient Volume	Insufficient Volume	Insufficient Volume	Insufficient Volume	Insufficient Volume	✓
1104A	✓	✓	✓	✓	✓	✓
1104B	✓	✓	✓	✓	✓	✓
1104C	Insufficient Volume	✓[e]	Insufficient Volume	Insufficient Volume	Insufficient Volume	✓
1105A	✓	✓	✓	✓	✓	✓
1105B	✓	✓	✓	✓	✓	✓
1106A	✓	✓	✓	✓	✓	✓
1106B	✓	✓	✓	✓	✓	✓
1107A	✓	✓	✓	✓	✓	✓
1108A	✓	✓	✓	✓	✓	✓
1109A	✓	✓	✓	✓	✓	✓
1109B	✓	✓	✓	✓	✓	✓
1110A	✓	✓	✓	✓	✓	✓
1111A	✓	✓	✓	✓	✓	✓

[e] Sample was collected in December 2017 due to insufficient sample volume in June 2017.

Table B-9. 2017 Groundwater Radiological Data – SDA 1100-Series Wells

Blank entries indicate a result was not obtained, typically due to insufficient sample volume. Duplicate samples on the same date indicate a field duplicate was collected and analyzed.

Source: NYSERDA

Sample Location	Sample Date	Gross Alpha (μCi/mL)	Q	Gross Beta (μCi/mL)	Q	Tritium (μCi/mL)	Q
1101A	06/07/17	3.56E-09±1.48E-09		2.78E-09±1.34E-09		8.16E-08±5.45E-08	U
1101A	12/06/17	4.32E-09±1.65E-09		1.94E-09±1.34E-09	U	4.25E-08±4.67E-08	U
1101B	06/06/17	2.24E-09±1.04E-09		1.92E-09±9.18E-10	J	4.43E-08±5.27E-08	U
1101B	12/06/17	1.30E-09±1.37E-09	U	1.72E-09±1.03E-09	J	-5.50E-08±4.07E-08	UJ
1101C	06/05/17	1.05E-09±7.88E-10	U	3.87E-08±9.12E-09	J	6.12E-09±5.26E-08	U
1101C	12/05/17	4.00E-10±7.82E-10	U	1.11E-09±5.58E-10	J	-1.58E-08±3.90E-08	U
1101C	12/05/17	7.55E-10±5.93E-10	U	5.24E-09±1.37E-09	J	-2.55E-08±3.84E-08	U
1102A	06/07/17	3.85E-09±1.54E-09		3.25E-09±9.68E-10		1.51E-07±5.74E-08	
1102A	12/05/17	4.77E-09±1.75E-09		1.77E-09±1.22E-09	U	4.26E-08±4.37E-08	U
1102B	06/06/17	3.93E-10±9.11E-10	U	2.20E-09±1.08E-09	J	6.50E-08±5.37E-08	U
1102B	12/05/17	-4.11E-10±1.29E-09	U	5.66E-10±1.03E-09	U	-3.45E-08±3.81E-08	U
1103A	06/05/17	1.25E-08±4.61E-09	J	-4.02E-09±3.24E-09	UJ	1.45E-07±5.62E-08	U
1103A	06/05/17	8.51E-09±3.16E-09	J	3.57E-09±1.63E-09	J	2.43E-08±5.25E-08	U
1103A	12/05/17	9.70E-09±2.95E-09		3.76E-09±1.89E-09		9.40E-08±4.75E-08	
1103A	12/05/17	9.47E-09±2.92E-09		2.73E-09±1.93E-09	U	8.71E-08±4.76E-08	J
1103B	06/05/17	3.41E-09±1.54E-09		-6.71E-10±1.10E-09	U	1.51E-07±5.65E-08	U
1103B	12/05/17	2.67E-09±1.69E-09	J	2.56E-09±1.16E-09		-4.70E-08±3.69E-08	UJ
1103C	06/02/17	8.07E-10±6.55E-10	J	3.17E-09±9.48E-10		6.56E-08±5.43E-08	U
1103C	12/01/17	1.37E-09±1.11E-09	U	2.80E-09±1.11E-09		-2.10E-08±4.30E-08	U
1104A	06/08/17	3.19E-09±1.35E-09		2.17E-09±9.02E-10		1.03E-07±5.67E-08	J
1104A	12/04/17	2.37E-09±1.55E-09	J	2.55E-09±1.14E-09		1.92E-08±4.16E-08	U
1104B	06/08/17	2.41E-09±1.14E-09		1.77E-09±7.16E-10		5.52E-08±5.38E-08	U
1104B	12/04/17	1.06E-09±8.79E-10	U	1.24E-09±8.16E-10	U	-1.62E-08±3.89E-08	U
1104C	06/02/17	6.39E-09±2.72E-09		3.97E-09±2.93E-09	UJ	1.34E-07±5.63E-08	
1104C	12/01/17	5.01E-09±1.81E-09		5.74E-09±3.24E-09	J	-2.94E-08±3.78E-08	U
1105A	06/02/17	1.80E-09±1.01E-09	J	3.31E-09±1.02E-09	J	1.23E-07±5.54E-08	U
1105A	12/04/17	8.29E-10±1.96E-09	UJ	2.62E-09±1.07E-09		3.96E-09±4.06E-08	U

Table B-9 continued.

Sample Location	Sample Date	Gross Alpha (μCi/mL)	Q	Gross Beta (μCi/mL)	Q	Tritium (μCi/mL)	Q
1105B	06/02/17	2.89E-09±1.16E-09		4.84E-09±1.29E-09	J	5.51E-08±5.37E-08	U
1105B	12/04/17	2.62E-09±1.40E-09	J	2.32E-09±8.95E-10		-2.58E-08±3.80E-08	U
1106A	06/07/17	3.92E-09±1.59E-09		2.42E-09±1.03E-09		2.74E-07±6.33E-08	
1106A	12/04/17	2.58E-09±1.76E-09	U	4.66E-09±1.51E-09		1.55E-07±5.32E-08	
1106B	06/07/17	1.97E-09±1.08E-09	J	1.90E-09±7.21E-10		1.64E-08±5.30E-08	U
1106B	12/04/17	4.22E-09±2.37E-09	J	1.68E-09±1.14E-09	U	-2.71E-08±3.81E-08	U
1107A	06/08/17	6.33E-09±2.16E-09		1.62E-08±5.27E-09	J	3.64E-06±3.86E-07	
1107A	12/04/17	8.37E-09±2.67E-09		2.04E-08±5.79E-09	J	3.78E-06±4.18E-07	
1108A	06/07/17	9.77E-09±2.96E-09		3.28E-09±1.32E-09		5.33E-08±5.39E-08	U
1108A	12/06/17	8.28E-09±2.59E-09		2.72E-09±1.48E-09	J	6.18E-09±4.41E-08	U
1109A	06/07/17	2.94E-09±1.28E-09		2.00E-09±7.31E-10		2.10E-07±6.00E-08	
1109A	12/04/17	2.36E-09±1.63E-09	U	2.95E-09±1.25E-09		1.41E-07±5.16E-08	
1109B	06/08/17	9.03E-10±7.29E-10	U	1.57E-09±7.02E-10		1.57E-07±7.10E-08	J
1109B	12/04/17	6.56E-10±7.67E-10	U	1.62E-09±7.73E-10		2.41E-07±6.06E-08	
1110A	06/02/17	3.63E-08±1.02E-08		5.73E-09±2.54E-09		3.69E-08±5.36E-08	U
1110A	12/01/17	1.21E-08±3.54E-09		8.66E-09±3.92E-09	J	4.07E-08±4.35E-08	U
1110A	12/01/17	1.28E-08±3.74E-09		8.10E-09±2.75E-09		9.23E-08±4.76E-08	J
1111A	06/06/17	7.59E-09±2.87E-09		4.19E-09±1.94E-09	J	1.89E-07±5.88E-08	U
1111A	12/05/17	9.80E-09±2.94E-09		3.44E-09±2.11E-09	J	-7.53E-09±3.96E-08	U

Table B-9 continued.

Sample Location	Sample Date	Actinium-228 (μCi/mL)	Q	Bismuth-214 (μCi/mL)	Q	Carbon-14 (μCi/mL)	Q
1101A	06/07/17	-2.28E-09±1.02E-08	U	2.12E-08±3.12E-08	U	9.88E-11±2.23E-07	UJ
1101B	06/06/17	3.13E-09±4.59E-09	U	2.31E-08±2.95E-08	U	1.90E-07±3.64E-07	UJ
1101C	06/05/17	-6.17E-10±5.55E-09	U	3.24E-08±2.89E-08	U	-9.52E-09±2.17E-07	UJ
1102A	06/07/17	2.94E-09±5.79E-09	U	-1.79E-08±4.98E-08	U	1.12E-08±2.42E-07	UJ
1102B	06/06/17	1.52E-09±4.41E-09	U	8.62E-08±4.48E-08	J	7.78E-07±5.82E-07	J
1103A	06/05/17	6.00E-09±4.34E-09	U	4.68E-08±3.73E-08	J	-2.18E-09±2.24E-07	UJ
1103A	06/05/17	-3.25E-09±7.99E-09	U	3.39E-08±4.18E-08	U	1.84E-09±2.32E-07	UJ
1103B	06/05/17	7.01E-09±4.95E-09	U	-7.70E-09±3.85E-08	U	4.61E-09±2.43E-07	UJ
1103C	06/02/17						
1103C	12/01/17						
1104A	06/08/17	1.77E-09±5.58E-09	U	-2.52E-08±7.99E-08	U	6.71E-09±2.80E-07	UJ
1104B	06/08/17	-2.53E-09±1.08E-08	U	4.05E-08±3.18E-08	U	5.35E-09±2.07E-07	UJ
1104C	06/02/17						
1104C	12/01/17					-1.23E-08±2.48E-07	UJ
1105A	06/02/17	4.50E-09±2.81E-09	U	1.22E-08±2.78E-08	U	4.17E-09±2.03E-07	UJ
1105B	06/02/17	6.45E-09±6.80E-09	U	3.47E-08±3.73E-08	U	-3.25E-09±2.22E-07	UJ
1106A	06/07/17	-7.20E-09±1.57E-08	U	1.02E-08±3.04E-08	U	-9.48E-10±2.35E-07	UJ
1106B	06/07/17	6.06E-09±4.42E-09	U	4.98E-09±3.00E-08	U	1.03E-08±2.32E-07	UJ
1107A	06/08/17	6.26E-09±4.48E-09	U	1.66E-08±1.31E-08	U	-1.82E-08±2.80E-07	UJ
1108A	06/07/17	6.09E-09±6.76E-09	U	6.09E-08±3.99E-08	J	-2.15E-10±2.90E-08	UJ
1109A	06/07/17	5.40E-09±4.07E-09	U	5.54E-10±2.93E-08	U	-3.38E-09±1.93E-07	UJ
1109B	06/08/17	-6.99E-09±1.40E-08	U	2.97E-08±2.33E-08	U	-6.97E-09±2.81E-07	UJ
1110A	06/02/17	8.22E-10±4.59E-09	U	4.71E-08±3.65E-08	U	4.62E-09±2.36E-07	UJ
1111A	06/06/17	4.39E-09±4.38E-09	U	5.64E-09±2.79E-08	U	1.22E-08±3.13E-07	UJ

Table B-9 continued.

Sample Location	Sample Date	Cesium-134 (μCi/mL)	Q	Cesium-137 (μCi/mL)	Q	Cobalt-57 (μCi/mL)	Q
1101A	06/07/17	-1.05E-09±7.05E-09	U	-1.05E-09±4.88E-09	U	1.40E-10±8.58E-10	U
1101B	06/06/17	-2.00E-10±2.60E-09	U	-9.71E-10±4.86E-09	U	-1.82E-10±6.43E-07	U
1101C	06/05/17	-6.71E-10±1.60E-07	U	-7.27E-10±7.98E-09	U	-4.66E-10±1.81E-09	U
1102A	06/07/17	7.32E-10±1.56E-09	U	-3.40E-10±2.70E-09	U	-2.49E-10±3.03E-08	U
1102B	06/06/17	5.74E-10±3.94E-10	U	-1.07E-09±4.05E-09	U	2.60E-10±8.16E-10	U
1103A	06/05/17	3.98E-11±1.25E-09	U	9.26E-11±1.25E-09	U	3.72E-10±7.14E-10	U
1103A	06/05/17	1.40E-09±1.47E-09	U	-1.24E-10±1.88E-09	U	-3.77E-10±9.98E-08	U
1103B	06/05/17	9.37E-10±1.56E-09	U	1.13E-10±1.52E-09	U	3.85E-11±8.62E-10	U
1103C	06/02/17						
1103C	12/01/17						
1104A	06/08/17	-8.38E-11±2.36E-09	U	-1.08E-09±1.21E-08	U	-3.27E-10±5.55E-09	U
1104B	06/08/17	-5.47E-10±1.25E-08	U	-9.93E-10±5.21E-09	U	-3.43E-10±2.89E-09	U
1104C	06/02/17						
1104C	12/01/17						
1105A	06/02/17	-4.98E-10±1.69E-07	U	-4.24E-10±4.37E-09	U	-1.60E-10±1.09E-09	U
1105B	06/02/17	1.62E-10±1.34E-09	U	-4.00E-10±2.81E-09	U	-1.17E-11±9.39E-10	U
1106A	06/07/17	-3.30E-11±5.12E-09	U	3.33E-10±1.55E-09	U	-3.42E-10±2.69E-08	U
1106B	06/07/17	3.27E-10±1.36E-09	U	-8.84E-10±1.74E-08	U	-8.04E-11±1.64E-09	U
1107A	06/08/17	6.13E-10±1.33E-09	U	-8.27E-10±3.91E-08	UJ	3.20E-10±7.83E-10	U
1108A	06/07/17	2.43E-10±1.50E-09	U	-9.79E-10±4.66E-09	U	-5.64E-10±1.79E-09	U
1109A	06/07/17	-2.66E-10±4.47E-09	U	-8.27E-10±4.02E-08	UJ	-4.23E-10±9.20E-10	U
1109B	06/08/17	-5.88E-10±2.19E-09	U	-1.18E-09±3.59E-08	UJ	-3.70E-10±1.48E-08	U
1110A	06/02/17	-2.81E-10±3.98E-09	U	-1.12E-09±4.32E-09	U	-2.87E-10±4.10E-09	U
1111A	06/06/17	2.43E-10±1.25E-09	U	-3.75E-10±3.65E-09	U	1.78E-10±7.34E-10	U

Table B-9 continued.

Sample Location	Sample Date	Cobalt-60 (μCi/mL)	Q	Iodine-129 (μCi/mL)	Q	Lead-212 (μCi/mL)	Q
1101A	06/07/17	-3.97E-10±4.15E-09	U	-1.67E-09±4.09E-09	UJ	5.58E-10±2.56E-09	U
1101B	06/06/17	-3.18E-10±3.19E-09	U	3.50E-10±5.40E-09	UJ	-1.50E-09±3.40E-09	U
1101C	06/05/17	-8.54E-10±3.41E-08	U	-5.27E-10±5.30E-09	UJ	-4.19E-10±2.55E-09	U
1102A	06/07/17	-4.00E-10±7.74E-09	U	2.38E-09±5.08E-09	UJ	-1.02E-09±2.92E-09	U
1102B	06/06/17	-1.21E-09±7.93E-09	U	-8.92E-10±3.60E-09	UJ	-3.40E-10±2.40E-09	U
1103A	06/05/17	-2.22E-10±1.32E-09	U	-5.39E-11±3.46E-09	UJ	2.93E-09±1.82E-09	J
1103A	06/05/17	-3.05E-09±1.48E-08	U	-3.38E-09±5.58E-09	UJ	9.60E-10±2.45E-09	U
1103B	06/05/17	1.31E-10±1.39E-09	U	-1.25E-09±5.59E-09	UJ	-5.56E-10±2.74E-09	U
1103C	06/02/17						
1103C	12/01/17						
1104A	06/08/17	-1.00E-10±2.08E-09	U	-2.04E-09±4.41E-09	UJ	-1.49E-10±2.74E-09	U
1104B	06/08/17	-9.59E-10±2.41E-08	U	1.40E-10±5.10E-09	UJ	-2.34E-10±3.14E-09	U
1104C	06/02/17						
1104C	12/01/17						
1105A	06/02/17	-4.81E-10±1.23E-09	U	-1.36E-09±5.41E-09	UJ	3.29E-09±1.96E-09	J
1105B	06/02/17	-6.62E-10±2.95E-08	U	-1.29E-09±3.60E-09	UJ	2.67E-09±3.07E-09	U
1106A	06/07/17	-2.46E-09±2.18E-07	U	4.06E-12±3.85E-09	UJ	3.92E-09±2.47E-09	J
1106B	06/07/17	-1.28E-10±1.47E-09	U	-5.60E-10±3.62E-09	UJ	2.14E-09±2.60E-09	U
1107A	06/08/17	6.64E-10±1.20E-09	U	-2.91E-13±3.24E-09	UJ	9.82E-10±2.20E-09	U
1108A	06/07/17	2.03E-10±1.12E-09	U	-1.37E-09±5.28E-09	UJ	8.36E-10±2.46E-09	U
1109A	06/07/17	1.10E-09±1.16E-09	U	1.11E-10±4.19E-09	UJ	2.01E-09±2.40E-09	U
1109B	06/08/17	-3.05E-09±1.48E-08	U	5.73E-10±4.94E-09	UJ	3.25E-11±2.70E-09	U
1110A	06/02/17	-6.77E-10±1.16E-08	U	7.74E-11±3.51E-09	UJ	2.53E-09±2.65E-09	U
1111A	06/06/17	1.47E-10±1.15E-09	U	-6.18E-10±3.92E-09	UJ	3.53E-11±2.33E-09	U

Table B-9 continued.

Sample Location	Sample Date	Lead-214 (μCi/mL)	Q	Potassium-40 (μCi/mL)	Q	Radium-224 (μCi/mL)	Q
1101A	06/07/17	9.58E-10±3.63E-09	U	-5.46E-09±2.97E-08	U	-2.31E-08±2.93E-08	U
1101B	06/06/17	-1.22E-09±5.73E-09	U	1.54E-08±2.22E-08	U	-2.47E-08±2.61E-08	U
1101C	06/05/17	1.80E-09±1.24E-09	U	-1.47E-08±2.90E-08	U	-3.26E-08±2.61E-08	UJ
1102A	06/07/17	-1.71E-10±3.61E-09	U	1.57E-09±2.55E-08	U	-2.14E-08±3.17E-08	U
1102B	06/06/17	2.53E-09±1.57E-09	U	-1.32E-08±2.71E-08	U	-3.59E-08±2.72E-08	UJ
1103A	06/05/17	5.49E-11±2.60E-09	U	3.84E-09±2.38E-08	U	-2.81E-08±2.67E-08	UJ
1103A	06/05/17	-2.34E-09±5.54E-09	U	-4.51E-08±5.02E-08	U	-5.84E-08±5.16E-08	UJ
1103B	06/05/17	-1.56E-09±5.43E-09	U	-1.91E-08±3.34E-08	U	9.79E-08±2.47E-08	J
1103C	06/02/17						
1103C	12/01/17						
1104A	06/08/17	-8.17E-10±4.01E-09	U	-2.41E-08±5.14E-08	U	-5.17E-08±3.50E-08	UJ
1104B	06/08/17	-2.86E-09±5.10E-09	U	1.10E-08±2.85E-08	U	-2.53E-08±2.87E-08	U
1104C	06/02/17						
1104C	12/01/17						
1105A	06/02/17	4.85E-10±2.62E-09	U	-1.49E-08±2.56E-08	U	-1.02E-08±2.64E-08	U
1105B	06/02/17	-1.30E-10±3.20E-09	U	-2.99E-08±6.48E-08	U	-2.80E-08±3.04E-08	U
1106A	06/07/17	-1.88E-09±5.13E-09	U	-1.29E-08±3.09E-08	U	-6.64E-08±5.37E-08	UJ
1106B	06/07/17	-6.32E-10±3.41E-09	U	2.31E-08±2.52E-08	U	-2.06E-08±2.78E-08	U
1107A	06/08/17	-6.29E-10±3.47E-09	U	-2.31E-08±3.40E-08	U	-2.34E-08±2.66E-08	U
1108A	06/07/17	1.25E-09±4.36E-09	U	-1.20E-08±2.33E-08	U	-3.34E-08±2.88E-08	UJ
1109A	06/07/17	1.13E-09±2.88E-09	U	-1.28E-08±2.26E-08	U	-2.15E-10±7.06E-08	U
1109B	06/08/17	-1.51E-09±4.81E-09	U	-4.31E-08±5.37E-08	U	-5.52E-08±5.65E-08	U
1110A	06/02/17	1.83E-09±1.36E-09	U	2.18E-08±3.30E-08	U	-4.01E-08±2.96E-08	UJ
1111A	06/06/17	8.09E-10±2.67E-09	U	-9.77E-09±2.91E-08	U	-1.88E-09±2.79E-08	U

Table B-9 continued.

Sample Location	Sample Date	Radium-226 (μCi/mL)	Q	Strontium-90 (μCi/mL)	Q	Technetium-99 (μCi/mL)	Q
1101A	06/07/17	-8.70E-09±3.70E-08	U	-3.43E-10±3.97E-10	U	7.13E-09±2.86E-09	
1101B	06/06/17	-7.28E-09±2.95E-08	U	2.24E-10±5.97E-10	UJ	2.09E-09±2.31E-09	U
1101C	06/05/17	1.39E-09±2.99E-08	U	3.13E-10±4.09E-10	U	5.98E-09±2.73E-09	
1102A	06/07/17	1.33E-07±3.79E-08	U	-8.05E-10±3.95E-10	UJ	5.24E-09±2.85E-09	J
1102B	06/06/17	-1.42E-09±3.00E-08	U	7.02E-10±6.52E-10	UJ	7.62E-09±2.92E-09	
1103A	06/05/17	-3.46E-09±2.43E-08	U	-2.32E-10±4.81E-10	U	3.32E-09±2.36E-09	U
1103A	06/05/17	1.25E-07±3.52E-08	J	3.35E-10±4.19E-10	U	4.80E-09±2.56E-09	J
1103B	06/05/17	1.43E-07±3.07E-08	J	5.20E-11±4.84E-10	U	5.78E-09±2.82E-09	
1103C	06/02/17						
1103C	12/01/17						
1104A	06/08/17	1.38E-07±3.55E-08	U	-1.99E-10±3.82E-10	U	6.41E-09±2.82E-09	
1104B	06/08/17	-9.39E-09±3.15E-08	U	3.15E-10±3.97E-10	U	8.23E-09±3.27E-09	
1104C	06/02/17						
1104C	12/01/17						
1105A	06/02/17	-3.14E-09±3.13E-08	U	1.03E-10±3.80E-10	U	3.10E-08±7.63E-09	
1105B	06/02/17	1.62E-07±3.59E-08	J	-1.68E-10±3.27E-10	U	5.98E-09±2.68E-09	
1106A	06/07/17	1.23E-07±4.03E-08	U	-3.32E-11±3.58E-10	U	8.72E-09±3.30E-09	
1106B	06/07/17	-1.11E-09±2.54E-08	U	6.08E-10±7.91E-10	UJ	3.13E-09±2.42E-09	U
1107A	06/08/17	1.28E-08±2.99E-08	U	9.09E-09±1.64E-09		8.36E-09±3.26E-09	
1108A	06/07/17	-7.78E-09±3.05E-08	U	-1.81E-10±5.06E-10	U	1.79E-08±4.79E-09	
1109A	06/07/17	-1.03E-10±3.57E-08	U	-1.12E-10±3.96E-10	U	1.47E-08±4.17E-09	
1109B	06/08/17	9.21E-08±3.01E-08	U	-2.60E-10±4.24E-10	U	6.60E-09±2.78E-09	
1110A	06/02/17	-4.09E-09±3.54E-08	U	-1.95E-10±4.32E-10	U	5.78E-09±2.83E-09	
1111A	06/06/17	-3.88E-09±2.93E-08	U	-3.28E-10±4.71E-10	U	1.34E-09±2.25E-09	U

Table B-9 continued.

Sample Location	Sample Date	Thallium-208 (µCi/mL)	Q	Thorium-234 (µCi/mL)	Q	Uranium-235 (µCi/mL)	Q
1101A	06/07/17	1.16E-09±1.51E-09	U	8.42E-09±2.76E-08	U	2.66E-10±7.72E-09	U
1101B	06/06/17	4.50E-10±1.36E-09	U	1.70E-08±1.13E-08	U	-1.08E-09±1.21E-08	U
1101C	06/05/17	9.13E-10±1.55E-09	U	1.10E-09±2.20E-08	U	-1.59E-09±1.62E-08	U
1102A	06/07/17	4.89E-09±2.47E-09	J	-2.84E-09±3.05E-08	U	-9.69E-10±9.08E-09	U
1102B	06/06/17	2.09E-09±1.58E-09	J	1.36E-08±2.39E-08	U	-3.29E-10±8.24E-09	U
1103A	06/05/17	4.28E-10±2.10E-09	U	2.27E-08±2.81E-08	U	-1.05E-09±9.83E-09	U
1103A	06/05/17	1.22E-08±1.72E-09	J	6.29E-09±3.17E-08	U	-5.20E-09±1.91E-08	U
1103B	06/05/17	2.03E-09±1.78E-09	U	-2.36E-08±3.95E-08	U	-7.89E-09±2.51E-08	U
1103C	06/02/17						
1103C	12/01/17						
1104A	06/08/17	5.08E-10±1.79E-09	U	-2.51E-08±4.76E-08	U	-6.90E-09±2.32E-08	U
1104B	06/08/17	9.98E-11±1.48E-09	U	8.52E-10±2.05E-08	U	-3.47E-10±8.78E-09	U
1104C	06/02/17						
1104C	12/01/17						
1105A	06/02/17	9.79E-09±2.59E-09		-1.10E-08±2.59E-08	U	6.75E-10±6.40E-09	U
1105B	06/02/17	7.89E-09±2.79E-09	J	-2.65E-08±4.33E-08	U	-4.38E-09±1.38E-08	U
1106A	06/07/17	8.88E-10±2.16E-09	U	-6.27E-10±3.07E-08	U	-2.13E-09±1.21E-08	U
1106B	06/07/17	-8.71E-10±2.62E-09	U	-1.13E-08±3.87E-08	U	-3.60E-10±7.98E-09	U
1107A	06/08/17	1.13E-10±1.28E-09	U	2.92E-08±3.36E-08	U	2.17E-10±7.21E-09	U
1108A	06/07/17	-3.77E-10±2.17E-09	U	-5.37E-10±2.34E-08	U	-3.37E-09±6.85E-08	U
1109A	06/07/17	7.87E-09±2.96E-09	J	-4.42E-09±2.72E-08	U	-3.66E-10±8.22E-09	U
1109B	06/08/17	8.26E-10±2.15E-09	U	-5.75E-09±3.83E-08	U	-5.67E-09±2.17E-08	U
1110A	06/02/17	1.25E-10±1.44E-09	U	1.01E-08±2.68E-08	U	8.79E-10±7.69E-09	U
1111A	06/06/17	8.98E-09±2.51E-09	J	-1.94E-08±3.76E-08	U	1.66E-09±6.49E-09	U

Key for Qualifier Codes (Q):

J = Analyte identified. Associated result is considered estimated or uncertain.

U = Not detected above MDC and/or 2-sigma uncertainty.

UJ = Not detected above MDC and/or 2-sigma uncertainty, which may be considered estimated or uncertain.

Table B-10. 2017 Groundwater Field Parameter Data – SDA 1100-Series Wells

Blank entries indicate a result was not obtained, typically due to insufficient sample volume. Duplicate samples on the same date indicate a field duplicate was collected and analyzed.

Source: NYSERDA

Sample Location	Sample Date	Conductivity (µmhos/cm)	pH	Temperature (°C)	Turbidity (NTU)
1101A	06/07/17	748	7.35	15.00	4.20
1101A	12/06/17	738	7.89	10.45	13.6
1101B	06/06/17				
1101B	12/06/17	561	8.05	8.73	5.49
1101C	06/05/17	359	7.90	13.43	124
1101C	12/05/17	346	8.20	9.87	>1,000[f]
1101C	12/05/17	346	8.20	9.87	>1,000[f]
1102A	06/07/17				
1102A	12/05/17	752	8.01	12.36	9.12
1102B	06/06/17	550	7.54	11.72	5.31
1102B	12/05/17	545	7.86	11.21	5.71
1103A	06/05/17	1226	7.25	12.27	52
1103A	06/05/17	1226	7.25	12.27	52
1103A	12/05/17	1298	7.48	11.26	15.0
1103A	12/05/17	1298	7.48	11.26	15.0
1103B	06/05/17	609	7.53	12.58	3.69
1103B	12/05/17	644	7.83	11.15	12.1
1103C	06/02/17				
1103C	12/01/17				
1104A	06/08/17	632	7.54	19.48	4.45
1104A	12/04/17	698	7.80	12.40	2.80
1104B	06/08/17	567	7.53	13.35	1.91
1104B	12/04/17	562	8.04	10.74	1.87
1104C	06/02/17				
1104C	12/01/17				
1105A	06/02/17	647	7.77	12.34	44.5
1105A	12/04/17	674	8.13	10.35	20.8
1105B	06/02/17	619	7.75	12.18	1428
1105B	12/04/17	622	7.98	9.42	20.5
1106A	06/07/17	687	7.57	14.96	11.00
1106A	12/04/17	680	7.90	12.40	9.13

Table B-10 continued.

Sample Location	Sample Date	Conductivity (μmhos/cm)	pH	Temperature (°C)	Turbidity (NTU)
1106B	06/07/17	679	7.44	14.03	16.2
1106B	12/04/17	692	7.90	11.78	20.0
1107A	06/08/17	1976	6.78	12.40	1.07
1107A	12/04/17	1905	6.84	12.27	17.11
1108A	06/07/17				
1108A	12/06/17	801	7.79	10.62	713
1109A	06/07/17	617	7.45	12.91	4.97
1109A	12/04/17	658	7.91	13.17	1.72
1109B	06/08/17	462	7.71	12.92	19.20
1109B	12/04/17	466	7.97	12.15	4.67
1110A	06/02/17				
1110A	12/01/17	1445	7.36	12.43	811
1110A	12/01/17	1445	7.36	12.43	811
1111A	06/06/17	982	7.30	10.95	3.74
1111A	12/05/17	956	7.51	11.60	9.00

[f] Turbidity at Well 1101C exceeded the range the meter was capable of reading.

Appendix C – Surface and Stormwater Data

Table C-1. 2017 SDA Surface Water Data – Lagoon Road Creek (WNNDADR)

Source: NYSERDA

Sample Date	Gross Alpha (µCi/mL)	Q	Gross Beta (µCi/mL)	Q	Tritium (µCi/mL)	Q
02/22/17	6.37E-10±6.10E-10	U	2.84E-08±6.71E-09		1.33E-07±9.34E-08	U
05/17/17	3.09E-09±1.30E-09		3.13E-08±7.44E-09		3.46E-07±9.41E-08	
08/16/17	1.42E-09±1.06E-09	U	2.58E-08±6.15E-09	U	1.33E-06±1.80E-07	
11/14/17	8.13E-10±9.17E-10	U	2.14E-08±5.09E-09		2.29E-07±8.75E-08	

Table C-2. 2017 SDA Surface Water Data – Erdman Brook (WNERB53)

Duplicate samples on the same date indicate a field duplicate was collected and analyzed.

Source: NYSERDA

Sample Date	Gross Alpha (µCi/mL)	Q	Gross Beta (µCi/mL)	Q	Tritium (µCi/mL)	Q
02/22/17	4.01E-10±5.88E-10	U	8.84E-10±6.49E-10	U	3.48E-07±1.02E-07	
02/22/17	5.88E-10±5.16E-10	U	3.31E-09±9.61E-10	J	1.87E-07±9.56E-08	J
05/17/17	-2.09E-09±1.45E-09	UJ	6.86E-09±2.01E-09		2.65E-08±8.02E-08	U
08/16/17	6.99E-10±1.09E-09	U	6.23E-09±1.88E-09	U	8.48E-08±9.84E-08	U
11/14/17	-5.35E-10±7.87E-10	U	2.88E-09±9.14E-10		1.94E-08±7.90E-08	U

Table C-3. 2017 SDA Surface Water Data – Franks Creek (WNFRC67)

Source: NYSERDA

Sample Date	Gross Alpha (µCi/mL)	Q	Gross Beta (µCi/mL)	Q	Tritium (µCi/mL)	Q
02/22/17	-1.50E-10±2.60E-10	U	1.39E-09±5.51E-10		1.27E-07±9.30E-08	U
05/17/17	1.01E-10±3.64E-10	U	3.62E-10±4.45E-10	U	1.66E-08±8.13E-08	U
08/16/17	2.77E-10±4.43E-10	U	1.13E-09±5.48E-10	U	6.60E-07±1.26E-07	
11/14/17	1.84E-10±4.40E-10	UJ	1.62E-09±6.17E-10		7.73E-08±8.06E-08	U

Table C-4. 2017 SDA Surface Water Data – Franks Creek (WNDCELD)

Source: NYSERDA

Sample Date	Gross Alpha (µCi/mL)	Q	Gross Beta (µCi/mL)	Q	Tritium (µCi/mL)	Q
02/22/17	1.18E-10±2.94E-10	U	8.59E-10±4.64E-10	J	1.58E-07±9.35E-08	J
05/17/17	1.61E-10±3.81E-10	U	3.19E-10±4.65E-10	U	3.04E-08±8.00E-08	U
08/16/17	7.08E-08±2.15E-08	R	5.79E-08±1.55E-08	UJ	1.20E-08±9.61E-08	U
11/14/17	1.30E-10±4.19E-10	U	1.31E-09±5.57E-10		1.51E-08±7.88E-08	U

Table C-5. 2017 SDA Surface Water Data – Buttermilk Creek: Upgradient of the SDA (WFBCBKG)

Source: NYSERDA

Sample Date	Gross Alpha (µCi/mL)	Q	Gross Beta (µCi/mL)	Q	Tritium (µCi/mL)	Q
02/22/17	1.33E-09±6.24E-10		3.09E-09±9.06E-10	J	1.56E-07±9.52E-08	J
05/17/17	-2.46E-10±4.55E-10	U	1.43E-09±6.19E-10		4.23E-08±7.98E-08	U
08/16/17	4.74E-10±7.57E-10	U	1.28E-09±6.45E-10	U	6.04E-08±9.75E-08	U
11/14/17	-3.24E-12±3.92E-10	U	7.84E-10±4.95E-10	J	6.55E-08±8.14E-08	U

Table C-6. 2017 SDA Surface Water Data - Buttermilk Creek: Downgradient of the SDA (WFBCANL).

Source: NYSERDA

Sample Date	Gross Alpha (µCi/mL)	Q	Gross Beta (µCi/mL)	Q	Tritium (µCi/mL)	Q
05/17/17	2.67E-10±5.28E-10	U	9.79E-10±5.70E-10	J	-4.43E-08±7.77E-08	U

Key for Qualifier Codes (Q):

J = Analyte identified. Associated result is considered estimated or uncertain.

R = Rejected. The data are determined to be unusable.

U = Not detected above MDC and/or 2-sigma uncertainty.

UJ = Not detected above MDC and/or 2-sigma uncertainty, which may be considered estimated or uncertain.

Table C-7. 2017 SDA Stormwater Radiological Data – Outfall Location W01

Duplicate samples on the same date indicate a field duplicate was collected and analyzed.

Source: NYSERDA

Sample Date	Gross Alpha (µCi/mL)	Q	Gross Beta (µCi/mL)	Q	Tritium (µCi/mL)	Q
04/06/17	2.00E-09±6.22E-10		6.34E-09±1.59E-09		2.31E-07±9.80E-08	
11/16/17	1.19E-10±3.90E-10	U	2.55E-09±7.93E-10		7.64E-08±8.19E-08	U
11/16/17	3.31E-10±3.85E-10	U	3.97E-09±1.07E-09		8.83E-08±8.12E-08	U

Sample Date	Cesium-137 (µCi/mL)	Q	Cobalt-60 (µCi/mL)	Q	Potassium-40 (µCi/mL)	Q
04/06/17	4.07E-10±1.36E-09	U	3.97E-10±1.33E-09	U	-2.13E-09±2.69E-08	U
11/16/17	-3.56E-10±3.58E-09	U	-7.88E-10±1.31E-09	U	3.88E-09±2.55E-08	U
11/16/17	-8.64E-10±6.67E-09	U	-6.06E-10±2.43E-08	U	-1.36E-08±2.81E-08	U

Key for Qualifier Codes (Q):

U = Not detected above MDC and/or 2-sigma uncertainty.

Table C-8. 2017 SDA Stormwater Chemical Physical Data – Outfall Location W01

Blank entries indicate a result was not obtained, typically because it was not required. Duplicate samples on the same date indicate a field duplicate was collected and analyzed. Data are reported herein relative to the laboratory practical quantitation limit.

Source: NYSERDA

Sample Date	Sample Type	BOD (mg/L)	Q	COD (mg/L)	Q	Nitrogen, Total (mg/L)	Q	Oil & Grease (mg/L)	Q
04/06/17	Grab	2.0	UJ	10.9		0.99	J	5.0	U
04/06/17	Grab	2.0	UJ	13.0		0.81	J	5.0	U
04/06/17	Composite	2.0	UJ	15.1		0.66	J		
04/06/17	Ambient Rain								
11/16/17	Composite	1.2	U	19.9	J	0.27	J		
11/16/17	Composite	1.3	U	9.3	J	0.29	J		
11/16/17	Ambient Rain								

Sample Date	Sample Type	Total Phosphorus (mg/L)	Q	TSS (mg/L)	Q	pH (SU)	Q	Temperature (℃)	Q
04/06/17	Grab	0.30		10.0	U	6.02		9.14	
04/06/17	Grab	0.05	U	10.0	U				
04/06/17	Composite	0.05	U	10.0	U				
04/06/17	Ambient Rain					6.53		9.19	
11/16/17	Composite	0.05	U	3.4	J				
11/16/17	Composite	0.05	U	9.3	J				
11/16/17	Ambient Rain					5.19		6.58	

Key for Qualifier Codes (Q):

J = Analyte identified. Associated result is considered estimated or uncertain.

U = Not detected above associated value.

UJ = Not detected above associated value, which may be considered estimated or uncertain.

Appendix D – Overland Gamma Radiation Survey & Thermoluminescent Dosimeter Data

Table D-1. 2017 Overland Gamma Radiation Survey Results

Source: NYSERDA

	May 01 (μrem/hr)		August 15 (μrem/hr)	
Location[g]	1m	1cm	1m	1cm
P-1	7	7	9	10
P-2	6	7	9	8
P-3	4	6	9	9
P-4	5	7	10	9
P-5	7	6	8	8
P-6	7	5	7	7
P-7	6	8	9	7
P-8	7	6	8	8
P-9	4	5	7	8
P-10	4	6	7	5
P-11	4	5	6	6
P-12	5	5	6	7
P-13	4	6	9	6
P-14	4	5	8	8
P-15	6	4	9	9
P-16	5	6	8	9
SDA2n	7	6	9	7
SDA2s	7	7	7	7
SDA3n	3	5	8	10
SDA3s	7	8	7	9
SDA4n	6	8	6	9
SDA4s	8	7	6	10
T1s	5	6	8	9
T2n	6	8	8	8
T3n	5	8	9	9
T3s	6	8	7	8

Table D-1 continued.

	May 01 (μrem/hr)		August 15 (μrem/hr)	
Location[g]	1m	1cm	1m	1cm
T4n	7	7	8	10
T4s	7	9	7	7
T5n	6	5	8	6
T5s	8	9	10	9
T6n	7	6	10	10
T6s	6	6	7	8
T7n	6	7	10	10
T7s	6	7	9	11
T8n	6	6	6	8
T8s	8	8	7	7
T9n	8	7	7	8
T9s	5	7	7	9
T10n	6	7	6	9
T10s	5	6	7	8
T11n	8	6	10	9
T11s	5	5	9	8
T12n	5	6	7	8
T12s	5	6	9	9
T13n	8	9	7	9
T13s	6	7	7	7
T14n	5	7	8	9
T14s	8	8	9	8
Tank T-1	3	2	5	6
DC-(G)[h]	5	5	9	8
DC-dr[h]	3	4	8	6

[g] SDA perimeter locations (P-1 through P-16) are identified on Figure 2-10. Measurements were made at one meter (1 m) and one centimeter (1 cm) from the ground, tank, or building surface.

[h] DC-(G) and DC-dr are located (at the Drum Cell) on the WVDP premises adjacent to the SDA. The Drum Cell was used to store low-level radioactive waste drums; however, the waste was removed and shipped for off-site disposal in 2007. The DC-(G) and DC-dr measurements were made at locations on the north side and west roll-up door, respectively.

Table D-2. 2017 Thermoluminescent Dosimeter Data

Source: NYSERDA

Location	1st Qtr (mR/Qtr)	Q	2nd Qtr (mR/Qtr)	Q	3rd Qtr (mR/Qtr)	Q	4th Qtr (mR/Qtr)	Q
DNTLD19 (SDA E. Fence)	17.8±3.2		17.5±3.2		12.8±2.3		21.5±3.9	
DNTLD33 (SDA SW Corner)	17.8±3.2		19.5±3.5		14.8±2.7		20.6±3.7	
DNTLD43 (SDA West Gate)	15.8±2.9		12.6±2.3		10.8±2.0		16.0±2.9	
DNTLD53 (SDA North Slope Fence)	21.8±3.9		24.4±4.4		20.8±3.8		25.3±4.5	
NYTLDBK (Background Location)	17.8±3.2		15.6±2.8		13.8±2.5		16.9±3.1	

Appendix E – Precipitation

Table E-1. First Quarter 2017 SDA Precipitation Data (Liquid Rainfall Equivalent)

Source: NYSERDA

January 2017	Precipitation (inches)	February 2017	Precipitation (inches)	March 2017	Precipitation (inches)
1/1/2017	0.00	2/1/2017	0.07	3/1/2017	0.20
1/2/2017	0.02	2/2/2017	0.08	3/2/2017	0.05
1/3/2017	0.28	2/3/2017	0.06	3/3/2017	0.04
1/4/2017	0.26	2/4/2017	0.00	3/4/2017	0.02
1/5/2017	0.16	2/5/2017	0.02	3/5/2017	0.00
1/6/2017	0.06	2/6/2017	0.00	3/6/2017	0.06
1/7/2017	0.09	2/7/2017	0.44	3/7/2017	0.99
1/8/2017	0.07	2/8/2017	0.13	3/8/2017	0.07
1/9/2017	0.00	2/9/2017	0.04	3/9/2017	0.02
1/10/2017	0.13	2/10/2017	0.02	3/10/2017	0.03
1/11/2017	0.10	2/11/2017	0.00	3/11/2017	0.03
1/12/2017	0.92	2/12/2017	0.83	3/12/2017	0.00
1/13/2017	0.00	2/13/2017	0.04	3/13/2017	0.00
1/14/2017	0.00	2/14/2017	0.00	3/14/2017	0.13
1/15/2017	0.00	2/15/2017	0.38	3/15/2017	0.05
1/16/2017	0.00	2/16/2017	0.01	3/16/2017	0.02
1/17/2017	0.38	2/17/2017	0.00	3/17/2017	0.00
1/18/2017	0.06	2/18/2017	0.00	3/18/2017	0.06
1/19/2017	0.00	2/19/2017	0.00	3/19/2017	0.04
1/20/2017	0.27	2/20/2017	0.00	3/20/2017	0.00
1/21/2017	0.00	2/21/2017	0.03	3/21/2017	0.00
1/22/2017	0.00	2/22/2017	0.00	3/22/2017	0.03
1/23/2017	0.05	2/23/2017	0.00	3/23/2017	0.00
1/24/2017	0.26	2/24/2017	0.10	3/24/2017	0.16
1/25/2017	0.05	2/25/2017	0.71	3/25/2017	0.26
1/26/2017	0.20	2/26/2017	0.01	3/26/2017	0.00
1/27/2017	0.31	2/27/2017	0.00	3/27/2017	0.13
1/28/2017	0.13	2/28/2017	0.04	3/28/2017	0.01
1/29/2017	0.23			3/29/2017	0.00
1/30/2017	0.01			3/30/2017	0.45
1/31/2017	0.13			3/31/2017	0.81
Total	**4.17**	**Total**	**3.01**	**Total**	**3.66**

Table E-2. Second Quarter 2017 SDA Precipitation Data (Liquid Rainfall Equivalent)

Source: NYSERDA

April 2017	Precipitation (inches)	May 2017	Precipitation (inches)	June 2017	Precipitation (inches)
4/1/2017	0.02	5/1/2017	0.76	6/1/2017	0.00
4/2/2017	0.00	5/2/2017	0.21	6/2/2017	0.00
4/3/2017	0.03	5/3/2017	0.04	6/3/2017	0.02
4/4/2017	0.50	5/4/2017	0.21	6/4/2017	0.10
4/5/2017	0.00	5/5/2017	0.55	6/5/2017	0.00
4/6/2017	0.50	5/6/2017	0.24	6/6/2017	0.58
4/7/2017	0.14	5/7/2017	0.14	6/7/2017	0.01
4/8/2017	0.00	5/8/2017	0.03	6/8/2017	0.05
4/9/2017	0.00	5/9/2017	0.00	6/9/2017	0.35
4/10/2017	0.00	5/10/2017	0.00	6/10/2017	0.02
4/11/2017	0.29	5/11/2017	0.02	6/11/2017	0.00
4/12/2017	0.00	5/12/2017	0.00	6/12/2017	0.00
4/13/2017	0.00	5/13/2017	0.02	6/13/2017	0.00
4/14/2017	0.00	5/14/2017	0.07	6/14/2017	0.03
4/15/2017	0.17	5/15/2017	0.00	6/15/2017	0.12
4/16/2017	0.31	5/16/2017	0.02	6/16/2017	0.00
4/17/2017	0.03	5/17/2017	0.00	6/17/2017	0.00
4/18/2017	0.00	5/18/2017	0.19	6/18/2017	1.83
4/19/2017	0.30	5/19/2017	0.33	6/19/2017	0.46
4/20/2017	1.11	5/20/2017	0.00	6/20/2017	0.16
4/21/2017	0.02	5/21/2017	0.18	6/21/2017	0.00
4/22/2017	0.00	5/22/2017	0.03	6/22/2017	0.02
4/23/2017	0.00	5/23/2017	0.00	6/23/2017	0.14
4/24/2017	0.00	5/24/2017	0.00	6/24/2017	0.85
4/25/2017	0.11	5/25/2017	0.92	6/25/2017	0.21
4/26/2017	0.00	5/26/2017	0.04	6/26/2017	0.29
4/27/2017	0.59	5/27/2017	0.02	6/27/2017	0.22
4/28/2017	0.00	5/28/2017	0.26	6/28/2017	0.00
4/29/2017	0.11	5/29/2017	0.07	6/29/2017	0.00
4/30/2017	0.11	5/30/2017	0.26	6/30/2017	0.39
		5/31/2017	0.01		
Total	**4.34**	**Total**	**4.62**	**Total**	**5.85**

Table E-3. Third Quarter 2017 SDA Precipitation Data (Liquid Rainfall Equivalent)

Source: NYSERDA

July 2017	Precipitation (inches)	August 2017	Precipitation (inches)	September 2017	Precipitation (inches)
7/1/2017	1.09	8/1/2017	0.00	9/1/2017	0.00
7/2/2017	0.00	8/2/2017	0.00	9/2/2017	0.02
7/3/2017	0.00	8/3/2017	0.33	9/3/2017	0.20
7/4/2017	0.00	8/4/2017	0.50	9/4/2017	0.18
7/5/2017	0.01	8/5/2017	0.00	9/5/2017	0.42
7/6/2017	0.00	8/6/2017	0.00	9/6/2017	0.00
7/7/2017	0.33	8/7/2017	0.00	9/7/2017	0.44
7/8/2017	0.75	8/8/2017	0.00	9/8/2017	0.35
7/9/2017	0.00	8/9/2017	0.00	9/9/2017	0.00
7/10/2017	0.11	8/10/2017	0.00	9/10/2017	0.00
7/11/2017	0.00	8/11/2017	0.01	9/11/2017	0.00
7/12/2017	1.41	8/12/2017	0.32	9/12/2017	0.00
7/13/2017	0.38	8/13/2017	0.00	9/13/2017	0.00
7/14/2017	0.03	8/14/2017	0.00	9/14/2017	1.23
7/15/2017	0.00	8/15/2017	0.02	9/15/2017	0.00
7/16/2017	0.00	8/16/2017	0.00	9/16/2017	0.00
7/17/2017	0.00	8/17/2017	0.75	9/17/2017	0.00
7/18/2017	0.00	8/18/2017	0.00	9/18/2017	0.01
7/19/2017	0.00	8/19/2017	0.00	9/19/2017	0.00
7/20/2017	0.05	8/20/2017	0.00	9/20/2017	0.00
7/21/2017	0.00	8/21/2017	0.23	9/21/2017	0.00
7/22/2017	0.00	8/22/2017	1.41	9/22/2017	0.00
7/23/2017	0.01	8/23/2017	0.03	9/23/2017	0.00
7/24/2017	0.19	8/24/2017	0.00	9/24/2017	0.00
7/25/2017	0.04	8/25/2017	0.00	9/25/2017	0.00
7/26/2017	0.00	8/26/2017	0.00	9/26/2017	0.00
7/27/2017	0.01	8/27/2017	0.00	9/27/2017	0.00
7/28/2017	0.00	8/28/2017	0.00	9/28/2017	0.00
7/29/2017	0.00	8/29/2017	0.00	9/29/2017	0.23
7/30/2017	0.00	8/30/2017	0.00	9/30/2017	0.04
7/31/2017	0.00	8/31/2017	0.05		
Total	**4.41**	**Total**	**3.65**	**Total**	**3.12**

Table E-4. Fourth Quarter 2017 SDA Precipitation Data (Liquid Rainfall Equivalent)

Source: NYSERDA

October 2017	Precipitation (inches)	November 2017	Precipitation (inches)	December 2017	Precipitation (inches)
10/1/2017	0.00	11/1/2017	0.10	12/1/2017	0.00
10/2/2017	0.00	11/2/2017	0.51	12/2/2017	0.00
10/3/2017	0.00	11/3/2017	0.86	12/3/2017	0.00
10/4/2017	0.19	11/4/2017	0.00	12/4/2017	0.00
10/5/2017	0.05	11/5/2017	1.68	12/5/2017	0.28
10/6/2017	0.06	11/6/2017	0.25	12/6/2017	0.03
10/7/2017	0.02	11/7/2017	0.00	12/7/2017	0.09
10/8/2017	0.13	11/8/2017	0.00	12/8/2017	0.00
10/9/2017	0.63	11/9/2017	0.13	12/9/2017	0.00
10/10/2017	0.00	11/10/2017	0.01	12/10/2017	0.08
10/11/2017	1.42	11/11/2017	0.00	12/11/2017	0.10
10/12/2017	0.00	11/12/2017	0.04	12/12/2017	0.38
10/13/2017	0.00	11/13/2017	0.03	12/13/2017	0.11
10/14/2017	0.00	11/14/2017	0.00	12/14/2017	0.06
10/15/2017	0.37	11/15/2017	0.01	12/15/2017	0.15
10/16/2017	0.00	11/16/2017	0.47	12/16/2017	0.41
10/17/2017	0.00	11/17/2017	0.00	12/17/2017	0.00
10/18/2017	0.00	11/18/2017	0.35	12/18/2017	0.06
10/19/2017	0.00	11/19/2017	0.95	12/19/2017	0.03
10/20/2017	0.00	11/20/2017	0.09	12/20/2017	0.00
10/21/2017	0.00	11/21/2017	0.00	12/21/2017	0.00
10/22/2017	0.00	11/22/2017	0.13	12/22/2017	0.16
10/23/2017	0.04	11/23/2017	0.00	12/23/2017	0.55
10/24/2017	0.28	11/24/2017	0.00	12/24/2017	0.05
10/25/2017	0.00	11/25/2017	0.17	12/25/2017	0.65
10/26/2017	0.01	11/26/2017	0.00	12/26/2017	0.27
10/27/2017	0.00	11/27/2017	0.00	12/27/2017	0.16
10/28/2017	0.65	11/28/2017	0.00	12/28/2017	0.00
10/29/2017	0.63	11/29/2017	0.00	12/29/2017	0.02
10/30/2017	0.06	11/30/2017	0.11	12/30/2017	0.25
10/31/2017	0.03			12/31/2017	0.00
Total	**4.57**	**Total**	**5.89**	**Total**	**3.89**

Appendix F – Ground Surface Elevation Data

Table F-1. 2016 and 2017 SDA North Slope Ground Surface Elevation Data

Source: NYSERDA

Location	2016 Elevation[i]	Location	2017 Elevation[j]
1	1367.49	1	1367.53
2	1371.06	2	1371.08
3	1372.87	3	1372.91
4	1371.82	4	1371.86
5	1370.54	5	1370.58
6	1370.30	6	1370.32
7	1371.42	7	1371.44
8	1370.91	8	1370.94
9	1370.92	9	1370.96
10	1371.21	10	1371.20
11	1364.89	11	1364.97
12	1361.29	12	1361.34
13	1363.16	13	1363.21
14	1362.47	14	1362.51
15	1365.60	15	1365.63
16	1364.84	16	1364.87
17	1364.58	17	1364.60
18	1364.71	18	1364.77
19	1364.62	19	1364.66
20	1365.14	20	1365.19
21	1362.84	21	1362.86
22	1359.18	22	1359.24
23	1357.83	23	1357.83
24	1353.50	24	1353.57
25	1353.74	25	1353.78
26	1348.73	26	1348.78
27	1352.38	27	1352.44
28	1355.50	28	1355.56

Table F-1 continued.

Location	2016 Elevation[i]	Location	2017 Elevation[j]
29	1357.53	29	1357.57
30	1357.20	30	1357.24
31	1358.63	31	1358.67
32	1359.60	32	1359.64
33	1359.60	33	1359.66
34	1362.28	34	1362.28
35	1359.41	35	1359.44
36	1358.44	36	1358.46
37	1356.57	37	1356.61
38	1353.28	38	1353.35
39	1352.75	39	1352.80
40	1354.39	40	1354.42
41	1348.62	41	1348.69
42	1349.44	42	1349.49
43	1352.33	43	1352.35
44	1350.38	44	1350.43
45	1351.66	45	1351.68
46	1356.29	46	1356.27
47	1351.55	47	1351.59
1004	1379.24	1004	1379.24
1005	1380.72	1005	1380.72
CP53	1374.92	CP53	1374.92

[i] NYSERDA established 47 new monitoring points on the north slope of the SDA in 2016 and had them surveyed on October 26, 2016. The new monitoring points were surveyed in the NAD 83 and NAVD 88 coordinate system and should not be compared to survey location data prior to 2016. Control for the north slope survey relied on Control Points CP53, 1004, and 1005.

[j] The 2017 survey was completed October 10, 2017 using the NAD 83 and NAVD 88 coordinate system.

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