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State-Licensed Disposal Area at West Valley: 2016 Annual Report

Final Report

March 2017

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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:

2016 Annual Report

Prepared by:

New York State Energy Research and Development Authority

West Valley Site Management Program

West Valley, NY

March 2017

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Acronyms and Abbreviations List

AMSL	Above Mean Sea Level
BGS	Below Ground Surface
BOD	Biological Oxygen Demand
BSW	Bulk Storage Warehouse
CMS	Corrective Measures Study
COD	Chemical Oxygen Demand
Consent Order	Administrative Order on Consent
CMP	Corrugated Metal Piping
DEC	Department of Environmental Conservation
Deg C	Degrees Celsius
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
mrem/Qtr	Millirem per Quarter
mR/Qtr	Milliroentgens per Quarter
NAD	North American 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
RCP	Radiation Control Program
RCRA	Resource Conservation and Recovery Act
SDA	State-Licensed Radioactive Waste Disposal Area
SPDES	State Pollution Discharge Elimination System
Temp	Temperature
TKN	Total Kjeldahl Nitrogen
TLD	Thermoluminescent Dosimeter
TSS	Total Suspended Solids
µCi/mL	Microcuries per Milliliter
µrem	Microrem (Roentgen Equivalent Man)
µmhos/cm	Micromhos per Centimeter
UPL	Upper Predictive Limit
UTL	Upper Tolerance Limit
VLDPE	Very-Low Density Polyethylene
VOC	Volatile Organic Compound
WNYNSC	Western New York Nuclear Service Center
WVDP	West Valley Demonstration Project
WVSMP	West Valley Site Management Program
XR-5	Ethylene Interpolymer Alloy Geomembrane

Executive Summary

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 2016 at the SDA, which is located at the Western New York Nuclear Service Center (WNYNSC).

The 2016 environmental monitoring data (from groundwater, surface water, stormwater, and gamma radiation measurements) indicate radioactive and chemical constituents in the SDA trenches are being effectively contained. In addition, inspections indicate that the SDA trench caps remain stable.

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 an increase in Trench 14, and very slight increase in Trench 1, are being evaluated. In 2016, NYSERDA installed 24 new piezometers near Trenches 14 and 1. The data from these piezometers are being evaluated, along with other monitoring locations, to determine if the source(s) of the leachate level increases can be identified.

The potential increase in Trench 3 identified in the 2015 State-Licensed Disposal Area (SDA) Annual Report,[1] was likely the result of a malfunctioning measurement probe. This probe was replaced in July 2016, and the results have decreased since the probe replacement and are consistent with the long-term decreasing trend for Trench 3.

NYSERDA's monitoring data and the ongoing evaluations show that the trench water levels (i.e., leachate levels) are not a public health and safety concern.

1 NYSERDA. 2016. "State-Licensed Disposal Area at West Valley: 2015 Annual Report, Final Report." NYSERDA Report WV-ar-15-r-1-v1.

In 2016, NYSERDA installed 47 new monitoring points on the north slope of the SDA to replace absent or damaged points. The new points, along with the older monitoring points, will be surveyed for a period of two years to ensure consistency in data evaluation and reporting. The erosion control measures are keeping the slopes surrounding the SDA stable, and the West Valley West Valley Site Management Program (WVSMP) operations and maintenance actions continue to keep the SDA systems functioning properly, and the grounds in good condition.

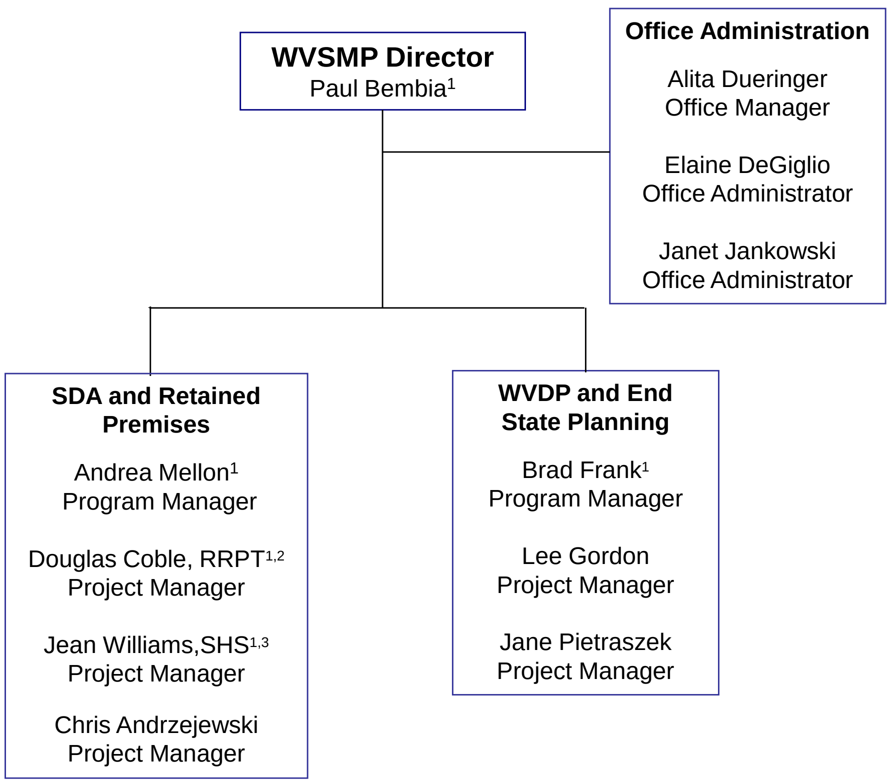
This report is prepared in accordance with the Department of Environmental Conservation (DEC) radiation control regulations and the SDA radiation control program (RCP). Annual reporting requirements are specified in:

- 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.
- DEC RCP #137-6, Permit No. 9-0422-00011/00011, March 13, 2015.

Part 380 Permit inspections were conducted on July 26 through July 28, 2016, and on November 3, 2016. 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 operations at the SDA were in compliance with the Part 380 regulations and the conditions of the permit.

S.1 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 approaches to protect the environment, and the well-being of our workers and neighbors.



1 Radiation Safety Committee Member
2 Radiation Safety Officer
3 Safety & Health Supervisor

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 five, 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 Western New York Nuclear Service Center

Source: *NYSERDA*

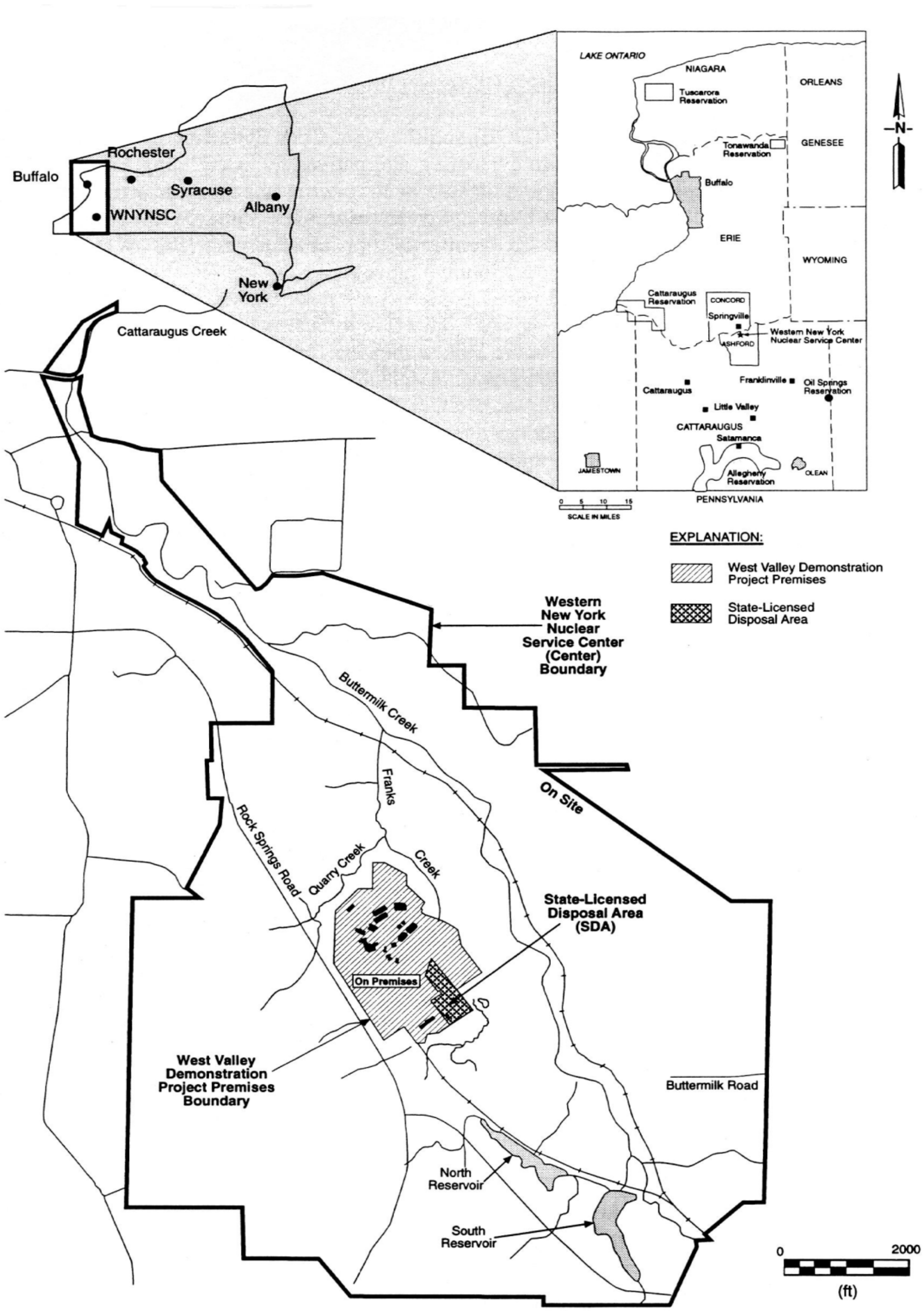


Figure 1-2. Aerial Photograph of the State-Licensed Disposal Area

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.

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, DEC approved NYSERDA's Protective Filer Certification for the unused portion of the Leachate Treatment Facility (two Frac tanks); and with the combined clean-closure certification and approval of protective filing status, NYSERDA has no further closure actions to complete. NYSERDA 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 divert groundwater flow away from the south trenches (eight through 14). In June 1993, the project was completed with the installation of an exposed, very low-density polyethylene (VLDPE) geomembrane cover 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 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 geomembrane covers at the SDA with the installation of an exposed, 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.

1.3 Corrective Measures Study (CMS)

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 CMS 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.*[2] NYSERDA is required to submit a Final CMS 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 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] 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.

2 Environmental Monitoring

2.1 Trench Leachate Elevations

2.1.1 Leachate Elevation Monitoring

One SDA trench sump is located in 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 Well Point-91 (WP-91), are located in Trench 14 (see Figure 2-1).

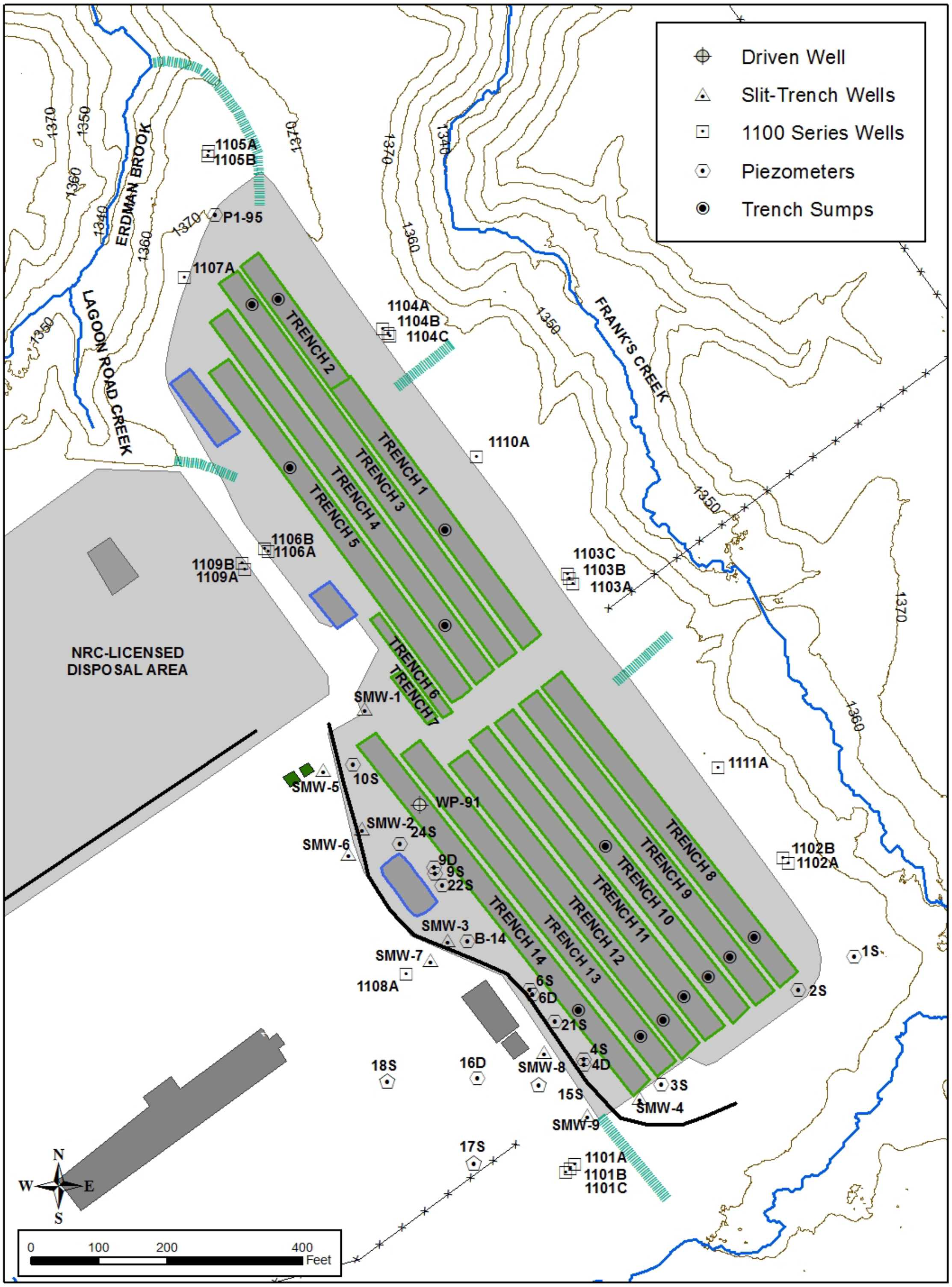
Leachate elevations are measured in the 13 trench sumps at the SDA in accordance with the *Leachate Monitoring Plan for the State-Licensed Disposal Area (SDA) at West Valley* (LMP).[3] In addition to requiring the leachate elevation measurements, the LMP specifies data assessment, notification, and reporting requirements. Table A-1 presents leachate elevation data for 2016. Graphical presentations of leachate elevations over the time period (2006 through 2016) 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. Note that Figures A-13 and A-14 present data starting from 1997 to demonstrate the long-term changes in leachate elevation trends at Trench 14. Figure A-15 presents data from 2013 (date of new indicator installation) to 2016 for WP-91. This method will aid in the identification of other leachate elevation 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 when any one of the independent variables change, 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). 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.

[3] 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 2016 were collected quarterly in March, June, September, and December (see Table A-1). 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 2016 (*Annual Statistical Assessment of SDA Water Elevations - Data Through 2016*[4]) indicates that from 2000 through 2016, most trenches show a decreasing long-term leachate elevation trend (Figure 2-2). Trench 1 shows an increasing long-term trend. 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 (Figure 2-3); 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 Figure 2-4 and Appendix A-14, Trench 14 is increasing at approximately 1.05 inches per year. 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 is increasing at approximately 0.86 inches per year.

In addition to the increasing trends in Trenches 1 and 14, a potential trend change had been noted for Trench 3. A review of recent SDA leachate elevation data had shown that the leachate elevation in Trench 3 exhibited a stable to very slightly increasing trend (0.13 ft) between 2014 and the first quarter of 2016. Prior to early 2014, the leachate elevation had been decreasing. Available data suggests that the leachate elevation in this trench may be near the trench bottom, or possibly even below (within the trench sump). During the second quarter 2016 measurement, it was noted that the water level indicator appeared to be malfunctioning. A new indicator was installed in the third quarter of 2016, with the initial result a 0.20 ft decrease from the second quarter 2016 result; and, the third quarter 2016 measurement a decrease of 0.37 ft. The fourth quarter 2016 measurement showed a decrease of 0.04 ft from the previous quarter. The measurements with the new indicator show that the leachate level is back on line with the long-term

4 NYSERDA. 2017. "Annual Statistical Assessment of SDA Water Elevations – Data Through 2016." Prepared by AECOM.

Figure 2-2. SDA Water Elevation Trends

Source: NYSERDA

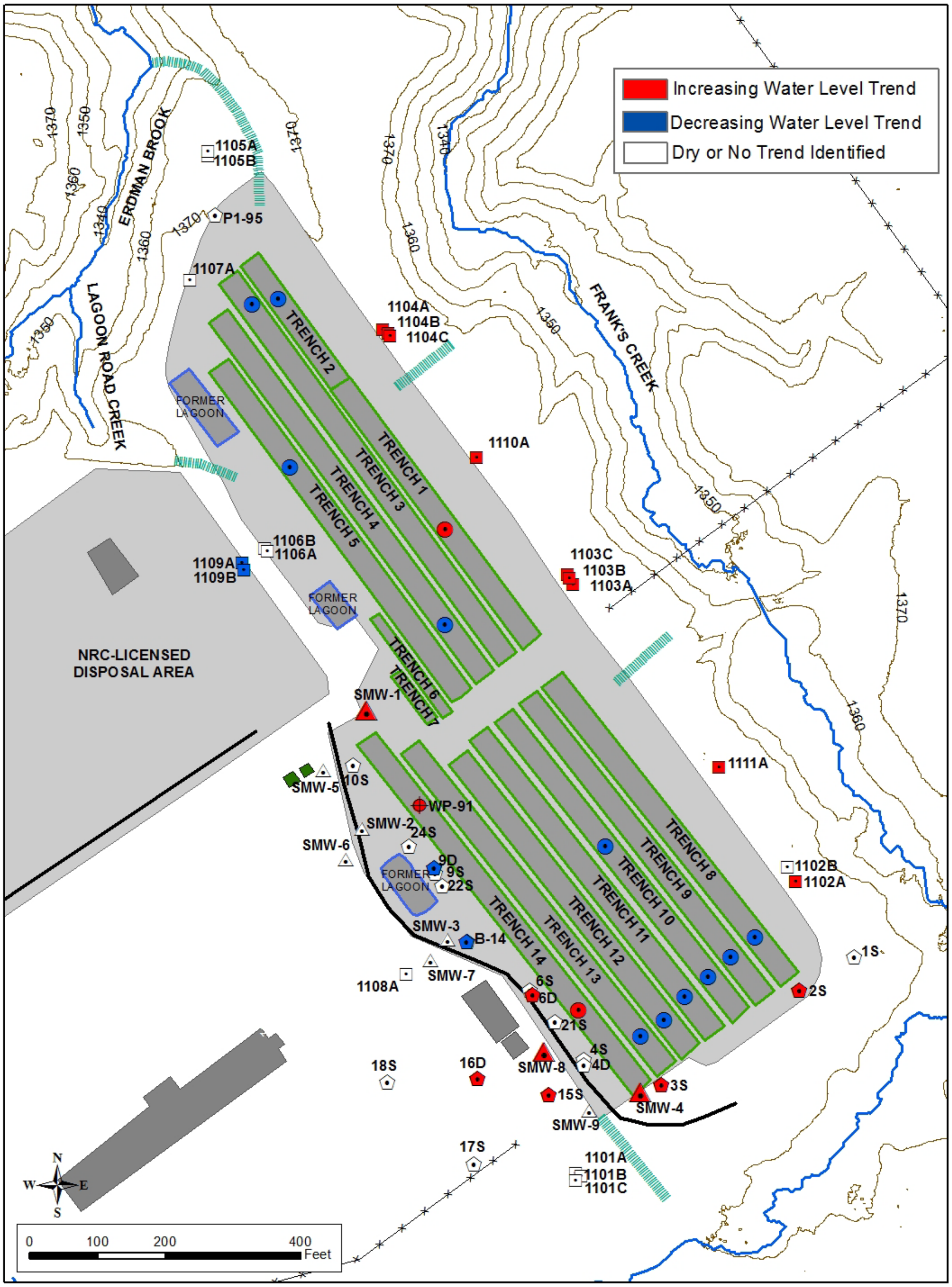
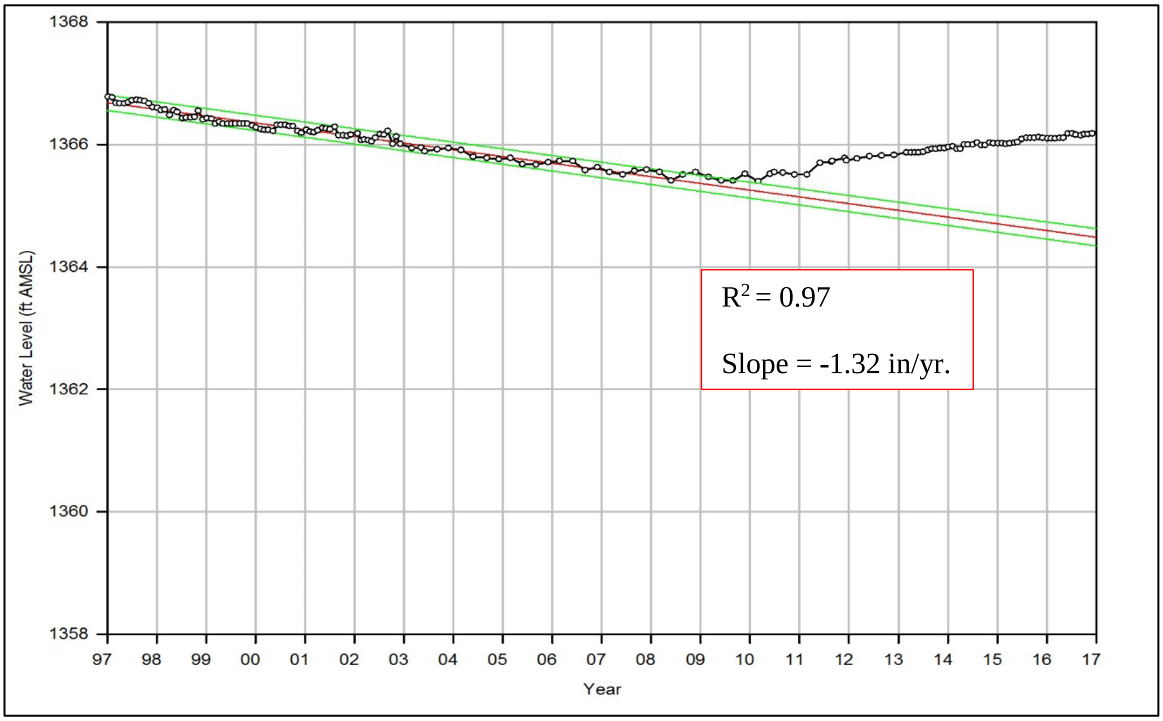


Figure 2-3. Trench 14 Leachate (Water) Elevations for the Period 1997 to 2016, Inclusive

Regression line (red) for data for the period January 1997 to May 2008. 95% Prediction intervals shown in green.

Source: NYSERDA



historical decreasing trend, suggesting that the malfunctioning measurement probe was responsible for the apparent deviation from the historical trend (see Figure A-3).

Due to the low levels in Trench 1, the fact that the current increase at this location is small, and the continuation of decreasing levels in Trench 3 after probe replacement, the current leachate levels do not represent a threat 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.

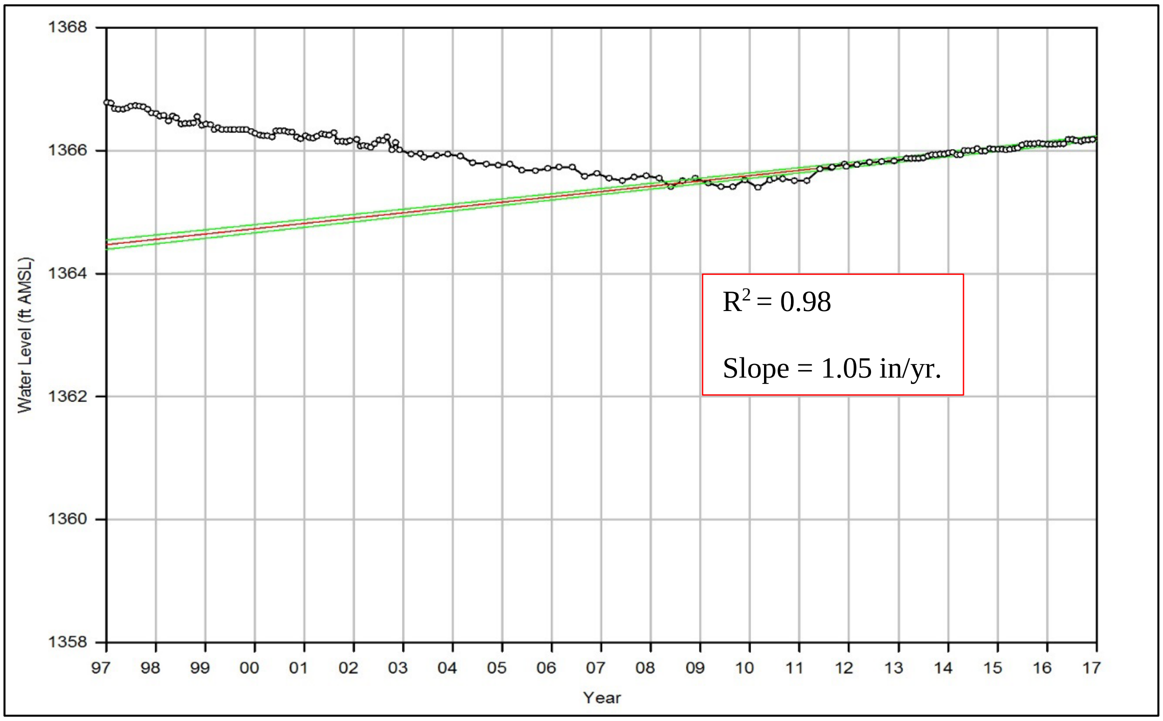
2.1.3 Trench 14 Leachate Elevation

Following the installation of infiltration controls in the mid-1990s, the Trench 14 leachate elevation followed a consistent and generally predictable decreasing trend (Figure 2-3). A noteworthy change in behavior of this trend occurred in approximately 2008 through 2009 when the decreasing trend stopped, as shown in Figure 2-3.

Figure 2-4. Trench 14 Leachate (Water) Elevations for the Period 2011 to 2016, Inclusive

Regression line (red) for data for the period June 2011 to December 2016. 95% Prediction intervals shown in green.

Source: NYSERDA



Small increases and decreases have been observed since 2011, but overall, the Trench 14 leachate elevation has continued to increase each year. Although none of the increases were large enough to trigger regulatory reporting requirements, the 2016 data set shows that the small increases have been continuing, and have been consistent and predictable since mid-2011 (Figure 2-4). During 2016, the leachate in Trench 14 increased by 0.08 ft (0.96 inches). None of the nearby trenches are showing a similar increase.

The highest leachate elevation observed in Trench 14 was in 1992 (1367.46 ft) above mean sea level (AMSL), when it was 1.28 ft higher than it is today. Even at this higher elevation, there was no release of leachate from the trench. As such, this current leachate elevation increase in Trench 14 does not present a threat to public health and safety, or the environment; however, NYSERDA is investigating the increase.

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 has 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 U.S. Environmental Protection Agency in 2016. Field activities began during the second quarter 2016 and included the installation of 24 piezometers. 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 Findings and Recommendations Report is anticipated to be completed by the end of 2017.

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).[5] 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 2016, 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 groundwater elevation measurements were taken at a number of locations in support of the Trench 14

5 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.”

leachate investigation (see Section 2.1.3). A tabulation of these supporting levels will be presented in the final Findings and Recommendations Report anticipated to be completed by the end of 2017.

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 2016 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 2016 (*Annual Statistical Assessment of SDA Water Elevations – Data through 2016*[6]*)*. The statistical assessment used groundwater elevation data from January 2000 through December 2016, and the results of the trend assessment show increasing long-term water elevation trend in: Wells 1102B, 1103A, 1103B, 1103C, 1104A, 1104B, 1104C, 1110A, and 1111A; Piezometers 2S, 3S, 15S, 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 appears to have reversed and is now an increasing water elevation trend (see Figures 2-5 and 2-6). Water levels will continue to be collected at 6D-91 as per the GMP to determine whether this increasing water elevation trend continues.

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 leachate elevation trends in all but two of the SDA

6 AECOM, pg. 8.

Figure 2-5. 6D-91 Groundwater Elevations – Long-Term Decreasing Trend 1997-2011, Inclusive

Regression line (red) for data for the period August 1997 to November 2011.

Source: *NYSERDA*

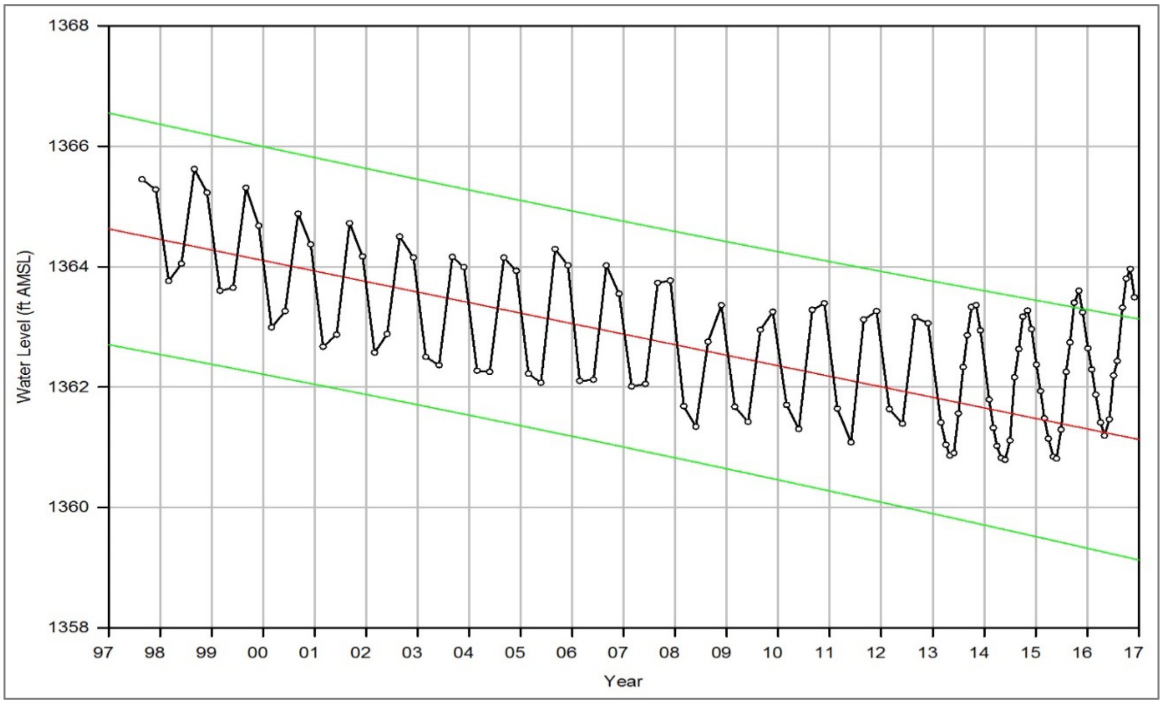
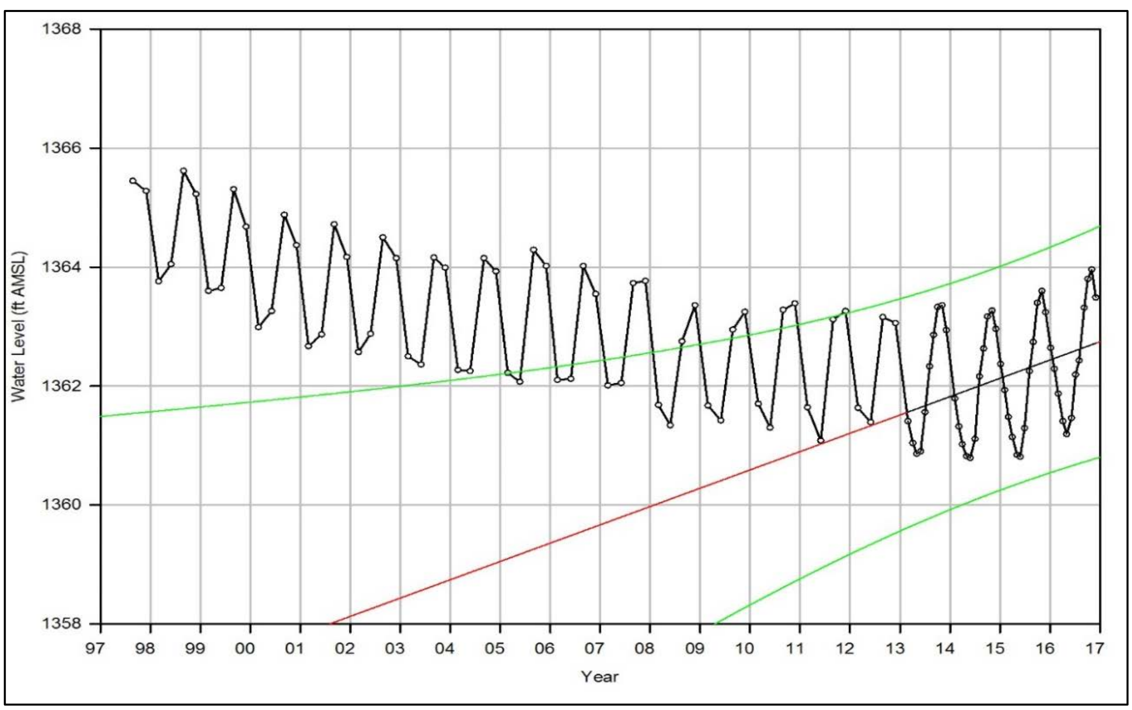


Figure 2-6. 6D-91 Groundwater Elevations – Short-Term Increasing Trend 2013-2016, Inclusive

Regression line (red) for data for the period February 2013 to December 2016.

Source: *NYSERDA*



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, and we note that Trench 1 is in this same area.

2.2.3 Groundwater Parameter Monitoring

In accordance with the GMP, the 1100-series wells were sampled semiannually (June and December) during 2016. 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 2016 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

The gross alpha sampling results from all wells did not exceed the reporting criteria set forth in the GMP. In June and December, none of the Upper Tolerance Limit (UTLs) or Upper Predictive Limits (UPLs) were exceeded for any of the sampled wells.

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

The gross beta sampling results from all wells did not exceed the reporting criteria set forth in the GMP. In June and December, 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

The tritium sampling results in all wells did not exceed the reporting criteria set forth in the GMP. In June and 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 cesium-134, cesium-137 (Cs-137), cobalt-57, cobalt-60 (Co-60), radium-224, and uranium-235 were below their minimum detection limits (MDCs) or 2-sigma uncertainties.

Positive detections were recorded at several wells for radium-226, potassium-40 (K-40), and bismuth-214, which are naturally occurring radionuclides, and were consistent with historical results. These positive detections are the result of lower analytical detection levels for NYSERDA’s contractor laboratory.

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-199 was performed in 2016.

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.

Five I-129 results were slightly elevated from historical results, and exceeded both the MDCs and program detection limits set forth in the GMP (1E-09 µCi/mL). The wells with positive detections above the program detection limits were: 1101A (1.41E-08±4.62E-09 µCi/mL), 1103A (1.43E-08±4.66E-09 µCi/mL), 1109B (1.39E-08±4.71E-09 µCi/mL), 1110A (1.41E-08±4.60E-09 µCi/mL), and 1111A (1.45E-08±4.66E-09 µCi/mL). NYSERDA’s environmental monitoring contractor and laboratory began work in December 2015, and there are differences between the previous and new analytical methodologies, which may account for these elevated results. Control charts were not developed for the I-129 results because there have not been five positive detections in the data set for any individual well.

The Sr-90 result for Well 1107A (8.00E-09±1.10E-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.

Three Tc-99 results were slightly elevated from historical results, and exceeded both the MDCs and program detection limits set forth in the GMP (5E-09 µCi/mL). The wells with positive detections above the program detection limits were 1101B (9.10E-08±2.10E-08 µCi/mL), 1102B (1.25E-08±3.70E-09 µCi/mL), and 1111A (1.02E-08±3.40E-09 µCi/mL). As stated above, the elevated results may be due to the change in contractor and laboratory. Control charts were not developed for the Tc-99 results because there have not been five positive detections in the data set for any individual well.

2.2.3.6 *Volatile Organic Compounds*

VOC results for samples collected in 2016 did not exceed the reporting criteria set forth in the GMP and were generally consistent with historical results. Because the VOC results are all “non-detects,” 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 2016 water quality measurements were generally consistent with historical results and are reported in Table B-10. The only exception is the elevated turbidity value of 14.90 (nephelometric turbidity unit [NTU]) for Well 1107A, which may be due to a stirring up of well sediment during the sampling procedure.

2.3 Surface Water Monitoring

During 2016, 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 2016, approximately 0.75 miles northeast (and downgradient) of the SDA on Buttermilk Creek.

As shown in Figure 2-7, 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 Frank's 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 Frank's Creek, monitors surface water on the eastern and southern portions of the SDA.

Figure 2-8, 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 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 2016 (*Statistical Assessment of SDA Surface Water Constituents for 2016*[7]).

2.3.1 Radiological Parameters

2.3.1.1 Gross Alpha

The 2016 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. All results were below the 6 NYCRR 703.5 - Table 1 Water Quality Standards for Surface Waters and Groundwater (6 NYCRR 703.5)[8] (1.5E-08 μCi/mL), which is used as a comparative value for gross alpha.

2.3.1.2 Gross Beta

The 2016 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

7 NYSERDA. 2016. "Statistical Assessment of SDA Surface Water Constituents for 2016." Prepared by AECOM.

8 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 2-7. Surface Water Monitoring Locations (WNNDADR, WNERB53, WNFRC67, and WNDCELD)

Source: NYSERDA

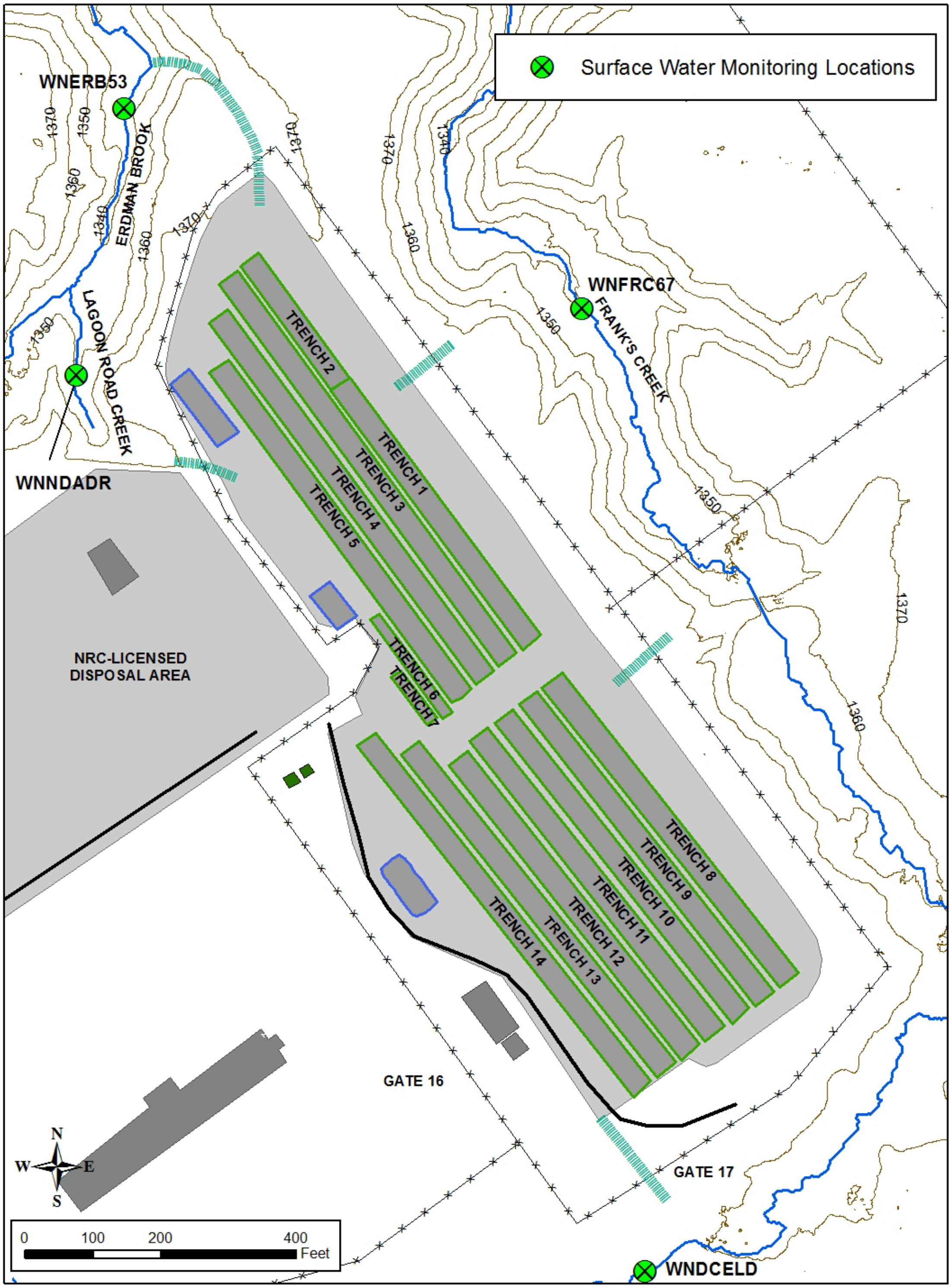
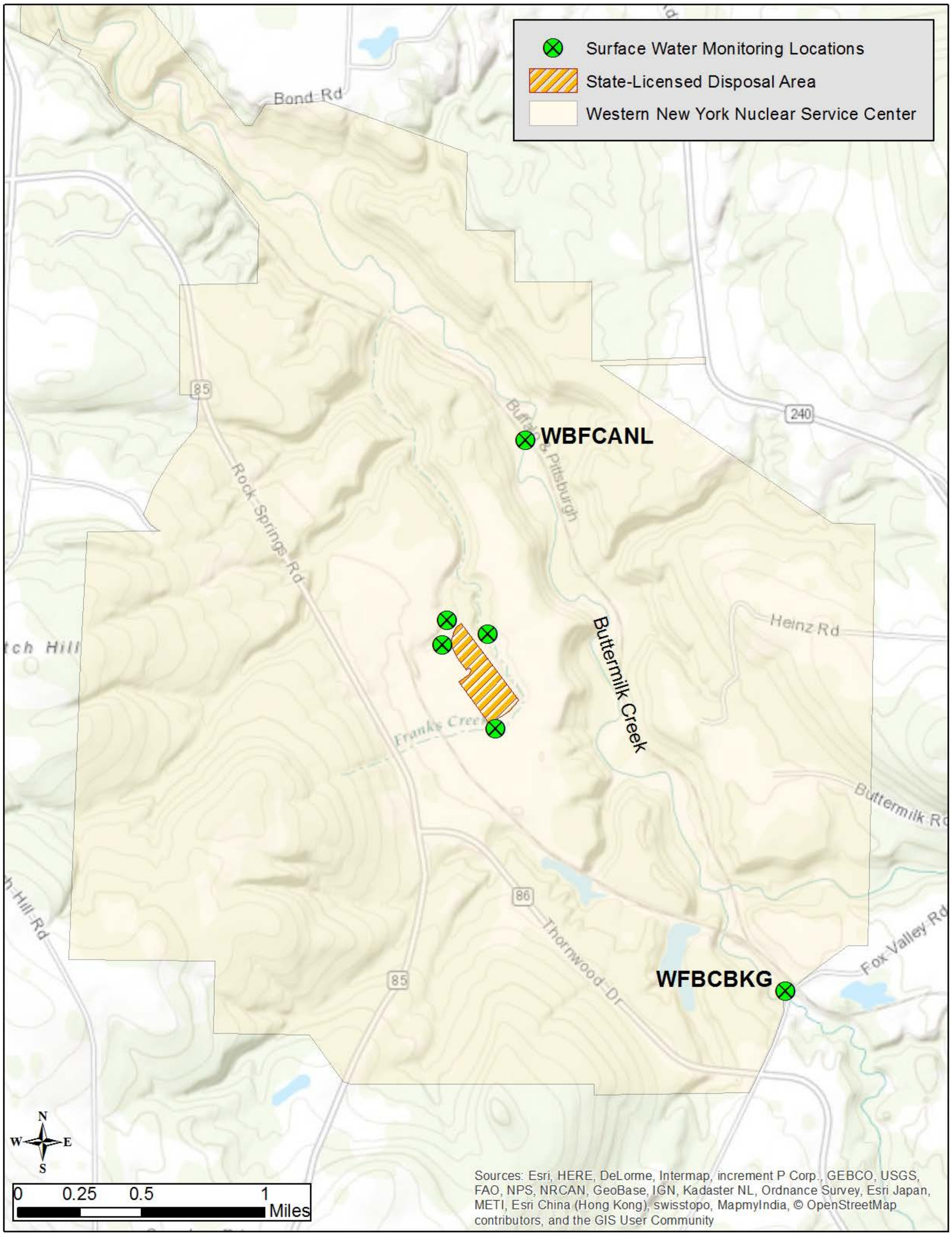


Figure 2-8. Surface Water Monitoring Locations (WFBCBKG and WFBCANL)

Source: NYSERDA



geomembrane cover and subsurface barrier were installed in 2008. Gross beta results for WNERB53 were also statistically higher than background in 2016, although quarterly reports have shown a statistically decreasing trend since May 2010. The gross beta result for WNDCELD was statistically higher than background in 2016, which represents a change from historical assessments. The 2016 result for WNFRC67 was statistically indistinguishable from background, which is consistent with previous annual assessments. Figure 2-9 shows the comparison of the gross beta results for the WNNDADR, WNERB53, and WNDCELD locations compared to the background location (WFBCBKG). All gross beta results were below 6 NYCRR 703.5 (1.0E-06 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 2016, which is consistent with historical results, although tritium levels have fallen since the NDA geomembrane cover and subsurface barrier wall were installed in 2008. The statistically higher result for tritium at location WNFRC67 noted in 2015 was not present in 2016. WNFRC67, as well as the tritium results for WNDCELD and WNERB53, were statistically indistinguishable from background, which is consistent with historical assessments. All tritium results were below 6 NYCRR 703.5 (2.0E-05 μCi/mL), which is used as a comparative value for tritium. Figure 2-10 shows the decreasing trend for tritium identified since 2008 for the WNNDADR location. Note: All tritium results for the WNNDADR location were reported as qualified values.

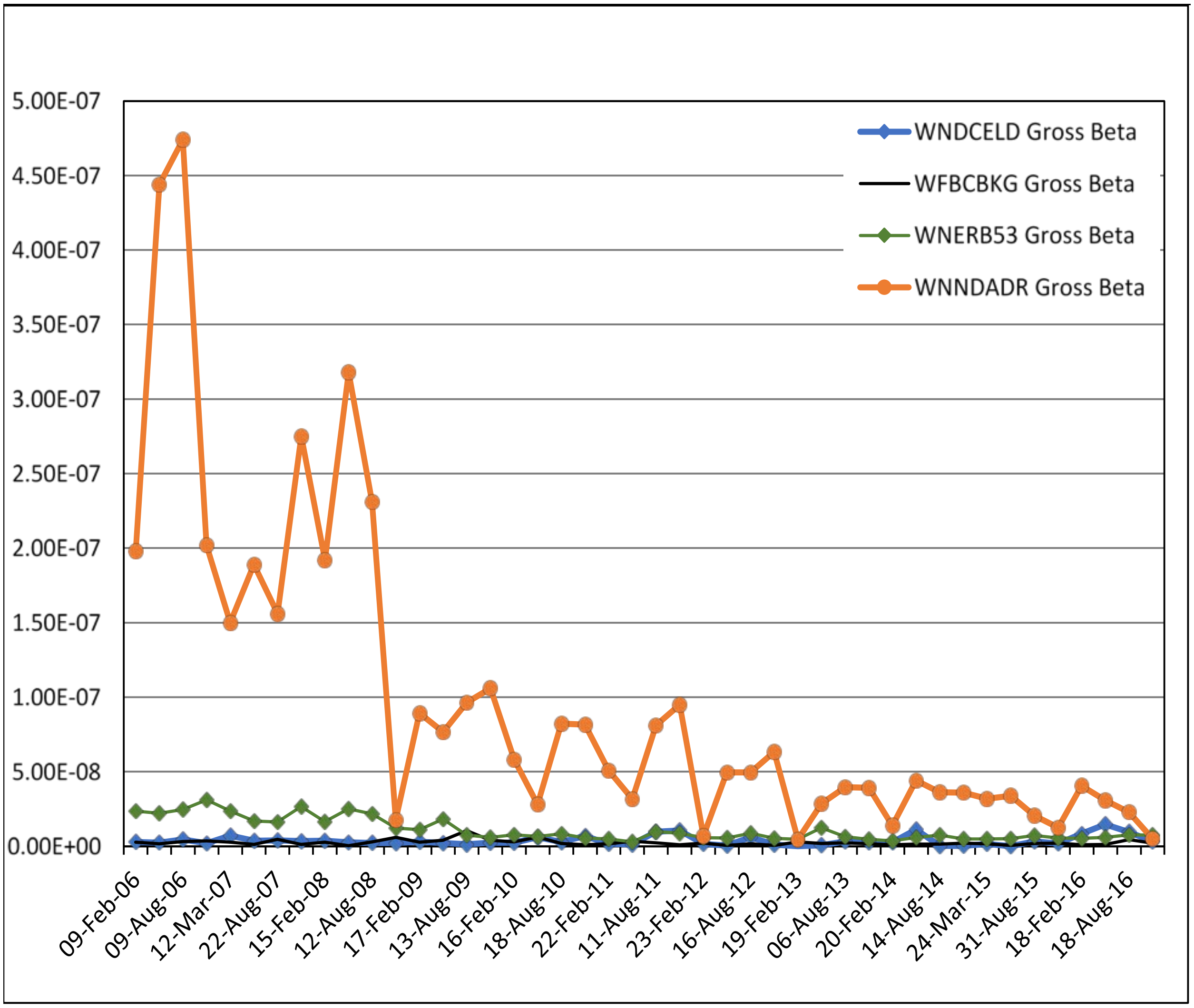
2.4 Stormwater Monitoring

As required by the SDA State Pollution Discharge Elimination System (SPDES) Permit No. NY-026971, semiannual sampling is conducted at one of the five designated SDA stormwater outfalls (as shown in Figure 2-11). During 2016, semiannual stormwater samples were collected from Outfall W01 during qualifying storm events on May 13 and October 13.

Composite samples from both events were analyzed for biological oxygen demand (BOD), chemical oxygen demand (COD), total nitrate-nitrite and total Kjeldahl nitrogen (TKN), 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 TKN, oil and grease, total phosphorus, TSS, pH, and temperature. Ambient rainfall samples from both events were analyzed for pH and temperature. Stormwater monitoring data for 2016 are reported in Tables C-7 and C-8.

Figure 2-9. Gross Beta Results for Surface Water Monitoring Locations (WNDCELD, WNFRC67, WNNDADR, and WNERB53)

Source: NYSERDA



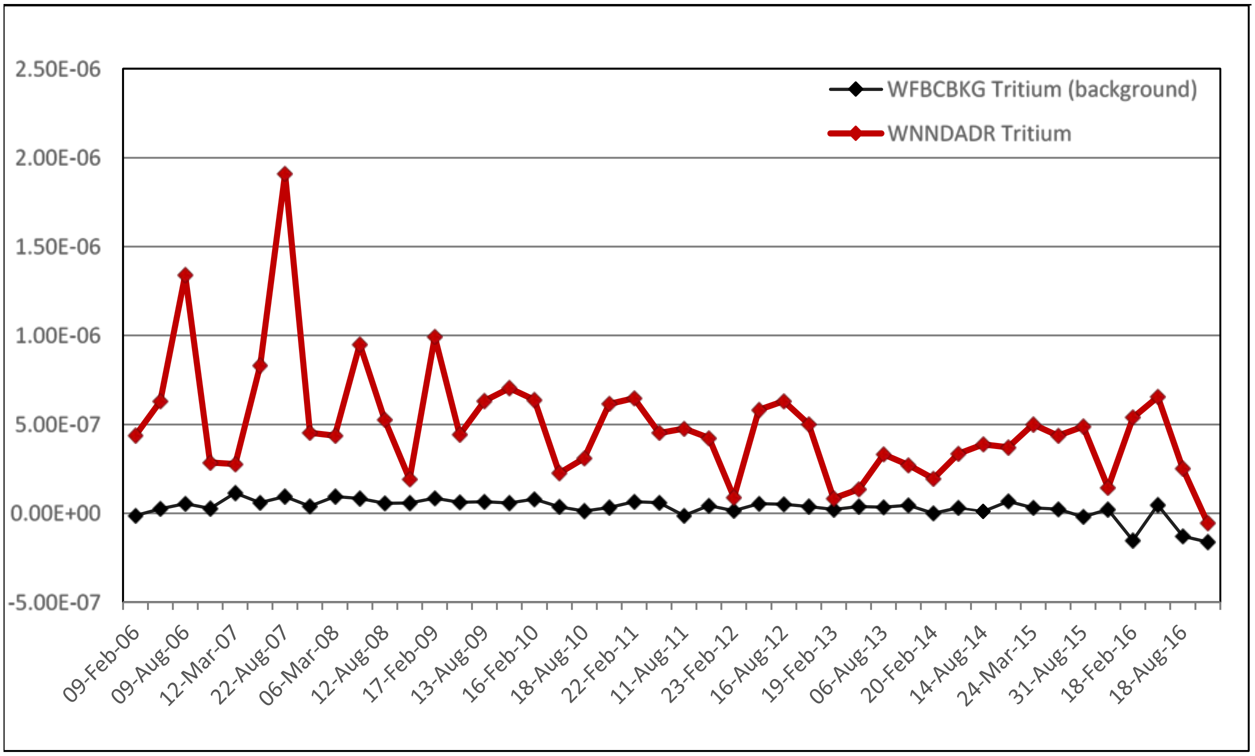
2.4.1 Radiological Parameters

2.4.1.1 Gross Alpha

Gross alpha results from the May and October 2016 sampling events (6.11E-10 µCi/mL and 6.25E-10 µCi/mL) were above the reported MDC values of 4.97E-10 µCi/mL and 4.53 E-10 µCi/mL, respectively. Statistical trend analysis for gross alpha results did not identify any significant trends. All results were below 6 NYCRR 703.5 (1.5E-08 µCi/mL), which is used as a comparative value for gross alpha.

Figure 2-10. Tritium Results for Surface Water Monitoring Location WNNDADR Compared to WFBCBKG

Source: NYSERDA



2.4.1.2 Gross Beta

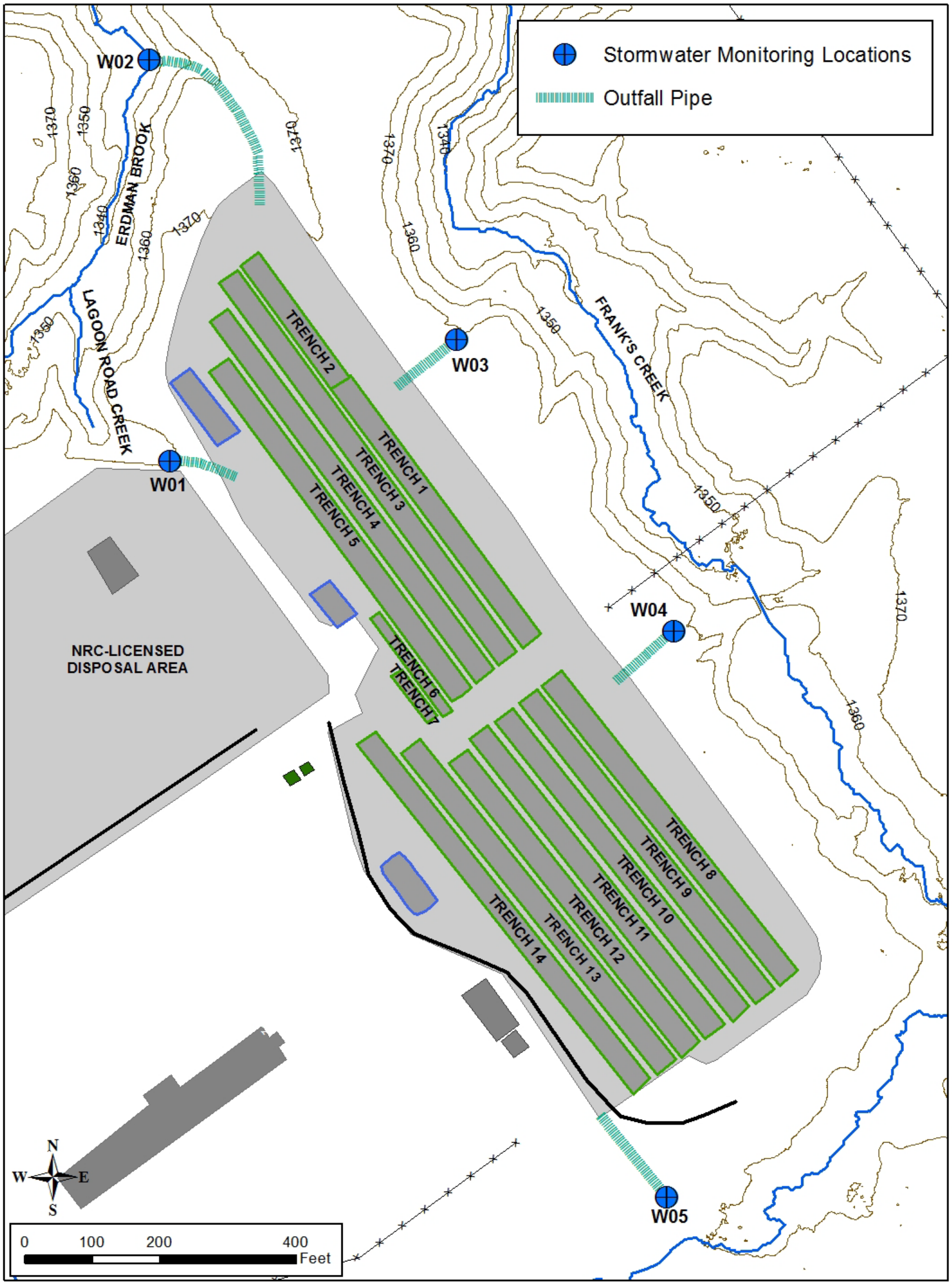
The gross beta results for the May and October 2016 sampling events (1.66E-09 µCi/mL and 2.20E-09 µCi/mL) were above the reported MDC values of 7.29E-10 µCi/mL and 7.55E-10 µCi/mL, respectively. Statistical trend analyses for gross beta results did not identify any significant trends for either event. 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 May 2016 sampling event (7.14E-07 µCi/mL) was above the reported MDC (1.75E-07 µCi/mL). The composite sample average exceeded the upper alarm limit and upper warning limit, and showed an increase over the previous results. The upper alarm limit exceedance is considered a statistical trend. It is important to note, however, that the tritium result for the October 2016 sampling event (7.27E-08 µCi/mL) was back below the reported MDC (1.72E-07 µCi/mL). Statistical trend analysis did not identify any significant trend for this event.

Figure 2-11. Stormwater Monitoring Locations

Source: NYSERDA



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 K-40) are reported for each stormwater sampling event. In addition, gamma spectroscopy results were reviewed for an additional 145 gamma-emitting radionuclides. During 2016, Cs-137, Co-60, and K-40 results were not above their respective MDC.

2.4.2 Chemical and Physical Parameters

Results for all chemical and physical parameters were below the SPDES permit limits. 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 2-12, 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.

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 2016 semiannual surveys (May and September) 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

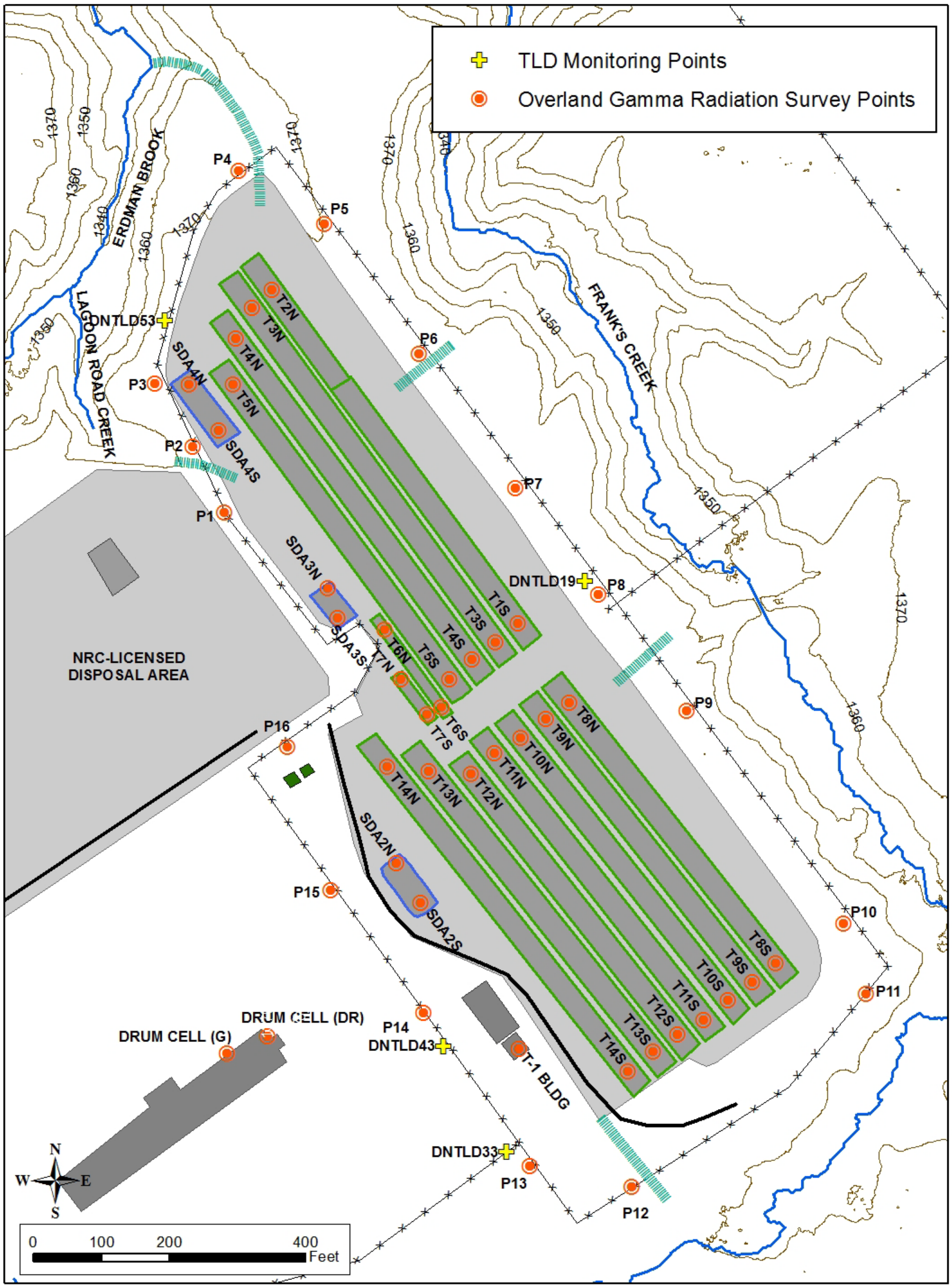
Each calendar quarter, four environmental thermoluminescent dosimeters (TLDs) placed around the SDA are processed to obtain the integrated gamma radiation exposure from each location (see Figure 2-12). TLD monitoring locations DNTLD43 and DNTLD33 are located north and south of the SDA Tank buildings, 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 2016 are included in Table D-2.

The quarterly environmental TLD results for 2016 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 2016 results for each location, for which no outliers were confirmed; therefore, no results were removed from the 2016 data set.

The results of the statistical tests show that radiation exposures for DNTLD33 and 53 were higher than background. DNTLD53 is consistent with previous results and is likely to reflect radiation “shine” from the WVDP. The 2016 data for DNTLD33 were consistent with previous results with a greater level of precision (e.g., range of 7.7 mrem/Qtr for 2015 versus 2.1 mrem/Qtr for 2016). This greater level of precision means that the data range is much smaller and is less influenced by other factors (e.g., natural variability). TLD exposures for DNTLD19 and 43 were consistent with background and consistent with previous statistical assessments. There were no known activities performed at or near the SDA in 2016 that would have been expected to affect routine ambient radiation exposure.

Figure 2-12. Gamma Radiation Monitoring Locations

Source: NYSERDA



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 2016. During 2016, total precipitation measured at the SDA was 43.3 inches.

NYSERDA operates and maintains a stage recorder on Buttermilk Creek at Thomas Corners Road Bridge (near the confluence with Cattaraugus Creek) to measure stream flow.

Data are logged at these stations every 10 minutes and transmitted via cellular modem to NYSERDA's offices. NYSERDA maintains an interactive meteorological and stream flow 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*[9] 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 2016 and found no significant impact on the erosion control structures within Erdman Brook or Frank's Creek aside from some minor maintenance items.

3.1.2 Visual Inspections of Surrounding Stream Channels

In 2016, NYSERDA conducted monthly visual inspections of the creeks that flow around three sides of the SDA (Erdman Brook, Frank's 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. Construction projects to repair erosion control structures are detailed in Section 4. As noted in the Erosion Monitoring Log updates for 2016, there remains an area of minor damage to erosion control structures on Erdman Brook well west of the SDA, which initially occurred as a result of

[9] NYSERDA. 2013. "Walkover Inspection of the SDA, OPS003.08."

rainstorms in July 2015. NYSERDA is working with the Department of Energy, who is responsible for maintenance in this area, to coordinate repairs.

3.1.3 Quantitative Measurements

Survey data for the north slope and trench cap was collected on October 26, 2016, by Clear Creek Land Surveying, LLC. Survey data contained herein is being reported in North American Datum (NAD 27) for horizontal positioning, and the National Geodetic Vertical Datum (NGVD 29) for vertical positioning or elevation.

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 elevation survey of the ground surface at established points on the north slope of the SDA to detect slope movement. The survey and periodic field inspections of the north slope area during 2016 confirmed no reportable horizontal or vertical movement (e.g., slumping).

The 2016 elevations of the north slope monitoring points (see Figure 3-1) are provided in Table F-1. A comparison of the 2016 elevation data with the 2015 data did not show any reportable changes (>0.5 ft) in the elevations of the monitoring points. A few of the numeric location points absent from Table F-1 are due to the physical point markers being damaged and removed during erosion mitigation construction activities.

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, by Clear Creek Land Surveying, LLC (see Figure 3-2 and Table F-2). The new monitoring points were surveyed in the North American Datum 83 and North American Vertical Datum 88 coordinate system, and will be used to monitor the north slope after a two-year period of data collection is completed for the new monitoring points and compared to the two-year data collection for the old monitoring points.

3.1.3.2 SDA Trench Cap Survey

NYSERDA also surveys the ground surface elevations along the SDA trench centerlines and monuments to monitor for trench cap settlement. NYSERDA has established fixed-trench cap elevation survey points that are easily surveyed from year to year. The annual results are compared to the previous year's data for

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

Source: NYSERDA

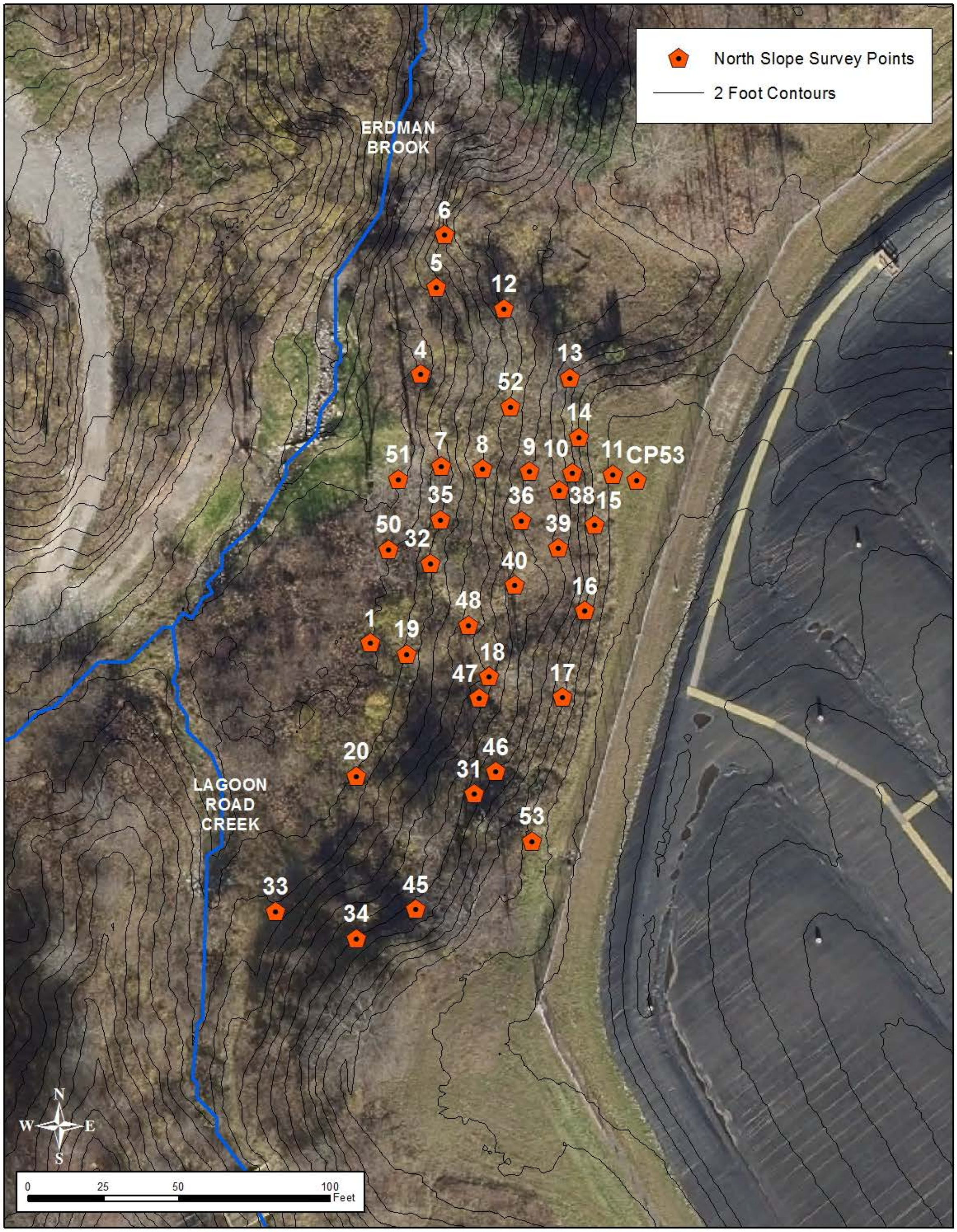
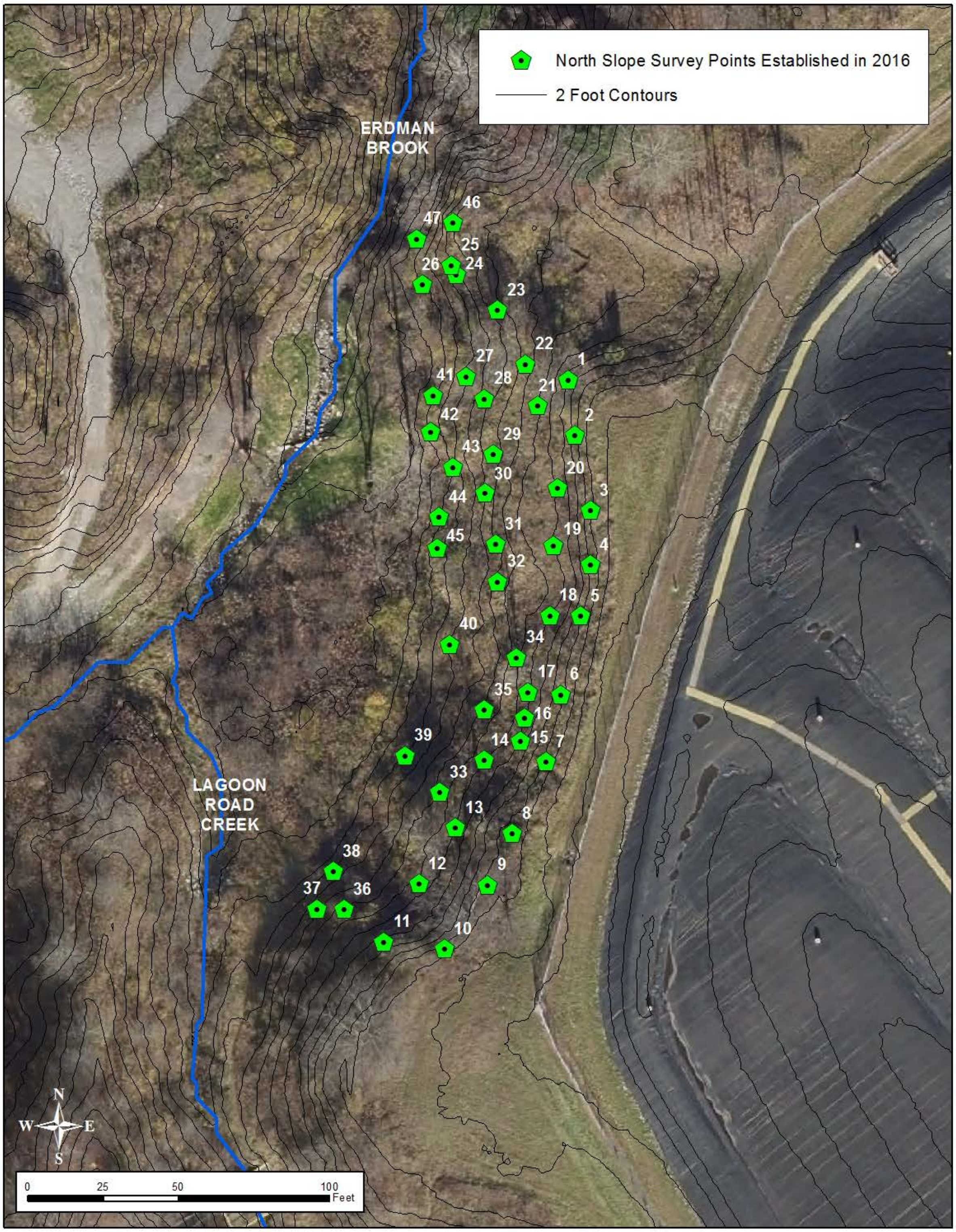


Figure 3-2. New EXIR North Slope Ground Surface Elevation Survey Points

Source: NYSERDA



indications of trench cap subsidence. A map identifying the location of the trench cap elevation survey points is shown in Figure 3-3.

All trench cap surveys begin at the centerline mark of the south monument plaque, and continue northerly at 100-ft stationing along the centerline of the trench until reaching the centerline mark of the north monument plaque. Results of the trench cap survey are provided in Table F-3. A comparison of the 2016 trench cap centerline elevations with 2015 elevation data did not indicate any significant elevation changes (>0.5 ft).

Areas of settlement were observed on the southernmost 100-foot sections of Trenches 8 and 13 in 2013. In 2014, NYSERDA conducted a focused topographic survey in each of the areas using a 10-foot grid pattern to monitor the rate of subsidence. To date, there has been less than one inch of subsidence. The subsidence occurring over Trench 8 will be monitored with a settlement plate that is being installed as part of the new geomembrane cover system. NYSERDA will continue to monitor the area on Trench 13 in the future with the focused topographic survey grid pattern. NYSERDA will report any significant rates of subsidence to DEC when they are identified.

3.1.4 LiDAR Mapping and Orthophotography

In 2010, NYSERDA conducted an aerial Light Detection and Ranging (LiDAR) mapping and orthoimagery project for the Buttermilk Creek watershed, covering both the WNYNSC and the SDA. This survey fulfills NYSERDA's requirement to complete a comprehensive topographic mapping of the SDA and adjacent premises once every five years (per NYSERDA's Erosion Monitoring Plan[10]). 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. Figure 3-4 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. This examination revealed active erosion of streams and gullies in the watershed, as would be expected. There was no subsidence or erosion at the SDA, or in areas adjacent to the SDA. There were some topographic changes at points along Erdman Brook and Frank's Creek, which were directly attributable to the construction of erosion controls at these locations.

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

Figure 3-3. Trench Cap Ground Surface Elevation Survey Points

Source: *NYSERDA*

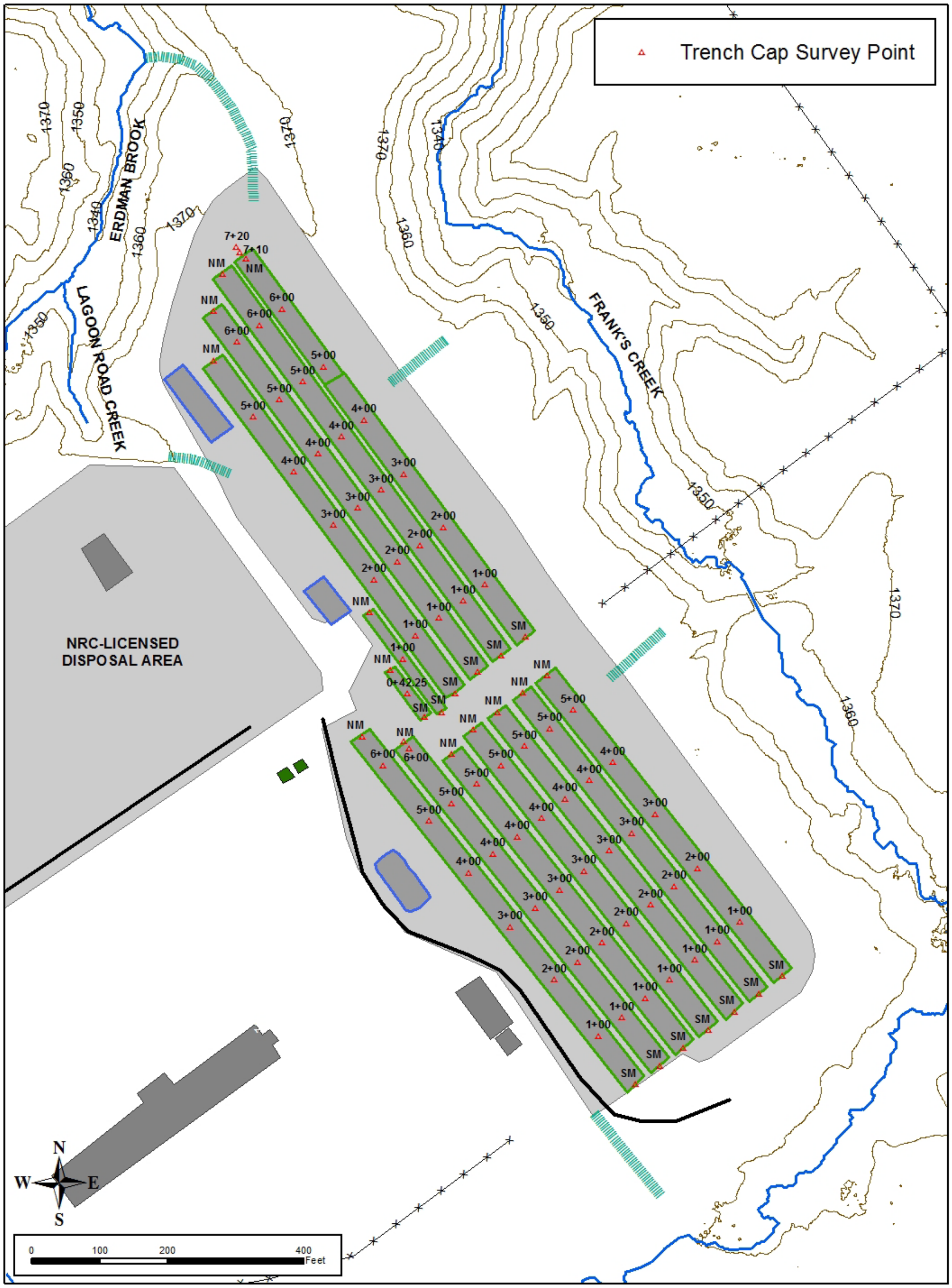
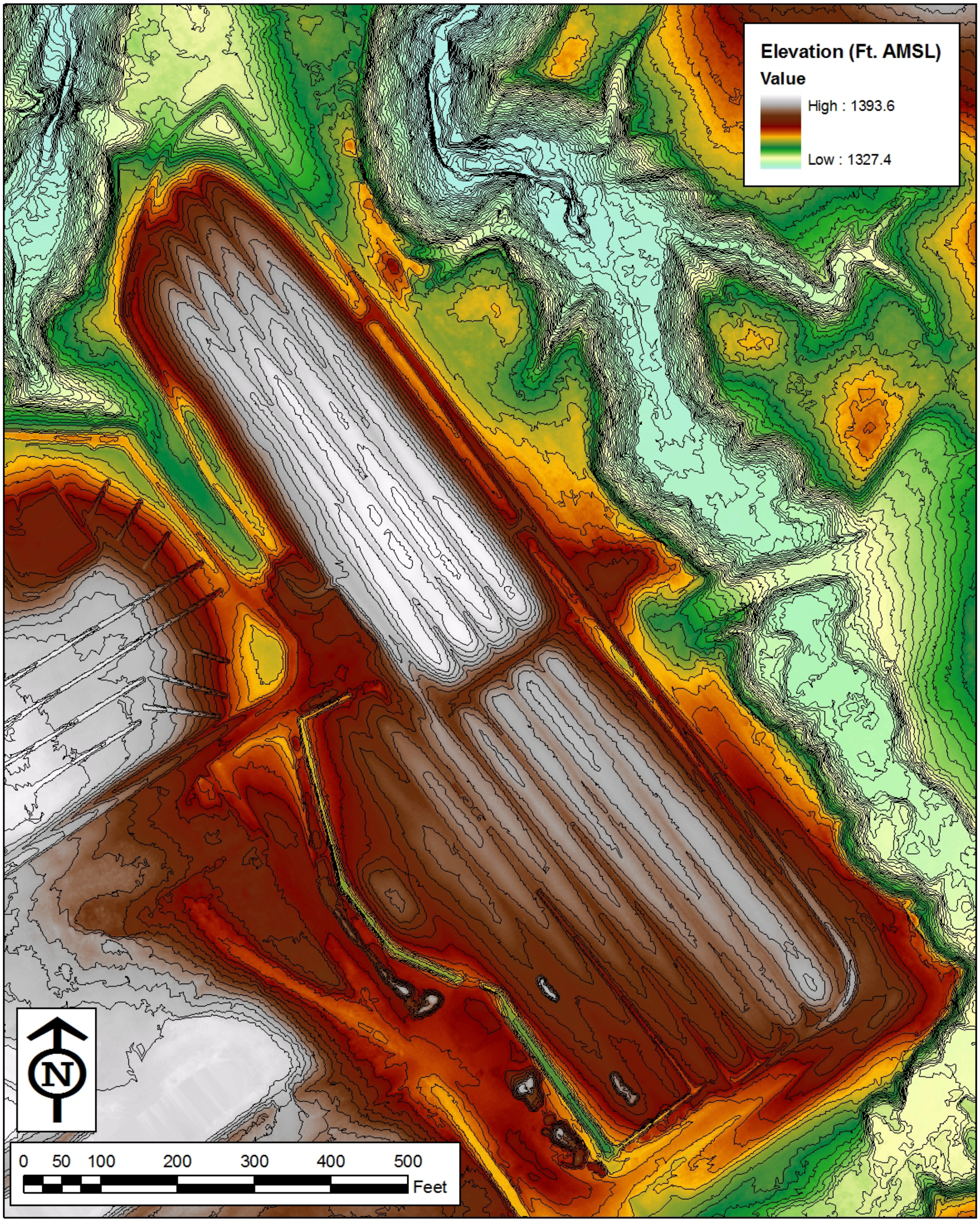


Figure 3-4. LiDAR-Derived Topographic Map of the SDA and Surrounding Area

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 2016, 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 2016, 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, surrounding slopes, and streams.
- Annual geomembrane cover system inspection.
- Triennial electrical inspection.

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

4.2 Maintenance

In 2016, NYSERDA completed the following routine and preventative maintenance at the SDA:

- Repaired miscellaneous punctures and tears on the XR-5 geomembrane covers.
- Snowplowing and vegetation control at the SDA and Bulk Storage Warehouse (BSW).
- Supported tasks for the annual deer hunting program on the WNYNSC.

NYSERDA completed the following nonroutine maintenance activities at the SDA in 2016:

- Cleared vegetation from the north slope of the SDA in support of the annual survey.
- Installed 47 new survey stakes on the north slope of the SDA to better assess slope stability.
- Removed obsolete stormwater weirs and ancillary debris from the areas north of the SDA.
- Completed the focused topographic survey of Trenches 8 and 13 for subsidence.

- Rehabilitation of the former Buttermilk Creek Road just west of the BSW.
- Provided support for the hydrogeological investigation led by GZA Geoenvironmental.
- Installed a raised gravel walkway and safety barrier on the east side of the Frac Tanks inside the Frac Tank building.

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

4.3 Engineered Construction Projects

Both the Erdman Brook and Frank's Creek erosion controls have been functioning as designed, including the recently installed corrugated metal pipe (CMP) culvert within Erdman Brook. Repairs needed in the DOE-controlled sections of Erdman Brook west of the SDA include re-armoring sections, and replacing or covering exposed geotextile. The maintenance issues involve primarily the smaller diameter armoring (rip-rap) that moved downstream and left exposed stream bank and bed during rainstorms in July 2015. Since the damage occurred, additional erosion of the stream bed and undermining of the geotextile has occurred.

4.3.1 Erdman Brook Erosion Control Repairs

Monitoring of the two retaining walls installed along Erdman Brook in 2011 revealed that the walls were tilting inward at an increasing rate. NYSERDA's former engineering services contractor engineered a new design that incorporated a CMP to hold back the soils behind the retaining walls. The construction work was completed during the summer of 2016.

Figure 4-1 shows the installation of the two CMP sections. Figure 4-2 shows the installed CMP with the construction area restored.

NYSERDA also addressed the seepage of water below and beside the Erdman Brook box culvert. The seepage pathway was sealed with bentonite chips, compacted, and backfilled in accordance with the design specifications.

4.3.2 Geomembrane Cover Replacement

In 1993, NYSERDA covered Trenches 13, 14, and a portion of 12 with a VLDPE geomembrane. In 1995, NYSERDA installed an XR-5 geomembrane over Trenches 1 through 8 and 10 through 12. NYSERDA constructed and maintained a bioengineered cover on Trench 9 until 1999, when it covered the trench with an XR-5 geomembrane.

Figure 4-1. Installation of CMPs

Source: NYSERDA

Figure 4-2. Completed CMP installation and Restoration

Source: NYSERDA

In 2010, NYSERDA determined that the VLDPE cover was approaching the end of its useful life, and was covered over with an XR-5. In 2014, NYSERDA's engineering support contractor prepared a Geomembrane Life Expectancy Estimate Report 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 2016, NYSERDA prepared design plans to replace the existing geomembrane cover with several enhancements. Enhancements include reconfiguring the geometry of select stormwater detention areas, regrading areas where ponding water has been observed, eliminating unnecessary pipe penetrations, and developing mechanisms to limit ice and wind damage. This work will be completed in a manner similar to the 2010 cover replacement, as the new geomembrane will be placed over the existing cover.

The new geomembrane cover installation will be completed in 2017.

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 2016, waste management at the SDA included:

- Inspections.
- Waste storage.

5.1 Inspections

In 2016, 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. No low-level radioactive waste was generated in 2016.

The total volume of waste currently in storage is 0.16 m^3. All waste currently in storage is low-level radioactive waste only.

Appendix A - Trench Leachate Elevation Data

Table A-1. 2016 Trench Leachate Elevation Data

Elevations are referenced to the National Geodetic Vertical Datum (NGVD) of 1929.

Source: NYSERDA

Trench	Jan 6	Feb 2	Mar 1	Apr 4	May 2	Jun 6
Trench 1			1365.88			1365.88
Trench 2			1361			1360.99
Trench 3			1360.41			[a]
Trench 4			1362.69			1362.69
Trench 5			1363.02			1363.01
Trench 8			1361.34			1361.34
Trench 9			1360.32			1360.36
Trench 10s			1360.59			1360.58
Trench 10n			1361.6			1361.62
Trench 11			1360.25			1360.17
Trench 12			1360.94			1361.01
Trench 13	1363.47	1363.47	1363.47	1363.45	1363.44	1363.44
Trench 14	1366.10	1366.10	1366.1	1366.11	1366.11	1366.18
WP-91	1366.04	1366.04	1366.06	1366.06	1366.06	

[a] The June 6, 2016 leachate level for Trench 3 was not collected due to a failed conductivity probe. The level was collected on July 6, 2016, after the conductivity probe was replaced.

Table A-1 continued.

Trench	Jul 6	Aug 1	Sep 7	Oct 3	Nov 1	Dec 1
Trench 1			1365.88			1365.84
Trench 2			1360.99			1360.98
Trench 3	1360.21		1359.82		1359.81	1359.78
Trench 4			1362.74			1362.58
Trench 5			1362.97			1362.97
Trench 8			1361.37			1361.33
Trench 9			1360.23			1360.21
Trench 10s			1360.58			1360.54
Trench 10n			1361.61			1361.42
Trench 11			1360.17			1360.12
Trench 12			1360.85			1360.93
Trench 13	1363.45	1363.44	1363.42	1363.47	1363.43	1363.47
Trench 14	1366.18	1366.16	1366.15	1366.17	1366.17	1366.18
WP-91	1366.10	1366.07	1366.07	1366.07	1366.05	1366.05

Figure A-1. 2006-2016 Leachate Elevations, Trench 1

Source: NYSERDA

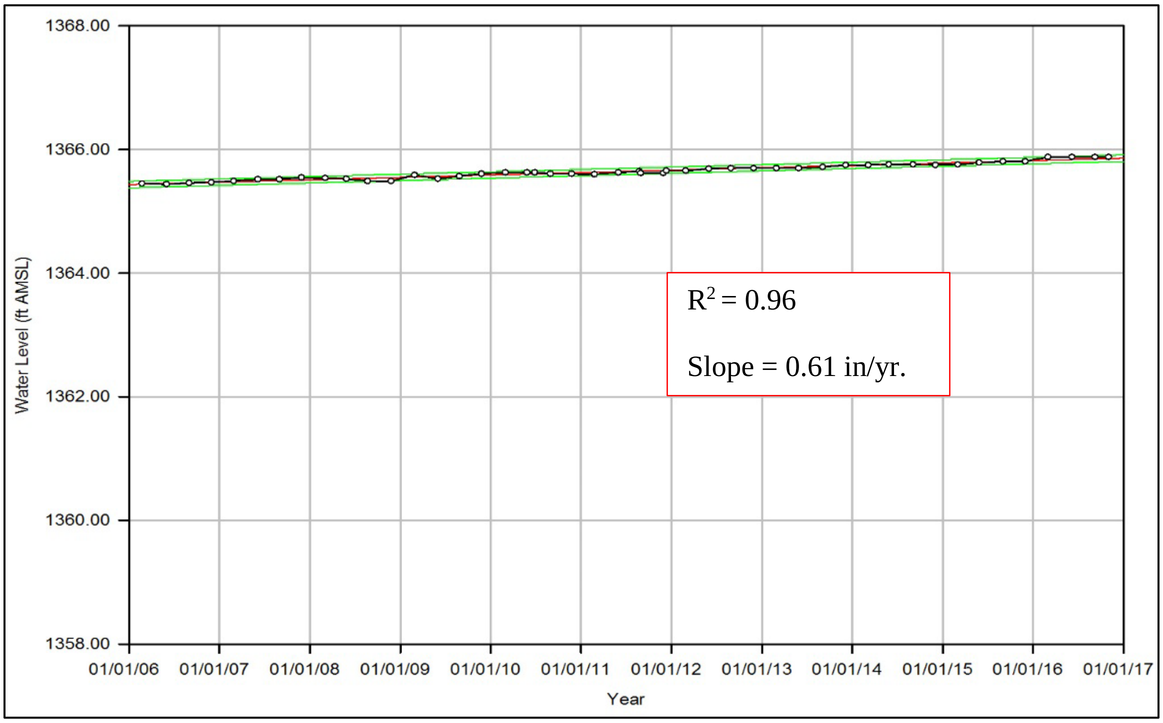


Figure A-2. 2006-2016 Leachate Elevations, Trench 2

Source: NYSERDA

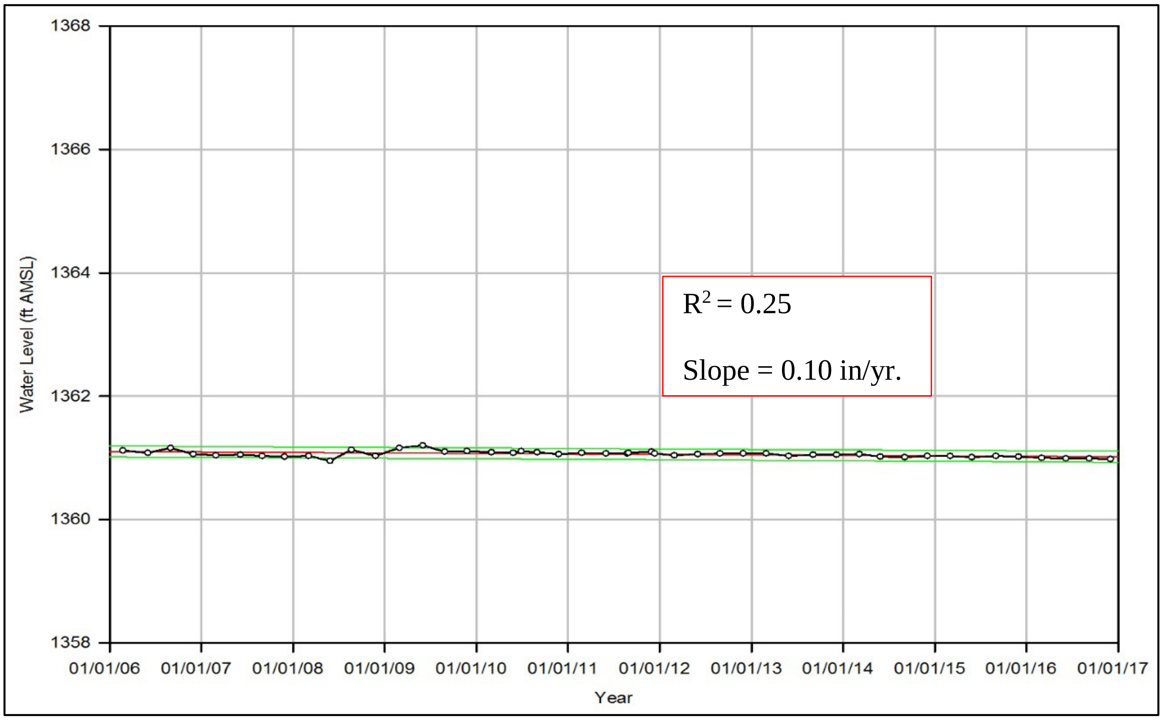


Figure A-3. 2006-2016 Leachate Elevations, Trench 3

Source: NYSERDA

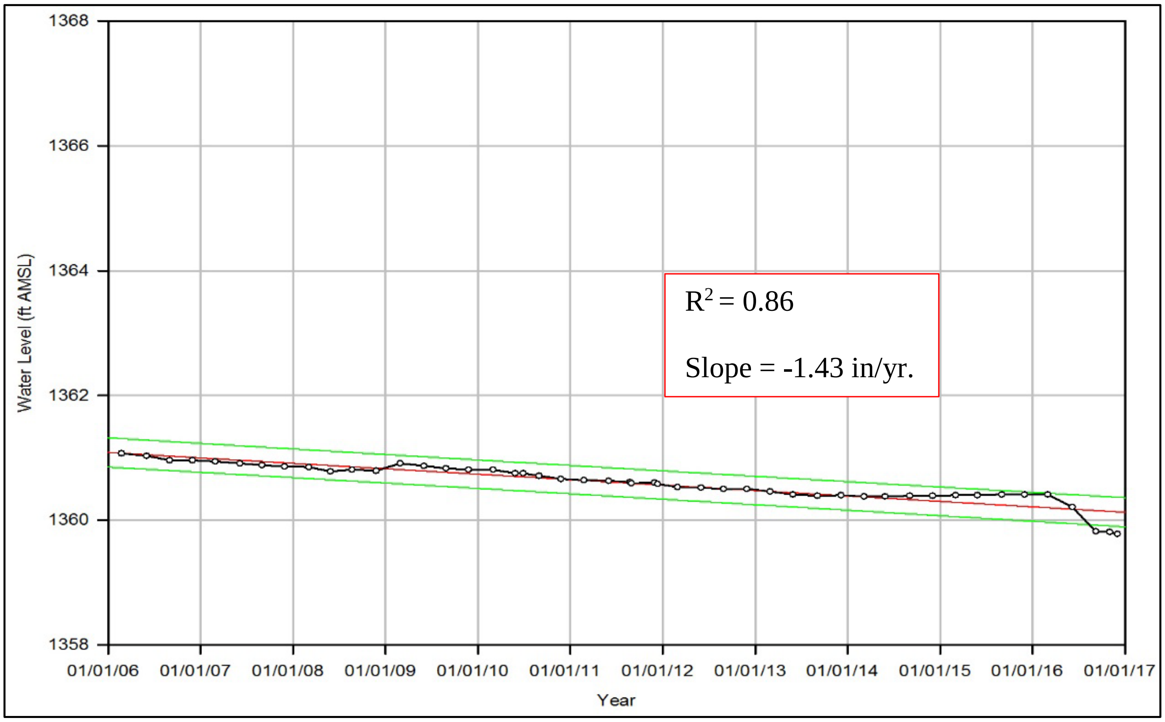


Figure A-4. 2006-2016 Leachate Elevations, Trench 4

Figure Source: NYSERDA

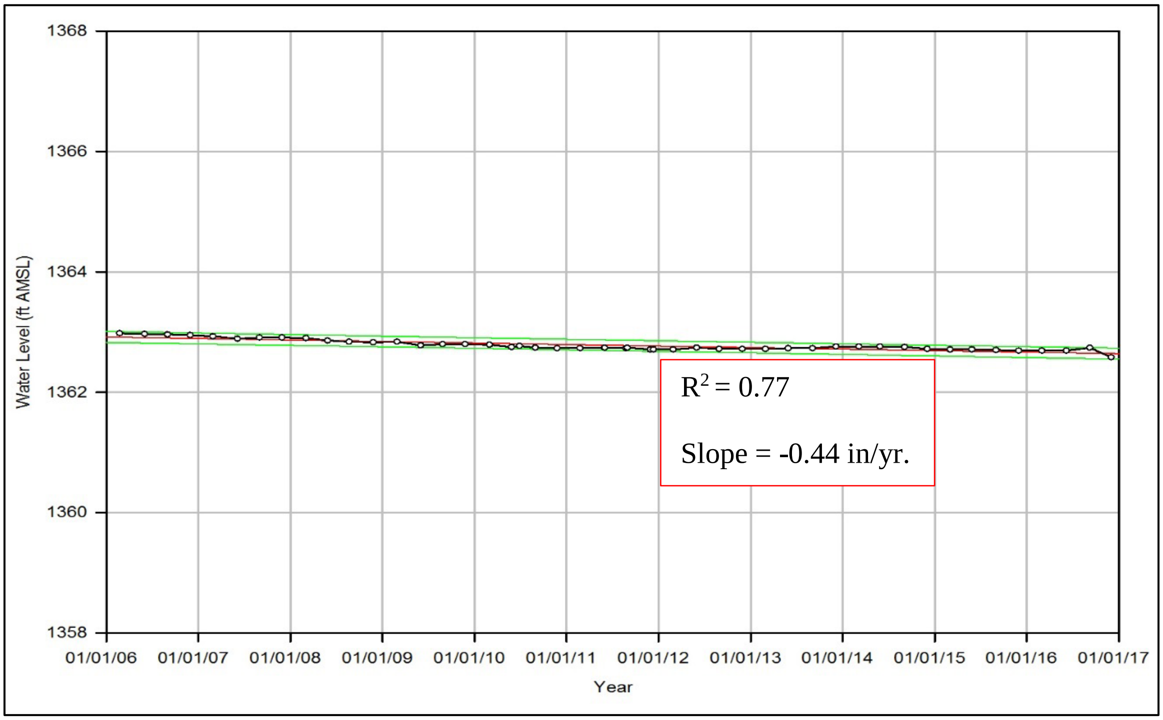


Figure A-5. 2006-2016 Leachate Elevations, Trench 5

Source: *NYSERDA*

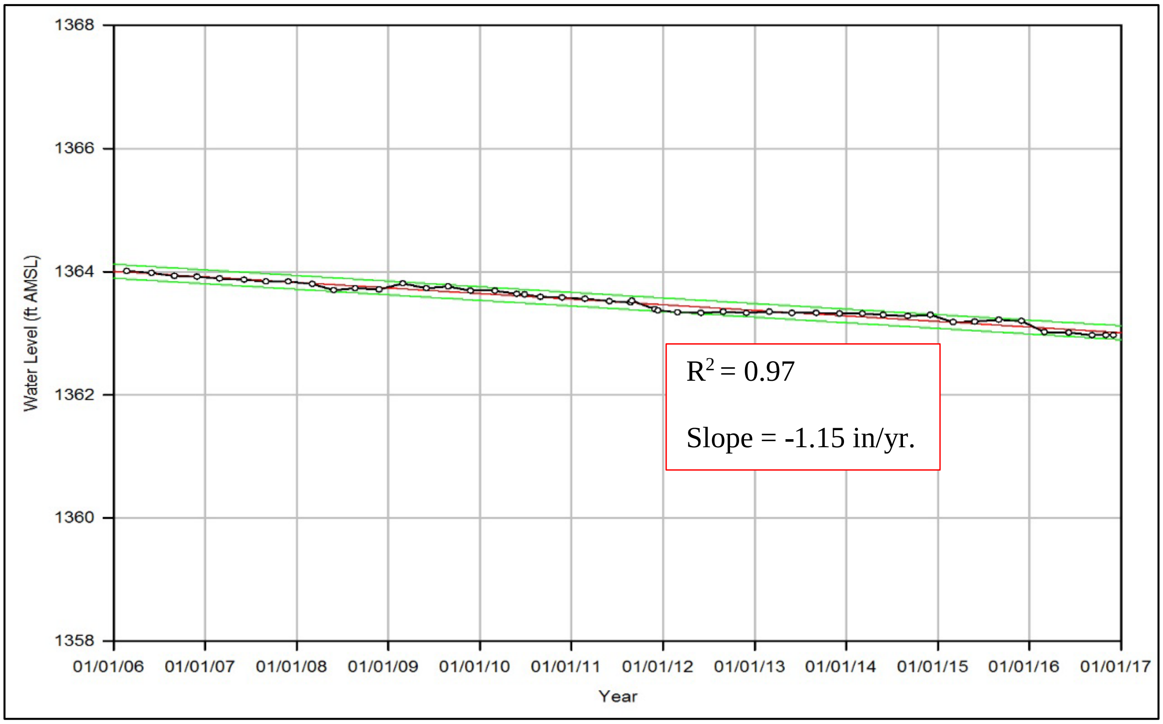


Figure A-6. 2006-2016 Leachate Elevations, Trench 8

Source: *NYSERDA*

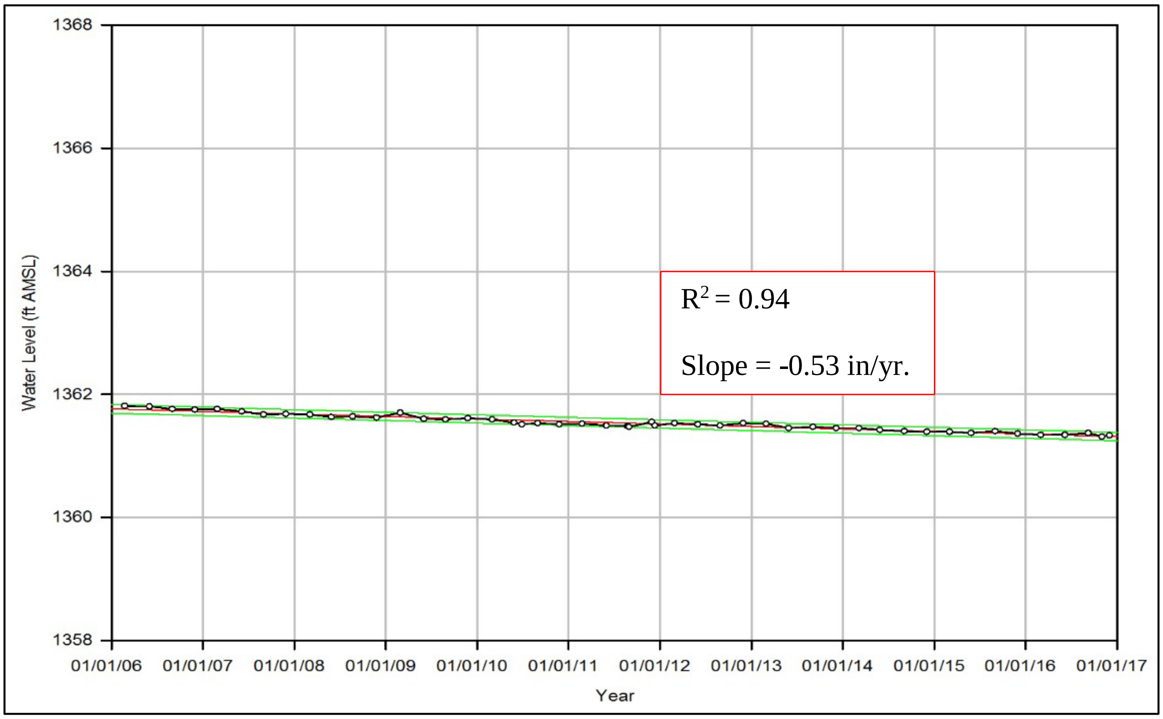


Figure A-7. 2006-2016 Leachate Elevations, Trench 9

Source: *NYSERDA*

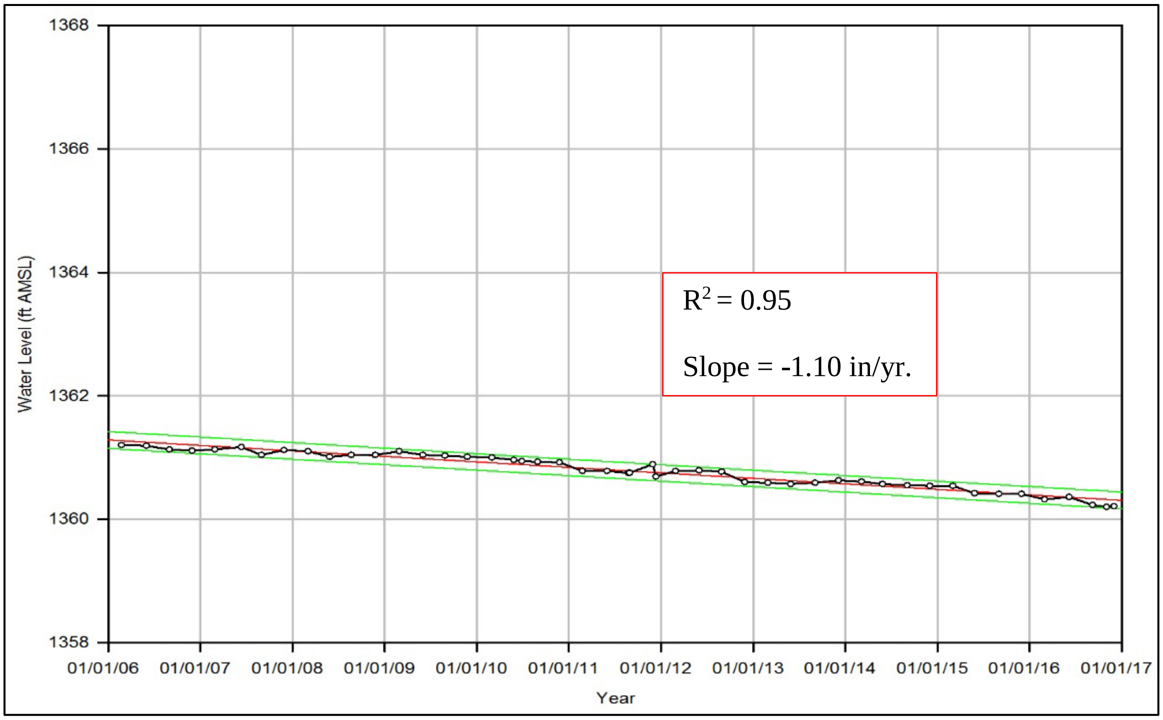


Figure A-8. 2006-2016 Leachate Elevations, Trench 10N

Source: *NYSERDA*

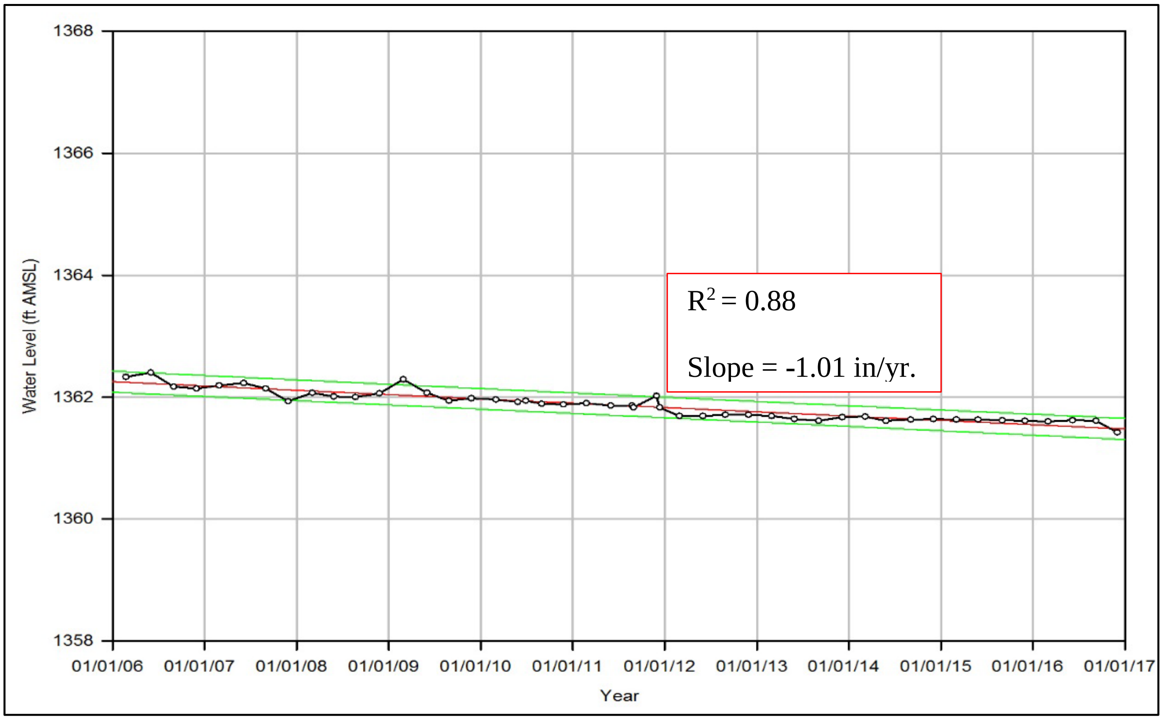


Figure A-9. 2006-2016 Leachate Elevations, Trench 10S

Source: NYSERDA

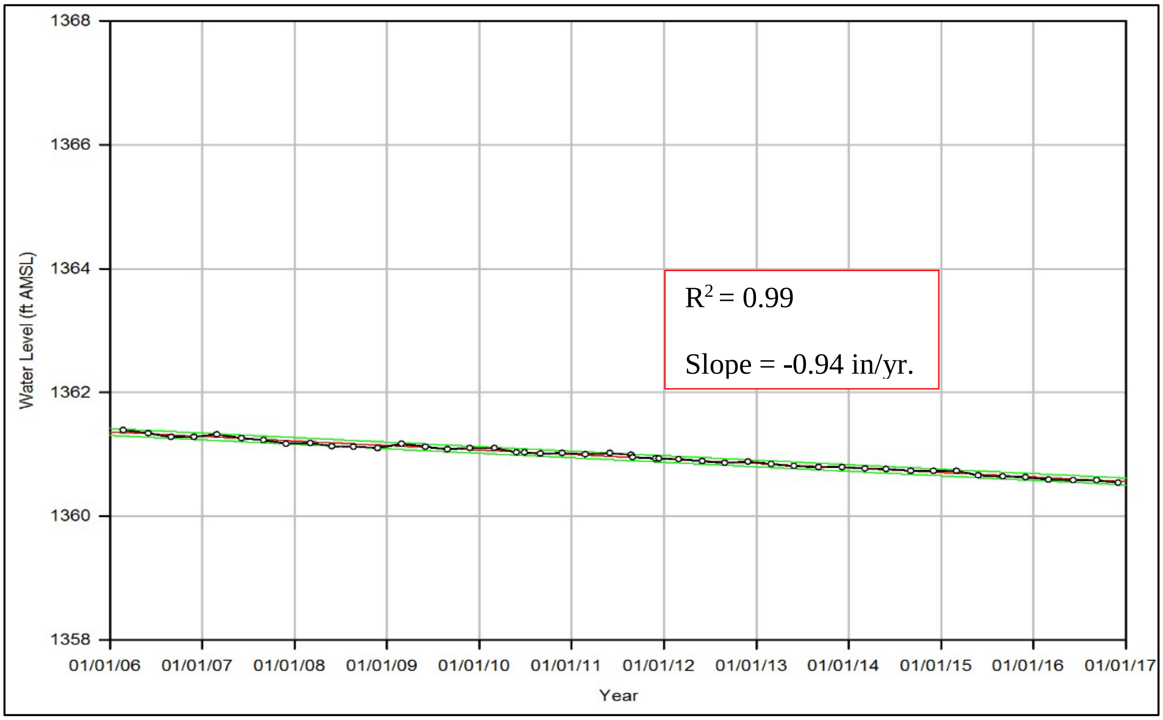


Figure A-10. 2006-2016 Leachate Elevations, Trench 11

Source: NYSERDA

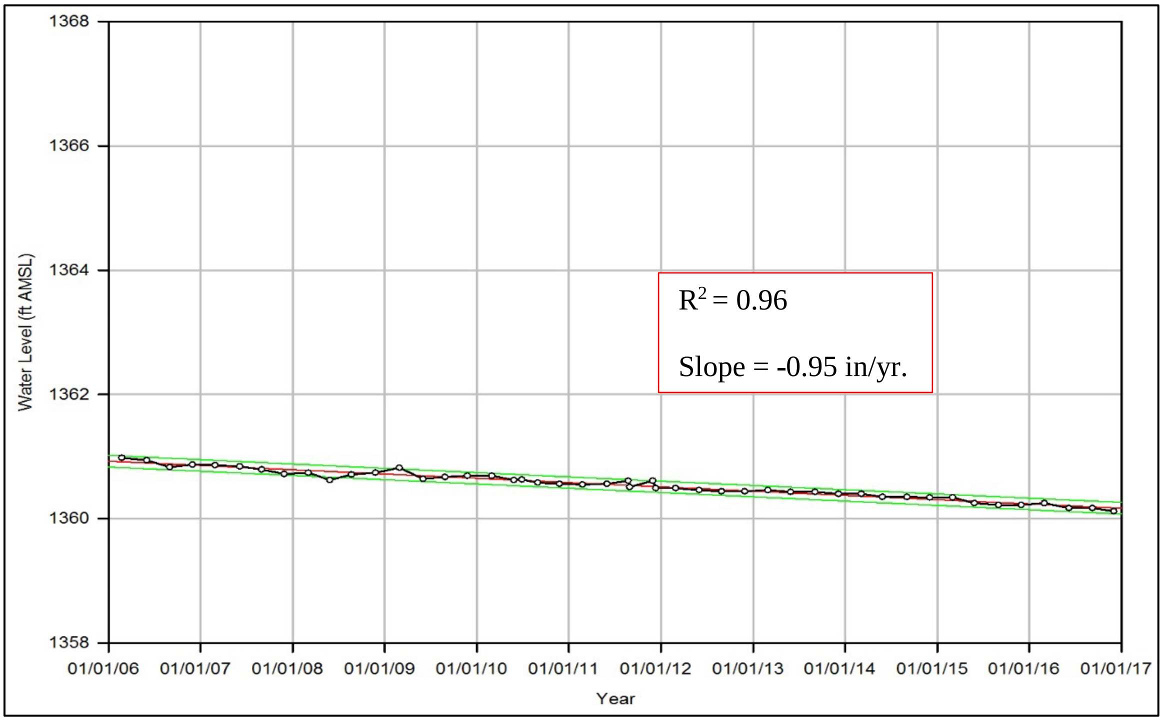


Figure A-11. 2006-2016 Leachate Elevations, Trench 12

Source: NYSERDA

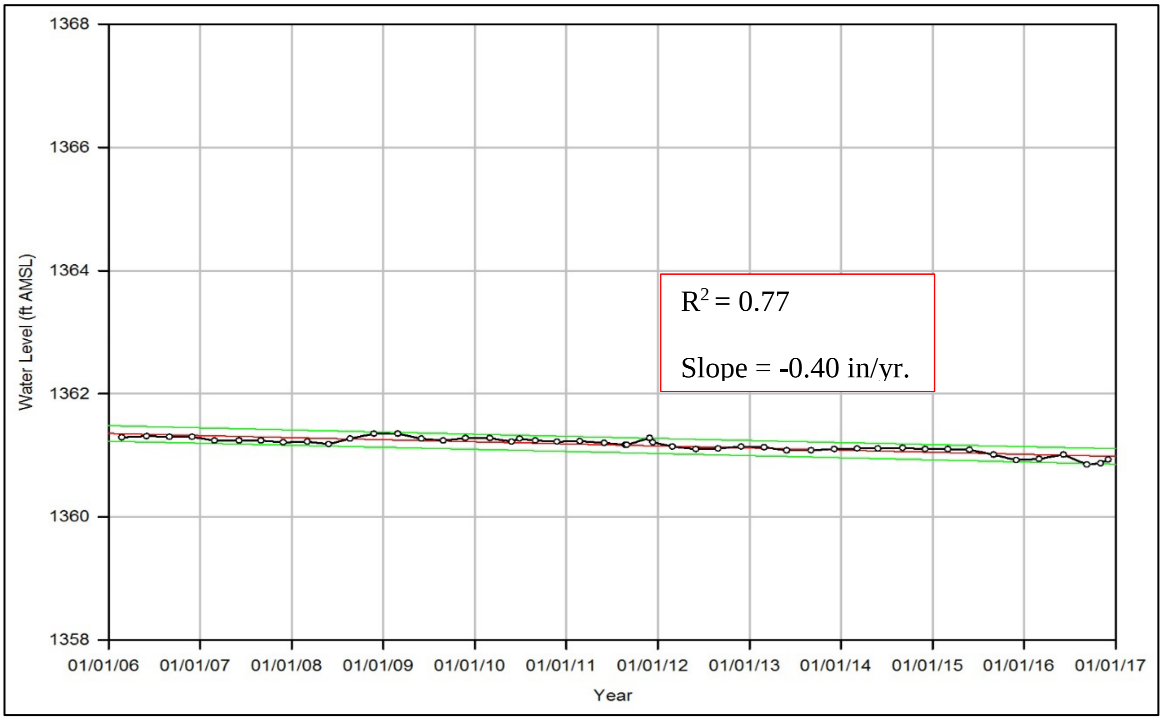


Figure A-12. 2006-2016 Leachate Elevations, Trench 13

Source: NYSERDA

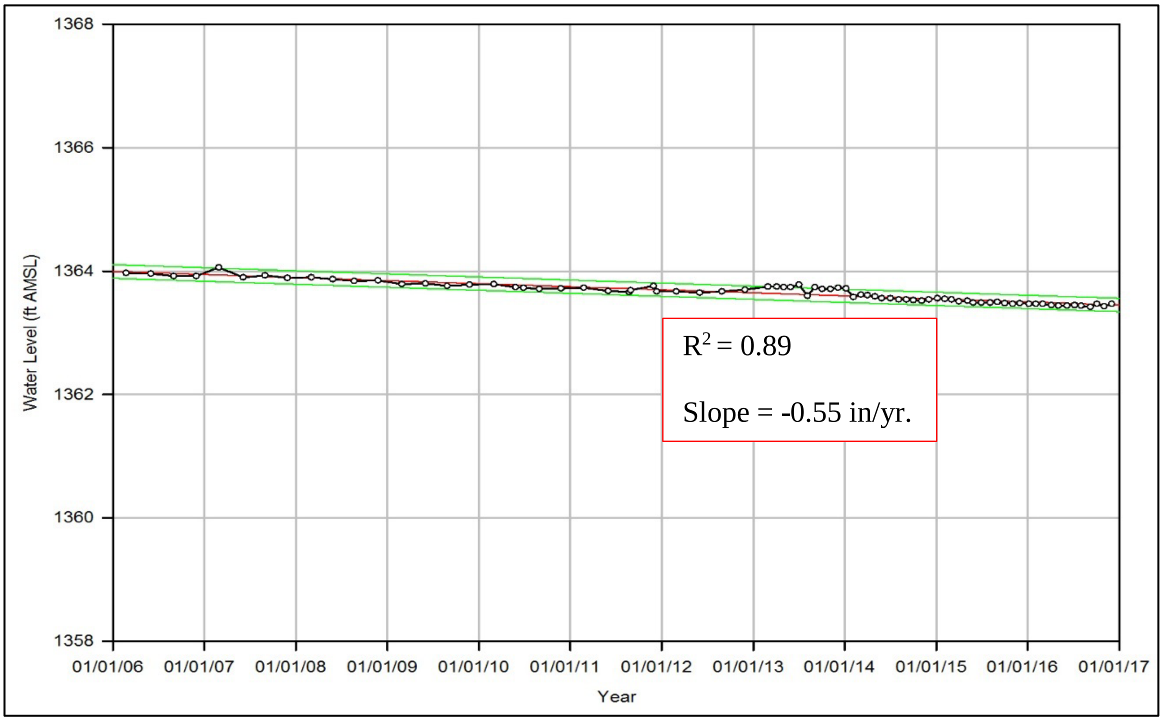


Figure A-13. Trench 14 Leachate (Water) Elevations for the Period 1997 to 2016, Inclusive

Source: *NYSERDA*

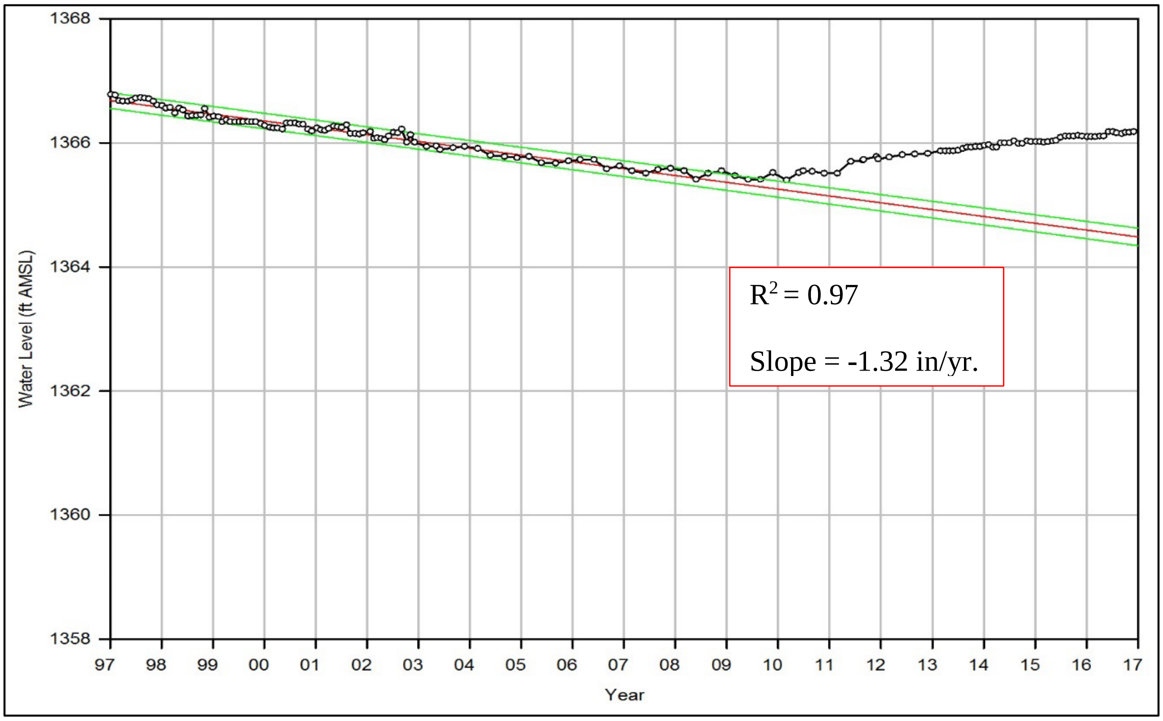


Figure A-14. Trench 14 Leachate (Water) Elevations for the Period 1997 to 2016, Inclusive

Source: *NYSERDA*

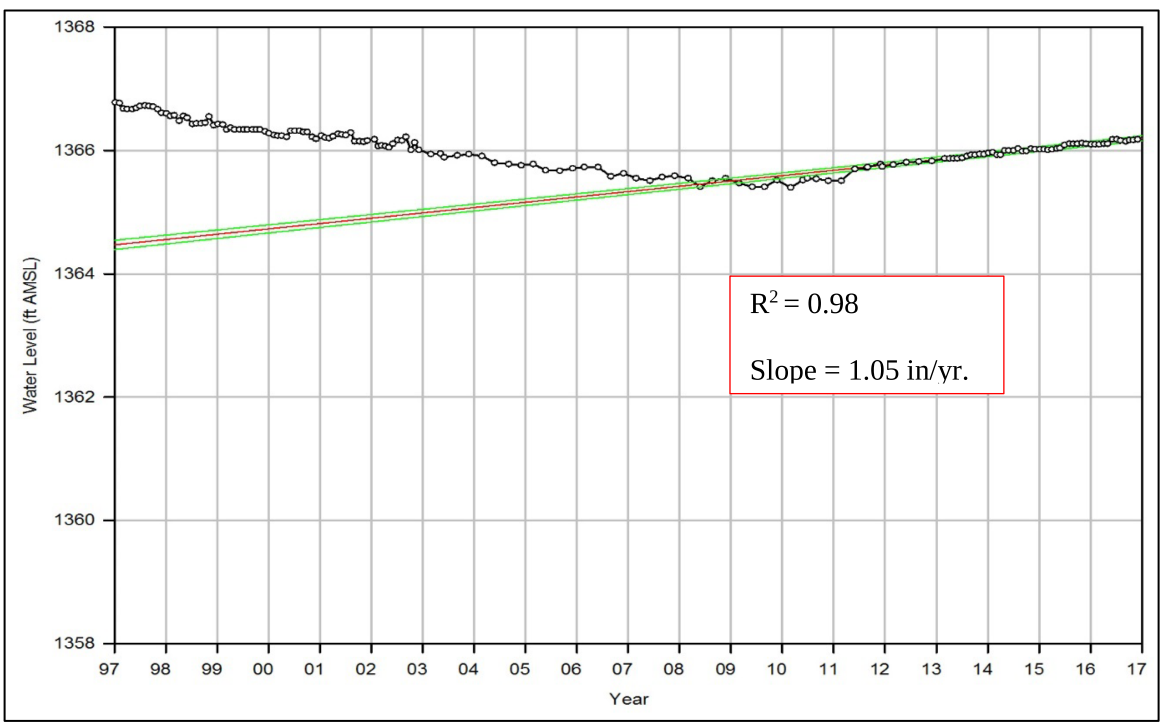
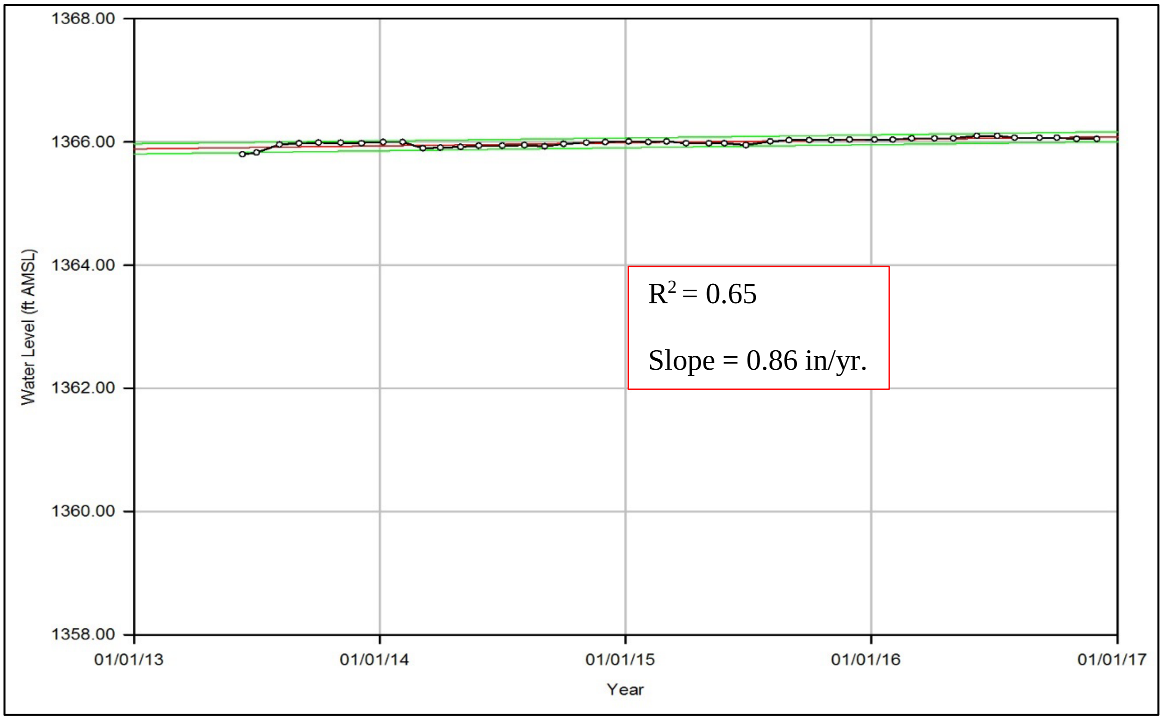


Figure A-15. 2013 to 2016 Leachate Elevations, WP-91

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 National Geodetic Vertical Datum (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. 2016 Groundwater Elevations - SDA 1100-Series Wells - (Feet Above Mean Sea Level)

Elevations are referenced to the National Geodetic Vertical Datum (NGVD) of 1929. Entries are blank for location/dates for which water elevation was not measured.

Source: NYSERDA

Well	Jan 6	Feb 2	Mar 1	Apr 4	May 2	Jun 6
1101A	1373.60	1377.66	1378.1	1378.05	1377.35	1376.59
1101B	1358.57	1360.1	1363.92	1364.23	1364.24	1363.9
1101C	1281.83	1282.15	1282.23	1282.28	1282.21	1282.42
1102A			1379.94			1378.36
1102B			1367.8			1366.83
1103A			1379.99			1377.9
1103B			1366.48			1365.71
1103C			1260.08			1260.1
1104A			1374.1			1373.01
1104B			1362.98			1363.33
1104C			1253.77			1254.07
1105A			1354.16			1356.04
1105B			1340.11			1341.74
1106A	1371.64	1372.05	1371.89	1371.04	1371.39	1370.85
1106B	1357.77	1358.35	1358.14	1357.86	1357.84	1357.85
1107A			1370.25			1368.43
1108A	1371.75	1373.85	1375.24	1376.49	1376.44	1376.03
1109A	1362.12	1362.73	1362.85	1362.8	1362.73	1362.63
1109B	1362.38	1363	1363.08	1362.98	1363.03	1363.37
1110A			1360.78			1360.09
1111A			1378.79			1376.77

Table B-2 continued.

Well	Jul 6	Aug 1	Sep 7	Oct 3	Nov 1	Dec 1
1101A	1370.04	1372.01	1374.16	1376.05	1377.08	1377.81
1101B	1355.7	1357.87	1360.23	1362.10	1363.08	1364.13
1101C	1282.23	1282.09	1282.07	1282.14	1282.02	1282.4
1102A			1374.28			1378.94
1102B			1364.17			1366.87
1103A			1376.44			1378.76
1103B			1364.63			1365.92
1103C			1260.03			1260.01
1104A			1370.97			1371.9
1104B			1360.94			1361.16
1104C			1253.88			1254
1105A			1351.41			1353.58
1105B			1337.73			1338.45
1106A	1365.49	1367.34	1370.58	1370.22	1371.79	1372.07
1106B	1355.49	1357.62	1358.86	1359.24	1359.56	1359.5
1107A			1368.92			1369.54
1108A	1369.73	1370.97	1370.49	1370.12	1370.06	1370.84
1109A	1361.35	1362.7	1364.1	1364.36	1364.74	1364.2
1109B	1361.49	1363.02	1364.1	1364.36	1364.01	1364.19
1110A			1360			1360.72
1111A			1372.91			1374.54

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

Elevations are referenced to the National Geodetic Vertical Datum (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[b]	7.7	1360.89	1360.89 - 1365.89	W

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

Key:

U Unweathered Till

W Weathered Till

W/U Weathered/Unweathered Till

Table B-4. 2016 Groundwater Elevations - SDA Piezometers - (Feet Above Mean Sea Level)

Elevations are referenced to the National Geodetic Vertical Datum (NGVD) of 1929. Entries are blank for location/dates for which water elevation was not measured.

Source: NYSERDA

Well/ Piezometer	Jan 6	Feb 2	Mar 1	Apr 4	May 2	Jun 6
1S			1381.26			1380.31
2S			1381.68			1381.16
3S	1374.12	1374.58	1375.25	1375.64	1375.5	1375.29
4S	dry	dry	dry	dry	dry	dry
4D	1357.72	1357.42	1357.03	1356.63	1356.36	1356.53
6S	dry	dry	dry	dry	dry	dry
6D	1362.64	1362.29	1361.87	1361.41	1361.19	1361.46
9S	dry	dry	dry	dry	dry	dry
9D	1358.21	1359.09	1357.87	1357.52	1357.16	1357.49
10S	1373.09	1372.59	1372.15	1372.15	1372.57	1373.88
15S	1380.39	1380.4	1380.37	1380.53	1380.14	1378.47
16D	1364.61	1364.32	1363.94	1363.8	1363.62	1363.42
17S	1382.50	1382.62	1382.79	1382.65	1382.12	1380.98
18S	1378.35	1378.56	1378.86	1378.82	1378.45	1378.03
21S	dry	dry	dry	dry	dry	dry
22S	dry	dry	dry	dry	dry	dry
24S	dry	dry	dry	dry	dry	dry
B-14	1360.61	1360.19	1359.89	1359.68	1359.6	1359.67
P1			1365			1363.69

Table B-4 continued.

Well/ Piezometer	Jul 6	Aug 1	Sep 7	Oct 3	Nov 1	Dec 1
1S			1378.97			1380.59
2S			1380.75			1378.73
3S	1374.3	1373.83	1373.09	1372.59	1372.67	1372.81
4S	dry	dry	dry	dry	dry	dry
4D	1356.51	1356.56	1357.43	1357.98	1358.28	1358.36
6S	dry	dry	dry	dry	dry	dry
6D	1362.19	1362.43	1363.32	1363.80	1363.96	1363.49
9S	dry	dry	dry	dry	dry	dry
9D	dry	dry	1357.71	1360.72	1360.47	1358.67
10S	1375.59	1376.02	1376.54	1376.22	1372.5	1373.57
15S	1377.41	1376.76	1377.88	1377.25	1380.04	1378.47
16D	1363.33	1363.24	1363.19	1363.36	1363.46	1363.59
17S	1378.76	1378.03	1378	1378.60	1381.43	1382.05
18S	1376.69	1374.93	1373.57	1373.01	1372.97	1373.1
21S	dry	dry	dry	dry	dry	dry
22S	dry	dry	dry	dry	1362.4	dry
24S	dry	dry	dry	dry	dry	dry
B-14	1359.74	1359.93	1360.62	1360.93	1361.21	1361.19
P1			1363.65			1366.15

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

Elevations are referenced to the National Geodetic Vertical Datum (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. 2016 Groundwater Elevations - SDA Slit-Trench Wells - (Feet Above Mean Sea Level)

Elevations are referenced to the National Geodetic Vertical Datum (NGVD) of 1929. Entries are blank for location/dates for which water elevation was not measured.

Source: NYSERDA

Well	Jan 6	Feb 2	Mar 1	Apr 4	May 2	Jun 6
SMW-1	1379.20	1379.45	1379.83	1380.07	1380.03	1380.16
SMW-2	dry	dry	dry	dry	dry	dry
SMW-3	dry	dry	dry	dry	dry	dry
SMW-4	1372.28	1372.92	1374.05	1375.07	1375.24	1375.41
SMW-5	1376.50	1376.5	1376.67	1376.82	1377.44	1376.81
SMW-6	1380.22	1380.21	1380.03	1380.71	1380.5	1378.93
SMW-7	1375.89	1376.69	1377.54	1377.33	1377.13	1376.8
SMW-8	1374.26	1373.77	1374.24	1374.44	1374.95	1376.38
SMW-9	1377.03	1377.03	1377.3	1377.06	1376.06	1376.19

Well	Jul 6	Aug 1	Sep 7	Oct 3	Nov 1	Dec 1
SMW-1	1379.09	1378.22	1378.8	1378.44	1376.78	1378.61
SMW-2	dry	dry	dry	dry	dry	dry
SMW-3	dry	dry	dry	dry	dry	dry
SMW-4	1375.05	1373.78	1371.99	1371.20	1371.05	1371.41
SMW-5	1376.58	1375.94	1376.73	1376.55	1375.81	1376.88
SMW-6	1377.17	1376.21	1377.08	1377.24	1379.93	1380.79
SMW-7	1376.01	1376.18	1375.83	1375.25	dry	dry
SMW-8	1376.38	1374.65	1375.5	1375.57	1374.55	1374.24
SMW-9	1374	1373.57	1373.69	1373.54	1373.52	1373.45

Figure B-1. First Quarter 2016 Weathered Lavery Till Groundwater Contour Map

Source: NYSERDA

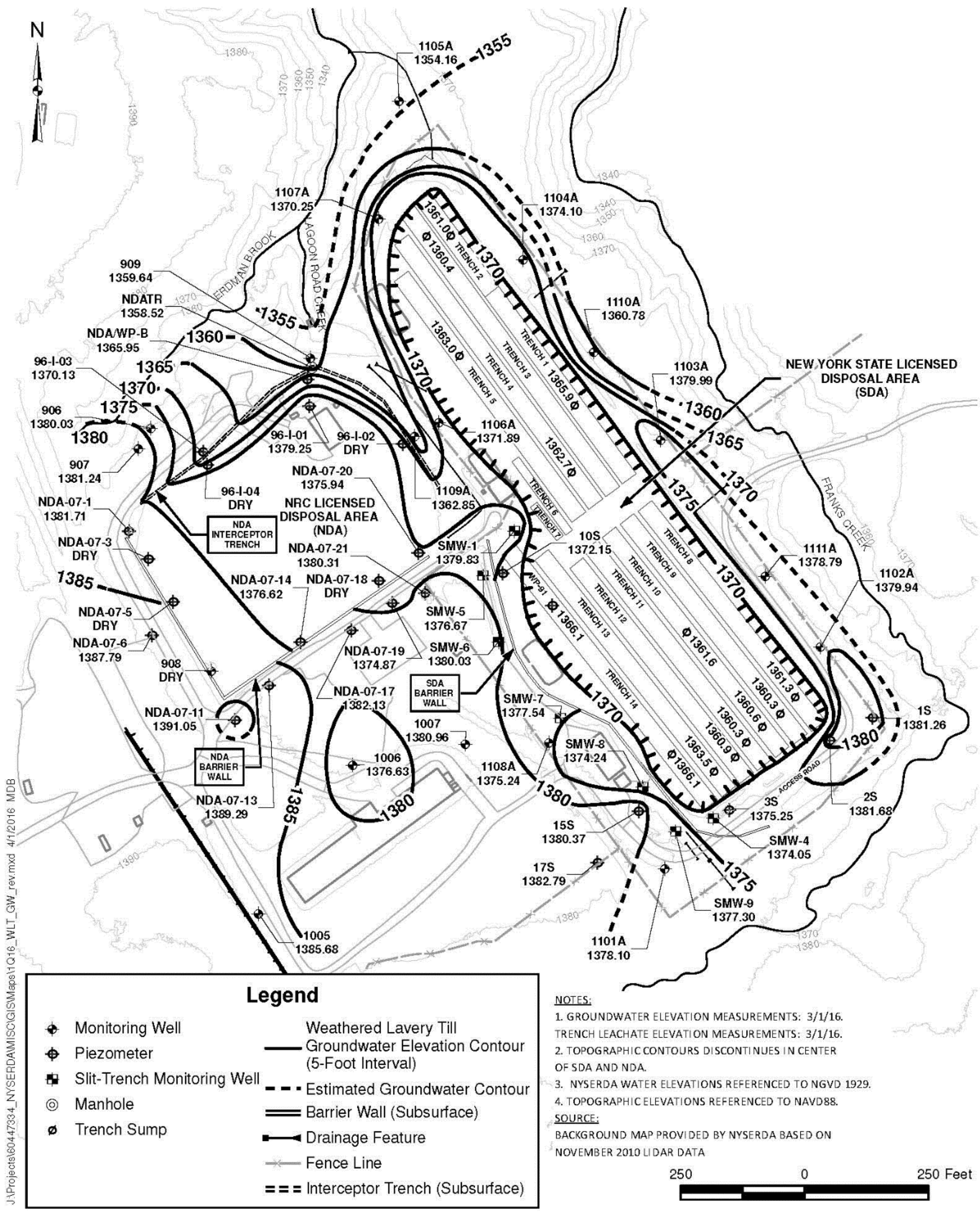


Figure B-2. First Quarter 2016 Kent Recessional Sequence Groundwater Contour Map

Source: *NYSERDA*

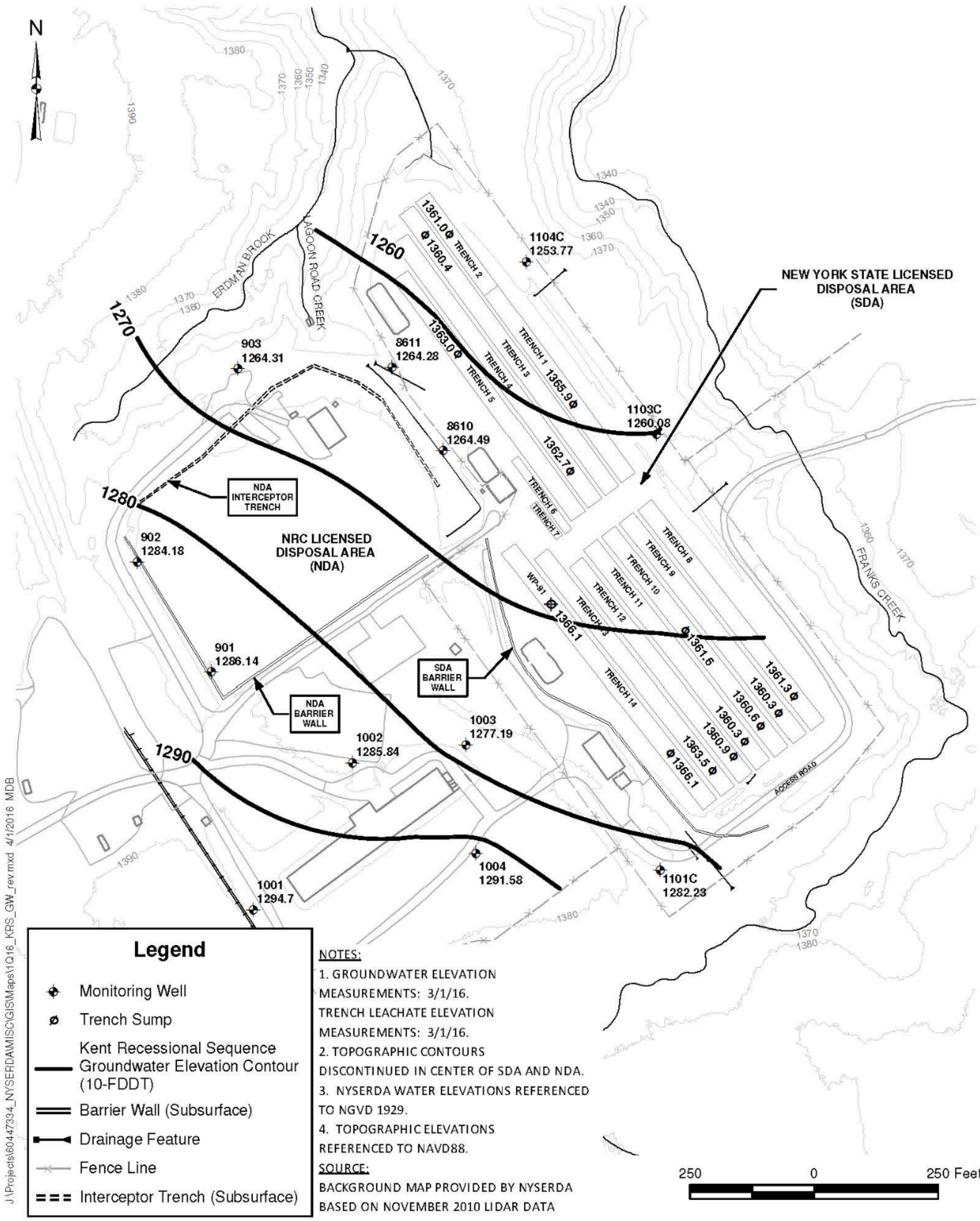


Figure B-3. Second Quarter 2016 Weathered Lavery Till Groundwater Contour Map

Source: NYSERDA

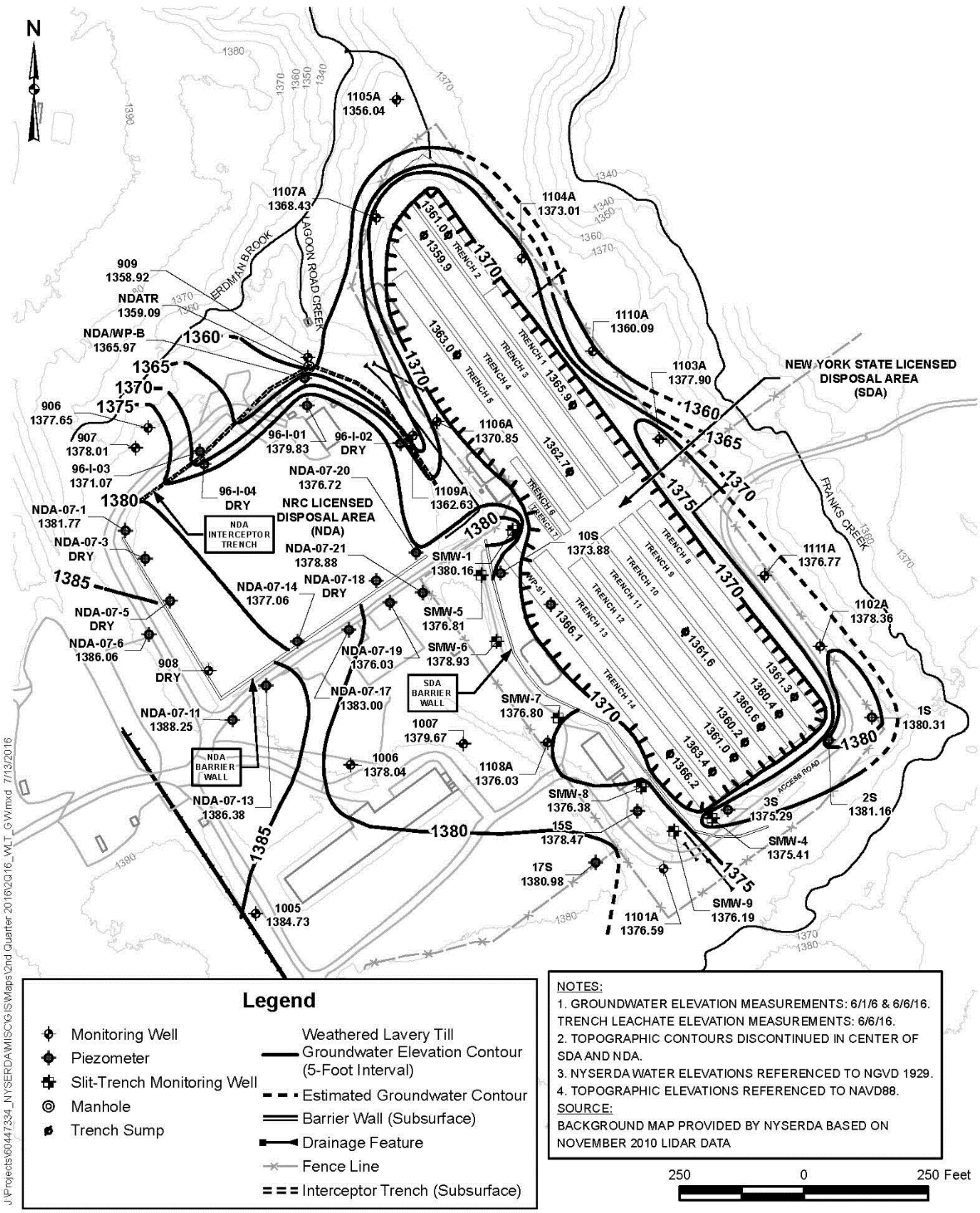


Figure B-4. Second Quarter 2016 Kent Recessional Sequence Groundwater Contour Map

Source: *NYSERDA*

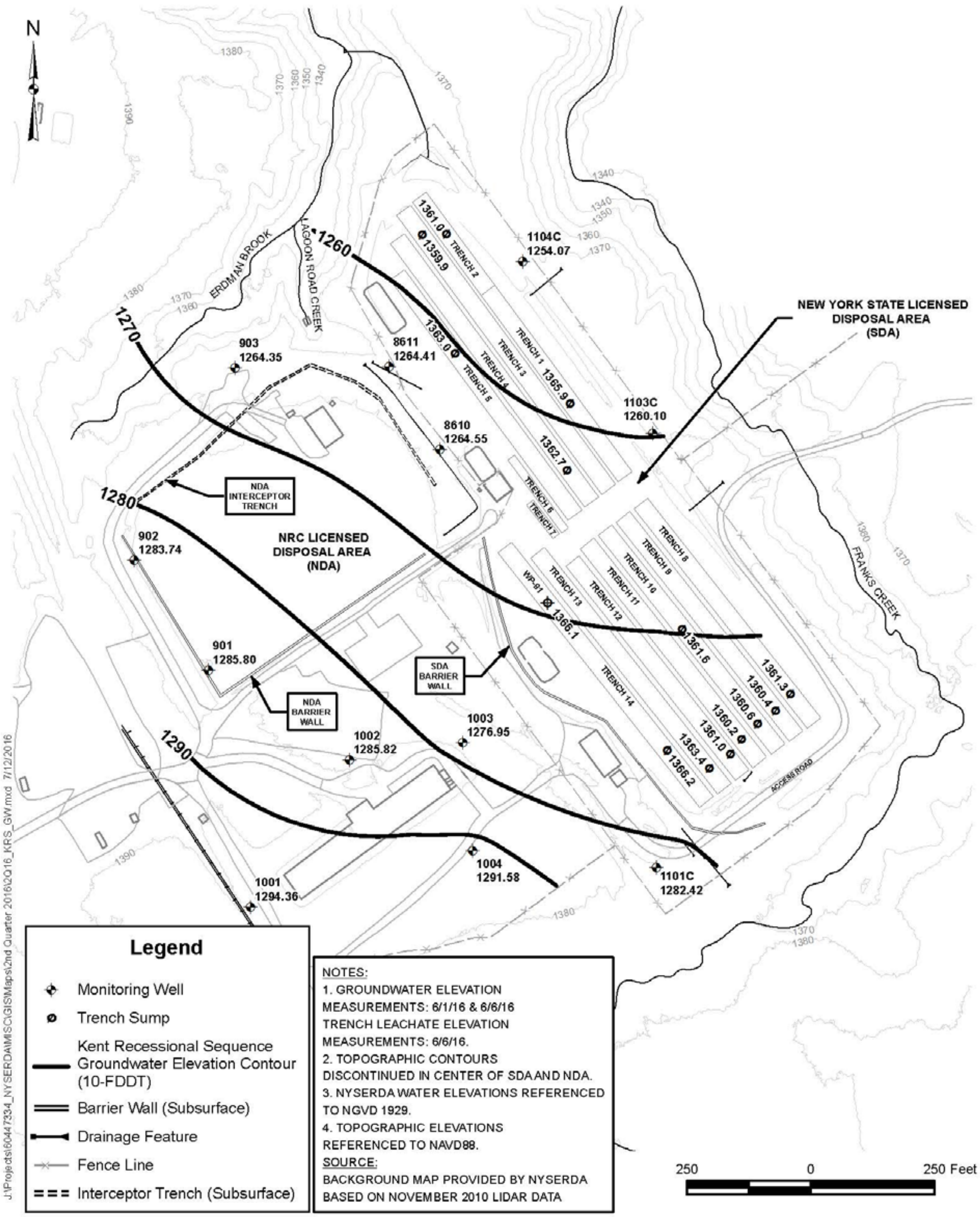


Figure B-5. Third Quarter 2016 Weathered Lavery Till Groundwater Contour Map

Source: NYSERDA

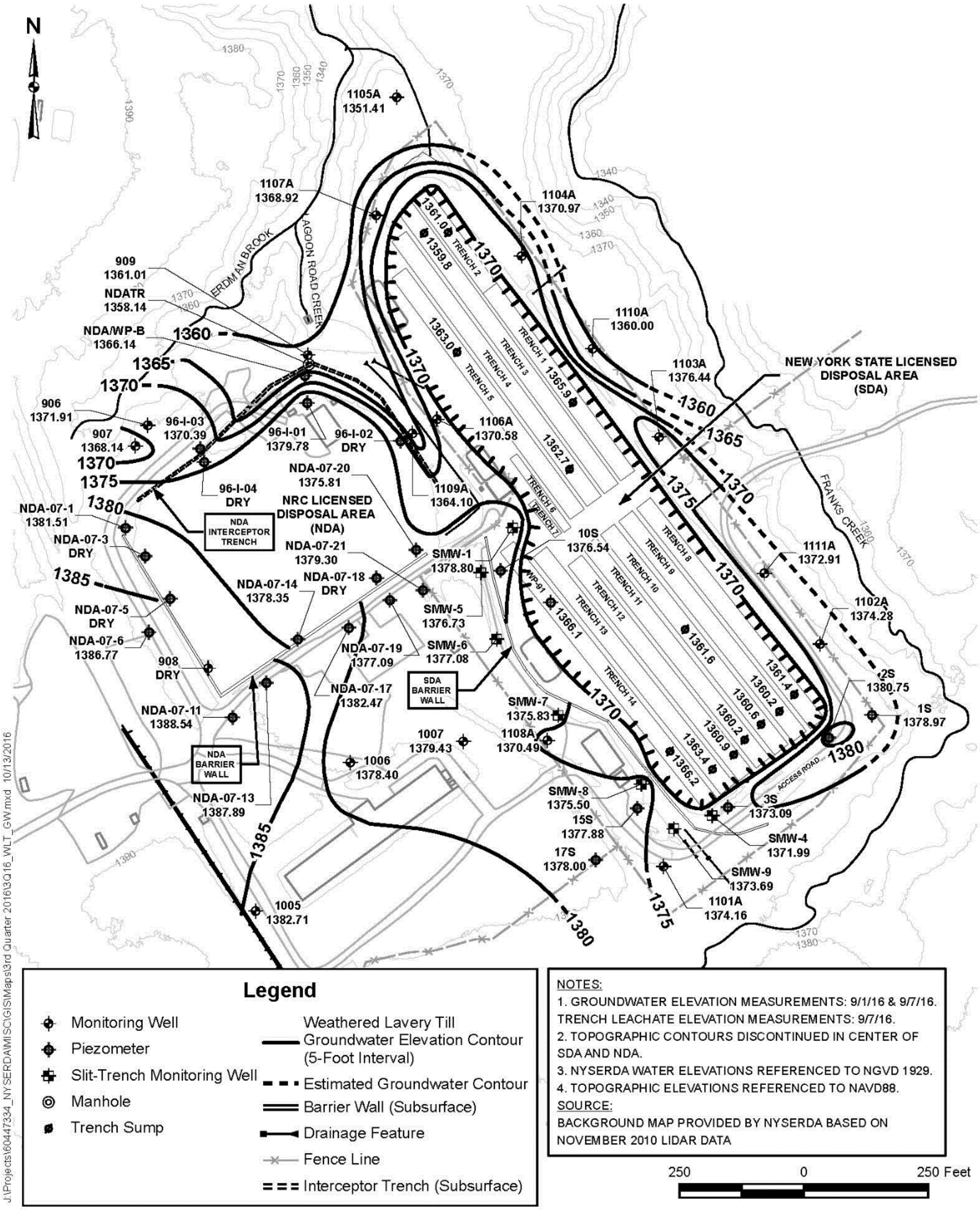


Figure B-6. Third Quarter 2016 Kent Recessional Sequence Groundwater Contour Map

Source: NYSERDA

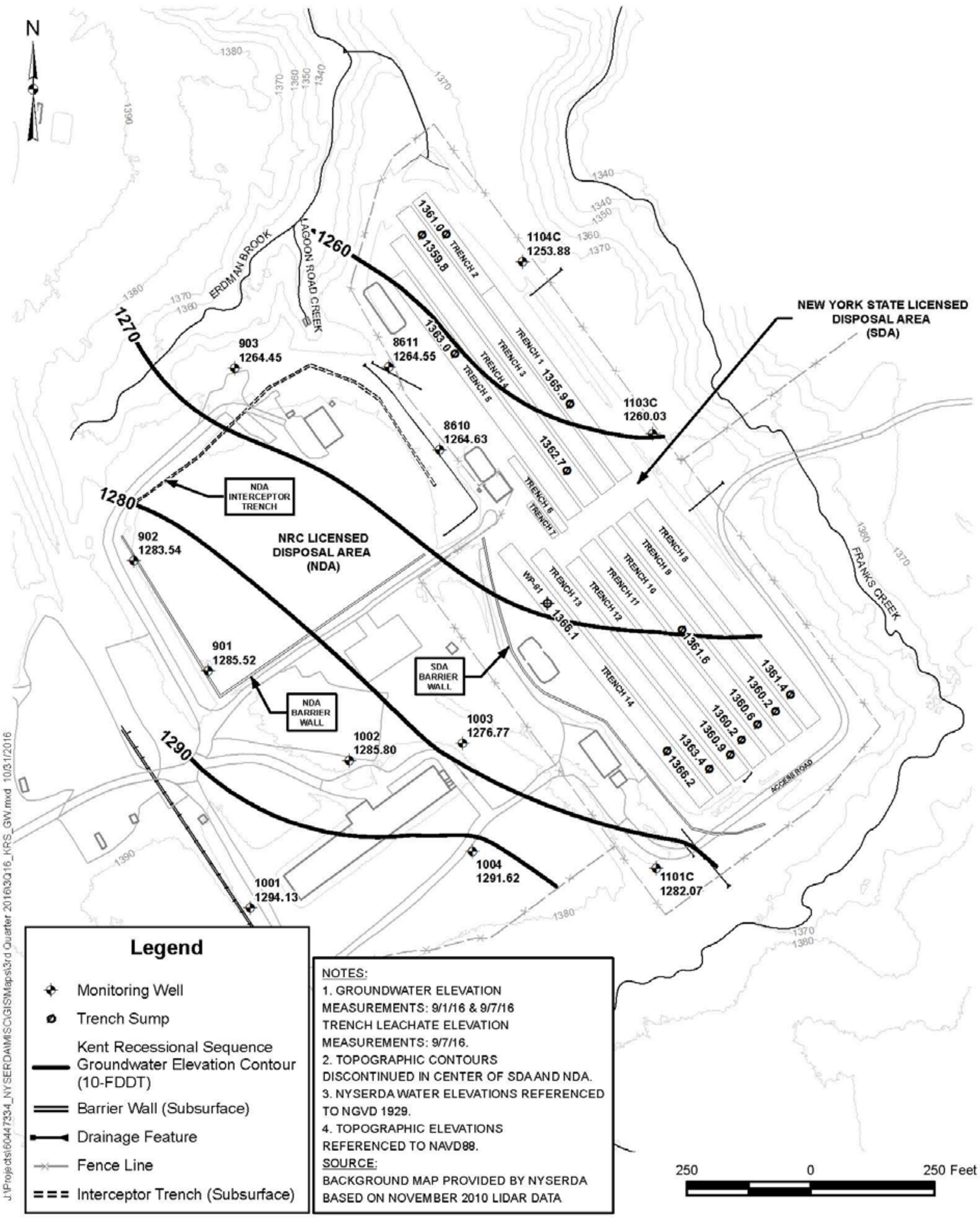


Figure B-7. Fourth Quarter 2016 Weathered Lavery Till Groundwater Contour Map

Source: *NYSERDA*

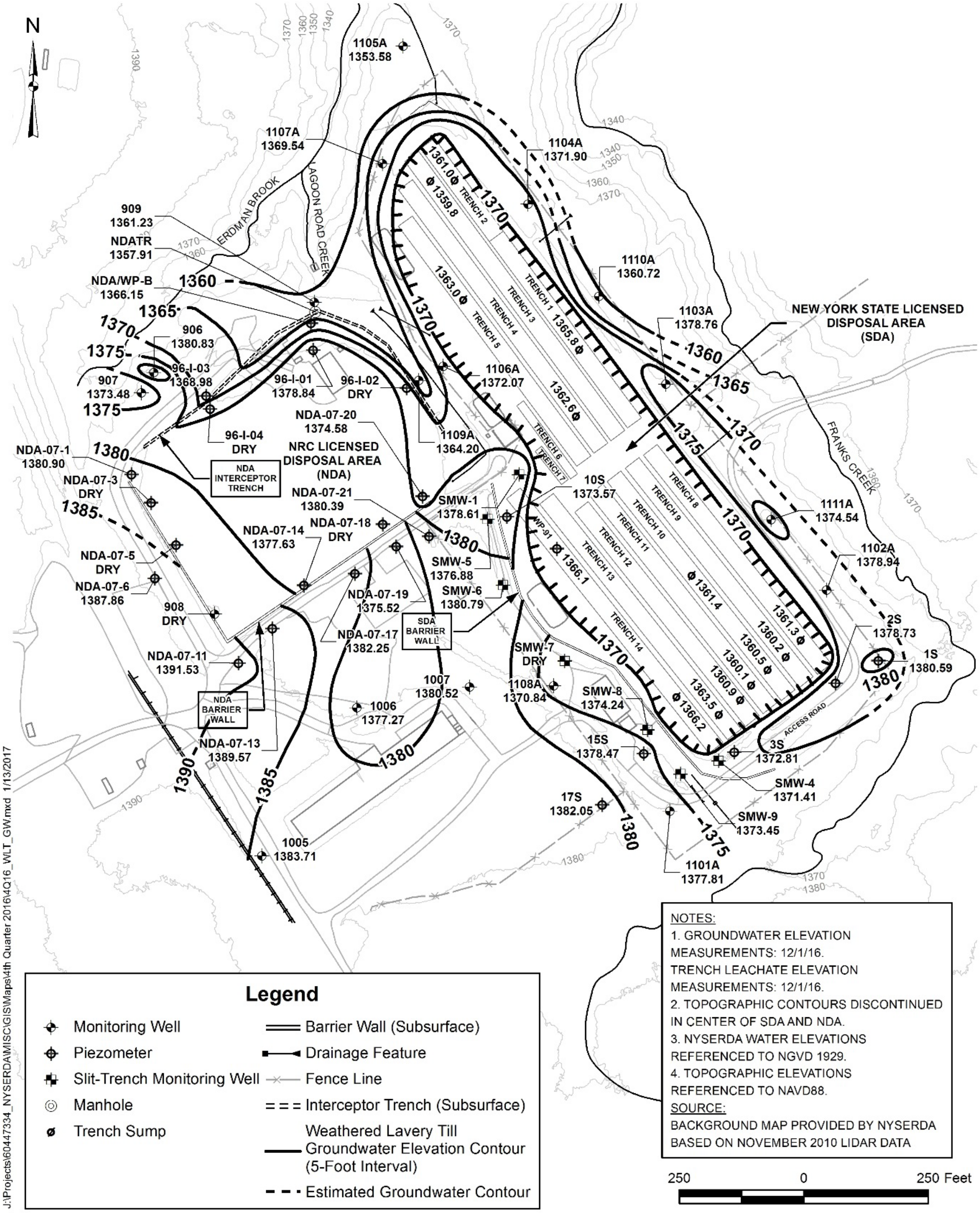


Figure B-8. Fourth Quarter 2016 Kent Recessional Sequence Groundwater Contour Map

Source: NYSERDA

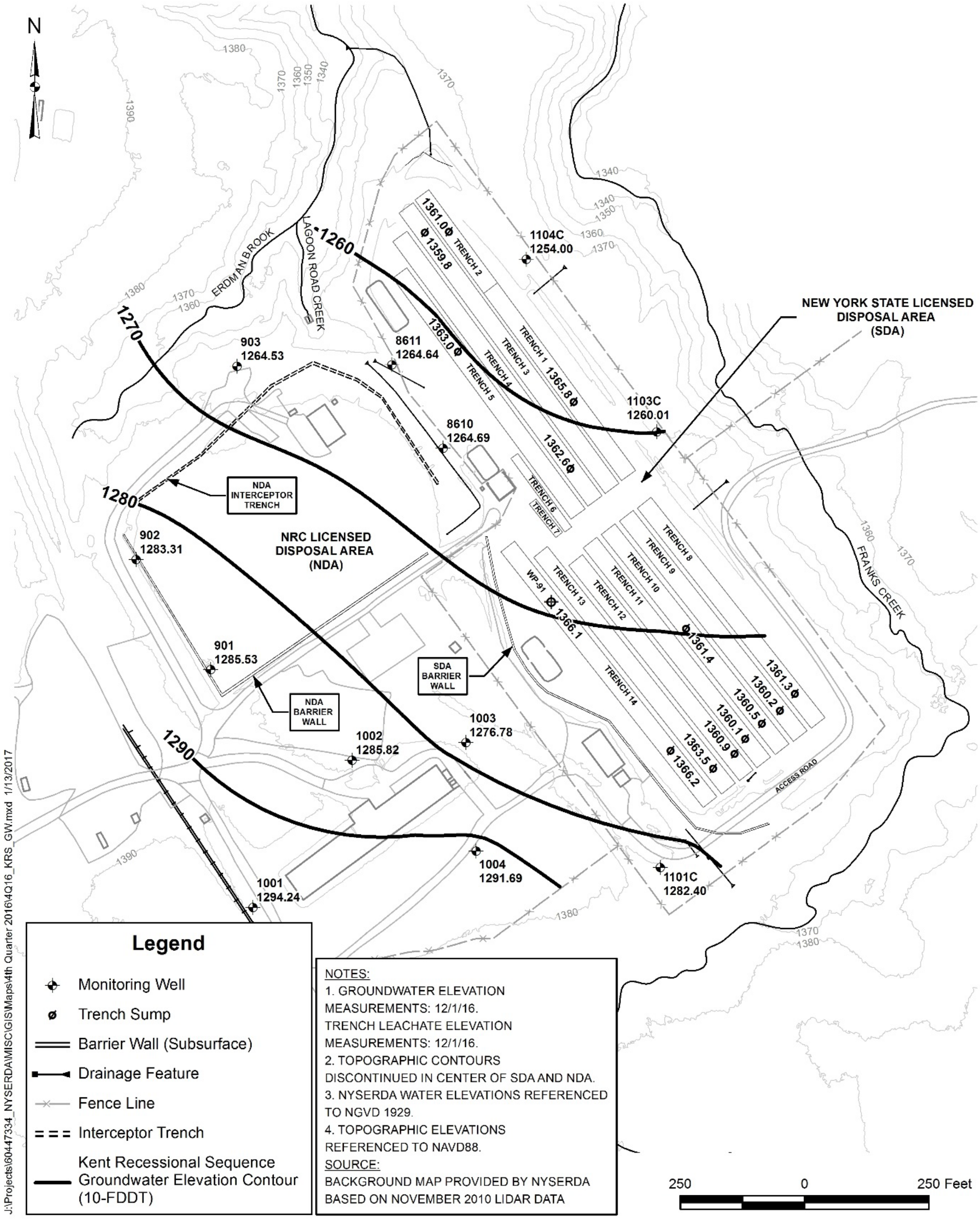


Table B-7. Semiannual Groundwater Sampling Performed in 2016

Source: NYSERDA

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

[c] Sample was collected in December 2016 due to insufficient sample volume in June 2016.

Table B-8. Annual Groundwater Sampling Performed in 2016

Source: NYSERDA

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

[d] Sample was collected in December 2016 due to insufficient sample volume in June 2016.

Table B-9. 2016 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	06/09/16	3.76E-09±1.70E-09		2.77E-09±1.30E-09		-6.87E-08±6.35E-08	UJ
1101A	12/02/16	2.87E-09±1.42E-09		1.58E-09±9.96E-10	J	3.80E-08±4.85E-08	U
1101B	06/09/16	3.09E-09±1.24E-09		2.70E-09±1.01E-09		-1.65E-07±6.38E-08	UJ
1101B	12/02/16	2.54E-09±1.01E-09		2.28E-09±8.24E-10		-7.96E-09±4.74E-08	U
1101C	06/09/16	4.71E-10±4.97E-10	U	2.59E-09±8.13E-10		-8.12E-08±6.32E-08	UJ
1101C	12/02/16	2.34E-11±3.87E-10	U	2.20E-09±7.20E-10		5.93E-09±4.73E-08	U
1102A	06/10/16	3.28E-09±1.35E-09		2.66E-09±1.18E-09		1.02E-07±6.58E-08	U
1102A	12/07/16	2.09E-09±1.17E-09	J	2.50E-09±1.11E-09		1.12E-07±5.09E-08	
1102B	06/10/16	1.16E-09±1.02E-09	U	1.63E-09±8.75E-10	J	-1.36E-07±6.28E-08	UJ
1102B	12/07/16	9.70E-10±8.93E-10	UJ	9.98E-10±8.35E-10	U	-8.11E-09±4.82E-08	U
1103A	06/08/16	7.56E-09±2.80E-09		3.42E-09±1.91E-09	J	8.28E-08±6.54E-08	U
1103A	12/05/16	6.68E-09±1.93E-09	J	3.67E-09±1.67E-09		8.61E-08±4.91E-08	J
1103B	06/08/16	2.72E-09±1.08E-09	J	1.88E-09±8.21E-10		-1.79E-08±6.37E-08	U
1103B	12/05/16	1.69E-09±1.04E-09	J	1.75E-09±8.56E-10		1.61E-08±4.83E-08	U
1103C	06/07/16					-1.61E-07±6.32E-08	UJ
1103C	12/01/16	1.16E-09±8.02E-10	J	4.19E-09±1.24E-09		2.58E-08±4.78E-08	U
1104A	06/08/16	3.42E-09±1.53E-09		2.96E-09±9.89E-10		9.05E-08±6.55E-08	U
1104A	12/05/16	1.88E-09±1.27E-09	J	2.04E-09±1.06E-09	J	3.61E-08±4.87E-08	U
1104B	06/08/16	1.64E-09±9.07E-10	J	1.73E-09±6.82E-10		-6.14E-08±6.31E-08	U
1104B	12/05/16	4.75E-10±7.40E-10	U	1.71E-09±7.32E-10		1.80E-08±4.81E-08	U
1104C	06/07/16	3.40E-09±2.98E-09	U	3.58E-09±3.38E-09	U	-1.53E-07±6.30E-08	UJ
1104C	12/01/16	6.63E-09±2.29E-09	J	9.93E-09±3.78E-09		1.59E-08±4.78E-08	U
1105A	06/07/16	1.90E-09±8.59E-10		1.64E-09±7.27E-10		5.54E-08±6.49E-08	U
1105A	06/07/16	1.51E-09±1.15E-09	UJ	1.74E-09±7.62E-10		-9.07E-08±6.24E-08	UJ
1105A	12/05/16	1.44E-09±8.22E-10	J	-1.26E-09±7.31E-10	UJ	4.36E-08±4.82E-08	U
1105B	06/07/16	1.23E-09±1.01E-09	U	1.44E-09±7.39E-10	J	2.96E-08±6.40E-08	U
1105B	12/05/16	2.21E-09±1.03E-09		2.14E-09±7.92E-10		0.00E+00±4.76E-08	U

Table B-9 continued.

Sample Location	Sample Date	Gross Alpha (µCi/mL)	Q	Gross Beta (µCi/mL)	Q	Tritium (µCi/mL)	Q
1106A	06/09/16	2.34E-09±1.07E-09		2.85E-09±1.07E-09		9.57E-08±6.58E-08	U
1106A	12/06/16	1.83E-09±1.18E-09	J	-1.32E-09±9.93E-10	UJ	1.89E-07±5.42E-08	
1106B	06/09/16	1.98E-09±1.01E-09	J	2.10E-09±9.69E-10		-6.95E-08±6.24E-08	UJ
1106B	12/06/16	8.40E-10±9.51E-10	UJ	1.69E-09±9.16E-10	J	-9.77E-09±4.65E-08	U
1107A	06/08/16	7.08E-09±3.77E-09	J	2.11E-08±5.52E-09		3.69E-06±3.94E-07	
1107A	12/05/16	5.13E-09±1.75E-09	J	2.69E-08±6.85E-09		3.90E-06±4.11E-07	
1107A	12/05/16	6.40E-09±1.85E-09	J	2.17E-08±5.73E-09		3.77E-06±3.97E-07	
1108A	06/07/16	5.56E-09±2.20E-09		5.03E-09±1.47E-09		4.35E-08±6.46E-08	U
1108A	12/07/16	3.36E-09±1.65E-09	J	4.14E-09±1.50E-09		3.58E-08±4.82E-08	U
1109A	06/09/16	2.61E-09±1.10E-09		3.03E-09±1.01E-09		4.90E-08±6.46E-08	U
1109A	12/06/16	1.20E-09±8.22E-10	J	2.50E-09±9.02E-10		1.50E-07±5.19E-08	
1109B	06/09/16	6.10E-10±6.48E-10	U	9.55E-10±6.13E-10	J	9.52E-08±6.54E-08	U
1109B	12/06/16	8.52E-11±4.70E-10	UJ	1.63E-09±6.35E-10		2.14E-07±5.56E-08	
1110A	06/07/16	1.04E-08±4.13E-09		8.15E-09±2.70E-09		6.30E-08±6.48E-08	U
1110A	12/02/16	1.20E-08±3.18E-09	J	5.31E-09±2.28E-09		6.42E-08±4.94E-08	U
1111A	06/10/16	6.06E-09±2.01E-09		3.97E-09±1.62E-09		2.51E-08±6.31E-08	U
1111A	12/07/16	4.95E-09±1.52E-09	J	3.71E-09±1.65E-09		1.04E-07±5.05E-08	

Table B-9 continued.

Sample Location	Sample Date	Actinium-228 (µCi/mL)	Q	Bismuth-214 (µCi/mL)	Q	Carbon-14 (µCi/mL)	Q
1101A	06/09/16	2.53E-09±5.56E-09	U	-8.51E-09±4.22E-08	U	3.01E-09±2.39E-08	U
1101B	06/09/16	-2.87E-09±1.20E-08	U	-1.35E-08±4.53E-08	U	1.48E-08±2.57E-08	U
1101C	06/09/16	7.64E-10±4.07E-09	U	2.17E-08±1.29E-08	U	6.16E-09±2.48E-08	U
1102A	06/10/16	-3.93E-09±1.18E-08	U	-4.32E-08±7.57E-08	U	-3.74E-09±2.40E-08	U
1102B	06/10/16	1.90E-08±6.84E-09		8.86E-08±5.10E-08	J	1.76E-08±2.88E-08	U
1103A	06/08/16	1.25E-08±8.32E-09	J	2.46E-08±3.55E-08	U	-8.90E-09±2.70E-08	U
1103B	06/08/16	-3.11E-09±9.53E-09	U	7.34E-08±4.25E-08	J	7.00E-10±2.32E-08	U
1103C	06/07/16						
1104A	06/08/16	-9.33E-10±6.04E-09	U	3.50E-09±3.03E-08	U	-4.00E-10±2.62E-08	U
1104B	06/08/16	-9.64E-09±2.05E-08	U	8.41E-09±3.09E-08	U	5.80E-09±2.47E-08	U
1104C	06/07/16						
1104C	12/01/16	5.42E-09±4.75E-09	U	1.16E-08±3.06E-08	U		
1105A	06/07/16	1.87E-09±5.35E-09	U	7.02E-08±4.50E-08	J	-1.40E-09±3.09E-08	U
1105A	06/07/16					-7.99E-09±2.48E-08	U
1105B	06/07/16	-3.47E-10±4.57E-09	U	1.66E-08±1.03E-08	U	2.20E-09±2.28E-08	U
1106A	06/09/16	7.43E-09±4.90E-09	U	-3.64E-08±6.90E-08	U	1.30E-08±2.52E-08	U
1106B	06/09/16	3.16E-09±6.93E-09	U	-2.89E-08±5.62E-08	U	8.91E-09±2.35E-08	U
1107A	06/08/16	3.73E-09±5.88E-09	U	-4.80E-09±4.02E-08	U	-6.00E-09±2.59E-08	U
1108A	06/07/16	-1.46E-09±6.68E-09	U	1.81E-08±1.45E-08	U	4.00E-10±2.53E-08	U
1109A	06/09/16	7.27E-09±5.71E-09	U	6.55E-08±5.00E-08	J	1.44E-08±2.55E-08	U
1109B	06/09/16	1.26E-10±5.83E-09	U	-5.13E-09±4.03E-08	U	1.13E-08±2.80E-08	U
1110A	06/07/16	-1.94E-09±8.61E-09	U	1.19E-08±3.64E-08	U	-7.40E-09±2.36E-08	U
1111A	06/10/16	-1.39E-09±6.95E-09	U	7.21E-09±3.51E-08	U	-4.90E-09±2.52E-08	U

Table B-9 continued.

Sample Location	Sample Date	Cesium-134 (μCi/mL)	Q	Cesium-137 (μCi/mL)	Q	Cobalt-57 (μCi/mL)	Q
1101A	06/09/16	1.35E-09±1.63E-09	U	2.89E-10±1.68E-09	U	4.41E-11±8.87E-10	U
1101B	06/09/16	-1.50E-11±2.73E-09	U	9.21E-11±1.39E-09	U	-4.43E-10±1.46E-09	U
1101C	06/09/16	2.00E-10±1.34E-09	U	-3.84E-10±3.37E-09	U	1.15E-10±7.96E-10	U
1102A	06/10/16	6.05E-10±1.24E-09	U	5.31E-11±1.49E-09	U	5.97E-11±8.53E-10	U
1102B	06/10/16	2.30E-10±1.63E-09	U	-1.82E-09±1.25E-08	U	-6.75E-10±6.94E-09	U
1103A	06/08/16	1.10E-09±1.60E-09	U	2.75E-10±1.72E-09	U	-1.99E-11±8.79E-10	U
1103B	06/08/16	6.78E-10±1.53E-09	U	-9.83E-11±1.31E-09	U	-1.78E-11±8.04E-10	U
1103C	06/07/16						
1104A	06/08/16	-3.01E-10±1.96E-09	U	-5.44E-10±5.58E-09	U	-3.33E-10±1.80E-09	U
1104B	06/08/16	5.29E-10±1.37E-09	U	-9.53E-10±5.50E-08	U	-5.32E-10±1.35E-09	U
1104C	06/07/16						
1104C	12/01/16	-5.18E-10±1.02E-07	U	3.72E-10±1.37E-09	U	-2.98E-10±9.50E-10	U
1105A	06/07/16	6.00E-10±1.61E-09	U	-1.54E-09±7.47E-09	U	-9.04E-10±6.99E-07	U
1105A	06/07/16						
1105B	06/07/16	-5.18E-11±4.58E-08	U	1.97E-10±1.36E-09	U	-8.66E-11±3.69E-09	U
1106A	06/09/16	4.54E-10±1.46E-09	U	3.22E-10±1.46E-09	U	4.13E-12±8.39E-10	U
1106B	06/09/16	5.05E-11±1.35E-09	U	-1.43E-10±1.43E-09	U	1.20E-11±9.04E-10	U
1107A	06/08/16	8.84E-11±1.71E-09	U	-1.16E-09±4.88E-09	U	-6.10E-10±5.47E-09	U
1108A	06/07/16	7.86E-11±1.48E-09	U	4.89E-10±1.49E-09	U	5.54E-10±7.58E-10	U
1109A	06/09/16	1.22E-09±1.62E-09	U	-1.77E-09±1.12E-08	U	-1.10E-09±1.09E-08	U
1109B	06/09/16	-3.88E-10±1.69E-09	U	7.97E-10±1.69E-09	U	-3.44E-10±9.27E-10	U
1110A	06/07/16	-3.84E-10±1.35E-09	U	6.03E-10±1.64E-09	U	1.49E-11±9.48E-10	U
1111A	06/10/16	-5.49E-11±1.27E-09	U	1.21E-10±1.55E-09	U	7.34E-11±9.25E-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	06/09/16	6.37E-10±1.46E-09	U	1.41E-08±4.62E-09		-1.56E-09±4.10E-09	U
1101B	06/09/16	-1.03E-09±2.12E-09	U	2.90E-09±2.14E-09	UJ	5.04E-10±1.84E-09	U
1101C	06/09/16	-9.67E-10±2.10E-09	U	-1.75E-09±3.25E-09	UJ	4.95E-09±2.80E-09	J
1102A	06/10/16	-1.15E-09±8.14E-09	U	8.03E-09±4.76E-09	J	1.34E-09±2.39E-09	U
1102B	06/10/16	-2.64E-09±1.55E-08	U	6.42E-12±5.00E-09	UJ	7.51E-10±2.94E-09	U
1103A	06/08/16	-6.82E-10±1.45E-08	U	1.43E-08±4.66E-09		-1.88E-09±4.02E-09	U
1103B	06/08/16	-6.25E-10±1.10E-08	U	3.29E-09±2.58E-09	UJ	2.19E-09±2.14E-09	U
1103C	06/07/16						
1104A	06/08/16	9.83E-10±1.19E-09	U	-7.43E-10±4.98E-09	UJ	1.97E-09±2.24E-09	U
1104B	06/08/16	-1.15E-10±4.75E-09	U	-2.29E-09±3.60E-09	UJ	3.22E-09±2.34E-09	U
1104C	06/07/16						
1104C	12/01/16	2.13E-10±1.34E-09	U			2.16E-09±2.54E-09	U
1105A	06/07/16	-2.58E-09±1.72E-08	U	-1.89E-09±5.28E-09	UJ	2.77E-09±2.60E-09	U
1105A	06/07/16						
1105B	06/07/16	3.37E-11±1.14E-09	U	-7.56E-10±3.58E-09	UJ	3.51E-09±2.32E-09	J
1106A	06/09/16	-8.00E-10±3.20E-08	U	5.74E-09±3.79E-09	UJ	1.17E-09±2.49E-09	U
1106B	06/09/16	-2.09E-10±2.22E-09	U	7.79E-11±3.82E-09	UJ	3.33E-09±2.61E-09	U
1107A	06/08/16	-2.64E-09±1.61E-08	U	-2.37E-09±5.28E-09	UJ	2.06E-09±2.92E-09	U
1108A	06/07/16	1.35E-11±1.38E-09	U	-2.83E-09±3.40E-09	UJ	3.98E-09±2.91E-09	J
1109A	06/09/16	-1.30E-09±6.15E-09	U	-1.71E-09±4.90E-09	UJ	1.44E-10±2.78E-09	U
1109B	06/09/16	-2.79E-10±4.87E-09	U	1.39E-08±4.71E-09		-2.09E-09±3.27E-09	U
1110A	06/07/16	-6.88E-10±1.38E-08	U	1.41E-08±4.60E-09		6.97E-10±2.77E-09	U
1111A	06/10/16	2.47E-10±1.59E-09	U	1.45E-08±4.66E-09		-1.78E-09±3.50E-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	06/09/16	-1.38E-09±4.66E-09	U	-7.64E-09±2.72E-08	U	-2.51E-08±3.28E-08	U
1101B	06/09/16	-1.64E-09±4.60E-09	U	7.58E-09±2.86E-08	U	-1.41E-08±2.44E-08	U
1101C	06/09/16	-4.13E-10±3.31E-09	U	-1.99E-08±2.68E-08	U	-2.99E-08±2.82E-08	UJ
1102A	06/10/16	-3.10E-09±6.46E-09	U	1.16E-08±1.92E-08	U	-3.86E-08±2.88E-08	UJ
1102B	06/10/16	6.05E-09±3.77E-09	U	-1.86E-08±3.62E-08	U	-5.48E-08±4.84E-08	UJ
1103A	06/08/16	-4.22E-10±3.91E-09	U	-1.41E-08±3.85E-08	U	-1.85E-08±3.24E-08	U
1103B	06/08/16	-7.79E-10±3.52E-09	U	2.71E-09±1.87E-08	U	-3.70E-08±2.92E-08	UJ
1103C	06/07/16						
1104A	06/08/16	-1.15E-09±4.08E-09	U	2.90E-08±2.58E-08	U	-2.14E-08±2.62E-08	U
1104B	06/08/16	-5.84E-10±3.56E-09	U	-2.68E-09±2.75E-08	U	-2.78E-08±2.76E-08	UJ
1104C	06/07/16						
1104C	12/01/16	-7.50E-10±3.56E-09	U	3.50E-10±2.42E-08	U	-1.29E-10±4.63E-08	U
1105A	06/07/16	6.37E-09±4.27E-09	J	3.21E-08±2.69E-08	J	-5.56E-08±4.90E-08	UJ
1105A	06/07/16						
1105B	06/07/16	-5.75E-10±3.40E-09	U	-1.59E-08±2.77E-08	U	-3.41E-08±2.86E-08	UJ
1106A	06/09/16	-7.28E-11±4.29E-09	U	3.36E-08±2.73E-08	U	-3.43E-08±2.78E-08	UJ
1106B	06/09/16	-3.74E-09±6.96E-09	U	7.60E-09±1.95E-08	U	-4.88E-08±3.01E-08	UJ
1107A	06/08/16	1.50E-09±3.63E-09	U	-8.44E-09±2.53E-08	U	-4.23E-08±5.27E-08	U
1108A	06/07/16	-2.50E-09±4.96E-09	U	5.68E-08±2.19E-08		-3.92E-08±2.86E-08	UJ
1109A	06/09/16	3.02E-09±3.54E-09	U	-5.13E-08±8.40E-07	U	-4.88E-08±4.96E-08	U
1109B	06/09/16	-3.53E-10±3.73E-09	U	-8.78E-09±2.85E-08	U	-2.11E-08±3.20E-08	U
1110A	06/07/16	1.04E-09±3.66E-09	U	-5.53E-09±2.33E-08	U	-3.36E-08±3.37E-08	U
1111A	06/10/16	-5.68E-10±3.92E-09	U	-1.87E-08±4.61E-08	U	-1.16E-08±3.21E-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	06/09/16	5.13E-08±3.96E-08	J	3.20E-10±3.30E-10	U	2.64E-08±6.50E-09	J
1101B	06/09/16	1.33E-08±2.44E-08	U	-9.00E-11±3.90E-10	U	9.10E-08±2.10E-08	
1101C	06/09/16	2.54E-08±3.56E-08	U	7.00E-11±5.10E-10	U	2.50E-09±2.40E-09	U
1102A	06/10/16	4.19E-09±2.91E-08	U	-7.00E-11±4.90E-10	U	5.10E-09±2.60E-09	J
1102B	06/10/16	-1.38E-08±4.67E-08	U	-2.00E-11±5.00E-10	U	1.25E-08±3.70E-09	
1103A	06/08/16	-1.26E-08±4.35E-08	U	4.00E-10±1.00E-09	UJ	-3.60E-09±3.40E-09	U
1103B	06/08/16	1.13E-08±2.67E-08	U	6.00E-10±1.00E-09	UJ	-2.00E-09±2.70E-09	U
1103C	06/07/16					-2.90E-09±2.40E-09	UJ
1104A	06/08/16	2.50E-08±2.77E-08	U	2.00E-10±7.00E-10	U	-9.00E-10±2.50E-09	U
1104B	06/08/16	8.18E-09±2.44E-08	U	3.00E-10±1.00E-09	UJ	-2.60E-09±2.90E-09	U
1104C	06/07/16					4.40E-09±2.80E-09	J
1104C	12/01/16	-3.39E-10±3.07E-08	U				
1105A	06/07/16	7.47E-09±4.10E-08	U	4.00E-10±1.30E-09	UJ	-1.30E-09±3.00E-09	U
1105A	06/07/16			1.20E-10±3.60E-10	U	-1.40E-09±2.40E-09	U
1105B	06/07/16	5.48E-09±2.43E-08	U	8.00E-10±8.00E-10	J	-3.00E-10±4.20E-09	U
1106A	06/09/16	2.85E-10±2.39E-08	U	2.70E-10±6.10E-10	U	-9.00E-10±2.40E-09	U
1106B	06/09/16	2.01E-09±2.72E-08	U	0.00E+00±4.20E-10	U	-2.00E-09±2.40E-09	U
1107A	06/08/16	4.90E-09±3.91E-08	U	8.00E-09±1.10E-09		3.20E-09±2.80E-09	U
1108A	06/07/16	1.16E-09±2.50E-08	U	8.00E-10±1.00E-09	U	-2.20E-09±4.20E-09	U
1109A	06/09/16	-6.40E-09±4.16E-08	U	1.30E-10±4.20E-10	U	-2.30E-09±2.40E-09	U
1109B	06/09/16	1.29E-08±3.13E-08	U	-1.00E-11±4.50E-10	U	1.20E-09±2.50E-09	U
1110A	06/07/16	3.14E-08±4.23E-08	U	7.00E-10±7.00E-10	U	-2.50E-09±2.80E-09	U
1111A	06/10/16	2.15E-08±2.86E-08	U	2.10E-10±5.20E-10	U	1.02E-08±3.40E-09	

Table B-9 continued.

Sample Location	Sample Date	Thallium-208 (µCi/mL)	Q	Thorium-234 (µCi/mL)	Q	Uranium-235 (µCi/mL)	Q
1101A	06/09/16	2.09E-09±1.84E-09	U	-4.36E-09±3.08E-08	U	7.68E-09±8.02E-09	U
1101B	06/09/16	2.80E-09±2.12E-09	J	-1.28E-08±3.64E-08	U	6.73E-11±7.10E-09	U
1101C	06/09/16	5.69E-11±1.36E-09	U	-6.02E-09±3.14E-08	U	-1.36E-09±1.08E-08	U
1102A	06/10/16	-5.78E-10±2.29E-09	U	3.92E-09±2.02E-08	U	1.59E-09±7.32E-09	U
1102B	06/10/16	4.59E-10±2.31E-09	U	1.38E-09±3.55E-08	U	-6.68E-09±2.19E-08	U
1103A	06/08/16	1.12E-09±1.66E-09	U	-4.45E-09±3.12E-08	U	4.50E-09±8.03E-09	U
1103B	06/08/16	1.80E-09±1.92E-09	U	9.94E-09±2.24E-08	U	-9.37E-11±7.67E-09	U
1103C	06/07/16						
1104A	06/08/16	-1.79E-09±4.68E-09	U	2.84E-08±2.97E-08	U	1.14E-09±7.07E-09	U
1104B	06/08/16	6.20E-10±1.71E-09	U	-4.23E-08±1.01E-07	U	-1.84E-09±1.30E-08	U
1104C	06/07/16						
1104C	12/01/16	1.42E-09±2.05E-09	U	-3.06E-08±5.99E-08	U	3.34E-10±7.18E-09	U
1105A	06/07/16	1.49E-09±1.15E-09	U	2.21E-08±3.82E-08	U	-9.70E-09±3.67E-08	U
1105A	06/07/16						
1105B	06/07/16	1.66E-09±2.00E-09	U	-3.14E-09±2.83E-08	U	2.43E-10±6.90E-09	U
1106A	06/09/16	-5.37E-10±2.06E-09	U	1.76E-08±2.46E-08	U	-4.08E-10±9.15E-09	U
1106B	06/09/16	4.15E-10±1.54E-09	U	8.04E-09±2.49E-08	U	-8.39E-10±1.12E-08	U
1107A	06/08/16	2.43E-09±2.03E-09	U	1.59E-08±3.53E-08	U	-9.87E-09±4.09E-08	U
1108A	06/07/16	9.04E-10±1.55E-09	U	3.11E-08±2.79E-08	U	4.09E-09±5.71E-09	U
1109A	06/09/16	1.88E-09±1.99E-09	U	5.99E-09±3.17E-08	U	-8.22E-09±2.78E-08	U
1109B	06/09/16	1.95E-09±1.80E-09	U	1.21E-08±3.80E-08	U	3.24E-10±7.88E-09	U
1110A	06/07/16	2.83E-09±2.03E-09	J	1.25E-08±3.61E-08	U	4.70E-09±7.85E-09	U
1111A	06/10/16	1.36E-09±1.84E-09	U	-5.13E-10±3.39E-08	U	-2.90E-09±1.84E-08	U

Key for Qualifier Codes (Q):

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

R = A rejected result. The data are determined to be unusable.

U = Not detected above minimum detectable concentration (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. 2016 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 (Deg C)	Turbidity (NTU)
1101A	06/09/16	755	7.36	12.06	1.68
1101A	12/02/16	777	7.60	11.26	3.11
1101B	06/09/16	593	7.62	17.86	2.51
1101B	12/02/16	602	7.84	9.74	5.07
1101C	06/09/16	383	7.82	13.56	95.3
1101C	12/02/16	354	7.90	9.23	119
1102A	06/10/16	746	7.47	15.23	6.66
1102A	12/07/16	786	7.85	11.58	9.40
1102B	06/10/16	564	7.47	14.79	2.38
1102B	12/07/16	553	7.88	10.61	4.23
1103A	06/08/16	1248	7.22	10.92	5.73
1103A	12/05/16	1290	7.32	11.19	21.0
1103B	06/08/16	645	7.42	11.67	3.25
1103B	12/05/16	634	7.67	10.23	2.90
1104A	06/08/16	734	7.48	11.2	2.35
1104A	12/05/16	715	7.62	12.37	5.66
1104B	06/08/16	570	7.63	12.44	2.05
1104B	12/05/16	551	7.85	10.94	3.02
1105A	06/07/16	690	7.87	12.58	44.8
1105A	12/05/16	653	7.88	9.71	89.7
1105B	06/07/16	620	7.66	13.04	66
1105B	12/05/16	620	7.81	9.04	35
1106A	06/09/16	696	7.5	12.09	2.95
1106A	12/06/16	684	7.82	11.64	3.80
1106B	06/09/16	692	7.44	13.02	19.9

Table B-10 continued.

Sample Location	Sample Date	Conductivity (μmhos/cm)	pH	Temperature (Deg C)	Turbidity (NTU)
1106B	12/06/16	688	7.71	11.19	12.0
1107A	06/08/16	2157	6.87	10.9	2.19
1107A	12/05/16	1843	6.00	11.64	14.9
1108A	06/07/16	813	7.35	11.66	122
1108A	12/07/16	850	7.68	11.79	57
1109A	06/09/16	636	7.56	13.16	2.67
1109A	12/06/16	640	7.67	12.96	2.48
1109B	06/09/16	450	7.71	13.56	4.83
1109B	12/06/16	449	7.97	11.43	11.08
1110A	12/02/16	1487	7.35	10.90	30.0
1111A	06/10/16	979	7.16	12.37	2.22
1111A	12/07/16	970	7.56	11.84	3.38

Appendix C - Surface and Stormwater Data

Table C-1. 2016 SDA Surface Water Data - Lagoon Road Creek (WNNDADR)

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
02/18/16	1.88E-08±5.05E-09	J	4.06E-08±9.66E-09		5.39E-07±1.22E-07	
05/24/16	1.28E-09±7.75E-10	J	3.08E-08±7.29E-09		6.55E-07±1.32E-07	
08/18/16	7.97E-11±5.50E-10	U	2.49E-08±5.88E-09		2.90E-07±9.63E-08	
08/18/16	2.75E-10±4.91E-10	U	2.09E-08±4.95E-09		2.15E-07±9.23E-08	
11/16/16	7.04E-10±4.86E-10	U	5.04E-09±1.31E-09		-5.48E-08±9.69E-08	U

Table C-2. 2016 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
02/18/16	2.21E-10±1.57E-09	UJ	5.35E-09±1.60E-09		-1.89E-07±1.00E-07	U
02/18/16	5.18E-10±1.23E-09	UJ	5.35E-09±1.56E-09		-1.58E-07±1.00E-07	U
05/24/16	1.23E-09±1.01E-09	U	5.89E-09±1.60E-09		1.02E-07±1.07E-07	U
08/18/16	1.89E-09±1.26E-09	J	7.59E-09±1.95E-09		-2.79E-08±8.46E-08	U
11/16/16	1.01E-09±4.87E-10	J	7.52E-09±1.86E-09		-6.91E-08±9.67E-08	U

Table C-3. 2016 SDA Surface Water Data - Frank's Creek (WNFRC67)

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
02/18/16	3.76E-10±5.84E-10	U	2.34E-09±7.75E-10		-8.71E-08±9.99E-08	U
05/24/16	6.26E-10±6.78E-10	U	8.56E-10±5.51E-10	J	1.34E-07±1.07E-07	U
08/18/16	-2.84E-10±3.17E-10	U	1.80E-09±6.38E-10		-8.42E-08±8.43E-08	U
11/16/16	2.58E-10±2.97E-10	U	1.83E-09±6.32E-10		-1.27E-07±9.65E-08	UJ

Table C-4. 2016 SDA Surface Water Data - Frank's Creek (WNDCELD)

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
02/18/16	8.11E-09±2.30E-09		8.40E-09±2.11E-09		-1.13E-08±1.01E-07	U
05/24/16	9.19E-09±2.84E-09		1.47E-08±3.76E-09		3.51E-08±1.06E-07	U
08/18/16	1.18E-09±6.27E-10	J	9.57E-09±2.33E-09		1.99E-09±8.52E-08	U
11/16/16	1.23E-09±5.52E-10	J	3.27E-09±9.35E-10		-1.45E-07±9.72E-08	UJ

Table C-5. 2016 SDA Surface Water Data - Buttermilk Creek: Upgradient of the SDA (WFBCBKG)

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
02/18/16	-5.26E-10±7.39E-10	U	1.09E-09±5.76E-10	J	-1.52E-07±1.00E-07	U
05/24/16	6.57E-11±6.55E-10	U	1.22E-09±6.03E-10		4.68E-08±1.06E-07	U
08/18/16	1.59E-09±7.95E-10		4.46E-09±1.21E-09		-1.28E-07±8.34E-08	UJ
11/16/16	2.36E-10±5.51E-10	U	2.04E-09±7.11E-10		-1.61E-07±9.59E-08	UJ

Key for Qualifier Codes (Q):

J = Analyte identified. Associated result is considered estimated or uncertain.
U = Not detected above minimum detectable concentration (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-6. 2016 SDA Surface Water Data - Buttermilk Creek: Downgradient of the SDA (WFBCANL)

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
05/24/16	-2.01E-10±5.76E-10	U	1.13E-09±5.80E-10	J	4.92E-08±1.05E-07	U

Table C-7. 2016 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
05/13/16	6.11E-10±3.60E-10	J	1.66E-09±6.10E-10		7.14E-07±1.35E-07	
10/13/16	6.25E-10±3.4E-10	J	2.2E-09±7.15E-10		7.27E-08±1.02E-07	U

Sample Date	Beryllium-7 (μCi/mL)	Q	Cesium-137 (μCi/mL)	Q
05/13/16	-4.26E-09±1.25E-08	U	-1.76E-10±2.14E-09	U
10/13/16	8.66E-09±1.03E-08	U	-7.77E-10±3.11E-08	UJ

Sample Date	Cobalt-60 (μCi/mL)	Q	Potassium-40 (μCi/mL)	Q
05/13/16	-6.02E-10±8.67E-08	U	-8.16E-09±3.09E-08	U
10/13/16	-7.24E-10±1.37E-09	U	1.46E-08±2.61E-08	U

Key for Qualifier Codes (Q):

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

U = Not detected above minimum detectable concentration (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-8. 2016 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
05/13/16	Grab								
05/13/16	Composite	2.0	U	10.0	U	0.1		5.0	U
05/13/16	Ambient Rain								
10/13/16	Grab	2.0	U	10.0	U	7.58	J	5.0	U
10/13/16	Composite	2.0	U	65.0		0.11			
10/13/16	Ambient Rain								

Sample Date	Sample Type	Total Phosphorus (mg/L)	Q	TSS (mg/L)	Q	pH (SU)	Q	Temp (Deg C)	Q
05/13/16	Grab					6.48		25.0	
05/13/16	Composite	0.05		5.0	U				
05/13/16	Ambient Rain					7.19		25.0	
10/13/16	Grab	0.10	U	10.0	U	5.35		12.01	
10/13/16	Composite	0.05	U	10.0	U				
10/13/16	Ambient Rain					4.95		12.14	

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. 2016 Overland Gamma Radiation Survey Results

Source: NYSERDA

	May 04 (µrem/hr)		September 08 (µrem/hr)	
Location[e]	**1m**	**1cm**	**1m**	**1cm**
P-1	7	8	8	8
P-2	9	9	8	7
P-3	9	10	9	9
P-4	6	6	10	9
P-5	9	9	8	9
P-6	9	9	8	9
P-7	8	8	6	7
P-8	7	8	6	6
P-9	8	8	6	8
P-10	8	7	6	6
P-11	9	7	7	7
P-12	7	5	6	7
P-13	8	8	8	8
P-14	7	7	6	8
P-15	8	7	7	7
P-16	9	10	9	10
SDA2n	9	10	9	10
SDA2s	8	8	9	10
SDA3n	10	9	11	10
SDA3s	9	9	8	8
SDA4n	10	10	6	8
SDA4s	7	8	7	7
T1s	10	10	9	10
T2n	8	8	10	10
T3n	10	10	10	11
T3s	11	9	8	10

Table D-1 continued.

	May 04 (μrem/hr)		September 08 (μrem/hr)	
Location[e]	1m	1cm	1m	1cm
T4n	9	11	10	9
T4s	8	8	9	10
T5n	10	9	9	11
T5s	10	10	8	10
T6n	7	9	10	9
T6s	10	10	9	9
T7n	10	9	9	10
T7s	9	11	9	9
T8n	10	10	9	8
T8s	8	8	9	8
T9n	11	8	8	10
T9s	8	10	7	9
T10n	9	9	9	8
T10s	10	10	7	9
T11n	10	11	8	9
T11s	9	9	9	10
T12n	11	9	7	8
T12s	10	9	7	8
T13n	10	10	8	9
T13s	8	8	7	7
T14n	9	9	8	8
T14s	10	10	7	9
Tank T-1	5	5	5	4
DC-(G)[f]	8	7	6	5
DC-dr[f]	8	8	6	6

[e] SDA perimeter locations (P-1 through P-16) are identified on Figure 2-6. Measurements were made at one meter (1m) and one centimeter (1 cm) from the ground, tank or building surface.

[f] 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. 2016 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)	20.0±3.6		14.7±2.7		20.8±3.7		14.8±2.7	
DNTLD33 (SDA SW Corner)	18.2±3.3		16.7±3.0		18.8±3.4		17.8±3.2	
DNTLD43 (SDA West Gate)	17.4±3.1		10.7±2.0		13.8±2.5		15.8±2.9	
DNTLD53 (SDA West Gate)	21.5±3.9		21.6±3.9		25.8±4.6		21.8±3.9	
NYTLDBK (Background Location)	16.4±3.0		14.7±2.7		17.8±3.2		15.8±2.9	

Appendix E - Precipitation

Table E-1. First Quarter 2016 SDA Precipitation Data (Liquid Rainfall Equivalent)

Source: NYSERDA

January 2016	Precipitation (inches)	February 2016	Precipitation (inches)	March 2016	Precipitation (inches)
1/1/2016	0.19	2/1/2016	0.03	3/1/2016	0.29
1/2/2016	0	2/2/2016	0.01	3/2/2016	0.1
1/3/2016	0.1	2/3/2016	0.57	3/3/2016	0.02
1/4/2016	0.01	2/4/2016	0.01	3/4/2016	0.02
1/5/2016	0	2/5/2016	0.17	3/5/2016	0.02
1/6/2016	0	2/6/2016	0	3/6/2016	0
1/7/2016	0	2/7/2016	0	3/7/2016	0
1/8/2016	0.1	2/8/2016	0	3/8/2016	0
1/9/2016	0.21	2/9/2016	0.03	3/9/2016	0
1/10/2016	0.51	2/10/2016	0.17	3/10/2016	0.74
1/11/2016	0.13	2/11/2016	0.06	3/11/2016	0
1/12/2016	0.22	2/12/2016	0.16	3/12/2016	0
1/13/2016	0.11	2/13/2016	0.02	3/13/2016	0.05
1/14/2016	0.09	2/14/2016	0	3/14/2016	0.04
1/15/2016	0	2/15/2016	0.02	3/15/2016	0.03
1/16/2016	0.25	2/16/2016	1.11	3/16/2016	0.1
1/17/2016	0.15	2/17/2016	0.15	3/17/2016	0.02
1/18/2016	0.43	2/18/2016	0	3/18/2016	0
1/19/2016	0.19	2/19/2016	0.02	3/19/2016	0
1/20/2016	0.02	2/20/2016	0.03	3/20/2016	0
1/21/2016	0.11	2/21/2016	0	3/21/2016	0.01
1/22/2016	0	2/22/2016	0	3/22/2016	0.02
1/23/2016	0	2/23/2016	0	3/23/2016	0.01
1/24/2016	0	2/24/2016	0.72	3/24/2016	0.11
1/25/2016	0	2/25/2016	0.16	3/25/2016	0.19
1/26/2016	0.12	2/26/2016	0.01	3/26/2016	0
1/27/2016	0.23	2/27/2016	0	3/27/2016	0
1/28/2016	0.01	2/28/2016	0	3/28/2016	0.55
1/29/2016	0.13	2/29/2016	0.07	3/29/2016	0
1/30/2016	0			3/30/2016	0
1/31/2016	0			3/31/2016	0.1
Total	**3.31**	**Total**	**3.52**	**Total**	**2.42**

Table E-2. Second Quarter 2016 SDA Precipitation Data (Liquid Rainfall Equivalent)

Source: NYSERDA

April 2016	Precipitation (inches)	May 2016	Precipitation (inches)	June 2016	Precipitation (inches)
4/1/2016	0.1	5/1/2016	0.46	6/1/2016	0
4/2/2016	0.26	5/2/2016	0.47	6/2/2016	0.21
4/3/2016	0.24	5/3/2016	0	6/3/2016	0.03
4/4/2016	0.24	5/4/2016	0	6/4/2016	0.1
4/5/2016	0	5/5/2016	0	6/5/2016	0.28
4/6/2016	0.01	5/6/2016	0	6/6/2016	0
4/7/2016	0.1	5/7/2016	0.01	6/7/2016	0.21
4/8/2016	0.11	5/8/2016	0.01	6/8/2016	0.2
4/9/2016	0.04	5/9/2016	0	6/9/2016	0
4/10/2016	0.05	5/10/2016	0	6/10/2016	0
4/11/2016	0.42	5/11/2016	0	6/11/2016	0.01
4/12/2016	0.06	5/12/2016	0	6/12/2016	0.01
4/13/2016	0	5/13/2016	0.54	6/13/2016	0
4/14/2016	0	5/14/2016	0.07	6/14/2016	0
4/15/2016	0	5/15/2016	0.02	6/15/2016	0.6
4/16/2016	0	5/16/2016	0.01	6/16/2016	0
4/17/2016	0	5/17/2016	0.02	6/17/2016	0
4/18/2016	0	5/18/2016	0	6/18/2016	0
4/19/2016	0	5/19/2016	0	6/19/2016	0
4/20/2016	0	5/20/2016	0	6/20/2016	0
4/21/2016	0.01	5/21/2016	0.1	6/21/2016	0.01
4/22/2016	0.02	5/22/2016	0	6/22/2016	0
4/23/2016	0	5/23/2016	0	6/23/2016	0
4/24/2016	0	5/24/2016	0	6/24/2016	0
4/25/2016	0.11	5/25/2016	0	6/25/2016	0
4/26/2016	0.19	5/26/2016	0.04	6/26/2016	0
4/27/2016	0	5/27/2016	0	6/27/2016	0.48
4/28/2016	0.13	5/28/2016	0.02	6/28/2016	0
4/29/2016	0.21	5/29/2016	0.02	6/29/2016	0
4/30/2016	0.01	5/30/2016	0	6/30/2016	0
		5/31/2016	0		
Total	**2.31**	**Total**	**1.79**	**Total**	**2.14**

Table E-3. Third Quarter 2016 SDA Precipitation Data (Liquid Rainfall Equivalent)

Source: NYSERDA

July 2016	Precipitation (inches)	August 2016	Precipitation (inches)	September 2016	Precipitation (inches)
7/1/2016	0.02	8/1/2016	0	9/1/2016	0
7/2/2016	0	8/2/2016	0	9/2/2016	0
7/3/2016	0	8/3/2016	0	9/3/2016	0
7/4/2016	0	8/4/2016	0.73	9/4/2016	0
7/5/2016	0	8/5/2016	0.26	9/5/2016	0
7/6/2016	0	8/6/2016	0.37	9/6/2016	0
7/7/2016	0.01	8/7/2016	0	9/7/2016	0
7/8/2016	0.03	8/8/2016	0	9/8/2016	0.38
7/9/2016	0.08	8/9/2016	0	9/9/2016	0.51
7/10/2016	0.02	8/10/2016	0.89	9/10/2016	0.39
7/11/2016	0	8/11/2016	0.35	9/11/2016	0.09
7/12/2016	0	8/12/2016	0.13	9/12/2016	0
7/13/2016	0	8/13/2016	1.57	9/13/2016	0
7/14/2016	0.15	8/14/2016	0.02	9/14/2016	0
7/15/2016	0	8/15/2016	0.02	9/15/2016	0
7/16/2016	0	8/16/2016	0.39	9/16/2016	0
7/17/2016	0	8/17/2016	0	9/17/2016	1.49
7/18/2016	0.38	8/18/2016	0.47	9/18/2016	0.53
7/19/2016	0	8/19/2016	0	9/19/2016	0
7/20/2016	0	8/20/2016	0.04	9/20/2016	0
7/21/2016	0	8/21/2016	0.11	9/21/2016	0
7/22/2016	0.24	8/22/2016	0	9/22/2016	0
7/23/2016	0.03	8/23/2016	0	9/23/2016	0
7/24/2016	0	8/24/2016	0	9/24/2016	0
7/25/2016	1.1	8/25/2016	1.06	9/25/2016	0
7/26/2016	0	8/26/2016	0	9/26/2016	0.09
7/27/2016	0	8/27/2016	0	9/27/2016	0
7/28/2016	0	8/28/2016	0	9/28/2016	0
7/29/2016	0.11	8/29/2016	0	9/29/2016	0.05
7/30/2016	0.22	8/30/2016	0	9/30/2016	0.01
7/31/2016	0	8/31/2016	0.62		
Total	**2.39**	**Total**	**7.03**	**Total**	**3.54**

Table E-4. Fourth Quarter 2016 SDA Precipitation Data (Liquid Rainfall Equivalent)

Source: NYSERDA

October 2016	Precipitation (inches)	November 2016	Precipitation (inches)	December 2016	Precipitation (inches)
10/1/2016	0.36	11/1/2016	0	12/1/2016	0.08
10/2/2016	0.01	11/2/2016	0.03	12/2/2016	0.63
10/3/2016	0.09	11/3/2016	0.7	12/3/2016	0
10/4/2016	0	11/4/2016	0	12/4/2016	0
10/5/2016	0	11/5/2016	0	12/5/2016	0.07
10/6/2016	0	11/6/2016	0	12/6/2016	0.3
10/7/2016	0	11/7/2016	0	12/7/2016	0.02
10/8/2016	0.04	11/8/2016	0.09	12/8/2016	0.64
10/9/2016	0	11/9/2016	0.14	12/9/2016	0.08
10/10/2016	0	11/10/2016	0	12/10/2016	0.68
10/11/2016	0	11/11/2016	0	12/11/2016	0.09
10/12/2016	0	11/12/2016	0	12/12/2016	0.11
10/13/2016	0.18	11/13/2016	0	12/13/2016	0
10/14/2016	0	11/14/2016	0	12/14/2016	0.11
10/15/2016	0	11/15/2016	0	12/15/2016	0.2
10/16/2016	0.31	11/16/2016	0.17	12/16/2016	0.14
10/17/2016	0.01	11/17/2016	0	12/17/2016	0.35
10/18/2016	0.33	11/18/2016	0	12/18/2016	0.28
10/19/2016	0	11/19/2016	0.39	12/19/2016	0
10/20/2016	1.19	11/20/2016	0.37	12/20/2016	0
10/21/2016	1.63	11/21/2016	0.11	12/21/2016	0.01
10/22/2016	0	11/22/2016	0	12/22/2016	0.1
10/23/2016	0.46	11/23/2016	0	12/23/2016	0
10/24/2016	0.02	11/24/2016	0.14	12/24/2016	0.07
10/25/2016	0	11/25/2016	0.15	12/25/2016	0
10/26/2016	0.02	11/26/2016	0.56	12/26/2016	0.31
10/27/2016	0.79	11/27/2016	0.07	12/27/2016	0.04
10/28/2016	0	11/28/2016	0	12/28/2016	0
10/29/2016	0.01	11/29/2016	0.02	12/29/2016	0.37
10/30/2016	0.19	11/30/2016	0.68	12/30/2016	0.87
10/31/2016	0			12/31/2016	0.08
Total	**5.64**	**Total**	**3.62**	**Total**	**5.63**

Appendix F – Ground Surface Elevation Data

Table F-1. 2015 and 2016 SDA North Slope Ground Surface Elevation Data

Source: NYSERDA

Location[g]	2015 Elevation[h]	Location[g]	2016 Elevation[h]
1	1345.91	1	1345.88
4	1345.42	4	1345.41
5	1349.80	5	1349.80
6	1355.98		
7	1348.43	7	1348.47
8	1356.62	8	1356.62
9	1363.19	9	1363.19
10	1368.66	10	1368.72
11	1375.70		
12	1358.98	12	1358.90
13	1367.74	13	1367.80
14	1371.61	14	1371.57
15	1373.64	15	1373.59
16	1371.26	16	1371.25
17	1370.71	17	1370.70
18	1357.46	18	1357.44
19	1349.48	19	1349.47
20	1349.09	20	1349.08
31	1363.91	31	1363.94
32	1350.89	32	1350.96
33	1352.04	33	1352.03
34	1362.87	34	1362.84
35	1350.87	35	1350.85
36	1363.02	36	1362.96
38	1364.58	38	1364.58
39	1365.31	39	1365.33
40	1361.46	40	1361.37

Table F-1 continued.

Location[g]	2014 Elevation[h]	Location[g]	2015 Elevation[h]
45	1363.47	45	1363.45
46	1364.81	46	1364.79
47	1357.94	47	1357.94
48	1355.38	48	1355.37
50	1346.25		
52	1359.87		
53	1373.74	53	1373.80
CP53	1375.74	CP53	1375.74

[g] Locations 1-20 and 30-40 were established in 1982 by the USGS and resurveyed in 1983. From 1983 to 1991, the north slope was not surveyed. Locations 45-48 were established by NYSERDA in 1991 when the annual north slope survey was reinstated. Locations 50-53 were added in December 2011. Gaps in location numbers are points that were discontinued or never used.

[h] Coordinate System: Horizontal datum is North American Datum of 1927 (NAD27), NY West Zone. Vertical datum is National Geodetic Vertical Datum of 1929 (NGVD29). Elevations were measured on November 9, 2015 and October 26, 2016, by Clear Creek Land Surveying, LLC.

Table F-2. 2016 SDA North Slope Ground Surface EXIR Elevation Data

Source: NYSERDA

Location[i]	2016 Elevation
NS-1 EXIR	1367.49
NS-2 EXIR	1371.06
NS-3 EXIR	1372.87
NS-4 EXIR	1371.82
NS-5 EXIR	1370.54
NS-6 EXIR	1370.30
NS-7 EXIR	1371.42
NS-8 EXIR	1370.91
NS-9 EXIR	1370.92
NS-10 EXIR	1371.21
NS-11 EXIR	1364.89
NS-12 EXIR	1361.29
NS-13 EXIR	1363.16
NS-14 EXIR	1362.47
NS-15 EXIR	1365.60
NS-16 EXIR	1364.84
NS-17 EXIR	1364.58
NS-18 EXIR	1364.71
NS-19 EXIR	1364.62
NS-20 EXIR	1365.14
NS-21 EXIR	1362.84
NS-22 EXIR	1359.18
NS-23 EXIR	1357.83
NS-24 EXIR	1353.50
NS-25 EXIR	1353.74
NS-26 EXIR	1348.73
NS-27 EXIR	1352.38
NS-28 EXIR	1355.50

Table F-2 continued.

Source: NYSERDA

Location[i]	2016 Elevation
NS-29 EXIR	1357.53
NS-30 EXIR	1357.20
NS-31 EXIR	1358.63
NS-32 EXIR	1359.60
NS-33 EXIR	1359.60
NS-34 EXIR	1362.28
NS-35 EXIR	1359.41
NS-36 EXIR	1358.44
NS-37 EXIR	1356.57
NS-38 EXIR	1353.28
NS-39 EXIR	1352.75
NS-40 EXIR	1354.39
NS-41 EXIR	1348.62
NS-42 EXIR	1349.44
NS-43 EXIR	1352.33
NS-44 EXIR	1350.38
NS-45 EXIR	1351.66
NS-46 EXIR	1356.29
NS-47 EXIR	1351.55

i NYSERDA established 47 new monitoring points on the north slope of the SDA in 2016 and had them surveyed on October 26, 2016, by Clear Creek Land Surveying, LLC. The new monitoring points were surveyed in the North American Datum 83 and North American Vertical Datum 88 coordinate system and will be used to monitor the north slope after being established for two years. Control for the north slope Survey relied on Control Points CP53, 1004 and 1005.

Table F-3. 2016 SDA Trench Cap Ground Surface Elevation Data

Source: NYSERDA

Trench	Location[j]	Elevation[k]	Trench	Location[j]	Elevation[k]	Trench	Location[j]	Elevation[k]
1&2	S-M	1393.57	6	S-M	1386.64	11	S-M	1386.19
1&2	1+0	1392.71	6	1+0	1389.07	11	1+0	1385.28
1&2	2+0	1391.74	6	N-M	1391.45	11	2+0	1386.41
1&2	3+0	1391.37				11	3+0	1387.33
1&2	4+0	1390.82	7	S-M	1386.71	11	4+0	1387.76
1&2	5+0	1389.72	7	0+42.25	1385.79	11	5+0	1388.02
1&2	6+0	1386.92	7	N-M	1385.57	11	N-M	1389.40
1&2	N-M	1384.55						
1&2	7+10	1380.44	8	S-M	1391.04	12	S-M	1386.15
1&2	7+20	1378.22	8	1+0	1388.10	12	1+0	1384.55
			8	2+0	1388.71	12	2+0	1385.73
3	S-M	1393.71	8	3+0	1388.44	12	3+0	1386.84
3	1+0	1393.22	8	4+0	1388.29	12	4+0	1387.51
3	2+0	1393.13	8	5+0	1388.35	12	5+0	1387.44
3	3+0	1391.85	8	N-M	1389.86	12	N-M	1390.31
3	4+0	1391.43						
3	5+0	1389.94	9	S-M	1389.27	13	S-M	1386.02
3	6+0	1387.21	9	1+0	1387.17	13	1+0	1383.13
3	N-M	1385.02	9	2+0	1387.91	13	2+0	1385.39
			9	3+0	1388.31	13	3+0	1386.30
4	S-M	1394.12	9	4+0	1388.93	13	4+0	1386.96
4	1+0	1392.19	9	5+0	1389.28	13	5+0	1387.25
4	2+0	1392.98	9	N-M	1390.62	13	6+0	1386.00
4	3+0	1392.36				13	N-M	1388.72
4	4+0	1392.22	10	S-M	1387.40			
4	5+0	1390.32	10	1+0	1386.15	14	S-M	1386.10
4	6+0	1388.07	10	2+0	1387.28	14	1+0	1383.90
4	N-M	1387.98	10	3+0	1387.84	14	2+0	1384.61
			10	4+0	1388.44	14	3+0	1385.71
5	S-M	1394.63	10	5+0	1388.58	14	4+0	1386.17
5	1+0	1392.47	10	N-M	1390.27	14	5+0	1385.66
5	2+0	1391.82				14	6+0	1385.13
5	3+0	1391.00				14	N-M	1385.39
5	4+0	1390.38						
5	5+0	1390.44						
5	6+0	1387.54						
5	N-M	1389.17						

Table F-3. continued.

[j] Location is given as X+Y where X is trench length in 100-foot increments plus Y in ft (e.g., 7+10 = 710 ft). N-M is located on the centerline mark of the north monument plaque at each trench. S-M is located on the centerline mark of the south monument plaque at each trench.

[k] Location is given as X+Y where X is trench length in 100-foot increments plus Y in ft (e.g., 7+10 = 710 ft). N-M is located on the centerline mark of the north monument plaque at each trench. S-M is located on the centerline mark of the south monument plaque at each trench.

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