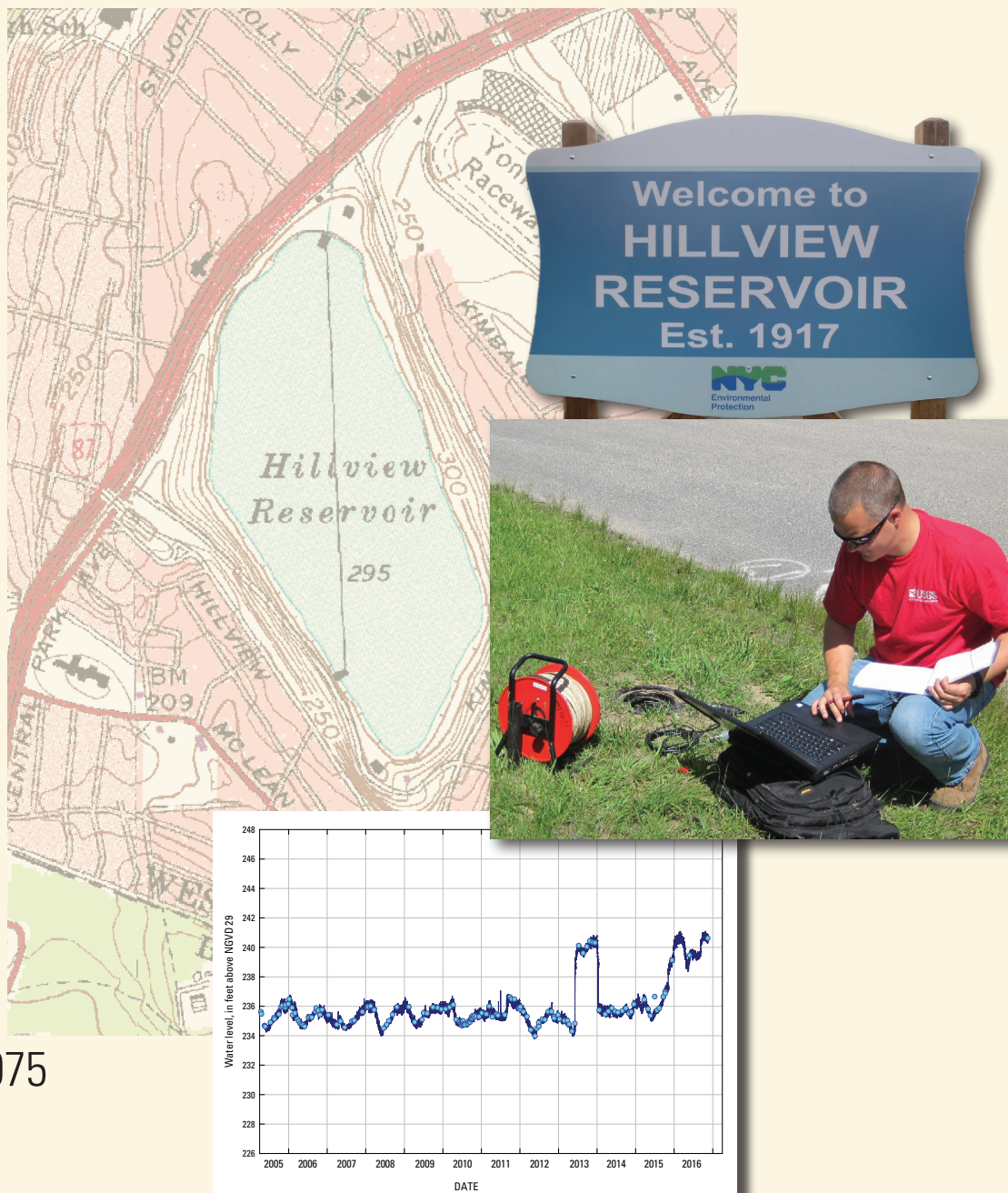


Prepared in cooperation with the  
New York City Department of Environmental Protection

# Groundwater-Level Data From an Earthen Dam Site in Southern Westchester County, New York



Data Series 1075

**Cover (clockwise).** U.S. Geological Survey (USGS) 7.5-minute (1:24,000-scale) topographic map of Mount Vernon, New York; from The National Map.

Welcome sign posted at an earthen dam site in Westchester County, New York; photograph by Michael L. Noll, USGS.

USGS scientist downloading data from a water level recorder; photograph by Simonette Rivera, USGS.  
Hydrograph for observation well TB-5S from an earthen dam site in Westchester County, New York, showing data from 2005 to 2016.

# **Groundwater-Level Data From an Earthen Dam Site in Southern Westchester County, New York**

By Michael L. Noll and Anthony Chu

Prepared in cooperation with the  
New York City Department of Environmental Protection

Data Series 1075

**U.S. Department of the Interior  
U.S. Geological Survey**

**U.S. Department of the Interior**

RYAN K. ZINKE, Secretary

**U.S. Geological Survey**

William H. Werkheiser, Deputy Director  
exercising the authority of the Director

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## Conversion Factors

U.S. customary units to International System of Units

<b>Multiply</b>	<b>By</b>	<b>To obtain</b>
inch (in.)	2.54	centimeter (cm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
acre	0.004047	square kilometer (km <sup>2</sup> )
gallon (gal)	3.785	liter (L)
pound, avoirdupois (lb)	0.4536	kilogram (kg)
pound per square inch (lb/in <sup>2</sup> )	6.895	kilopascal (kPa)

## Datum

Vertical coordinate information is referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29).

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

Altitude, as used in this report, refers to distance above the vertical datum.

## Abbreviations

NYCDEP	New York City Department Environmental Protection
USGS	U.S. Geological Survey



# Groundwater-Level Data From an Earthen Dam Site in Southern Westchester County, New York

By Michael L. Noll and Anthony Chu

## Abstract

In 2005, the U.S. Geological Survey began a cooperative study with New York City Department of Environmental Protection to characterize the local groundwater-flow system and identify potential sources of seeps on the southern embankment of the Hillview Reservoir in Westchester County, New York. Groundwater levels were collected at 49 wells at Hillview Reservoir, and 1 well in northern Bronx County, from April 2005 through November 2016. Groundwater levels were measured discretely with a chalked steel or electric tape, or continuously with a digital pressure transducer, or both, in accordance with U.S. Geological Survey groundwater-measurement standards. These groundwater-level data were plotted as time series and are presented in this report as hydrographs. Twenty-eight of the 50 hydrographs have continuous record and discrete field groundwater-level measurements, 22 of the hydrographs contain only discrete measurements.

## Introduction

The Hillview Reservoir (fig. 1) in southern Westchester County, New York, which was constructed between 1913 and 1916, contains more than 900 million gallons of water and maintains a hydrostatic head of about 293 feet (ft) on the New York City water distribution system to the south. Most of the water used in New York City passes through the Hillview Reservoir facility from the Kensico Reservoir, which is fed by the Delaware and Catskill aqueducts in upstate New York. Water is chlorinated at the reservoir and is piped from the southern end of the reservoir for distribution to users in New York City. The 90-acre reservoir, which is partly lined by concrete, is about equally divided into the East Basin and West Basin by a concrete-dividing wall. It has operated continuously since the first water tunnel was completed in 1917.

The earthen embankment comprises highly compact, low-permeability glacial clays that were excavated from the site and rest on a veneer of low-permeability glacial till that overlies crystalline bedrock (New York City Department of Environmental Protection, 1909; Malcolm Pirnie, Inc. and

TAMS Consultants, Inc., 2002). The earthen embankment was subsequently modified by other construction and maintenance projects near the downtake, uptake, and control chambers; connecting shafts; connecting conduits; the reservoir dividing wall; and the bypass tunnel that are critical to reservoir operations (fig. 2).

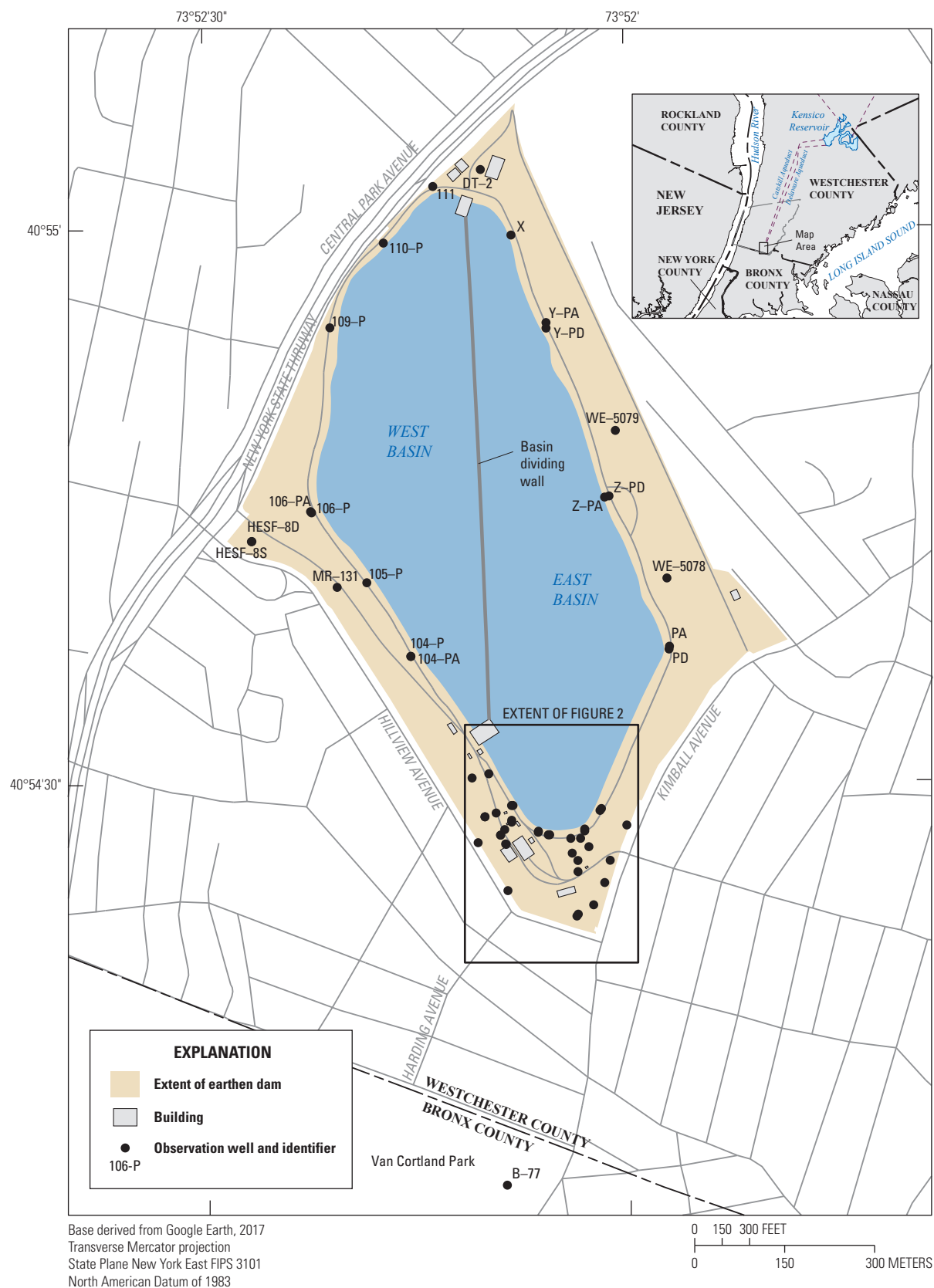
From April 2005 through November 2016, the U.S. Geological Survey (USGS), in cooperation with the New York City Department of Environmental Protection, collected hydraulic-head data (groundwater levels) at 49 wells at Hillview Reservoir and 1 well in northern Bronx County. The principal objectives of this study were to characterize the distribution of groundwater levels near the reservoir to better understand the embankment groundwater-flow system, characterize possible flow paths of water to the seeps, and monitor the long- and short-term changes in groundwater levels and seep discharge within the study area.

Groundwater-level data from the 50 wells that were monitored during the project are shown in hydrographs in this report (figs. 3–52) and can be retrieved from the USGS National Water Information System (U.S. Geological Survey, 2016) by using the USGS site identifiers in table 1. These data are also available in tabular format in appendix 1.

Groundwater generally flows or seeps outward from the reservoir through the low-permeability embankment toward the surrounding glacial drift. Since 1999, several seeps downslope from the East Basin have flowed out from the western side of the southern embankment, which is the steepest slope at the Hillview Reservoir (fig. 2). One seep that flowed continuously during the study was discovered during an inspection of the embankment in 1999 (George Schmitt, New York City Department of Environmental Protection, written commun., 2007). In 2001, the New York City Department of Environmental Protection (NYCDEP) drilled 25 wells at the southern end of the reservoir, adding to the 32 wells previously installed around the reservoir in an effort to locate the potential sources of the continuous flowing seep. The NYCDEP approach included taking periodic depth-to-water measurements and sampling reservoir and spring water for major ions (Malcolm Pirnie, Inc. and TAMS Consultants, Inc., 2002).



## 2 Groundwater-Level Data From an Earthen Dam Site in Southern Westchester County, New York



**Figure 1.** Location of the Hillview Reservoir study area and selected observation wells in Westchester County, New York.



**Figure 2.** Location of observation wells on the southern embankment at the Hillview Reservoir in Westchester County, New York.

#### 4 Groundwater-Level Data From an Earthen Dam Site in Southern Westchester County, New York

**Table 1.** Site information for observation wells at Hillview Reservoir in Westchester County, New York.

[Altitudes are in feet above the National Geodetic Vertical Datum of 1929. Depths are in feet below land surface. Latitude and longitude are referenced to the North American Datum of 1983. NYSDEC, New York State Department of Environmental Conservation; ID, identifier; USGS, U.S. Geological Survey; ft, foot; —, no data; D, discrete measurements only; DC, discrete and continuous-record measurements]

Local well name	NYSDEC well ID	Longitude	Latitude	USGS site ID	Measuring point altitude (ft)	Land surface altitude (ft)	Well depth (ft)	Sounded depth (ft)	Screen depth (ft)	Saturated zone screened	Water level measurement type	Figure number
B-77 <sup>a</sup>	B77	-735209	405408	405408073520901	189.35	190.00	21	20.7	16-21	—	DC	1
TB-1S	WE5051	-735210	405428	405428073520901	302.01	300.69	40	41.8	30-40	Shallow	DC	2
TB-1D	WE5062	-735210	405428	405428073520902	302.37	300.49	122	72.05	60-70	Deep	DC	2
TB-2S	WE5058	-735206	405427	405428073520302	300.23	299.73	41	38.45	30-40	Shallow	DC	2
TB-2D	WE5072	-735209	405427	405427073520802	300.23	300.16	71	67.45	60-70	Deep	DC	2
TB-3S	WE5032	-735207	405427	405426073520701	300	300.28	41	39.5	30-40	Shallow	—	2
TB-3D	WE5057	-735207	405427	405426073520702	300.2	300.29	71	62.2	60-70	Deep	D	2
TB-4S	WE5039	-735205	405427	405427073520401	302.79	300.29	—	43.3	—	Shallow	DC	2
TB-4D	WE5045	-735205	405427	405427073520402	302.46	300.05	103	73.1	60-70	Deep	DC	2
TB-5S	WE5024	-735210	405426	405426073521002	300.92	299.17	51	50.9	30-40	Shallow	DC	2
TB-5D	WE5071	-735210	405426	405426073521004	301.13	299.03	77	76.15	66-76	Deep	DC	2
TB-8	WE5040	-735204	405425	405425073524001	276.87	275.14	42	42.1	29-39	Shallow	D	2
TB-9	WE5043	-735204	405425	405424073520501	268.63	269.03	41	42.2	30-40	Toe	D	2
TB-10	WE5050	-735204	405423	405423073520401	245.44	243.39	41	42.35	20-40	Toe	DC	2
TB-11B	WE5048	-735203	405425	405425073520201	255.85	253.46	31	31.7	20-30	Shallow	DC	2
TB-12	WE5035	-735203	405427	405424073520301	249.27	247.11	52	32.1	20-30	Toe	DC	2
TB-13	WE5033	-735210	405424	405423073521001	220.66	217.97	31	32.4	30-Oct	Toe	DC	2
TB-14S	WE5028	-735205	405422	405422073520501	241.45	238.9	48	—	20-30	Toe	—	2
TB-14D	WE5041	-735205	405422	405422073520502	242.97	240.54	50	50.9	29-49	Toe	DC	2
TB-15	WE5046	-735212	405426	405426073521201	229.77	227.95	33	30.17	12-32	Toe	DC	2
TB-16	WE5027	-735210	405427	405427073521001	299.33	299.75	49	48.75	—	—	D	2
TB-17S	WE5022	-735211	405427	405426073521001	299	297.32	40	39.9	30-40	Shallow	DC	2
TB-17D	WE5063	-735211	405427	405426073521003	299.2	297.37	80	79.75	70-80	Deep	DC	2
TB-18S	WE5056	-735212	405428	405427073521102	277.99	275.32	27	26.8	—	Shallow	DC	2
TB-18D	WE5049	-735212	405428	405427073521101	278.02	275.43	60	63.55	50-60	Deep	DC	2
MB-1W	WE5065	-735212	405430	405430073521101	300.38	300.55	107	77	60-80	—	—	2
MB-4W	WE5069	-735213	405430	405429073521201	288.31	286.82	103	61.5	50-60	Deep	DC	2
MB-5	WE5070	-735211	405428	405427073521103	299.31	299.67	105	75.25	60-80	Deep	DC	2
MR-100P	WE5042	-735210	405428	405427073520901	300.71	299.02	—	39.45	—	Shallow	DC	2
MR-100PA	WE5066	-735208	405428	405427073520902	300.88	298.96	—	61.35	—	Deep	DC	2
MR-121	WE5067	-735202	405427	405427073520102	265.19	262.33	—	20.5	—	Shallow	D	2
MR-123P	WE5068	-735204	405428	405427073520801	302.49	299.73	—	38.9	—	Deep	D	2
MR-123PA	WE5031	-735204	405428	405428073520301	302.06	299.35	—	19.6	—	Shallow	D	2
MR-131	WE5074	-735222	405440	405439073522101	273.2	270.6	33	32.55	—	—	D	1
B-3P	WE5026	-735206	405427	405426073520501	299.79	300.53	—	22.55	—	Shallow	D	2
B-4	WE5060	-735206	405426	405425073520502	283.81	282.15	—	35.67	—	Shallow	D	2
B-5A	WE5055	-735206	405425	405425073520501	279.45	277.35	—	35.45	—	Shallow	D	2
HESF-8S	WE5037	-735228	405443	405442073522801	243.88	241.78	10	10.7	5-10	Shallow	D	1
HESF-8D	WE5029	-735228	405443	405442073522701	244.15	241.81	19	19.3	14-19	Deep	D	1
CMB-2W	WE5064	-735205	405427	405426073520502	301.03	299	—	35.4	—	Shallow	DC	2
104-P	WE5059	-735217	405436	405436073521702	301.72	300	—	41.3	—	—	D	1
104-PA	WE5047	-735217	405436	405436073521701	302.98	300	—	20.7	—	—	D	1

**Table 1.** Site information for observation wells at Hillview Reservoir in Westchester County, New York.—Continued

[Altitudes are in feet above the National Geodetic Vertical Datum of 1929. Depths are in feet below land surface. Latitude and longitude are referenced to the North American Datum of 1983. NYSDEC, New York State Department of Environmental Conservation; ID, identifier; USGS, U.S. Geological Survey; ft, foot; —, no data; D, discrete measurements only; DC, discrete and continuous-record measurements]

Local well name	NYSDEC well ID	Longi-tude	Lati-tude	USGS site ID	Measur-ing point altitude (ft)	Land surface altitude (ft)	Well depth (ft)	Sounded depth (ft)	Screen depth (ft)	Saturat-ed zone screened	Water level measure-ment type	Figure num-ber
105-P	WE5053	-735220	405441	405440073522001	302.65	300.7	—	42.65	—	—	D	1
106-P	WE5061	-735224	405444	405444073522301	301.2	298.9	—	42.4	—	—	DC	1
106-PA	WE5054	-735224	405444	405444073522401	301.33	296.6	—	42.62	—	—	—	1
109-P	WE5073	-735223	405454	405454073522201	303.1	300.1	—	34.75	—	—	D	1
110-P	WE5034	-735220	405458	405458073521901	303.4	302.1	—	32.65	—	—	—	1
111	—	-735215	405502	—	—	—	—	—	—	—	—	1
X	WE5021	-735209	405459	405458073520901	302.1	299.9	—	38.35	—	—	—	1
Y-PA	WE5030	-735207	405454	405454073520701	302.63	300	—	21.14	—	—	D	1
Y-PD	WE5044	-735207	405454	405454073520702	302.45	300	—	42.4	—	—	D	1
Z-PA	WE5036	-735203	405445	405445073520201	302.75	300.4	—	19.86	—	—	DC	1
Z-PD	WE5052	-735203	405445	405445073520202	302.06	299.4	—	46.12	—	—	DC	1
PA	WE5038	-735159	405432	405432073515801	303.17	300.3	—	22.05	—	—	—	1
PD	WE5023	-735159	405437	405436073515801	302.76	300.2	—	42.3	—	—	D	1
DT-2	WE5025	-735212	405503	405502073521101	300.9	298.92	—	44.8	—	—	DC	1
WE-5078	WE5078	-735157	405441	405441073515701	290.6	287.6	124	124.2	—	—	D	1
WE-5079	WE5079	-735201	405449	405449073520001	277.58	274.6	91	91.15	—	—	D	1

<sup>a</sup>Well B-77 is in Bronx County.

In 2005, the U.S. Geological Survey (USGS) began a cooperative study with the NYCDEP to investigate the relevant hydrogeologic framework to characterize the local groundwater-flow system and to determine possible sources of the seeps (Chu and others, 2013). In August 2011, the USGS drilled one additional well, B-77 (fig. 1; table 1), south of the reservoir in Van Cortland Park in Bronx County to supplement the existing 57-monitoring-well network. The USGS was able to access 50 of the 58 wells for monitoring groundwater levels.

## Groundwater-Level Measurements

Discrete and continuous-record groundwater levels were collected at 50 of the 58 wells from April 2005 through November 2016 (fig. 1; table 1). Groundwater-level data were not collected from eight sites (TB-3S, TB-14S, MB-1W, 106-PA, 110-P, 111, X, and PA) in the monitoring network because these wells were decommissioned, damaged, or destroyed before the beginning of the study. Groundwater-level records are incomplete for wells HESF-8D, HESF-8S, MR-131, Y-PA, and 104-P because they were destroyed during various construction projects at the reservoir during the study period (figs. 3 through 52, in back of report). To supplement the existing monitoring network and replace damaged or destroyed wells, MR-123P, MR-123PA, PD, and Y-PD were repaired during the study period so groundwater levels could be collected. For some wells, such as TB-16, TB-18S, and B-77, water levels occasionally dropped below the bottom of the well screen; these measurements were recorded as “dry” in the National Water Information System (NWIS) database (U.S. Geological Survey, 2016) and are not shown on the hydrographs in figures 3 through 52 (in back of report). Throughout the study, the USGS measured groundwater levels on a monthly basis except when site access was limited or denied for legal or safety concerns. Episodic groundwater measurements were made at select wells during hydraulic testing, water-quality sampling, and other data-collection activities throughout the course of the study.

Water-level measurements were either taken manually with a chalked, graduated steel tape or a calibrated electric tape from the wellhead (measuring point) or calculated from pressure-transducer output that was recorded automatically by data loggers installed on select observation wells. Manual depth-to-water measurements were made in accordance with standard USGS procedures (Cunningham and Schalk, 2011). Depth-to-water measurements were converted to groundwater-level altitude values by subtracting the depth-to-water measurement from the wellhead altitude. Depth-to-water measurements using the steel tape or calibrated electric tape method are considered accurate to about 0.01 ft (Cunningham and Schalk, 2011).

Vented submersible pressure transducers were installed in 28 wells and were programmed to measure and record groundwater levels every 60 minutes. Data logged on these

instruments were downloaded and corrected for instrument drift based on manual measurements of groundwater-level altitudes that were made from the wellhead measuring points during periodic field inspections from April 2005 through November 2016. The accuracy of a pressure transducer rated to 15 pounds per square inch (lb/in<sup>2</sup>) is approximately 0.05 ft (In-Situ Inc., 2015). Hydrographs were created from the continuous-record data (figs. 3 through 52, in back of report). Discrete field measurements are included in the hydrographs to verify the continuous-record measurements, and to provide data where continuous measurements are missing throughout the period of record. Twenty-eight of the 50 hydrographs in this report have both continuous record and discrete field groundwater-level measurements; the other 22 hydrographs contain only discrete measurements.

## Data Dissemination

Discrete and continuous record groundwater-level data collected during this project are shown in hydrographs in the back of this report (figs. 3–52) and can be downloaded from the USGS National Water Information System (U.S. Geological Survey, 2016). These data have been replicated from the USGS National Water Information System in appendix 1 and can be downloaded in tabular format at <https://doi.org/10.3133/ds1075>.

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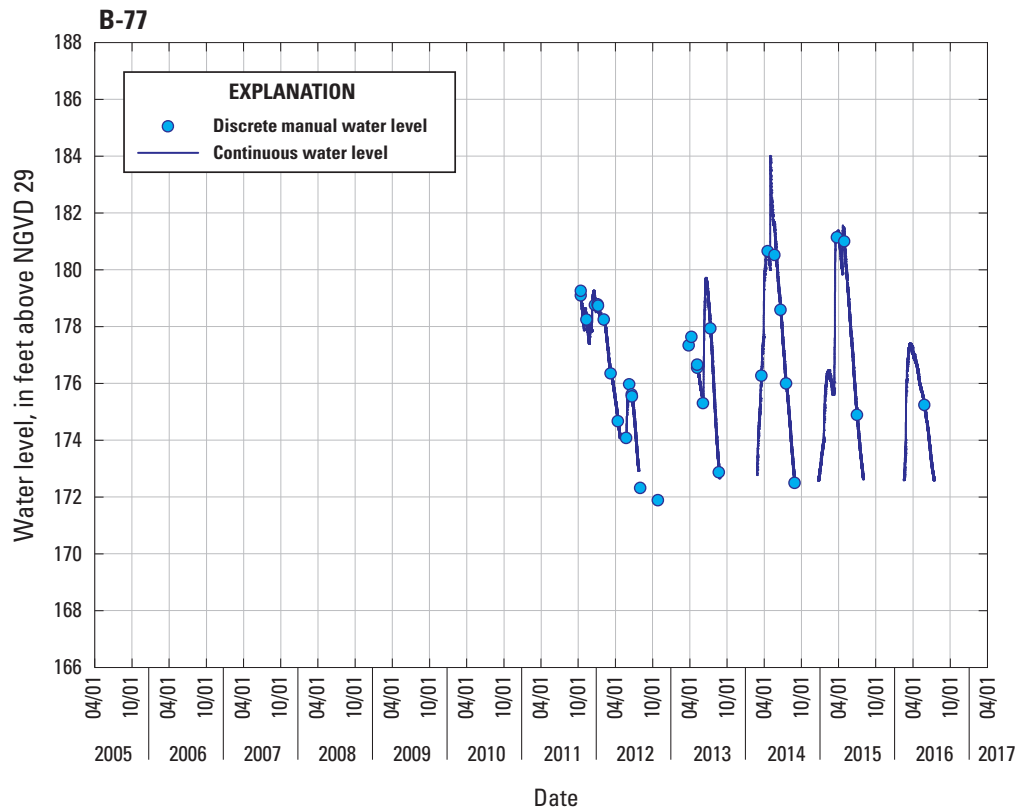
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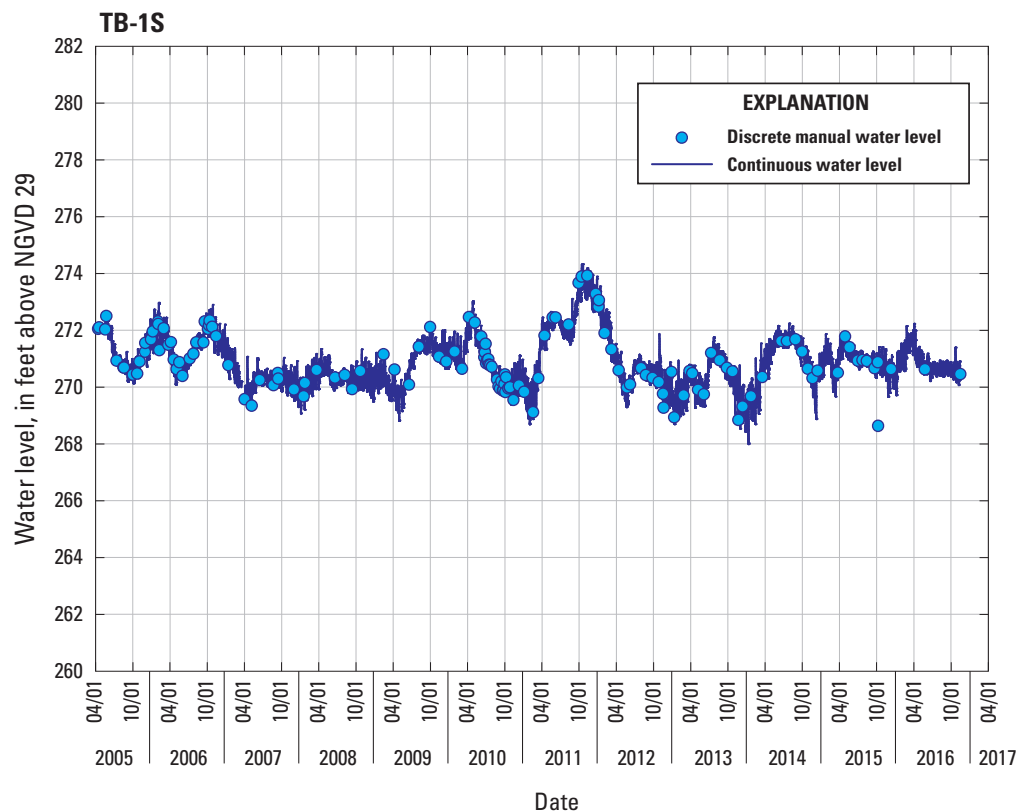


**Figures 3–52**

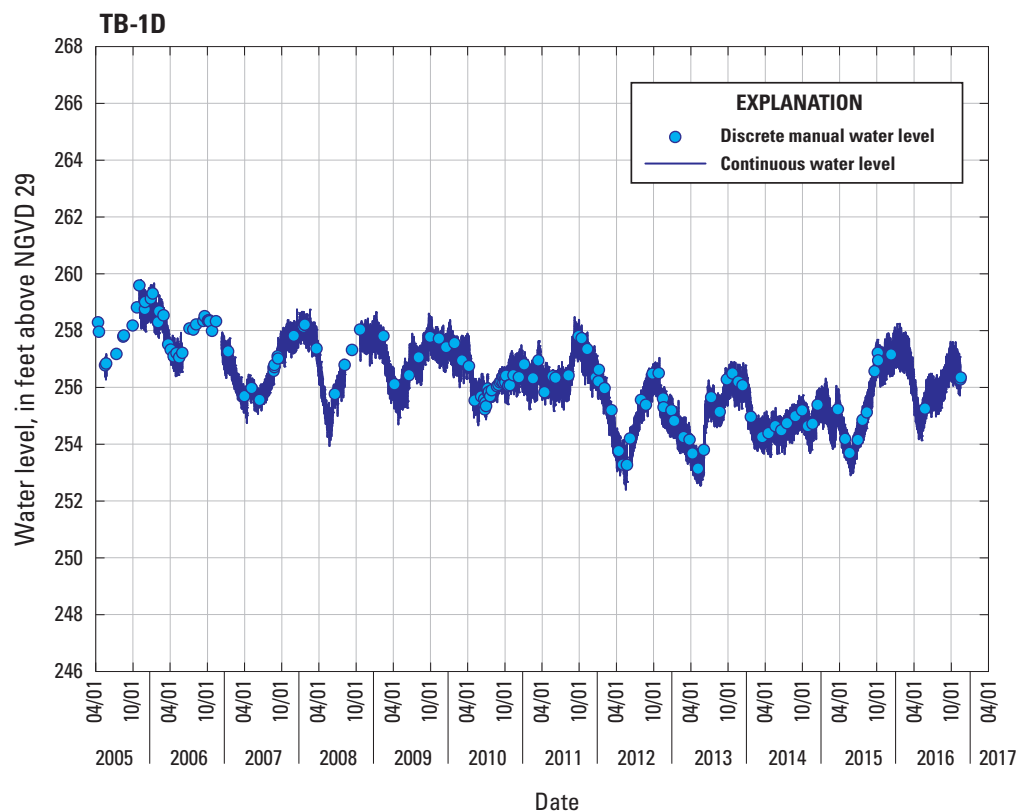
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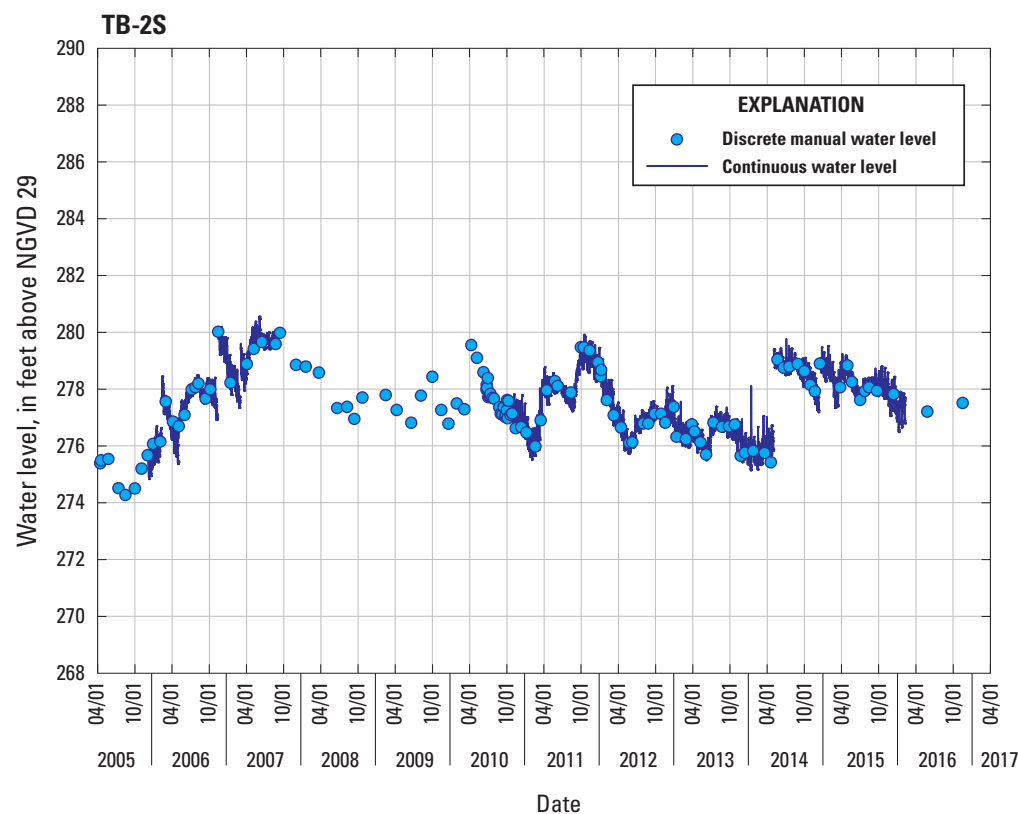
**Figure 3.** Discrete and continuous-record groundwater-level measurements for observation well B-77 from an earthen dam site in southern Westchester County, New York. Well B-77 is in Bronx County. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 1; details are listed in table 1



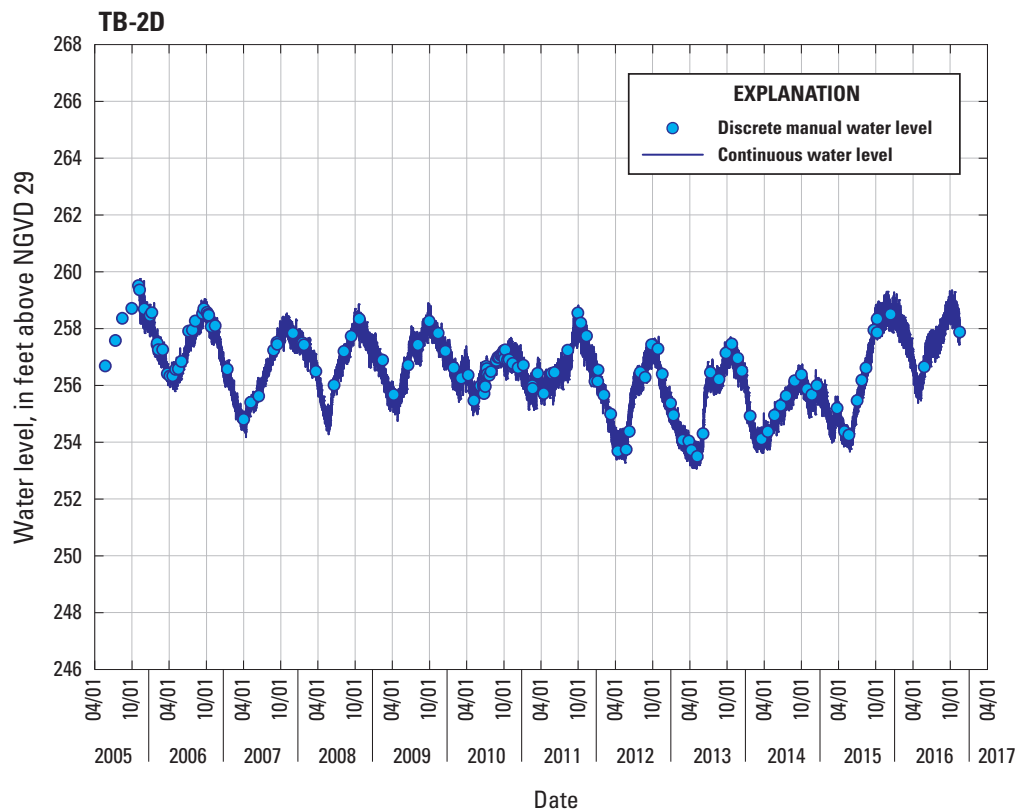
**Figure 4.** Discrete and continuous-record groundwater-level measurements for observation well TB-1S from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



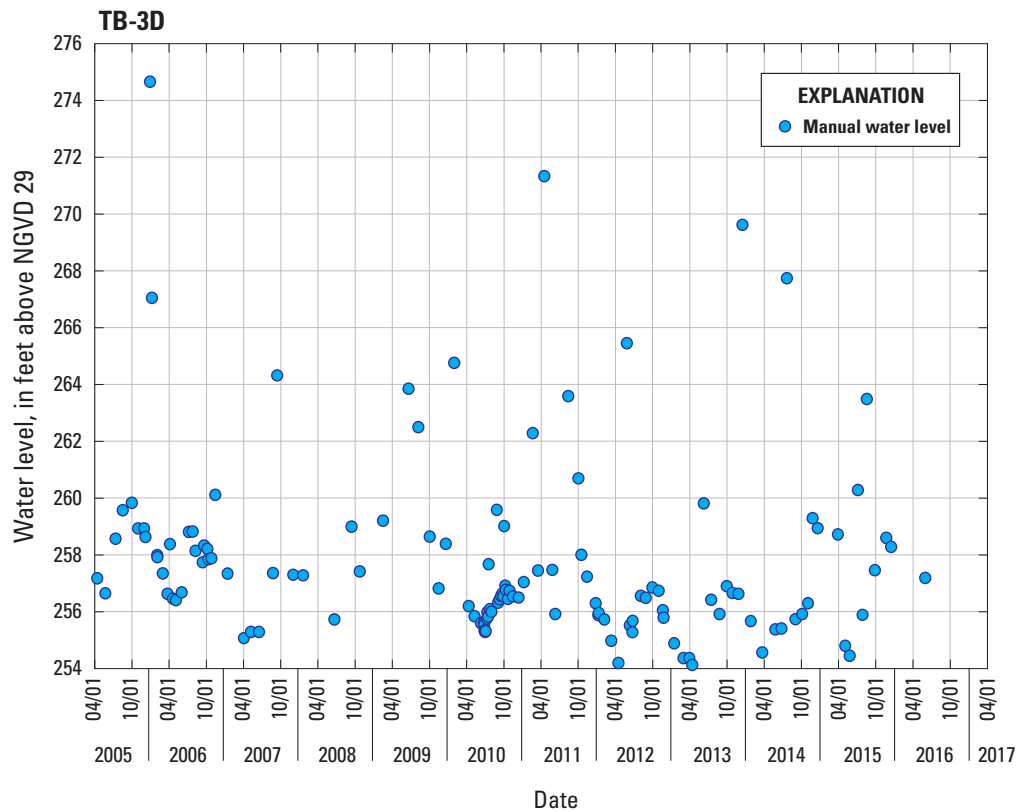
**Figure 5.** Discrete and continuous-record groundwater-level measurements for observation well TB–1D from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



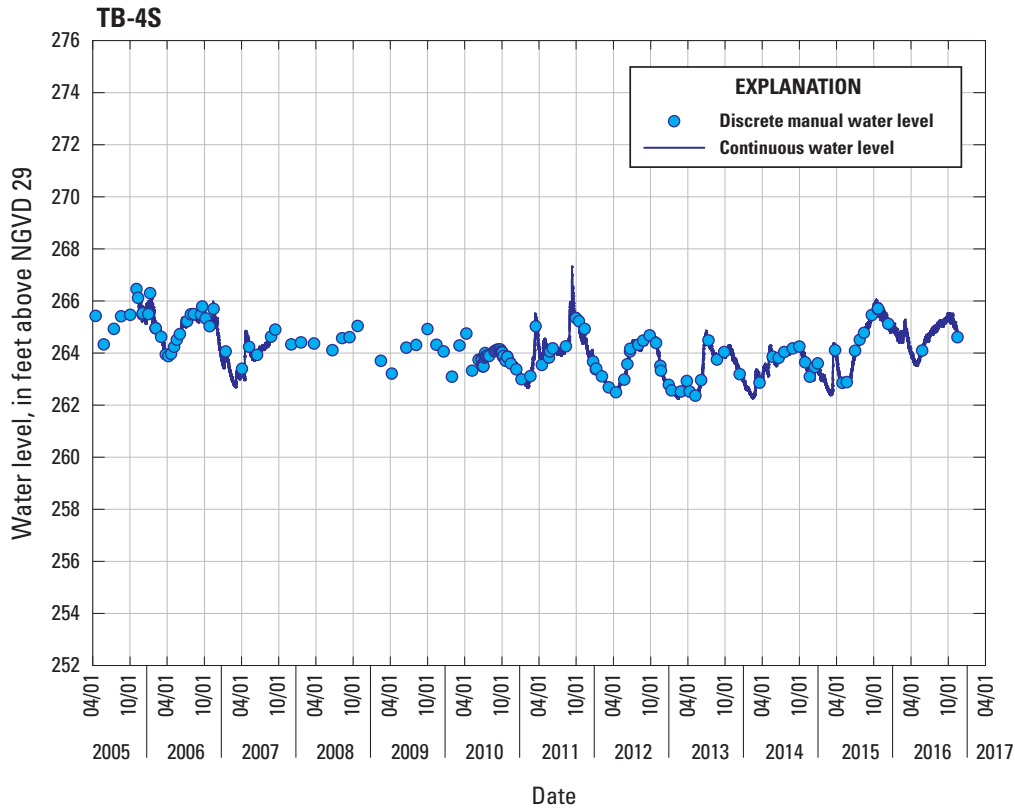
**Figure 6.** Discrete and continuous-record groundwater-level measurements for observation well TB–2S from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



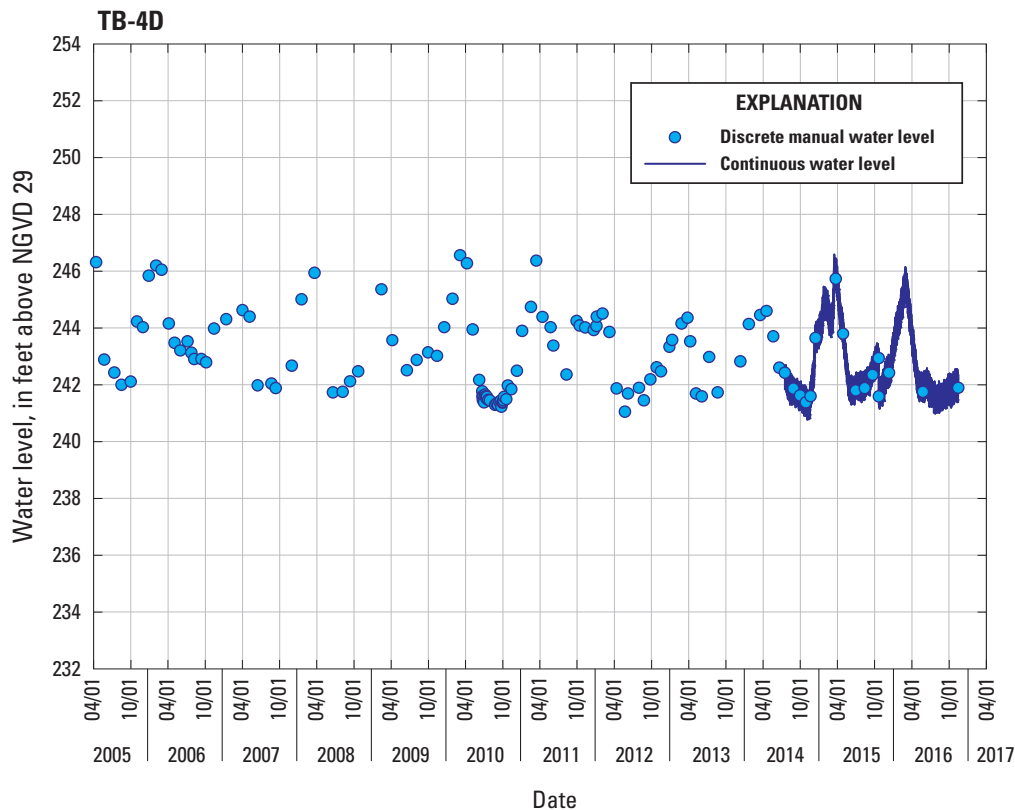
**Figure 7.** Discrete and continuous-record groundwater-level measurements for observation well TB-2D from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



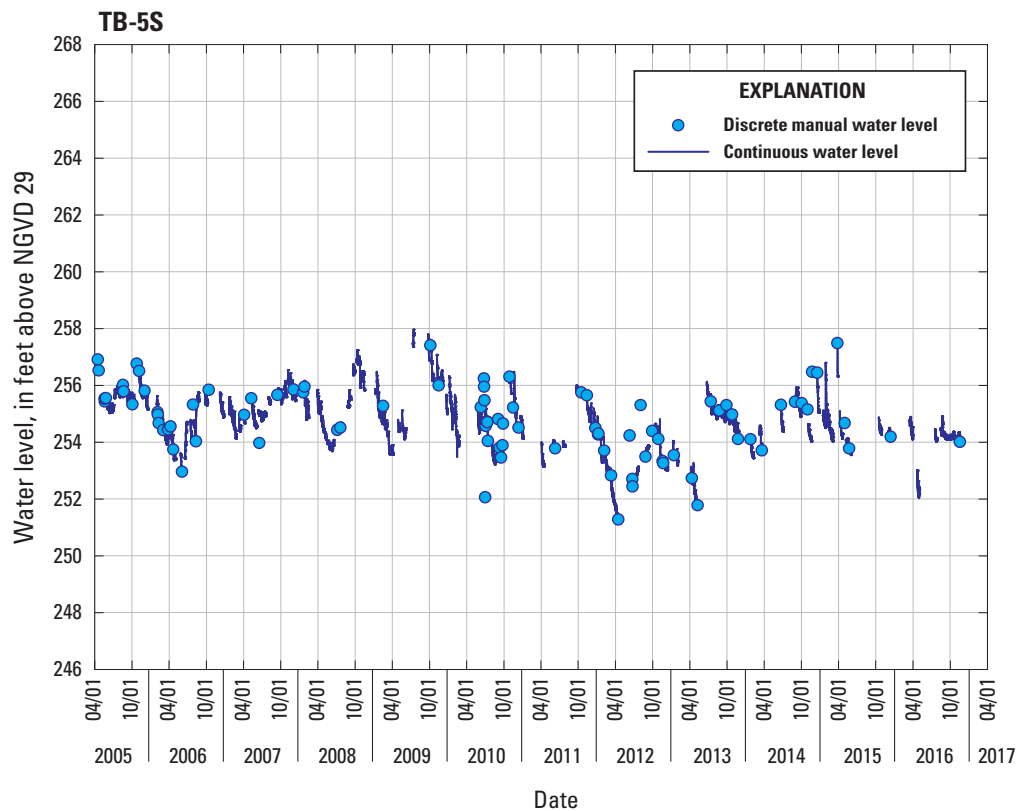
**Figure 8.** Discrete groundwater-level measurements for observation well TB-3D from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



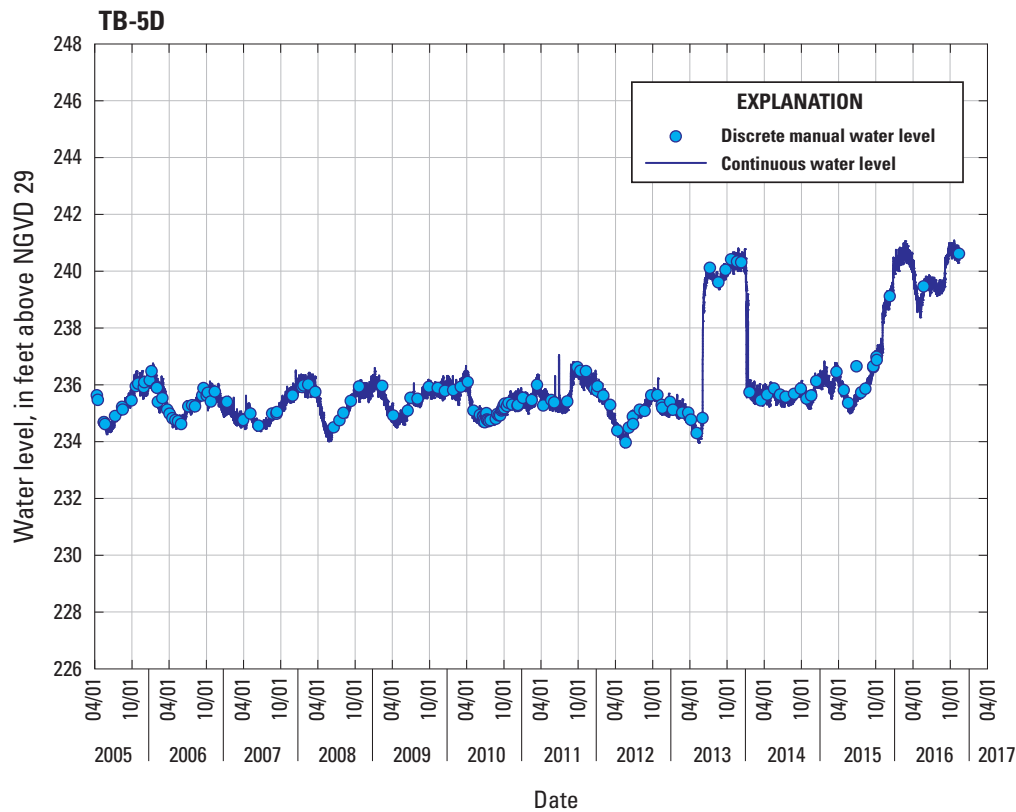
**Figure 9.** Discrete and continuous-record groundwater-level measurements for observation well TB–4S from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



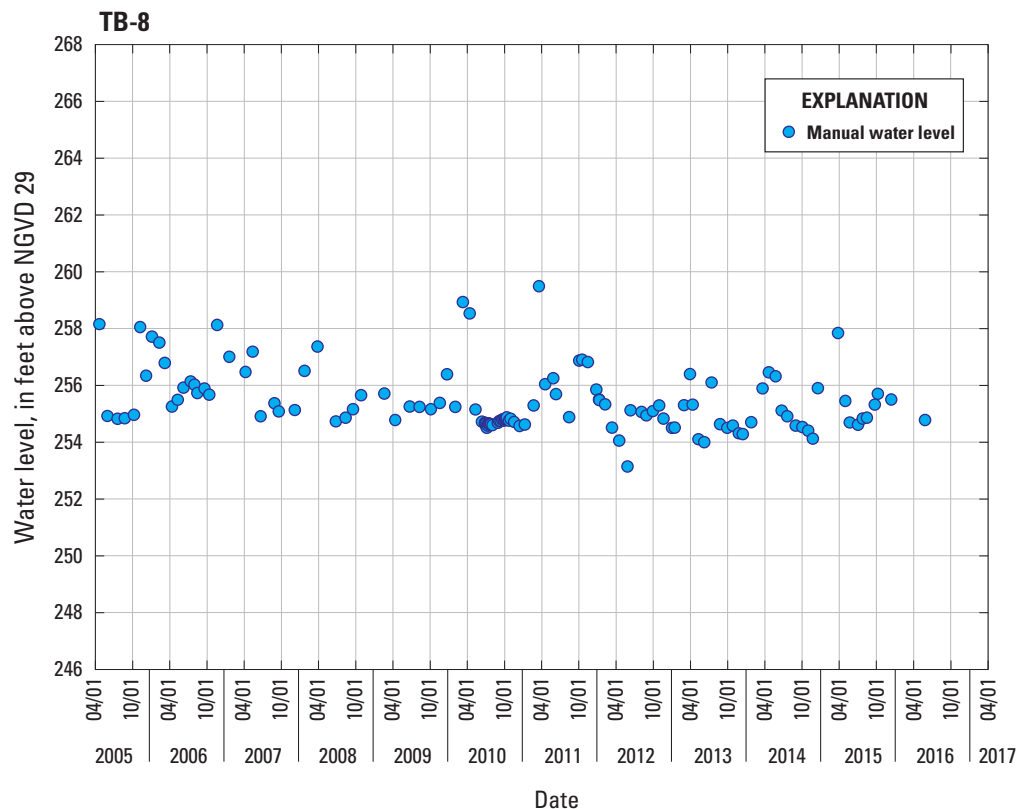
**Figure 10.** Discrete and continuous-record groundwater-level measurements for observation well TB–4D from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



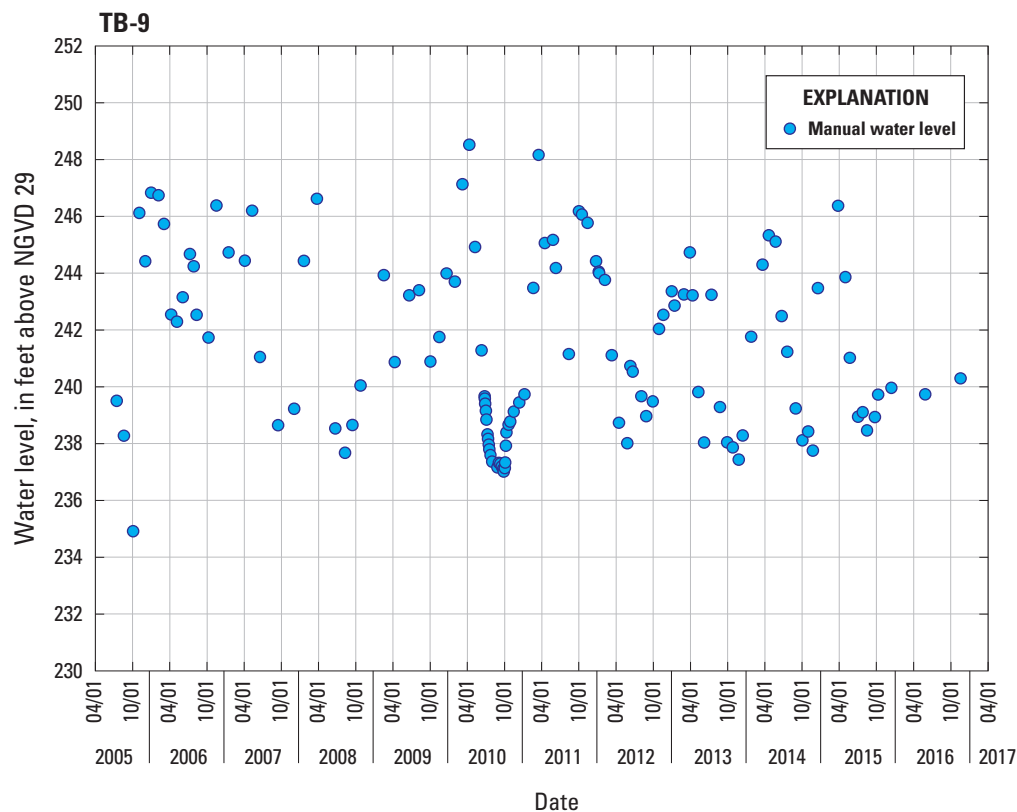
**Figure 11.** Discrete and continuous-record groundwater-level measurements for observation well TB-5S from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



**Figure 12.** Discrete and continuous-record groundwater-level measurements for observation well TB-5D from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.

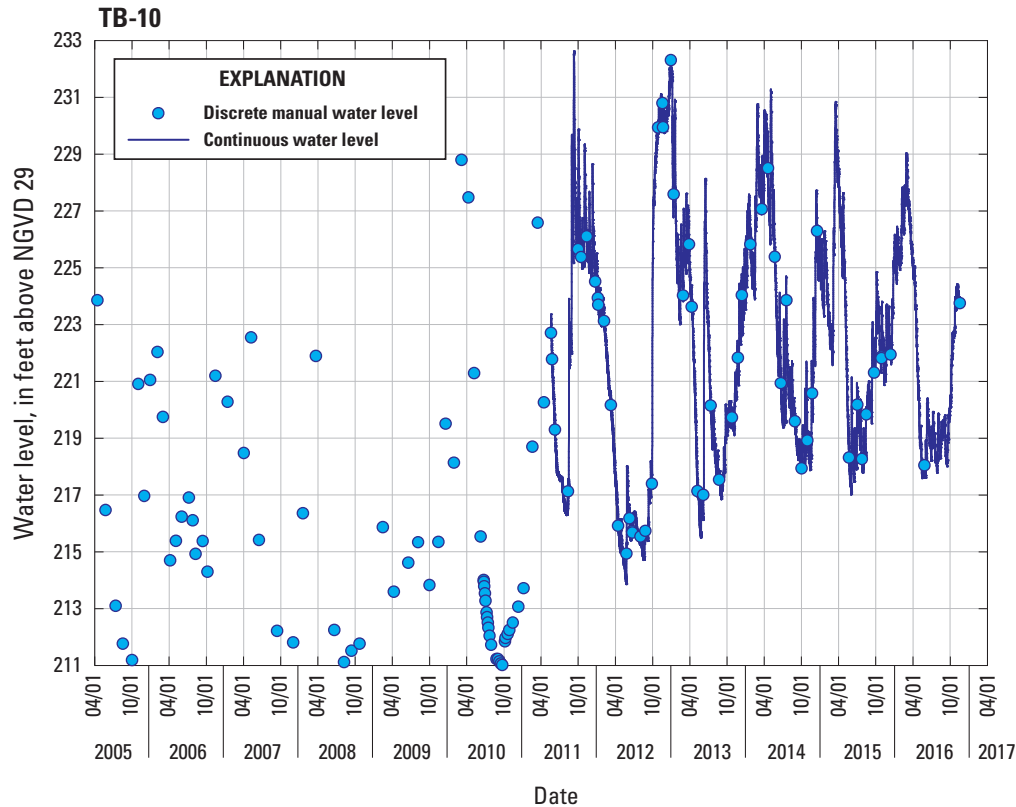


**Figure 13.** Discrete groundwater-level measurements for observation well TB–8 from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.

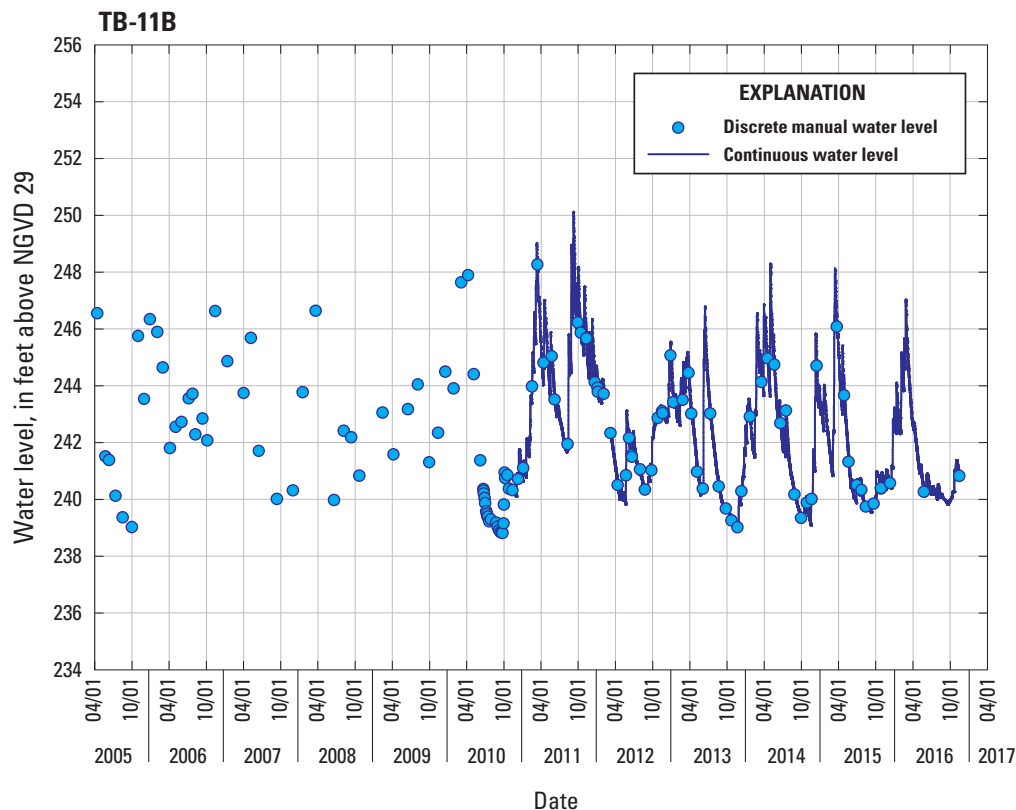


**Figure 14.** Discrete groundwater-level measurements for observation well TB–9 from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.

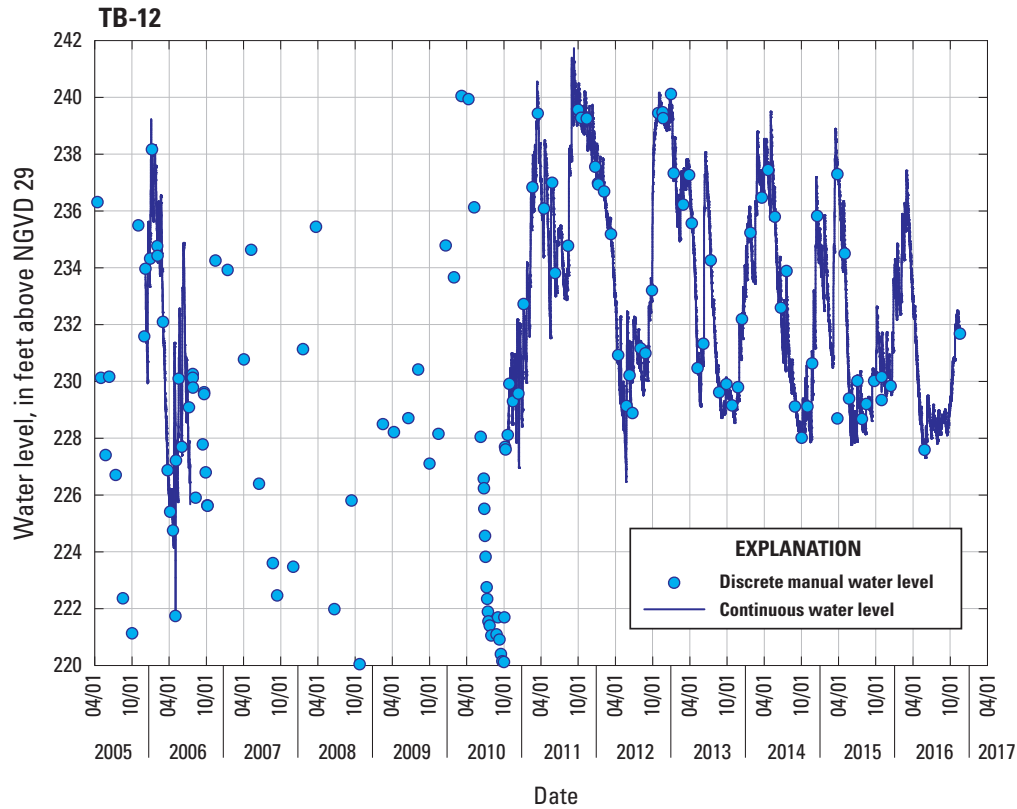




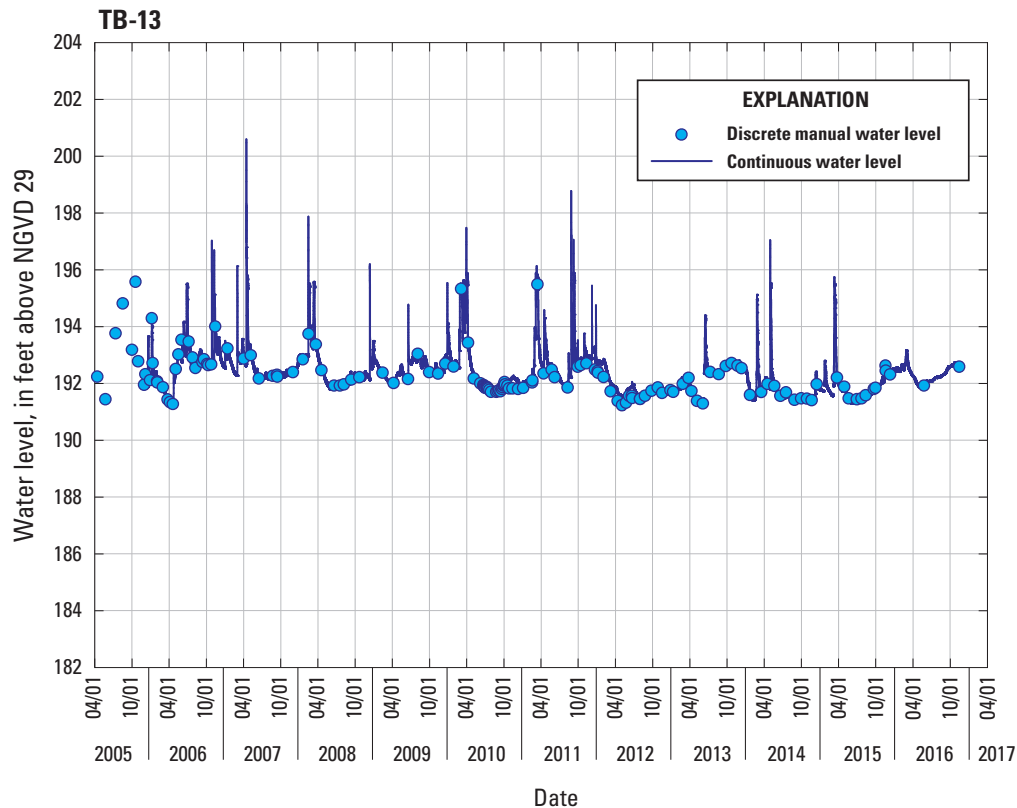
**Figure 15.** Discrete and continuous-record groundwater-level measurements for observation well TB-10 from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



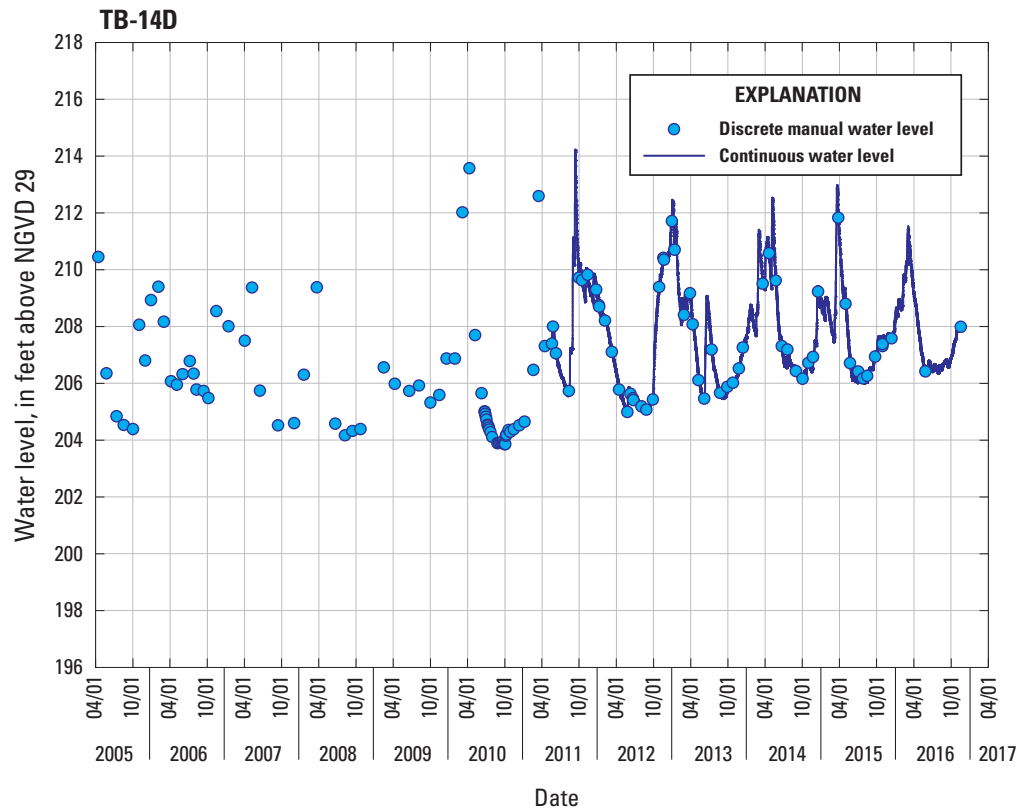
**Figure 16.** Discrete and continuous-record groundwater-level measurements for observation well TB-11B from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



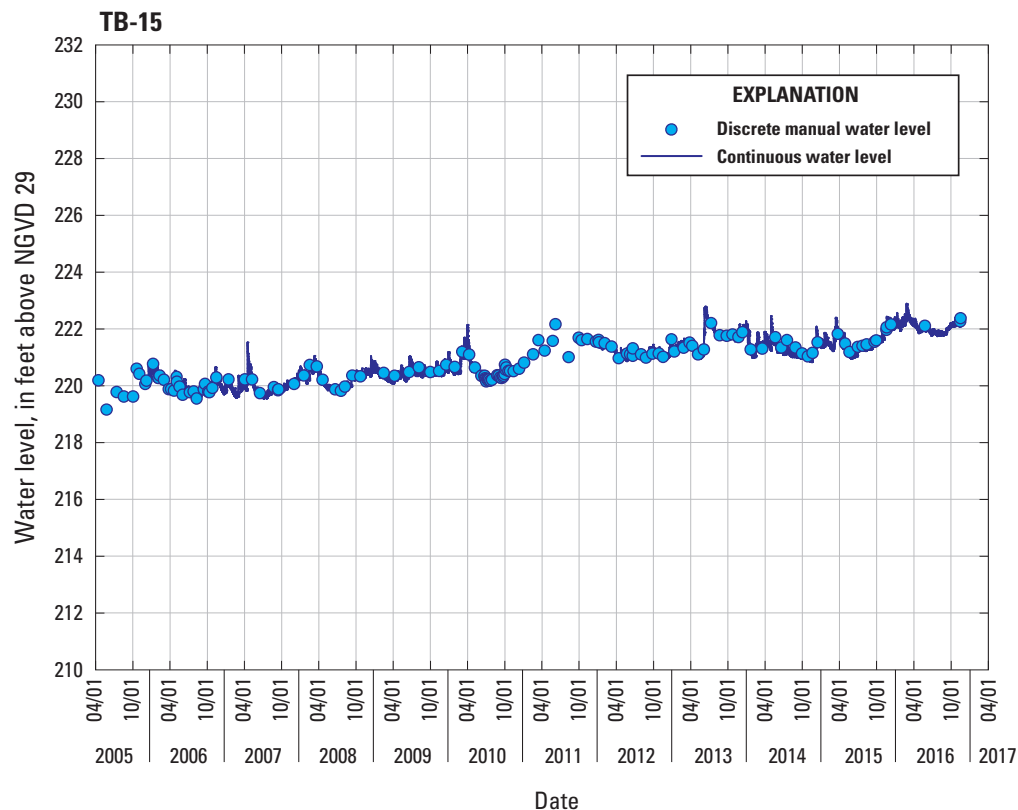
**Figure 17.** Discrete and continuous-record groundwater-level measurements for observation well TB–12 from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



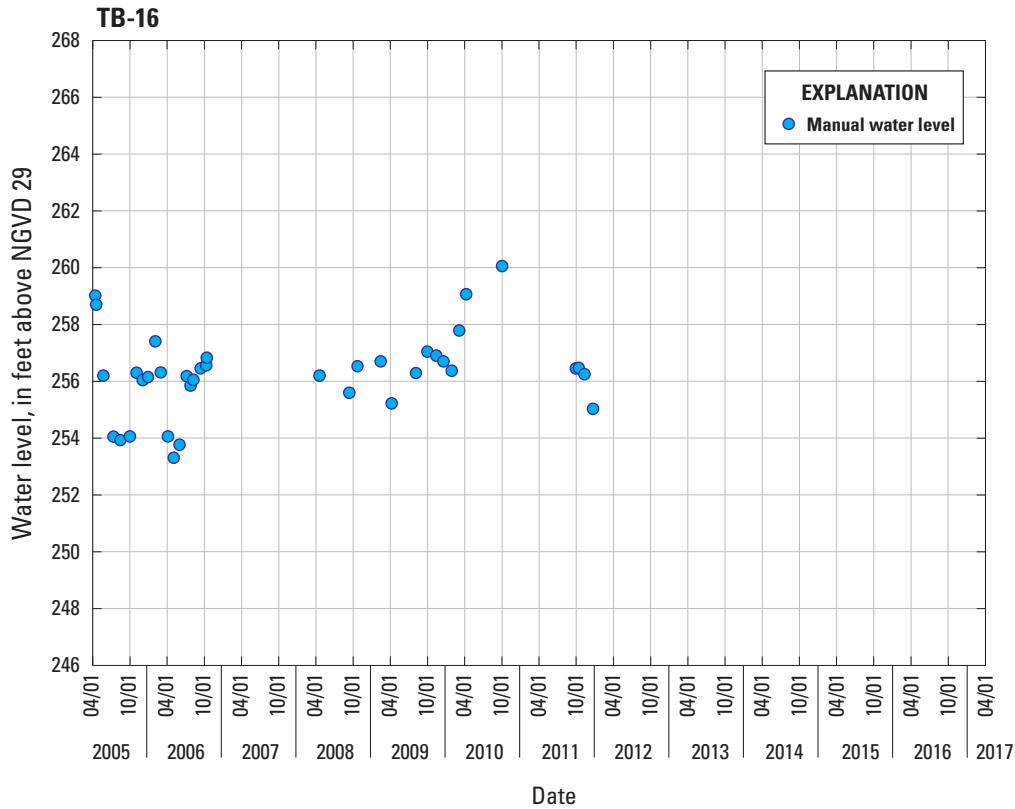
**Figure 18.** Discrete and continuous-record groundwater-level measurements for observation well TB–13 from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



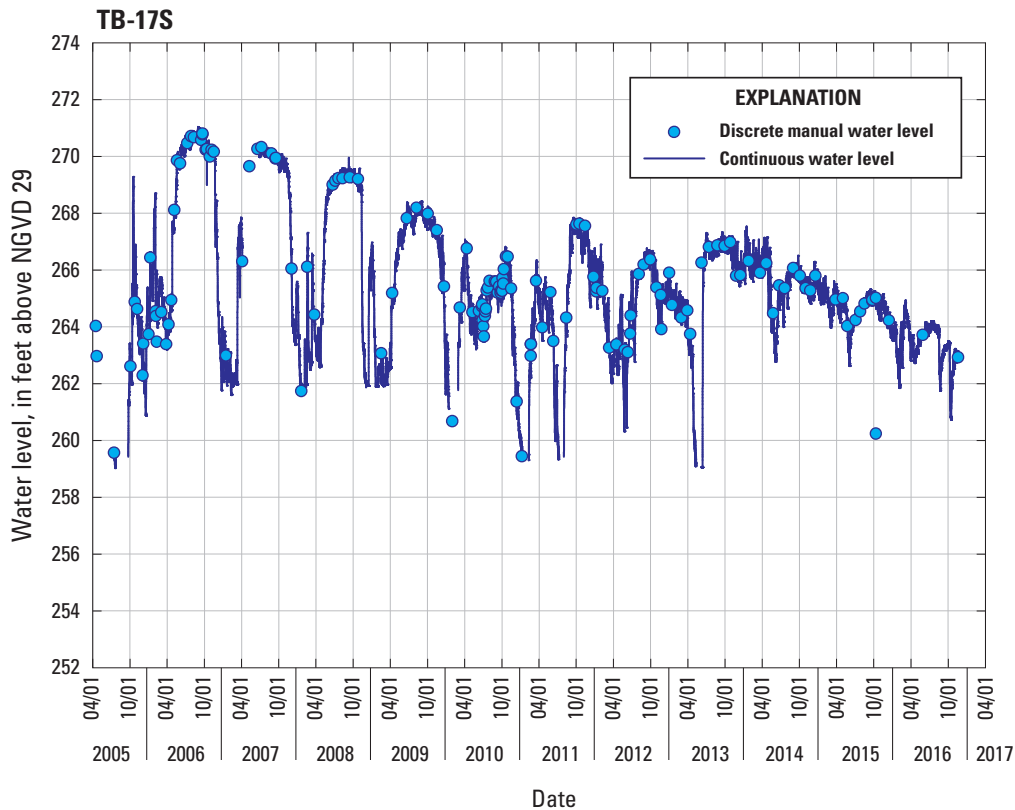
**Figure 19.** Discrete and continuous-record groundwater-level measurements for observation well TB-14D from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



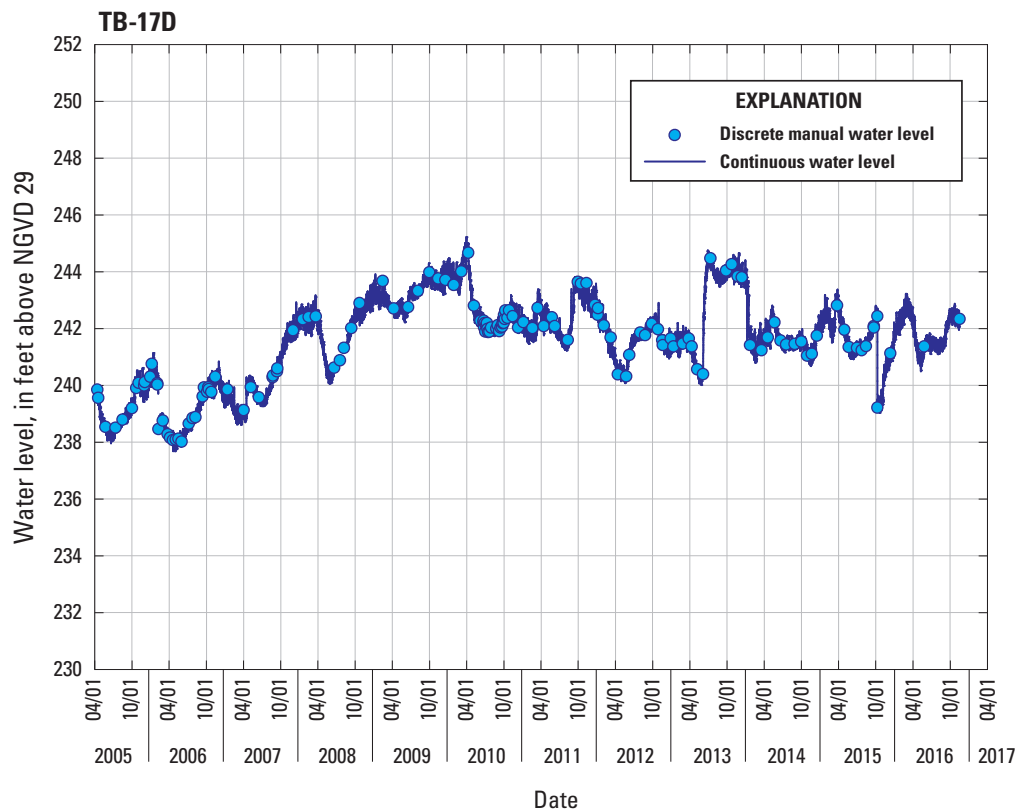
**Figure 20.** Discrete and continuous-record groundwater-level measurements for observation well TB-15 from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



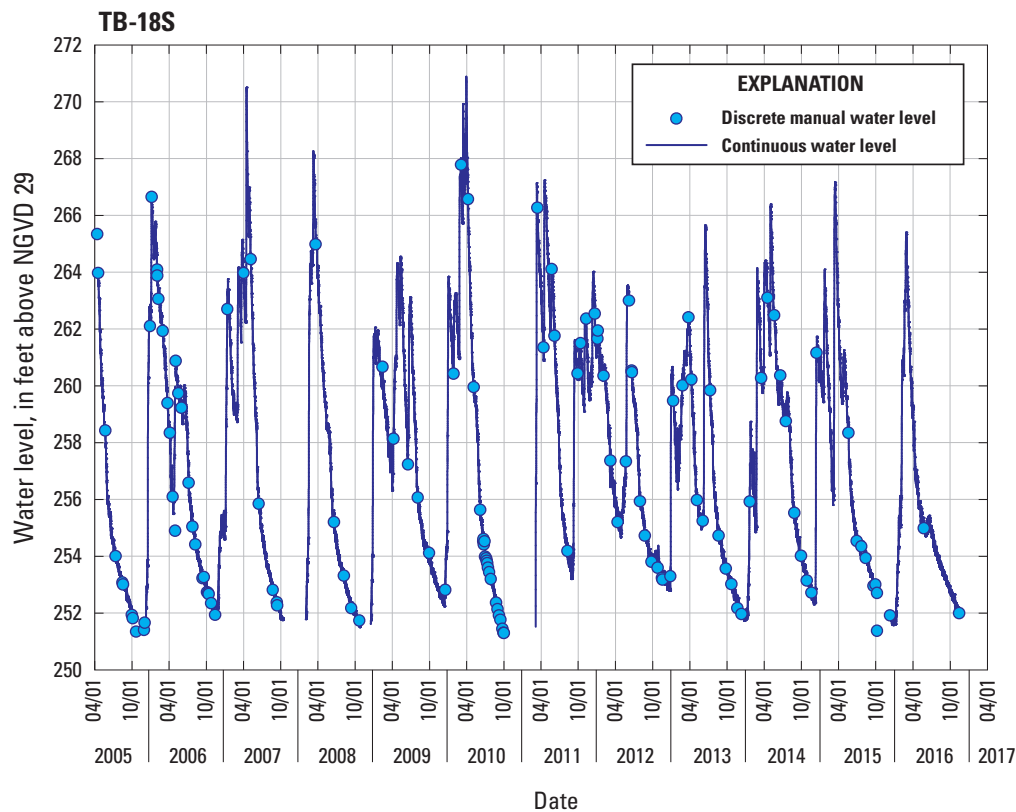
**Figure 21.** Discrete groundwater-level measurements for observation well TB–16 from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



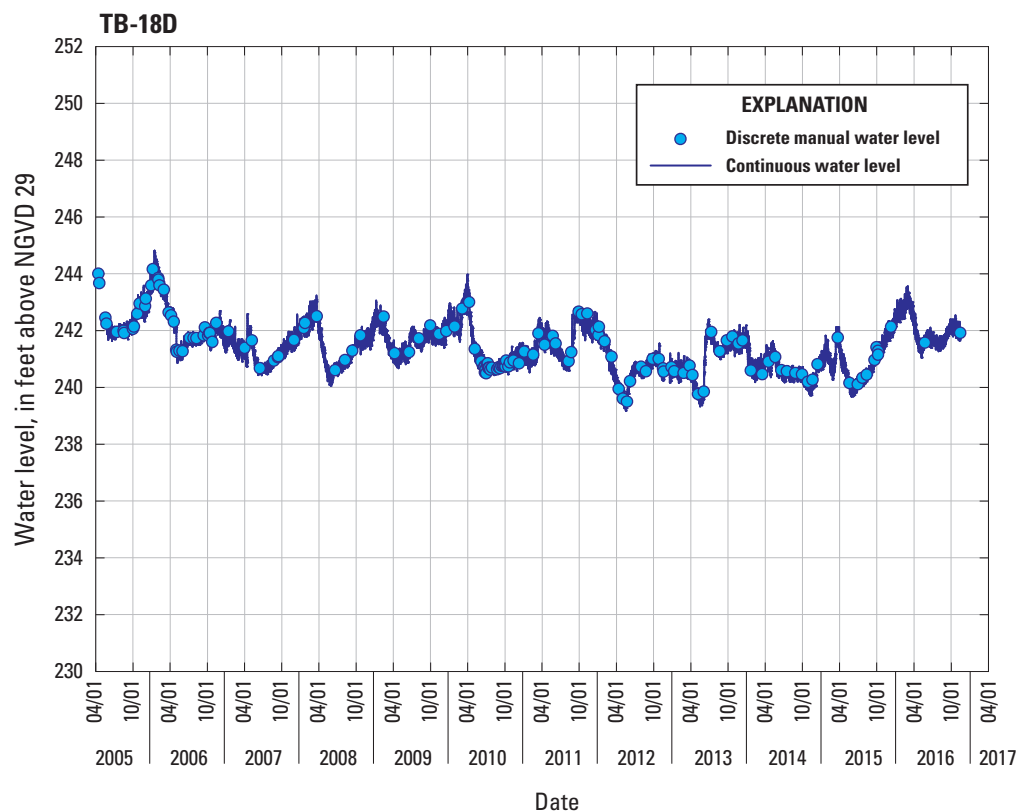
**Figure 22.** Discrete and continuous-record groundwater-level measurements for observation well TB–17S from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



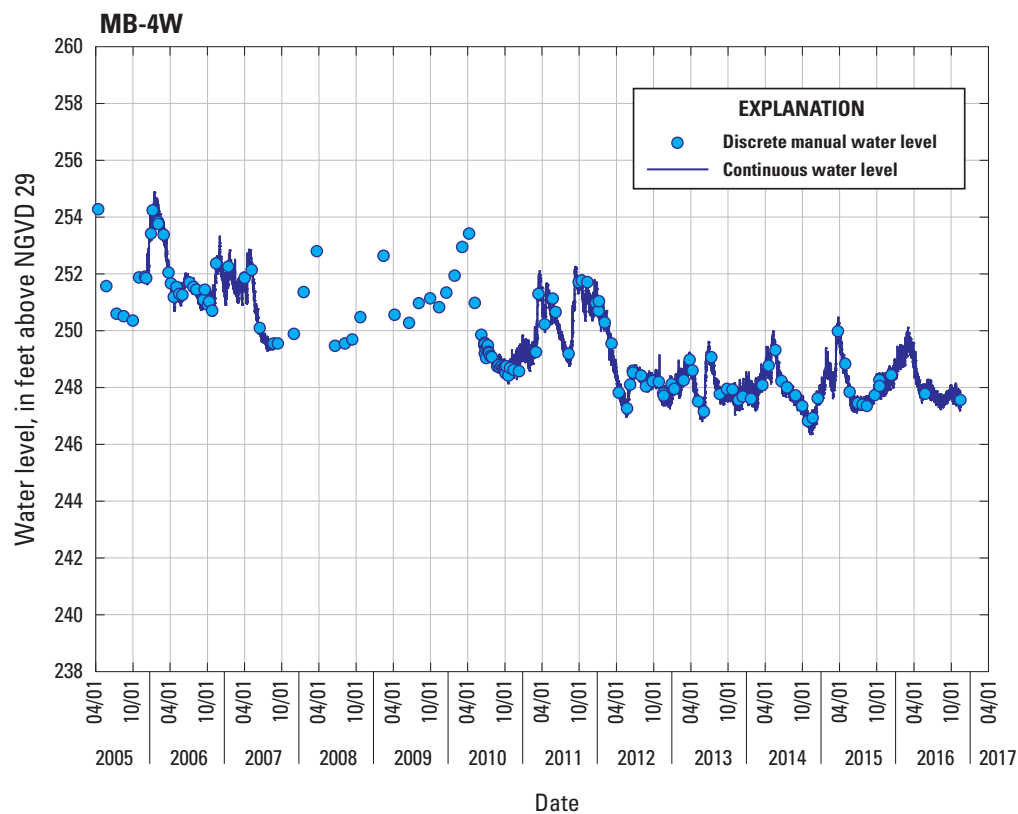
**Figure 23.** Discrete and continuous-record groundwater-level measurements for observation well TB-17D from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



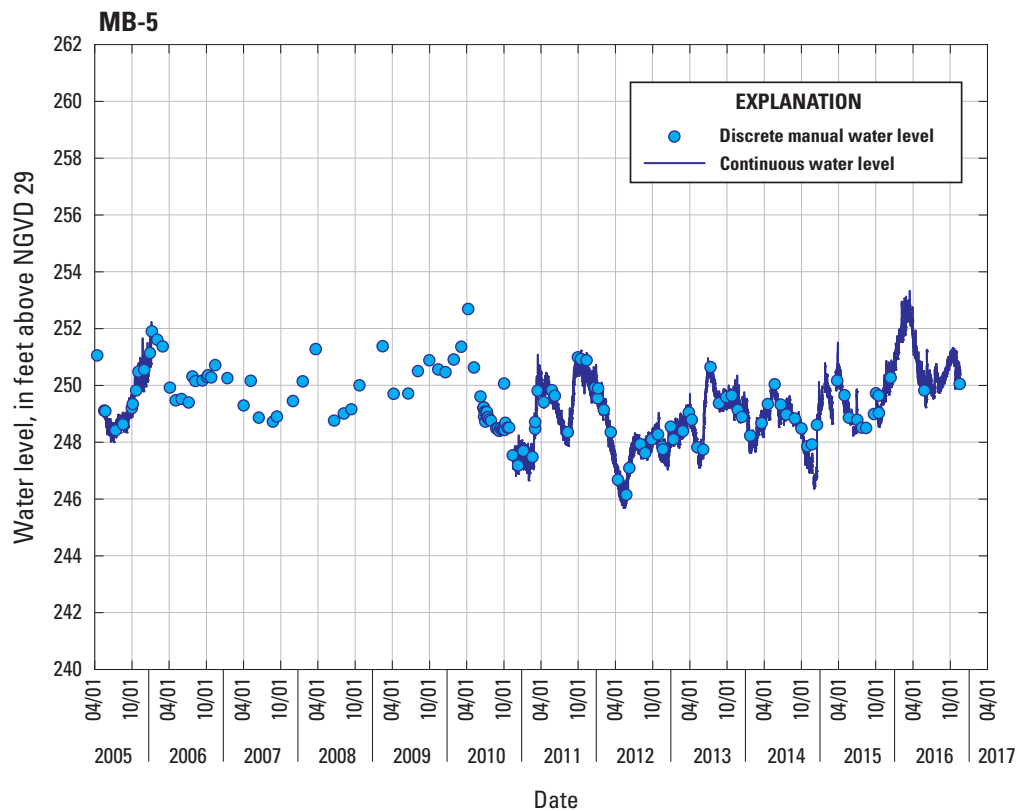
**Figure 24.** Discrete and continuous-record groundwater-level measurements for observation well TB-18S from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



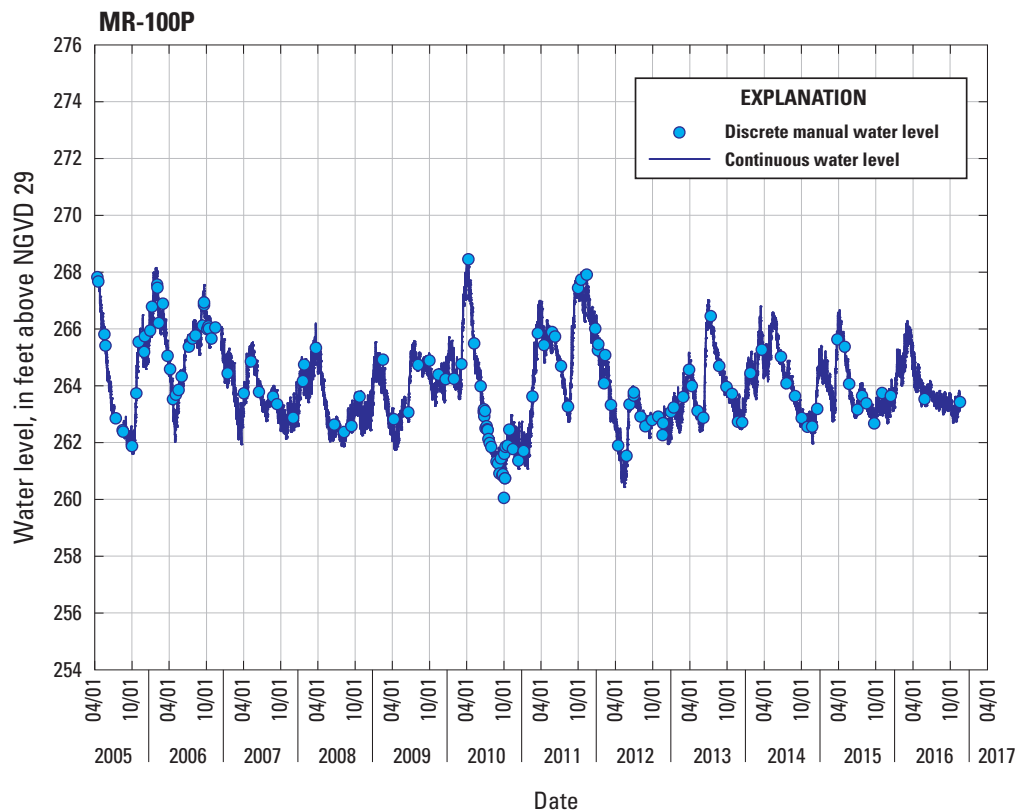
**Figure 25.** Discrete and continuous-record groundwater-level measurements for observation well TB–18D from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



**Figure 26.** Discrete and continuous-record groundwater-level measurements for observation well MB–4W from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.

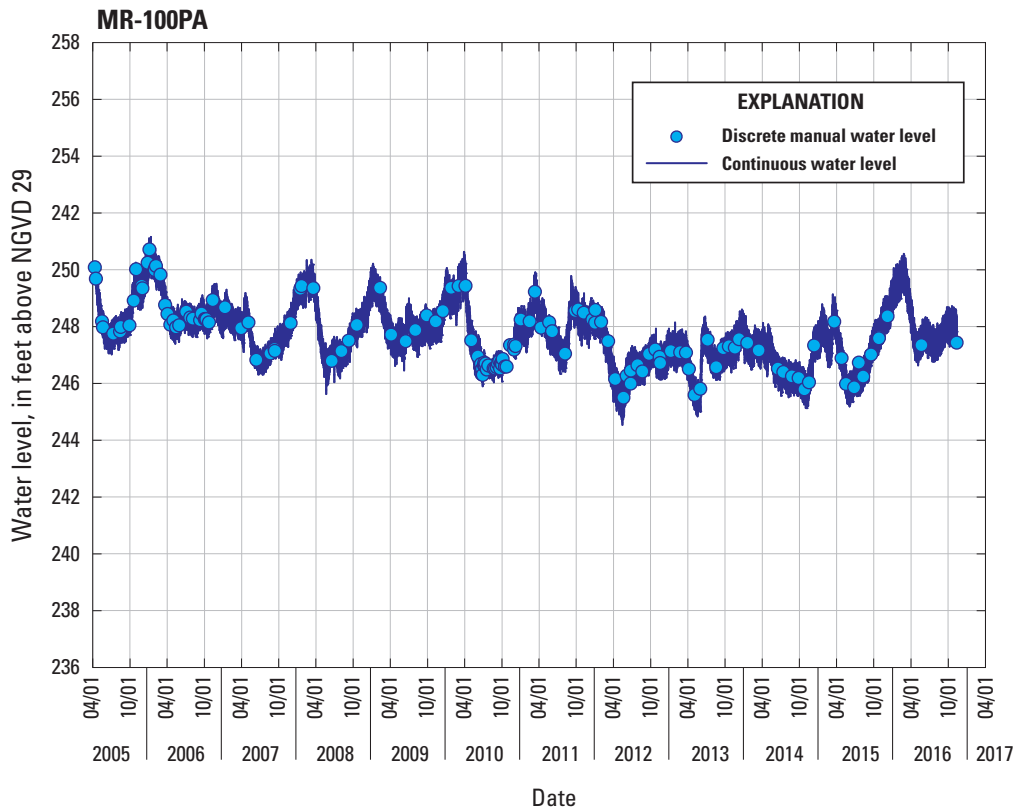


**Figure 27.** Discrete and continuous-record groundwater-level measurements for observation well MB-5 from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.

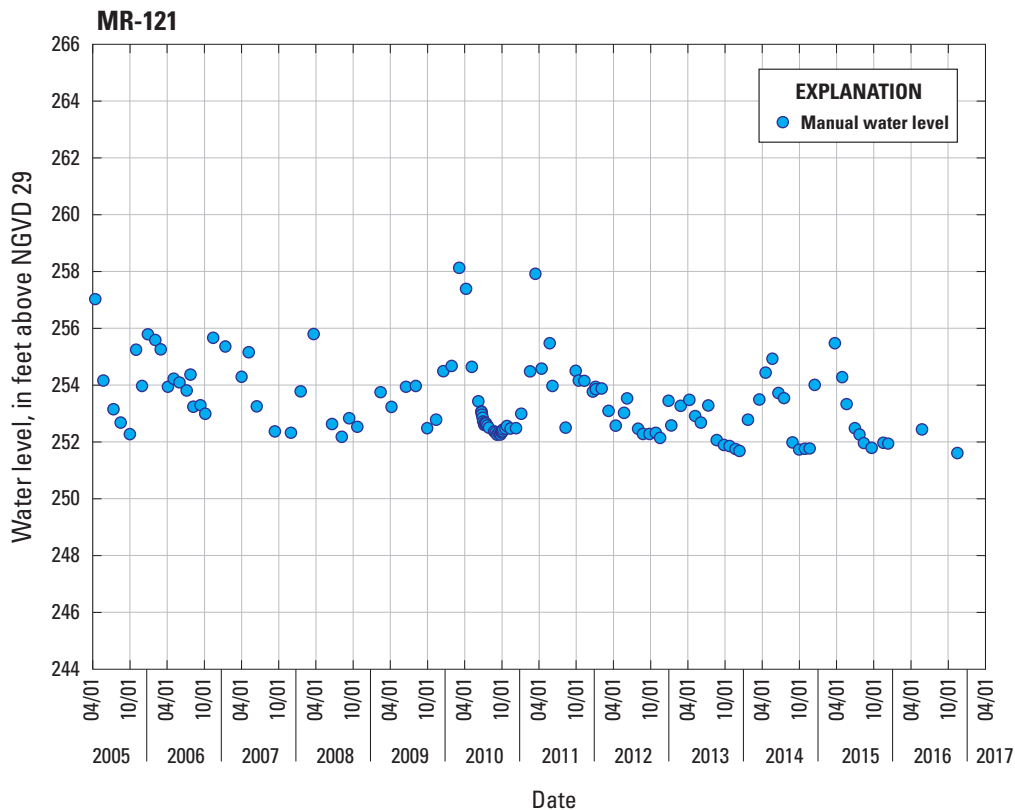


**Figure 28.** Discrete and continuous-record groundwater-level measurements for observation well MR-100P from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



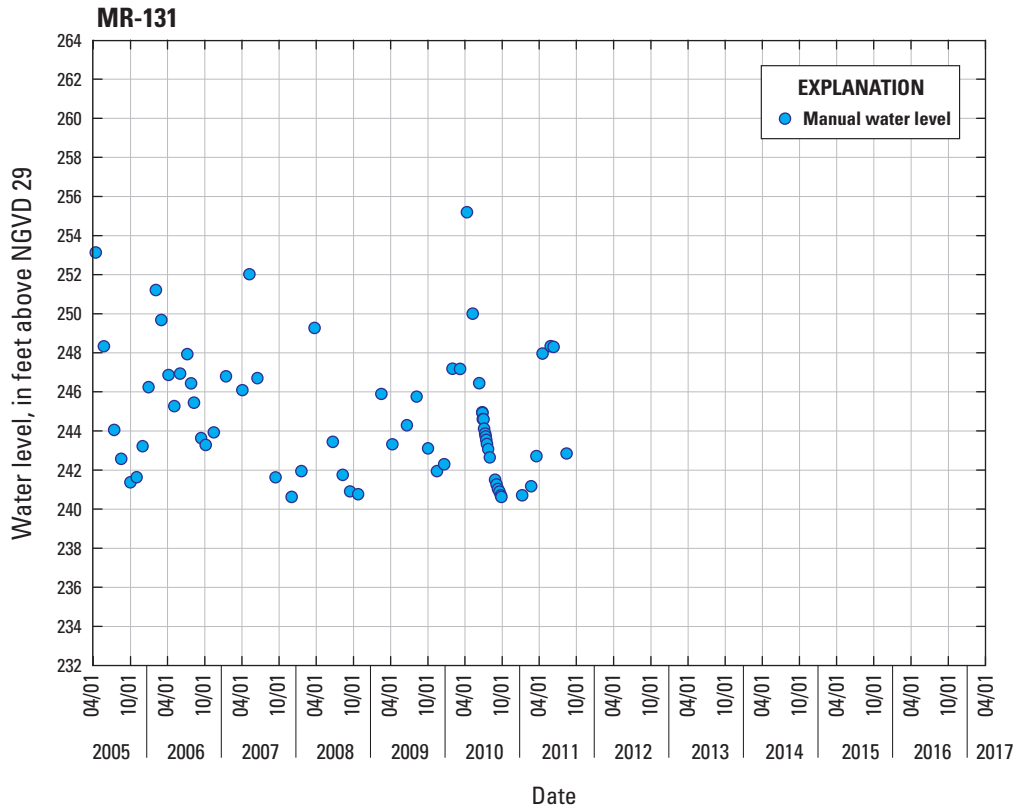


**Figure 29.** Discrete and continuous-record groundwater-level measurements for observation well MR-100PA from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.

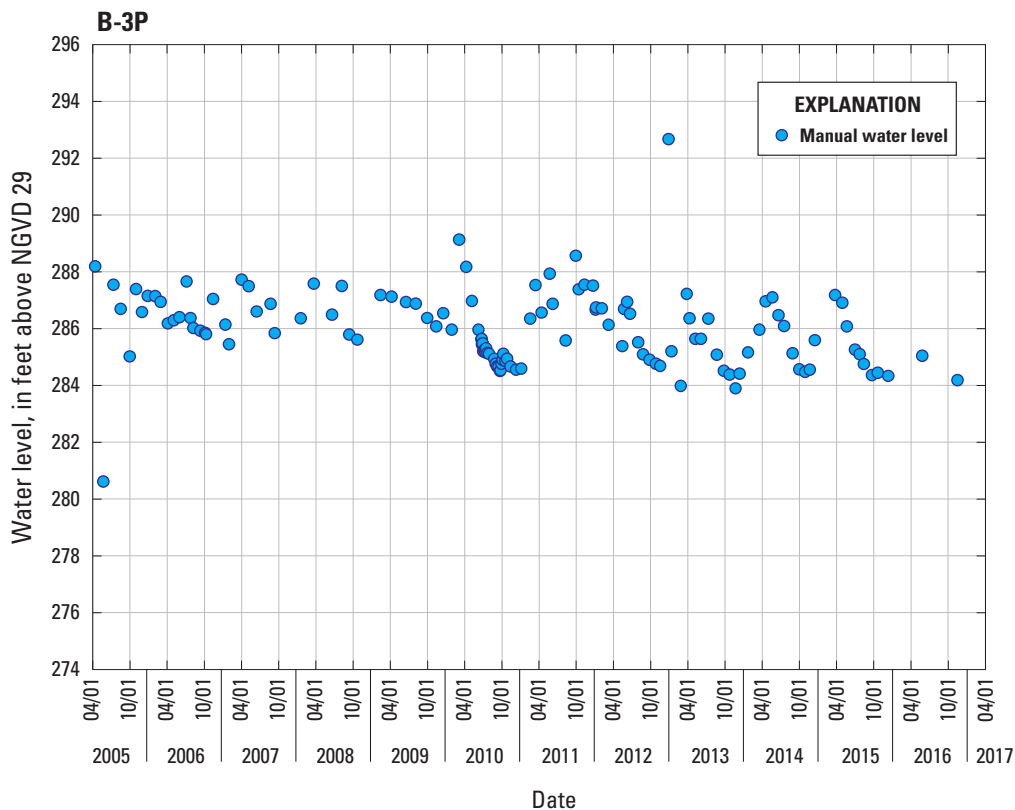


**Figure 30.** Discrete groundwater-level measurements for observation well MR-121 from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.

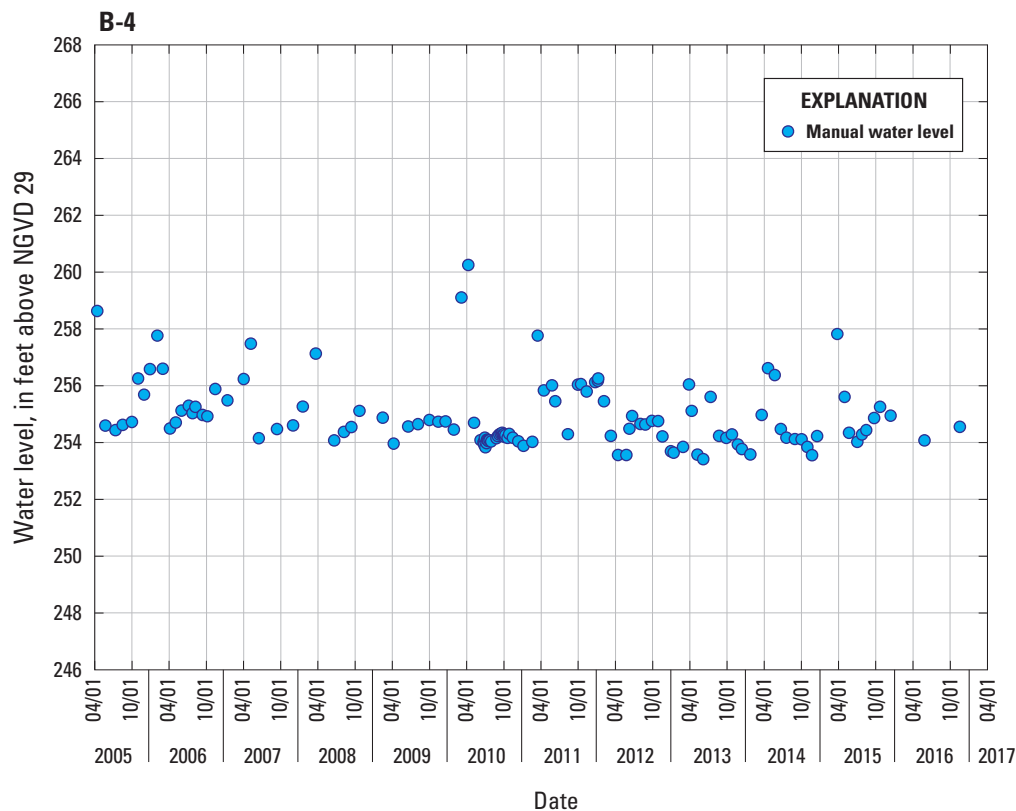




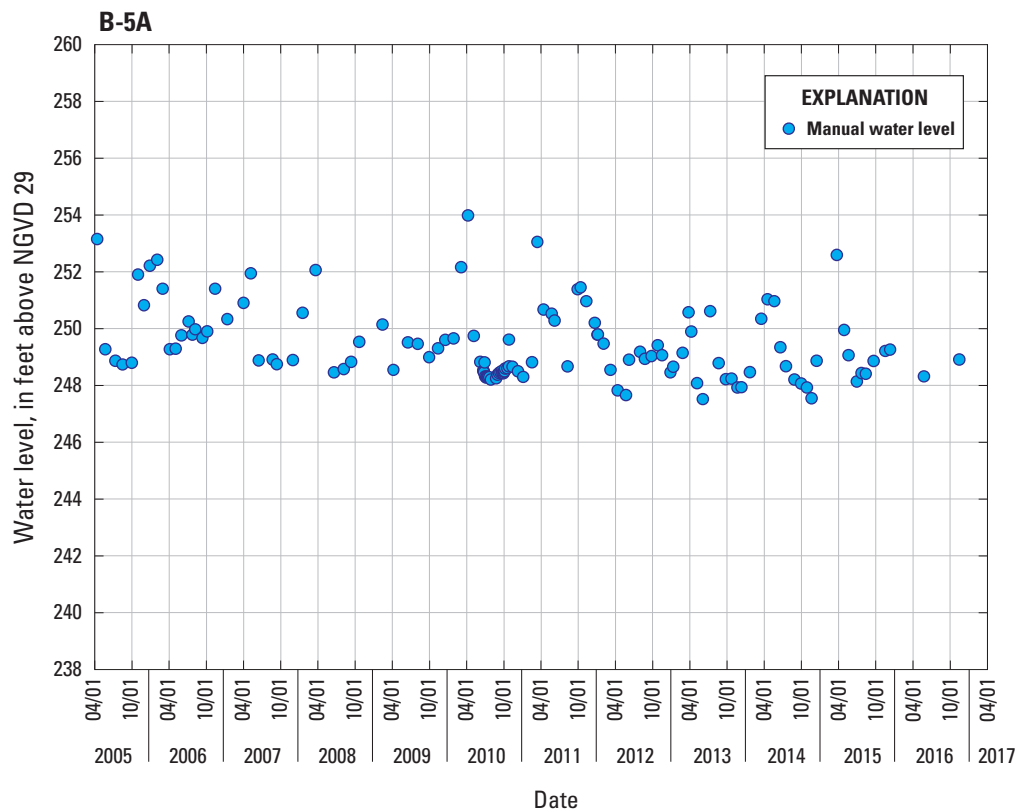
**Figure 33.** Discrete groundwater-level measurements for observation well MR-131 from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 1; details are listed in table 1.



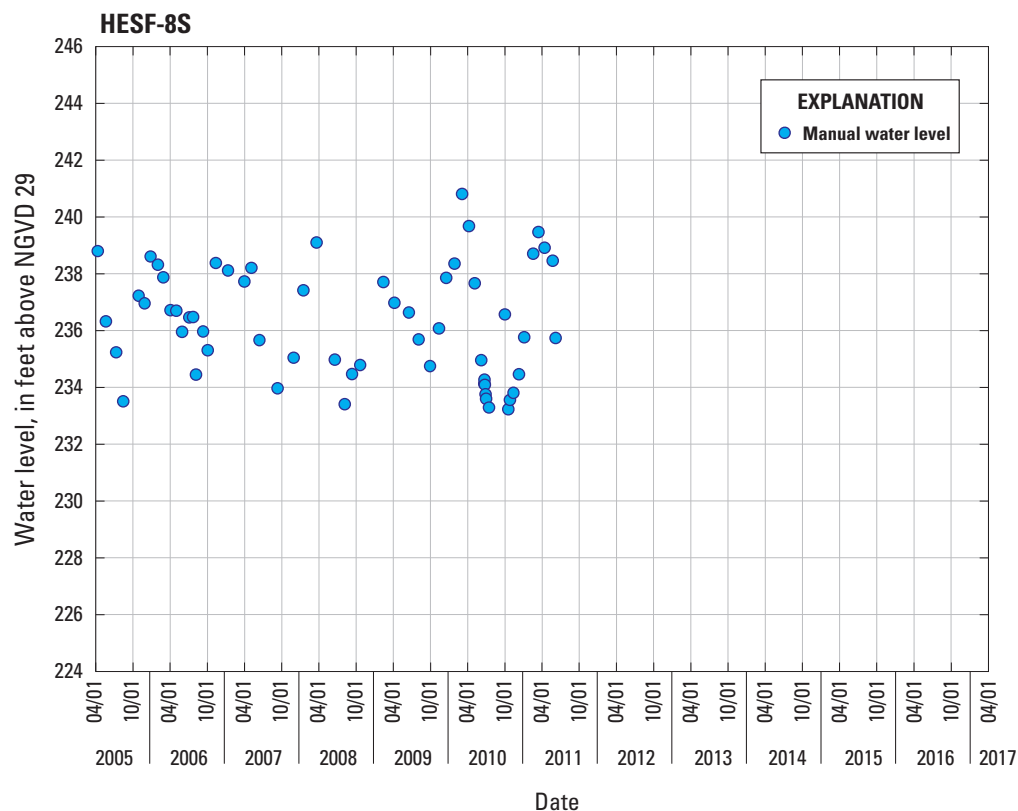
**Figure 34.** Discrete groundwater-level measurements for observation well B-3P from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



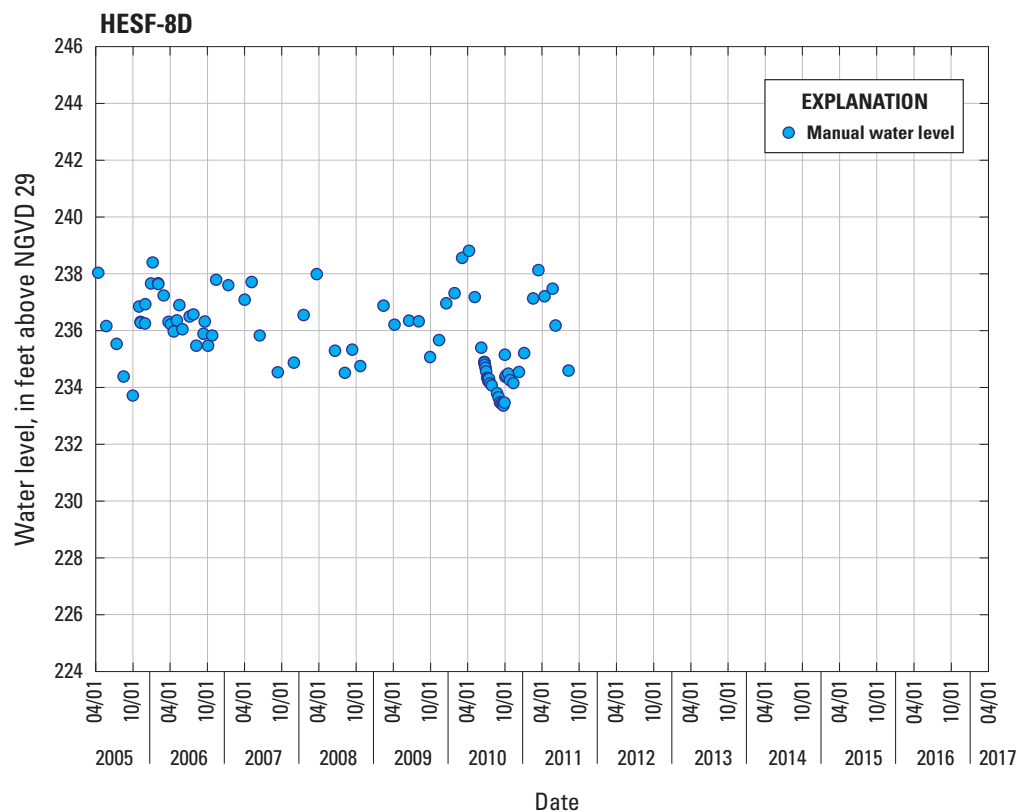
**Figure 35.** Discrete groundwater-level measurements for observation well B-4 from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



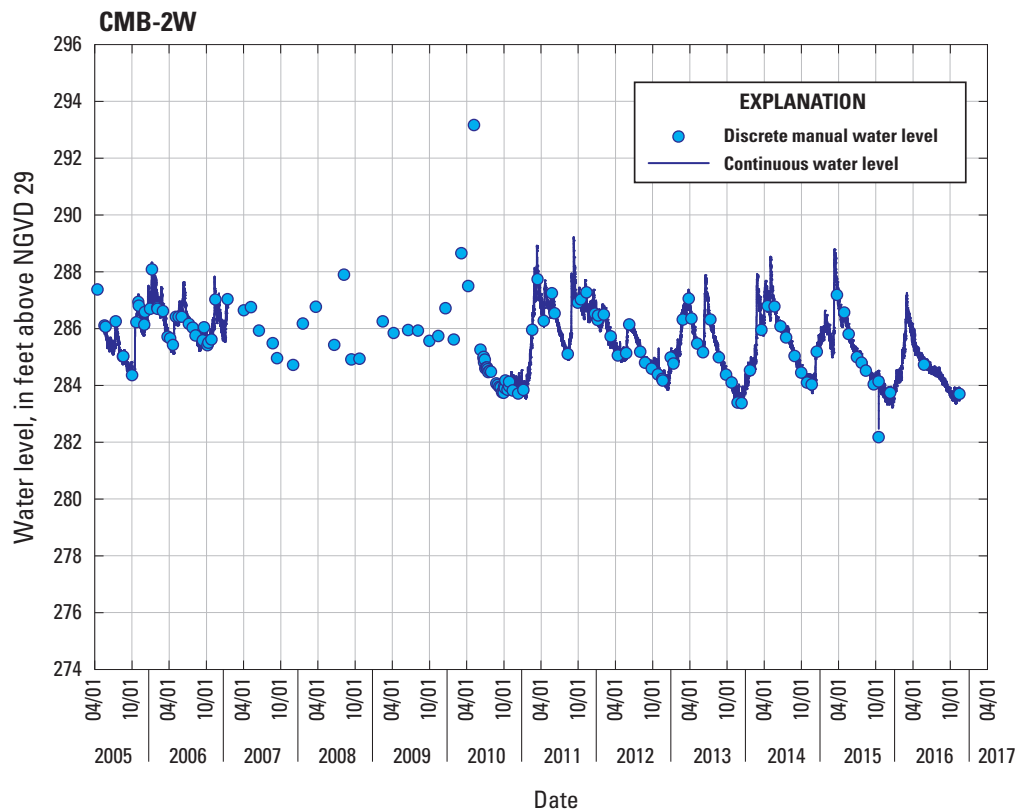
**Figure 36.** Discrete groundwater-level measurements for observation well B-5A from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



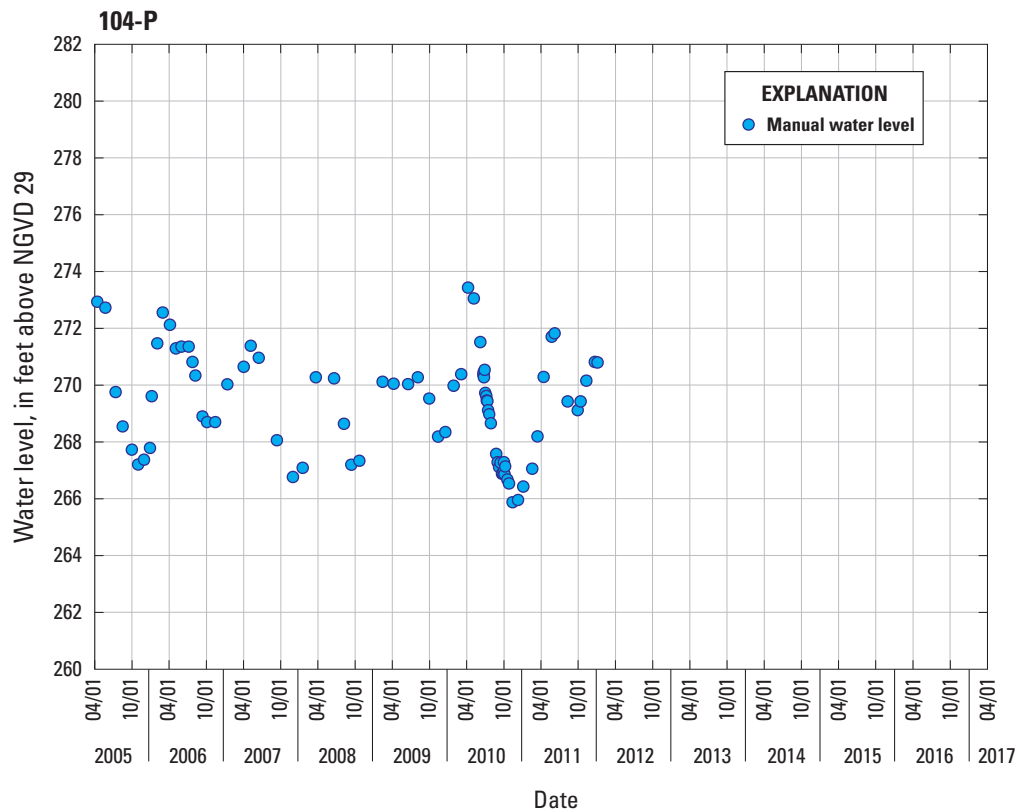
**Figure 37.** Discrete groundwater-level measurements for observation well HESF-8S from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 1; details are listed in table 1.



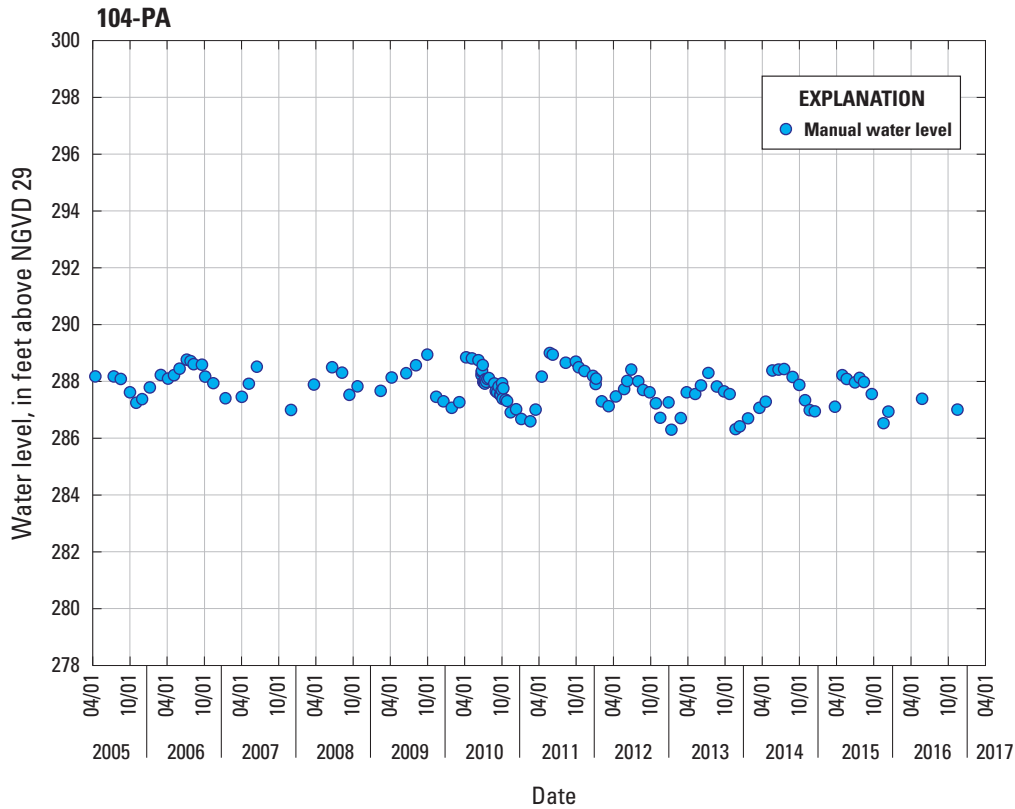
**Figure 38.** Discrete groundwater-level measurements for observation well HESF-8D from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 1; details are listed in table 1.



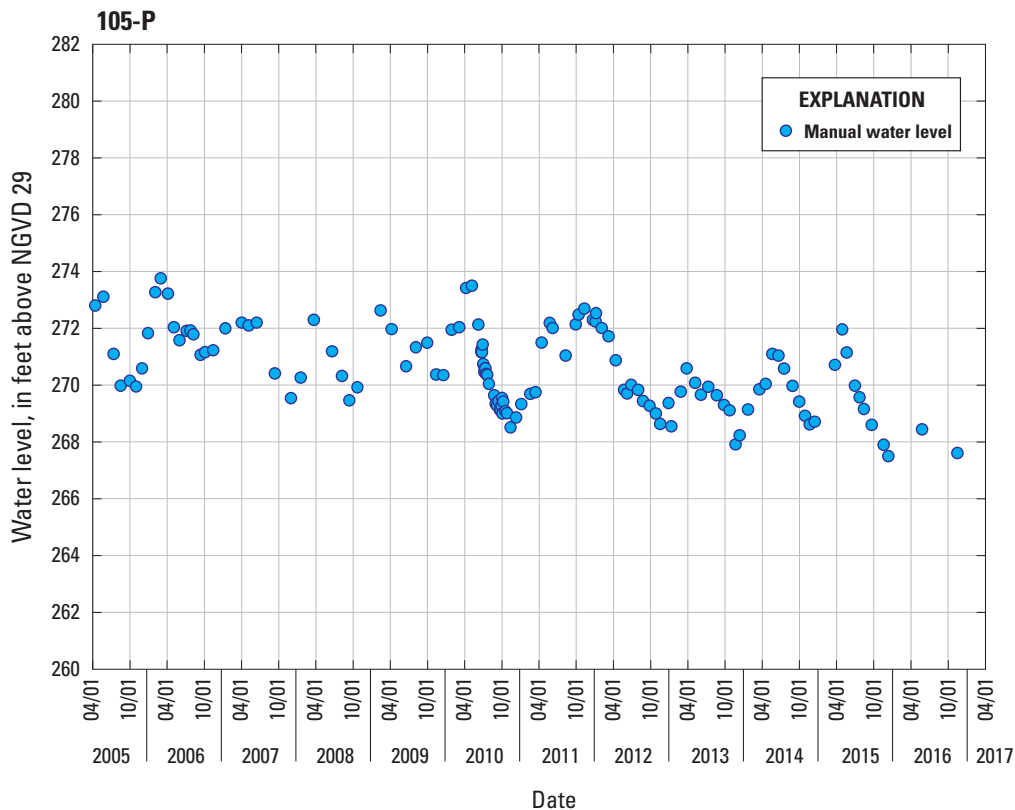
**Figure 39.** Discrete and continuous-record groundwater-level measurements for observation well CMB-2W from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 2; details are listed in table 1.



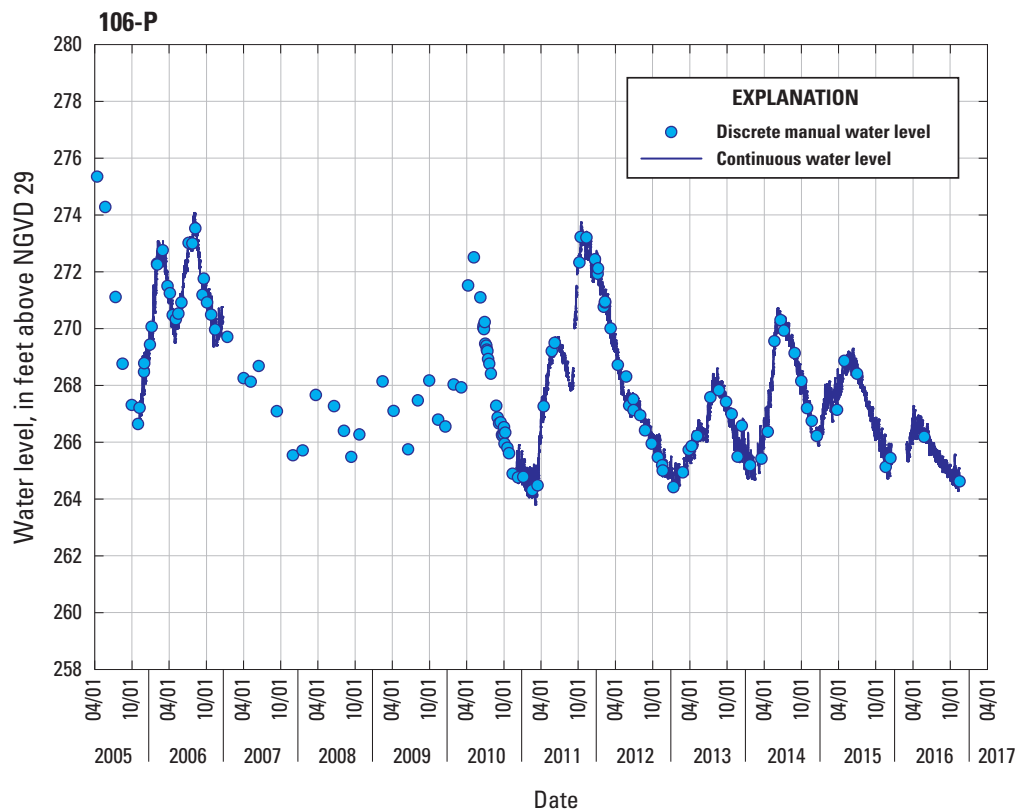
**Figure 40.** Discrete groundwater-level measurements for observation well 104-P from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 1; details are listed in table 1.



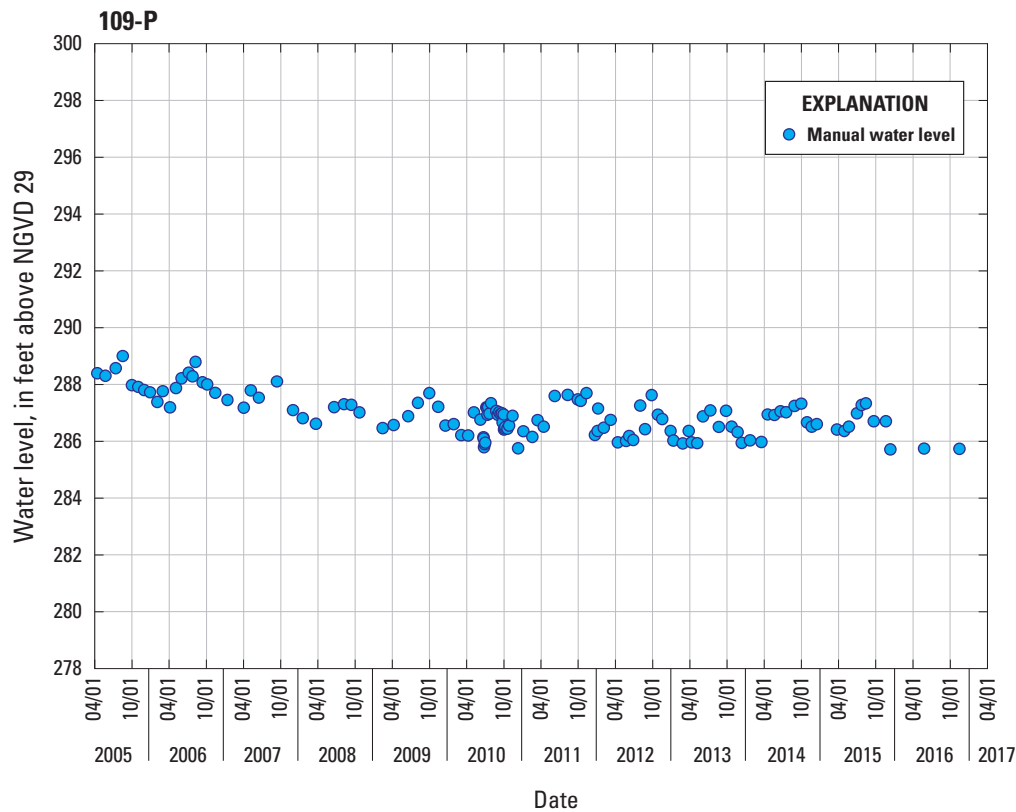
**Figure 41.** Discrete groundwater-level measurements for observation well 104–PA from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 1; details are listed in table 1.



**Figure 42.** Discrete groundwater-level measurements for observation well 105–P from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 1; details are listed in table 1.

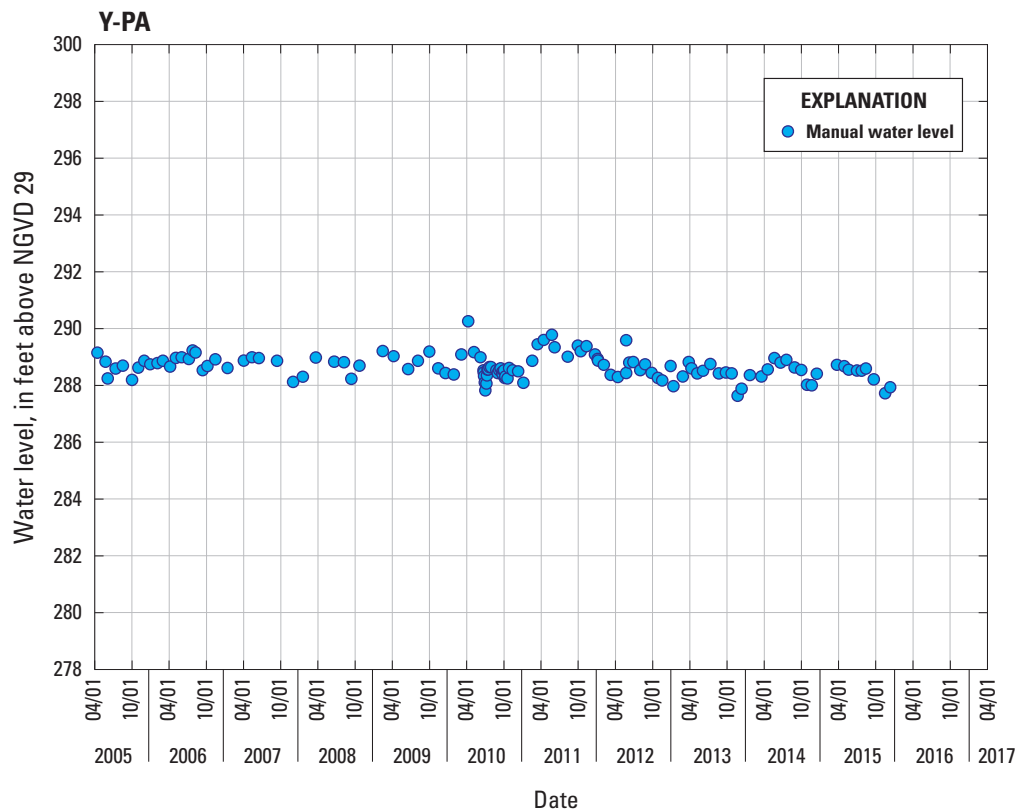


**Figure 43.** Discrete and continuous-record groundwater-level measurements for observation well 106–P from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 1; details are listed in table 1.

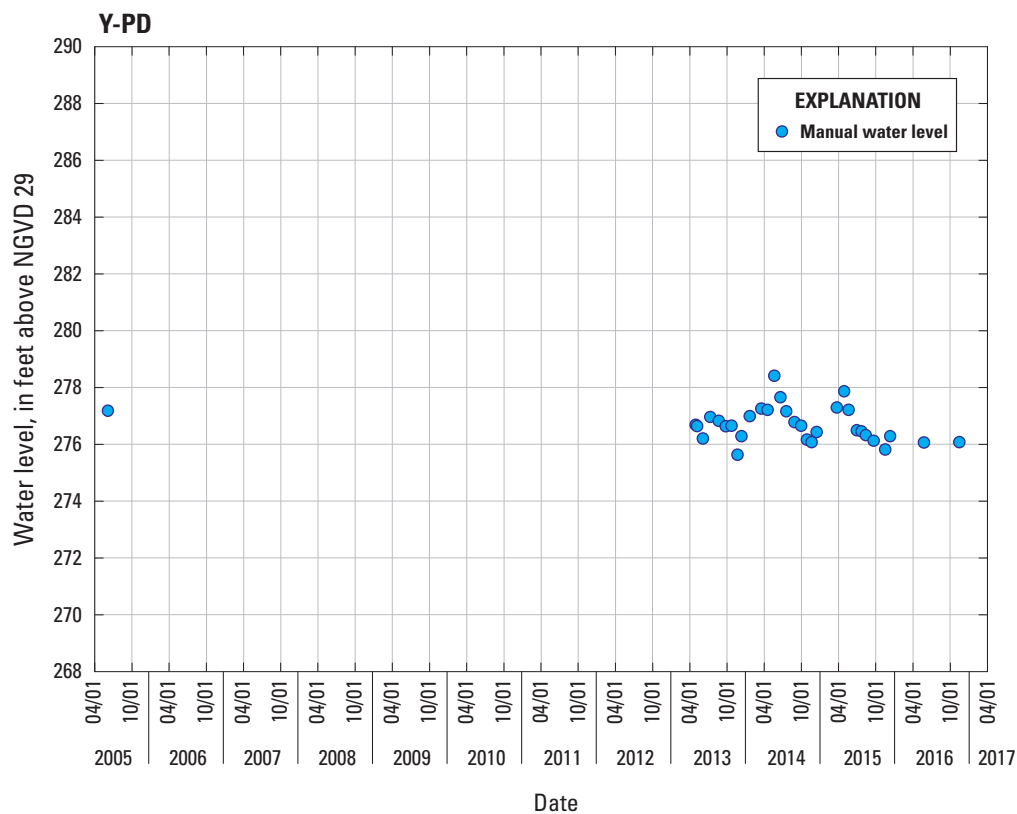


**Figure 44.** Discrete groundwater-level measurements for observation well 109–P from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 1; details are listed in table 1.

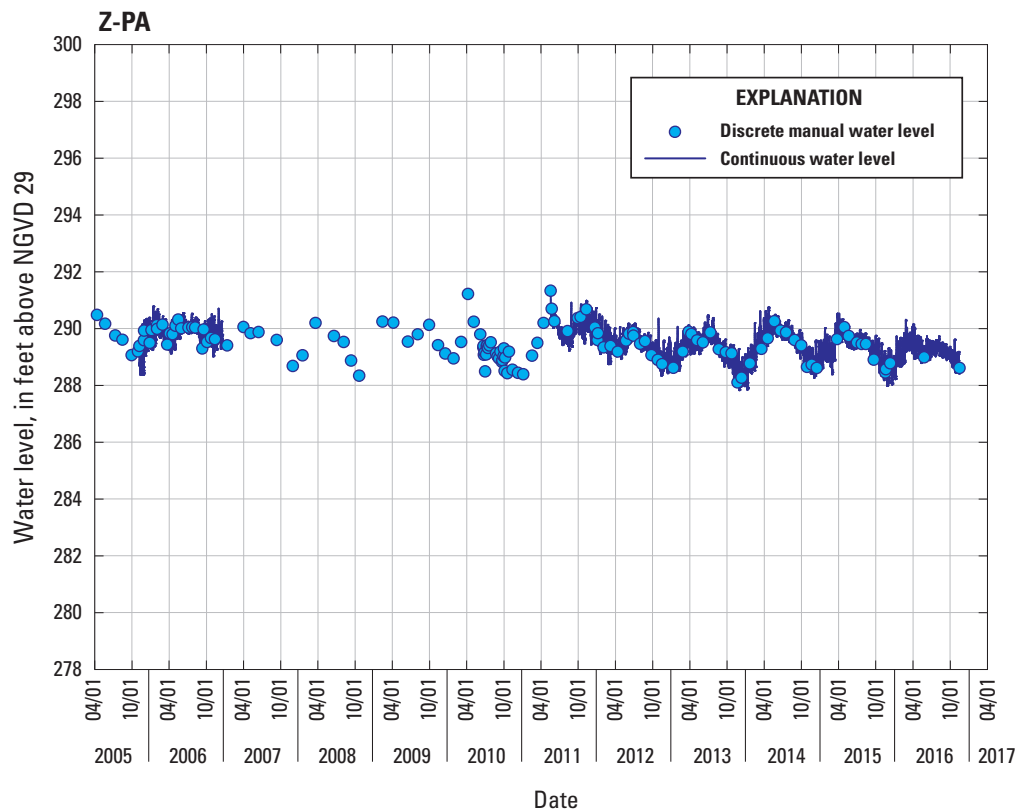




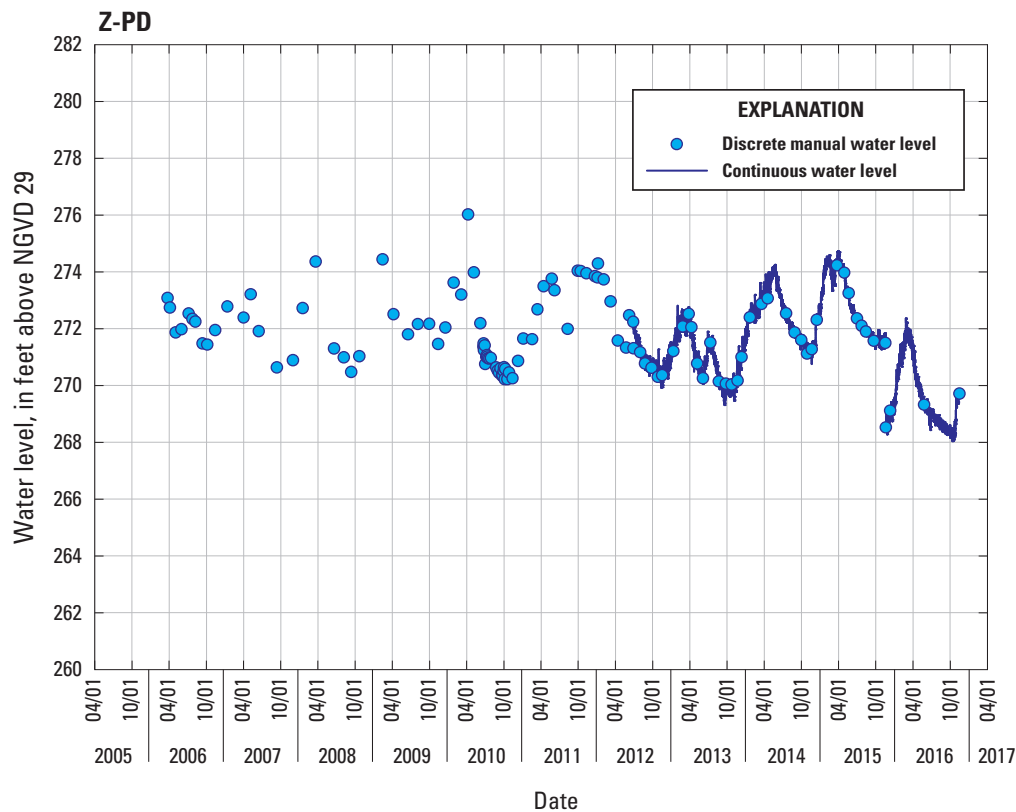
**Figure 45.** Discrete groundwater-level measurements for observation well Y-PA from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 1; details are listed in table 1.



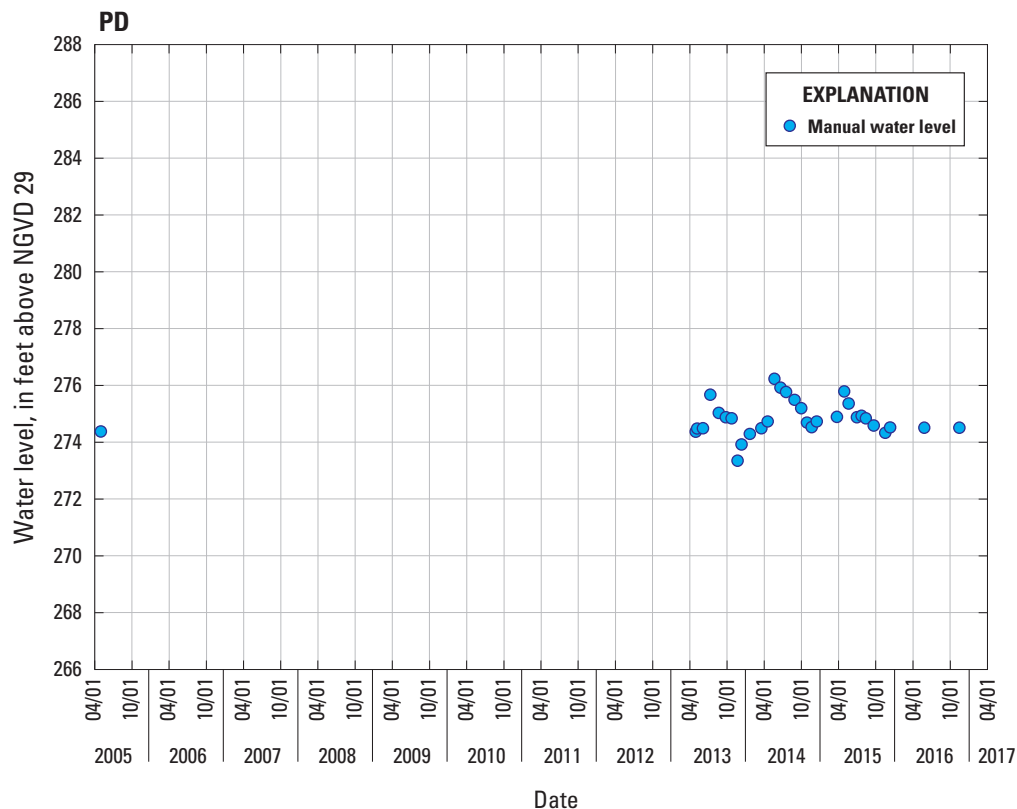
**Figure 46.** Discrete groundwater-level measurements for observation well Y-PD from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 1; details are listed in table 1.



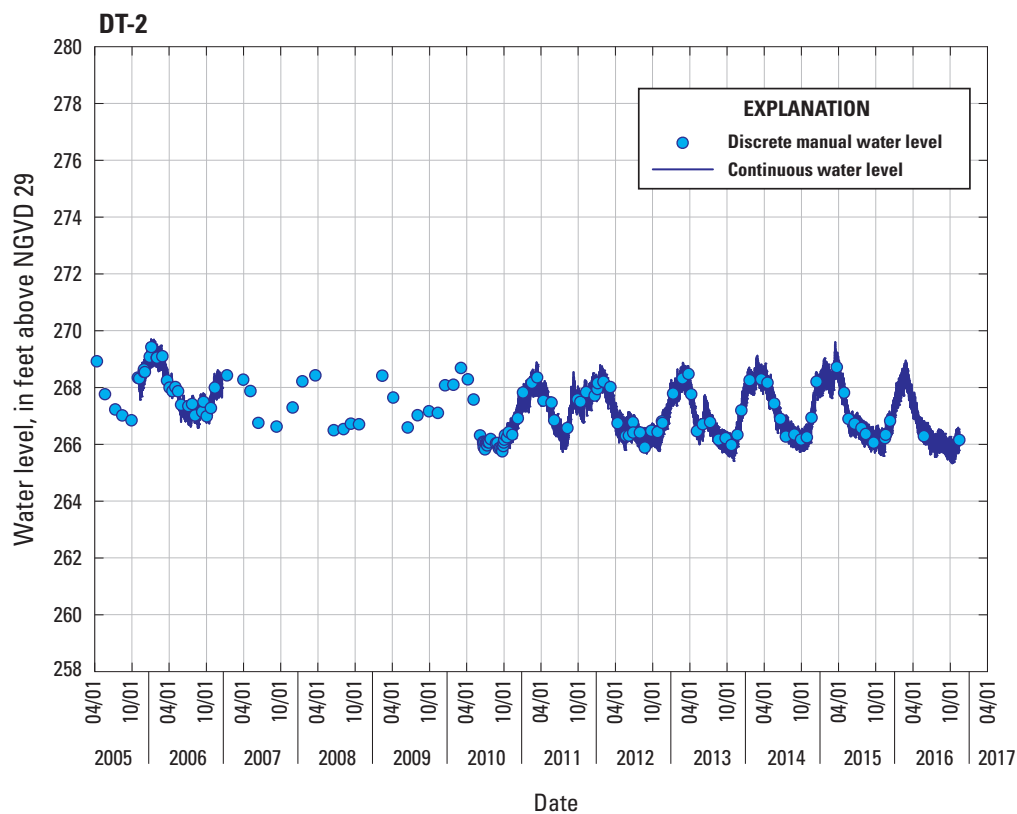
**Figure 47.** Discrete and continuous-record groundwater-level measurements for observation well Z-PA from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 1; details are listed in table 1.



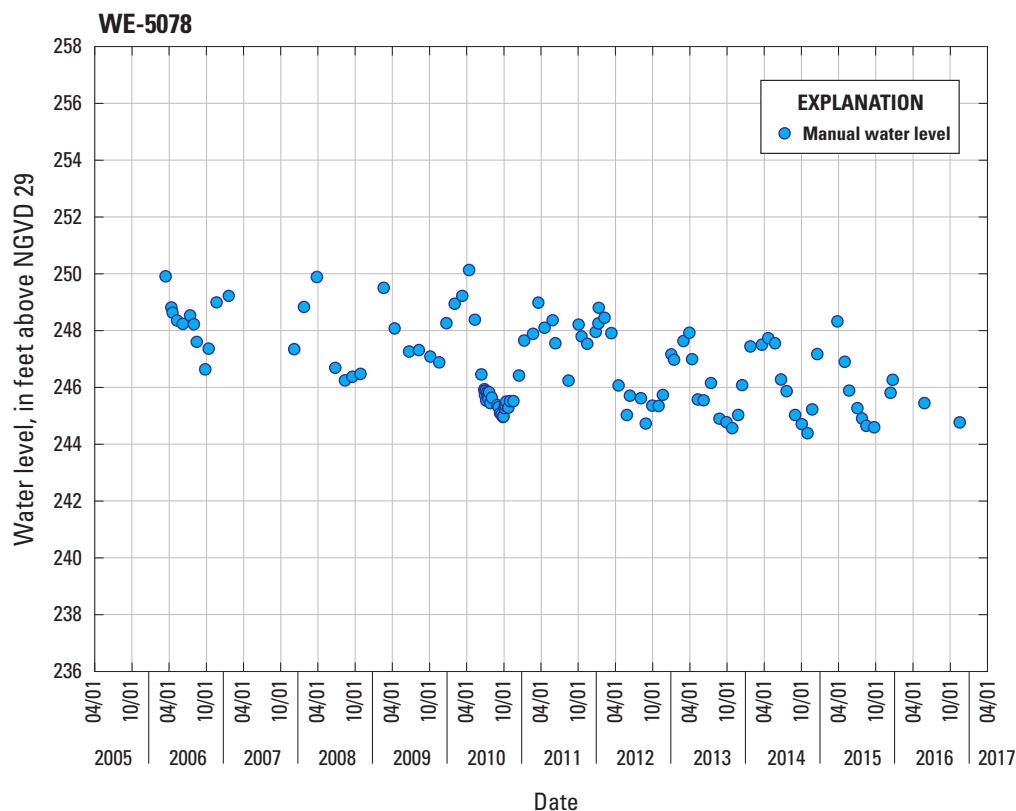
**Figure 48.** Discrete and continuous-record groundwater-level measurements for observation well Z-PD from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 1; details are listed in table 1.



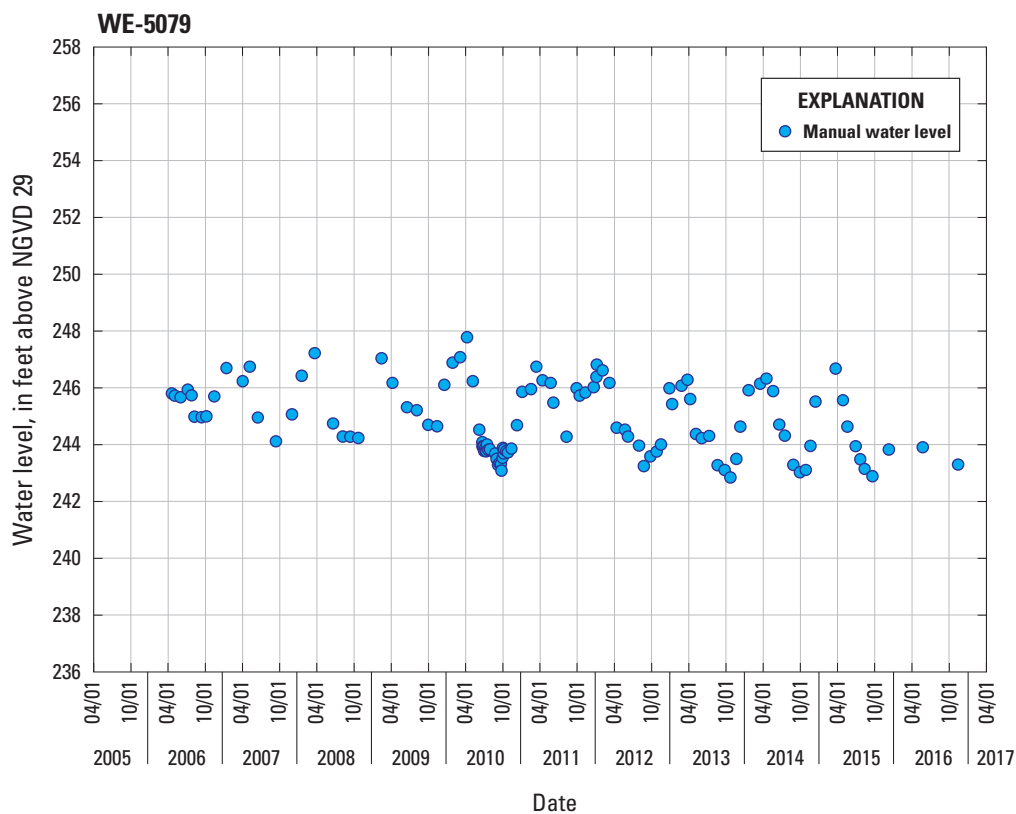
**Figure 49.** Discrete groundwater-level measurements for observation well PD from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 1; details are listed in table 1.



**Figure 50.** Discrete and continuous-record groundwater-level measurements for observation well DT–2 from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 1; details are listed in table 1.



**Figure 51.** Discrete groundwater-level measurements for observation well WE-5078 from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 1; details are listed in table 1.



**Figure 52.** Discrete groundwater-level measurements for observation well WE-5079 from an earthen dam site in southern Westchester County, New York. Gaps in groundwater-level record indicate no data or a dry measurement. Location of well shown on figure 1; details are listed in table 1.

## **Appendix 1. Discrete and Continuous-Record Groundwater-Level Measurements for Observation Wells in Bronx and Westchester Counties, New York**

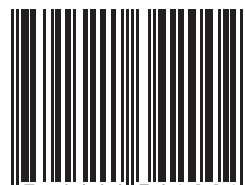
The data in tables 1.1 through 1.50 are replicated from the U.S. Geological Survey National Water Information System (U.S. Geological Survey, 2016) and can be downloaded at <https://doi.org/10.3133/ds1075>.



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