CCR Groundwater Monitoring System Certification Report

Black Dog Generating Plant
Burnsville, Minnesota

Prepared for
Northern States Power Company

April 2019

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Contents

List of Tables

List of Figures

Certifications

I hereby certify that I have examined the facility and, being familiar with the provisions of 40 CFR 257 Subpart D, attest that the groundwater monitoring system has been selected and that this Groundwater Monitoring System Report has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and the requirements of 40 CFR §257.91. I hereby certify that the monitoring system is adequate for this facility. I further certify that I am a duly Licensed Professional Engineer under the laws of the state of Minnesota.

04/15/2019

Jeremy Gacnik Date

PE #: 49292

Revision	Date	Summary of Revisions

1.0 Introduction

Northern States Power Company, a Minnesota corporation doing business as Xcel Energy (NSPM), formerly operated three coal combustion residuals (CCR) units, referred to as Ash Ponds 1, 2 and 3 (collectively the Ash Ponds) at its Black Dog Generating Plant (Plant or Site), located in Burnsville, MN (Figure 1). Coal operations ceased at the Plant in April 16, 2015 and CCR discharges to the Ash Ponds ceased prior to October 19, 2015. Decommissioning of the Plant's coal-fired boilers and associated equipment eliminated placement of CCR related materials in the Ash Ponds. The remaining wastewater discharged from the Plant was redirected to an alternate discharge system in 2016, thereby allowing for closure of the Ash Ponds and their associated components. Subsequently, the Ash Ponds were excavated and backfilled between October 2016 and November 2017.

The United States Environmental Protection Agency (EPA) published a final rule to regulate the disposal of CCR as solid waste under Subtitle D of the Resource Conservation and Recovery Act (RCRA), 40 CFR Parts 257 and 261 (CCR Rule) in 2015. This report has been prepared to describe the groundwater monitoring system for the former CCR units and how the groundwater monitoring system has been designed to meet the requirements of the Rule. This report fulfills the requirement of §257.91(f):

> *The owner or operator must obtain a certification from a qualified professional engineer stating that the groundwater monitoring system has been designed and constructed to meet the requirements of this section.*

Specific requirements and demonstration of compliance of the groundwater monitoring system to Part §257.91 of the Rule are summarized in Table 1 below, and further described in Sections 2.0 through 4.0 of this report.

Table 1 Rule Requirements and Compliance

CCR Rule Requirements (§257.91)	Compliance with CCR Rule
Performance Standard (a): The owner or operator of a CCR unit must install a groundwater monitoring system that consists of a sufficient number of wells, installed at appropriate locations and depths, to yield groundwater samples from the uppermost aquifer" that: (1) Accurately represent the quality of background groundwater that has not been affected by leakage from a CCR unit. A determination of background quality may include sampling of wells that are not hydraulically upgradient of the CCR management area where: a. Hydrogeologic conditions do not allow the owner or operator of the CCR Unit to determine what wells are hydraulically upgradient; or b. Sampling at other wells will provide an indication of background groundwater quality that is representative or more representative than that provided by the upgradient wells; and (2) Accurately represent the quality of groundwater passing the waste boundary of the CCR unit. The downgradient monitoring system must be installed at the waste boundary that ensures detection of groundwater contamination in the uppermost aquifer. All potential contamination must be monitored.	See Section 2.0 (Site Setting) and Section 3.0 (CCR Unit Groundwater Monitoring System) of this report.
Well Spacing and Site Specific Information (b): The number, spacing, and depths of monitoring systems shall be determined based upon site-specific technical information that must include thorough characterization of: (1) Aquifer thickness, groundwater flow rate, seasonal and temporal fluctuations in groundwater flow; and (2) Saturated and unsaturated geologic units and fill materials overlying the uppermost aquifer, materials comprising the uppermost aquifer, and materials comprising the confining unit defining the lower boundary of the uppermost aquifer, including, but not limited to, thickness, stratigraphy, lithology, hydraulic conductivities, porosities, and effective porosities.	See Section 2.0 (Site Setting) and Section 3.0 (CCR Unit Groundwater Monitoring System) of this report.
Number of Monitoring Wells (c): The groundwater monitoring system must include the minimum number of monitoring wells necessary to meet the performance standards specified in paragraph (a) of this section, based on the site-specific information specified in paragraph (b) of this section. The groundwater monitoring system must contain: (1) A minimum of one upgradient and three downgradient monitoring wells; and (2) Additional monitoring wells are necessary to accurately represent the quality of background groundwater that has not been affected by leakage from the CCR unit and the quality of groundwater passing the waste boundary of the CCR unit.	Seven background wells and five downgradient wells exceed the minimum requirements. See Section 3.0 (CCR Unit Groundwater Monitoring System) of this report.

CCR Rule Requirements (§257.91)	Compliance with CCR Rule
Multiunit Groundwater Systems (d): The owner or operator of multiple CCR units may install a multiunit groundwater monitoring system instead of separate groundwater monitoring systems for each CCR unit.	This facility is being monitored as a multiunit system using the well network summarized in Section 4.0.
Monitoring Well Construction (e): Monitoring wells must be cased in a manner that maintains the integrity of the monitoring well borehole. This casing must be screened or perforated and packed with gravel or sand, where necessary, to enable collection of groundwater samples. The annular space (i.e. the space between the borehole and well casing) above the sampling depth must be sealed to prevent contaminating of samples and the groundwater. (1) The owner or operator of the CCR unit must document and include in the operating record the design, installation, development, and decommissioning of any monitoring wells, piezometers, and other measurements, sampling, and analytical devices. The qualified professional engineer must be given access to this documentation when completing the groundwater monitoring system certification required under paragraph (f) of this section. (2) The monitoring wells, piezometers, and other measurements, sampling, and analytical devices must be operated and maintained so that they perform to the design specifications throughout the life of the monitoring program.	See Section 3.0 (CCR Unit Groundwater Monitoring System) and the Well Documentation Memo.
Certification (f): The owner or operator must obtain a certification from a qualified professional engineer stating that the groundwater monitoring system has been designed and constructed to meet the requirements of this section. If the groundwater monitoring system includes the minimum number of monitoring wells specified in paragraph (c)(1) of this section, the certification must document the basis supporting this determination.	See the Certifications page of this report.

2.0 Site Setting

The Site is located in the Minnesota River Valley on the south bank of the Minnesota River in Burnsville, Minnesota (Figure 1). The Plant and associated operational areas, including an electrical substation, former coal yard, and former Ash Ponds, occupy approximately 115 acres. NSPM's property also includes Black Dog Lake, a 500-acre water body developed for cooling Plant discharge water, consisting of Lyndale Basin, which is located southwest of the Plant, and Cedar Basin, which is located southeast of the Plant (Figure 1). The undeveloped portion of the property largely consists of lowlands located along the river and around Black Dog Lake. All of the property except for the 115-acre operating area is under lease to the United States Fish and Wildlife Service for wildlife refuge management and limited outdoor recreational use.

2.1 CCR Management

CCR has been managed in basins or ponds at the Site since the facility was constructed in the early 1950s through closure in 2017, as described in the following subsections.

2.1.1 Former Ash Basins (1950s – 1970s)

Starting in the early 1950s, prior to the construction of the CCR Units, CCR was managed in on-site ash basins (Figure 2), as approved by the Minnesota Water Pollution Control Commission. The ash basins were closed in phases during this period (1950s through 1970s), with the waste surface stabilized and the facility closed as a solid waste facility. These basins were incised, closed in place, have a soil cover system and do not impound water. The ash basins are not regulated by the CCR Rule because they were closed prior to publication of the CCR Rule.

2.1.2 CCR Units (1970s – 2017)

In the 1970s, following closure of the former ash basins, new CCR units (Ash Ponds 1, 2, and 3) were constructed as incised impoundments within the footprint of the former basins. Legacy materials, which included legacy materials from historic landfilling and beneficial use activities, were left in place beneath (i.e., below elevation 695 feet mean sea level (MSL)) and around the footprints of the CCR Units. These legacy materials are not subject to regulation under the CCR rule and are being managed separately under a State-approved Response Action Plan. Closure of the ponds consisted of the removal of CCRs from an elevation of 694.5 feet MSL and above.

The Ash Ponds served as the primary component of the process water treatment system at the Plant between the 1970s and October 2016. During this time, two pipelines—the ash sluice pipeline and the bilge water/yard drainage pipeline—discharged into the west end of Ash Pond 3 and a return water pipeline with an intake at the west end of Ash Pond 2 provided for water reuse in the Plant. Each of the Ash Ponds was approximately two acres in size, separated from each other by berms. Corrugated metal culverts in the berms allowed the Ash Ponds to be operated in series (3, 2, 1). Process water that was not reclaimed for reuse in the Plant was discharged to a settling pond, designated Pond 4. A NPDES approved discharge control structure in Pond 4 allowed periodic batch releases of water to Cedar Basin. The batch discharges occurred periodically after isolating Pond 4 and determining that the water met permit discharge criteria.

2.2 Geology

The primary geologic units at the Site include non-native sediments, native sediments, and bedrock. These units are described in the following subsections.

2.2.1 Non-Native Deposits

The predominant surficial deposit at the Site is fill, comprised of imported soil brought in for the construction of flood protection berms, raising grade inside the flood control berms, or backfilling the Ash Ponds. The imported fill consists of structural fill (primarily road base aggregate) or granular fill with sandy to gravelly silt or silty to lean clay textures. Lesser amounts of native soils consisting primarily of silty or fine sand-textured river deposits and organic topsoil are present along the northern and southern margins of the Site. These native soils have been disturbed in many areas with regrading or excavations conducted as part of Site development and/or operations. The thickness of the non-native fill soils varies from less than five feet along the Site margins to approximately 20 feet at areas inside the flood protection berm. The estimated hydraulic conductivity of the saturated non-native deposits is provided in Table 2.

Legacy materials include ashes generated and deposited into the former ash basins under various operational permits prior to the construction of the Ash Ponds, and coal from the former Coal Yard, which was located northeast of the Plant (Figure 2). Legacy materials are present below the footprint of the Ash Ponds, and extend to an approximate depth of 690-ft MSL in some areas (Barr, 2012). These legacy materials are not subject to regulation under the CCR rule and are being managed separately under a State-approved Response Action Plan.

The distribution and thickness of the non-native and underlying deposits in the vicinity of the Ash Ponds are shown on Figures 4 through 7 (see Figure 3 cross section alignments).

2.2.2 Native Deposits

Alluvium—consisting primarily of fine-grained native sediments described as lean clay, fat clay, and organic clay/silt with lesser amounts of peat, silt, and silty sand—underlies the non-native deposits across the Site. The clay and peat deposits are interpreted to be backwater deposition from the Minnesota River and the silt and silty sand are likely the result of slightly higher energy fluvial regimes of the Minnesota River channel as it meandered through the river valley or flooded. The alluvial sediments are distinguishable from underlying fine-grained glacial deposits due to their higher organic content (Balaban and Hobbes 1990) and/or snail shell fragments. The overall thickness of the alluvium varies from 40 to 60 feet at the Site.

Glacial deposits consisting of till and outwash and bedrock consisting of sandy dolostone of the Prairie du Chien Group are present below the alluvium. The till is described as a gray to grayish brown, lean clay to gravelly lean clay, and the outwash consists of silty sand to sand with gravel. Collectively, the glacial deposits vary in thickness from 12 to 40 feet, with a top elevation varying from approximately 630 to 670 feet MSL. The depth to bedrock encountered in investigation borings varied from 70 to 92 feet below ground surface (bgs) and the elevation of the top of bedrock varies from 620 to 630 feet MSL (Barr, 2012).

2.3 Hydrogeology

The hydrogeologic conditions at the Site have been the subject of detailed site characterization investigations dating back to the early 1980s. These investigations have included advancing more than 100 soil borings, installing 60+ groundwater monitoring points, conducting field and laboratory hydraulic testing, monitoring hydraulic head, developing a groundwater flow model, and sampling and analyzing water chemistry. The following subsections describe the key results of the hydrogeologic investigations that were considered in the design and construction of the groundwater monitoring system.

2.3.1 Groundwater Occurrence

The water table is located in the non-native deposits across the Site throughout the year. The underlying alluvium, glacial deposits, and bedrock are fully saturated. The position of the water table in the vicinity of the Ash Ponds is illustrated on Figures 4 through 7.

2.3.2 Groundwater Flow Directions and Rates

Groundwater elevations and inferred flow directions along the water table for two synoptic water level measuring events, December 11, 2017 and October 22, 2018, are shown on Figures 8 and 9, respectively. In both instances, groundwater elevation maxima occur in close proximity to unlined temporary stormwater sedimentation basin A (Pond A) with groundwater flowing away from Pond A radially. A groundwater divide that is roughly aligned with the axis of the Site and parallel to unlined temporary stormwater sedimentation basin 3 (Pond 3) is present east of Pond A in the vicinity of the Ash Ponds during both measurement events. The presence of this groundwater divide is consistent with prior Site investigation results and is a function of the consistent upward hydraulic gradient that results from the Site location in a regional groundwater discharge zone. Groundwater flow directions in the vicinity of the Ash Ponds are to the north towards the Minnesota River, to the south towards Cedar Basin, and to the east towards Pond 4. Pond 4, which is located outside of the flood control berm, was under natural conditions during the December 2017 monitoring event and shows flow to the north and south consistent with the groundwater divide. Pond 4 was being dewatered during a dredging project in October 2018 and, as a result of the dewatering, shows inward groundwater flow from the north and south and an increased gradient from the Ash Ponds.

Since the Ash Ponds were dredged and backfilled, horizontal hydraulic gradients at the Site have varied from approximately 0.001 ft/ft to 0.04 ft/ft. Based on the hydraulic conductivity of the non-native sediments (Table 2; Barr, 2012), an effective porosity of 0.27, and the hydraulic gradients observed on the water table maps, horizontal average linear groundwater velocity estimates range from 0.005 to 0.2 feet per day.

Table 2 Hydraulic Conductivity Summary

Unit	Hydraulic Conductivity[1]	
	Horizontal (meters/day)	Vertical (meters/day)
Surficial / Non-Native	4.37E-01 (n = 7)	1.95E-01 (n = 5)
Alluvium	5.78E-02 (n = 20)	9.96E-05 (n = 31)

[1] Geometric mean value of n number of tests.

Prior investigations have demonstrated the consistent vertically upward gradient between the bedrock/glacial outwash deposits and the water table at the Site (Barr, 2012). The upward vertical gradient is one to two orders in magnitude greater than the shallow horizontal hydraulic gradient. The upward vertical gradient prevents downward migration of shallow groundwater to the underlying regional bedrock aquifer.

3.0 CCR Unit Groundwater Monitoring System

The hydrogeologic data from past investigations served as the initial design basis for the CCR groundwater monitoring system. The CCR groundwater monitoring system components are shown on Figure 2 and are described below. Cross sectional views of the groundwater monitoring system wells are provided on Figures 4 through 7. Because the Ash Ponds are close to each other and it is not feasible to construct a monitoring system that would distinguish the potential impacts of each pond, the background and downgradient groundwater monitoring network was designed as a multiunit system.

3.1 Network Installation and Development

Each well included in the monitoring system was installed by a well driller licensed by the State of Minnesota. Well materials and construction methods were consistent with Minnesota Well Code and local well ordinance. Each well was cased to maintain integrity of the borehole, the well screen was installed and surrounded by filter pack sand to enable collection of water samples from the targeted interval, and the well annular space above the screened interval was sealed to prevent surface water infiltration into the screened interval. The well construction details are provided in Table 3.

Table 3 Well Construction Details

Well	Unique Well ID No.	Type			Top of Riser Elev. (ft msl)	Bottom of Screen Depth (ft bgs)	Well Construction Details				
		Back-ground	Down-gradient	Water Level Only			Casing Material	Screen Material	Dia. (in)	Screen Length (ft)	Slot Size (in)
W502A	772793	X			708.02	15.5	Steel	Stainless	2	10	0.01
W502B	782669	X			707.04	30	Steel	Stainless	2	10	0.01
W504A	772794	X			706.93	15.5	Steel	Stainless	2	10	0.01
W504B	772795	X			706.19	29	Steel	Stainless	2	10	0.01
W506A	772790	X			711.27	16.5	Steel	Stainless	2	10	0.01
W600A	824832	X			712.25	18	Steel	Stainless	2	10	0.01
W601A	824833	X			709.57	15	Steel	Stainless	2	10	0.01
W7A	491943		X		706.03	17.7	Steel	Stainless	2	10	0.01
W602A	824834		X		707.25	21	Steel	Stainless	2	14	0.01
W603A	824835		X		716.58	25	Steel	Stainless	2	14	0.01
W604A	824836		X		716.52	25	Steel	Stainless	2	10	0.01
W605A	824837		X		716.74	28	Steel	Stainless	2	14	0.01
W14A	496033			X	702.58	16.4	Steel	Stainless	2	10	0.01
W505A	772792			X	716.26	22	Steel	Stainless	2	10	0.01
W506B	772791			X	711.27	29	Steel	Stainless	2	10	0.01
W507A	782677			X	704.60	16.5	Steel	Stainless	2	10	0.01
W510A	782674			X	705.79	19	Steel	Stainless	2	10	0.01
W511A	784715			X	708.49	15	Steel	Stainless	2	10	0.01
W514A	784711			X	712.02	15	Steel	Stainless	2	10	0.01
W514B	784712			X	712.15	30	Steel	Stainless	2	5	0.01

Table 3 Notes:
MSL - mean sea level
bgs - below ground surface

Each well in the monitoring network was developed to remove fines from the water column and to improve hydraulic connection with well screen filter pack and the surrounding aquifer. The wells were developed by repeated cycles of disrupting the water column with a surge block, purging, and allowing the water levels to recover. Monitoring well development was conducted until water purged at sampling rates yielded turbidity values of 20 NTU (Nephelometric Turbidity Units) or less.

Well nomenclature is generally defined by well screen elevations. A-series wells are screened across the water table (at depths less than 22 feet), with basal elevations ranging from 684.8 to 695.6 feet MSL. These wells are generally constructed in the non-native sediments. B-series wells are screened below the A wells (at depths ranging from 29 to 39 feet), with basal elevations ranging from 665.9 to 685.6 fee MSL. These wells are generally constructed in the upper to middle portions of alluvium. Due to variable groundwater elevations across the Site, minor overlap of A and B-series screened intervals exist.

3.2 Background Wells

The location of the Site in a regional groundwater discharge area and the presence of legacy materials beneath the footprint of the Ash Ponds did not allow the determination of the background groundwater quality with a standard configuration of upgradient well(s). Therefore, the background monitoring network was established with multiple wells installed in locations and completed at depths that were unaffected by the former Ash Ponds but representative of background groundwater quality at the Site (including legacy materials in the former ash basins). Major cation and anion groundwater chemistry was used to assess the water quality conditions in each background monitoring system well and to demonstrate that the wells were not affected by leakage from the Ash Ponds.

The resultant monitoring system includes the seven background wells listed in Table 4, which exceeds the minimum number (one) required by the rule. The background wells include three wells located in the footprint of former ash basins (W600A, W601A, and W506A), two wells located in native materials along the north margin of the Site (W502A and W504A), and two wells completed in the top of the alluvium beneath (but hydraulically upgradient of) the uppermost aquifer (W502B and W504B).

Table 4 Monitoring System Summary

Category	Monitoring Well	Screen placement	Rationale (CCR Rule)
Background Wells	W502A	A-series	To accurately represent the quality of background groundwater that has not been affected by leakage from a CCR unit. A determination of background quality may include sampling of wells that are not hydraulically upgradient of the CCR management area where: Hydrogeologic conditions do not allow the owner or operator of the CCR Unit to determine what wells are hydraulically upgradient, or Sampling at other wells will provide an indication of background groundwater quality that is representative or more representative than that provided by the upgradient wells... (§257.91(a) (1) and (2).
	W502B	B-series	
	W504A	A-series	
	W504B	B-series	
	W506A	A-series	
	W600A	A-series	
	W601A	A-series	
Downgradient Wells	W7A	A-series	To detect a release from the Site and to account for geologic and hydrogeologic variability, and to establish a sufficient number of downgradient monitoring wells at appropriate locations and depths to yield groundwater samples of the uppermost aquifer accurately representing the quality of groundwater passing through the waste boundary (§257.91(a) (1) and (2)).
	W602A	A-series	
	W603A	A-series	
	W604A	A-series	
	W605A	A-series	

3.3 Downgradient Wells

Five monitoring wells installed at (or as close as practical to) the CCR units boundaries were utilized for the downgradient monitoring system (Table 4), which exceeds the minimum required (three) by the rule. Each of these wells is completed in the uppermost aquifer and designed to yield samples that are representative of the quality of groundwater passing through the three downgradient sides of the former Ash Ponds waste boundaries.

4.0 References

Balaban and Hobbes 1990. Balaban N.H. and Hobbs H.C., eds., 1990. Geological Atlas of Dakota County, Minnesota: Minnesota Geological Survey County Atlas C-6, plate 4, scale 1:100,000. http://conservancy.umn.edu/handle/58494.

Barr, 2012. Phase II Investigation / Risk Evaluation Report, Coal and Ash Pond Decommissioning Project, VIC Site VP26870. July 2012.

Figures

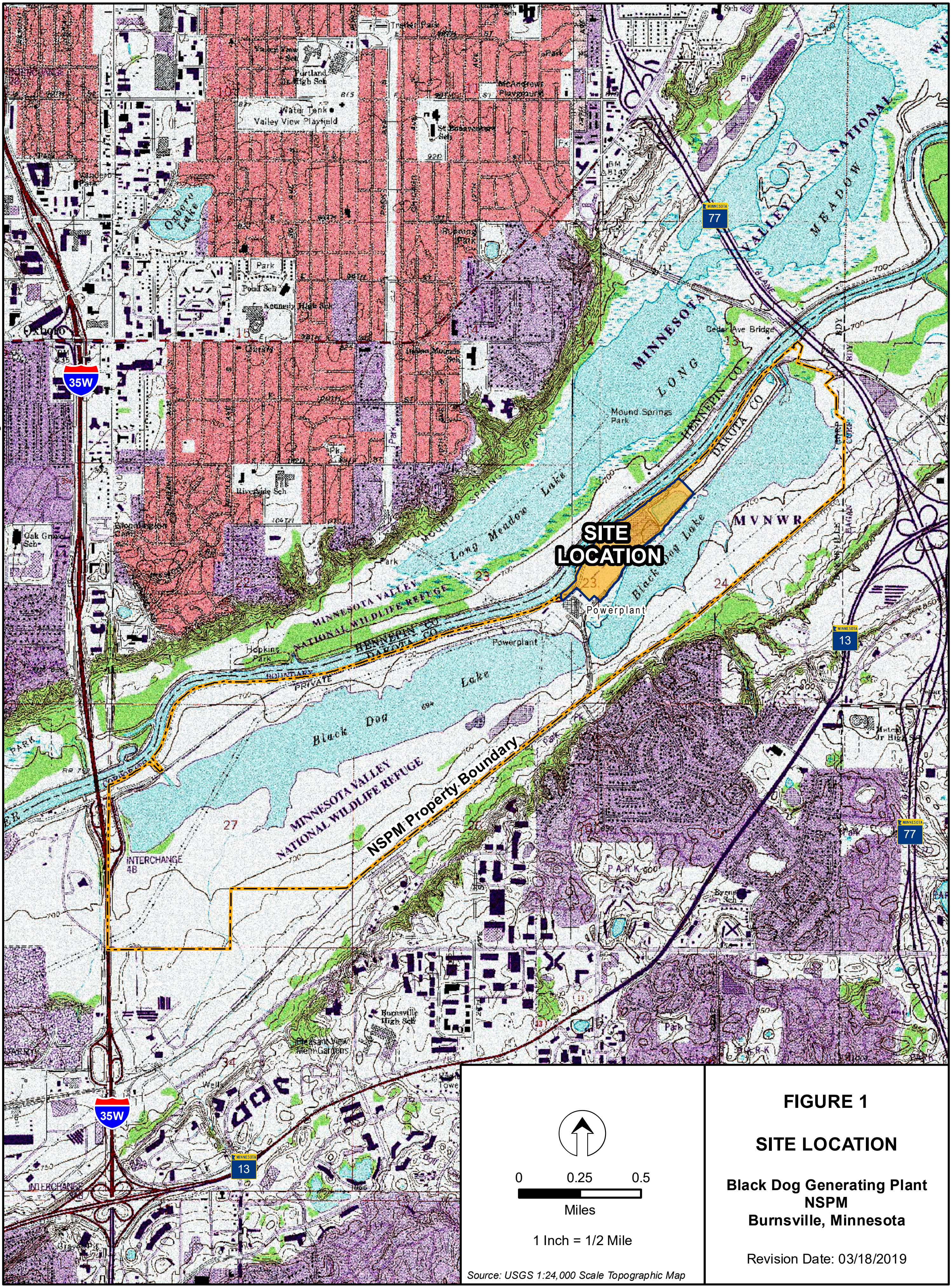


FIGURE 1

SITE LOCATION

Black Dog Generating Plant
NSPM
Burnsville, Minnesota

Revision Date: 03/18/2019

Barr Footer: ArcGIS 10.6.1, 2019-03-18 10:02 File: I:\Client\Xcel_Energy\Black_Dog_Plant\Work_Orders\Environmental_Monitoring\Maps\Reports\2019 Groundwater Network Certification\Figure 1 Site Location.mxd User: bal

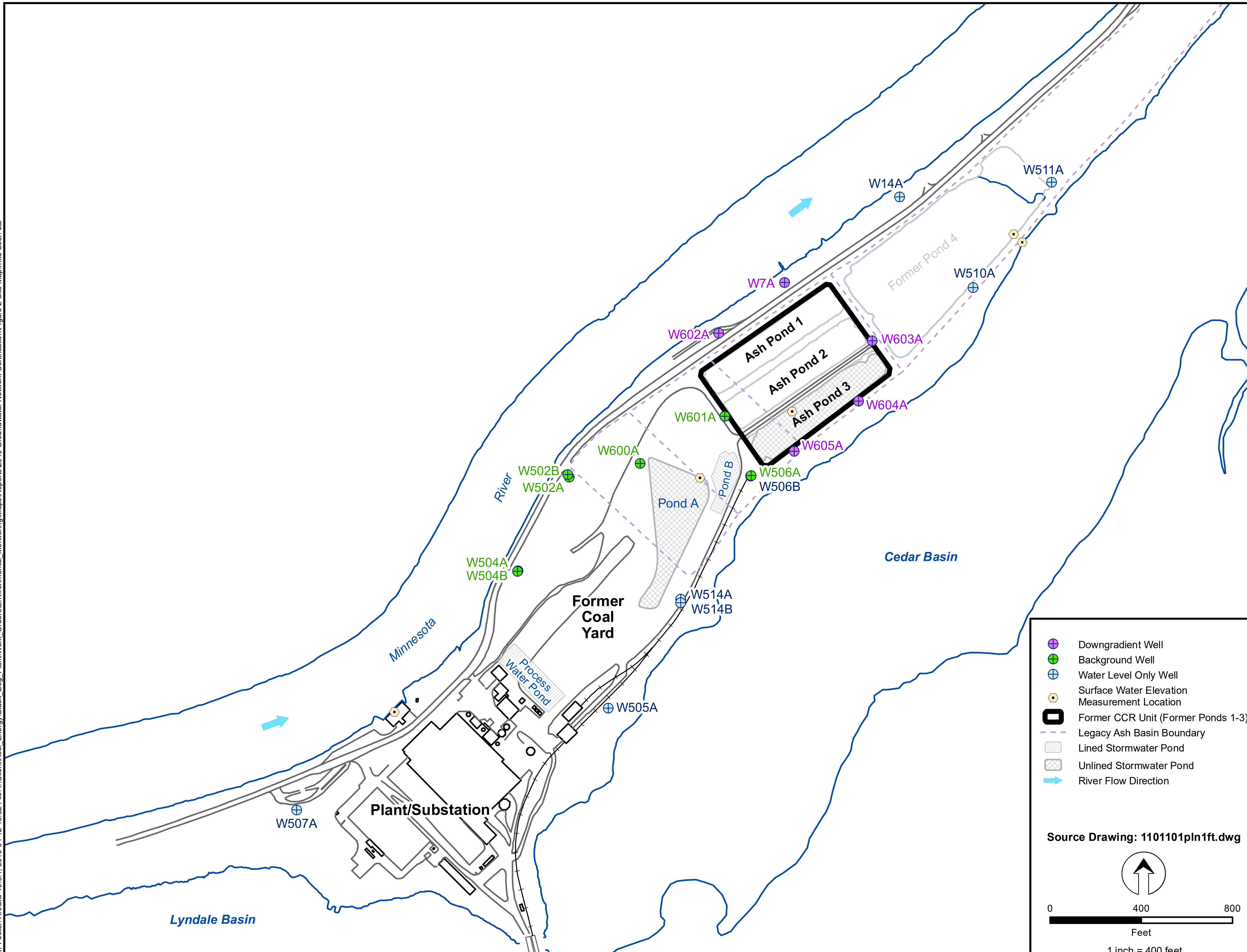


FIGURE 2

SITE MAP
Black Dog Generating Plant
NSPM
Burnsville, Minnesota

Revision Date: 03/26/2019

Data Sources:
Site Features: AeroMetric 2010
Process and Stormwater Ponds, Sampling, Well and Piezometer Locations, VIC Site Boundary, and Groundwater Contours: Barr Engineering Company

Barr Footer: ArcGIS 10.6.1, 2019-04-12 13:32 File: I:\Client\Xcel_Energy\Black_Dog_Plant\Work_Orders\Environmental_Monitoring\Maps\Reports\2019 Groundwater Network Certification\Figure 2 Site Map.mxd User: bal

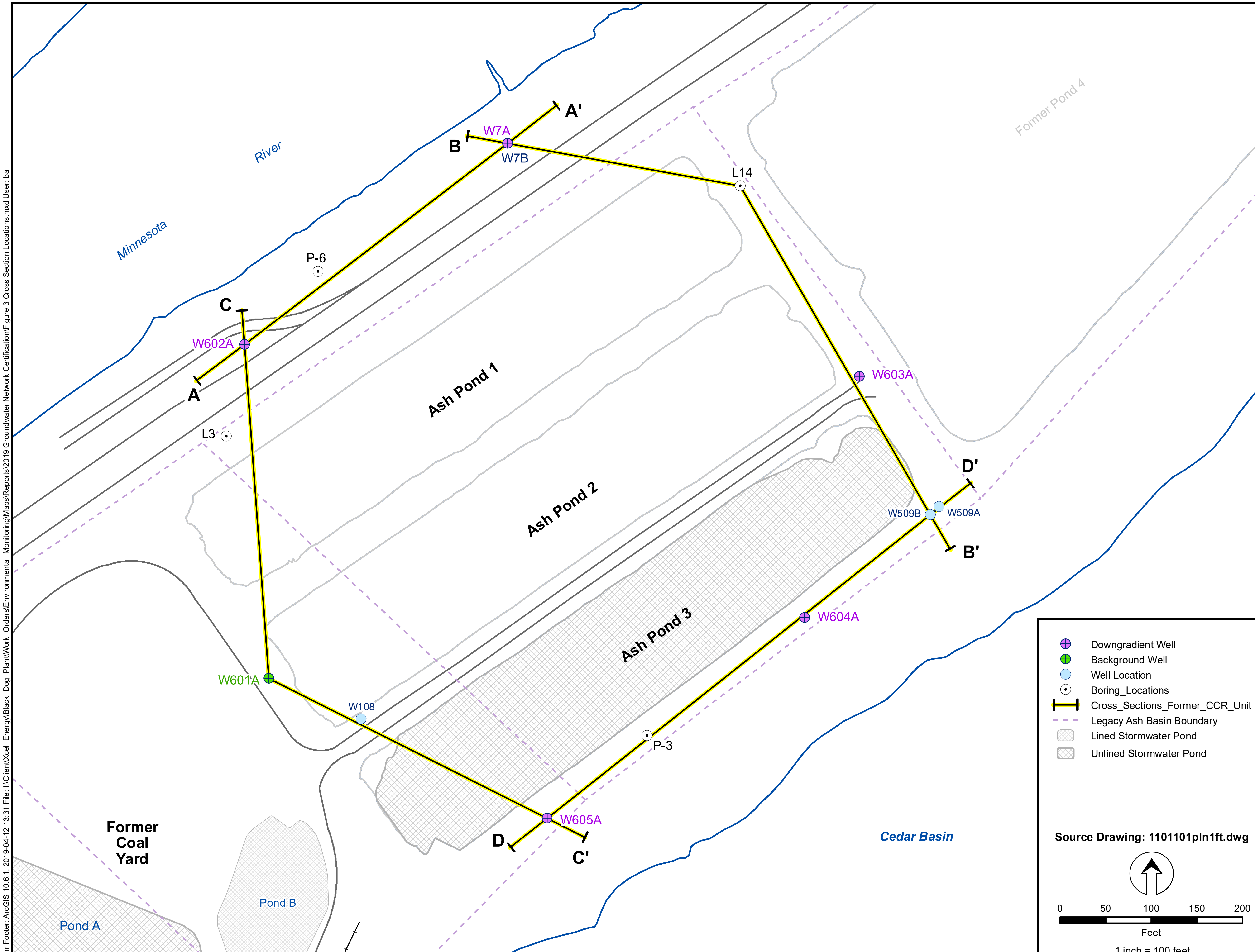
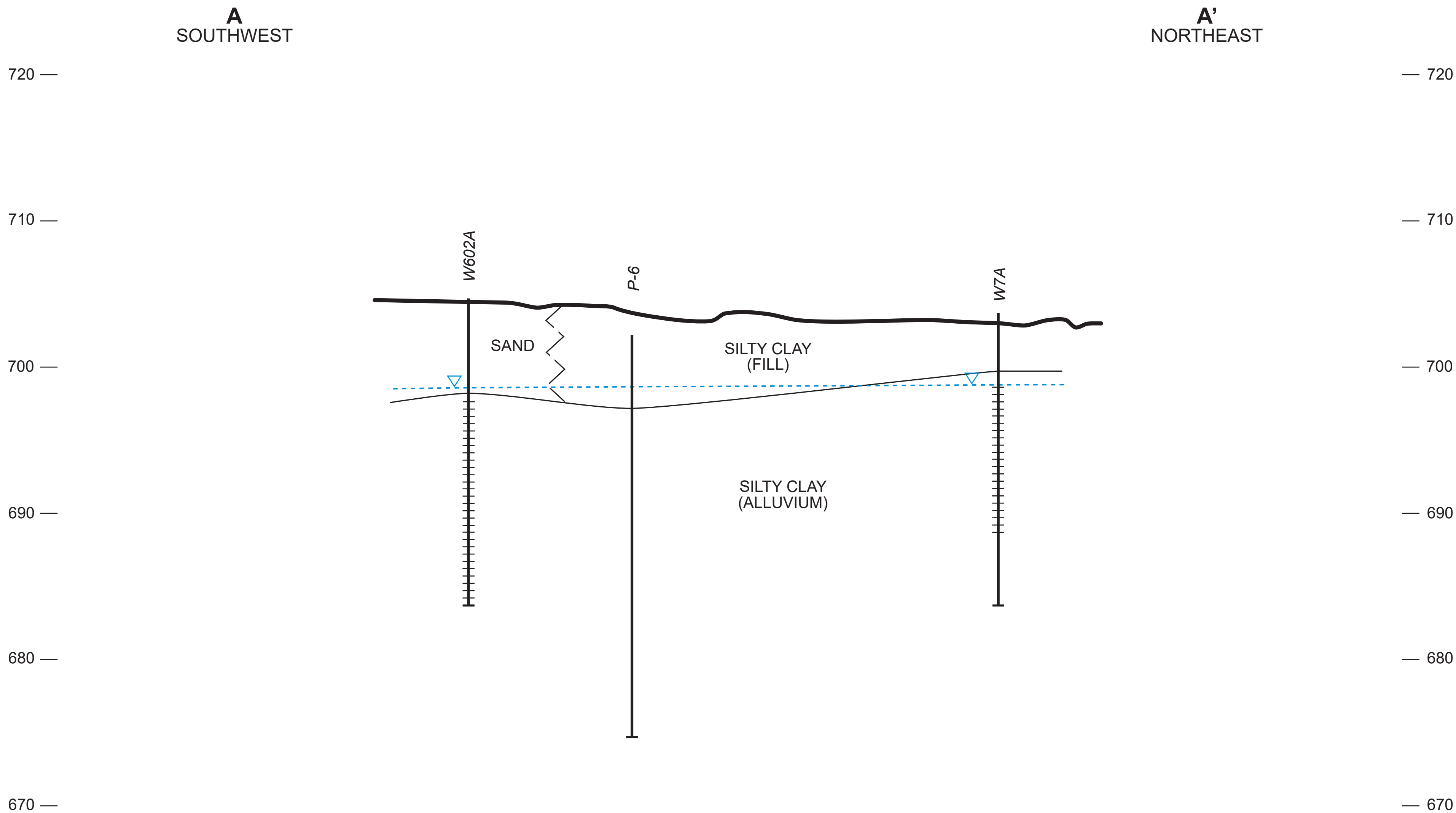


FIGURE 3

CROSS SECTION LOCATIONS
Black Dog Generating Plant
NSPM
Burnsville, Minnesota

Revision Date: 03/26/2019

Data Sources:
Site Features: AeroMetric 2010
Process and Stormwater Ponds, Sampling,
Well and Piezometer Locations, VIC Site Boundary,
and Groundwater Contours: Barr Engineering Company



LEGEND

Geologic Contact

Inferred Geologic Contact

Approximate Water Table (December 2017)

Monitoring Well Screen

Soil Boring/Piezometer

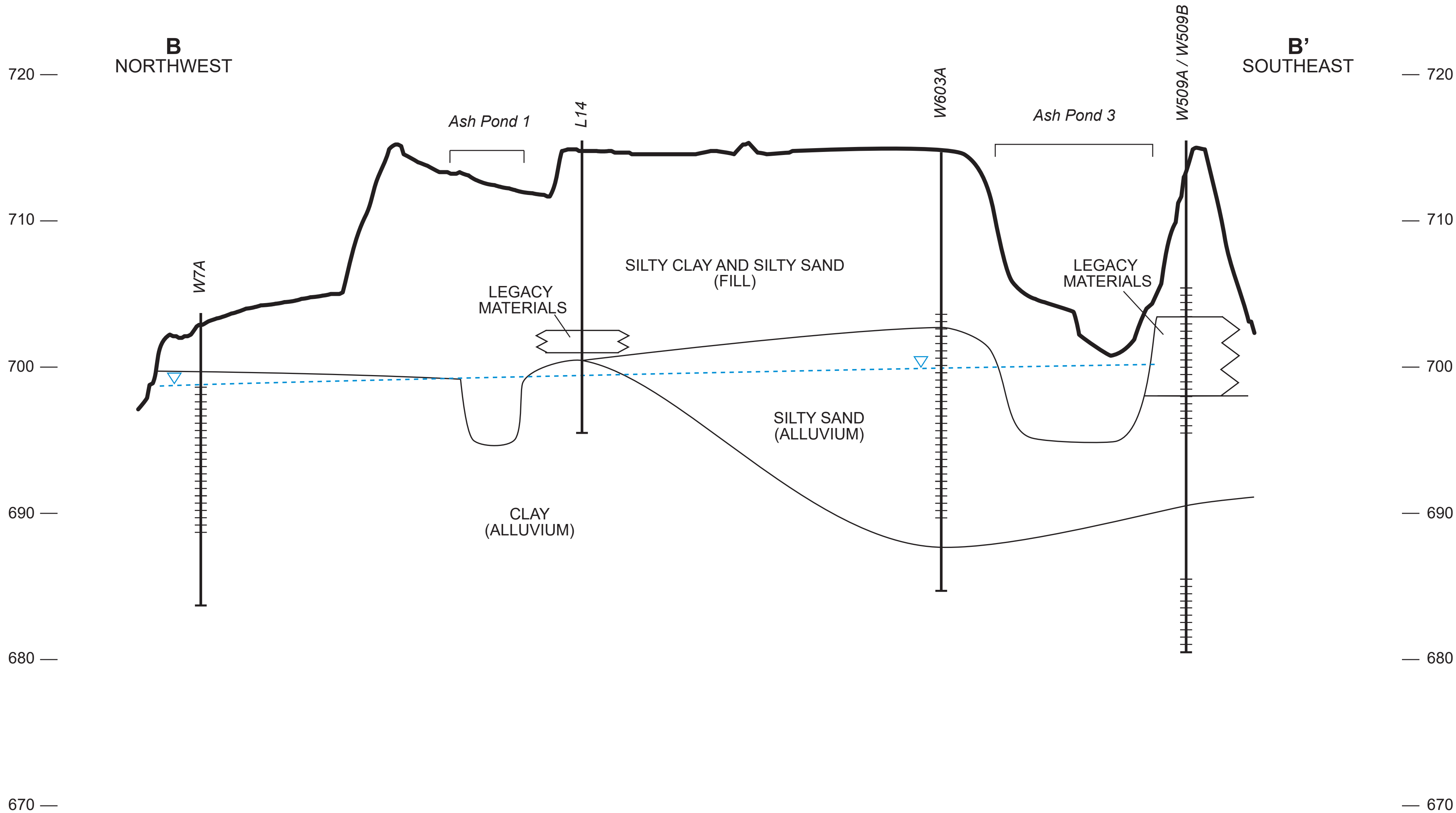
0 100

Approximate Horizontal Scale in Feet
10X Vertical Exaggeration

BARR

Figure 4

GEOLOGIC CROSS SECTION A-A'
Black Dog Generating Plant
NSPM
Burnsville, Minnesota



LEGEND

Geologic Contact

Inferred Geologic Contact

Approximate Water Table (December 2017)

Monitoring Well Screen

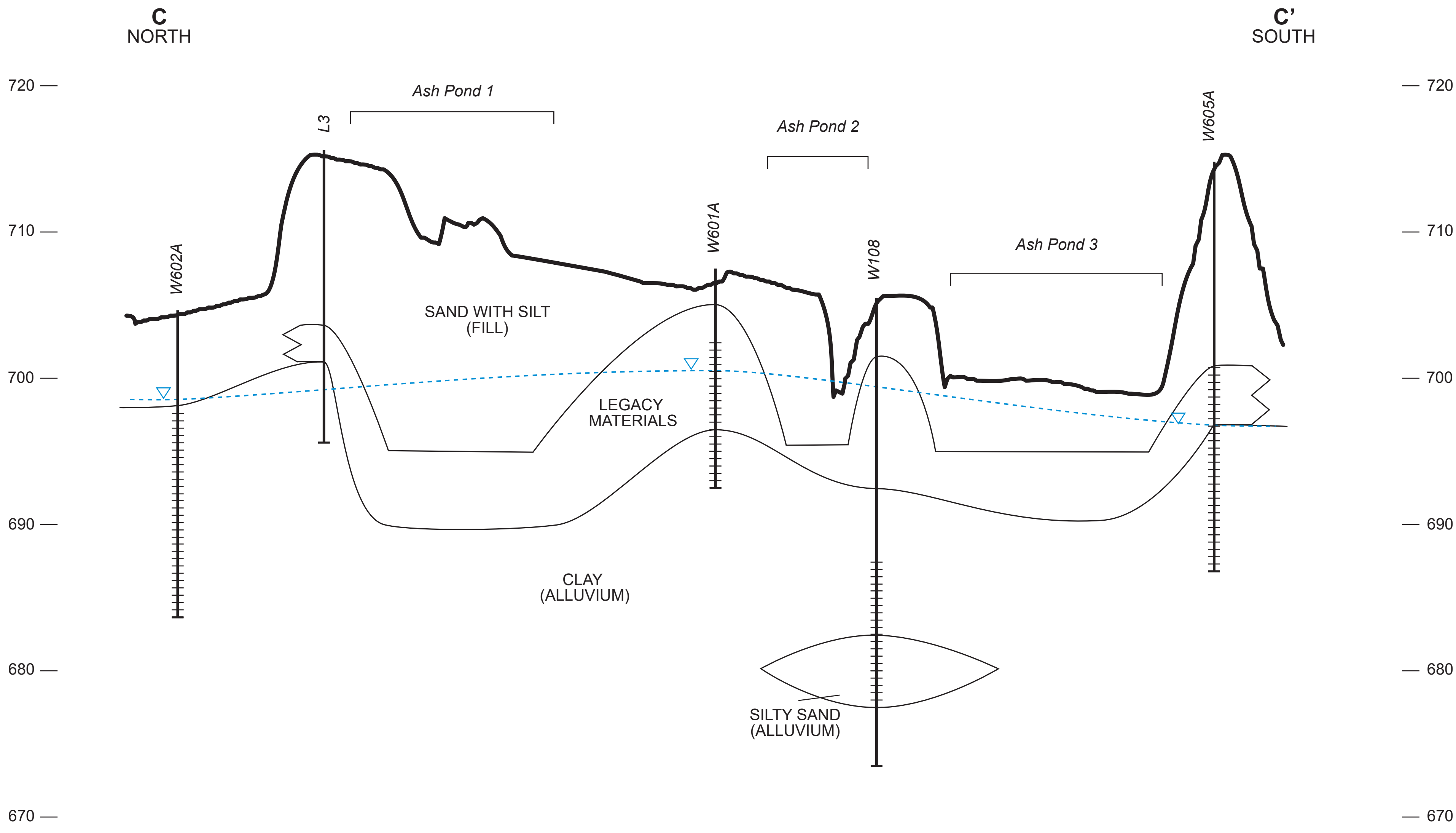
Soil Boring/Piezometer

0 100

Approximate Horizontal Scale in Feet
10X Vertical Exaggeration

Figure 5

GEOLOGIC CROSS SECTION B-B'
Black Dog Generating Plant
NSPM
Burnsville, Minnesota



LEGEND

Geologic Contact

Inferred Geologic Contact

Approximate Water Table (December 2017)

Monitoring Well Screen

Soil Boring/Piezometer

0 100

Approximate Horizontal Scale in Feet
10X Vertical Exaggeration

BARR

Figure 6

GEOLOGIC CROSS SECTION C-C'
Black Dog Generating Plant
NSPM
Burnsville, Minnesota

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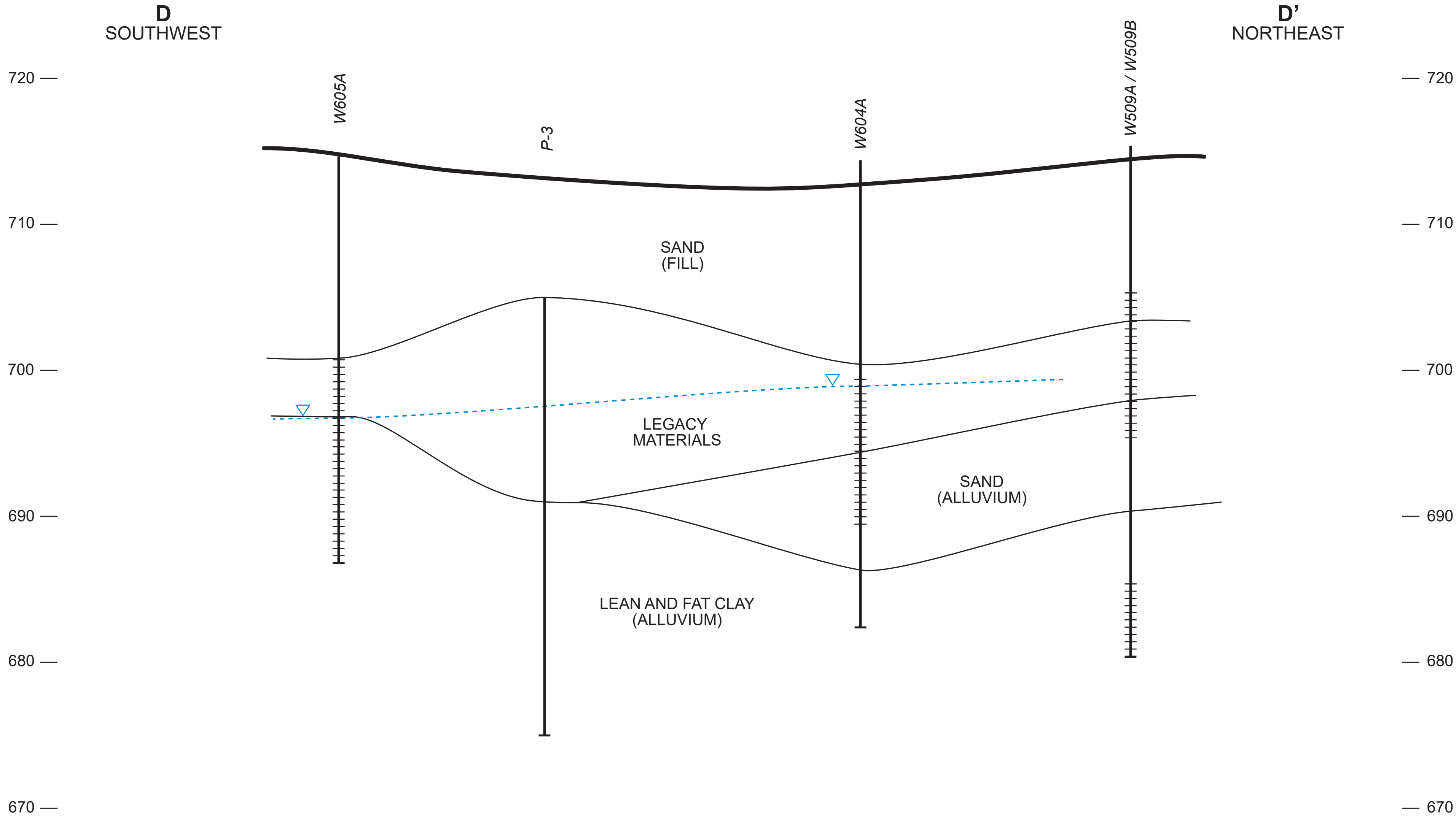

LEGEND

Geologic Contact

Inferred Geologic Contact

Approximate Water Table (December 2017)

Monitoring Well Screen

Soil Boring/Piezometer

0 100

Approximate Horizontal Scale in Feet
10X Vertical Exaggeration

BARR

Figure 7

GEOLOGIC CROSS SECTION D-D'
Black Dog Generating Plant
NSPM
Burnsville, Minnesota

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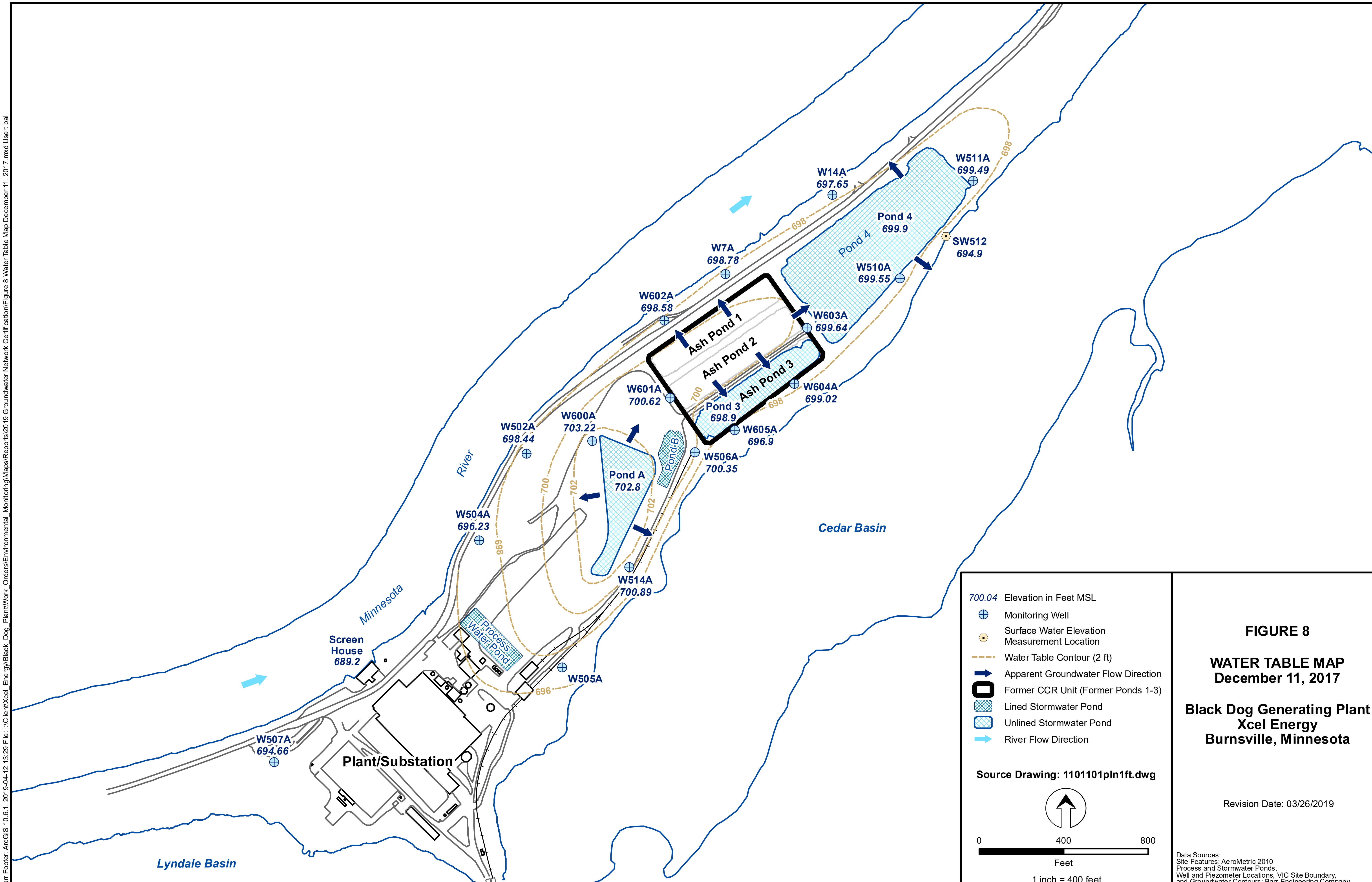
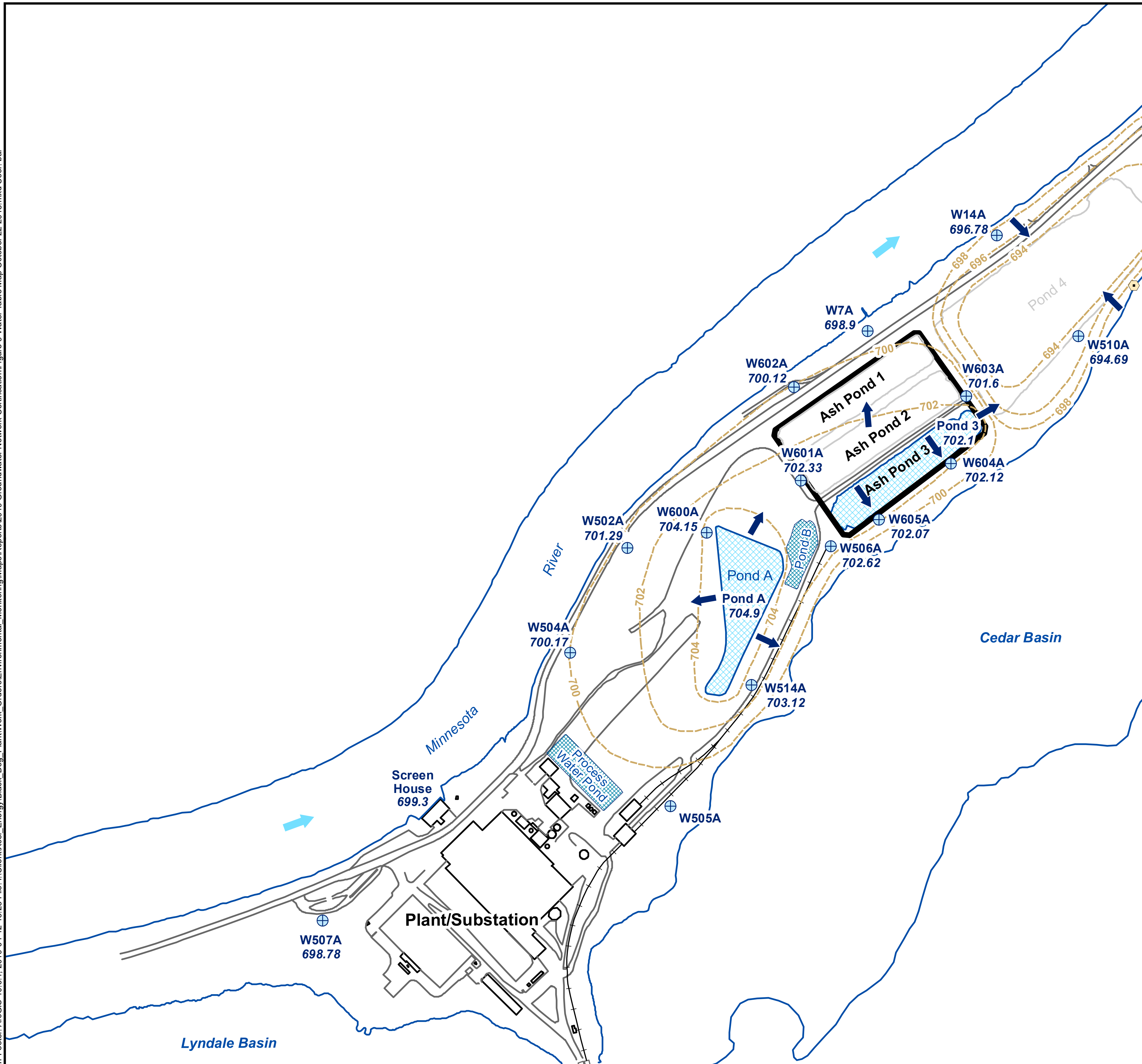


FIGURE 8

WATER TABLE MAP
December 11, 2017

Black Dog Generating Plant
Xcel Energy
Burnsville, Minnesota

Revision Date: 03/26/2019



700.04 Elevation in Feet MSL
Monitoring Well
Surface Water Elevation Measurement Location
Water Table Contour (2 ft)
Apparent Groundwater Flow Direction
Former CCR Unit (Former Ponds 1-3)
Lined Stormwater Pond
Unlined Stormwater Pond
River Flow Direction

Source Drawing: 1101101pln1ft.dwg

0 400 800
Feet
1 inch = 400 feet

FIGURE 9

WATER TABLE MAP
October 22, 2018

Black Dog Generating Plant
Xcel Energy
Burnsville, Minnesota

Revision Date: 03/26/2019

Data Sources:
Site Features: AeroMetric 2010
Process and Stormwater Ponds,
Well and Piezometer Locations, VIC Site Boundary,
and Groundwater Contours: Barr Engineering Company